TO 31W4-4-300-1
(ARMY) TM 11-5815-606-34
NAVELEX 0969-LP-188-0010
MANUAL 359
ISSUE 3

TEMPEST model 40 SHOP MANUAL

Including Manual 355 Model 40 Printer

THIS PUBLICATION REPLACES TO 31W4-4-300-1 DATED 1 DECEMBER 1976.

This copy is a reprint which includes current pages from Changes 1.

Teletype Corporation

1 NOVEMBER 1982

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C1

Change
No. 1

DEPARTMENTS OF THE ARMY.
THE NAVY, AND THE AIR- FORCE
WASHINGTON, DC, 19 *September 1984*

Direct Support, and General Support
Maintenance 359m Shop Manual for
MODEL 40 DATA TERMINAL (AN/GGR-3, GGC-55,
GGC-57, GGC-59, GGC-62) (NSN 5815-01-016-4662,
5815-01-009-4322, 5815-01-009-4321, NSN 5815-01-015-0838,
5815-01-071-8446)

TM 11-5815-606-34, 1 November 1982, is changed as follows:
1. The attached pages were inadvertently omitted from copies of the subject publication recently distributed.
2. Insert pages as indicated below:

Remove	*Insert*
None	9-1 through 9-45/9(9-46 Blank)
None	10-1 through 10-15/(10-16 Blank)

3. File this change sheet in .he front of publication.

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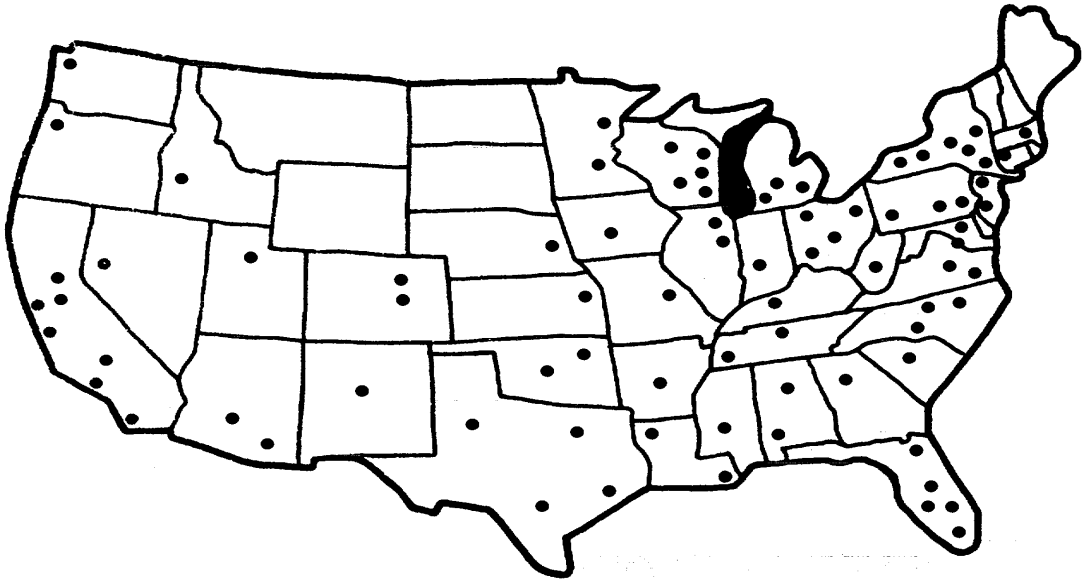

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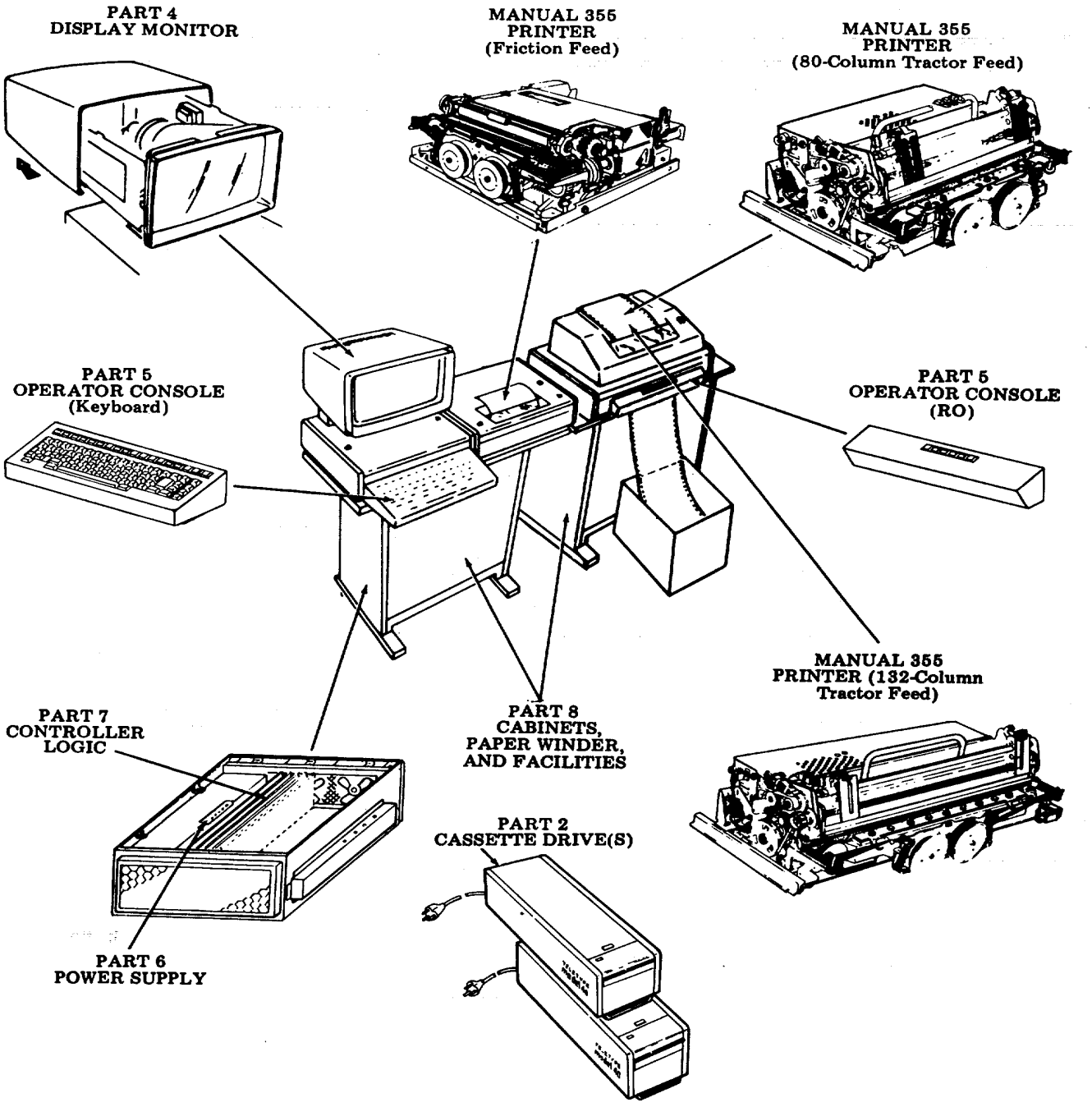
TELETYPE CORPORATION
Skokie, Illinois, U. S. A.

TEIPEST M40 SHOP MANUAL 359
Issue 3, November 1982

INDEX

PART 1 -- INTRODUCTION
A. GENERAL

This Shop Manual is structured to facilitate maintenance and/or repair of Teletype Corporation Tempest Model 40 Sets and Components. A KDP-RO Set arrangement detailing the components covered in Parts 2 through 8 is shown here. Part 9 covers various set arrangements. Part 10 contains a master numerical component parts list.



A. GENERAL (Cont)

In addition to a knowledge of supplementary information and comprehensive training on Model 40 equipment, it will be advantageous to the Shop Manual user to become thoroughly familiar with the contents before attempting maintenance or repair. The Shop Manual should also be consulted when planning a shop in order to organize a most convenient work place, and to assemble the necessary tools, test equipment, cleaning and packing materials, and spare parts stock.

Each part numbered 2 through 9 is prefaced with an index containing a detailed listing of section contents as follows:

A. GENERAL: Provides a brief description of equipment covered in the section and a list of tools and test equipment required for performing all operations contained in the section.

B. SHOP PROCEDURES: Contains general information relative to repair of equipment covered in the section. Also includes specific information regarding cleaning and refinishing, conversions from one arrangement to another, and approved methods and materials for packing.

C. TESTING: Waveform illustrations, diagrams, adjustment and troubleshooting section references are provided as supplementary aids to the testing procedural text.

D. TROUBLESHOOTING: Step-by-step analysis of encountered troubles are supported by charts, diagrams, and adjustment section references. In most cases, the diagnostic steps should lead the repair person to a particular defective component or maladjustment.

When troubleshooting the controller, the additional diagrams and circuit descriptions contained in the appropriate Wiring Diagram Package (WDP), as listed on Pages 1-3 and 1-4, B. REFERENCE MATERIAL, will be useful.

E. ADJUSTMENTS AND LUBRICATION: Contains requirements, instructions, and descriptive views for each adjustment and lubrication point of the subject component.

On equipment having interrelated adjustments, particularly the Model 40 Printer, a table is included listing any related adjustments for a specific adjustment. The related adjustment table should be followed to insure proper equipment functioning.

F. DISASSEMBLY/REASSEMBLY AND PARTS: Provides detailed procedures for removing and replacing various subassemblies and individual piece parts of components covered in Parts 2 through 9. The sequenced textual instructions are directly supported by part numbered illustrations. In addition, a complete parts listing is included that contains a brief description of each part along with the page numbers on which the part is illustrated.

Part 10, Sets, contains additional information and illustractions relevant to interconnecting and placement of cables.

Part 11, Master Component Parts List, contains a master numerical components parts list, excluding general mounting hardware which are listed in the component parts section for each component.

B. REFERENCE MATERIAL

TECHNICAL DATA

Power Source Requirements

115 Vac +10% 50/60 hertz connection to most sets is made by using a terminal block (No. 10 screws) in the interface assembly of the set. Some sets provide a power cord equipped with a three prong plug. Refer to Part 10 for set arrangements.

Note: When operating from a 50 cycle power source, a pulley change is required on the printer, the cassette drives and the flexible diskette drives.

Depending on set configuration up to six ac outlets with ground connection (3 prong) is required. Each cassette drive requires an outlet. On certain set configurations, the controller pedestal requires an outlet. The paper winder (if supplied) requires an outlet.

DANGER: SETS MUST BE PROPERLY GROUNDED TO PREVENT SHOCK HAZARD.

Power Consumption and Heat Dissipation

			Approx Current Draw
KDP	500 Watts	1720 BTU/Hr	4.5 Amps
KD	365 Watts	1250 BTU/Hr	3.35 Amps
ROP	260 Watts	885 BTU/Hr	3.15 Amps
KP	330 Watts	1130 BTU/Hr	3.65 Amps
CD (each)	150 Watts	367 BTU/Hr	1.0 Amps

Environmental Restrictions

Environmental conditions should be maintained within the following limits to avoid damage and provide proper operation.

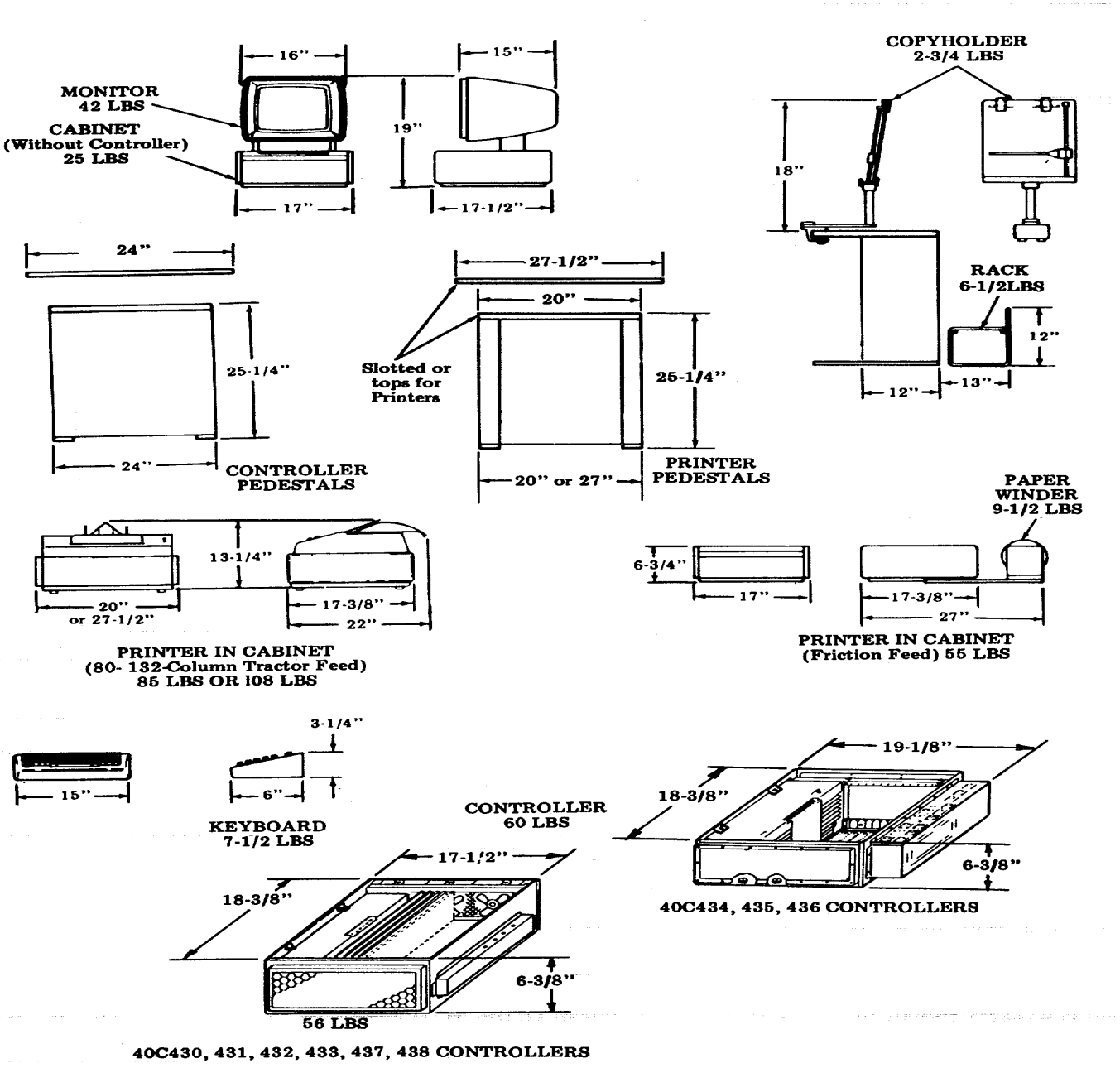
	Storage or Transportation		Operation	
Environmental Condition	Min	Max	Min	Max
Temperature	-40°F	+150°F	+40°F	+110°F
Humidity	2%	95%	2%	95%
Altitude	Sea Level	50,000 ft	Sea Level	10,000 ft

Note: As with any device that can be damaged by water, sudden temperature changes that can cause condensation should be avoided.

Example: A device stored in subzero temperatures will collect frost when unpacked in a warm humid room.

B. REFERENCE MATERIAL (Contd)

COMPONENT SPACE REQUIREMENTS AND WEIGHTS



SUPPLEMENTARY MANUALS

The following manuals provide important information concerning operation, installation and field servicing of Model 40 Sets and Components. The manuals are broken down into two categories How to Operate and Installation and Service Manuals. Listed below are manuals applicable to the Tempest Model 40 Set Configuration and the sets that they cover. These manuals may be ordered from Teletype Corporation by the titles shown.

How To Operate Manuals

The "How to Operate" manuals are oriented toward the operator. The operating function and features of the various Tempest Model 40 Set Configurations and their access or control by the operator are presented in an easy to understand now technical format.

Manual	Title	Equipment Covered
354	How to Operate Tempest Model 40	Set Configurations Containing the 40C430 to 40C432 Controllers (40/8A)
362	How to Operate Tempest Model 40 ASR	Set Configurations Containing the 4OC433 Controllers (40/8A)
370	How to Operate Tempest Model 40 Dual ASR	Set Configurations Containing the 40C434/ACW/063 Controller
405	How to Operate Tempest Model 40/8B ASR	Set Configurations Containing the 40435/AEE/091 Controller (40/8B)
413	How to Operate Tempest Model 40/8C	Set Configuration Containing the 40C435
445	How to Operate Tempest Model 40/8A Ruggedized Rack Mounted ASR	Set Configuration Containing the 40C430 to 40C432 Controllers (40/8A)
446	How to Operate Tempest Model 40/8B and 40/8B II KDP with Cassette Drives	Sets Configurations Containing the 40C437/AEE/091 (40/8B) 40C437/AEL/106 (40/8B II)
491	How to Operate Tempest Model 40/8A ROP-KP-KP3	Set Configurations Containing the 40C432/AEM/103, 40C433/AEN/104, 40C438/AEP/105 Controllers
526 J	How to Operate Tempest Model 40/8B I KDP with Cassette Drives	Set Configuration Containing the 40C437/AEL/106 Controller
559	How to Operate Tempest Model 40/8B II KDP with Cassette Drives	Set Configuration Containing the 40C437/AEL/107 Controller

B. REFERENCE MATERIAL (Contd)

INSTALLATION AND SERVICE MANUALS

The "Installation and Service Manuals" provide in depth information required for set or station assembly, installation and for field troubleshooting and maintenance. The subject includes?

- Installation
- Operational Checkout
- Troubleshooting
- Adjustments
- Component Access
- Routine Maintenance

The "Installation Manuals" provide information required for assembly, optioning and installation of set or station. The "Service Manuals" provide in depth information for operational checkout and in field troubleshooting and maintenance.

Manual	Title	Equipment Covered
353	Tempest Model 40 Instal-lation and Servicing Manual	Set Configurations Containing the 40C430 to 40C432 Controllers (40/8A)
358	Tempest Model 40 132 Column Printer Set Installation and Servicing Manual	Tempest 132 Column ROP Sets (40/8A)
363	Tempest Model 40 ASR Instal-lation and Servicing Manual	Set Configurations Containing the 40C433 Controllers
371	Tempest Model 40 Dual ASR Installation and Servicing Manual	Set Configuration Containing the 40C434/ACW/063 Controller
404	Tempest Model 4()/8B ASR With Cassetes Installation Manual	Set Configuration Containing the 40C435/AEE/091 Controller (40/8B)
408	Tempest Model 40/8B ASR With Cassettes Servicing Manual	Set Configurations Containing the 40C435/AEE/091 Controller (40/8B)
414	Tempest Model 40 Synchronous 40/8C Installation Manual	Set Configurations Containing the 40C436/ADK/075 40C436/ADIU/095 40C436/ADN/094 40C436/ADD/093 40C436/ADA/092 Controllers (40/8C)

Manual	Title	Equipment Covered
415	Tempest Model 40 Synchronous 40/8C Service Manual	Set Configuration Containing the 40C436/ADK/075 40C436/ADU/095 40C436/ADN/094 40C436/ADD/093 40C436/ADA/092 Controllers (40/8C)
447	Ruggedized Rack Mounted Tempest Model 40/8A Installation Manual	Set Configuration Containing the 40C430 to 40C432 Controllers (40/8A
448	Ruggedized Rack Mounted Tempest Model 40/8A Service Manual	Same as Manual 447
449	Ruggedized Rack Mounted Tempest Model 40/8B and 8BII ASR With Cassette Drives Installation Manual	Set Configuration Containing the 40C437/AEE/091 (40/8B) 40C437/AEL/107 Controllers (40/8BII)
450	Ruggedized Rack Mount Tempest Model 40/8B and 8BII ASR With Cassette Drives Service Manual	Same as Manual 449
492	Tempest Model 40/8A ROP-KP-KP3 Installation Manual	Set Configuration Containing the 40C431/AEM/103 40C432/AEN/104 40C438/AEP/105 Controllers
493	Tempest Model 40/8A ROP-KP-KP3 Service Manual	Same as Manual 493
527	Tempest Model 40/8BI/KDP also Tempest Model 40/8B/KDP With Cassette Drives and 403142 Modification Kit	Set Configuration Containing the 40C437/AEL/106 Controller
528	Tempest Model 40/8BI/KDP also Tempest Model 40/8B/KDP With Cassette Drives and 403142 Modification Kit	Same as Manual 527
560	Tempest Model 40/8BII/KDP With Cassette Drives Installation Manual	Set Configurations Containing 40C437/AEL/107 Controller (40/8BII)
561	Tempest Model 40/8BII/KDP With Cassette Drives Service Manual	Same as Manual 560

B. REFERENCE MATERIAL (Contd)

FACTORY AUTHORIZED SERVICE

Teletype Corporation maintains a nationwide Product Service Organization to serve users of Teletype Corporation equipment. Refer to Pages 1-10 and 1-11 for details of services offered and a listing of Service Center locations.

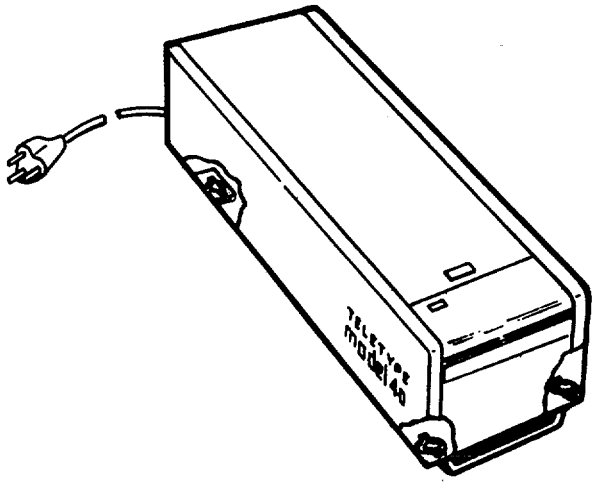
WIRING DIAGRAM PACKAGE (WDP) LISTING

The following WDPs covering the component are supplied with the set.

WDP0435	40P 20-Column Friction Feed Printer
WDP0453	40CAB202/RA, RO 80-Column Friction Feed Printer Cabinet
WDP0454	40CAB352/RA, RO 80-Column Tractor Feed Printer Cabinet
WDP0456	40CAB354/RA 132-Column Tractor Feed Printer Cabinet
WDP0457	40CAB903 Pedestals
WDP0458	40K103 Keyboards
WDP0460	40MN202/RA Display
WDP0461	40C430/ZZZ/000 Controller Without Cards
WDP0462	40P201 & 40P202/ZZ 132-Column Tractor Feed Printer Cabinet
WDP0464	40C431/ZZZ/000 Controller Without Cards
WDP0465	40C432/ZZZ/000 Controller Without Cards
WDP0468	40CD101 Cassette Drive (Non-Tempest)
WDP0469	40C430/AAT/017 Controller With Cards RCMP
WDP0470	40C431/ABE/026 & 40C432/ABF/027 Controllers 40/8A
WDP0471	40C430/ABD/025 Controller With Cards 40/8A
WDP0475	4016AB/001/AB Cassette Drive Set (Non-Tempest)
WDP0476	40C433/ZZZ/OOO Controller Without Cards
WDP0478	40C433/ACS/059 Controller With Cards Samson
WDP0479	40P154/ZZ 80-Column Tractor Feed Printer
WDP0484	40C434/ZZZ/000 Controller Without Cards
WDP0485	40C434/ACW/063 Controller With Cards TERP I
WDP0488	40C435/ZZZ/000 Controller Without Cards
WDP0489	40C435/AEB/088 Controller With Cards Samson
WDP0495	40C435/AEE/091 & 40C437/AEE/091 Controller With Cards 40/8B
WDPO501	4016RA/001/RA & 4016RB/001/RA Cassette Drives
WDP0506 &	
WDP0507	M40 Paper Tape 5 & 8 Level
WDP0519	40C436/ADK/075 Controller With Cards 40/8C SCC
WDP0520	40C436/ADU/095 Controller With Cards 40/8C DCC-A
WDP0521	40C436/ADN/094 Controller With Cards 40/8C DCC-B
WDP0522	40C436/ADD/093 Controller With Cards 40/8C MCC-A
WDP0523	40C436/ADA/092.Controller With Cards 40/8C MCC-B
WDP0524	40C436/ZZZ/000 Controller With Cards
WDP0525	40K108 Keyboards
WDP0542	40C435/AEE/099 Controller With Cards 40/8D
WDP0546	408828 Modification Kit- 40/8B to 40/8D
WDPO547	40MlO3/BC Memory System
WDP0548	40M803/BC Memory System
WDP0551	40C434/AEK/101 Controller With Cards TERP II
WDP0554	40C437/ZZZ/000 Controller Without Cards
WDP0572	40K109/CAA Keyboard (40/7)

WDP0573		Terminal With 40C405 Controller (40/7)
WDP0581		40C437/AEL/106 Controller With Cards 40/8B1
WDP0582		40C431/AEM/103 Controller With Cards 40/8AI KP
WDP0583		40C432/AEN/104 Controller With Cards 40/8AI ROP
WDP0584	&	
WDP0585		40C438/AEP/105 Controller With Cards 40/8AI KP3
WDP0587		413330 Modification Kit Clock-Phase Correction
WDP0592		40C437/AEL/107 Controller With Cards 40/8BII

PART 2 -- TEMPEST MODEL 40 CASSETTE DRIVE



INDEX

PART 2 -- TEMPEST MDDEL 40 CASSETTE DRIVE (Contd)

INDEX (Contd) PAGE

PART 2 -- TEMPEST MODEL 40 CASSETTE DRIVE
A. GENERAL

1. DESCRIPTION

The function of the Tempest Model 40 Cassette Drive is to record (store) and retrieve data on a magnetic tape media. The cassette drive accomodates a "Phillips" type cassette which conforms with the exception of tape length to the proposed ANSI standard for digital cassettes for the purpose of storing data. The cassette drive is designed to be used with Model 40 equipment containing a C400 or equivalent controller. Transmission of data and control signals between the cassette drive and the controller conform to the Teletype Standard Serial Interface (SSI), system. The cassette drive has no local controls and functions only in response to commands from the associated controller.

Tape movement is accomplished by means of a synchronous motor and a reel to reel drive arrangement wherein the drive (forward) and rewind (reverse) shafts are controlled by electromechanical clutches and electromagnetic brakes.

The cassette drive is designed to operate as a block device. Operation is synchronous within a block and asynchronous by block. As such, transmission to or from the cassette drive may be selected as required by the controller, but once the transmission has started the entire block must be transmitted. Tempest applications of the cassette drive utilize a 256 SSI word (512 ASCII characters) block size. The cassette storage capacity with the 256 SSI word block format is 500 blocks or 256,000 characters.

The cassette drive contains a single control logic circuit card which contains all logic required to control the cassette drive. The control logic card of the cassette drive receives commands from the controller and translates them into the appropriate signals to control the clutches, brakes and the read/write head. The control logic card interprets the input from cassette-in-place and write inhibit switches and the BOT photo sensor and translates them into the proper signals to the controller. It also provides drive for the BOT sensor lamp and the status (Run-Stop) lamp.

The cassette drive utilizes a single two channel read/write magnetic tape head to record and read data on the magnetic tape. Both channels are used during either the read or write operations.

The cassette drive contains a power supply to supply the voltage and current required by the cassette drive control logic card. The ac power to the cassette drive motor and power supply is controlled by an attendant accessible switch.

Refer to WDP 0501 for a general circuit description with block diagram and for further details of the major component functions.

The cassette drive is designed for operation with a supply voltage of 115 V ac ±10 percent 50 or 60 hertz ±5 percent. Operating power is 105 watts and heat generation is 367 BTU per hour. When operating on 50 hertz power, a pulley change is required at the cassette drive motor.

A. GENERAL (Contd)

2. TOOLS, TEST EQUIPMENT AND MISCELLANEOUS

Tools

The tools listed below are supplementary to common types such as pliers, screwdrivers, wrenches, etc and may be procured locally or ordered from Teletype Corporation.

NOTE: When ordering parts, prefix each part number with the letters "TP" unless otherwise specified.

Description	Part No.
• Pull Spring Hook	75765
• Nut Driver Wrench 1/4 Inch	89954
• Nut Driver Wrench 5/16 Inch	89955
• Nut Driver Wrench 3/16 Inch	125752
• Terminal Extractor	182697
• Allen Wrench 0.050 Inch	104457
• Allen Wrench 0.078 Inch	110271
• Ruler 6 inch	95960
• Gauge (Brake and Clutch Gap)	406130
• Wrench, Drive (402274/402275 Drive Hubs)	406131
• Soldering Iron, Weller Model W-MCP-750 With MP2C Tip, or Equivalent (Procure Locally)	
• Desoldering Tool, EDSYN Model MMS005 Soldapullt ®, or Equivalent (Procure Locally)	

Test Equipment

The following equipment or equivalent is required for testing, troubleshooting and adjusting the cassette drive.

- Volt-Ohm-Millimeter, Triplett Model 630 APL
- Digital Multimeter, Fluke Model 8100A
- Oscilloscope, Tektronix Model 7904 E/W:
  - 2 -- 7A16A Single Trace Amplifiers
  - 1 -- 7B70 Time Base Unit
  - 2 -- RX10 Circuit Probes
- High Voltage DC Breakdown Tester, Slaughter Company Model 108-2.5MW
- Tempest Model 40 KDP Set E/W 40C433/ACS/059
- Cassette Drive Program

  The test program used with a C400 controller provides a 38 step program for recording, reading and verifying approximately ten million characters on a block by block basis.

The Cassette Drive Test Program is available from:

Teletype Custom Systems Division
5555 Touhy Avenue
Skokie, Illinois 60677
312-982-2000

- Cassette Drive Test Program - CP10.006
- Modified 410504 Circuit Card With Cassette Tape
- Loader EPROMS - CP10.006.010

Miscellaneous

Grease -- 145867 (4 ounce can) or 143484 (1 pound can)
Oil -- 88970 (1 quart can)
Degreaser (Freon TF) -- 337449 (6 ounce aerosol can)
Tape Head Cleaner -- 337401 (6 ounce aerosol can)

B. SHOP PROCEDURES

1. GENERAL

This section details the cleaning, refinishing and inspection procedures to be followed prior to testing and troubleshooting the cassette drive. In many cases, careful inspection will save later troubleshooting by revealing broken or loose connections, damaged components, possible short circuits, etc.

Refer to Page 114 F. DISASSEMBLY/REASSEMBLY AND PARTS whenever detailed information on removing cassette drive components is required.

The packing materials detailed in this section are designed for protection against damage from rough handling in shipping.

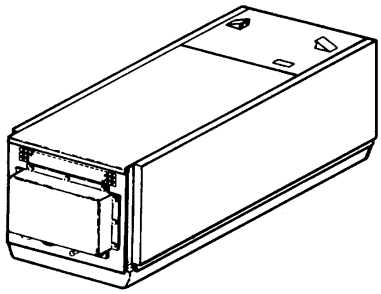
2. CLEANING

Immersion type cleaning is NOT recommended for the cassette drive.

CAUTION: AVOID THE USE OF HARSH OR ABRASIVE CLEANING AGENTS OR SOLVENTS WHICH COULD SCRATCH OR DAMAGE THE EXTERNAL SURFACES OF THE CASSETTE DRIVE CABINET.

Exterior

Remove upper cabinet assembly.



40CAB102RA
CABINET

Clean all surfaces as follows:

(1) Wipe with soft cloth moistened with water and wrung almost dry.

(2) When necessary a very weak solution of mild detergent may be used to remove stubborn dirt, grease, or finger prints.

(3) Vacuum louvers in rear of cabinet to remove all dust.

B. SHOP PROCEDURES (Contd)

2. Cleaning (Contd)

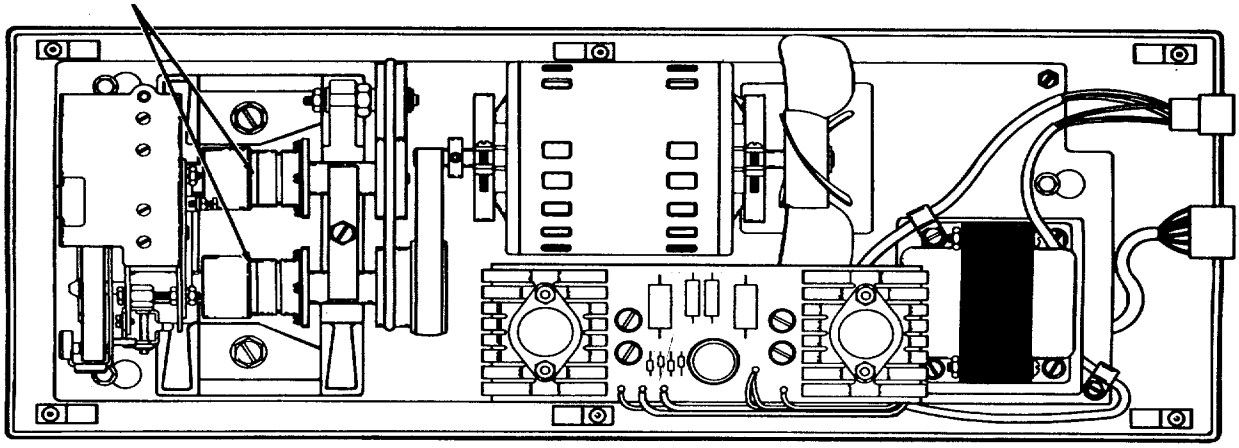
Interior

Remove cassette if present from drive mechanism before cleaning is started.

(1) Clean drive mechanism by using a vacuum, brushing or wiping away dust and foreign material.

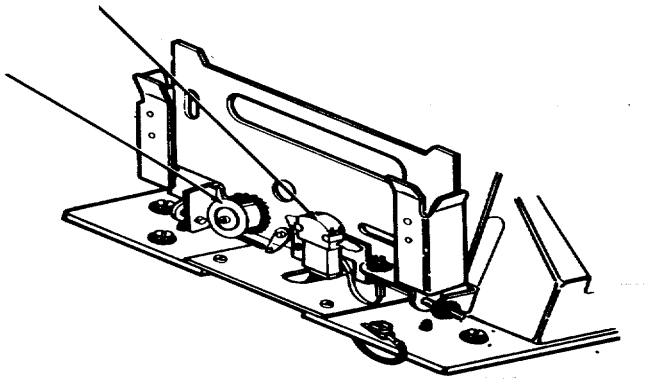
CAUTION: EXTREME CARE SHOULD BE EXERCISED WHEN CLEANING IN THE AREA OF THE TAPE READ/WRITE HEAD TO PREVENT DAMAGE TO THE HEAD PARTICULARLY SCRATCHES OR DENTS ON THE TAPE HEAD POLE PIECES.

(2) Clean mating surfaces of the armature and rotor faces; place a small piece of paper saturated with 337401 recording head cleaner between the armature and rotor faces of each clutch assembly; apply pressure to each face; withdraw paper from between the armature and rotor. Repeat for each pole face until the withdrawn paper is clean.



(3) Using 337401 recording head cleaner and a cotton swab, clean the tape head, hub drivers and cassette locating pins.

(4) Check 403238 tape cleaner, if dirty replace.

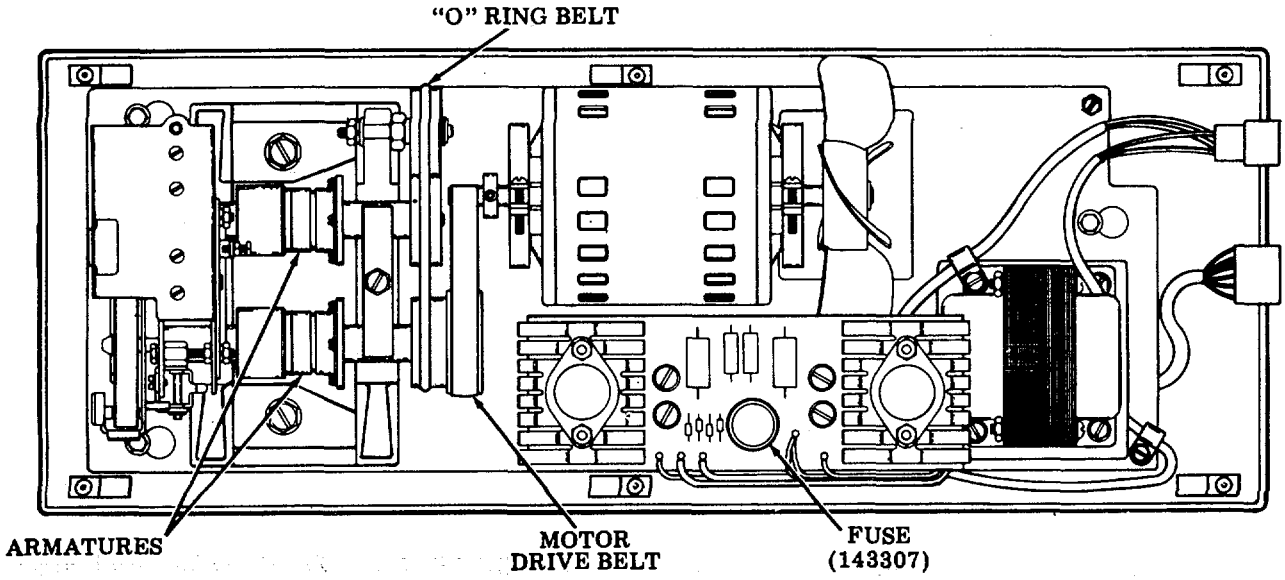


3. INSPECTION

Interior

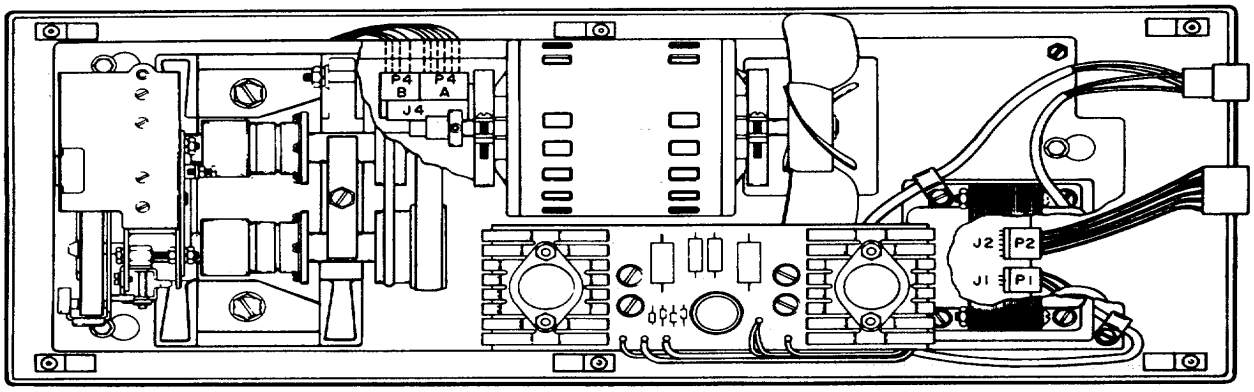
a. Check that the motor drive belt and the "O" ring are present and free from cracks and are not frayed.

b. Check that all three pullies and both armatures turn when motor is turned by hand at fan end. (Turn clockwise as viewed from fan end.)



c. Check that power supply fuse is present, not blown and correct value (0.6 amp SL-BL).

d. Check that plug P1, P2, P4A and P4B are fully seated in their respective connectors on the 410764 control logic circuit card. Connectors are under the cassette drive base plate.



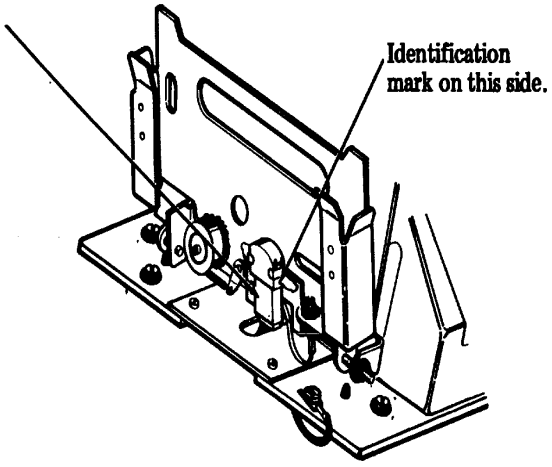
e. Remove cassette if present.

B. SHOP PROCEDURES (Contd)

3. INSPECTION (Contd)

Interior (Contd)

f. Check that the tape load connector is fully seated in the tape head and is orientated in the correct direction.



4. MARKING AND PACKING

Packing

Factory-type packing may be duplicated by ordering material shown below and applying as follows. PK designated items should be ordered from Teletype Corporation.

Qty.	Materials Required
1	10774PK Corrugated Carton
1	9861PK Corrugated Carton
8	28278PK Corner Details
1	28218PK Detail A
1	28218PK Detail B
1	23457PK Plastic Bag
2	27643PK Labels
-	21719PK Tape (as required)
-	21632PK Tape (as required)
-	21480PK Tape (as required)

(1) Carefully turn set upside down. Apply a strip of 21480PK tape on either side of unit base. Each tape strip must overlap both the base and cover side plate, as shown. Turn set right side up.

(2) Apply two bands of 21632PK tape around set as shown. Apply a third strip of tape across top and front of set to hold lid down.

(3) Place set in a 23457PK plastic bag. Leave line cord extended outside of bag.

(4) Position a 28218PK Detail A on right side of unit and a 28218PK Detail B on left side of unit as shown. Position line cord on top of unit.

(5) Form a 9861PK carton. Close and seal bottom flaps with a strip of 21719PK tape applied at the center seam and extending at least three inches up the sides of the carton.

(6) Place set and details in the carton. Close and seal top flaps of carton as outlined in Step 5. Apply a 27643PK label to upper left hand portion of top of carton.

(7) Form a 10774PK carton. Close and seal bottom of flaps with three strips of 21719PK tape. Apply tape to center and end seams.

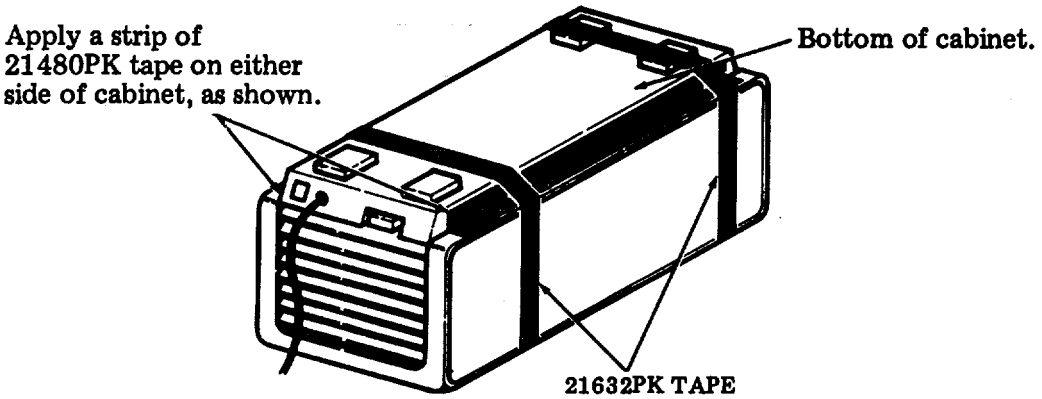
(8) Secure a 28278PK detail to each of the four bottom corners of the inner carton by means of the pressure sensitive tape on each detail.

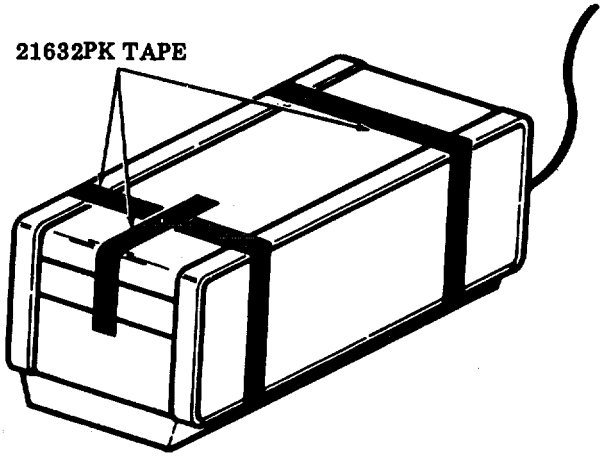
(9) Place carton and details in the outer carton.

(10) Position a 28278PK detail on each of the four top corners of the inner carton.

(11) Close and seal top flaps of carton and seal as indicated in Step 7.

(12) Moisten and apply a 27643PK label to upper left hand portion of top of carton.

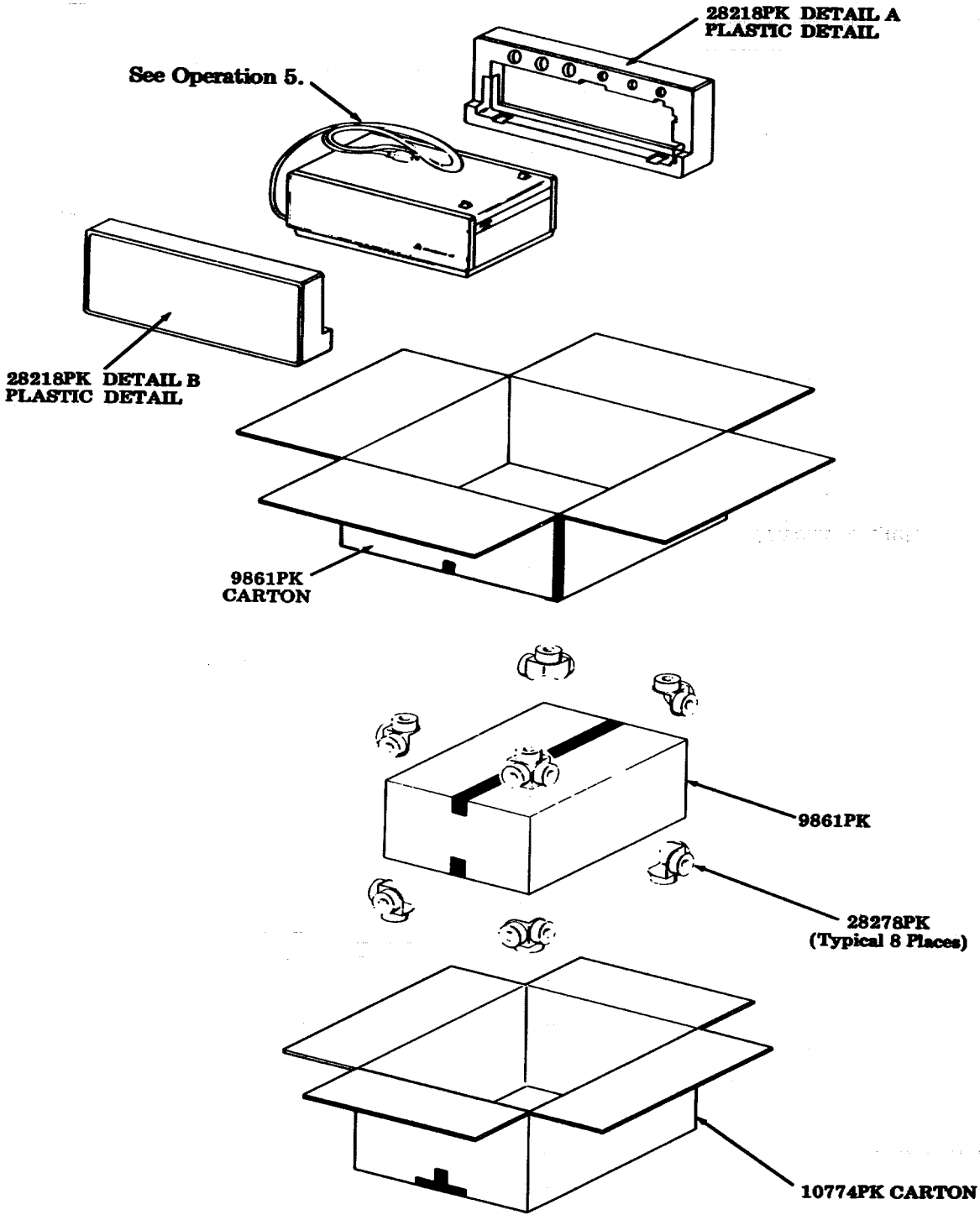




B. SHOP PROCEDURES (Contd)

4. MARKING AND PACKING (Contd)

Packing (Contd)



C. TESTING

1. GENERAL

Testing of the Tempest Model 40 Cassette Drive Units is accomplished with the cassette drive(s) connected as part of a Tempest C400 Station. The test is performed in two stages:

(1) Off-line/on-line checkout,
(2) Functional test using the Teletype Custom Systems Division CP10.006 Cassette Test Program.

Each test procedure should be performed from start to finish with no omissions.

Whenever the cassette drive fails a particular test, refer to Page 2-40, D. TROUBLESHOOTING and/or Page 2-93, E. ADJUSTMENTS AND LUBRICATION to locate the trouble. After the trouble has been located and corrected, repeat the test that disclosed the trouble and if found OK, resume testing from that point.

NOTE: When ordering replaceable parts or components, unless otherwise specified, prefix each part number with the letters "TP' (ie, TP410055).

An operational checkout should be performed upon installation or on trouble calls.

If the indicated response is not obtained in any step of a checkout procedure, repeat the step to make sure that the procedure has been performed correctly. If the results are still unsatisfactory, perform the indicated trouble analysis.

Always perform the checkout in the order given in the chart,

The trouble analysis steps are based on satisfactory results of all previous steps.

2. PRELIMINARY CHECKS

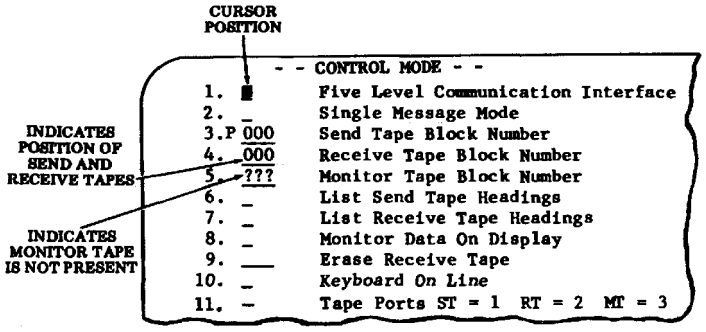
Before turning on any equipment, check the following:

a. Are all circuit cards and cable connectors fully seated?
b. Are all fuses in place?
c. Are all cabinet lids and pedestal doors closed?
d. Do all printers have paper and ribbon properly installed?
e. Is the station connected to a properly grounded ac service?
f. Have the station options been installed and are they properly recorded?
g. Prior to applying ac power to the controller, insure that power is on to the tape cassette drives and the cassette is in the unlatched (cassettes disengaged) position.
h. Insure that all tape cassettes are properly formatted, each tape cassette must be placed in the receive tape cassette drive and the erase function performed. The erase function must be performed prior to the off-line checkout of the cassette drive. Refer to How to Operate Manual 405, Page 19 for procedure to erase cassettes.

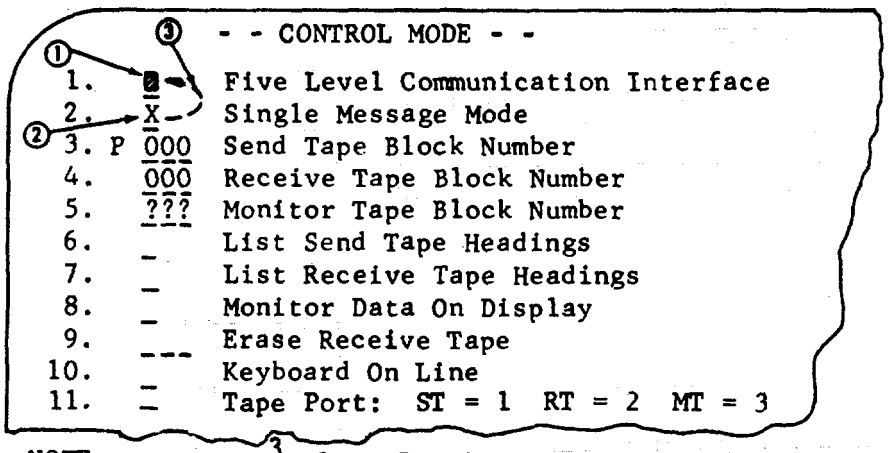
C. TESTING (Contd)

3. OFF-LINE CHECKOUT PROCEDURE

NOTE: Immediately when power is turned on, various LED displays will be lighted on the opcon depending upon station type and applicable controller. See appropriate service manual for operation of particular stations.

STEP	PROCEDURE	RESULTS
1	Depress CNTRL MODE keytop.  Number indicates cassette drive assigned for that function. ST = Send Tape RT = Receive Tape MT = Monitor Tape 0 will appear if no cassette drive is available for that function.	CNTRL MDE lamp lights and the following message appears on the display.
	LOCAL CHECKOUT KDP[2] AND KDPM[3]	
2	Using cursor positioning key (1)position cursor to the first underline to the right of 2. (2) Type an upper case X.	Cursor moves under direction of cursor key. X appears, cursor moves one space to the right.

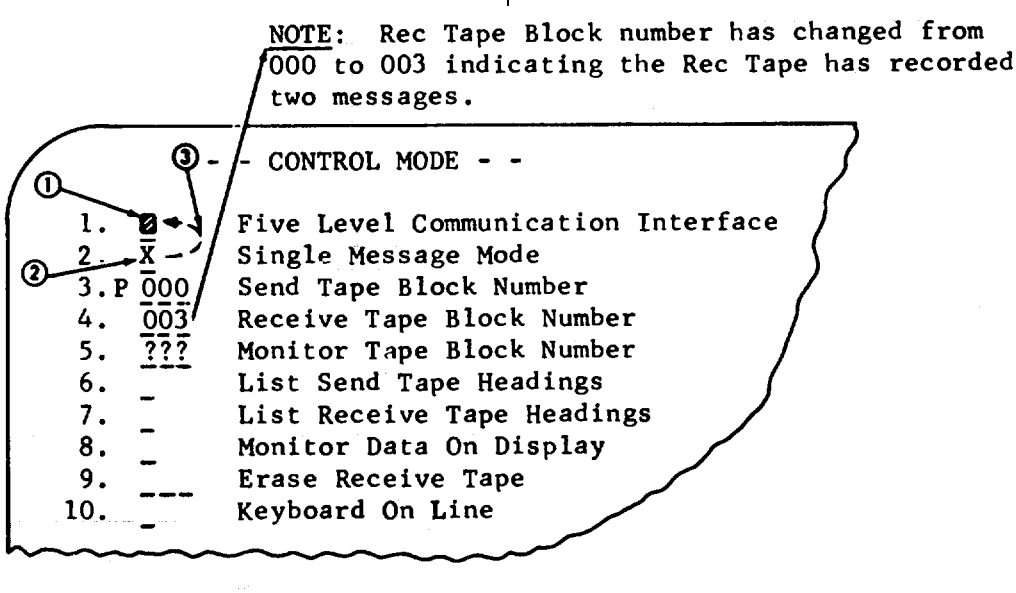
STEP	PROCEDURE	RESULTS
2 (Contd)	Depress LINE FEED key.	X remains, cursor returns to its original position.



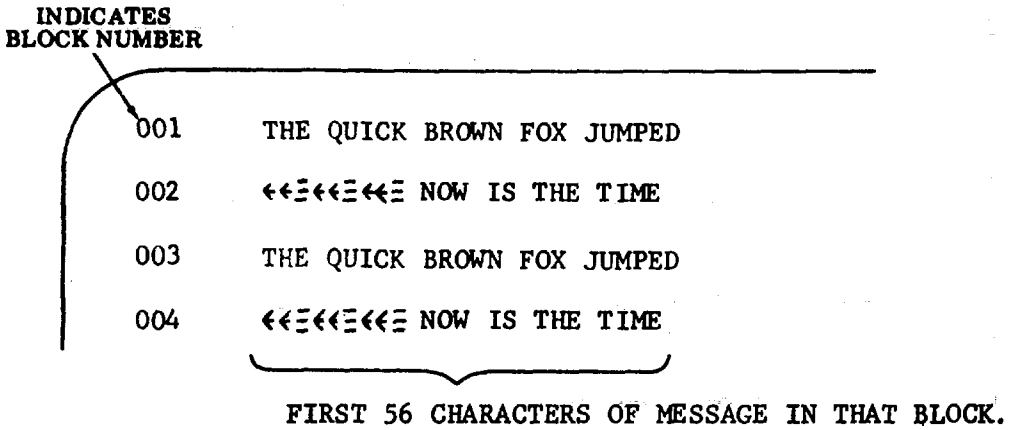
3	Depress CNTRL MDDE key.	Message on screen extinguishes, cursor goes to home position.
4	Enter a line of "Quick Brown Fox". End line with ETX. Enter several new lines. Enter a line of "Now is the time" end with ETX.	Message appears on display as typed.
	Depress HOME.	Cursor goes home.
	Depress PTR LCL.	PTR LCL lamp lights.
	Depress REC TAPE LCL.	REC TAPE lamp lights.
	Depress DISP SEND.	DISP SEND lamp lights.
	Depress DISP LCL.	DISP LCL lamp lights. Cursor moves across message and stops at character position after first ETX. Printer motor starts and copies message. REC TAPE positions cassette to next available recording block and records message. When cursor reaches the first ETX, DISP LCL will extinguish.

C. TESTING (Contd)

3. OFF-LINE CHECKOUT PROCEDURE (Contd)

STEP	PROCEDURE	RESULTS
5	Depress DISP LCL again. **NOTE:** If terminal is optioned for home on send, the cursor will go to the HOME position and the first message will be sent again.	Cursor moves from present position to next ETX. Printer and REC TAPE copy message as in Step 4.
6	Depress PTR LCL. Depress DISP SEND. Depress REC TAPE LCL.	PTR LCL lamp extinguishes. DISP SEND lamp extinguishes. REC TAPE LCL lamp extinguishes.
7	Depress CNTRL MODE key.	Prepared message extinguishes, and control mode message appears.
8	(1) Using cursor positioning key, position cursor over X placed in line 2. (2) Depress SPACE BAR key. (3) Depress LINE FEED key.	Cursor moves under direction of cursor control keys. X is deleted. Cursor returns to its original position.
		
9	Depress CNTRL MDDE key.	Control mode message extinguishes, and original typed message appears. Cursor in HOME position.

STEP	PROCEDURE	RESULTS
10	Depress PTR LCL. Depress REC TAPE LCL. Depress DISP SEND. Depress DISP LCL. Depress DISP LCL again. See Note in Step 5.	PTR LCL lamp lights. REC TAPE LCL lamp lights. DISP SEND lamp lights. DISP LCL lamp lights Cursor moves through messages until first ETX is reached. Printer and REC TAPE copy message. DISP LCL lamp extinguishes when the first ETX is reached. Cursor moves to next ETX, and DISP LCL lamp extinguishes.
11	Depress PTR LCL. Depress REC TAPE LCL. Depress DISP SEND.	PTR LCL lamp extinguishes. REC TAPE LCL lamp extinguishes. DISP SEND lamp extinguishes.
12	Depress CNTRL MDDE key.	Typed message extinguishes, and control message appears on display.
13	Using the cursor control keys, position the cursor over the underline next to 7. Type an upper case X. Depress LINE FEED key.	Cursor moves under control of cursor control keys. X appears on display. The control mode message extinguishes the REC TAPE rewinds and the following appears on the display.



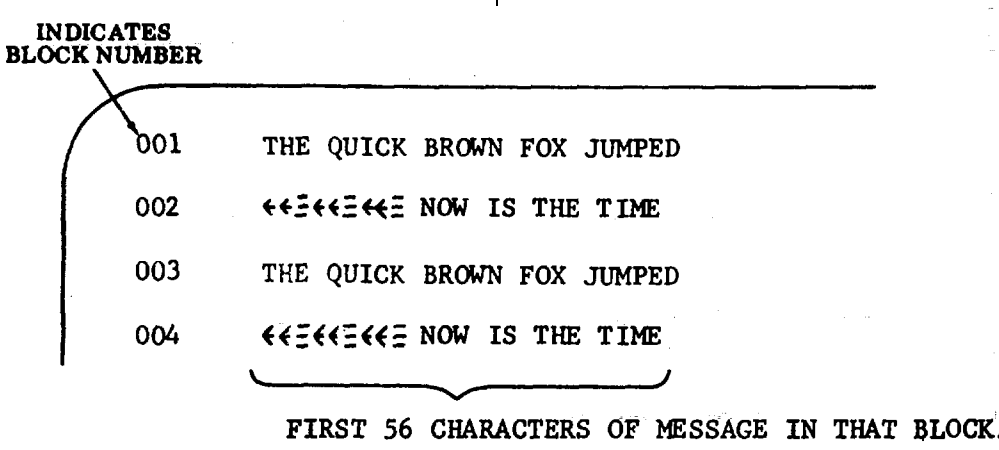
NOTE: When listing is complete, alarm will sound once. If no messages are recorded on tape, alarm will sound once and display will be blank.

C. TESTING (Contd)

3. OFF-LINE CHECKOUT PROCEDURE (Contd)

STEP	PROCEDURE	RESULTS
14	Depress SPACE BAR.	Tape heading listing extinguishes, and control mode message appears on display.
15	Using the cursor control keys, position cursor. (1) To character space to left of Receive Tape Block Number and enter an upper case R. (2) Position cursor over X in line 7 and depress Space Bar. (3) Depress LINE FEED.	 Cursor moves under control of cursor control key. R appears on display. X is deleted from display. Cursor returns to its original position. REC TAPE rewinds. When rewind is complete. 4. 000 REC TAPE BLOCK NUMBER is displayed.
16	Using the cursor control keys, or CURSOR TAB key. (1) Position cursor to underline next to 11 in line 11. (2) Enter an upper case X. (3) Position cursor to 1 after ST = 1 in line 11. (4) Overwrite the 1 with a 2. (5) Position cursor to 2 after RT = 2 in line 11. (6) Overwrite the 2 with a 1. (7) Depress LINE FEED key. position in line 1. **NOTE:** The above procedure has reassigned Cassette 1 as the receive cassette and Cassette 2 as the send cassette.	 Cursor moves under control of the cursor positioning keys. X appears on display. Cursor moves under control of the cursor positioning keys. 2 appears on display Cursor moves under control of the cursor positioning keys. 1 appears on display. Cursor returns to its original

STEP	PROCEDURE	RESULTS
17	Using the cursor control keys, or CURSOR TAB key.	
	(1) Position cursor to first underline in row 6.	Cursor moves under control.
	(2) Enter a upper case X.	X appears on display.
	(3) Depress LINE FEED.	Control mode message extinguishes, and the send tape headings are listed.
18	Depress SPACE BAR.	The send tape heading listing extinguishes, and the control message appears on display.



NOTE: When listing is complete, alarm will sound once. If no messages are recorded on tape, alarm will sound once and display will be blank.

NOTE: At any time during the listing of tape heading, the space bar may be depressed halting the tape heading listing. Depressing the space again will start the listings.

If listing exceeds 24 lines (capacity of display), listing will stop at 24th line. Depressing the space bar will cause the next 24 listings to be displayed.

C. TESTING (Contd)

3. OFF-LINE CHECKOUT PROCEDURE (Contd)

STEP	PROCEDURE	RESULTS
19	Using the cursor control keys or CURSOR TAB key. (1) Position cursor over first 0 in line 3. (2) Enter 001. (3) Depress LINE FEED.	 Cursor moves under control of the cursor control keys. The current block number is overwritten with 001. Send block number changes counting down to 000 and then up to 001.
20	Depress CNTRL MDE key.	Control mode message extinguishes and cursor returns to HOME position.
21	Depress DISP LCL. Depress REC TAPE LCL. Depress PTR LCL. Depress SEND TAPE LCL.	DISP LCL lamp lights. REC TAPE LCL lamp lights. PTR LCL lamp lights. The SEND TAPE transfers all its messages (4). The display will copy to first ETX, and DISP LCL will extinguish. The printer and REC TAPE will copy all messages. The SEND TAPE LCL lamp will extinguish when the message transfer is completed.
22	Depress REC TAPE LCL. Depress PTR LCL. Depress HOME. Depress CLEAR.	REC TAPE LCL lamp extinguishes. PTR LCL lamp extinguishes. Cursor goes to HOME position. Message is cleared from display.
23	Depress CNTRL MDDE key.	Send tape message on display extinguishes, and control mode message appears.

STEP	PROCEDURE	RESULTS
24	Using the cursor control keys. (1) Position cursor over first 0 in send tape block number. (2) Enter 001. (3) Position cursor over under-line in line 8. (4) Enter an upper case X. (5) Depress LINE FEED.	 Cursor moves under control of the cursor control keys. 001 appears in send tape block number. Cursor moves under control of cursor control key. X appears on display. Send tape rewinds to block 001. DISP LINE and DISP LCL lamps start flashing indicating monitor data on display mode.
25	Depress CNTRL NMDE key.	Control mode message extinguishes and blank display with cursor in HOME position is displayed.
26	Depress REC TAPE LCL. Depress PTR LCL. Depress DISP LCL. Depress SEND TAPE LCL.	REC TAPE LCL lamp lights. PTR LCL lamp lights. DISP LCL lamp stays on steady DISP LINE continues to flash. SEND TAPE LCL lamp lights. Send tape transmits all four messages recorded on it. Printer, receive tape and monitor copy all four messages.
27	Depress REC TAPE LCL. Depress PTR LCL. Depress DISP LCL.	REC TAPE LCL lamp extinguishes. PTR LCL lamp extinguishes. DISP LCL starts to flash.
28	Depress CNTROL MODE key.	Received message extinguishes, and control message appears on display.

C. TESTING (Contd)

3. OFF-LINE CHECKOUT PROCEDURE (Contd)

STEP	PROCEDURE	RESULTS
29	Using the cursor control keys or CURSOR TAB key.	
	(1) Position cursor over P in line 3.	Cursor moves under control of the cursor control keys.
	(2) Enter an upper case R.	R overwrites P.
	(3) Position cursor over X in line 8, depress SPACE BAR.	X is deleted from display.
	(4) Position cursor to first underline in line 9. Enter three upper case Xs.	XXX appears on display.
	(5) Depress LINE FEED.	DISP LINE and DISP LCL lamps stop flashing and are extinguished. Send and receive tapes rewind. *** appear in the tape block numbers while rewind is completed, 000 appears in the receive tape block number. 000 appears in the send block number.
30	Using the cursor control keys or CURSOR TAB key.	
	(1) Position the cursor to the underline next to 11 in line 11.	Cursor moves under control of the cursor positioning keys.
	(2) Enter an upper case X.	X appears on display.
	(3) Position the cursor to the 2 after ST=2.	Cursor moves under control of the cursor positioning keys.
	(4) Overwrite the 2 with a 1.	1 appears on display.
	(5) Position the cursor to the 1 after RT=1.	Cursor moves under control of the cursor positioning keys.
	(6) Overwrite the 1 with a 2.	2 appears on display.
	(7) Depress the LINE FEED key.	Cursor returns to its original position in line 1.
	NOTE: The above procedure has reassigned Cassette 1 as the send cassette and Cassette 2 as the receive cassette.	

STEP	PROCEDURE	RESULTS
31	Using the cursor positioning keys or CURSOR TAB key, position the cursor to the first underline following 9 in line 9. Enter three upper case Xs. Depress the LINE FEED key.	Cursor moves under control of the cursor position keys. XXX appears on display. Cursor returns to its original position in line 1. REC TAPE (Cassette 2) rewinds. *** appears in the tape block number while rewind is taking place.
32	For KDPM[2] sets, go to 5. On-Line Checkout, Page 2-82. For KDPM[3] sets, to 4. Monitor Tape Cassette Checkout.	

4. MONITOR TAPE CASSETTE CHECKOUT

The off-line checkout procedure of Part C does not check the operation of the monitor tape cassette since the monitor tape cassette (Cassette 3) has no local mode of operation. To perform an on-line check of the monitor tape cassette drive, two methods are available, depending on system protocol.

1. METHOD 1

If the system provides for on-line testing of terminals, a sample test message may be sent to the Test Center. After the test message has been sent, Cassette 3 should be rewound, reassigned to the send cassette and a local send tape to display transfer done. The message can then be checked to insure the monitor tape correctly copied the sent message. Rewind the tape, reassign Cassette 3 to be the receive tape. Perform the erase function on Cassette 3 and then reassign Cassette 3 to be the monitor tape cassette.

2. METHOD 2

If system protocol does not allow on-line testing, temporarily disconnect the terminal from the line by removing the line connections. Add the half-duplex strap between terminals 2 and 3 of TB101 of interface, if it was removed during installation. For this test, the clear-to-send input must be turned on or temporarily remove the 303181 or 303184 circuit card in slot Z4 of the interface assembly. Now, the following procedure may be followed to check out the monitor tape cassette drive. During this test, the set must be in the manual mode of operation (POLL/SEL lamp not lit).

C. TESTING (Contd)

4. MONITOR TAPE CASSETTE CHECKOUT (Contd)

STEP	PROCEDURE	RESULTS
1	Prepare a test message on display in keyboard-display mode (DISP LINE, DISP LCL and DISP SEND lamps not lit). Start message with SOH. End message with ETX. Home cursor.	Message appears on display as typed on keyboard.
2	Depress PTR LINE. Depress DISP SEND. Depress DISP LINE.	PTR LINE lamp lights. DISP SEND lamp lights. DISP LINE lamp lights. Cursor moves through message and stops at character position after ET,. Printer motor starts and printer copies message. Display lamps will extinguish, if Option U2 is installed. The DISP SEND lamp will extinguish if Option U1 is installed.
3	Depress DISP LINE if lit. Depress CNTRL MODE.	DISP LINE lamp extinguishes. Test message disappears from display and control message appears.
4	Using cursor control keys or CURSOR TAB key. (1) Position cursor to the character position to the left of the tape block number in line 5. (2) Enter an upper case R. (3) Depress the LINE FEED key.	 Cursor moves under control of the cursor positioning keys. R appears on display. Cursor returns to its original position in line 1. *** appears in the monitor tape block while the monitor tape is rewinding. When the rewind is completed, 000 appears in the monitor tape block.

STEP	PROCEDURE	RESULTS
5	Using the cursor positioning keys.	
	(1) Position cursor to the under line after 11 in line 11.-	Cursor moves under control of the cursor positioning key.
	(2) Enter an upper case X.	X appears on display.
	(3) Position cursor to the 1 after ST=1.	Cursor moves under control of the cursor positioning keys.
	(4) Overwrite the 1 with a 3.	3 appears on display.
	(5) Position the cursor to the 3 after MT=3.	Cursor moves under control of the cursor positioning keys.
	(6) Overwrite the 3 with a 1.	1 appears on display.
	(7) Depress the LINE FEED key.	Cursor returns to its original position in line 1.
	NOTE: Cassette 3 (monitor) has now been reassigned as the send tape and Cassette 1 has been reassigned as the monitor tape.	
6	Enter block number of test message (001 if cassette was not used before) in line 3. Depress LINE FEED	Send tape cassette positions to test message.
7	Depress CNTRL MDDE. Position cursor to the beginning of the line after original message.	Control message disappears and original test message appears.
	Depress DISP LCL.	DISP LCL lamp lights. SEND TAPE LCL lamp lights.
	Depress SEND TAPE LCL.	Test message appears on display below original message. These messages should be the same, except line feeds (≡) which were sent and stored on monitor tape are displayed as ←, ← (≡)
8	Depress the SEND TAPE LCL key.	SEND TAPE LCL lamp extinguishes.
	Home cursor.	Cursor goes to HOME position.
	Depress CLEAR key.	Both messages are cleared from display.
9	Depress CNTRL MODE key.	Control message appears on display.

C. TESTING (Contd)

4. MONITOR TAPE CASSETTE CHECKOUT (Contd)

STEP	PROCEDURE	RESULTS
10	Using the cursor positioning key or CURSOR TAB key.	
	(1) Position the cursor to the character space to the left of the send tape block number.	Cursor moves under control of the cursor positioning key.
	(2) Enter an uppercase R.	R appears on display.
	(3) Depress the LINE FEED key.	Cursor returns to its original position in line 1. *** appears in the send tape block number while the send tape is rewinding. 000 appears in the send tape block number when rewind in completed.
11	Using cursor positioning keys,	
	(1) Position cursor to underline after 11 in line 11.	Cursor moves under control of the cursor positioning keys.
	(2) Enter an uppercase X.	X appears on display.
	(3) Position cursor to the 3 after ST=3.	Cursor moves under control of the cursor positioning keys.
	(4) Overwrite the 3 with a 2.	2 appears on display.
	(5) Position the cursor to the 2 after RT=2.	Cursor moves under control of the cursor positioning keys.
	(6) Overwrite the 2 with a 3.	3 appears on display.
	(7) Depress the LINE FEED key.	Cursor returns to its original position in line 1.
	NOTE: Cassette 3 has now been reassigned as the receive tape and Cassette 2 has been reassigned as the send tape.	
12	Position the cursor to the first underline following 9 in line 9.	Cursor moves under control of the cursor positioning keys.
	Enter three uppercase Xs.	XXX appears on display.
	Depress the LINE FEED key.	Cursor returns to the original position in line 1. The erase function is performed on the tape in Cassette 2.

STEP	PROCEDURE	RESULTS
13	Using the cursor positioning key or CURSOR TAB key.	
	(1) Position the cursor to the underline after 11 in line 11.	Cursor moves under control of the cursor positioning keys.
	(2) Enter an uppercase X.	X appears on display.
	(3) Position the cursor to the 2 after ST=2.	Cursor moves under control of the cursor positioning keys.
	(4) Overwrite the 2 with a 1.	1 appears on display.
	(5) Position the cursor to the 3 after RT=3.	Cursor moves under control of the cursor positioning keys.
	(6) Overwrite the 3 with a 2.	2 appears on display.
	(7) Position the cursor to the 1 after MT=1.	Cursor moves under control of the cursor positioning keys.
	(8) Overwrite the 1 with a 3.	3 appears on display.
	(9) Depress the LINE FEED key.	Cursor returns to its original position in line 1.
	NOTE: Cassette 1 has now been reassigned as the send tape, Cassette 2 has been reassigned as the receive tape and Cassette 3 has been reassigned as the monitor tape.	

Remove the half-duplex strap between terminals 2 and 3 of TB101 of the interface assembly, if it was installed for this test. Replace the 303181 or 303184 circuit card in slot Z4, if it was removed for this test. Reconnect the signal line connections in the interface unit at the rear of the test.

C. TESTING (Contd)

5. ON-LINE CHECK-OUT

To perform an on-line check of the set, two methods are available depending on system protocol.

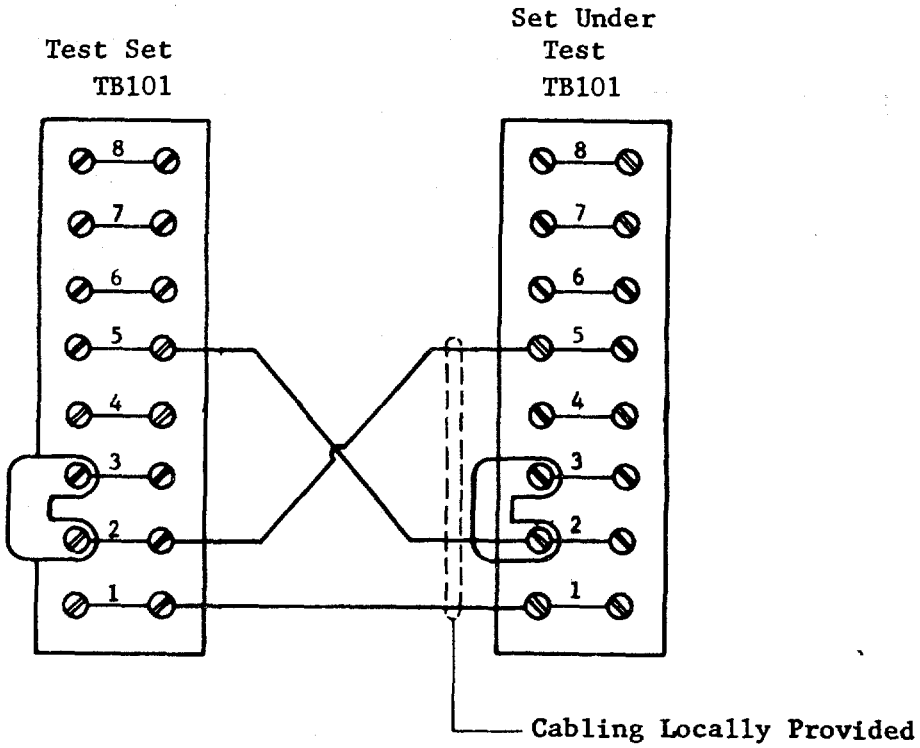
1. METHOD 1

If system protocol allows for on-line testing, a sample test message may be sent to the Test Center in both the manual and poll/select modes. In the poll/select mode, the Test Center must send polling sequences before the set under test can send, and selecting sequences before the set under test can receive.

2. METHOD 2

If system protocol does not allow on-line testing or if transmission facilities to the Test Center are not available, an alternative method called back-to-back can be used.

This method requires the use of another functional KD Set (referred to as test set). The test set should be optioned for 8-level ASCII code operation at the same baud rate as the set being tested is optioned (Option ZZ). The test set should be connected as indicated below.



In either arrangement, the clear-to-send input must be turned on (46 V). If no clear-to-send input is available, temporarily remove the 303181 or 303184 circuit card in slot Z4 of each interface assembly.

MANUAL MODE CHECKOUT

The manual mode checkout must be performed with the POLL/SEL lamp not lit and the 5-level communication interface not selected (no character X in line 1 of control mode) in both the test set and the set under test.

STEP	PROCEDURE	RESULTS
1	Locally prepare a test message on set under test. Start message with SOH and end message with ETX.	Message appears on display.
2	Condition test set to receive (DISP SEND and POLL/SEL not lit; DISP LINE lamp lit).	
3	Home cursor on set under test. Depress DISP SEND. Depress DISP LINE.	Cursor goes to HOME position. DISP SEND lamp lights. DISP LINE lamp lights. Cursor moves through message and stops at character position after ETX. Message is received on display of test set.
	NOTE: If Option Z1 (Home on Send) is installed, the cursor will go to home when the DISP LINE key is depressed. If Option F1 (printer on-line required to send), PTR LINE indicator must be lighted before sending will start. If Option H1 (monitor tape on required to send) is installed, MONITOR TAPE indicator must be lit before sending will start.	
4	Locally copy test message on display on receive tape (Cassette 2) of the set under test. (Refer to How to Operate Manual 405 for procedure.) Reassign Cassette 2 as the send tape. (Refer to How to Operate Manual 405 for procedure.) Position send tape to send test message. Condition test set to receive. Depress SEND TAPE LINE.	Send tape sends test message and test set receives message on display.

C. TESTING (Contd)

5. ON-LINE CHECK-OUT (Contd)

STEP	PROCEDURE	RESULTS
5	On set under test, enter control mode and place keyboard on-line. Type a character X in line 10 and depress LINE FEED. Exit control mode. Condition test set to receive.	
	Type a test message on keyboard.	Message will be received on test set display. **NOTE:** If Option D2 was selected, message will be copied on set under test display also.
6	Enter control mode. Delete the X in line 10 and depress the LINE FEED key. Exit control mode.	
7	Locally prepare a test message on test set. Start message with SOH and end with EOT. Condition set under test to receive (DISP SEND lamp not lit; DISP LINE, PTR LINE, and REC TAPE LINE lamps lit. Send test message from test set.	Display, printer and receive tape receive message from test set. **NOTE:** Set under test will take received EOT, transform it into an EXT, display it on display and record it on receive tape.
8	To check receive tape: Depress CNTRL MODE. Place an X in line 7 of control message. Depress LINE FEED.	Control mode message appears. Receive tape listing will be displayed with first 56 characters of test message.

STEP	PROCEDURE	RESULTS
9	Depress the space bar. Delete the X in line 7. Rewind all tapes and reassign Cassettes 1, 2 and 3 so that Cassette 1 is send tape, Cassette 2 is receive tape and Cassette 3 is monitor tape. Refer to How to Operate Manual 405 for procedures.	The control mode message appears on display.

6. CASSETTE TEST PROGRAM

Program Description

The CP10.006 Cassette Test Program consists of a programmed cassette tape and a modified 410504 circuit card, which functions to load the program tape into the C400 Controller.

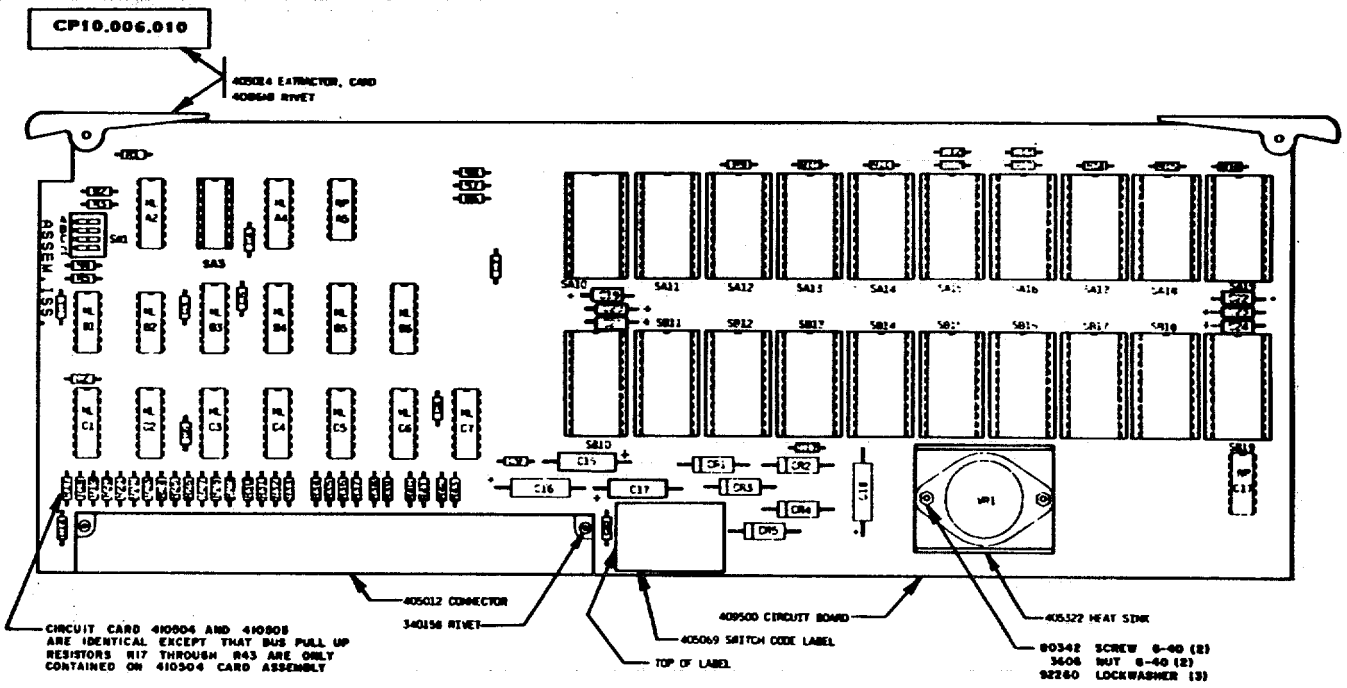
The parts required for this test are as follows:

Parts List

Part No.	Description
CP10.006.004	Programmed Cassette - CD Test Program for 40C434 Controller
CP10.006.010	Modified 410504 Circuit Card With Four Programmed EPROMS Containing Program Tape Loader Program (See Fig. 1.)
CP10.006.100	EPROM
CP10.006.101	EPROM
TP405403	EPROM
TP451003-1	EPROM

C. TESTING (Contd)

6. CASSETTE TEST PROGRAM (Contd)



The Basic 410504 Circuit Card Becomes CSD Part No. CP10.006.010 When The Following Components Are Added:

LOCATION	PART NUMBER
MLA3	405403
MLA8	451002-1
MLA9	CP10.006.100
MLB8	451003-1
MLB9	CP10.006.101

Fig. 1

Parts can be obtained from Teletype Custom Systems Division. See Page 2-4 for ordering information.

This program functions to:

Verify the condition of cassette tapes.

Provide the user with an aid for troubleshooting cassette drives (CD's).

Two parts constitute the program.

Part one is the cassette tape verification stage. Test characters are written from controller memory to the tape which is to be verified. The tape is then read nine times and compared to controller memory. Word numbers of errored words will print out during each read cycle. This test will run approximately 25 minutes.

Part two of the test program consists of 38 steps which write and read approximately 10 million characters to/from the cassette on a block by block basis. Errored blocks will print out and indicate the type of error.

The test program will classify cassette tape errors as "soft" errors. It will rerun the errored blocks-up to nine times. If the error does not clear, the program will classify it as a "hard" error. Other types of error messages are as follows:

Error Printouts

1. Cassette not in place
2. Soft error (cassette error).
3. Hard error (repeated cassette error)
4. Positioning error (controller could not find marker)
5. In write mode not received -- disabled!
6. Two wrong positions -- off until rewritten!
7. This tape failed at word #
8. Drive disabled -- no SS1 or no cassette!
9. Drive disabled -- too many errors!
10. Tape fails tape test -- drive disabled!
    (Possible response to "REC TAPE LINE" "Y".)

Part two of this program will run for approximately six hours to complete the 38 steps one time, unless otherwise terminated. This will give the maintenance personnel adequate time to perform cassette drive analysis,

Table 1 lists the specific test program steps. Steps 1A and 1B constitute the tape verification stage. This test is initiated by depressing the "REC TAPE LINE", "'Y" keys on the operator console.

NOTE: References in this procedure will be to "REC TAPE LINE" key, however, on some units containing a 40K108RDF keyboard (Terp System), the depressed key will be "NEXT INCOM". In any case, the depressed key should be the eighth keytop from the left in the top row of keytops.

"REC TAPE LINE" "Z" will execute "REC TAPE LINE" "Y" repeatedly.

Steps 1C through 38 are part two of the test program and function on "REC TAPE LINE" "Q".

Any other commands are not related to this test procedure even if they are functional.

Operating the "DISP LINE" ("LOCAL" for Terp) key after the test has begun, will stop the test and rewind all cassette tapes.

One to six cassette drives can be accommodated by the program. When multiple drives are used, the drive input port number will print out with the program responses. This allows service personnel to relate the printout to the drive that caused it. Sample test copy is included in this procedure for the user's reference.

The user is required to provide one 40C400 Controller for test program use. The controller must be reconfigured and optioned as follows.

C. TESTING (Contd)

6. CASSETTE TEST PROGRAM (Contd)

Test Terminal Configuration

Arrange the controller circuit cards and option them as shown in Fig. 2.

CAUTION: BEFORE HANDLING CIRCUIT CARDS, ATTACH A 346392 STATIC DISCHARGE WRIST STRAP OR EQUIVALENT. ALSO, ALWAYS TURN CONTROLLER DC POWER OFF BEFORE REMOVING OR INSERTING CIRCUIT CARDS.

CONTROLLER CONFIGURATION

Arrange Circuit Cards -- Remove Extra Cards

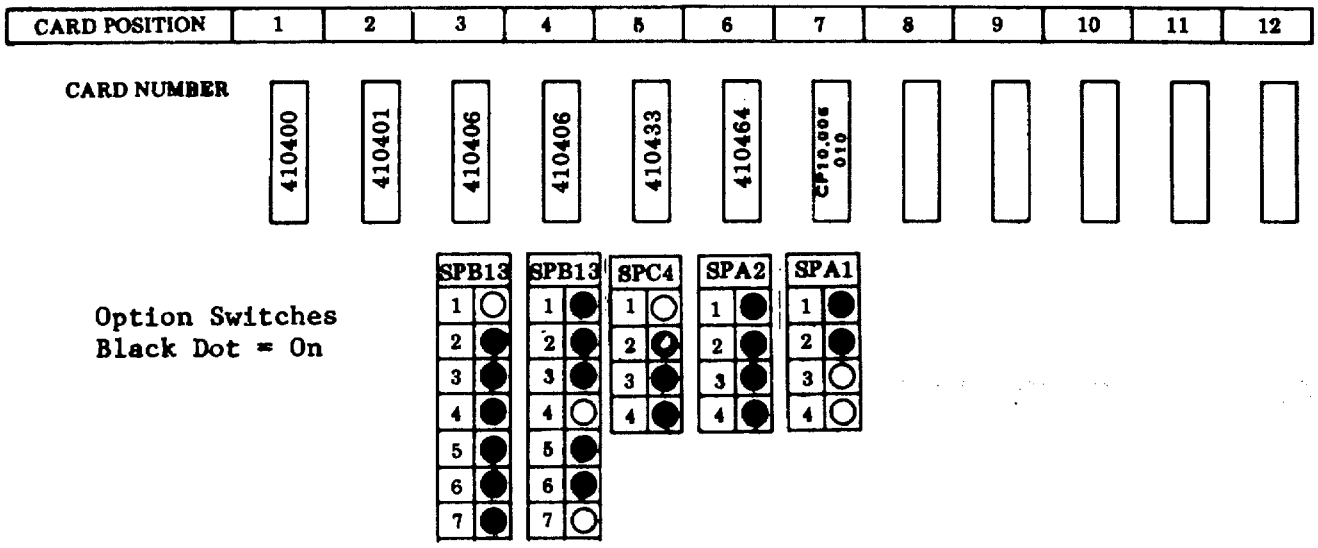


Fig. 2

One Model 40 Printer and one operator console (opcon) are required. The printer must be optioned for no error character on parity error. Connect the SSI cables of these units to the controller as shown in Fig. 3.

Two additional cassette drives may be connected to the controller as shown in Fig. 3.

CONTROLLER INPUT-OUTPUT

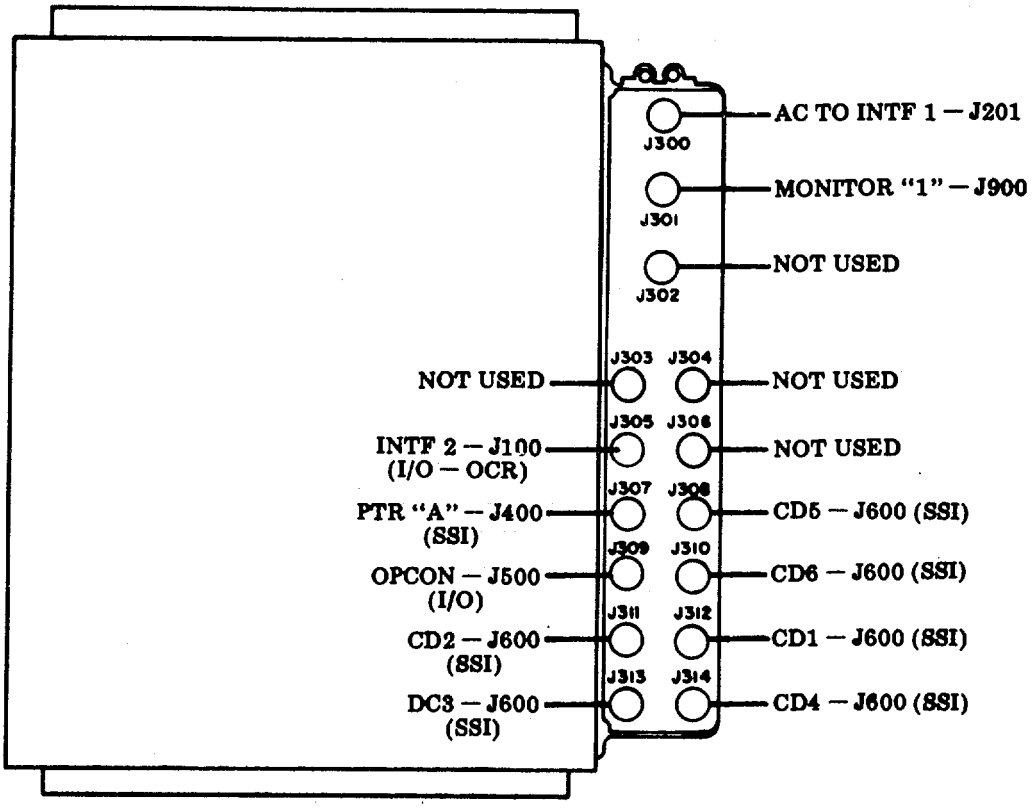


Fig. 3

Pretest Precautions

Observe all usual precautions when handling cassette tapes such as never turning off ac power when a cassette is running.

The CP10.006.004 cassette should have been delivered in the write protect (write inhibit) mode. Be sure the write protect tab is up and to the right before using. Refer to Fig. 4.

C. TESTING (Contd)

6. CASSETTE TEST PROGRAM (Contd)

NOTE: Write inhibit tab of CP10.006.004 cassette program tape must ALWAYS be to the right (window uncovered) to prevent destruction of program.

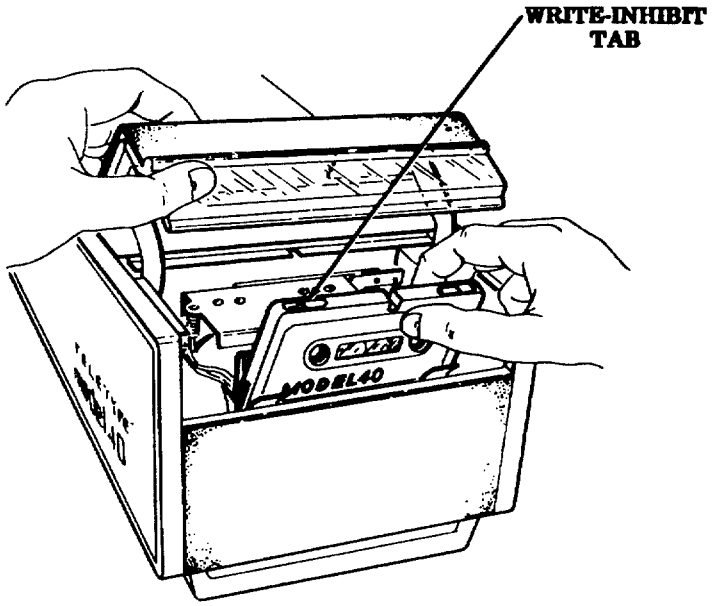


Fig. 4

Clean all cassette drive heads before and after testing. Check the 403238 tape cleaner and replace if required.

Double check test terminal cable connections, Fig. 3, and controller card arrangement and options according to Fig. 2.

Program Loading

Remove all cassette tapes, if any, from all cassette drives.

Turn on ac power to the test terminal.

Power On Reset (POR) the 40C400 controller by operating its power supply switch to the OFF and then ON position.

Be sure the CP10.006 program cassette is write inhibited. Insert the program tape into any one of the cassette drives which is known to be in good working order. Push the cassette forward to start in the normal manner. The test program will load into the controller memory.

The monitor cursor will appear and the "DT.SP LINE" ("LOCAL" for Terp) lamp will light if the program has loaded properly.

If the program did not load properly, repeat the load procedure by power on resetting the power supply.

When the cassette drive RUN/TEST lamp has gone off, remove the program tape from the drive and store away. Never remove a cassette when the lamp is on.

Load the desired number of drives with cassette tapes to be checked. All tapes will go thru the normal self test upon loading. A flashing RUN/TEST lamp indicates that the self-test has failed.

New cassettes may not be added after testing has begun. However, any drive may be removed from test at any time by disconnecting its SSI cable from the controller.

Program Execution

Tape verification. Operator console should now have "DISP LINE" (or "LOCAL") lighted.

Home the cursor (HOME position is fourth line down). Now Clear.

Depress "REC TAPE LINE" "Y" on the opcon. See below for sample copy for explanation of this command.

Cassette Drive 38 Step Exercise

Depress "DISP LINE" (or "LOCAL). Home the cursor and clear the monitor.

Depress "REC TAPE LINE" "Q". Refer to Page 2-36 for explanation of this command and see the sample copy.

Depressing the "DISP LINE" (or "LOCAL") key during the test will stop the test and cause all cassettes to rewind.

Printout from "REC TAPE LINE." "Y". Only the port number column has meaning at the right hand side last four columns. The first column will indicate the number of times "REC TAPE LINE" "Y" has been repeated if "REC TAPE LINE" "Z" has been used to do "Y" repeatedly.

Response to "REC TAPE LINE" "Y"

Monitor will display "40 CD TEST PROGRAM".

If tape has no errors, no other printout will occur.

Monitor will display "TEST COMPLETE" after end of test.

4ϕCD TEST PROGRAM
THIS TAPE FAILED AT WORD ≠ϕϕϕ,411 ϕ1 5 ϕ1
THIS TAPE FAILED AT WORD ≠ϕϕϕ,411 ϕ1 5 ϕ1
THIS TAPE FAILED AT WORD ≠ϕϕ1,195 ϕ1 5 ϕ1
THIS TAPE FAILED AT WORD ≠ϕϕ1,195 ϕ1 5 ϕ1
THIS TAPE FAILED AT WORD ≠ϕϕϕ,914 ϕ1 5 ϕ1
THIS TAPE FAILED AT WORD ≠ϕϕϕ,914 ϕ1 5 ϕ1
THIS TAPE FAILED AT WORD ≠ϕϕ1,195 ϕ1 5 ϕ1
THIS TAPE FAILED AI WORD ≠ϕϕϕ,914 ϕ1 5 ϕ1
THIS TAPE FAILED AT WORD ≠ϕϕϕ,914 ϕ1 5 ϕ1
TEST COMPLETE

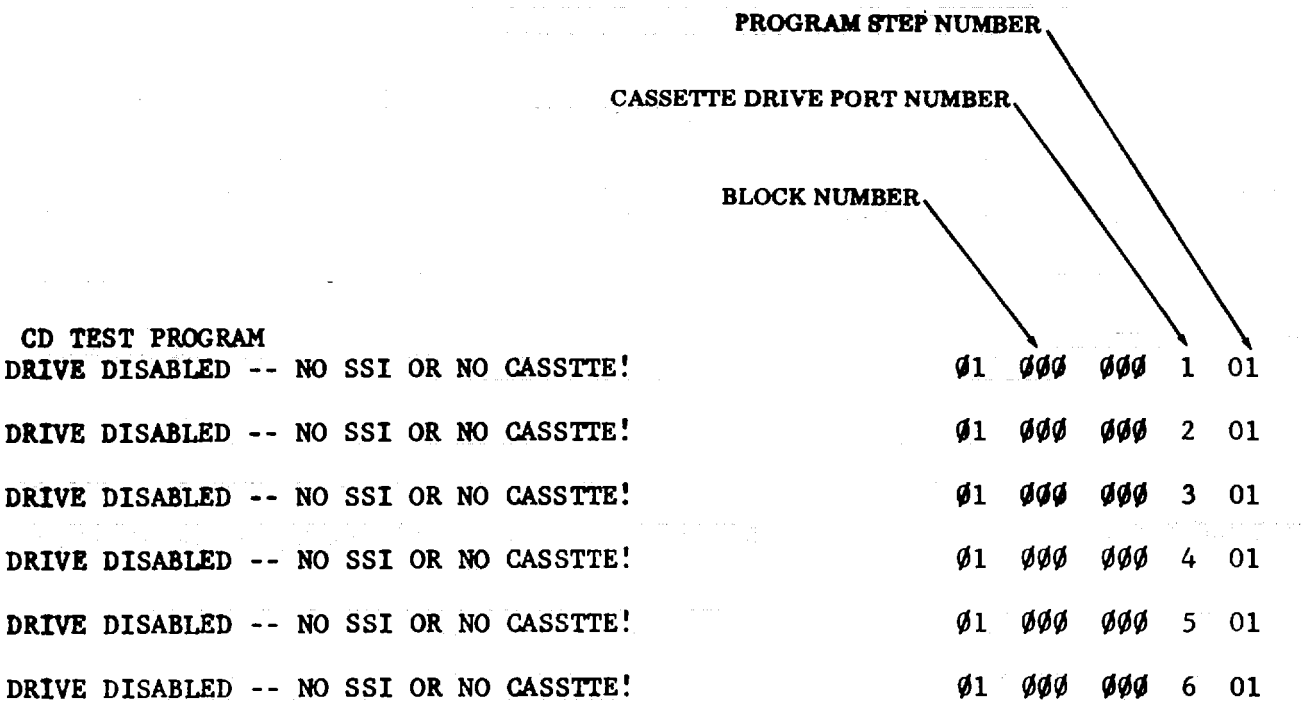
Printout using "REC TAPE LINE" "Q" when there are no cassettes in any of the cassette drives. This sample is included to illustrate the meaning of the columns at the right-hand side of the page. The two digits at the extreme right will indicate the program step in process during the execution of "REC TAPE LINE" "Q".

C. TESTING (Contd)

6. CASSETTE TEST PROGRAM (Contd)

Program Execution (Contd)

The next column to the left is the input port number of the cassette SSI cable to: the C400 controller; Port 6 will correspond to controller SSI connector J310, Port 5 will correspond to connector J308 etc. The next two three digit numbers to the left are the block number and the last column to the left has no significance to this procedure.



Printout from "REC TAPE LINE" "Q". This sample shows the entire 38 steps of the program using a good cassette tape being read from the cassette drive which is connected to Port 5 (J308). Note that the printout indicates that Ports 1, 2, 3, 4, and 6 are either not being used or have defective drives and/or cassette tapes. Also note that the cassette tape ran error free until block 461 during Step No. 36. At this time an error was detected; when the controller reread the tape the fifth time, the error had cleared and the program continued.

```
38 Step exercise                                    Program step no.
                                                    Drive connected to port no.
                                                    Block no.

 40CD TEST PROGRAM

DRIVE DISABLED - NO SSI OR NO CASSTTE!              01  000 000  1  01
DRIVE DISABLED - NO SSI OR NO CASSTTE!              01  000 000  2  01
DRIVE DISABLED - NO SSI OR NO CASSTTE!              01  000 000  3  01
DRIVE DISABLED - NO SSI OR NO CASSTTE!              01  000 000  4  01
DRIVE DISABLED - NO SSI OR NO CASSTTE!              01  000 000  6  01
END OF STEP                                         01  499 499  5  01
END OF STEP                                         01  499 499  5  02
END OF STEP                                         01  499 499  5  03
END OF STEP                                         01  499 499  5  04
END OF STEP                                         01  499 499  5  05
END OF STEP                                         01  499 499  5  06
END OF STEP                                         01  499 499  5  07
END OF STEP                                         01  499 499  5  08
END OF STEP                                         01  499 499  5  09
END OF STEP                                         01  499 499  5  10
END OF STEP                                         01  499 499  5  11
END OF STEP                                         01  010 010  5  12
END OF STEP                                         01  499 499  5  13
END OF STEP                                         01  499 499  5  14
END OF STEP                                         01  499 499  5  15
END OF STEP                                         01  499 499  5  16
END OF STEP                                         01  499 499  5  17
END OF STEP                                         01  499 499  5  18
END OF STEP                                         01  499 499  5  19
END OF STEP                                         01  499 499  5  20
END OF STEP                                         01  499 499  5  21
END OF STEP                                         01  499 499  5  22
END OF STEP                                         01  010 010  5  23
END OF STEP                                         01  499 499  5  24
END OF STEP                                         01  499 499  5  25
END OF STEP                                         01  499 499  5  26
END OF STEP                                         01  499 499  5  27
END OF STEP                                         01  499 499  5  28
END OF STEP                                         01  499 499  5  29
END OF STEP                                         01  499 499  5  30
END OF STEP                                         01  499 499  5  31
END OF STEP                                         01  499 499  5  32
END OF STEP                                         01  499 499  5  33
END OF STEP                                         01  499 499  5  34
END OF STEP                                         01  010 010  5  35
SOFT ERROR                                          01  461 461  5  36

TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+
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L+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3
TL+3+0+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+
L+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3
TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3
SOFT ERROR                                          01  461 461  5  36

TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+
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TL+3+0+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+
L+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3
TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3
SOFT ERROR                                          01  461 461  5  36

TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+
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TL+3+0+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+
L+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3
TL+3TL+3TL+3TL+3TL+3TL+3TL+3TL+3
END OF STEP                                         01  499 499  5  36
END OF STEP                                         01  499 499  5  37
END OF STEP                                         01  010 010  5  38
```

C. TESTING (Contd)

6. CASSETTE TEST PROGRAM (Contd)

CHART

STEP	PROCEDURE
Step 1A	The ASCII characters "+" and "3" are written onto the tape continuously over an area equivalent to approximately 520 blocks.
Step 1B	The tape is then read and each character received by the C400 is compared bit by bit to "+" and "3".
Step 1C	The ASCII characters "+" and "3" are written onto Channel 1 and the ASCII characters "T" and "L" are written onto Channel 2. There will be 129 SSI words containing +3 on Channel 1 and 129 SSI words containing TL on Channel 2. In addition, there will be two more SSI words on Channel 1, a word containing (New Line-ETX) and a block check word. Also, Channel 2 will contain one more SSI word (Block No.). The above block of 261 SSI words or 522 characters is written onto the tape with "markers". A total of 500 blocks are written (0 to 499).
Step 2 through Step 10	Read one block at a time.
Step 11	The same as Step 1C except TL is written onto Channel 1 and +3 is written onto Channel 2. The blocks are written without "markers".
Step 12	Read block 490 and then read block 10.
Step 13 through Step 21	Read one block at a time.
Step 22	The same as Step 1C.
Step 23	The same as Step 12.
Step 24 through Step 32	Read one block at a time.
Step 33	Write with "markers" (TL on Channel 1 and +3 on Channel 2) followed by a "REW" and then a READ. This test is performed one block at a time.
Step 34	Write without "markers" (+3 on Channel 1 and TL on Channel 2) followed by a "REW" and then a READ. This test is performed one block at a time.

CHART (Contd)

STEP	PROCEDURE
Step 35	Same-as Step 12.
Step 36	Same as Step 33.
Step 37	Same as Step 34.
Step 38	Read Block 0, 50, 100, 150, 200, 250, 300, 350, 400, 450, 490, 451, 401, 351, 301, 251, 201, 151, 101, 51 and 10.

The following procedure is used to check the outputs of the magnetic tape head assembly. The controller should be configured as it was for use with the Cassette Test Program. See Fig. 2, Page 2-32 for configuration. After execution of this procedure, the controller should be configured in it's original state. The tape head checkout procedure utilizes a special cassette tape No. 10.006.020 which is available from Teletype Custom Systems Division. See Page '2-4 for ordering information. The 410764 circuit card contained in the cassette drive unit must be electrically extended from the base to provide access to the components. Refer to D. TROUBLESHOOTING, Page 2-40 for further information.

Observe all usual precautions when handling cassette tapes such as never turning off ac power when a cassette is running.

The CP10.006.020 Cassette Tape should have been delivered in the write protect (write inhibit) mode. Be sure the write protect tab is up and to the right before using.

Turn on ac power to the test terminal.

Power On Reset (POR) the 40C400 controller by operating its power supply switch to the OFF and then ON position.

Be sure the CP10.006.020 Program Cassette is write inhibited. Insert the program tape into the cassette drive. Push the cassette forward to start in the normal manner. The tape should be allowed to run to the end and the check should be made only with the tape moving in the forward direction.

If the program did not load properly, repeat the load procedure by power on resetting the power supply. The power supply should also be reset before each new check.

C. TESTING (Contd)

6. CASSETTE TEST PROGRAM (Contd)

With tape moving in the forward direction, check anode of CR16 (with Channel 1 of scope), and anode of CR17 (with Channel 2 of scope) for waveform shown in Fig. 5. The two waveforms must be in phase within +10 microseconds. If waveforms do not meet requirement, replace the 403241 tape head assembly. Refer to F. DISASSEMBLY/ REASSEMBLY AND PARTS for replacement procedure.

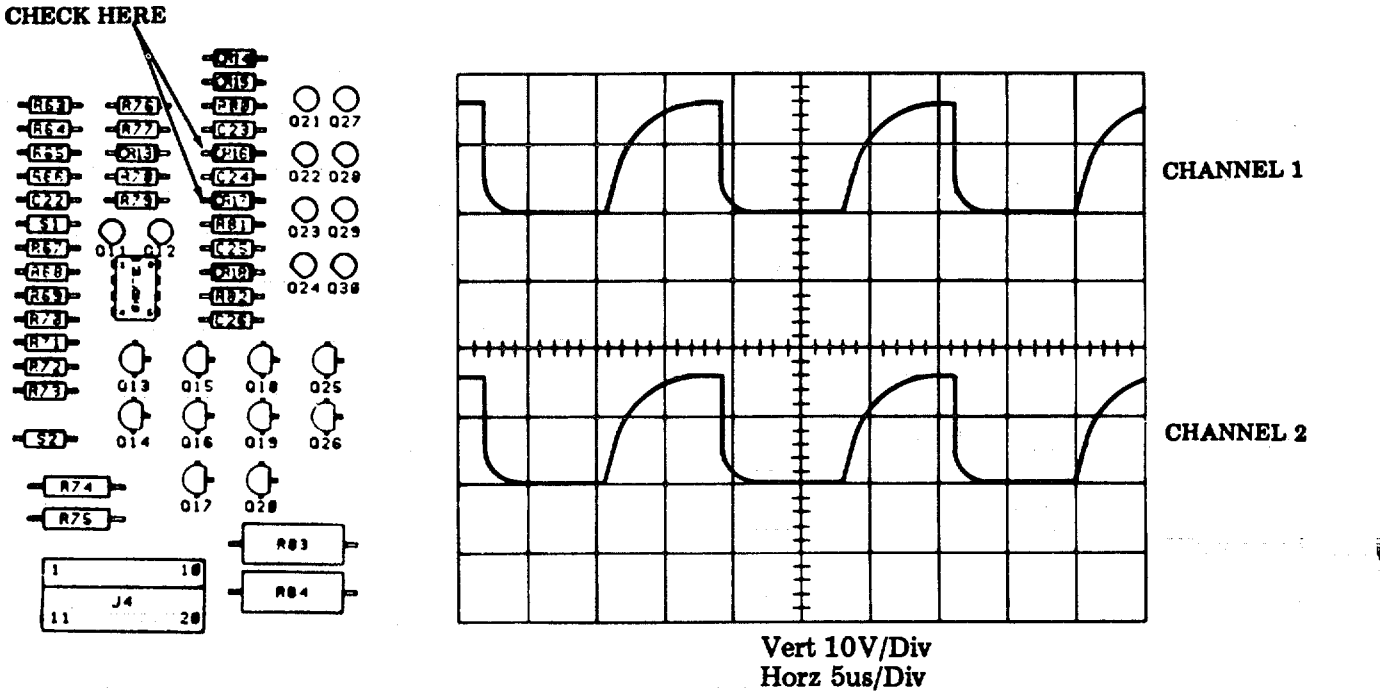


Fig. 5

D. TROUBLESHOOTING

1. GENERAL

This section provides troubleshooting methods to be followed in repairing the Tempest Model 40 Cassette Drive Units.

When trouble is encountered in testing a cassette drive, the diagnostic steps and corrective measures should be followed to arrive at the trouble source. After corrective steps have been verified by successfully repeating the test that disclosed the problem, the testing procedure should be resumed.

Functional schematics have been supplied in 6. FUNCTIONAL SCHEMATICS of this section as an aid to troubleshooting.

Waveshapes and voltage levels specified for troubleshooting the cassette drive logic circuit card are to be checked with an oscilloscope unless stated otherwise.

Continuity and dc voltage checks specified for troubleshooting are to be made with a multimeter.

If the cassette drive fails to perform its intended function, the difficulty should be analyzed in a logical manner to recognize the source of the problem. Above all, make certain it is the cassette drive which is causing the problem rather than associated apparatus or electronics.

Take the time to pinpoint the exact nature of the difficulty rather than just a general description. For example, it would be of much more use to be able to say that "The brake fails to operate properly" rather than "The unit is failing to transmit data properly".

Check to see that all springs are attached and parts mounted properly. No adjustment should be changed indiscriminately in an effort to correct a difficulty which is not fully understood. Very often this will only result in more than one difficulty being present.

As an aid to troubleshooting, the following list of troubles and remedies are intended to serve as a guide in the analysis and correction of difficulties. The associated schematic wiring diagrams of this specification are required for reference. These remedies are intended for field repair and, as such, will call for the most expeditious solution to the problem. For instance, if a clutch fails, the immediate solution would be to replace it.

D. TROUBLESHOOTING (Contd)

1. General (Contd)

SYMPTOM	POSSIBLE CAUSE	REMEDY
Cassette drive motor does not turn on.	1. Loss of ac power.	Check all fuses and switches between 40CD101 and ac source.
Motor runs, but nothing else operates, self-test is not performed.	1. Interface circuit open.	Make sure interface circuit is complete.
	2. No dc power.	Check power source and replace faulty portion.
	3. Cassette in place or file protect switch are inoperative.	Readjust switches per E. ADJUSTMENTS AND LUBRICATION.
Either brake or clutch fail to operate.	1. Open coil.	Replace complete set of faulty items.
Either clutch fails to operate properly.	1. Dirty clutch armature rotor faces.	Clean faces.
	2. Improper clutch adjustment,	Readjust clutch per E. ADJUSTMENTS AND LUBRICATION.
Either brake fails to operate properly (usually evidenced by slack in the tape).	1. Dirty armature face.	Clean armature face.
	2. Improper brake adjustment.	Readjust per E. ADJUSTMENTS AND LUBRICATION.
Garbling of data in read or write mode.	1. Dirty head or tape.	Clean the tape head.
	2. Damaged tape, ie, wrinkled tape or oxide layer is scratched.	Use new tape cassette.
	3. Dirty tape cleaner.	Replace cleaner.
	4. Faulty belt adjustments.	Readjust "O Ring" belt and flat belt per E. ADJUSTMENTS AND LUBRICATION.

SYMPTOM	POSSIBLE CAUSE	REMEDY
Cleaning bobbin fails to rotate	1. Faulty adjustment.	Readjust bobbin per E. ADJUSTMENTS AND LUBRICATION.
	2. Weak flat spring.	Bend spring per E. ADJUSTMENTS AND LUBRICATION.
	3. Weak tension spring.	Replace spring.

D. TROUBLESHOOTING (Contd)

2. ERROR ANALYSIS

Table A is provided as a guide for associating errors with likely causes and recommends specific areas of the cassette drive to be checked.

TABLE A

Errors Caused By Acceleration Problem:

1. Generally occur in first third of block.
2. Can result in incomplete block error with more than one missing SSI word.
3. Will usually cause errors on both channels.
4. Errors will usually change with each reread.
5. Will not cause character errors with just one or two bits incorrect.
6. If written with acceleration problem, data cannot be recovered correctly no matter how many rereads are attempted.

Errors Caused By Tape:

1. Can occur anywhere in block.
2. Can occur on one or both channels.
3. Damaged tape will usually cause incomplete block errors. (Even if rewritten, block cannot be recovered correctly.)
4. Debris on tape will usually cause one character error which could be distributed throughout the block.
5. Blocks written with debris on tape cannot be recovered correctly no matter how many rereads are made even if debris falls off of tape.

Errors Caused By Tape Head:

1. If head has debris on it, incomplete block errors will result. (Lost data could be from one or both channels).
2. If skew adjustment is out, data errors will result throughout block.
3. If mechanical dimensions are out, data errors and incomplete blocks will result.

Errors Caused By Circuit Card:

1. Generally circuit card errors will result in many or all blocks being either written or read incorrectly.

Types of errors and the manner in which they manifest themselves are listed in Table B. The following procedures are recommended for testing and analyzing test results.

The drive in question should be allowed to complete enough steps of the test program to allow sufficient data for analysis.

The first step of error analysis is to remove the tape from the drive in question and verify the tape in a known good drive. If the tape does not verify properly, it should be discarded and another-properly conditioned tape installed in the drive in question. The drive in question should be watched closely because it may be damaging tapes. If the tape verifies properly, the drive in question should be examined.

If errors occur on both channels and near the beginning of the block, acceleration is most likely the cause of the errors. Check the items listed under ACCELERATION ERRORS, and also check the items listed under IRREGULAR DATA PATTERN.

If the errors occur only on one channel, the items listed under HEAD RELATED ERRORS may apply. If these items are suspected, replace the 410764 circuit card with a known good card.

If the errors occur anywhere throughout a block and on both channels, check the items listed under ACCELERATION ERRORS and IRREGULAR DATA PATTERN. If these items are okay, replace the 410764 circuit card with a known good card.

If the errors are positioning type errors, check the items listed under COAST PROBLEMS and CLUTCH PICKUP PROBLEMS.

If a cassette drive will not verify a cassette tape, check the items listed under MOTION PROBLEMS.

TABLE B

ACCELERATION ERRORS

1. Check connections at Berg connector (brakes and clutches).
2. Check brake gap adjustment (forward and reverse).
3. Check holdback torque with tension monitor.
4. Check belt tension.
5. Check clutch torque.
6. Check yield spring tension.
7. Check end play and side to side play of all shafts.
8. Check brake disc and armature (both forward and reverse).

IRREGULAR DATA PATTERN

1. Check end play and side to side play of all shafts.
2. Check clutch torque.
3. Check belt tension.
4. Check yield spring tension.
5. Check brake disc and armature.

HEAD RELATED ERRORS

1. Channel amplitude incorrect.
2. Skew (read head outputs out of phase).
3. Flutter (one channel jittering with respect to other).
4. Check for wear.

D. TROUBLESHOOTING (Contd)

2. ERROR ANALYSIS (Contd)

TABLE B (Contd)

COAST PROBLEMS

1. Check connections at Berg connector.
2. Clean clutches and brake disc.
3. Check polarity of clutches and brakes.
4. Check brake and clutch gaps.
5. Check resistance of brake coils.

CLUTCH PICKUP PROBLEMS

1. Check connections at Berg connector.
2. Clean clutches and brake disc.
3. Check brake and clutch gaps.
4. Check resistance of clutch coils.

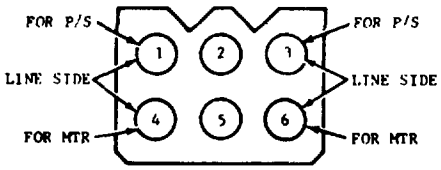
MOTION PROBLEMS

1. Check end play and side to side play of all shafts.
2. Check clutch torque.
3. Clean clutches.
4. Check belt tension.
5. Check head.

Refer to Section E. ADJUSTMENTS AND LUBRICATION for adjustment procedures.

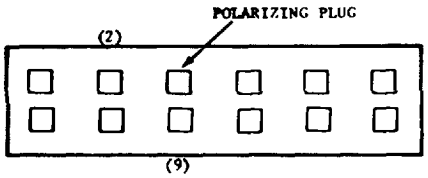
3. COMPONENT ANALYSIS

NOTE: In the following sections, where references are made to specific adjustments and/or lubrications, refer to E. ADJUSTMENTS AND LUBRICATION for procedures. Perform repair steps listed in the "NO" RESPONSE DIRECTIVE column in the order specified until trouble is corrected.

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. With the Cassette Drive power switch in the "ON" position, does motor run?	Go to 4.	Go to 2.
2. Is 115 volts available at source?	Go to 3.	Repair or replace voltage.
3. With motor connector removed from ac distribution assembly connector, is 115 volts present at ac distribution assembly connector? 	(a) Disconnect power supply from motor connector and replace motor. (b) Replace connector	(a) Replace 408598 SSI/AC interface assembly. (b) Replace connector.
4. With no cassette in the cassette holder and power switch in the "ON" position, is the BOT/EOT lamp lit?	Go to 9.	Go to 5.
5. Is power supply fuse "open"? Check continuity. continues to "blow". Recheck power- supply.	Replace fuse, recheck. Recheck if fuse	Go to 6.
6. Is -12 volts present at power supply? Check for -12 volts dc between terminals marked common and -12.	Go to 5. CIRCUIT CARD ANALYSIS. (410764)	Go to 7.
7. Is transformer output voltage present (approximately 31.6 volts ac) present between unmarked terminals on power supply circuit card?	(a) Go to 4. CIRCUIT CARD ANALYSIS. (410043) (b) Replace 406101 power supply.	Go to 8.

D. TROUBLESHOOTING (Contd)

3. COMPONENT ANALYSIS (Contd)

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
8. Is transformer input voltage present (103 to 127 volts ac) between pins 1 and 3 of connector P8?	Replace 406103 transformer.	Replace 408598 SSI/ AC interface assembly
9. Is RUN (Status) lamp lit?	Go to 5. CIRCUIT CARD ANALYSIS (410764)	Go to 10.
10. Does RUN (Status) lamp light when the "Cassette in Place" switch is manually activated?	Go to 13.	Go to 11.
11. Is +12 volts dc present at power supply? Check for +12 volts dc between terminals marked common and +12.	Go to 12.	(a) Go to 4. CIRCUIT CARD ANALYSIS. (410043) (b) Replace power supply 406101.
12. With power removed from the cassette drive, the cassette drive removed from its base, and plug P4 removed from the J4 connector, is there continuity between terminals 2 and 9 of plug P4? 	Go to 5. CIRCUIT CARD ANALYSIS (410764)	(a) Go to 5. CIRCUIT CARD ANALYSIS. (410764) (b) Replace 406111 cassette in place switch. (c) Perform switch height adjustment.
13. Does left drive shaft (rewind) hub rotate when "Cassette in Place" switch is manually activated?	Go to 18.	Go to 14.
14. Does left drive shaft (rewind) rotor rotate?	Go to 15.	Go to 18.
15. Is clutch activated when the "Cassette in Place" switch is actuated?	Perform pulley and shaft end play adjustment.	Go to 16.
16. Is clutch out of adjustment?	Adjust clutch.	Go to 17.

D. TROUBLESHOOTING (Contd)

3. COMPONENT ANALYSIS (Contd)

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
17. With power removed from cassette drive, drive removed from base and the P4B connector removed from J4 connector is resistance between terminals 3 and 8 of P4B 32 to 50 ohms?	Go to 5. CIRCUIT CARD ANALYSIS (410764)	(a) Replace 402271 clutch assembly. (b) Perform clutch adjustment. (c) Perform pulley alignment adjustment.
18. Does right drive shaft (forward drive) rotor rotate?	Go to 19.	Go to 23.
19. Is O-Ring belt present?	Go to 20.	Assemble O-Ring belt.
20. Are left drive shaft (rewind) pulley and idler pulley present?	Go to 21.	Assemble missing pulley/pulleys.
21. Are left drive shaft (rewind) Pulley set screws (2) tight?	Go to 22.	Tighten set screws.
22. Does left drive shaft (rewind) pulley bind on casting?	Adjust for end play.	(a) Replace 403296 brake assembly. (b) Perform brake adjustment. (c) Perform pulley and shaft end play adjustment. (d) Perform latch adjustments.
23. Is motor drive belt present?.	Go to 24.	Assemble Belt.
24. Are right drive shaft (forward drive) pulley set screws tight?	Go to 25.	Tighten set screws.
25. Are motor pulley set screws tight?	Go to 26.	Tighten set screws.
26. Does right drive shaft (forward drive) pulley bind on casting?	Adjust for end play.	(a) Perform motor drive belt adjustment. (b) Perform motor pulley adjustments. (c) Replace 403296 brake assembly. (d) Perform brake adjustment.

D. TROUBLESHOOTING (Contd)

3. COMPONENT ANALYSIS (Contd)

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
26. (Contd)		(e) Perform pulley and shaft end play adjustment. (f) Perform latch adjustments. (g) Go to 5. CIRCUIT CARD ANALYSIS. (410764)
27. With a partially unwound standard cassette placed wrong side out, is the cassette held flat against inside surface of the cassette holder?	Go to 28.	Adjust cassette pressure spring.
28. Is cassette holder properly latched?	Go to 29.	Adjust latch.
29. Does the left drive (rewind) shaft rotate?	Adjust "Cassette in Place Switch".	Go to 30.
30. When removing cassette does latch open too far?	Adjust latch stop screw.	Go to 31.
31. Is cassette holder ejected from drive mechanism?	Go to 32.	Adjust cassette holder pressure spring.
32. With the cassette properly assembled to the cassette holder, did the cassette rewind?	Go to 34.	Go to 33.
33. With the cassette removed from the cassette holder, do both reels rotate freely?	Adjust "Cassette in Place" switch height.	Replace cassette.
34. After rewinding, does the tape move forward and rewind?	Go to 36.	(a) Cassette drive not plugged into mating equipment. (b) Go to 35.
35. With power switch in the OFF position, remove system cable from mating equipment connector and connect it to a known good part. Restore power to cassette drive, does tape move forward and rewind?	Replace or repair mating equipment. Restore Cassette Drive. to proper configuration.	(a) Replace system cable. (b) Replace 408598 SSI/AC interface assembly. (c) Go to 5. CIRCUIT CARD ANALYSIS. (410764)

D. TROUBLESHOOTING (Contd)

3. COMPONENT ANALYSIS (Contd)

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
36. Does tape move forward and reverse a second time?	Go to 38.	Go to 37.
37. Does cassette have red tab on left side folded back so that notch is exposed?	Go to 38.	(a) Adjust "Write Inhibit Switch".
38. Does the RUN (Status) lamp turn off or flash when tape is rewound?	Go to 41.	Go to 39.
39. Is the tape between the BOT/EOT sensor tube mechanism transparent?	Go to 40.	(a) Replace cassette. (b) Go to 5. CIRCUIT CARD ANALYSIS. (410764) (c) Replace 406123 cable assembly. (d) Perform sensor tube adjustment.
40. Is the hole in the under-side of the sensor tube over the BOT/EOT lamp?	Go to 5. CIRCUIT CARD ANALYSIS. (410764)	Perform sensor tube adjustment.
41. Does the RUN (Status) lamp flash?	Go to 42.	Go to 43.
42. Remove cassette and place in known good Cassette Drive. Does RUN (Status) lamp flash after moving forward and reversing when "Write Inhibit" tab is folded back (see Step 37) or after moving forward, reversing, moving forward again and reversing a second time for "Write Inhibit" tab not folded back?	Cassette bad - replace.	Go to 45.
43. With the cassette drive connected to a M40 KD or KDP capable of receiving from a cassette drive and using a cassette previously recorded on the cassette drive, can text be sent to the display?	Go to 44.	Go to 48.
44. Is text garbled?	Go to 45.	Cassette drive good.

D. TROUBLESHOOTING (Contd)

3. COMPONENT ANALYSIS (Contd)

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
45. Replace the cassette used in Step 43 with a known properly recorded cassette - does garbling still occur?	Go to 46.	Go to 5. CIRCUIT CARD ANALYSIS. (410764)
46. Is the tape cleaner bobbin indexed as the cassette is inserted and removed?	Go to 47.	(a) Adjust bobbin latch spring. (b) Check bobbin ratchet spring requirement. (c) Check bobbin stepper spring requirement. (d) Replace tape cleaner bobbin.
47. Is "O" Ring Belt frayed?	Replace "O" Ring Belt 403289.	Go to 48.
48. Is tape cleaner bobbin dirty?	Replace 403238 tape cleaner bobbin.	(a) Check Drive Belt adjustment. (b) Check "O" Ring Belt adjustment. (c) Clean recording head. (d) Clean clutch faces. (e) Clean brake faces. (f) Adjust clutches. (g) Adjust brakes. (h) Go to 5. CIRCUIT CARD ANALYSIS. (410764)
49. Does associated display indicate Block Number *** or 000?	Cassette drive good - mating equipment at fault.	(a) Replace System Cable. (b) Replace 408598 SSI/AC interface assembly. (c) Go to 5. CIRCUIT CARD ANALYSIS. (410764)

4. CIRCUIT CARD ANALYSIS (410043)

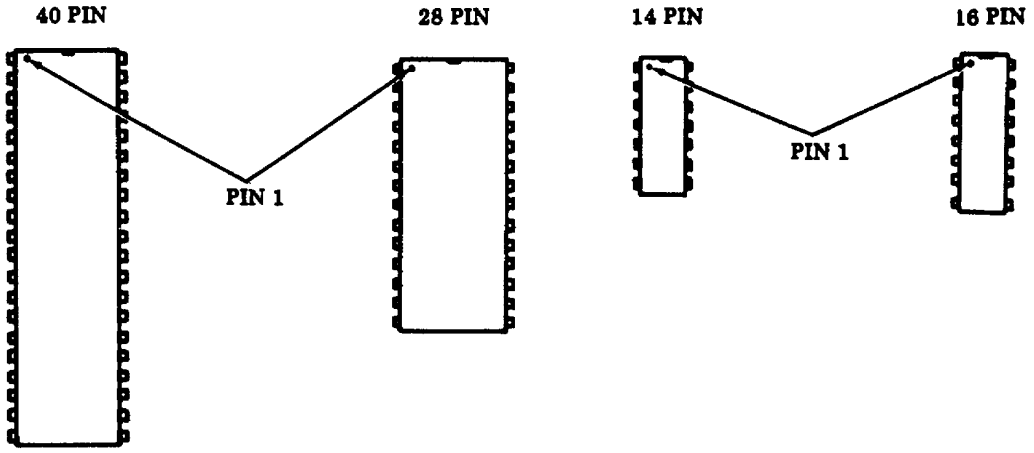
If the repair troubleshooting instructions do not serve to correct the defective card, refer to functional schematics in this section for further analysis.

View of circuit card connection looking from the top of all components. These designations are for reference only.

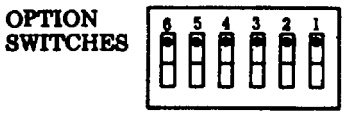
DIODE

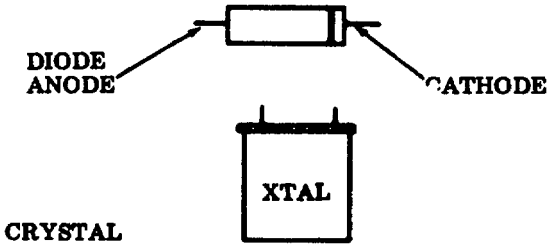
E = emitter
C = collector
B = base

Pin callouts for different size circuit packs.



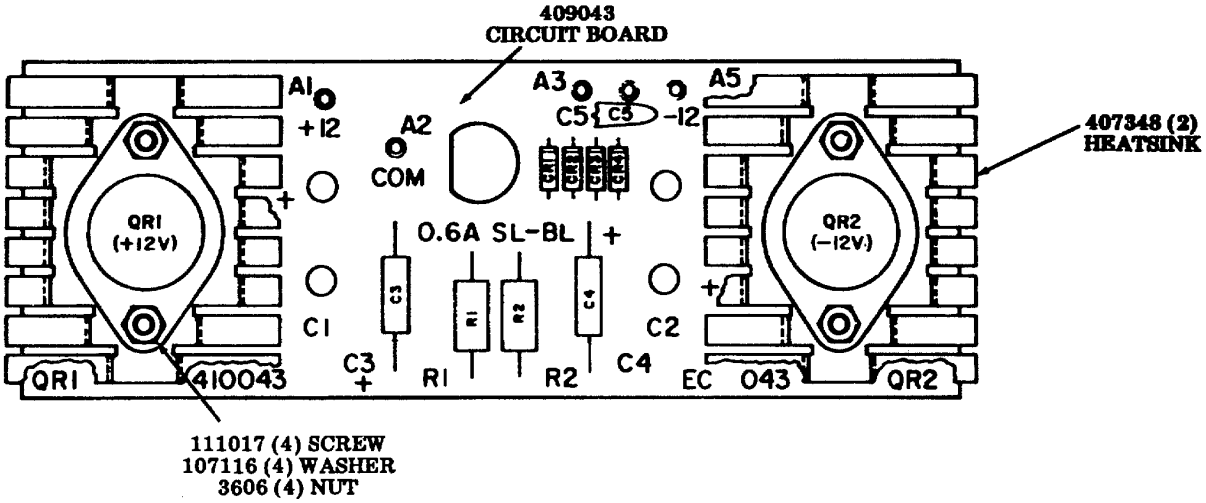
Miscellaneous component identification callouts.





D. TROUBLESHOOTING (Contd)

4. CIRCUIT CARD ANALYSIS (Contd)



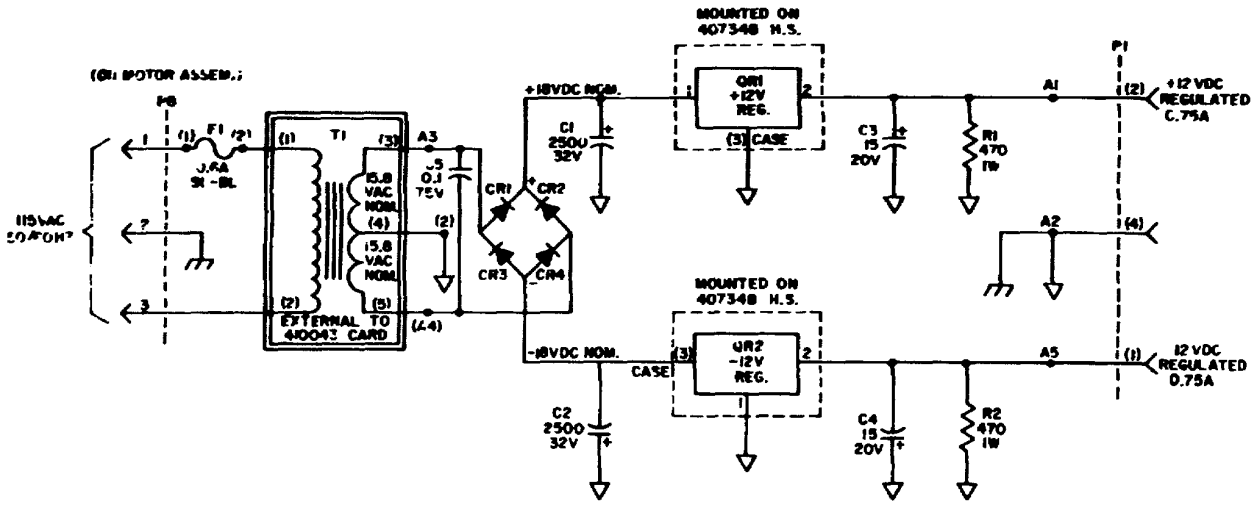
REF. DESIG.	PART NO. REQ.	QTY	DESCRIPTION
QR1	402201	1	REGULATOR, +12V
QR2	402204	1	REGULATOR, -12V
R1, R2	171580	2	RESISTOR 470, IW
C3, C4	305455	2	CAPACITOR, 15 MFD
C5	321158	1	CAPACITOR, 0.1 MFD
CR1-4	312341	4	DIODE, IN4004
AL-A5	137471	5	POST
	407348	2	HEAT SINK
	111017	4	SCREW, 6-40 X .312 PAN
	107116	4	WASHER, STAR
	3606	4	NUT, 6-40 HEX.
	409043	1	BOARD, CIRCUIT

410043 Power Supply Circuit Card

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. Is 15.8 volts ac (RMS) present at terminal marked A3?	Go to 2.	Go to 3. COMPONENT ANALYSIS.
2. Is +18 volts dc (approximately) present at cathodes of CR1 and CR2?	Go to 3.	(a) Replace CR1-CR2. (312341) (b) Replace CS. (321158) (c) Replace C1. (336027)
3. Is +12 volts dc present at terminal marked A1?	Go to 4.	(a) Replace QR1. (402201) (b) Replace C3. (305455) (c) Replace R1. (171580)
4. Is 15.8 volts ac (RMS) present at terminal marked A4?	Go to 5.	Go to 3. COMPONENT ANALYSIS.
5. Is -18 volts dc (approximately) present at anodes of CR3 and CR4?	Go to 6.	(a) Replace CR3-CR4. (312341) (b) Replace C5. (321158) (c) Replace C2. (336027)
6. Is -12 volts dc present at terminal marked A5?	410043 card is good.	(a) Replace QR2. (402204) (b) Replace C4. (305455) (c) Replace R2. (171580)

D. TROUBLESHOOTING (Contd)

4. CIRCUIT CARD ANALYSIS (410043) (Contd)



Information Notes:

1. Terminal designations enclosed in parenthesis are for reference only and are not marked on the components.
2. All resistors are ¼ watt and all resistance values in ohms, unless otherwise specified.
3. All capacitance values in microfarads unless otherwise specified.
4. Indicates Common.

   Indicates Frame Ground.
5. SL-BL Indicates Slow Blowing.

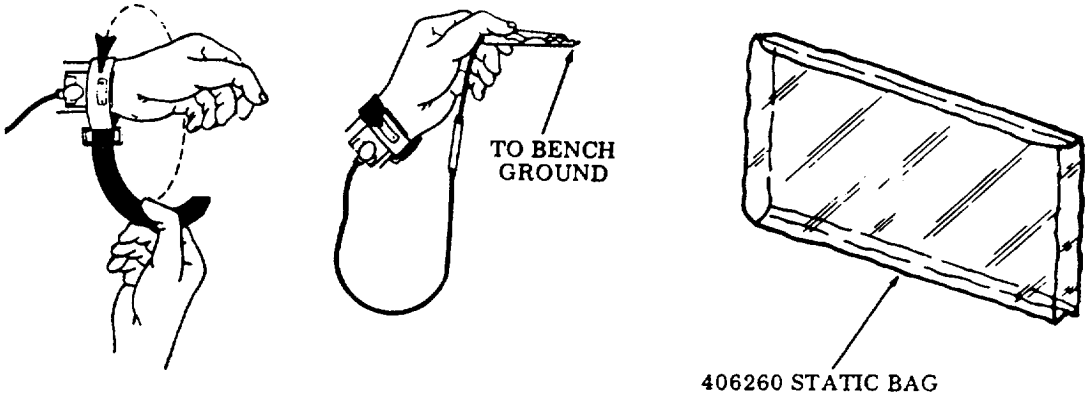
5. CIRCUIT CARD ANALYSIS (410764)

General

CAUTION 1: TO AVOID POSSIBLE INTERNAL DAMAGE TO THE MOS DEVICES, OR CARD WITH MOS DEVICES, DUE TO ELECTRICAL STATIC DISCHARGE BY SERVICE PERSONNEL, THE DETAILED PROCEDURES LISTED SHOULD BE FOLLOWED.

(a) ALL MOS DEVICES SHOULD BE DELIVERED AND STORED IN CONDUCTIVE CARRIERS SUCH AS FOAM PADS OR ALUMINUM TUBES.
(b) ALL HANDLING OF MOS DEVICES, OR CARDS WITH MOS-DEVICES, SHOULD BE DONE AT A GROUNDED BENCH WITH A CONDUCTIVE FOAM PAD OR AT A LOCATION WHERE THE SERVICE PERSONNEL CAN BE MAINTAINED AT GROUND POTENTIAL.
(c) ALL PERSONNEL HANDLING MOS DEVICES, OR CARDS WITH MOS DEVICES, MUST WEAR A STATIC PROTECTION GROUNDING STRAP ADJUSTED TO MAKE FILM CONTACT WITH THE SKIN AT ALL TIMES.
(d) MOS DEVICES DELIVERED IN ALUMINUM TUBES OR FOAM PADS MAY BE TRANSFERRED TO WORK AREA PAD BY TOUCHING CARRIER OR PAD FIRST, AND REMOVING DEVICES BY THEIR PACKAGE (BODY), RATHER THAN BY THE LEADS, IF AT ALL POSSIBLE. HOWEVER, THESE DEVICES SHALL ALWAYS BE POSITIONED SO THAT THE LEGS ARE IN CONTACT WITH THE FOAM AT ALL TIMES.
(e) SOLDERING IRONS, TEST, AND INSERTION EQUIPMENT MUST BE GROUNDED.

*Service personnel are never to be connected directly to ground, but rather through a high resistance discharge path of a minimum of 1 megohm where 110 volts is present. Use 346392 static discharge strap.



CAUTION 2: TO AVOID POSSIBLE INTERNAL DAMAGE TO MOS CIRCUITRY WHENEVER THE 410764 CIRCUIT CARD IS REMOVED, THE 346392 STATIC GROUND STRAP MUST BE WORN. THE STRAP IS NOT TO BE WORN OVER CLOTHING BUT MUST CONTACT THE SKIN TIGHTLY. THE GROUND STRAP MUST BE CONNECTED TO GROUND (EITHER "EARTH" GROUND OR FRAME GROUND) VIA ITS ASSOCIATED CLIP.

CAUTION 3: TURN OFF ALL POWER OR SIGNAL SOURCES BEFORE REMOVING OR REPLACING ANY COMPONENT.

Grounding Precautions

The 410764 circuit card contains MOS logic which requires careful handling. If the card is not already installed in the unit it should be handled while stored in its protective 406260 static bag.

D. TROUBLESHOOTING (Contd)

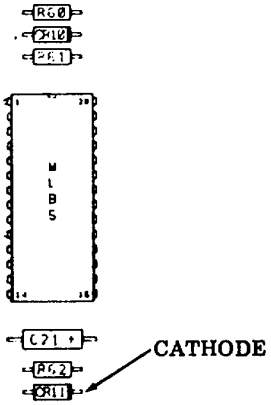
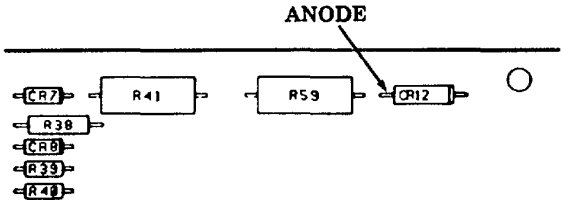
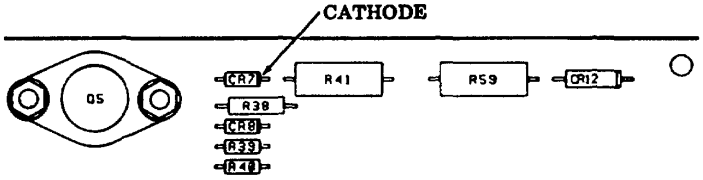
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

Before troubleshooting of the 410764 logic circuit card can be undertaken, it mast be removed from the cassette drive unit and extended away 80 that it may lie flat on a surface which is accessible to the repair person.

Refer to F. DISASSEMBLY/REASSEMBLY AND PARTS for procedure to remove circuit card from cassette drive unit.

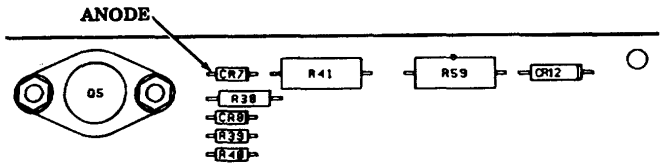
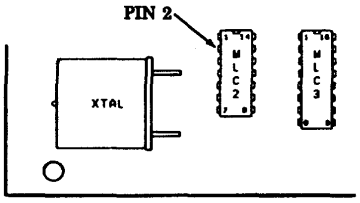
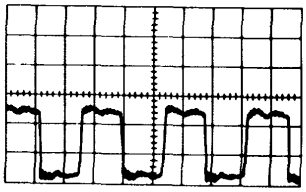
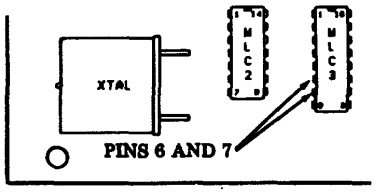
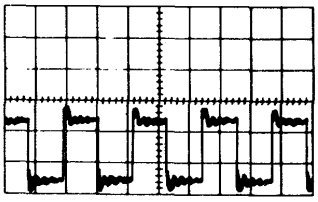
Extender cables necessary for the circuit card are number CP10.019.000 and may be ordered from:

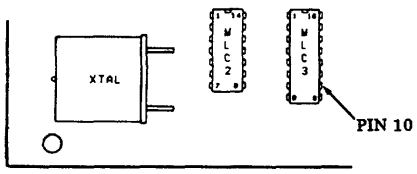
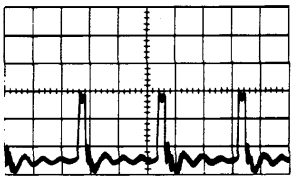
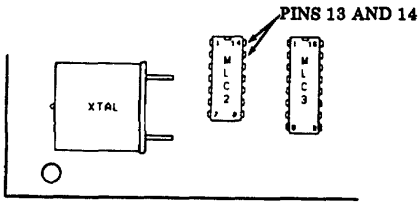
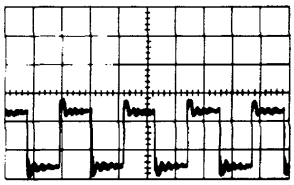
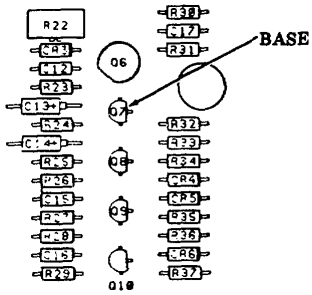
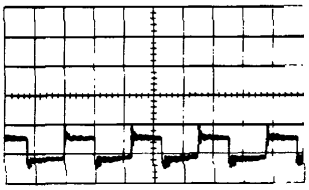
Teletype Custom Systems Division
5555 Touhy Avenue
Skokie, Illinois 60677
(312) 982-2000

ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
"POR" Step 1. Check Cathode of CR11. When power is applied to cassette drive, does voltage change from O volts to +12 volts and slowly back to O volts?  	Yes Go to 2.
Replace C21 with 337335. Replace CR11 with 197464. Replace R62 with 321508.	No
"CIRCUIT VOLTAGES" Step 2. Check Anode of CR12. Is voltage level +3 volts dc?  	Yes Go to 3.
Replace CR12 with 341735. Replace R59 with 327793.	No
Step 3. Check Cathode of CR7. Is voltage level approximately -1 volt dc?  	Yes Go to 4.
Replace CR7 with 312922. Replace R41 with 194963. Replace CR8 with 346713. Replace R38 with 182180.	No

D. TROUBLESHOOTING (Contd)

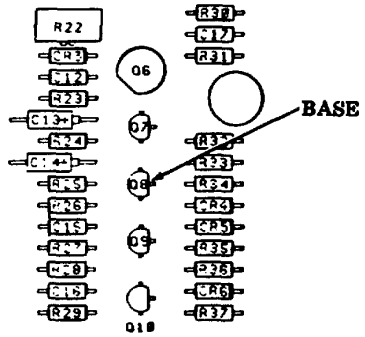
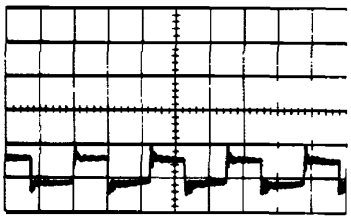
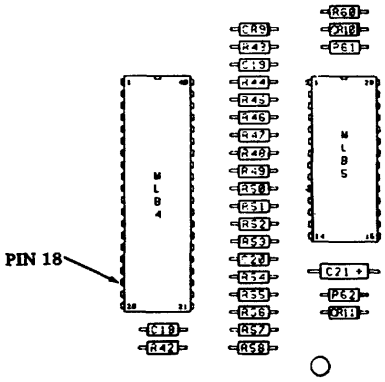
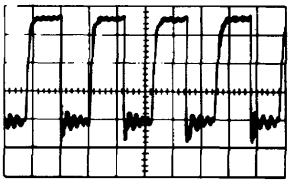
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

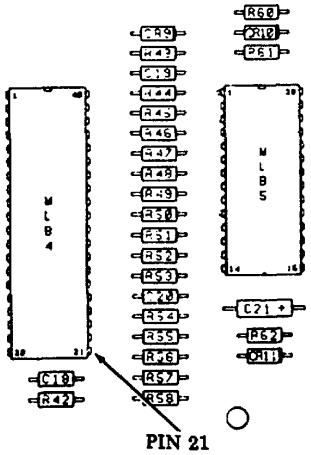
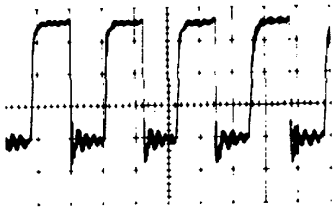
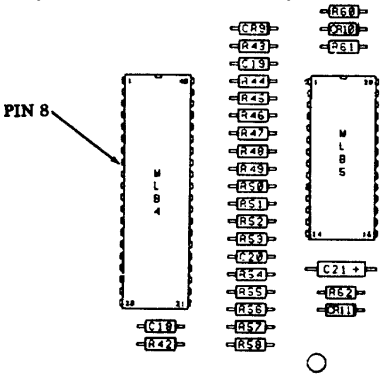
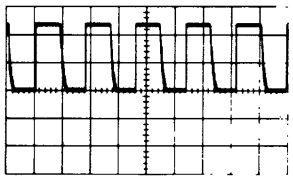
ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 4. Check Anode of CR7. Is voltage level approximately -6 volts dc?  	Yes Go to 5.
Replace CR7 with 312922. Replace Q5 with 337340. Replace R41 with 194963. Replace CR8 with 346713. Replace R38 with 182180.	No
"CLOCKS" Step 5. Check MLC2 pin 2 for waveform.  	Yes Go to 6.
Replace MLC2 with 339380. Replace XTAL with 406685. Vert .2V/Div. Horz .2us/Div.	No
Step 6. Check MLC3 pins 6 and 7 for waveform.  	Yes Go to 7.
Replace MLC3 with 339022. Vert .2V/Div. Horz .5us/Div.	No

ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 7. Check MLC3 pin 10 for waveform.   Vert .2V/Div. Horz .2us/Div. Replace MLC3 with 339022.	Yes Go to 8. No
Step 8. Check MLC2 pins 13 and 14 for waveform.   Vert .2V/Div. Horz .5us/Div. Replace MLC2 with 339380.	Yes Go to 9. No
Step 9. Check base of Q7 for waveform.   Vert .2V/Div. Horz .5us/Div. Replace C15 with 325034. Replace R26 with 320275.	Yes Go to 10. No

D. TROUBLESHOOTING (Contd)

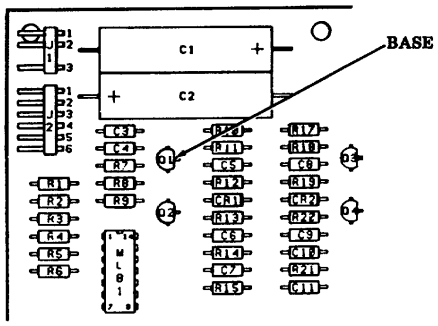
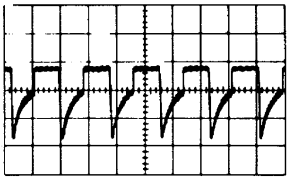
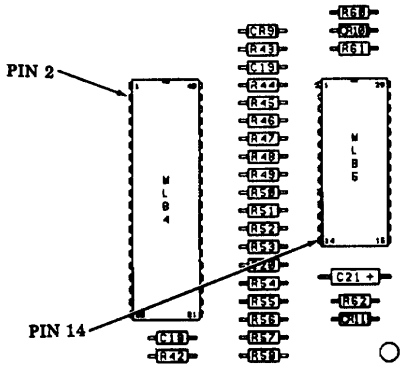
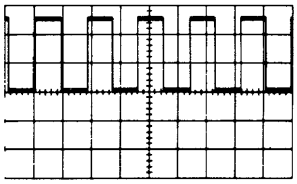
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

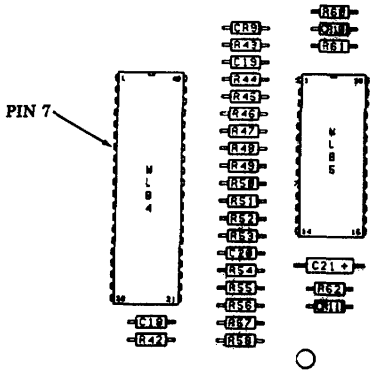
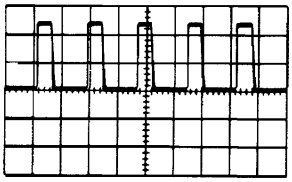
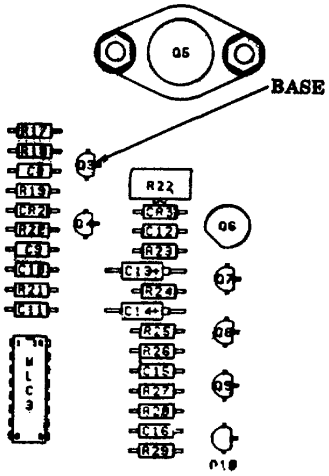
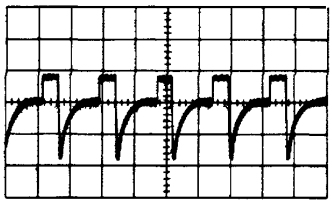
ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 10. Check base of Q8 for waveform.   Replace C16 with 197464 Replace R28 with 320275 Vert .2V/Div.. Horz .5 us/Div.	Yes Go to 11. No
Step 11. Check MLB4 pin 18 for waveform.   Replace Q7 with 341091. Replace Q9 with 341091. Replace CR5 with 197464. Replace R27 with 315954. Replace R35 with 315948. Vert .5V/Div. Horz .5us/Div.	Yes Go to 12. No

ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 12. Check MLB4 pin 21 for waveform.   Replace Q7 with 341091. Replace Q10 with 341091. Replace CR6 with 197464. Replace R36 with 315954. Replace R37 with 315948. Vert .5V/Div. Horz .5us/Div.	Yes Go to 13. No
Step 13. Check MLB4 pin 8 for waveform.   Replace MLB4 with 402279. Vert .5V/Div. Horz 10us/Div.	Yes Go to 14. No

D. TROUBLESHOOTING (Contd)

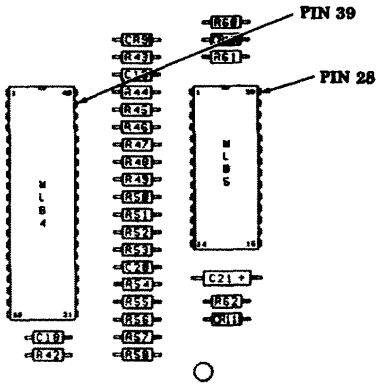
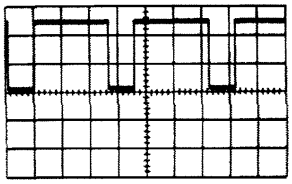
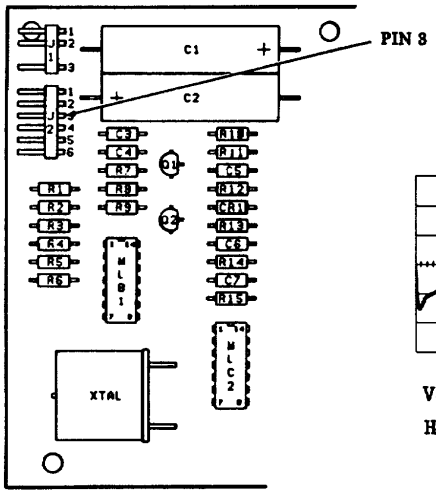
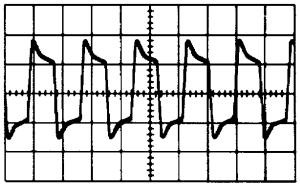
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

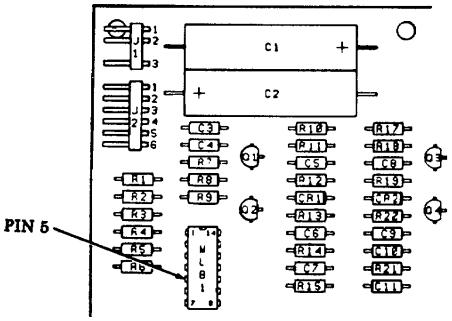
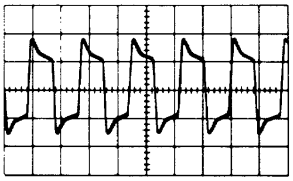
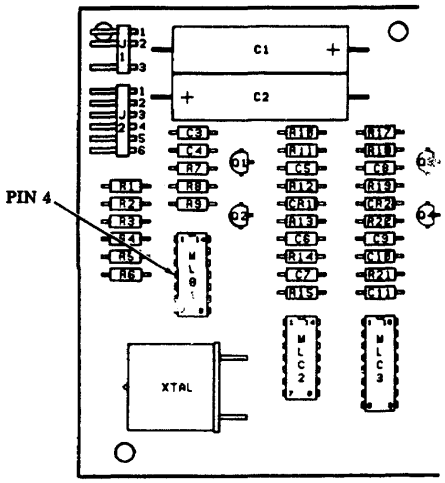
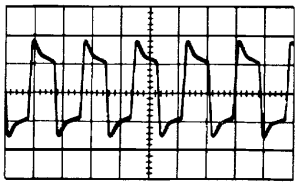
ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 14. Check base of Q1 for waveform.   Replace C5 with 325034. Replace R10 with 320275. Replace R10 with 320275. Vert .1V/Div. Horz 10us/Div.	Yes Go to 15. No
Step 15. Check MLB4 pin 2 and MLB5 pin 14 for waveform.   Replace Q1 with 341091. Replace Q2 with 341091. Replace CR1 with 197464. Replace R12 with 315954. Replace R13 with 315948. Vert .5V/Div. Horz 10us/Div.	Yes Go to 16. No

ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 16. Check MLB4 pin 7 for waveform.   Replace MLB4 with 402279. Vert .5V/Div. Horz 10us/Div.	Yes Go to 17. No
Step 17. Check base of Q3 for waveform.   Replace C8 with 325034. Vert .1V/Div. Replace R18 with 320275. Horz 10us/Div. Replace R17 with 320275.	Yes Go to 18. No

D. TROUBLESHOOTING (Contd)

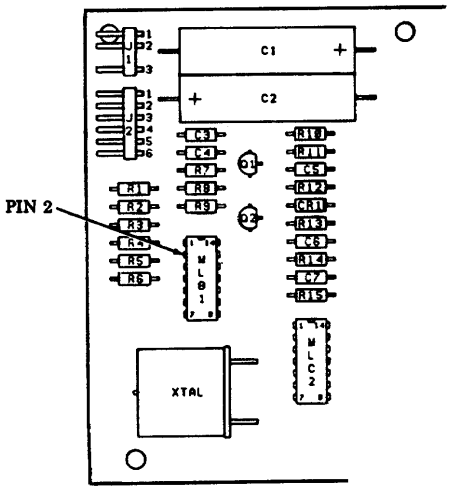
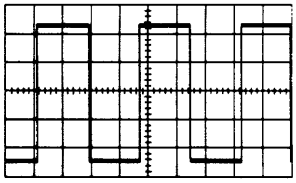
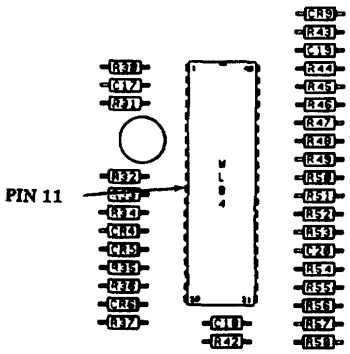
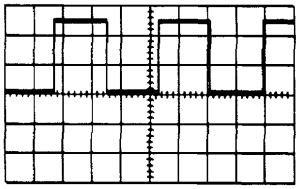
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

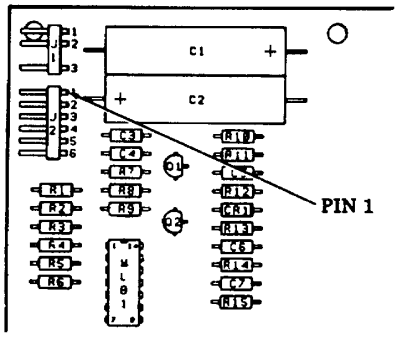
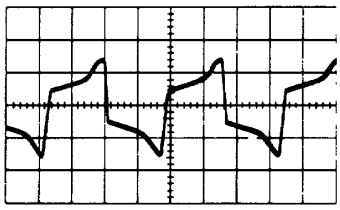
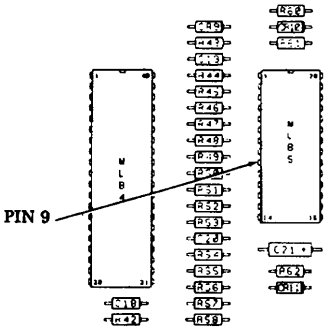
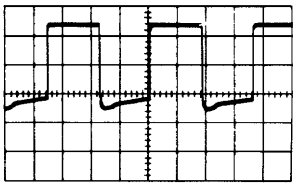
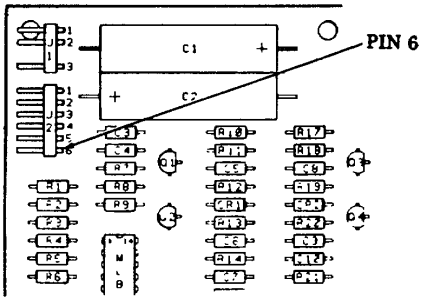
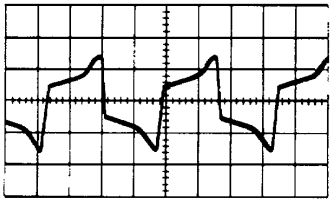
ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 18. Check MLB4 pin 39 and MLB5 pin 28 for waveform.  	Yes Go to 19.
Replace Q3 with 341091. Replace Q4 with 341091. Replace CR2 with 197464. Replace R19 with 315954. Replace R20 with 315948. Vert .5V/Div. Horz 5us/Div.	No
Step 19. Check J2 pin 3 for waveform.   Vert .1V/Div. Horz 20us/Div.	Yes Go to 20.
Replace 408598 SSI/AC Distribution Assembly. Go to 3. COMPONENT ANALYSIS.	No

ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 20. Check MLB1 pin 5 for waveform.   Replace R1 with 315956. Replace R2 with 315956. Replace R3 with 315985. Vert .1V/Div. Horz 20us/Div.	Yes Go to 21. No
Step 21. Check MLB1 pin 4 for waveform.   Replace R1 with 315956. Replace R2 with 315956. Replace R3 with 315985. Vert .1V/Div. Horz 20us/Div.	Yes Go to 22. No

D. TROUBLESHOOTING (Contd)

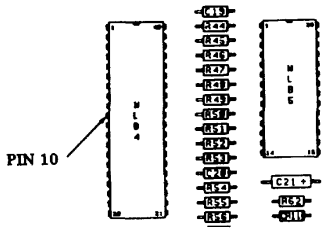
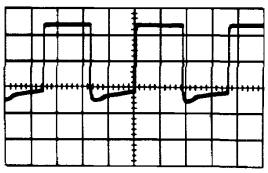
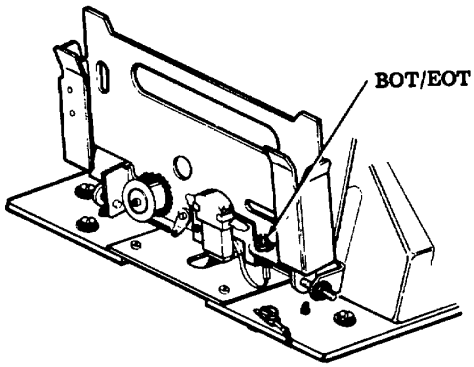
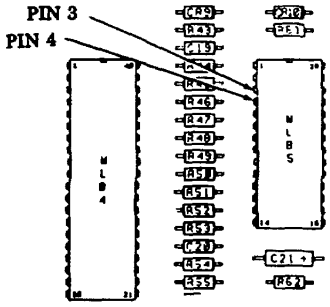
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

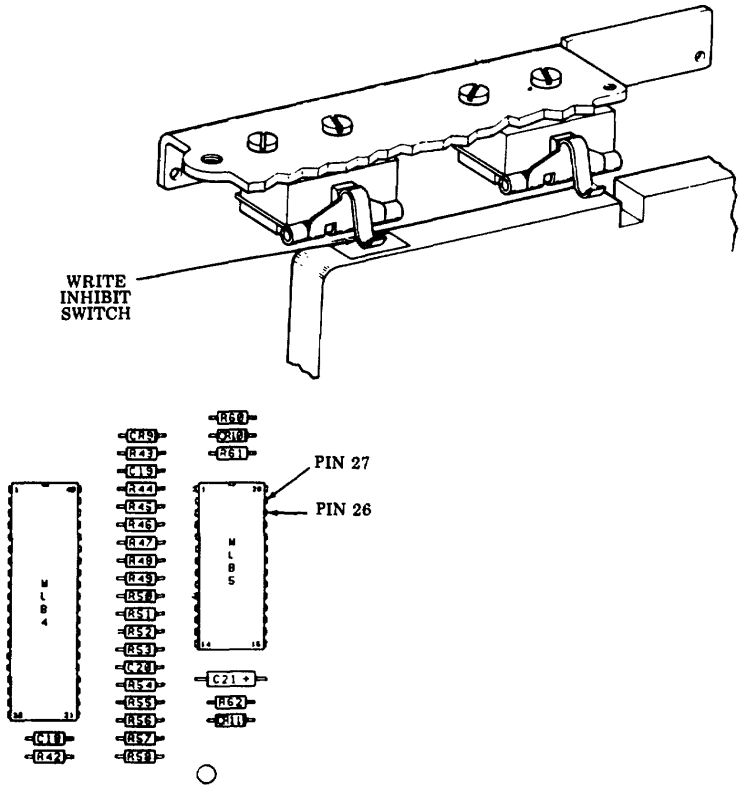
ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 22. Check MLB1 pin 2 for waveform.   Replace MLB1 with 404239. Replace R4 with 328767. Vert .5V/Div. Horz 10us/Div.	Yes Go to 23. No
Step 23. Check MLB4 pin 11 for waveform.   Replace R5 with 315957. Replace R6 with 315957. Vert .5V/Div. Horz 10us/Div.	Yes Go-to 24. No

ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 24. Check J2 pin 1 for waveform.   Vert .2V/Div. Horz 10us/Div. Replace 408598 SSI/AC Distribution Assembly. Refer to 3. COMPONENT ANALYSIS.	Yes Go to 25. No
Step 25. Check MLB4 pin 9 for waveform.   Vert .5V/Div. Horz 10us/Div. Replace R7 with 315957. Replace R8 with 320275.	Yes Go to 26. No
Step 26. Check J2 pin 6 for waveform.   Vert .5V/Div. Horz 10us/Div. Replace 408598 SSI/AC Distribution Assembly. Refer to 3. COMPONENT ANALYSIS.	Yes Go to 27. No

D. TROUBLESHOOTING (Contd)

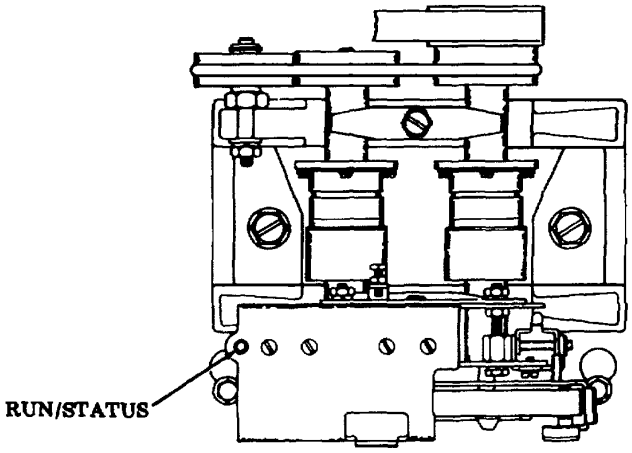
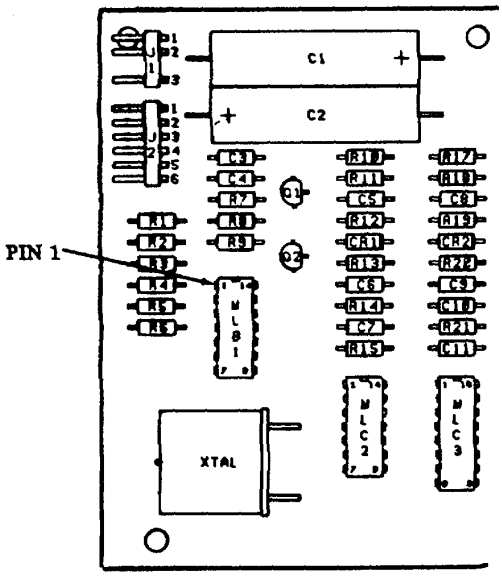
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

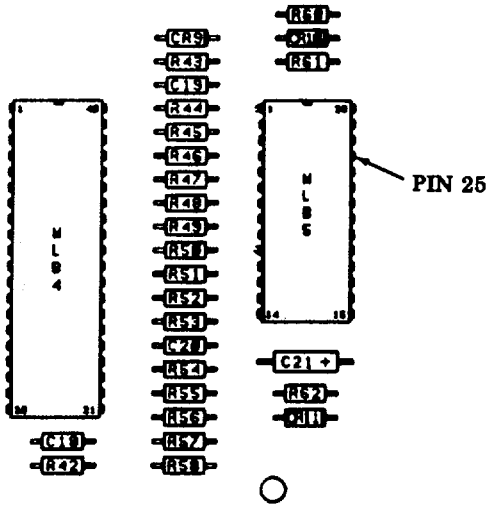
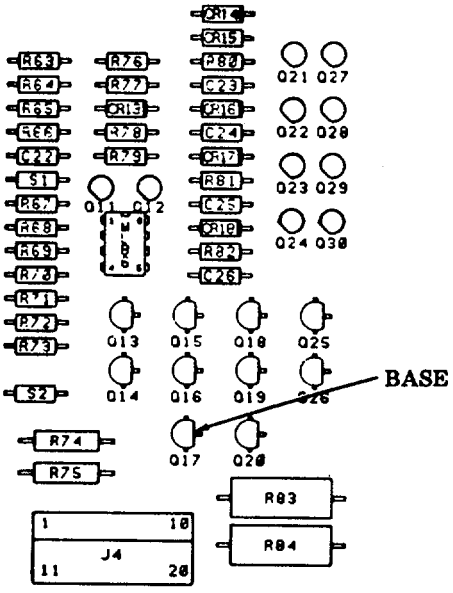
ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 27. Check MLB4 pin 10 for waveform.   Replace R9 with 315957. Replace R8 with 320275. Vert .5V/Div. Horz 10us/Div.	Yes Go to 28. No
Step 28. Check to see if BOT/EOT lamp is lit.  Replace 406123 cable assembly. Replace R75 with 300255. Refer to 3. COMPONENT ANALYSIS.	Yes Go to 29. No
"SELF-TEST" Step 29. Perform self-test by latching cassette into cassette drive. MLB5 pin 3 should be +12 V dc, and MLB5 pin 4 should be 0 V dc.  Replace cassette in place switch with 406111. Refer to 3. COMPONENT ANALYSIS.	Yes Go to 30. No

ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 30. Unlatch cassette and manually activate write inhibit switch. MLB5 pin 26 should be at O V dc, and MLB5 pin 27 should be at +12 V dc. 	Go to 31.
Replace write inhibit switch with 406111. Refer to 3. COMPONENT ANALYSIS.	No

D. TROUBLESHOOTING (Contd)

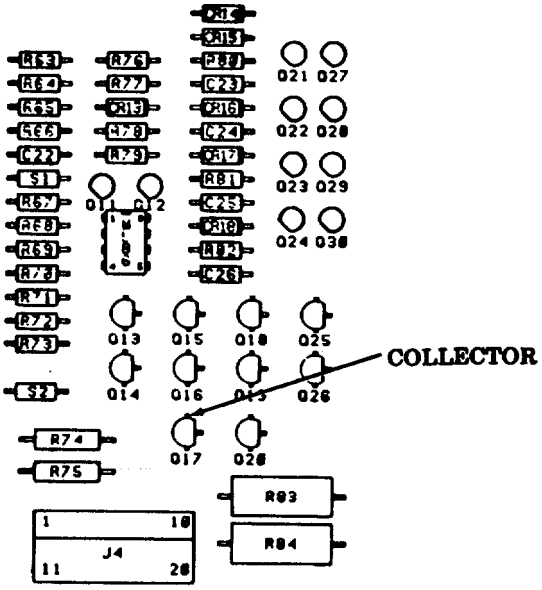
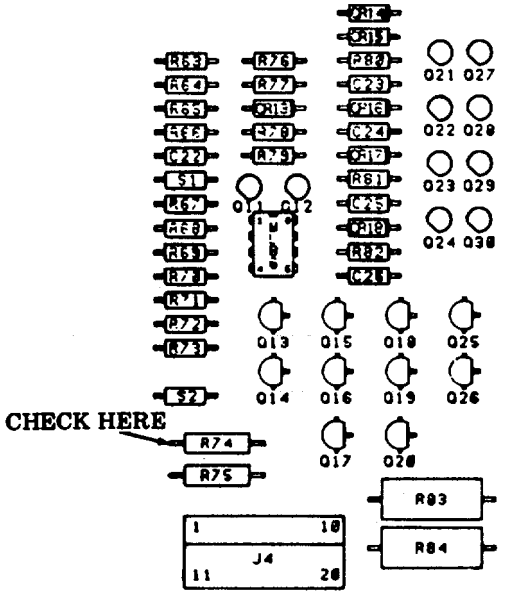
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

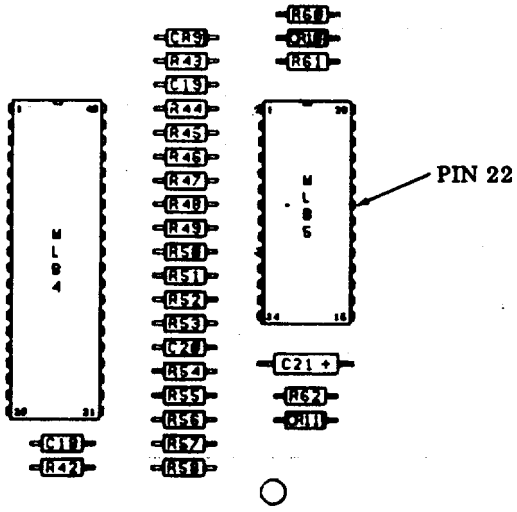
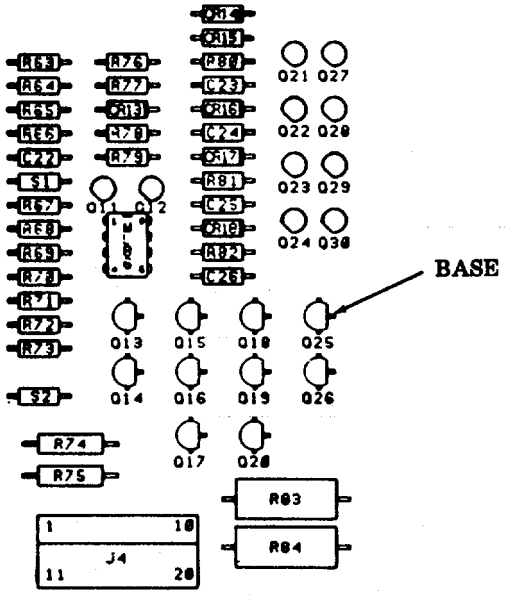
ANALYSIS QUESTION	YES/NO RESPONSE DIRECTIVE
Step 31. During self-test does RUN/STATUS lamp turn on?  	Yes Go to 37. No Go to 32.
Step 32. Check MLB1 pin 1 for -12 V dc when lamp is on, and +12 V dc when lamp is off.  Replace MLB1 with 404239. Replace 406123 cable assembly.	Yes Go to 33. No

	ANALYSIS QUESTION	YES, NO RESPONSE DIRECTIVE
Step 33.	Check MLB5 pin 25 for +12 V dc when lamp is on, and -12 V dc when lamp is off.  	Yes Go to 34.
	Replace MLB5 with 405683.	No
Step 34.	Check base of Q17 for -11 V dc when lamp is on, and -12 V dc when lamp is off.  	Yes Go to 35.
	Replace R64 with 315989. Replace R63 with 315989.	No

D. TROUBLESHOOTING (Contd)

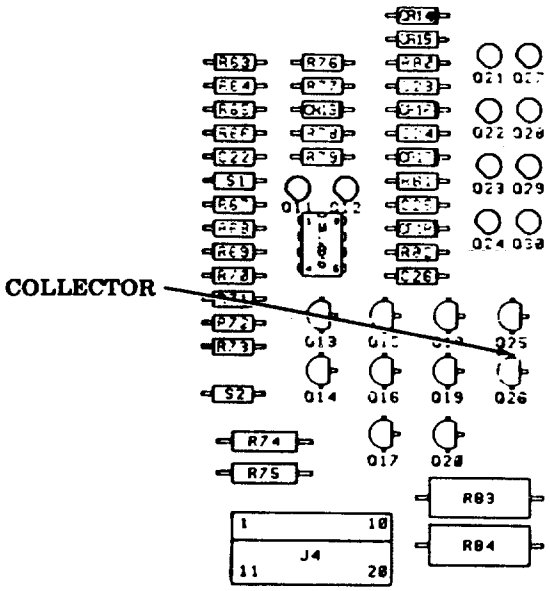
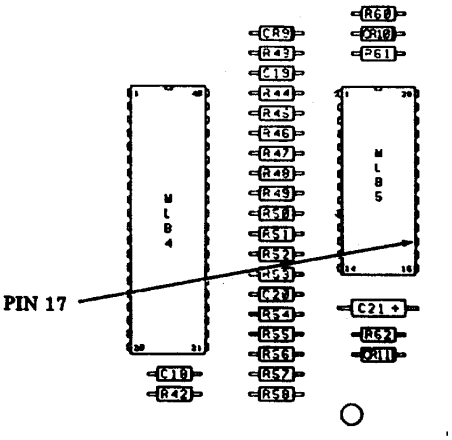
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

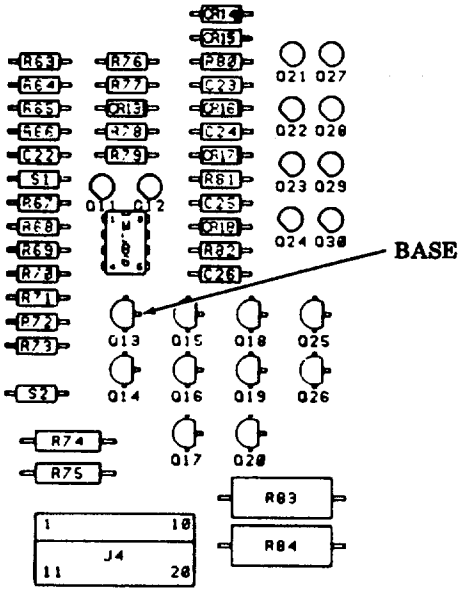
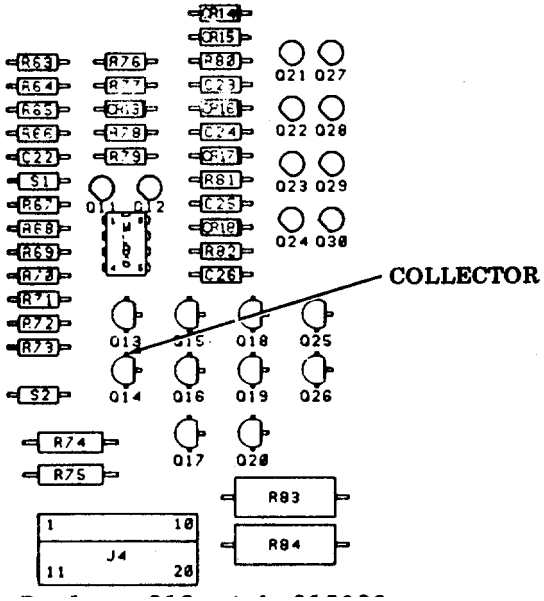
	ANALYSIS QUESTION	YES, NO RESPONSE DIRECTIVE
Step 35.	Check collector of Q17 for -12 V dc when lamp is on, and 0 V dc when lamp is off.	Yes Go to 36.
		
	Replace Q17 with 315930. Replace Q20 with 341091.	No
Step 36.	Check left side of R74 for -5 V dc when lamp is on, and 0 V dc when lamp is off.	Yes Go to 37.
		
	Replace R74 with 137438. Replace 406123 cable assembly.	No

	ANALYSIS QLESTION	YES, NO RESPONSE DIRECTIVE
Step 37.	Check MLB5 pin 22 with scope set on Vert .5V/Div. and Horz lOus/Div., signal should toggle between -12 V dc, and +12 V dc during normal operation (self-test, reading and writing), and should remain at -12 V dc during forward and reverse tape movement. 	Yes Go to 38.
	Replace MLB5 with 405683.	No
Step 38.	Check base of Q25. Signal should toggle between -12 V dc and -10 V dc during normal operation, and should remain at -12 V dc during forward and reverse tape movement. 	Yes Go to 39.
	Replace R65 with 315989. Replace R66 with 315989.	No

D. TROUBLESHOOTING (Contd)

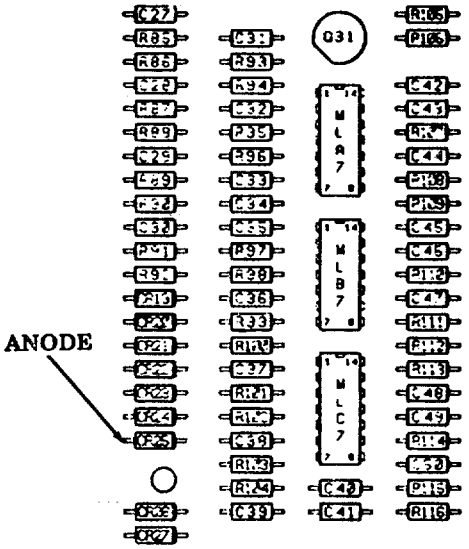
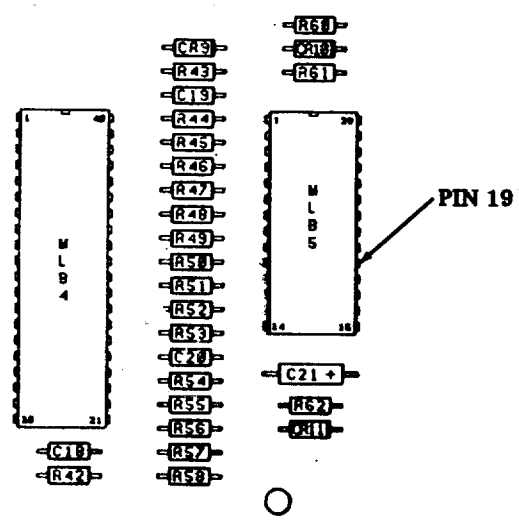
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

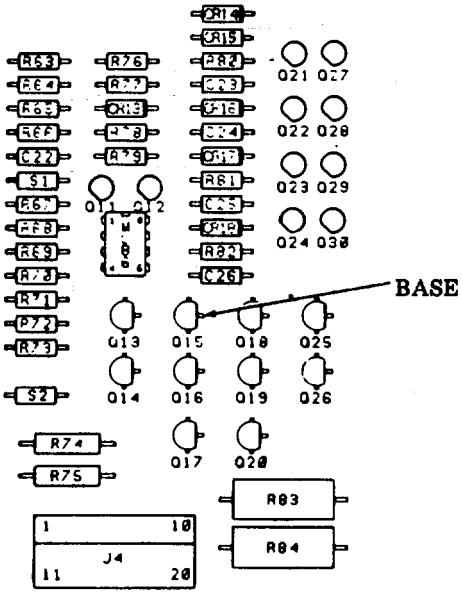
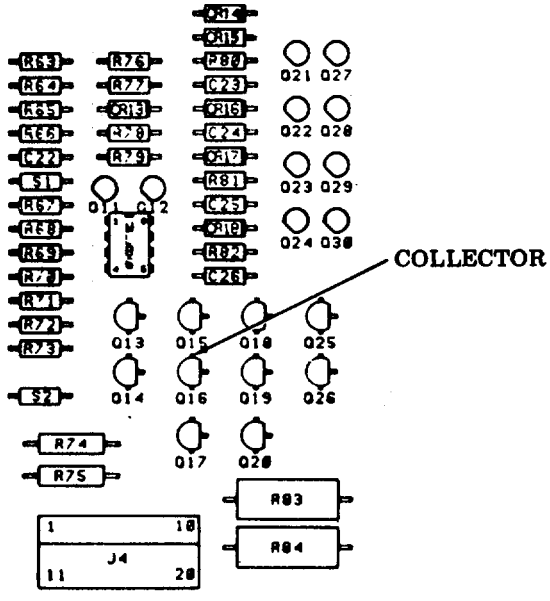
	ANALYSIS QUESTION	YES, NO RESPONSE DIRECTIVE
Step 39.	Check collector of Q26. Signal should toggle between +12 V dc and -12 V dc during normal operation, and should remain at +12 V dc during forward and reverse tape movement.  	Yes Go to 40. No
	Replace Q25 with 315930. Replace Q26 with 341091. Replace CR20 with 312341. Replace CR27 with 312341. Replace 403296 brake assembly (2).	No
Step 40.	Check MLB5 pin 17. Signal should toggle between -12 V dc and +12 V dc during normal operation, should remain at -12 V dc during forward tape movement, and should remain at +12 V dc during reverse tape movement.  	Yes Go to 41.
	Replace MLB5 with 405683.	No

	ANALYSIS QUESTION	YES, NO RESPONSE DIRECTIVE
Step 41.	Check base of Q13. Signal should toggle between -12 V dc and -10 V dc during normal operation, should remain at -12 V dc during forward tape movement, and should remain at -10 V dc during reverse tape movement. 	Yes Go to 42.
	Replace R72 with 315989. Replace R73 with 315989.	No
Step 42.	Check collector of Q14. Signal should toggle between O V dc and -12 V dc during normal operation, should remain at O V dc during forward tape movement, and should remain at -12 V dc during reverse tape movement. 	Yes Go to 43.
	Replace Q13 with 315930. Replace Q14 with 341091.	No

D. TROUBLESHOOTING (Contd)

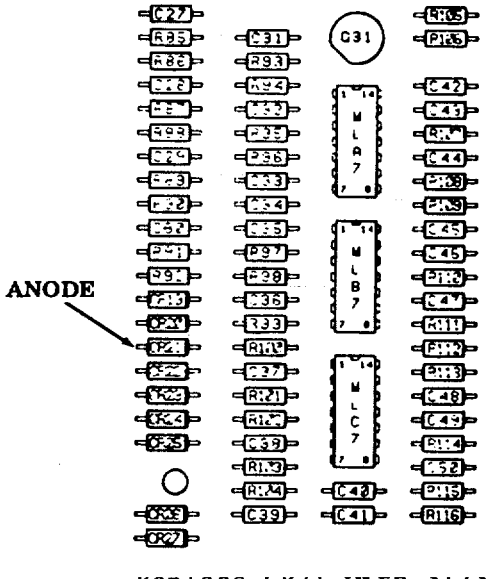
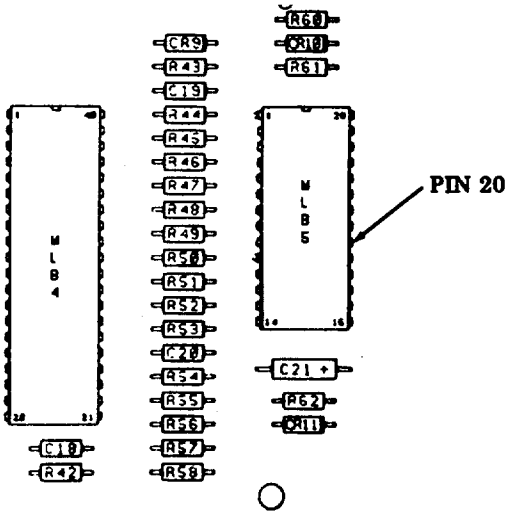
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

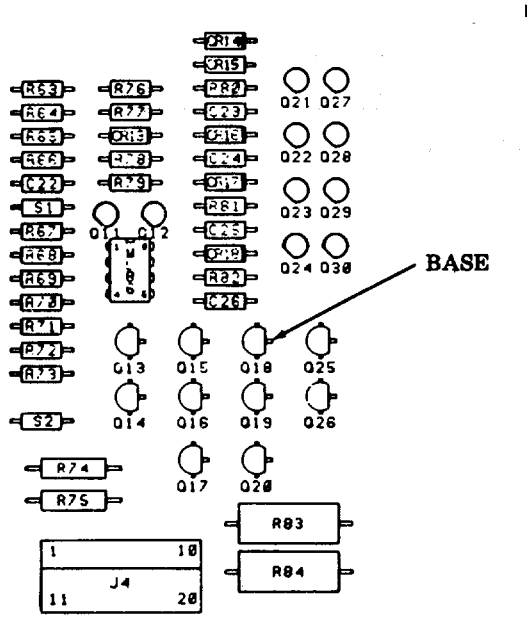
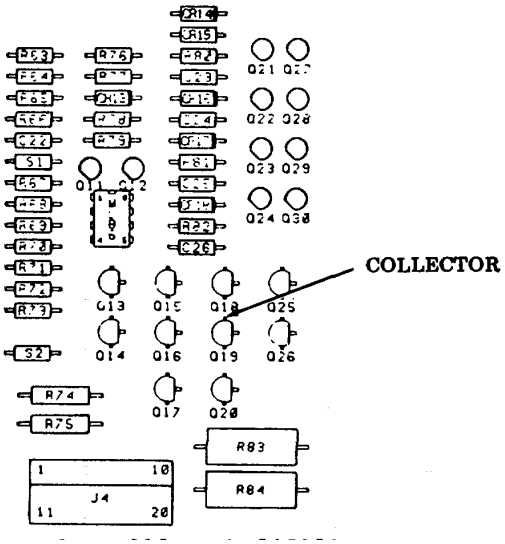
	ANALYSIS QUESTION	YES, NO RESPONSE DIRECTIVE
Step 43.	Check Anode of CR25. Signal should toggle between 0 V dc and -10 V dc during normal operation, should remain at 0 V dc during forward tape movement, and should remain at -10 V dc during reverse tape movement.  Replace CR25 with 312341. Replace CR26 with 312341. Replace 403274 clutch coil Replace 402271 clutch assembly.	Yes Go to 44. No
Step 44.	Check MCB5 pin 19. Signal should toggle between -12 V dc and +12 V dc during normal operation, and should remain at -12 V dc for forward and reverse tape movement.  Replace MLB5 with 405683.	Yes Go to 45. No

	ANALYSIS QUESTION	YES, NO RESPONSE DIRECTIVE
Step 45.	Check base of Q15. Signal should toggle between -12 V dc and -10 V dc during normal operation, and should remain at -12 V dc during forward and reverse tape movement.  	Yes Go to 46.
	Replace R69 with 315989. Replace R70 with 315989.	No
Step 46.	Check collector of Q16. Signal should toggle between +12 V dc and -12 V dc during normal operation, should remain at -3 V dc during forward tape movement, and should remain at +12 V dc during reverse tape movement.  	Yes Go to 47.
	Replace Q15 with 315930. Replace Q16 with 341091.	No

D. TROUBLESHOOTING (Contd)

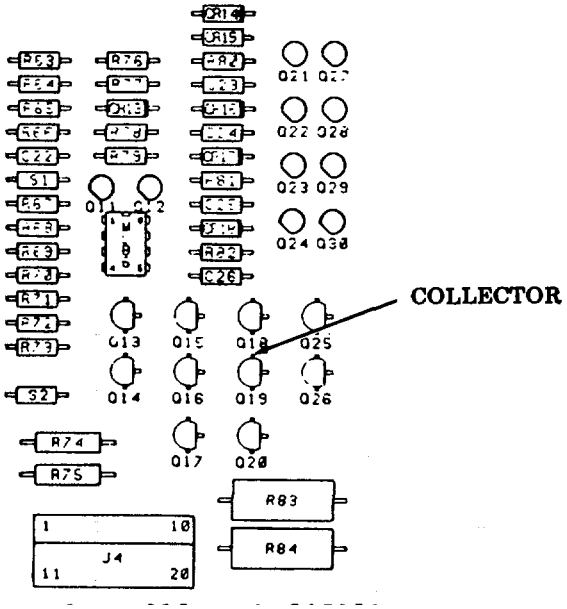
5. CIRCUIT CARD ANALYSIS (410764) (Contd)

	ANALYSIS QUESTION	YES, NO RESPONSE DIRECTIVE
Step 47.	Check Anode of CR21. Signal should toggle between +12 V dc and -12 V dc for normal operation, should remain at +5 V dc during forward tape movement, and should remain at +12 V dc during reverse tape movement. 	Yes Go to 48.
	Replace CR21 with 312341. Replace R84 with 301767. Replace CR20 with 312341. Replace CR19 with 312341. Replace 403296.brake assembly.	No
Step 48.	Check MLB5 pin 20. Signal should toggle between -12 V dc and +12 V dc during normal operation, should remain at +12 V dc during forward tape movement, and should remain at -12 V dc during reverse tape movement. 	Yes Go to 49.
	Replace MLB5 with 405683.	No

	ANALYSIS QUESTION	YES, NO RESPONSE DIRECTIVE
Step 49.	Check base of Q18. Signal should toggle between -12 V dc and -10 V dc during normal operation, should remain at -10 V dc during forward tape movement, and should remain at -12 V dc during reverse tape. movement.	Yes Go to 50.
		No
	Replace R67 with 315989. Replace R68 with 315989.	
Step 50.	Check collector of Q19. Signal should toggle between +12 V dc and -12 V dc during normal operation, should remain at -12 V dc during forward tape movement, and should remain at +12 V dc during reverse tape movement.	Yes Go to 51.
		
	Replace Q18 with 315930. Replace Q19 with 341091. Replace C22 with 315976. Replace CR24 with 312341. Replace R83 with 301767. Replace R84 with 301767. Replace CR21 with 312341.	No

D. TROUBLESHOOTING (Contd)

5. CIRCUIT CARD ANALYSIS (410764) ,(Contd)

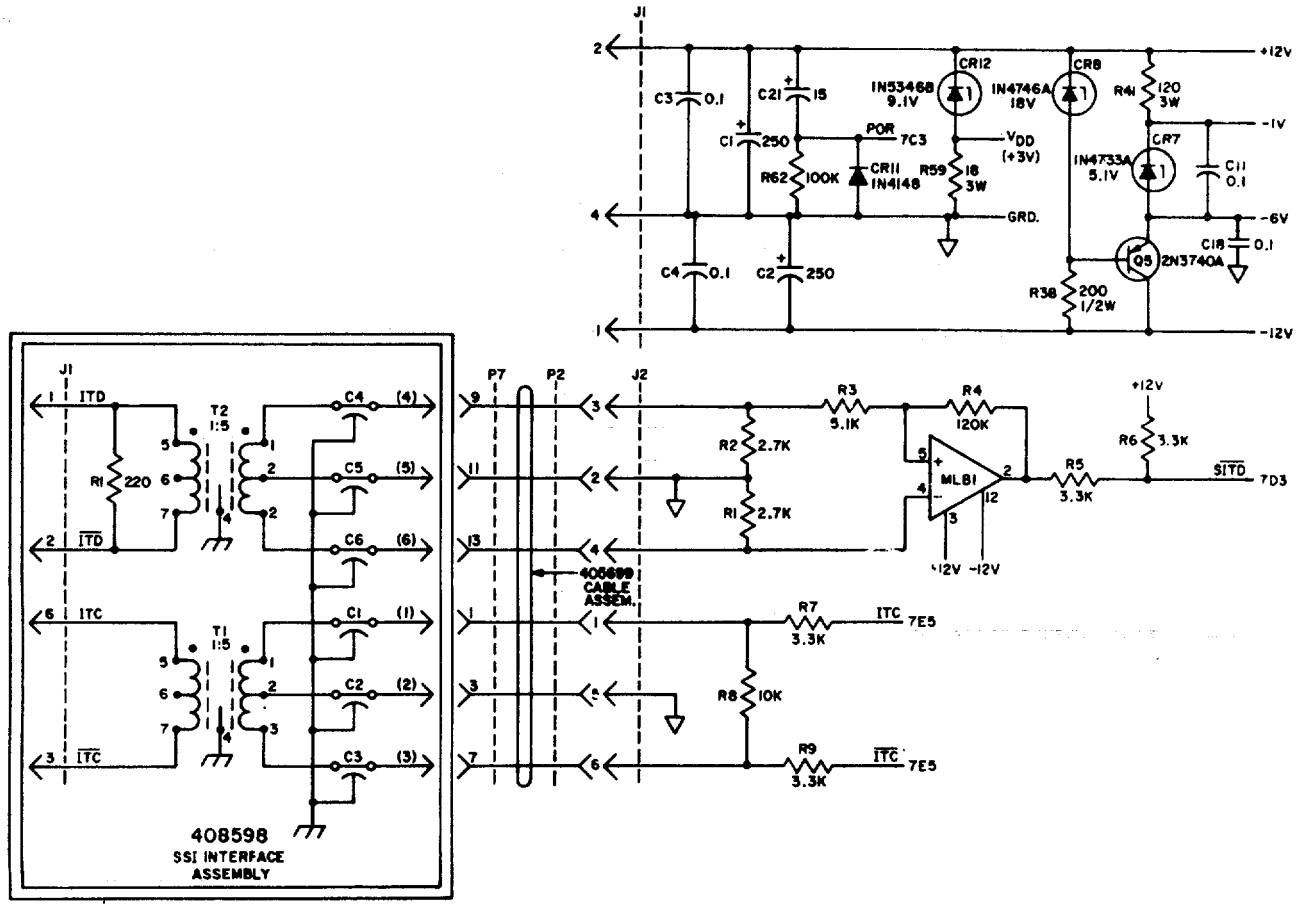
	ANALYSIS QUESTION	YES, NO RESPONSE DIRECTIVE
Step 51.	Check Anode of CR23. Signal should toggle between 0 V dc and -12 V dc during normal operation, should remain at -10 V dc during forward tape movement, and should remain at 0 V dc during reverse tape movement.	Yes Go to 52.
		
	Replace CR23 with 312341. Replace CR22 with 312341. Replace 403274 clutch coil. Replace 402272 clutch assembly.	No

	ANALYSIS QUESTION	YES, NO RESPONSE DIRECTIVE
Step 52.	Analysis Steps 1-51 should be sufficient to repair a defective 410764 circuit card. If problems are still encountered at this point, the following steps may be undertaken: 1. Replace MLB4 with 402279. 2. Replace MLB5 with 405683. 3. Refer to functional schematics at end of section for further analysis. If problems are still encountered during write operations, the following steps may be undertaken: 1. Replace MLB8 with 404239. 2. Replace Q31 with 315931. 3. Replace Q32 with 341091. 4. Replace Q33 with 341091. 5. Replace CR28 with 197464. 6. Replace CR29 with 197464. 7. Refer to functional schematics at end of section for further analysis. If problems are still encountered during read operations, the following steps-may be undertaken: 1. Replace MLA7 with'337347. 2. Replace MLC7 with 337347. 3. Replace MLB7 with 337347. 4. Replace Q21 with 323934. 5. Replace Q22 with 323934. 6. Replace,Q23 with 323934. 7. Replace Q24 with 323934. 8. Replace Q27 with 323934. 9. Replace Q28 with 323934. 10. Replace Q29 with 323934. 11. Replace Q30 with 323934. 12. Replace CR9 with 197464. 13. Replace CR10 with 197464. 14. Replace CR15 with 197464. 15. Replace CR16 with 197464. 16. Replace CR17 with 197464. 17. Replace CR18 with 197464. 18. Refer to functional schematics at end of section for further analysis.	

D. TROUBLESHOOTING (Contd)

6. FUNCTIONAL SCHEMATICS

POWER INPUT, REGULATORS, POR AND SSI INTERFACE CIRCUITS



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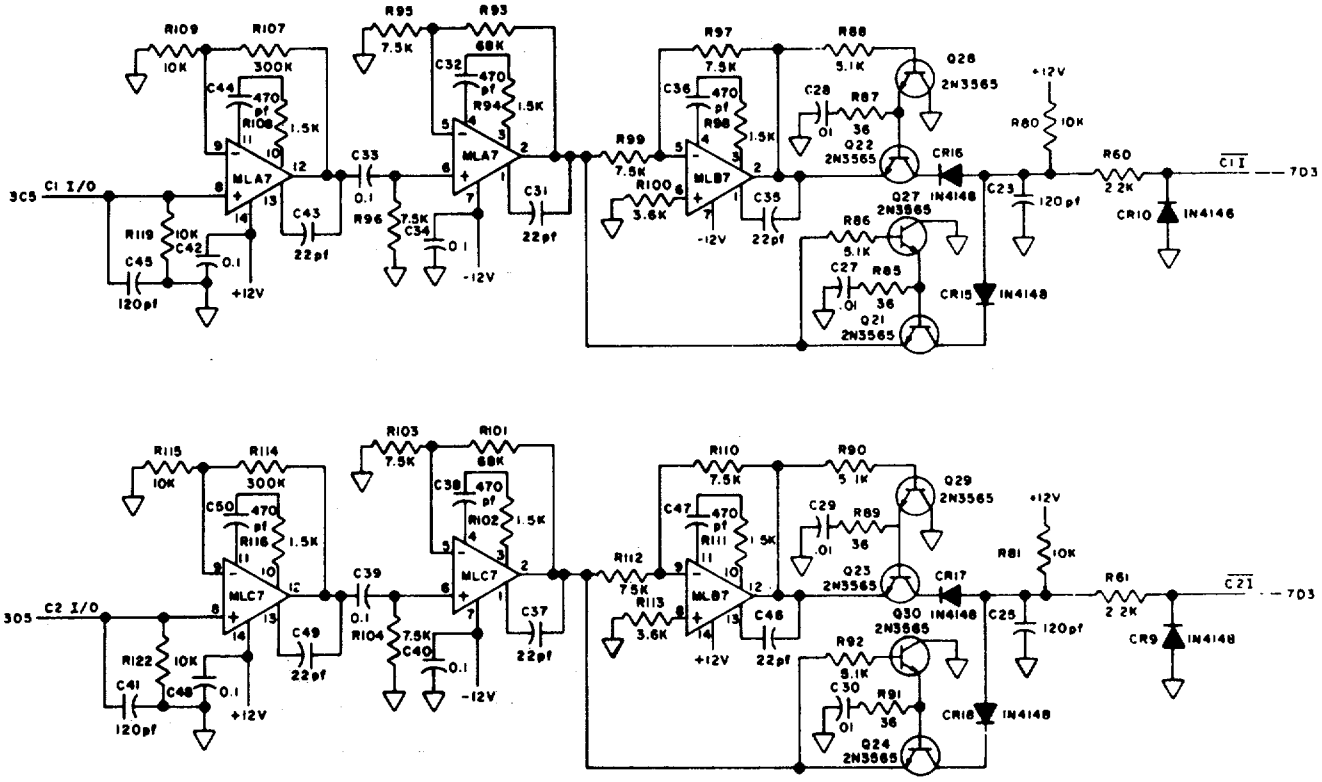
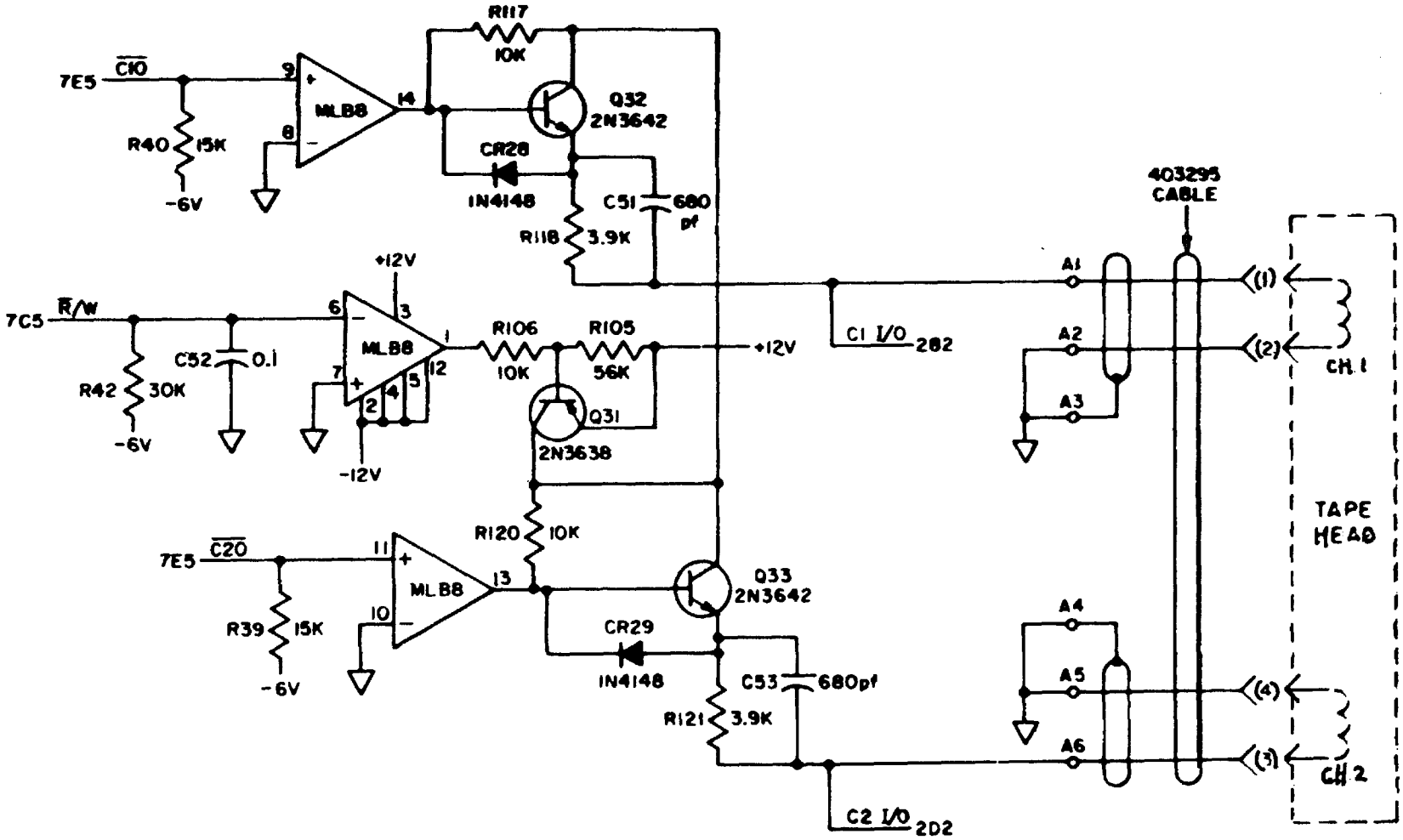
PEAK DETECTOR CIRCUITS

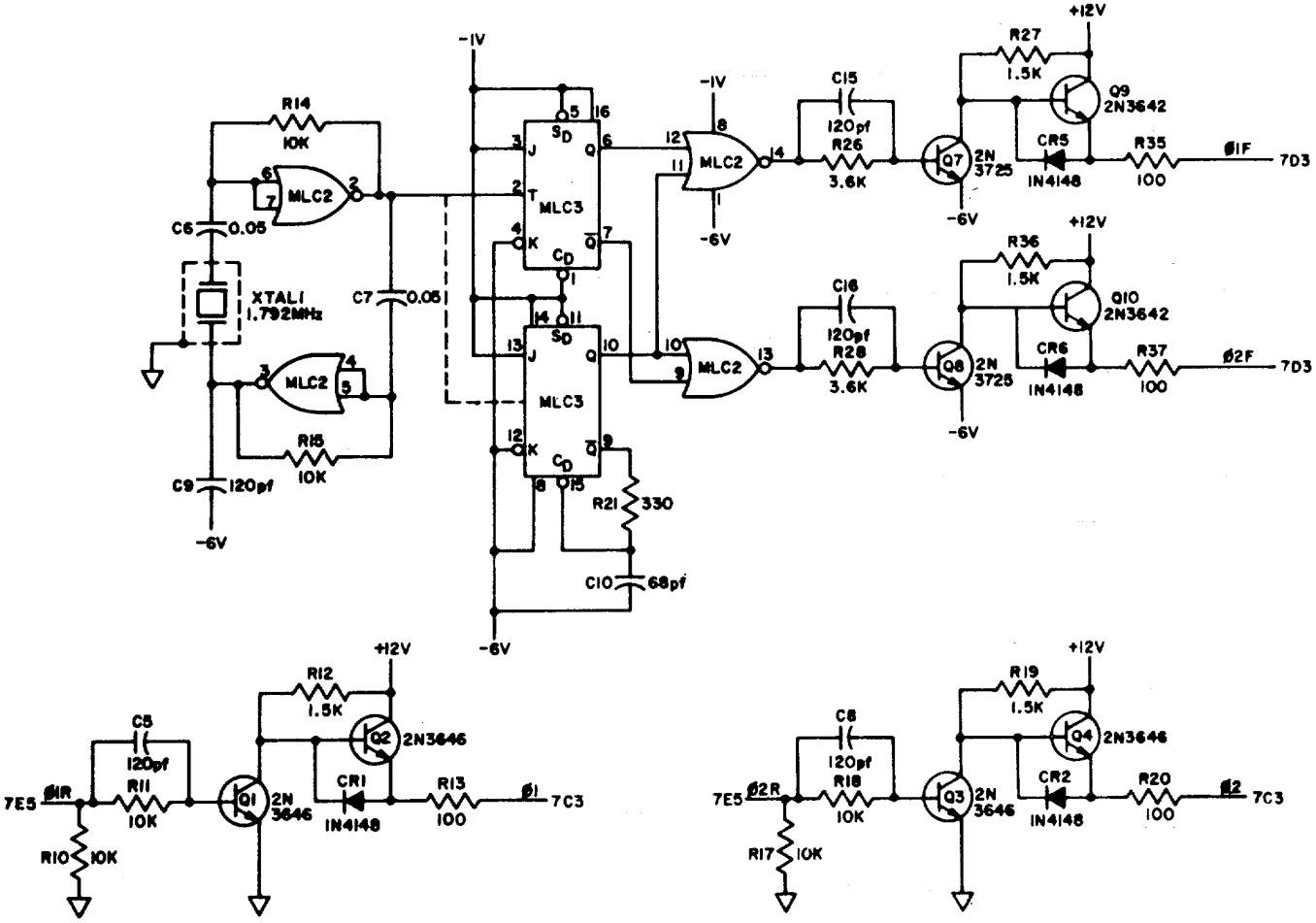


D. TROUBLESHOOTING (Contd)
6. FUNCTIONAL SCHEMATICS (Contd)

WRITE AMPLIFIERS



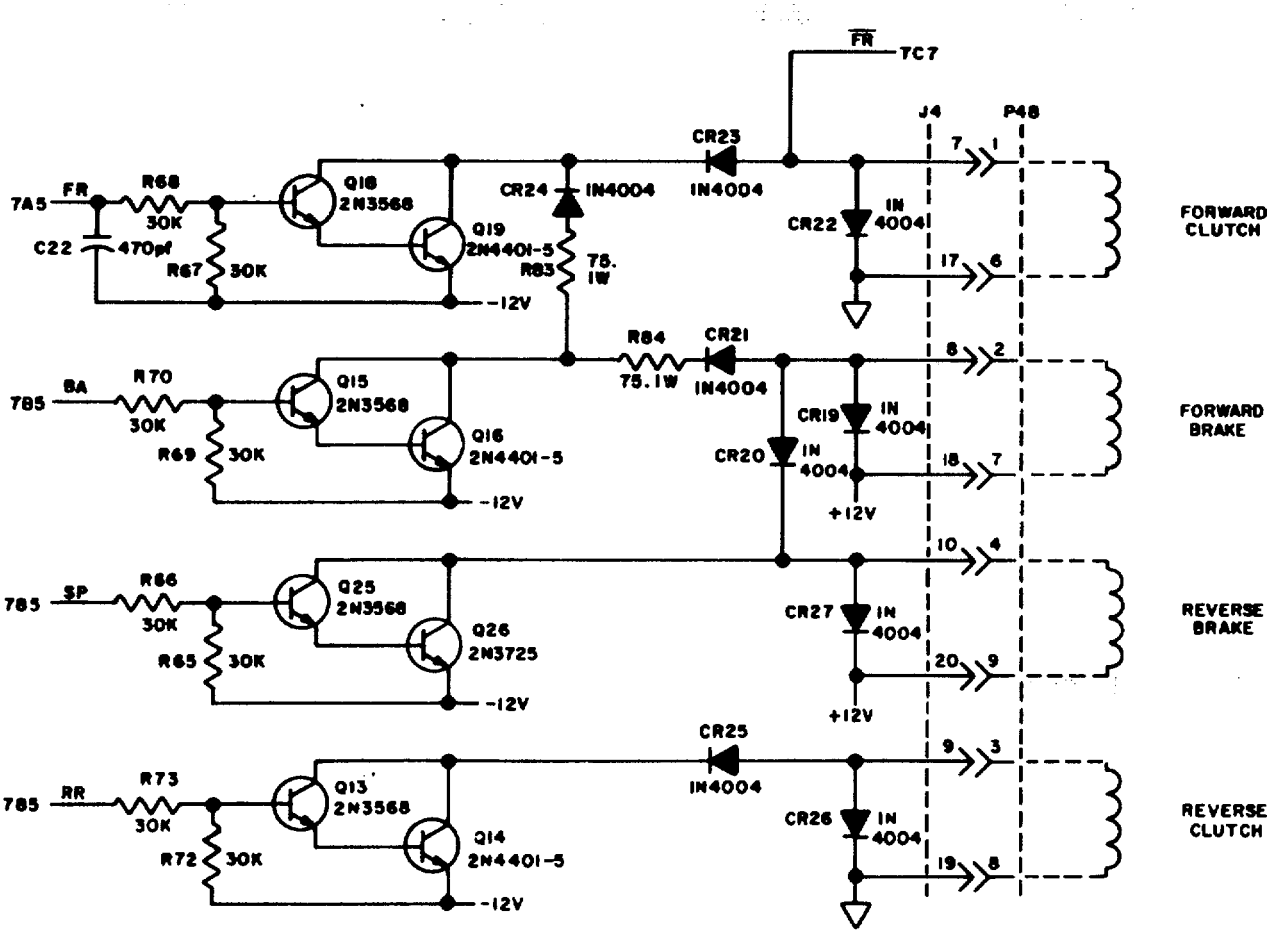
OSCILLATOR AND CLOCK DRIVERS



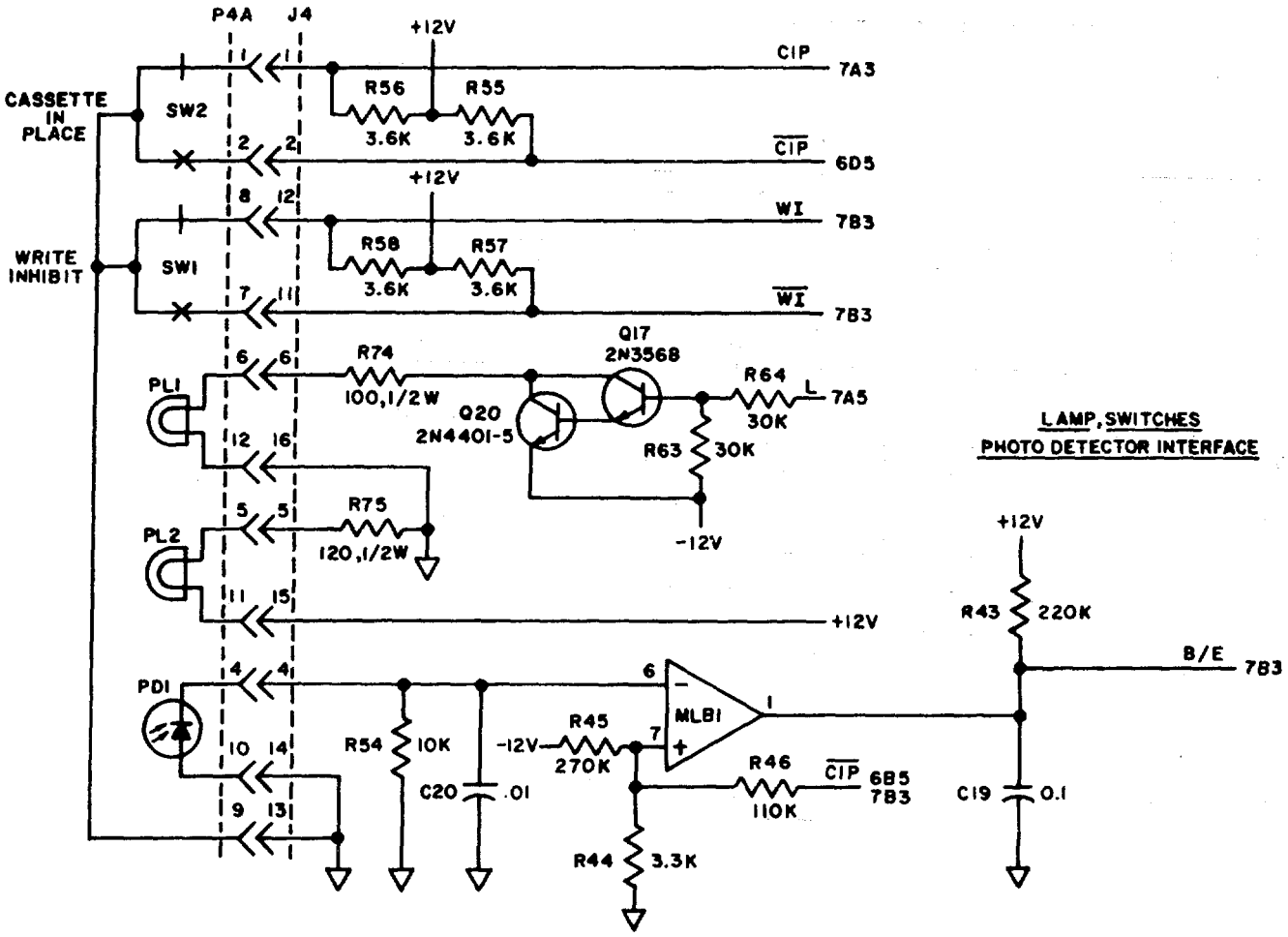
D. TROUBLESHOOTING (Contd)

6. FUNCTIONAL SCHEMATICS (Contd)

CLUTCH AND BRAKE DRIVERS



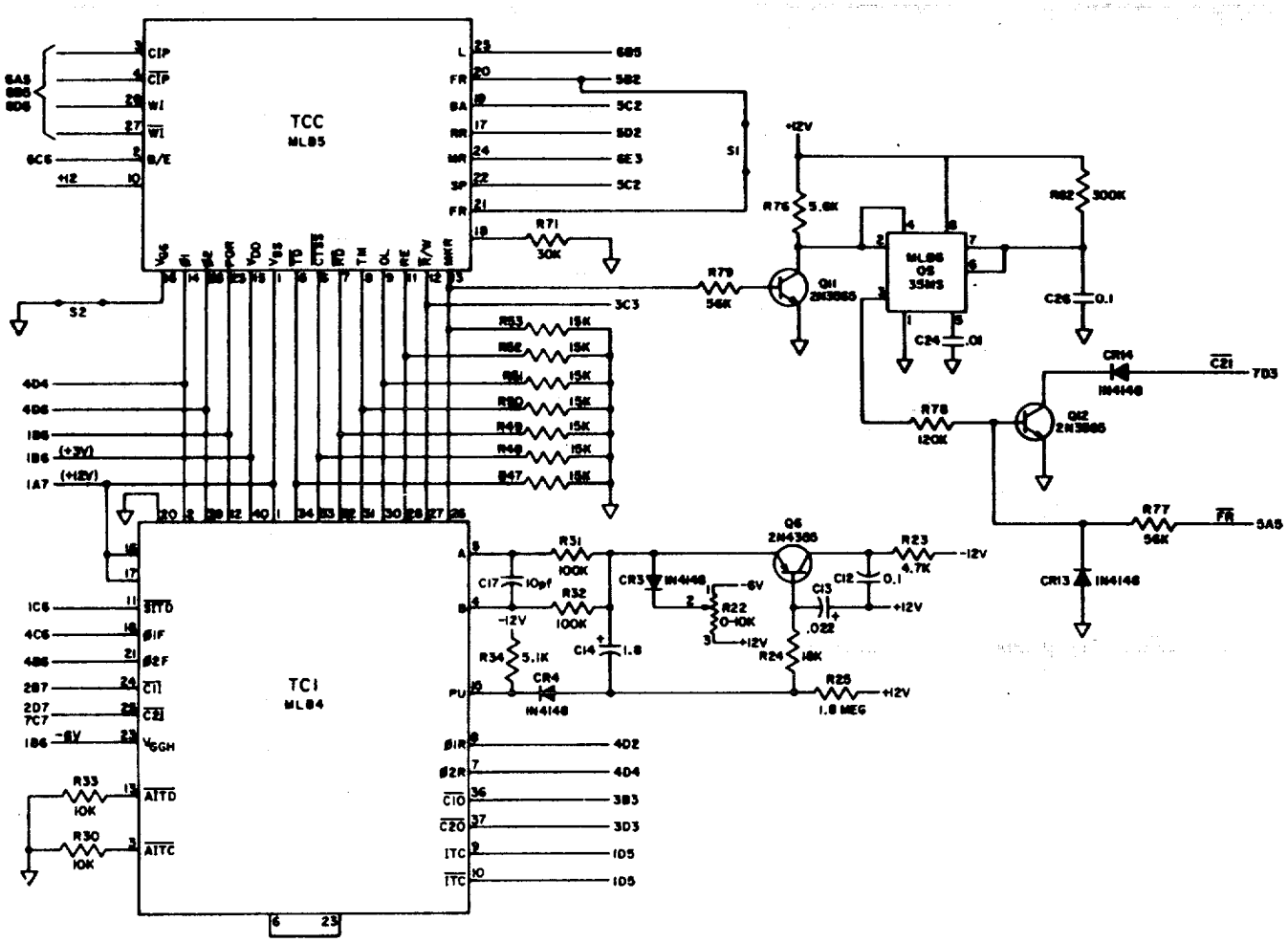
LAMP, SWITCHES, PHOTO DETECTOR INTERFACE, MOTOR AND MOTOR CONTROL



D. TROUBLESHOOTING (Contd)

6. FUNCTIONAL,SCHEMATICS (Contd)

MOS CIRCUIT, PLL CONTROL AND MIRKER BLIND



E. ADJUSTMENTS AND LUBRICATION

1. GENERAL

Adjustments that require major disassembly of the cassette drive are not covered in this manual at this time.

Adjustments are grouped according to the mechanism (cassette holder or drive mechanism), and in the sequence recommended for a comprehensive "in-the-field" adjustment. One electrical adjustment of the 410764 card "Open Line Frequency" is shown.

Identification drawings and tables are included to locate the mechanisms and list the adjustments related to these mechanisms.

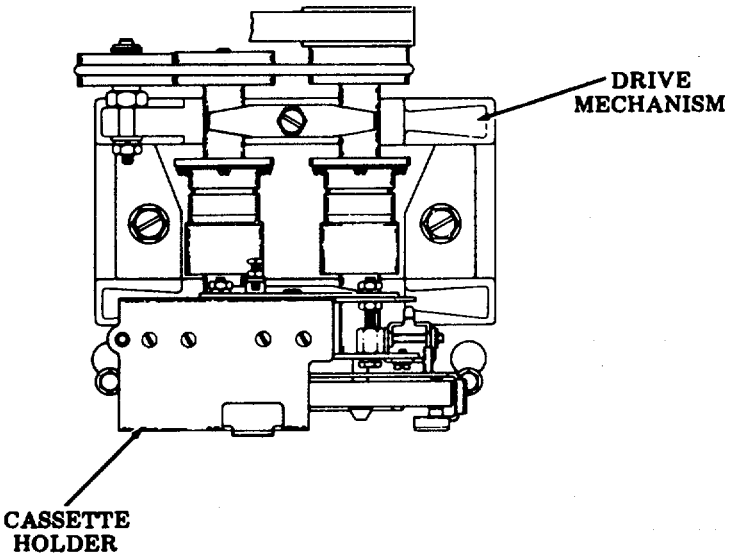
The instruction "friction tight" means to tighten to the point where friction keeps the parts from moving, but they are still loose enough to move for adjustment purposes.

Spring or belt tensions are checked with a spring scale held at the angle shown in the adjustment illustration. Springs that do not meet requirements, and for which no adjustment procedure is given, should be replaced.

After adjustment is complete, tighten any screws or nuts loosened to make the adjustment.

Tools Required: 406131 Gauge (Brake and Clutch Gap)
406130 Wrench, Driver (402274/402275 Drive Hubs)

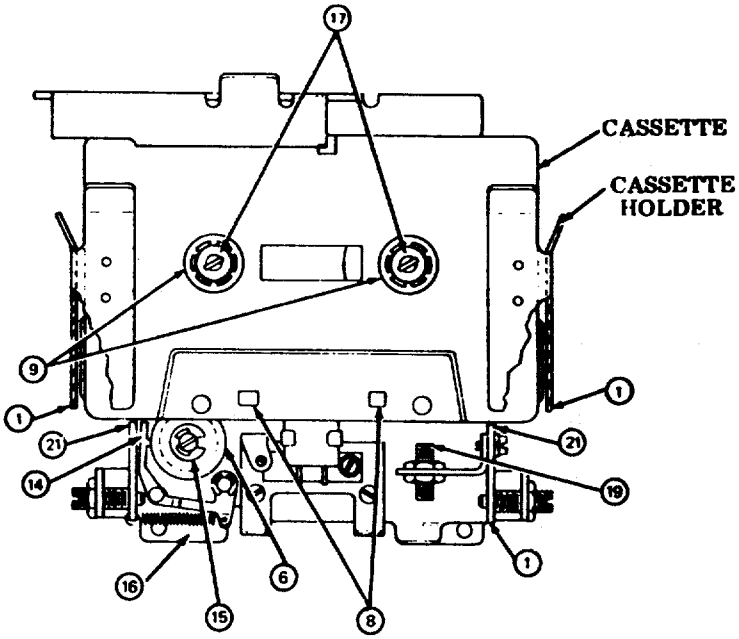
2. ASSEMBLIES



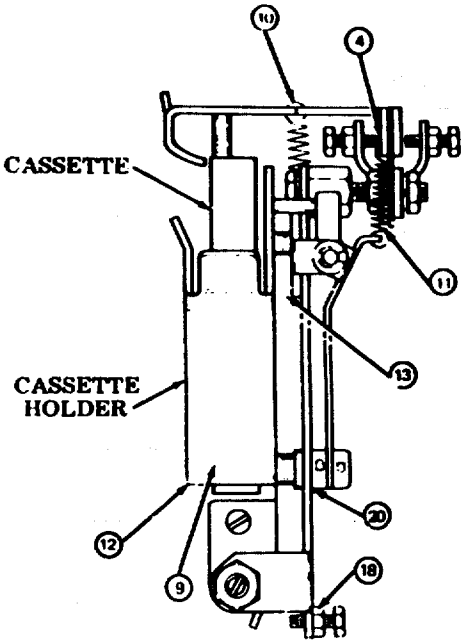
E. ADJUSTMENTS AND LUBRICATION (Contd)

2. ASSEMBLIES (Contd)

Cassette Holder



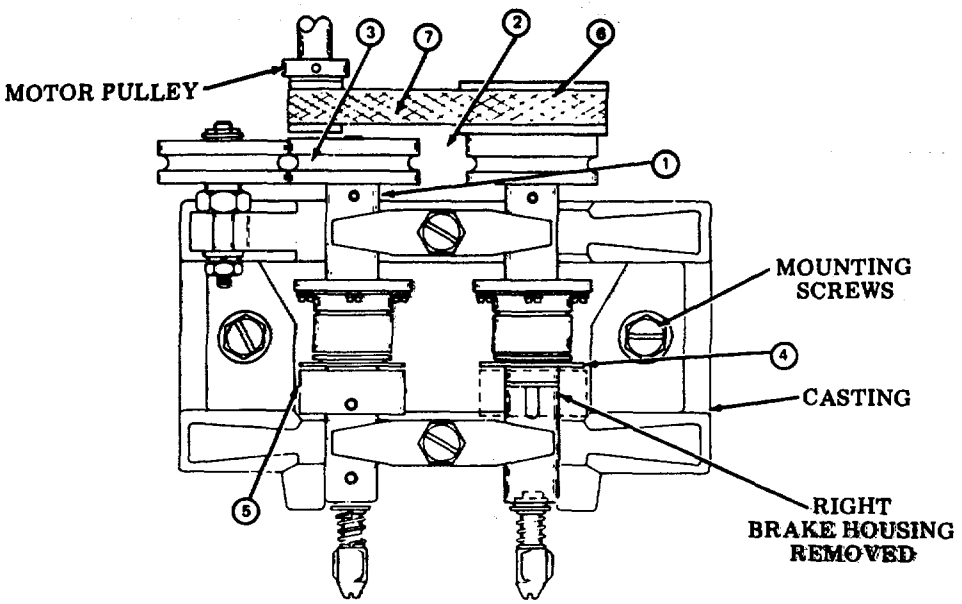
(Front View)



(Right Side View)

CASSETTE HOLDER ADJUSTMENTS		ADJUSTMENT REFERENCE PAGES
(1)	Cassette Holder	2-96
(2)	Latch (Preliminary and Final)	2-97
(3)	Latch Stop Screw (Rear)	2-97
(4)	Latch Stop Screw (Front)	2-98
(5)	Switch Height	2-99
(6)	Tape Cleaner	2-99
(7)	Run Lamp Mounting	2-100
(8)	Head	2-100
(9)	Plate With Cassette Holder	2-101
(10)	Cassette Latch Spring	2-101
(11)	Sensing Bail Spring	2-101
(12)	Cassette Pressure Spring	2-102
(13)	Cassette Holder Pressure Spring	2-102
(14)	Bobbin Latch Spring	2-102
(15)	Bobbin Spring	2-105
(16)	Stepper Spring	2-105
(17)	Drive Hub Spring	2-103
(18)	Cassette Holder Stop	2-103
(19)	BOT-EOT Lamp Mounting	2-104
(20)	BOT-EOT Sensor Tube	2-104
(21)	Cassette Downstop	

Drive Mechanism



DRIVE MECHANISM ADJUSTMENTS	ADJUSTMENT REFERENCE PAGES
(1) Pulley and Shaft Endplay	2-106
(2) Pulley Alignment	2-106
(3) Belt ("O" Ring)	2-106
(4) Clutch	2-107
(5) Brake	2-107
(6) Motor Pulley	2-108
(7) Motor Drive Belt	2-108

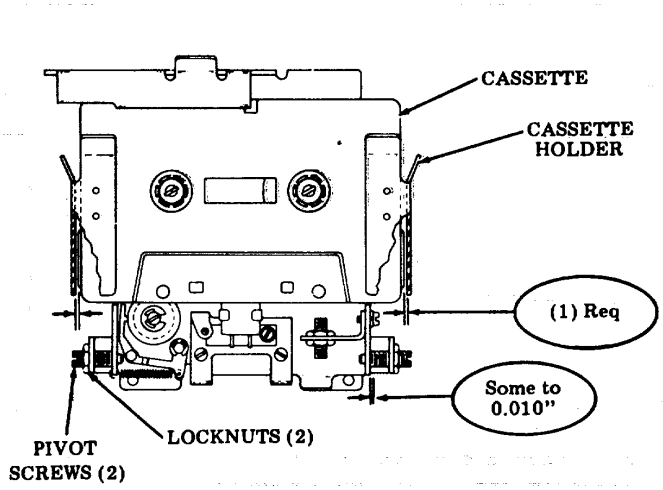
3. CASSETTE HOLDER ADJUSTMENTS

Cassette Holder

(1) Requirement
With a standard cassette latched in position, there should be equal clearance (as gauged by eye) between both sides of the cassette and the cassette holder.

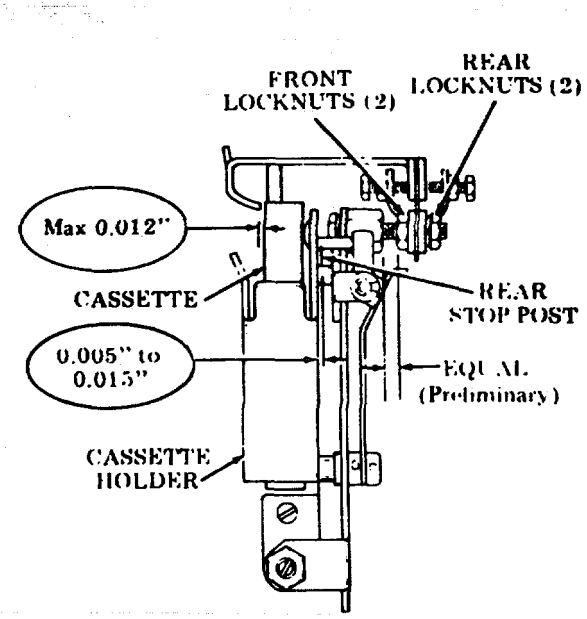
(2) Requirement
Endplay between the cassette holder and the pivot screws Min Some---Max Q.010 inch.

To Adjust
With the locknuts friction tight, adjust pivot screws until the requirements are met. Tighten locknuts.



E- ADJUSTMENTS AND LUBRICATION (Contd)

3. CASSETTE HOLDER ADJUSTMENTS (Cont)

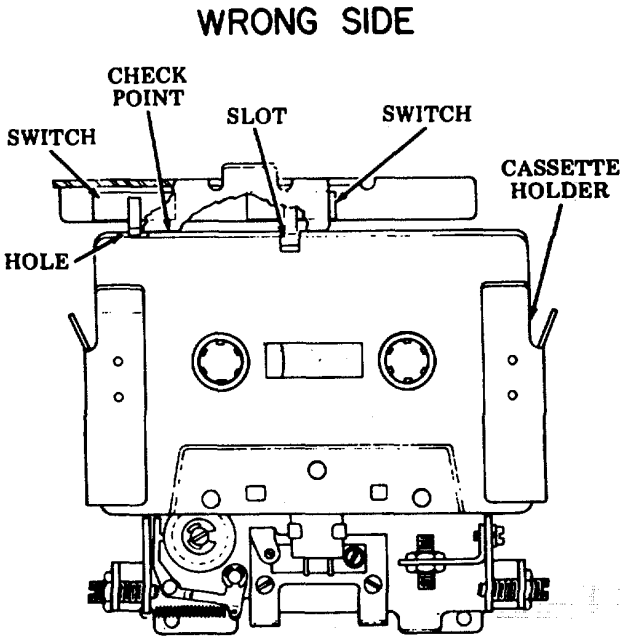


Latch (Preliminary)

(1) Requirement
With a standard cassette in place and the cassette latched, the clearance between the cassette holder and the stop post should be
Min 0.005 inch---Max 0.015 inch.

(2) Requirement
With a standard cassette in place and the cassette holder latched, the clearance between any point and the latch should be
Max 0.012 inch.

To Adjust
With the rear locknuts loosened, adjust the two front stoop nuts equally (preliminary) until the requirement is met. Tighten locknuts.



Latch(Final)

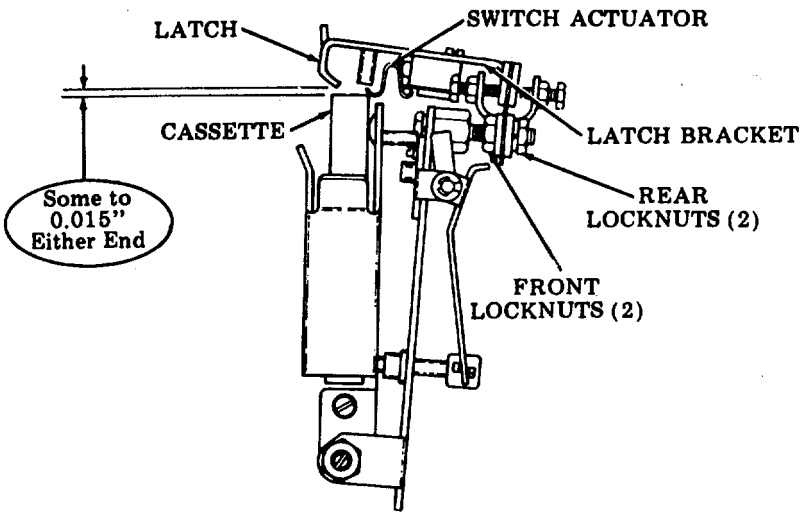
(1) Requirement
With a standard cassette placed (wrong side out) in the cassette holder and the cassette holder rotated until the latch is resting on the cassette, clearance between the cassette and either end of the latch should be
Min Some---Max 0.015 inch.

(2) Requirement
The two switch actuators should be centered with their respective hole or slot, as gauged by eye.

(3) Requirement
With the cassette removed, the write inhibit switch actuator should clear the cassette holder when it is moved in and out.

To Adjust
Maintain front locknuts position, loosen the rear locknuts, position the latch and switch to meet the requirements. Tighten locknuts.

NOTE: Recheck PRELIMINARY LATCH adjustment. Refine if necessary.



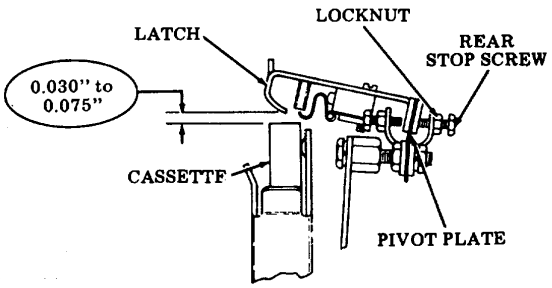
Latch Stop Screw (Rear)

Requirement

With the latch raised to its uppermost position, there should be clearance between the latch and a standard cassette of
Min 0.030 inch-Max 0.075 inch.

To Adjust

With locknut loose, position rear stop screw until the requirement is met. Tighten locknut.



Latch Stop Screw (Front)

(1) Requirement

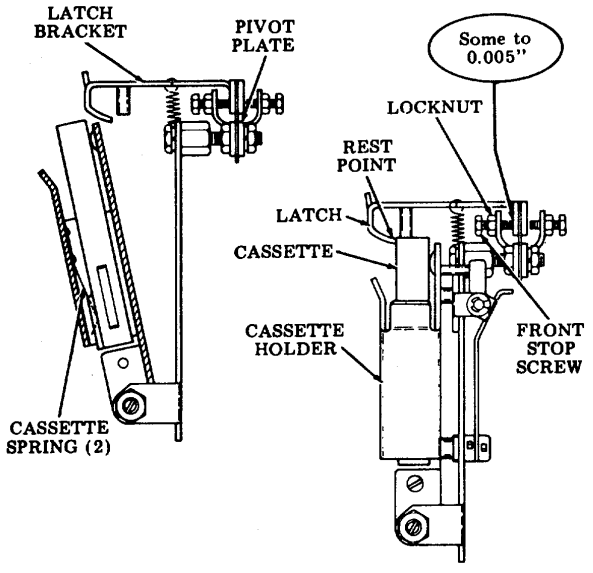
As the cassette holder with a standard cassette installed is pivoting toward the latched position, the cassette should strike the latch and cam the latch upward.

(2) Requirement

In the latched position, the latch should rest on the cassette and there should be clearance between the front stop screw and the latch bracket of
Min Some-Max 0.005 inch.

To Adjust

With the locknut loose, position the front stop screw until the requirement is met. Tighten locknut.

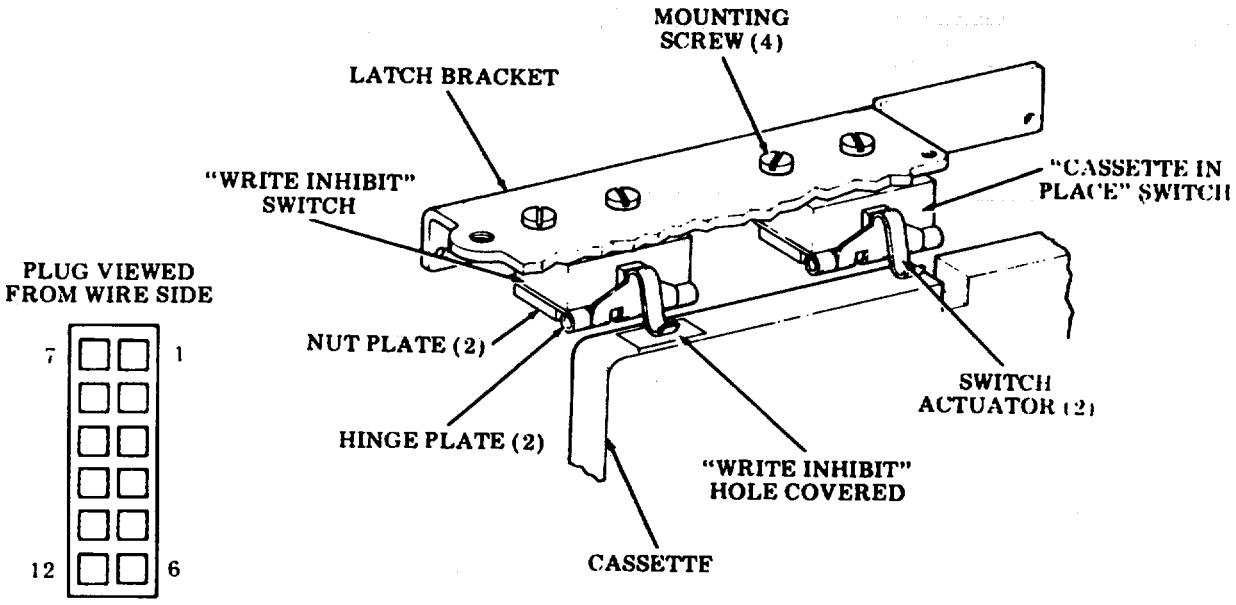


NOTE: Requirements (1) and (2) have to be checked with cassette spring holding cassette in place against the rear of the cassette holder.

E. ADJUSTMENTS AND LUBRICATION (Contd)

3. CASSETTE HOLDER ADJUSTMENTS (Contd)

Switch Height



(1) Requirement

As a standard cassette (right side out) is loaded and unloaded into position, the two switches should operate at approximately the same time.

To Check

Operation may be determined by the audible "click" of switches or by use of a continuity checking device, on terminals 7 and 8, ("Write Inhibit" switch) and terminals 1 and 2 ("Cassette in Place" switch) to indicate contact closure.

(2) Requirement

There should be some over travel left on the two switch actuators.

To Check

Check for some clearance between the switch actuator and the cassette, without bottoming the actuator against the switch.

To Adjust

With the switch mounting screws friction tight, position the hinge plate until the requirements are met. Tighten mounting screws.

NOTE: Power must be removed from unit when this measurement is taken. Recheck
LATCH adjustment, refine if necessary.

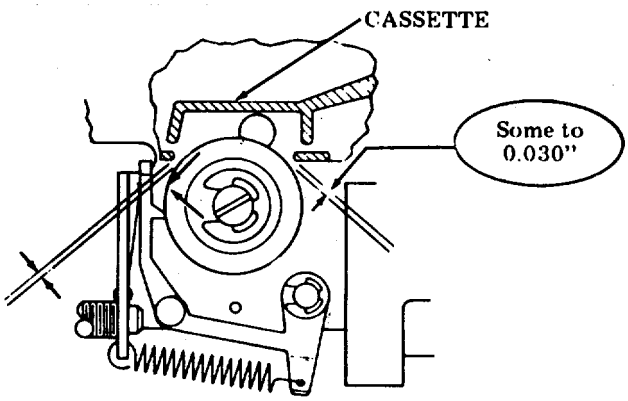
Tape Cleaner

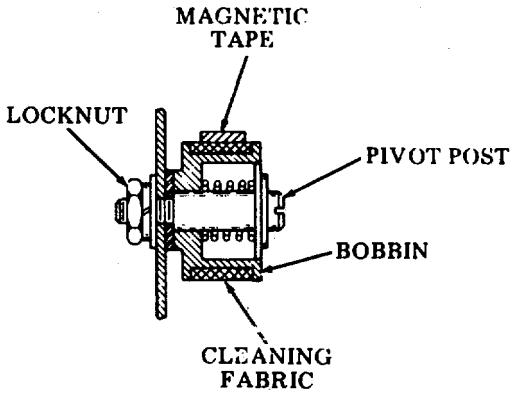
(1) Requirement
With a standard cassette in the loaded position, the magnetic tape should be in contact with the cleaning fabric.

(2) Requirement
There should be
Min Some---Max 0.030 inch clearance between cassette and bobbin on the side with least clearance.

(3) Requirement
The bobbin should step at least every second time the cassette is inserted.

To Adjust
With the locknut friction tight, position the bobbin vertically to meet the requirement. Tighten locknut.

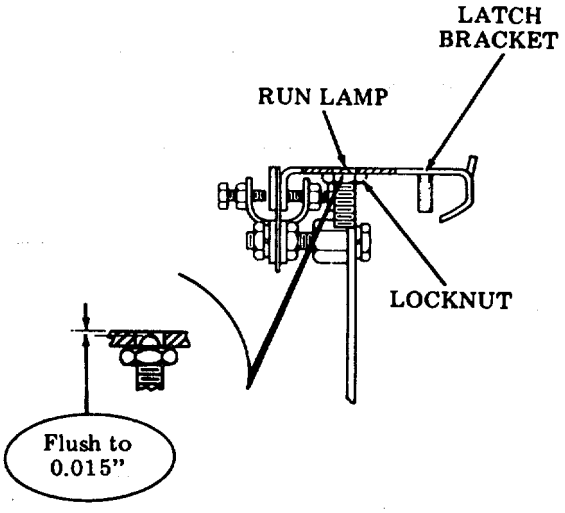




Run Lamp Mounting

Requirement
The tip of the run lamp should be
Min Flush---Max 0.015 inch
under flush with the top surface of the latch bracket.

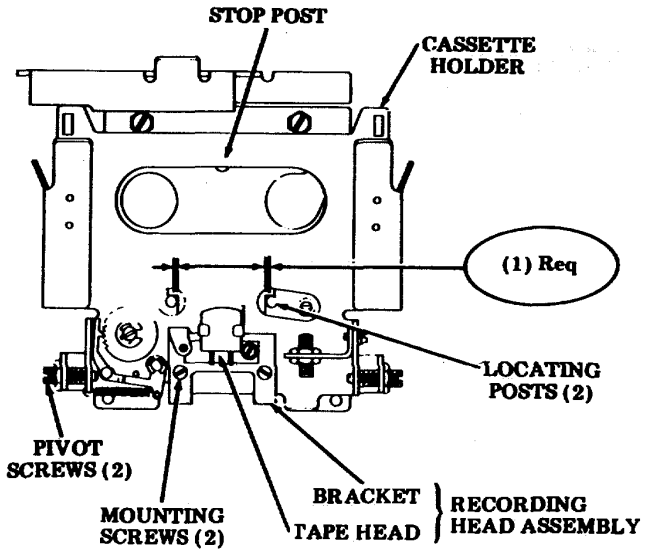
To Adjust
With the locknut loose, position the lamp. Tighten the locknut.



E. ADJUSTMENTS AND LUBRICATION (Contd)

3. CASSETTE HOLDER ADJUST (Contd)

Head Adjustment



(1) Requirement

With the cassette holder biased rearward against the stop post, recording head assembly should rest on the locating posts and should be centered with equal clearance, as gauged by eye, between the locating posts.

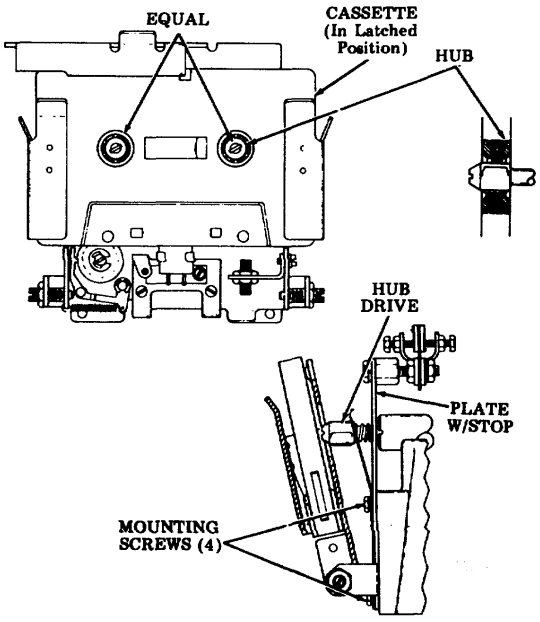
(2) Requirement

The recording head assembly should not bind on the locating pins when cassette holder is pivoted outward. Check that the end play between the cassette holder and pivot screws is taken up, first to the left and then to the right.

To Adjust

With the cassette holder biased rearward against the stop post and the mounting screws friction tight, slide recording head assembly against locating posts and the clearance on both sides should be equal. Tighten mounting screws.

Plate With Cassette Holder



Requirement

With a standard cassette loaded in its latched position, the radial distance between the drive hub (less driving teeth) and the cassette case should be equal, as gauged by eye. Check requirement on both hubs.

To Adjust

With the mounting screws friction tight, position plate with stop to meet this requirement. Tighten mounting screws.

NOTE: The flat portion of the driving teeth of the drive hubs must drive the reel clockwise on the left (rewind) shaft and counterclockwise on the right (wind) shaft.

Cassette Latch Spring

Requirement

With a standard cassette in the latched position, it should take Min 7 ounces---Max 10 ounces to start spring moving from the installed length.

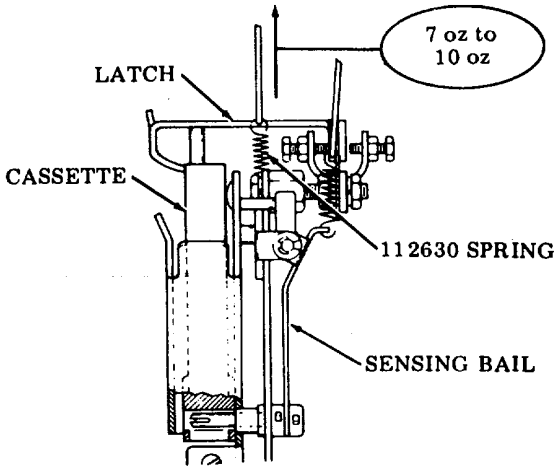
NOTE: If spring does not meet requirement, it should be replaced.

Sensing Bail Spring

Requirement

With a standard cassette in the latched position, it should take Min 5 ounces---Max 8 ounces to start spring moving from the installed length.

NOTE: If spring does not meet requirement, it should be replaced.



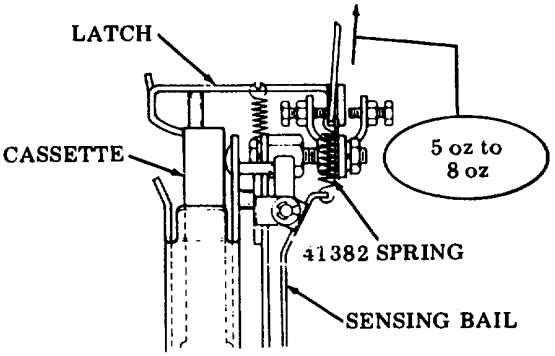
Cassette Pressure Spring

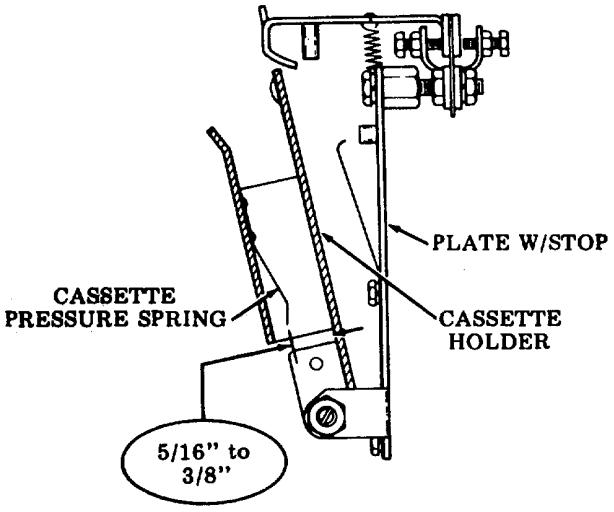
Requirement

With an unloaded cassette holder, the clearance between the tip of the pressure spring and the cassette holder should be Min 5/16 inch---Max 3/8 inch.

To Adjust

Bend spring to meet requirement.





E. ADJUSTMENTS AND LUBRICATION (Contd)

3. CASSETTE HOLDER ADJUSTMENTS (Contd)

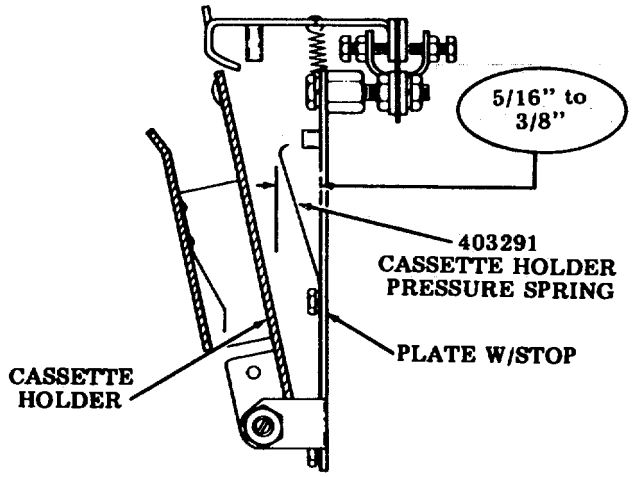
Cassette Holder Pressure Spring

Requirement

With the cassette holder in the unlatched position, the distance between the outside edge of the upper form of the spring and the plate with stop should be Min 5/16 inch---Max 3/8 inch.

To Adjust

Bend spring to meet this requirement.



Bobbin Latch Spring

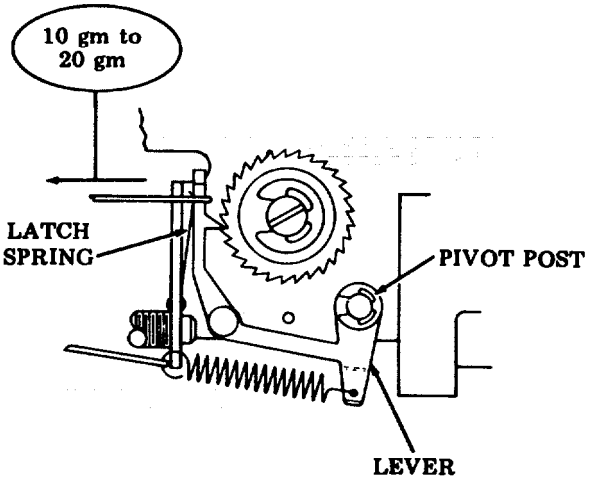
Requirement

It should take Min 10 grams---Max 20 grams to start latch moving.

To Adjust

Bend spring to meet his requirement.

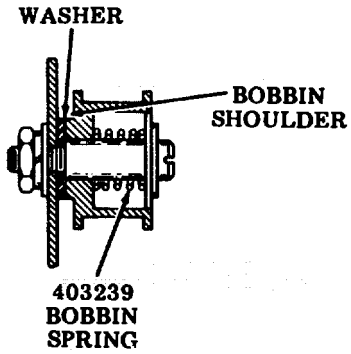
NOTE: While checking, hand rotate ratchet wheel 1/2 tooth travel.



Bobbin Spring

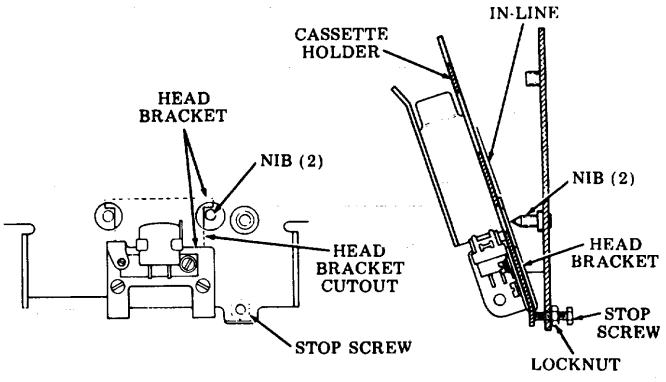
Requirement

The bobbin spring should bias the bobbin shoulder against the washer.



Cassette Holder Stop

Requirement
With cassette holder in unlatched (forward) position, rear side of head bracket should be in line with the tip of the NIB (as gauged by eye at cutout of head bracket).



To Adjust
With Locknut. friction tight, adjust stop screw until requirement is met. Tighten locknut.

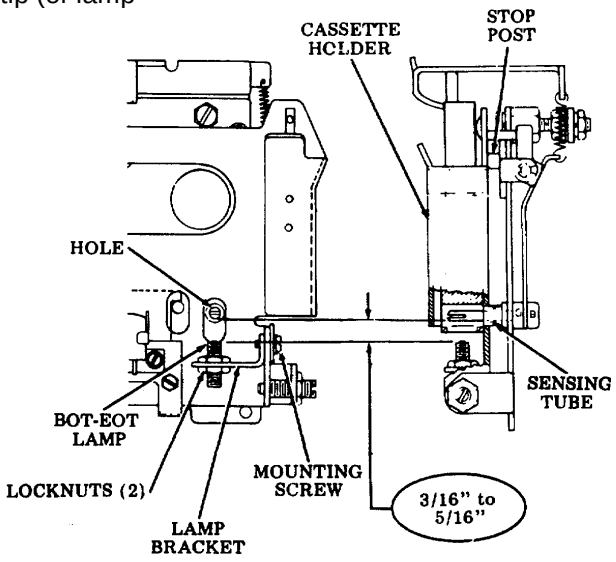
BOT-EOT Lamp Mounting

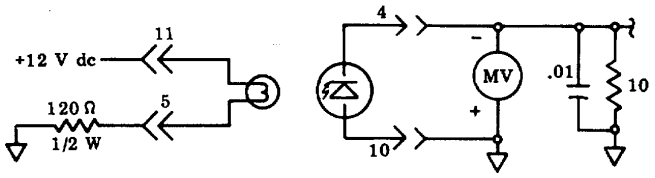
(1) Requirement

With cassette holder in its rearmost position (against stop post), tip (of lamp should be
Min 3/16 inch---Max 5/16 inch
from bottom of sensing tube.

(2) Requirement
Lamp should be in line with hole in underside of sensing tube, as gauged by eye. Lamp should be aimed for peak photo-cell output. (A minimum of -200 millivolts.)

To Adjust
Loosen locknuts and mounting screw which secures lamp bracket to cassette holder. To meet requirement, adjust light source in the following sequence (to produce a minimum output of -200 millivolts between pins 4 and 10 (to 410764 BOT circuit card).
(a) Vertical (up and down) LOCKNU'
(b) Vertical Rotation
(c) Horizontal Position
(within mounting hole)
Tighten locknuts and mounting screws.





E. ADJUSTMENTS AND LUBRICATION (Contd)

3. CASSETTE HOLDER ADJUSTMENTS (Contd)

BOT-EOT Sensor Tube

Requirement

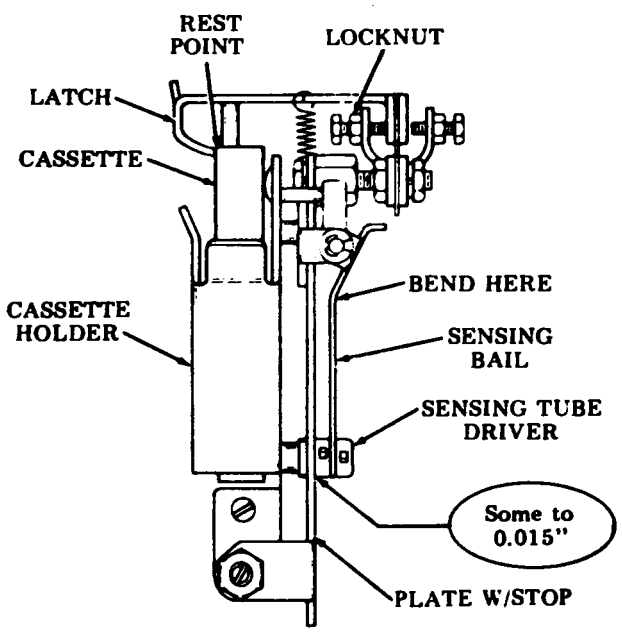
With the cassette in the latched position, the clearance between the sensing tube driver and the plate with stop should be

Min: Touch without binding.

Max: Not to exceed 0.015 inch at the point of least clearance when the sensing tube is biased lightly to the rear to take up play.

To Adjust

Bend sensing bail as required to meet requirement.



Cassette Downstop

Requirement

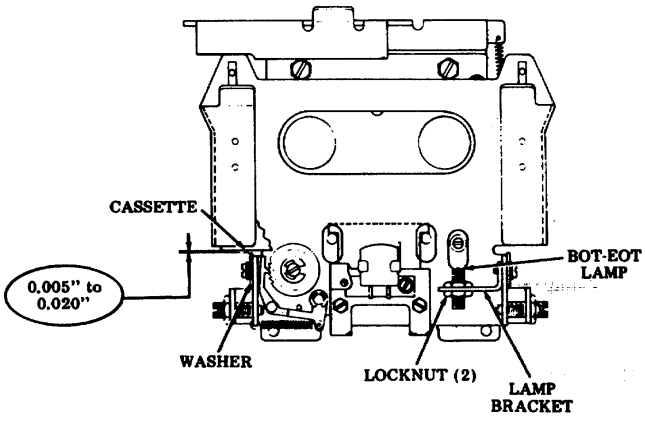
With a cassette latched in place, the clearance between the cassette and the top of the washer should be

Min 0.005 inch---Max 0.020 inch on both sides.

To Adjust

With mounting screw friction tight, move washer up or down to meet requirement. Tighten mounting screw.

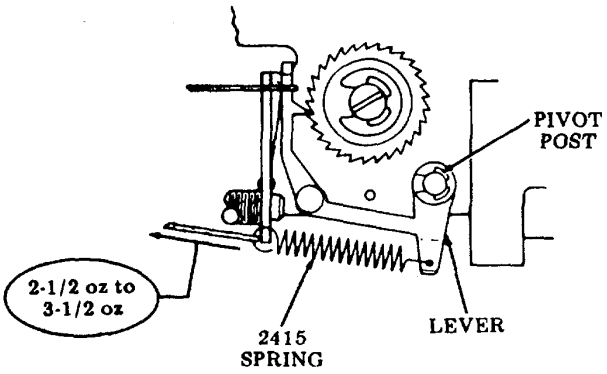
NOTE: The downstop washer on the right side should be adjusted in conjunction with the BOT-EOT LAMP MOUNTING adjustment.



Stepper Spring

Requirement
With the cassette removed, it should take
Min 2-1/2 ounces---Max 3-1/2 ounces
to start spring moving at the installed length.

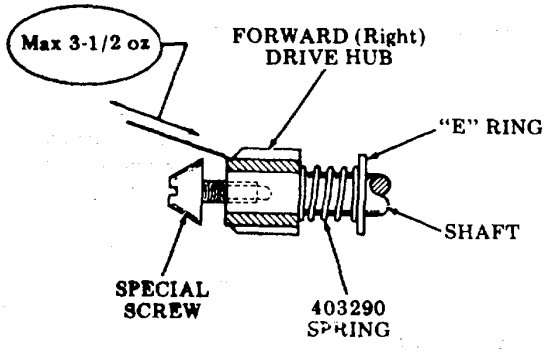
NOTE: If spring does not meet requirement, it should be replaced.



Drive Hub Spring -- Forward (Right)

Requirement
The drive hub should contact the special screw. It should require
Max 3-1/2 ounces
to start drive hub moving rearward.

NOTE: It may be necessary to remove the special screw to check this requirement, however, the check is made with the drive hub at the normal rest position. If spring does not meet requirement, replace spring.

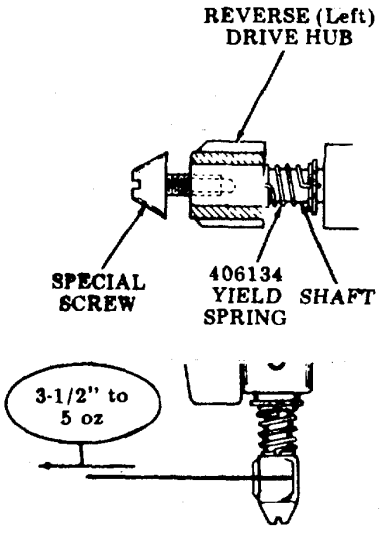


Drive Hub Yield Spring -- Reverse (Left)

(1) Requirement
Restrain the shaft from turning; it should require
Min 3-1/2 ounces---Max 7 ounces
applied to the outer edge of the drive hub to start the hub moving counter-clockwise.

(2) Requirement
When the drive hub is moved all the way to the rear and let snap forward, the drive hub should contact the special screw.

NOTE: If the spring does not meet the requirement, replace spring.



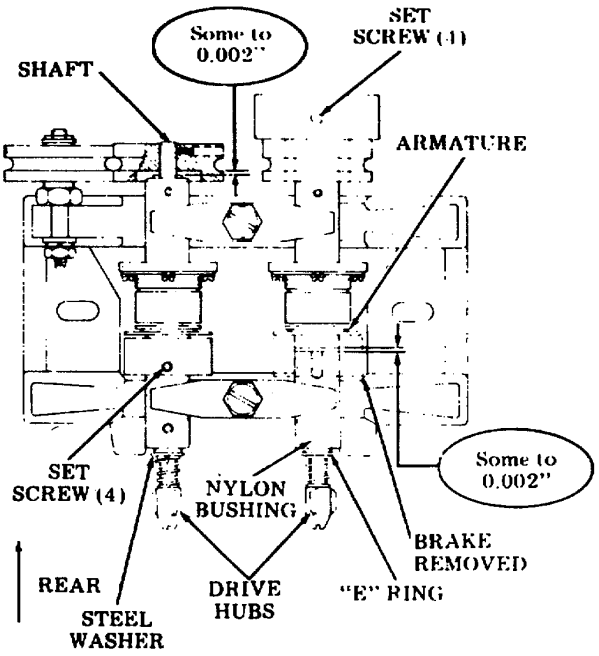
E. ADJUSTMENTS AND LUBRICATION (Contd.)

4. DRIVE MECHANISM ADJUSTMENTS

Pulley and Shaft Endplay

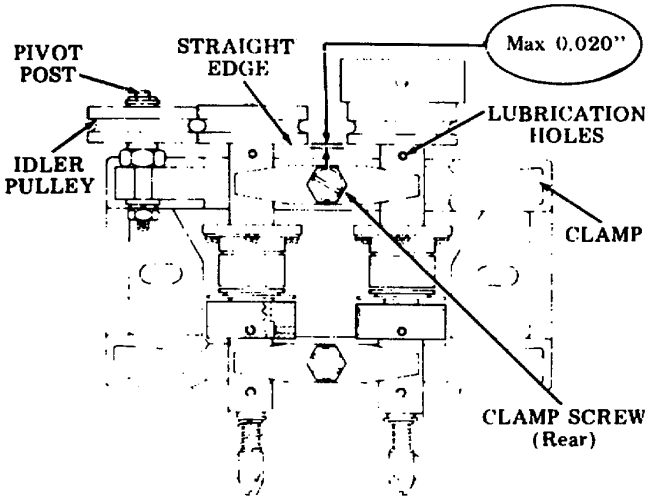
Requirement
There should be
Min Some---Max 0.002 inch
perceptible endplay, as gauged by eye, on each shaft.

To Adjust
(a) Position each armature oin its shaft with two set screws loosened.
(b) Insert a 0.002 inch gauge between friction washer and armature.
(c) Apply enough rearward pressure on the drive hubs to force the steel washer against the nylon bushing and overcome any play between the "E" ring and the shaft "E" ring groove.
(d) Tighten (very securely, both set screws for each assembly).



Pulley Alignment
Requirement
With lubrication holes upward, the front face of all three pulleys should be in line within
Max 0.020 inch
as gauged against a straight edge. (Bias idler pulley toward rear.)

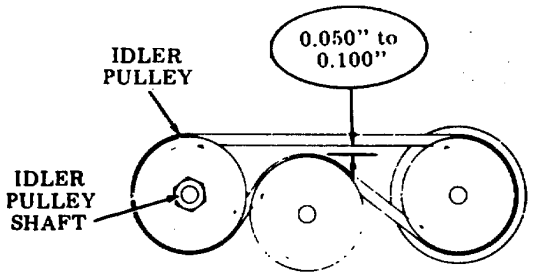
To Adjust
With the rear clamp screw friction tight and the "O" ring removed, adjust the shafts with pulleys until the requirement is met. Tighten clamp screw.



Belt ("O" Ring)

Requirement
The gap in the reversing belt should be
Min 0.050 inch---Max 0.100 inch.

To Adjust
With the idler pulley shaft friction tight, adjust up or down until the requirement is met. Tighten shaft nut.



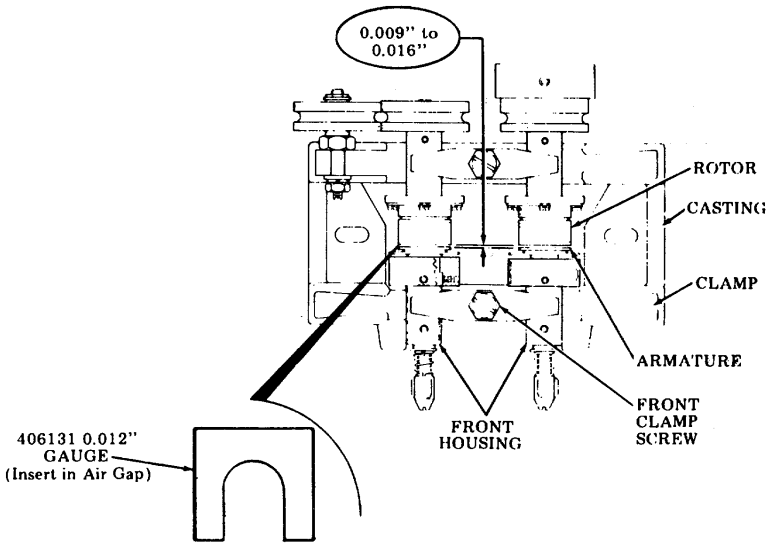
Clutch

Requirement

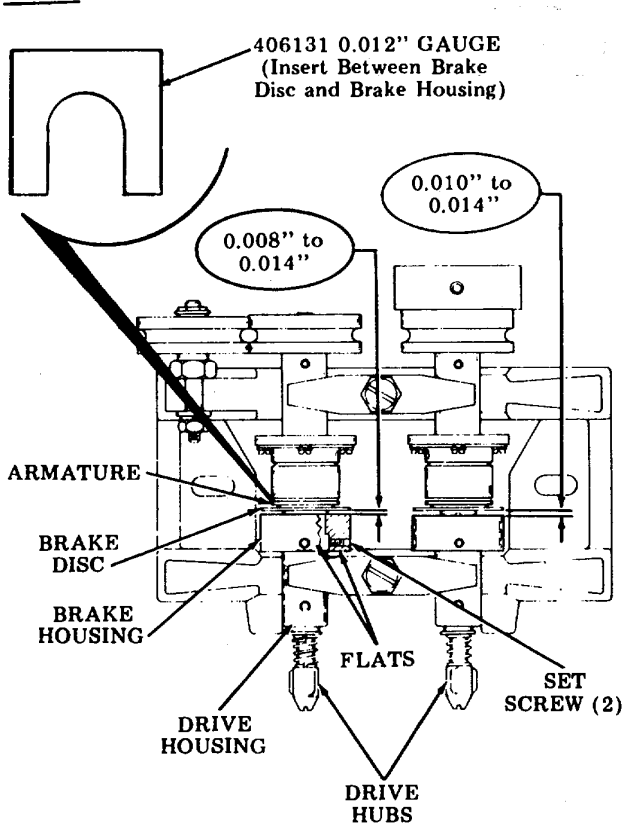
With lubrication holes upward and each shaft biased toward the center, the air gap between the rotor and armature of each clutch should, at the point of least clearance, be
Min 0.009 inch---Max 0.016 inch.

To Adjust

With the front clamp screw friction tight, and the 406131 0.012 inch gauge between the rotor and armature, slide front housing rearward until the requirement is met. Tighten clamp screw



Brake



Requirement

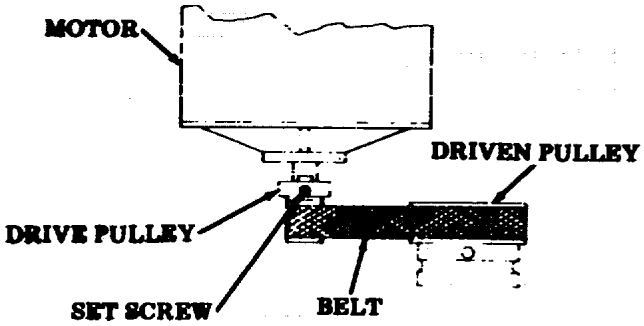
With the armature biased toward the front (by means of pulling slightly on the drive hub), the air gap between the brake disc and the brake housing should, at the point of least clearance, be
Min 0.010 inch---Max 0.014 inch (Forward Brake)
Min 0.008 inch---Max 0.014 inch (Reverse Brake)

To Adjust

Loosen the two sets screws. Insert the 406131 0.012 inch gauge between the brake disc and the brake housing. With the set screws over the mounting flats on the drive housing, slightly tighten the right set screw until friction tight. Adjust brake coil housing until the requirement is met. Tighten two set screws.

E. ADJUSTMENTS AND LUBRICATION (Contd)

4. DRIVE MECHANISM ADJUSTMENTS (Contd.)



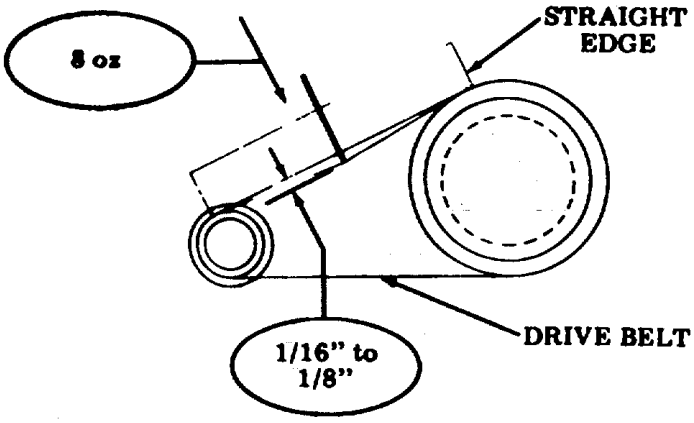
Motor Pulley

Requirement
The flat belt should be approximately centered on both the motor drive pulley and driven pulley.

To Adjust
With the set screw loose, position the drive pulley to meet the requirement.

Motor Drive Belt

(1) Requirement
With a force of 8 ounces applied perpendicular to the drive belt, approximately midway along its free length, the belt should deflect Min 1/16 inch---Max 1/8 inch from a line tangent to both pulleys.



(2) Requirement
While the belt is motor driven (motor on), the belt should maintain its center position on the large pulley and should not walk to the edge of the pulley.

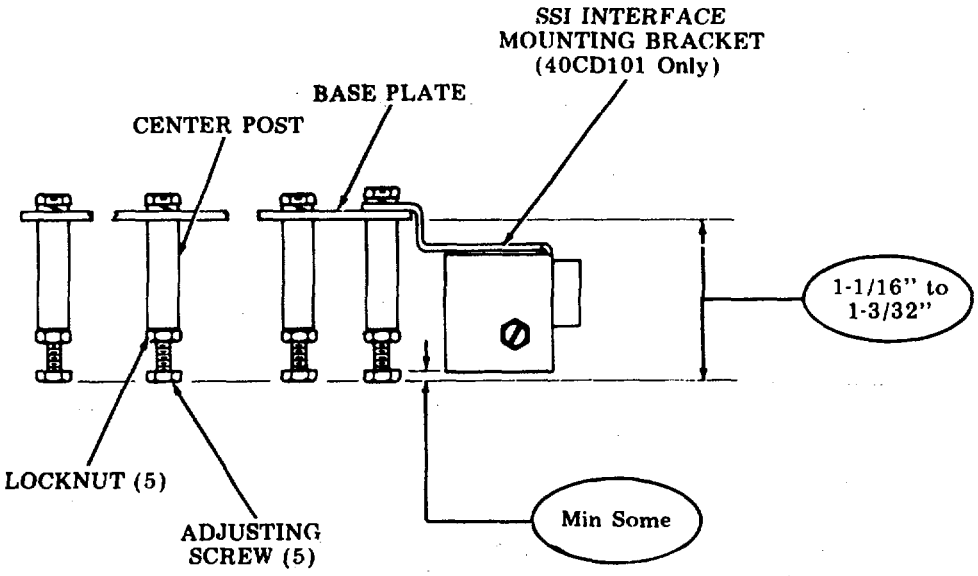
To Adjust
With the casting mounting screws friction tight, move casting, left or right with a slight pivot, to meet the requirements.

Base Plate Height (Early Design Only - See Note)

(1) Requirement
The five posts and adjusting screws should support and maintain a level balance of the unit when removed from the cover base.

(2) Requirement
The distance between the tops of the adjusting screws and base plate should be Min 1-1/16 inch---Max 1-3/32 inch.

To Adjust
With the locknuts friction tight, adjust the four corner posts to meet the requirement. Tighten locknuts. With the aid of a flat surface, adjust the center post until the tip of the adjusting screw is parallel to the four outer posts. Tighten locknut..



NOTE: Early design 40CD102 were supplied with five posts and five adjusting screws. Later design units are supplied with screws replacing the posts and adjusting screws and do not require adjusting.

E. ADJUSTMENTS AND LUBRICATION (Contd.)

5. 410764 CIRCUIT CARD ADJUSTMENT

Open Line Frequency

Requirement

The open line frequency of the 405681 TCI chip must be 50 kilohertz +1 kilohertz.
The adjustment must be accurate to within +.4 microseconds.

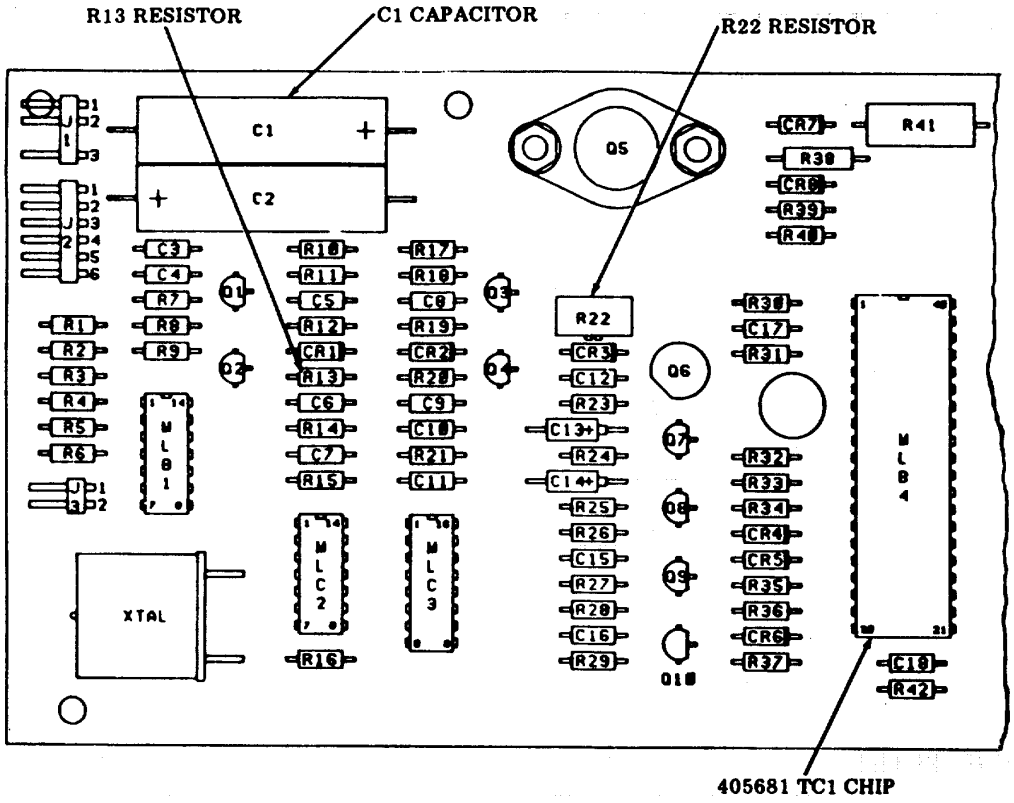
To Adjust

With dc power applied to the 410764 circuit card and the SSI signal line disconnected, adjust R22 to meet the above requirement.

NOTE 1: To adjust variable resistor (R22), connect oscilloscope common to board common (negative end of CI) and oscilloscope probe to the phase 1 clock output (either end of R13).

Set the scope:
X10 probe to 0.5 V per division
2 microseconds per division
Center the trace
Adjust R22 to obtain one complete cycle in 10 divisions.

NOTE 2: With the exception of this adjustment on the 410764 circuit card assembly, all other adjustments are related to the mechanical portion of the 40CD102.



6. CASSETTE DRIVE LUBRICATION

Lubricate the cassette drive Just prior to placing in service or before putting it in storage. The cassette drive should be relubricated after it has been in service a few weeks. Thereafter, relubricate every 2000 hours of running time or 6 months, whichever occurs first.

Apply lubricants to points as indicated.
On small parts, a minimum amount of lubricant should be applied, so that the lubricant remains on the parts and does not run off.
Excessive lubricant should be removed with a dry, lint-free cloth.

The following areas must be kept dry, free of all lubricant:

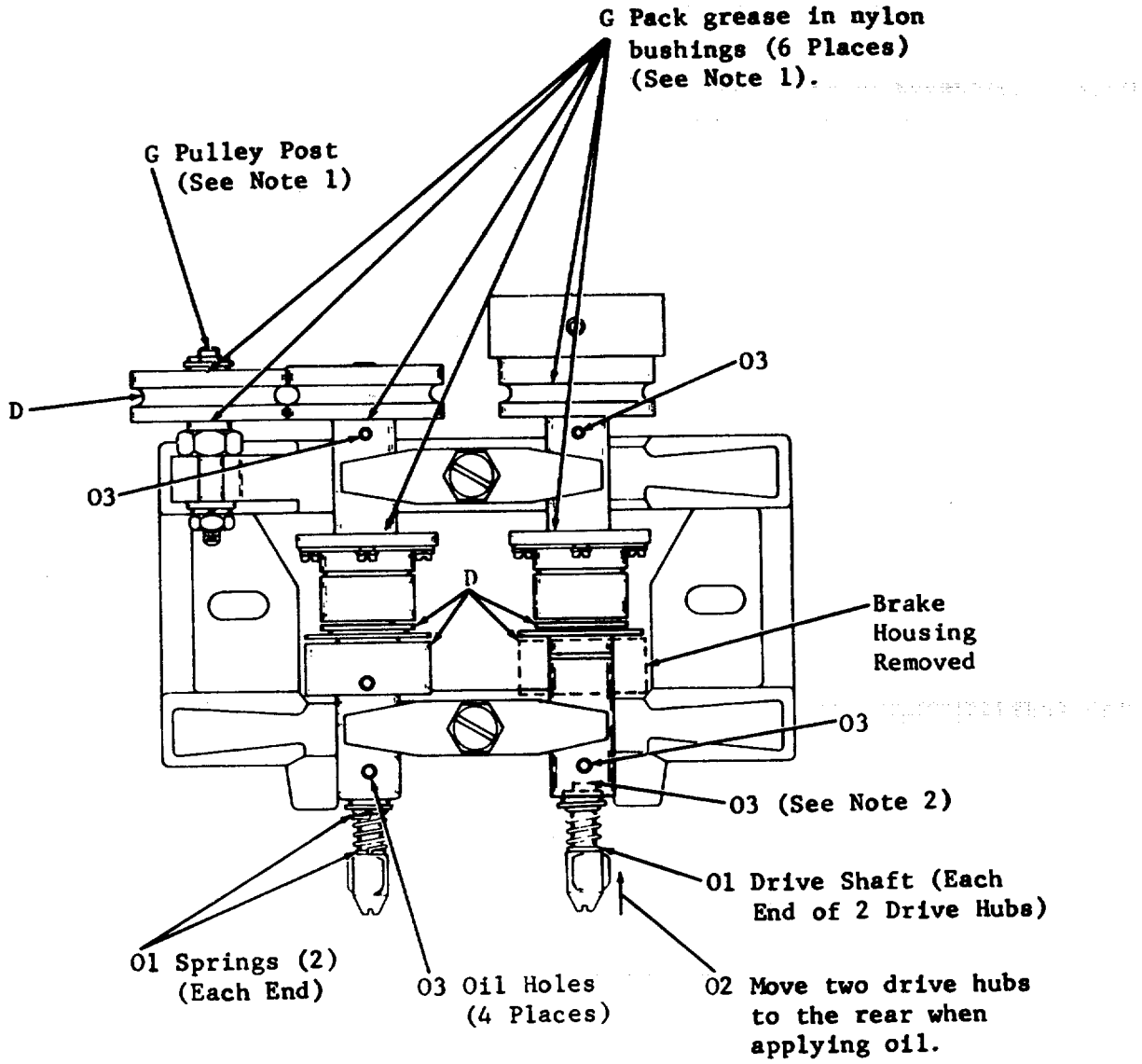
All electrical components, including terminals.
All parts normally touched by the operator, including exposed surfaces in the cassette holder area and all large flat areas..
Reading head.
Surfaces of the tape cleaner which contact the magnetic tape.
Friction surfaces of the magnetic clutches.

The following symbols indicate the quantity of lubricant to. be used on a specified area: Symbols 01, 02, 03, etc., refer to 1, 2, 3, etc., drops of oil. The following list of symbols applies to the lubrication instructions and the type of lubricant to be used:

O Oil (88970)
G Pack grease between nylon bushings (143484--one pound can or 145867 4-ounce tube)
D Keep dry, no lubricant permitted.

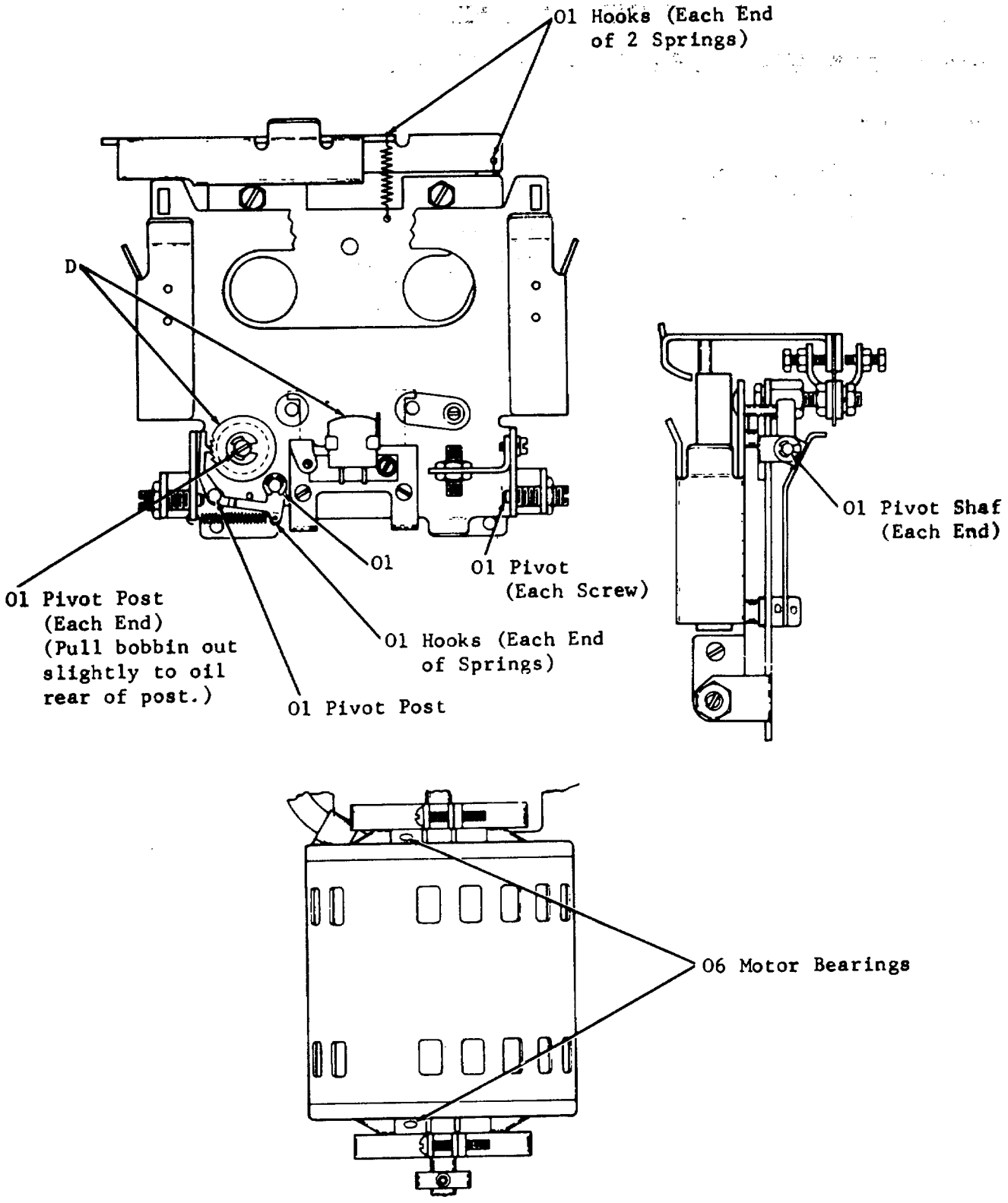
E. ADJUSTMENTS AND LUBRICATION (Contd.)

6. CASSETTE DRIVE LUBRICATION (Contd)



NOTE 1: These nylon bushings should be greased only when the unit is reassembled.

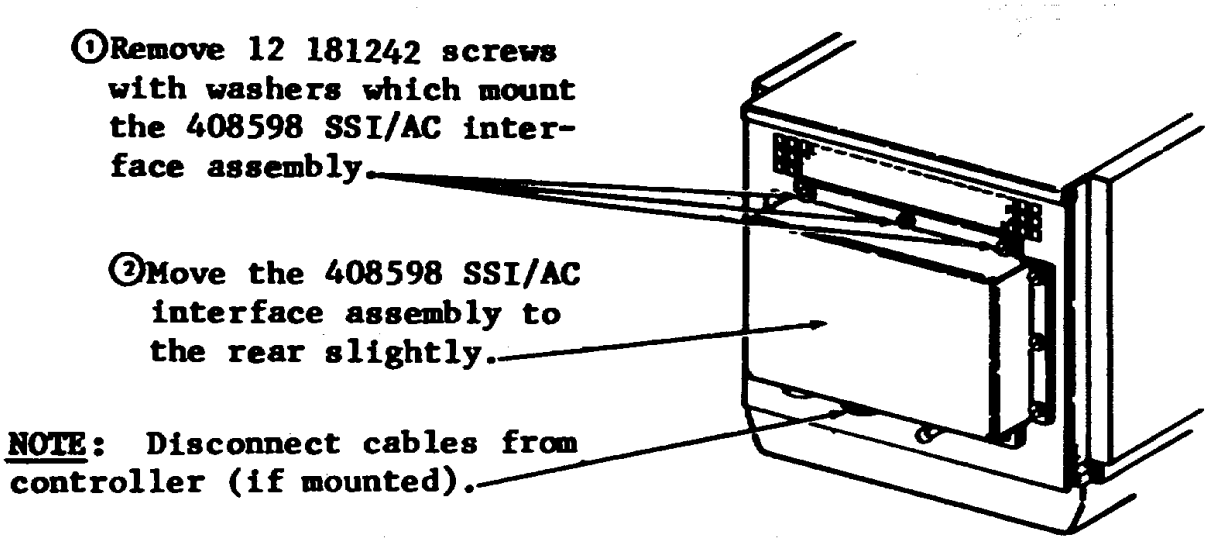
NOTE 2: These nylon bushings (4) and fiber friction washer (4) should be oiled (03 drops), whenever a nylon bushing or a friction washer is replaced.

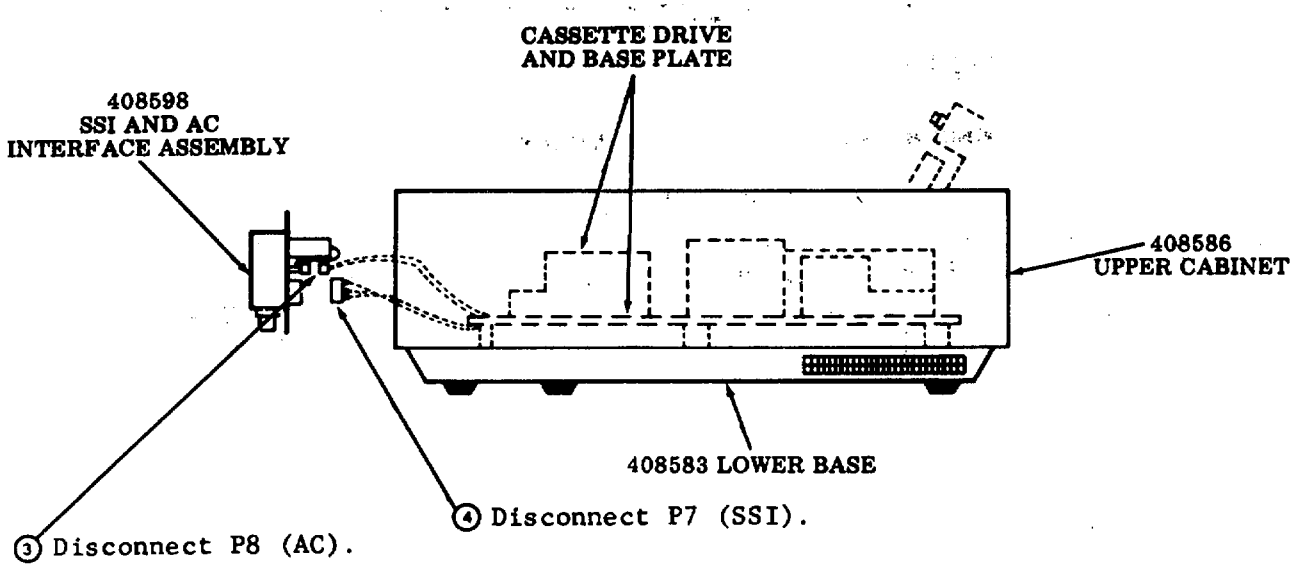

01 Hooks (Each End of 2 Springs)
D
01
01 Pivot (Each Screw)
01 Pivot Post (Each End) (Pull bobbin out slightly to oil rear of post.)
01 Hooks (Each End of Springs)
01 Pivot Post
01 Pivot Shaf (Each End)
06 Motor Bearings

F. DISASSEMBLY/REASSEMBLY AND PARTS

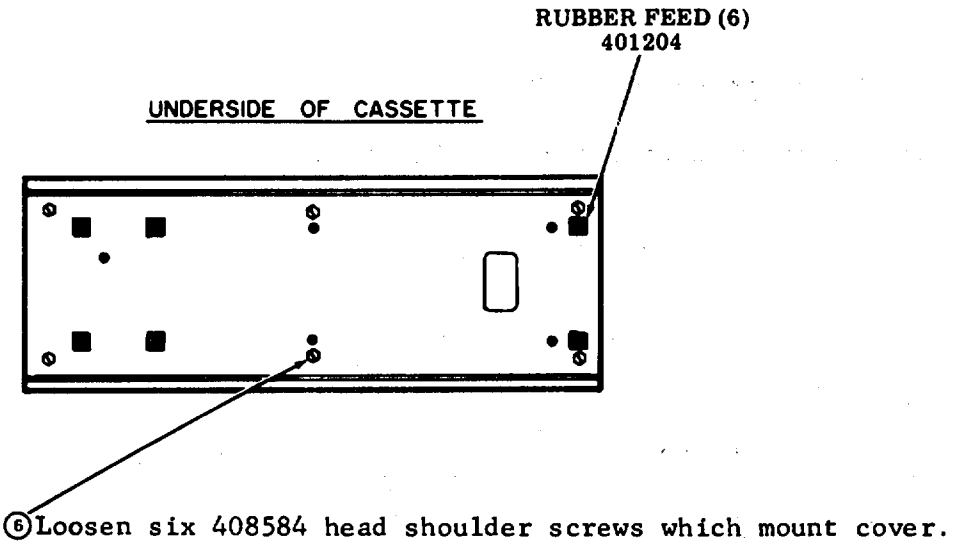
1. REMOVAL AID REPLACEMENT OF UPPER CABINET ASSEMBLY

To remove cover.





(5) Lay cassette drive on its side for access to the underside of drive.



(7) Holding the base and cover firmly together, return the cassette drive to its upright position.

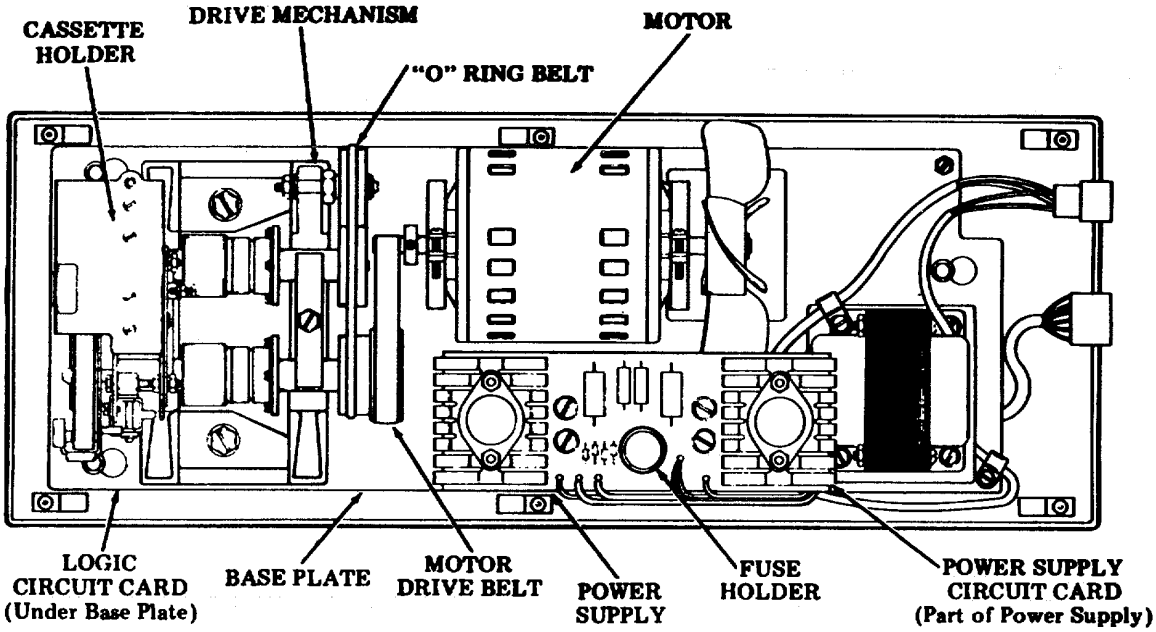
(8) Remove the cover from the base with cassette drive by lifting the cover straight up.

To replace the cover, reverse the removal procedure.

WARNING: DO NOT OVERTIGHTEN THE SIX 408584 CAPTIVE SCREWS WHICH MOUNT THE COVER.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

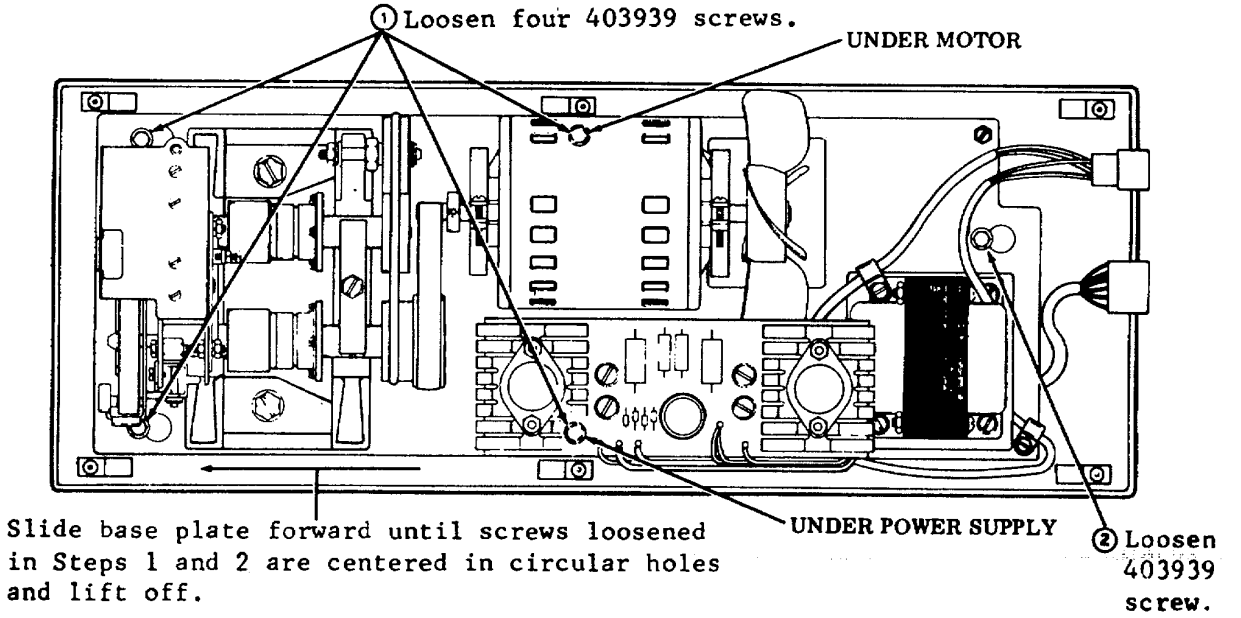
2. SUBASSEMBLY IDENTIFICATION



3. DISASSEMBLY/REASSEMBLY DRIVE

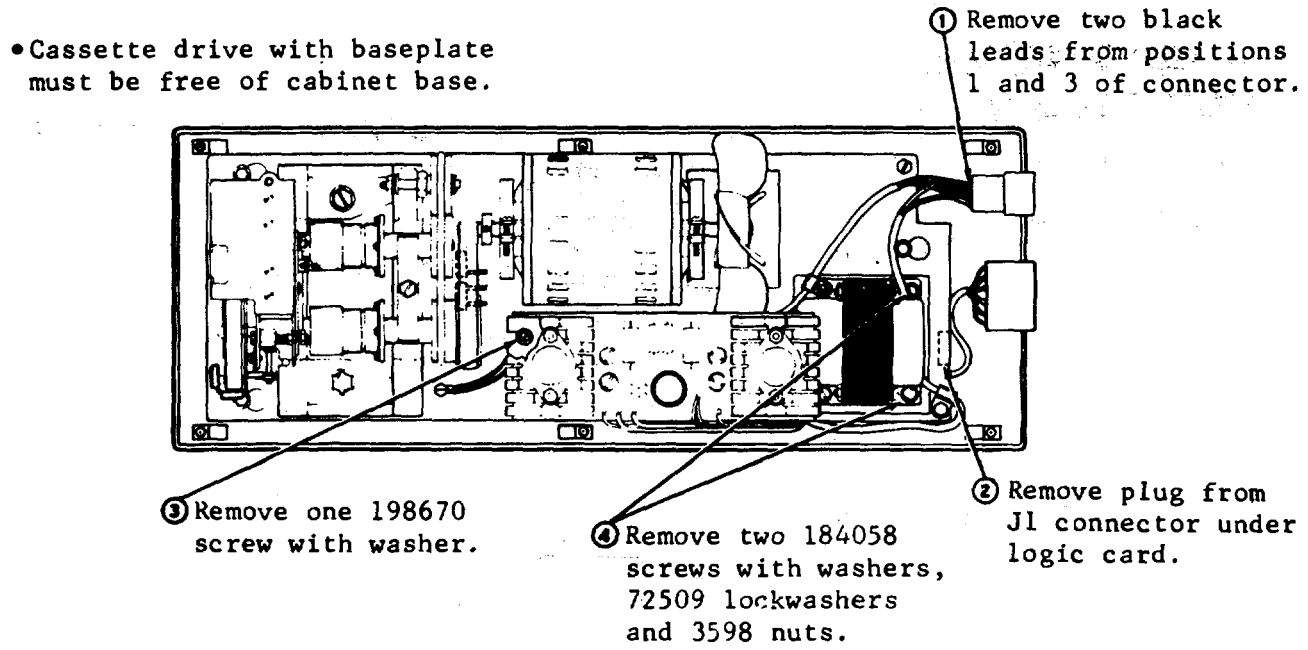
40CD102 Cassette Drive (From Cabinet Base)

- Remove cabinet.



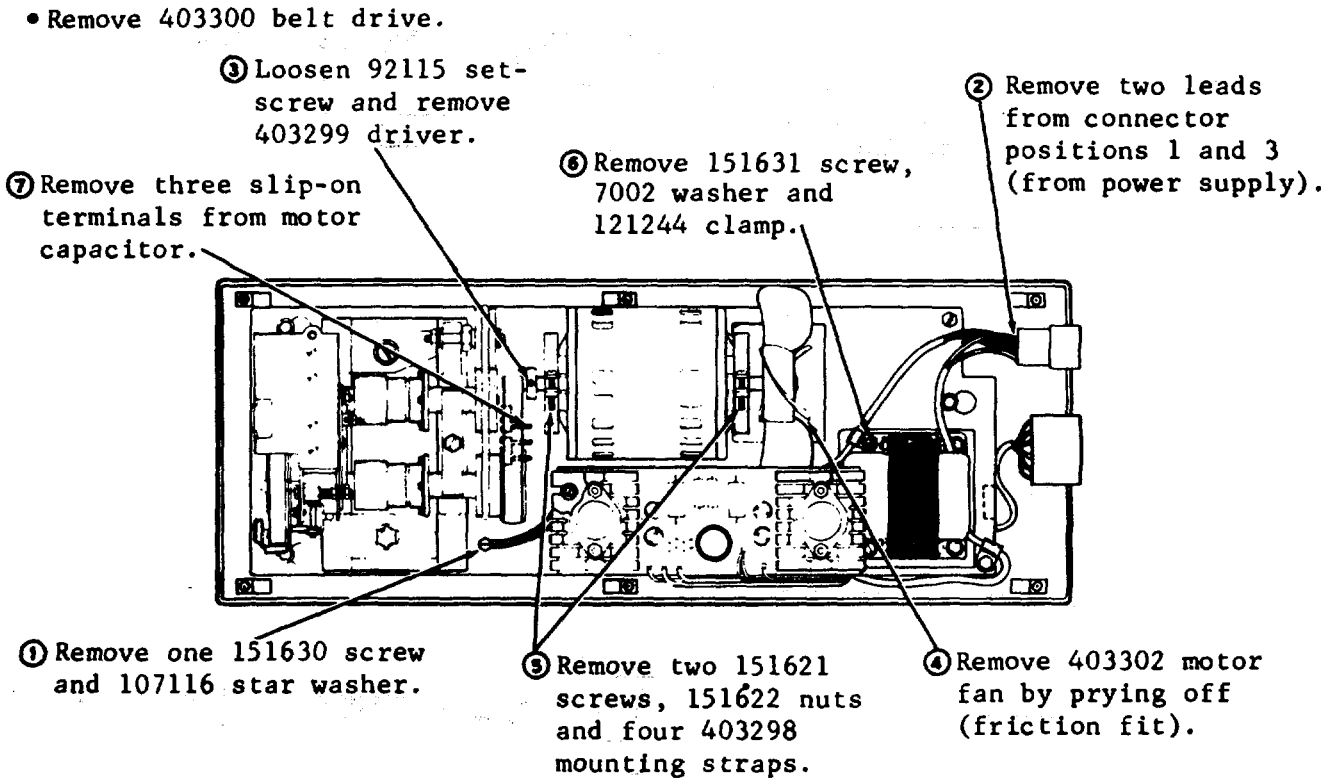
To install cassette drive with base plate, reverse removal procedures. Before sliding cassette drive rearward, screws must be centered in circular holes located under power supply and motor.

406101 Power Supply



To install power supply, reverse procedures.

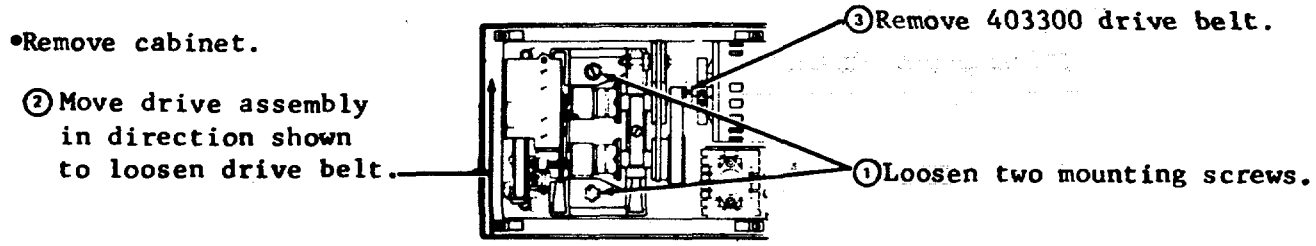
403303 Motor Assembly



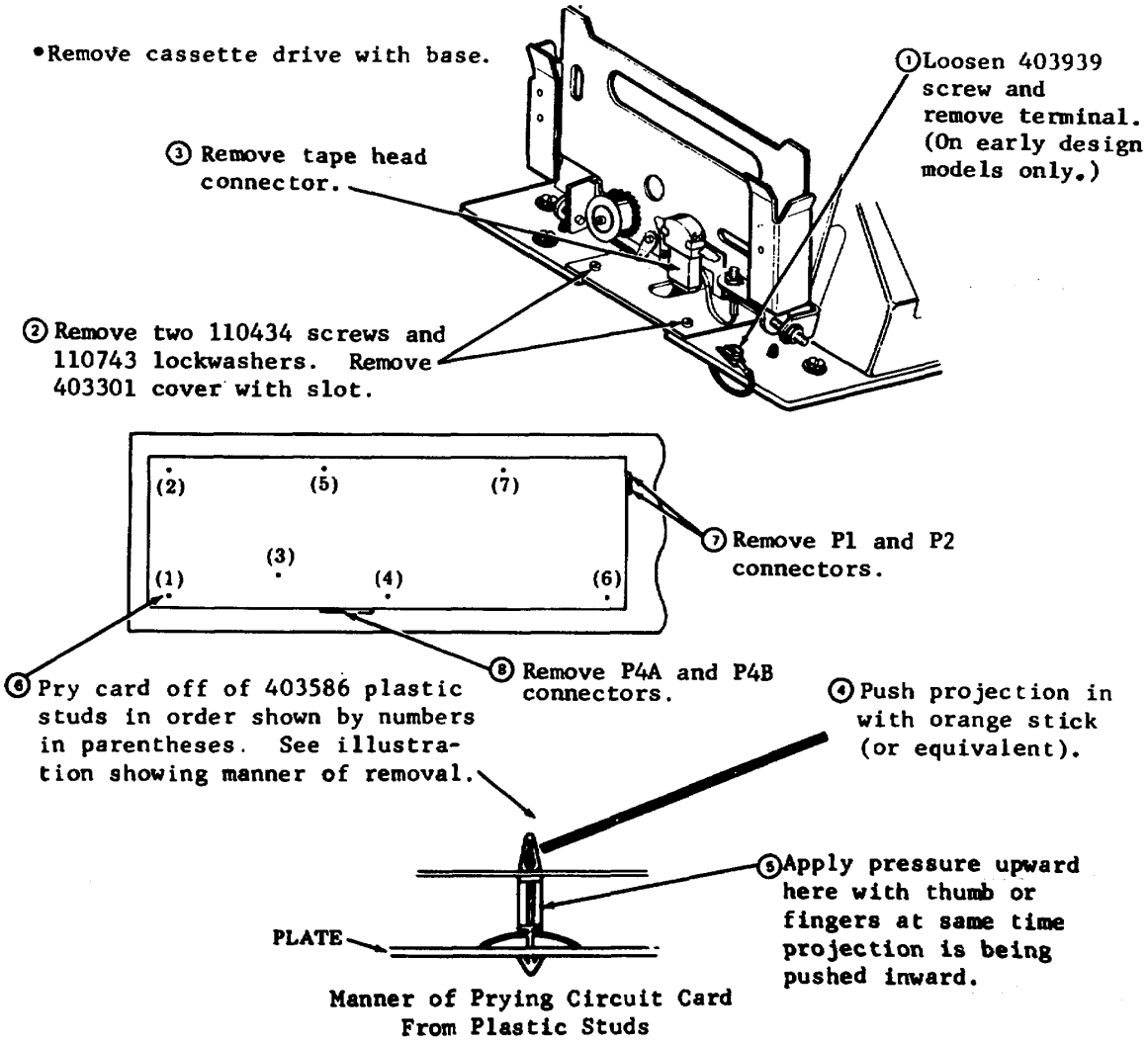
To install motor, reverse procedures.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

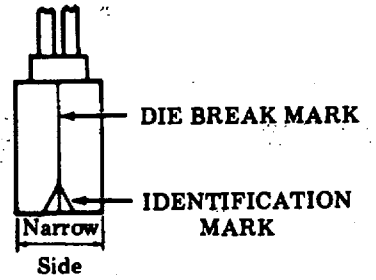
3. DISASSEMBLY/REASSEMBLY DRIVE (Contd.)
403300 Dive Belt



To install drive belt, reverse procedures. Recheck Motor Drive Belt and Motor Pulley adjustments (2-108).
410764 Logic Circuit Card



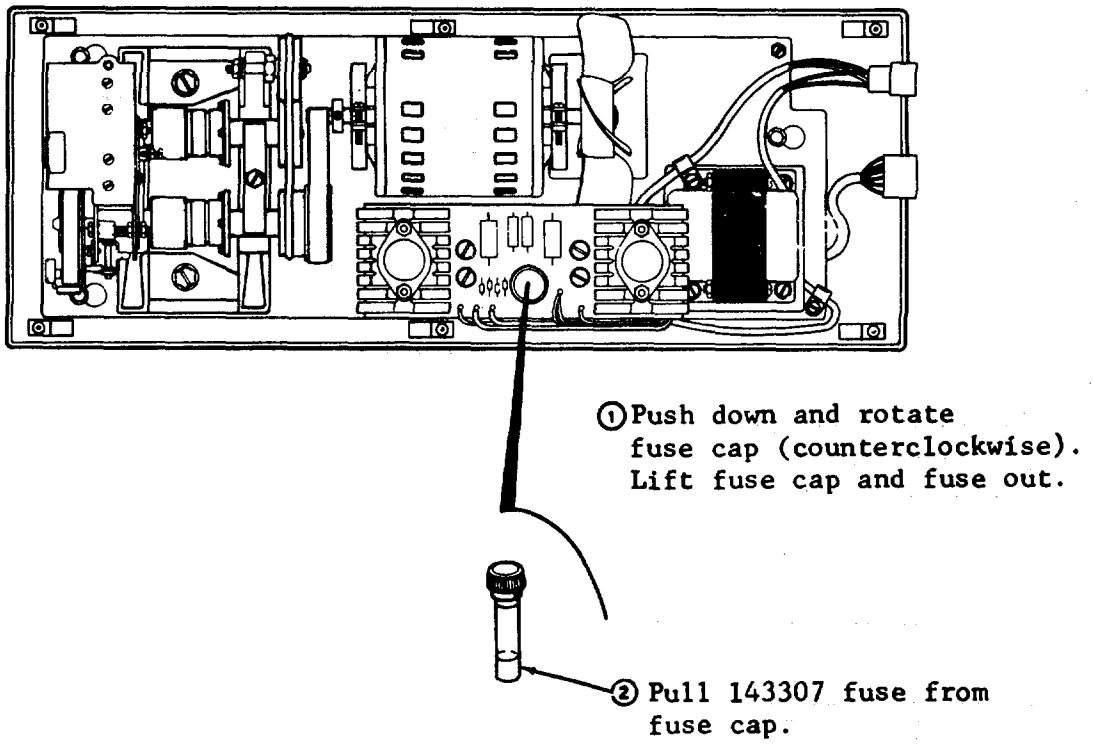
Manner of Prying Circuit Card From Plastic Studs



To install 410764 logic circuit card, reverse removal procedures. Circuit card must be installed with component side- toward baseplate. -Projections or 403586 plastic studs must secure circuit board. The tape head connector must be assembled to the tape head so that the identification mark is to the right as viewed from the front of the cassette drive.

143307 Fuse

- Remove cover.



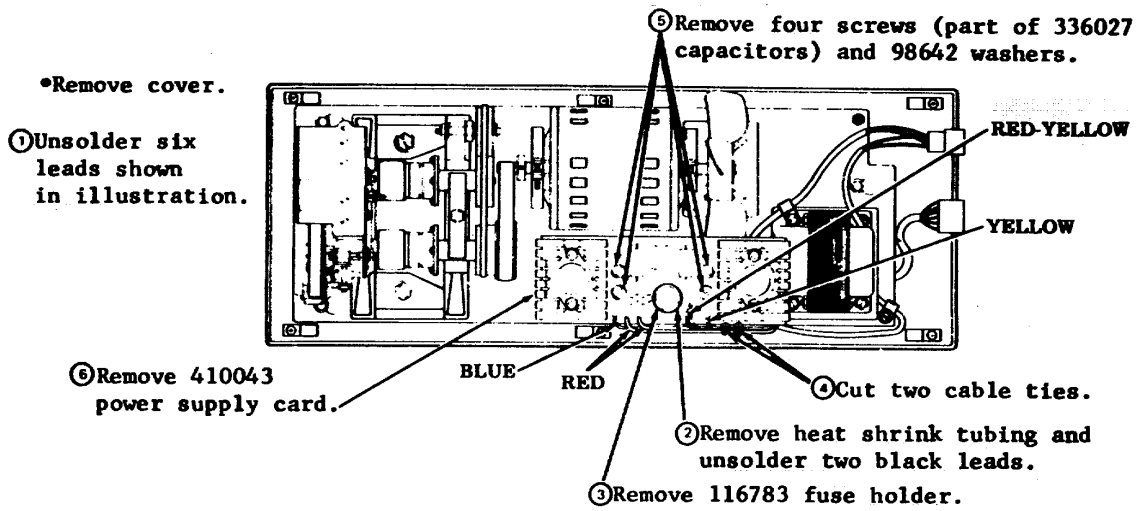
To install fuse, reverse removal procedures.

NOTE: Replace with 143307 0.6 amp Slow-Blow fuse.

F. DISASSEMBY/REASSEMBY AND PARTS (Contd)

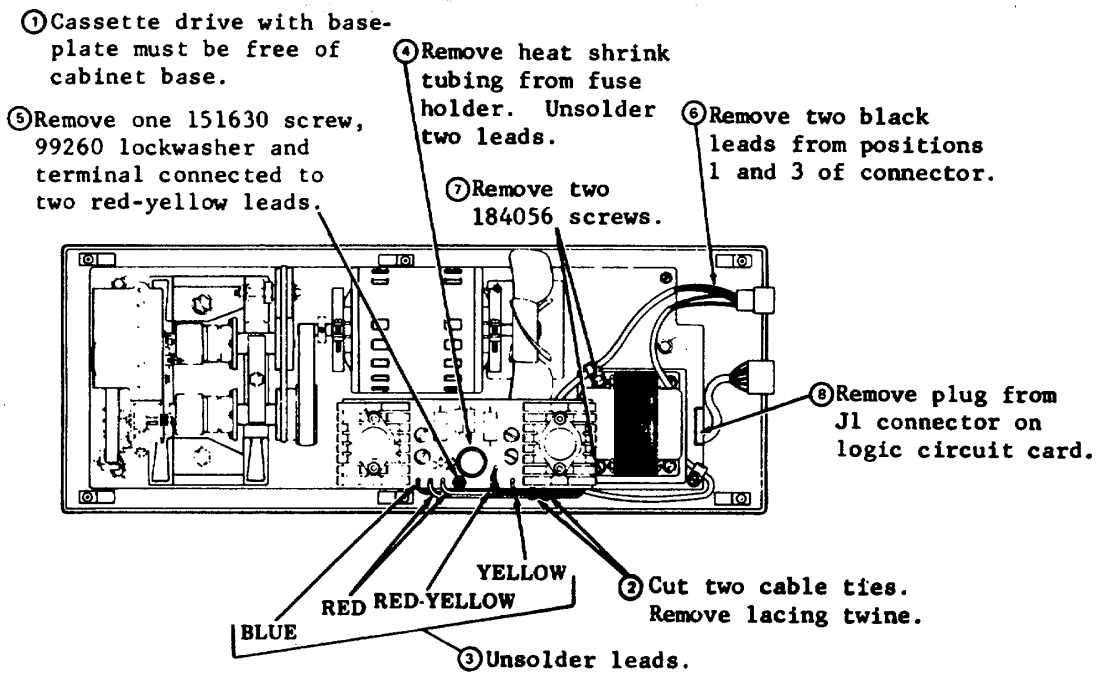
3. DISASSEMBLY/REASSEMBLY DRIVE (Contd)

410043 Power Supply Circuit Card



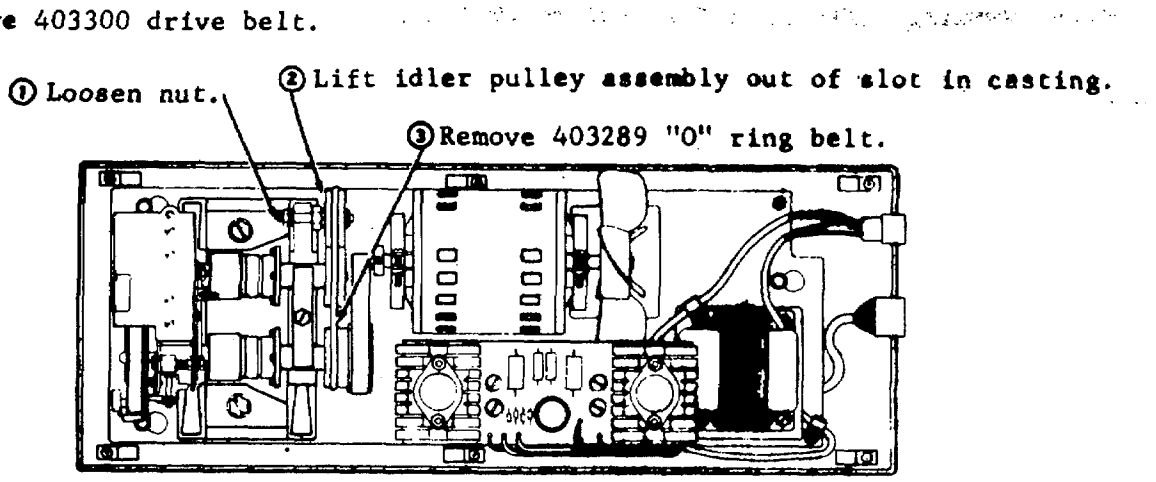
To install circuit card, reverse procedures. Cover lower portion of fuse holder with suitable heat shrink tubing after black leads are soldered in place. Secure cable assembly to power supply circuit board with two RM43679 cable ties.

406103 Transformer



To install 406103 transformer, reverse removal procedures. Cover lower portion of fuse holder with suitable heat shrink tubing after leads are soldered in place. Secure cable assembly to power supply circuit board with two RM43679 cable ties.

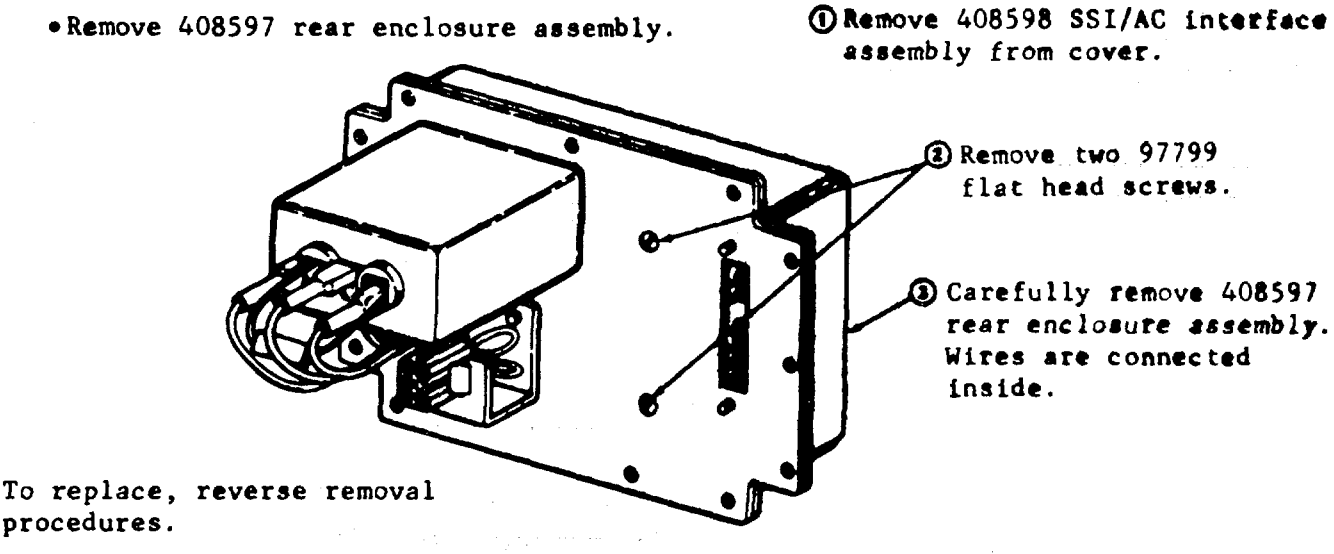
403289 "0" Ring Belt'



To install, reverse procedures. Recheck Belt ("0" Ring) adjustment (2-106).

To install, reverse procedures. Recheck Belt ("O" Ring) adjustment (2-106).

4. DISASSEMBLY/REASSEMBLY SSI/AC INTERFACE

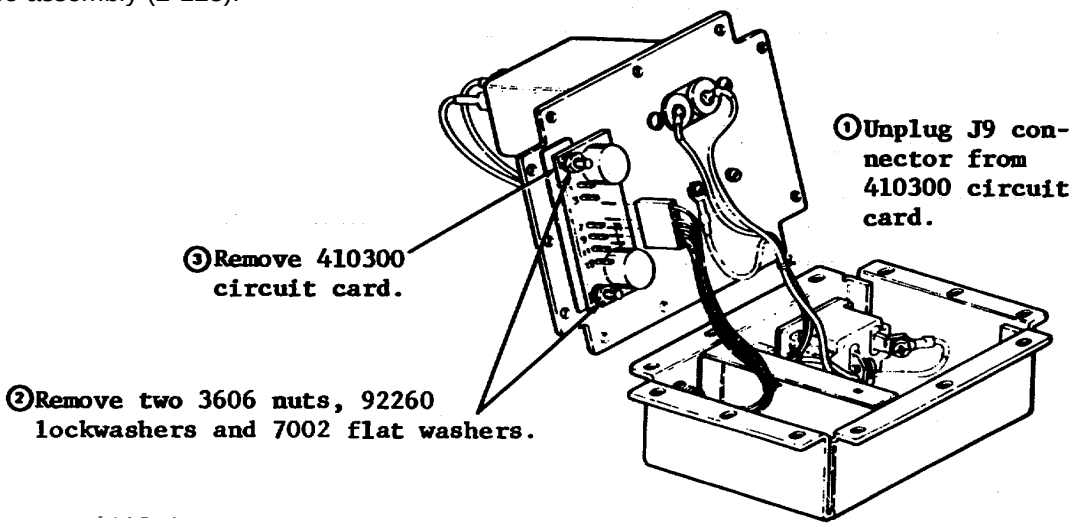


F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

4. DISASSEMBLY/REASSEMBLY SSI/AC INTERFACE (Contd)

410300 Circuit Card

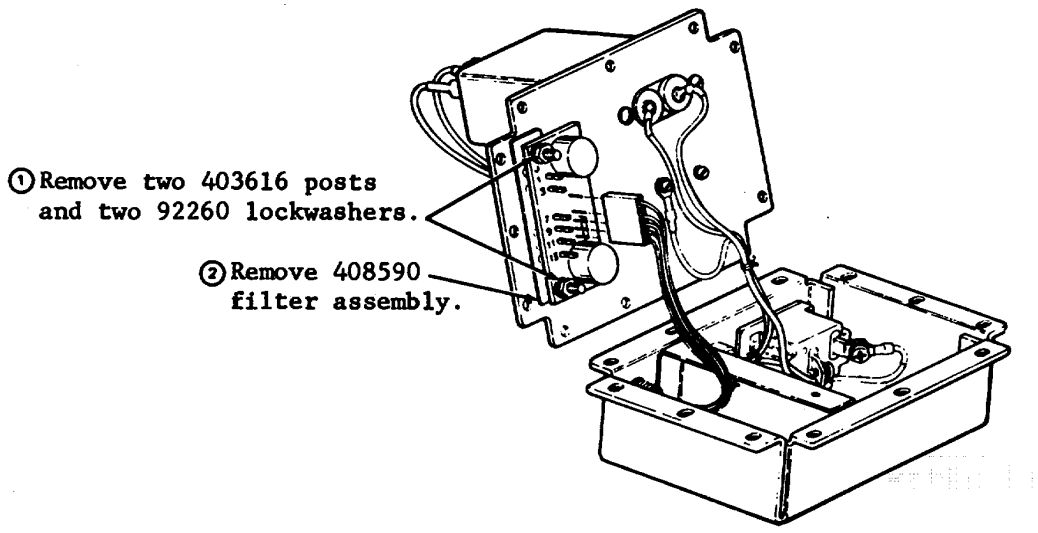
- Remove upper cabinet assembly (2-114)'.
- Remove SSI/AC interface from cabinet assembly (2-121).
- Remove rear enclosure assembly from (interface assembly (2-128).



To install a new 410300 circuit card, reverse removal procedure.

408590 Filter Assembly Removal

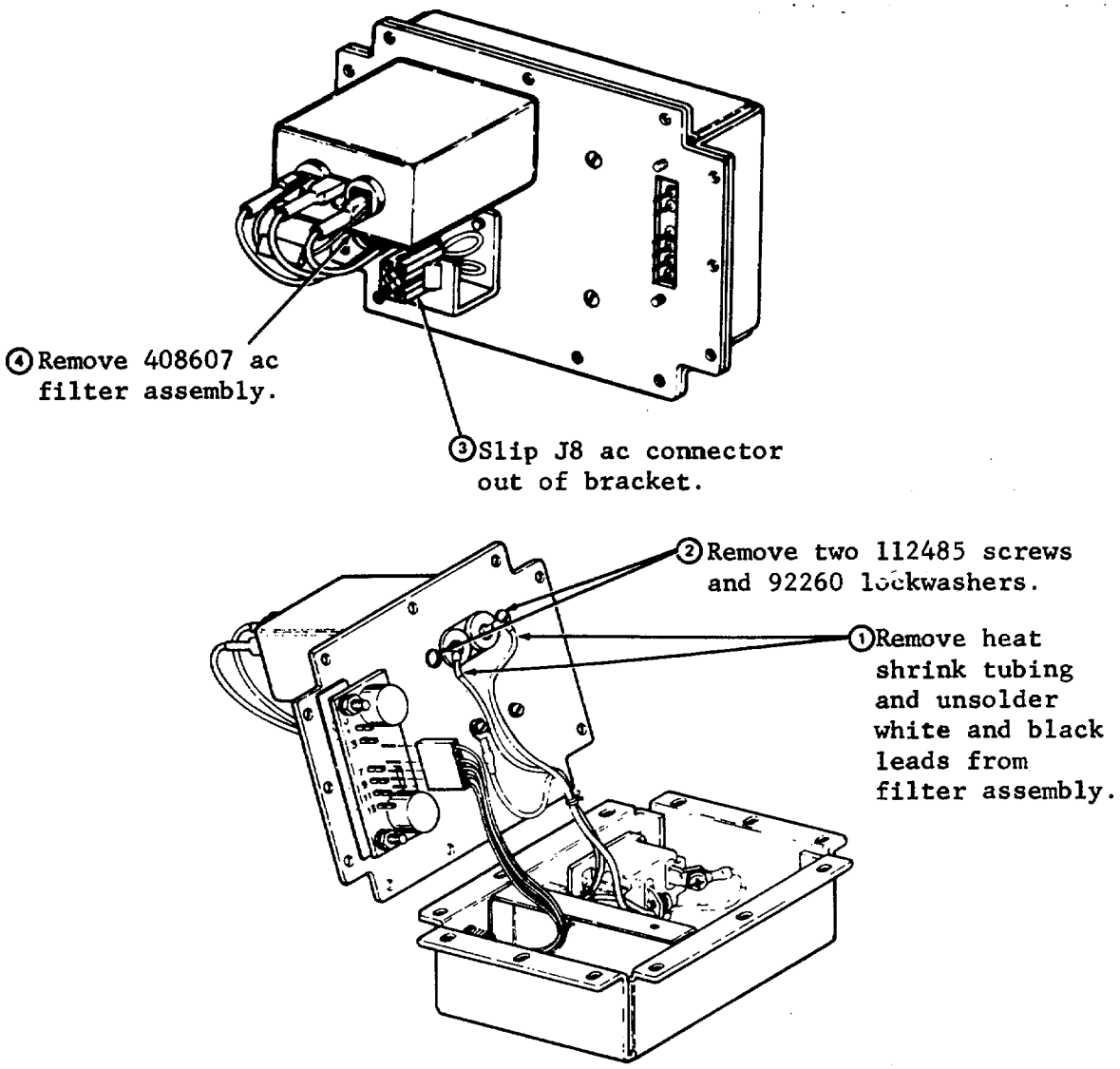
- Remove upper cabinet assembly (2-114).
- Remove SSI/AC interface assembly (2-121).
- Remove rear enclosure assembly from interface assembly (2-128).
- Remove 410300 SSI from circuit card (2-129).



To install new 408590 filter assembly, reverse removal procedure.

408607 AC Filter Assembly Removal

- Remove upper cabinet assembly (2-114)
- Remove SSI/AC interface assembly from upper cabinet assembly (2-114).
- Remove Rear enclosure assembly from interface assembly (2-128).



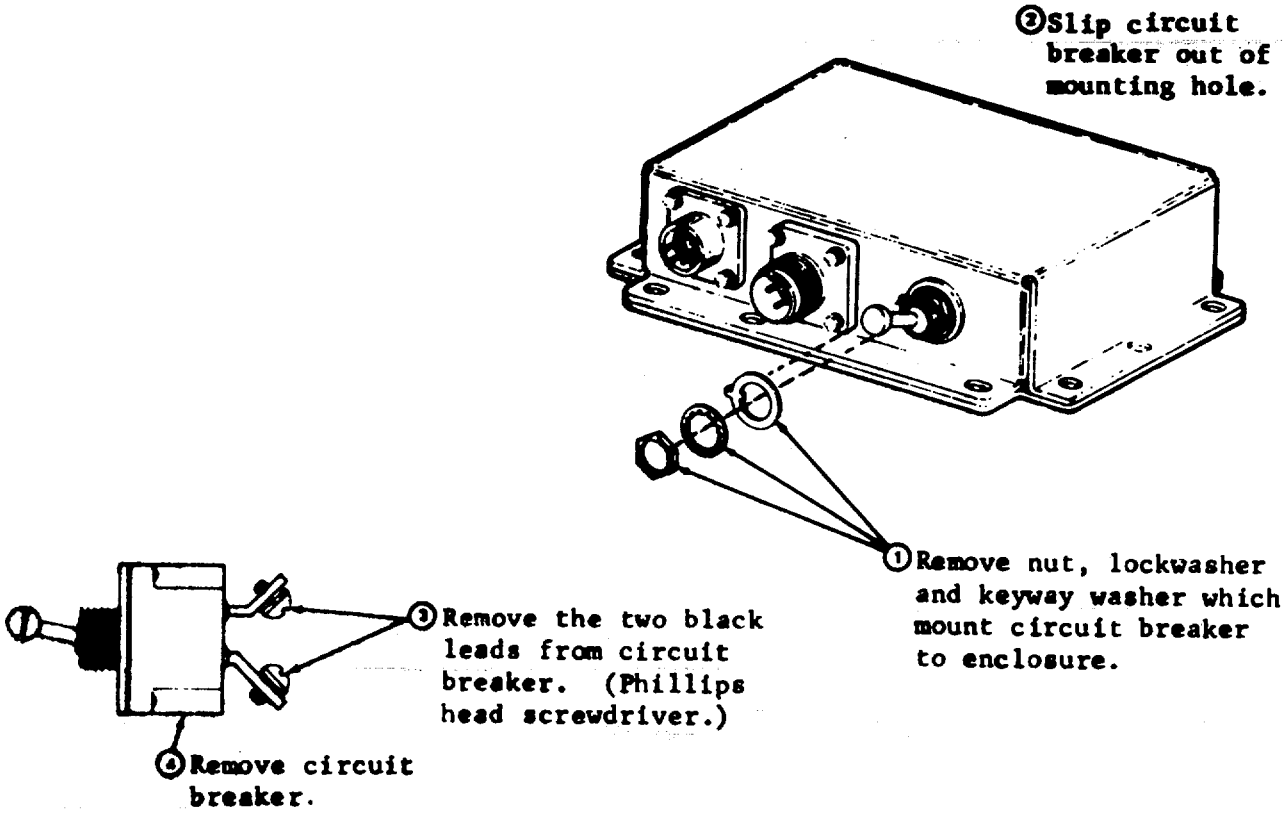
To install the ac filter assembly, reverse the removal procedure. When resoldering leads to line side of filter, solder black lead to terminal 5 and white lead to terminal 4. Leads should be covered with heat shrink tubing after soldering.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

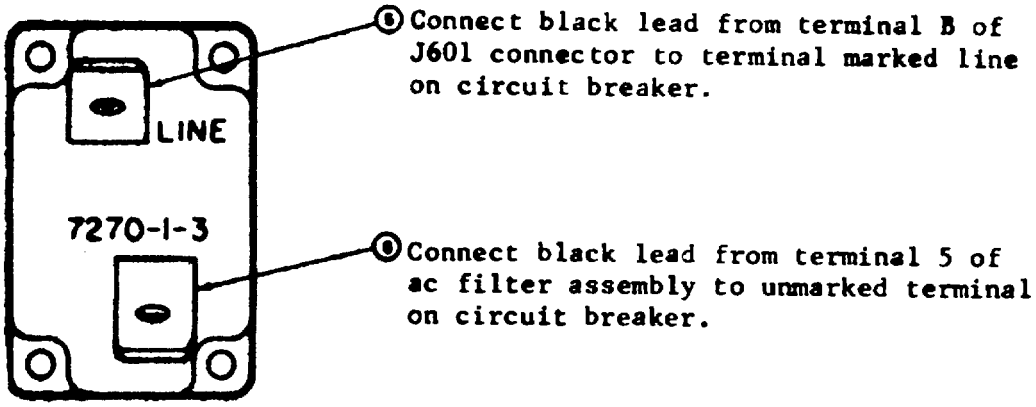
4. DISASSEMBLY/REASSEMBLY SSI/AC INTERFACE (Contd)

408594 Circuit Breaker Removal

Remove upper cabinet assembly (2-115).
Remove rear enclosure assembly from interface assembly (2-129).



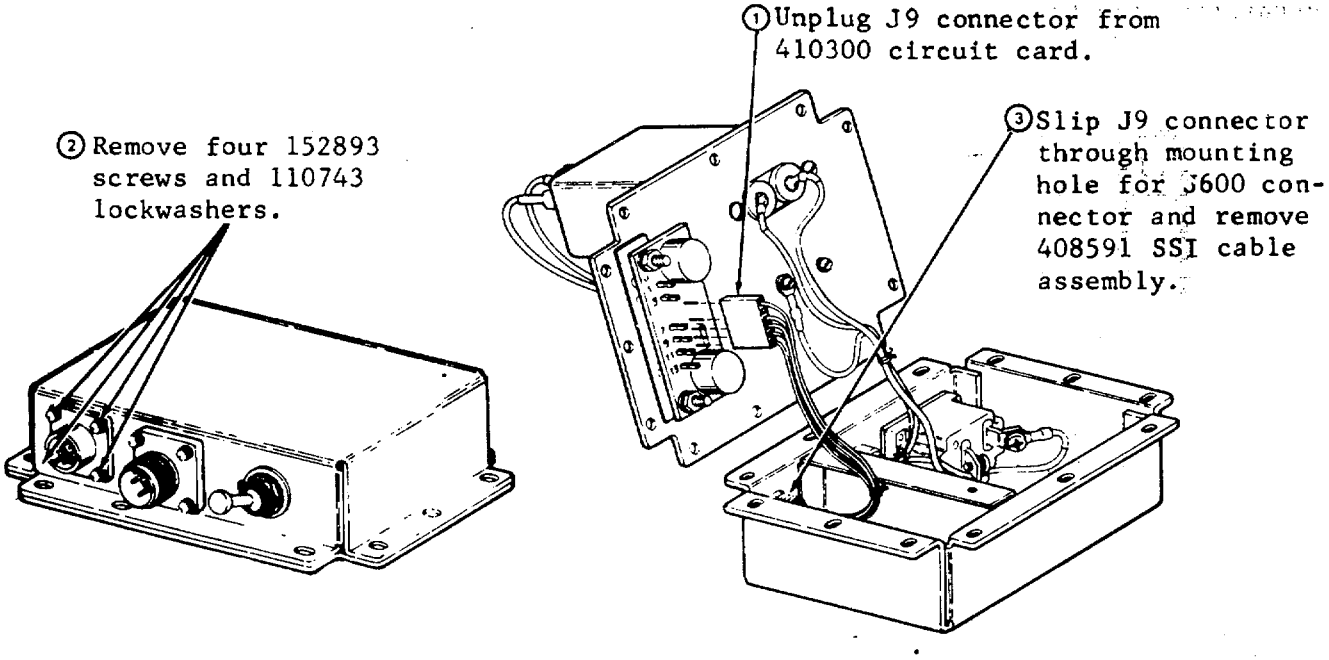
To install a new 408594 circuit breaker, reverse removal procedure. When connecting the black leads, proceed as indicated below.



When mounting circuit breaker in rear enclosure, orientate circuit breaker so that keyway is pointing toward small hole next to circuit breaker mounting hole.

408591 SSI Cable Assembly Removal

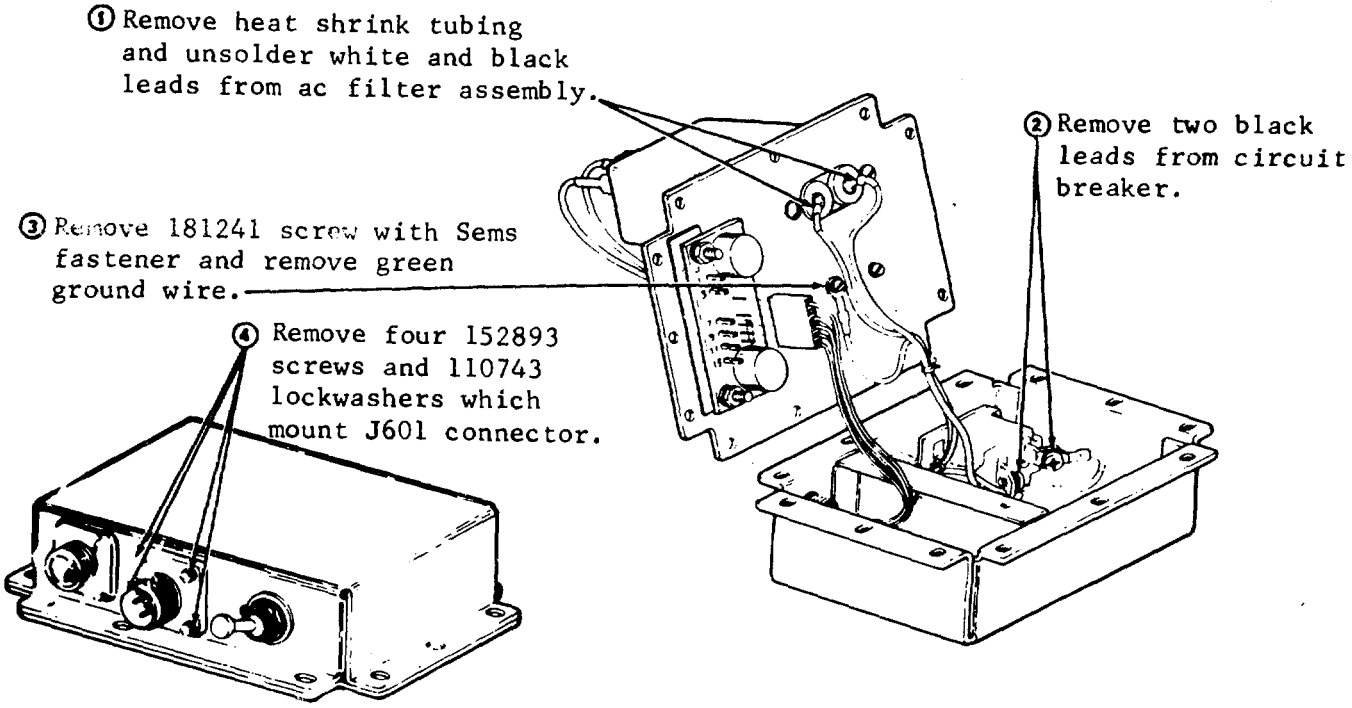
- Remove upper cabinet assembly (2-114).
- Remove rear enclosure assembly from the interface assembly (2-128).



To install SSI cable assembly, reverse removal procedure.

408592 AC Cable Assembly Removal

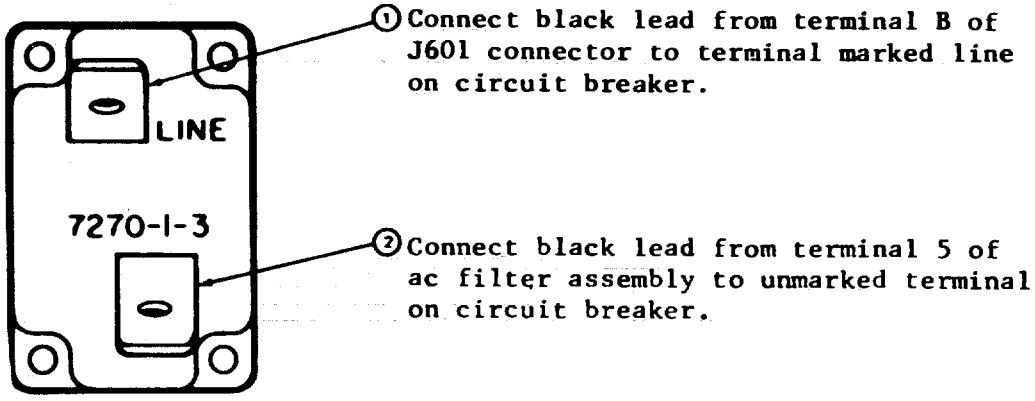
- Remove the upper cabinet assembly (2-114).
- Remove the rear enclosure assembly from the interface assembly (2-128).



F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

4. DISASSEMBLY/REASSEMBLY SSI/AC INTERFACE (Contd)

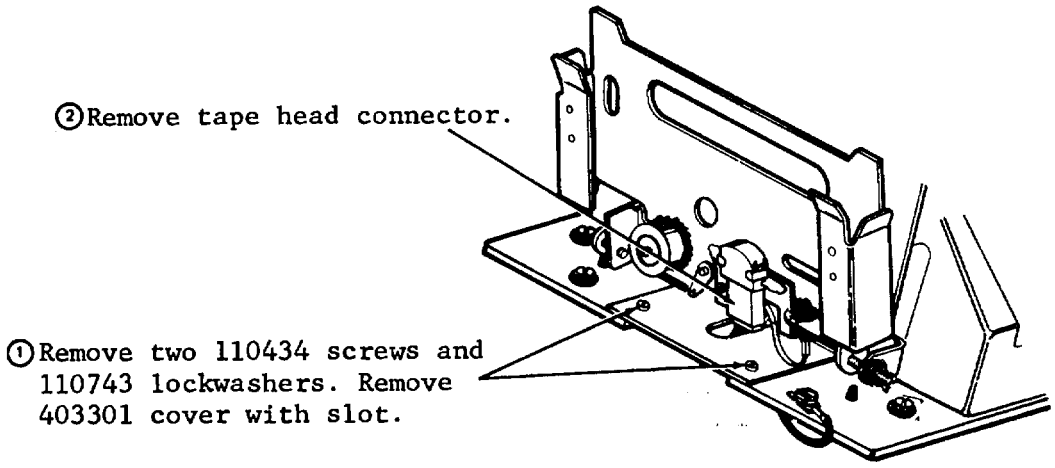
To install the 408592 ac cable assembly, reverse the removal procedure. When connecting the black leads to the circuit breaker, proceed as indicated below:

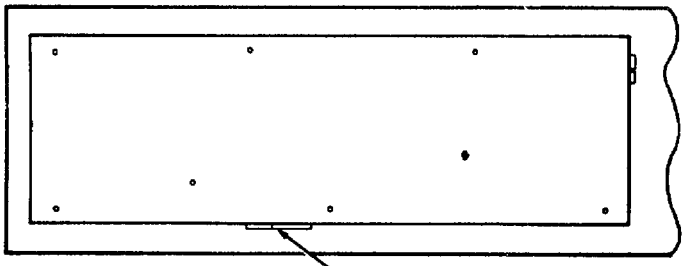


(3) When connecting the white and black leads to the ac filter assembly, solder the black lead from circuit breaker to terminal 5 of the ac filter assembly. Solder the white lead from terminal A of J601 connector to terminal 4 of the ac filter assembly. The leads: , should be covered with heat shrink tubing after soldering.

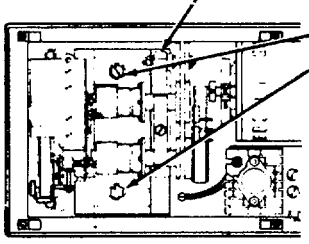
Drive Mechanism

- Remove cassette drive with base from lower cabinet.
- Remove 403300 drive belt.





④Check if plastic strap securing cables to casting also straps casting to base. If it does, cut strap.

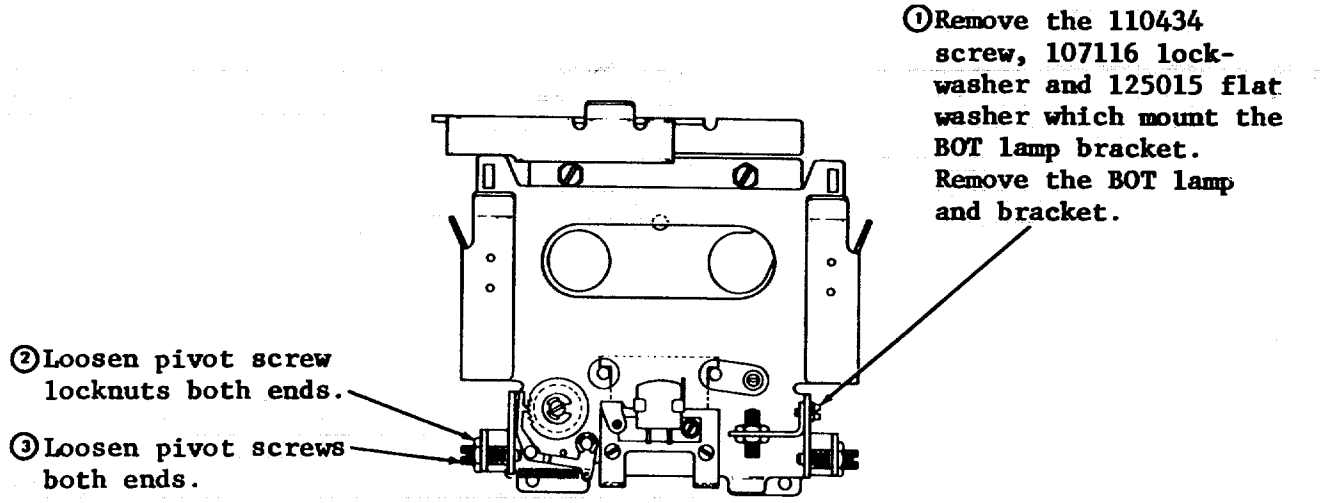


⑤Remove two mounting screws, lockwashers and flat washers.

⑥Remove drive mechanism.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

4. DISASSEMBLY/REASSEMBLY SSI/AC INTERFACE (Contd)



④Remove cassette holder assembly.

To install cassette holder assembly, reverse removal procedure. The tape head connector must be assembled to the tape head so that the identification mark is to the right as viewed from the front of the cassette drive.

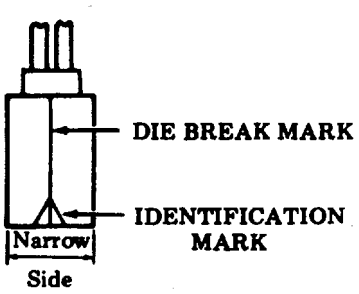
Recheck adjustments:

Cassette Holder Page 2-95 and BOT-EOT Sensor Tube Page 2-104 and BOT-EOT Lamp Mounting Page 2-103.

Front Plate Assembly

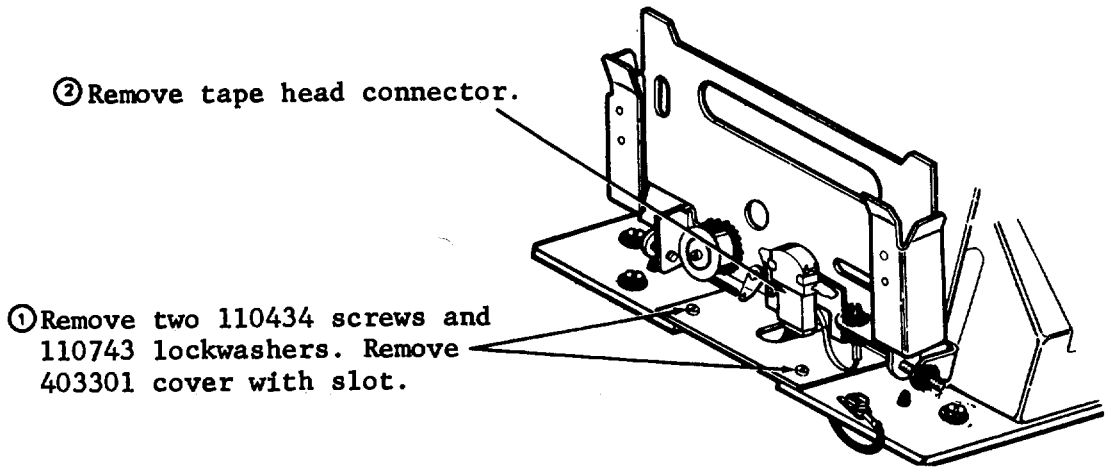
- Remove cassette drive with base from lower cabinet.
- Remove drive mechanism from base.
- Remove cassette holder assembly.

To install drive mechanism, reverse removal. procedures. The tape head connector must be assembled to the tape head so that the identification mark is to the right as viewed from the front of the cassette drive. If plastic strap was cut, secure cabling to left rear of casting with a new plastic strap or lacing twine. Recheck Motor Drive Belt and Motor Pulley adjustments (2-108).



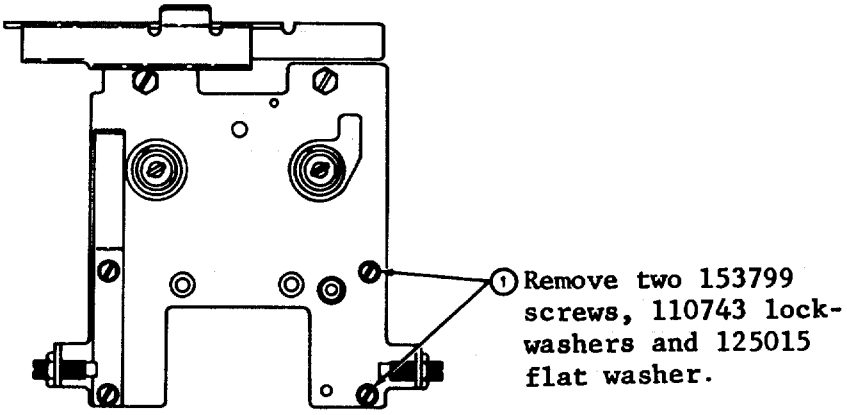
Cassette Holder Assembly

- Remove cassette drive with base from lower cabinet.
- Remove drive mechanism.



F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

4. DISASSEMBLY/REASSEMBLY SSI/AC INTERFACE (Contd)

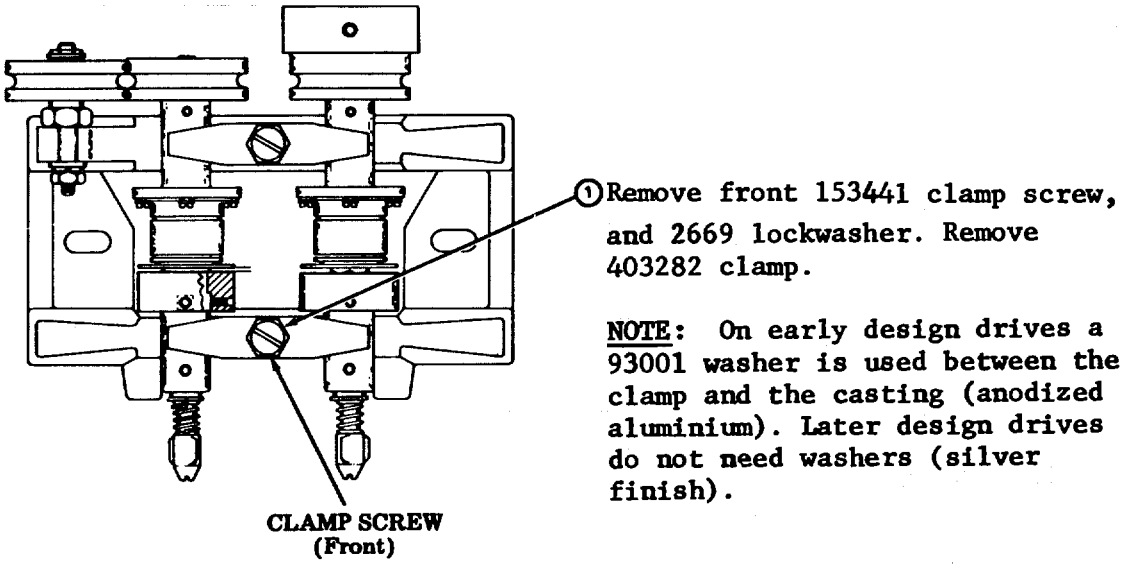


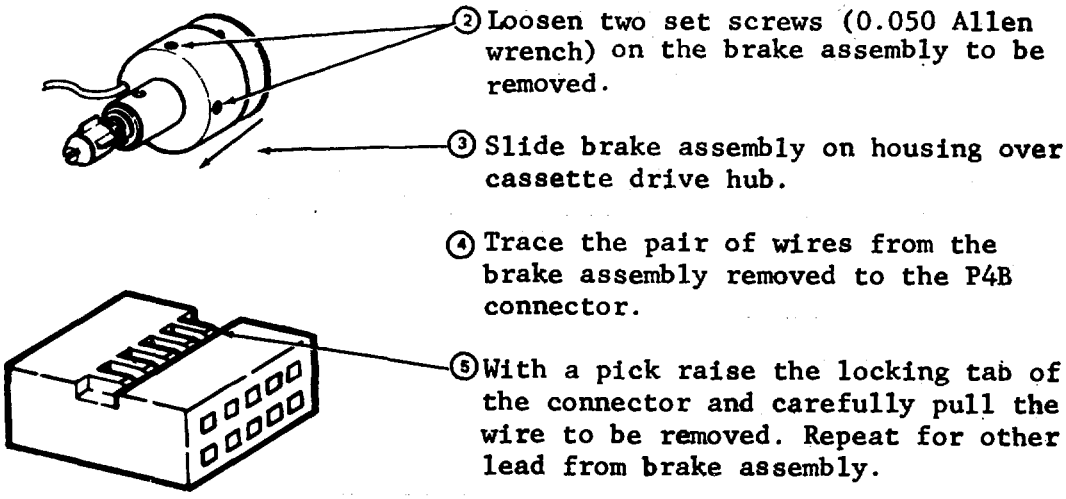
(2) Remove two 153799 screw and 110743 lockwasher and 403291 cassette holder pressure spring.
(3) Carefully route cable through casting.
(4) Remove front plate assembly.

To install the front plate, reverse removal procedure.
Check Plate With Cassette Holder adjustment Page 2-100.

Brake Assembly

- Remove cassette drive with base from lower cabinet.
- Remove drive mechanism from base.
- Remove cassette holder assembly.
- Remove front plate assembly.





To install a brake assembly, reverse the, removal procedure. Refer to WDP 0501 for connections to P4B connector.

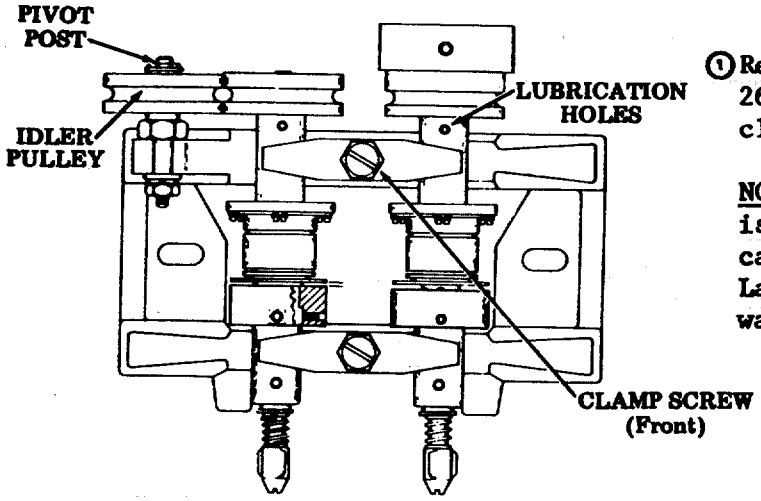
Check adjustment, Clutch, Page 2-107 and Brake, Page 2-107.

Armature Assembly

- Remove cassette drive with base from lower cabinet.
- Remove drive mechanism from base.
- Remove cassette holder assembly.
- Remove front plate assembly.

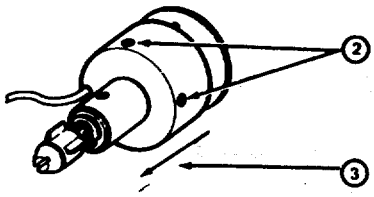
F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

4. DISASSEMBLY/REASSEMBLY SSI/AC INTERFACE (Contd)



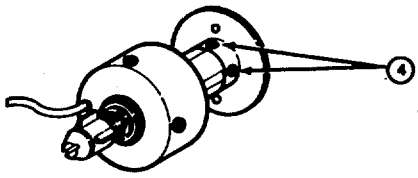
① Remove front 153441 clamp screw and 2669 lockwasher. Remove the 403282 clamp.

NOTE: On early design drives, a 93001 is used between the clamp and the casting (anodized aluminium casting). Later design drives do not need washers (silver finish casting).



② Loosen two set screws (0.050 Allen wrench) on the brake assembly of the shaft from which armature is to be removed. (See Note.)

③ Slide brake assembly back over housing for access to armature hub.



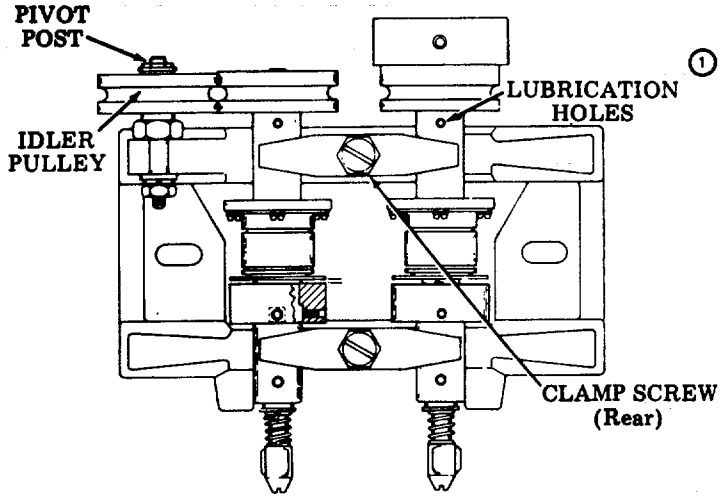
④ Remove two 180595 set screws (0.050 Allen wrench).

To install armature assembly, reverse the removal procedure.
Check adjustments: Pulley and Shaft End Play Page 2-106.

NOTE: Armature assemblies with clutch assemblies should be replaced as mated pairs.

Clutch Assembly

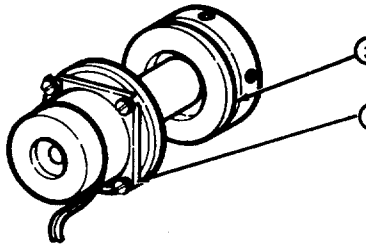
- Remove cassette drive with base from lower cabinet.
- Remove drive mechanism from base.
- Remove cassette holder assembly.
- Remove front plate assembly.



① Remove rear 153441 clamp screw and 2669 lockwasher. Remove rear clamp.

NOTE: On early design drives, a 93001 is used between the clamp and the casting (anodized aluminium casting). Later design drives do not need washer (silver finish casting).

② Loosen two set screws (0.050 Allen wrench) on pulley of shaft from which clutch is to be removed. (See Note 1.)



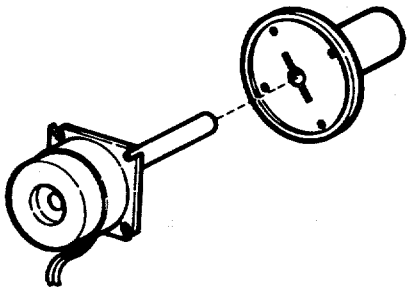
③ Remove pulley from shaft.

④ Remove four 111640 screws and 130663 lockwashers.

NOTE 1: Clutch assemblies with armature assemblies should be replaced as mated pairs.

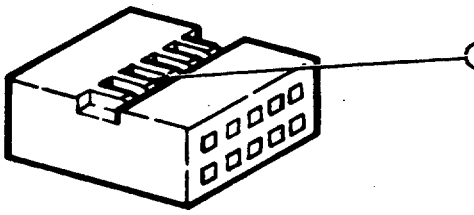
F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

4. DISASSEMBLY/REASSEMBLY SSI/AC INTERFACE (Contd)



⑤Remove clutch with shaft assembly from housing.
Forward clutch assembly (long)-402272.
Reverse clutch assembly (short)-402271.

NOTE: Field coil, rotor and shaft are replaced as mated pairs.

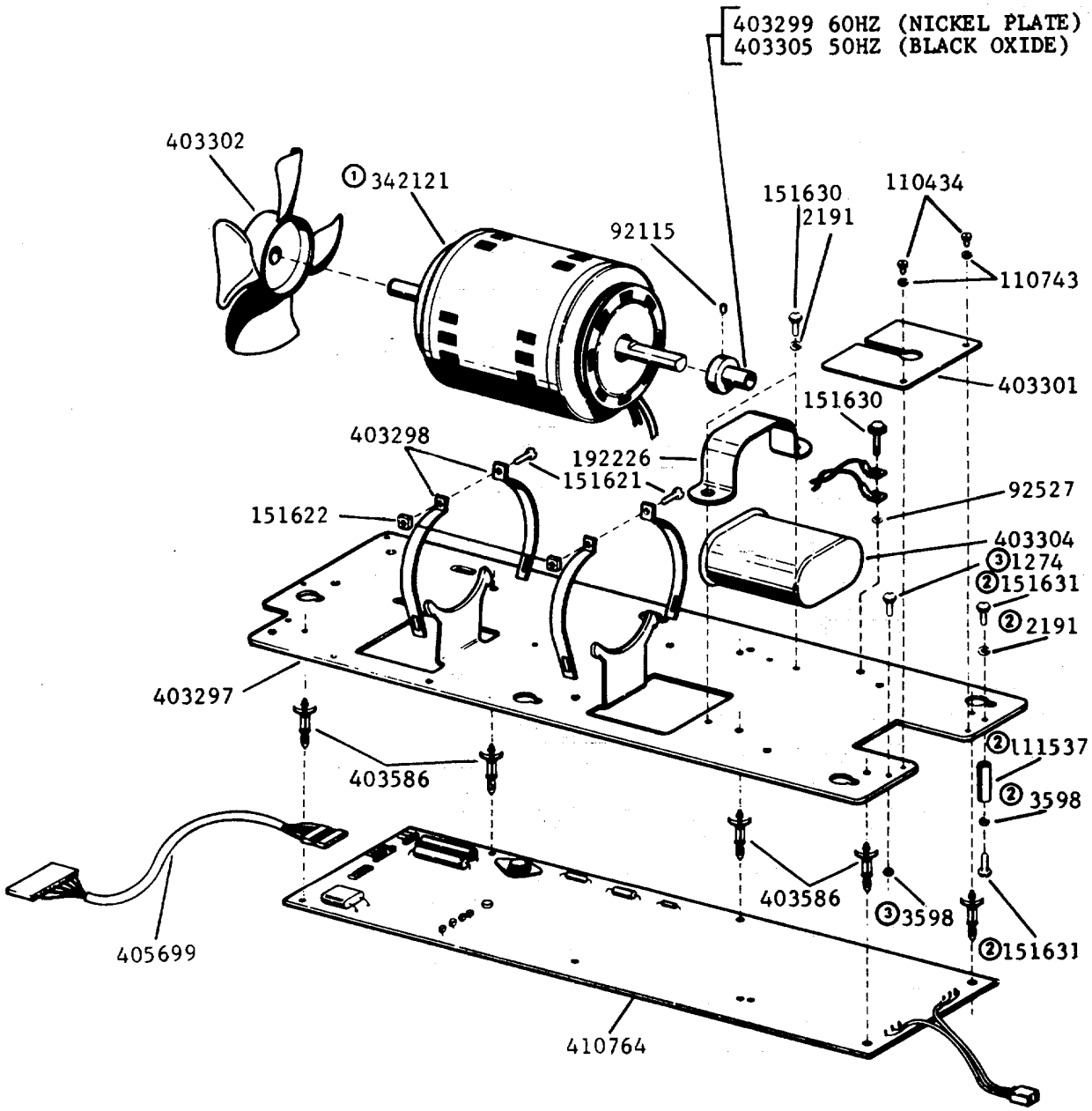


⑥ Trace wires from clutch assembly being removed to connector P4B.

⑦ With a pick, raise the locking tab of the connector and carefully pull the wire to be removed. Repeat for other lead from the clutch assembly.

To install clutch assembly, reverse the removal procedure. Refer to WDP 0501 for connections to P4B. Check adjustments: Clutch Shaft End Play Page 2-106 Pulley Alignment Page 2-106 and Clutch Gap, Page 2-107.

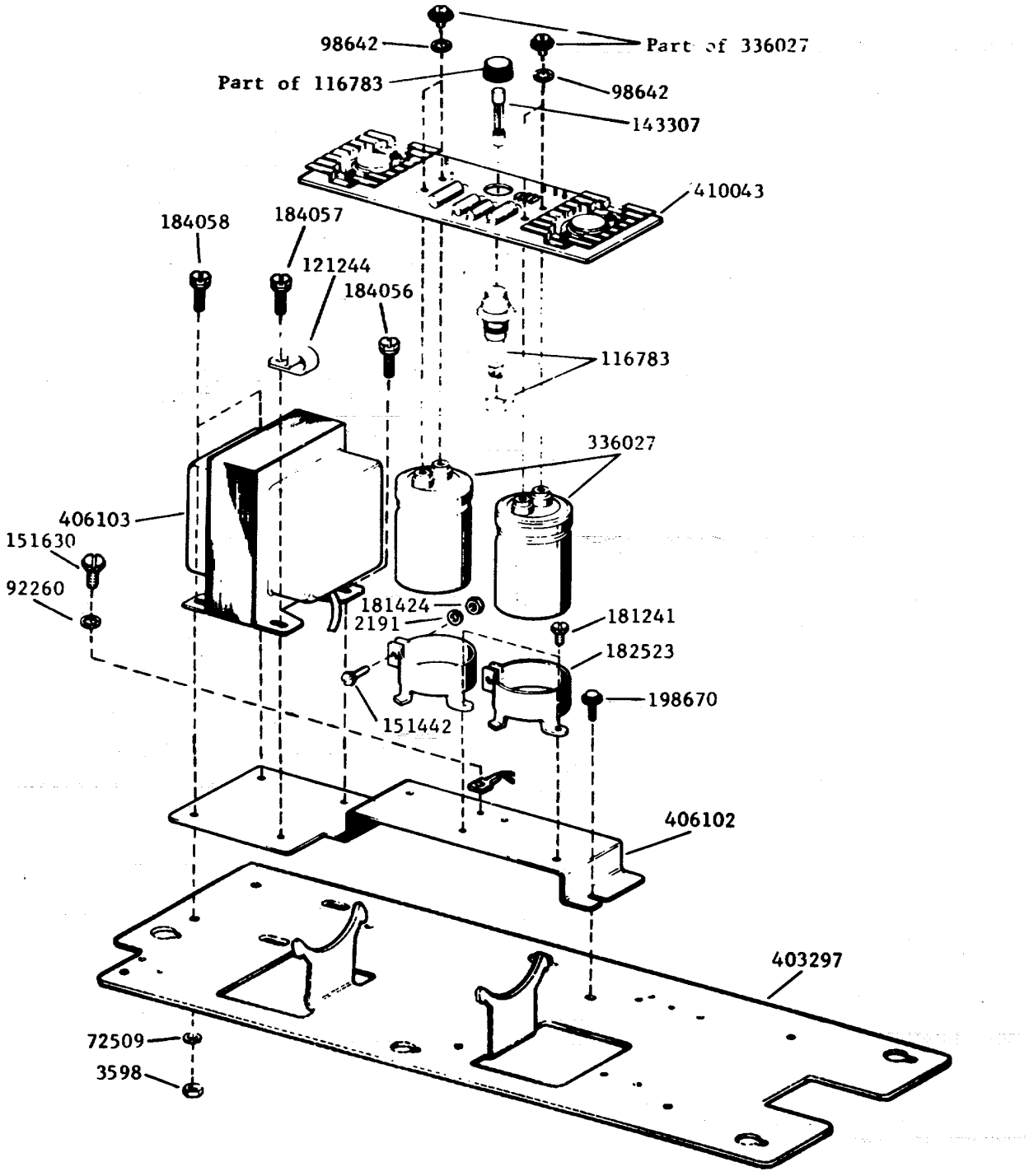
5. PARTS



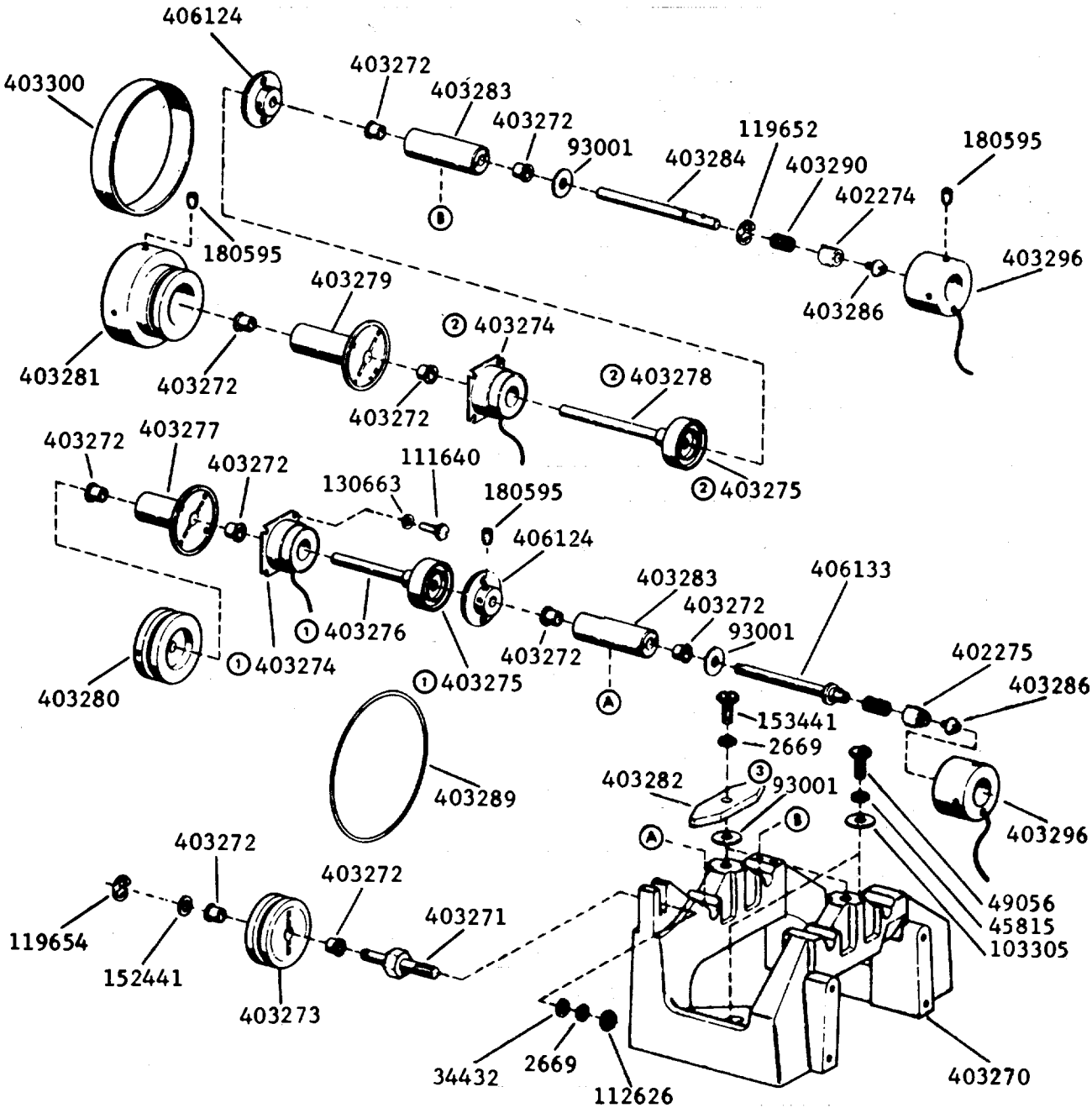
①Part of 403303 motor assembly.
②Early design units were supplied with five posts and adjusting screws.
③Late design units are supplied with five screws and nuts.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

5. PARTS (Contd)



Power Supply Assembly

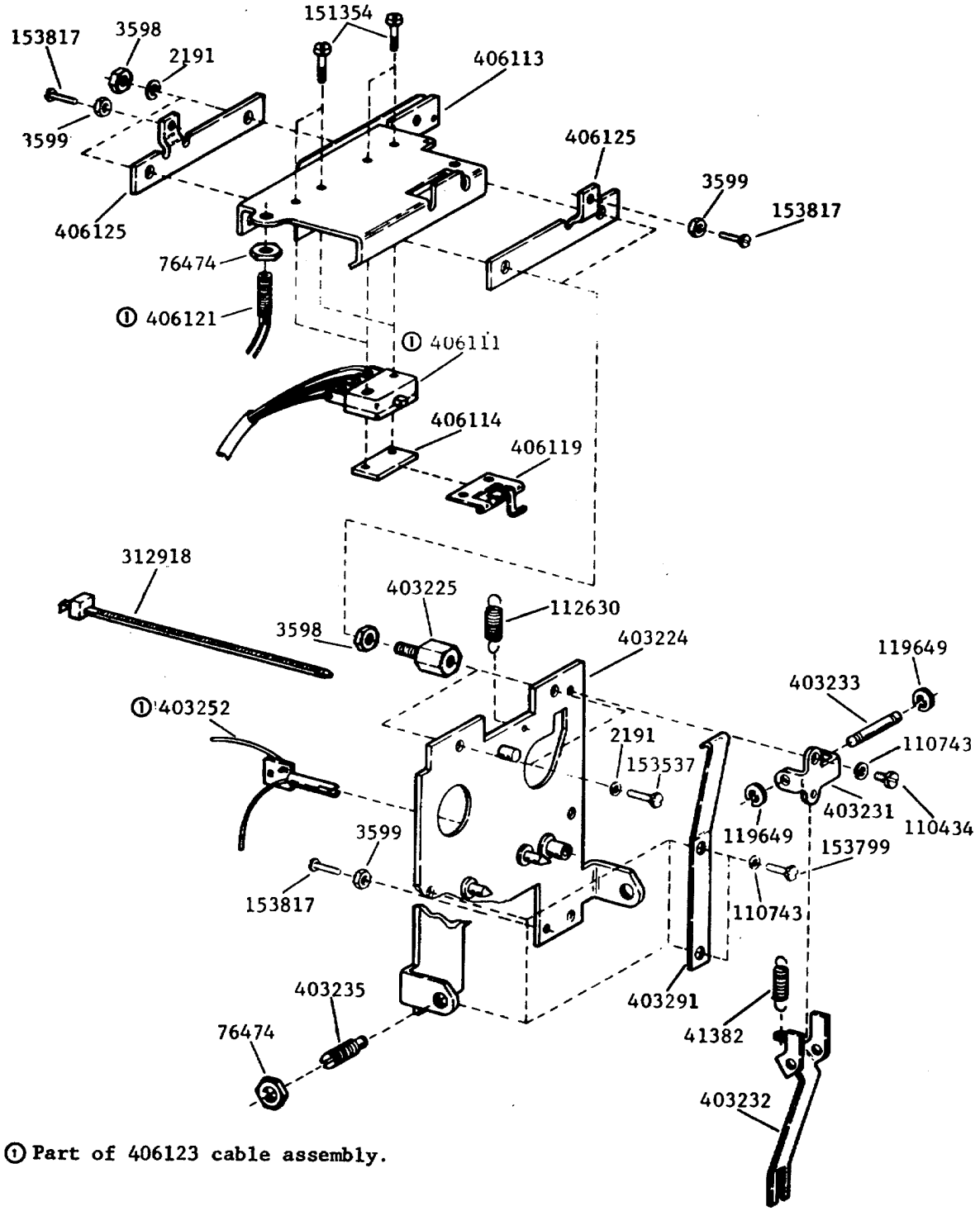


①Part of 402271 clutch assembly (short shaft).
②Part of 402272 clutch assembly (long shaft).
③93001 washers not required if 403270 casting has silver finish (not anodized).

Casting Assembly

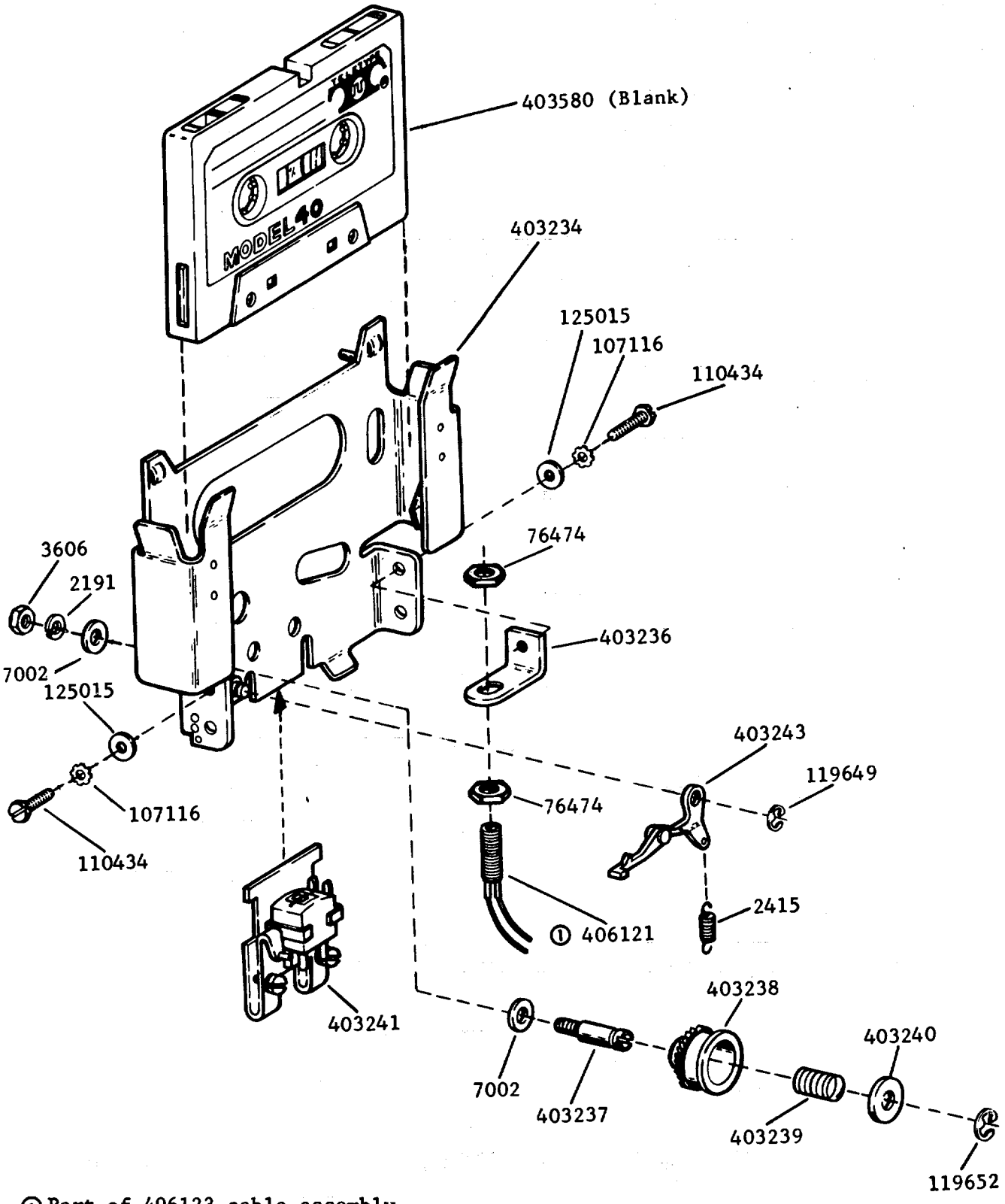
F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

5. PARTS (Contd)



① Part of 406123 cable assembly.

Front Plate Assembly

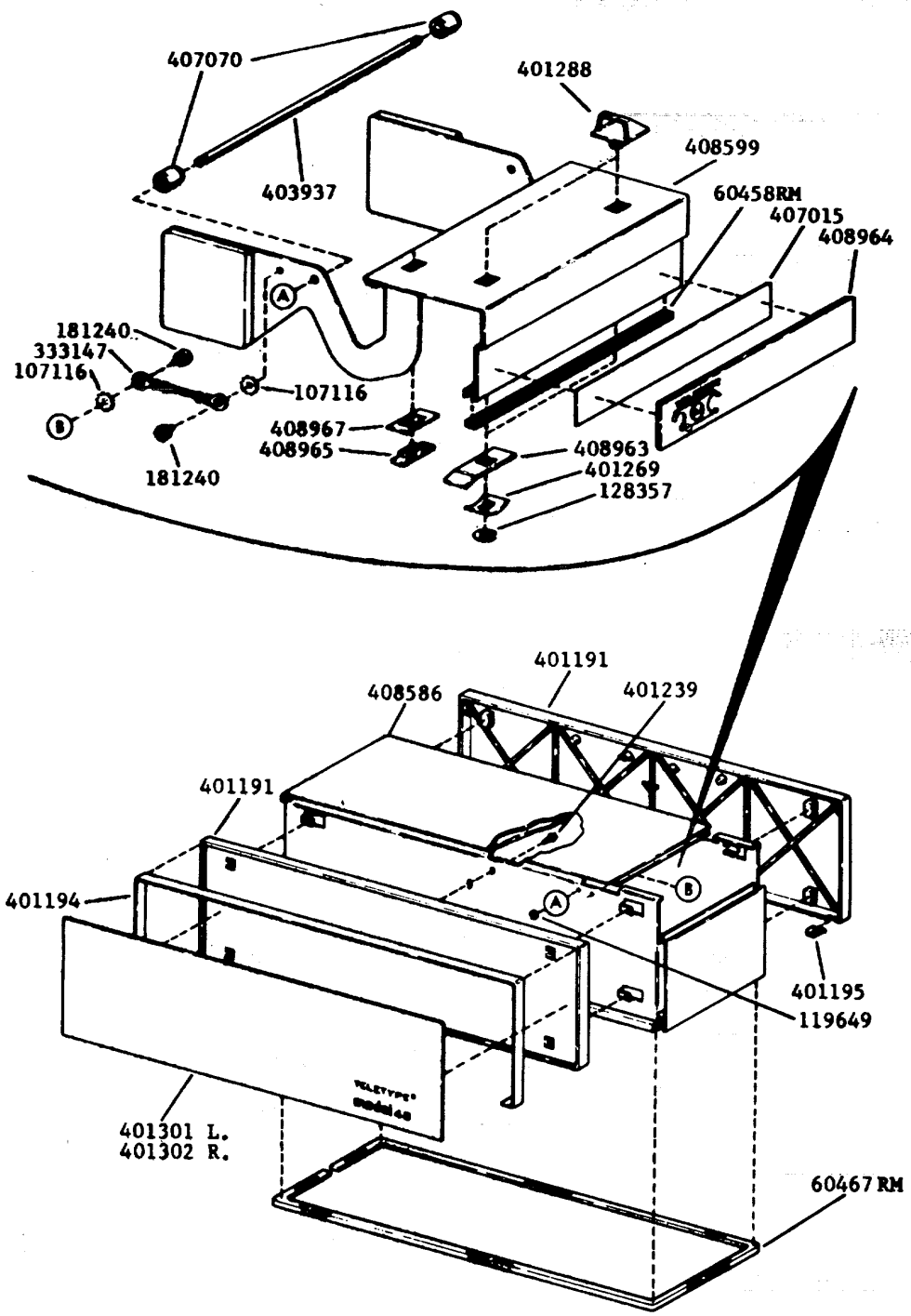


① Part of 406123 cable assembly.

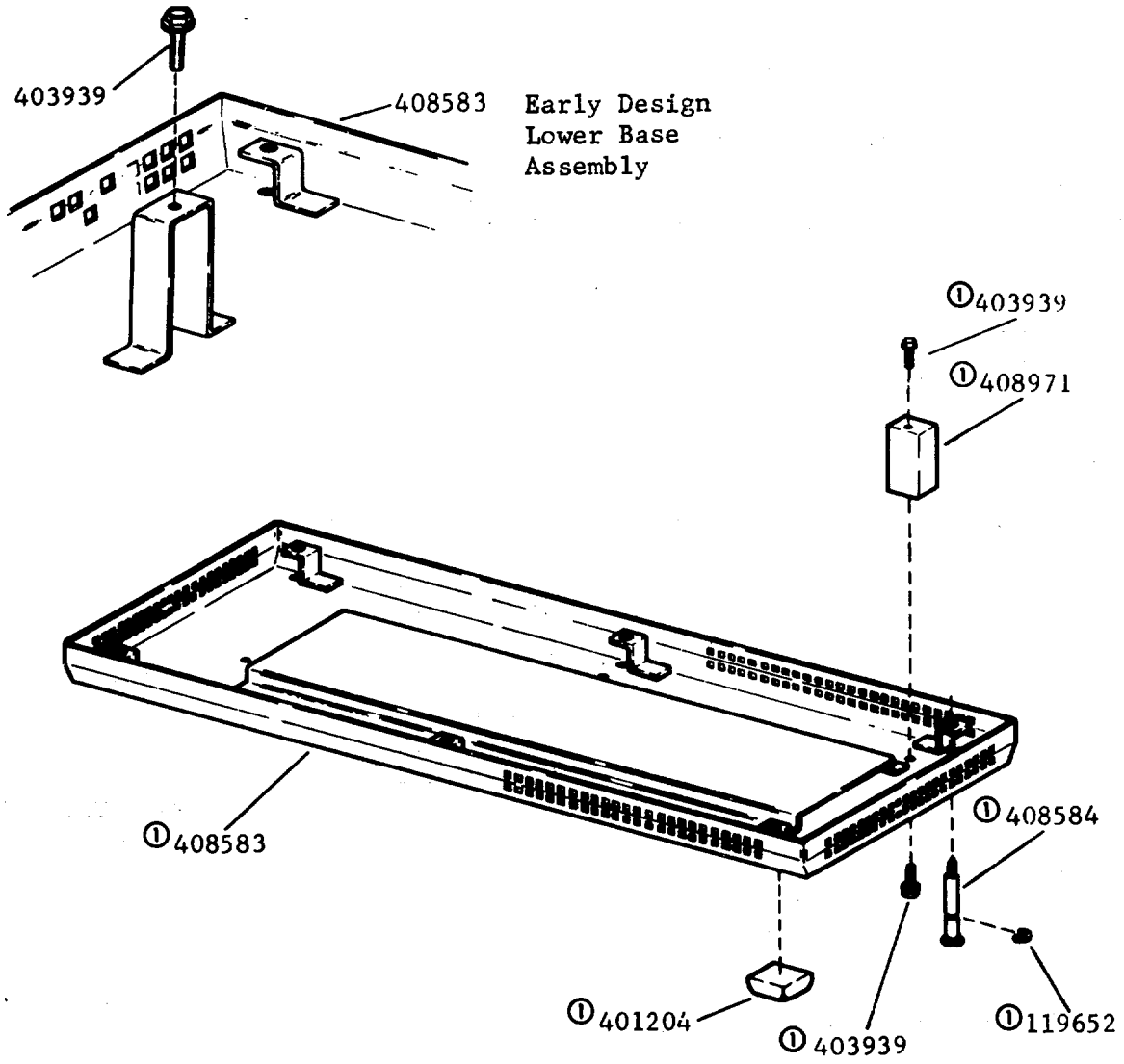
Cassette Holder Assembly

F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

5. PARTS (Contd)



40CAB102- Upper Cabinet Assembly

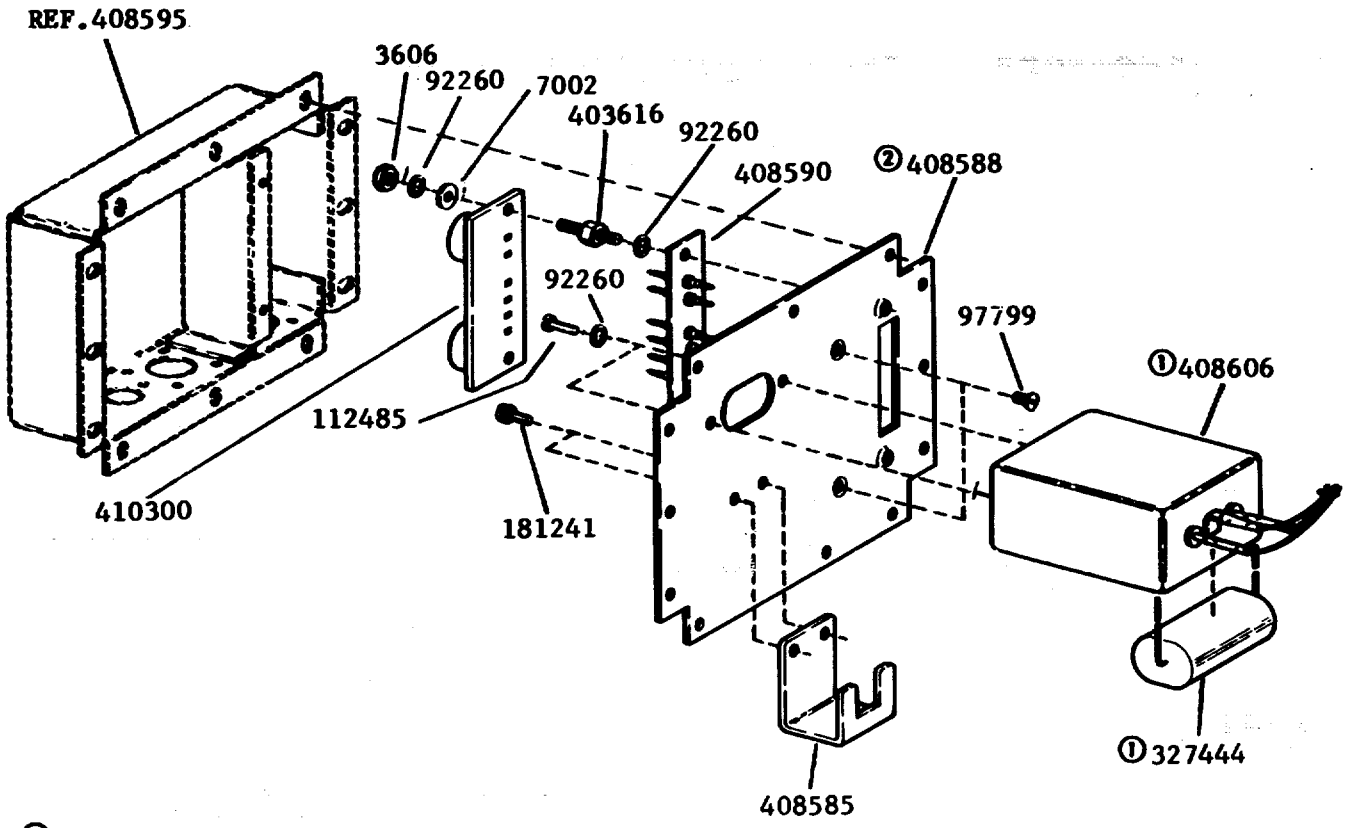


①Part of 408613 lower base assembly.

40CAB102 - Lower Base Assembly

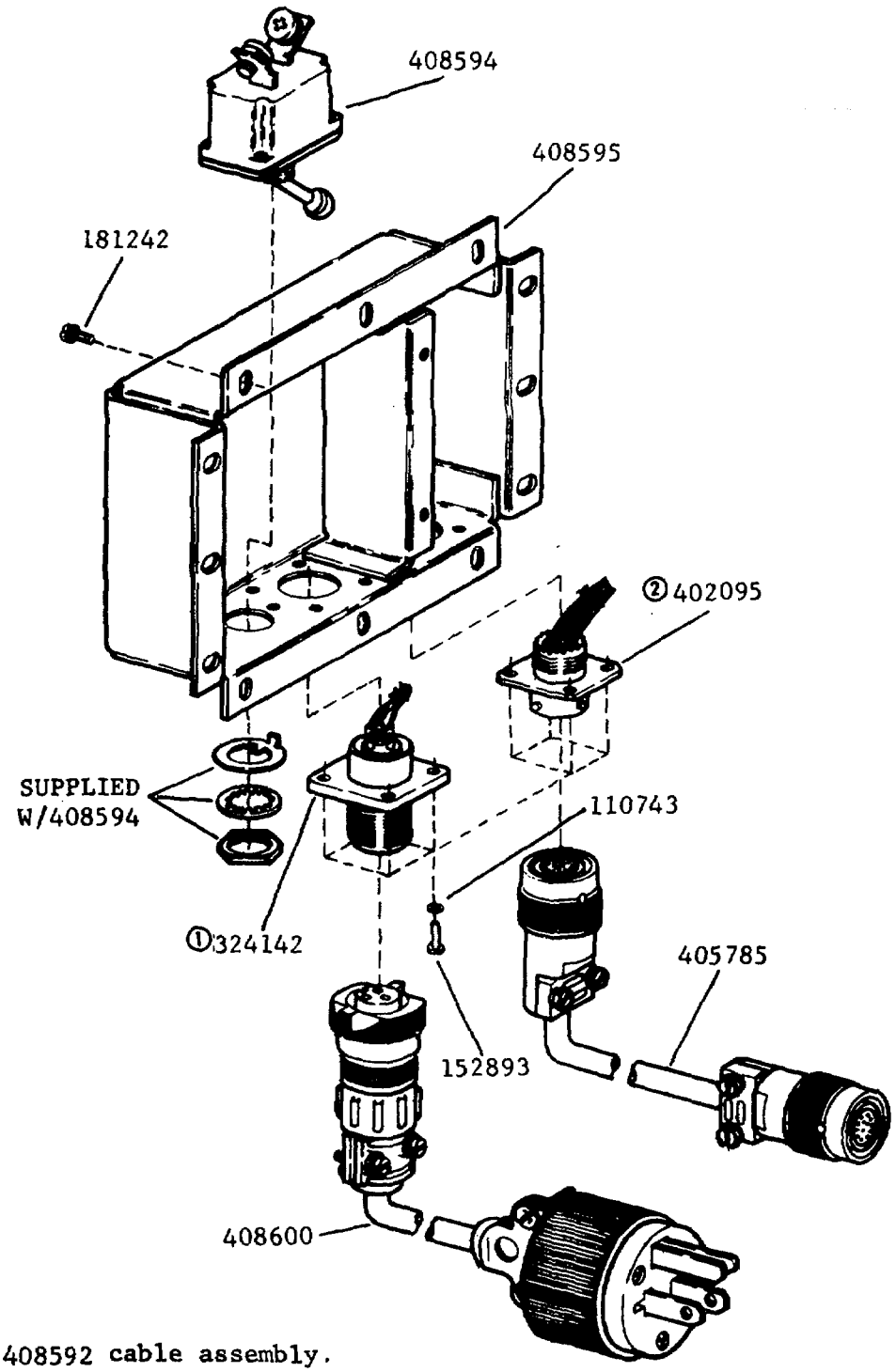
F. DISASSEMBLY/REASSENBLY AND PARTS (Contd)

5. PARTS (Contd)



①Part of 408607 filter assembly.
②Early design 408588 had shelf below filter assembly.
③Later design 408588 shelf was eliminated as it was not needed.

Chassis Assembly of 408598 SSI/AC Interface Assembly



①Part of 408592 cable assembly.
②Part of 408591 cable assembly.

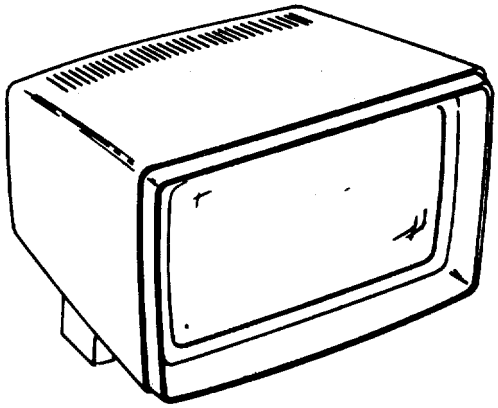
408597 Rear Enclosure Assembly of the 408598 SSI/AC Interface Assembly

F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

5. PARTS (Contd)

PART NO.	DESCRIPTION AND PAGE NO.
1274	Screw, 6-40 x 1-1/8 FIL 135
2191	Lockwasher 135, 136, 138, 139
2415	Spring 139
2669	Lockwasher 137
3598	Nut, 6-40 Hex 135, 136, 138
3599	Nut, 4-40 Hex 138
3606	Nut, 6-40 Hex 139, 142
7002	Washer, Flat 139, 142
34432	Washer, Flat 137
41382	Spring 138
45815	Lockwasher 137
49056	Screw, 10-32 x 7/8 Hex 137
60458	Gasket 140
72509	Lockwasher 136
76474	Nut, 10-32 Hex 138, 139
92115	Setscrew, 8-32 135
92260	Lockwasher 136, 142
92527	Lockwasher 135
93001	Washer, Flat 137
97799	Screw, 6-40 x 9/64 Flat 142
98642	Lockwasher 136
103305	Washer, Flat 137
107116	Lockwasher 139, 140
110434	Screw, 4-40 x 3/16 FIL 135, 138, 139
110743	Lockwasher 135, 138, 143
111537	Post 135
111640	Screw, 2-56 x 7/32 FIL 137
112485	Screw, 6-32 x 1/4 FIL 142
112626	Nut, 10-32 Hex 137
112630	Spring 138
116783	Holder, Fuse 136
119649	Ring, Retaining 138, 139, 140
119652	Ring, Retaining 137, 139, 141
119654	Ring, Retaining 137
121244	Clamp, 1/4 ID Cable 126
125015	Washer, Flat 139
128357	Ring, Retaining 140
130663	Lockwasher 137
143307	Fuse, .6 AMP 136
151354	Screw, 2-56 x 15/32 FIL 138
151442	Screw, 6-40 x 1/2 Hex 136
151621	Screw, 6-32 x 3/4 RD 135
151622	Nut, 6-32 SQ 135
151630	Screw, 6-40 x 1/4 Hex 135, 136
151631	Screw, 6-40 x 5/16 Hex 135
152441	Washer, Flat 137
152893	Screw, 4-40 x 1/4 Hex 143
153441	Screw, 10-32 x 7/16 Hex 137
153537	Screw, 6-40 x 9/32 Hex 138
153799	Screw, 4-40 x 21/64 Hex 138
153817	Screw, 4-40 x 3/8 Hex 138
180595	Setscrew, 4-40 137
181240	Screw w/Lockwasher, 6-40 x 3/16 Hex 140
181241	Screw w/Lockwasher, 6-40 x 1/4 Hex 136, 142
181242	Screw w/Lockwasher, 6-40 x 5/16 Hex 143
181424	Nut, 6-40 SQ 136
182523	Clamp, 1-38 in ID Mounting 136
184056	Screw w/Lockwasher, 6-40 x 1/4 Hex 136
184057	Screw w/Lockwasher, 6-40 x 3/8 Hex 136
184058	Screw w/Lockwasher, 6-40 x 7/16 Hex 136-
192226	Bracket, Capacitor Mounting 135
198670	Screw w/Lockwasher, 6-40 x 5/16 Hex 136
312918	Strap 138
324142	Connector, 3 PT Plug 143
327444	Capacitor, 2 MFD 142
333147	Jumper, 1-3/4 in Braided 140
336027	Capacitor, 2500 MFD 136
342121	Motor 135
401191	Panel, End 140
401194	Band, Trim 140
401195	Clip 140
401204	Bumper 141
401239	Screw, 8-18 SPL 140
401269	Washer, Spring 140
401288	Handle 140
401301	Plate 140
401302	Plate 140
402095	Receptacle 43
402271	Clutch Assembly 137
402274	Hub, Right Drive 137
402275	Hub, Left Drive 137
403224	Plate w/Stop 138
403225	Post 138
403231	Bracket 138

PART 4 - TEMPEST MODEL 40 DISPLAY MONITOR 40MN202/RA



INDEX PAGE

PART 4 -- TEMPEST MODEL 40 DISPLAY MONITOR 40MN202/RA
A. GENERAL

1. DESCRIPTION

The function of the Tempest Model 40 Display Monitor (standard Teletype Tempest treated) is to provide a visual display on a cathode ray tube of the data stored by the Tempest Model 40 display logic. Characters are displayed in dot pattern form within a matrix of 720 horizontal dots by-336 vertical dots, over an area 11-1/4 inches wide by 5-1/4 inches high, centered on the CRT face. Adjustments are provided within the monitor for horizontal size and linearity, brightness, focus and centering. Operator controls include a power (ON-OFF) switch, brightness control, and tube tilt to minimize reflected glare. Indicator lamps are provided within the monitor for use in checking operation of major subsystems. Under control of the display logic, the monitor is capable of displaying characters, singly or in groups, at half intensity. The ac power is routed to the display monitor via a connector in the left support leg. Logic signals are routed to the display monitor via a cable through an opening in the rear of the housing assembly.

Refer to Page 4-65, 5. REFERENCE MATERIAL for a general circuit description with block diagram and for further details of the major components functions.

The display monitor is designed for operation with a supply voltage of 115 V ac (+10 percent) at 60 or 50 Hz. Operating power is 115 watts and heat generation is 400 BTU/Hr.

2. TOOLS, TEST EQUIPMENT, AND MISCELLANEOUS

Tools

The tools listed below are supplementary to common types such as pliers, screwdrivers, etc, and may be procured locally or ordered from Teletype Corporation.

NOTE: When ordering replaceable components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP410055).

Description	Part No.
• Pull Spring Hook	75765
• Nut Driver Wrench 1/4 Inch	89954
• Nut Driver Wrench 5/16 Inch	89955
• Nut Driver Wrench 3/16 Inch	125752
• Terminal Extractor	182697
• Adjusting Tool	405992
• Scale, 6 Inch L. S. Starrett No. 338 or equivalent (procure locally)	
• Soldering Iron, Weller Model W-MCP-750 with MP2C Tip, or equivalent (procure locally)	
• Desoldering Tool, EDSYN Model MMS005 Soldapullt ®, or equivalent (procure locally)	

Test Equipment

The following equipment or equivalent is required for testing, troubleshooting, and adjusting the display monitor.

- Volt-Ohm-Milliameter, Triplett Model 630 APL
- Digital Multimeter, Fluke Model 8100A
- Oscilloscope, Tektronix Model 7904 e/w:
  2 - - 7A16A Single Trace Amplifiers
  1 - - 7B70 Time Base Unit
- High Voltage DC Breakdown Tester, Slaughter Co. Model 108-2.5MW
- Tempest Model 40 KD Set, Full Edit or
- Display Monitor Test Set -- CP10.010.000
  Supplied by: Teletype Corporation
  Custom Product Division
  5555 Touhy Avenue
  Skokie, Illinois 60077
  (312) 982-2499

Miscellaneous

The following items should be procured locally:

- Glyptol®, General Electric, Type 1201, Red
- Brush, 1/2 Inch Soft-Bristle
- Thermal Joint Compound

B. SHOP PROCEDURES

1. GENERAL

This section details the cleaning, refinishing, and inspection procedures to be followed prior to testing and troubleshooting the display monitor. In many cases, careful inspection will save later troubleshooting by revealing broken or loose connections, damaged components, possible short circuits, etc.

Refer to Page 4-76, F. DISASSEMBLY/REASSEMBLY AND PARTS whenever detailed information on removing display monitor components is required.

The packing materials detailed in this section are designed for protection against damage from rough handling in shipping.

2. CLEANING

Immersion type cleaning is NOT recommended for the display monitor.

CAUTION: AVOID THE USE OF HARSH OR ABRASIVE CLEANING AGENTS OR SOLVENTS WHICH COULD SCRATCH OR DAMAGE THE EXTERIOR PLASTIC SURFACES OF THE MONITOR HOUSING OR THE FACE OF THE CATHODE RAY TUBE (CRT) OR CRT MASK.

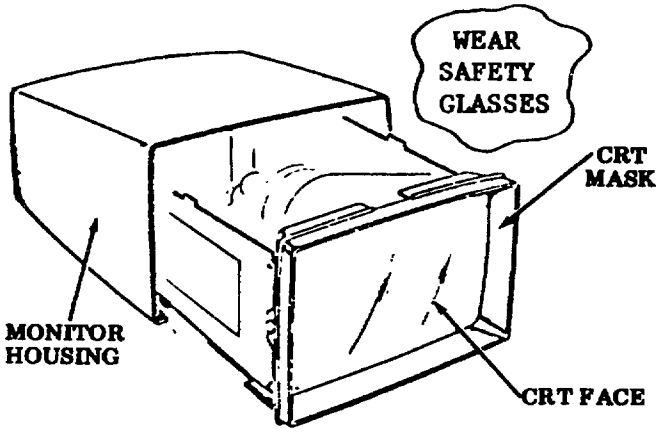
Exterior

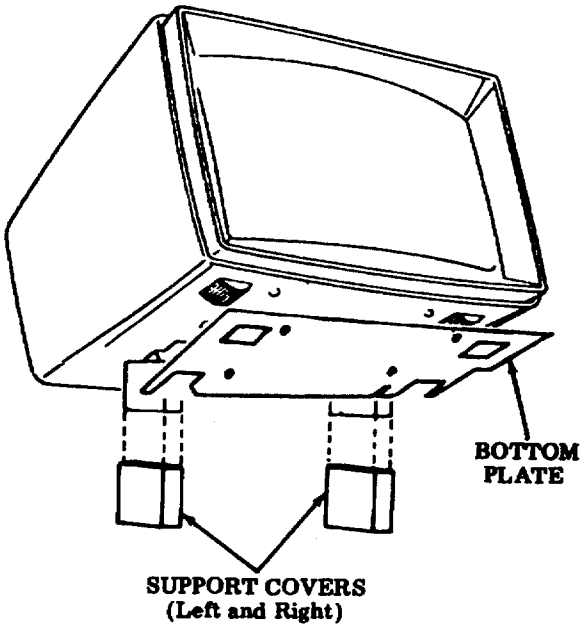
CAUTION: WEAR SAFETY GLASSES AND USE CARE IN HANDLING.

B. SHOP PROCEDURES (Cont)

2. CLEANING, Exterior (Cont)

(1) Remove housing (bottom latch).
(2) Set display monitor on the rear, display tube face up, and pull off bottom cover and support covers.
(3) Restore unit to its normal position.





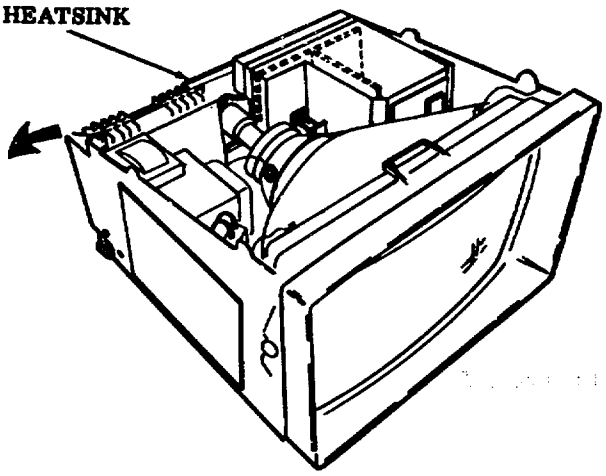
Clean all indicated surfaces as follows:

a. Wash with mild detergent solution
b. Rinse with damp cloth
c. Buff dry with soft cloth

Interior

CAUTION 1: WEAR SAFETY GCLASSES, AND BE CAREFUL NOT TO STRIKE OR DAMAGE THE FRAGILE NECK OF THE CRT.

Rotate heatsink back if necessary for easier access.



Clean chassis and components, particularly heatsink area, by lightly brushing with a clean dry 1/2 inch brush followed by air blowing.

CAUTION 2: THE AIR SUPPLY SHOULD NOT EXCEED 20 PSI. HIGHER AIR PRESSURES MAY DAMAGE SMALL COMPONENTS.

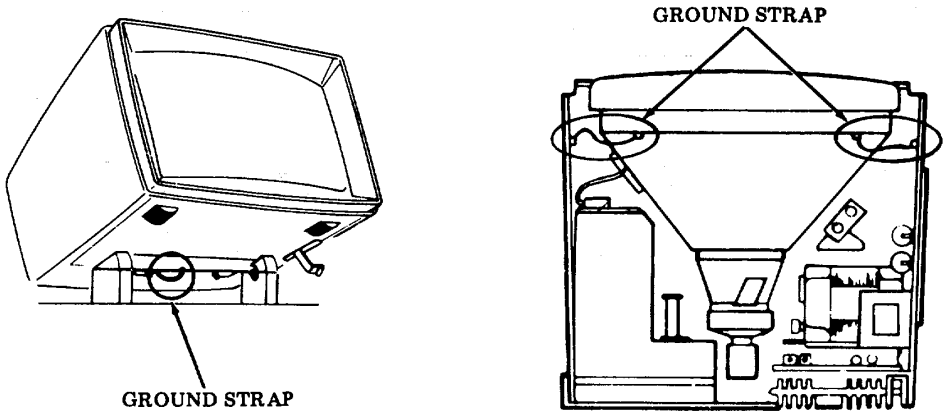
3. INSPECTION

Interior

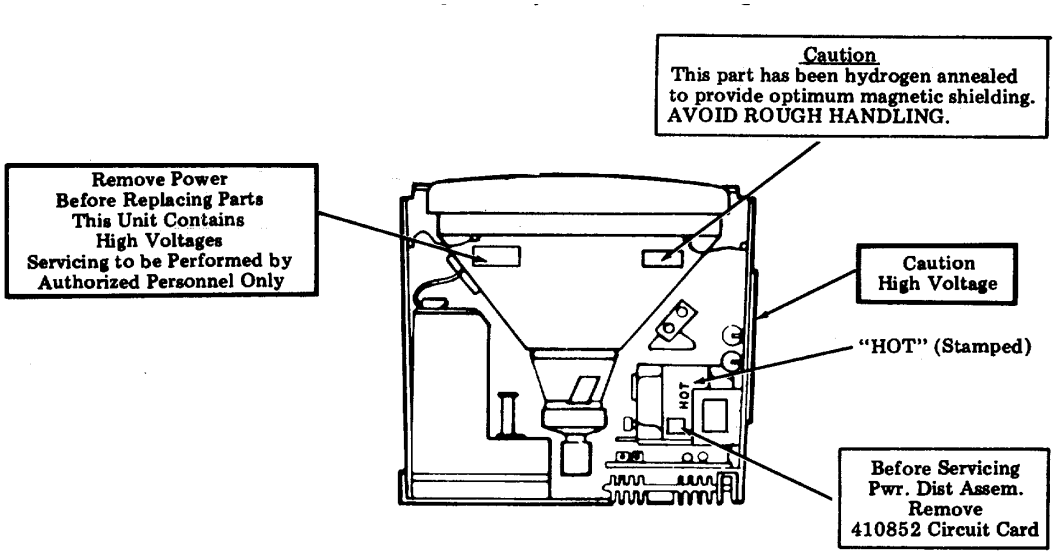
CAUTION: WEAR SAFETY GLASSES, AND BE CAREFUL AROUND SUCH FRAGILE AREAS AS THE DISPLAY TUBE NECK, YOKE, AND SOCKET.

a. Rotate heatsink to the rear and check the condition of wiring and components. Verify that various connectors are in place and fully seated.

b. Check for the presence and proper connection of grounding straps. Make sure these connections are tight.



c. Check for the presence and legibility of all warning labels.



B. SHOP PROCEDURES (Cont)

3. INSPECTION (Cont)

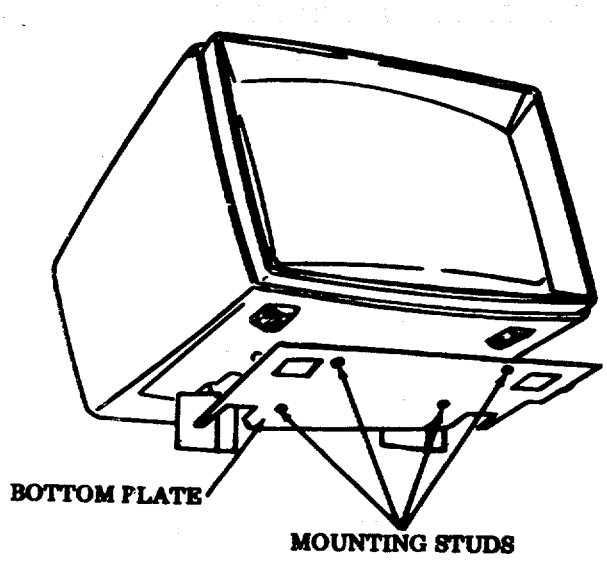
External

a. Examine the face of the display tube for chips, scratches, or severe discolorations.

b. Check that housing, bottom plate and support bracket shields are not cracked, severely scratched, discolored, etc.

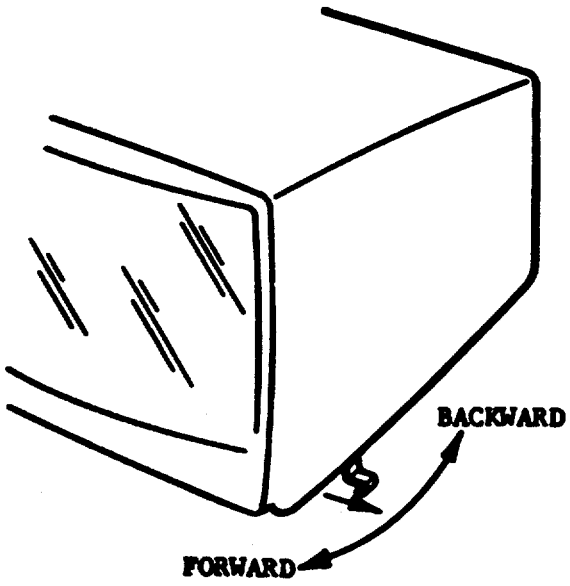
c. Verify that all four studs associated with bottom plate are present and not broken or mutilated.

d. Reinstall bottom plate and support bracket shields which were removed prior to cleaning. Note the differences in the right and left support shields to accommodate the support bracket's hinge.



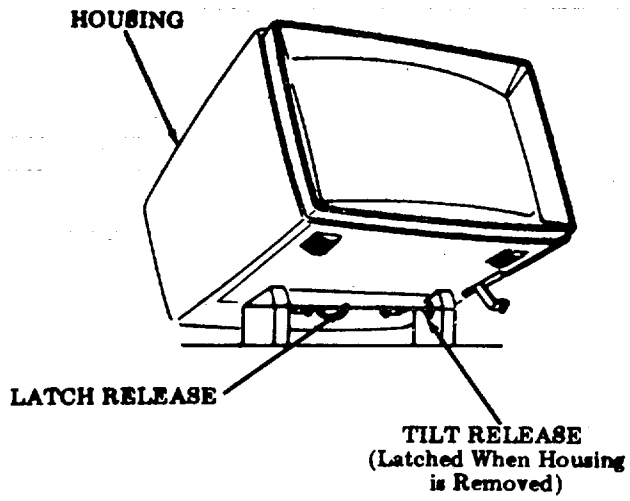
Mechanical Checks

a. Check tube tilt control for proper detenting throughout the entire range of tilt, so that the tube will remain positioned at any desired tilt angle in the range. Move adjusting lever to the right to disengage from rack teeth. Move lever forward or backward to obtain desired position. Release lever to lock in place.



b. With monitor housing removed, the monitor tilt release mechanism should latch to prevent monitor from tilting back on support brackets. Check this feature by attempting to tilt monitor from the horizontal.

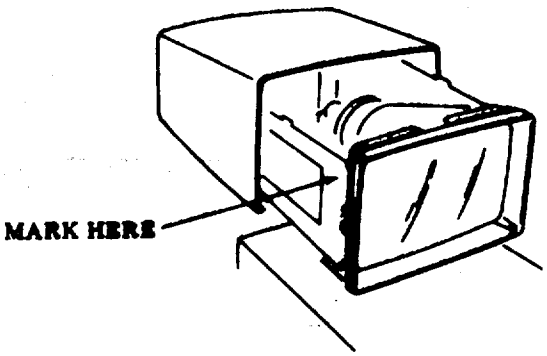
c. Replace housing. Observe that housing latch operates to securely lock housing to monitor and that monitor is now capable of being tilted back on support brackets.



4. MARKING AND PACKING

Marking

For record keeping purposes, repair date may be marked on monitor chassis as shown.



B. SHOP PROCEDURES (Cont)

4. MARKING AND PACKING (Cont)

Packing

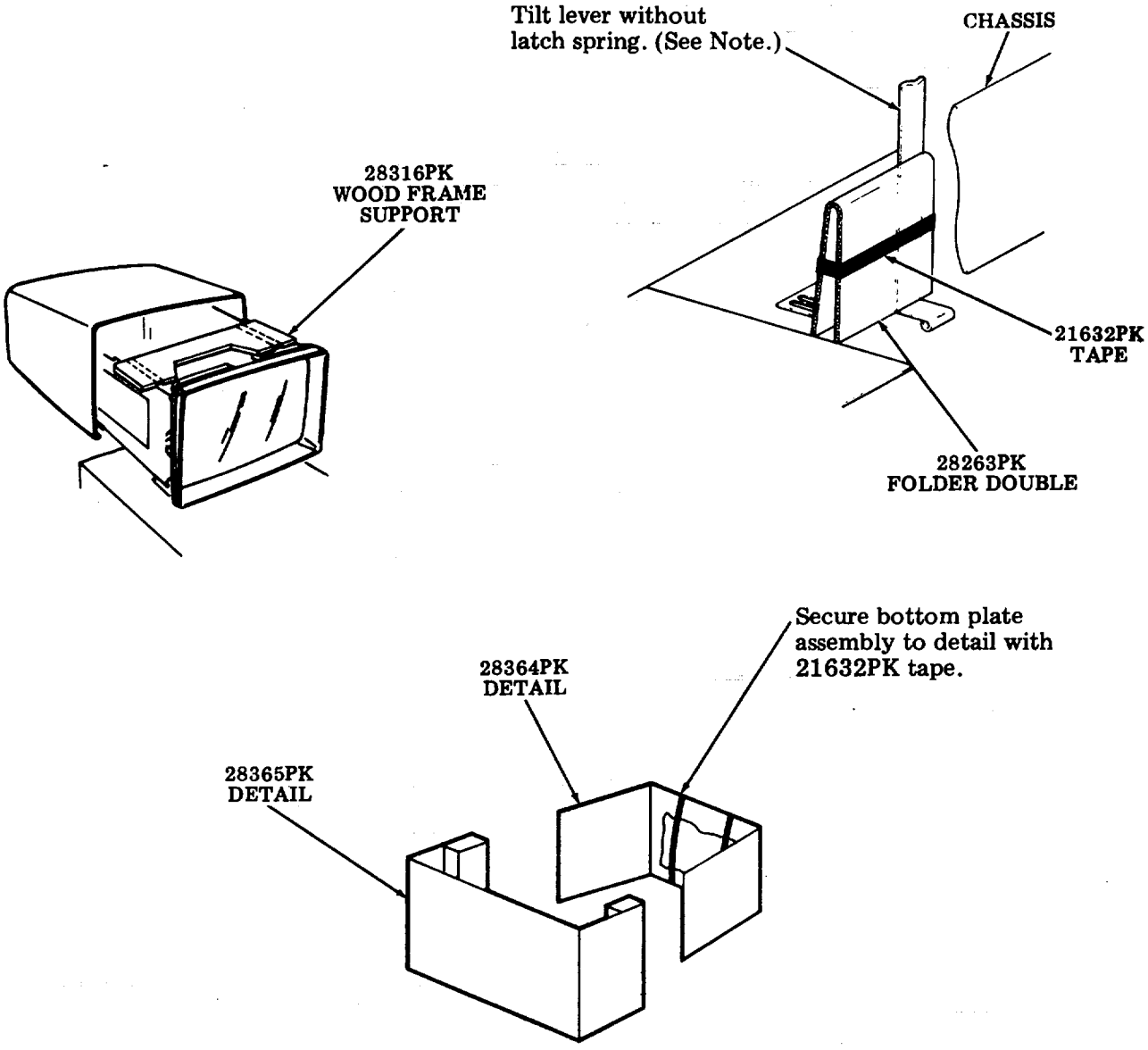
Factory-type packing may be duplicated by ordering material shown below and applying as follows. PK designated items should be ordered from Teletype Corporation. The screws, washers, and lockwashers should be procured locally.

Qty	Materials Required	Qty	Materials Required
1	11322PK Corrugated Carton	4	1/4-20 by 2 Inch RH Steel
1	10603PK Corrugated Carton		Machine Screws
1	28381PK Wood Pallet	4	Steel Compression Lockwashers for
1	28364PK Corrugated Detail		1/4 Inch Screws
1	28365PK Corrugated Detail	4	Flat Iron Washers for 1/4 Inch
2	28051PK Metal Spacers		Screws
8	27442PK Plastic Corners	-	21719PK Tape (as required)
2	27542PK Labels	-	21632PKTape (as required)
1	23457PK Plastic Bag	-	21298PK Tissue Paper (as required)
1	28316PK Wood Frame	1	28263PK Corrugated Detail

a. Preassemble all parts to bottom of main frame. Mount assembly to a 28381PK pallet with two 28051PK spacers, four 1/4-20 by 2 inch right-hand steel machine screws, four steel compression lockwashers for 1/4-inch screws and four flat iron washers for 1/4-inch screws. Tighten screws securely.

b. Complete assembly of monitor with cover removed. Invert monitor.
c. Secure each of the two support covers in place with a strip of 21632PK tape. Return unit to an upright position.
d. Carefully disconnect CRT cable. Tape the video cable to inside of left frame with 21632PK tape.
e. Mount one 28316PK wood frame support to the two side frames at the top of unit. The side frames must fit inside the slots of the wood detail. The cut out portion of the wood detail must be facing in the direction of the front face of the tube. Move detail to rear so it is positioned just in front of the round projections on frames.
f. Tape the wood frame support tightly in position on the frames with three complete bands of 21632PK tape over the front and rear of the support and the underside of the monitor.
g. Mount cover and latch securely.
h. Release monitor and bottom plate assembly to the packing area.
i. Form a 10603PK carton. Close and seal bottom flaps with a strip of 21719PK tape applied along the center seam. The tape should extend approximately three inches down the ends of the carton.
j. Place unit in carton. Place a 23457PK plastic bag around unit.
k. Form a 28365PK detail and place in carton at front of unit as illustrated.
l. Wrap the bottom plate assembly in a sheet of 21298PK tissue paper. Form a 28364PK detail and secure the wrapped bottom plate to the detail with two bands of 21632PK tape.
m. Position the detail and bottom plate in the carton.
n. Close and seal the top flaps of the carton as outlined in operation 9.
o. Moisten and apply a 27542PK label to upper left-hand portion of top of carton.

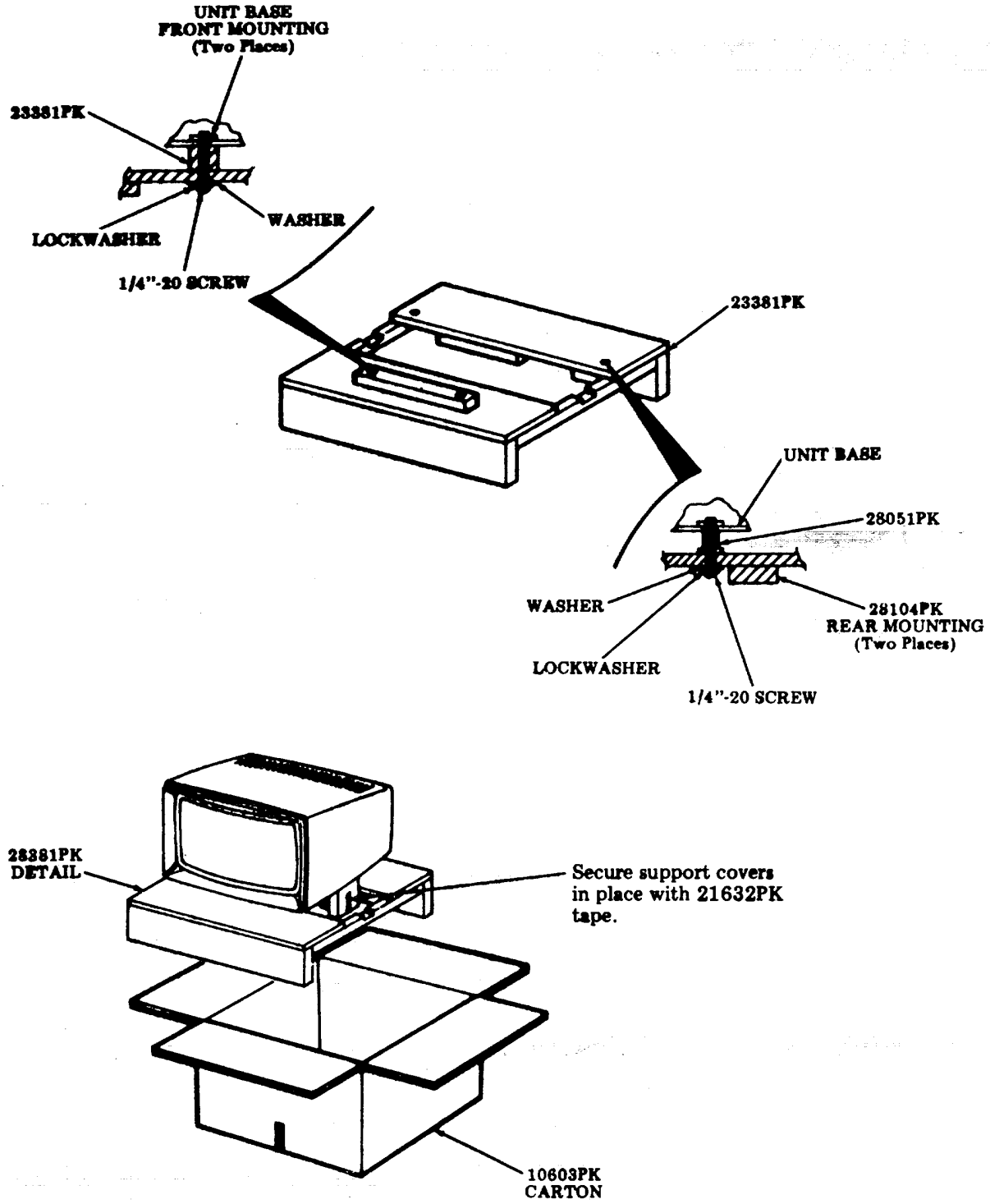
p. Form a 11322PK carton and with bottom flaps down and outward, place around the inner carton.
q. Position a 27442PK plastic corner on each of the four corners of the inner carton.
r. Close and seal the top flaps of the carton with 21719PK tape as outlined in operation 9.
s. Moisten and apply a 27542PK label to upper left-hand portion of top of carton.
t. Carefully invert carton and contents. Position a 27442PK plastic corner on each of the four corners of the inner carton.
u. Close and seal bottom flaps of carton as outlined in operation 9. Invert carton.



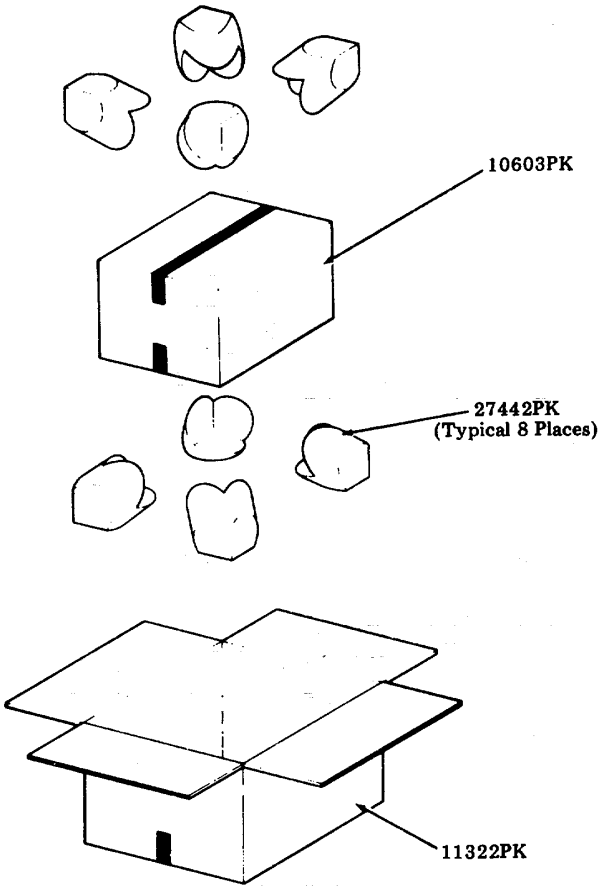
NOTE: If tilt lever is equipped with 406152 latch spring (late design), 28263PK detail is not required. Move lever to front detent position and latch will engage when monitor bottom plate is removed.

B. SHOP PROCDURES (Cont)

4. MARKING AND PACKING, Packing (Cont)



NOTE: 23457PK plastic bag deleted for clarity.



5. CRT DISPOSAL

Because cathode ray tubes are highly evacuated the glass shell may collapse if dropped, scratched, or struck sharply. The sudden inrush of air displacing the vacuum may exert sufficient force to dangerously propel shattered glass. To eliminate this accidental possibility, air must be allowed to enter the tube under controlled conditions prior to disposal of defective or worn out CRT tubes. Once the air pressure is equalized, standard glass disposal methods can be followed. Either of the methods illustrated can be used to allow air into the tube.

DANGER: ALWAYS WEAR SAFETY GLASSES (PREFERABLY SAFETY GOGGLES OR GLASSES WITH SIDE SHIELDS) WHEN HANDLING OR WORKING IN THE AREA OF EXPOSED CATHODE RAY TUBES.

WEAR LEATHER GLOVES WHEN HANDLING EXPOSED CRT.

EXTREME CAUTION MUST BE OBSERVED TO AVOID CONTACT BETWEEN SKIN ABRASIONS OR OPEN WOUNDS AND BROKEN FRAGMENTS OF THE CRT.

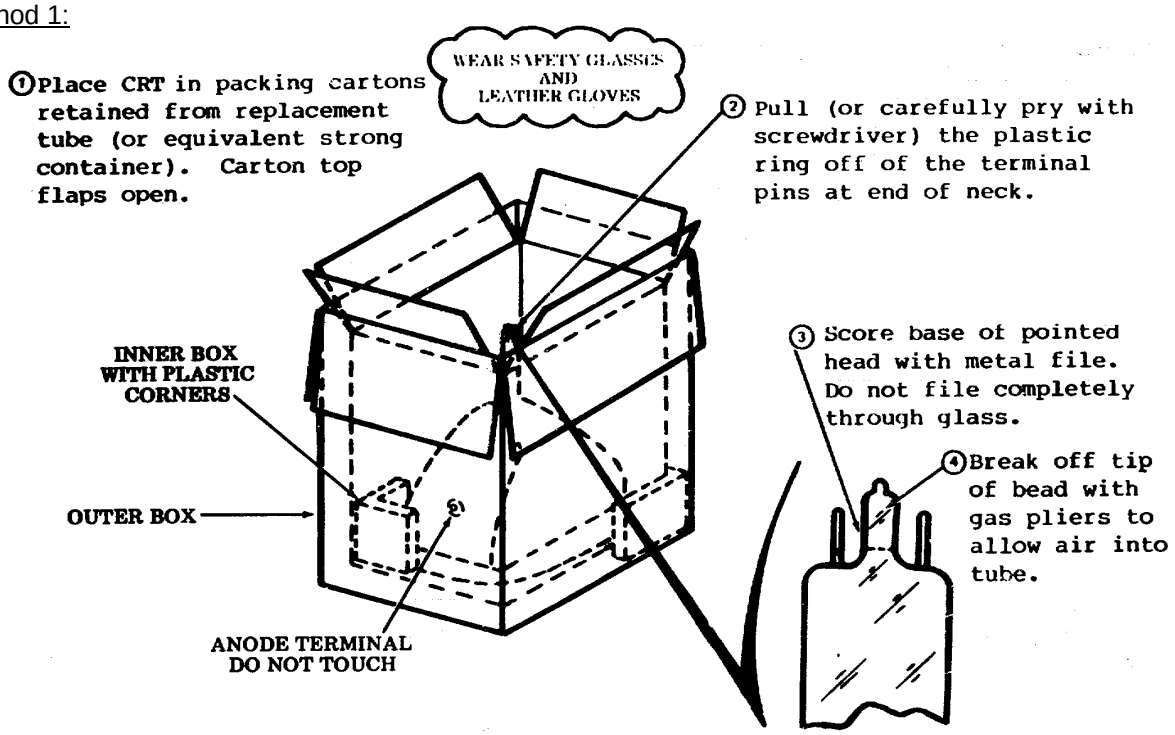
IF A CUT IS RECEIVED FROM CRT GLASS OBTAIN IRDICAL TREATMENT IMMEDIATELY.

DO NOT PICK UP THE TUBE BY ITS NECK. CARRY TIE TUBE WITH BOTH HANDS NEAR ITS FACE. DO NOT TOUCH THE ANODE TERMINAL (RING SHAPED) ON SIDE OF TUBE.

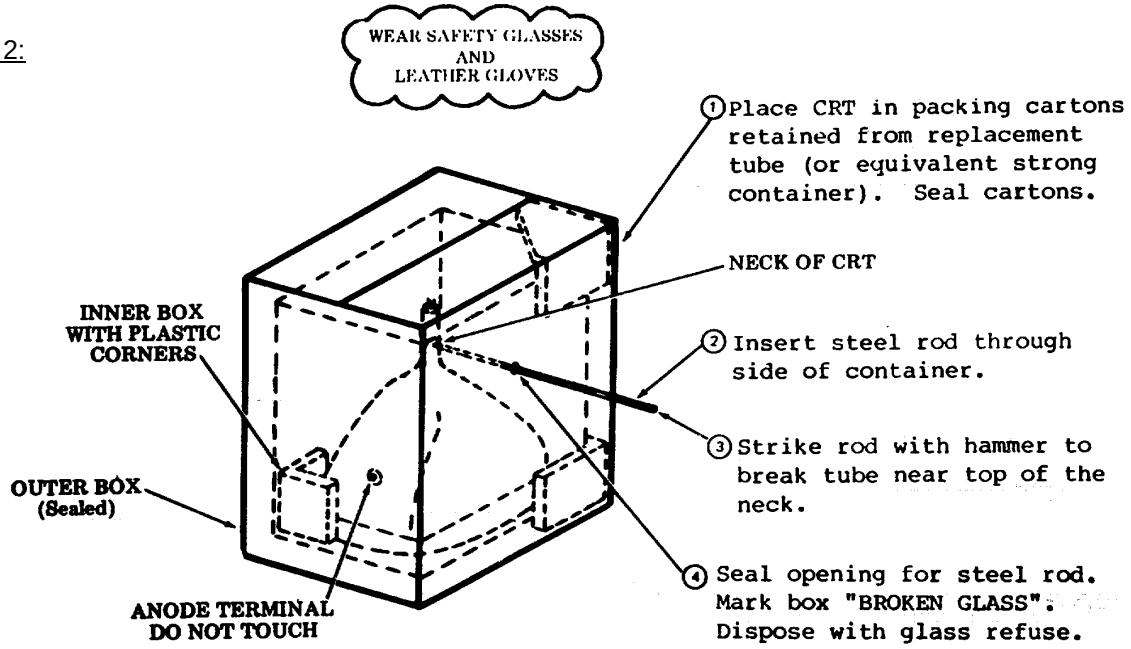
B. SHOP PROCEDURES (Cont)

5. CRT DISPOSAL (Cont)

Method 1:



Method 2:



C. TESTING

1. GENERAL

Functional testing of the display monitor is accomplished with the use of a full edit Tempest Model 40 KD Set or Display Monitor Test Set.

Functional testing provides a means for verifying operational requirements of the display monitor unit. The test procedure should be performed from start to finish without omissions. Possible causes of trouble are listed with the tests to provide aid in correcting the trouble.

Whenever the display monitor fails a particular test, refer to D. TROUBLESHOOTING to locate the trouble. After the trouble has been corrected, repeat the test that disclosed the trouble and if found satisfactory, resume testing from that point.

CAUTION: TURN OFF ALL AC POWER AND SIGNAL SOURCES WHEN INSTALLING THE DISPLAY MONITOR ON THE TEST SET OR WHEN REMOVING IT. SIMILARLY, TURN OFF ALL POWER AND SIGNAL SOURCES WHEN REMOVING OR REPLACING COMPONENTS.

NOTES

4-14

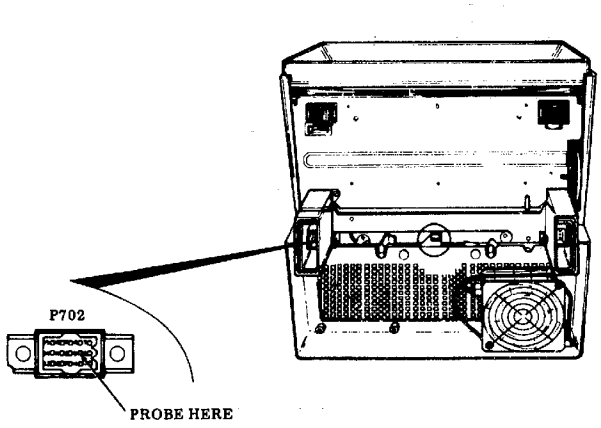
2. HIGH VOLTAGE BREAKDOWN TEST

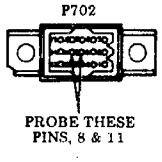
Resistance Checks

These checks are to be made prior to connecting power to unit and prior to breakdown test. Remove monitor housing and place unit as shown.

Using digital multimeter, select (R X 1) scale and clip common lead (black) to chassis at a convenient point. Touch pin 5 of P702 with probe lead. The meter should read essentially zero ohms.

Select (R X 1 K) scale of multimeter. Operate monitor ON/OFF switch to ON. Leave meter common lead on chassis and touch pin 8, and then pin 11 of P702. The multimeter should indicate infinite (∞) resistance at both pins. Any reading indicates a leak to ground in cabling or power distribution circuitry.





NOTE: If any of these tests fail DO NOT perform the high -voltage breakdown test. The trouble must be corrected first. Proceed to D. TROUBLESHOOTING for the appropriate procedure to correct the trouble.

Precautions

CAUTION: EXTREME CARE SHOULD BE TAKEN WHEN TESTING AS HIGH VOLTAGE IS PRESENT WHEN POWER SWITCH IS ON. OPERATOR SHOULD OBSERVE THE FOLLOWING PRECAUTIONS.

a. AVOID BODILY CONTACT WITH CHASSIS WHEN PROBING.
b. PROBE ONLY THE POINTS SPECIFIED BY THIS SECTION.

C. TESTING (Cont)

2. HIGH VOLTAGE BREAKDCWN TEST (Cont)

Equipment Preparation

Verify that breakdown tester power switch is OFF and that probe tips are retracted.
Connect breakdown tester to 115 V ac power source.

Operate breakdown tester power switch to ON and adjust for 500 V output.

Extend both probe tips and touch together momentarily to verify that breakdown indicator is functioning.

Retract probe tips and proceed.

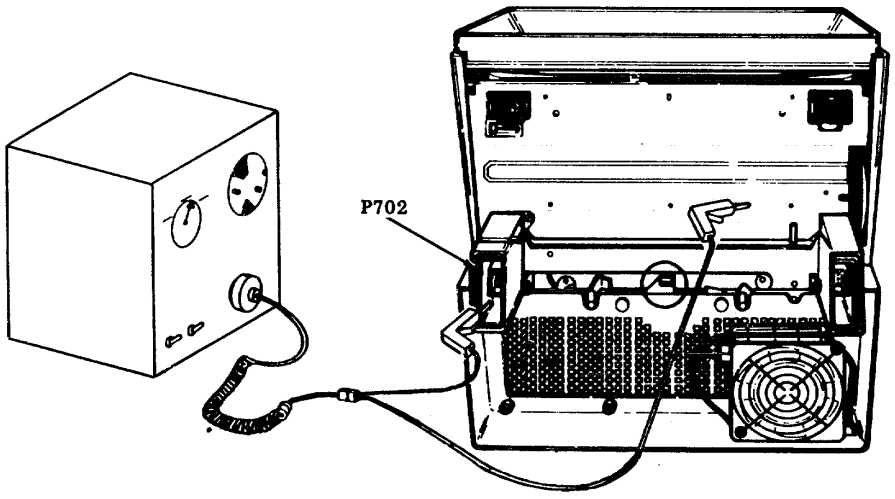
Breakdown Test Procedure

With the breakdown tester turned ON, set the breakdown voltage to O V dc.

Hold one extended probe tip of the breakdown tester on bottom of monitor chassis.

Use the other extended probe tip to touch pin 8. Increase the breakdown test set output voltage to 500 V dc and hold for one second. Repeat the procedure probing pin 11. The test set should NOT signal a breakdown.

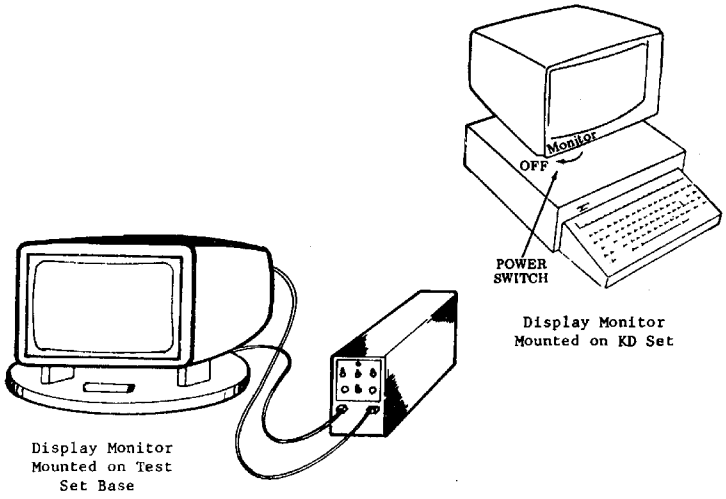
If a breakdown failure occurs, refer to D., 2. HIGH VOLTAGE BREAKDOWN FAILURE for detailed troubleshooting methods. If the breakdown test was successful, operate display monitor power switch to OFF and proceed to 3. FUNCTIONAL TESTS.



3. FUNCTIONAL TESTS

Preliminary

Check that 115 V ac power switch of KD set or display monitor test set, whichever used, is in the OFF position. The display monitor power switch should also be switched to OFF. Mount display monitor as shown, either on the KD set or on the circular base supplied with test set.

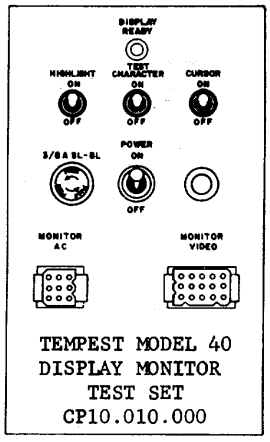


Certain differences in the displayed information are present when using the display monitor test set in lieu of KD set for performing the functional tests.

Operating the TEST CHARACTER switch to ON, causes 24 lines of 80 test characters per line, or, 1920 test characters to be generated. These characters are displayed as white on a dark background and are rectangular with a central dot: [•]

The CURSOR ON switch operated, produces a uniformly bright screen by illuminating all 1920 character positions (cursor in all character positions).

The HIGHLIGHT switch operated in conjunction with the CURSOR ON or TEST CHARACTER switch causes the display to alternate from full to half intensity at intervals of approximately one second.

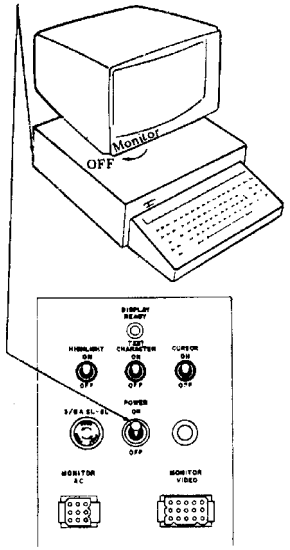
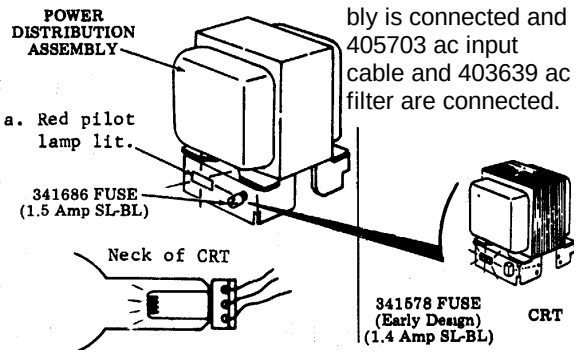
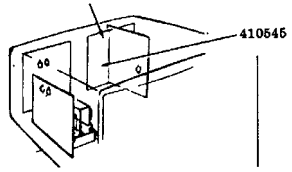


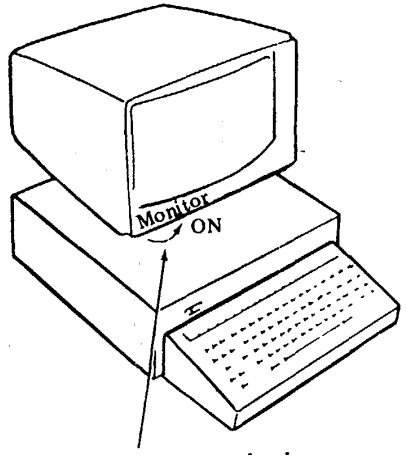
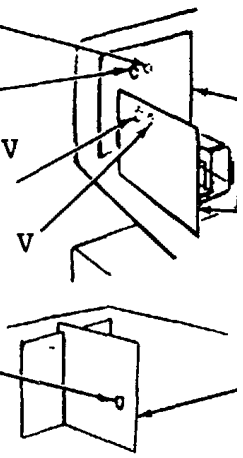
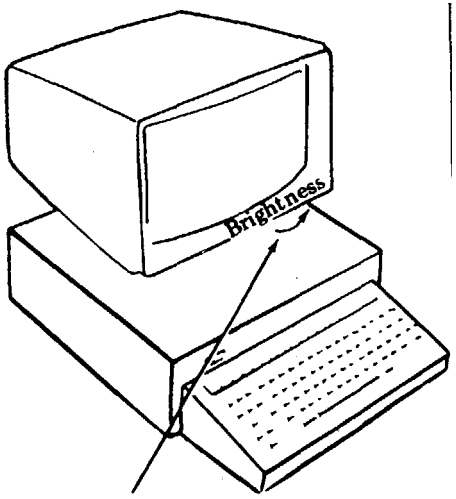
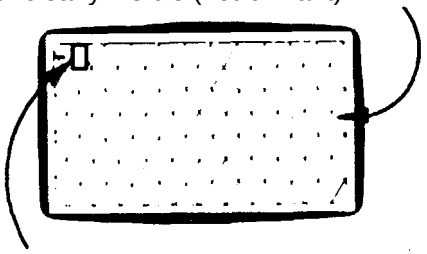
Residual Images

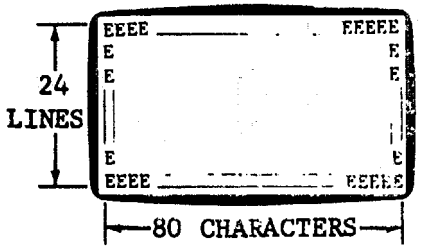
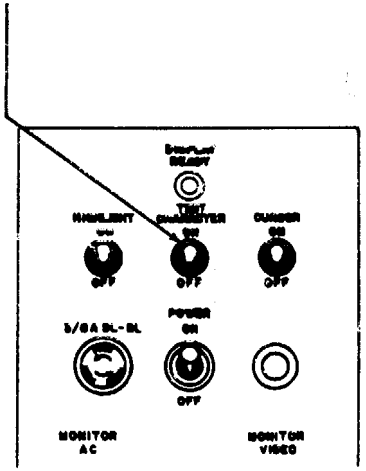
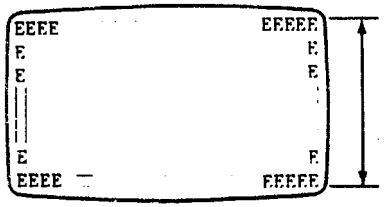
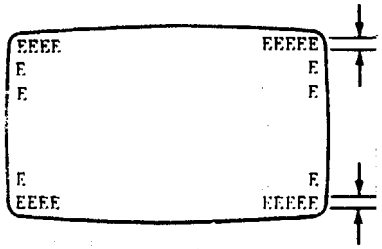
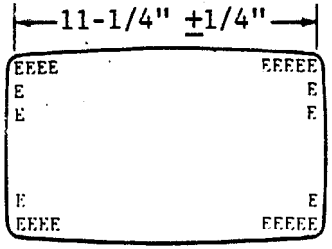
Residual images on the display monitor screen shall be considered permissable subject to local. appearance standards so long as the images are not apparent when the monitor is in operation and are not objectionable in nature when the monitor is turned off. Refer to F. DISASSEMBLY/REASSEMBLY AND PARTS for CRT replacement and B. SHOP PROCEDURES for CRT disposal.

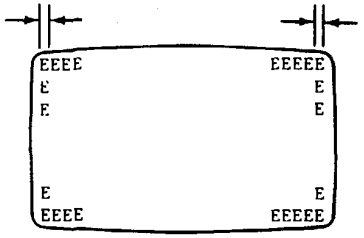
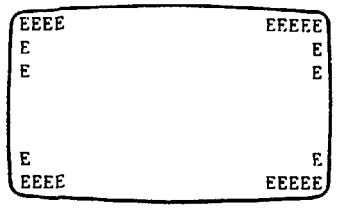
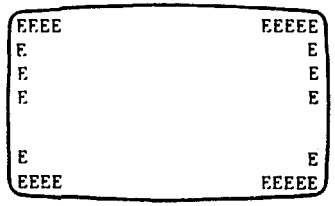
C. TESTING (Cont)

3. FUNCTIONAL TESTS, Preliminary (Cont)

TEST NO.	PROCEDURE	RESPONSE	POSIBLE CAUSE OF TROUBLE	ADDITIONAL ANALYSIS
1	**Apply ac power to KD or test set. Turn ac switch on.**  **NOTE: All other test set switches should be OFF.**	 b. Filaments lit. (Do not check if CRT screen has raster or display.) NOTE: To view filament, turn power off, remove CRT J17 connector, remove 402112 shield, replace J17 connector, and restore power. c. Red drive lamp lit. (Do not check if CRT screen has raster or display.)  NOTE: To view red drive lamp, turn power off and remove 405873 front enclosure from 402254 high voltage and video assembly. Connect P3 directly to J6 on 410545 circuit card by passing the 410547 filter assembly. Reconnect all other connectors and restore power.	Make sure P5 in front of power distribution assembly is connected and 405703 ac input cable and 403639 ac filter are connected.	**4-24, 1.a.** **4-24, 1. b.** **4-25, 1.c**

TEST NO.	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	ADDITIONAL ANALYSIS
2	 Monitor ac power switch on.	c. Overvoltage lamp extinguished. b. Normal lamp lit. a. Unreg 65 V lamp lit. Unreg 130 V lamp lit. d. High voltage lamp lit. (Do not check if CRT screen has raster or display.)  NOTE: If all lamps remain extinguished.	410853 410852 410546 Check red pilot lamp.	4-25, 2.c. 4-25, 2.b. 4-25, 2.a. 4-26, 2.d. 4-24, 1.a.
3	 Operator brightness to maximum intensity.	a. Raster clearly visible (not brilliant).  b. Cursor and segment marker present when using KDP set.	Master Brightness Adjustment 410545 410547 Regulator Filter	4-69 4-26, 3.

TEST NO.	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	ADDITIONAL ANALYSIS
4	Generate the following test pattern on screen from the KD keyboard, or  Operate test set TEST CHARACTER switch to ON. See Page 4-13, Preliminary for discussion of test patterns. 	a. Characters well defined.	Focus adjustment	4-69
		b. Vertical size 5-1/4 inches ± 1/8 inch. 	Vertical Size adjustment	4-70
		c. Equal character height. 	Vertical Linearity adjustment	4-70
		d. Horizontal size. 	Horizontal Size adjustment	4-70

TEST NO.	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	ADDITIONAL ANALYSIS
4 (Cont)		e. Equal character width.  f. Lines across display appear parallel to horizontal plane.  g. Test pattern centered. 	Horizontal Linearity adjustment Yoke Orientation adjustment Display Centering adjustment	4-73 4-74 4-74
5	Generate one line of highlighted characters or operate test set HIGHLIGHT	Characters shall alternate full to half intensity at approximately one second intervals as gauged by eye.	410545	4-28, 4

D. TROUBLESHOOTING

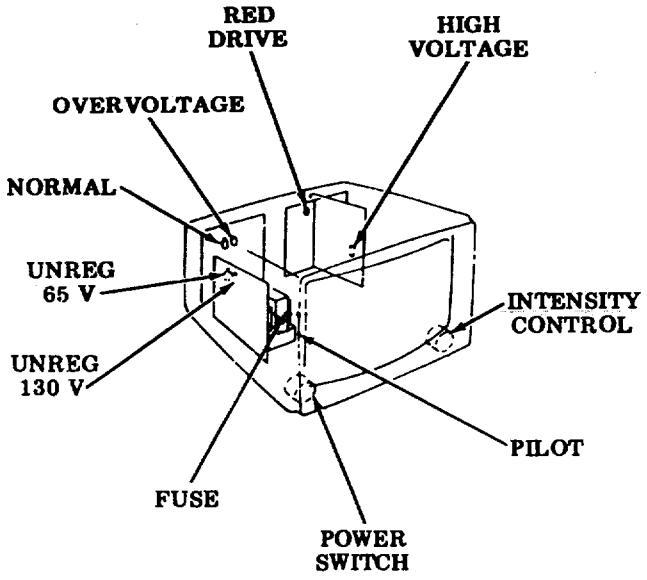
1. GENERAL

This section provides necessary information for locating and clearing troubles encountered in testing the display monitor per C. TESTING. Proceed directly to the additional analysis of this section that is referenced in C. TESTING.

Troubleshooting of breakdown test failures are provided completely in 2. HIGH VOLTAGE BREAKDOWN FAILURE. For other problems, 3. TROUBLE ISOLATION should always be consulted first. Proceed, when necessary, to the referenced in depth information of 4. DETAILED TROUBLE ANALYSIS which contains voltage levels, oscilloscope waveforms, and step-by-step instructions required for circuit analysis.

Supplementary information such as circuit descriptions and block diagrams is provided in 5. REFERENCE MATERIAL.

The display monitor contains a number of circuit status lamps as an aid to locating trouble. The sketch details the location of these lamps.



To view the red drive lamp on the 410545 circuit card or the high voltage lamp on the 410546 circuit card, or to probe test points on these cards, it is necessary to remove the 405873 front en closure from 402254 high voltage and video assembly. See F. DISASSEMBLY/REASSEMBLY AND PARTS for procedures. With the enclosure removed, connect P3 (from 410853 circuit card) directly to J6 on 410545 circuit card bypassing the 410547 filter assembly. Reconnect all other connectors and restore power.

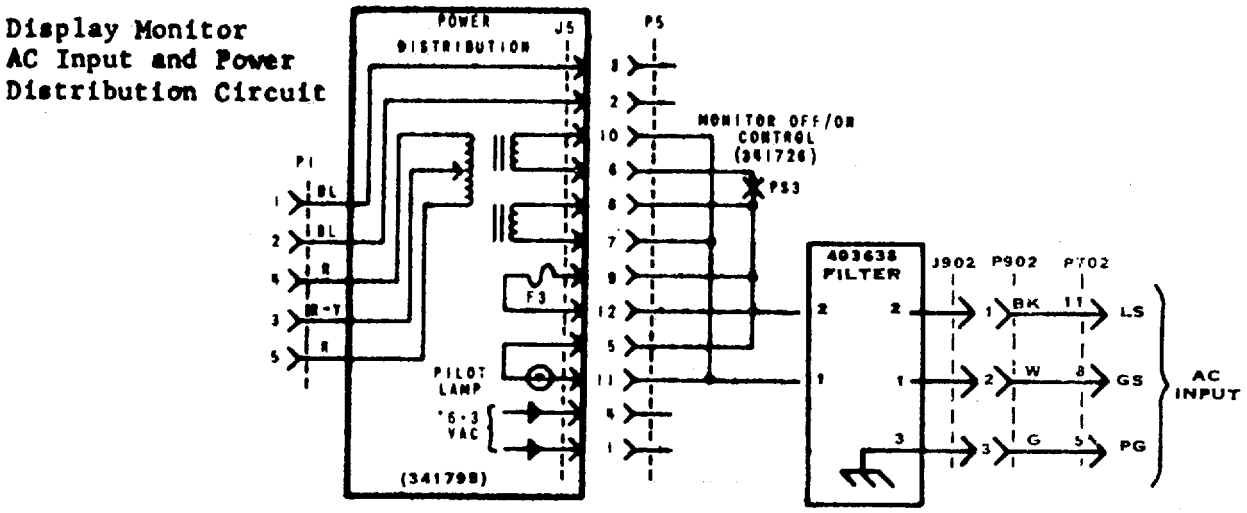
Resistance checks are to be made with the digital multimeter.

Signal waveforms and voltage levels indicated at the test points of the trouble analysis procedure are to be checked with the oscilloscope.

Refer to F, DISASSEMBLY/REASSEMBLY AND PARTS for procedures.

2. HIGH VOLTAGE BREAKDOWN FAILURE

Select the (R X 1) scale of the digital multimeter and check resistance between P702(5) and chassis. If not zero ohms, check for a loose chassis connection or green wire broken off at P702(5). The P702(5) MUST have continuity to the chassis.



Unplug P902 leads from the top of the 403638 ac filter. Use the breakdown tester as in C. TESTING, holding one prod on the chassis. Use the other prod to probe P702 pins 8 and 11. If a failure occurs, check 405703 ac input cable.

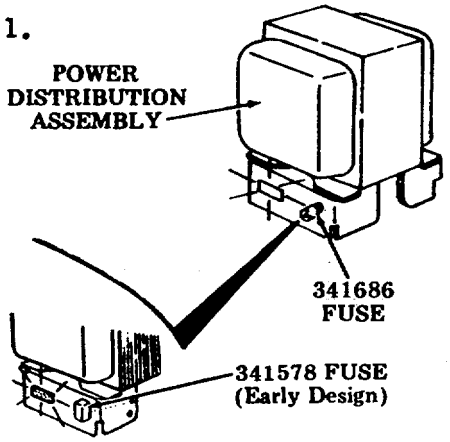
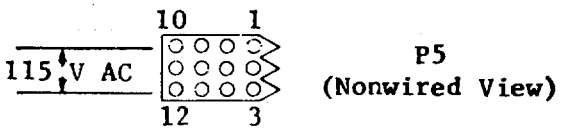
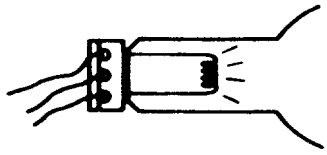
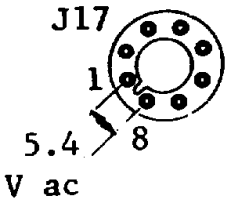
If P902 checked satisfactorily, unplug J5 and P5. Use breakdown tester in C. TESTING, holding one prod on the chassis. Use the other prod and progressively probe J35, pins 5 through 12. If a failure occurs on any pin, remove 341795 power distribution assembly and examine components and wiring associated with the pin (see circuit). Also check for signs of arcing at J5. Replace any defective wiring or components.

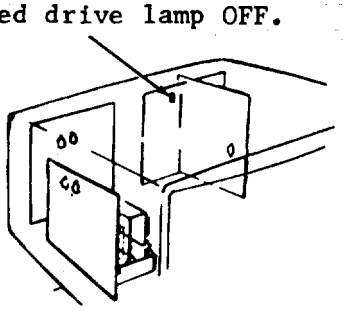
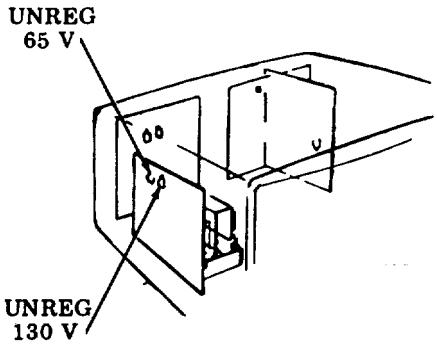
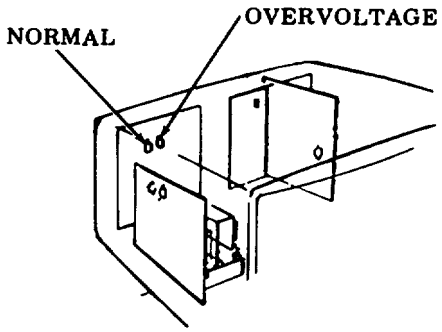
If J5 checked satisfactory, repeat the above procedure on P5, pins 5 through 12. Carefully examine wiring associated with failure indication for signs of arcing. Note that certain P5 pins are connected together by wiring. Disconnect switch PS3 and check separately if cabling appears in good order. Replace any defective wiring, 403638 ac filter, or components.

D. TROUBLESHOOTING (Cont)

3. TROUBLE ISOLATION

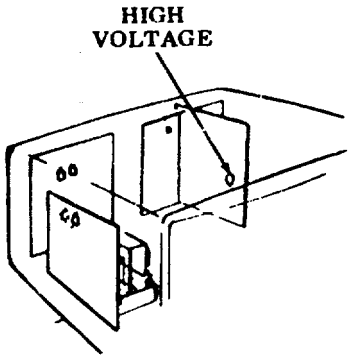
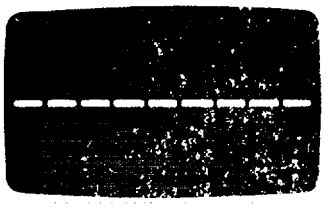
CAUTION: TURN OFF ALL POWER OR SIGNAL SOURCES BEFORE DISCONNECTING OR CONNECTING ELECTRICAL COMPONENTS IN THE DISPLAY MONITOR.

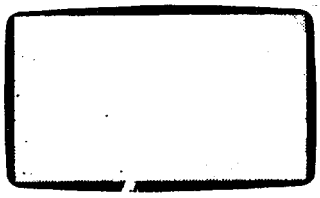
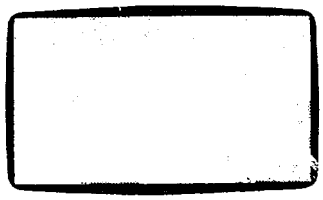
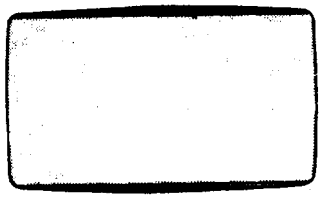
TROUBLE SYMPTOM	TROUBLE ISOLATION AND CORRECTION	DETAILED TROUBLE ANALYSIS
a. Red pilot lamp OFF.  	Check fuse for continuity -- early design 341578 (1 .4A SL-BL). Current design 341686 (1.5A SL-BL). Fuse good, but pilot lamp not lit. Check 115 V ac ± 10% at connector P5 (10, 12).  No 115 V ac -- Replace 405703 cable assembly or 403639 ac filter assembly. 115 V ac OK -- Replace 341795 power distribution assembly. Fuse continues to fail -- Replace: ! 410852 circuit card assembly, 410853 circuit card assembly, 402254 high voltage and video assembly, Q1 and Q2 on heatsink.	4-67
b. CRT filaments OFF.  NOTE: To view CRT filaments remove the 402112 shield.	Pilot lamp ON -- Power distribution assembly. Disconnect J17 from CRT. Check 5.4 V ac ±10% at connector J17 (1, 8).  5.4 V ac OK -- Replace CRT. No 5.4 V ac. Remove power. Disconnect P5. Check continuity P5(1) to J17(8). Check continuity P5(4) to J17(1). Check continuity P20(1) and (2) to J17(8) and (1). No continuity -- Replace or repair 405863 cable assembly or 405861 rear cover assembly. Continuity OK -- Replace 341795 power distribution assembly.	4-67 4-67

TROUBLE SYMPTOM	TROUBLE ISOLATION AND CORRECTION	DETAILED TROUBLE ANALYSIS
1. (Cont) c. Red drive lamp OFF. 	Check Test Point 4 on 410545. NOTE: To view red drive lamp, remove 405873 front enclosure from the 402254 high voltage and video assembly.	4-36
2. a. Unreg 65 V or 130 V lamp is OFF. 	Check Test Point 1 on 410852. Remove power and remove the 410852 card. Apply power and check for 135 V ac ±10% at P1 (4, 5). If 135 V ac not present, replace 341795 power distribution assembly.	4-46
b. Normal lamp OFF. 	Check Test Point 19 on 410853.	4-54
c. Overvoltage lamp ON.	Check Test Point 20 on 410853.	4-54

D. TROUBLESHOOTING (Cont)

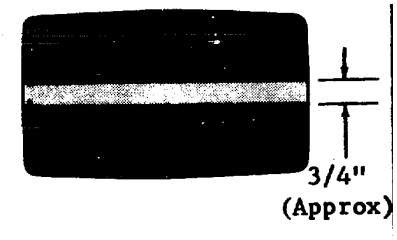
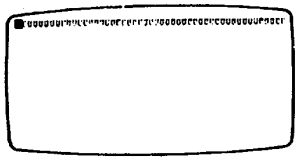
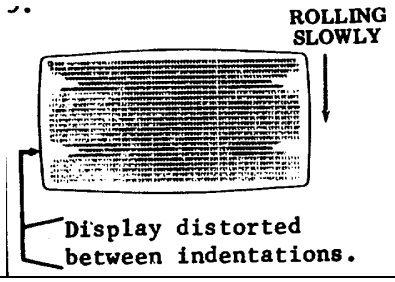
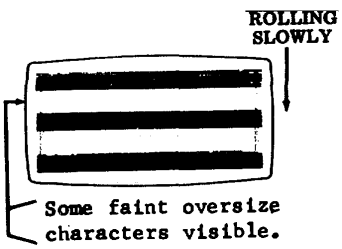
3. TROUBLE ISOLATION (Cont)

TROUBLE SYMPTOM	TROUBLE ISOLATION AND CORRECTION	DETAILED TROUBLE ANALYSIS
2. (Cont) d. High voltage lamp OFF. 	Check Test Point 1 on 410545.	4-36
3. a. No display. 	Normal lamp OFF -- 410853. Check 130 volt regulator. Normal lamp ON -- 410853. High voltage lamp OFF -- 410546. Check horizontal driver. High voltage lamp ON -- 410546. Check connector P10, 405858 cable assembly, and 405859 high voltage plate assembly.	454 4-36 4-67
b. Bright horizontal line. 	Decrease operator brightness. Depress Test Switch No. 3 on 410001 circuit card in KD test set display logic or switch test set test character ON. If horizontal line appears dashed, go to 3.c. Check 65 volt regulator. 4-52	 4-52
c. Bright horizontal dashed line. 	Check connector 34 and 410559 vertical deflection assembly. Check vertical control. Check for open C3 capacitor on 410852 rectifier assembly.	4-30 4-48 4-45

TROUBLE SYMPTOM	TROUBLE ISOLATION AND CORRECTION	DETAILED TROUBLE ANALYSIS
3. (Cont) d. Raster, but no cursor or character. 	Check dot amplifier.	4-39
e. Rolling (vertical). 	Check vertical control. Check vertical receiver. NOTE: Rectifier assembly can cause vertical rolling and linearity problems without failure of indicator lamps.	4-48 4-38 4-45
f. No brightness control. 	Check connector P13. Check highlight amplifier.	4-31 4-42
g. Expanded vertical. 	Check 65 volt regulator.	4-51
h. Expanded horizontal. 	Overvoltage lamp ON -- 410853. Check 130 volt regulator.	4-54

D. TROUBLESHOOTING (Cont)

3. TROUBLE ISOLATION (Cont)

TROUBLE SYMPTOM	TROUBLE ISOLATION AND CORRECTION	DETAILED TROUBLE ANALYSIS
3. (Cont) i. Reduced display. 	Check Test Point 5 on 410853.	4-48
j. Dim vertical line. 	Check connector P10, 405858 cable assembly, and 405859 high voltage plate assembly. Replace 410546 circuit card.	4-31
4. No highlight. 	Check highlight amplifier.	4-42
5, 	Check for open C1 capacitor on 410852 rectifier assembly.	4-45
6. 	Check for open C2 capacitor on 410852 rectifier assembly.	4-45

TROUBLE SYMPTOM	TROUBLE ISOLATION AND CORRECTION	DETAILED TROUBLE ANALYSIS
7. a. Snowy, fuzzy display random flickering of dots.	Check highlight (R-13)	4-42
b. Blooming, oversize display.	High voltage (410546)	4-57
c. Gradual decrease in intensity over periods up to 1/2 hour.	Check CRT (402110)	
d. Entire display flickers brighter or dimmer randomly or for extended Periods of time.	Check CRT (402110)	
e. Parts of characters dim or fading over entire or part of display.	Check CRT (402110)	
f. Entire display out of focus.	Check focus adjustment Check CRT (402110)	4-69

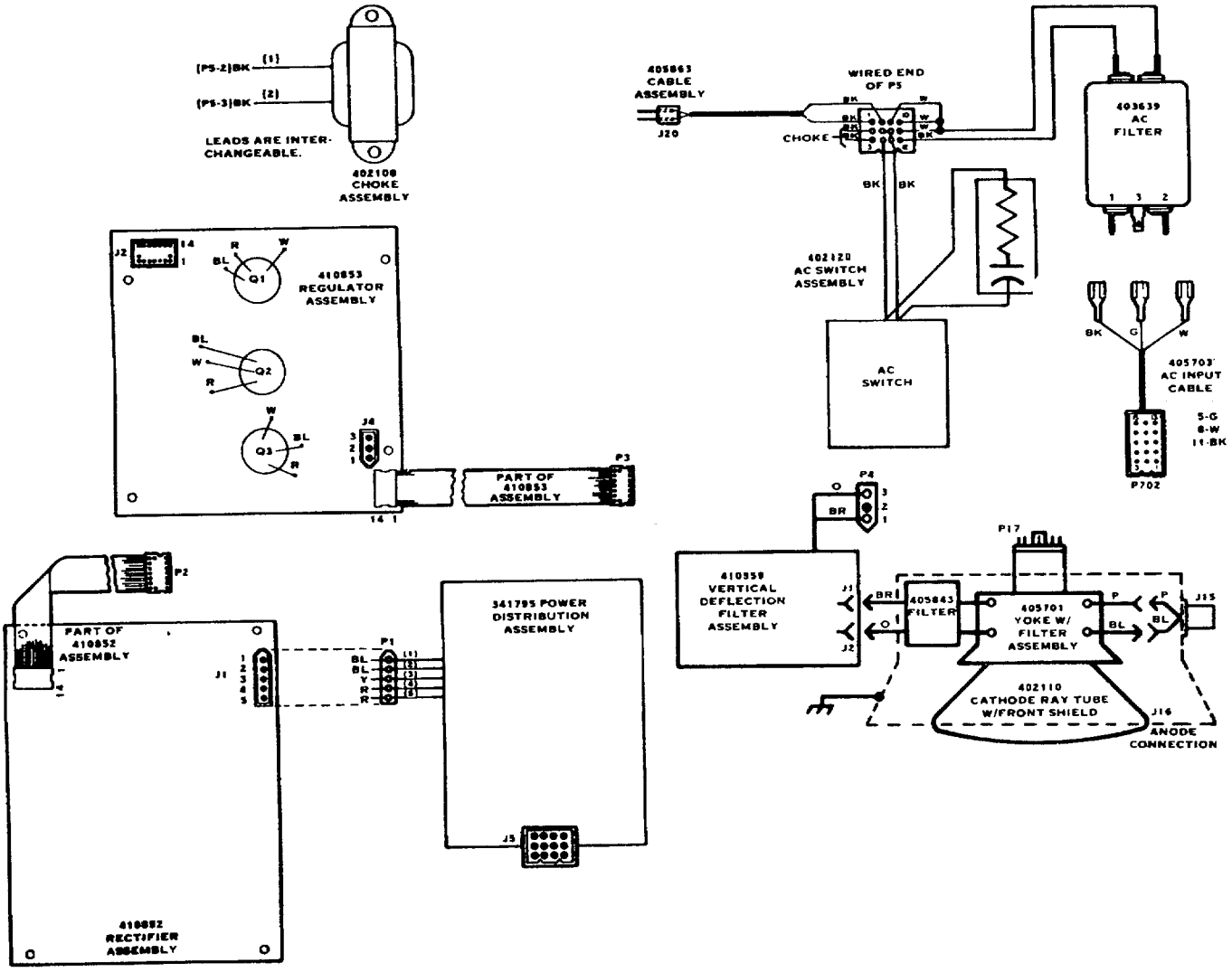
D. TROUBLESHOOTING (Cont)

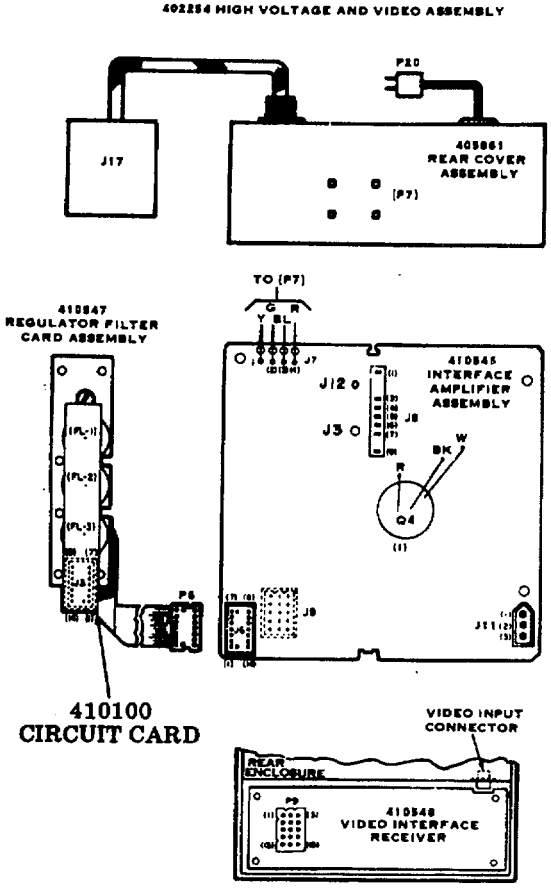
4. DETAILED TROUBLE ANALYSIS

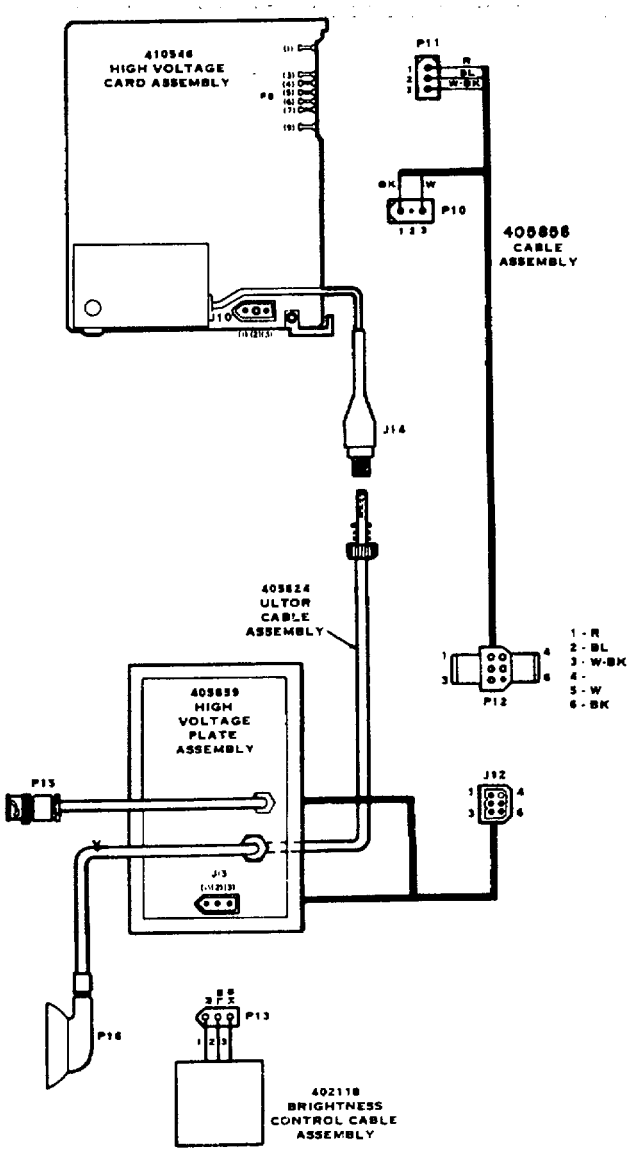
NOTE: The circled numbers on the schematic and pictorial diagrams designate the test points referenced in the associated troubleshooting sequences.

Actual Wiring Diagram

NOTE: Transistors Q1, Q2 and Q3 are mounted on heatsink. Transistor Q4 is mounted on the rear enclosure of the 402254 high voltage and video assembly.



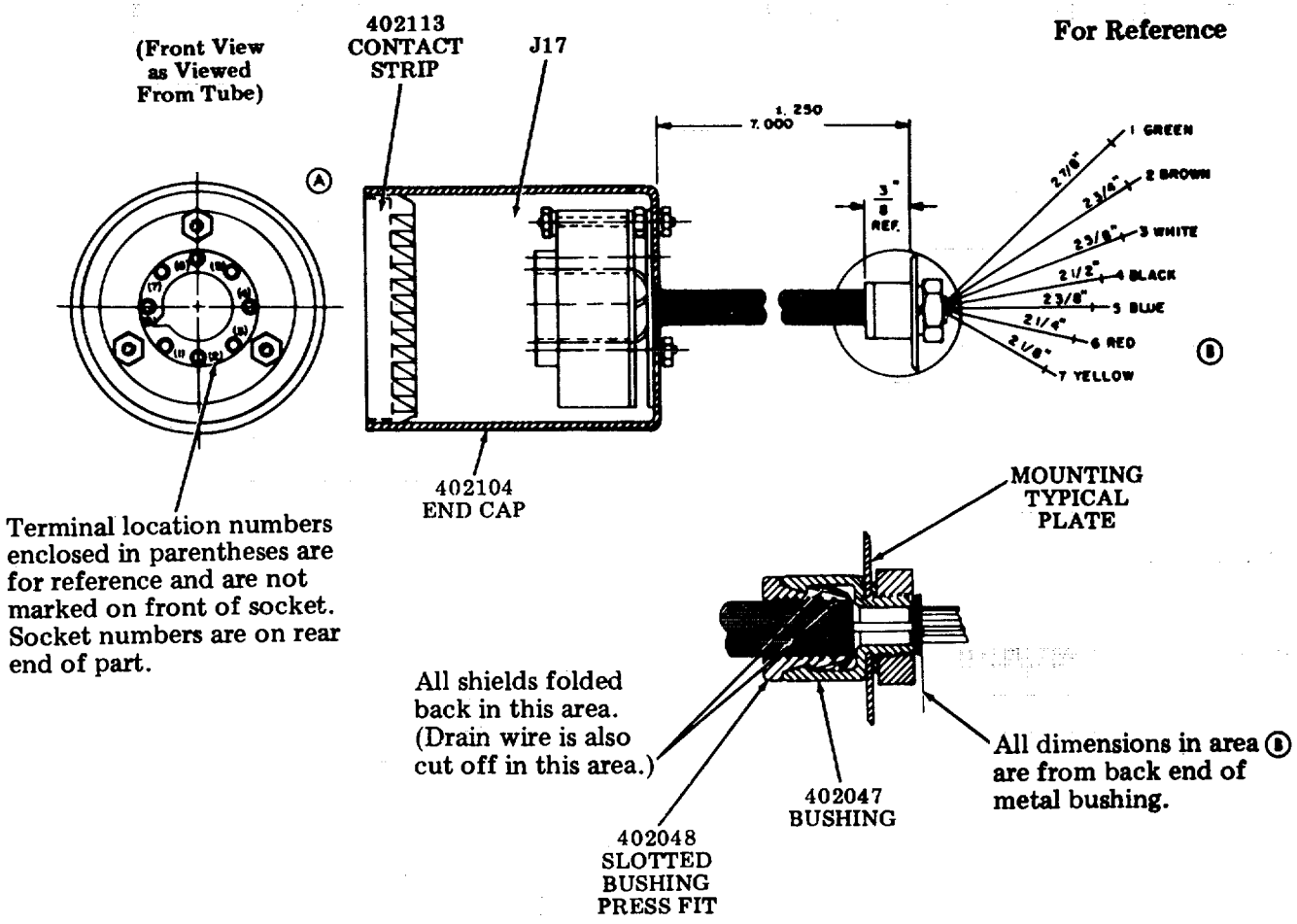

402254 HIGH VOLTAGE AND VIDEO ASSEMBLY
P20
J17
405861
REAR COVER
ASSEMBLY
(P7)
TO (P7)
G R
Y BL
410847
REGULATOR FILTER
CARD ASSEMBLY
410845
INTERFACE
AMPLIFIER
ASSEMBLY
J12
J3
J8
J7
BK
W
R
Q4
P6
J9
J11
410100
CIRCUIT CARD
VIDEO INPUT
CONNECTOR
REAR
ENCLOSURE
P9
410848
VIDEO INTERFACE
RECEIVER


410546
HIGH VOLTAGE
CARD ASSEMBLY
P8
J10
P11
R
BL
W-BK
BK
W
P10
405856
CABLE
ASSEMBLY
J14
405824
ULTOR
CABLE
ASSEMBLY
405839
HIGH
VOLTAGE
PLATE
ASSEMBLY
P12
1 - R
2 - BL
3 - W-BK
4 -
5 - W
6 - BK
P13
J12
J13
P16
P13
402118
BRIGHTNESS
CONTROL CABLE
ASSEMBLY

D. TROUBLESHOOTING (Cont)

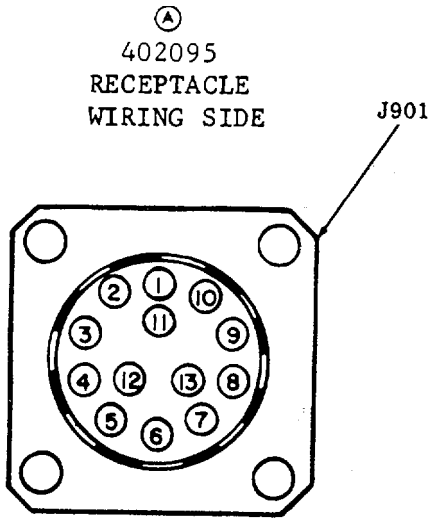
4. DETAILED TROUBLE ANALYSIS (Cont)

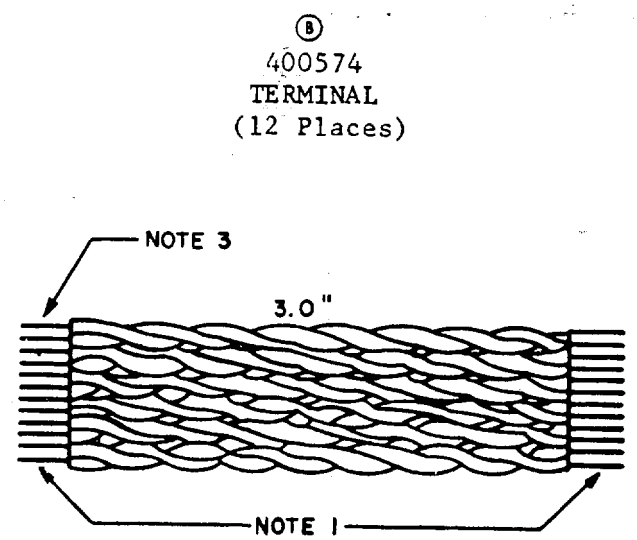
402117 CRT Cable Assembly



RUNNING LIST		
24 AWG. TEFLON WIRE, VOLTAGE RATING 1000V		
FROM	COLOR	TO
A1	BROWN	B2
A3	RED	B6
A4	BLUE	B5
A5	GREEN	B1
A8	YELLOW	B7
24 AWG. DOUBLE SHIELDED CABLE		
A2	BLACK	B4
A7	WHITE	B3

402246 Video Cable Assembly





7 TWISTED PAIR 26 AWG. 31194 RM		
FROM	COLOR	TO
A1	ORANGE	B
A2	WHITE-ORANGE	B
A3	WHITE-YELLOW	B
A4	WHITE-BROWN	B
A5	GREEN	B
A6	YELLOW	B
A8	WHITE-GREEN	B
A9	BLACK	B
A10	SLATE	B
A11	VIOLET	B
A12	BLUE	B
A13	BROWN	B

NOTE 1: Prepare for crimping (24 places).

NOTE 2: Remove twisted pair, namely red and white/red.

NOTE 3: In area (A) use 402097 male pins (12 places).

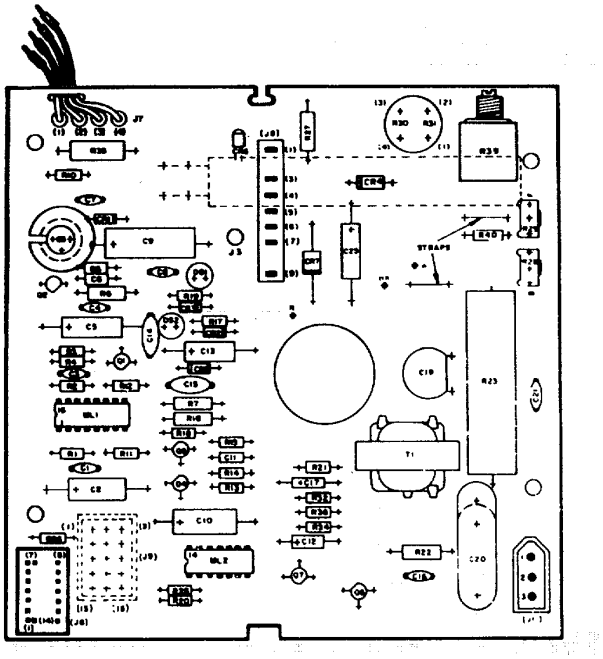
NOTE 4: In area (B) cover terminals with suitable heat shrink tubing (12 places).

D. TROUBLESHOOTING (Cont)

4. DETAILED TROUBLE ANALYSIS (Cont)

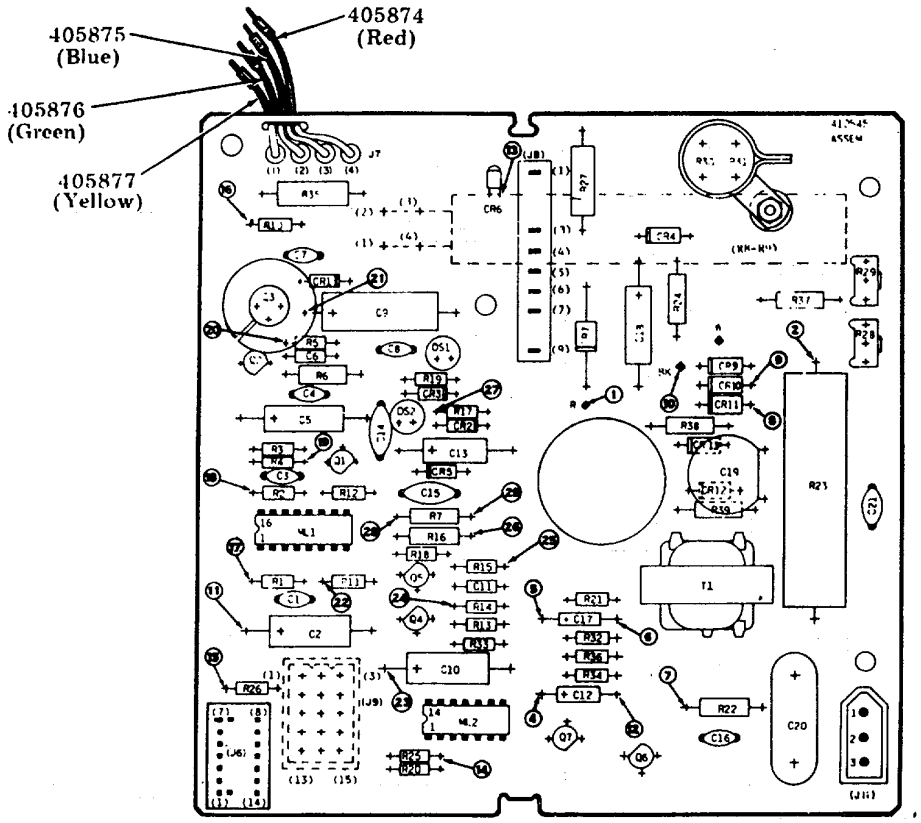
410545 Horizontal Driver

Issue 6A



REF DESIGN	DESCRIPTION	PART NO	REF DESIGN	DESCRIPTION	PART NO.
C1	0.1 MFD 25 W Vdc	305821	R8	300 ohm, 20 W, 5%	341634
C2	.47 MFD 20 W Vdc	310931	R9	600 ohm, 5 W, 5%	
C3	0.01 MFD 100 W Vdc	319999	R10	150 ohm	330640
C6	.220 MFD 200 W Vdc	335803	R13	2.7 K	315956
C9	.50 MFD 50 W Vdc	192711	R16	470 ohm, 1/2 W, 5%	137602
C12	0.22 MFD 35 W Vdc	300089	R17	4.7 ohm	341575
C13	0.10 MFD 20 W Vdc	403016	R18	270 ohm	328784
C14	0.01 MFD 1.4 K Vdc	336377	R19	22 meg	324855
C16	0.27 MFD 1 K Vdc	325035	R22	2.7 K, 1/2 W, 5%	118144
C20	0.22 MFD 400 W Vdc	341637	R23	1200 ohm, 15 W, 5%	341631
C21	0.002 MFD 1 K Vdc	328794	R26	330 ohm, 1/4 W, 5%	328785
C23	0.47 MFD 35 Vdc	323139	R27	6.8 meg, 1/2 W	147028
R1	.120 ohm	333405	R28	Variable 1 meg, 1/2 W	341567
R2	1000 ohm	321213	R29	Variable 5 meg, 1/2 W	341668
R3	4.7 K	315959	R30	50 ohm, 15 W, 5%	341635
R4	220 ohm	318802	R31	25 ohm, 10 W', 5%	
R5	470 ohm	320276	R34	1.5 K	315954
R39	200 ohm, pot.	406292	J6	Guide, Connector	341751
R40	1.3 M, .25 W	330642		Connector, Pin .025	341618
CR1	Diode 1N4148	197464	9	Plug, 15 Circuit	341645
CR3	Diode 1N4007	335880		Terminal	341644
CR4	Diode	430605	J8	Connector, 9 Pin Male	341700
CR5	Diode, 1N4740 ZENER 10 V	336019	J11	Plug, 3 Pin	341692
CR6	Diode, LED	341636	R	Connector, Pin .025	341618
CR7	Diode, Damper	341539		Heat Sink, Snap On	341660
Q1	Transistor, 2N4275	335774		Pad, Transistor Mounting	144495
Q3	Transistor, 2N3725	341638		.027 Dia. Wire (Strap)	39550RM
Q6	Transistor, Horz. Driver	341639	J7(1)	Lead, Elect. (Yellow)	405877
Q7	Transistor, 2N3569	324656	J7(2)	Lead, Elect. (Green)	405876
ML1	Integrated Circuit	339716	J7(3)	Lead, Elect. (Blue)	405875
ML2	Integrated Circuit	339002	J7(4)	Lead, Elect. (Red)	405874
DS1	Bulb, NEON (Orange Dot)	341590	TI	Transformer	341521

410545 Horizontal Driver



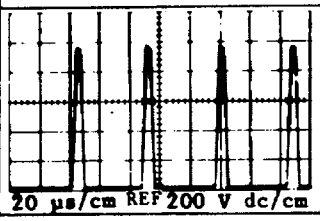
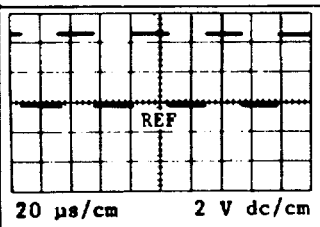
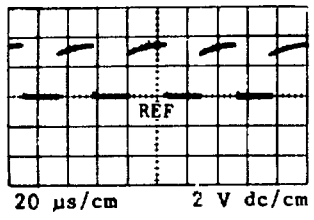
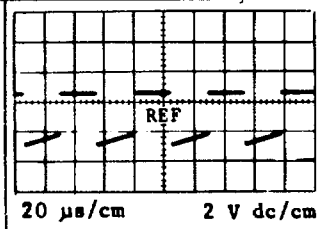
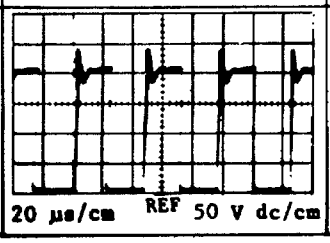
REF DESIGN	DESCRIPTION	PART NO.	REF DESIGN	DESCRIPTION	PART NO.
C1	0.1 MFD 25 W V dc	305821	R21	470 ohm, 1/4 W, 5%	320276
C2	47 MFD 20 W V dc	310931	R22	2.7 K, 1/2 W, 5%	118144
C12	0.22 MFD 35 W V dc	300089	R23	1200 ohm; 15 W, 5%	341631
C16	270 PFD 1000 W V dc	325035	R24	6.8 ohm, 1/2 W, 5%	177101
C17	0.22 MFD 35 W V dc	300089	R30	50 ohm, 15 W, 5%	341635
C18	100 MFD 10 W V dc	181665	R31	25 ohm, 10 W, 5%	341635
C20	0.22 MFD 400 W V dc	341637	R32	4.7 K ohm, 1/4 W, 5%	315959
C21	0.002 MFD 1000 W V dc	328794	R33*	1 K ohm, 1/4 W, 5%	321213
		315954	R34	1.5 K ohm, 1/4 W, 5%	315954
ML2	Integrated Circuit	339002	R36	180 ohm, 1/4 W, 5%	328783
		118184	R38	120 K ohm, 1/2 W	118184
CR6	Diode, LED	341636	R39	120 K ohm, 1/2 W	118184
CR7	Diode	341539			
CR8	Diode Network	402282	Q6	Transistor	341639
CR9	Diode	341732	Q7	2N 3569	324656
CR10	Diode	341732	Q4	(Heatsink) Transistor	341570
CR11	Diode	341732	Q4	(Heatsink) Transistor (See Note)	406306
			F1	No. 18 ga wire strap**	
			T1	Transformer	341521

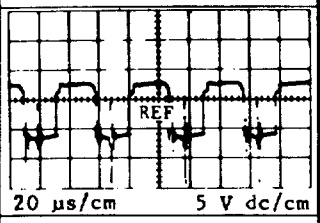
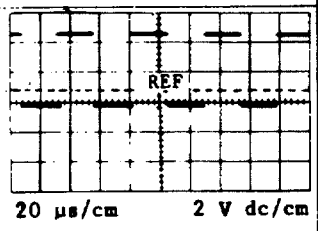
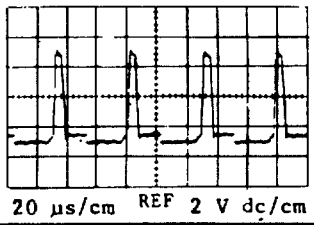
NOTE: Transistor Q4, 406306, can only be used with Issue 6A or later, 410545. circuit card. Transistor Q4, 341570, can be used with any issue of 410656 card.

*Deleted at Issue 4A.

D. TROUBLESHOOTING (Cont)

4. DETAILED TROUBLE ANALYSIS. 410545 Horizontal Driver (Cont)

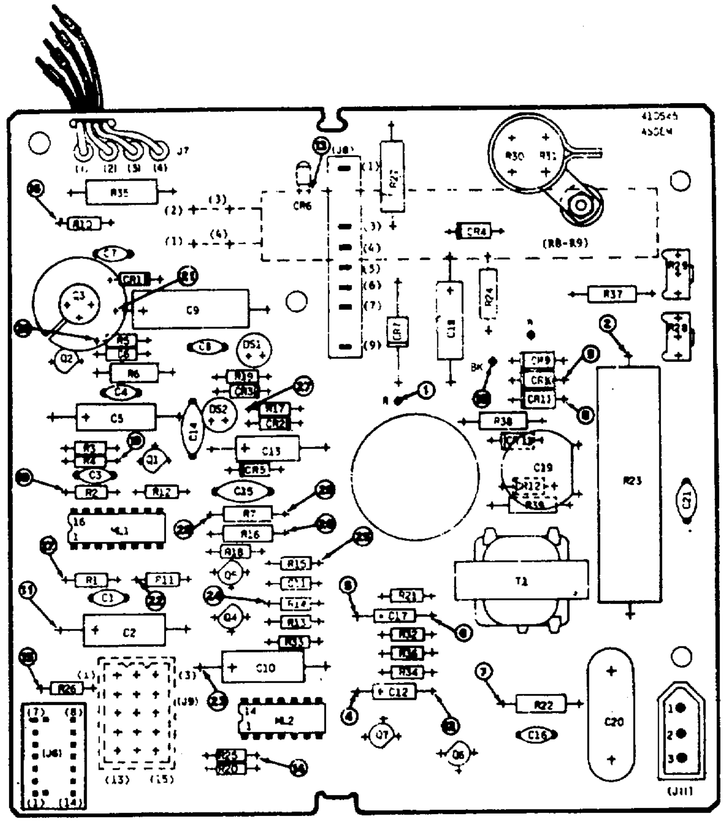
TEST POINT	VOLTAGE OR WAVEFORM	COMPONENT ANALYSIS
1		No display. Replace Q4. If Test Points 3 and 10 are good and signal good, see Note 1.
2	130 V dc	No voltage. Check J6. Check J3 and 410547 regulator filter (4-53).
	No Test Point 3.	
4		No signal. Check J9 and 410548 video interface receiver (4-57) and video input cable.
5		No signal. Replace ML2.
6		No signal. Replace C17.
7		Incorrect signal. Replace Q6.

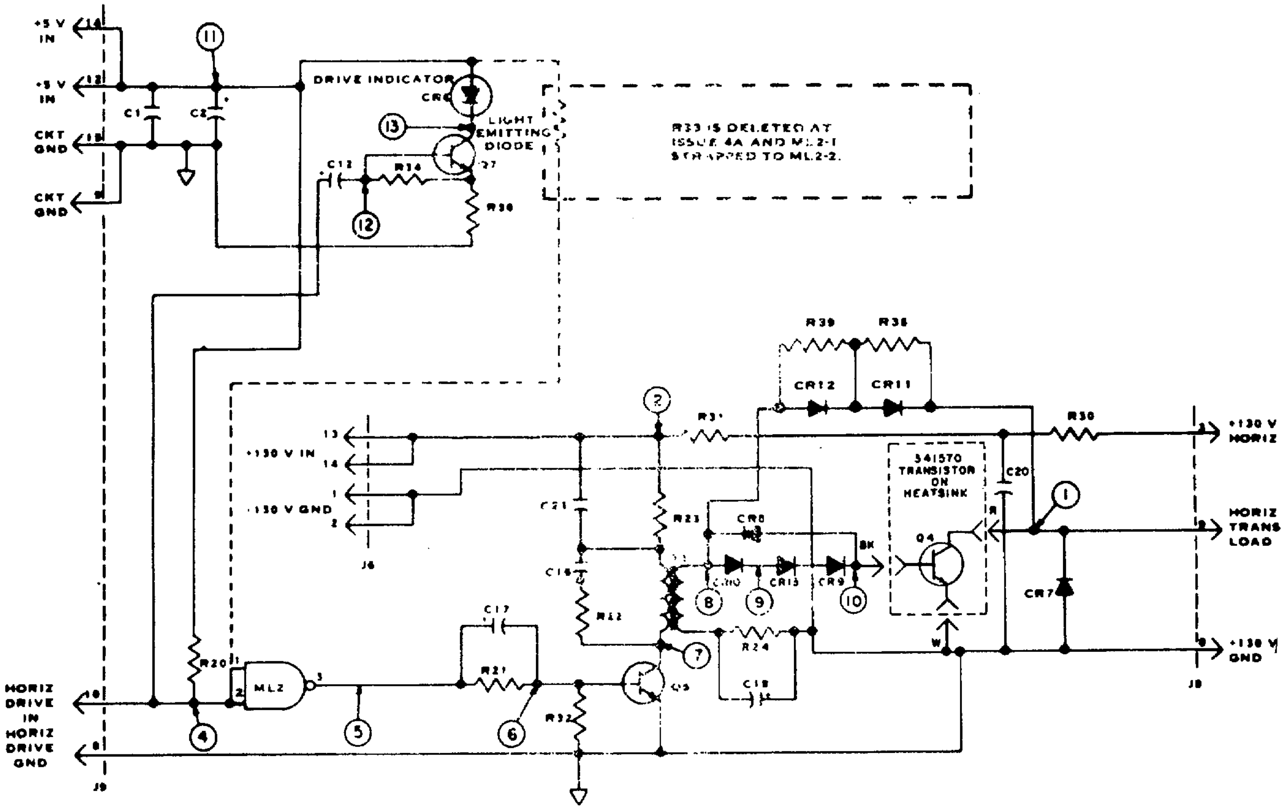
TEST POINT	VOLTAGE OR WAVEFORM	COMPONENT ANALYSIS
8 9 10		No signal. Replace respectively: T1 CR11 CR10 NOTE 3
11	5 V dc	No voltage: Check J9 and 410548 video interface receiver and video input cable.
12		No signal. Replace C12. NOTE 3
13		No signal. Replace CR6 and Q7. NOTE 3

NOTE 1: If high voltage lamp remains extinguished with a good signal at Test Point 1, replace 410546 circuit card.

NOTE 2: Most failures isolated under Test Points 1 through 10 will result in no raster.

NOTE 3: The above waveforms may appear different in the new Issue 6A or higher 410545 circuit cards. It may be necessary to adjust the R39 variable resistor for the correct waveforms.

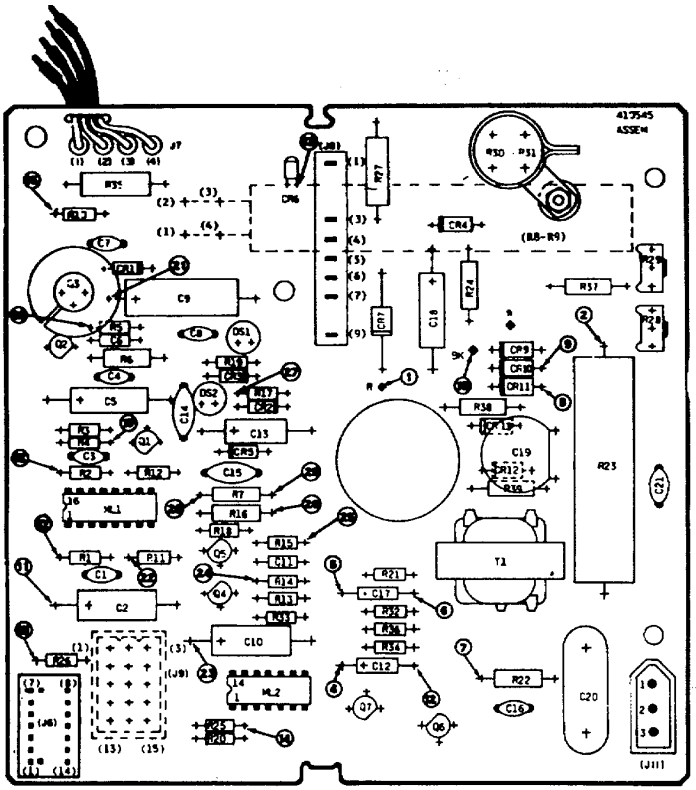


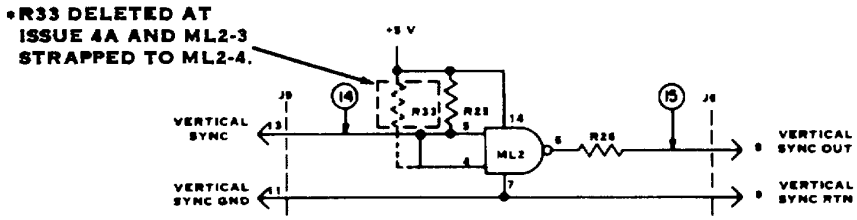

+5 V IN
+5 V IN
CKT GND
CKT GND
DRIVE INDICATOR
LIGHT EMITTING DIODE
R33 IS DELETED AT ISSUE 4A AND ML2-1 STRAPPED TO ML2-2.
+130 V IN
-130 V GND
541570 TRANSISTOR ON HEATSINK
+130 V HORIZ
HORIZ TRANS LOAD
+130 V GND
HORIZ DRIVE IN
HORIZ DRIVE GND

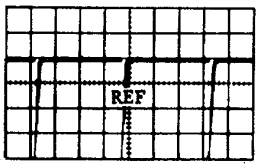
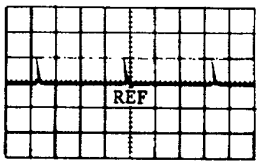
D. TROUBLESHOOTING (Cont)

4. DETAILED TROUBLE ANALYSIS (Cont)

410545 Vertical Receiver



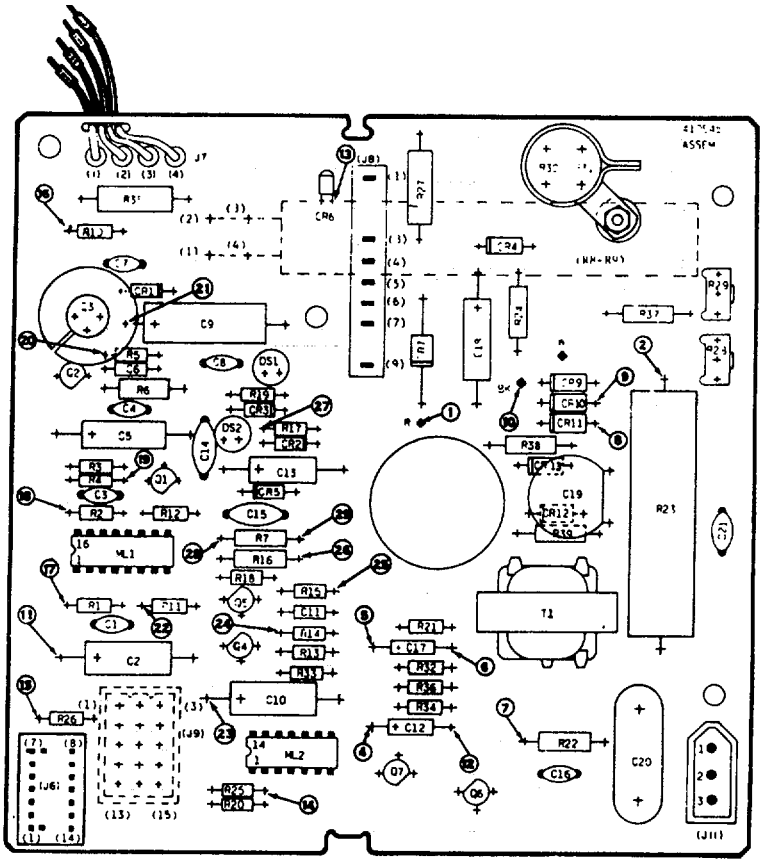


TEST POINT	VOLTAGE OR WAVEFORM	COMPONENT ANALYSIS	TEST POINT	VOLTAGE OR WAVEFORM	COMPONENT ANALYSIS
14	 5 ms/cm 1 V dc/cm	Rolling. No signal. Check J9.	15	 5 ms/cm 1 V dc/cm	Rolling. No signal. Replace ML2. Rolling. Signal good. Go to 4-43. Test Point 2.

NOTE: Problem in this circuit will result in a rolling display.

REF DESIGN	DESCRIPTION	PART NO.
R25	120 ohm, 1/4 W, 5%	333405
R26	330 ohm, 1/4 W, 5%	328785
R33*	1 K ohm, 1/4 W, 5%	321213
ML2	Integrated Circuit	339002

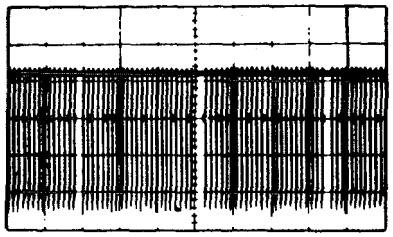
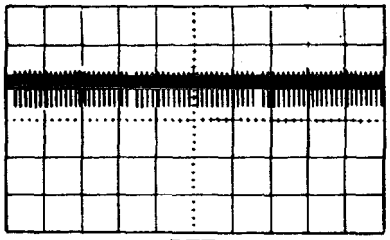
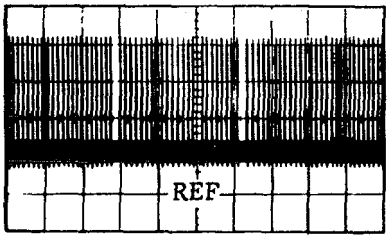
410545 Dot Amplifier



REF DESIGN	DESCRIPTION	PART NO.	REF DESIGN	DESCRIPTION	PART NO.
R1	120 ohm, 1/4 W, 5%	333405	C3	0.01 MFD 100 W V dc	319999
R2	1 K ohm, 1/4 W, 5%	321213	C4	0.1 MFD 25 W V dc	305821
R3	4.7 K ohm, 1/4 W, 5%	315959	C5	47 MFD 20 W V dc	310931
R4	220 ohm, 1/4 W, 5%	318802	C6	220 PFD 200 W V dc	335803
R5	470 ohm, 1/4 W, 5%	320276	C7	0.01 MFD 100 W V dc	319999
R6	51 ohm, 1/2 W, 5%	143656	C8	0.01 MFD 100 W V dc	319999
R8	300 ohm, 20 W, 5%	341634	C9	50 MFD 50 W V dc	192711
R9	600 ohm, 5 W, 5%	341634			
R10	150 ohm, 1/4 W, 5%	330640	CR1	1N4148	197464
R35	15 K ohm, 1 W, 10%	120210			
			DS1	NEON, (Orange Dot)	341590
Q1	2N4275	335774			
Q2	2N4275	335774			
Q3	2N3725	341638			

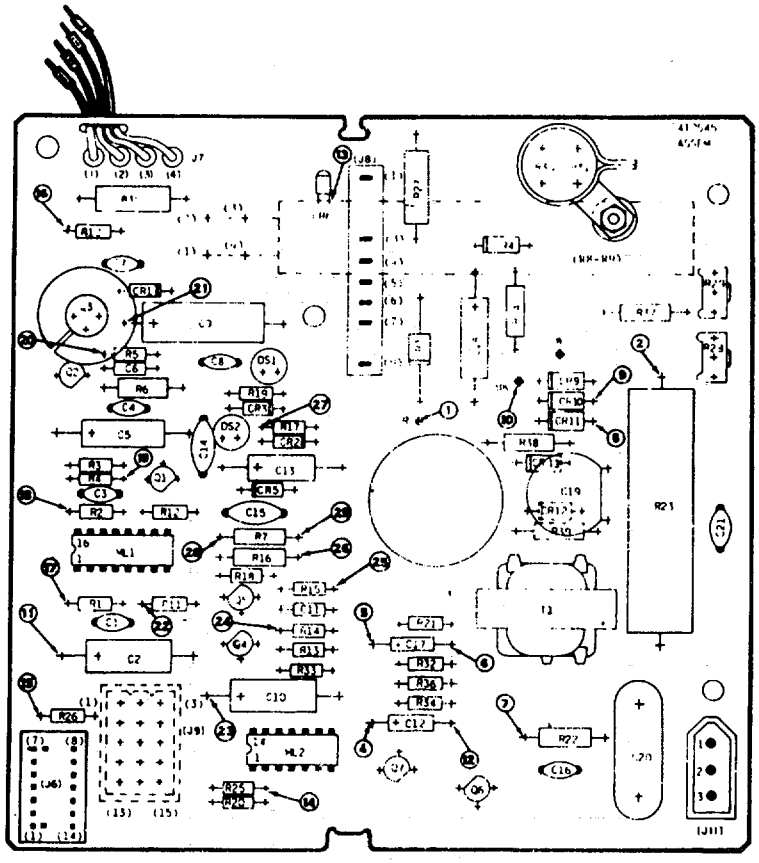
D. TROUBLESHOOTING (Cont)

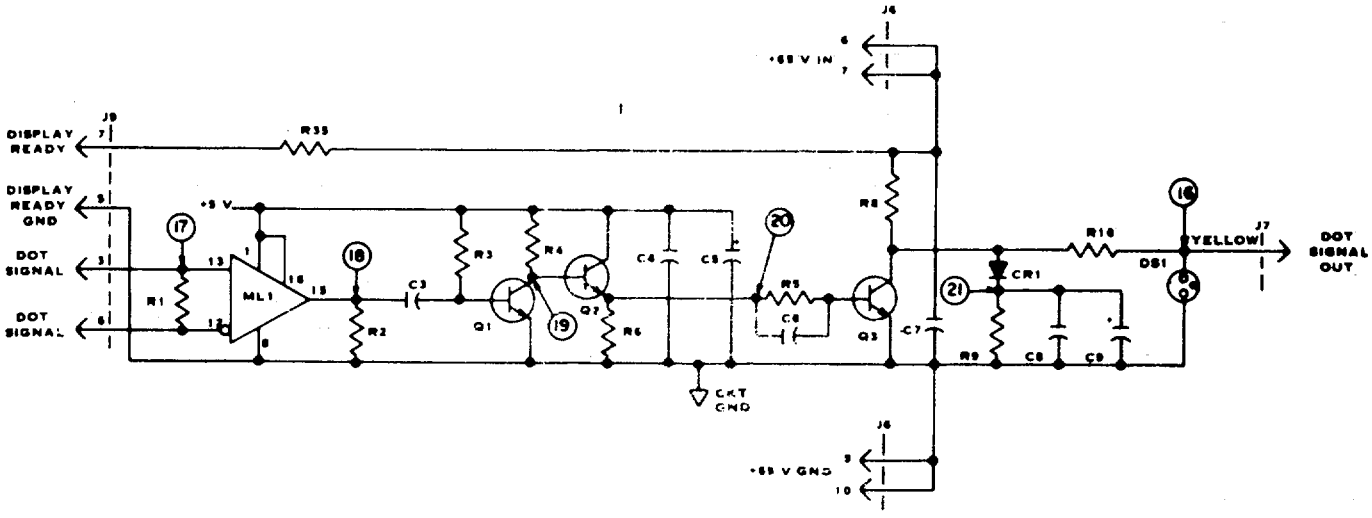
4. DETAILED TROUBLE ANALYSIS, 410545 Dot Amplifier (Cont)

TEST POINT	VOLTAGE OR WAVEFORM	COMPONENT ANALYSIS
16		No signal. Test Point 20. Replace Q3. Signal good. No characters. Check J7 and 405861 rear cover assembly including CRT cable. Replace CRT.
17 18		No signal. Check J9 and 410548 video interface receiver and video input cable. Replace ML1.
19 20		No signal. Replace respectively: Q1 Q2
21	42 V dc	No voltage. Replace CR1.

NOTE 1: The signals above are developed by entering characters on the display.

NOTE 2: Failure here will result in no cursor or any characters.

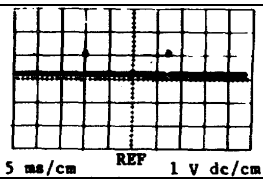
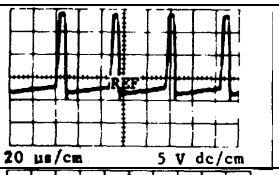
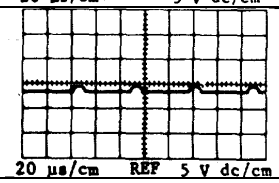



+68 V IN
DISPLAY READY
DISPLAY READY GND
DOT SIGNAL
DOT SIGNAL
+5 V
R35
R8
R10
YELLOW
DOT SIGNAL OUT
CR1
DS1
ML1
R1
R2
R3
R4
R5
R6
C3
C4
C5
C6
C7
C8
C9
Q1
Q2
Q3
CKT GND
+68 V GND

D. TROUBLESHOOTING (Cont)

4. DETAILED TROUBLE ANALYSIS (Cont)

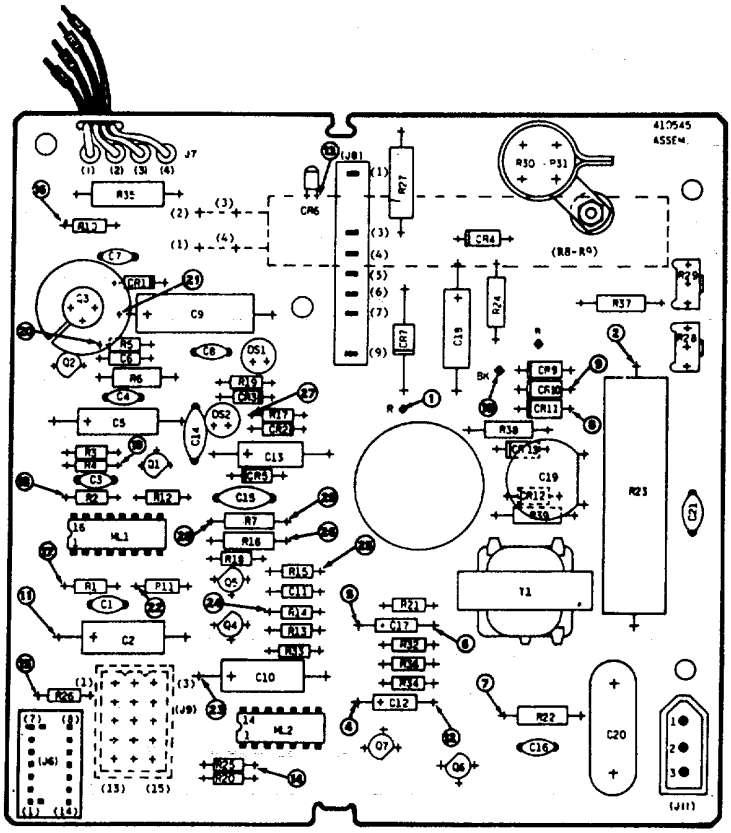
410545 Highlight Amplifier

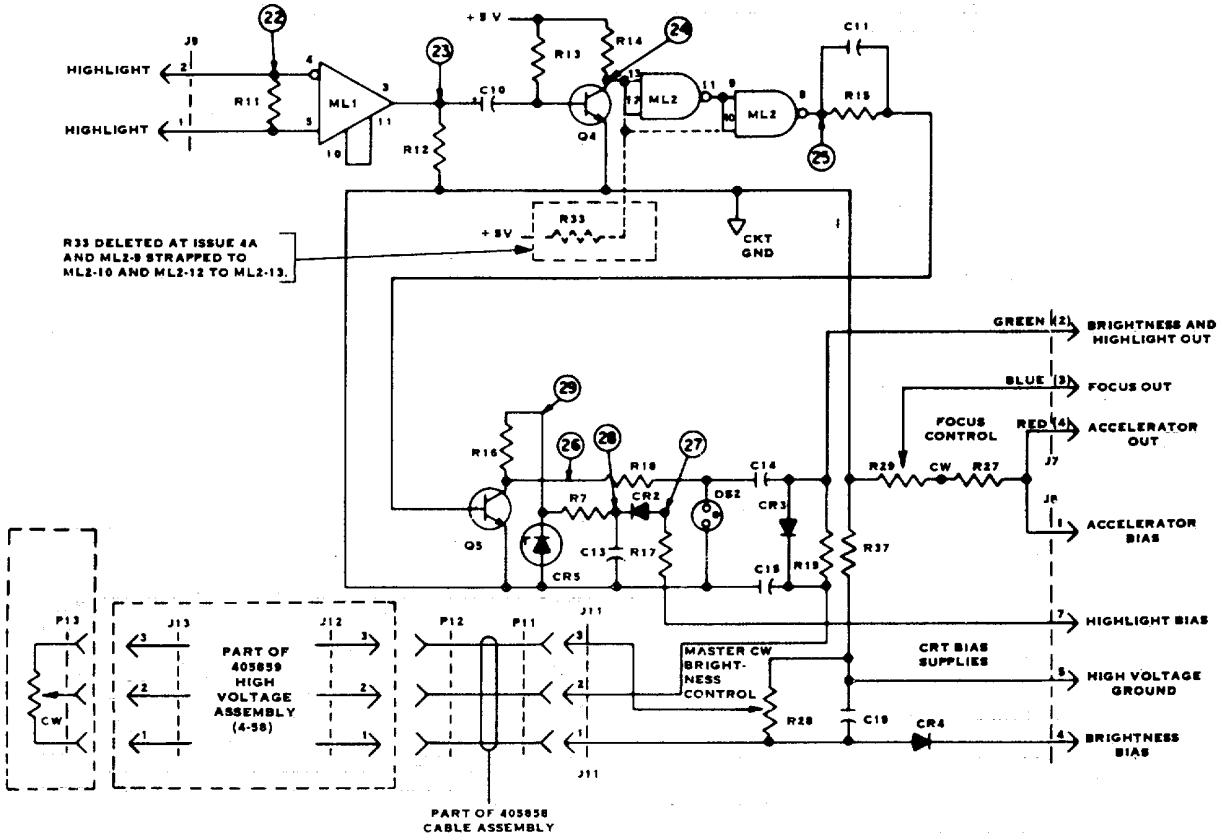
TEST POINT	VOLTAGE OR WAVEFORM	COMPONENT ANALYSIS
22		No signal. Check J9, 410548 video interface receiver, and video input cable.
	Test Points 23-26 look similar to Test Test Point 22 - changes indicated below.	
23	Level 4.2 V dc Neg. Pulse.	No signal. Replace ML1.
24	Level .2 V dc-+5 V dc Pulse.	No signal. Replace Q4.
25	Level 0 V dc +3.5 V dc Pulse.	No signal. Replace ML2.
26	Level 10 V dc Neg. Pulse.	No signal. Replace Q5. Signal good. Check J7 and 405861 rear cover assembly. Replace 410546. Replace CRT.
27		No signal. Check J8.
28		No signal. Replace CR2.
29	10 V de	No voltage. Replace CRS.

NOTE 1: The signals shown are developed by placing 80 highlighted *S on line one of display. The rest of display is blank and cursor is home. If monitor test set is used, turn HIGHLIGHT and TEST CHARACTER ON. The signal at test point 22 will appear similar

NOTE 2: Failure will result in no highlight or protected information.

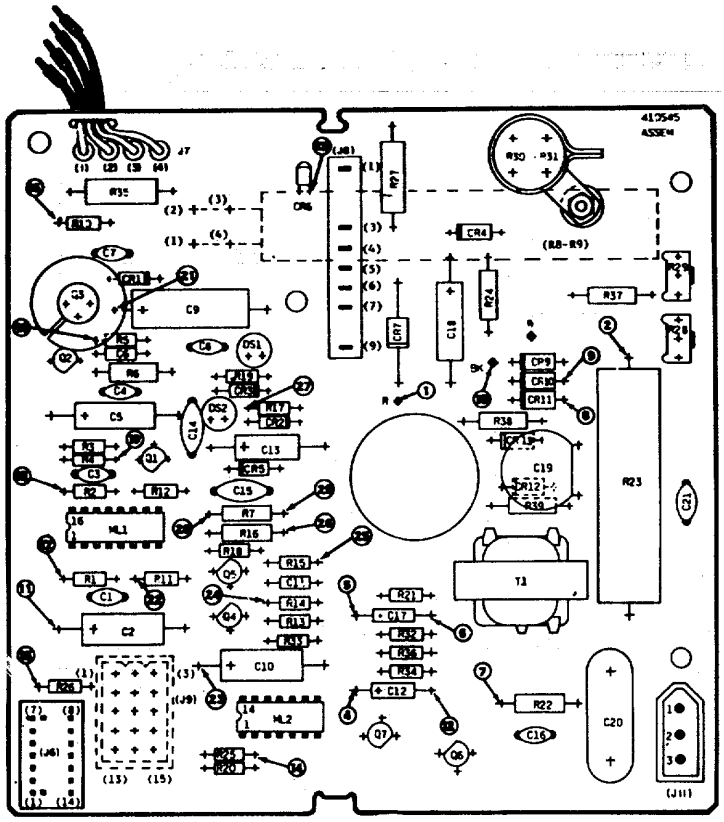
CAUTION: PROBE ONLY DESIGNATED TEST POINT AREAS ON THIS CIRCUIT CARD AS DAMAGE TO MONITOR OR TEST EQUIP-MENT COULD RESULT.




HIGHLIGHT
HIGHLIGHT
+5V
R33 DELETED AT ISSUE 4A AND ML2-9 STRAPPED TO ML2-10 AND ML2-12 TO ML2-13.
CKT GND
GREEN
BRIGHTNESS AND HIGHLIGHT OUT
BLUE
FOCUS OUT
FOCUS CONTROL
RED
ACCELERATOR OUT
ACCELERATOR BIAS
HIGHLIGHT BIAS
CRT BIAS SUPPLIES
HIGH VOLTAGE GROUND
BRIGHTNESS BIAS
MASTER CW BRIGHTNESS CONTROL
PART OF 405859 HIGH VOLTAGE ASSEMBLY (4-58)
PART OF 405858 CABLE ASSEMBLY

D. TROUBLESHOOTING (Cont)

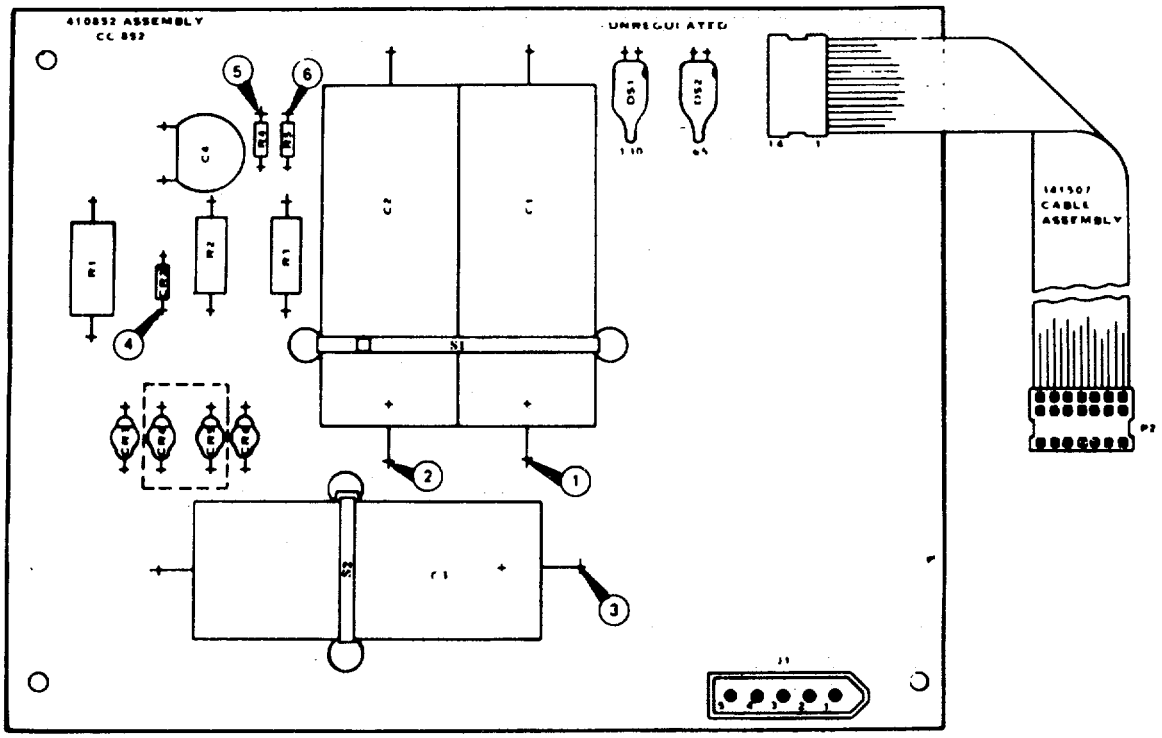
4. DETAILED TROUBLE ANALYSTS, 410545 Highlight Amplifier (Cont)



REF DESIGN	DESCRIPTION	PART NO.	REF DESIGN	DESCRIPTION	PART NO.
R7	100 ohm, 1/2 W, 5%	137438	C10	47 MFD 20 W V dc	310931
R11	120 ohm, 1/4 W, 5%	333405	C11	220 PFD 200 W V dc	335803
R12	1 K ohm, 1/4 W, 5%	321213	C13	10 MFD 25 W V dc	321976
R13	2.7 K ohm, 1/4 W, 5%	315956	C14	0.01 MFD 1.4 K V dc	336377
R14	220 ohm, 1/4 W, 5%	308802	C15	0.1 MFD 500 W V dc	315942
R15	470 ohm, 1/4 W, 5%	320276	C19	0.1 MFD 500 W V dc	315942
R16	470 ohm, 1/2 W, 5%	137602	C20	0.01 MFD 1.4 K V dc	336377
R17	4.7 ohm, 1/4 W, 5%	341575			
R18	270 ohm, 1/4 W, 5%	328784	CR2	1N4148	197464
R19	22 meg, 1/4 W, 5%	324855	CR3	1N4007	335880
R27	6.8 meg, 1/2 W, 5%	147028	CR4	1N4004	312341
R28	RES Variable	341667	CR5	1N4740 ZENER 10 V	336019
R29	RES Variable	341668			
R33*	1 K ohm, 1/4 W, 5%	321213	ML1	Integrated Circuit	339716
R37	27 K ohm, 1/2 W, 5%	118187	ML2	Integrated Circuit	339002
Q4	2N4275	335774			
Q5	2N4275	335774	DS2	NEON, (Orange Dot)	341590

*Deleted at Issue 4A.

410852 Rectifier Assembly

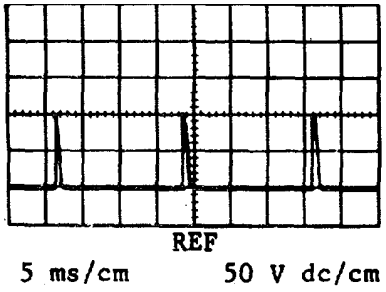


REF DESIGN	DESCRIPTION	PART NO.	REF DESIGN	DESCRIPTION	PART NO.
C1	200 MFD 250 V	341504	DS1	NEON, (Orange Dot)	341590
C2	300 MFD 150 V	341505	DS2	NEON, (Green Dot)	341589
C3	1000 MFD 75 V	341506			
C4	0.01 MFD 1000 V	341550	R1	39 K, 2 W	341572
			R2	20 K, 1 W	120211
CR1*	Bridge, 2A, 400 V	341503	R3	10, 1 W	178862
CR2	1N4004	312341	R4	330 K, 1/4 W	333415
CR3	Diode	408307	R5	82 K, 1/4 W	333411
CR4	Diode	408307			
CR5	Diode	408307			
CR6	Diode	408307			

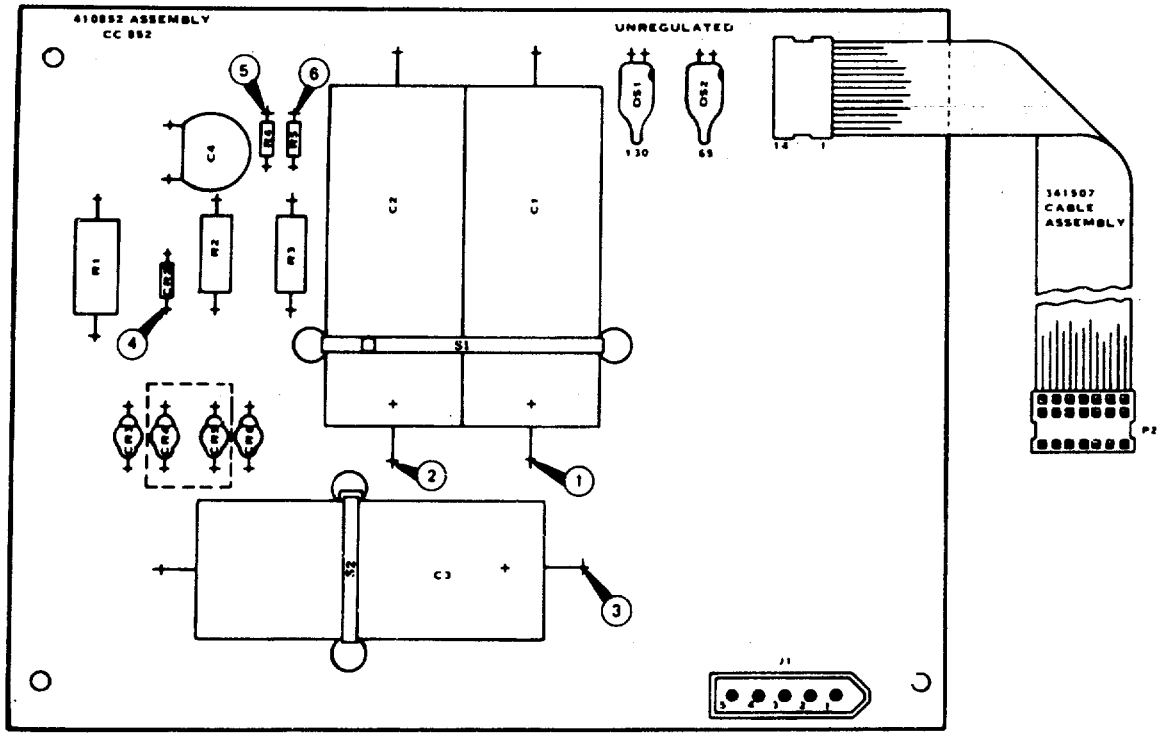
*Deleted at Issue 1B; replaced by CR3, CR4, CR5, and CR6.

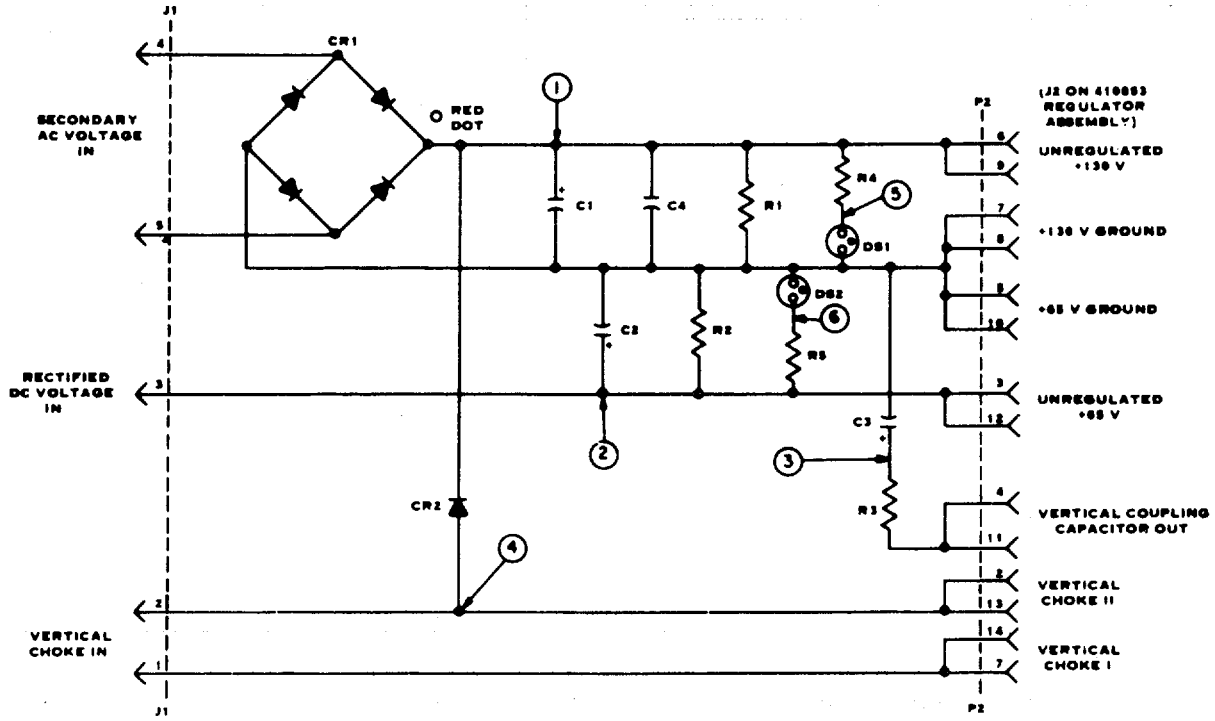
D. TROUBLESHOOTING (Cont)

4. DETAILED TROUBLE ANALYSIS, 410852 Rectifier Assembly (Cont)

TEST POINT	VOLTAGE OR WAVEFORM	COMPONENT ANALYSIS
1	190 V dc ±10%	No voltage. Replace CR1.
2	90 V dc ±10%	No voltage. Check J1.
3	55 V dc ±10%	No voltage. Check yoke.
4		Incorrect signal. Replace CR2.
5	60 V dc ±10%	High voltage. Replace DS1.
6	55 V dc ±10%	High voltage. Replace DS2.

NOTE: Troubles on this card will usually result in no display.

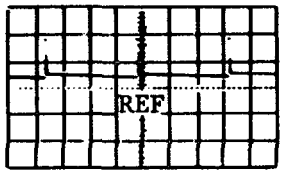
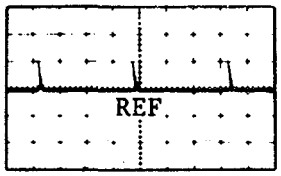
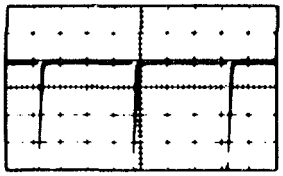
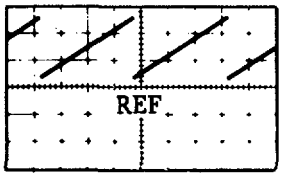
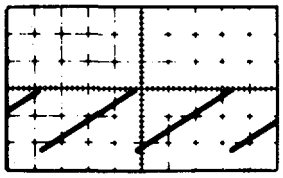
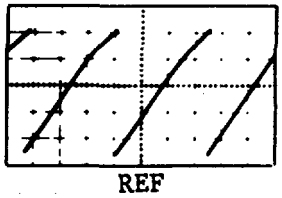

410852 ASSEMBLY
CC 852
UNREGULATED
DS1
DS2
130
65
14
1
341507
CABLE
ASSEMBLY
P2
C4
R4
R5
R1
R2
R3
C2
C1
S1
S2
C3
J1
5
6
4
2
1
3

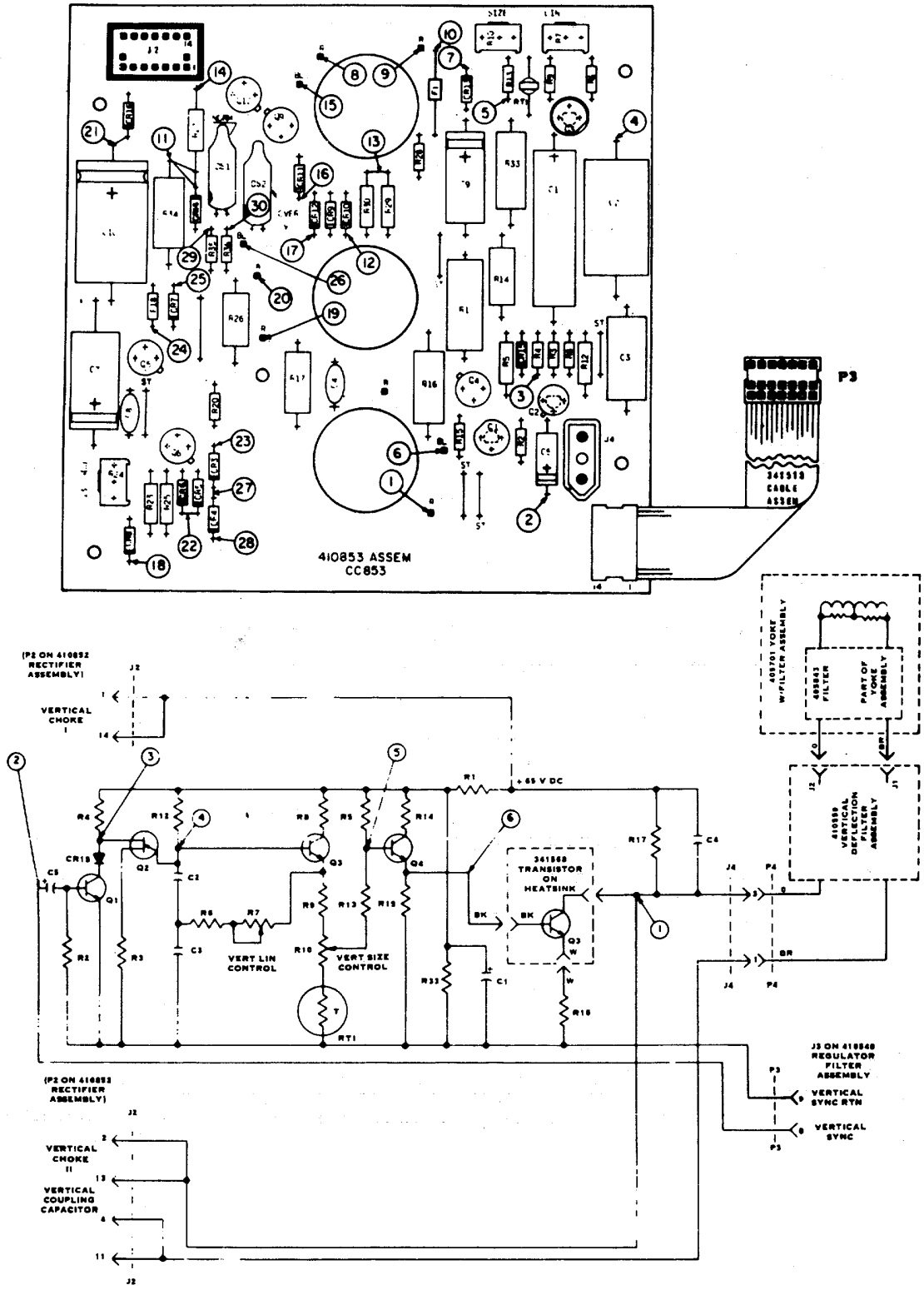

J1
CR1
RED DOT
SECONDARY AC VOLTAGE IN
RECTIFIED DC VOLTAGE IN
VERTICAL CHOKE IN
C1
C4
R1
R4
DS1
DS2
C2
R2
R5
C3
R3
CR2
P2
(J2 ON 410893 REGULATOR ASSEMBLY)
UNREGULATED +130 V
+130 V GROUND
+65 V GROUND
UNREGULATED +65 V
VERTICAL COUPLING CAPACITOR OUT
VERTICAL CHOKE II
VERTICAL CHOKE I

D. TROUBLESHOOTING (Cont)

4. DETAILED TROUBLE ANALYSIS (Cont)

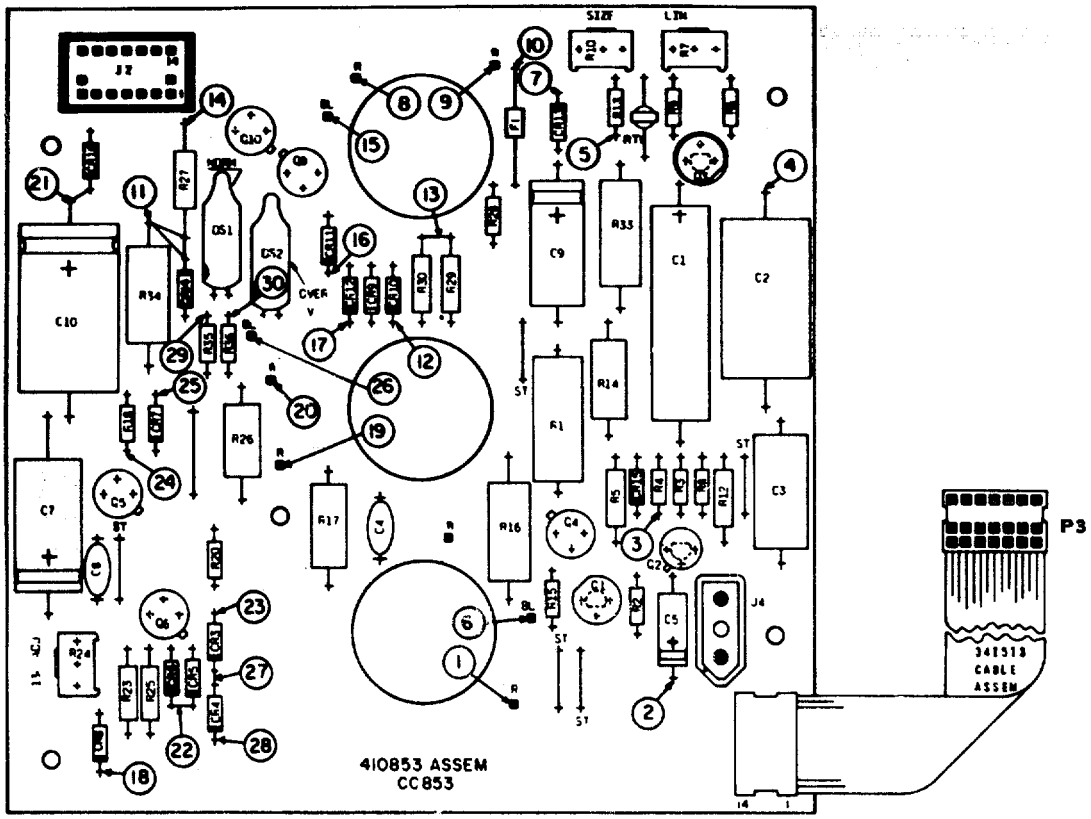
410853 Vertical Control

TEST POINT	VOLTAGE OR WAVEFORM	COMPONENT ANALYSIS
1	 5 ms/cm 100. V dc/cm	Signal good. No trouble here. Horizontal dashed line. Check Test Points 4 and 6. Replace Q3 (Heatsink).
2	 5 ms/cm 1 V dc/cm	Rolling. Incorrect signal. Problem on 410545. No signal. Check 410547 regulator filter circuit card assembly.
3	 5 ms/cm 5 V dc/cm	Rolling. Incorrect signal. Replace CR15 or Q1.
4	 5 ms/cm 5 V dc/cm	Horizontal dashed line. Incorrect signal. Replace Q2.
5	 5 ms/cm 2 V dc/cm	Reduced display. Incorrect signal. Replace Q3.
6	 5 ms/cm 1 V dc/cm	Horizontal dashed line. No signal. Replace Q4.


410853 ASSEM
CC853
P3
341918
CABLE
ASSEM
(P2 ON 410852
RECTIFIER
ASSEMBLY)
VERTICAL
CHOKE
I
+65 V DC
341868
TRANSISTOR
ON
HEATSINK
VERT LIN
CONTROL
VERT SIZE
CONTROL
RT1
405701 YOKE
W/FILTER ASSEMBLY
405843
FILTER
PART OF
YOKE
ASSEMBLY
410158
VERTICAL
DEFLECTION
FILTER
ASSEMBLY
J3 ON 410848
REGULATOR
FILTER
ASSEMBLY
VERTICAL
SYNC RTN
VERTICAL
SYNC
(P2 ON 410852
RECTIFIER
ASSEMBLY)
VERTICAL
CHOKE
II
VERTICAL
COUPLING
CAPACITOR

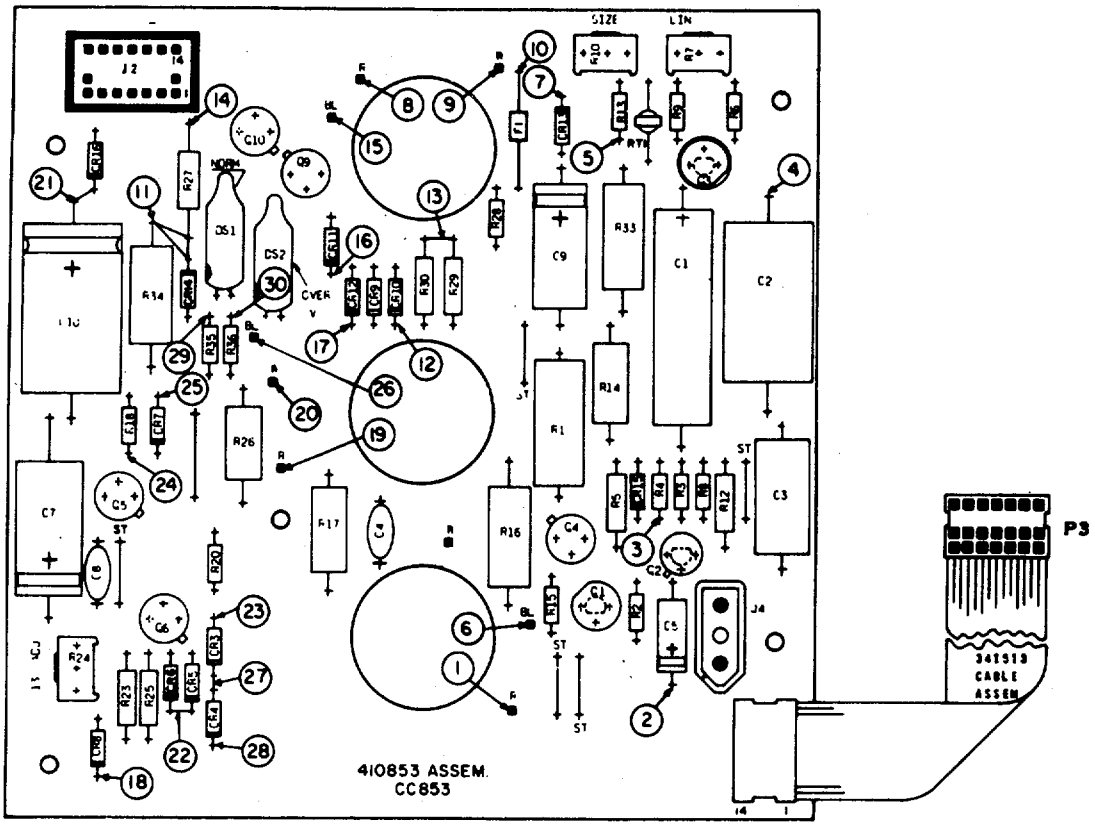
D. TROUBLESHOOTING (Cont)

4. DETAILED TROUBLE AIALYSIS, 410853 Vertical Control (Cont)



REF DESIGN	DESCRIPTION	PART NO.	REF DESIGN	DESCRIPTION	PART NO.
R1	1.5 K ohm, 5 W, 5%	341551	C1	100 MFD 50 W V dc	327668
R2	15 K ohm, 1/4 W, 5%	333408	C2	2 MFD 200 W V dc	341609
R3	51 ohm, 1/4 W, 5%	315947	C3	47 MFD 200 W V dc	341617
R4	2.2 K ohm, 1/4 W, 5%	315955	C4	0.01 MFD 1000 V	341550
R5	75 K ohm, 1/4 W, 1%	341592	C5	2 MFD 25 W V dc	320290
R6	2.2 K ohm, 1/4 W, 5%	315955			
R7	Resistor, Variable	341666	Q1	2N3568	315930
R8	1.5 K ohm, 1/4 W, 5%	315954	Q2	Transistor, UNIJ	341511
R9	1 K ohm, 1/4 W, 5%	32i213	Q3	2N3569	324656
R10	Resistor, Variable	341665	Q4	2N2218	325083
R12	75 K ohm, 1/4 W, 1%	341592			
R13	2.2 K ohm, 1/4 W, 5%	315955	Q3	(Heatsink) Transistor	341568
R14	1.5 K ohm, 1 W, 5%	341597			
R15	1 K ohm, 1/4 W, 5%	321213	RT1	Thermistor	341606
R16	15 ohm, 2 W, 5%	332764			
R17	1.5 K ohm, 1 W, 5%	341597	CR15	Diode	300102
R33	2 K ohm, 2 W, 5%	321155			

410853 -- 65 Volt Regulator



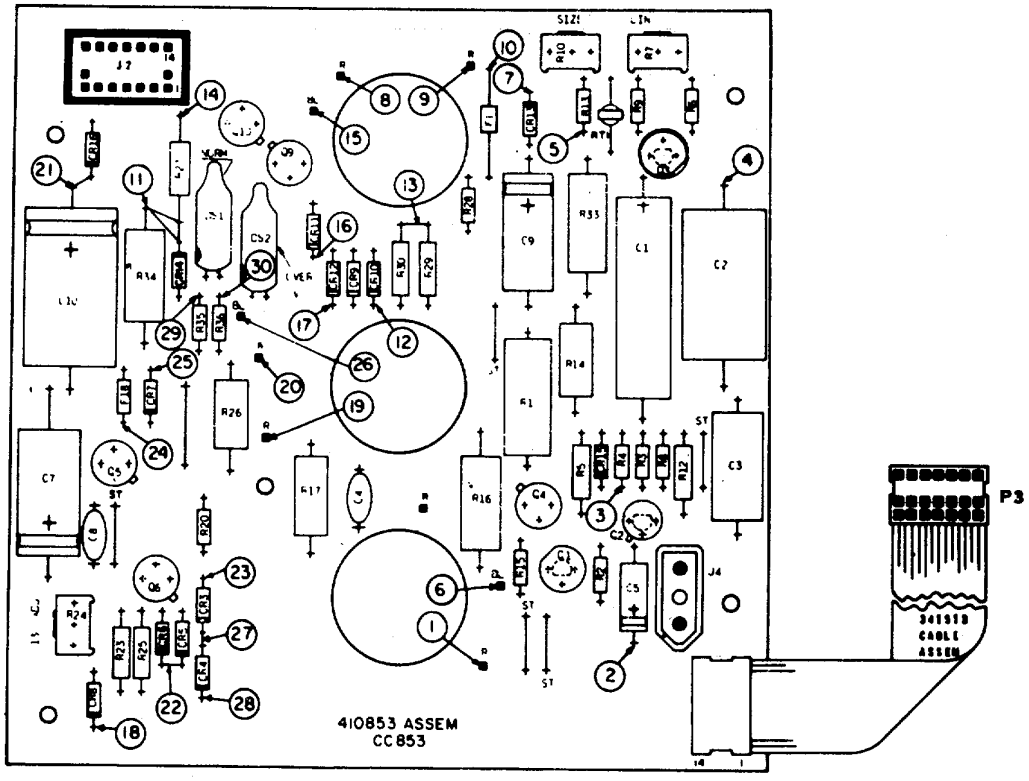
REF DESIGN	DESCRIPTION	PART NO.	REF DESIGN	DESCRIPTION	PART NO.
R27	18 K ohm, 1/2_W, 5%	118151	CR9	1N4004	312341
R28	68 K ohm, 1/4 W, 5%	333410	CR10	1N5235 B	341510
R29	28.7 K ohm, 1/2 W, 1%	341595	CR11	1N4004	312341
R30	4.02 K ohm, 1/4 W, 1%	324900	CR12	1N4004	312341
R34	27 K ohm, 2 W, 5%	341603	CR13	1N4007	335880
			CR14	1N5268 A	341571
Q9	2N3440	341508			
Q10	2N3440	341508	C9	4 MFD 150 W V dc	341602
Q1	(Heat Sink) Transistor	341569	F1	Fuse (0.5 Amp)	341752

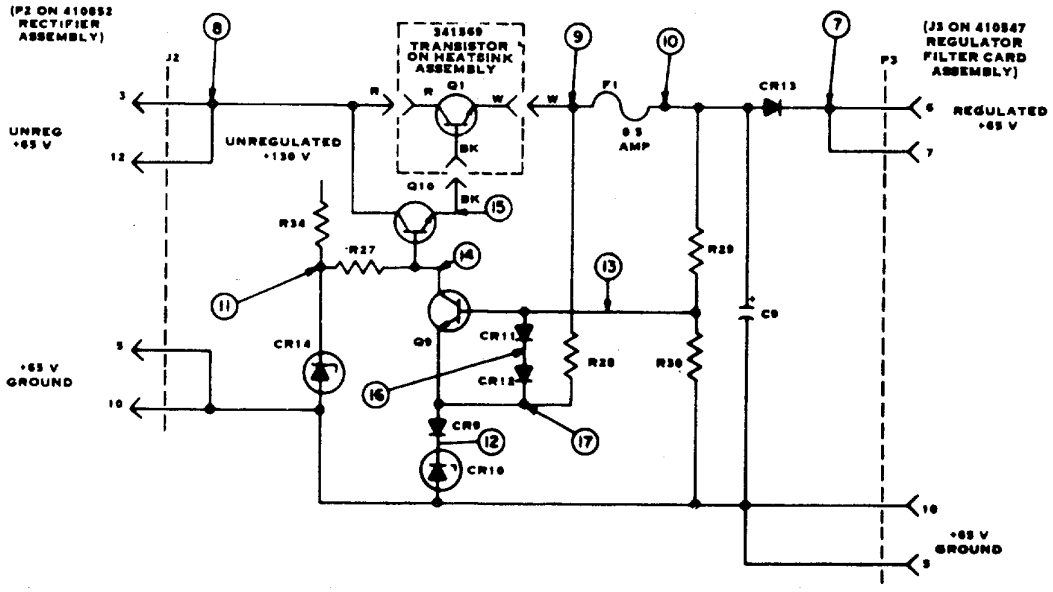
D. TROUBLESHOOTING (Cont): -

4. DETAILED TROUBLE ANALYSIS, 410853 -- 65 Volt Regulator (Cont)

TEST POINT	VOLTAGE OR WAVEFORM	COMPONENT ANALYSIS
7	+65 V dc ±10Z	Horizontal line. Test Point 10 CR13.
8	90 V dc	No signal. Check J2.
9	65 V dc	Horizontal line. Replace Q1 (Heatsink).
10	65 V dc	Horizontal line. Replace F1.
11	82 V dc	High voltage. Replace CR14.
12	6.8 V dc	Expanded vertical. Replace CR9, CR10.
13	8 V dc	No signal. Replace R29.
14	65 V dc	Expanded vertical. If high, replace Q9.
15	65 V dc	Horizontal line. If zero, replace Q10.
16	7.6 V dc	No signal. Replace CR11.
17	7.4 V dc	No signal. Replace CR12.

NOTE: Components listed in Trouble Analysis column should be replaced if symptom specified exists.


410853 ASSEM
CC853
P3
341518
CABLE
ASSEM


(P2 ON 410852
RECTIFIER
ASSEMBLY)
341369
TRANSISTOR
ON HEATSINK
ASSEMBLY
(J3 ON 410847
REGULATOR
FILTER CARD
ASSEMBLY)
UNREG
+65 V
UNREGULATED
+130 V
0.5
AMP
REGULATED
+65 V
+65 V
GROUND
+65 V
GROUND

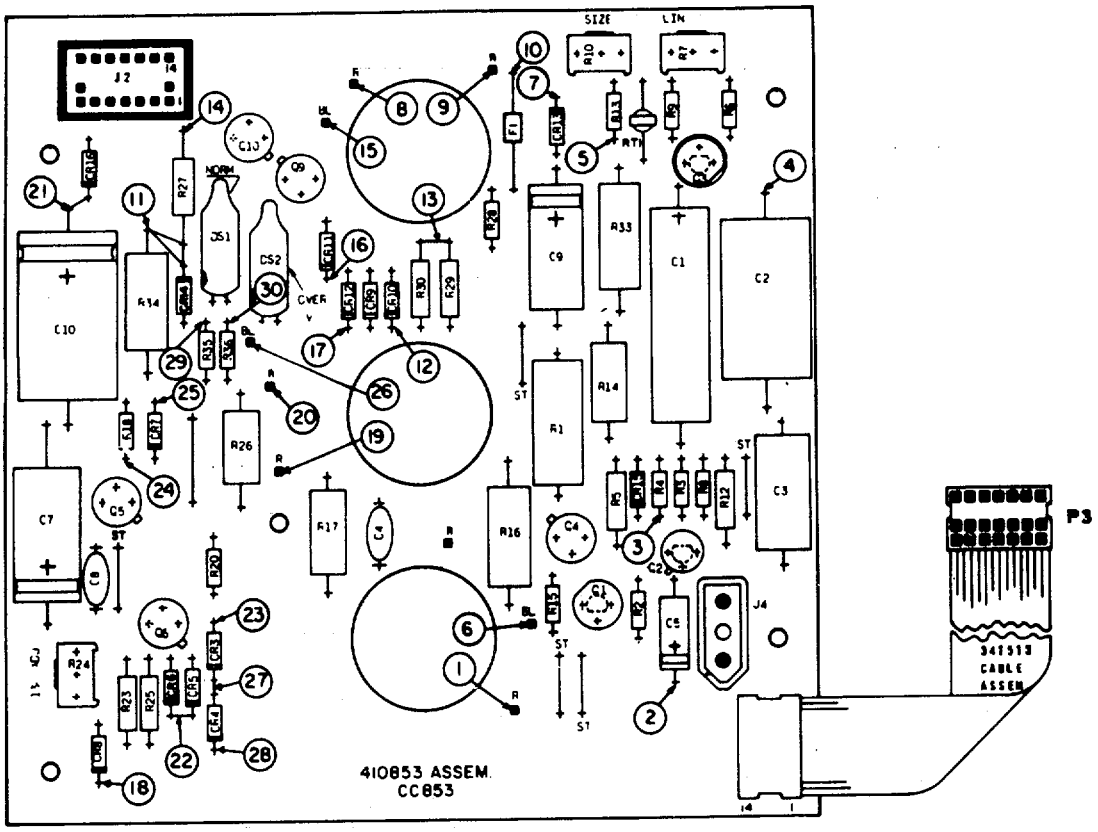
D. TROUBLESHOOTING (Cont)

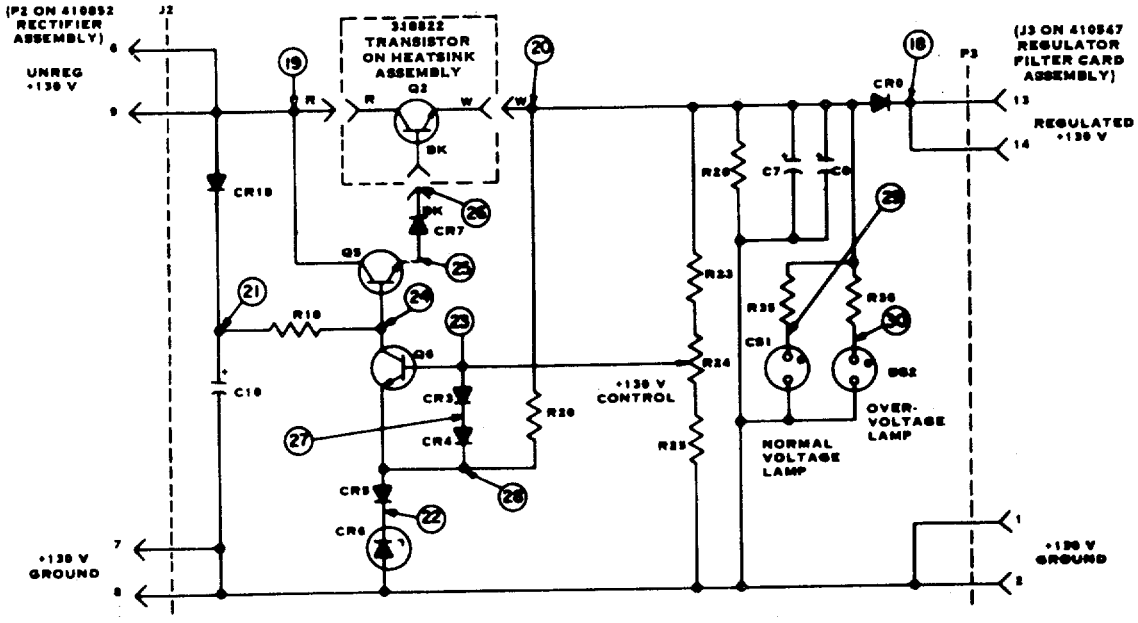
4. DETAILED TROUBLE ANALYSIS (Cont)

410853 -- 130 Volt Regulator

TEST POINT	VOLTAGE OR WAVEFORM	COMPONENT ANALYSIS
18	130 ±1.3 V dc	No display. Replace CR8.
19	190 V dc	No signal. Check connector J2.
20	130 V dc	No display. Replace Q2 on heat-sink.
21	190 V dc	No display. Replace CR16.
22	6.8 V dc	Expanded horizontal. Replace CR6, CR5.
23	8 V dc	No signal. Replace R24.
24	130 V dc	Expanded horizontal. Replace Q6.
25	130 V dc	No display. Replace Q5.
26	130 V dc	No display. Replace CR7.
27	7.8 V dc	No signal. Replace CR5.
28	7.6 V dc	No signal. Replace CR4.
29	55 V dc.	No signal. Replace DS1.
30	130 V dc	No signal. Replace DS2

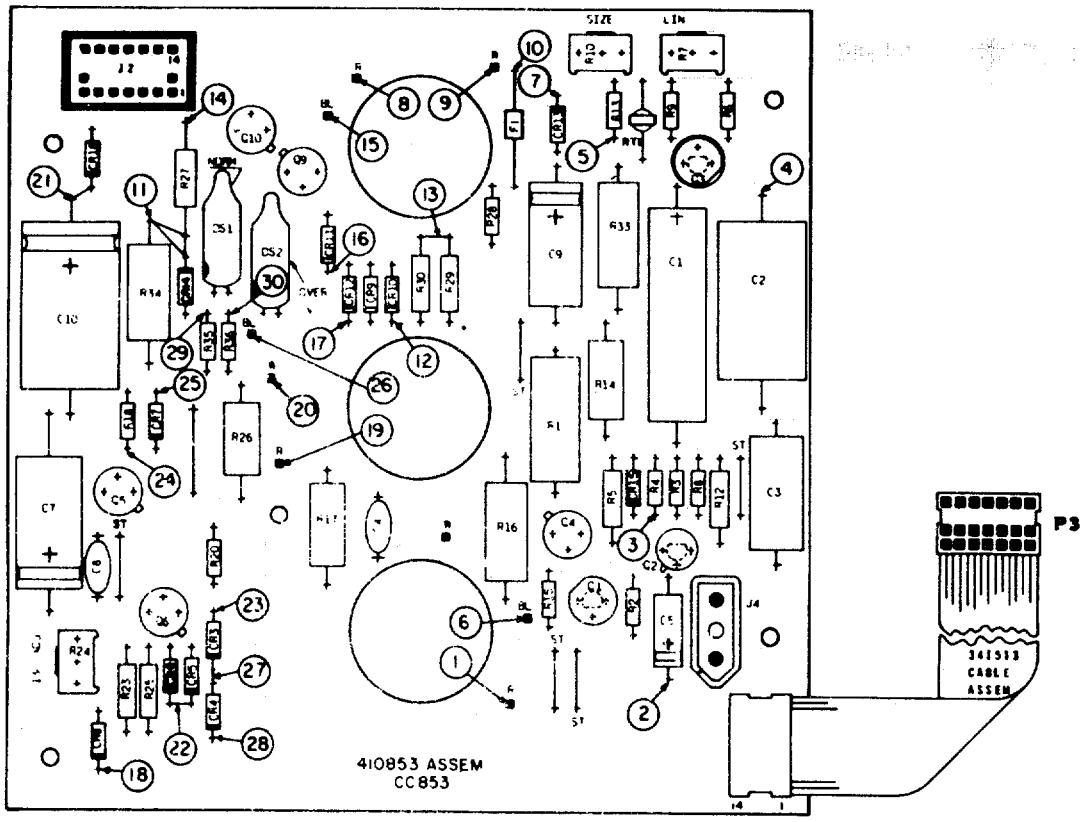
NOTE: The components listed in Component Analysis column should be replaced if no signal is found at test point.


410853 ASSEM.
CC853
P3
341513
CABLE
ASSEM.


(P2 ON 410852 RECTIFIER ASSEMBLY)
UNREG +130 V
+130 V GROUND
318822 TRANSISTOR ON HEATSINK ASSEMBLY
+130 V CONTROL
NORMAL VOLTAGE LAMP
OVER-VOLTAGE LAMP
(J3 ON 410547 REGULATOR FILTER CARD ASSEMBLY)
REGULATED +130 V
+130 V GROUND

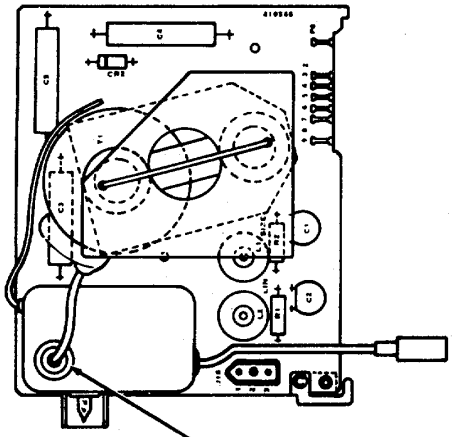
D. TROUBLESHOOTING (Cont)

4. DETAILED TROUBLIE ANALYSIS, 410853 -- 130 Volt Regulator (Cont)



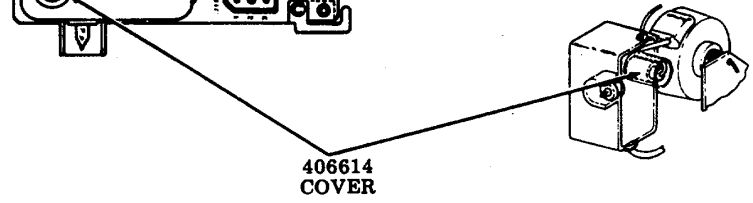
REF DESIGN	DESCRIPTION	PART NO.	REF DESIGN	DESCRIPTION	PART NO.
R18	100 K	321508	CR3	1N4004	3-12341
R20	180 K	333412	CR4	1N4004	312341
R23	121 K, 1%	341596	CR5	1N4004	312341
R24	2 K,.1/2 W, Var.	364l665	CR6	1N5235 B	341510
R25	7.15 K, 1%	341594	CR7	1N4004	312341
R26	56 K, 1 W	118198	CR8	1N4007	335880
R35	180 K	333412	CR16	1N4004	312341
R36	47 K	318801			
			Q5	2N3440	341508
C7	4 MFD 250 W V dc	341600	Q6	2N3440	341508
C8	0.01 MFD 1000 V	341550			
C10	10 MFD 250 W V dc	341601	Q2	(Heatsink) Transistor	318822
DS1	NEON (Orange Dot)	341590			
DS2	NEON (Black Dot)	341591			

410546 High Voltage Assembly

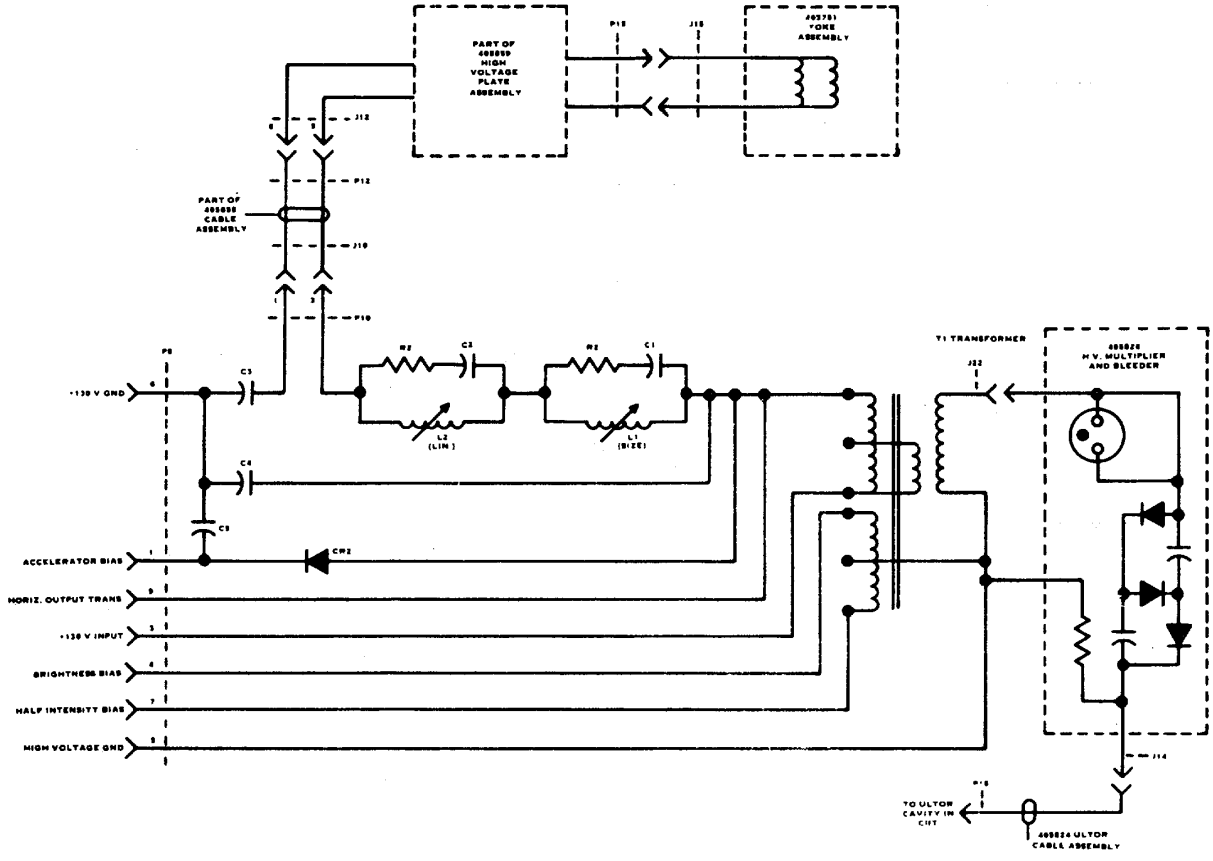


WARNING: DO NOT USE OSCILLOSCOPE TO PROBE HIGH VOLTAGE ASSEMBLY.

REF DESIGN	DESCRIPTION	PART NO.	REF DESIGN	DESCRIPTION	PART NO.
C1	0.0047 MFD 1 KV	341622	CR2	D1 Diode 2 KV	341554
C2	0.0068 MFD 1 KV	341623			
C3	0.47 MFD 400 V 5%	405951	L1	Size Control	341530
C4	0.0033 MFD 1600 V 5%	341625	L2	Linearity Control	341531
C5	0.1 MFD 1000 V 10%	341547			
			T1	Trans. Asm., Horiz. Out.	341528
R1	220 ohm 1W 5%	144464			
R2	680 ohm 1W 5%	182763		H. V. Multiplier & Bleeder	405826



406614
COVER

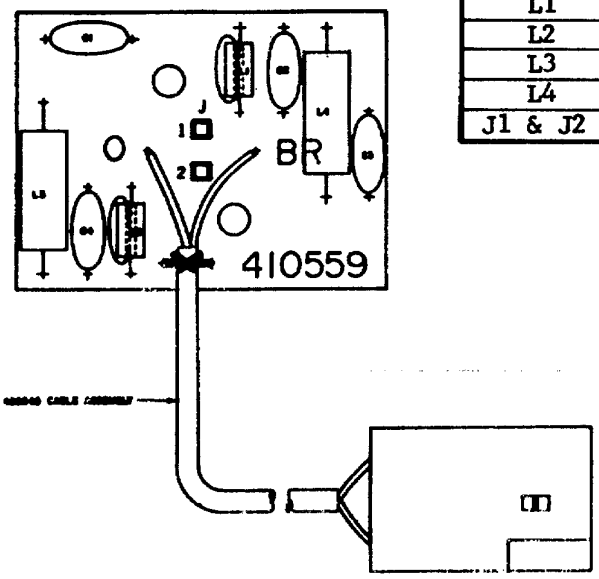


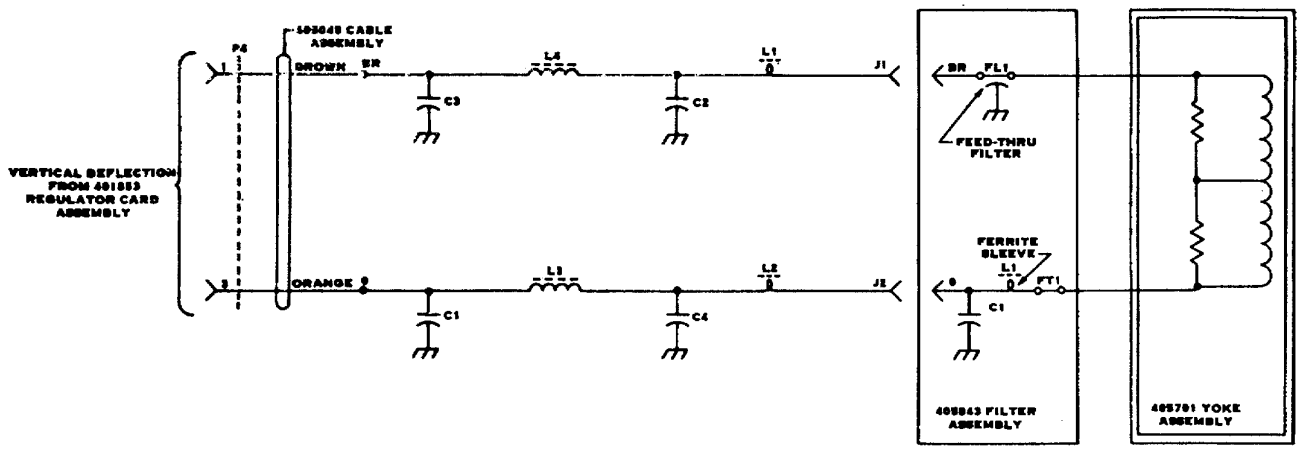
D. TROUBLESHOOTING (Cont)

4. DETAILED TROUBLE ANALYSIS (Cont)

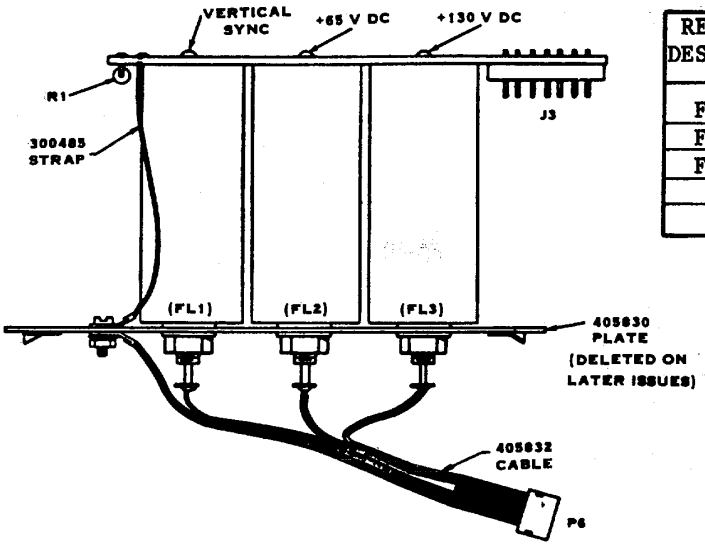
410559 Vertical Deflection Filter Circuit Card Assembly

REF DESIGN	DESCRIPTION	PART NO.
C1	0.01 UF ±20%	341550
C2	0.01 UF ±20%	341550
C3	0.01 UF ±20%	341550
C4	0.0047 UF ±20%	341622
L1	R. F. Choke	405849
L2	R. F. Choke	405849
L3	R. F. Choke 39 UH ±10%	321159
L4	R. F. Choke 39 UH ±10%	321159
J1 & J2	Receptacle	403611

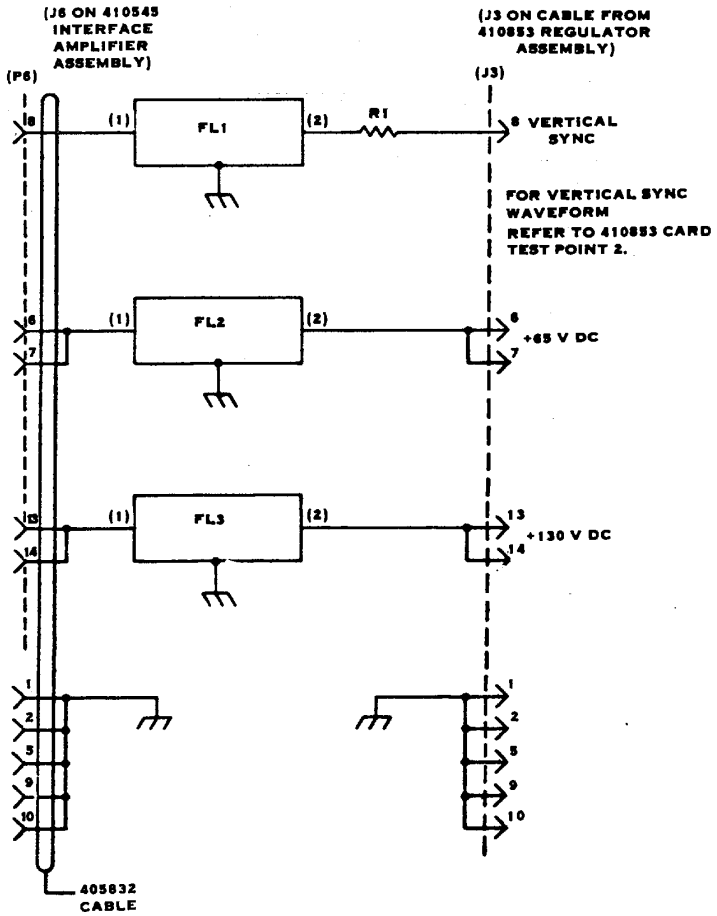




410547 Regulator Filter Circuit Card Assembly



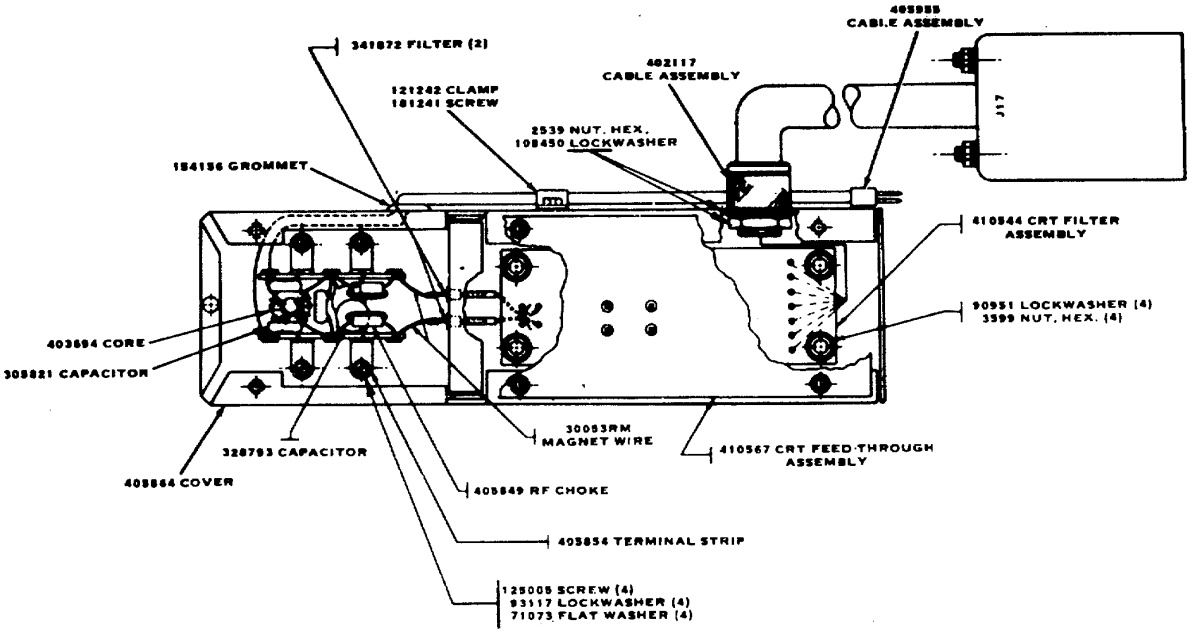
REF DESIGN	DESCRIPTION	PART NO.
FL1	LP Filter	405860
FL2	LP Filter	405860
FL3	LP Filter	405860
R1	680 Ohm, 1/4 W	315971



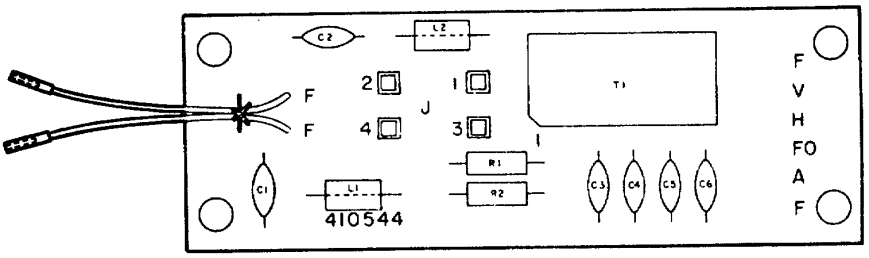
D. TROUBLESHOOTING (Cont)

4. DETAILED TROUBLE ANALYSIS (Cont)

405861 Rear Cover Assembly

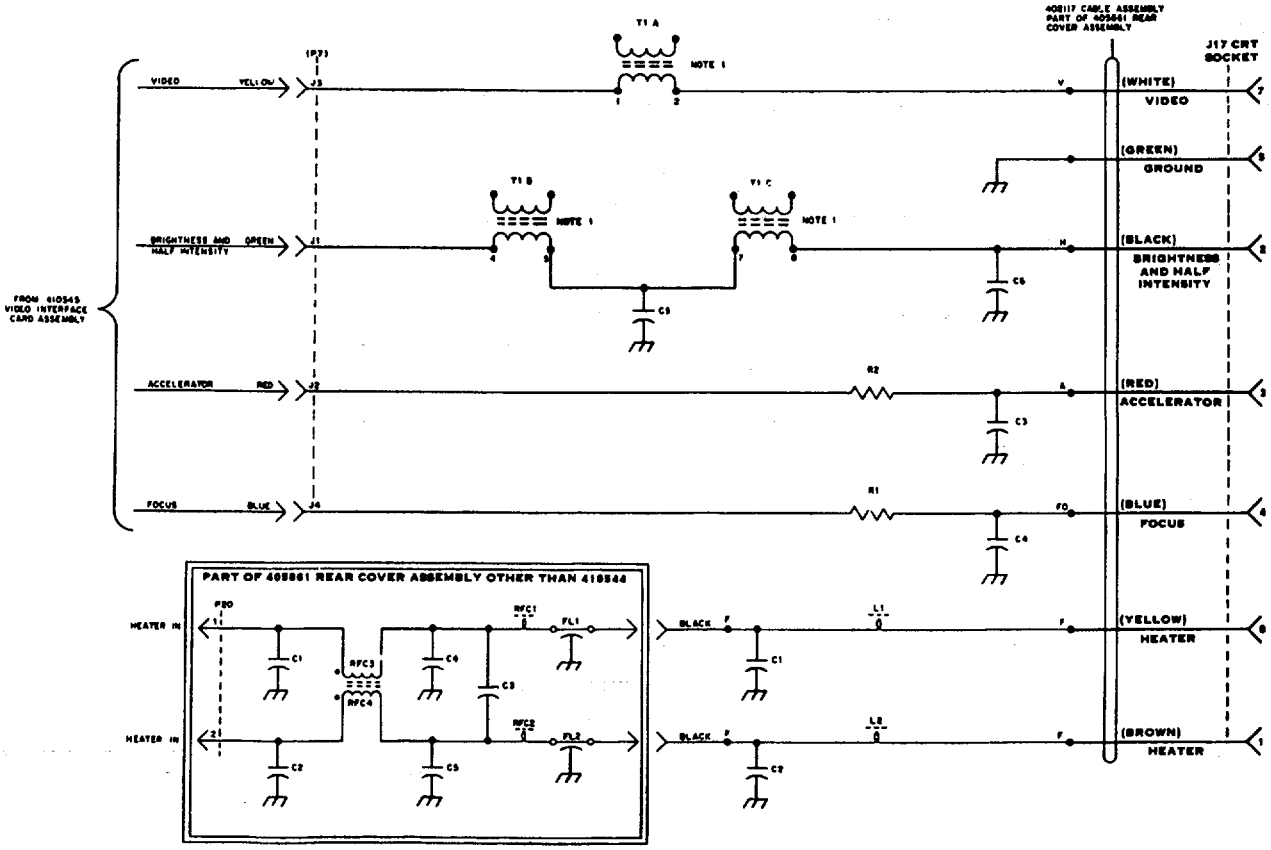


410544 CRT Filter Assembly (Used Above)



REF DESIGN	DESCRIPTION	PART NO.	REF DESIGN	DESCRIPTION	PART NO.
C1	0.1 MFD, 25 V DC	305821	R1	1.5K Ohm 1/4 W	315954
C2	0.1 MFD, 25 V DC	305821	R2	1.5K Ohm 1/4 W	315954
C3	200 PF, 1000 V DC	325011	T1'	Transformer Assem.	403659
C4	200 PF, 1000 V DC	325011	J1-J4	Vert. PV Receptacle	403611
C5	22 PF, 1000 V DC	325007	L1	Ferrite Sleeve	343619
C6	22 PF, 1OO000V DC	325007	L2	Ferrite Sleeve	343619

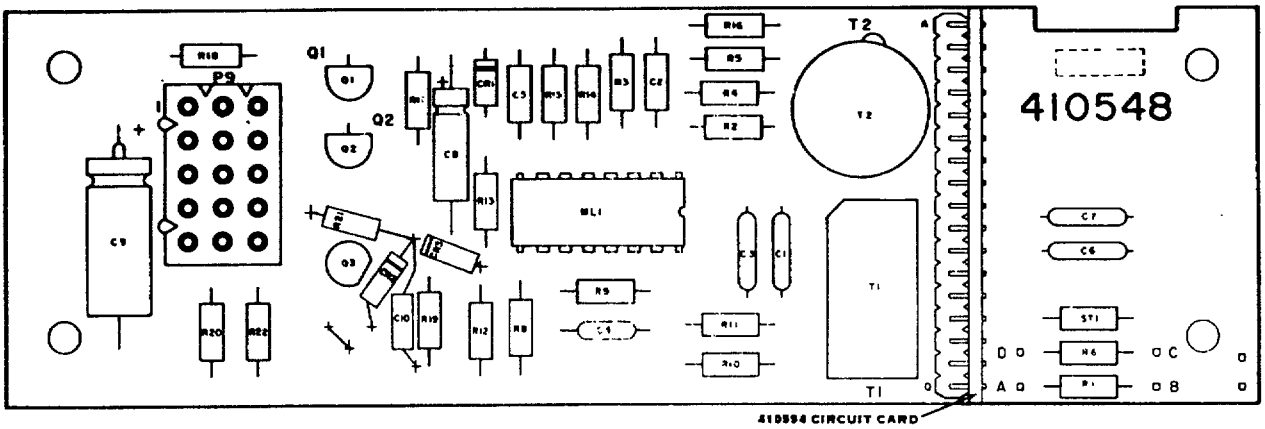
405861 Rear Cover Assembly (Includes 410544)



D. TROUBLESHOOTING (Cont)

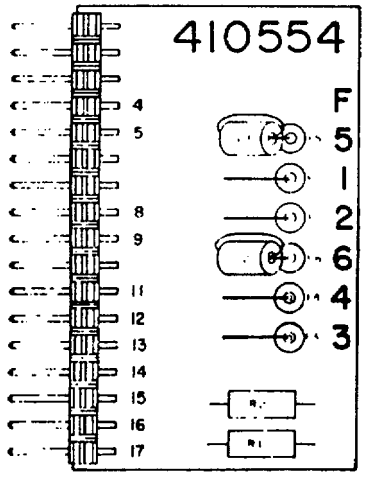
4. DETAILED TROUBLE ANALYSIS (Cont)

410548 Video Interface Receiver



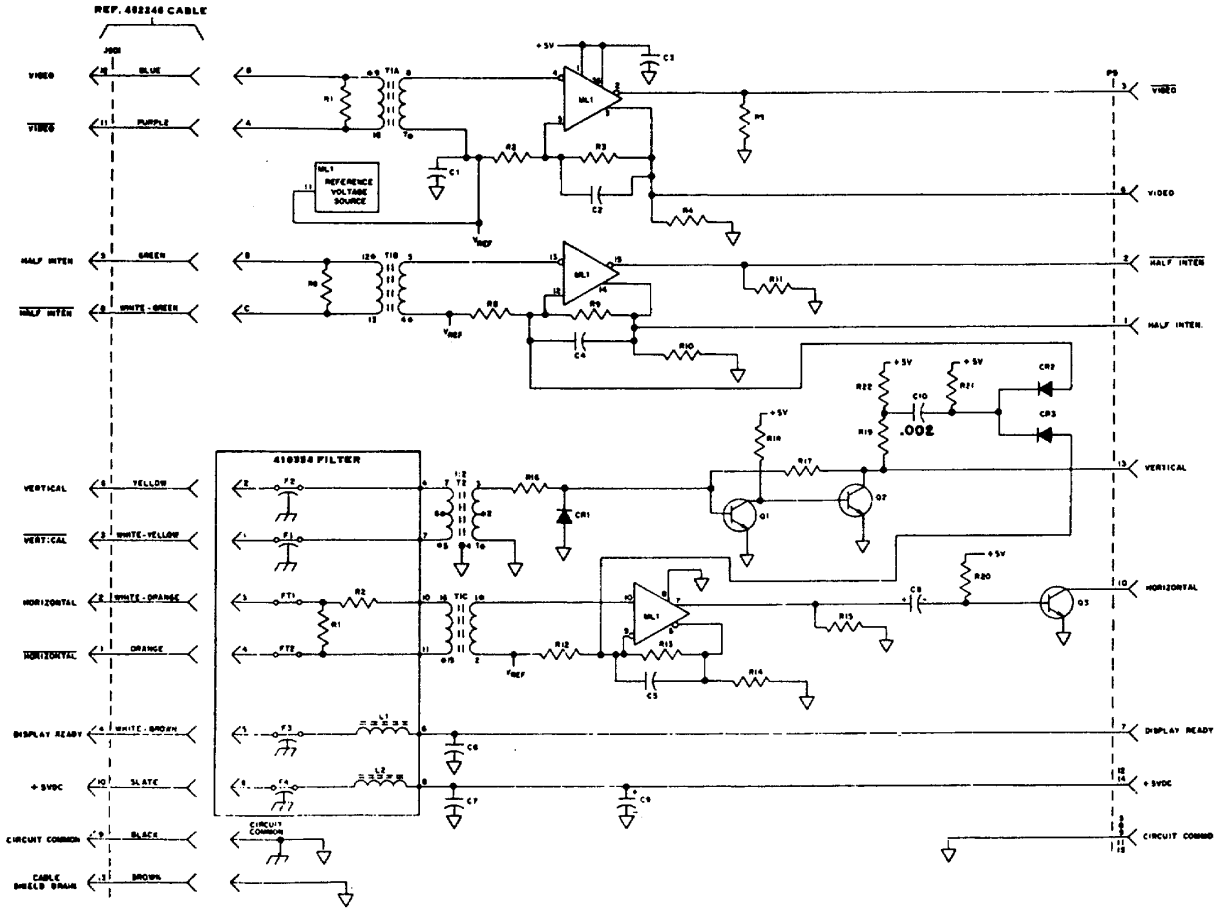
REF DESIGN	DESCRIPTION	PART NO.	REF DESIGN	DESCRIPTION	PART NO.
C1	0.1 MFD	305821	R12	560 Ohm 1/4 W	315951
C2	22 PF	335801	R13	220 Ohm 1/4 W	318802
C3	0.1 MFD	305b21	R14	220 Ohm 1/4 W	318802
C4	0.001 MFD	328793	R15	470 Ohm 1/4 W	320276
C5	0.01 MFD	300057	R16	1.2K Ohm 1/4 W	315953
C6	0.1 MFD	305821	R17	3.6K Ohm 1/4 W	315958
C7	0.1 MFD	305821	R18	820 Ohm 1/4 W	315952
C8	10 MFD	137312	R19	430 Ohm 1/4 W	336697
C9	47 MFD	310931	R20	2.2K Ohm 1/4 W	315955
C10	0.002 MFD	328794	R21	4.7K Ohm 1/4 W	315959
R1	1200 Ohm 1/4 W	333405	R22	4.7K Ohm 1/4 W	315959
R2	1000 Ohm 1/4 W	321213	T1	Transformer Assem.	403659
R3	100 Ohm 1/4 W	315948	T2	Transformer	403658
R4	220 Ohm 1/4 W	318802	Q1	2N4410 Transistor	334133
PR5	220 Ohm 1/4 W	318802	Q2	2N3646 Transistor	325076
R6	1200 Ohm 1/4 W	333405	Q3	2N4275 Transistor	335774
R8	560 Ohm 1/4 W	315951	CR1	1N4178 Diode	197464
R9	220 Ohm 1/4 W	318802	CR2	1N4148 Diode	197464
R10	220 Ohm 1/4 W	318802	CR3	1N4148 Diode	197464
R11	220 Ohm 1/4 W	318802	ML1	I.C. Line Receiver	339716

410554 Filter Circuit Card Assembly



REF DESIGN	DESCRIPTION	PARTNO.
F1	Filter	341872
F2	Filter	341872
F3	Filter	402087
F4	Filter	402087
F5	Filter	341872
F6	Filter	341872
L1	R.F. Choke	405849
L2	R.F. Choke	405849
R1	120 Ohm 1/4 W	333405
R2	15 Ohm 1/4 W	335635

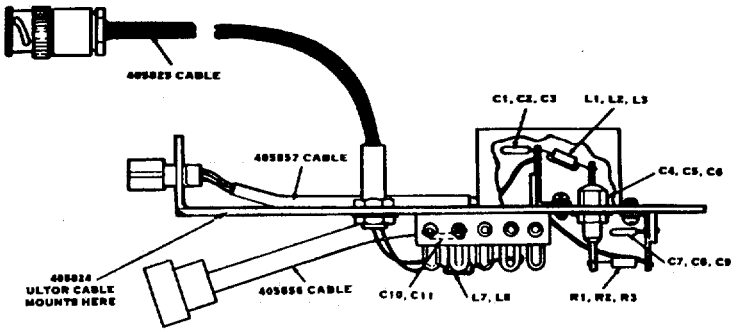
410548 Video Interface Receiver and 410554 Filter



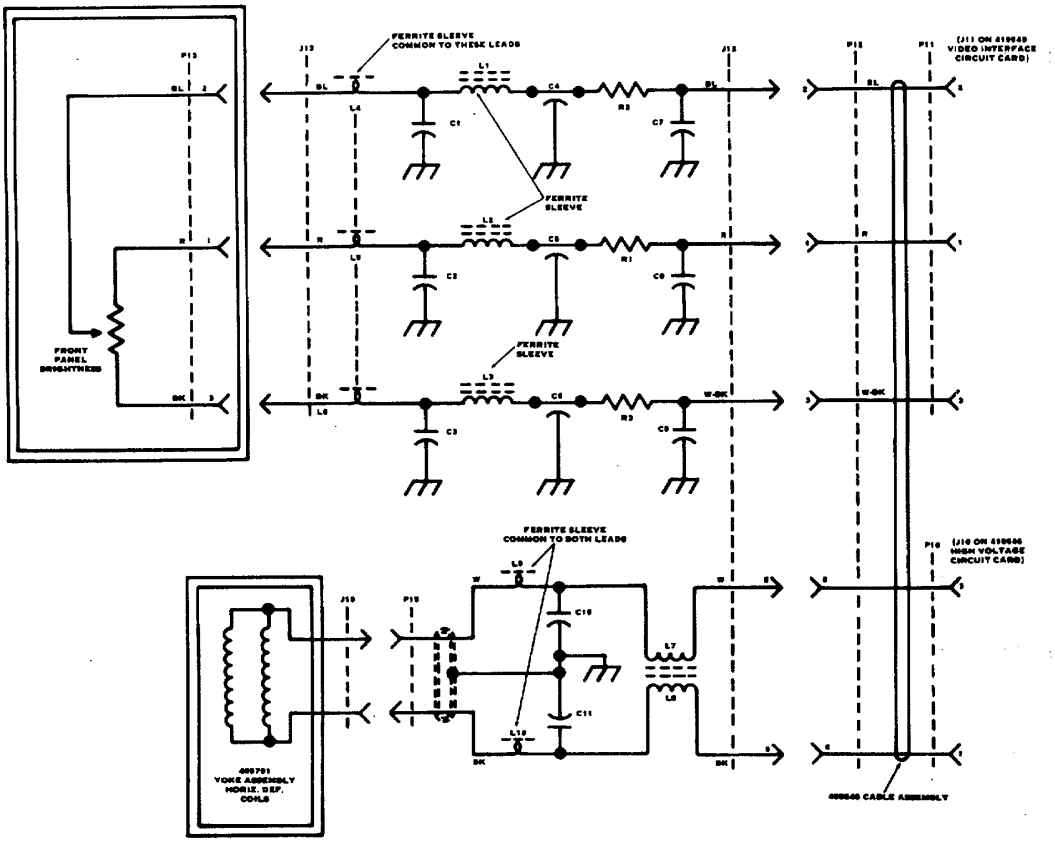
D. TROUBLESHOOTING (Cont)

4. DETAILED TROUBLE ANALYSIS (Cont)

405859 High Voltage Plate Assembly

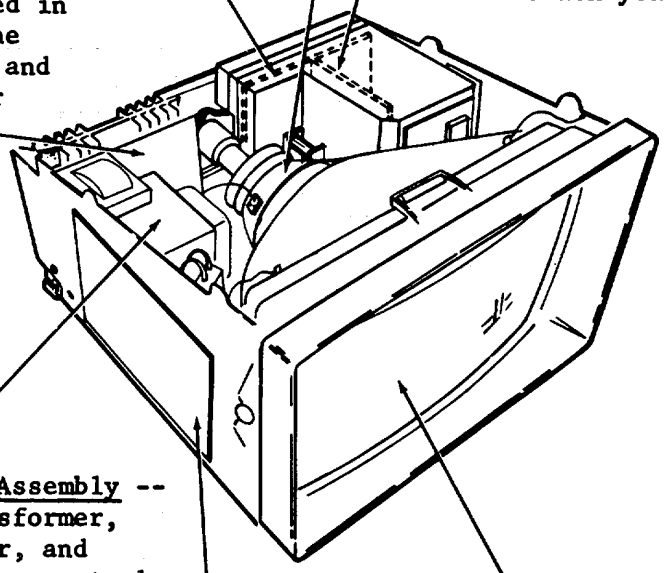


REF DESIGN	DESCRIPTION	PART NO.	REF DESIGN	DESCRIPTION	PART NO.
C1, 2, 3-	0.001 MFD, 1K V	328793	L1, 2, 3	R.F. Choke	405849
C4, 5, 6	0.001 MFD, 1K V	338801	L7, 8	R.F. Choke	405849
	Feed-Thru				
C7,8,9	500 PF, 1K V	321157			
C10,11	500 PF, 1K V	325036	R1, 2, 3	10K Ohm	320275



5. REFERENCE MATERIAL

Major Component Function and Position



Interface/Amplifier Circuit Card -- Contains interface circuits necessary to receive and process the horizontal drive, vertical synchronization, and dot signals used to control the deflection and modulation of the electron beam in the CRT. The interface/amplifier circuit card is used in conjunction with the regulator and vertical deflection circuit card and with the high voltage and horizontal deflection assembly.

Regulator and Vertical Deflection Circuit Card -- Contains vertical sweep generator, +130 volt and +65 volt regulator. This circuit card is used in conjunction with the rectifier assembly and interface/amplifier circuit card.

Power Distribution Assembly -- Contains power transformer, filament transformer, and provides termination, control, and distribution of all ac power for the display monitor.

Deflection Yoke Assembly -- Contains horizontal and vertical coil windings that control the sweep of the electron beam across display screen.

High Voltage and Horizontal Deflection Assembly -- Contains circuits necessary to generate horizontal deflection, CRT bias voltage, and second anode accelerating voltage for the CRT. The high voltage and horizontal deflection assembly is used in conjunction with interface/amplifier circuit card, regulator and vertical deflection circuit card, and deflection yoke assembly.

Cathode Ray Tube (CRT) -- Is a high contrast tube with a glare reducing etched face. The CRT is mounted between two pivot points to allow adjustment by operator for line of vision or lighting conditions.

Rectifier Assembly -- Contains rectifier circuit to provide unregulated +130 volts and +65 volts, vertical coupling capacitor, and interconnection to vertical choke. The rectifier assembly interfaces with power distribution assembly and regulator and vertical deflection circuit card.

D. TROUBLESHOOTING (Cont)

5. RENCE MATERIAL (Cont)

General Circuit Description

Power

Ac power is applied to power distribution assembly through the left support leg of display monitor and through the ac line filter assembly. At this time the pilot lamp lights and half power is supplied to the CRT filaments. By turning on display monitor control, full ac power is supplied to power distribution assembly where voltage is stepped up and applied to rectifier assembly. Normal filament voltage is now provided for CRT.

The rectifier assembly provides two filtered dc voltages for use on regulator assembly, unregulated +65 V and unregulated +130 V. The two indicator lamps on the circuit card indicate the presence of both dc voltages.

The regulator assembly has two regulators which provide +130 V and +65 V to the interface/amplifier assembly. The norm lamp on the circuit card should be on indicating regulated 130 volt power.

The voltages needed to bias CRT are processed and controlled by the interface/ amplifier assembly. These voltages as well as the horizontal deflection current are generated by high voltage assembly.

The high voltage assembly also generates 17,000 V accelerating voltage for CRT. An indicator lamp on the circuit card indicates the presence of high voltage during normal operation.

Deflection

In order to form characters, numbers, or symbols on the CRT screen, the CRT electron beam must be positioned from up to down, and from left to right across screen in successive sweeps.

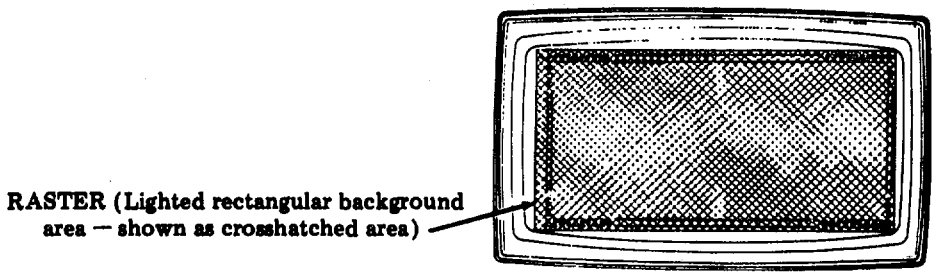
This is done by generating two independent ramps of current coupled to the deflection yoke vertical and horizontal coils. One ramp of current is generated by the vertical sweep generator of the regulator assembly at a 60 Hz rate. The other ramp generated by the high voltage assembly sweeps the electron beam from left to right and back again at a 21,000 Hz rate.

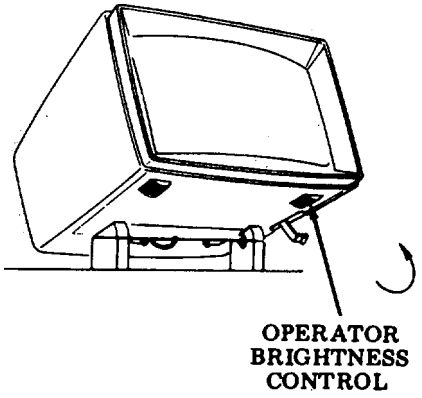
Since horizontal rate is much faster than vertical rate, the electron beam will travel across the CRT screen 350 times during one vertical cycle, thereby, creating a uniform lighted area called the raster. Video signals from the display logic to CRT grid element turn the electron beam on or off at proper times during vertical raster deflection to accomplish writing of a character on display screen.

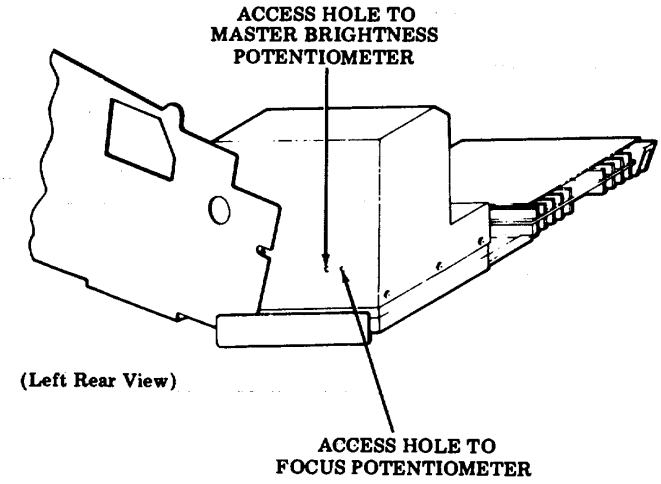
Master Brightness

Requirement: After a 3 minute warmup, the raster (lighted rectangular background) shall be just visible (not brilliant) with operator brightness control turned full counterclockwise to maximum intensity.

To Adjust: Rotate operator brightness control full counterclockwise for maximum intensity. Rotate master brightness potentiometer clockwise for darker; counterclockwise for brighter. Adjust for clearly visible raster.







Focus Adjustment

Requirement: The display characters shall be well defined.

To Adjust: Rotate focus potentiometer to position giving sharpest display characters. For 410545 Issue 6A and later, if focus is unobtainable and sharpest setting of potentiometer is at counterclockwise extreme, remove cover from high voltage and video assembly. Cut strap ST (DANGER: POWER DOWN FIRST), immediately behind R29. Repeat Master Brightness and Focus adjustments. Replace cover from high voltage and video assembly.

E. ADJUSTMENTS AND LUBRICATION (Cont)

1. ADJUSTMENTS (Cont)

Vertical Size

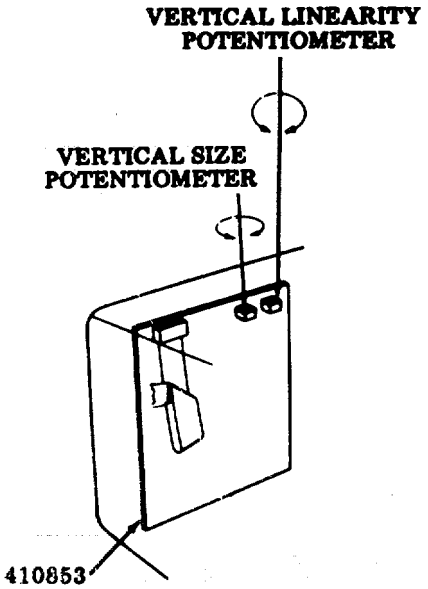
Requirement: The height of the 24 lines shall be 5-1/4 inches ±1/8 inch.

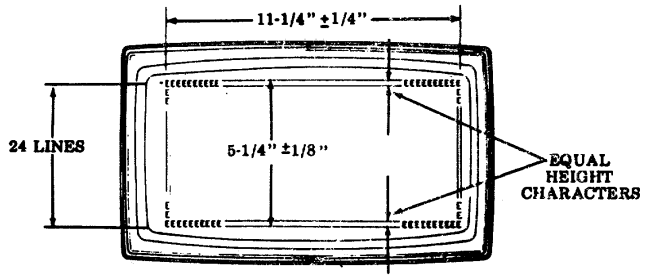
To Adjust: Rotate vertical size potentiometer clockwise to decrease; counter-clockwise to increase.

Vertical Linearity

Requirement: Character height shall be uniform throughout the display.

To Adjust: Rotate vertical linearity potentiometer clockwise to decrease top row; counterclockwise to decrease bottom.



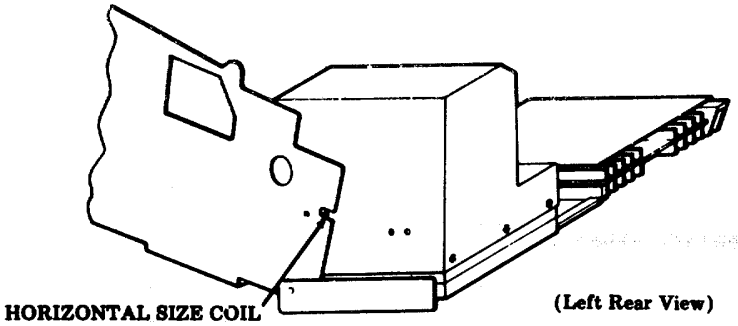


Horizontal Size

NOTE: Use 405992 monitor adjusting tool to perform this adjustment.

Requirement: The width of 80 characters shall be 11-1/4 inches ±1/4 inch

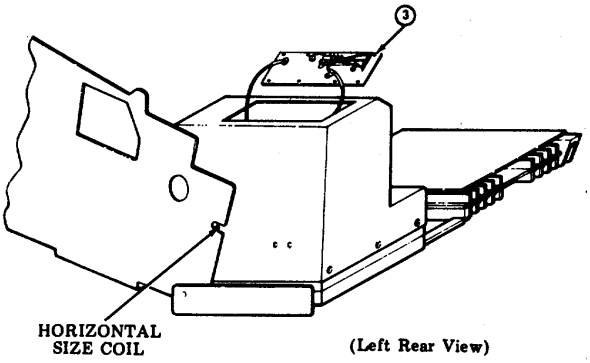
To Adjust: Rotate horizontal size coil clockwise to decrease width;. counterclockwise to increase width.



(1) Turn off main power switch.
(2) Remove eight 152893 screws, 110743 lock washers and 125011 flat washers from 405859 high voltage plate assembly.
(3) Position high voltage plate so that there is an unobstructed view of the horizontal size and linearity coils on the 410546 circuit card

WARNING: BE SURE THAT TERMINALS AND/OR FEED THROUGH FILTERS ON THE HIGH VOLTAGE PLATE ASSEMBLY ARE NOT TOUCHING THE COPPER ENCLOSURE.

(4) Turn on main power switch.
(5) Insert the 405992 adjusting tool through the access hole on the left side of the enclosure as viewed from back of monitor

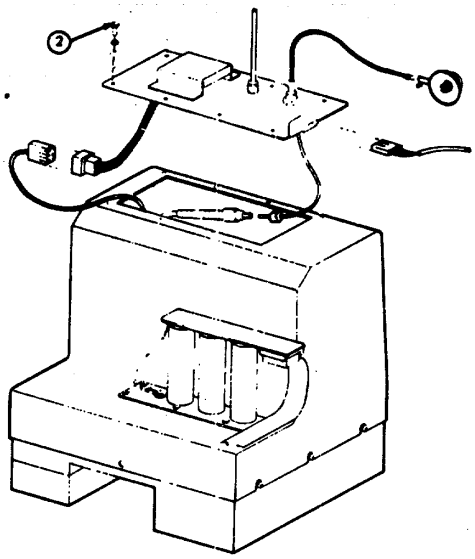


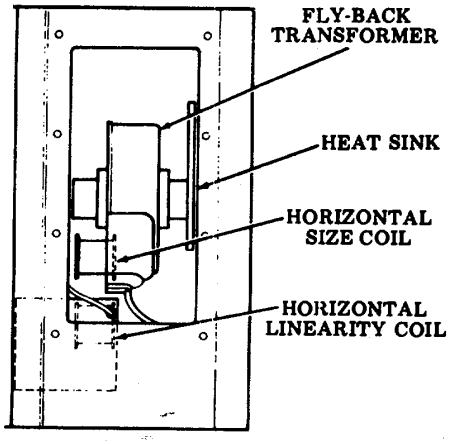
While viewing through the top opening of the enclosure, route the 405992 past the heat sink on the fly-back transformer and into the horizontal size coil.

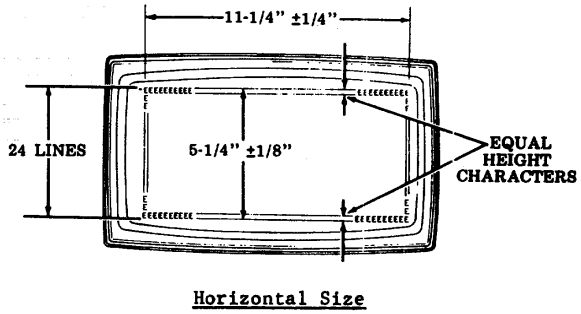
DANGER: DO NOT PUT FINGERS INSIDE THE ENCLOSURE AND DO NOT TOUCH COMPONENTS ON HIGH VOLTAGE PLATE ASSEMBLY,

(6) Adjust horizontal size of display to 11-1/4 inches ±1/4 inch.
(7) Turn off main power switch.
(8) Reassemble 405859 high voltage plate assembly by reversing the removal procedure.

NOTE: On later design monitors, the horizontal drive cable is clamped to the high voltage plate assembly







Horizontal Size

E. ADJUSTMENTS AND LUBRICATION (Cont)

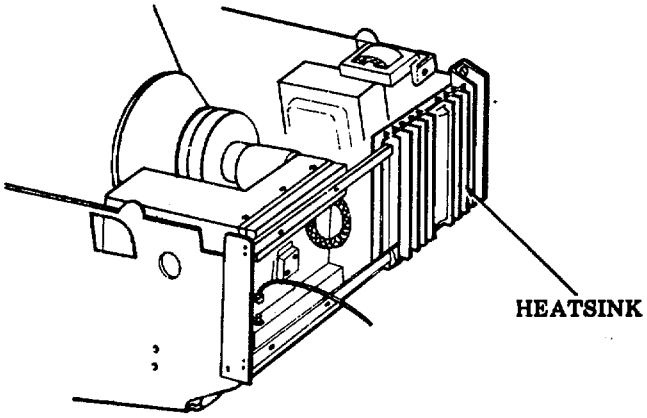
1. ADJUSTMENTS (Cont)

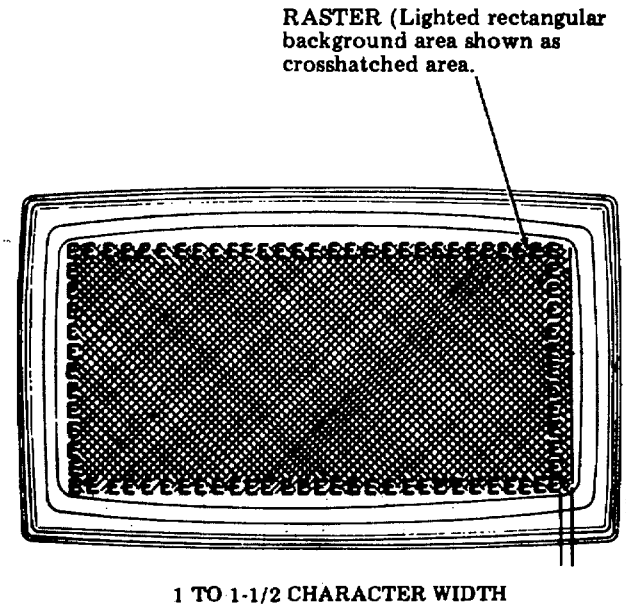
Horizontal Centering Adjustment (New)

Requirement: (410545 Issue 6A and later), the space between the 80th character and the right edge of the raster should be 1 to 1-1/2 character width (gauged by eye) after a three minute warm-up.

To Adjust: Rotate horizontal centering potentiomenter.

HORIZONTAL CENTERING
POTENTIOMETER





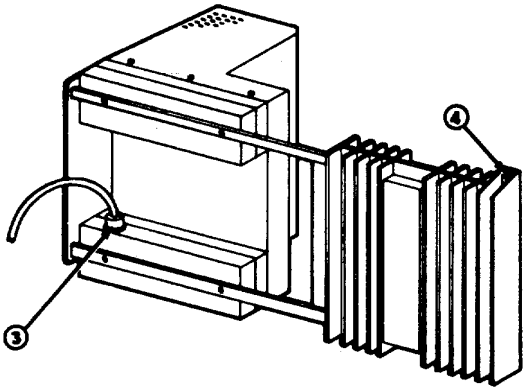
Procedure for Access to Monitor Yoke and Centering Rings

(1) Turn main power switch off.

(2) Remove monitor cover.

(3) Remove monitor P901 connector.

(4) Release 1/4-turn fastener securing heat sink assembly and tilt heat sink assembly rearward.



- To reinstall 402112 shield assembly reverse above procedure.

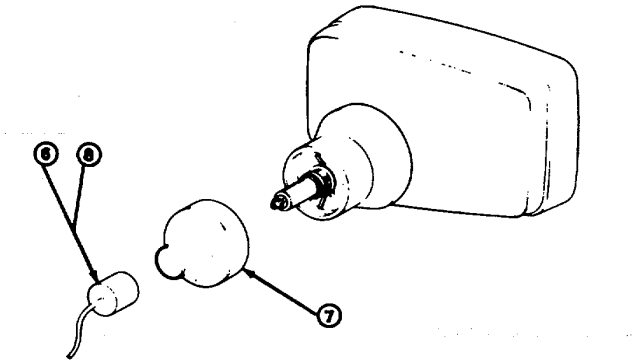
(5) Using tube tilt mechanism, tilt tube face downward.

(6) Carefully remove CRT J17-connector.

(7) Carefully remove 402112 shield assembly.

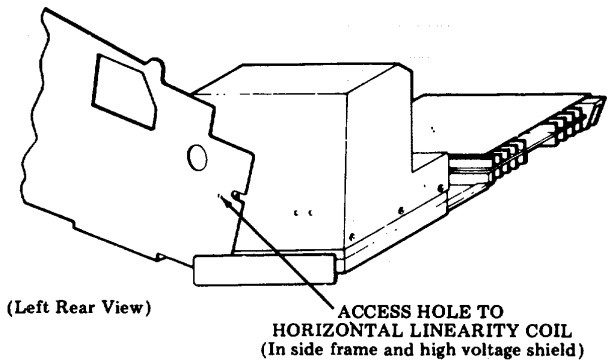
(8) Replace CRT J17 connector.

(9) Turn main power switch on.

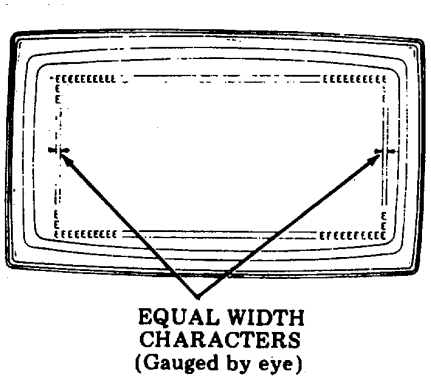


Horizontal Linearity

Requirement: Character width shall be uniform throughout the display as gauged by eye.



To Adjust: Rotate horizontal linearity coil for uniform width characters. Check and refine (if necessary) Horizontal Size adjustment.



E. ADJUSTMENTS AND LUBRICATION (Cont)

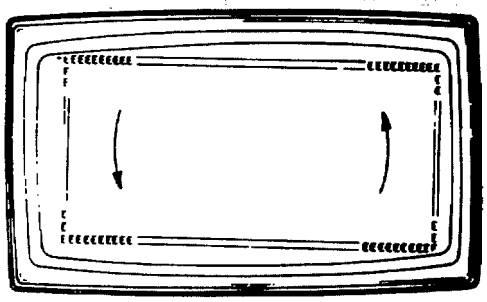
1. ADJUSTMENTS (Cont)

Yoke Orientation

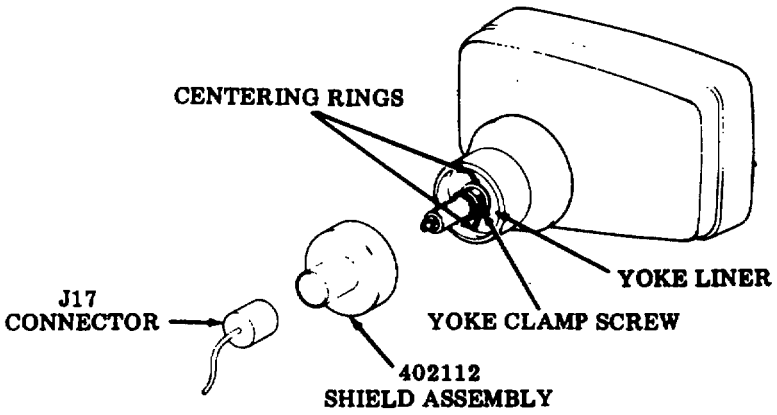
Requirement: The rectangular display area shall be aligned (rotationally) to the CRT face.

CAUTION: HIGH VOLTAGES ARE PRESENT AT YOKE. HANDLE ONLY BY YOKE LINER. THE NECK OF CRT IS FRAGILE. BE CAREFUL NOT TO STRIKE GLASS WITH SCREWDRIVERS, ETC. DO NOT OVERTIGHTEN YOKE CLAMP SCREW.

To Adjust: Loosen yoke clamp screw. Rotate yoke to align display with CRT face. Do not overtighten yoke clamp screw.



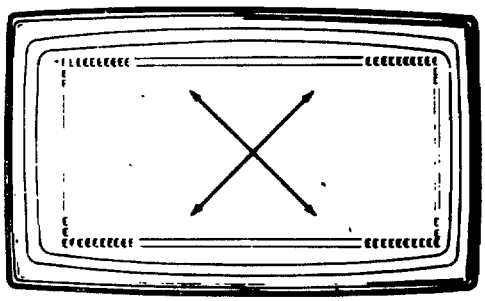
Rotate yoke to align display.



Display Centering

Requirement: The display (80 character by 24 lines) shall be centered on CRT face as gauged by eye.

To Adjust: Rotate two display centering rings by tabs.



Display movement as centering rings are rotated.

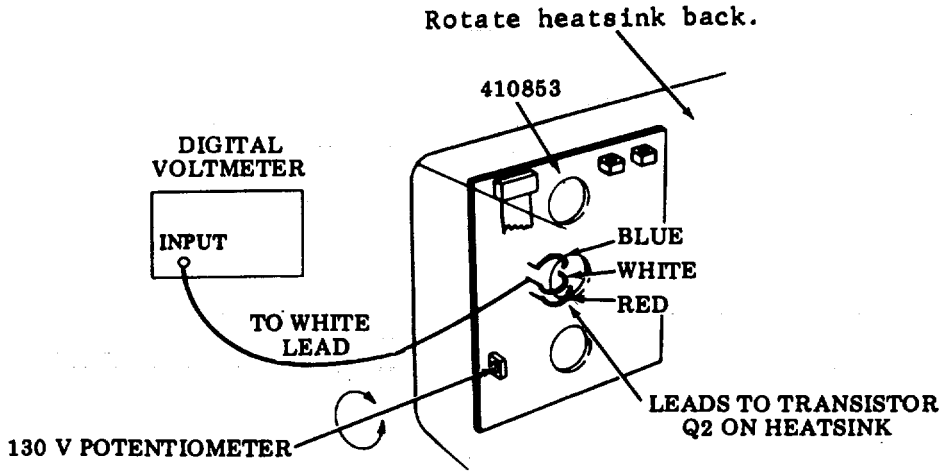
130 VOLT ADJUSTMENT

NOTE: The 130 V adjustment is preset at the factory, and should not be remade unless:

- There is definite indication that adjustment is not correct. Refer to Test and Troubleshooting Sections C and D.
- Components on 410853 circuit card have been replaced during repair.

Requirement: The voltage at the emitter of transistor Q2 (318822) on heatsink shall be 130 V dc ±1.3 V.

To Adjust: Connect voltmeter input to white lead going to emitter of Q2 on heatsink. Rotate 130 V potentiometer to adjust measured voltage to 130 V dc. Apply small amount of Glyptal to 130 V potentiometer adjusting screw.



2. LUBRICATION

None required.

F.- DISASSEMBLY/REASSEMBLY AND PARTS

1. GENERAL

This section provides removal and disassembly procedures of various display monitor assemblies. For identification and removal of soldered-in circuit card components, refer to Page 4-30, 4. DETAILED TROUBLE ANALYSIS or wiring diagram package WDP0460.

Included in this section are exploded assembly views detailing individual part numbers and a numerical listing of parts referenced to page numbers of the exploded views. This information will be found on Page 4-111, 3. PARTS.

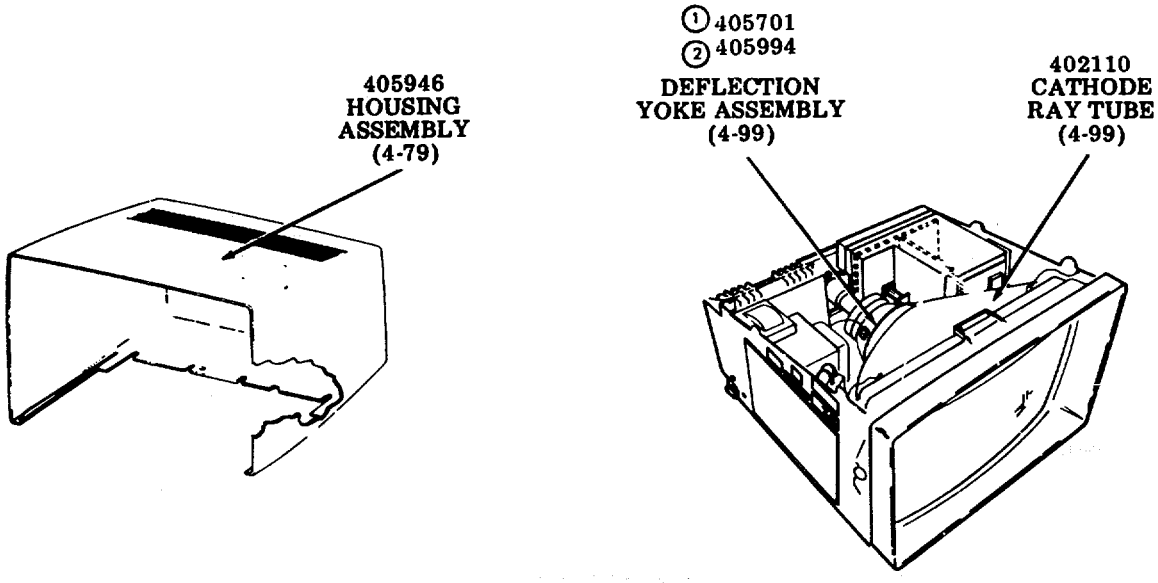
When removing a subassembly or part, follow the order of removal as indicated by the circled numbers, such as, (1) (2) etc. Do NOT force or pry any parts to provide clearance for removal.

Refer to Page 4-2, 2. TOOLS, TEST EQUIPMENT, AND MISCELLANEOUS for a listing of tools required to disassemble or reassemble the display monitor unit.

After disassembly and reassembly of a subassembly or component are performed, the associated adjustments shall be checked, and relubrication (if applicable) shall be performed. For adjustments and lubrication of the monitor refer to Page 4-70, E. ADJUSTMENTS AND LUBRICATION.

For all disassembly or reassembly procedures or when disconnecting or reconnecting any electrical components of the display monitor, all power and video signals to the monitor shall be turned OFF to avoid safety hazards and prevent electrical component damage. A recommended safety practice is to unplug all ac input power cords.

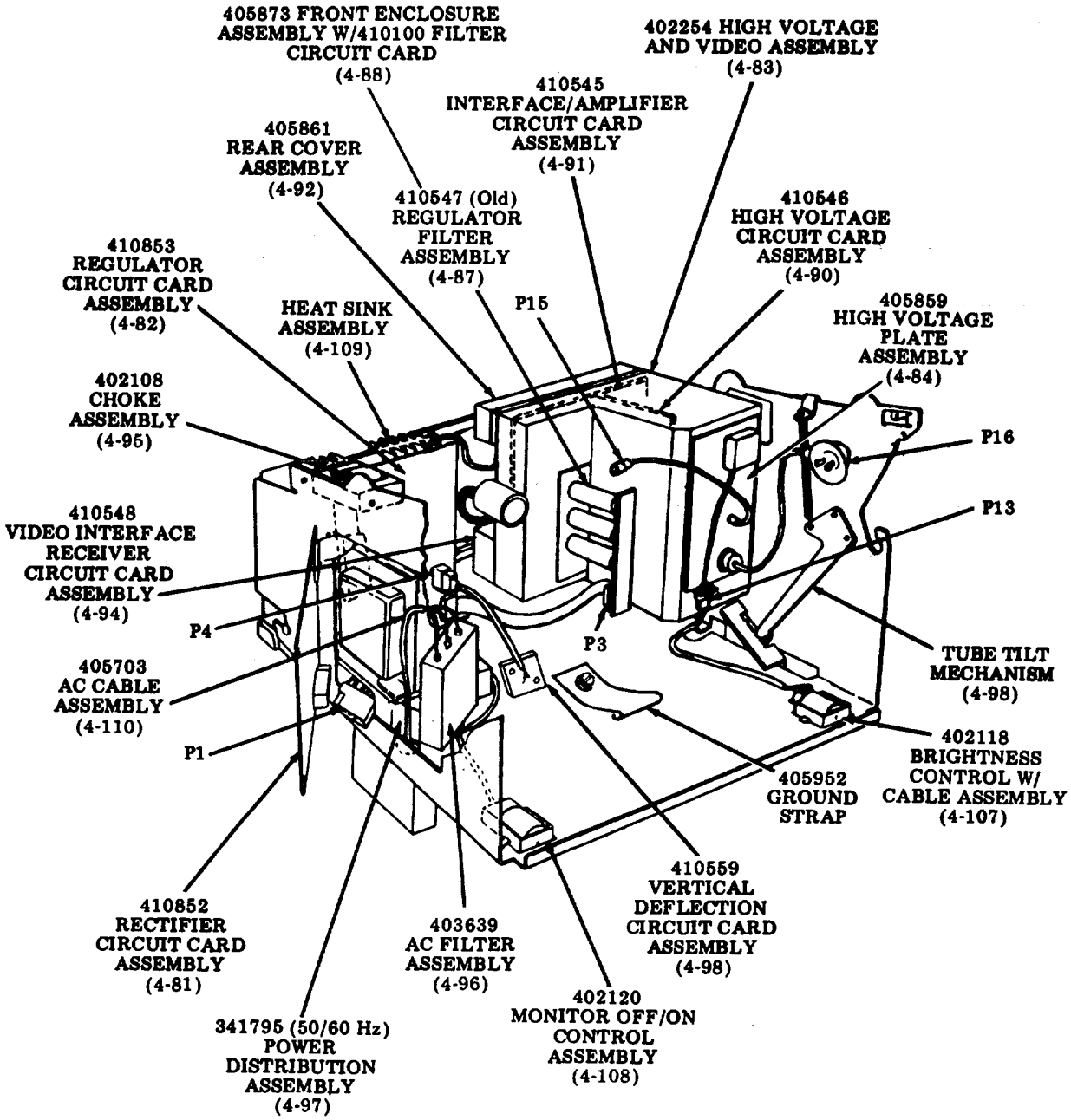
CAUTION: WEAR APPROVED SAFETY GLASSES WHEN THE MONITOR HOUSING. IS REMOVED, AS THE DISPILAY TUBE IS FRAGILE IN THE NECK AFEA AND IS SLBJECT TO IMPLOSION IF BROKEN. BE CAREFUL NOT TO STRIKE THE GLASS TUBE WITH TOOLS OR COMPONENTS WHEN WORKING IN ITS VICINITY.



(1) Yoke with 405843 filter assembly.
(2) Yoke without filter assembly.

NOTE: To remove a subassembly or individual part, follow the procedure on page referenced in parentheses.

NOTE: The number indicated in parentheses after each assembly designates the page covering the disassembly/reassembly procedures.



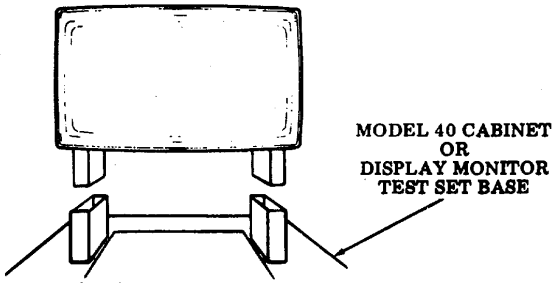
NOTES

4-78

2. DISASSEMBLY/REASSEMBLY

The disassembly/reassembly procedures are based upon the following initial conditions unless otherwise specified:

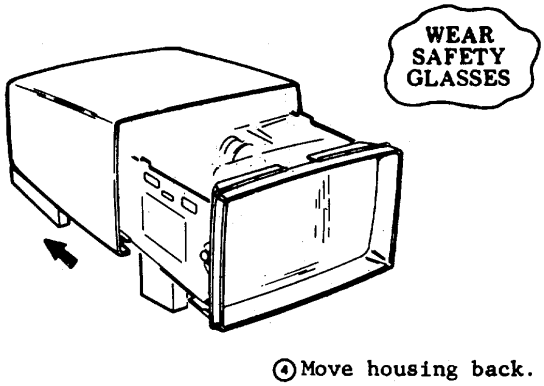
The display monitor shall be placed on a suitable holding fixture.



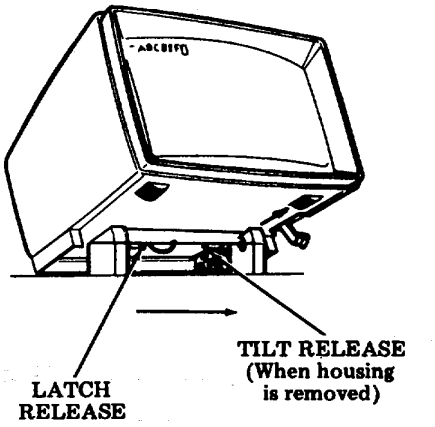
405946 Housing Assembly

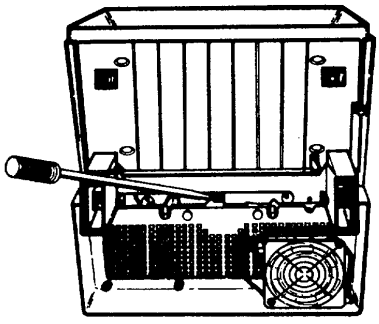
(2) Removal of monitor housing:

Disconnect the fan cable and ground strap and route cable out of cover through opening in rear of the shroud assembly.



(3) Disengage latch. New cover latch has rectangular hole to accept a tool (small screwdriver) to unlatch display cover.





New cover latch has rectangular hole to accept a tool (small screwdriver) to unlatch monitor cover.

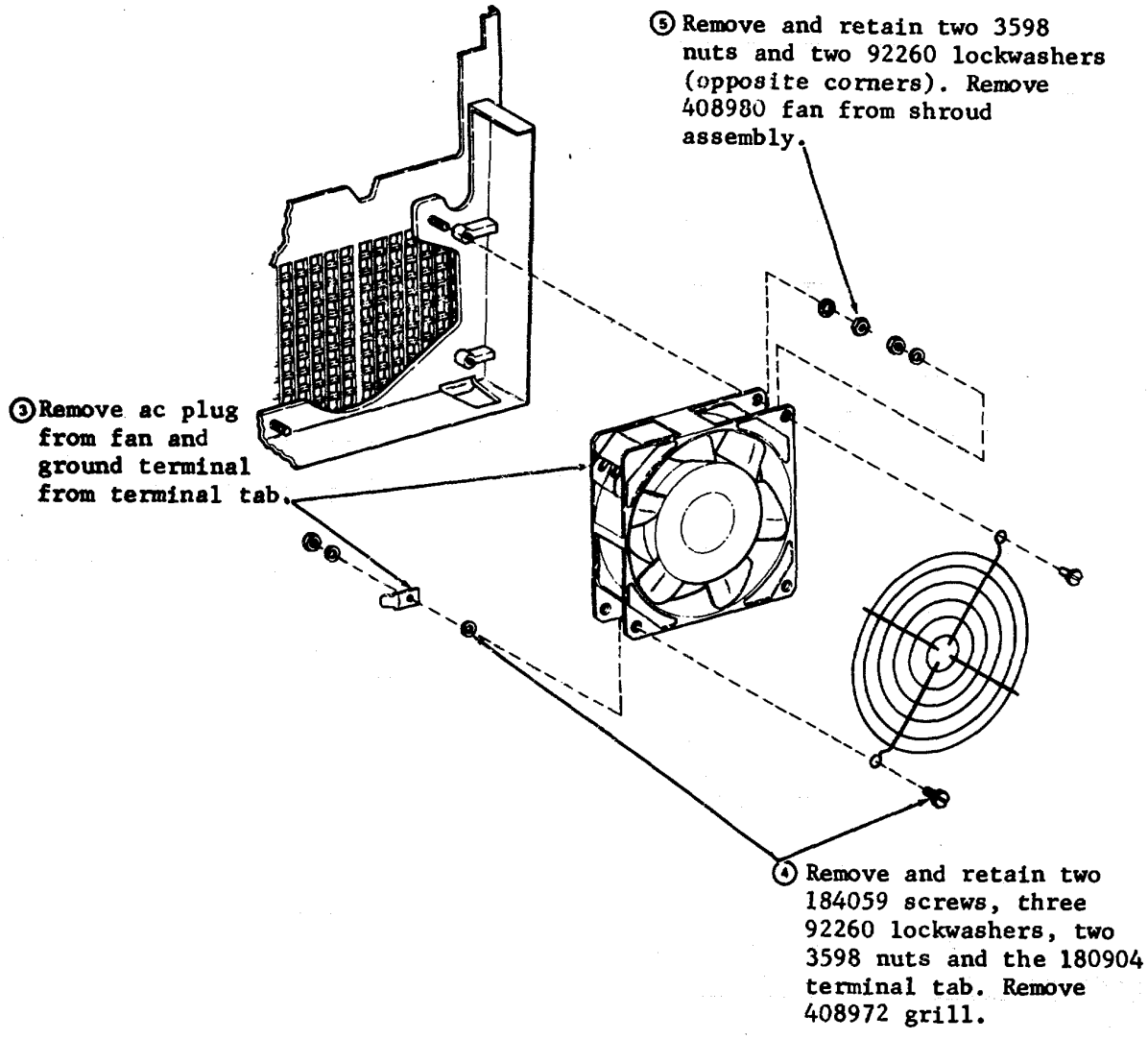
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. DISASSEMBLY/REASSEIBLY (Cont)

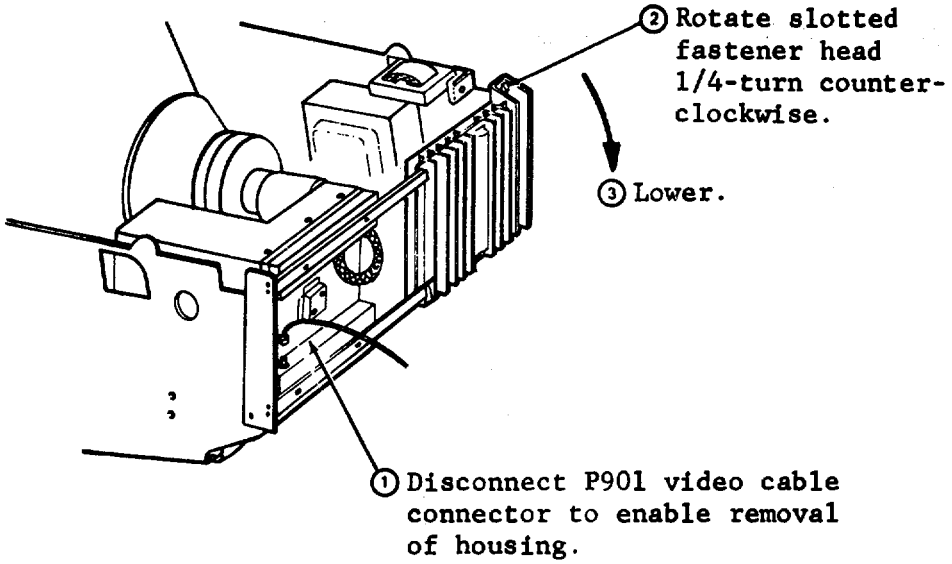
408980 Pan Assembly

(1) Remove monitor and place on end for access to shroud assembly with fan.

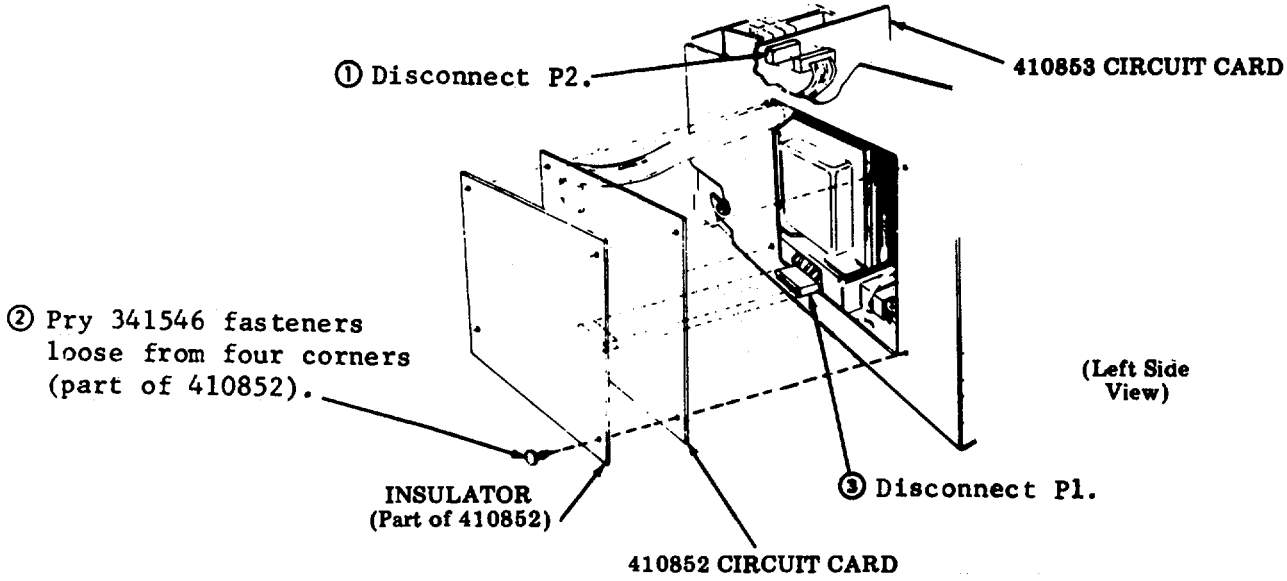
(2) Remove the six self-threading screws and flat washers that hold the shroud assembly to the cover. Remove the shroud assembly from the cover assembly.



Heat Sink to Lowered Position



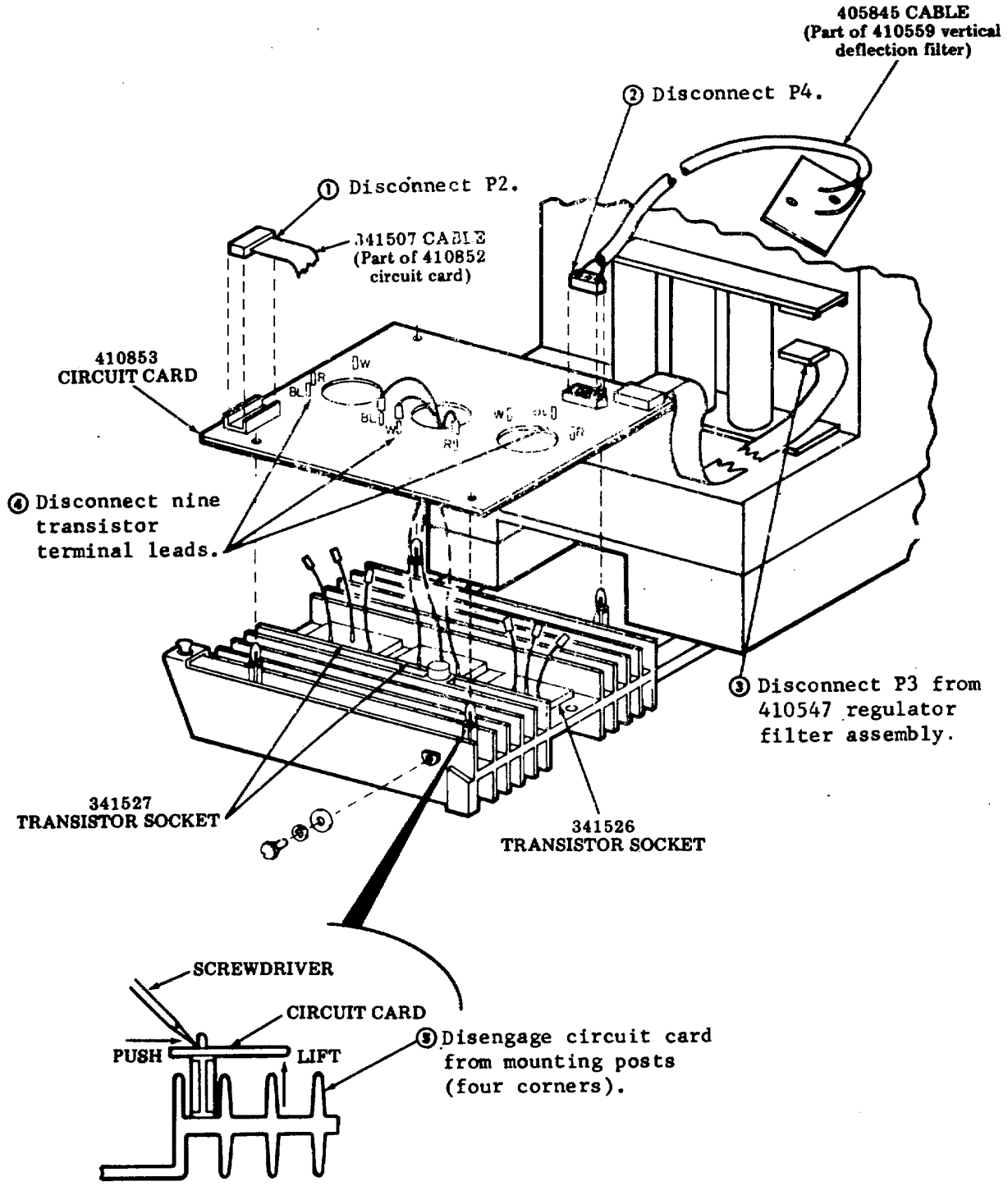
410852 Rectifier Circuit Card Assembly



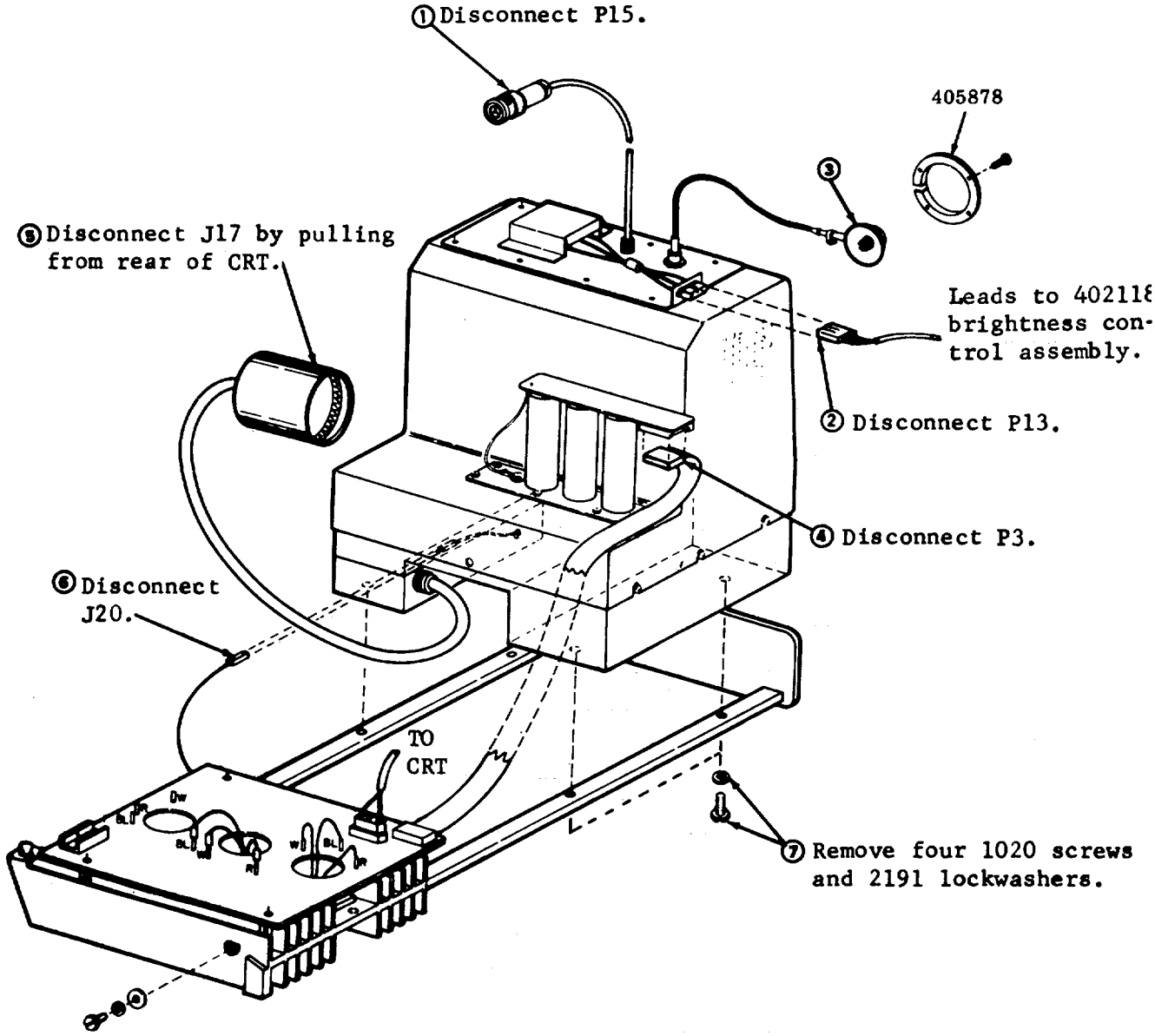
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

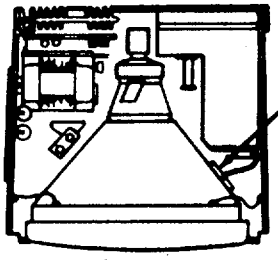
2. DISASSEMBLY/REASSEMBLY (Cont)

410853 Regulator Circuit Card Assembly



402254 High Voltage and Video Assembly



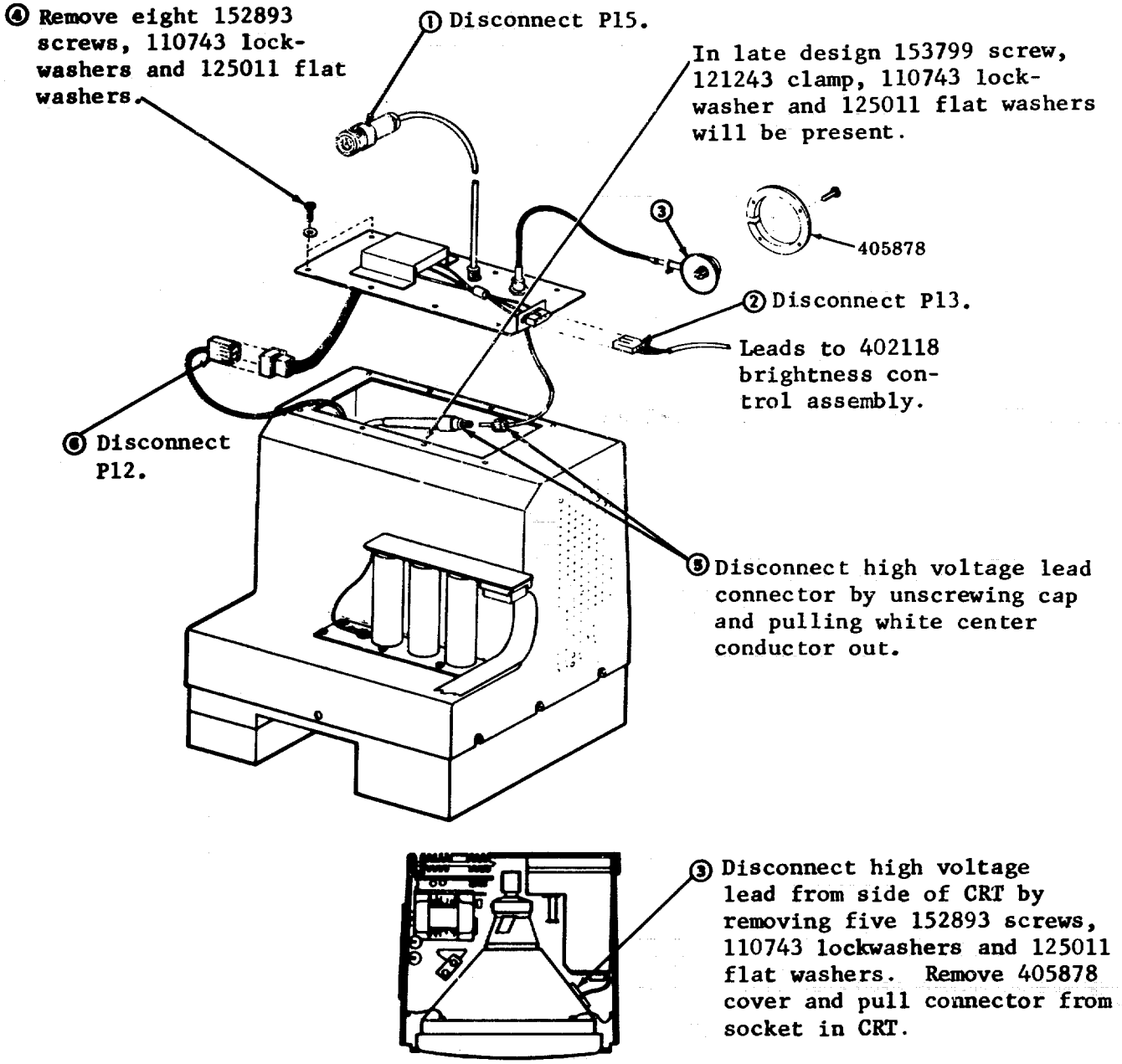


③ Disconnect high voltage lead from side of CRT by removing five 152893 screws, 110743 lockwashers and 125011 flat washers. Remove 405878 cover and pull connector from socket in CRT.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

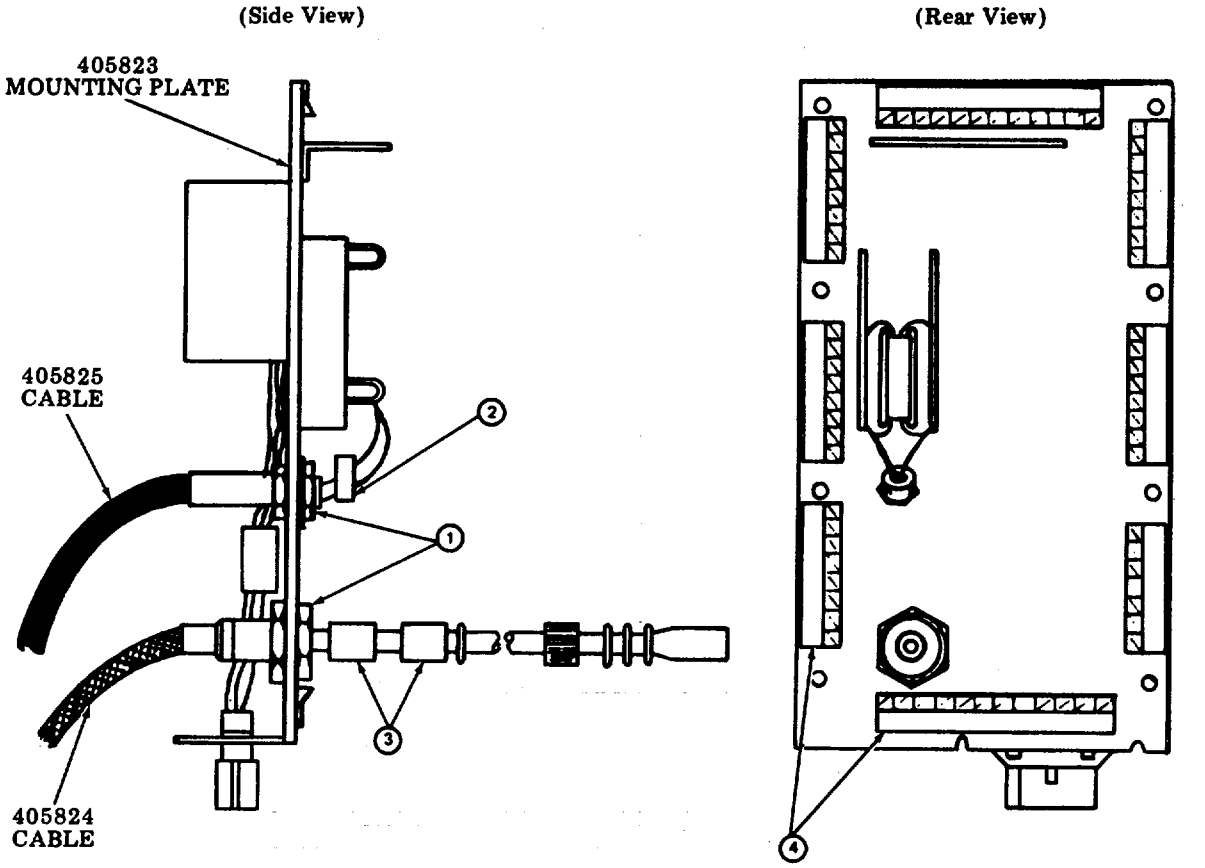
2. DISASSEMBLY/REASSEMBLY (Cont)

405859 High Voltage Plate Assembly



NOTE: During reassembly of 405859 high voltage plate assembly, the requirements specified on the following pages should be checked and met to insure proper operation of the monitor.

High Voltage Plate Assembly



(1) The hex nuts that mount the two 405824 and 405825 cable assemblies must be tight and secure to the 405823 mounting plate.

(2) The 403694 ferrite sleeve must be on the 405825 cable assembly when mounted to the 405823 high voltage plate.

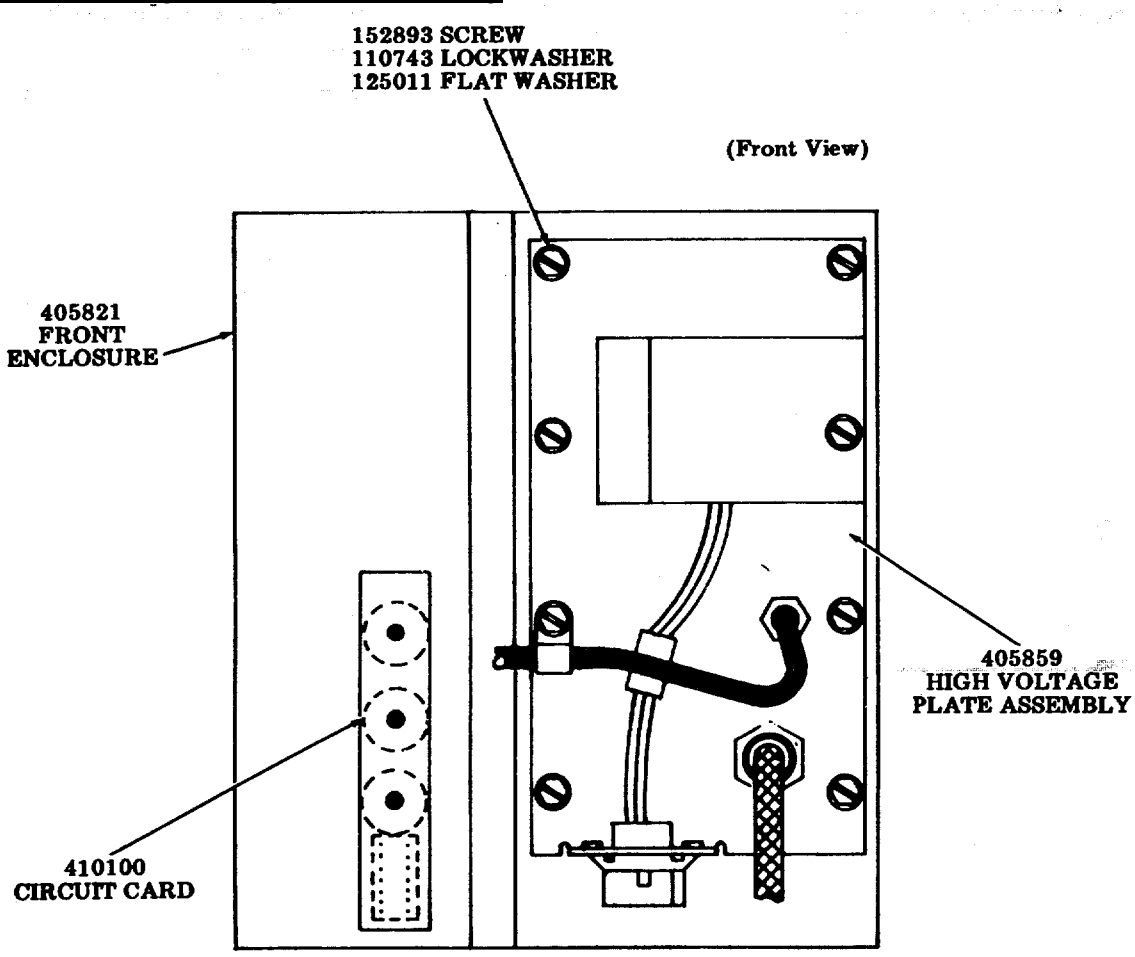
(3) The 408974 ferrite sleeve (two required) must be on the 405824 cable assembly when mounted to the 405823 high voltage plate.

(4) The presence of eight segments of 39628RM contact strip must be around the perimeter and between the 405823 mounting plate and the 405821 front housing when assembled.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. DISASSEMBLY/REASSEMBLY (Cont)

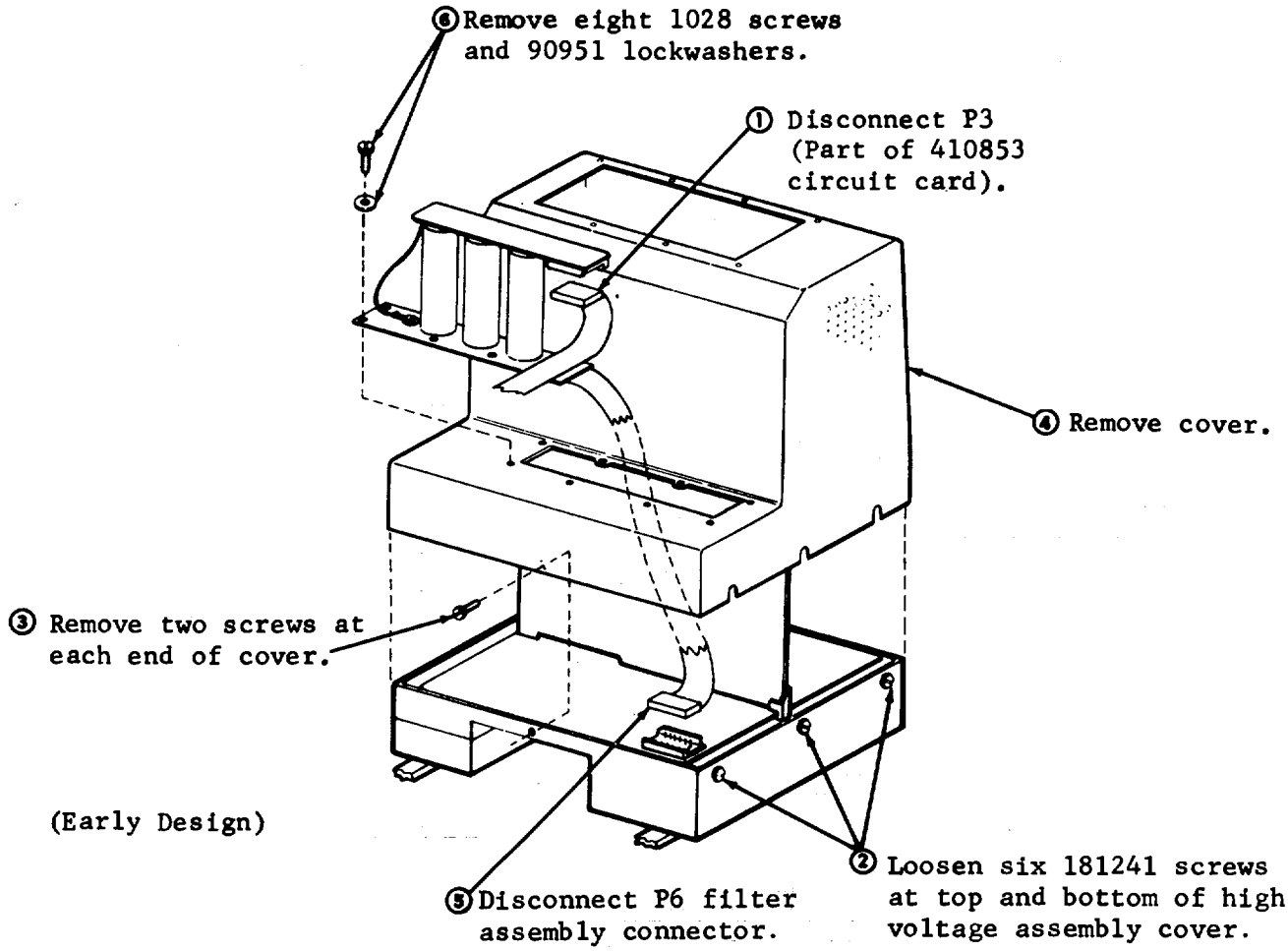
Front Enclosure With High Voltage Plate Assembly



The eight 152893 hex head screws, 110743 lockwashers and 125011 flat washers must be tight and secure when 405859 high voltage plate assembly is mounted to 405821 front housing.

410547 Regulator Filter Assembly

- Remove 405859 high voltage plate assembly (4-87).

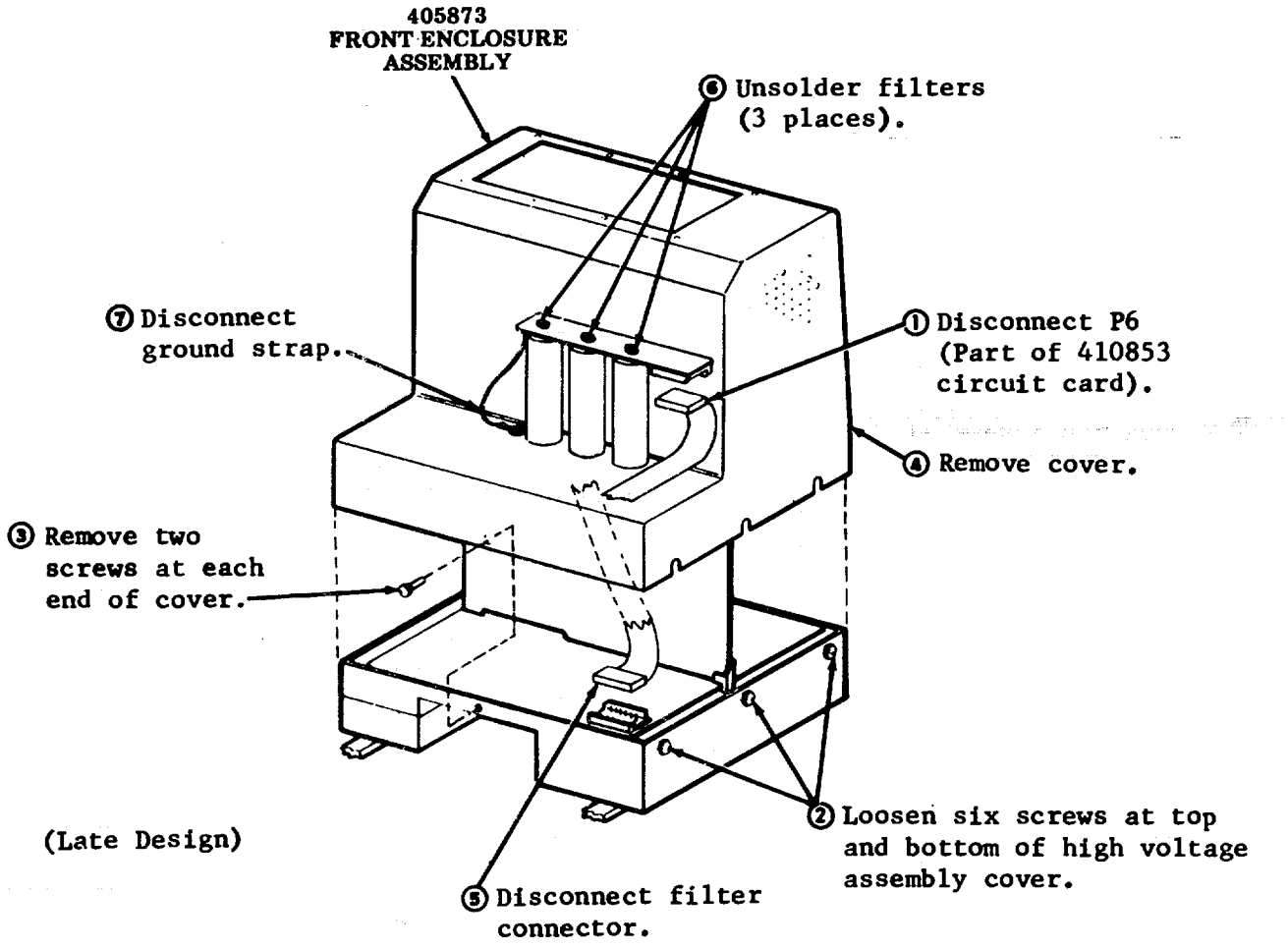


F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. DISASSEMBLY/REASSEMBLY (Cont)

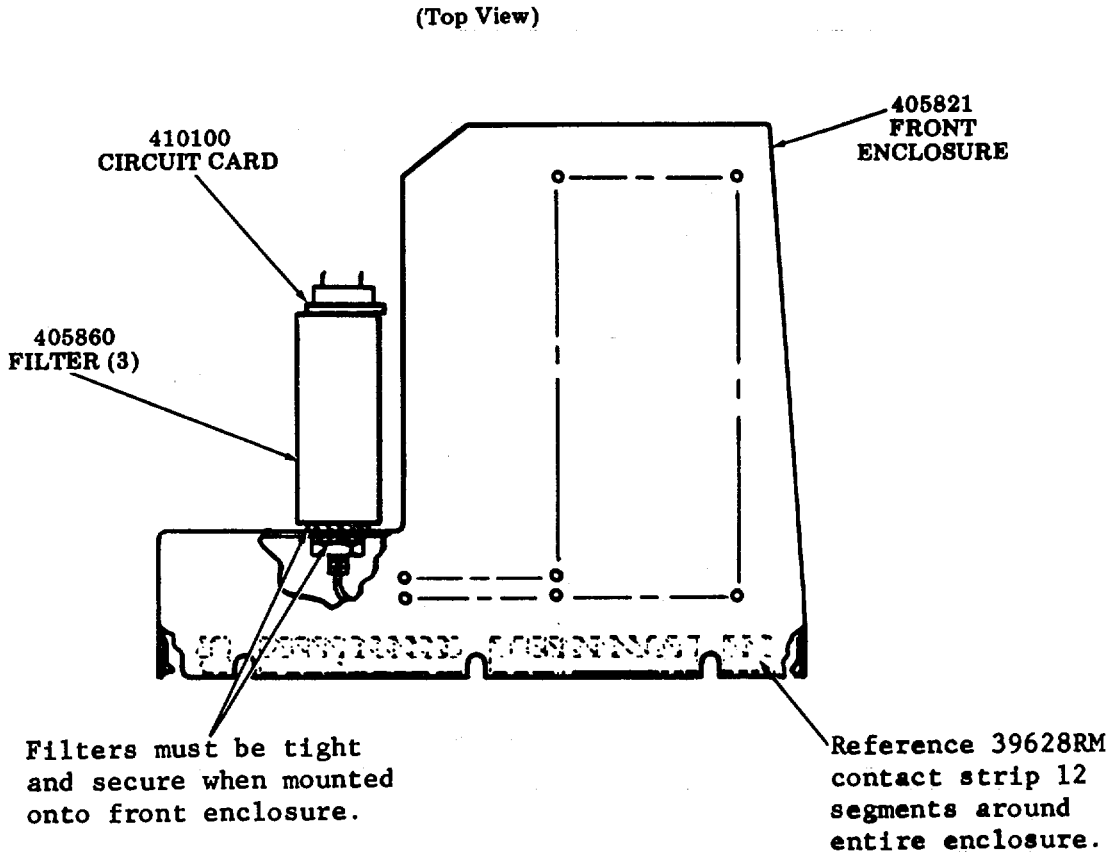
410100 Circuit Card Assembly

- Remove 405859 high voltage plate assembly (4-88).



NOTE: During reassembly, the requirements specified on the following page should be checked and met to insure proper operation of the monitor.

405873 Regulator Filter Assembly



The three 405860 tubular filter cartridges must be tight and secure when mounted onto the 405821 front housing.

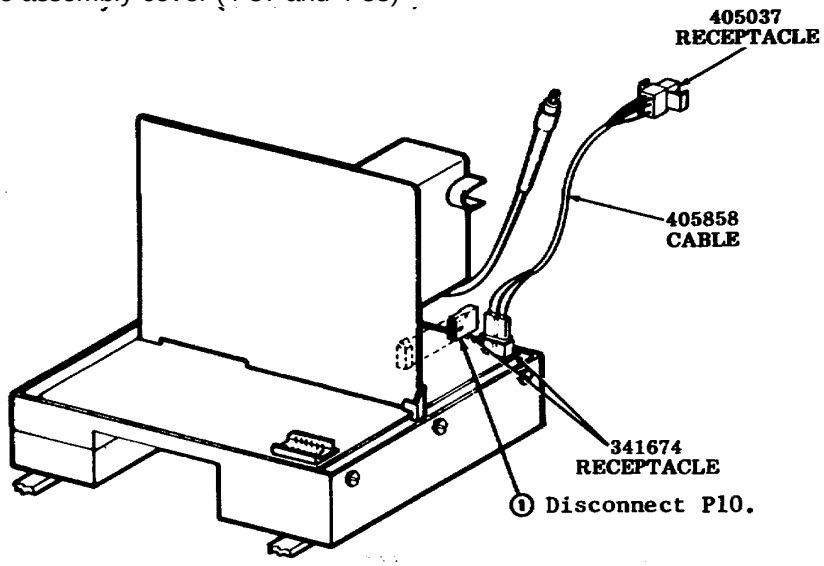
At the lower edge of the 405821 front housing, check for the presence of (12) segments of 39628RM contact strip around entire opening and make sure that they are parallel to the lower edge.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

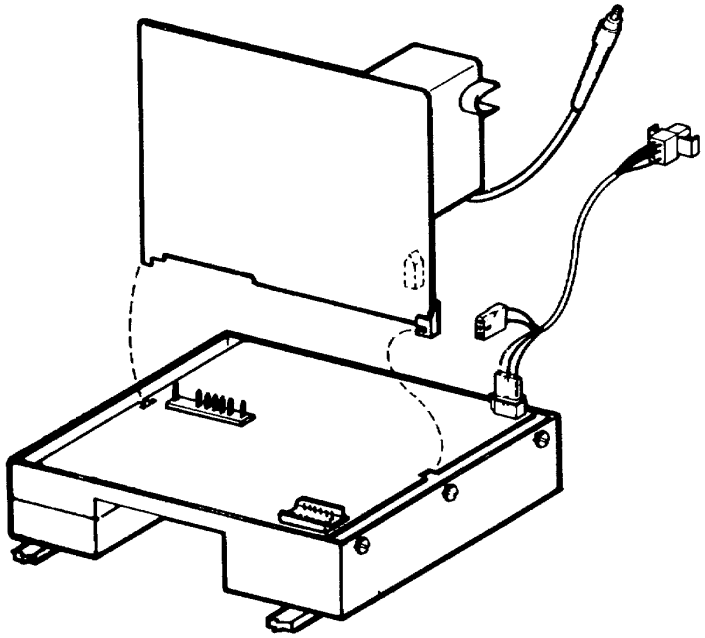
2. DISASSEMBLY/REASSEMBLY (Cont)

410546 High Voltage Circuit Card Assembly

- Remove 405859 high voltage plate assembly (4-84).
- Remove high voltage assembly cover (4-87 and 4-88)

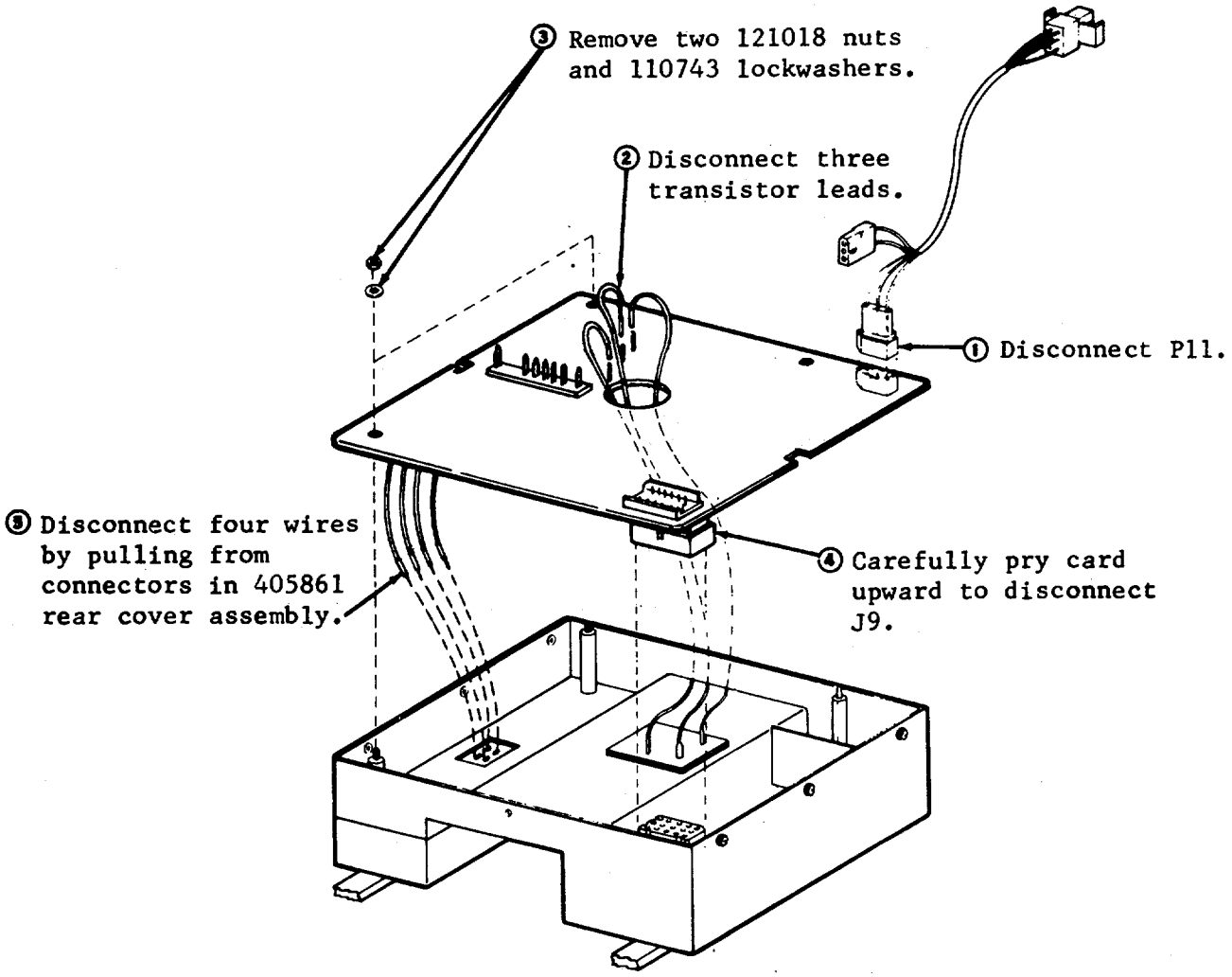


(2) Rotate and unhook 410546 circuit card.



410545 Interface/Amplifier Circuit Card Assembly

- Remove 405859 high voltage plate assembly (4-84).
- Remove high voltage assembly cover (4-87 and 4-88).
- Remove 410546 high voltage circuit card assembly (4-90).

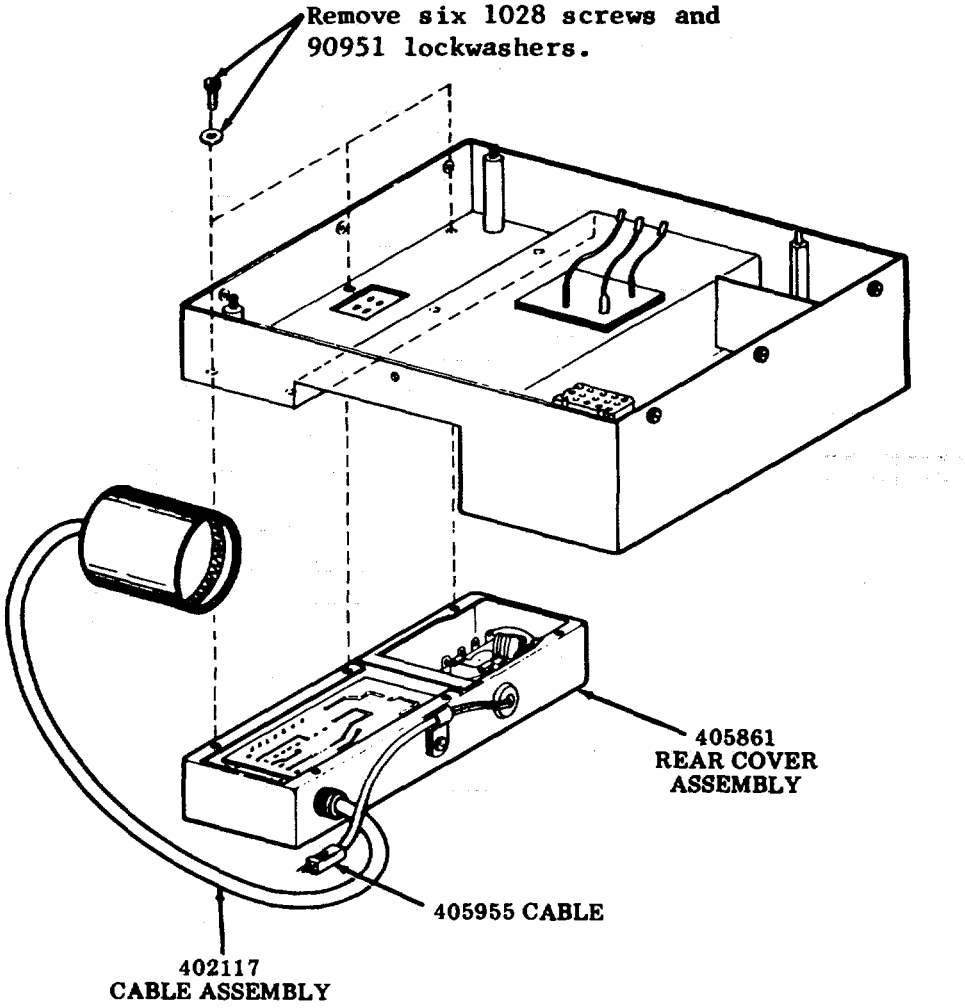


F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. DISASSEMBLY/REASSEMBLY (Cont)

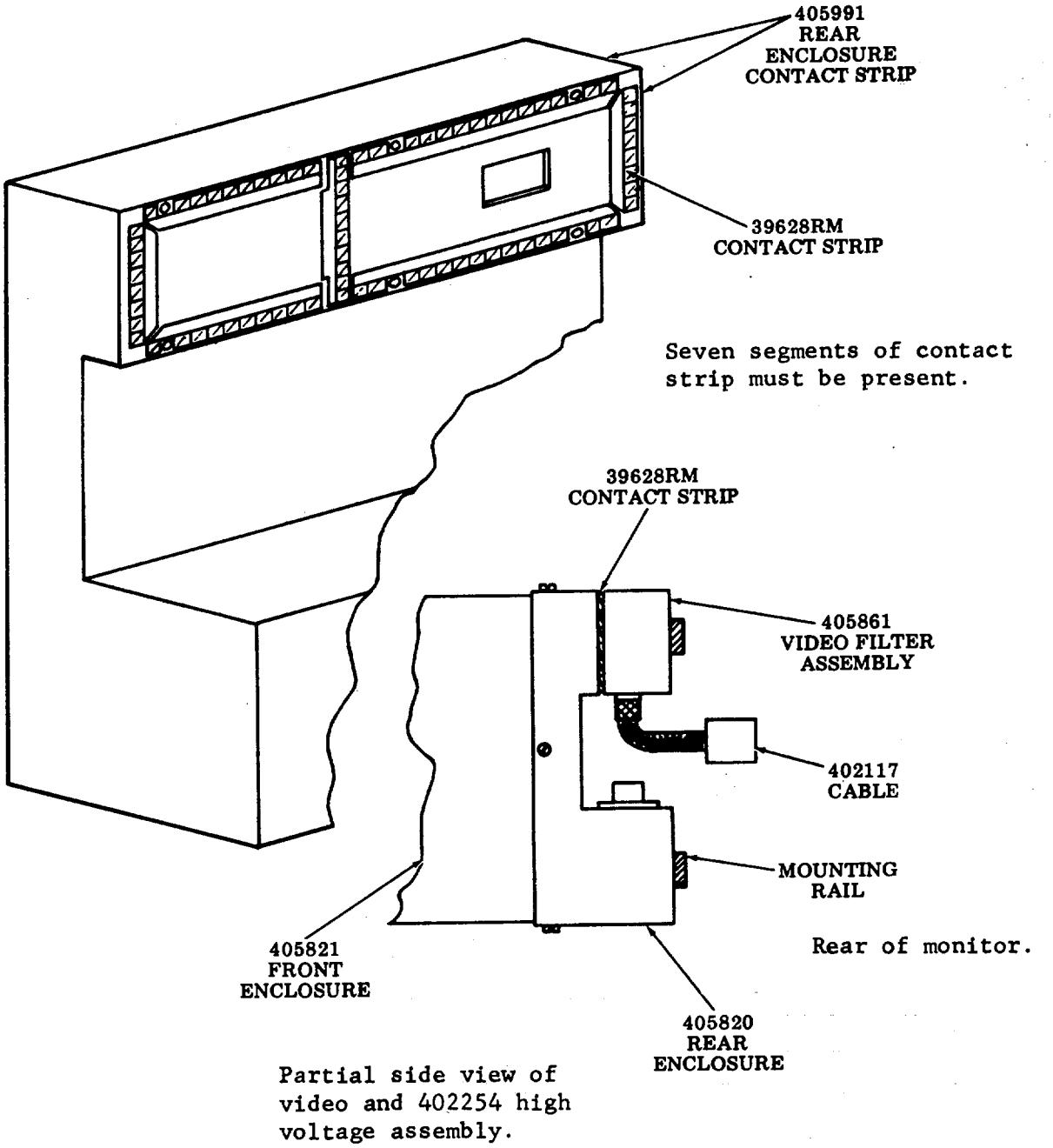
405861 Rear Cover Assembly

- Remove 402254 high voltage and video assembly (4-83) from heat sink.
- Remove 405859 high voltage plate assembly (4-84).
- Remove high voltage assembly cover (4-87 and 4-88).
- Remove 410546 high voltage circuit card assembly (4-90).
- Remove 410545 interface/amplifier circuit card assembly (4-91).



NOTE: During reassembly of the 405861 rear cover assembly, the requirements specified on the following page should be checked and met to insure proper operation of the monitor.

For location of contact strip see 405991 rear enclosure contact strip.



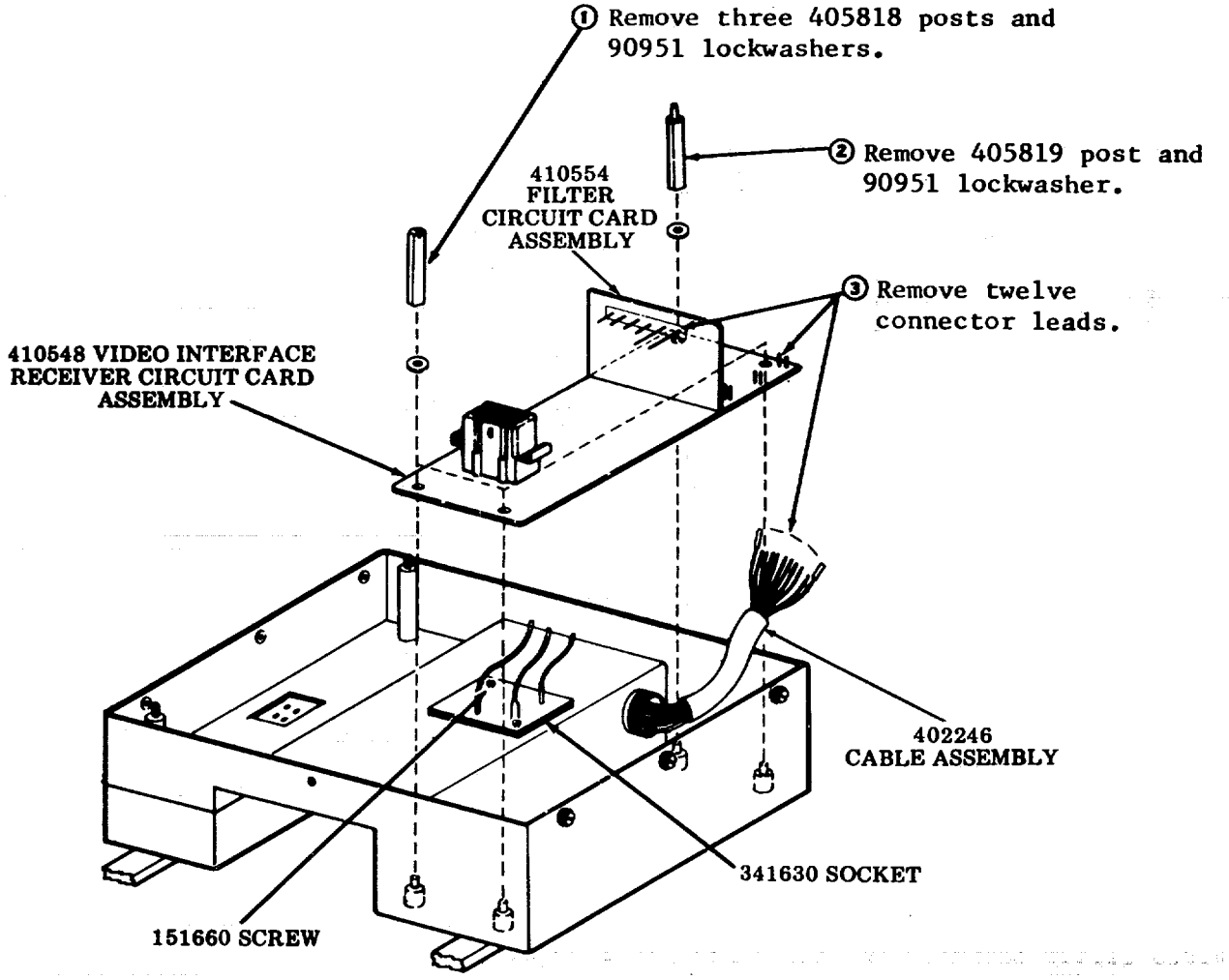
The presence of seven segments of 39628RM contact strip must be between the 405861video filter assembly and the 405820 rear housing.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. DISASSEMBLY/REASSEMBLY (Cont)

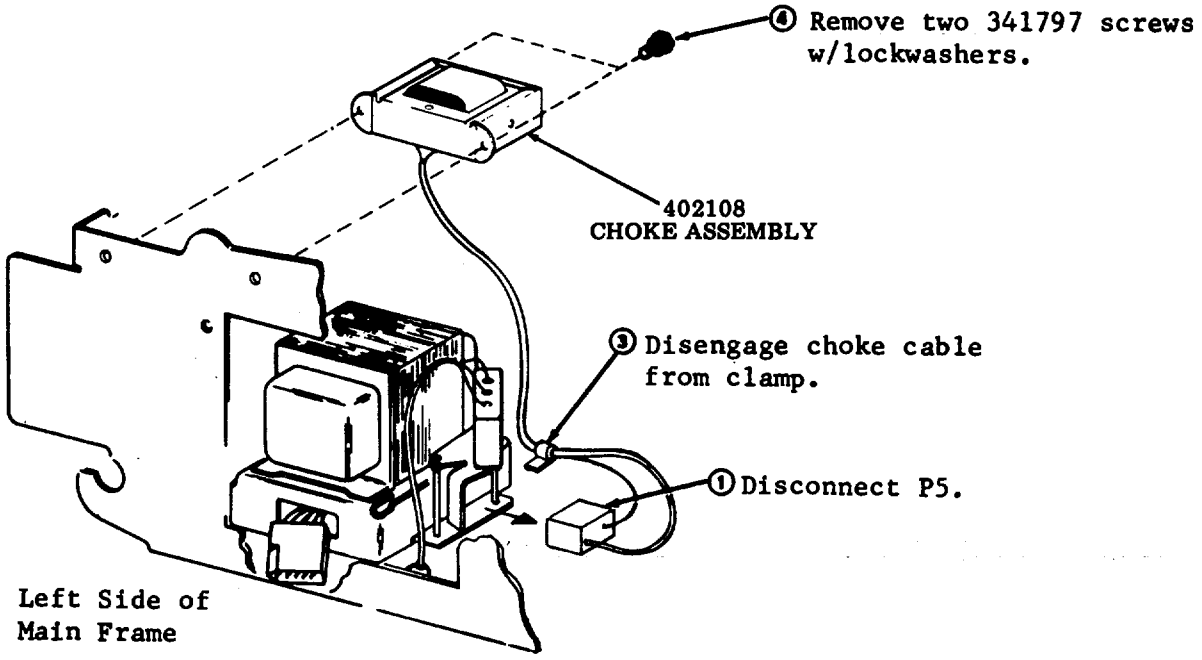
410548 Video Interface Receiver Circuit Card Assembly

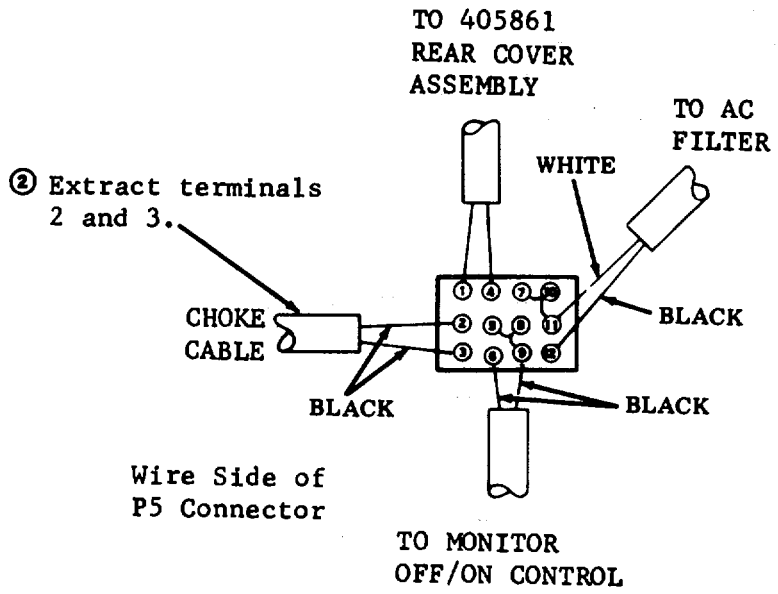
- Remove 405859 high voltage plate assembly (4-84).
- Remove high voltage assembly cover (4-87 and 4-88).
- Remove 410546 high voltage circuit card assembly (4-90).
- Remove 410545 interface/amplifier circuit card assembly (4-91).



402108 Choke Assembly

- Remove 410852 rectifier circuit card assembly (4-81).



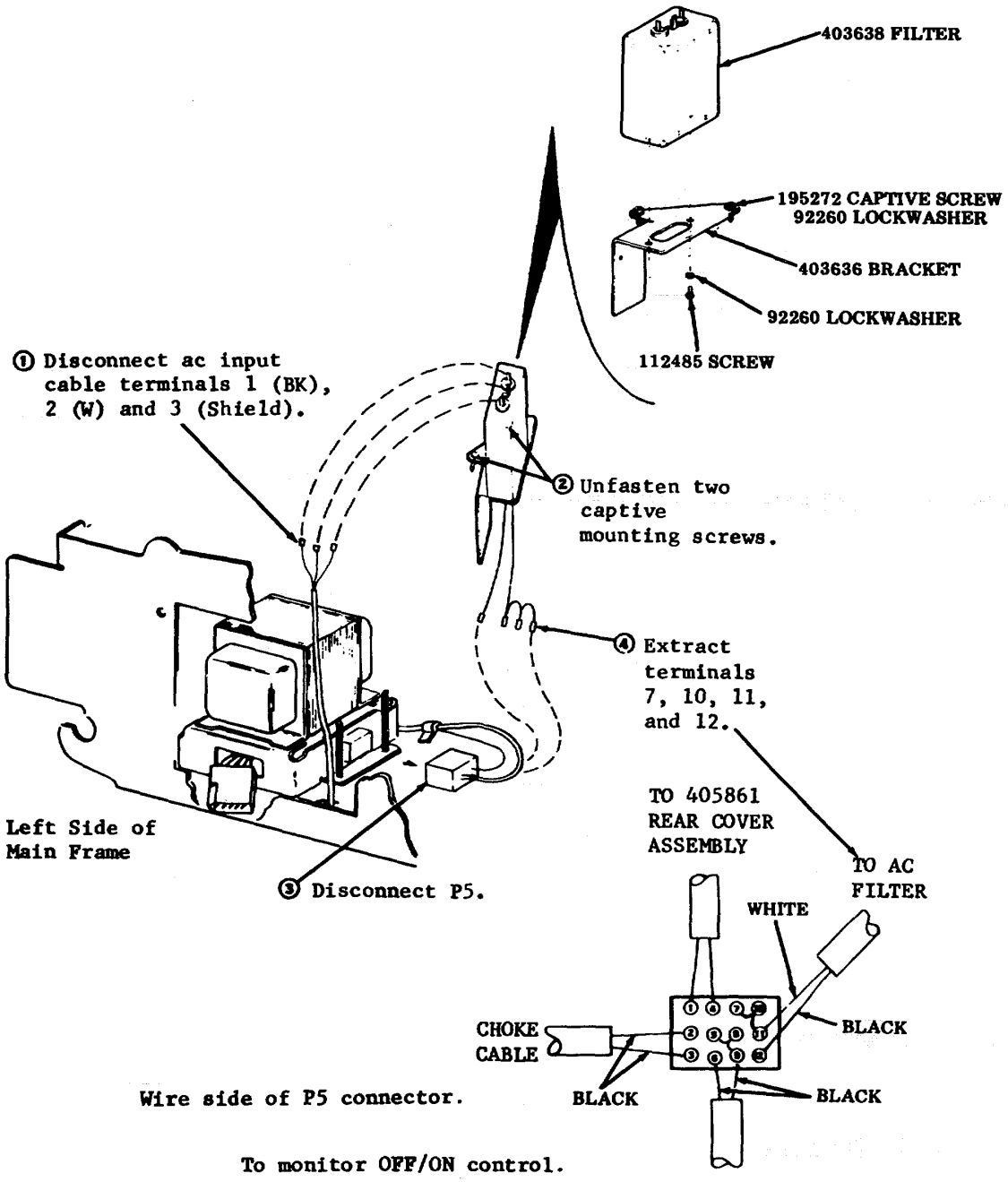


F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. DISASSEMBLY/REASSEMBLY (Cont)

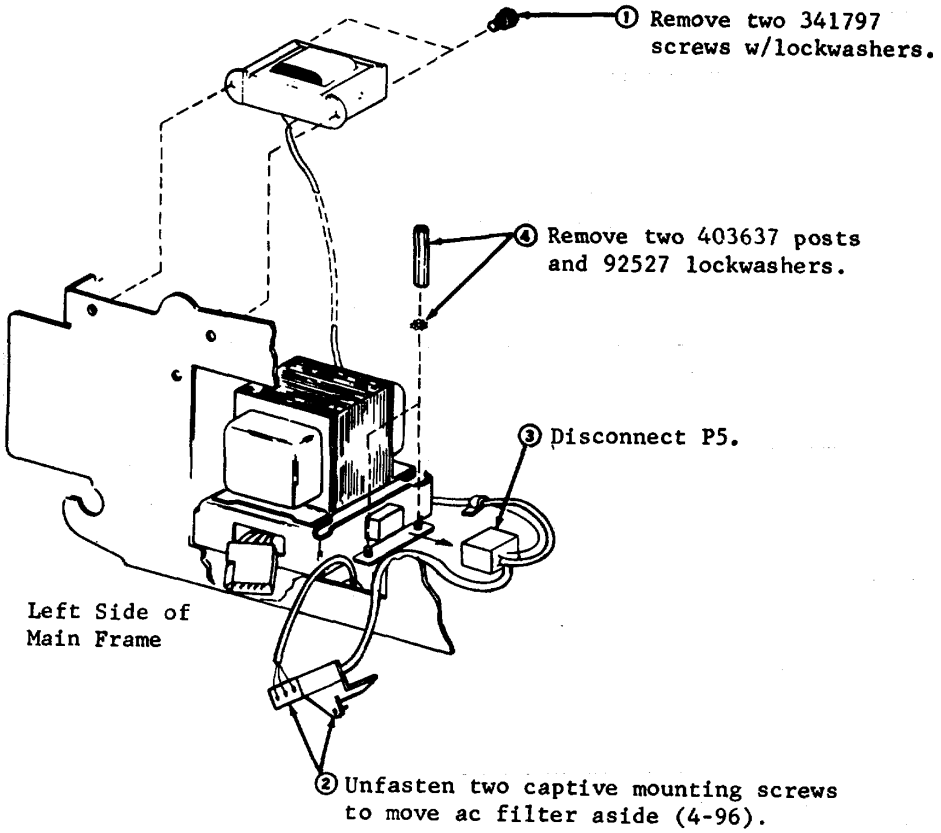
403639 AC Filter Assembly

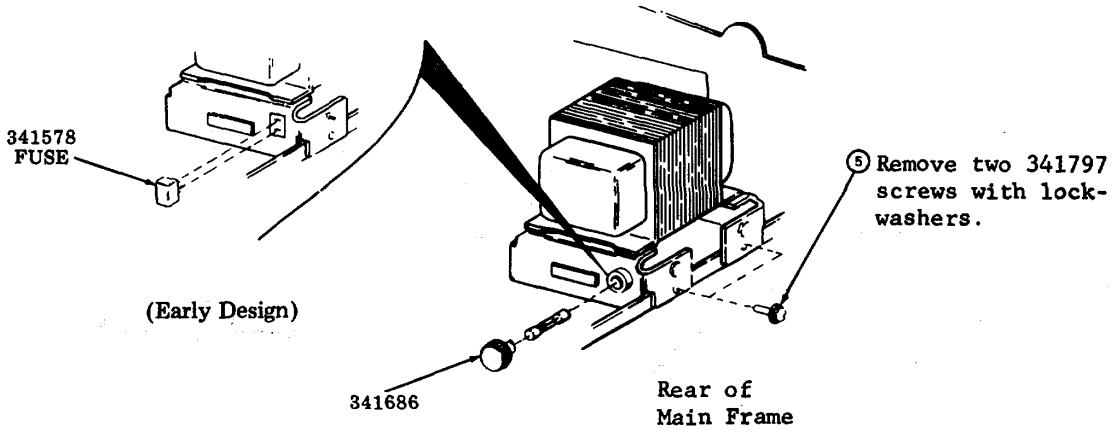
- Remove 410852 rectifier circuit card assembly (4-81).



341795 (50/60 Hz) Power Distribution Assembly

- Remove 410852 rectifier circuit card assembly (4-81).

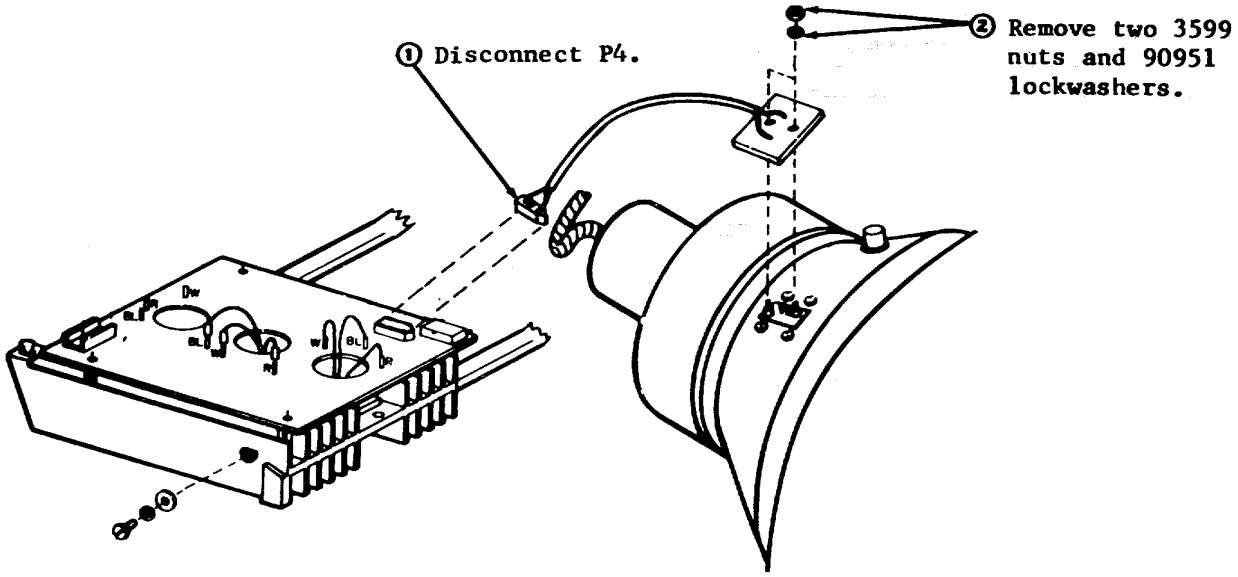




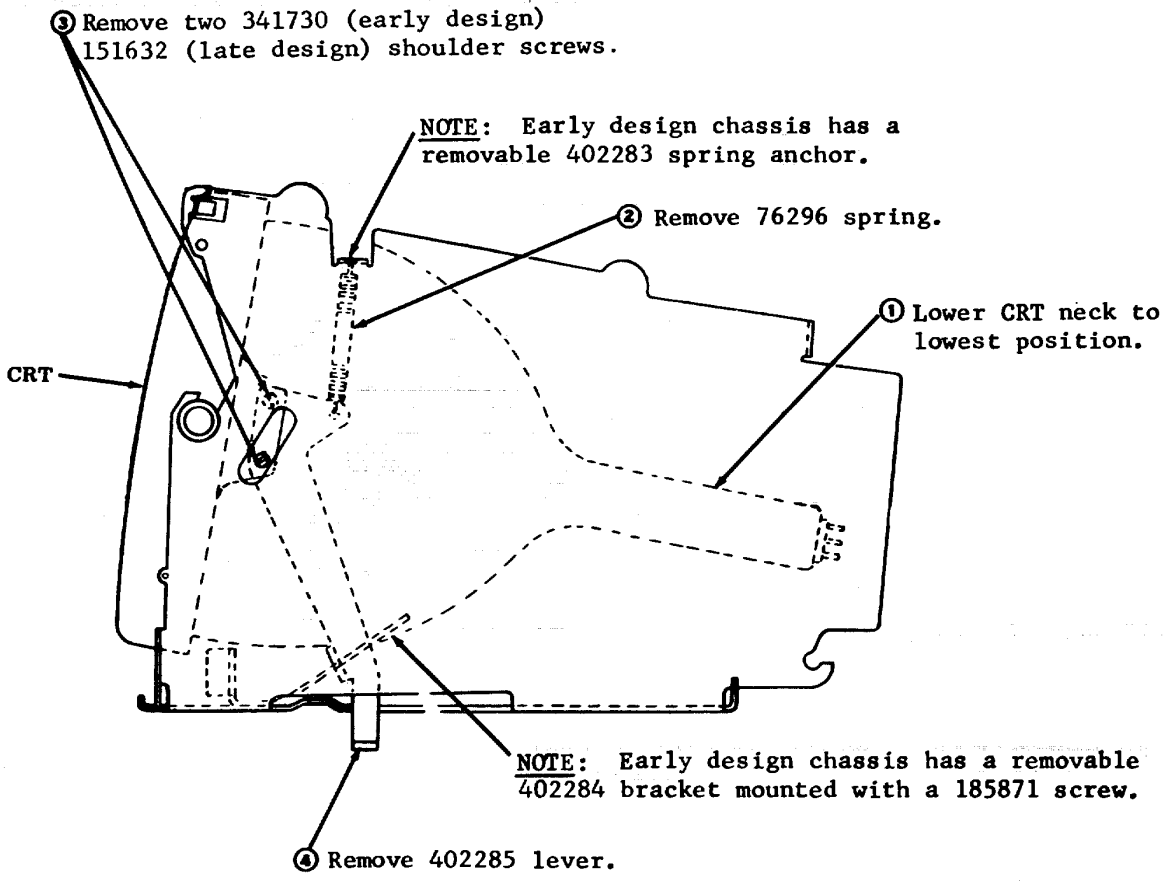
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. DISASSEMBLY/REASSEMBLY (Cont)

410559 Vertical Deflection Circuit Card Assembly



Tube Tilt Mechanism



402110 Cathode Ray Tube (See Page 4-100 for location of parts.)
405701 or 405994 Deflection Yoke Assembly

- Remove 410852 rectifier circuit card assembly (4-81).

(1) Disengage captive mounting screws and move ac filter assembly aside.

(2) Disconnect J17.

(3) Disconnect P15.

(4) Disconnect high voltage lead from side of CRT by removing five 152893 screws, 110743 lockwashers and 125011 flat washers. Remove 405878 cover and pull connector from socket in CRT.

(5) Disengage 410559 vertical deflection. circuit card assembly from CRT (see 4-98).

(6) Remove four 152893 screws, 110743 lockwashers, 125011 flat washers.

NOTE: Insert 402244 ferrite sleeve on filter marked "0". Above ferrite sleeve, solder one end of 328793 disc capacitor to portion of filter leg that is round. Other end of disc capacitor to be between shield and washer of screw as shown. Both leads of capacitor to be as short as possible.

(7) Remove 402285 tube tilt lever (see 4-98).

(8) Remove four 181523 springs.

(9) Rotate rod rearward and remove by disengaging from holes in chassis.

(10) Remove mask.

(11) Remove top two 181243 screws w/lockwashers, 107116 lockwashers, and 3598 nuts to disengage ground straps.

(12) Rotate neck of CRT toward vertical and lift to disengage pivot points from chassis.

(13) Remove bottom two 181243 screws w/lockwashers, 107116 lockwashers, and 3598 nuts.

(14) Remove 402112 intermediate shield.

(15) Carefully remove 402101 shield from CRT.

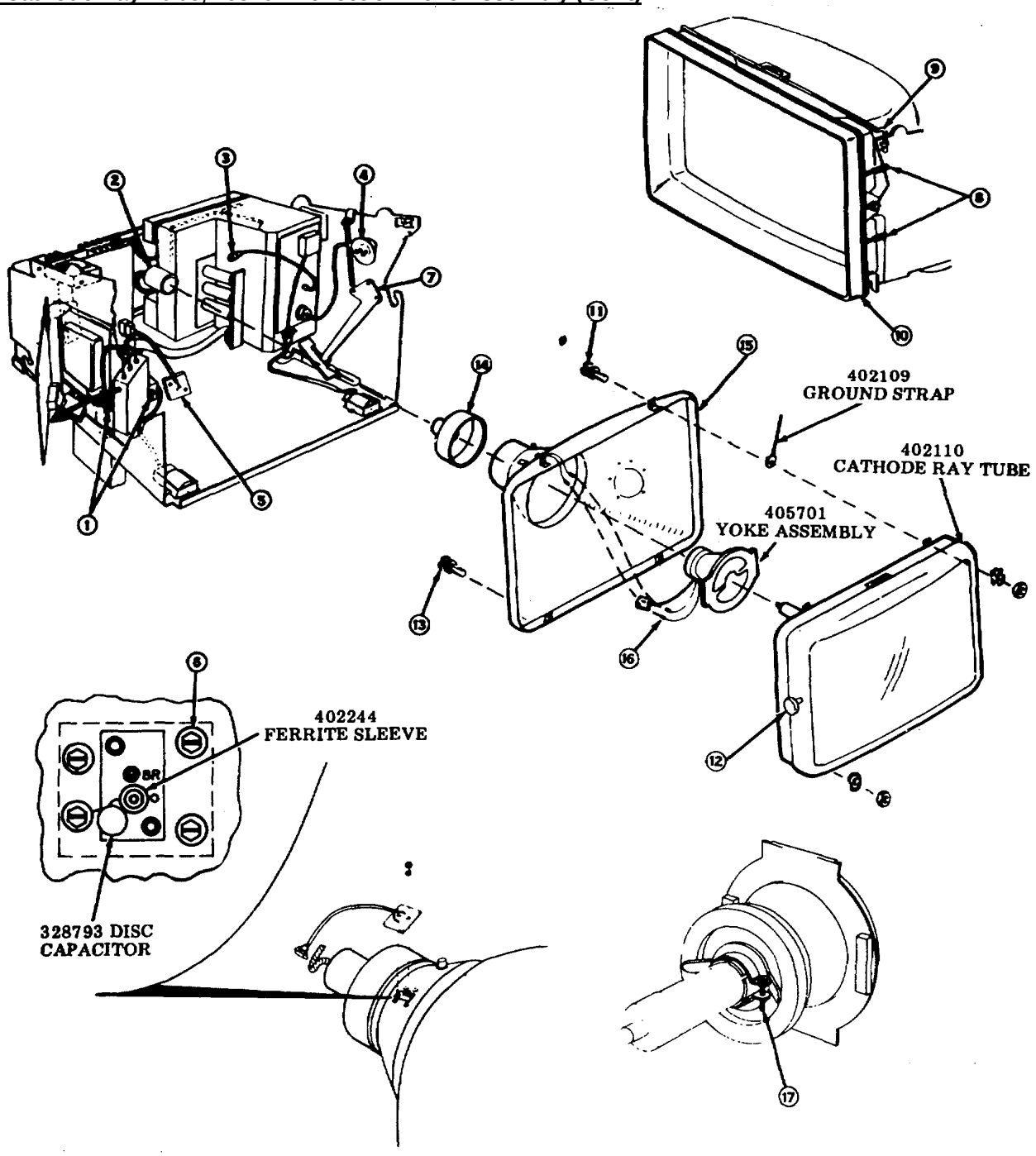
(16) Disconnect two leads.

(17 Loosen yoke clamp screw. Slide yoke rearward off CRT neck. In reassembly, do not overtighten yoke clamp screw.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

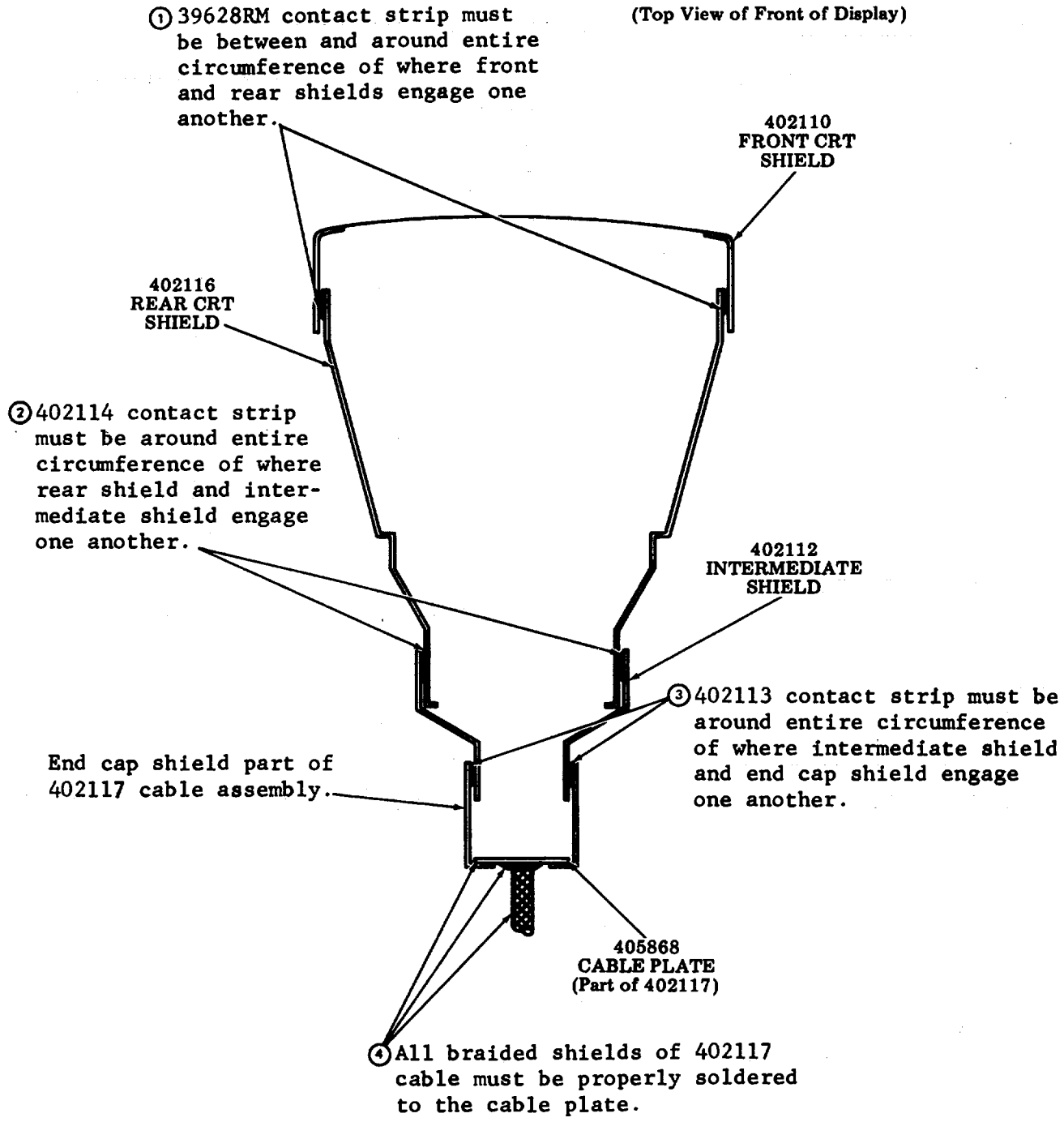
2. DISASSEMBLY/REASSEMBLY (Cont)

402110 Cathode Ray Tube, 405701 Deflection Yoke Assembly (Cont)



NOTE: During reassembly, the requirements specified on the following pages should be checked and met to insure proper operation of the monitor. These recommended checks are to be performed by qualified service personnel.

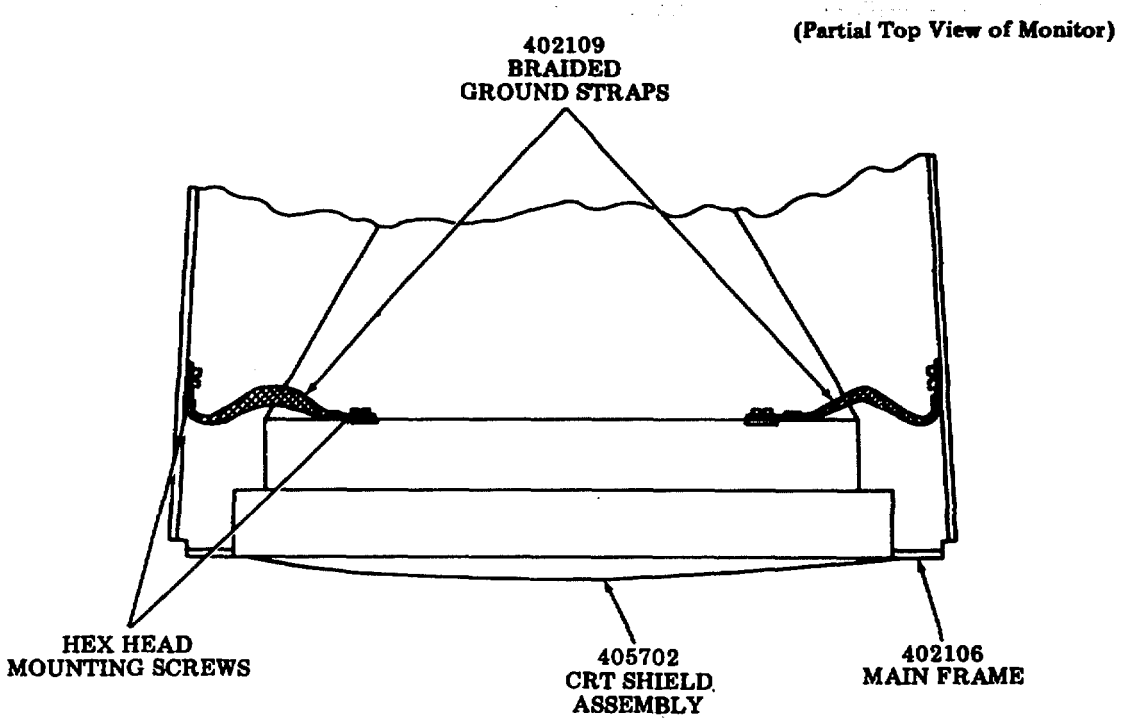
This figure shows all the shield assemblies that enclose the CRT.



F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

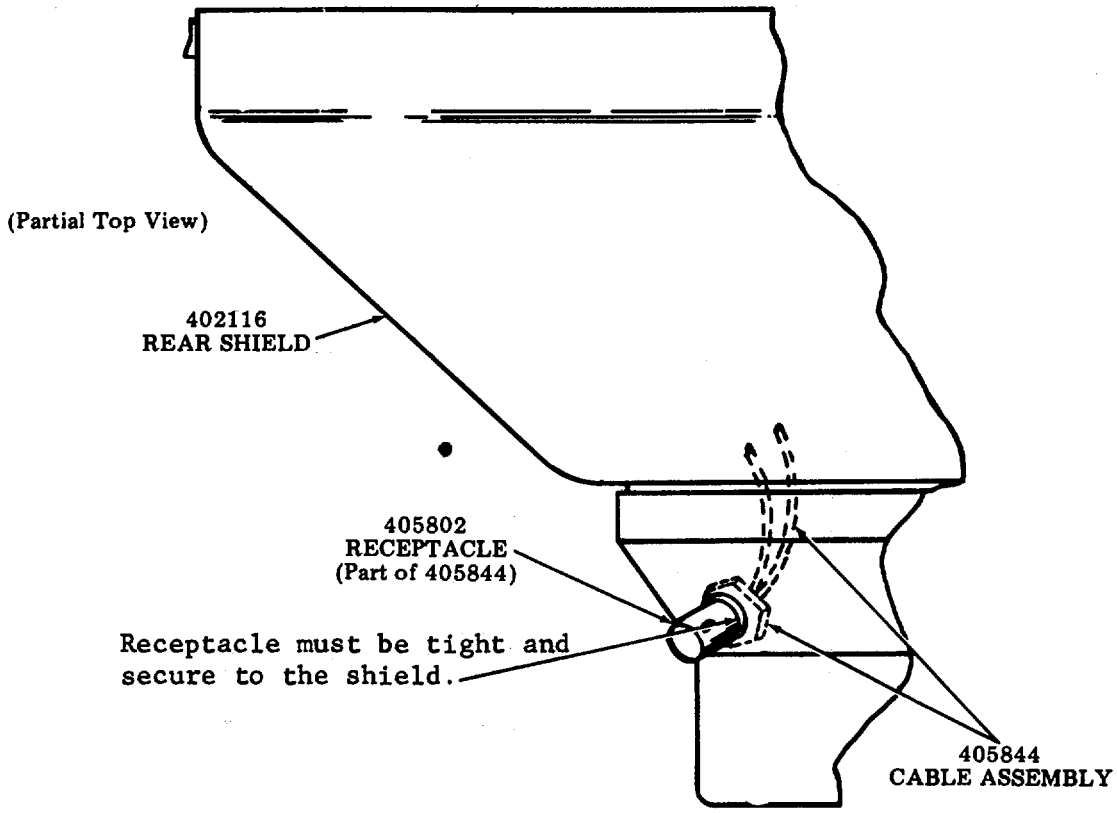
2. DISASSEMBLY/REASSEMBLY (Cont)

402110 Cathode Ray Tube, 405701 Deflection Yoke Assembly (Cont)



Check that the 402109 braided ground straps are properly mounted from the upper right and upper left side of the CRT tube shield assembly to the right and left sidewalls of the 402106 main frame.

Rear 402116 CRT Shield Assembly



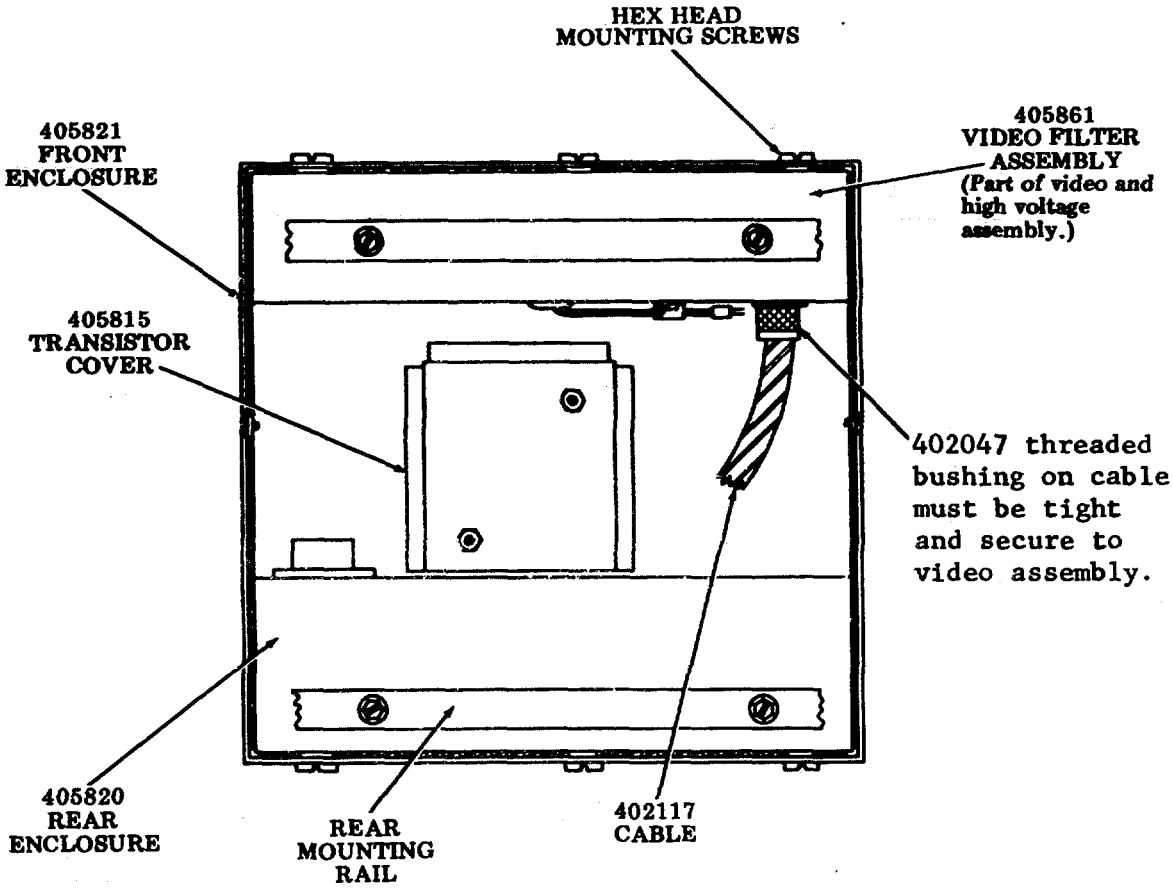
Check that the 405802 "twin-ax" connector that mounts on the rear 402116 CRT shield is tight and secure to the shield.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. DISASSEMBLY/REASSEMBLY (Cont)

Video and High Voltage Assembly

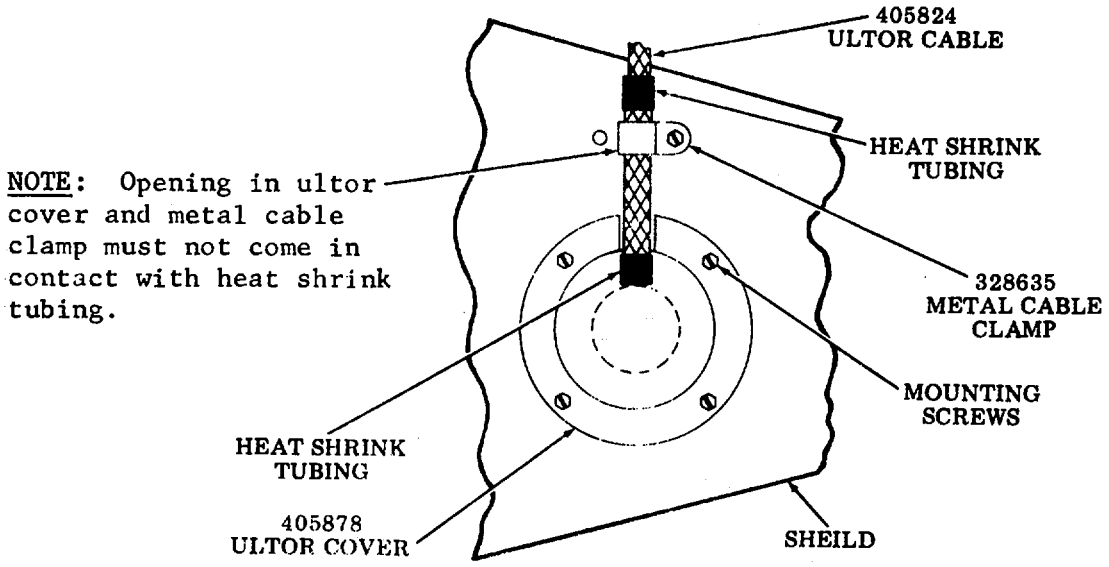
As viewed from rear of monitor.



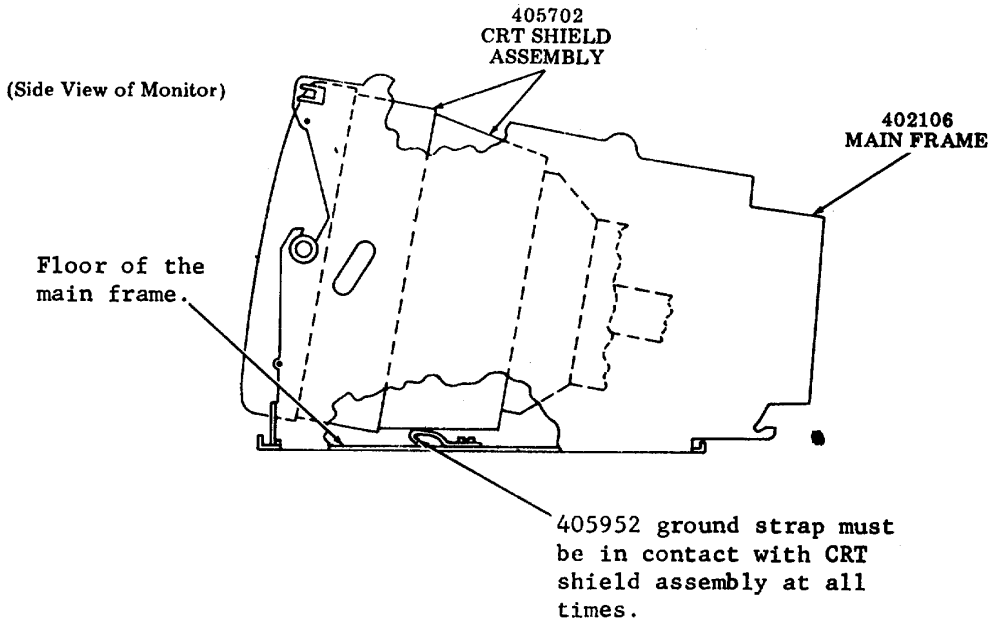
Check that the 402047 threaded metallic bushing on the 402117 CRT cable assembly is tight and secure at the point of entry to the 405861 video filter assembly.

Left Side of Shielded Tube

As viewed from rear of monitor.



Check that the 328635 metal cable clamp is in total metallic contact with the braid of the 405824 ultor cable assembly and that the braid of the 405824 ultor cable assembly is in metallic contact with the edges of the slot in the 405878 ultor cover shield that covers the connection to the CRT. The shrink tubing on the cable should not prevent metallic contact as indicated above.



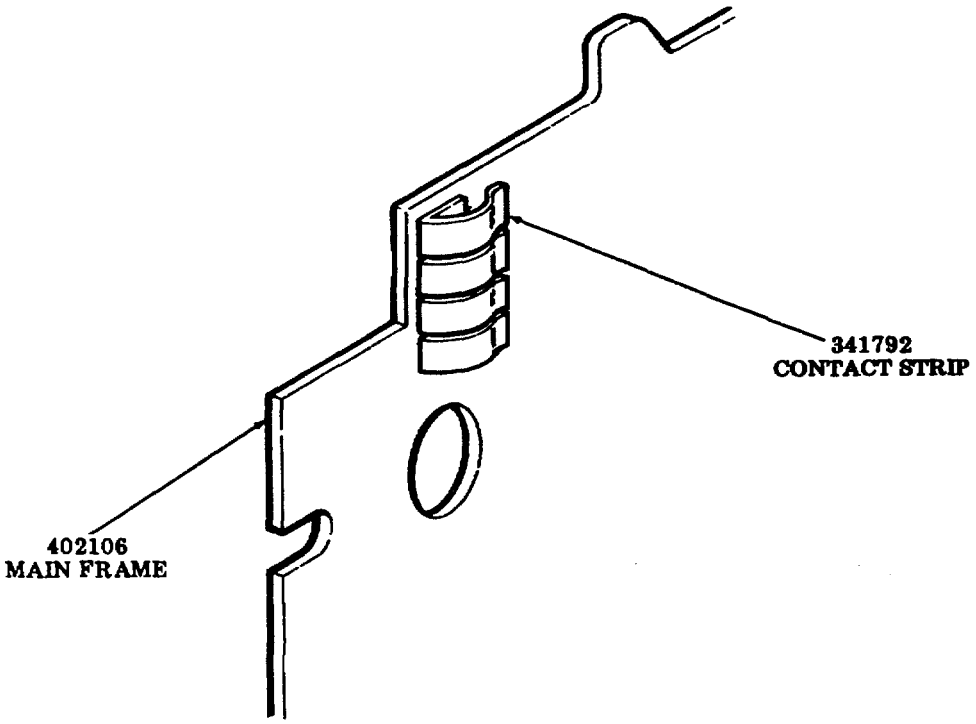
Check that the ground strap which is centrally located and mounts to the floor of the 402106 main frame is in direct contact with the 405702 CRT shield assembly at all times.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. DISASSEMBLY/REASSEMBLY (Cont)

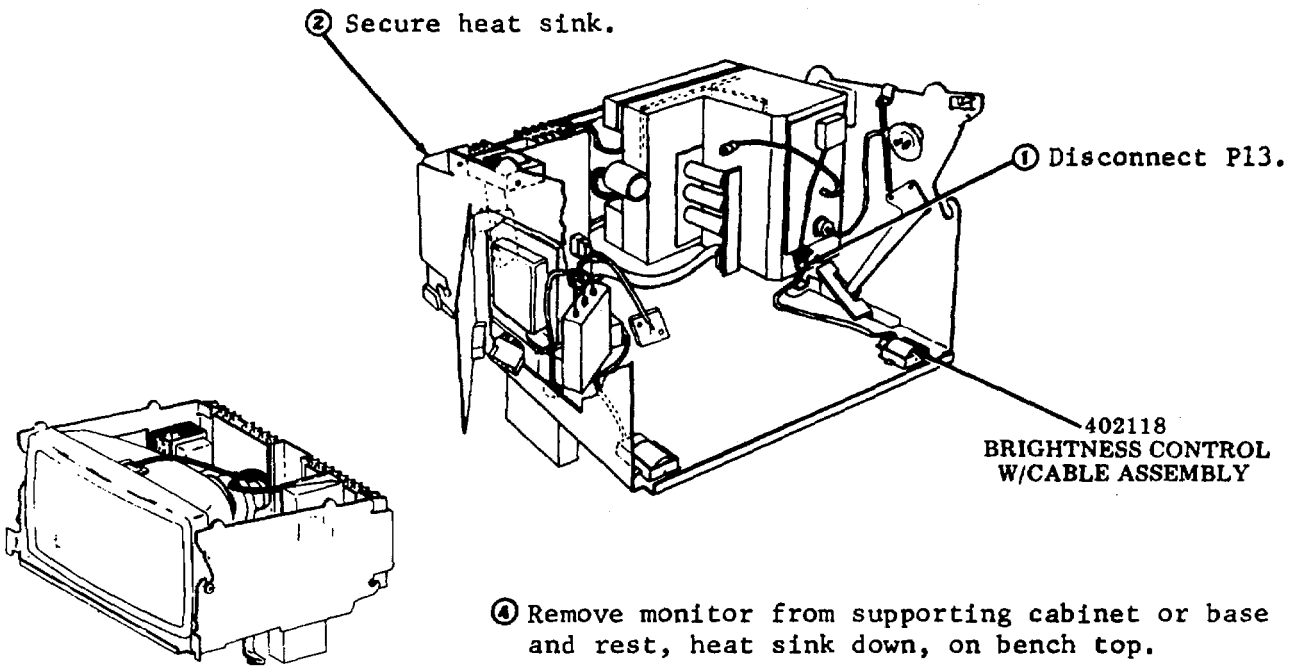
Upper Rear Corner of the Right Sidewall of the Main Frame

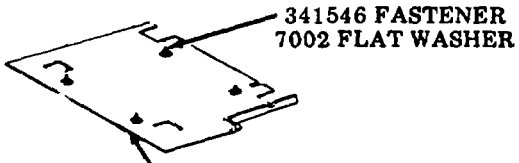
As viewed from rear of monitor.



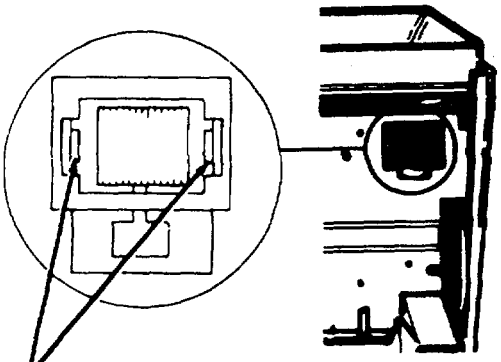
Check for presence of the 341792 contact strip which should be mounted on the inside surface in the upper rear area of the right sidewall of the 402106 main frame.

402118 Brightness Control W/Cable Assembly

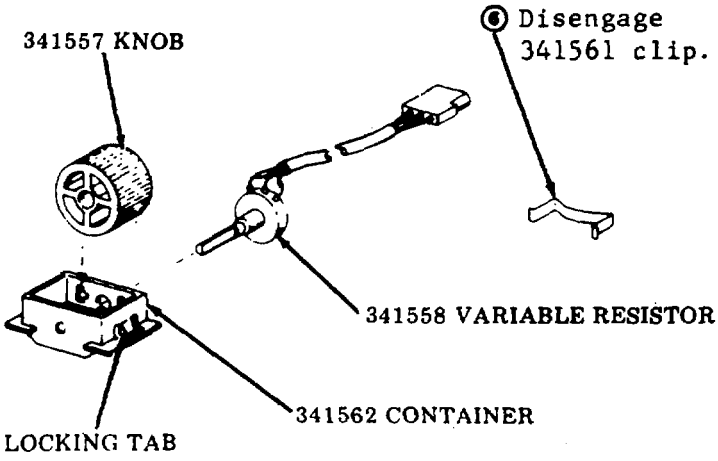




③ Remove 401108 bottom plate; pry loose at fasteners.



402118 Brightness Control W/Cable Assembly

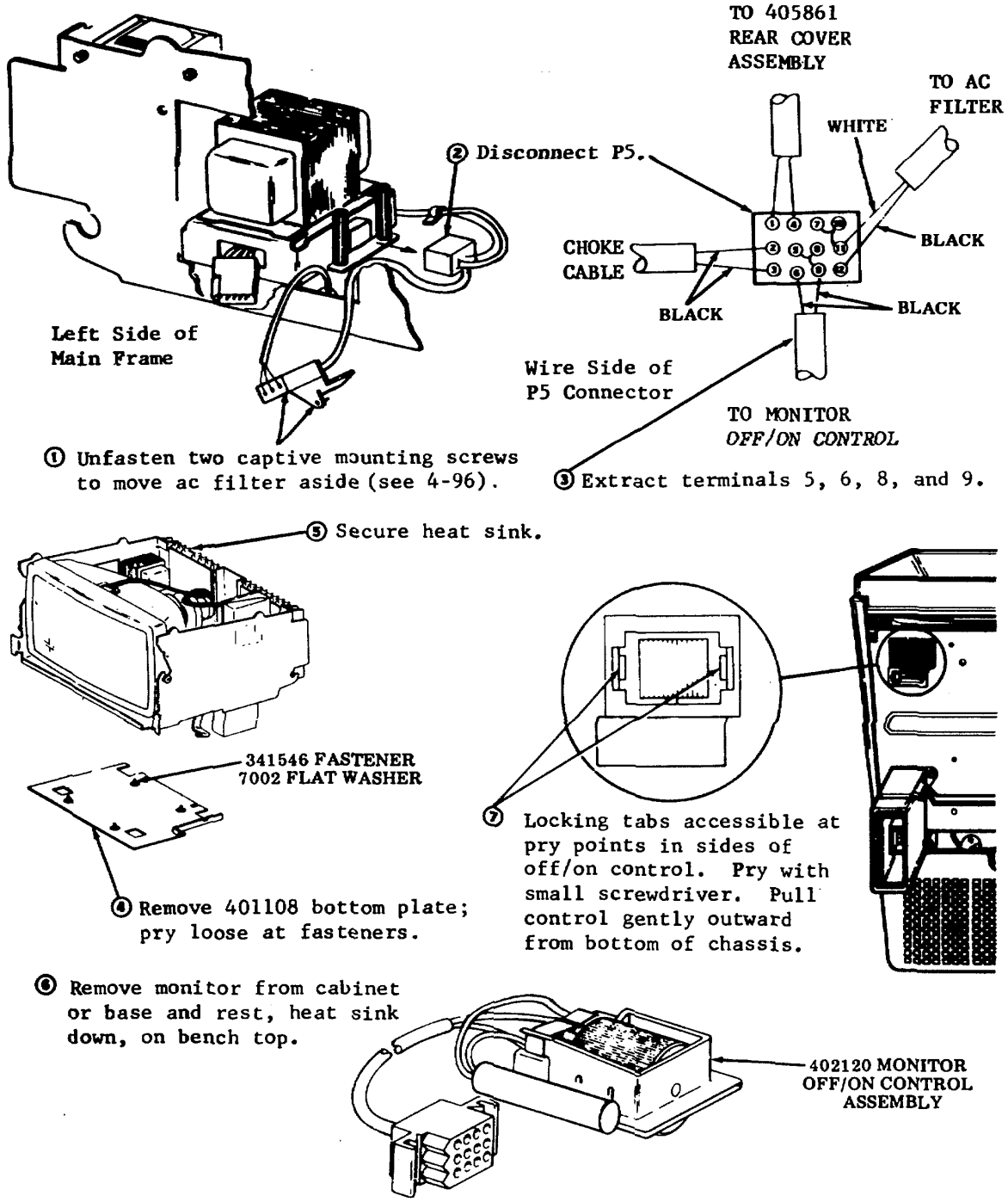


F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. DISASSEMBLY/REASSEMBLY (Cont)

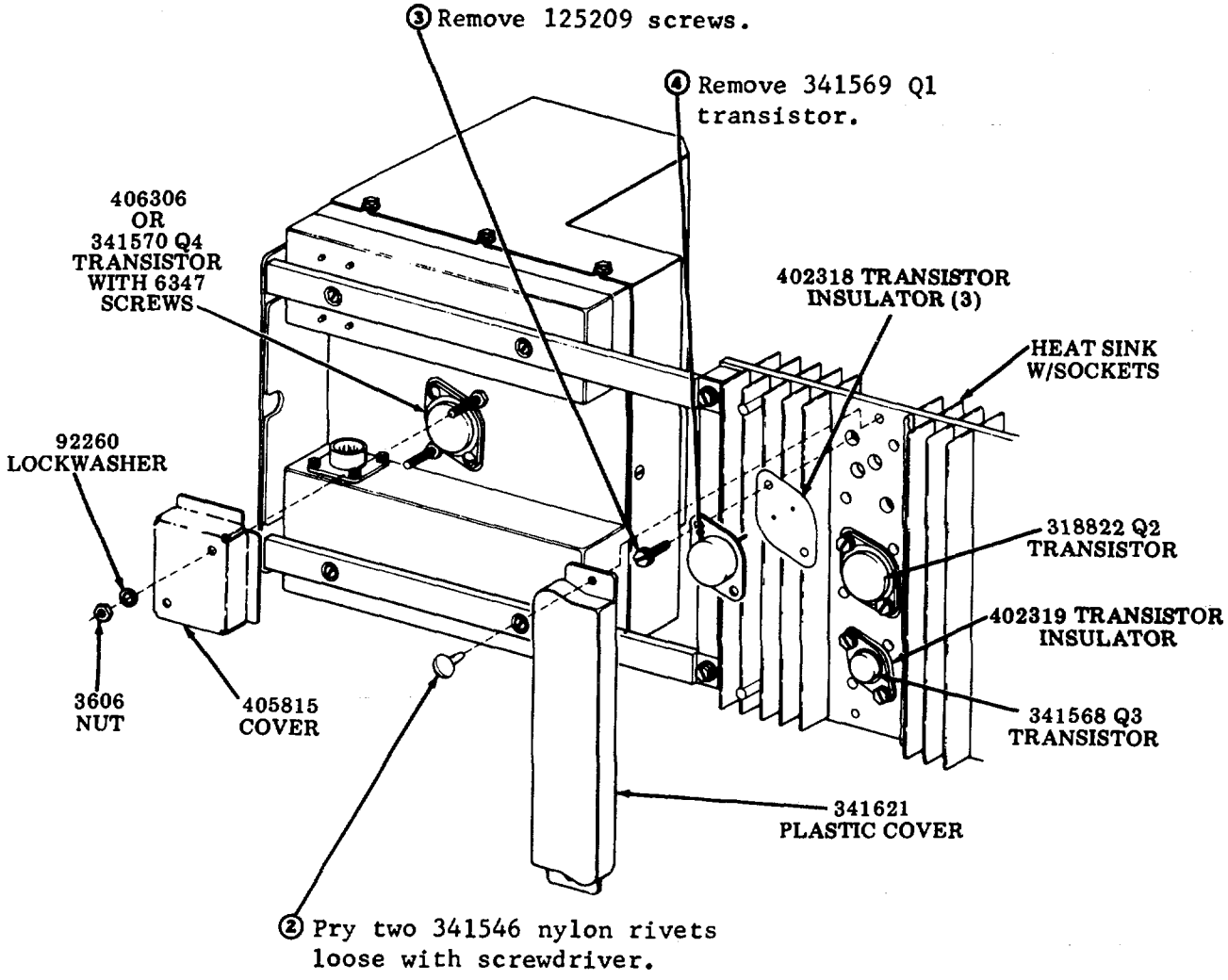
402120 Monitor Off/On Control Assembly

- Remove 410852 rectifier circuit card assembly (4-81).



Heat Sink Transistors

(1) Secure heat sink in upright position.



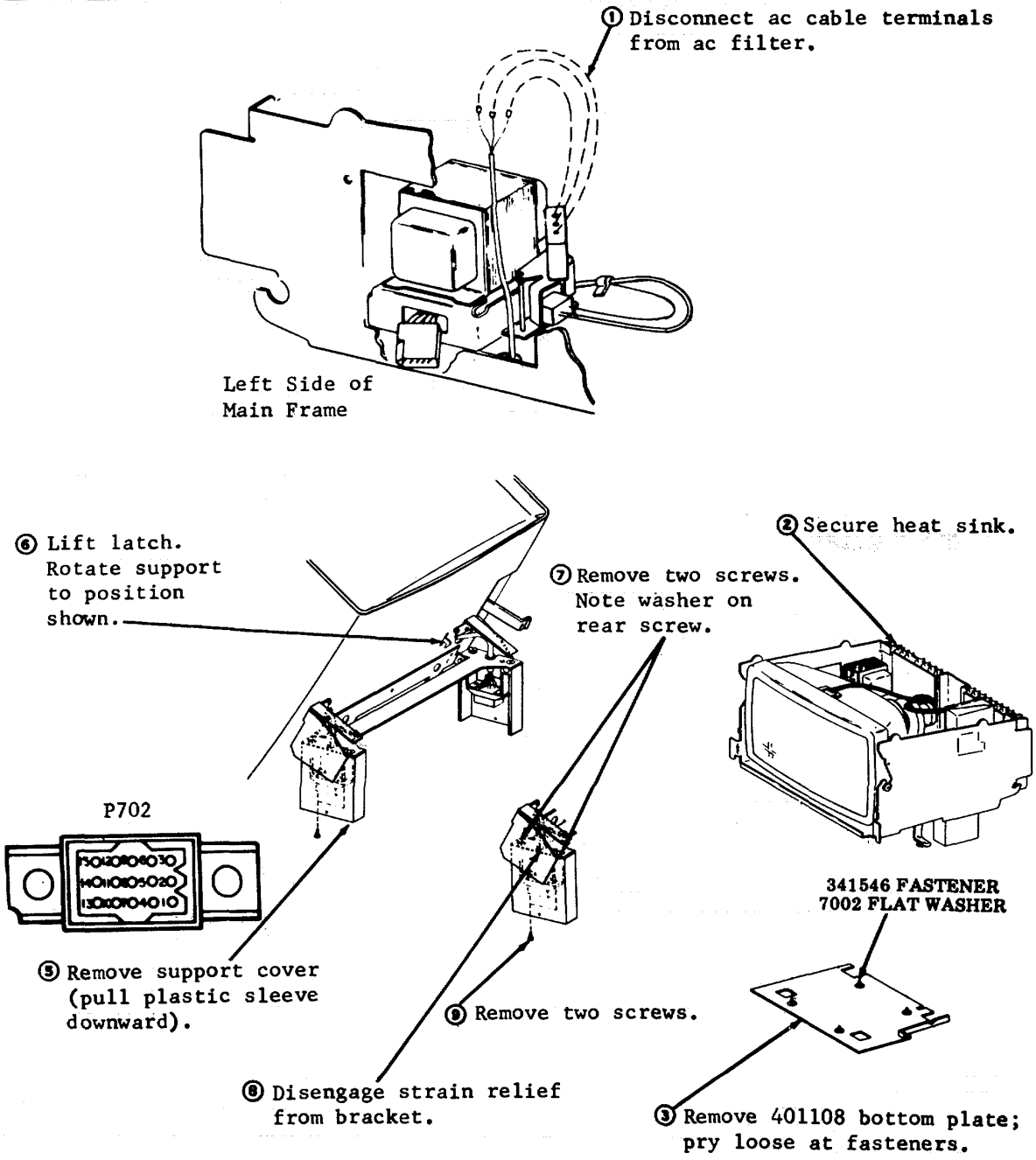
NOTE 1: On heat sink assembly, 402319 insulator associated with transistor (Q3) is replaced by 402319 (new) using mica (muscovite) material. The mica insulator requires thermal joint compound (heat conducting paste) applied to the rear side of the transistor and on the heat sink surface. The 402318 insulator associated with transistors (Q1, Q2 and Q4) remains unchanged. The insulator material used is fiberglass reinforced silicone rubber and does not require thermal joint compound.

NOTE 2: Transistor Q4 part number 406306 can only be used with 410656 Issue 6A or later, incorporating R39 part number 406292 horizontal centering control. Transistor Q4 part number 341570 can be used with any issue of 410656 circuit card.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

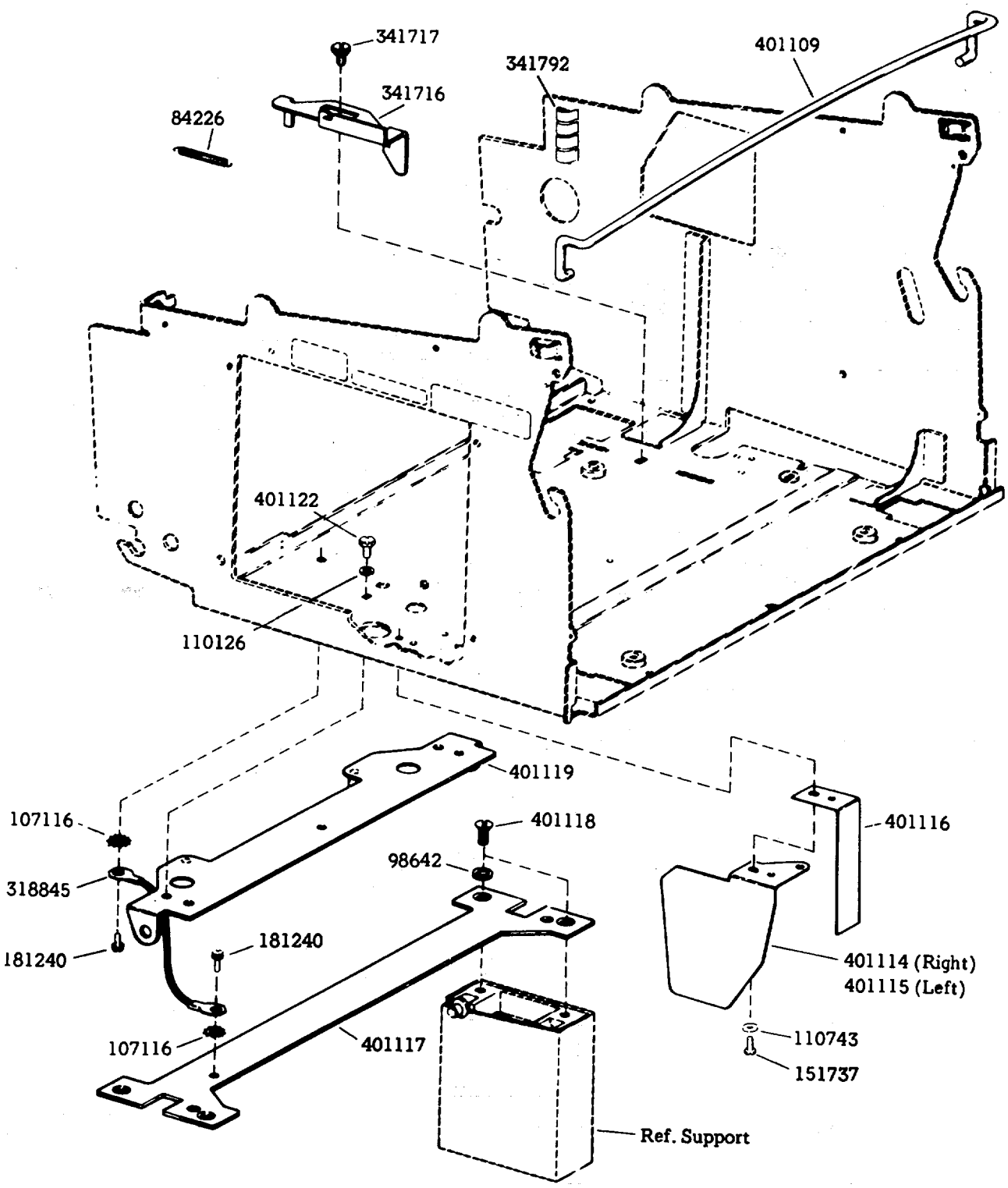
2. DISASSEMBLY/REASSEMBLY (Cont)

405703 AC Cable Assembly



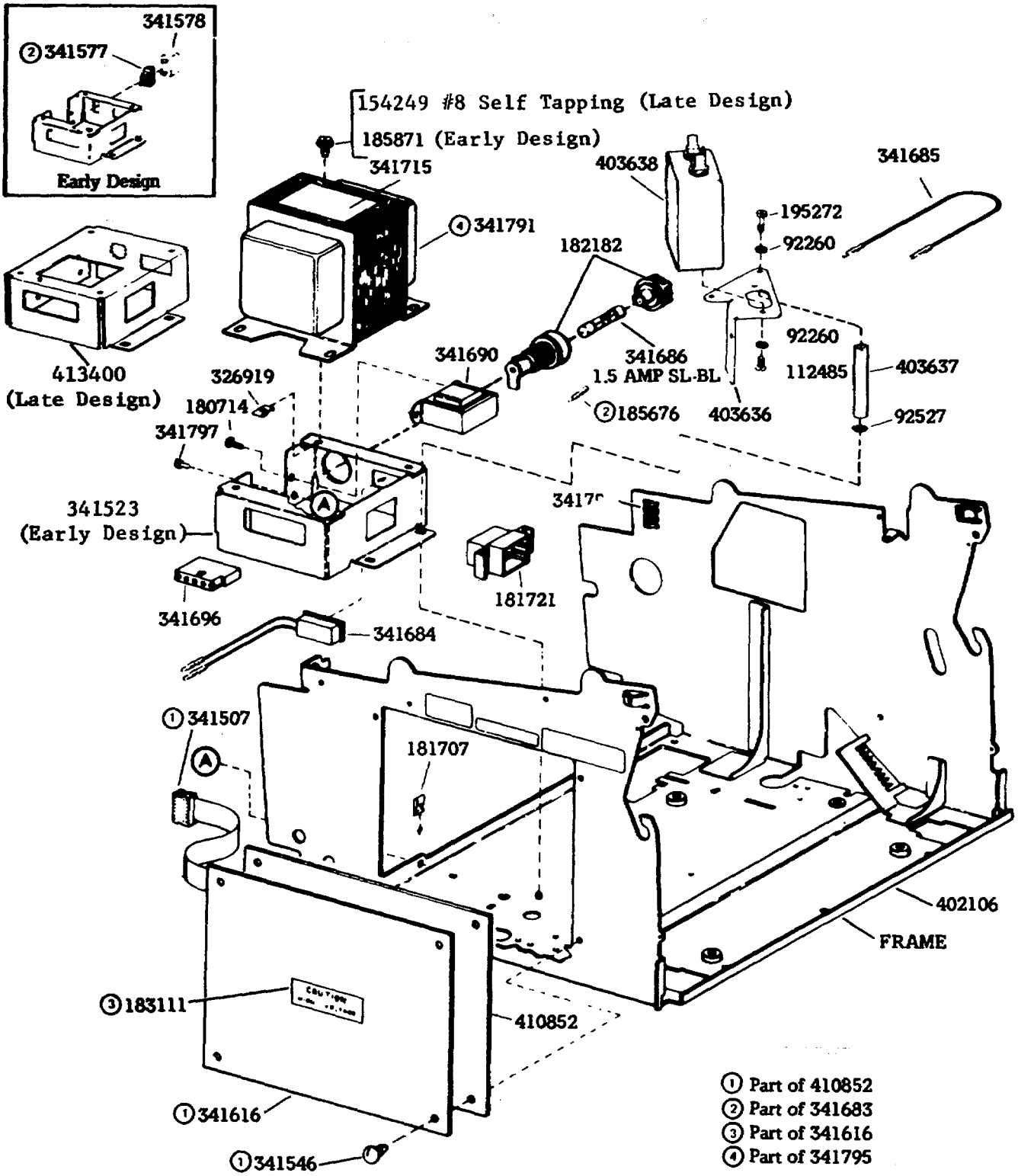
3. PARTS

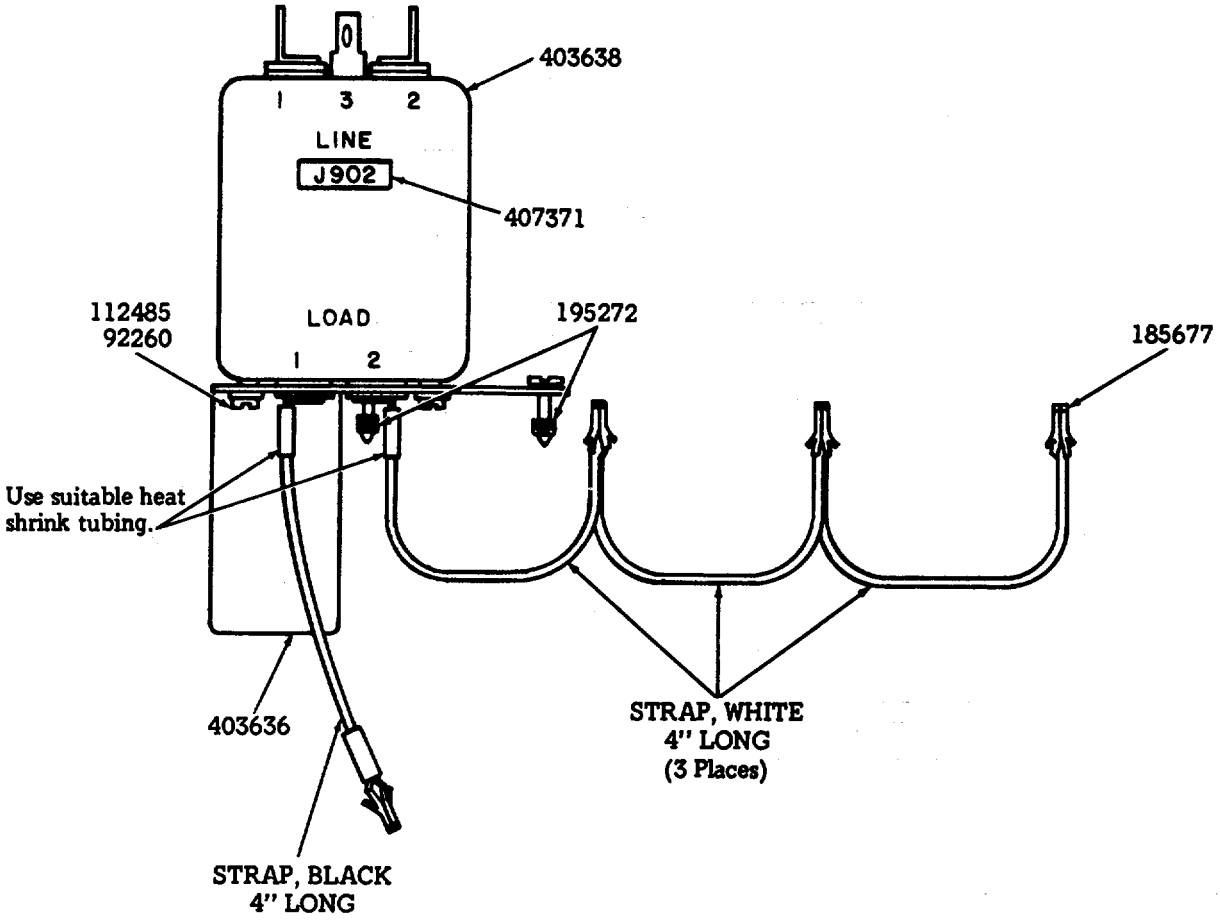
Frame Assembly



F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS, Frame Assembly (Cont)

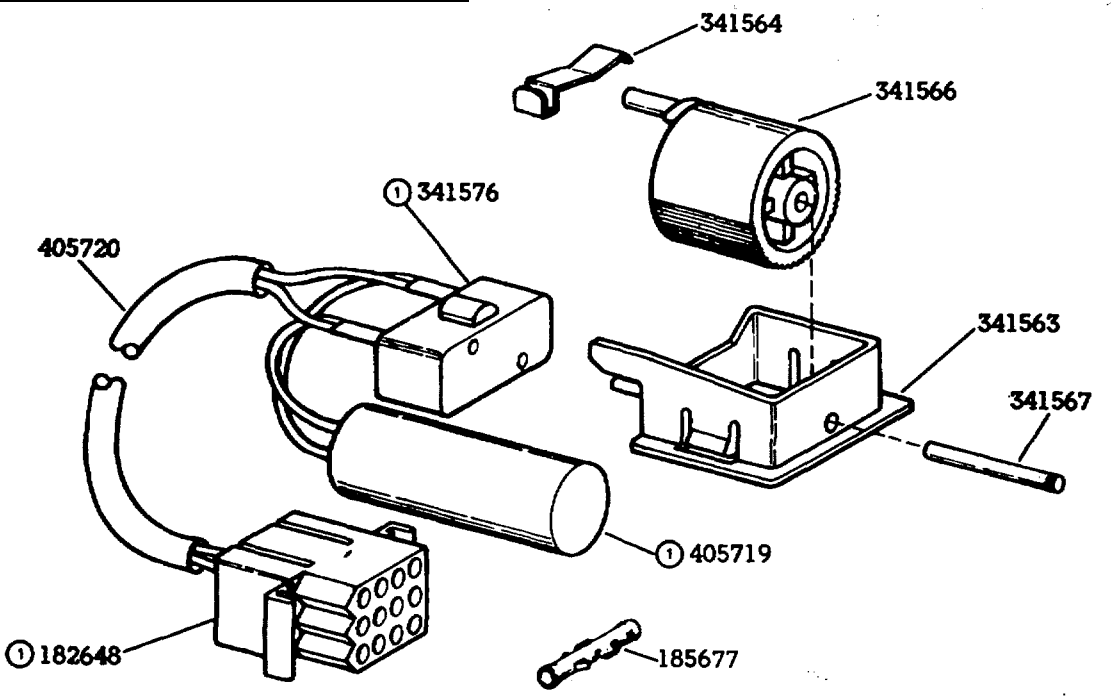



403638
1 3 2
LINE
J902
407371
112485
92260
LOAD
1 2
195272
185677
Use suitable heat
shrink tubing.
403636
STRAP, WHITE
4" LONG
(3 Places)
STRAP, BLACK
4" LONG

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

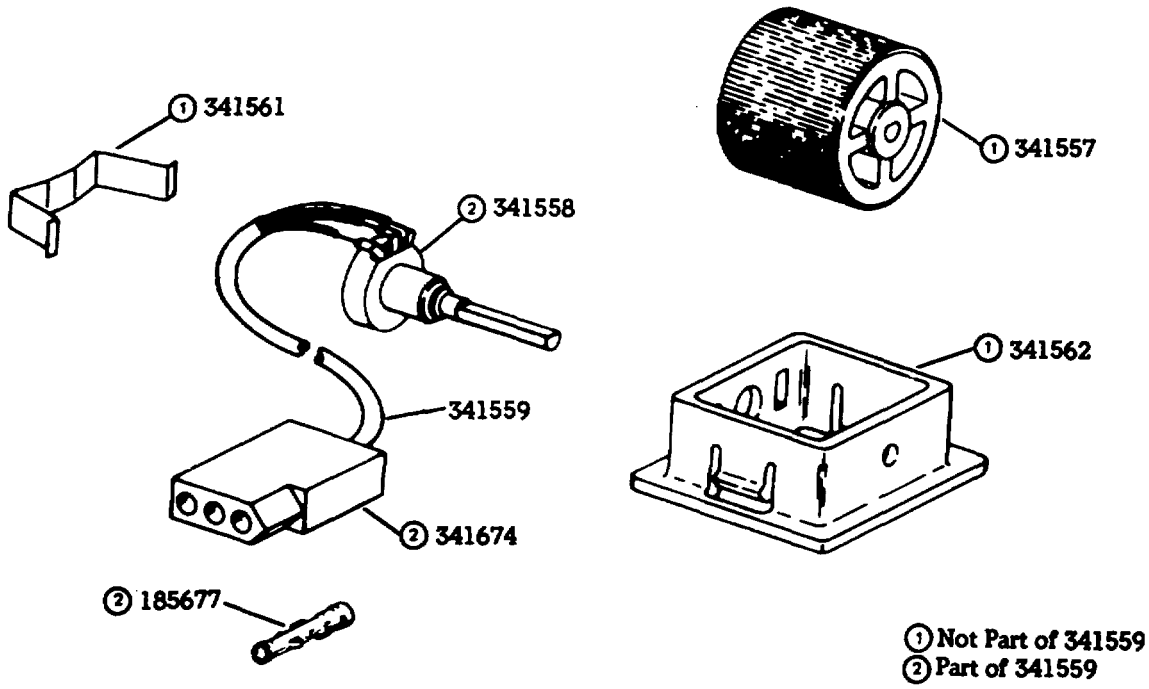
3. PARTS (Cont)

402120 Monitor Control Switch (On-Off) Assembly

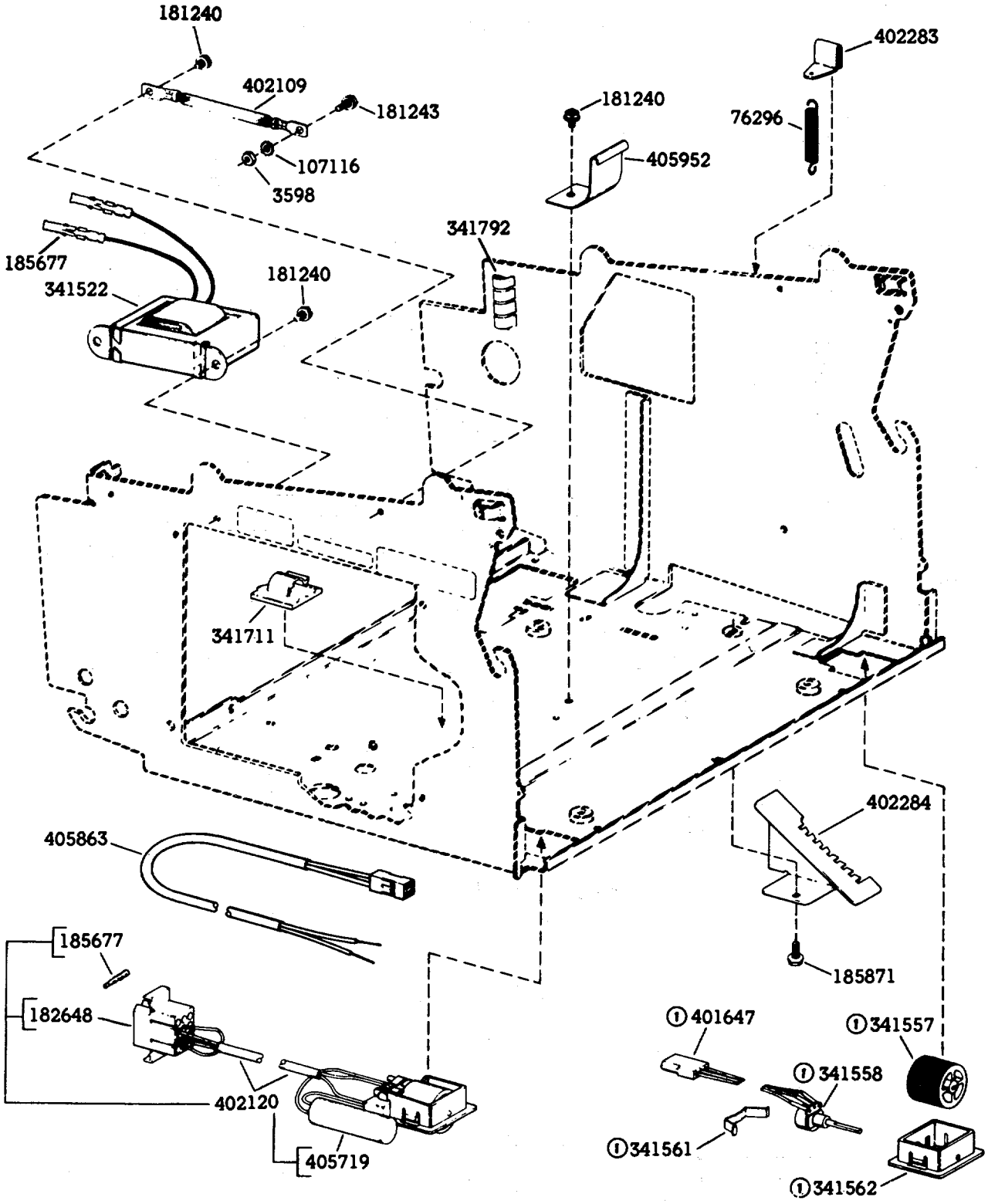


① Part of 405720 Cable Assembly

402118 Brightness Control Switch Assembly



① Not Part of 341559
② Part of 341559

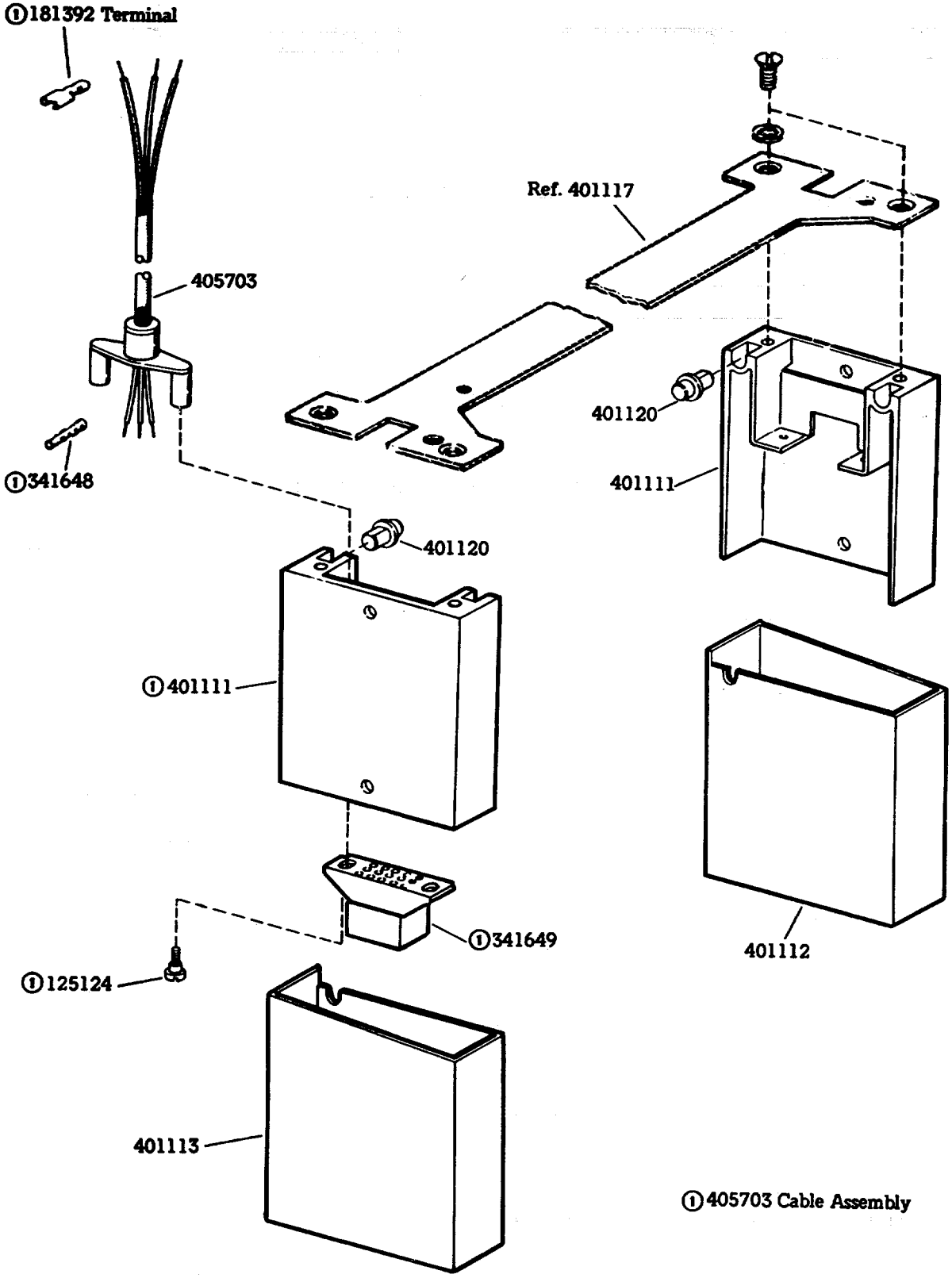


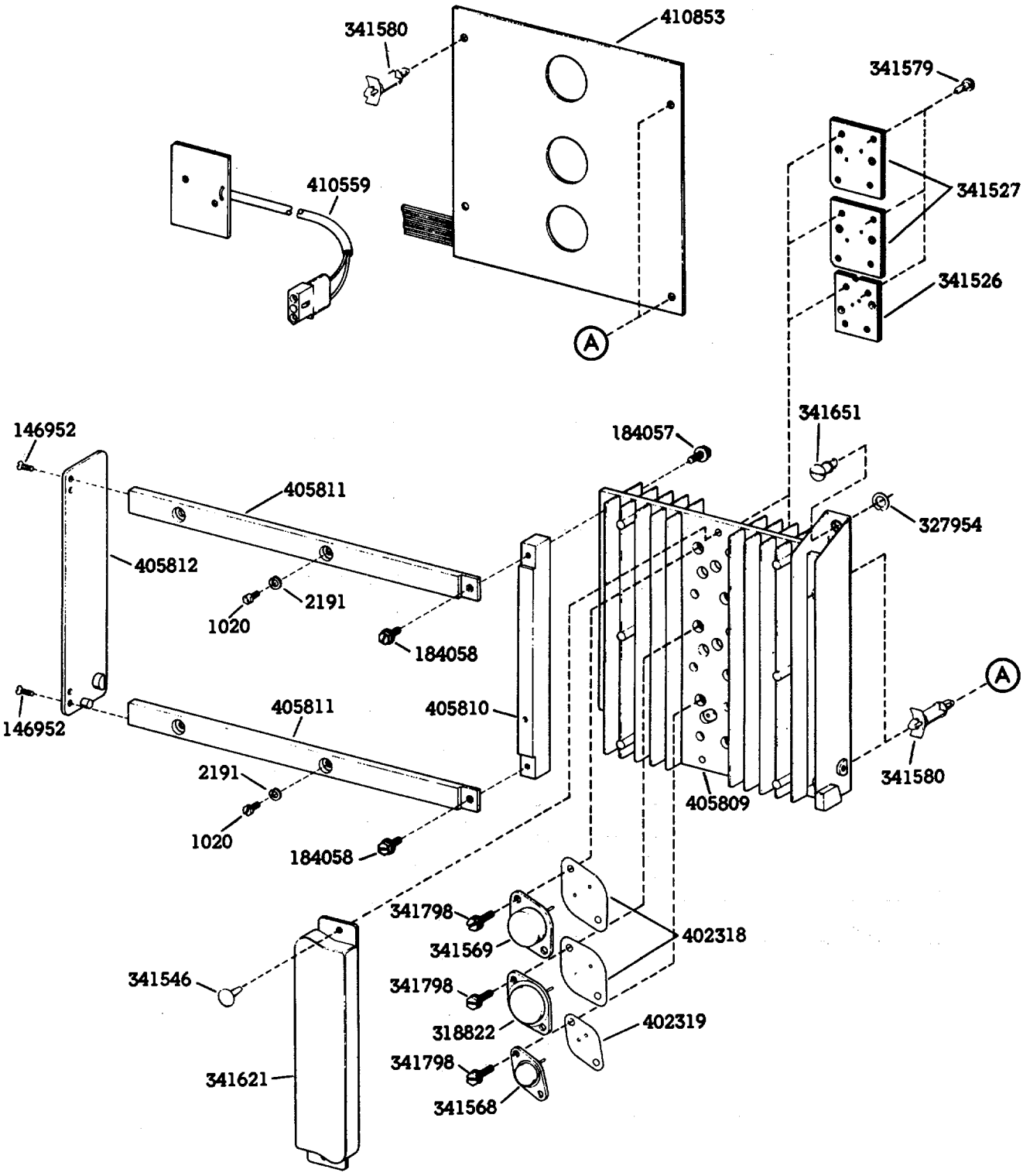
①402118 Cable Assembly

402286 MK

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

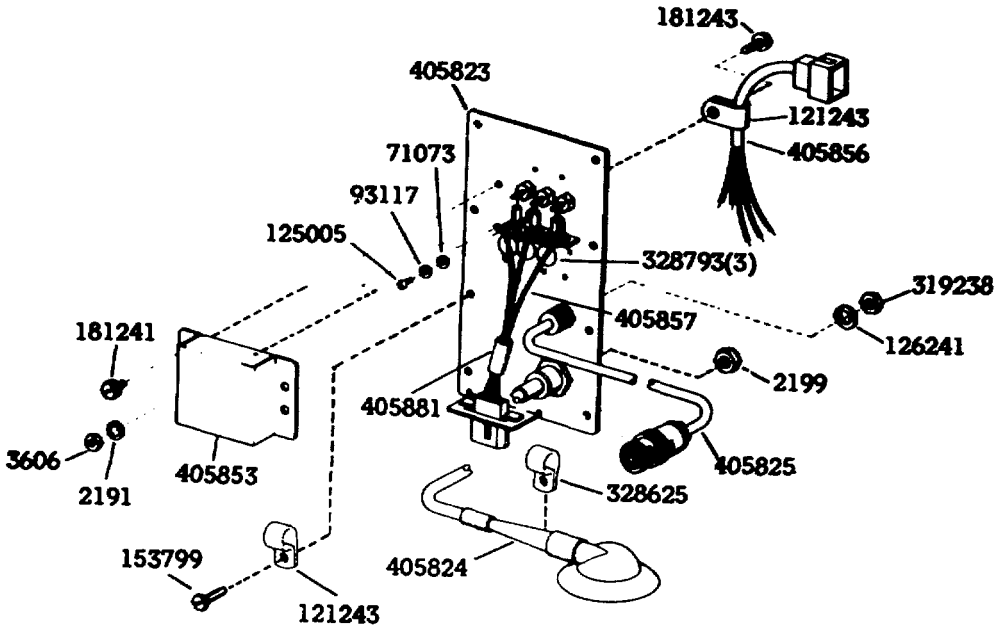




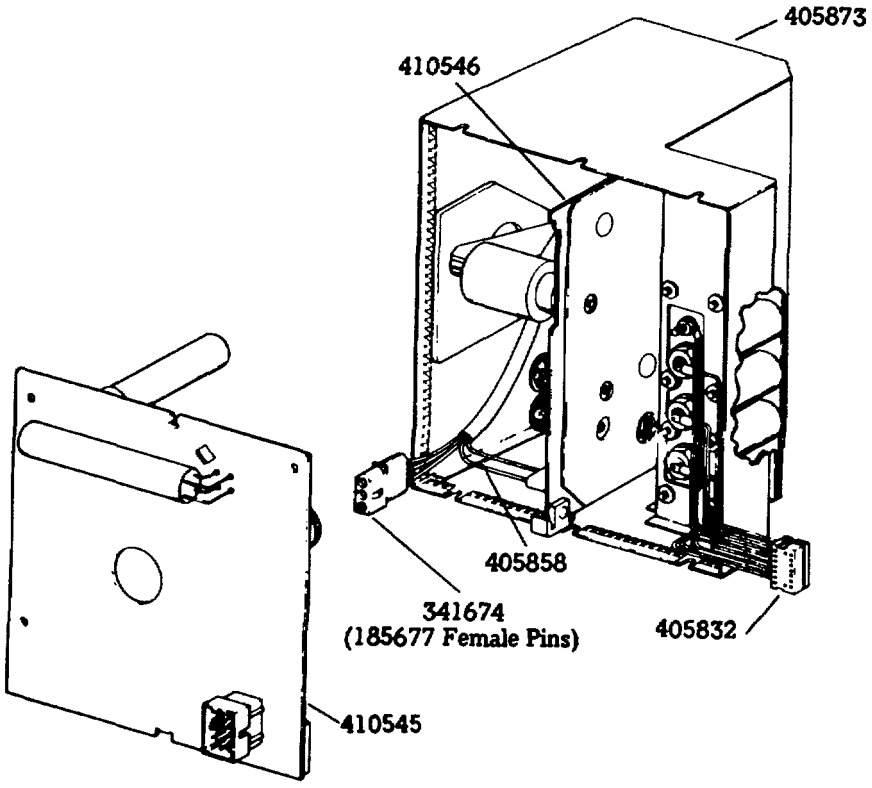
HEAT SINK ASSEMBLY

F. DISASSENBLY/REASSEMBLY AND PARTS (Cont)

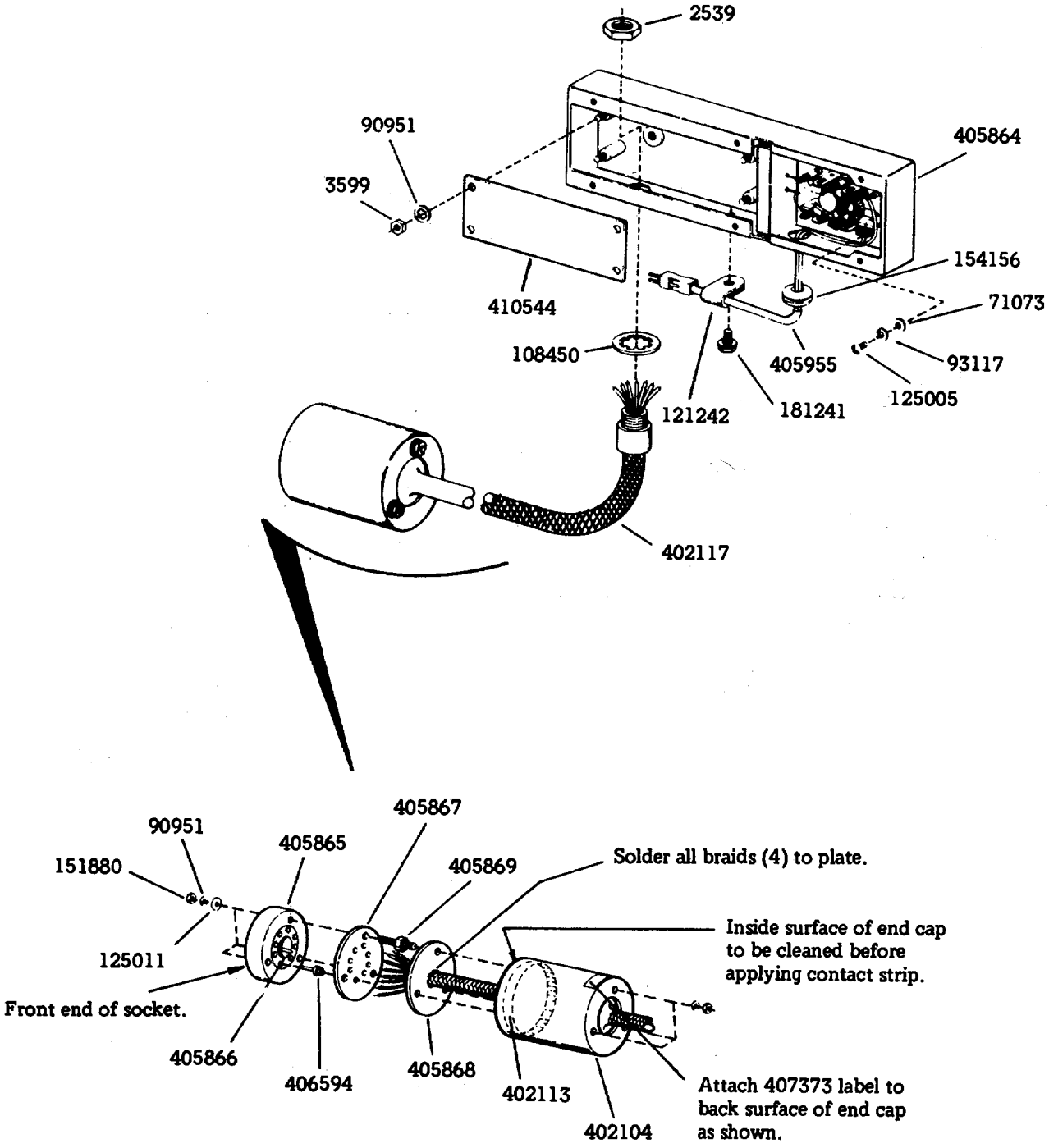
3. PARTS (Cont)



HIGH VOLTAGE PLATE ASSEMBLY (405859)



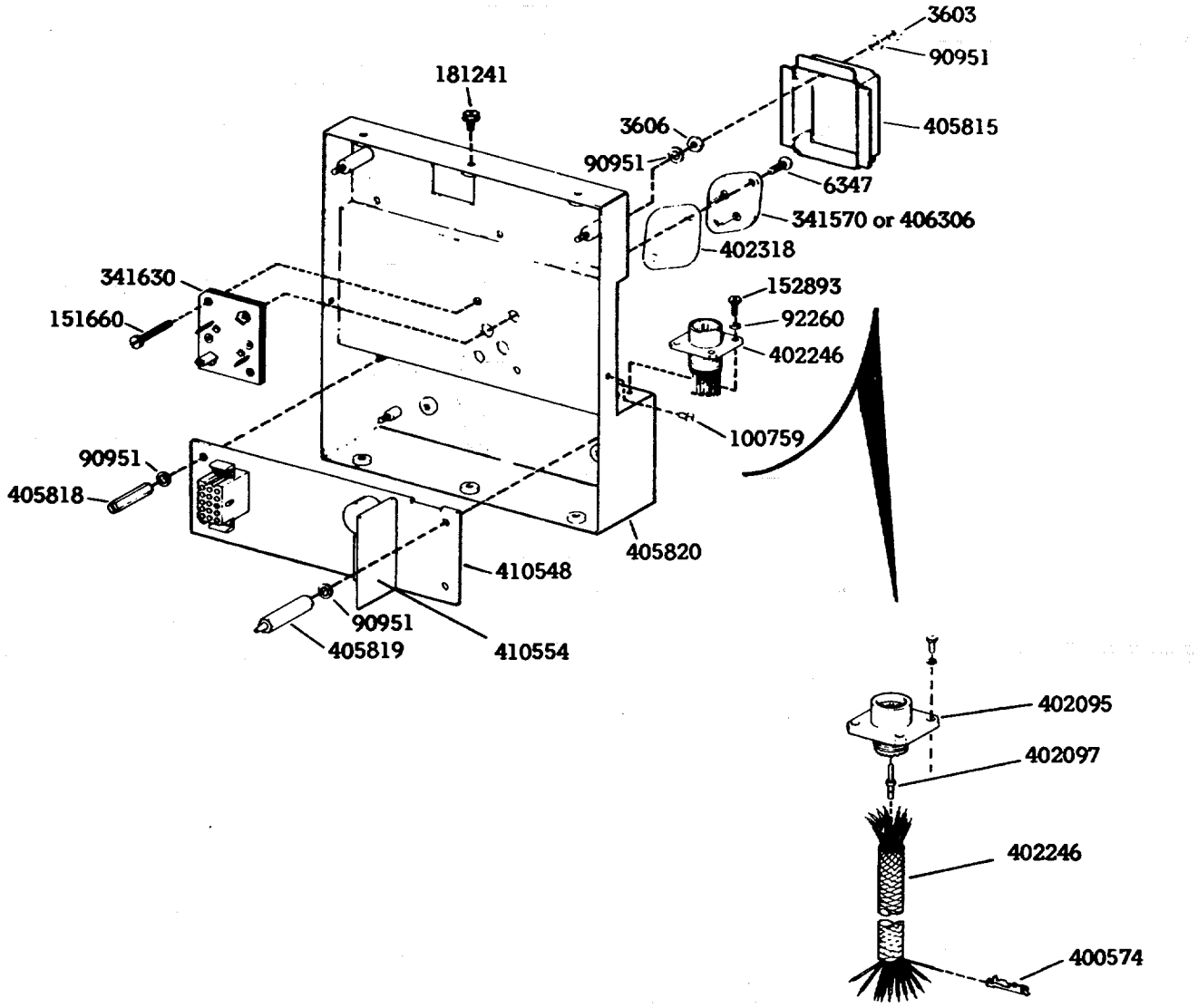
FRONT ENCLOSURE ASSEMBLY (405873)



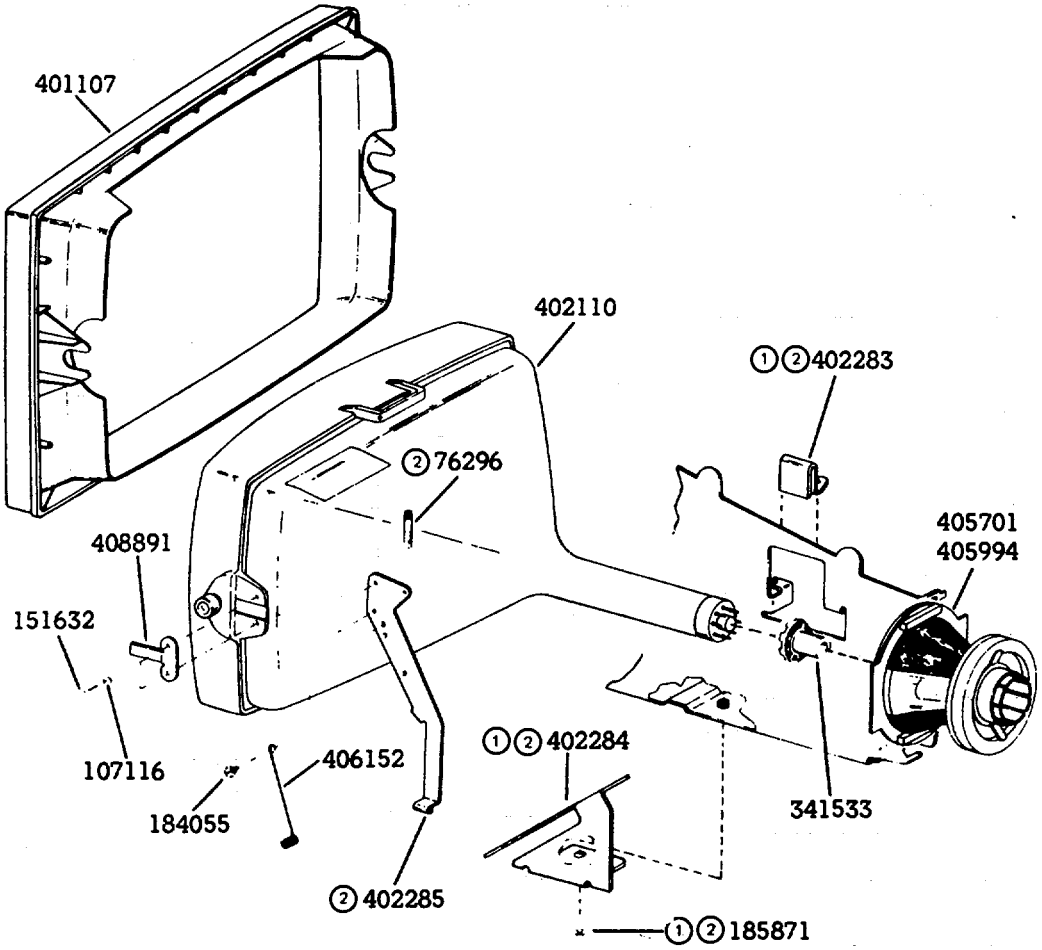
REAR COVER ASSEMBLY (405861)

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

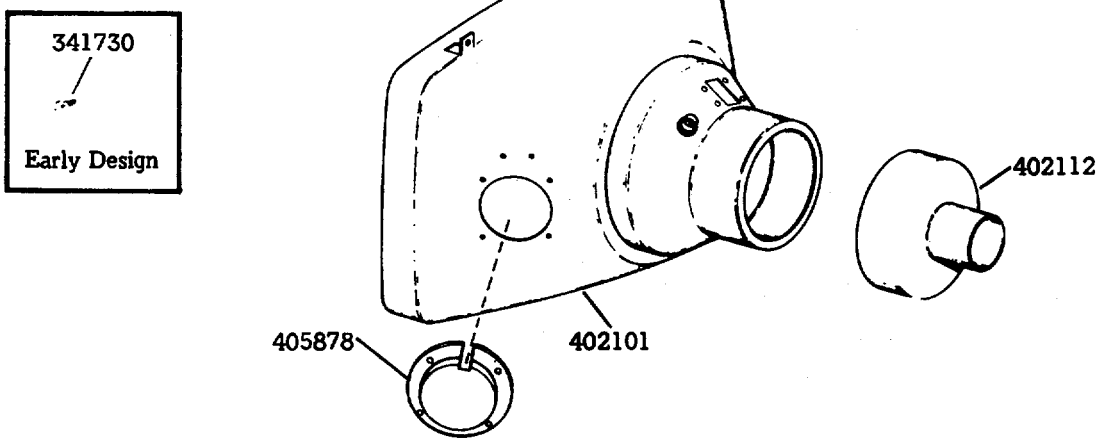


REAR ENCLOSURE ASSEMBLY



② Part of 402286 modification kit.

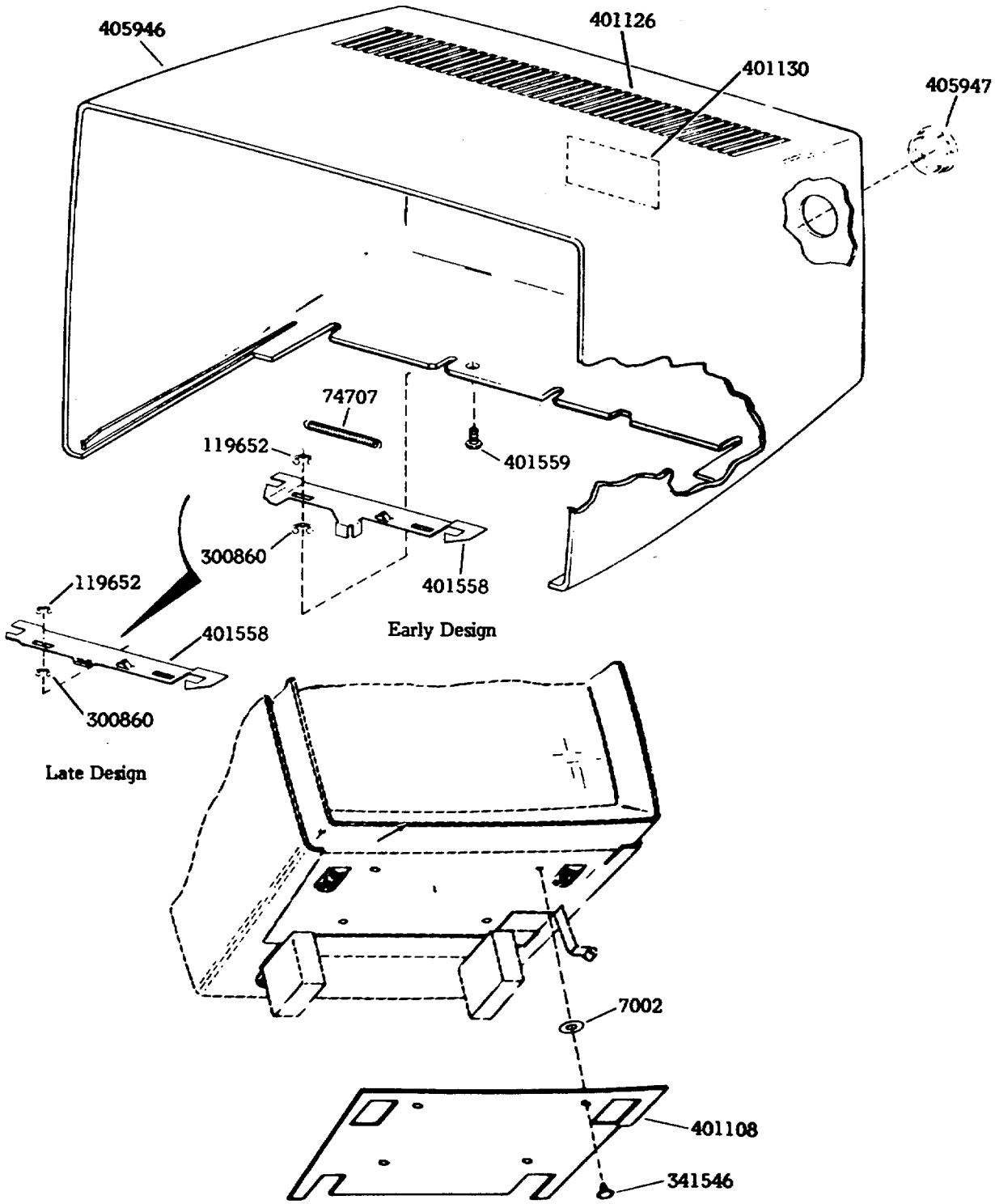
① New style chassis is redesigned such that these parts are not required.

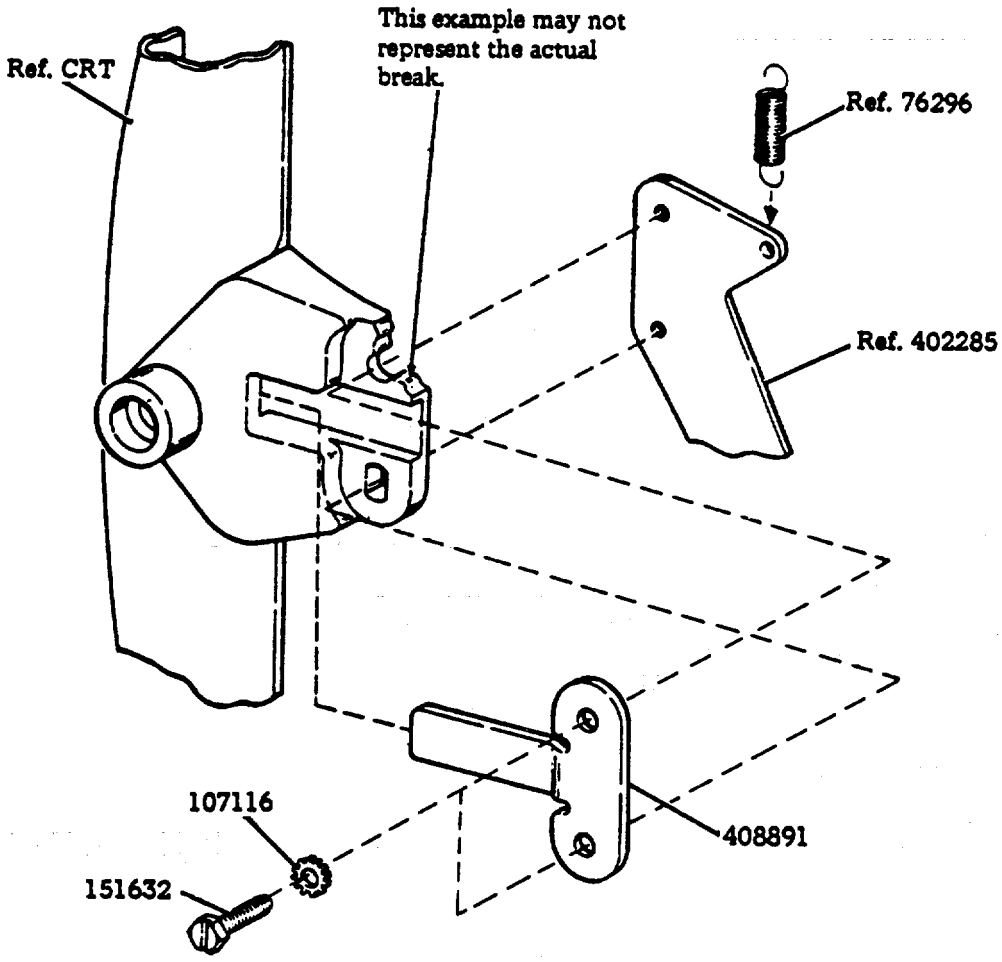


402286 MODIFICATION KIT TO REPLACE WHEEL-TYPE TUBE TILT MECHANISM WITH LEVER-TYPE

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)





408892 MODIFICATION KIT TO REPAIR 40-TYPE DISPLAY MONITOR CRT WITH BROKEN TILT LEVER MOUNTING TAB

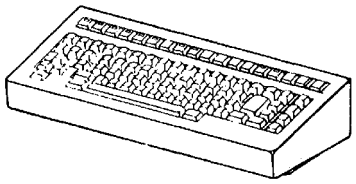
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

4. COMPONENT PARTS LIST

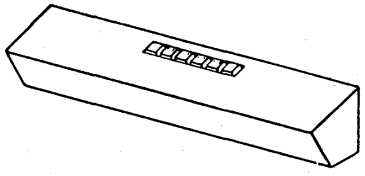
NOTE: When ordering replaceable parts or components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP410055).

Part Number	Description and Page Number
1020	Screw, 640 x 1/4 Hex 117
2191	Lockwasher 118
2199	Nut, 7/16-32 Hex 118
2539	Nut, 3/8-32 Hex 119
3598	Nut, 640 Hex 115
3599	Nut, 440 Hex 119
3603	Nut, 1/4-32 Hex 120
3606	Nut, 6-40 Hex 118, 120
6347	Screw, 6-32 x 3/8 RD 120
7002	Washer, Flat 122
71073	Washer, Flat 118, 119
74707	Spring 122
76296	Spring 115, 121, 123
84226	Spring 111
90951	Lockwasher 119, 120
92260	Lockwasher 112, 113, 120
92527	Lockwasher 112
93117	Lockwasher 118, 119
98642	Lockwasher 111
100759	Screw, 440 x 3/16 Flat 120
107116	Lockwasher 111, 115, 121, 123
108450	Lockwasher 119
110126	Lockwasher 111
110743	Lockwasher 111
112485	Screw, 6-32 x 1/4 Fil 112, 113
119652	Ring, Retainer 122
121242	Clamp, 8/8 ID Cable 119
121243	Clamp, 3/16 ID Cable 118
125005	Screw, 2-56 x 3/16 RD 118, 119
125011	Washer, Flat 119
125124	Screw, 440 Shoulder 116
126241	Lockwasher 118
146952	Screw, 440 x 3/8 Flat 117
151632	Screw, 640 x 3/8 Hex
121, 123	341526
151660	Screw, 640 x 7/8 Fill 120
151737	Screw, 440 x 11/64 Hex 111
151880	Nut, 440 Hex 119
152893	Screw, 440x 1/4 Hex 120
153799	Screw, 440 x 21/64 Hex 118
154156	Grommet, Rubber 119
180714	Screw, #6 Self-Tapping 112
181240	Screw w/Lockwasher, 6-40 x 3/18 Hex 111, 115
181241	Screw w/Lockwasher, 6.40 x 1/4 Hex 118, 119, 120
181243	Screw w/Lockwasher, 640 x 3/8 Hex 115, 118
181392	Terminal, Tab Type 116
181707	Nut, Speed 112
181721	Connector, 12 Pt Plug Type 112
182182	Holder, Fuse 112
182648	Connector, 12 Pt Receptacle Type 114, 115
183111	Label 112
184055	Screw w/Lockwasher, 640 x 3/16 Hex 121
184057	Screw w/Lockwasher, 640 x 3/8 Hex 117
184058	Screw w/Lockwasher, 6-40 x 7/16 Hex 117
185676	Terminal, Plug Type 112
185677	Terminal, Receptacle Type 113, 114, 115, 118
185871	Screw w/Lockwasher, 8-32 x 3/8 Hex 112, 115, 121
195272	Screw, 640 Spl 112, 113
300860	Ring, Retaining 122
318822	Transistor 117
318845	Jumper 111
319238	Nut, 12-32 Hex 118
326919	Nut, Speed 112
327954	Retainer, Split Ring 117
328625	Cable Assembly 118
328793	Capacitor, .001 MFD 118
341507	Cable Assembly 112
341522	Choke 115
341523	Bracket 112
	Socket Assembly 117
341527	Socket Assembly 117
341533	Base, CRT 121
341546	Fastener, Drive 112, 117, 122
341557	Wheel 114, 115
341558	Potentiometer 114, 115
341559	Cable Assembly 114
341561	Retainer, Spring 114, 115
341562	Container 114, !15
341563	Container 114
341564	Retainer, Spring 114
341566	Wheel 114
341567	Shaft 114
341568	Transistor 117
341569	Transistor 117
341570	Transistor 120
341576	Switch 114
341577	Socket, Fuse 112
341578	Fuse, 1.4A SL-BL 112
341579	Fastener 117
341580	Support, Circuit Card 117
341616	Insulator 112
341621	Cover 117
341630	Socket Assembly 120
341648	Terminal, Plug Type 116
341649	Connector 116
341651	Stud 117
341674	Connector, 3 Pt Receptacle 114,118
341683	Socket, Fuse 112
341684	Lamp Assembly, Neon 112
341685	Strap 112
341686	Fuse, 1.5A SL-BL 112
341690	Transformer 112
341696	Connector,5Pt Receptacle 112
341711	Clamp, Cable 115
341715	Lable 112
341716	Latch 111
341717	Screw, 8-32 Shoulder 111
341730	Screw, 640 Shoulder 121
341791	Transformer 112
341792	Finger 111, 112, 115
341795	Distribution Assembly, Power 112
341797	Screw w/Lockwasher, 6-32 x 5/16 Hex 112
341798	Screw w/Lockwasher, 6-32 x 9/16 Hex 117
400574	Terminal, Plug Type 120
401107	Mask, Monitor 121
401108	Plate, Bottom 122

PART 5 - TEMPEST MODEL 40 OPCONS



40K103 and 40K108 KD Opcons
(With Keyboard)



40K002 RO Opcon
(Without Keyboard)

INDEX PAGE

PART 5 -TEMPEST MODEL 40 OPCONS
A. GENERAL

1. DESCRIPTION

KR. Opcon

The KD Opcon is a keytop actuated device for manually generating data and operational mode information in the form of coded signals. The KD opcon also functions to receive and indicate (lighted keytops) status codes or sound (internal tone generator) alarm codes. Interface with other Model 40 components is by means of separate controller logic.

The KD Opcon consists of one or two circuit cards mounting the integrated and discrete component logic, keytop associated keyswitches, tone generator and necessary cabling, hardware and covers. A 9-pin connector is provided for interfacing with the Model 40 controller.

RO Opcon

The 40K002 RO Opcon is a keytop actuated device for manually selecting certain operating modes of receive-only printer sets. Selection is by direct keyswitch make-break operation in contrast to the keyswitch code generating capabilities of the KD opcon. Status of the various modes is indicated by lighted keytops.

The RO opcon consists of a frame mounting the keytop associated keyswitches, necessary hardware and covers, and cabling terminated by a 9-pin connector for interfacing with the Model 40 controller.

2. TOOLS AND TEST EQUIPMENT

Tools

The tools listed below are supplementary to common types such as pliers, screwdrivers, etc, and may be ordered from Teletype Corporation using the part number shown. Tools listed without a Teletype part number may be procured locally.

NOTE: When ordering parts, prefix each number with the letters "TP" unless specified otherwise.

Description	Part No.
• Spring Hook (Pull)	75765
• 1/4 Inch Nut Driver Wrench	89954
• Keyswitch Extractor Tool	346257
• Keytop Extractor Tool	346260
• Cable Assembly (Interface and Bell Card Extractor) (2 required)	346274
• Static Discharge Strap	346392
• Cable Extender (Opcon Extender - 6 Ft)	401641
• Terminal Extractor Tool	402840
• Terminal Insertion Tool, Molex HT-1807, or equivalent (procure locally)	
• Soldering Iron, Weller Model W-MCP-750 with MP2C Tip, or equivalent (procure locally)	
• Desoldering Tool, EDSYN Model MMS005 Soldapullt®, or equivalent (procure locally)	

Test Equipment

The following equipment is required for testing and troubleshooting the KD Opcon. This equipment, or equivalent substitutes, should be procured locally.

- Triplett Model 630APL Multimeter
- Tektronix Model 7904 Oscilloscope e/w:
  2 - -7A16A Single Trace Amplifiers
  1 - -7B70 Time Base Unit

Miscellaneous

Items a. through d. may be procured locally. Item e. should be ordered from Teletype Corporation.

a. Refined Mineral Spirits
b. Wiping Cloths, Soft, Lint-Free
c. 1/2-Inch Nylon-Bristle Paint Brush
d. Thermal Joint Compound, Wakefield Engineering No. 340, or equivalent
e. Grease, 4-Ounce Tube 97116

B. SHOP PROCEDURES

1. GENERAL INFORMATION

This section details the cleaning, refinishing and inspection procedures to be followed prior to testing and troubleshooting the opcon unit. In many cases careful inspection, in particular, will save later troubleshooting by revealing broken or loose connections, damaged components, possible short circuits, etc.

Refer to Page 5-121,F. DISASSEMBLY/REASSEMBLY AND PARTS whenever detailed information on removing opcon components is required.

CAUTION: TO AVOID POSSIBLE INTERNAL DAMAGE TO THE MOS DEVICES OR CIRCUIT CARDS WITH MOS DEVICES DUE TO ELECTRICAL STATIC DISCHARGE BY SERVICE PERSONNEL, FOLLOW THE HANDLING AND GROUNDING PROCEDURES ON PAGE 5-64, 1. GENERAL.

Refer to Page 5-6, 4. CONVERSIONS for keytop locations and part numbers when a change from one standard keytop arrangement to another is desired.

The packing materials detailed in this section are designed for protection against damage from rough handling in shipping.

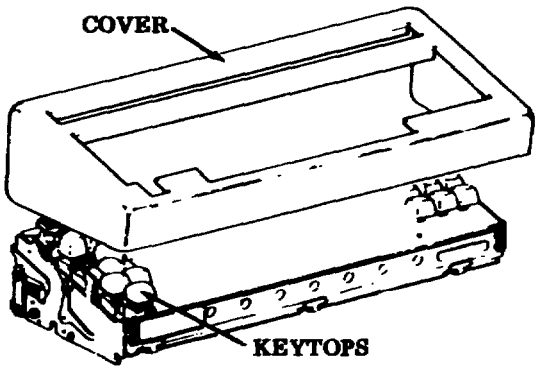
2. CLEANING AND REFINISHING Immersion type cleaning is not recommended for the KD or RO opcon units.

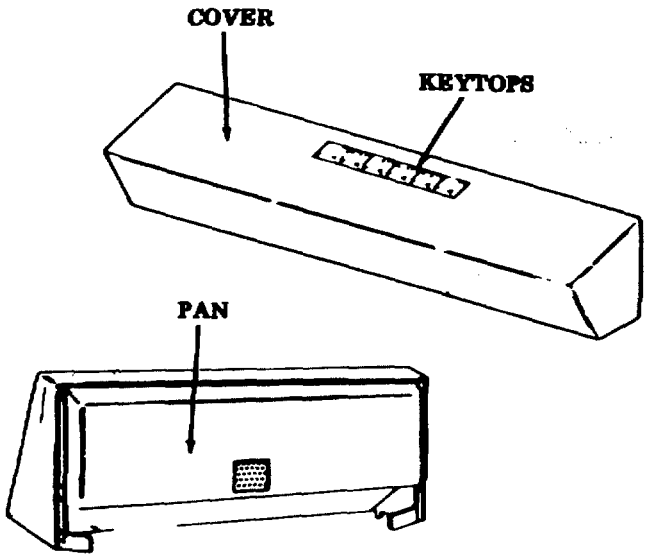
CAUTION: AVOID THE USE OF HARSH OR ABRASIVE CLEANING AGENTS, OR SOLVENTS WHICH COULD SCRATCH OR DAMAGE THE EXTERIOR PLASTIC COVER OR KEYTOPS.

B. SHOP PROCEDURES (Cont)

2. CLEANING AND REFINISHING (Cont)

Exterior





Clean all indicated surfaces as follows:

Cover (Removed From Opcon)

Wash with mild detergent solution.

Rinse with damp cloth.

Buff dry with soft cloth.

Keytops (Removed Frotr Opcon)

Place keytops in dipping basket or other mesh container.

Immerse basket in mild detergent solution and agitate for 1 or 2 minutes.

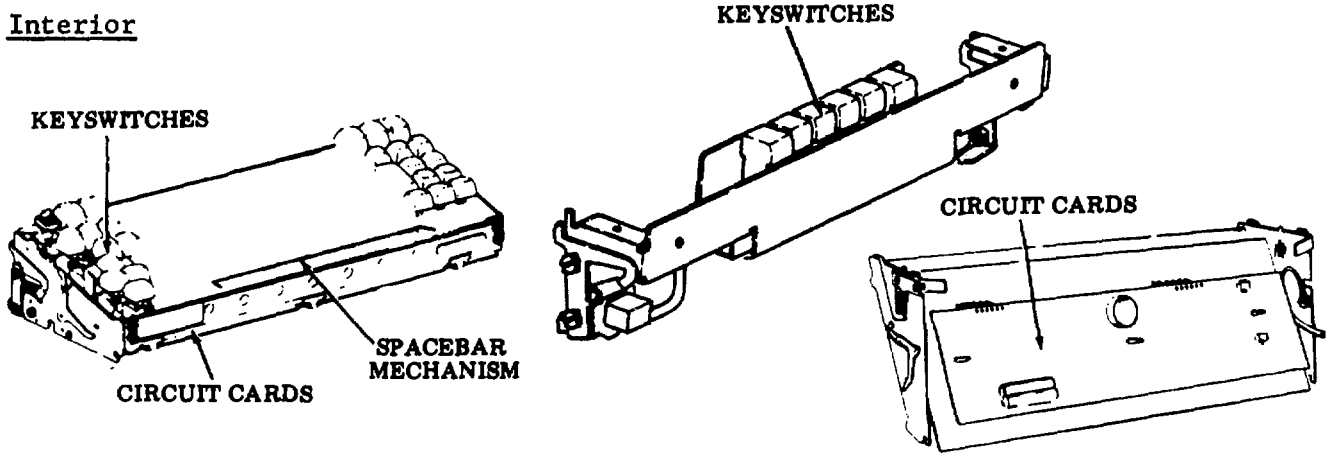
Rinse keytops with clean hot water (140°F).

Remove keytops from basket and air dry or buff dry with clean soft cloth.

Before keytops are reinstalled, clean the opcon interior as specified on Page 5-5, Interior.

Pan (Removed From Opcon)

Wipe off metal pan with a soft cloth dampened with refined mineral spirits.



Clean the interior area, keyswitches, circuit cards, and other components by lightly brushing with a clean dry 1/2-inch paint brush followed by air blowing.

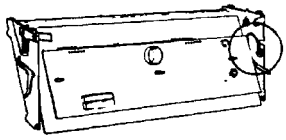
CAUTION: THE AIR SUPPLY SHOULD NOT EXCEED 20 P,S.I. HIGHER AIR PRESURES MAY DAMAGE SMALL COMPONENTS.

Reinstall the keytops in accordance with the arrangements detailed on Page 5-6, 4. CONVERSION! of this section. Replace any damaged or illegible keytops. Leave the cover ant pan off at this time to facilitate inspection.

3. INSPECTION

Internal Inspection

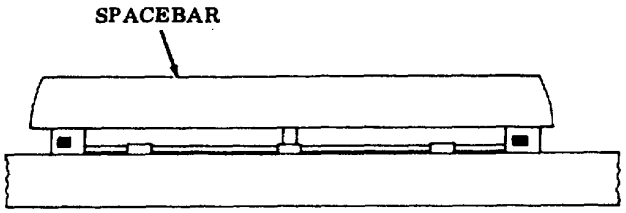
Remove the cover and pan, if not already removed, and visually check general condition of opcon, replacing any damaged components.



Verify continuity of green ground strap between opcon connector pin 9 and the opcon frame.

Examine the 9-pin connector located at the left rear side of the opcon for dirty, loose, bent, broken, or missing pins.

Check for presence of audible click when each key is depressed (except CAPS LOCK) and when each key is released. A second click should be heard when repeat keys are depressed fully and click again when released.



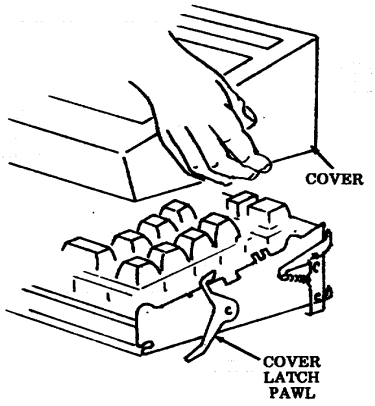
Check mechanical operation of the CAPS LOCK key. This key should latch down when depressed and release when depressed again. (Remove blocking keytop, if present, to check.) Check mechanical operation of spacebar mechanism. The spacebar should return to its unoperated position freely when depressed and released slowly. Replace cover and pan.

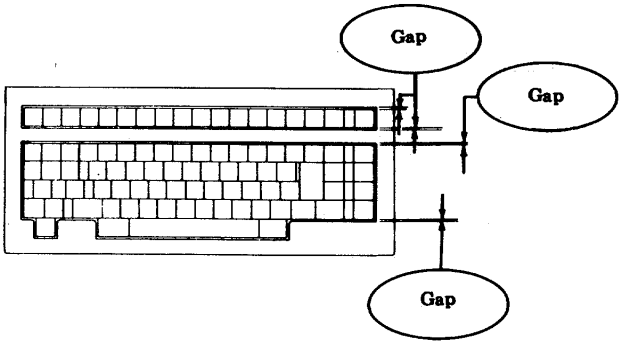
B. SHOP PROCEDURES (Cont)

3. INSPECTION (Cont)

External Inspection

Replace the KD opcon cover. The cover latch pawls should operate freely and when latched should securely hold cover to console frame.





Check clearance between cover and keytop on the KD opcon. The gap should be approximately equal in four places as shown. Make Cover-to-Keytop adjustment (Page 5-121) if any keytops are found rubbing against cover.

4. CONVERSIONS

Conversions from one KD opcon keyboard arrangement to another is accomplished in the following ways:

a. Disabling certain mode selection by substituting blank blocking keytops for keytops having descriptive designations.

b. Enabling certain mode selection by substituting keytops with descriptive designations for blank blocking keytops.

Keyboard arrangements are directly related to the various Model 40 set arrangements relative to selectable controller and/or printer options. The variable keytops involved are shown and described.

Arrangements for 40K103 Opcon

RCA

This arrangement used on Tempest KD Sets.

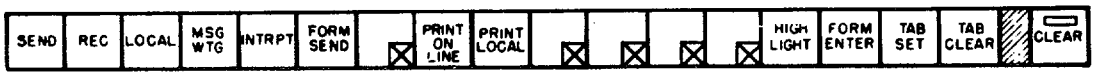
RCB

This arrangement used on asynchronous or isochronous Tempest KDP Sets.

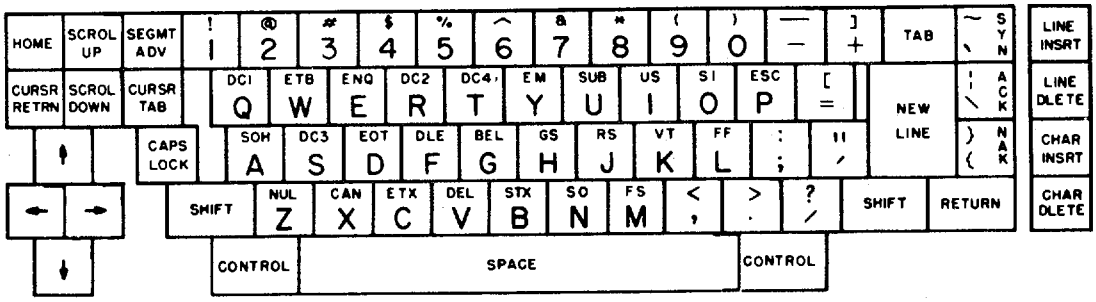
RCC

This arrangement used on Tempest KP Sets.

RCD



This arrangement used on synchronous Tempest KDP Sets.



Indicates 340701 blocking keytop.

All 40K103 KD Opcons have the same typewriter field, cursor controls and editing features keytop arrangement.

B. SHOP PROCEDURES (Cont)

4. CONVERSIONS (Cont)

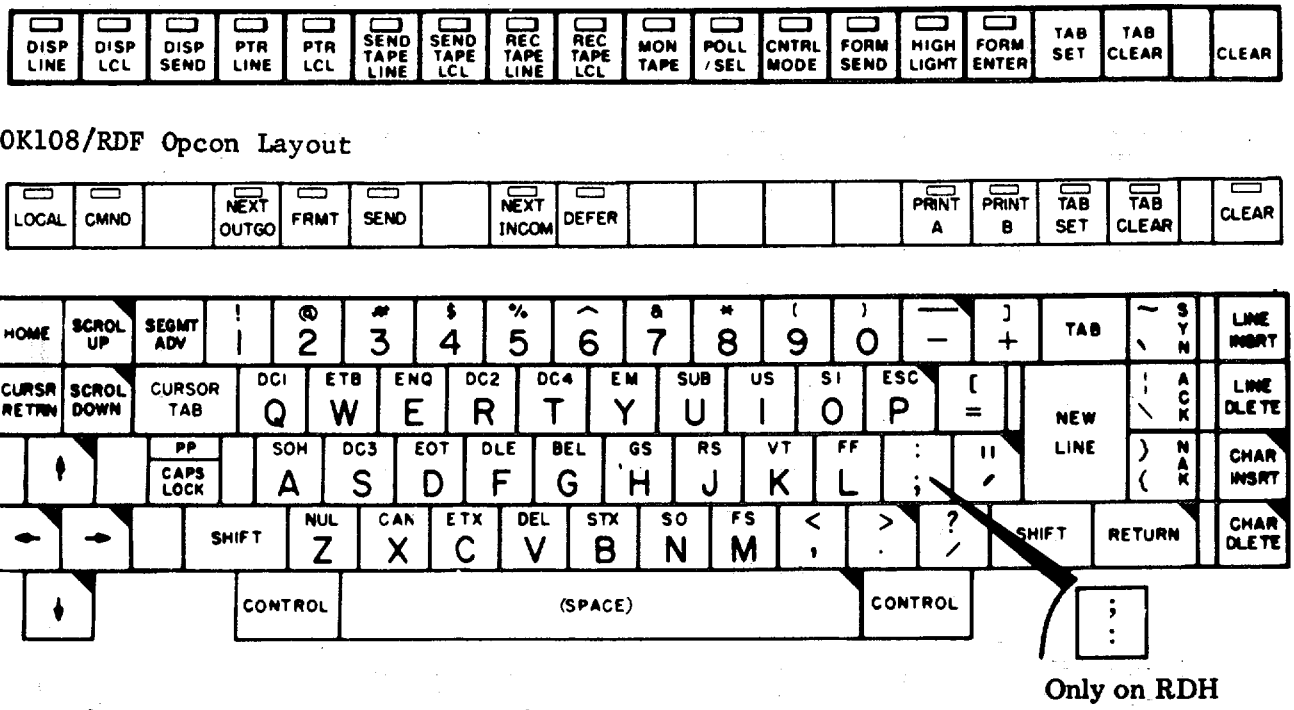
4OC103 -- CONTROL KEYTOPS

KEYTOP	TP PART NUMBER	USED ON KEYBOARD ARRANGEMENT			
		RCA	RCB	RCC	RCD
SEND	346100	X	X	X	X
REC	346101	X	X	X	X
LOCAL	346102	X	X	X	X
S/R	346103	X	X		
INTRPT	346106	X	X		X
FORM SEND	346121	X	X		X
OPT II	346124	X	X	X	
PRINT ON LINE	346104	X	X		
PRINT LOCAL	346105	X	X		
PARITY ERROR	346126	X	X	X	
TERM READY	346127	X	X	X	
KBD OVRN	346159	X	X	X	
CLEAR TO SEND	346158	X	X	X	
HIGH LIGHT	346107	X	X		X
FORM ENTER	346108	X	X		X
TAB SET	346110	X	X		X
TAB CLEAR	346111	X	X		X
CLEAR (TST)	405933	X	X		X
BLANK (TST)	405935			X	
MSG WTG	346123				X

Arrangements for 40K108 Opcon

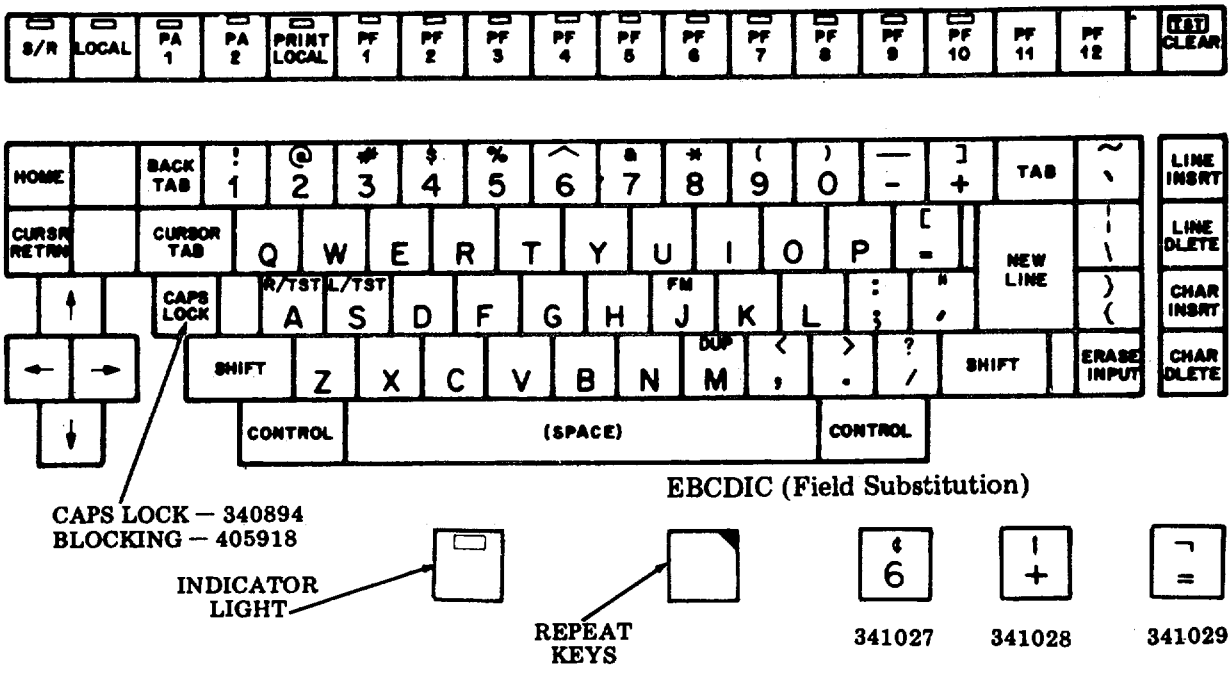
40K108/RDE or 40K108/RDH Opcon Layout

Have the same typewriter field, cursor controls and editing controls as a 40K108/RDF.



40K108/RDF Opcon Layout

40K108/RDG Opcon Layout -- ASCII (Factory Installed)



B. SHOP PROCEDURES (Cont)

4. CONVERSIONS (Cont)

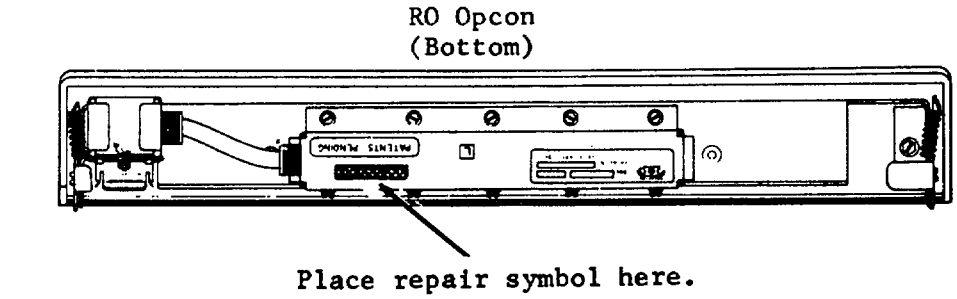
40C108 -- CONTROL KEYTOPS

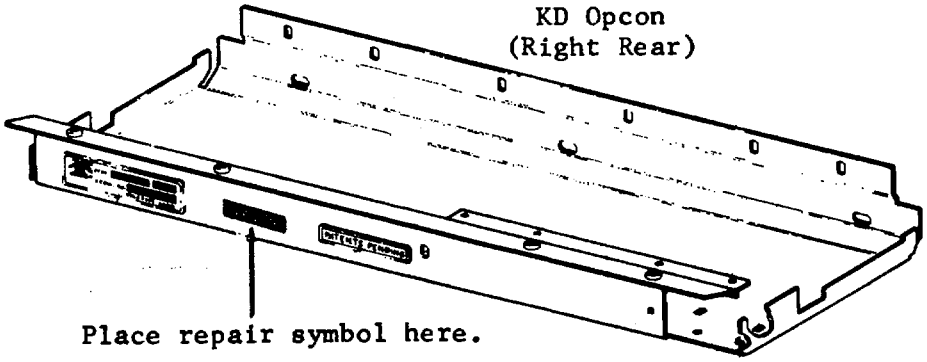
KEYTOP	TP PART NUMBER	USED ON KEYBOARD ARRANGEMENT			
		RDE	RDF	RDG	RDH
SEND	346100		X		
LOCAL	346102		X	X	
S/R	346103			X	
FORM SEND	346121	X			X
PRINT LOCAL	346105			X	
HIGH LIGHT	346107	X			X
FORM ENTER	346108	X			X
TAB SET	346110	X	X		X
TAB CLEAR	346111	X	X		X
DISP LINE	346170	X			X
DISP LCL	346171	X			X
DISP SEND	346172	X			X
PTR LINE	346173	X			X
PTR LCL	346174	X			X
SEND TAPE LINE	346175	X			X
SEND TAP LCL	346176	X			X
REC TAPE LINE	346177	X			X
REC TAPE LCL	346178	x			X
MON TAPE	346179	X			X
POLL/SEL	346180	X			X
CNTRL MODE	346181	X			X
CMND	346182		X		
NEXT OUTGO	346183		X		
FRM	346184		X		
NEXT INCOM	346185		X		
DEFEC	346186		X		
PRINT A	346187		X		
PRINT B	346188		X		
PAl	346863				X
PA2	346864				X
PF1 - PF1O	346865-874				X
PF11	346877				X
PF12	346878				X
CLEAR (TST)	405933	X	X	X	X

5. MARKING AND PACKING

Marking

For record keeping purposes, the repair date may be marked on the opcon frame in a manner similar to that detailed below.





Packing

Factory-type packing may be duplicated by ordering the required PK materials from Teletype Corporation and applying, as follows.

Materials Required for KD Opcon

Qty		Qty	
1	9526PK Corrugated Carton	1	21307PK Muslin Bag
1	28164PK Set of Polystyrene Details		21719PK Tape (as required)
1	TC-135 Instruction Sheet		21632PK Tape (as required)
1	23456PK Plastic Bag		21480PK Tape (as required)
1	27643PK Label		

(1) Place spare keytops in a 21307PK muslin bag and set aside.
(2) Place a 28164PK detail "A" base on work bench. Place muslin bag containing keytops in cavity provided.
(3) Remove KD opcon cover, if late design 28164PK packing details are used.
(4) Place unit in a 23456PK plastic bag. Place a TC-135 instruction sheet in bag on top of keytops. Close open end of bag and secure with a strip of 21480PK tape.

B. SHOP PROCEDURES (Contd)

5. MARKING AND PACKING, Packing (Contd)

(5) Place a 28164PK detail "B" cover over keyboard and place KD keyboard cover in cavity provided in late design 28164PK detail "B".

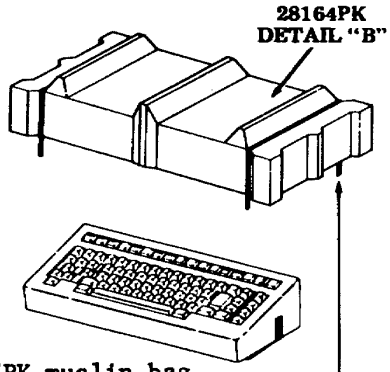
(6) Secure 28164PK detail "A" base to detail "B" cover with a band of 21632PK tape applied girthwise around each end of plastic details.

(7) Form a 9526PK carton. Close bottom flaps and seal center seam with a strip of 21719PK tape. The tape should extend approximately three inches down ends of carton.

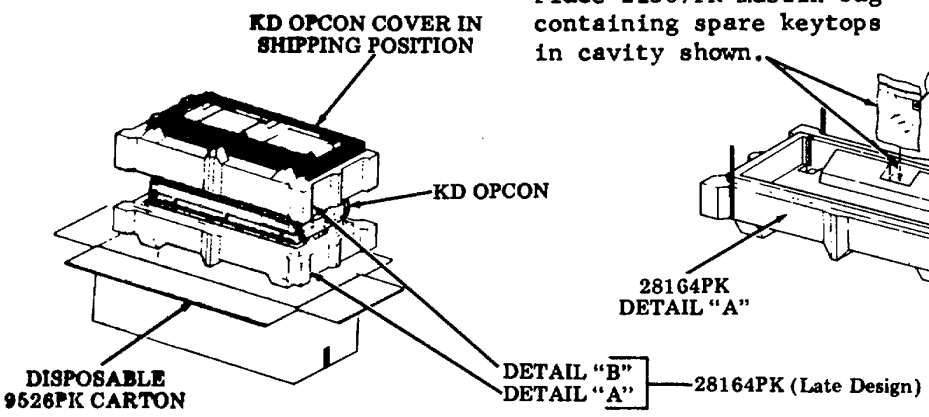
(8) Place prepacked unit in carton. Close top flaps of carton and seal as outlined in (7).

(9) Moisten and apply a 27643PK label to upper left-hand portion of top of carton.

Early Design Packing Detail



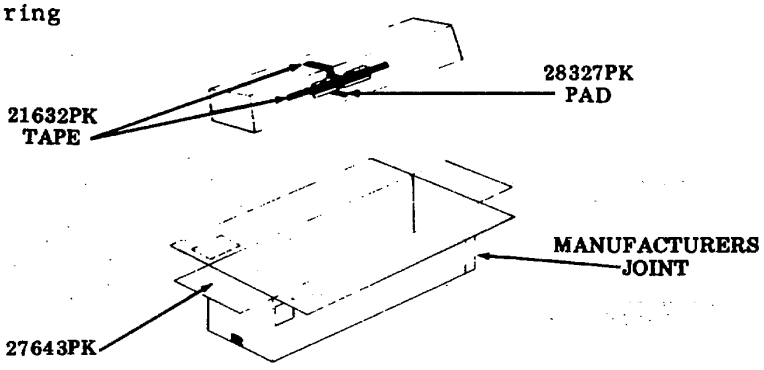
Late Design Packing Details



Material Required for RO Opcon

21632PK Tape	1 28327PK Pad
12719PK Tape	1 27643PK Carton
21480PK Tape	27952PK Air Cap Covering

NOTE: 23456PK plastic bag not shown.



(1) Form an 8762PK carton. Close and seal bottom flaps with a strip of 21719PK tape applied to the center seam and extending three inches down the ends of the carton.

(2) Place one 28327PK corrugated pad on top of the keytops. Tape securely to keyboard with two pieces of 21632PK tape (one piece across the length and one piece across the width of the pad).

(3) Cut a seventy six inch long piece of 27952PK air cap and place on bench.

(4) Place unit with open end down lengthwise on center of air cap approximately six inches from the end.

(5) Wrap the unit lengthwise and tape end of air cap with a strip of 21480PK tape.

(6) With manufacturers joint on the carton to the right side, place the unit into the carton with the-keytops to the side of the carton.

(7) Close and seal top flaps of carton as indicated in Step 1.

NOTE: 27952PK air cap deleted for clarity.

C. TESTING

1. GENERAL

Functional testing of the 40K103 or 40K108 KD Opcon is accomplished with the use of a full edit Model 40 KD Set. The 40K002 RO Opcon is tested in conjunction with a Model 40 ROP Set.

Functional testing provides a means for verifying the operational requirements of the KD or RO opcon units. The test procedure should be performed from start to finish without omissions. Possible causes of trouble are listed with the tests to provide aid in making the trouble correction.

Whenever the opcon fails a particular test, refer to Page 5-50, D. TROUBLESHOOTING to locate the trouble. After the trouble has been corrected, repeat the test that disclosed the trouble and if found ok, resume testing from that point.

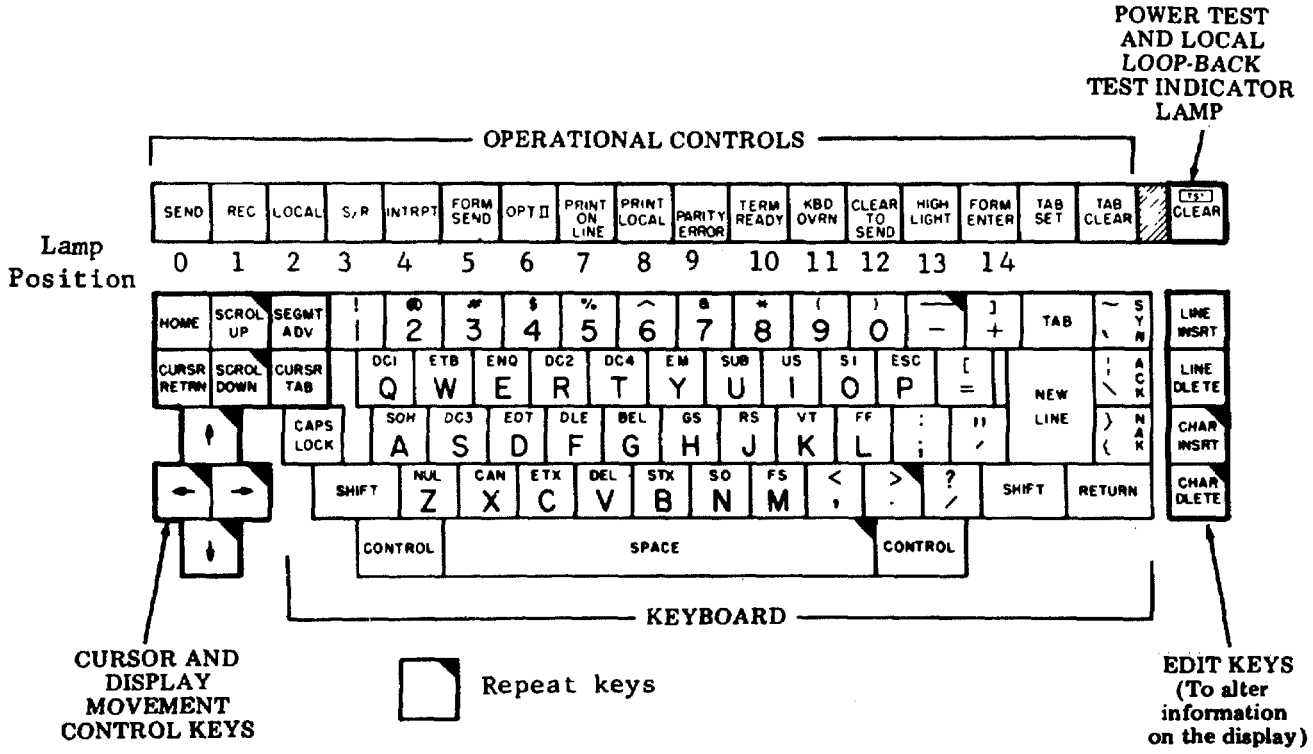
2. PRELIMINARY

With power off, install the opcon to be tested to the Model 40 KD or ROP Set serving-as a test set. Then proceed with either:

3. FUNCTIONAL TESTS -- 40K103 Opcons
4. FUNCTIONAL TESTS -- 40K108/RDE/RDH OPCONS
5. FUNCTIONAL TESTS -- 40K108/RDG OPCON
6. FUNCTIONAL TESTS -- 40K108/RDF
7. FUNCTIONAL TESTS -- 40K002 OPCON

3. FUNCTIONAL TESTS -- 40K103 OPCONS

Remove all blocking keytops, if present. The location of the various control and data keys referred to in the KD opcon test are shown below. Apply power and proceed to Page 5-15, 3. FUNCTIONAL TESTS.

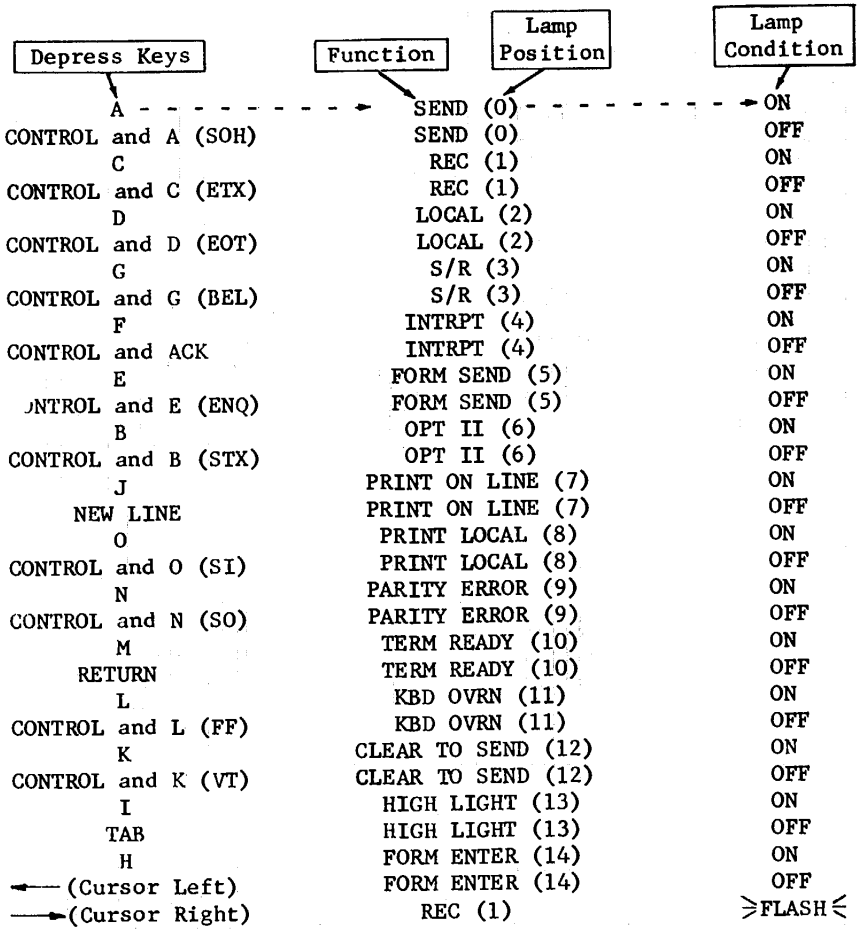


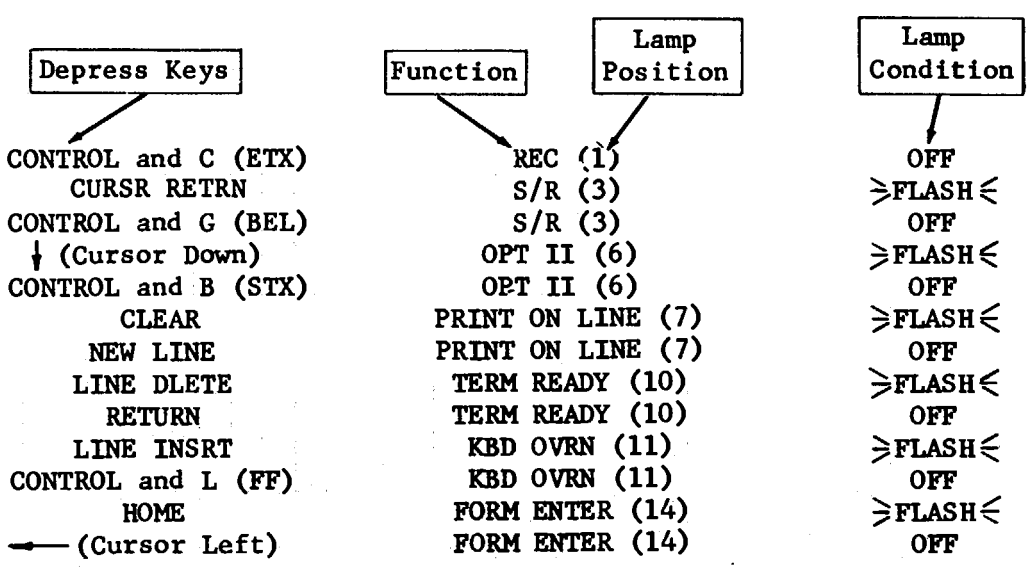
NOTE: The REC lamp lights immediately when power to the set is turned on. When using 40C430/AAT/017 controller, LOCAL lamp lights on power turn on.

STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	SECTION D TROUBLE ANALYSIS
KD OPCON TEST				
1	Depress RETURN and ESC P simultaneously with additional force, and then release (Power Test).	TST CLEAR lamp lights(brightly) momentarily indicating power to opcon.	Dirty or broken connector pins. Dirty or broken connection in feed-through box. 410074 interface and bell card.	Page 5-24
2	Depress RETURN and  simultaneously with additional force, and then release (Loop-Back Test).	TST CLEAR lamp lights (brightly) and remains lit indicating the loop-back test mode is activated. **NOTE:** Occasionally the operational lamps may flash on and then off, or the alarm bell -may sound when the loop-back test mode is activated. If this occurs, clear the test by depressing RETURN and ESC P keys beyond their normal stop, and reenter the test mode.	Check  keyswitch	Page 5-38, 5-47
a.	Place opcon into the caps mode by depressing and latching CAPS LOCK.			
b.	Depress the following keys while observing lamps for proper indication.			

C. TESTING (Contd)

3. Functional Tests – 40K103 OPCONS (Contd)

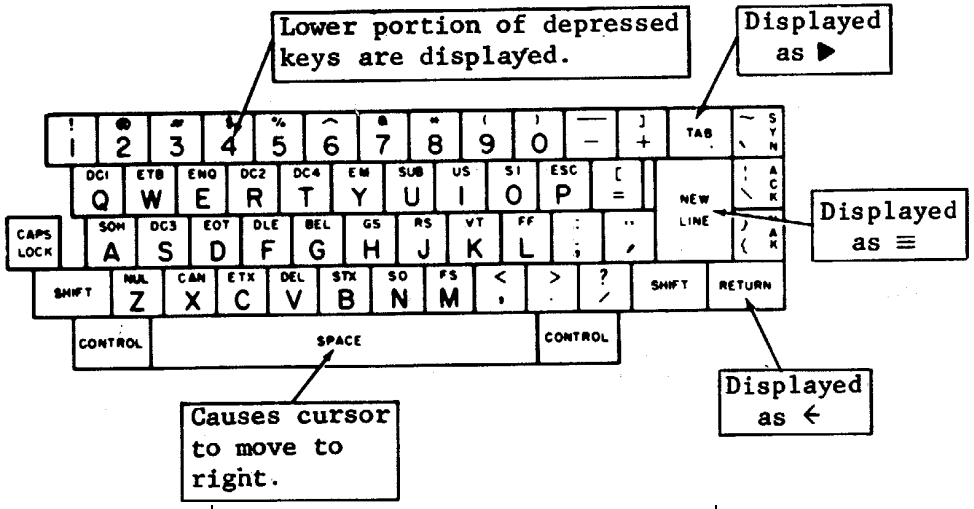
STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	SECTION D TROUBLE ANALYSIS
2b. (Cont)				Page 5-52

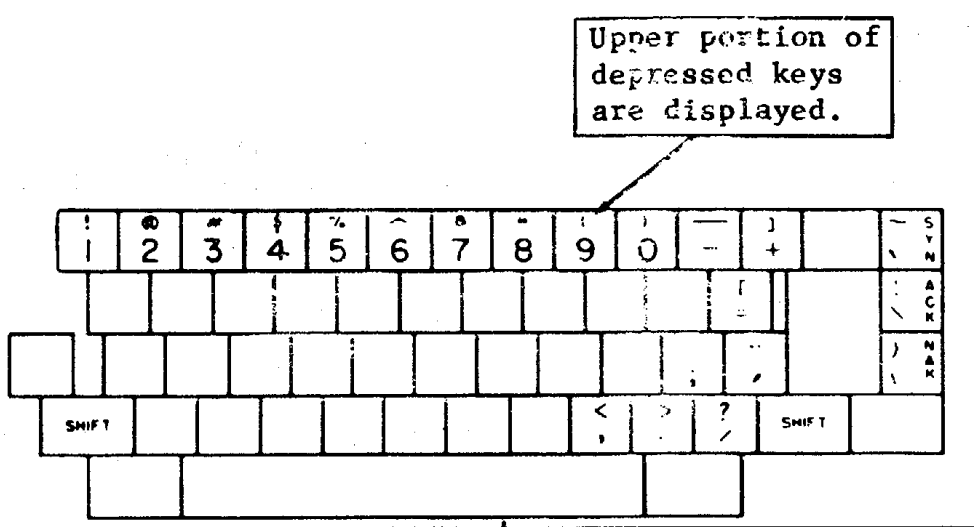
STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	SECTION D TROUBLE ANALYSIS
2b. (Cont)				
c.	Depress RETURN and ESC P simultaneously with additional force, and then release.	TST CLEAR lamp extinguishes and returns opcon to normal operating mode.		

C. TESTING (Contd)

3. Functional Tests – 40K103 OPCONS (Contd)

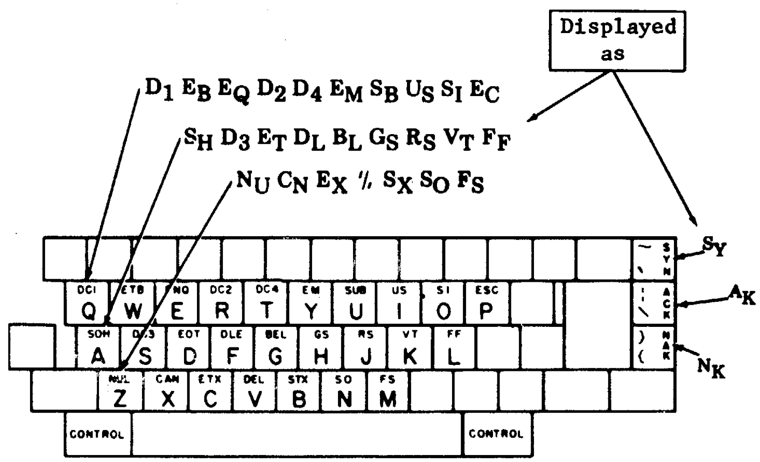
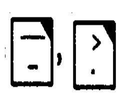
STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	SECTION D TROUBLE ANALYSIS
3	Depress each key on keyboard portion of opcon four or five times.			Page 5-56, 5-64
4	Disengage CAPS LOCK by depressing it again momentarily. Again depress each key on keyboard portion of opcon four or five times.	The alpha characters described in Step 3 are displayed in lower case(ie, abcdef, etc). Numerical 0-9 are displayed as numericals 0-9.	Check mechanical operation of CAPS LOCK key.	Page 5-56, 5-64

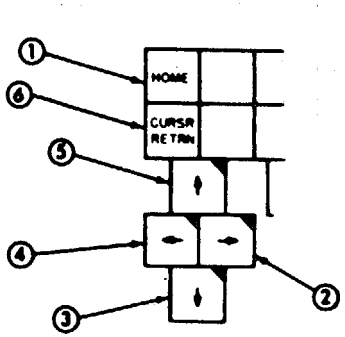
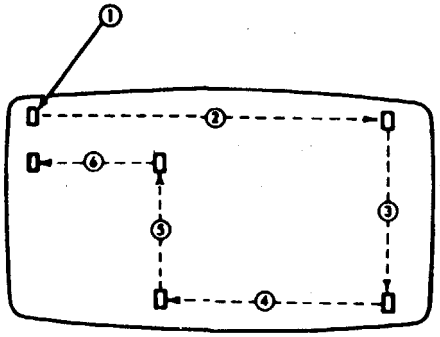


STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	SECTION D TROUBLE ANALYSIS
5	Depress left SHIFT together with each nonalpha key (ie, '@#$, etc) on keyboard portion of opcon. 			Page 5-56, 5-64
6	Depress right SHIFT together with one of the keys depressed in Step 5.	The character on upper portion of depressed key is displayed..	Check operation of right SHIFT keyswitch	

C. TESTING (Contd)

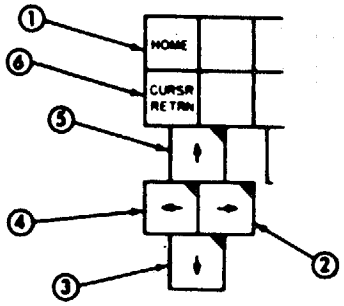
3. Functional Tests – 40K103 OPCONS (Contd)

STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	SECTION D TROUBLE ANALYSIS
7	Depress left CONTROL together with keys containing control characters four or five times each.  		Check operation of left CONTROL keyswitch. **NOTE:** On opcon being tested with a 40C430/AAT/017 controller, ENQ, US, SYN, ACK, EOT, DLE and NAK cannot be generated from the opcon.	
8	Depress right CONTROL together with one of the keys depressed in Step 7.	The corresponding control character is displayed.	Check operation of right CONTROL keyswitch.	
9	Depress the  and SPACE with additional force than is normally required.	- …………………………………………… The SPACE key repeatedly moves the cursor.	Another key may be stuck in the partially depressed condition (check mechanical operation of that keyswitch.	Page 5-55

STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	SECTION D TROUBLE ANALYSIS
10	Depress HOME. Then in sequence depress momentarily with more force than normally required, each cursor movement key shown. 			Page 5-55
11	Home the cursor and type alpha characters A through J on the display. Place cursor over character E and depress CHAR INSRT momentarily; then depress it fully -- releasing it after characters stop moving.	[ ] ABCDEFGHIJ[ ] ABCD[E]FGHIJ ABCD[ ]EFGHIJ ABCD[ ] EFGHIJ		Page 5-55
12	Depress CHAR DELETE momentarily; then depress it fully.	ABCD[ ] EFGHIJ ABCD[ ] EFGHIJ ABCD[E]FGHIJ ABCD[F]GHIJ ABCD[G]HIJ		Page 5-55

C. TESTING (Contd)

3. Functional Tests – 40K103 OPCONS (Contd)

STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	SECTION D TROUBLE ANALYSIS
14	Depress LINE DLETE once; then depress CLEAR.	The line of data moves up, and then display is cleared of all characters.	Check operation of LINE DLETE keyswitch.	
	Depress SEND, REC and LOCAL in sequence as shown.	SEND lamp lights when key is depressed (LOCAL lamp extinguishes). REC lamp lights when key is depressed (SEND lamp extinguishes). LOCAL lamp lights when key is depressed (REC lamp extinguishes).		Page 5-55
		**NOTE:** The following steps provide test procedures for the opcon to be used on KD or KDP Sets. As a reminder, any blocking keytops should be removed.		
16	Depress HOME and numeric 1.	Numeric 1 is displayed in home position.		
17	Depress NEW LINE 24 times.	Cursor moves down display, displaying new line character at 1st position of each line. On the 24th depression of NEW LINE, the numeric 1 will disappear from display.		

STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	SECTION D TROUBLE ANALYSIS
18	Type a numeric 2 and depress NEW LINE 24 times.	The numeric 2 will move up one line each time NEW LINE is depressed. On the 24th depression of the NEW LINE, the numeric 2 will disappear from screen.		
19	Type a numeric 3.	A numeric 3 is displayed.		
20	Depress HOME.	The cursor moves to the home position and a 1 is displayed under the cursor.		
21	Depress SEGMT ADV.	Cursor does not move, a 2 is displayed under cursor.		
22	Depress SEGMT ADV again.	The cursor does not move, the 2 is replaced by the 3 under the cursor.		
23	Depress SEGMT ADV again.	The cursor does not move, the 3 is replaced by the 1 under the cursor.		
24	Depress SCROL UP once.	The 1 disappears from the display and the 2 appears at bottom left of display.		
25	Depress SCROL UP fully.	The 2, then the 3 move up the display. Scrolling stops when the 3 reaches top of display.		

C. TESTING (Contd)

3. Functional Tests – 40K103 OPCONS (Contd)

STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	SECTION D TROUBLE ANALYSIS
26	Depress SCROL DOWN once, then fully.	The 3 moves down one line, then moves down continuously and disappears as the 2 appears at top of display. Scrolling continues until the 1 appears at top of display.		
27	Place cursor away from home position and depress TAB SET. Depress CURSR TAB twice.	Cursor moves to the same position on the next line. (Next tab mark -- not displayed.)	Check operation of TAB SET and CURSR TAB keyswitches.	
28	Home the cursor and depress TAB CLEAR.	Cursor returns to home position, and all tab marks are cleared.	Check operation of TAB CLEAR keyswitch.	Page 5-55
29	Depress INTRPT, FORM SEND, PRINT ON LINE, HIGH LIGHT and FORM ENTER each twice.	Lamp lights when key is depressed; extinguishes when key is depressed again. **NOTE:** When HIGH LIGHT and FORM ENTER are turned on and off, cursor will move one character position on display.		
30	Depress S/R, PRINT LOCAL and LOCAL in sequence as shown.	S/R lamp lights when key is depressed. PRINT LOCAL lamp lights when key is depressed (S/R remains on). LOCAL lamp lights when key is depressed.		Page 5-55

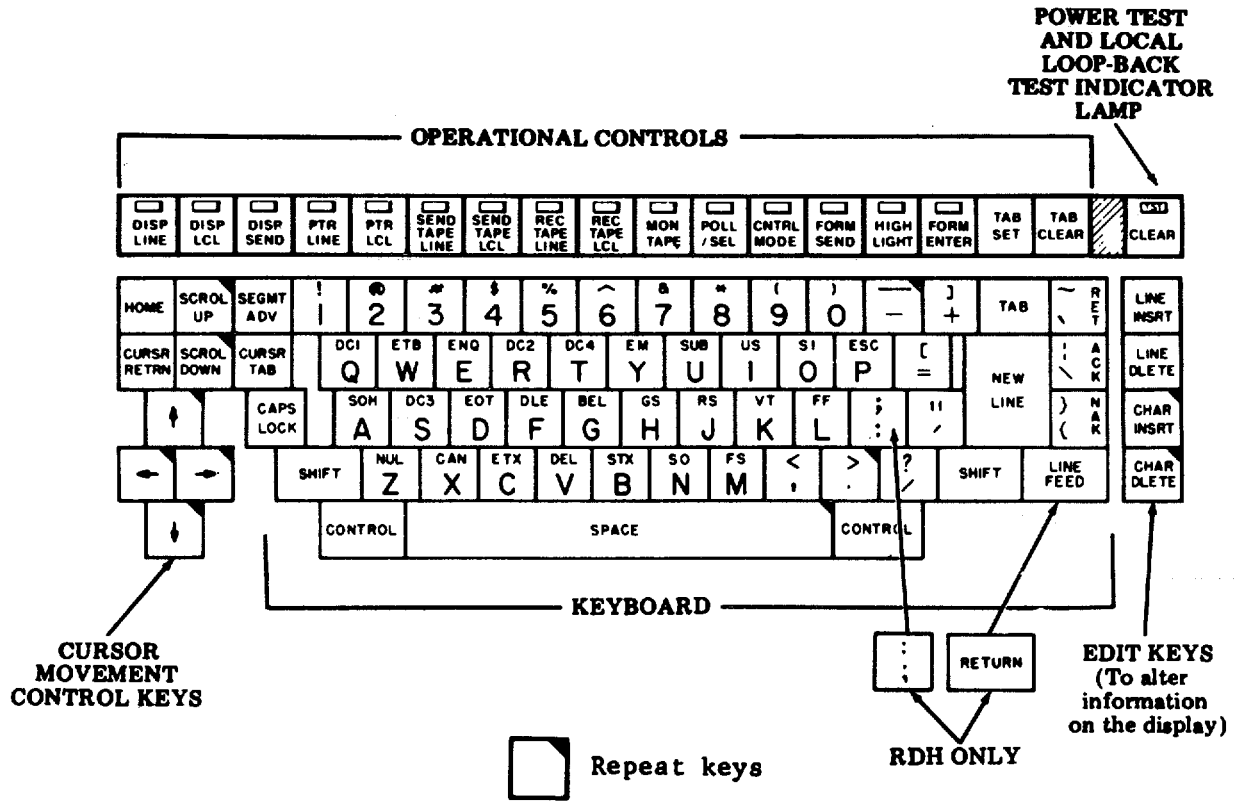
NOTES

C. TESTING (Contd)

4. FUNCTIONAL TESTS -- 40KIU8/RDE/RDH OPCONS

Keytop Layout

The location of the various control and data keys referred to in the checkout procedures can be found in the following illustration.



Preliminary Instructions

Follow these preliminary instructions before testing of the opcon is started using a Tempest Model 40 set. The operational checks are to be performed in the order presented.

(a) Cassettes are in unlatched position; turn power on to cassette drive (if present).

(b) Turn on power to the set or station.

(c) Turn on power to the display and adjust brightness.

(d) Perform Erase function on each of the cassettes, if not previously preformatted. Refer to How To Operate Manual 405 for procedure.

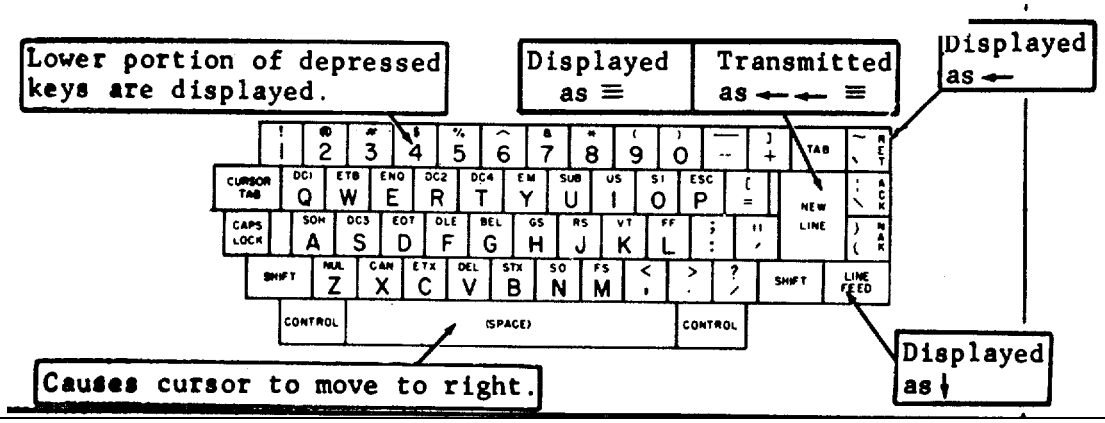
NOTE: Immediately when power is turned on, the poll/sel and mon tape (if monitor tape is present) lamps will light. PTR line lamp will light after approximately 14 seconds.

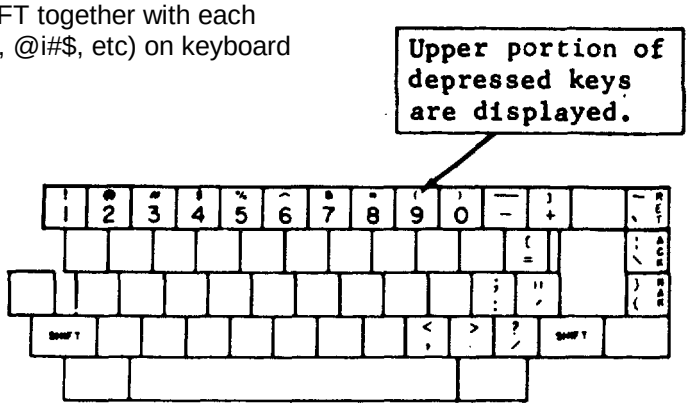
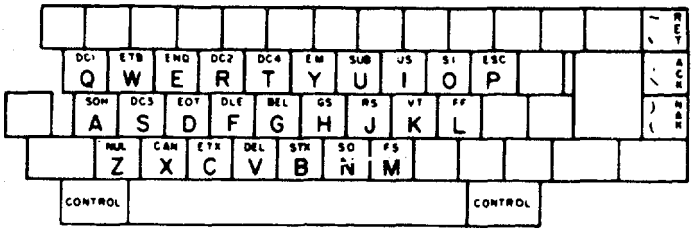
STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
1	Depress RETURN or LINE FEED and  simultaneously with additional force and then release	TST CLEAR lamp lights(brightly) and remains lit indicating loopback test mode is activated and power is being supplied to opcon. **NOTE:** Occasionally the operational lamps may flash on and then off, when loop- back test mode is activated. If this occurs, clear the test by depressing LINE FEED and ESC P beyond their normal stop, and re-enter test mode.	Page 5-73 and 5-88
a.	Place opcon into the caps mode by depressing and latching CAPS LOCK.		
b.	Depress the following keys while observing lamps for proper indication.		Page 5-76
			Check operation of keyswitches.

Depress Keys	Function	Lamp Condition
A	DISP LINE	ON
CONTROL and A (SOH)	DISP LINE	OFF
C	DISP LCL	ON
CONTROL and C (ETX)	DISP ICL	OFF
D	DISP SEND	ON
CONTROL and D (EOT)	DISP SEND	OFF
G	PTR LINE	ON
CONTROL and G (BEL)	PTR LINE	OFF
F	PTR LCL	ON
CONTROL and ACK	PTR LCL	OFF
E	SEND TAPE LINE	ON
CONTROL and E (ENQ)	SEND TAPE LINE	OFF
B	SEND TAPE LCL	ON
CONTROL and B (STX)	SEND TAPE LCL	OFF
J	REC TAPE LINE	ON
NEW LINE	REC TAPE LINE	OFF
0	REC TAPE LCL	ON
CONTROL and 0 (SI)	REC TAPE LCL	OFF
N	MON TAPE	ON
CONTROL and N (SO)	MON TAPE	OFF
M	POLL/SEL	ON
LINE FEED	POLL/SEL	OFF

C. TESTING (Contd)

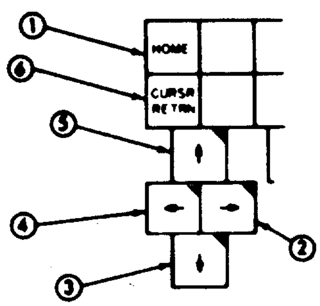
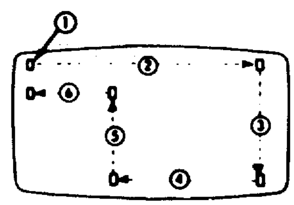
4. FUNCTIONAL TESTS –40K208/RDE/RDH OPCONS (Contd)

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
1b. (Cont)	L	CNTRL MODE ON	
	CONTROL and L (FF)	CNTRL MODE OFF	
	K	FORM SEND ON	
	CONTROL and K (VT)	FORM SEND OFF	
	I	HIGH LIGHT ON	
	TAB	HIGH LIGHT OFF	
	H	FORM ENTER ON	
	← (Cursor Left)	FORM ENTER OFF	
	→ (Cursor Right)	DISP LCL ≡FLASH≡	
	CONTROL and C (ETX)	DISP LCL OFF	
	CURSR RETRN	PTR LINE ≡FLASH≡	
	CONTROL and G (BEL)	PTR LINE OFF	
	↓ (Cursor Down)	SEND TAPE LCL ≡FLASH≡	
	CONTROL and B (STX)	SEND TAPE LCL OFF	
	CLEAR	REC TAPE LINE ≡FLASH≡	
	NEW LINE	REC TAPE LINE OFF	
	LINE DLETE	POLL/SEL ≡FLASH≡	
	LINE FEED	POLL/SEL OFF	
	LINE INSRT	CNTRL MODE ≡FLASH≡	
	CONTROL and L (FF)	CNTRL MODE OFF	
	HOME	FORM ENTER ≡FLASH≡	
	← (Cursor Left)	FORM ENTER OFF	
c.	Depress LINE FEED and ESC P simultaneously with additional force, and then release.	TST CLEAR lamp extinguishes and returns opcon to normal operating mode.	Page 5-73
2.	Home the cursor, enter opcon -- Display mode (DISP LINE, DISP LCL, DISP SEND lamp out). Then depress each key on the keyboard portion of the opcon four or five times. Check monitor for character or function. 		Pages 5-81 and 5-83

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
3	Disengage CAPS LOCK by depressing it again momentarily. Again depress each key on keyboard portion of opcon four or five times.	Alpha characters described in Step 2 are displayed in lower case (ie, abcdef, etc).	Pages 5-81 and 5-83.
4	Depress left SHIFT together with each nonalpha key (ie, @i#$, etc) on keyboard portion of opcon. 		Pages 5-81 and 5-83
5	Depress right SHIFT together with one of the keys depressed in Step 4.	The character on upper portion of depressed key is displayed.	Pages 5-81 and 5-83
6	Depress left CONTROL together with keys containing control characters four or five times each. 		Page 5-89

C. TESTING (Contd)

4. FUNCTIONAL TESTS -- 40K108/RDE/RDH OPCONS (Contd)

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
7	Depress right CONTROL together with one of the keys depressed in Step 7.	The corresponding control character is displayed.	
8	Depress  ,  and SPACE with additional force than is normally required.	- …………………………………………………… The SPACE key repeatedly moves the cursor.	Page 5-78
9	Depress HOME. Then in sequence depress momentarily with more force than normally required, each cursor movement key shown. 		Page 5-89
10	Home the cursor and type alpha characters A through J on the display. Place the cursor over character E and depress CHAR INSRT momentarily; then-depress it fully -- releasing it after characters stop moving.	ABCDEFGHIJ[ ] ABCD[E]FGHIJ ABCD[ ]EFGHIJ ABCD[ ] EFGHIJ ↓	Page 5-78
11	Depress CHAR DLETE momentarily; then depress it fully.	ABCD[ ] EFGHIJ ABCD[ ] EFGHIJ ABCD[E]FGHIJ ABCD[F]GHIJ ABCD[G]HIJ	Page 5-78
12	Depress LINE INSRT once.	Cursor moves to beginning of line, and the line of data moves down one line.	Page 5-78

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
13	Depress LINE DLETE once; then depress CLEAR of all characters.	The line of data moves up, and then display is cleared	Page 5-78
14	Place the cursor away from home position and depress CURSOR TAB.	Cursor moves to first character position of next line(unformatted display).	Page 5-89
15	Place the cursor away from home position and depress TAB.	Cursor moves to first character position of next line(unformatted display).	Page 5-89
16	Depress HOME and numeric 1.	Numeric 1 is displayed in home position.	Pages 5-81 and 5-89
17	Depress NEW LINE 24 times.	Cursor moves down display, displaying new line character at 1st position of each line. On the 24th depression of NEW LINE, the numeric 1 will disappear from display	Pages 5-81 and 5-89
18	Type a numeric 2 and depress NEW LINE 24 times	The numeric 2 will move up one line each time NEW LINE is depressed. On the 24th depression of the NEW LINE, the numeric 2 will disappear from screen.	Pages 5-81 and 5-89
19	Type a numeric 3.	A numeric 3 is displayed.	
20	Depress HOME.	The cursor moves to the home position and a 1 is displayed under the cursor.	Page 5-89
21	Depress SEGMT ADV.	Cursor does not move, a 2 is displayed under cursor.	Page 5-89
22	Depress SEGMT ADV again.	The cursor does not move, the 2 is replaced by the 3 under the cursor.	
23	Depress SEGMT ADV again.	The cursor does not move, the 3 is replaced by the 1 under the cursor.	
24	Depress SCROL UP once.	The 1 disappears from the display and the 2 appears at bottom left of display.	Page 5-89

C. TESTING (Contd)

4. FUNCTIONAL TESTS -- 40K108/RDE/RDH OPCONS (Contd)

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
25	Depress SCROL UP fully.	The 2, then the 3 move up the display. Scrolling stops when the 3 reaches top of display.	Page 5-89
26	Depress SCROL DOWN once, then fully.	The 3 moves down one line, then moves down continuously and disappears as the 2 appears at top of display. Scrolling continues until the 1 appears at top of display.	Page 5-78
27	Depress SEGMT ADV twice.	First the 2 then the 3 appear at top of display.	Page 5-89
28	Position cursor by means of the [↑] and [←] to next to the last line of display. Type some Us on this line.	Cursor moves under direction of cursor control key. Us are displayed.	Page 5-78
29	Depress LINE INSRT once.	The Us move to last line of display. The cursor moves to the 1st character position of the line next to last line of display.	Page 5-78
30	Depress LINE INSRT several times.	Display does not change.	
31	Home cursor and depress TAB CLEAR.	All tabs (on all segments) are cleared.	Page 5-89
32	Depress HIGH LIGHT.	HIGH LIGHT lamp lights.	
33	Enter a full line of *s at top of display.	*s are displayed as intensified. Alarm sounds at 73rd and 80th character positions. Cursor remains at right end of line. **NOTE:** If option X1 is installed, the cursor will wrap to the beginning of the next line.	

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
34	Depress HIGH LIGHT again.	HIGH LIGHT lamp extinguishes.	Page 5-89
35	Place cursor away from home position and depress TAB SET. Depress CURSR TAB twice.	Cursor moves to the same position on the next line. (Next tab mark – not displayed.)	
36	Home the cursor and depress TAB CLEAR.	Cursor returns to home position, and all tab marks are cleared.	

5. FUNCTIONAL TESTS -- 40K108/RDG OPCON

The location of the various control and data keys referred to in the checkout procedures can be found in the following illustration.

Preliminary Instructions

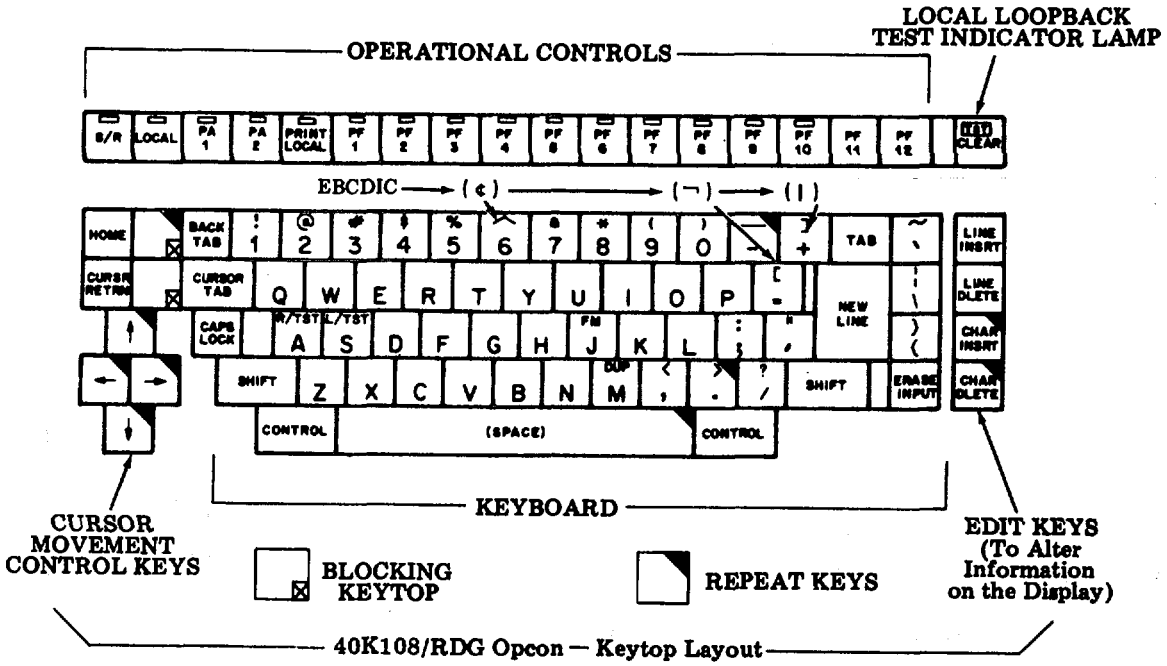
Follow these preliminary instructions before testing of the opcon is started using a Tempest Model 40 Set. The operational checks are to be performed in the order presented.

(a) Turn on power to the set or station (LOCAL indicator lights on each opcon).

(b) Turn on power to the display and adjust brightness.

(c) Perform Steps 1 through 19.

NOTE: Immediately when power is turned on, the POLL/SEL and MON TAPE (if monitor tape is present) lamps will light. PTR line lamp will light after approximately 14 seconds.

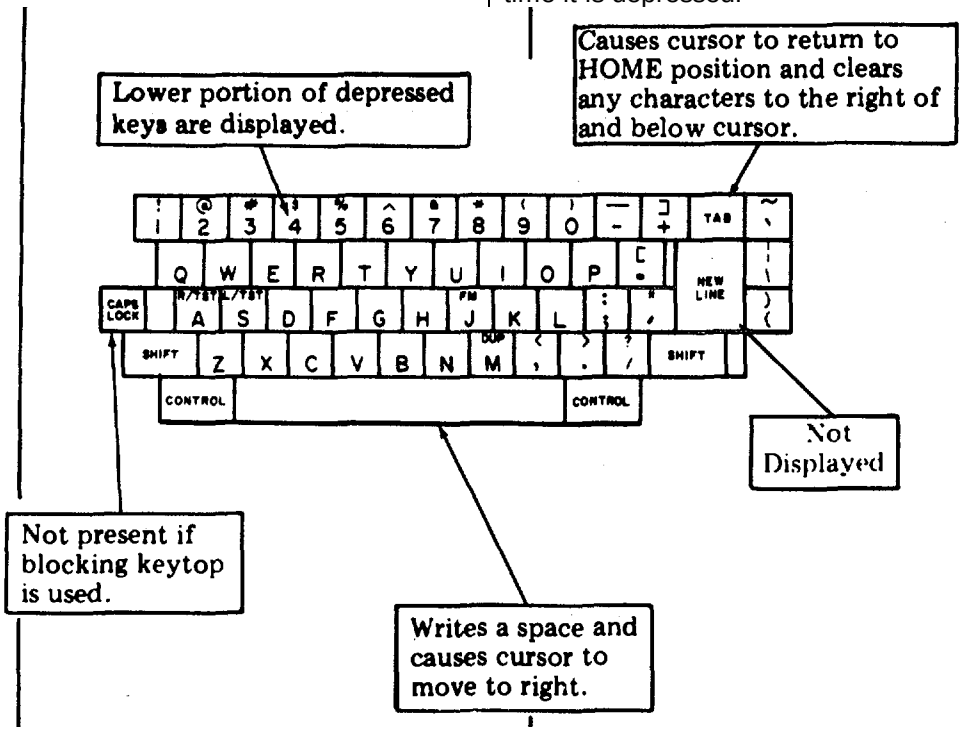


C. TESTING (Contd)

5. FUNCTIONAL TESTS -- 40K108/RDG OPCON

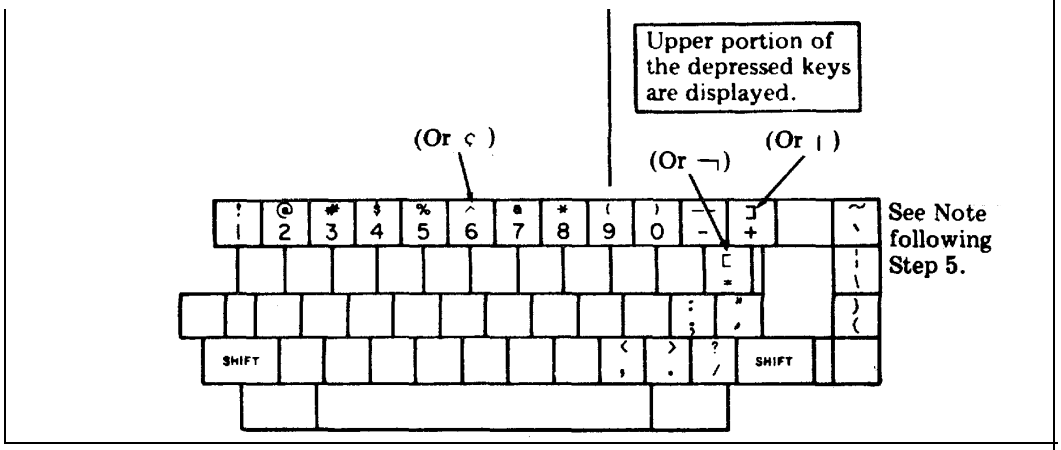
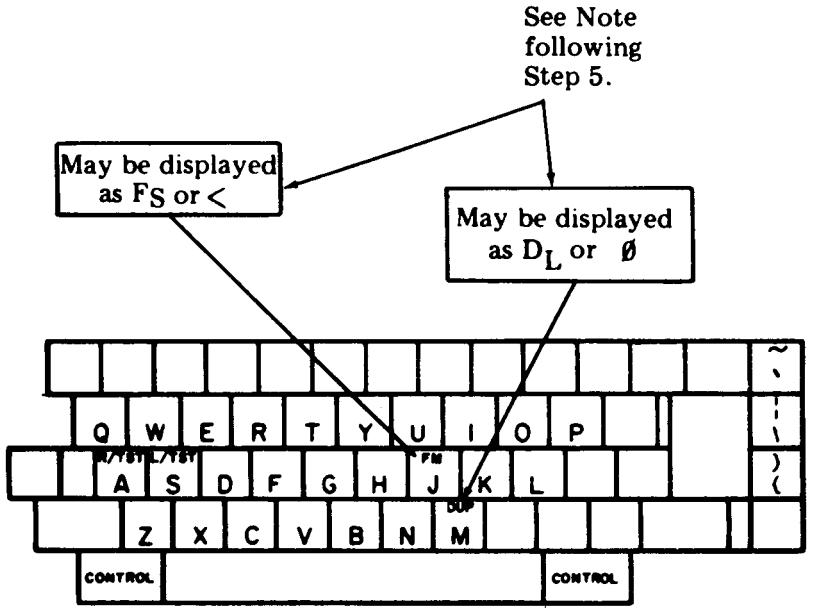
STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
1	Depress ERASE INPUT and simultaneously with additional force and then release.	TST CLEAR lamp lights(brightly) and remains lit indicating loopback test mode is activated and power is being supplied to opcon.	Page 5-73 and 5-88.
a.	Place opcon into the caps mode by depressing and latching CAPS LOCK.	**NOTE:** Occasionally the operational lamps may flash on and then off, when loop back test mode is activated.	
b.	Depress the following keys while observing lamps for proper indication.	If this occurs, clear the test by depressing LINE FEED and ESC P beyond their normal stop, and re-enter test mode.	
			Check operation of keyswitches.
c.	Depress ERASE INPUT and ESCP simultaneously. TST lamp extinguishes.		Page 5-73.

Depress Keys	Function	Lamp Condition
A-	S/R	ON
CONTROL and A (SOH)	S/R	OFF
C	LOCAL	ON
CONTROL and C (ETX)	LOCAL	OFF
D	PA1	ON
CONTROL and D (EOT)	PA1	OFF
G	PA2	ON
CONTROL sad G (BEL)	PA2	OFF
F	PRINT LOCAL	ON
CONTROL and ACK	PRINT LOCAL	OFF
E	PF1	ON
CONTROL and E (ENQ)	PF1	OFF
B	PP2	ON
CONTROL and B (SIX)	PF2	OFF
J	PF3	ON
NEW LINE	PF3	OFF
O	PF4	ON
CONTROL and O (SI)	PF4	OFF
N	PF5	ON
CONTROL and N (SO)	PF5	OFF
M	PF6	ON
ERASE INPUT	PF6	OFF
L	PF7	ON
CONTROL and L (FF)	PF7	OFF
K	PF8	ON
CONTROL and K (VT)	PF8	OFF
I	PF9	ON
TAB	PF9	OFF
H	PF10	ON
←(Cursor Left)	PF10	OFF

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
2	Home the cursor and depress a few keys on the keyboard portion of the opcon.	*Note*: Each keytop need not be checked except for a trouble call. Each keytop shall function each time it is depressed. 	Pages 5-81 and 5-83.
3	Disengage the CAPS LOCK key by depressing it again momentarily. Again depress a couple of keys on the keyboard portion of the opcon. (Opcons with no CAPS LOCK key require no action; go to Step 4.)	The alpha characters described in Step 2 are displayed in lower case (de, abcdef, etc).	Pages 5-81 and 5-83.

C. TESTING

5. FUNCTIONAL TESTS -- 40K108/RDG OPCON

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
4	Depress the left then the right SHIFT key while depressing and checking operation of one of the following alpha keys (ie, !@ #-$, etc). 		Pages 5-81 and 5-83.
5	Depress the CONTROL key together with the FM J key; then depress the CONTROL key together with the DUP M 		

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS

Note: Some characters may not be displayed or may be displayed as a character other than the character received on-line or entered from the opcon. See the table below which also provides printer actions for applicable characters.

Type of 40K108 Opcon		ASCII or EBCDIC					ASCII			EBCDIC			ASCII or EBCDIC	
Character Received From LCU or Entered on 40K108 Type Opcon		~	\	¦	{	}	^	]	[	¢	¦	¬	DUP	FM
Character Displayed Using DIO:	410431 ASCII UP-LO	~	\	¦	{	}	^	]	[	^	]	[	DL	FS
	410434 ASCII MONO	^	`	\	¦	¦	^	]	[	^	]	[	Ø	/
	410435 EBCDIC UP-LO	~	\	¦	{	}	¢	.	¬	¢	¦	¬	DL	FS
	410436 EBCDIC MONO	¢	`	\	¬	¦	¢	.	¬	¢	¦	¬	Ø	<
	410432 ASCII LINE-DRAW	┤	┌	│	+	├	^	]	[	^	]	[	DL	FS
Character Printed Using Type Carrier:	400629 80C ASCII UP-LO	~	\	¦	{	}	^	]	[	^	]	[	SP	SP
	400645 80C ASCII MONO	^	`	\	[	]	^	]	[	^	]	[	SP	SP
	400775 80C ASCII LINE-DRAW	┤	┌	│	+	├	^	]	[	^	]	[	SP	SP
	400777 132C ASCII UP-LO	~	\	¦	{	}	^	]	[	^	]	[	SP	SP
	400780 132C ASCII MONO	^	`	\	[	]	^	]	[	^	]	[	SP	SP
	400783 132C EBCDIC UP-LO	~	\	¦	{	}	¢	¦	¬	¢	¦	¬	SP	SP
	400784 80C EBCDIC UP-LO	~	\	¦	{	}	¢	¦	¬	¢	¦	¬	SP	SP
	400785 80C EBCDIC MONO	¢	`	\	¬	¦	¢	¦	¬	¢	¦	¬	SP	SP
	400887 132C EBCDIC MONO	¢	`	\	¬	¦	¢	¦	¬	¢	¦	¬	SP	SP

9

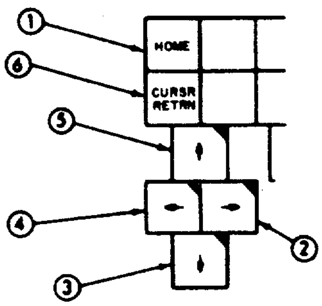
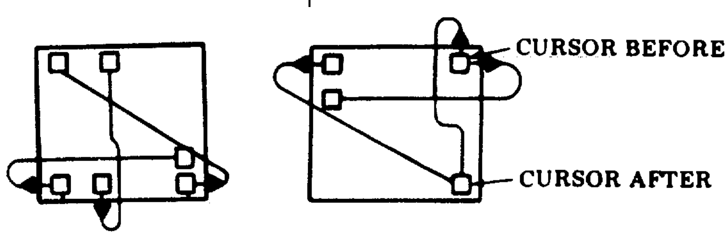
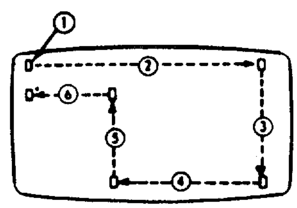
LEGEND:

Will print with foldover option in printer enabled. Error symbol will print if foldover option is not enabled.

Note: ϕ is displayed as 0 but printed as ϕ.

C. TESTING

5. FUNCTIONAL TESTS -- 40K108/RDG OPCON

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
6	Depress one of the following keys **with additional force,**  	- - - -- ……………………………………………… The space key repeatedly moves the cursor.	Page 5-78.
7	Depress the [HOME] key. Then in sequence depress momentarily with more force than normally required, each cursor movement key shown.  	 ***Note:*** In local opcon operation, attempts to move the cursor off the display will result as shown:	Page 5-89.
8	Depress ERASE INPUT key.	Display clears and cursor goes to home position. LOCAL indicator remains lit.	Pages 5-76 and 5-89.
9	Type the alpha characters A through J on the display. Place the cursor over the character E and depress  key once, then depress it fully - releasing it after the characters move to the next line.	(1) ABCD[E]FGHIJ (2) ABCD[ ]EFGHIJ (3) ABCD[ ] EFGHIJ ***Note:*** CHAR INSRT and CHAR DLETE affect all 24 lines on a DCC KD. CHAR INSRT and CHAR DLETE affect only 4 lines including the line with the cursor on MCC KD. Characters move slowly.	Page 5-78.

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
10	Depress the CHAR INSRT key momentarily, then depress it fully.	ABCD[ ] EFGHIJ ABCD[E]FGHIJ Characters delete one at a time or repeatedly when key is held depressed. See Note in Step 9.	Page 5-78.
11	Depress the LINE INSRT key three times.	The cursor remains at its present location, and the line of data moves down three lines.	Page 5-78.
12	Depress the LINE DLETE key once, then depress it fully.	The line of data moves up one line, then stops on the first line.	Page 5-78.
13	Depress PRINT LOCAL key, (if printer is not provided, go to Step 14).	LOCAL indicator extinguishes, PRINT LOCAL indicator lights and then goes off when printer buffer receives the message; LOCAL indicator lights. Printer copies entire display(24 lines):	• Flashing PRINT LOCAL indicator indicates printer: a. is not print local. b. cabinet lid is open. c. form-out or paper-out condition. d. ac power is off. e. defective printer cable.
14	Place the cursor away from home position and depress the CURSOR TAB key.	The cursor returns to home position. ***Note:*** Displayed data is not affected by CURSOR TAB and BACK TAB keys.	Page 5-89.
15	Place the cursor away from home position and depress the BACK TAB key.	The cursor returns to home position.	Page 5-89.
16	Place the cursor away from home position and depress the TAB key.	Cursor returns to home position. Any characters to the right of and below cursor will be cleared.	Page 5-89.

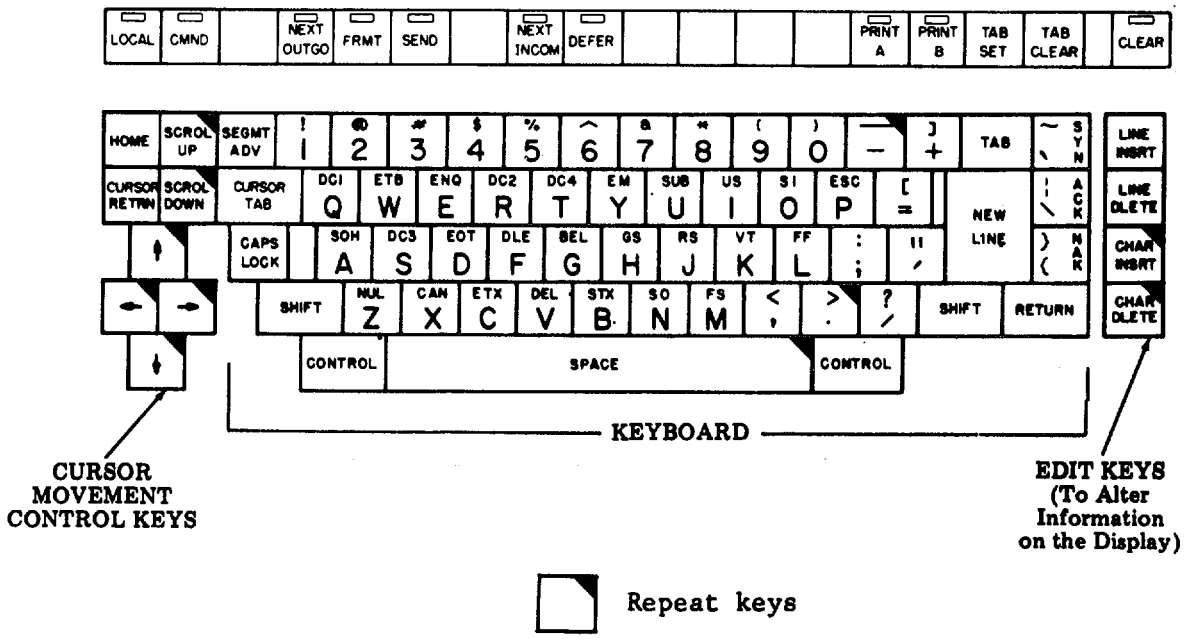
C. TESTING

5. FUNCTIONAL TESTS -- 40K108/RDG OPCON

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
17	Type some text on the opcon and then depress S/R. Attempt to type some text on the opcon.	Text is displayed. LOCAL indicator extinguishes when S/R is depressed. Attention bell sounds each time a key is depressed.	Page 5-89.
18	Alternately depress LOCAL then depress PA 1 key, then LOCAL key and PF 2, PF 1, PF 2 through PF 12, A/TST and CLEAR keys in the same manner.	LOCAL is lit and extinguishes when a key is depressed (same for each key). Data on display remains unchanged, except when CLEAR key is depressed; all data clears from display and cursor goes to home position.	Page 5-76.
19	This step applies only to monocase opcons (blocking keytop over CAPS LOCK position).		Page 5-76.
	a. Depress ERASE INPUT and QUOTES keys together with additional force	TST indicator lights and remains lit.	
	b. Depress A (do not depress SHIFT).	S/R key lights.	• Remove blocking keytop, check that plunger is in lower position. • Replace opcon.
	c. Depress ERASE INPUT and P keys together with additional force.	TST indicator light goes out.	Page 5-76.

6. FUNCTIONAL TESTS -- 40K108/RDF

The location of the-various control and data keys referred to in the checkout procedures can be found in the following illustration.



Preliminary Instructions

Follow these preliminary instructions before testing of the keyboard is started. The steps are to be performed in the order presented.

(a) Power-up sequence:

(1) Turn power on to memory system.
(2) Insert properly formatted diskette into drive 3.
(3) Turn power on to KD1 (with controller in pedestal).
(4) Turn power on to KD2.
(5) Turn power on to Intr 2 (in Printer A pedestal).
(6) Turn monitor power switches on.
(7) Turn printer cabinet power switches on.

(b) When the power is turned on:
LOCAL indicator lights.
Monitor displays raster, cursor, time and date.
Diskette drives are initialized with lamps in door release latch dimly lit.
NEXT INCOM indicator may be lit.
Controller fans are on.
Power supply indicators light.
Input line is enabled and output line disabled.

(c) Insert blank 407640 diskettes at drive 1 and drive 2, refer to Manual 434 for instructions.

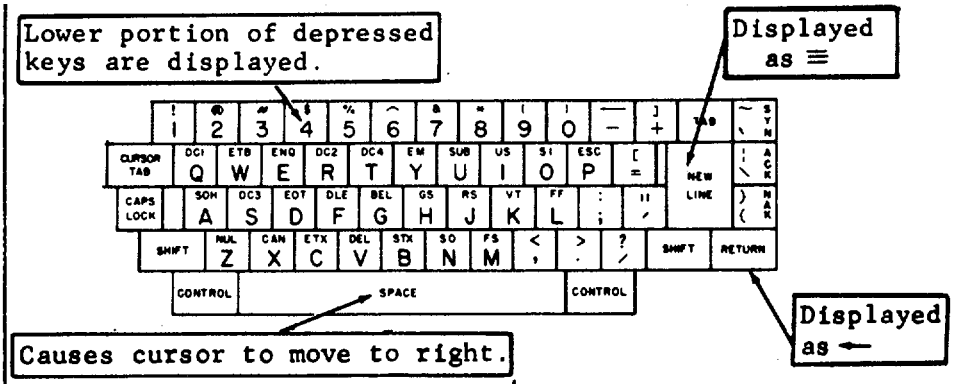
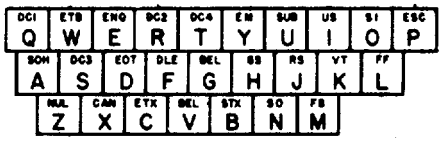
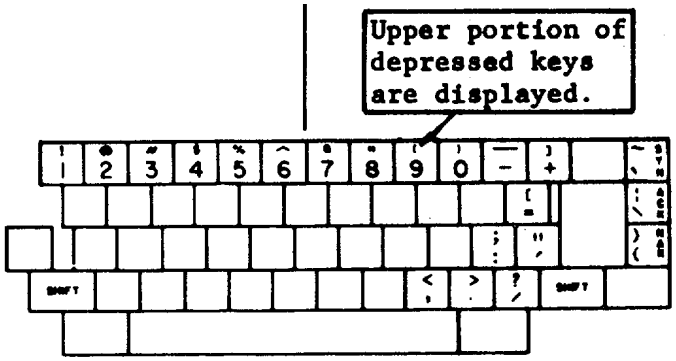
C. TESTING

6. FUNCTIONAL TESTS -- 40K108/RDF

(d) Insert properly preformatted diskette in drive 3. Variable system information can be entered on diskette 3 (if required), by use of CMD procedure.

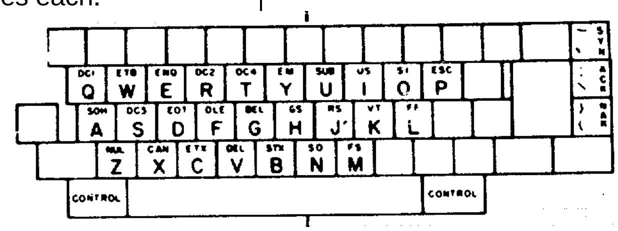
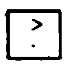
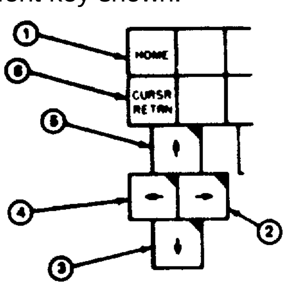
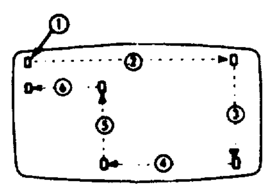
STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
1	Depress RETURN and  simultaneously with additional force and then release.	TST CLEAR lamp lights(brightly) and remains lit indicating loopback test mode is activated and power is being supplied to opcon.	Page 5-73 and 5-88.
a.	Place opcon into the caps mode by depressing and latching CAPS LOCK.	**NOTE:** Occasionally the operational lamps may flash on and then off, when loop-back test mode is activated. If this occurs, clear the test by depressing LINE FEED and ESC p beyond their normal stop, and re-enter test mode.	Page 5-76.
b.	Depress the following keys while observing lamps for proper indication.		Check operation switches.
c.	Depress RETURN and P keys.	TST indicator goes out.	Page 5-73.

Depress Keys	Function	Lamp Condition
A	LOCAL	ON
CONTROL and A (SOH)	LOCAL	OFF
CONTROL and C (ETX)	CMND	OFF
G	NEXT OUTGO	ON
CONTROL and G (BEL)	NEXT OUTGO	OFF
FRMT	ON	
CONTROL and ACK	FRMT	OFF
E	SEND	ON
CONTROL and E (ENQ)	NEXT INCOM	OFF
J	NEXT INCOM	ON
NEW LINE	DEFER	OFF
O	DEFER	ON
CONTROL and O (SI)	HIGH LIGHT	OFF
I	HIGH LIGHT	ON
TAB	FORM ENTER	OFF
H	FORM ENTER	ON
←(Cursor Left)	FORM ENTER	OFF

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
1.(d) (Contd)	Depress LOCAL (if indicator is not lit), HOME, and CLEAR. LOCAL indicator lights, cursor at home position, and no characters displayed. Then depress each key on opcon four or five times. Check monitor for character. 		Page 5-81 and 5-83.
2	Depress CAPS LOCK (if present). Depress each alpha key on opcon. four or five times. Depress RETURN and/or NEW LINE when required.	Character on each key is displayed 	Page 5-81 and 5-83.
3	Depress and hold left SHIFT, then each nonalpha key (ie, !@#$, etc) on opcon. 		Page 5-81 and 5-83.
4	Depress and hold right SHIFT. Depress one of the keys depressed in Step 3.	The character on upper portion of depressed key is displayed.	Page 5-81 and 5-83.

C. TESTING (Contd)

6. FUNCTIONAL TESTS -- 40K108/RDF

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
5	Depress and hold left CONTROL Depress keys containing control characters a few times each.  	The corresponding control character is displayed.	Page 5-89.
6	Depress and hold right CONTROL. Depress one of the keys depressed in Step 5.	The corresponding control character is displayed.	
7	**Depress**  **,**  **and SPACE with additional force than is normally required.**	- …………………………………………… The SPACE key repeatedly moves the cursor.	Page 5-78.
8	Depress HOME. Then in sequence depress momentarily with more force than normally required, each cursor movement key shown.  		Page 5-89.
9	Home the cursor (depress HOME) and type alpha characters A through J on the display. Place the cursor over character E and depress CHAR INSRT momentarily; then depress it fully – releasing it after characters stop moving.	[ ] ABCDEFGHIJ[ ] ABCD[E]FGHIJ ABCD[ ]EFGHIJ ABCD[ ] EFGHIJ	Page 5-78.
10	Depress CHAR DLETE momentarily; then depress it fully.	ABCD[ ] EFGHIJ ABCD[ ] EFGHIJ ABCD[E]FGHIJ ABCD[F]GHIJ (E is deleted) ABCD[G]HIJ (F is deleted, etc)	Page 5-78.

STEP	PROCEDURE	RESULTS	TERMINAL ANALYSIS
11	Depress LINE INSRT once.	Cursor moves to beginning of line, and the line of data moves down one line.	Page 5-78.
12	Depress LINE DLETE once; then depress CLEAR.	The line of data moves up, and then display is cleared of all characters.	Page 5-78.
13	Place the cursor away from home position and depress CURSOR TAB	Cursor moves to first character position of next line (unformatted display).	Page 5-89.
14	Place the cursor away from home position and depress TAB.	Cursor moves to first character position of next line (unformatted display).	Page 5-89.
15	Depress HOME and numeric 1.	Numeric 1 is displayed in home position.	Page 5-81 and 5-89.
16	Depress NEW LINE 24 times;.	Cursor moves down display, displaying new line character- at 1st position of each line. On the 24th depression of NEW LINE, the numeric 1 will disappear from display.	Page 5-81 and 5-89.
17	Type a numeric 2 and depress NEW LINE 24 times.	The numeric 2 will move up one line each time NEW LINE is depressed. On the 24th depression of the NEW LINE, the numeric 2 will disappear from screen.	Page 5-81 and 5-89.
18	Repeat Steps 16 and 17 for numeric 3, 4 and 5.	A numeric 3, 4 or 5 is displayed- at the 1st line of each segment.	
19	Depress HOME.	The cursor moves to the home position and a 1 is displayed under the cursor.	
20	Depress SEGMT ADV.	Cursor does not move; a 2 is displayed under cursor.	Page 5-89.

C. TESTING (Contd)

6. FUNCTIONAL TESTS -- 4K108/RDF (Contd)

STEP	PROCEDURE	RESULTS	TROUBIE ANALYSIS
21	Depress SEGCT ADV three times more to advance the segments.	The cursor does not move; the 2 is replaced by a 3 under the cursor, 4 replaces the 3, and 5 replaces the 4.	Page 5-89.
22	Depress SEGHT ADV again.	The cursor does not move; the 5 is replaced by a 1 under the cursor.	
23	Depress SCROL UP once.	The 1 disappears from the display and a 2 appears at bottom left of display.	Page 5-89.
24	Depress SCROL UP fully and hold.	The 2 is replaced by a 3, then the 3 moves up the display Then a 4 appears followed by a 5. Scrolling stops when the 5 reaches top of display.	
25	Depress SCROL DOWN once, then fully.	The 5 moves down one line Then moves down continues and disappears followed by 4, 3 and 2 until the 1 . appears at top of display .	Page 5-78.
26	Depress SEGMT ADV four times.	The 5 appears at top of display.	Page 5-89.
27	Position cursor by means of the [↓] and [←] to next to the last line of display. Type some Us on this line.	Cursor moves under direction. of cursor control key Us are displayed	Page 5-78
28	Depress LINE INSRT once.	The Us move to last line of display The cursor moves to the 1st character position of the line next to last line of display .	Page 5-78.
29	Depress LINE INSRT several times.	Display does not change.	
30	Depress HOME and CLEAR TAB. .	All tabs and data (on all segments) are cleared	Page 5-89.

STEP	PROCEDURE	RESULTS	TERMINAL ANALYSIS
31	Enter a full line of dashes (-) at top of display.	Dashes (-) are displayed. Alarm sounds at 70th through 80th character positions. Cursor remains at right end of line.	Page 5-78.
32	Depress RETURN.	Cursor moves to left margin. No characters altered in any way.	Page 5-89.
33	. Depress NEW LINE	. Cursor drops one line	Page 5-89
34	Enter a full line of periods (.) on the display.	Periods (.) are displayed across monitor Alarm sounds at 70th and 80th character positions. Cursor remains at right end of line.	Page 5-78.
35	Depress NEW LINE.	Cursor moves to left margin and moves down one line (E is not added over 80th character).	
36	. Depress HOME and CLEAR	Cursor to home position Screen is cleared (data in all segments is cleared).	
37	Type QUICK . Depress SPACE (5 times) Depress TAB SET Depress HOME	Word QUICK appears on line 1. Cursor moves No change (stop is set). Cursor to home position.	Page 5-89.
38	Depress CHAR INSRT fully and hold until movement stops.	Word QUICK moves to right and off display	Page 5-89.
39	Depress CHAR DLETE twice .	Word QUICK in line 1 moves. two positions left	Page 5-89

C. TESTING (Contd)

6. FUNCTIONAL TESTS -- 4OK108/RDF OPCON (Contd)

STEP	PROCEDURE	RESULTS	TERMINAL ANALYSIS
40	Depress CURSOR TAB.	Cursor moves to tab column. No data is altered along the way.	Page 5-89.
41	Depress TAB.	Tab symbol (▷) appears at original position of cursor. Cursor moves one space to Tabs are not sent	Page 5-89.
42	Depress HOME, CLEAR, then TAB CLEAR .	Cursor goes to home position. All characters and tab columns- are cleared from screen and on all segments.	Page 5-89.

7. FUNCTIONAL TESTS—40K002 OPCON

STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	SECTION D TROUBLE ANALYSIS
RO OPCON TEST				
1	Depress OPT II once.	Key should latch down and lamp should light.	Wiring to keyswitch. Open keyswitch	Page 5-83 and 5-89.
	Depress OPT II again.	Key should unlatch and come up, lamp should extinguish.	Defective lamp.	
2	Depress TEST once.	Key should latch down and lamp should light.	Wiring to keyswitch. and 5-89. Open keyswitch.	Page 5-83
	Depress TEST again.	Key should unlatch and come up, lamp should extinguish.	Defective lamp.	
3	TERM READY is normally lit during operation. Depress key twice.	On the first depression, lamp should extinguish. On the second depression, lamp should relight.	Wiring to keyswitch. Open keyswitch. Defective lamp.	Page 5-76

D. TROUBLESHOOTING

1. GENERAL

This section provides the necessary information for locating and clearing troubles encountered in testing the 40K103 and 40K108 KD or 40K002 ROP opcon units per 5-14.

The detailed troubleshooting charts include voltage levels, oscilloscope waveforms, abbreviated schematics and step-by-step instructions for trouble diagnosis. apaplementary information such as block diagrams, functional schematics and keyswitch assignments and coding is provided on Page 5-92 REFERENCE MATERIAL.

2. PRELIMINARY

KD Opcon.

CAUTION: TO AVOID POSSIBLE INTERNAL DAMAGE TO THE MOS DEVICES OR CIRCUIT CARDS WITH MOS DEVICES DUE TO ELECTRICAL STATIC DISCHARGE BY SERVICE PERSONNEL, FOLLOW THE HANDLING AND GROUNDING PROCEDURES ON PAGES 5-120 AND 5-121.

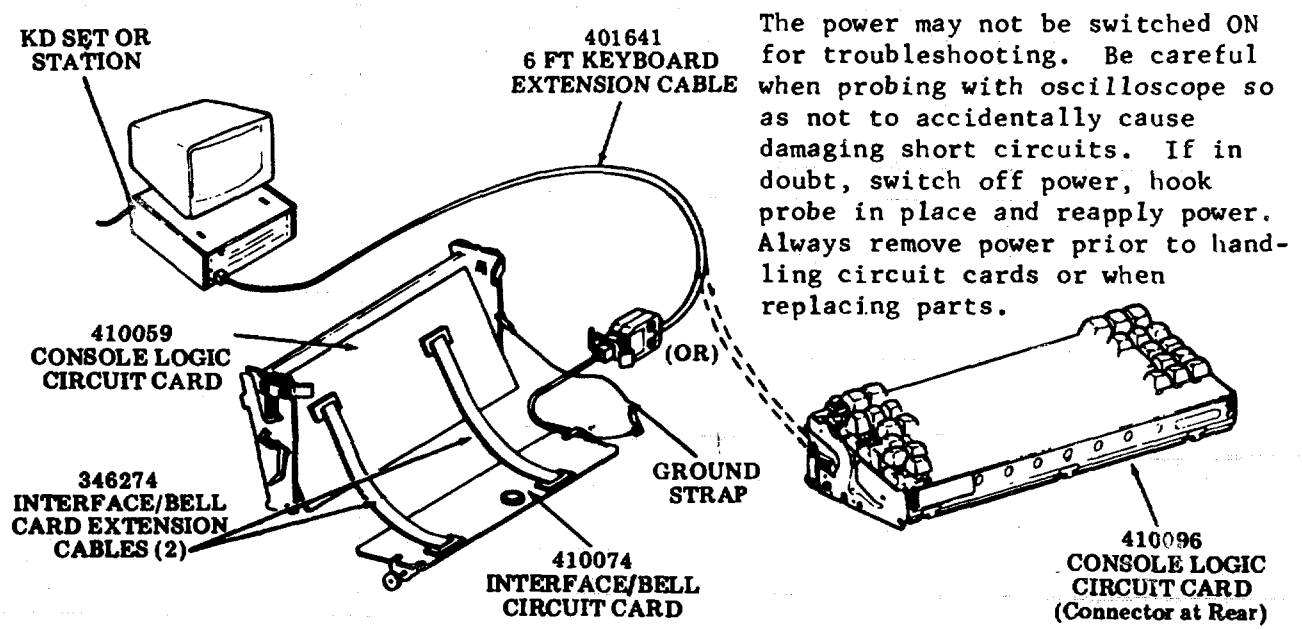
Arrange the KD-opcon on the bench as illustrated, following with cover, bottom pan, interface/bell card and coverplate removed.

Connect a ground strap having an alligator clip at each end from opcon side plate to green ground lead terminal as shown. Connect oscilloscope ground to keyboard side plate in the same manner.

Using two 346274 interface/bell card extender cables, connect card to console logic as shown; if the 410074 circuit card is present.

With power off, connect keyboard to KD set or station using a 401641 keyboard extension cable.

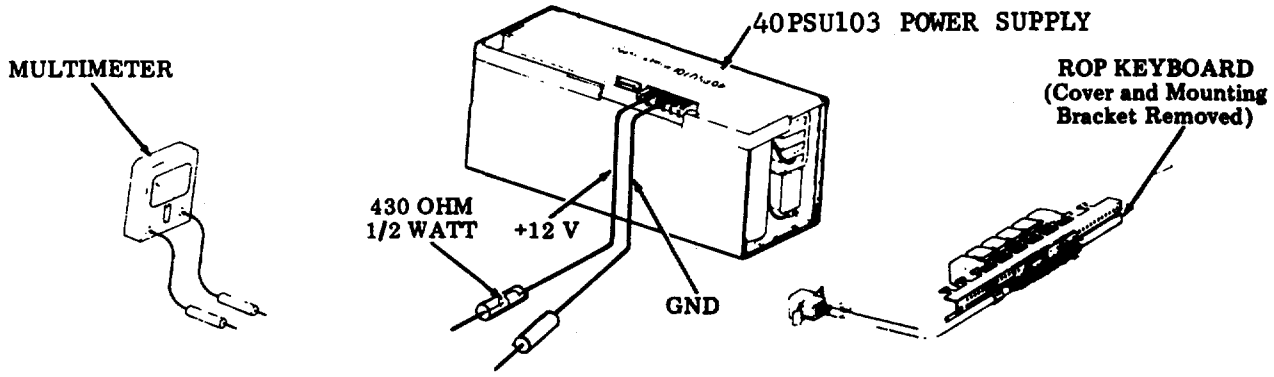
CAUTION: MAKE SURE THE NONCOMPONENT SIDE OF EITHER CIRCUIT CARD DOES NOT REST ON OR AGAINST ANYTHING THAT WILL CAUSE SHORTING DURING TROUBLESHOOTING OPERATIONS.



ROP Opcon

ROP opcon troubleshooting consists solely of checking keyswitch operation and indicator lighting. Remove power, disconnect ROP opcon from ROP set and remove opcon cover and mounting bracket. · Arrange opcon as shown below.

Connect two test leads with probes to +12 (terminal 6) and GND (terminal 6) of a 40PSU103 power supply. The +12 test lead MUST include a series connected 430 ohm, 1/2 watt resistor most conveniently placed in the probe.



Use the multimeter (R X 1 scale) to check opcon keyswitch operation and the power supply and probes to check opcon indicator lamps per troubleshooting of this section.

3. TROUBLESHOOTING CHARTS

The following charts pertain to the early design 40K103 (410059 and 410054 or 410074 circuit cards) or 40K108 (410096 circuit card) opcon:

Chart 1 Power Test Fails (Page 5-53)
Chart 2 Control Row Indicator Fails to Light (Page 5-54)
Chart 3 No Repeat Characters Output From the Opcon (Page 5-56)
Chart 4 Incorrect Characters From the Opcon (Page 5-57)
Chart 5 No Data Output From the Opcon and "Loopback Test Mode" Does Not Function (Page 5-65)
Chart 6 No Alarm (Page 5-69)
Chart 7 Delay in Repeat (Page 5-71)
Chart 8 All Control Row Indicators Flash (Page 5-73)

The following charts pertain to the late design 40K108 (410096) opcons:

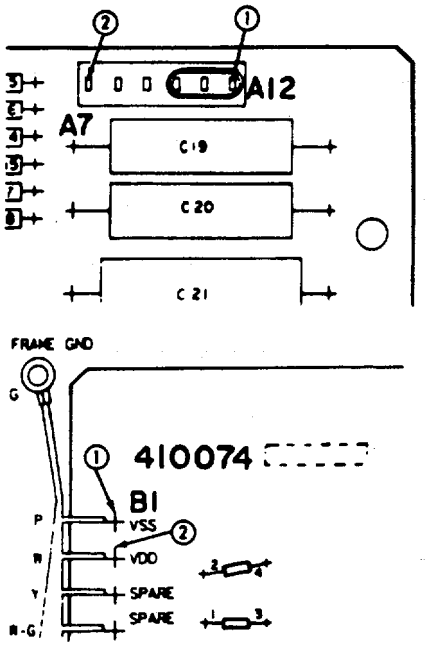
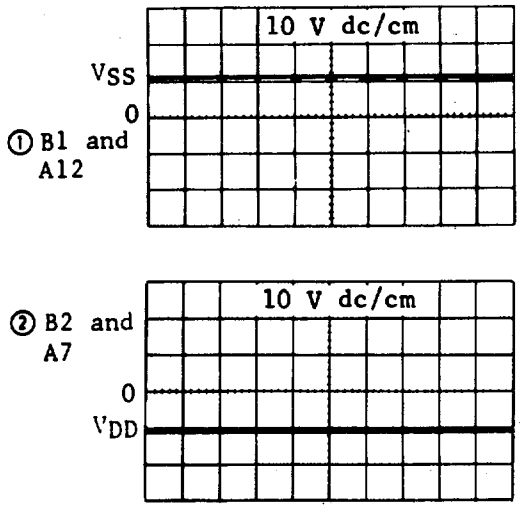
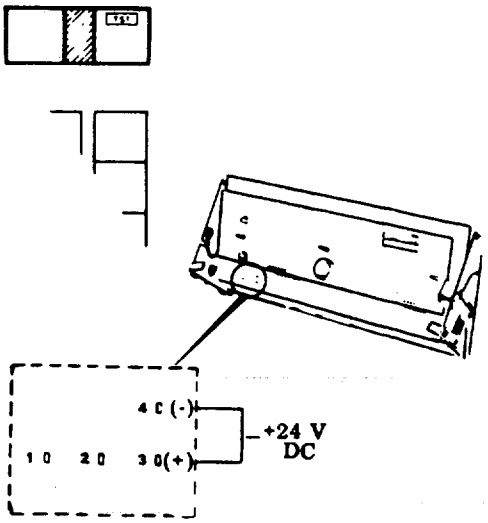
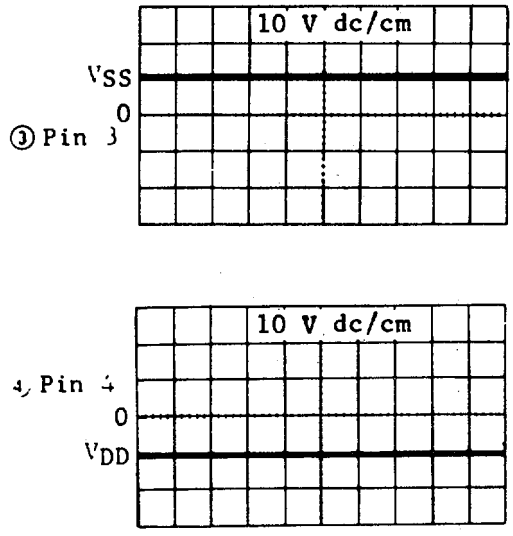
Chart 9 "TST" or "Console Test" Indicator Fails to Light (Page 5-74)
Chart 10 Control Row Indicator Fails to Light (Page 5-77)
Chart 11 No Repeat (Page 5-79)
Chart 12 Incorrect Characters From the Opcon (Page 5-82)
Chart 13 No Data Output From the Opcon (Page 5-84)
Chart 14 No Alarm (Page 5-88)
Chart 15 "Loopback" Test Does Not Work (Page 5-89)
Chart 16 Single Key Failure (Page 5-90)

The following chart pertains to the 40K002 ROP opcons.

Chart 17 ROP Opcon Troubleshooting Using 4OPSU1O1 or Equivalent (Page 5-18)

NOTES

CHART I
POWER TEST FAILS

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	Check to see that supply voltages are present at B1, A12 (VSS) and B2, A7 (VDD) on 410074 card. 	 If voltages are not present, check for dirty or broken connector pins, open lands, cut leads, etc. If voltages are present, go to Step 2.
2	Check for correct voltages on terminals of 405925 TST indicator assembly when lamp should be lit.  Terminal Side of Indicator Keyswitch	

D. TROUBLESHOOTING (Contd)

3. **TROUBLESHOOTING CHARTS (Contd)**

CHART I (Con'td)

POWER TEST FAILS

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
2 (Cont)		If voltages are correct, replace defective 405925 TST indicator assembly. If voltages are incorrect, check for open CR15 diode, open emitter to collector on Q7 transistor or shorted emitter to collector on Q6 transistor on 410059 circuit card.
NOTE: Refer to Pages 5-98 and 5-101, Functional Schematics FS-1 and FS-4 (410059) circuit card) and Page 5-107, Functional Schematic FS-10 (410074 circuit card).		

CHART 2

CONTROL ROW INDICATOR FAILS TO LIGHT

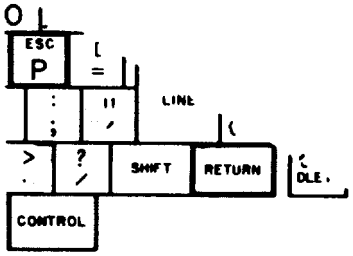
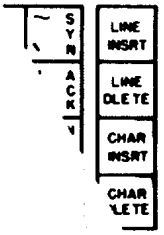
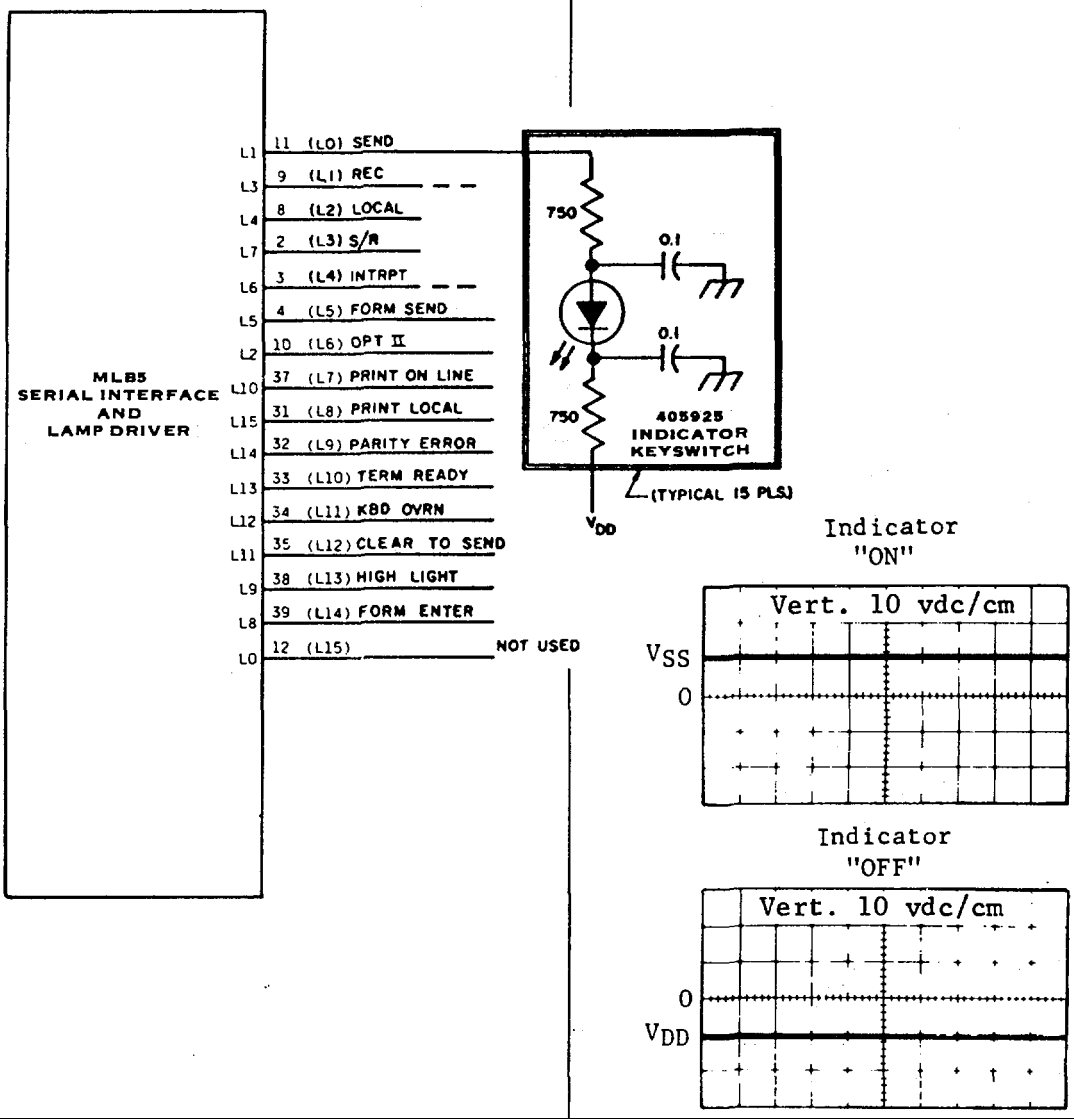
STEP	ACTION	NORMAL INDICATION AND CORPECTIVE PROCEDURE
1	Depress RETURN and ESC P fully and check to see that TST CLEAR lamp lights.. 	If TST CLEAR lamp fails to light, go o Page 5-53  If TST CLEAR lamp lights, go to Step 2. 
2	Enter loop-back test mode and perform test. Refer to Page 5-15 3. FUNCTIONAL TESTS, Step 2	If failing lamp fails to light in test mode, go to Step 3 If failing lamp lights in test mode, check for defective keyswitch with ailing lamp (refer to Pages 5-56 and 5-57, Steps 1 and 2).

CHART 2 (Contd)

CONTROL ROW INDICATOR FAILS TO LIGHT

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
3	Check to see that associated lamp driver output voltage is correct at MLB5-2, 3, 4, 8, 9, 10, 11, 31, 32, 33, 34, 35, 37, or 38 (SSI) on 410059 card when lamp should be lit.	
		
		If voltage output on lamp driver goes to VSS when lamp should be lit, replace defective indicator key-switch. If voltage output on lamp driver remains at VDD when lamp should be lit, replace defective MLB5.

D. TROUBLESHOOTING (Contd)

3. **TROUBLESHOOTING CHARTS (Contd)**

CHART 3

NO REPEAT CHARACTERS OUTPUT FROM THE OPCON

•**Place opcon in local mode**.

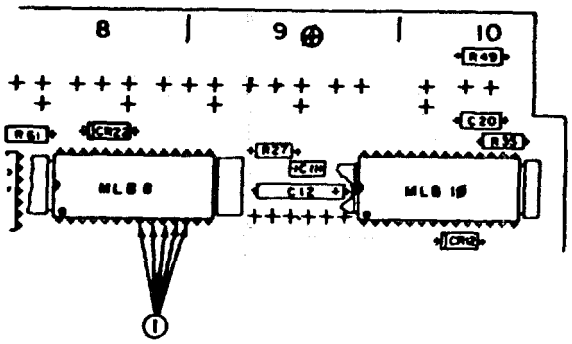
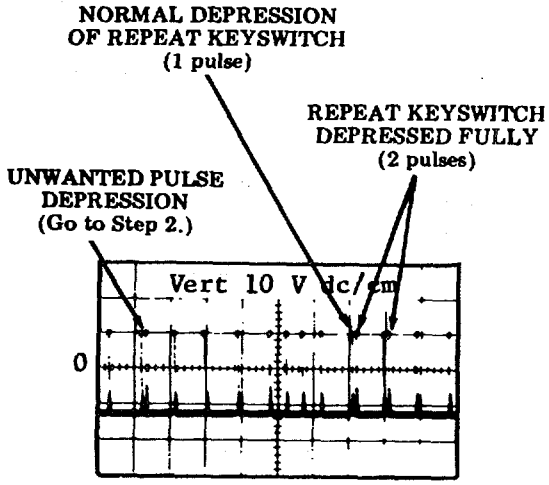
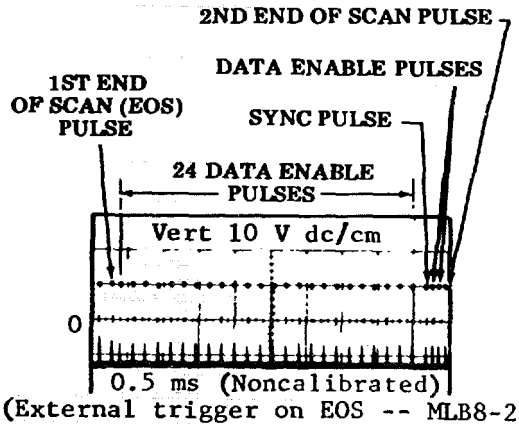
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	Depress a repeatable key fully. Hold and check I/O signals on MLB8-8 through 12 (KL) on 410059 card   I/O signal of one scan period from any sense amplifier with a repeatable key depressed fully.	 (1)I/O signal of one scan period (4.57 ms) from any sense amplifier with no depressed keyswitches.* *When depressed, CAPS LOCK key will cause a depression pulse in I/O signal at MLB8-10. This pulse has no effect on any repeatable key. If there are no other keyswitch depressions besides the desired repeat keyswitch depressions, replace MLB8 on 410059 card. If there are other unwanted keyswitch depressions present in the I/O signal, go to Step 2.

CHART 3 (Contd)

NO REPEAT CHARACTER OUPUT FROM THE OPCON

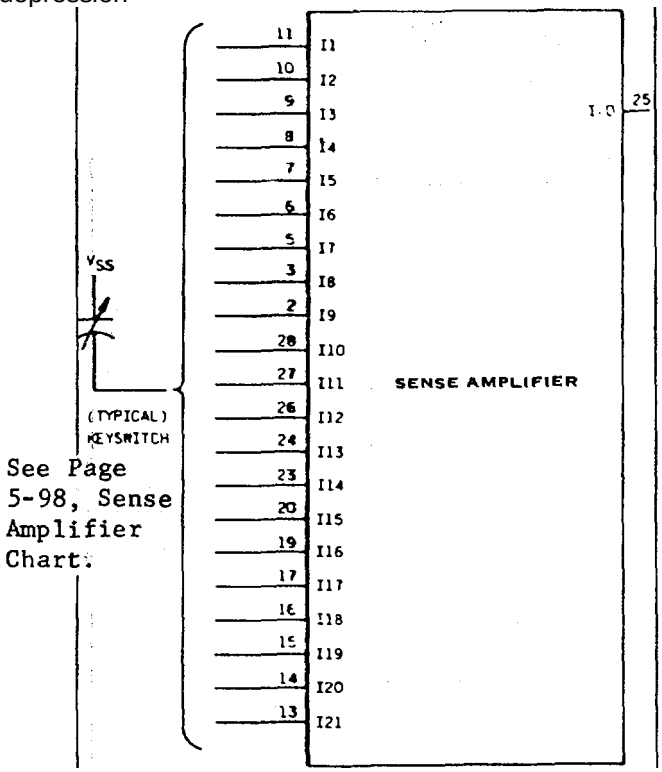
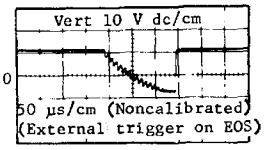
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
2	Release depressed repeat keyswitch and check inputs of sense amplifier associated with unwanted keyswitch depression  See Page 5-98, Sense Amplifier Chart.	If inputs to sense amplifier do not indicate a keyswitch depression replace sense amplifier associated with false depression.  Signal of Sense Amplifier Input Having a Keyswitch depression: If input to sense amplifier does indicate a keyswitch depression. a. Check for open connection to keyswitch associated with sense amplifier input having depression indicated. b. Check for cold solder connections at terminals of keyswitch. c. If above results show no difficulties, replace defective keyswitch.
NOTE: Refer to Pages 5-98 and 5-99, Functional Schematics FS-1 and FS-2 (410059 circuit card).		

CHART 4

INCORRECT CHARACTERS FROM THE OPCON

*Place opcon in local mode.

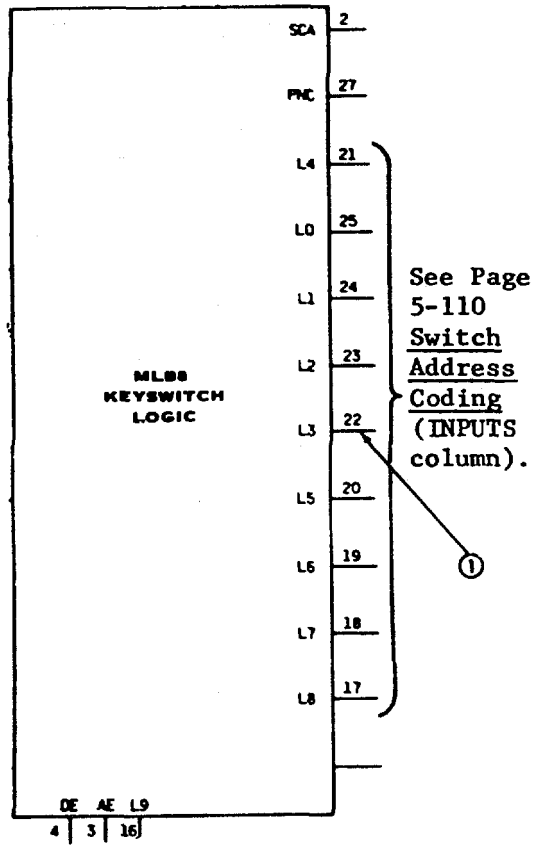
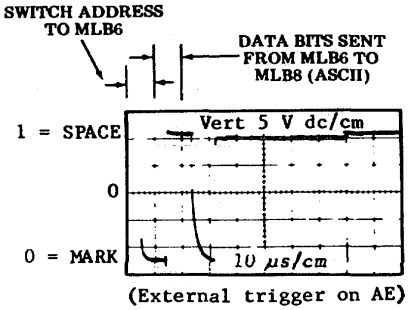
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	Check that all switch address signals which are sent from MLB8-17 through 25 to MLB6 (ROM) on 410059 card are correct (external trigger on AE -- MLB8-3).	

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 4 (Contd)

INCORRECT CHARACTERS FROM THE OPCON

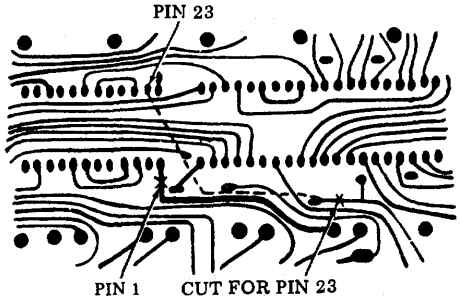
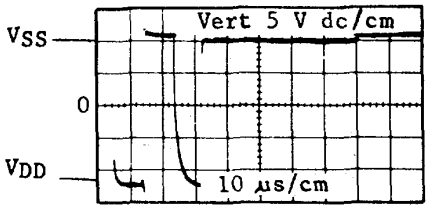
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1 (Cont)		(1)MLB8-22 ↑ key depressed fully and held.  If switch address signal is not correct on MLB8-17 through 25 and the signal on each data level toggles, replace defective MLB8. If switch address signal is incorrect on MLB8-17 through 25 and the signal on each data level does not toggle, go to Step 2. If switch address signal sent to MLB6 on MLB8-17 through 25 is correct, go to Step 3.

NOTE 1: Depress a repeatable key fully and hold to view signals required in chart (ie, cursor ↑).

NOTE 2: Refer to Page 5-99, Functional Schematic FS-2 (410059 circuit card) and Pages 5-102 and 5-103, Functional Schematics FS-5 and FS-6 (410074 circuit card).

CHART 4 (Contd)

INCORRECT CHARACTERS FROM THE OPCON

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
2	If one of the data levels is held at near VSS voltage, the defective MOS package can be found by the following technique	If lead which was held at near VSS goes to VDD the defective package may be either MLB8 or MLB5, go to Step 2b
a	Cut the conductors on noncomponent side of 410059 card which go to VSS on MLB6-1 and to VREF on MLB6-23. 	
b.	Next, cut the conductor on non component side of 410059 card for this data level at input MLB5-16 through 24 (SSI).	If data level goes to VDD, replace defective package MLB5; if it does not, replace defective package MLB8
NOTE: Replace package and make certain that all conductors that were cut are repaired by soldering a piece of wire in place where conductors were cut.		
3	Check that all data bits which are sent from MLB6-6 through 10 and 16 through 19 to MLB8 on 410059 card are correct (external trigger on -OE MLB6-11).	

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS

CHART 4 (Contd)

INCORRECT CHARACTERS FROM THE OPCON

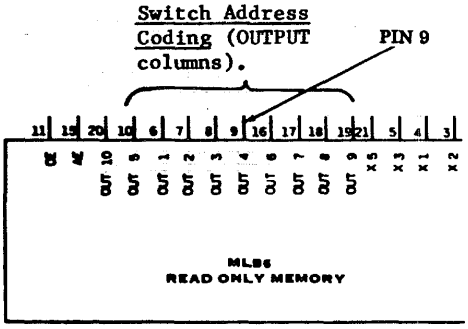
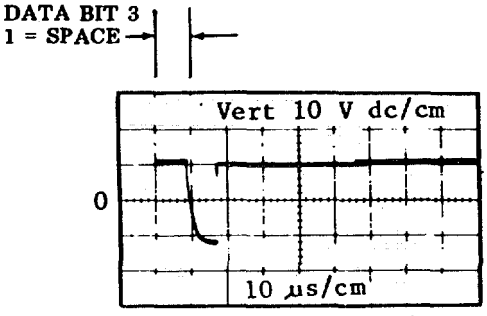
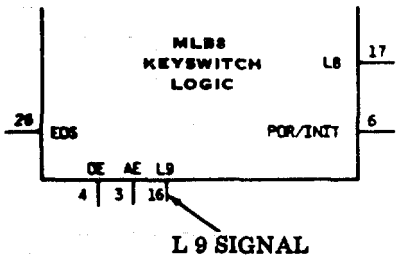
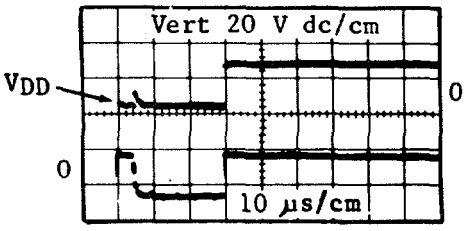
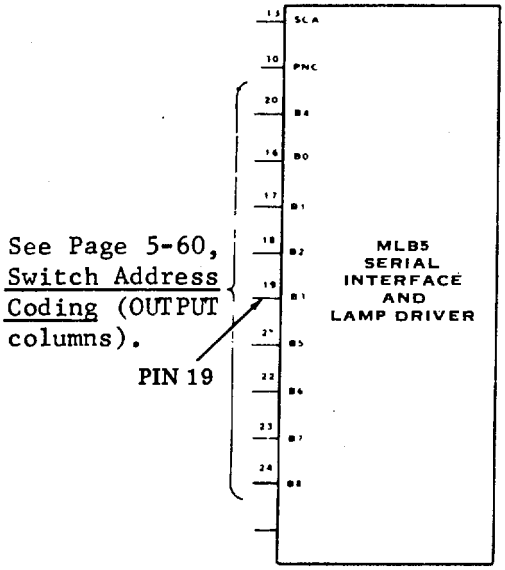
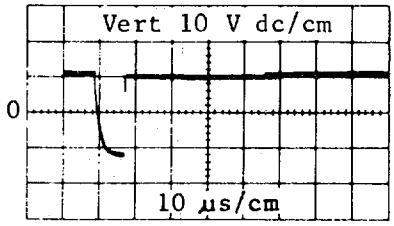
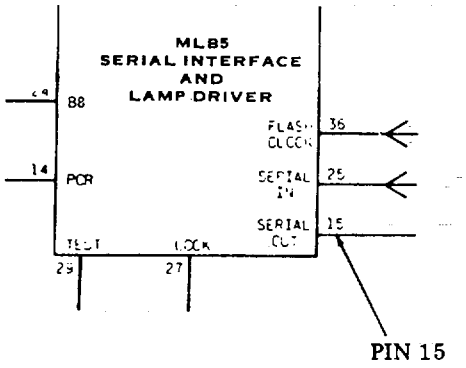
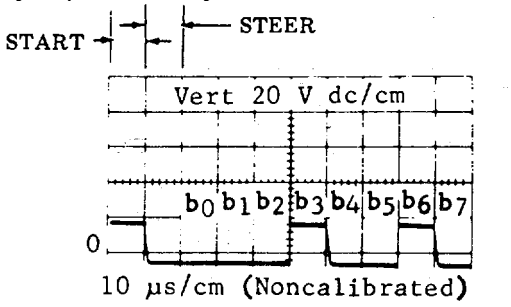
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
3 (cont)	See Page 5-60, Switch Address Coding (OUTPUT columns). 	 MLB6-9 waveform, with key depressed fully and held. If any data bit (ASCII -American National Standard Code for Information Interchange) is incorrect on MLB6-6 through 10 and 16 through 19 and the signal on each data level toggles, replace defective MLB6. If any data bit (ASCII) is incorrect on MLB6-6 through 10 and 16 through 19 and the signal on each data level does not toggle, go to Step 2. If all data bits sent to MLB8 on MLB6-6 through 10 and 16 through 19 are correct, go to Step 4.
4	Check that L9 signal on MLB8-16 remains near VDD during output enable for a valid character generated 	Top Signal -L9 signal at VDD during output of data bit -see. bottom signal  If L9 signal remains near VSS, check for shorted emitter to collector on Q9 transistor

CHART 4 (Contd)

INCORRECT CHARACTERS FROM THE OPCON

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
4(Cont)		If L9 signal remains near VDD during output enable for a valid character generated, go to Step 5.
5	Check that all ASCII character input signals on MLB5-16 through 24 on 410059 card are correct 	MLB5-19 waveform, with [↑] key depressed fully and held  If any data bit (ASCII) is incorrect on MLB5-16 through 24 and the signal on each data level toggles, replace defective MLB5 on 410059 card. If any data bit (ASCII) is incorrect on MLB5-16 through 24 and the signal on each data level does not toggle, go to Step 2. If all data bits are correct on MLB5-16 through 24, go to Step 6.
6	Check that serial out signal on MLB5-15 on 410059 card is correct Trigger oscilloscope internally to view this signal 	NOTE: This signal consists of an 18 .bit character having a start bit, steer bit, and 16 data bits (only .ASCII b_0 through b_7 are shown in waveform). MLB5-15 waveform, with [↑] key depressed fully and held.  If serial out signal is incorrect, replace defective MLB5 on 410059 card. If serial out signal is correct, go to Step 7.

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 4 (Contd)

INCORRECT CHARACTERS FROM THE OPCON

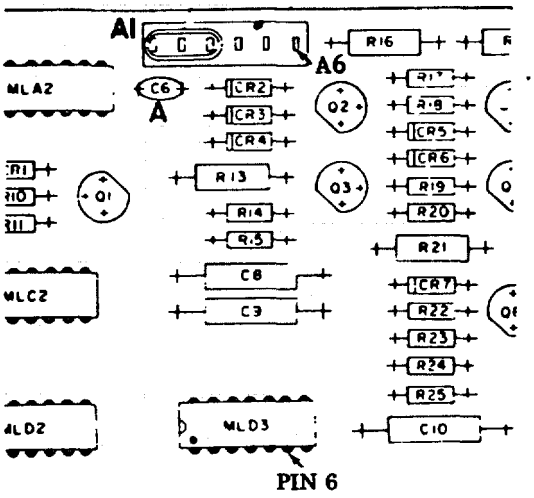
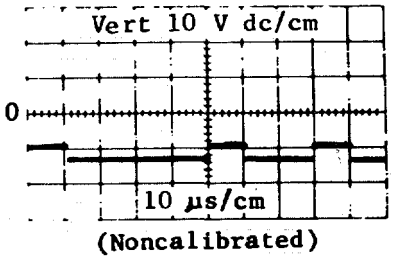
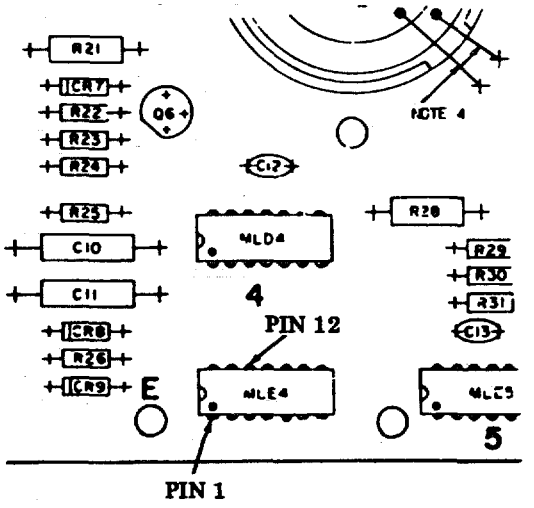
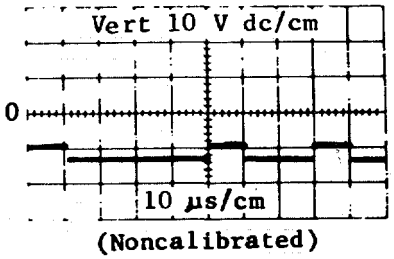
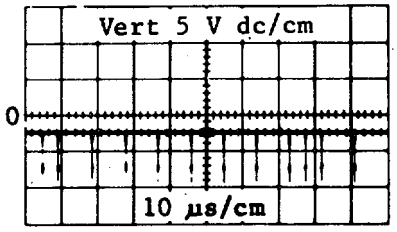
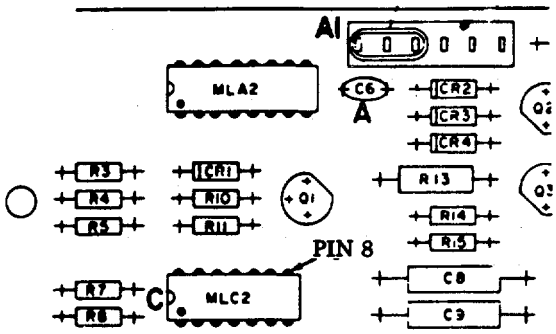
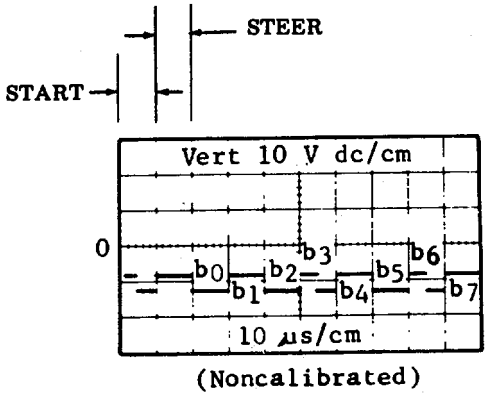
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
7	Check output data signal on MLD3-6 on 410074 card. Trigger oscilloscope E key depressed fully and held. externally on serial out data pin A6 	MLD3-6 waveform, with [ ] key depressed fully and held  If signal is incorrect or not present, check for open CR7 diode, replace MLD3. If signal is present and correct, go to Step 8.
8	Check space bit timing signal on M1E4-1 on 410074 card. Trigger internally 	MLE4-1 waveform Continual signal  If signal is incorrect or not present, check for open CRS diode, shorted C11 capacitor, replace MLE3. If signal is present and correct, go to Step 9.

CHART 4 (Contd)

INCORRECT CHARACTERS FROM THE OPCON

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
9	Check output data signal on MLE4-12 on 410074 card. External trigger on pin A6 (see step 12 for location of MLE4-12.)	MLE4-12 waveform, with [↑] key depressed fully and held  (Noncalibrated) If signal is not present, replace MLE4. If signal is present, go to Step 10
10	Check output data signal on MLC2-8 on 410074 card. External trigger on pin A6. 	NOTE: This signal consists of an 18 bit character having a start bit, steer bit and 16 bits (only ASCII through b0 are shown in waveform). MLC2-8 waveform, with [↑] key depressed fully and held.  (Noncalibrated) If signal is not present, replace MLC2. If signal is correct, go to Step 11.

D. TROUBLESHOOTING (Contd)

3. TROUBIESHOOTING CHARTS (Contd)

CHART 4 (Contd)

INCORRECT CHARACTERS FROM THE OPCON

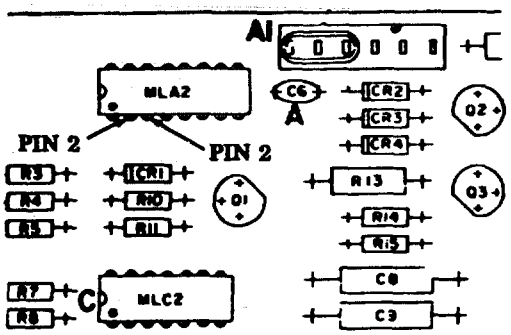
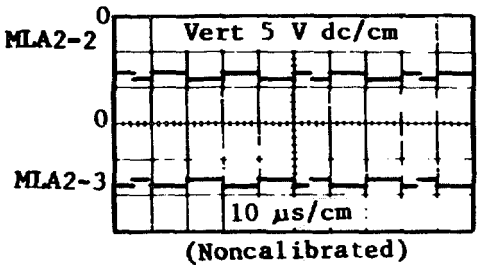
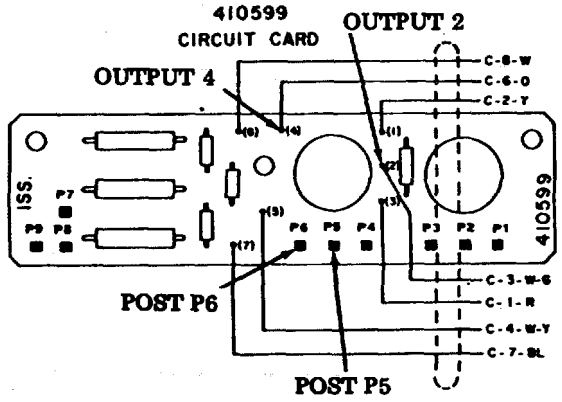
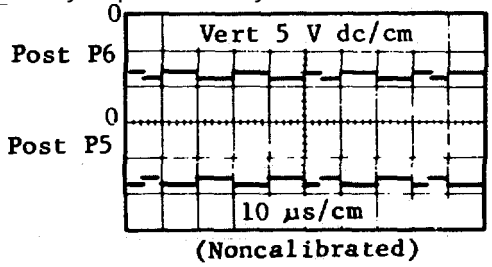
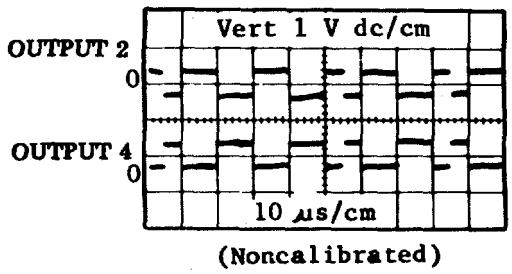
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
11	Check output data signal on MLA2-2 and 3 on 410074 card. External trigger on pin A6. 	. ↑ key depressed fully and held  If signal is not present, replace MLA2. If signal is correct, go to Step 12.
12	Check output data signal at posts P5 and P6 of 410599 card. External trigger on pin A6 	↑ key depressed fully and held.  If signal is not present, check for open wiring to 410074 card. Check continuity of feed-through filter
13	Check output data signal at outputs (2) and (4) of 410599 card. External trigger on pin A6.	↑ key depressed fully and held. 

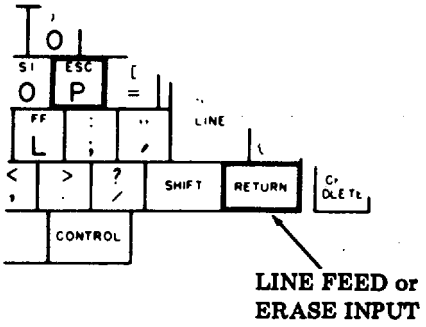
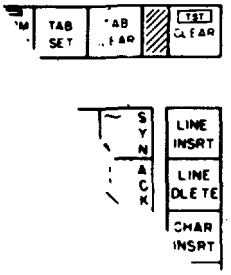
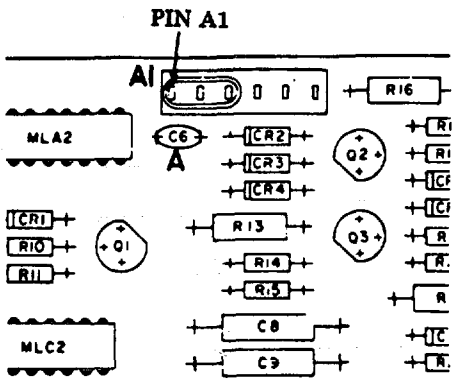
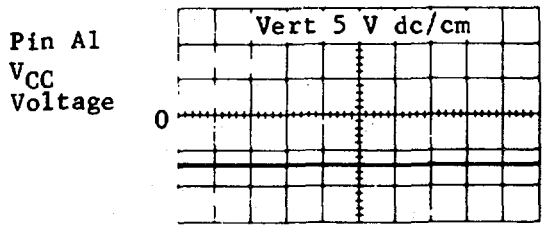
CHART 4 (Contd)

INCORRECT CHARACTERS FROM THE OPCON

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
13(Cont)		If signal is not present, check for open output winding in T1 transformer, poor solder connections. If signal is present, opcon is good, check associated controller logic.

CHART 5

NO DATA OUTPUT FROM OPCON AND LOOP-BACK TEST MODE DOES NOT FUNCTION

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	Depress RETURN, LINE FEED or ERASE INPUT to see that TST CLEAR lamp lights. 	If TST CLEAR lamp fails to light go to Page 5-53 If TST CLEAR lamp lights,-go to Step 2 
2	Check to see that VCC voltage is present on pin Al of 410074 card 	 If VCC voltage is not present, check switching regulator. (Refer to Page 5-103, Functional Schematic FS-11). If VCC voltage is present, go to Step 3

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 5 (Contd)

NO DATA OUTPUT FROM OPCON AND LOOP-BACK TEST MODE DOES NOT FUNCTION

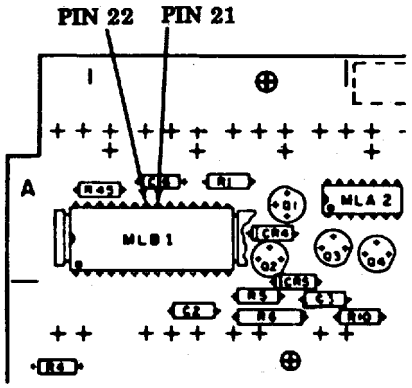
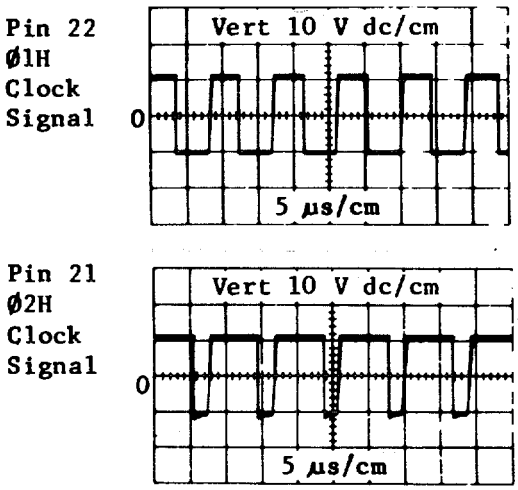
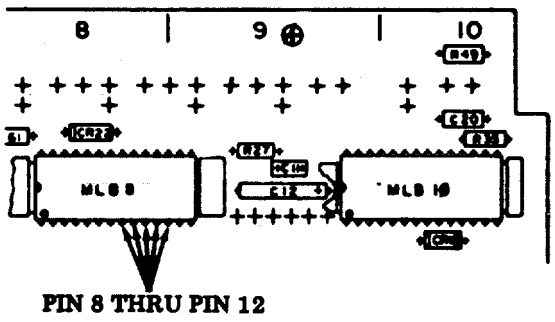
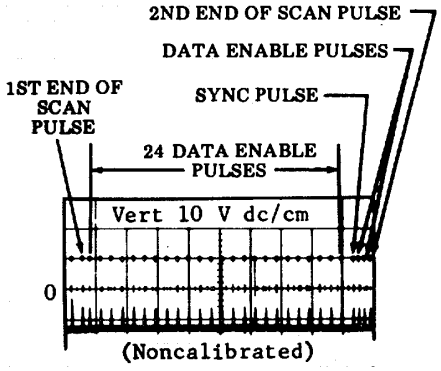
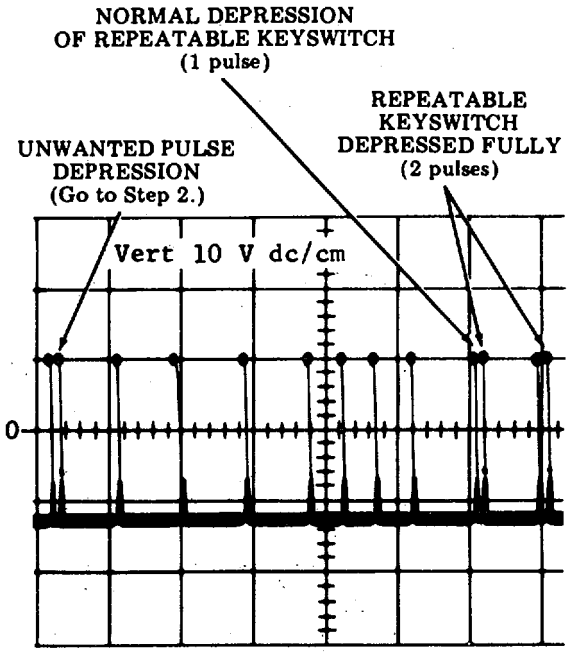
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
3	Check to see that 01H and 02H clocks are present on MLB1-22 and 21, respectively on 410059 card 	 If Φ1H and Φ2H clocks are not present, check high 'frequency clock and drivers. (Refer to Page 5-100, Functional Schematic FS-3). If Φ1H and Φ2H clocks are present, go to Step 4.
4	Depress a repeatable key fully --hold -- and check I/0 signals on MLB8-8 through 12 on 410059 card. 	 (External trigger on EOS) Pin 8 thru Pin 12, I/O signal of one scan period (4.57 ms) from any sense amplifier with no depressed keyswitches.* *When depressed, the CAPS LOCK key will cause a depression pulse in

CHART 5 (Contd)

NO DATA OUTPUT FROM OPCON AND LOOP-BACK TEST MODE DOES NOT FUNCTION

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
4 (Cont)		I/O signal at MLB8-10. This pulse has no effect on any repeatable key.  (4)I/O signal of one scan period from any sense amplifier with a repeatable key depressed fully. If there are other unwanted keyswitch depressions present in the I/O signal, refer to Page 5-57, Step 2. If there are no other keyswitch depressions besides the desired repeat keyswitch depression go to Step 5.
5	Check that all switch address signals on MLB8-17 through 25 are correct on 410059 card (Refer to Page 5-58, Step 1).	If switch address signal is not correct and the signal on each data .level toggles, replace defective MLB8. If switch address signal is not correct and the signal on each data level does not toggle, go to Page 5-59, Step 2. If switch address signal is correct, go to Step 6.

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 5 (Contd)

NO DATA OUTPUT FROM OPC AND LOOP-BACK TEST MODE DOES NOT FUNCTION

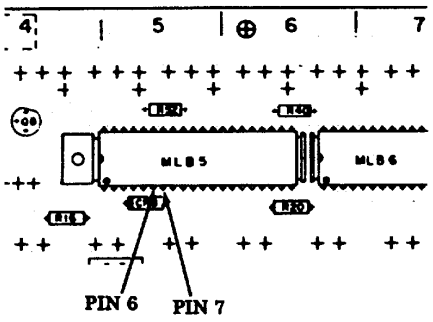
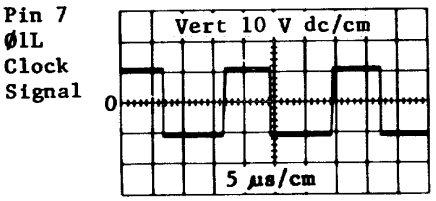
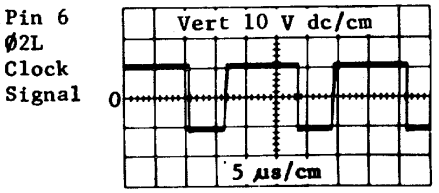
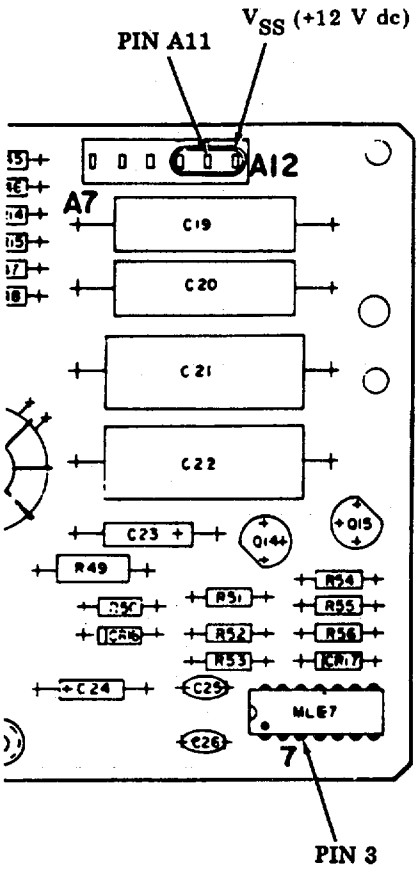
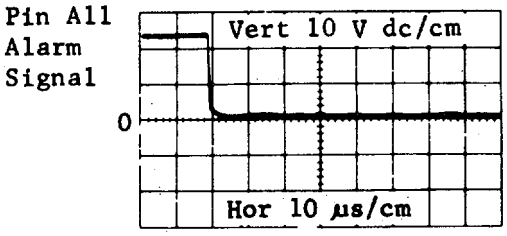
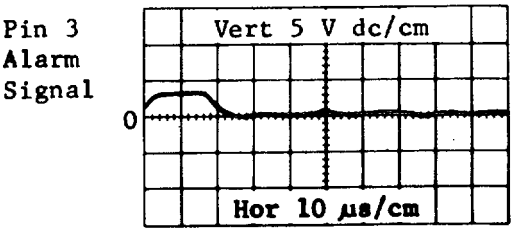
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
6	Check that serial out signal on MLB5-15 on 410059 card is correct (Refer to Page 5-61, Step 6).	If serial out signal is not present,. go to Step 7. If serial out signal is present, go to Page 5-62, Step 7.
7	Check to see that Φ1L and Φ2L clocks are present on MLB5-7 and 6, respectively on 410059 card. 	  If Φ1L and Φ2L clocks are not present, check the low frequency clock drivers. (Refer to Page 5-105, Functional Schematic FS-8). If Φ1L and Φ2L clocks are present, replace defective MLB5 on 410059 card.

CHART 6

NO ALARM

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	Check for alarm signal on pin All of 410074 card (see Page 5-72, Notes 1 through 4.) 	 If waveform is not present, momentarily jump pin A12 to All. If alarm sounds, replace defective 342553 TSS1 (MLB5), 410059 card. If waveform is present, and alarm does not sound, go to Step 2.
2	Check for alarm signal on MLE7-3 on 410074 card (see Page 5-71, Note 3	 If waveform is not present, check for shorted C25 capacitor or shorted input on MLE7 on 410074 card.

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 6 (Contd)

NO ALARM

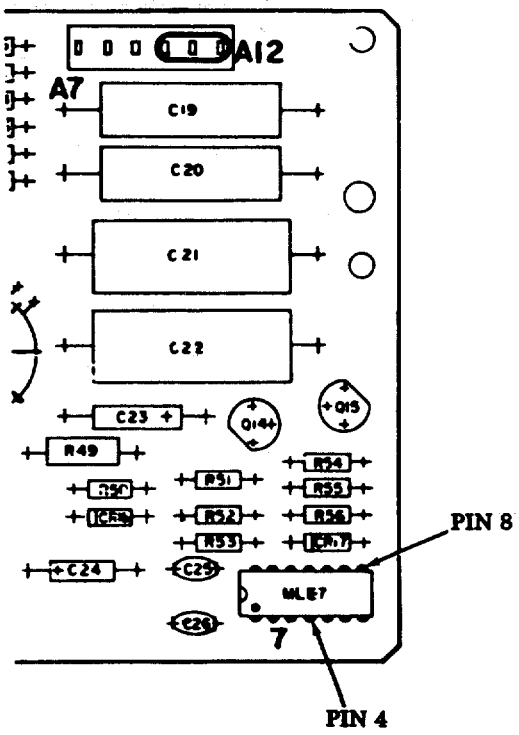
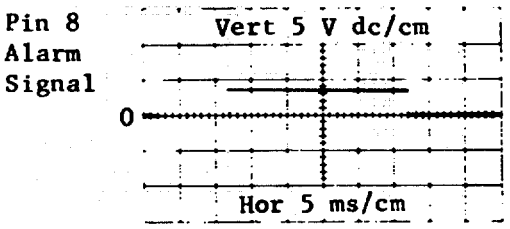
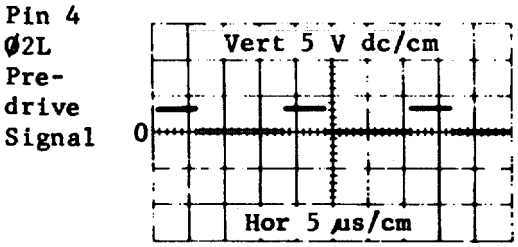
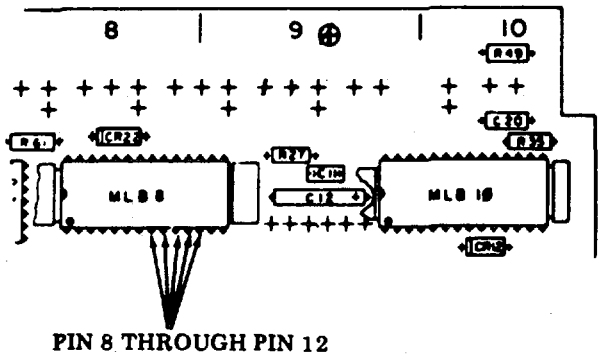
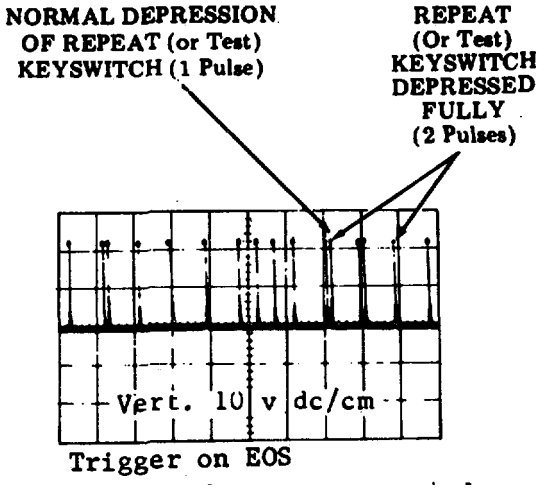
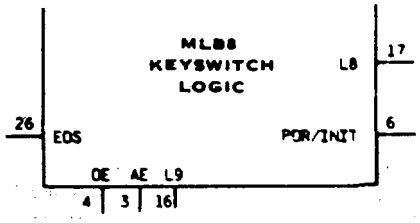
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
2(Cont)		If the waveform is present and alarm does not sound, go to Step 3.
3	Check for alarm signal on MLE7-8 on 410074 card (see Page 5-72, Note 3). 	If waveform is present, and alarm does not sound, go to Step 4  If waveform is not present, check for Φ2L predrive signal on MLE7-4 on 410074 card.  If ϕ2L predrive signal is present, replace MLE7 on 410074 card. If ϕ2L predrive signal is not present, replace MLD3 on 410074 card.

CHART 7

DELAY IN REPEAT

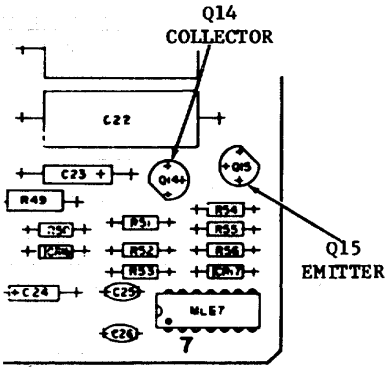
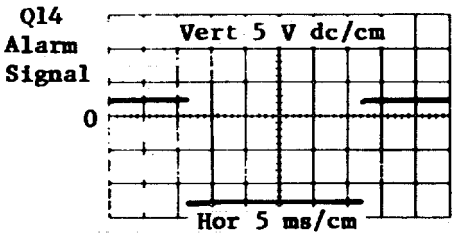
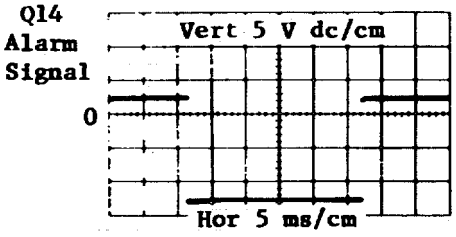
STEP ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1 Depress a repeatable key fully. Hold and check I/O signals on Pins 8, 9, 10, 11 and 12 of MLB8 on 410059 card.  PIN 8 THROUGH PIN 12 Note: Signal appears when key is depressed	 1/0 signal of one scan period from any sense amplifier with a repeatable key depressed fully. If signal is incorrect go to page 5-29. If signal is correct go to Step 2.
2. Check address enable (AE) on MLB8 Pin 3 as a repeatable key is fully depressed  	If the same delay exists in this signal, that appear in cursor .response, replace MLB8.

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 7 (Contd)

DELAY IN REPEAT

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
4	Check for alarm signal on collector of Q14 transistor on 410074 card (see Note 3). 	 If waveform is not present, replace defective Q14 transistor. If waveform is present and alarm does not sound, go to Step 5.
5	Check for alarm signal on emitter of Q15 transistor on 410074 card (see Q15 transistor (shown in Step 4) on 410074 card (see Note 3).	 If waveform is not present, check for shorted C21, C22 or C23 capacitors, or shorted emitter to collector on Q15 transistor, etc. on 410074 card. If waveform is present, alarm should sound.

NOTE 1: Controller must have an alarm detect circuit.

NOTE 2: Generating a bell code at the opcon will not cause the alarm to sound.

NOTE 3: Depress the spacebar fully and hold to view signals required in chart.

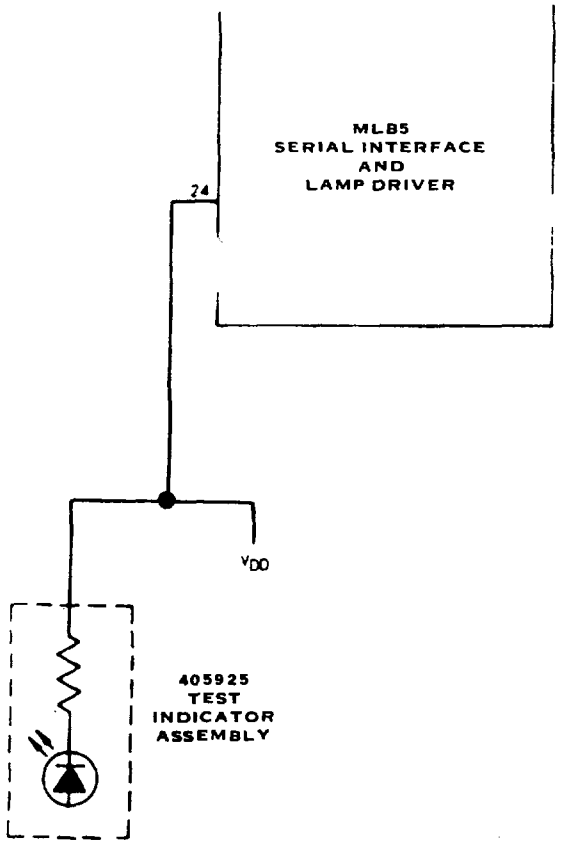
NOTE 4: Refer to Page 5-105, Functional Schematic FS-9 (410074 circuit card).

All Control Row Indicators Flash-in Local Loopback Test Mode When a Character Having the Eight Bit Spacing is Generated

NOTE 1: Place opcon in local loopback test mode.

NOTE 2: Depress PERIOD fully and hold to view signals required in chart.

CHART 8

ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
Check voltage at MLB5-24 on 410059 card when lamps are flashing (see Note 2).. 	If this level remains at VDD while lamps flash, replace defective MLB5

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 9

'TST" INDICATOR FAILS TO LIGHT

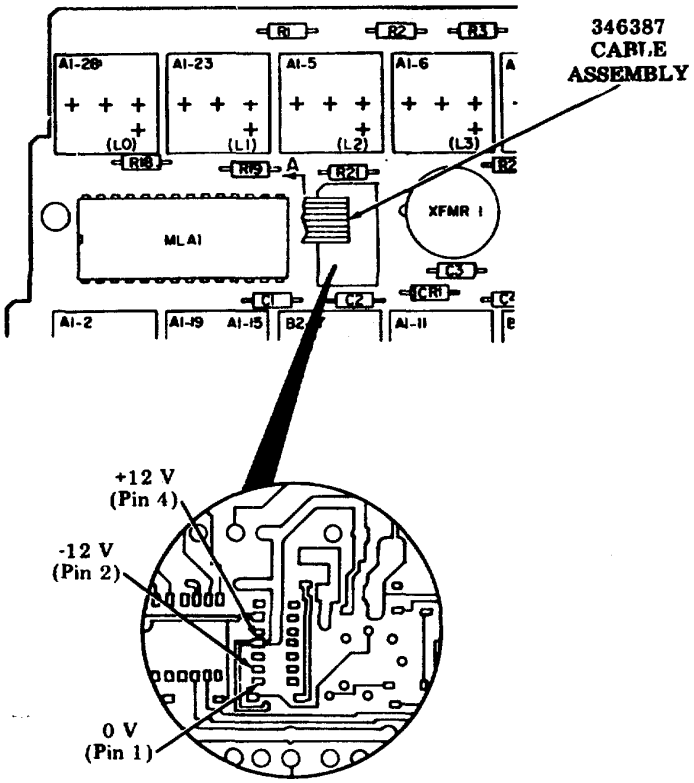
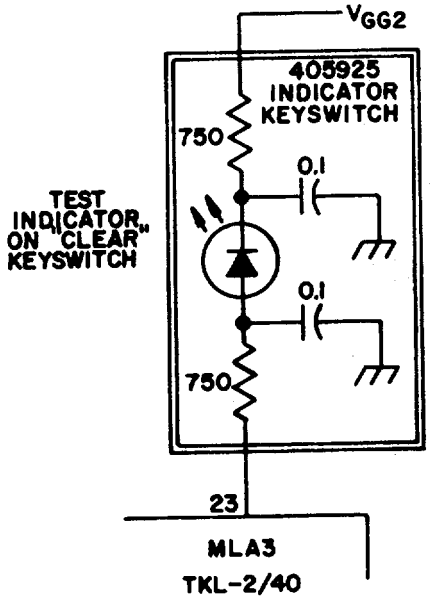
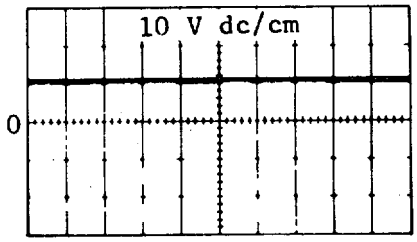
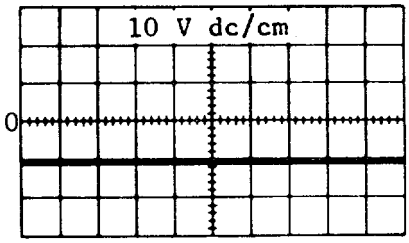
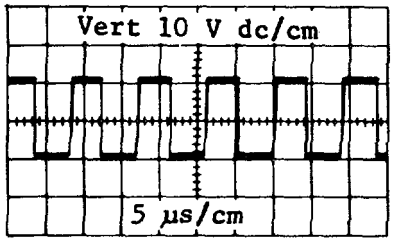
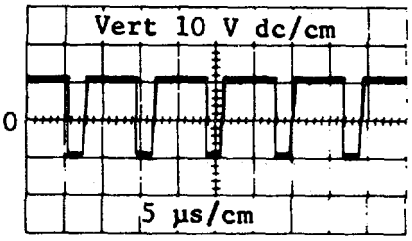
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	Check to see that supply voltages are present at Pin 1 (O V), Pin 2 (-12 V) and Pin 4 (+12 V) of the dip connector on 346387 cable assembly.  Bottom View of Dip Connector on 410096 Card.	If voltages are not present, check for dirty or broken connector pins, open lands, cut cable, etc. If voltages are present, go to Step 2.

CHART 9 (Contd)

"TST" INDICATOR FAILS TO LIGHT

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
2	Check for correct voltage at Pin 23 of MLA3 when "TST" lamp should be on. 	"TST" or "CONSOL TEST" lamp "ON"  "TST" or "CONSOL TEST" lamp "OFF" 
3	Check to see that Θ1 and Θ2 clocks are present on Pins 22 and 21, respectively, of MLA1 on 410096 card.	Pin 22 Ø1 Clock Signal  Pin 21 Ø2 Clock Signal 

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 9 (Contd)

"TST INDICATOR FAILS TO LIGHT

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
3 (Cont)		If ∅1 and ∅2 clocks are not present, go to Chart 11, Step 3. If ∅1 and ∅2 clocks are present, go to Step 4.
4	Check I/O signal at Pin 14 of MLA3 for depression of "RETURN" and "QUOTES" keys when depressed fully.	If I/O signal indicates the desired keyswitch depressions and "TST" indicator fails to light, replace MLA3 or MLA5 respectively.
5	Depress "RETURN" and "QUOTES" keys fully, hold and check inputs of MLB3 associated with depressed keyswitches.	If inputs to sense amplifier do not indicate the desired key-switch depressions, replace defective keyswitch(es). If inputs to sense amplifier do indicate the desired keyswitch depressions, replace MLB3 or MLA6.

CHART 10

CONTROL ROW INDICATOR FAILS TO LIGHT

<table>
<tr><th>STEP ACTION</th><th>NORMAL INDICATION AND CORRECTIVE PROCEDURE</th></tr>
<tr><td>1 Place keyboard in local loopback test mode per table below and check to see that test indicator lights and remains on.

LOCAL LOOPBACK TEST TABLE

<table>
<tr><th>OPCON / TEST</th><th>RDF-RDH</th><th>RDG</th><th>RDE</th></tr>
<tr><td>IN</td><td>RETURN AND "</td><td>ERASE INPUT AND "</td><td>LINE FEED AND "</td></tr>
<tr><td>INDICATOR</td><td>TST</td><td>TST</td><td>TST</td></tr>
</table>
</td><td>If "TST" lamp fails to light, go to Chart 8.

If "TST" lamp lights, go to Step 2.</td></tr>
<tr><td>2 Perform "Loopback" test. Refer to Section C, Part 4. Testing for Functional Tests -- 40K108 Opcons.</td><td>If failing lamp fails to light in test mode, go to Step 3.

If failing lamp lights in test mode, check for defective keyswitch with failing 1a--(refer to Chart 8, Steps 1 and 2).</td></tr>
</table>

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

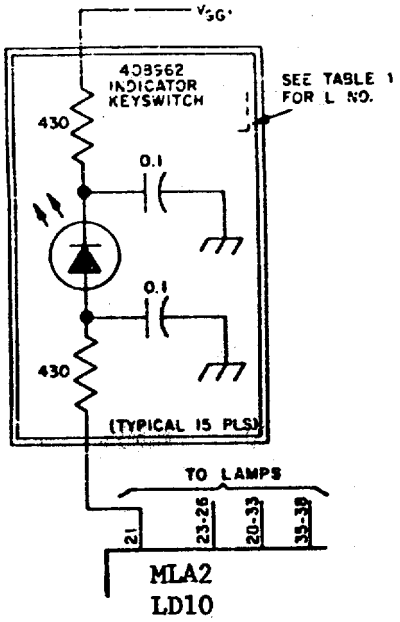
CHART 10 (Contd)

CONTROL ROW INDICATOR FAILS TO LIGHT

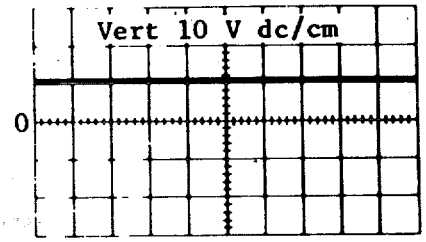
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
3	Check to see that associated lamp driver output voltage is correct at pin numbers per table below when the associated indicators should be on.	

LAMP DRIVER TABLE

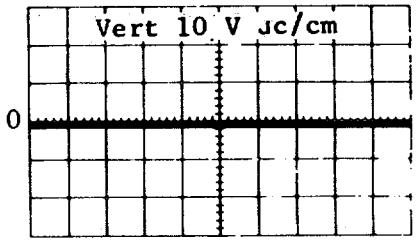
LAMP NO.	PIN NO. ON LDIO CHIP	LAMP NO.	PIN NO. ON LDIO CHIP
L0	33	L8	29
L1	35	L9	28
L2	37	L10	24
L3	38	L11	23
L4	36	L12	21
L5	32	L13	25
L6	31	L14	26
L7	30	NOT USED	22



Indicator "ON"



Indicator "OFF"



If voltage on the lamp driver output is correct when lamp should be on, check resistance of associated current limiting resistor and replace if necessary.

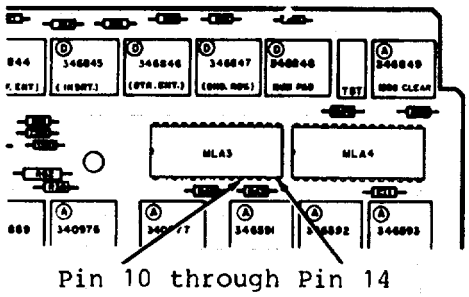
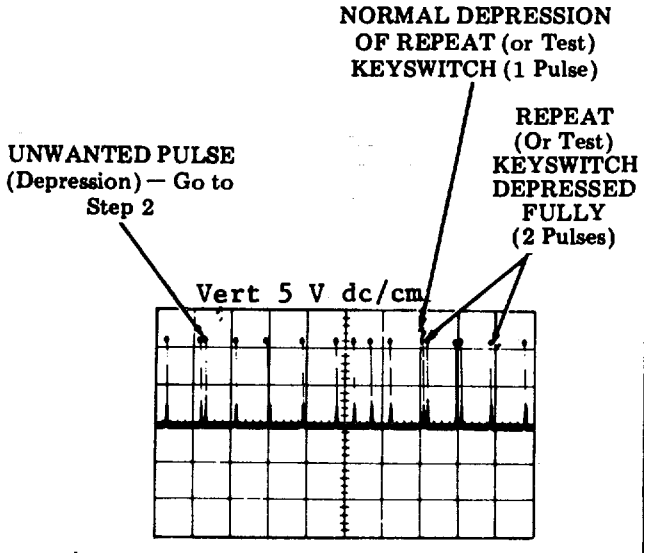
If resistor checks OK, replace defective indicator keyswitch. If voltage on the lamp driver output remains at an off state when lamp should be on, replace defective MLA2.

Note: Vgg 1 = 0 V dc.
Vss = +12 V dc.

CHART 11

NO REPEAT

- Place opcon in local mode.

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	Depress a repeatable key fully. Hold and check I/O signals on Pins 10 through 14 of MLA3 on 410096 card. 	If there are no other keyswitch depressions besides the desired repeat keyswitch depressions, replace MLA3. If there are other unwanted keyswitch depressions present in the I/O signal, go to Step 2.  I/O signal of one scan period from any sense amplifier with a repeatable key depressed fully. I/O signal of one scan period (4.57 ms) from any sense amplifier with no depressed keyswitches.* ‡ The "CAPS LOCK" key when depressed will cause a depression pulse in I/O signal at Pin 12 of MLA3. This pulse has no effect on any repeatable key.

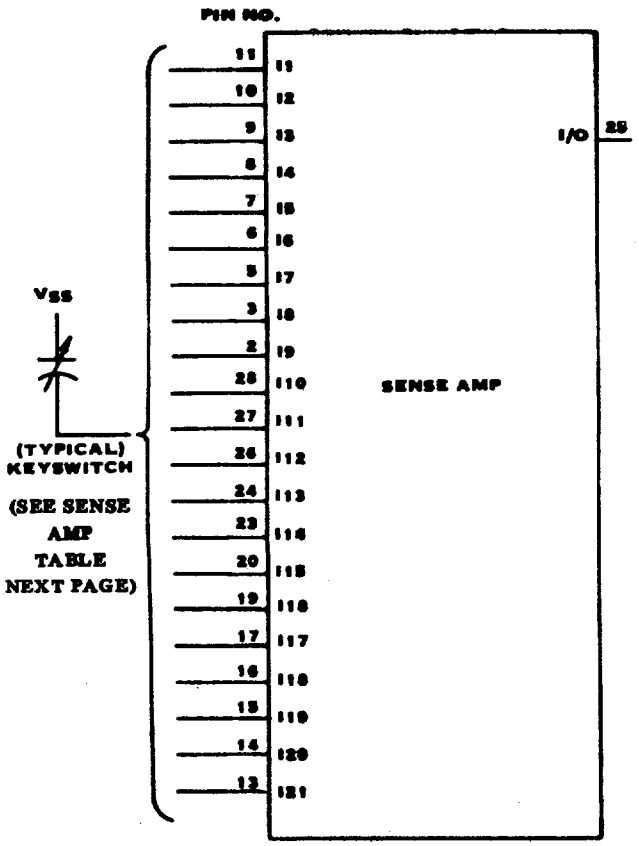
D. TROUBLESHOOTING (Contd)

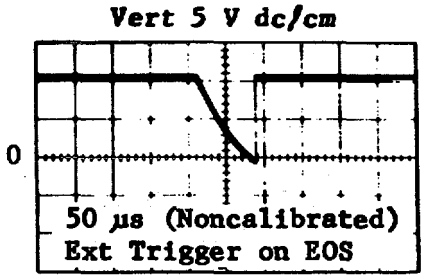
3. TROUBLESHOOTING CHARTS (Contd)

CHART 11 (Contd)

NO REPEAT

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
2	Release depressed repeat keyswitch and check inputs of sense amplifier associated with unwanted key-switch depression.	If inputs to sense amplifier, do not indicate a keyswitch depression, replace sense amplifier associated with false depression.





Signal of Sense Amplifier Input Having a Keyswitch Depression

If input to sense amplifier does indicate a keyswitch depression:

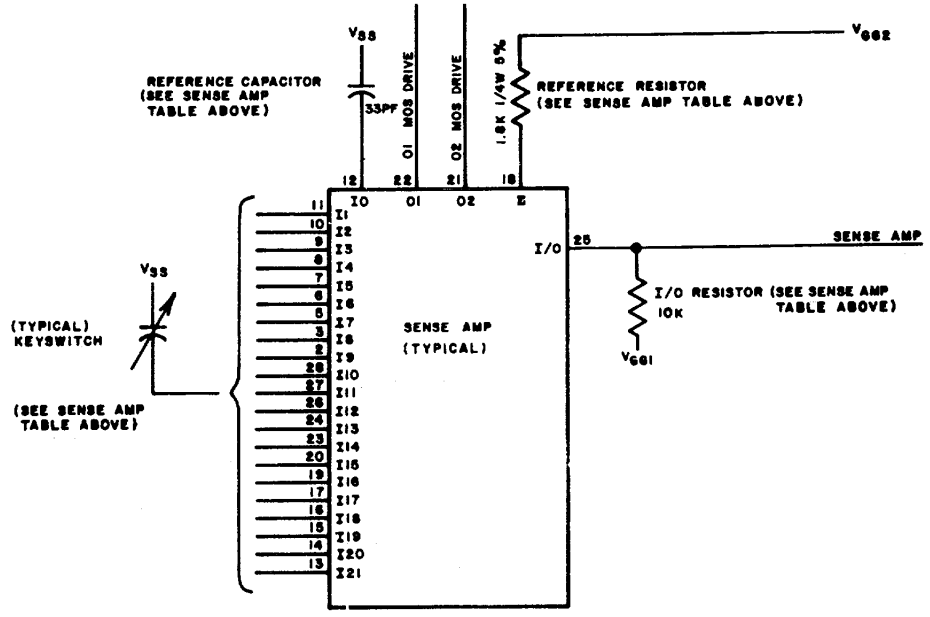
a. Check for open connection to keyswitch associated with sense amplifier input having depression indicated.
b. Check for cold solder connections at terminals of keyswitch.
c. If above results show no difficulties, replace defective keyswitch.

CHART 11 (Contd)

NO REPEAT

SENSE AMP TABLE

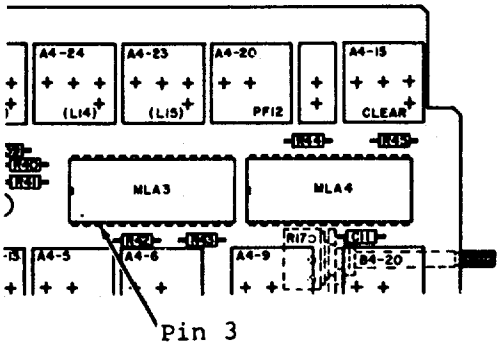
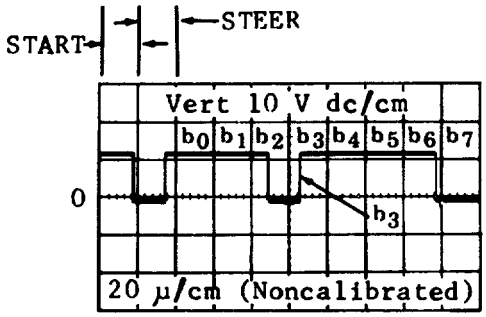
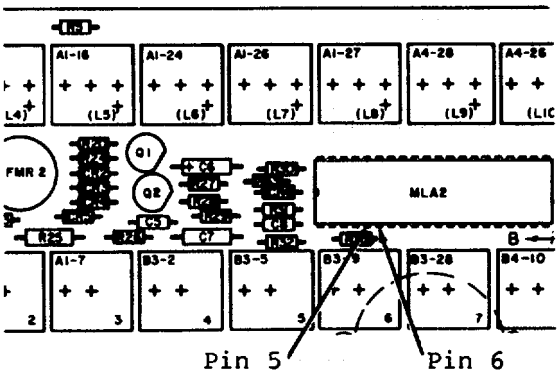
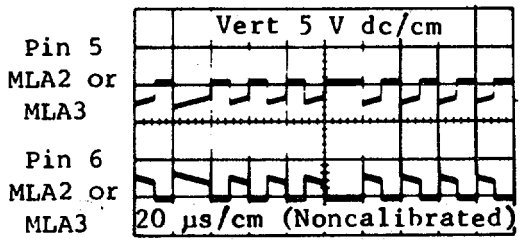
SENSE AMP PIN NO	SENSE AMP 1 (MLA4)	SENSE AMP 2 (MLB4)	SENSE AMP 3 (MLB2)	SENSE AMP 4 (MLA1)	SENSE AMP 5 (MLB3)
	KEYTOP CHARACTER				
11	{	XTRA (V_{SS})	E	I	Y
10	\	8	B	→	N
9	↑	1	F	↓	6
8	P(TEST)	L	2	←	T
7	P	U	V	3	M
6	TAB	/	W	(L3)	G
5	+	K	Q	(L2)	5
3	−	,	D	CURSOR RET.	R
2	0 (ZERO)	.	C	HOME	4
28	(L9)	0	Z	(L0)	7
27	=	;	A	(L8)	M
26	(L10)	9	S	(L7)	J
24	(L14)	/	X	(L6)	SPACE
23	TAB SET	RETURN	SHIFT (LEFT)	(L1)	CONTROL (LEFT)
20	TAB CLEAR	LINE INSERT	CAPS LOCK	SCROL DOWN	SHIFT (RIGHT)
19	(L13)	LINE DELETE	CURSR. TAB	SCROL UP	NEW LINE
17	(L12)	CHAR. INSRT.	SEGMT. ADV.	(L4)	^ (TEST)
16	(L11)	CHAR. DLETE	↓	(L5)	CONTROL (RIGHT)
15	CLEAR	CHAR. DLETE - RPT	→ REPEAT	SCROL UP - RPT	> . - REPEAT
14	CHAR. INSRT - RPT	OPTION-RPT(V_{SS})	← REPEAT	SCROL DOWN-RPT	SPACE - RPT
13	= RPT	NEW LINE-RPT(V_{SS})	↑ REPEAT	↓ REPEAT	RETURN (TEST)
10	REFERENCE RESISTOR				
	R45	R57	R55	R 19	R56
25	I/O RESISTOR				
	R44	R42	R49	R 18	R43
	KEYSWITCH LOGIC (MLA3) INPUT PIN NO.				
	10	11	12	13	14
12	REFERENCE CAPACITOR				
	C11	C 15	C13	C1	C14



NOTES

CHART 12

INCORRECT CHARACTERS FROM THE KEYBOARD

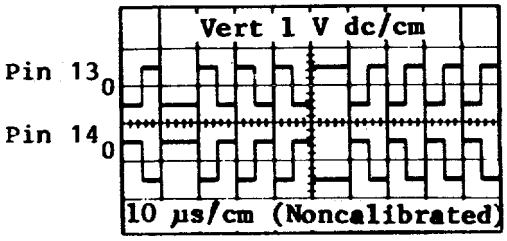
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	Check that Serial Send Data signal on Pin 3 of MLA3 is correct.  Trigger oscilloscope internally to view this signal. See Note 1 and 2 below.	NOTE: This signal consists of an 18 bit character having a start bit, a steer bit and 16 data bits (only ASCII b_0 through b_7 are shown in waveform). ←--Key Depressed Fully and Held  If Serial Send Data signal is incorrect, replace defective **MLA3**. If Serial Send Data signal is correct, go to Step 2.
NOTE 1: Depress a repeatable key fully and hold to view signals required in chart (i.e., cursor ←). NOTE 2: Refer to Functional **Schematics**.		
2	Check that SSI data signal (ITC) on Pins 5 or 6 of MLA2 is correct.  External trigger on Pin 3 of MLA3.	← Key Depressed Fully and Held  If signal is not correct, replace **MLA2**. If signal is correct, go to Step 3.

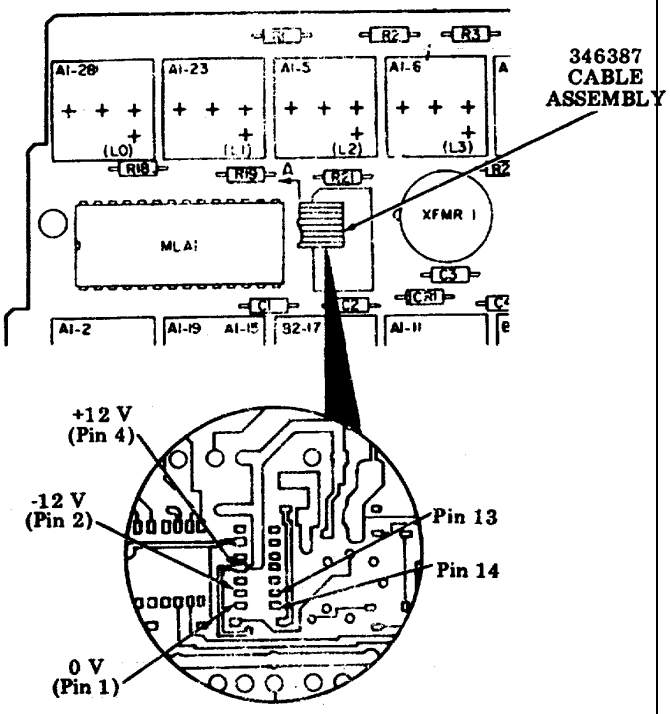
D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 12 (Contd)

INCORRECT CHARACTERS FROM THE KEYBOARD

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
3	Check that SSI data signal is correct at Pin 13 and Pin 14 of the dip connector on 346387 cable assembly.	← Key Depressed Fully and Held  If signal is not present, check for open output winding on XFMR1 transformer or poor solder connections, etc. If signal is present, opcon is good, check associated controller logic.



Bottom View of Dip Connector

CHART 13

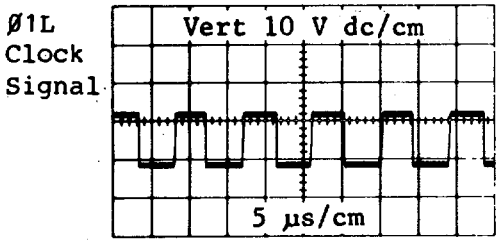
NO DATA OUTPUT FROM THE KEYBOARD

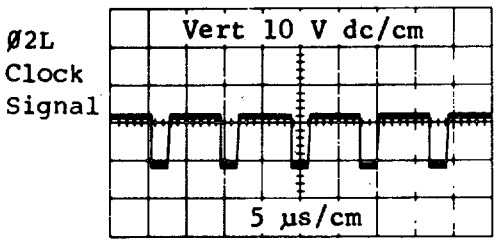
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	Place keyboard in local loopback test mode (see table below) and check to see that "TST" indicator lights and remains on. (See Note below.)	If "TST" indicator fails to light in local loopback mode, go to Chart 9. If "TST" indicator lights, place opcon out of local loopback test mode to extinguish "TST" indicator and go to Step 8. (See Table).
2	Check to see that Ø1L and Ø2L clocks are present at MLA2, MLA3 and Ø1 and Ø2 clocks at all sense amplifiers (See D. 4. REFERENCE MATERIAL).	If ∅1 and ∅2 clocks are not present, go to Step 3. If ∅1 and ∅2 clocks are present, go to Step 8.

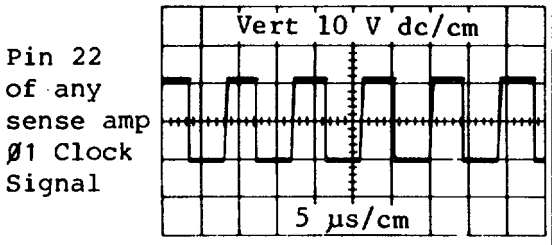
LOCAL LOOPBACK TEST MODE TABLE

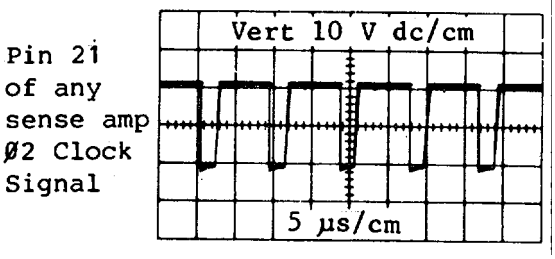
OPCON STATE	RDF RDH	RDG	RDE
IN	RETURN AND "	ERASE INPUT AND "	LINE FEED AND "
OUT	RETURN AND P	ERASE INPUT AND P	LINE FEED AND P
TEST INDICATOR	TST	TST	TST

NOTE: If "TST" indicator is lighted after power is on, go to Step 2.









D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 13 (Contd)

NO DATA OUTPUT FROM THE KEYBOARD

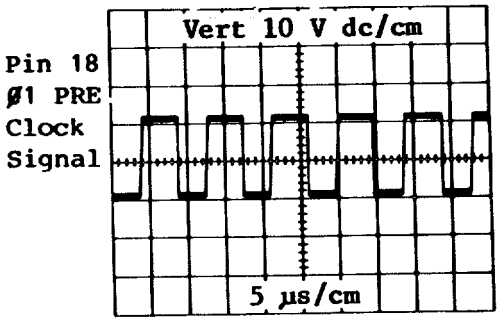
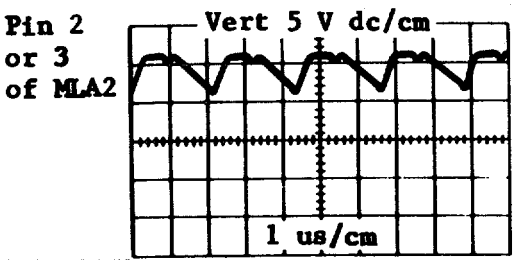
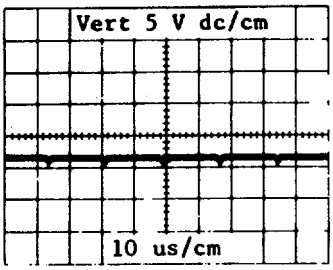
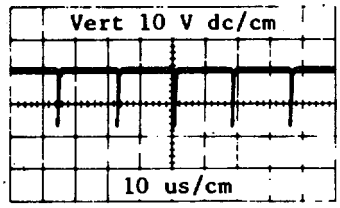
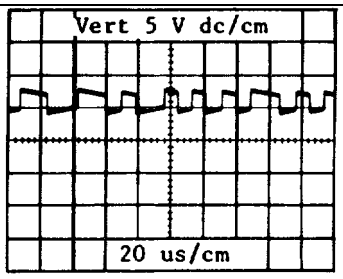
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
3	Check to see that ∅1 and ∅2 clock predrives are present at Pins 18 and 19 respectively, of MLA2.	 If ∅1 PRE and ∅2 PRE clocks are present, replace MLB1. ∅1 PRE and ∅2 PRE are not present, go to Step 4.
4	Check signal at timing Pins 2 and 3 of MLA2. NOTE: The timing pins are very sensitive to stray capacitance. Many oscilloscope probes will cause improper operation of the phase-locked loop if they are attached to either Pin 2 or Pin 3 of MLA2.	 If signal is not present, go to Step 5. If signal is present, go to Step 7.

CHART 13 (Contd)

NO DATA OUTPUT FROM THE KEYBOARD

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
5	Check for correct signal at emitter of Q2.	Emitter of Q2  If signal is present, check the timing components R31, R32 and C8. If signal is not present, go to Step 6.
6	Check for correct PU signal at Pin 8 of MLA2.	Pin 8 of MLA2  If signal is present, check associated PU filter components (C6, C7, R27, R29, and Q2). If signal is not present, go to Step 7.
7	Check to see that ITD signal is present at Pins 39 or 40 of MLA2.	Pin 39 or 40 of MLA2  If signal is present, replace MLA2 or MLA3. If signal is not present, check for open output winding on XFMR2 transformer, check R22, SSI cable, etc.

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 13 (Contd)

NO DATA OUTPUT FROM THE KEYBOARD

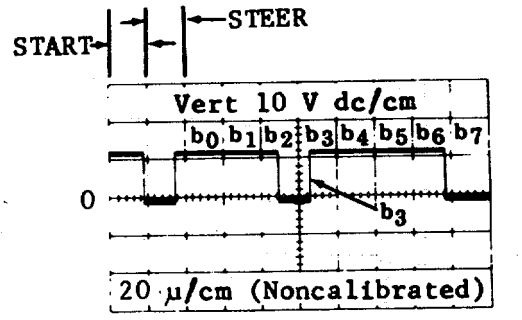
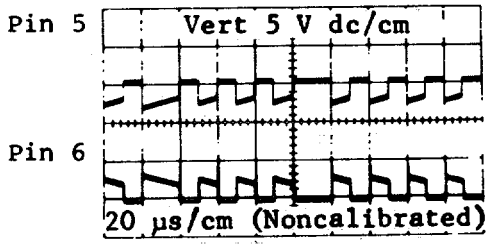
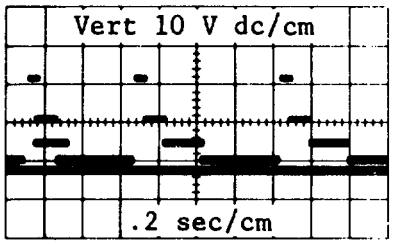
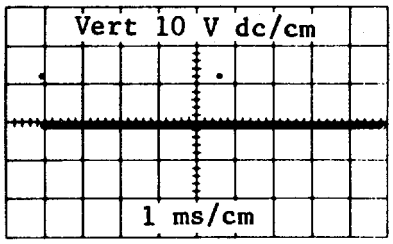
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
8	Check that Serial Send Data signal is present on Pin 3 of MLA3.	NOTE: This signal consists of an 18 bit character having a start bit, a steer bit and 16 data bits (only ASCII b_0 thru b_7 are shown in waveform). ← Key Depressed Fully and Held  If Serial Send Data Signal is incorrect, replace defective MLA3. If Serial Send Data signal is correct, go to Step 2.
9	Check that ITC signal is present at Pin 5 and Pin 6 of MLA2.	← Key Depressed Fully and Held  If signal is not correct, replace **MLA2.** If signal is correct, go to Step 3.

CHART 14

NO ALARM

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	With alarm volume turned up, enter the loopback test mode, then depress the "RETURN" or "ERASE INPUT" or "LINE FEED" key fully. (See Notes 1, 2 and 3.) NOTE 1: Controller must have an alarm detect circuit. NOTE 2: Generating a bell code at the opcon will not cause the alarm to sound locally. NOTE 3: Refer to Functional Schematic.	The "TST" indicator lights and remains lighted and the alarm sounds as long as the "RETURN", "ERASE INPUT" or "LINE FEED" key is fully depressed. If alarm sounds, alarm circuit is working. Go to Step 3. If alarm does not sound, go to Step 2.
2	With keyboard in loopback test mode and the specified key in Step 1 is fully depressed, check alarm signal at Pin 21 of **MLA3**.	Pin 21 of MLA3  If signal is present and alarm does not sound, check R17 and 346370 crystal assembly. If signal is not present, replace MLA3 or MLA5.
3	Clear the loopback test mode, then depress the space bar fully and hold. Check for alarm signal at Pin 14 of MLA2.	Pin 14 of MLA2 Without Alarm Signal 

D. TROUBLESHOOTING (Contd)

3. TROUBLESHOOTING CHARTS (Contd)

CHART 14 (Contd)

NO ALARM

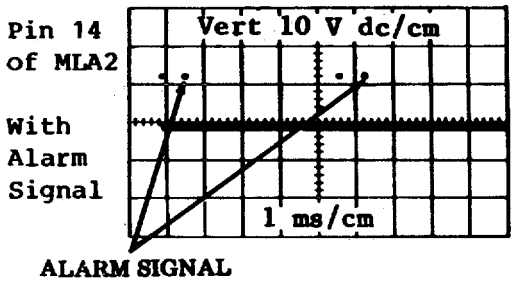
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
3 (Cont)		 If alarm signal is present and alarm does not sound, replace MLA3. If alarm signal is not present when alarm should sound, replace MLA2.

CHART 15

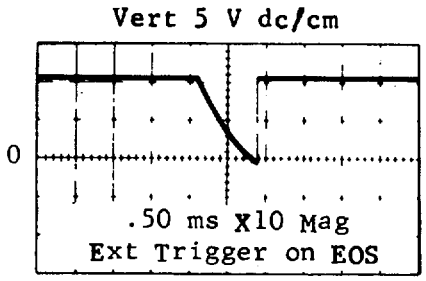
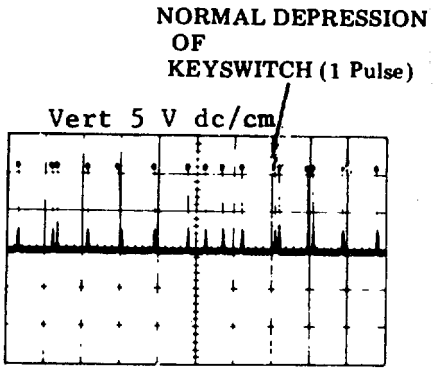
LOOPBACK TEST DOES NOT WORK

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	Depress "RETURN" "LINE FEED" or "'RASE INPUT" and "QUOTES" keys fully and check to see that "'TST" indicator lights and remains on.	If 'TST" indicator fails to light, go to Chart 9. If "TST" indicator lights, go to Step 2.
2	Check to see that L-LPBK/HALT lead (Pin 22 of ML3) is high (approximately +11 V dc) when “TST" is lighted.	If L-LPBK/HALT lead remains at approximately O V dc, replace MLA3. If L-LPBK/HALT lead is at approximately +11 V dc, and loopback test does not work, replace MLA2.

CHART 16

SINGLE KEY FAILURE

•Place opcon in local mode.

STEP ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1. Depress key in question several times.	Check for proper tactile feel. If key feels sluggish or clicks are not heard, replace keyswitch. If key feels normal; go to Step 2.
2. Check input of sense amplifier associated with key in question, while depressing key.	 Signal of Sense Amplifier Input Having a Keyswitch Depression If signal is not present, replace keyswitch. If signal is present, go to Step 3.
3. Check Output of sense amplifier (pin 25) associated with key in question, while depressing key.	 Signal of Sense Amplifier Input Having a Keyswitch Depression If signal is not present, replace keyswitch. If signal is present, go to Step 4.

D. TROUBLESHOOTING (Contd)

TROUBLESHOOTING CHARTS (Contd)

CHART 16 (Contd)

SINGLE KEY FAILURE

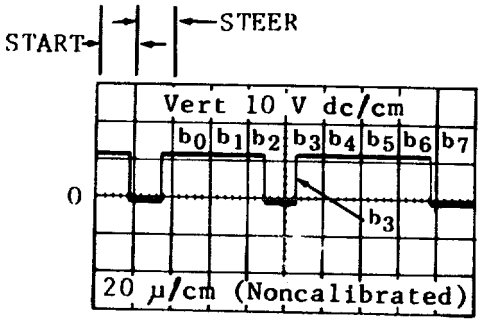
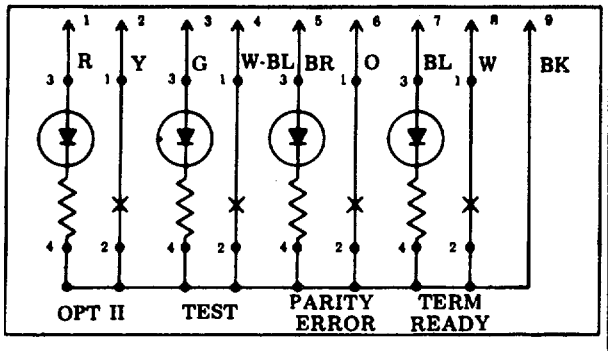
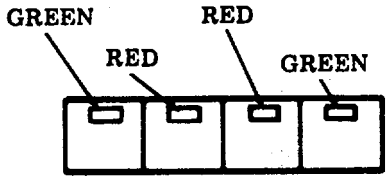
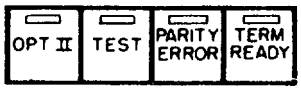
STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
4	Check Serial Send Data (Pin 3) of TKL for proper signal when key is depressed.	This signal consists of an 18 bit character having a start bit, a steer bit and 16 character bits (only ASCII b_0 through b_7 are shown in waveform. ←-Key Depressed Fully and Held  If Serial Send Data signal is incorrect, replace defective MLA3.

CHART 17

RO OPCON TROUBLESHOOTING

STEP	ACTION	NORMAL INDICATION AND CORRECTIVE PROCEDURE
1	Using the equipment arrangement detailed on Page 5-49, RO Opcon, hold GND probe on pin 9 of opcon connector. Apply +12 probe with 430 ohms resistor progressively to pins 1, 3, 5 and 7 of opcon connector. All blocking keytops should be temporarily removed.  RO Opcon Schematic	 The corresponding lamps should light in the color indicated. If all lamps fail to light, check for open ground lead. (Refer to schematic.) If one lamp fails to light, check wiring to failing lamp or replace keyswitch. If all lamps light as indicated, go to Step 2.
2	Using the multimeter as a continuity checker, hold the common probe on pin 9 of the opcon connector. Hold OHMS probe on pin 2 of the opcon connector and depress OPT II. Repeat with TEST, PARITY ERROR, and TERM READY, moving the OHMS probe to pins 4, 6 and 8, respectively. 	Each keyswitch, when operated, should register continuity on the multimeter. If a keyswitch fails the continuity check, check wiring to failing key- switch, or replace open keyswitch. Replace any blocking keytops removed.

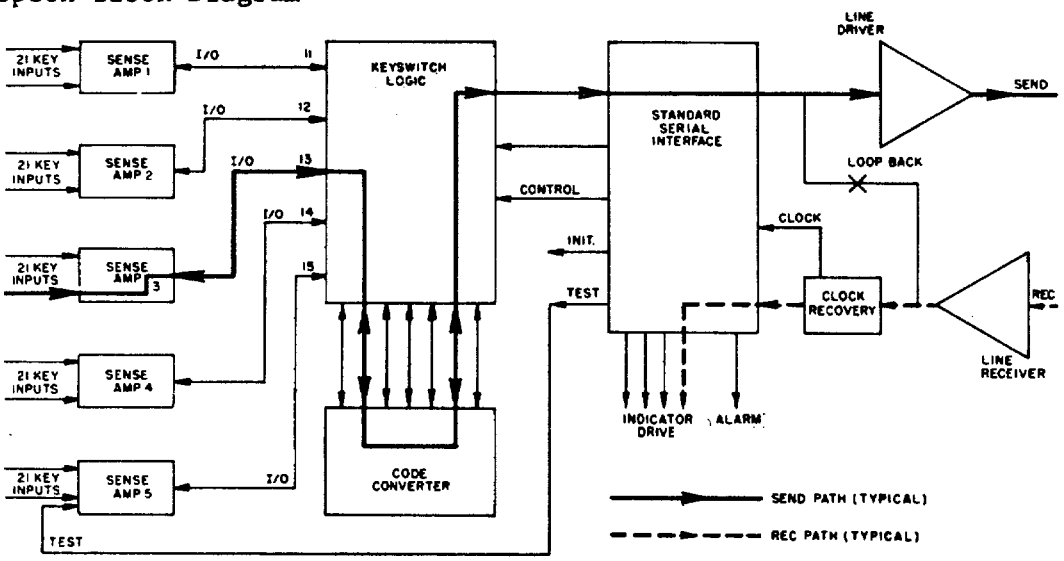
D. TROUBLESHOOTING (Contd)

4. REFERENCE MATERIAL

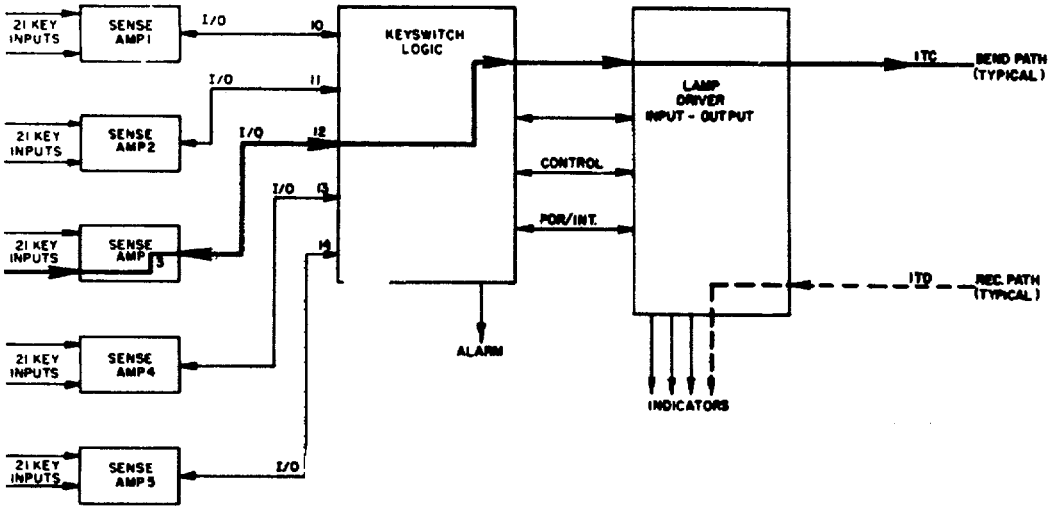
The opcon diagrams, functional schematics and keyswitch assignment tables are provided as aids in locating and clearing troubles encountered while testing and troubleshooting.

A. OPCON DIAGRAMS

40K103 Opcon Block Diagram



40K108 Opcon Block Diagram



B. FUNCTIONAL SCHEMATICS

The following functional schematics support the troubleshooting analysis contained in D. 3. TROUBLESHOOTING CHARTS (refer to Page 5-51).

FS-1 Keyswitches and Sense Amplifiers (410059 Circuit Card)

FS-2 Keyswitch and Interface Logic (410059 Circuit Card)

FS-3 High Frequency Clock and Drivers (410059 Circuit Card)

FS-4 Power Distribution (410059 Circuit Card)

FS-5 Di-Phase Logic (410074 Circuit Card)

FS-6 Serial Data Driver and Receiver (410074 Circuit Card)

FS-7 Loopback Test (410074 Circuit Card)

FS-8 Low Frequency Clock Drivers (410074 Circuit Card)

FS-9 Flash Timer and Alarm (410074 Circuit Card)

FS-10 Power Distribution (410074 Circuit Card)

FS-11 Switching Regulator (410074 Circuit Card)

FS-12 Keyswitches and Sense Amplifiers (410096 Circuit Card)

FS-13 Keyswitch and Interface Logic (410096 Circuit Card)

FS-14 Power Distribution (410096 Circuit Card)

D. TROUBLESHOOTING (Contd)

4. REFERENCE MATERIAL (Contd)

Functional Schematics

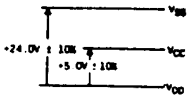
The following functional schematics support the troubleshooting analysis beginning on Page 5-24, 3. TROUBLESHOOTING CHARTS.

For detailed circuit descriptions and/or complete data interchange and clock and interface timing diagrams, refer to Wiring Diagram Package 0458WDP which may be ordered from Teletype Corporation.

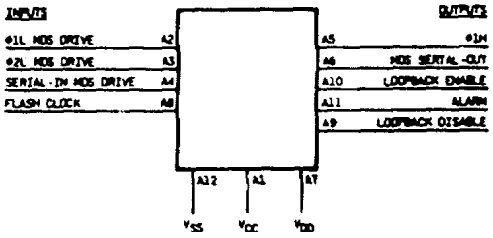
Functional Schematic Notes

CIRCUIT NOTES

1. SUPPLY VOLTAGES:
   THE FOLLOWING VOLTAGES ARE MEASURED IN RESPECT TO VDD-



2. SIGNAL VOLTAGES:
   THE INPUT VOLTAGES FOR PIN NUMBERS A2, A3, A4, A8 AND THE OUTPUT VOLTAGES FOR PIN NUMBERS A6, A9, A10, A11, ALL SWING BETWEEN VSS AND VDD. THE OUTPUT VOLTAGE FOR PIN NUMBER A5 SWINGS BETWEEN VCC AND V_{DD}-

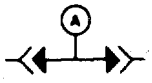


INFORMATION NOTES

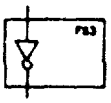
1. TERMINALS DESIGNATIONS ENCLOSED IN PARENTHESES ARE FOR REFERENCE AND ARE NOT MARKED ON COMPONENTS.
2. ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.
3. ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SHOWN.
4. ALL CAPACITANCE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
5. SYMBOLS:

SIGNAL GROUND

FRAME OR CHASSIS GROUND



LETTER OR TITLE IN CIRCLE INDICATES PRESENCE OF AN OPTION WHICH THE CUSTOMER CAN ARRANGE TO SUIT HIS CHOICE OR REQUIREMENT WITHIN THE POSSIBILITIES SHOWN.



CIRCUITRY WITHIN SINGLE SOLID LINE ENCLOSURE. IS SHOWN FOR REFERENCE ONLY. IT IS SHOWN IN DETAIL ELSEWHERE IN THE SAME SD.

NORMALLY OPEN CONTACT

TEST POINT

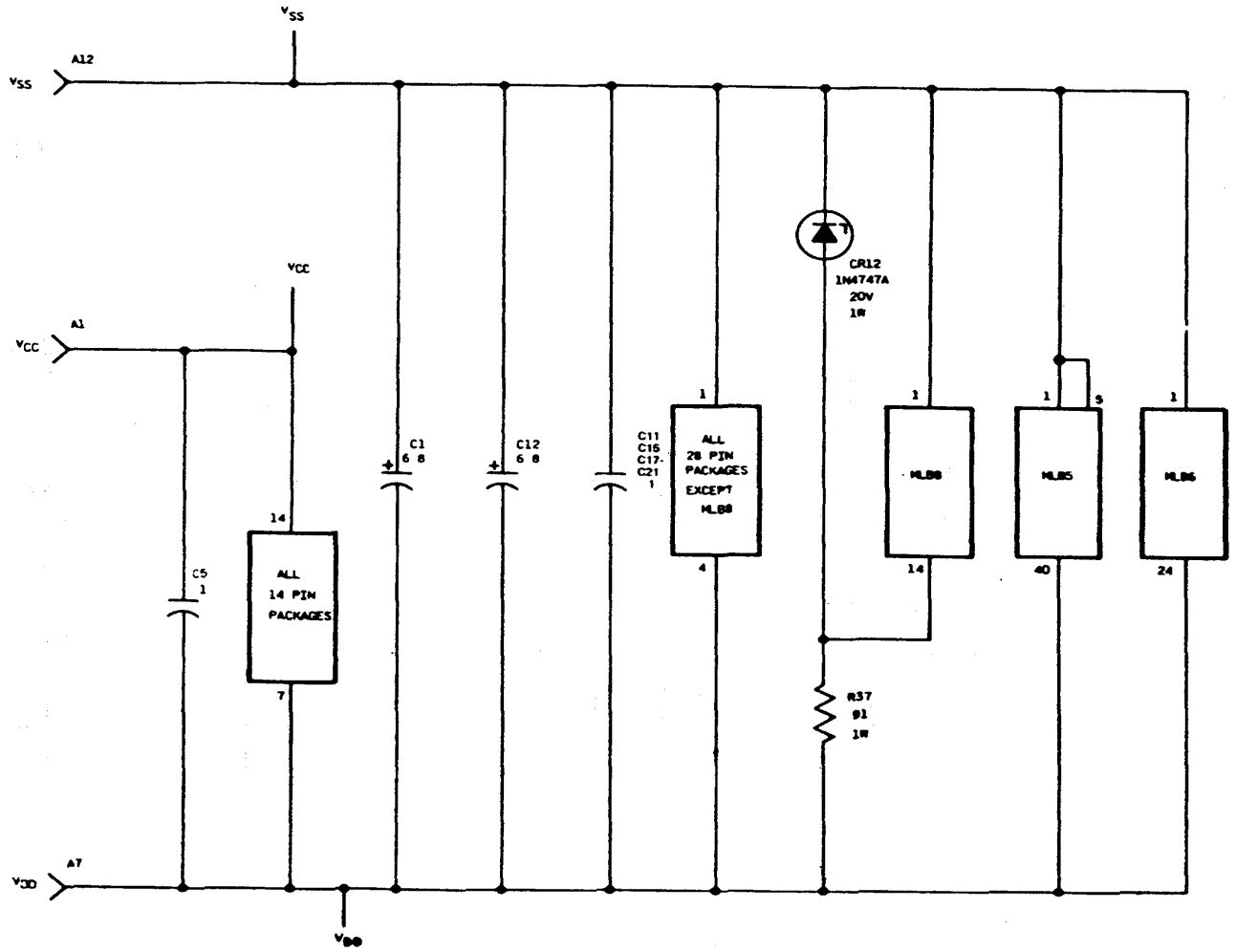
Σ

SUMMATION

EQUIPMENT NOTES

THE 410059 CIRCUIT CARD ASSEMBLY IS MANUFACTURED FOR CAPS LOCK MODE OF OPERATION.

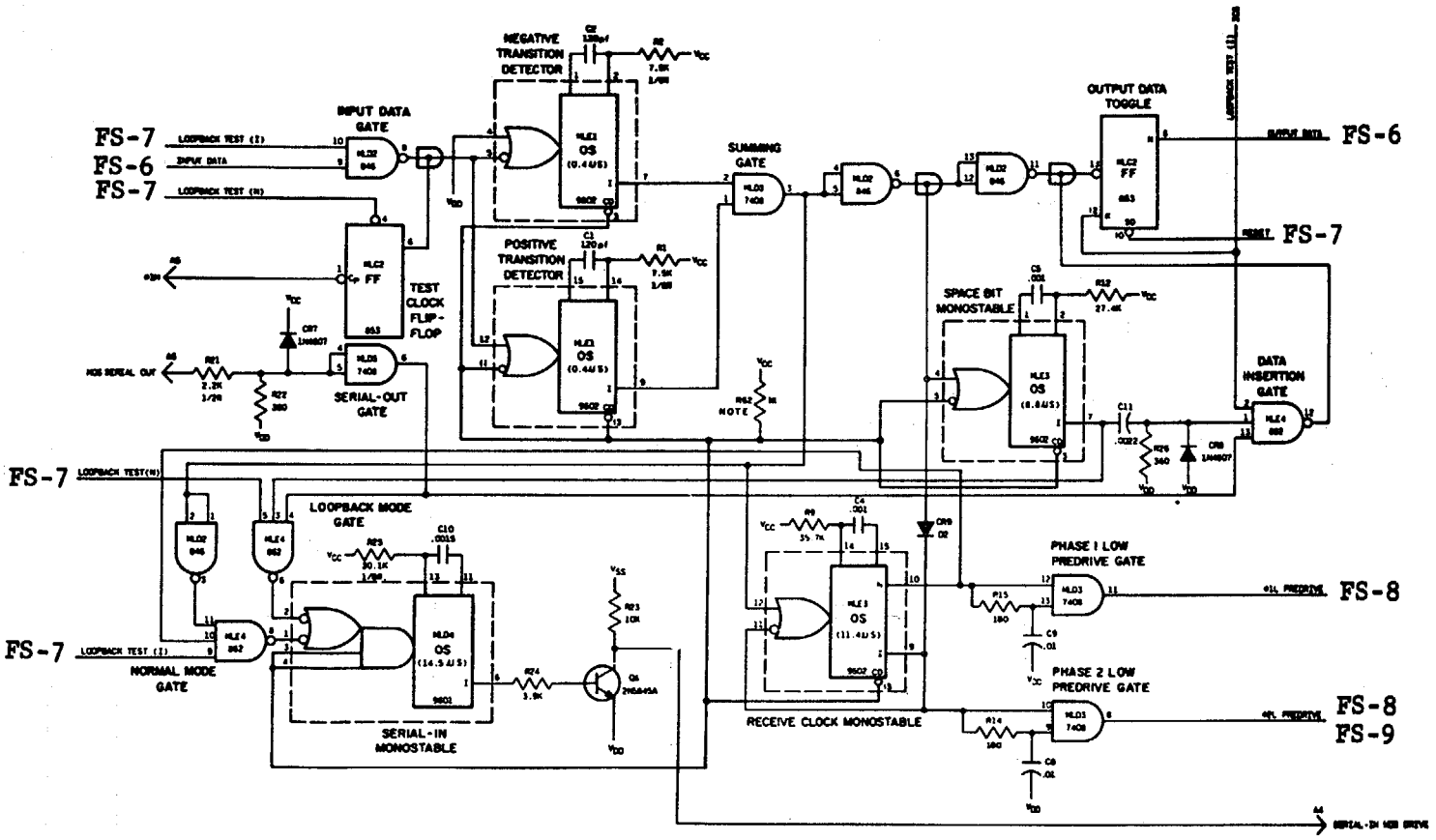
Power Distribution (410059 Circuit Card) (FS-4)



D. TROUBLESHOOTING (Contd)

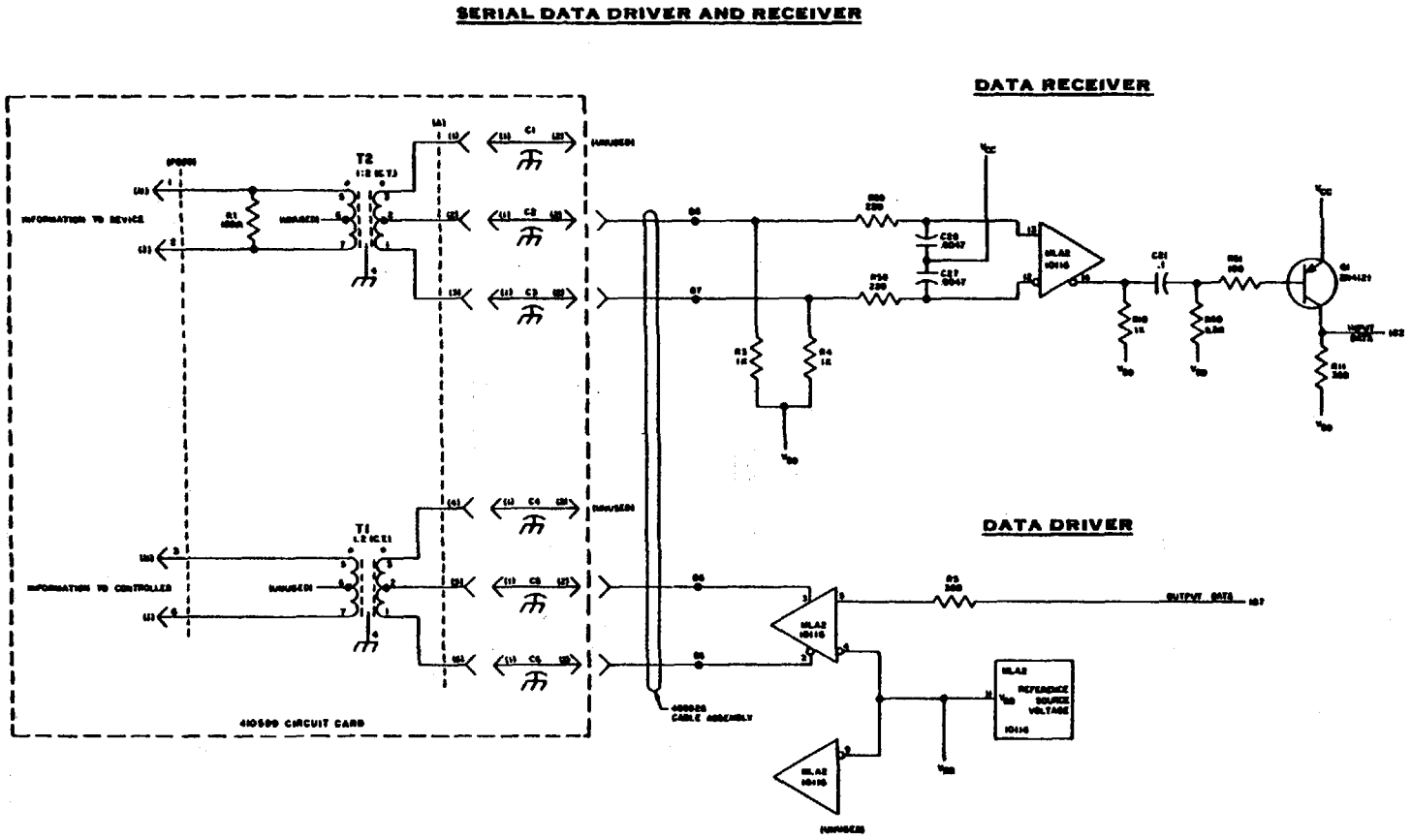
4. REFERENCE MATERIAL, Functional Schematics (Contd)

Di-Phase Logic (410074 Circuit Card) (FS-5)



NOTE: At customer identification issue 1B, R16 and associated connections added.

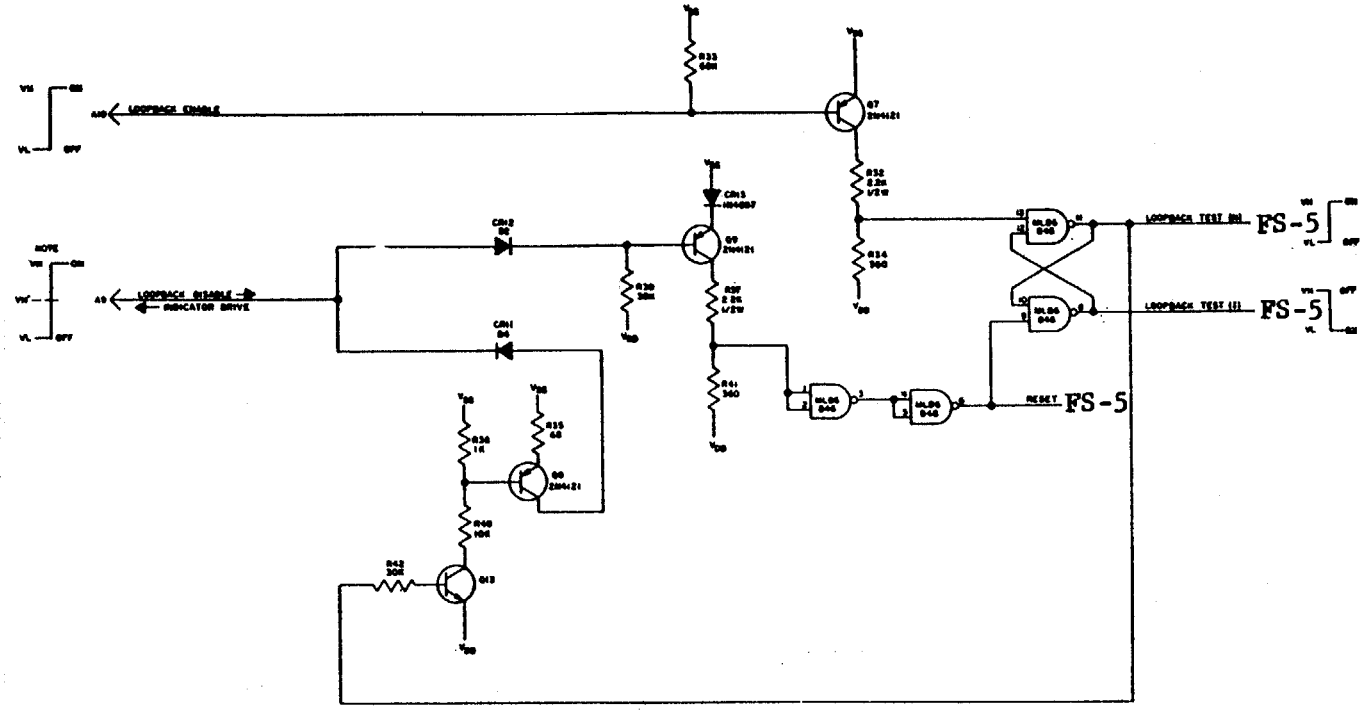
Serial Data Driver and Receiver (410074 Circuit Card) (FS-6)



D. TROUBLESHOOTING (Contd)

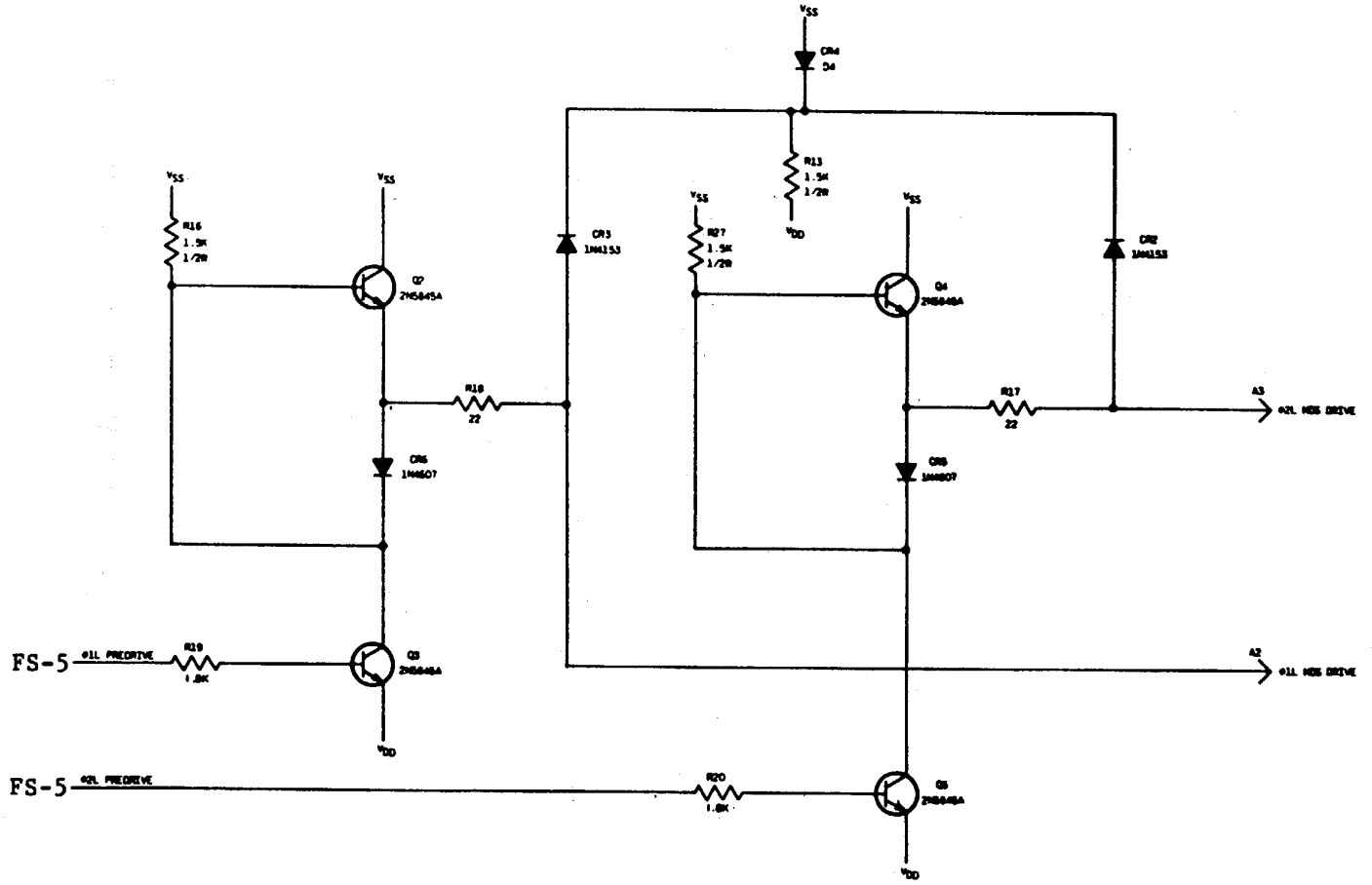
4. REFERENCE MATERIAL, Functional Schematics (Contd)

Loop-Back Test (410074 Circuit Card) (FS-7)



NOTE: This signal is both an input and an output with loop-back disable being active at VH and indicator drive being active at VH'

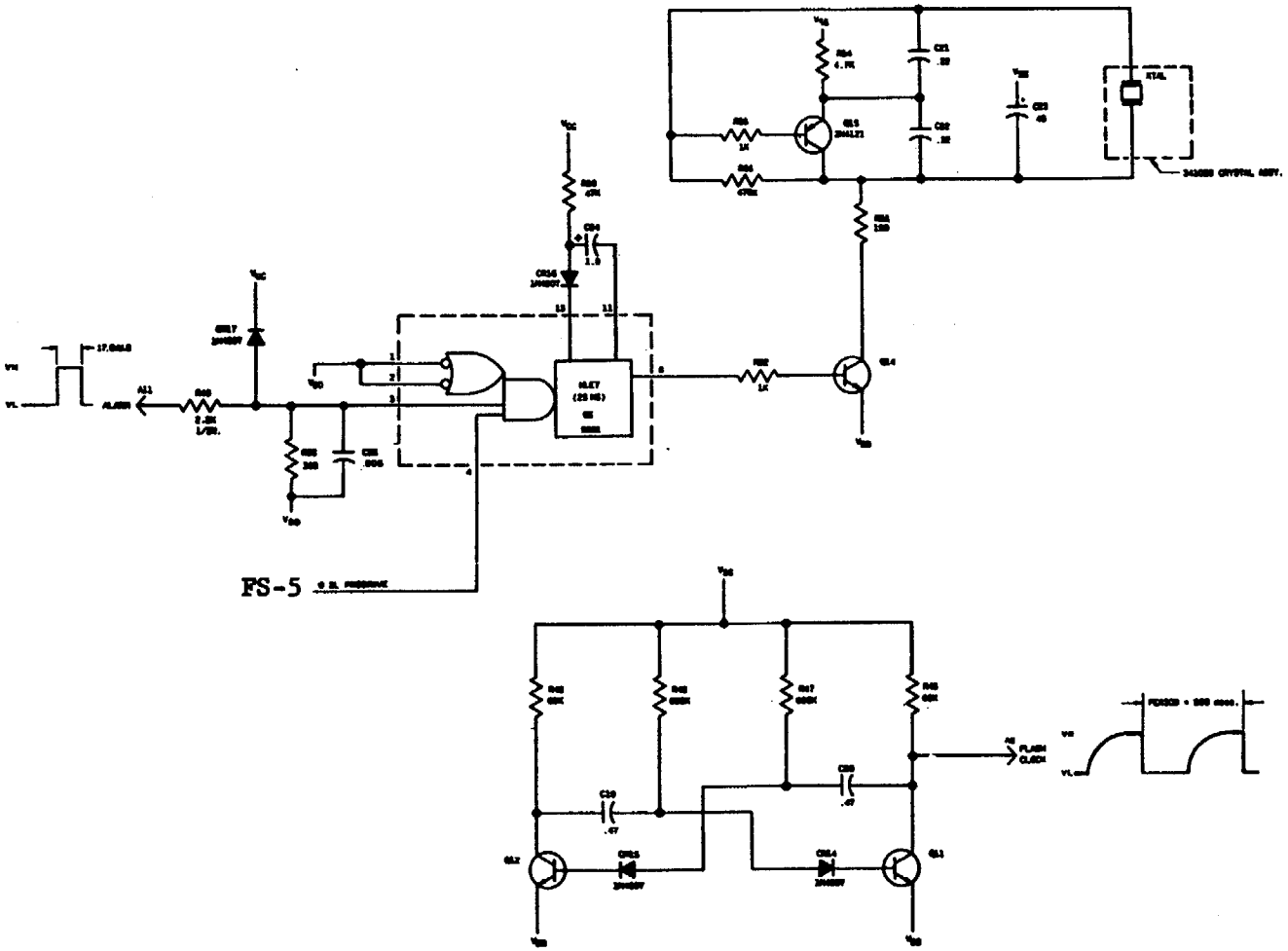
Low Frequency Clock Drivers (410074 Circuit Card) (FS-8)



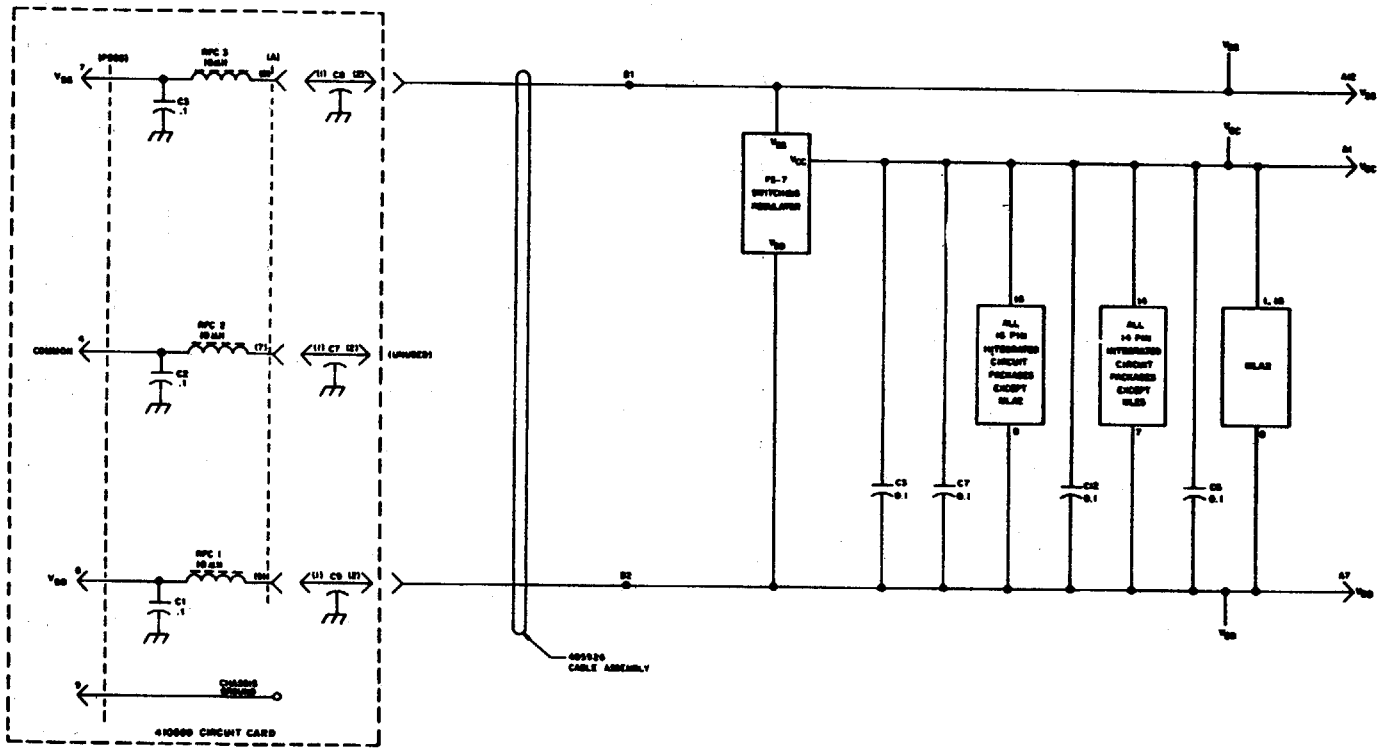
D. TROUBLESHOOTING (Contd)

4. REFERENCE MATERIAL, Functional Schematics (Contd)

Flash Timer and Alarm (410074 Circuit Card) (FS-9)



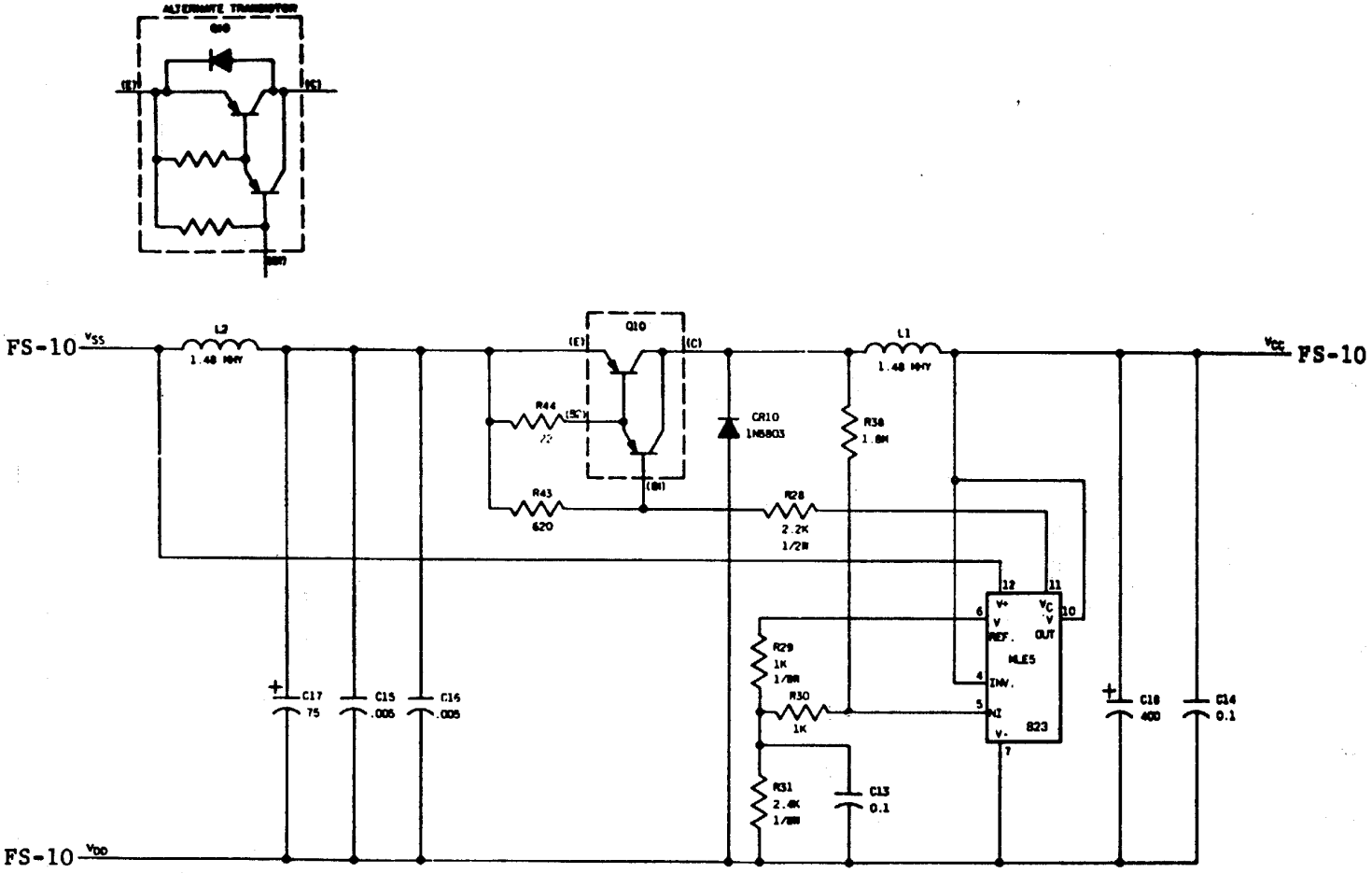
Power Distribution (410074 Circuit Card) (FS-10)



D. TROUBLESHOOTING (Contd)

4. REFERENCE MATERIAL, Functional Schematics (Contd)

Switching Regulator (410074 Circuit Card) (FS-11)



KD Opcon Keyswitch Assignments

Sense Amplifier Keyswitch Assignments

SENSE AMPLIFIER		SENSE AMPLIFIER TO KEYSWITCH LOGIC INPUT				
		SA1-I1	SA2-I2	SA3-I3	SA4-I4	SA5-I5
INPUT	PIN	(MLB10)	(MLC9)	(MLC4)	(MLB1)	(MLC6)
I1	11	{	(X_2)	E	1	6
I2	10	\	I	B	→	H
I3	9	'	U	F	↑	T
I4	8	=	L	2	←	5
I5	7	P	7	V	(TEST)	N
I6	6	+	/	W	S/R	G
I7	5	-	K	Q	LOCAL	R
I8	3	0 (ZERO)	,	D	CURSOR RETURN	4
I9	2	9	.	C	HOME	3
I10	28	PARITY ERR	8	Z	SEND	Y
I11	27	(NOT USED)	;	A	PRINT LOCAL	M
I12	26	TERM READY	0	S	PRINT ON LINE	J
I13	24	FORM ENTER	'	X	OPT II	SPACE
I14	23	TAB SET	RETURN	SHIFT L	RECEIVE	CONTROL L
I15	20	TAB CLEAR	LINE INSERT	CAPS LOCK	SCROL DOWN	SHIFT R
I16	19	HIGH LIGHT	LINE DELETE	CURSOR TAB	SCROL UP	NEW LINE
I17	17	CLR TO SEND	CHAR INSERT	SEG ADV	INTRPT	TAB
I18	16	KBD OVRN	CHAR DELETE	CURSOR DOWN	FORM SEND	CONTROL R
I19	15	CLEAR	REPEAT CHAR DELETE	REPEAT →	REPEAT SCROL UP	REPEAT •
I20	14	REPEAT CHAR INSERT	REPEAT (X_2)	REPEAT ←	REPEAT SCROL DOWN	REPEAT SPACE
I21	13	REPEAT -	REPEAT NEW LINE	REPEAT ↓	REPEAT ↑	(X_1)

SCANNING ORDER

NOTE 1: Unshift keytop symbols shown only.

NOTE 2: RCB arrangement shown.

D. TROUBLESHOOTING (Contd)

4. REFERENCE MATERIAL (Contd)

40K103 Keyswitch Codes -- Switch Address Coding

SENSE AMP.			INPUTS		UNSHIFT OUTPUT		SHIFT OUTPUT		CONTROL OUTPUT	
			SWITCH ADDRESS		BIT 7 (Y_2) = 1, BIT 8 (X_4) = 1		BIT 7 (Y_2) = 0, BIT 8 (X_4) = 1		BIT 7 (Y_2) = 1, BIT 8 (X_4) = 0	
SENSE AMP NO.	PIN NO.	INPUT NO.	TKL TRON TSSI	0 1 2 3 4 5 7 8 X_3 X_1 X_2 Y_1 X_5 Y_3 Y_2 X_4	0 1 2 3 4 5 6 7 8 9	CHAR.	0 1 2 3 4 5 6 7 8 9	CHAR.	0 1 2 3 4 5 6 7 8 9	CHAR.
1	11	1	SA 0	1 1 1 1 1 1 X X	0 0 1 0 0 0 0 1 0 0	{	0 1 0 0 0 0 0 1 0 0	}	0 1 0 1 0 1 1 1 0 0	NAK
2	11	1	SA 1	0 1 1 1 1 1	1 0 0 0 1 0 0 0 0 0	(XTRA) X_2	0 0 0 0 0 0 0 0 0 1	(XTRA) X_2	0 0 0 0 0 0 0 0 0 1	
3	11	1	SA 2	1 0 1 1 1 1	0 1 0 1 1 0 0 1 1 0	e	0 1 0 1 1 1 0 1 0 0	E	0 1 0 1 1 1 1 1 1 0	ENQ
4	11	1	SA 3	0 0 1 1 1 1	0 1 1 1 0 0 1 1 0 0	1 (ONE)	0 1 1 1 1 0 1 1 0 0	!	0 0 0 0 0 0 0 0 0 1	
5	11	1	SA 4	1 1 0 1 1 1	1 0 0 1 0 0 1 1 1 0	6	1 0 0 0 0 1 0 1 0 0	^	0 0 0 0 0 0 0 0 0 1	
1	10	2	SA 5	0 1 0 1 1 1	1 1 0 0 0 1 0 1 1 0	\	1 1 0 0 0 0 0 0 1 0 0	;	1 0 0 1 1 1 1 1 1 0	ACK
/	10	2	SA 6	1 0 0 1 1 1	0 1 1 0 1 0 0 1 1 0	'	0 1 1 0 1 1 0 1 0 0	]	0 0 0 0 0 1 1 1 0 0	US
3	10	2	SA 7	0 0 0 1 1 1	1 0 1 1 1 0 0 1 0 0	b	1 0 1 1 1 1 0 1 1 0	B	1 0 1 1 1 1 1 1 1 0	STX
4	10	2	SA 8	1 1 1 0 1 1	0 0 1 1 1 1 0 0 0 0	→	0 0 0 0 0 0 0 0 0 1	→	0 0 0 0 0 0 0 0 0 1	
5	10	2	SA 9	0 1 1 0 1 1	1 1 1 0 1 0 0 1 0 0	h	1 1 1 0 1 1 0 1 1 0	H	0 1 0 0 0 1 1 1 1 0	GS
1	9	3	SA 10	1 0 1 0 1 1	1 1 1 1 1 0 0 1 1 0	'	1 0 0 0 0 0 0 1 1 0	~	1 0 0 1 0 1 1 1 0 0	SYN
2	9	3	SA 11	0 0 1 0 1 1	0 1 0 1 0 0 0 1 0 0	u	0 1 0 1 0 1 0 1 1 0	U	1 0 1 0 0 1 1 1 0 0	SUB
3	9	3	SA 12	1 1 0 0 1 1	1 0 0 1 1 0 0 1 1 0	f	1 0 0 1 1 1 0 1 0 0	F	1 1 1 1 0 1 1 1 0 0	DLE
4	9	3	SA 13	0 1 0 0 1 1	0 0 0 1 0 0 1 0 0 0	↑	0 0 0 0 0 0 0 0 0 1	↑	0 0 0 0 0 0 0 0 0 1	
5	9	3	SA 14	1 0 0 0 1 1	1 1 0 1 0 0 0 1 1 0	t	1 1 0 1 0 1 0 1 0 0	T	1 1 0 1 0 1 1 1 1 0	DC4
1	8	4	SA 15	0 0 0 0 1 1	0 1 0 0 0 0 1 1 0 0	=	0 0 1 0 0 1 0 1 0 0	[	0 0 0 0 0 0 0 0 0 1	
2	8	4	SA 16	1 1 1 1 0 1	1 1 0 0 1 0 0 1 1 0	1 (ALPHA)	1 1 0 0 1 1 0 1 0 0	L	1 1 0 0 1 1 1 1 1 0	FF
3	8	4	SA 17	0 1 1 1 0 1	1 0 1 1 0 0 1 1 0 0	2	1 1 1 1 1 1 1 0 1 0	@	0 0 0 0 0 0 0 0 0 1	
4	8	4	SA 18	1 0 1 1 0 1	1 1 1 0 1 1 1 1 0 0	← (BS)	0 0 0 0 0 0 0 0 0 1	← (BS)	0 0 0 0 0 0 0 0 0 1	
5	8	4	SA 19	0 0 1 1 0 1	0 1 0 1 0 0 1 1 1 0	5	0 1 0 1 1 0 1 1 0 0	%	0 0 0 0 0 0 0 0 0 1	
1	7	5	SA 20	1 1 0 1 0 1	1 1 1 1 0 0 0 1 0 0	p	1 1 1 1 0 1 0 1 1 0	P	0 0 1 0 0 1 1 1 1 0	ESC
2	7	5	SA 21	0 1 0 1 0 1	0 0 0 1 0 0 1 1 0 0	7	1 0 0 1 1 0 1 1 0 0	&	0 0 0 0 0 0 0 0 0 1	
3	7	5	SA 22	1 0 0 1 0 1	1 0 0 1 0 0 0 1 0 0	v	1 0 0 1 0 1 0 1 1 0	V	0 0 0 0 0 0 1 0 0 0	DEL
4	7	5	SA 23	0 0 0 1 0 1	1 0 1 0 1 0 1 1 0 0	* (TEST)	0 0 0 0 0 0 0 0 0 1	* (TEST)	0 0 0 0 0 0 0 0 0 1	
5	7	5	SA 24	1 1 1 0 0 1	1 0 0 0 1 0 0 1 0 0	n	1 0 0 0 1 1 0 1 1 0	N	1 0 0 0 1 1 1 1 1 0	SO
1	6	6	SA 25	0 1 1 0 0 1	0 0 1 0 1 0 1 1 0 0	+	0 1 0 0 0 1 0 1 0 0	]	0 0 0 0 0 0 0 0 0 1	
2	6	6	SA 26	1 0 1 0 0 1	0 0 0 0 1 0 1 1 0 0	/	0 0 0 0 0 0 1 1 1 0	?	0 0 0 0 0 0 0 0 0 1	
3	6	6	SA 27	0 0 1 0 0 1	0 0 0 1 0 0 0 1 1 0	w	0 0 0 1 0 1 0 1 1 0	W	0 0 0 1 0 1 1 1 1 0	ETB
4	6	6	SA 28	1 1 0 0 0 1	1 0 1 1 1 0 0 0 0 0	S/R	0 0 0 0 0 0 0 0 0 1	S/R	0 0 0 0 0 0 0 0 0 1	
5	6	6	SA 29	0 1 0 0 0 1	0 0 0 1 1 0 0 1 0 0	g	0 0 0 1 1 1 0 1 1 0	G	0 0 0 1 1 1 1 1 1 0	BEL
1	5	7	SA 30	1 0 0 0 0 1	0 1 0 0 1 0 1 1 1 0	-	0 0 0 0 0 1 0 1 1 0	←	0 0 0 0 0 0 0 0 0 1	
2	5	7	SA 31	0 0 0 0 0 1	0 0 1 0 1 0 0 1 0 0	k	0 0 1 0 1 1 0 1 1 0	K	0 0 1 0 1 1 1 1 1 0	VT
3	5	7	SA 32	1 1 1 1 1 0	0 1 1 1 0 0 0 1 1 0	q	0 1 1 1 0 1 0 1 0 0	Q	0 1 1 1 0 1 1 1 1 0	DC1
4	5	7	SA 33	0 1 1 1 1 0	1 1 0 1 1 0 0 0 0 0	LOCAL	0 0 0 0 0 0 0 0 0 1	LOCAL	0 0 0 0 0 0 0 0 0 1	
5	5	7	SA 34	1 0 1 1 1 0	1 0 1 1 0 0 0 1 1 0	r	1 0 1 1 0 1 0 1 0 0	R	1 0 1 1 0 1 1 1 1 0	DC2
1	3	8	SA 35	0 0 1 1 1 0	1 1 1 1 0 0 1 1 1 0	0 (ZERO)	0 1 1 0 1 0 1 1 0 0	)	0 0 0 0 0 0 0 0 0 1	
2	3	8	SA 36	1 1 0 1 1 0	1 1 0 0 1 0 1 1 0 0	o	1 1 0 0 0 0 1 1 1 0	<	0 0 0 0 0 0 0 0 0 1	
3	3	8	SA 37	0 1 0 1 1 0	1 1 0 1 1 0 0 1 0 0	d	1 1 0 1 1 1 0 1 1 0	D	1 1 0 1 1 1 1 1 0 0	EOT
4	3	8	SA 38	1 0 0 1 1 0	0 0 0 1 1 1 0 0 1 0	CURSOR RETURN	0 0 0 0 0 0 0 0 0 1	CURSOR RETURN	0 0 0 0 0 0 0 0 0 1	
5	3	8	SA 39	0 0 0 1 1 0	1 1 0 1 0 0 1 1 0 0	4	1 1 0 1 1 0 1 1 1 0	$	0 0 0 0 0 0 0 0 0 1	

NOTE: CODING: POS. LOGIC
1 = 0 V (SPACE)
0 = -24 V (MARK)

7th BIT = EXTENDED
8th BIT = HAS NO MEANING
9th BIT = NO CHAR.

SENSE AMP			INPUTS		UNSHIFT OUTPUT		SHIFT OUTPUT		CONTROL OUTPUT	
			SWITCH ADDRESS		BIT 7 (Y_2) = 1, BIT 8 (X_4) = 1		BIT 7 (Y_2) = 0, BIT 8 (X_4) = 1		BIT 7 (Y_2) = 1, BIT 8 (X_4) = 0	
SENSE AMP NO.	PIN NO.	INPUT NO.	TKL TROM TSSI	0 1 2 3 4 5 7 8 X_3 X_1 X_2 Y_1 X_5 Y_3 Y_2 X_4	0 1 2 3 4 5 6 7 8 9	CHAR.	0 1 2 3 4 5 6 7 8 9	CHAR.	0 1 2 3 4 5 6 7 8 9	CHAR.
TRIMODE 1	2	9	SA 40	1 1 1 0 1 0 X X	0 1 1 0 0 0 1 1 1 0	9	1 1 1 0 1 0 1 1 0 0	(	0 0 0 0 0 0 0 0 0 1	
2	2	9	SA 41	0 1 1 0 1 0	1 0 0 0 1 0 1 1 1 0	-	1 0 0 0 0 0 1 1 0 0	>	0 0 0 0 0 0 0 0 0 1	
3	2	9	SA 42	1 0 1 0 1 0	0 0 1 1 1 1 0 0 1 1 0	c	0 0 1 1 1 1 1 0 1 1 0	C	0 0 1 1 1 1 1 1 1 1 0	ETX
4	2	9	SA 43	0 0 1 0 1 0	1 1 1 0 1 1 0 0 1 0	HOME	0 0 0 0 0 0 0 0 0 1	HOME	0 0 0 0 0 0 0 0 0 1	
5	2	9	SA 44	1 1 0 0 1 0	0 0 1 1 0 0 1 1 1 0	3	0 0 1 1 1 0 1 1 0 0	#	0 0 0 0 0 0 0 0 0 1	
1	28	10	SA 45	0 1 0 0 1 0	1 0 1 0 1 0 0 0 1 0	PARITY ERROR	0 0 0 0 0 0 0 0 0 1	PARITY ERROR	0 0 0 0 0 0 0 0 0 1	
2	28	10	SA 46	1 0 0 0 1 0	1 1 1 0 0 0 1 1 0 0	8	1 0 1 0 1 0 1 1 0 0	*	0 0 0 0 0 0 0 0 0 1	
3	28	10	SA 47	0 0 0 0 1 0	1 0 1 0 0 0 0 1 1 0	z	1 0 1 0 0 1 0 1 1 0	Z	1 1 1 1 1 1 1 1 1 0	NUL
4	28	10	SA 48	1 1 1 1 0 0	1 0 0 1 1 0 0 0 1 0	SEND	0 0 0 0 0 0 0 0 0 1	SEND	0 0 0 0 0 0 0 0 0 1	
5	28	10	SA 49	0 1 1 1 0 0	0 1 1 0 0 0 1 1 0 0	y	0 1 1 0 0 1 0 1 1 0	Y	0 1 1 0 0 1 1 1 0 0	EM
1	27	11	SA 50	1 0 1 1 0 0	0 0 0 0 0 0 0 0 0 1	(NOT USED)	0 0 0 0 0 0 0 0 0 1	(NOT USED)	0 0 0 0 0 0 0 0 0 1	
2	27	11	SA 51	0 0 1 1 0 0	0 0 1 0 0 0 1 1 0 0	:	1 0 1 0 0 0 1 1 1 0	:	0 0 0 0 0 0 0 0 0 1	
3	27	11	SA 52	1 1 0 1 0 0	0 1 1 1 1 1 0 0 1 0	a	0 1 1 1 1 1 1 0 1 1 0	A	0 1 1 1 1 1 1 1 1 0	SOH
4	27	11	SA 53	0 1 0 1 0 0	0 1 1 1 1 0 0 0 0 0	PRINT LOCAL	0 0 0 0 0 0 0 0 0 1	PRINT LOCAL	0 0 0 0 0 0 0 0 0 1	
5	27	11	SA 54	1 0 0 1 0 0	0 1 0 0 1 0 0 1 0 0	m	0 1 0 0 1 1 0 1 1 0	M	1 1 0 0 0 1 1 1 0 0	FS
1	28	12	SA 55	0 0 0 1 0 0	0 0 1 0 1 0 0 0 0 0	TERM READY	0 0 0 0 0 0 0 0 0 1	TERM READY	0 0 0 0 0 0 0 0 0 1	
2	26	12	SA 56	1 1 1 0 0 0	0 0 0 0 1 0 0 1 1 0	o (ALPHA)	0 0 0 0 1 1 0 1 0 0	O (ALPHA)	0 0 0 0 1 1 1 1 1 0	SI
3	26	12	SA 57	0 1 1 0 0 0	0 0 1 1 0 0 0 1 0 0	s	0 0 1 1 0 1 0 1 1 0	S	0 0 1 1 0 1 1 1 0 0	DC3
4	26	12	SA 58	1 0 1 0 0 0	0 0 1 1 1 0 0 0 1 0	PRINT ON LINE	0 0 0 0 0 0 0 0 0 1	PRINT ON LINE	0 0 0 0 0 0 0 0 0 1	
5	26	12	SA 59	0 0 1 0 0 0	1 0 1 0 1 0 0 1 1 0	j	1 0 1 0 1 1 0 1 0 0	J	1 0 0 0 0 1 1 1 1 0	RS
1	24	13	SA 60	1 1 0 0 0 0	0 0 0 1 0 1 0 0 0 0	FORM ENTER	0 0 0 0 0 0 0 0 0 1	FORM ENTER	0 0 0 0 0 0 0 0 0 1	
2	24	13	SA 61	0 1 0 0 0 0	0 0 0 1 1 0 1 1 1 0	p	1 0 1 1 1 0 1 1 1 0	P	0 0 0 0 0 0 0 0 0 1	
3	24	13	SA 62	1 0 0 0 0 0	1 1 1 0 0 0 0 1 1 0	x	1 1 1 0 0 1 0 1 0 0	X	1 1 1 0 0 1 1 1 1 0	CAN
4	24	13	SA 63	0 0 0 0 0 0	0 1 1 0 1 0 0 0 1 0	OPT II	0 0 0 0 0 0 0 0 0 1	OPT II	0 0 0 0 0 0 0 0 0 1	
UNIMODE 5	24	13	SA 64	1 1 1 1 1 1 0 0	1 1 1 1 1 0 1 1 0 0	SPACE				
1	23	14	SA 65	0 1 1 1 1 1 0 0	0 1 1 1 0 0 1 0 0 0	TAB SET				
2	23	14	SA 66	1 0 1 1 1 1 0 0	0 1 0 0 1 1 1 1 0 0	RETURN				
3	23	14	SA 67	0 0 1 1 1 1 0 0	0 0 0 0 0 0 0 0 0 1	SHIFT (L)				
4	23	14	SA 68	1 1 0 1 1 1 0 0	0 1 0 1 1 0 0 0 1 0	RECEIVE				
5	23	14	SA 69	0 1 0 1 1 1 0 0	0 0 0 0 0 0 0 0 0 1	CONTROL (L)				
1	20	15	SA 70	1 0 0 1 1 1 0 0	1 0 1 1 0 0 1 0 0 0	TAB CLEAR				
2	20	15	SA 71	0 0 0 1 1 1 0 0	1 1 0 0 1 1 0 0 0 0	LINE INSERT				
3	20	15	SA 72	1 1 1 0 1 1 0 0	0 0 0 0 0 0 0 0 0 1	CAPS LOCK				
4	20	15	SA 73	0 1 1 0 1 1 0 0	1 1 0 1 0 1 0 0 0 0	SCROL DOWN				
5	20	15	SA 74	1 0 1 0 1 1 0 0	0 0 0 0 0 0 0 0 0 1	SHIFT (R)				
1	19	16	SA 75	0 0 1 0 1 1 0 0	0 0 1 1 0 0 1 0 1 0	HIGH LIGHT				
2	19	16	SA 76	1 1 0 0 1 1 0 0	0 1 0 0 1 1 0 0 1 0	LINE DELETE				
3	19	16	SA 77	0 1 0 0 1 1 0 0	1 1 1 1 1 1 0 0 0 0	CURSOR TAB				
4	19	16	SA 78	1 0 0 0 1 1 0 0	0 0 1 1 0 1 0 0 1 0	SCROL UP				
5	19	16	SA 79	0 0 0 0 1 1 0 0	1 0 1 0 1 1 1 1 1 0	NEW LINE				

NOTE: CODING: POS. LOGIC
1 = 0 V (SPACE)
0 = -24 V (MARK)

7th BIT = EXTENDED
8th BIT = HAS NO MEANING
9th BIT = NO CHAR.

D. TROUBLESHOOTING (Contd)

4. REFERENCE MATERIAL (Contd)

40K103 Keyswitch Codes -- Switch Address Coding (Contd)

SENSE AMP			INPUTS		UNSHIFT OUTPUT	
			SWITCH ADDRESS		BIT 7 (Y_2) 0, BIT 8 (X_4) 0	
SENSE AMP. NO.	PIN NO.	INPUT NO.	TRL TROM TSSI	0 1 2 3 4 5 7 8 X_3 X_1 X_2 Y_1 X_5 Y_3 Y_2 X_4	0 1 2 3 4 5 6 7 8 9	CHAR.
1	17	17	SA 80	1 1 1 1 0 1 0 0	0 1 0 0 1 0 0 0 0 0	CLEAR TO SEND
2	17	17	SA 81	0 1 1 1 0 1 0 0	1 0 0 0 0 1 0 0 0 0	CHAR. INSERT
3	17	17	SA 82	1 0 1 1 0 1 0 0	0 1 0 1 0 1 0 0 1 0	SEGMENT ADVANCE
4	17	17	SA 83	0 0 1 1 0 1 0 0	0 0 0 1 1 0 0 0 0 0	INTERRUPT
5	17	17	SA 84	1 1 0 1 0 1 0 0	0 1 1 0 1 1 1 1 1 0	TAB
1	18	18	SA 85	0 1 0 1 0 1 0 0	1 1 0 0 1 0 0 0 1 0	KBD OVRN
2	18	18	SA 86	1 0 0 1 0 1 0 0	1 1 1 1 0 1 0 0 1 0	CHAR. DELETE
3	16	18	SA 87	0 0 0 1 0 1 0 0	1 0 1 1 1 1 0 0 1 0	CURSOR DOWN
4	16	18	SA 88	1 1 1 0 0 1 0 0	1 1 1 0 1 0 0 0 0 0	FORM SEND
5	16	18	SA 89	0 1 1 0 0 1 0 0	0 0 0 0 0 0 0 0 0 1	CONTROL (H)
1	15	19	SA 90	1 0 1 0 0 1 0 0	1 0 1 0 1 1 0 0 0 0	CLEAR
2	15	19	SA 91	0 0 1 0 0 1 0 0	0 0 0 0 0 0 0 0 0 1	
3	15	19	SA 92	1 1 0 0 0 1 0 0	0 0 0 0 0 0 0 0 0 1	
4	15	19	SA 93	0 1 0 0 0 1 0 0	0 0 0 0 0 0 0 0 0 1	
5	15	19	SA 94	1 0 0 0 0 1 0 0	0 0 0 0 0 0 0 0 0 1	
1	14	20	SA 95	0 0 0 0 0 1 0 0	0 0 0 0 0 0 0 0 0 1	
2	14	20	SA 96	1 1 1 1 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
3	14	20	SA 97	0 1 1 1 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
4	14	20	SA 98	1 0 1 1 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
5	14	20	SA 99	0 0 1 1 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
1	13	21	SA 100	1 1 0 1 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
2	13	21	SA 101	0 1 0 1 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
3	13	21	SA 102	1 0 0 1 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
4	13	21	SA 103	0 0 0 1 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
5	13	21	SA 104	1 1 1 0 1 0 0 0	0 0 0 0 1 0 0 0 1 0	(XTRA) X_1
			SA 105	0 1 1 0 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 106	1 0 1 0 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 107	0 0 1 0 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 108	1 1 0 0 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 109	0 1 0 0 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 110	1 0 0 0 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 111	0 0 0 0 1 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 112	1 1 1 1 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 113	0 1 1 1 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 114	1 0 1 1 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 115	0 0 1 1 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 116	1 1 0 1 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 117	0 1 0 1 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 118	1 0 0 1 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
			SA 119	0 0 0 1 0 0 0 0	0 0 0 0 0 0 0 0 0 1	

UNIMODE

REPEAT ZONE

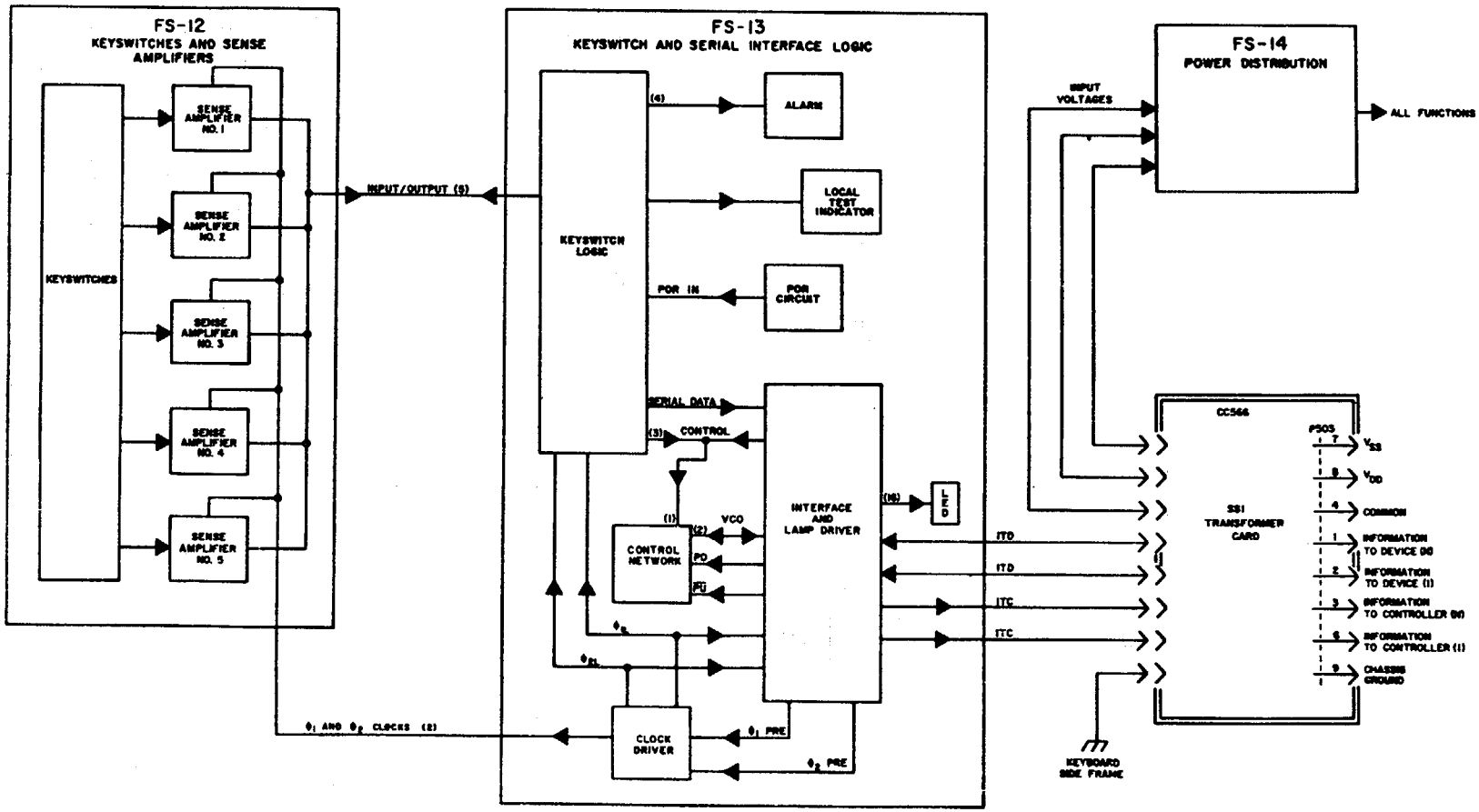
INPUTS		UNSHIFT OUTPUT	
SWITCH ADDRESS		BIT 7 (Y_2) = 0, BIT 8 (X_4) = 0	
TRL TROM TSSI	0 1 2 3 4 5 7 8 X_3 X_1 X_2 Y_1 X_5 Y_3 Y_2 X_4	0 1 2 3 4 5 6 7 8 9	CHAR.
SA 120	1 1 1 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
SA 121	0 1 1 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
SA 122	1 0 1 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
SA 123	0 0 1 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
SA 124	1 1 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
SA 125	0 1 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
SA 126	1 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	
SA 127	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1	

NOTE: CODING: POS. LOGIC
1 = 0 V (SPACE)
0 = -24 V (MARK)

7th BIT = EXTENDED
8th BIT = HAS NO MEANING
9th BIT = NO CHAR.

Circuit Block Diagram -- 40K103 Opcon

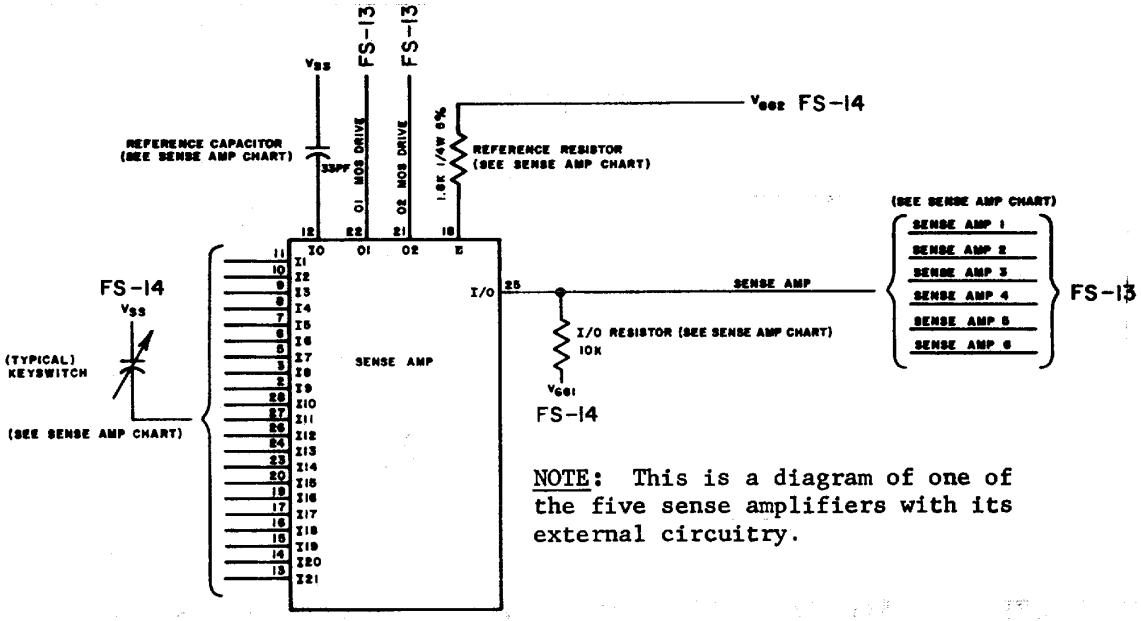
BD-1
CIRCUIT BLOCK DIAGRAM



D. TROUBLESHOOTING (Contd)

4. REFERENCE MATERIAL (Contd)

Keyswitches and Sense Amplifiers (410096 Circuit Card) (FS-12)

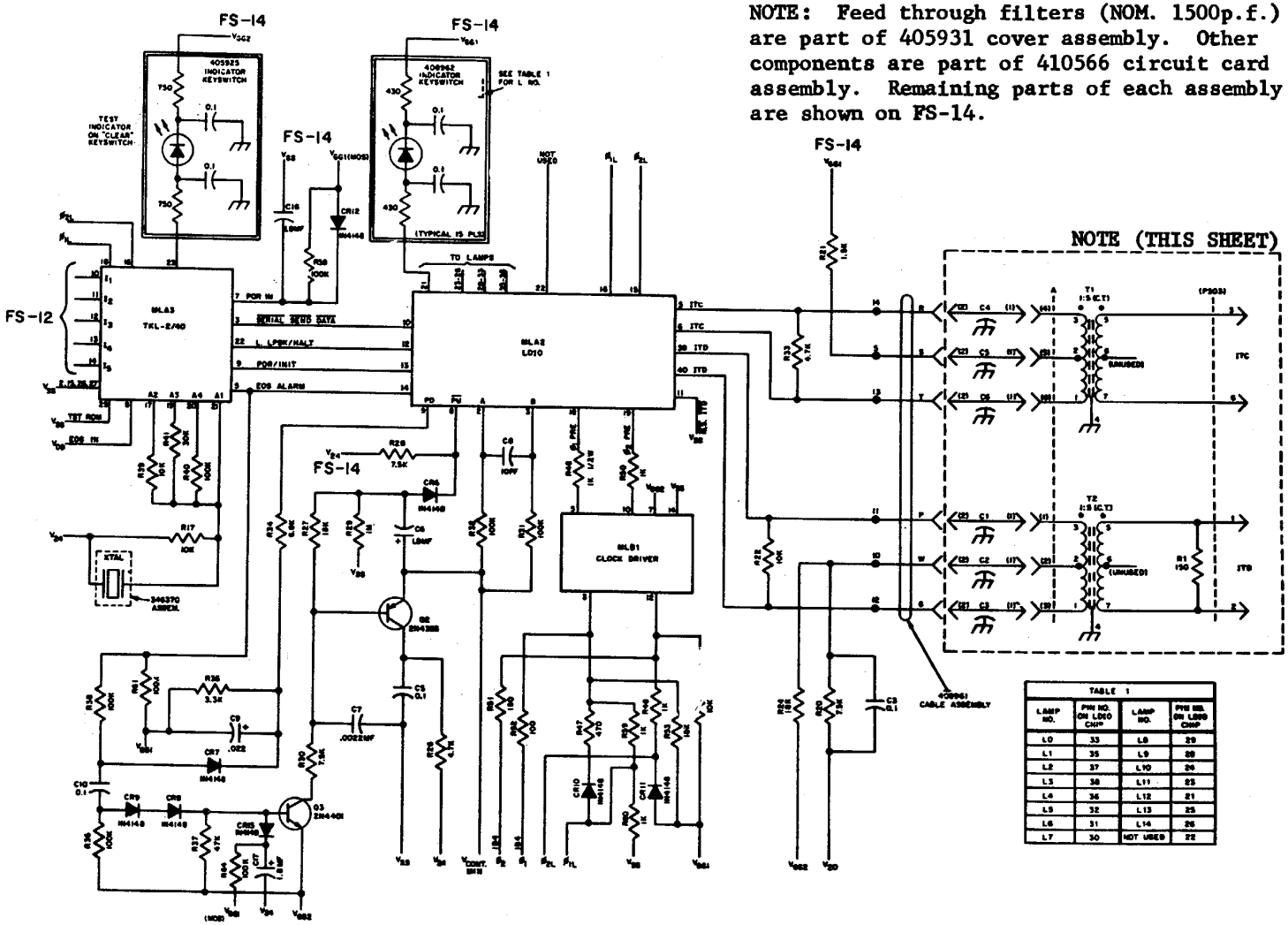


NOTE: This is a diagram of one of the five sense amplifiers with its external circuitry.

SENSE AMP TABLE

SENSE AMP PIN NO	SENSE AMP 1 (MLA4)	SENSE AMP 2 (MLB4)	SENSE AMP 3 (MLB2)	SENSE AMP 4 (MLA1)	SENSE AMP 5 (MLB3)
	KEYTOP CHARACTER				
11	{	XTRA (V_{BB})	E	I	Y
10	\	8	B	→	H
9	[	7	F	↓	6
8	P (TEST)	L	2	←	T
7	P	U	V	3	N
6	TAB	/	W	(L3)	6
5	+	K	Q	(L2)	5
3	−	,	D	CURSOR RET.	R
2	0 (ZERO)	.	C	HOME	4
28	(L9)	0	Z	(L0)	7
27	=	;	A	(L8)	M
26	(L10)	9	S	(L7)	J
24	(L12)	/	X	(L6)	SPACE
23	TAB SET	RETURN	SHIFT (LEFT)	(L1)	CONTROL (LEFT)
20	TAB CLEAR	LINE INSERT	CAPS LOCK	SCROL DOWN	SHIFT (RIGHT)
19	(L13)	LINE DELETE	CURSR. TAB	SCROL UP	NEW LINE
17	(L12)	CHAR. INSRT.	SEGMT. ADV.	(L4)	° (TEST)
16	(L11)	CHAR. DLETE	↓	(L5)	CONTROL (RIGHT)
15	CLEAR	CHAR. DLETE - RPT	→ REPEAT	SCROL UP - RPT	>, - REPEAT
14	CHAR. INSERT-RPT	OPTION-RPT(V_{BB})	← REPEAT	SCROL DOWN-RPT	SPACE - RPT
13	= RPT	NEW LINE-RPT(V_{SS})	↑ REPEAT	↑ REPEAT	RETURN (TEST)
18	REFERENCE RESISTOR				
	R45	R57	R55	R 19	R56
25	I/O RESISTOR				
	R44	R42	R49	R 18	R43
	KEYSWITCH LOGIC (MLA3) INPUT PIN NO.				
	10	11	12	13	14
12	REFERENCE CAPACITOR				
	C11	C 15	C13	C1	C14

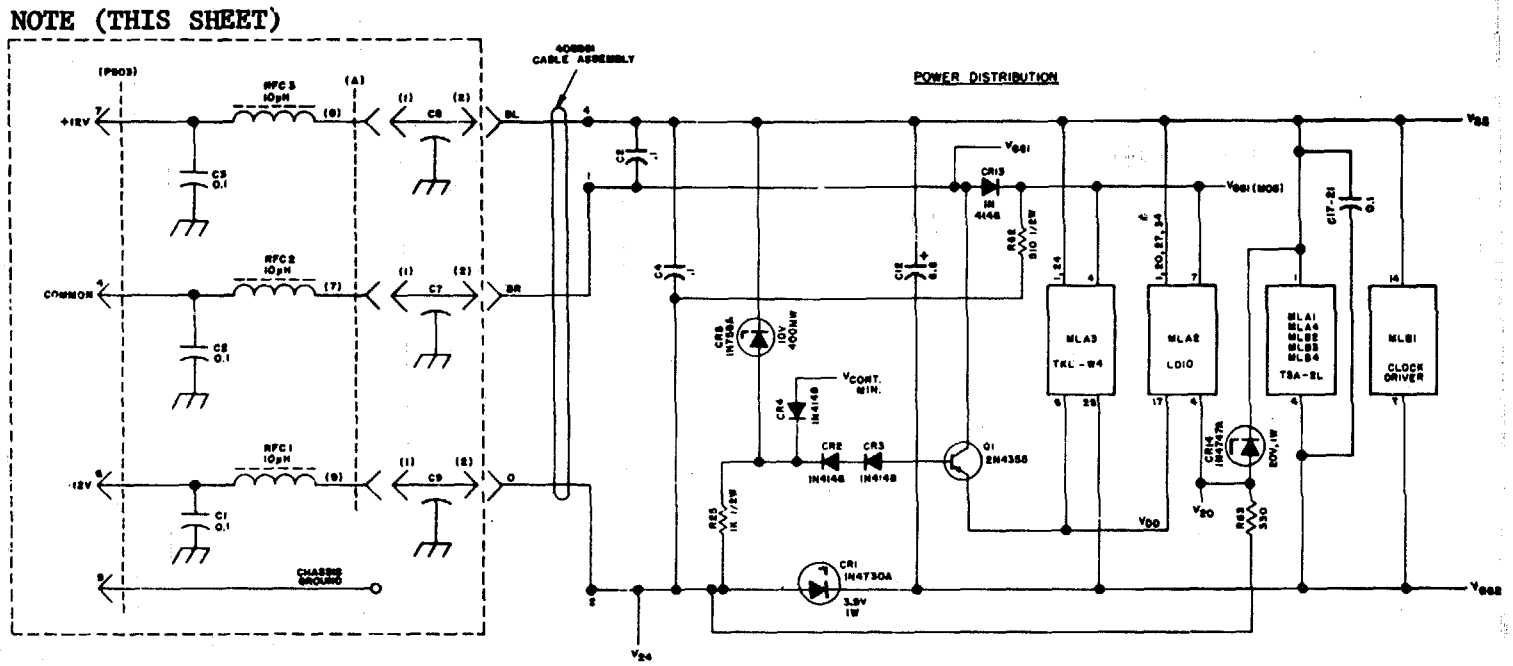
Keyswitch and Interface Logic (410096 Circuit Card) (FS-13)



D. TROUBLESHOOTING (Contd)

4. REFERENCE MATERIAL (Contd)

Power Distribution (410096 Circuit Card) (FS-14)



NOTE: Feed through filters (NOM. 1500p.f.) are part of 405931 cover assembly. Other components are part of 410566 circuit card assembly. Remaining parts of each assembly are shown on FS-13.

40K108 Keyswitch Codes -- Switch Address Coding

SENSE AMPS				UNSHIFT		SHIFT		CONTROL	
Sense Amp Pin No.	Sense Amp No.	Data Enable No.	Switch Addresses	$B_0B_1B_2B_3B_4B_5B_6B_7B_8B_9$	Character	$B_0B_1B_2B_3B_4B_5B_6B_7B_8B_9$	Character	$B_0B_1B_2B_3B_4B_5B_6B_7B_8B_9$	Character
11	1	1	0	0010000110	{	0100000110	}	0101011100	NAK
11	2	1	1	1000100000	X -	1000100000	X -	1000100000	X
11	3	1	2	0101100111	e	0101110101	E	0101111111	ENQ
11	4	1	3	0111001100	l	0111101110	!	0000000001	
11	5	1	4	0110000101	y	0110010111	Y	0110011101	EM
10	1	2	5	1100010110	\	1100000100	:	1001111110	ACK
10	2	2	6	1110001100	8	1010101100	*	0000000001	
10	3	2	7	1011100101	b	1011110111	B	1011111101	STX
10	4	2	8	0011110000	→	0011110000	→	0011110000	→
10	5	2	9	1110100101	h	1110110111	H	0100011111	GS
9	1	3	10	1111100110	'	1000000110	~	1001011100	SYN
9	2	3	11	0110100111	i	0110110101	I	0000011101	US
9	3	3	12	1001100111	f	1001110101	F	1111011101	DLE
9	4	3	13	0001001000	↑	0001001000	↑	0001001000	↑
9	5	3	14	1001001110	6	1000010100	^	0000000001	
8	1	4	15	NON-SEND	P(TEST)	NON-SEND	P(TEST)	NON-SEND	P(TEST)
8	2	4	16	1100100111	l	1100110101	L	1100111111	FF
8	3	4	17	1011001100	2	1111110100	@	0000000001	
8	4	4	18	1110111100	←	1110111100	←	1110111100	←
8	5	4	19	1101000111	t	1101010101	T	1101011111	DC4
7	1	5	20	1111000101	p	1111010111	P	0010011111	ESC
7	2	5	21	0101000101	u	0101010111	U	1010011101	SUB
7	3	5	22	1001000101	v	1001010111	V	0000000101	DEL
7	4	5	23	0011001110	3	0011101100	#	0000000001	
7	5	5	24	1000100101	n	1000110111	N	1000111101	SO
6	1	6	25	0110111110	TAB	0110111110	TAB	0110111110	TAB
6	2	6	26	0000101100	/	0000001110	?	0000000001	
6	3	6	27	0001000111	w	0001010101	W	0001011111	ETB
6	4	6	28	1011100000	(L3) S/R	1011100000	(L3)	1011100000	(L3)
6	5	6	29	0001100101	g	0001110111	G	0001111101	BEL
5	1	7	30	0010101110	+	0100010100	]	0000000001	
5	2	7	31	0010100101	k	0010110111	K	0010111101	VT
5	3	7	32	0111000111	q	0111010101	Q	0111011111	DC1
5	4	7	33	1101100000	(L2) LOCAL	1101100000	(L2)	1101100000	(L2)
5	5	7	34	0101001110	5	0101101100	%	0000000001	
3	1	8	35	0100101110	-	0000010110	—	0000000001	
3	2	8	36	1100101100	;	1100001110	<	0000000001	
3	3	8	37	1101100101	d	1101110111	D	1101111101	EOT
3	4	8	38	0001110010	CURSOR RETURN	0001110010	CURSOR RETURN	0001110010	CURSOR RETURN
3	5	8	39	1011000111	r	1011010101	R	1011011111	DC2

D. TROUBLESHOOTING (Contd)

4. REFERENCE MATERIAL (Contd)

40K108 Keyswitch Bodes -- Switch Address Coding (Contd)

SENSE AMPS				VSHIFT		SHIFT		CONTROL	
Sense Amp Pin No.	Sense Amp No.	Data Enable No.	Switch Addresses	B0 B1 B2 B3 B4 B5 B6 B7 B8 B9	Character	B0 B1 B2 B3 B4 B5 B6 B7 B8 B9	Character	B0 B1 B2 B3 B4 B5 B6 B7 B8 B9	Character
2	1	9	40	1 1 1 1 0 0 1 1 1 0	0(Zero)	0 1 1 0 1 0 1 1 0 0	)	0 0 0 0 0 0 0 0 0 1	
2	2	9	41	1 0 0 0 1 0 1 1 1 0	.	1 0 0 0 0 0 1 1 0 0	>	0 0 0 0 0 0 0 0 0 1	
2	3	9	42	0 0 1 1 1 0 0 1 1 1	c	0 0 1 1 1 1 1 0 1 0 1	C	0 0 1 1 1 1 1 1 1 1	ETX
2	4	9	43	1 1 1 0 1 1 0 0 1 0	HOME	1 1 1 0 1 1 0 0 1 0	HOME	1 1 1 0 1 1 0 0 1 0	HOME
2	5	9	44	1 1 0 1 0 0 1 1 0 0	4	1 1 0 1 1 0 1 1 1 0	$	0 0 0 0 0 0 0 0 0 1	
28	1	10	45	1 0 1 0 1 0 0 0 1 0	(L9)	1 0 1 0 1 0 0 0 1 0	(L9)	1 0 1 0 1 0 0 0 1 0	(L9)
28	2	10	46	0 0 0 0 1 0 0 1 1 1	o(Alpha)	0 0 0 0 1 1 0 1 0 1	O	0 0 0 0 1 1 1 1 1 1	SI
28	3	10	47	1 0 1 0 0 0 0 1 0 1	s	1 0 1 0 0 1 0 1 1 1	S	1 1 1 1 1 1 1 1 1 1	NUL
28	4	10	48	1 0 0 1 1 0 0 0 1 0	(Lo) SEND	1 0 0 1 1 0 0 0 1 0	(Lo)	1 0 0 1 1 0 0 0 1 0	(Lo)
28	5	10	49	0 0 0 1 0 0 1 1 0 0	7	1 0 0 1 1 0 1 1 0 0	&	0 0 0 0 0 0 0 0 0 1	
27	1	11	50	0 1 0 0 0 0 1 1 0 0	-	0 0 1 0 0 1 0 1 0 0	[	0 0 0 0 0 0 0 0 0 1	
27	2	11	51	0 0 1 0 0 0 1 1 0 0	;	1 0 1 0 0 0 1 1 1 0	:	0 0 0 0 0 0 0 0 0 1	
27	3	11	52	0 1 1 1 1 0 0 1 0 1	a	0 1 1 1 1 1 1 0 1 1 1	A	0 1 1 1 1 1 1 1 0 1	SOH
27	4	11	53	0 1 1 1 1 0 0 0 0 0	(L8) PRINT LOCAL	0 1 1 1 1 0 0 0 0 0	(L8)	0 1 1 1 1 0 0 0 0 0	(L8)
27	5	11	54	0 1 0 0 1 0 0 1 0 1	m	0 1 0 0 1 1 0 1 1 1	M	1 1 0 0 0 1 1 1 0 1	FS
26	1	12	55	0 0 1 0 1 0 0 0 0 0	(L10)	0 0 1 0 1 0 0 0 0 0	(L10)	0 0 1 0 1 0 0 0 0 0	(L10)
26	2	12	56	0 1 1 0 0 0 1 1 1 0	9	1 1 1 0 1 0 1 1 1 0	(	0 0 0 0 0 0 0 0 0 1	
26	3	12	57	0 0 1 1 0 0 0 1 0 1	s	0 0 1 1 0 1 0 1 1 1	S	0 0 1 1 0 1 1 1 0 1	DC3
26	4	12	58	0 0 1 1 1 0 0 0 1 0	(L7) PRINTONLINE	0 0 1 1 1 0 0 0 1 0	(L7)	0 0 1 1 1 0 0 0 1 0	(L7)
26	5	12	59	1 0 1 0 1 0 0 1 1 1	j	1 0 1 0 1 1 0 1 0 1	J	1 0 0 0 0 1 1 1 1 1	RS
24	1	13	60	0 0 0 1 0 1 0 0 0 0	(L14) FORM ENTER	0 0 0 1 0 1 0 0 0 0	(L14)	0 0 0 1 0 1 0 0 0 0	(L14)
24	2	13	61	0 0 0 1 1 0 1 1 1 0	'	1 0 1 1 1 0 1 1 1 0	"	0 0 0 0 0 0 0 0 0 1	
24	3	13	62	1 1 1 0 0 0 0 1 1 1	x	1 1 1 0 0 1 0 1 0 1	X	1 1 1 0 0 1 1 1 1 1	CAN
24	4	13	63	0 1 1 0 1 0 0 0 1 0	(L6)	0 1 1 0 1 0 0 0 1 0	(L6)	0 1 1 0 1 0 0 0 1 0	(L6)
24	5	13	64	1 1 1 1 1 0 1 1 0 0	SPACE				
23	1	14	65	0 1 1 1 0 0 1 0 0 0	(L15) TAB SET				
23	2	14	66	0 1 0 0 1 1 1 1 0 0	RETURN				
23	3	14	67	NON-SEND	SHIFT (LEFT)				
23	4	14	68	0 1 0 1 1 0 0 0 1 0	(L1) REC				
23	5	14	69	NON-SEND	CONTROL (LEFT)				
20	1	15	70	1 0 1 1 0 0 1 0 0 0	(L16) TAB CLEAR				
20	2	15	71	1 1 0 0 1 1 0 0 0 0	LINE INSERT				
20	3	15	72	NON-SEND	CAPS LOCK				
20	4	15	73	1 1 0 1 0 1 0 0 0 0	SCROL DOWN				
20	5	15	74	NON-SEND	SHIFT RIGHT				
19	1	16	75	0 0 1 1 0 0 1 0 1 0	(L13) HIGHLIGHT				
19	2	16	76	0 1 0 0 1 1 0 0 1 0	LINE DELETE				
19	3	16	77	1 1 1 1 1 1 0 0 0 0	CURSOR TAB				
19	4	16	78	0 0 1 1 0 1 0 0 1 0	SCROL UP				
19	5	16	79	1 0 1 0 1 1 1 1 1 0	NEW LINE				

SENSE AMPS				UNSHIFT		SENSE AMP			UNSHIFT	
Sense Amp Pin No.	Sense Amp No.	Data Enable No.	Switch Addresses	$B_0B_1B_2B_3B_4B_5B_6B_7B_8B_9$	Character	Sense Amp No.	Data Enable No.	Switch Addresses	$B_0B_1B_2B_3B_4B_5B_6B_7B_8B_9$	Character
17	1	17	80	0100100000	(L12)	1	25	120	NON-SEND	
17	2	17	81	1000010000	CHAR INSRT	2	25	121		
17	3	17	82	0101010010	SEGMT ADV	3	25	122		
17	4	17	83	0001100000	(L4) INTRPT	4	25	123		
17	5	17	84	NON-SEND	"(TEST)	5	25	124		
16	1	18	85	1100100010	(L11)	1	26	125		
16	2	18	86	1111010010	CHAR DLETE	2	26	126		
16	3	18	87	1011110010	↓	3	26	127	↓	
16	4	18	88	1110100000	(L5)FORM SEND					
16	5	18	89	NON-SEND	CONTROL(RIGHT)					
15	1	19	90	1010110000	CLEAR					
15	2	19	91	NON-SEND	CHAR DLETE REPEAT					
15	3	19	92		→ REPEAT					
15	4	19	93		SCROL UP-REPEAT					
15	5	19	94		. REPEAT					
14	1	20	95	↓	CHAR INSRT-REPEAT					
14	2	20	96	NON-SEND	I REPEAT					
14	3	20	97		← REPEAT					
14	4	20	98		SCROL DOWN REPEAT					
14	5	20	99		SPACE REPEAT					
13	1	21	100		- REPEAT					
13	2	21	101		NEW LINE REPEAT					
13	3	21	102		↓ REPEAT					
13	4	21	103	↓	↑ REPEAT					
13	5	21	104	NON-SEND	RETURN-(TEST)					
	1	22	105							
	2	22	106							
	3	22	107							
	4	22	108							
	5	22	109							
	1	23	110							
	2	23	111	↓						
	3	23	112	NON-SEND						
	4	23	113							
	5	23	114							
	1	24	115							
	2	24	116							
	3	24	117							
	4	24	118							
	5	24	119	↓						

NOTES

E. ADJUSTMENTS AND LUBRICATION

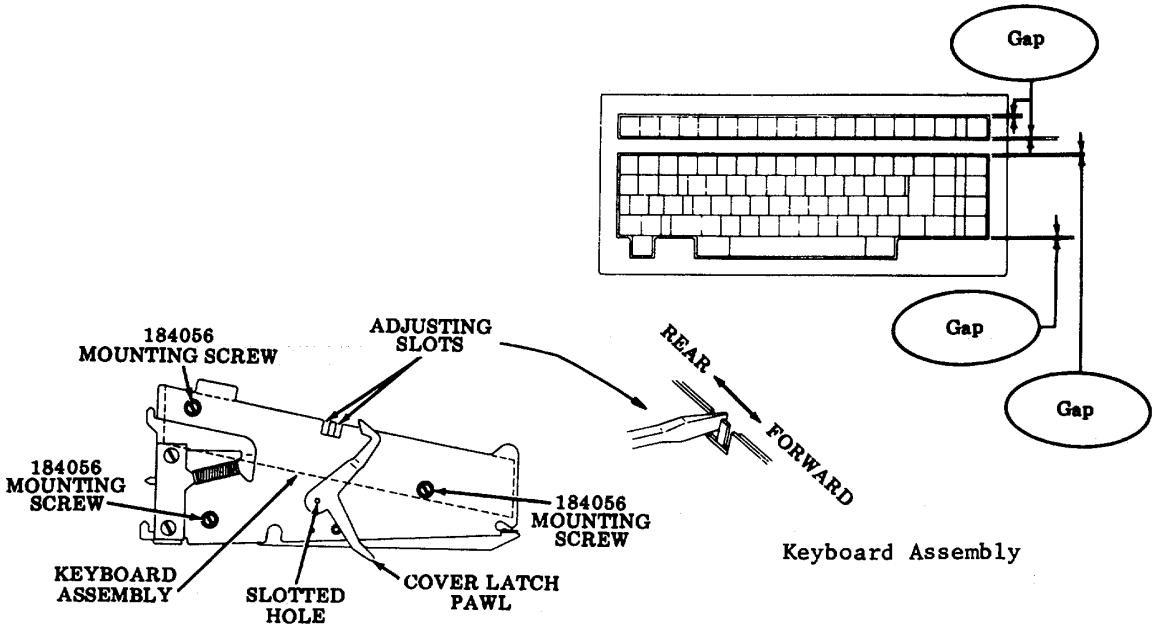
1. ADJUSTMENTS

NOTE: The clearance between the cover and keytop is the only adjustment provided on the KD opcon. Normally, readjustment is not necessary unless the cover is replaced or if there is an interference between keytop and cover.

Cover-to-Keytop Adjustment

Requirement: Gap, approximately equal in four places shown.

To Adjust: Remove cover and loosen three mounting screws friction tight on both sides of console.



Insert screwdriver blade into adjusting slot and move keyboard assembly forward or to the rear to gain "gap" clearance. Tighten screws, replace cover and check gaps. If the gaps are not approximately equal after reassembly, remove cover and repeat the adjustment.

2. LUBRICATION

NOTE: Only the side frame slotted holes as detailed require occasional lubrication -and then sparingly. Lubrication of any other part, assembly, keyswitch or the opcon as a whole is NOT required and MUST be avoided.

Lubricate the slotted holes on each side sparingly only with 97116 grease. Oil is NOT permissible.

F. DISASSEMBLY/REASSEMBLY AND PARTS

1. GENERAL

This section covers KD or RO opcon removal from an assembly to an associated set and disassembly or reassembly of either opcon down to or up from basic components.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

1. GENERAL (Contd)

Precautions should be taken to assure that the opcon is disassembled and reassembled under clean conditions. No oil, grease, or other liquids should be allowed on unassembled parts, subassemblies, keyswitches, or the complete opcon.

The locations of major subassemblies and parts are shown on Page 5-123, 3. SUBASSEMBLY IDENTIFICATION -KD and Page 5-140, 6. SUBASSEMBLY IDENTIFICATION -RO with references to applicable disassembly/reassembly procedures.

Reference in the procedures to left or right and up or down and top or bottom, etc., refer to the opcon in its normal operating position.

When removing a subassembly or part from the opcon, follow the removal procedures and note how each part is removed and the sequence of its removal. For reassembly, reverse the removal procedure except where different instructions are given.

CAUTION: TO AVOID POSSIBLE INTERNAL DAMAGE TO THE MDS DEVICES, OR CARD WITH MDS DEVICES, DUE TO ELECTRICAL STATIC DISCHARGE BY SERVICE PERSONNEL, THE DETAILED PROCEDURES LISTED SHOULD BE FOLLOWED.

(1) ALL MOS DEVICES SHOULD BE DELIVERED AND STORED IN CONDUCTIVE CARRIERS SUCH AS FOAM PADS OR ALUMINUM TUBES.

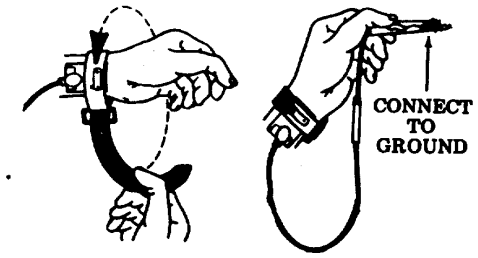
(2) ALL HANDLING OF MDS DEVICES, OR CARDS WITH MDS DEVICES, SHOULD BE DONE AT A GROUNDED BENCH WITH A CONDUCTIVE FOAM PAD OR AT A LOCATION WHERE THE SERVICE PERSONNEL CAN BE MAINTAINED AT GROUND POTENTIAL.*

(3) ALL PERSONNEL HANDLING MOS DEVICES, OR CIRCUIT CARDS WITH MDS DEVICES, MUST WEAR A STATIC PROTECTION GROUNDING STRAP ADJUSTED TO MAKE FIRM CONTACT WITH THE SKIN AT ALL TIMES.*

(4) MOS DEVICES DELIVERED IN ALUMINUM TUBES OR FOAM PADS MAY BE TRANSFERRED TO WORK AREA PAD BY TOUCHING CARRIER OR PAD FIRST AND REMDVING DEVICE BY THEIR PACKAGE (BODY), RATHER THAN BY THE LEADS, IF AT ALL POSSIBLE. HOWEVER, THESE DEVICES SHOULD ALWAYS BE POSITIONED SO THAT THE LEGS ARE IN CONTACT WITH THE FOAM AT ALL TIMES.

(5) SOLDERING IRONS, TEST AND INSERTION EQUIPMENT MUST BE GROUNDED.

*Service personnel are never to be connected directly to ground but rather through a high resistance discharge path of a minimum of one megohm where 115 V ac is present



A separate listing of part numbers, Page 5-144, 9. COMPONENT PARTS LIST -KD AND RO, is included to facilitate ordering of replacement parts.

Refer to Page 5-2, Tools for a listing of the necessary tools.

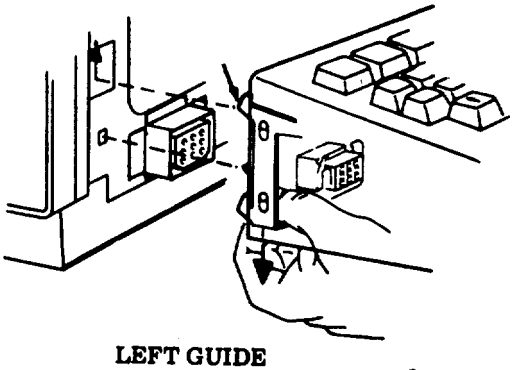
2. REMOVAL AND REPLACEMENT -- KD AND RO

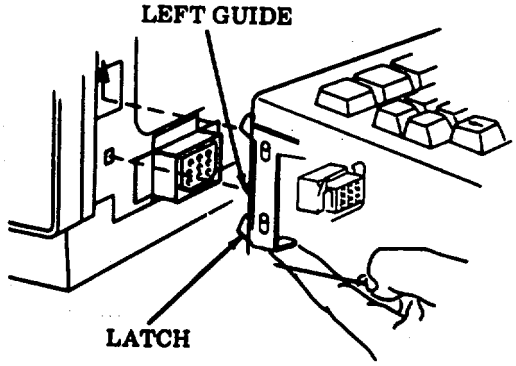
Removal

(1) Place thumb on inward tab of left latch and press downward to unlatched position.

(2) Hold opcon firmly with left hand. With right hand place thumb on right latch tab and press downward to unlatched position.

(3) Carefully pull opcon forward to disengage from cabinet.





Replacement

(1) Slide left and right latches down.

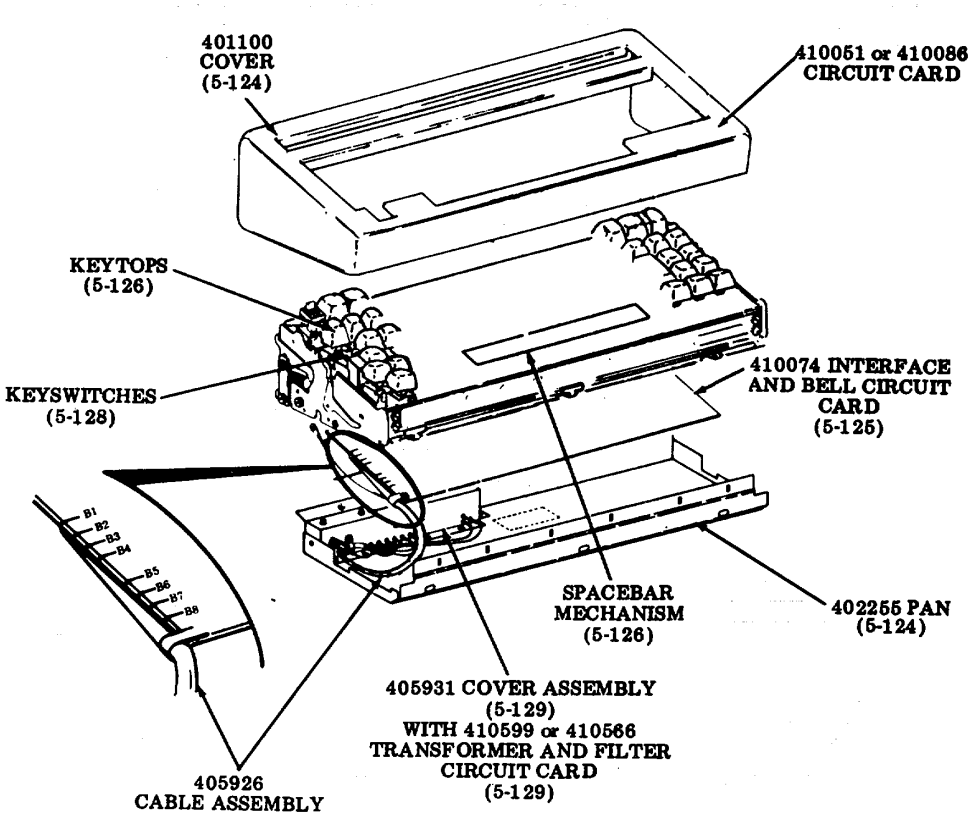
(2) Engage connectors and left and right guides into the slots.

(3) Slide left and right latches upward to latched position.

CAUTION: CHECK THAT OPCON IS FIRMLY ATTACHED ON BOTH SIDES BEFORE RELEASING HOLD.

3. SUBASSEMBLY IDENTIFICATION -- KD

NOTE: The number indicated in parentheses after each assembly designates the page covering the disassembly/reassembly procedures.

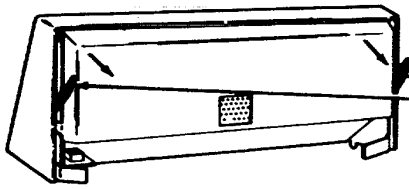


F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

4. DISASSEMBLY/REASSEMBLY -- KD

401100 Cover

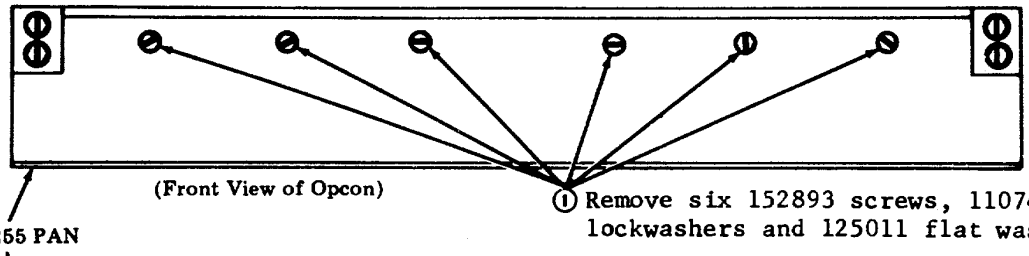
401100 Cover



① Stand opcon upright on back side as shown.

② Use a thin bladed screwdriver or orange stick and pry left and right levers down. Remove cover.

402255 Pan

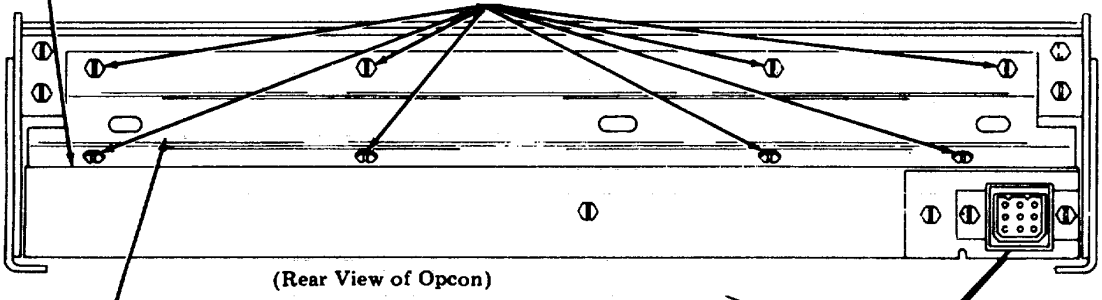


(Front View of Opcon)

① Remove six 152893 screws, 110743 lockwashers and 125011 flat washers.

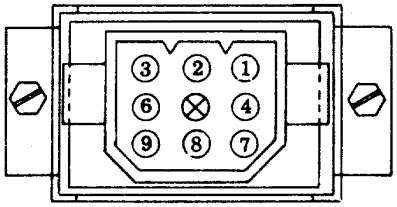
402255 PAN

② Remove eight 152893 screws, 110743 lockwashers and 125011 flat washers.

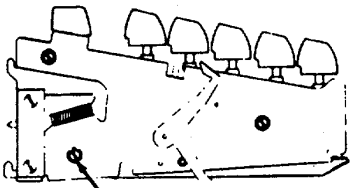


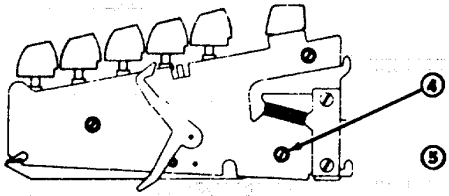
(Rear View of Opcon)

③ Remove 402256 plate.



SSI Connector Orientation





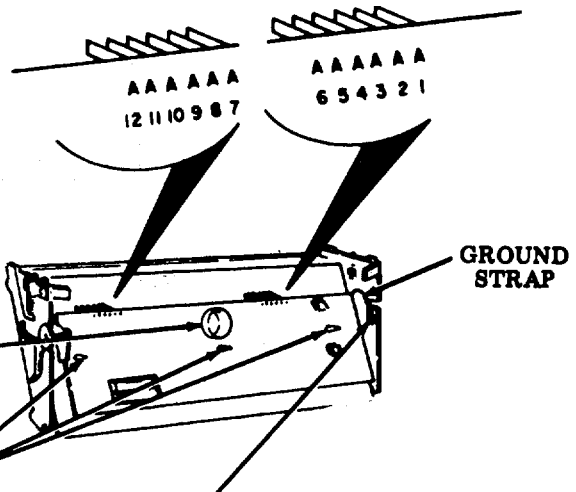
⑤ Remove pan.

④ Remove two 184056 screws; one from each side of frame.

410074 Interface and Bell Circuit Card

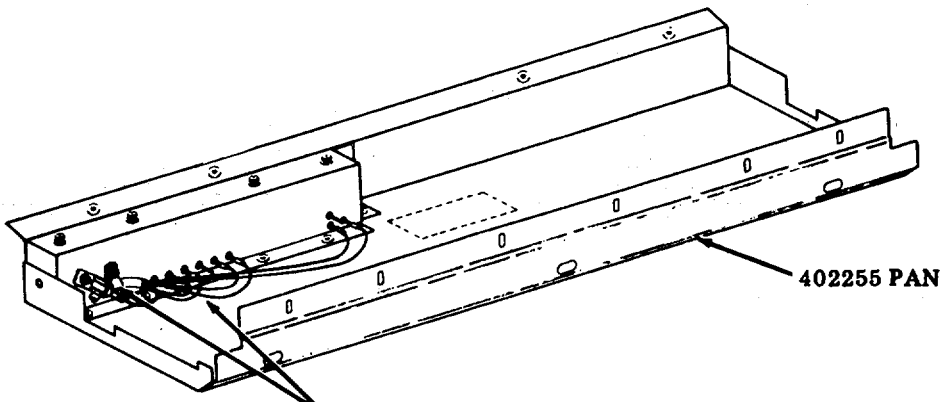
CAUTION 1: DURING REASSEMBLY, CAREFULLY SEAT PINS OF CIRCUIT CARD INTO RECEPTACLES BEFORE APPLYING PRESSURE.

CAUTION 2: DURING DISASSEMBLY AND REASSEMBLY, AVOID HANDLING OF CRYSTAL IN TUNED HOLDER, AS DAMAGE MAY OCCUR.



② Using long nose pliers, compress three locking tabs on plastic standoffs one at a time while applying upward pressure to circuit card.

① Remove 151722 screw and 107116 lockwasher securing ground strap to left side frame.



③ Remove push on terminals of 405926 cable assembly.

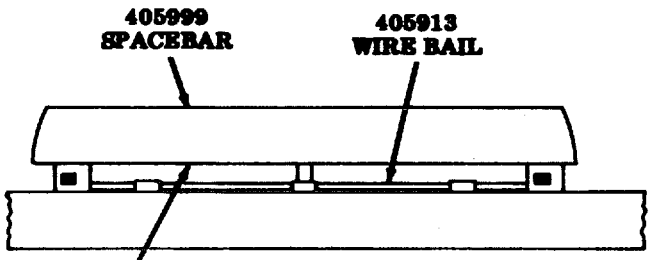
④ Remove circuit card.

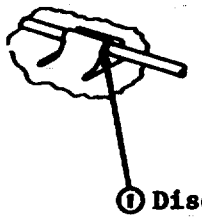
F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

4. DISASSEMBLY/REASSEMBLE -- KD (Contd)

Spacebar Mechanism

- Remove 401100 cover (5-124).
- Remove both control keytops (5-126).





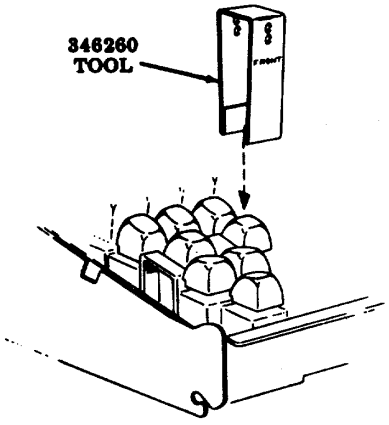
① Disengage 405913 wire bail from two snap clips formed out of top shield using a small screwdriver. Push bail to rear.

② With wire bail removed, push spacebar to right and upward to release spacebar from guides keyswitch assembly.

Keytops

To remove data keytops:

Place 346260 tool over the keytop and pull up to remove.



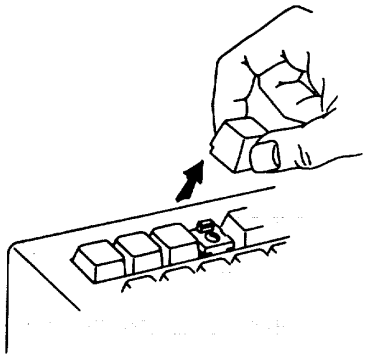
CAUTION 1: THE CAPS LOCK KEYTOP MUST BE IN THE FULLY EXTENDED, UNLATCHED POSITION BEFORE ATTEMPTING TO REMDVE THE KEYTOP. FAILURE TO OBSERVE THIS PRECAUTION WILL RESULT IN A DAMAGED KEYSWITCH.

To remove control keytops and blocking keytops:

(1) Grasp keytop using thumb and index finger.

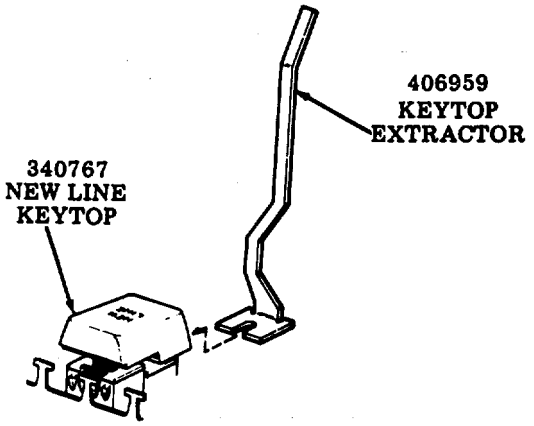
(2) Exert upward force until keytop releases.

In reassembly of the blocking keytop for the CAPS LOCK switch only, operate the switch to the latched (down) position. For all other blocking keytops, position keytop over switch housing and snap down until ridges are retained by notches in switch body.



To remove new line keytop.

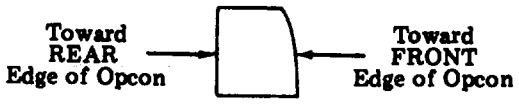
(1) Remove TAB keytop directly above the NEW LINE keytop.



(2) Insert the fork portion of the 406959 keytop extractor under the top edge of the keytop so that the tines of the extractor tool are around the metal post at the top of the keytop and the 340764 spring is depressed under the extractor tool.

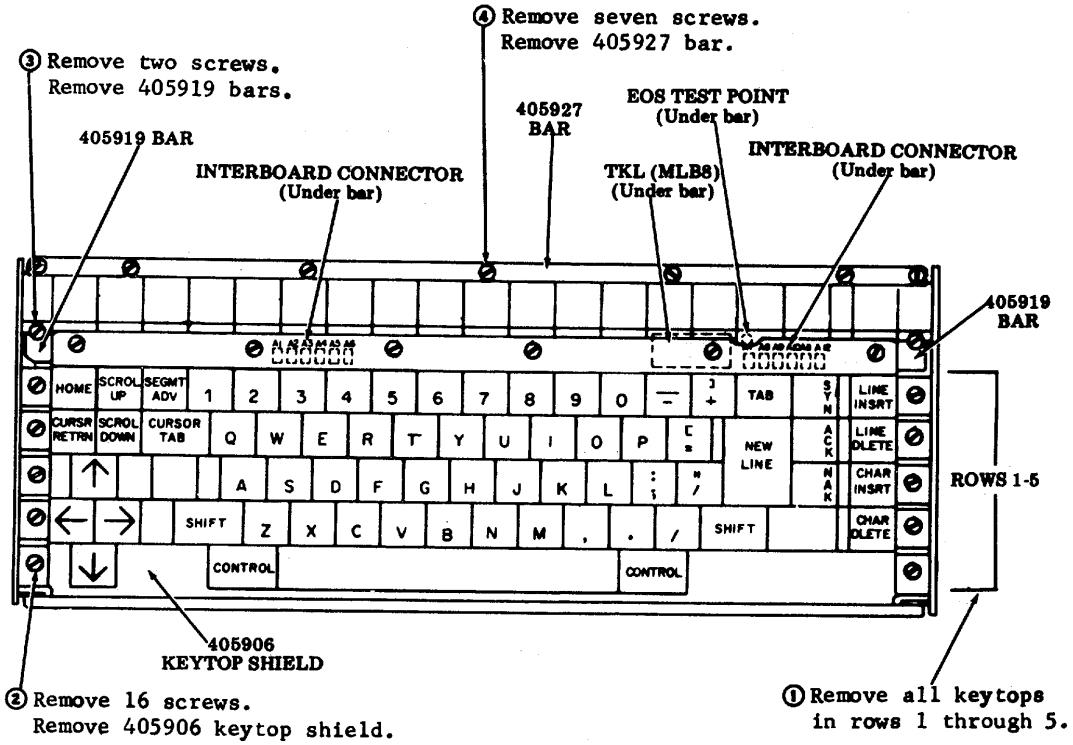
(3) Pry up with the extractor tool being sure the tines of the extractor tool pry against the metal plate embedded in the keytop. Pry up until keytop pops loose.

CAUTION 2: CONTROL ROW BLOCKING KEYTOPS ARE NOT THE SAME ON THE FRONT AND REAR SIDE AND MUST BE ASSEMBLED WITH THE PROPER ORIENTATION.



Profile of Control Row Blocking Keytop

405906 Keytop Shield



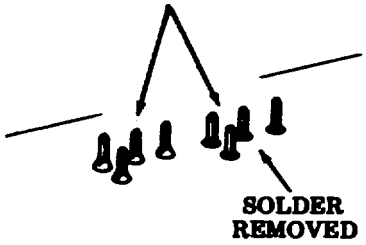
F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

4. DISASSEMBLY/REASSEMBLY -- KD (Contd)

Keyswitches

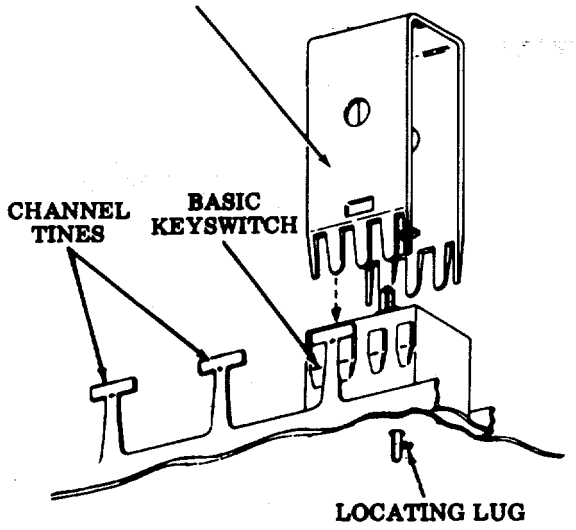
- Remove 401100 cover(5-124).
- Remove 402255 pan (5-124).
- Remove 410074 interface and bell circuit card (5-125) (if present).
- Remove keytops (5-126).
- Remove 405906 keytop shield (5-127).

(1) Remove solder from around terminal pins of keyswitch to be removed.



CAUTION: USE A LOW WATTAGE SOLDERING IRON (AVOID PROLONGED CONTACT WITH PINS) ALONG WITH A DESOLDERING TOOL TO PREVENT DAMAGE TO KEYSWITCH CARD CIRCUITS AND COMPONENTS.

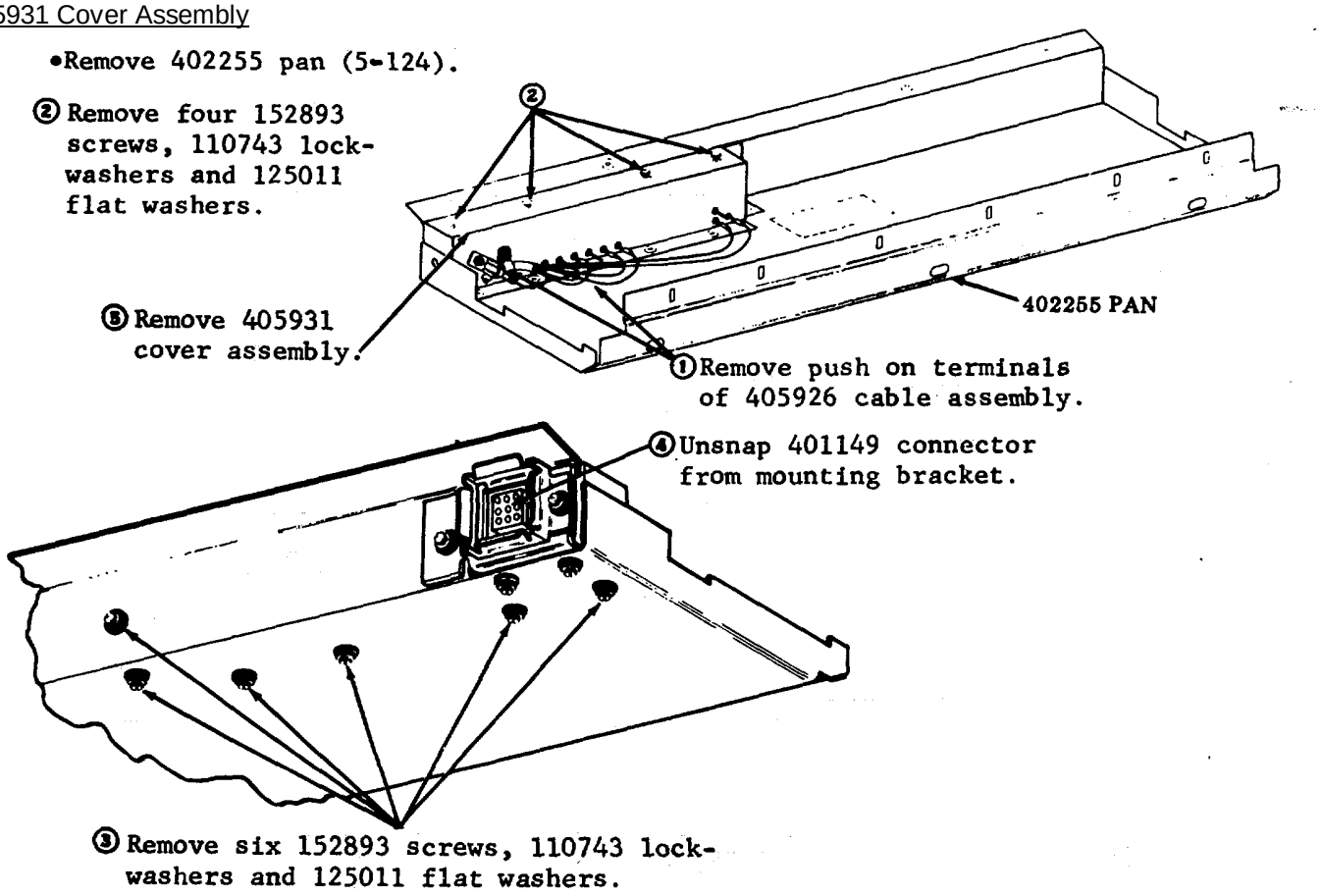
(2) Place 346257 tool over keyswitch and press downward. When tool bottoms and embossed projections snap into notches on keyswitch, squeeze and pull back on tool to lift keyswitch out.



NOTE: The tool tines must pass between keyswitch housing and inside of channel tines.

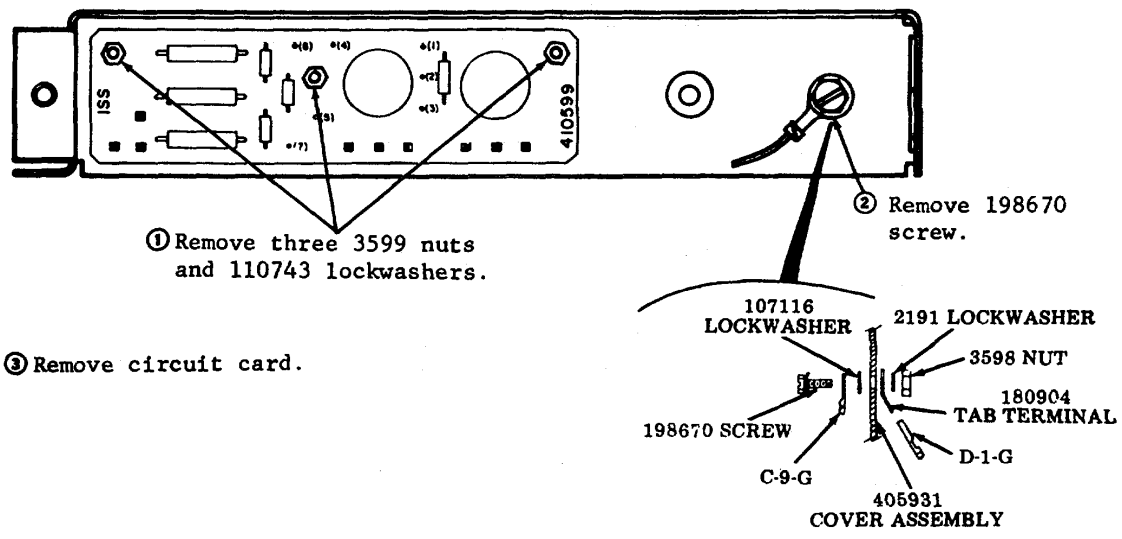
In reassembly, insert new keyswitch, observe position of locating lug, and press keyswitch into channel. Switch must snap fully into front and rear channel tines. Hold keyswitch in place and resolder.

405931 Cover Assembly



410599 or 410566 Transformer and Filter Circuit Card.

- Remove 402255 pan (5-124).
- Remove 405931 cover assembly (5-129).



F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

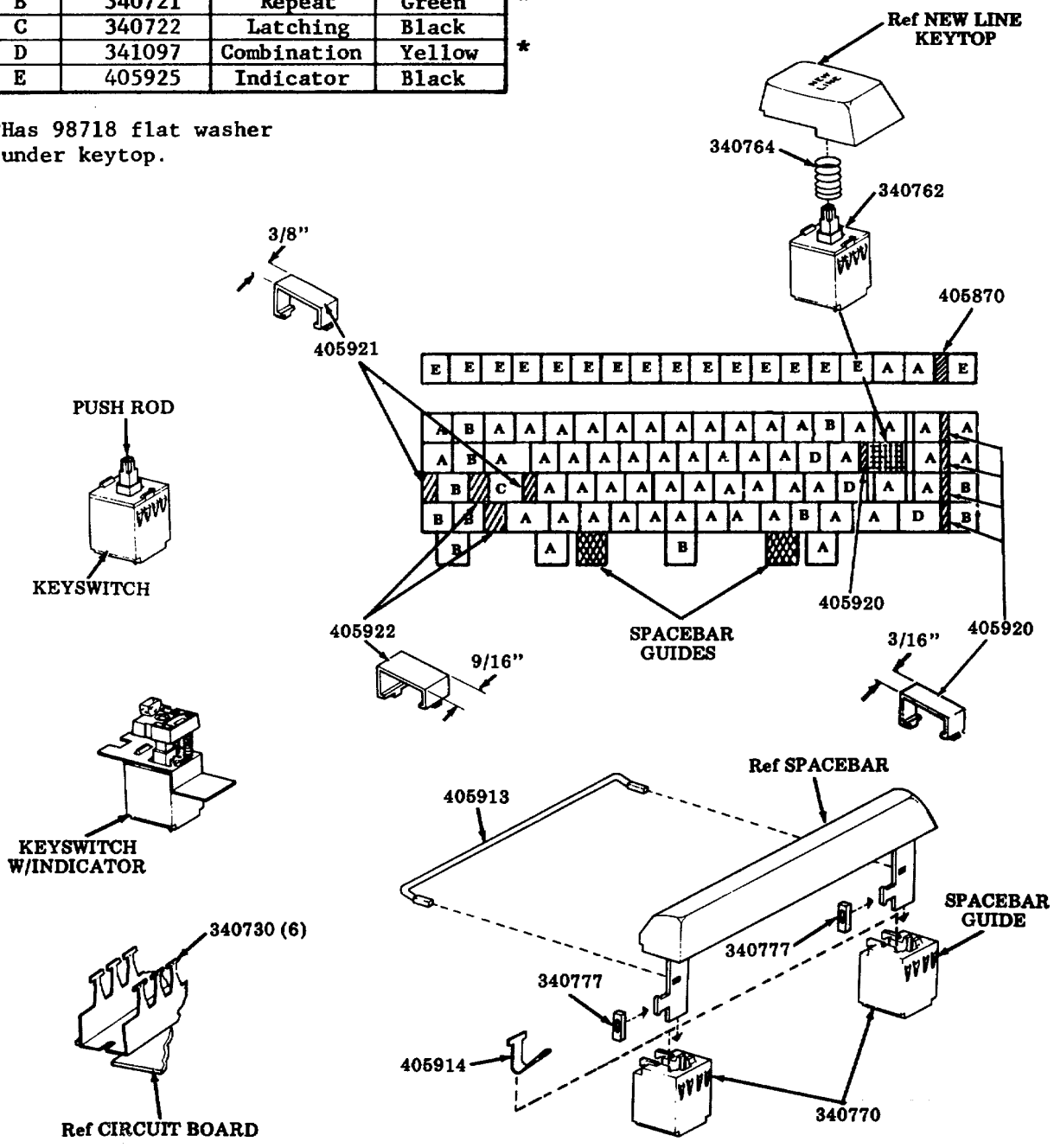
5. PARTS -- KD

410051 Console Logic Circuit Card

POS	KEYSWITCH NO.	TYPES	PUSH ROD COLOR	
A	340720	Basic	White	
B	340721	Repeat	Green	*
C	340722	Latching	Black	
D	341097	Combination	Yellow	*
E	405925	Indicator	Black	

*Has 98718 flat washer under keytop.

NOTE: Early design keyswitches have the part number stamped on the keyswitch housing.

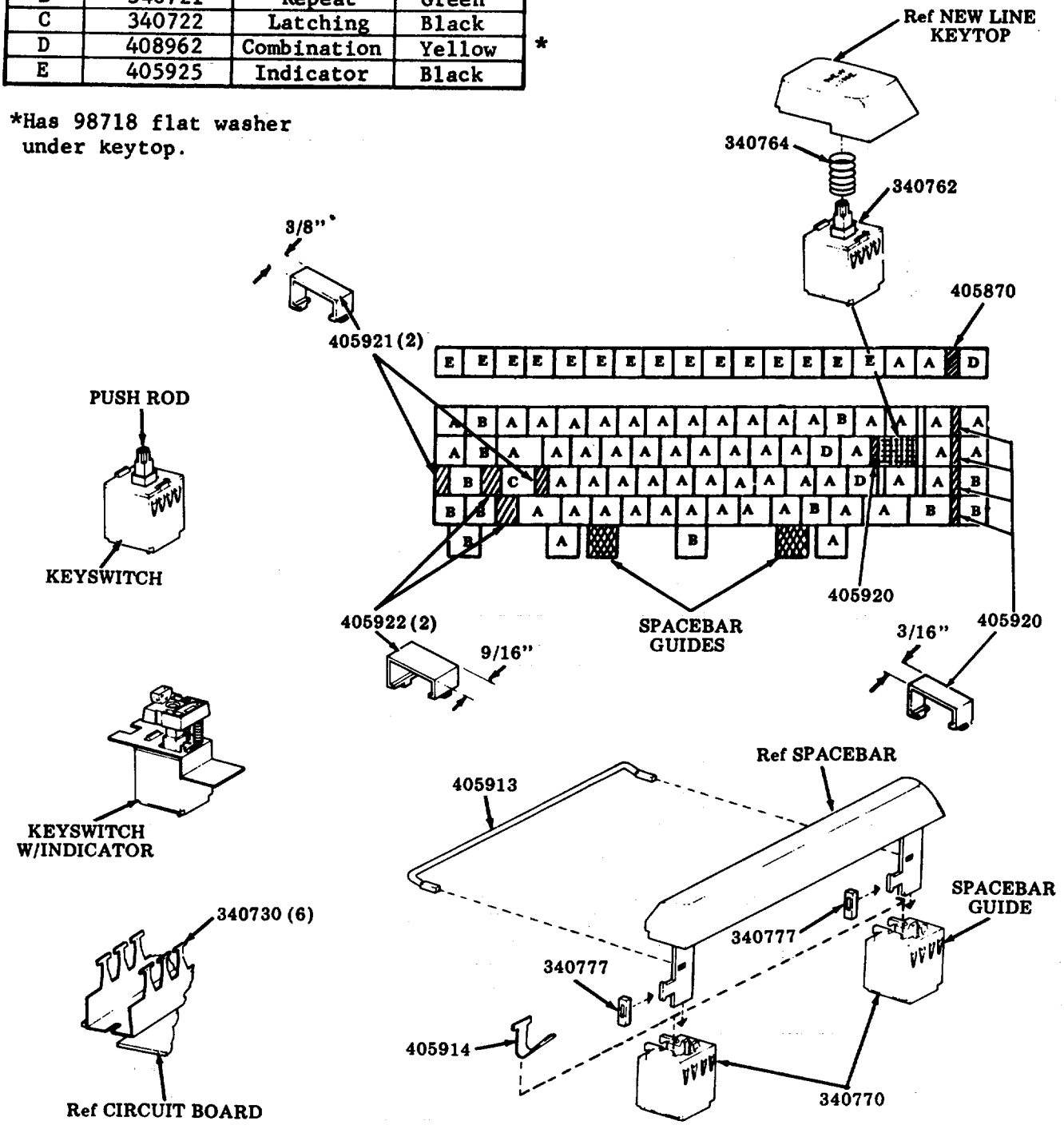


410096 Console Logic Circuit Card

POS	KEYSWITCH NO.	TYPES	PUSH ROD COLOR	
A	340720	Basic	White	
B	340721	Repeat	Green	*
C	340722	Latching	Black	
D	408962	Combination	Yellow	*
E	405925	Indicator	Black	

*Has 98718 flat washer under keytop.

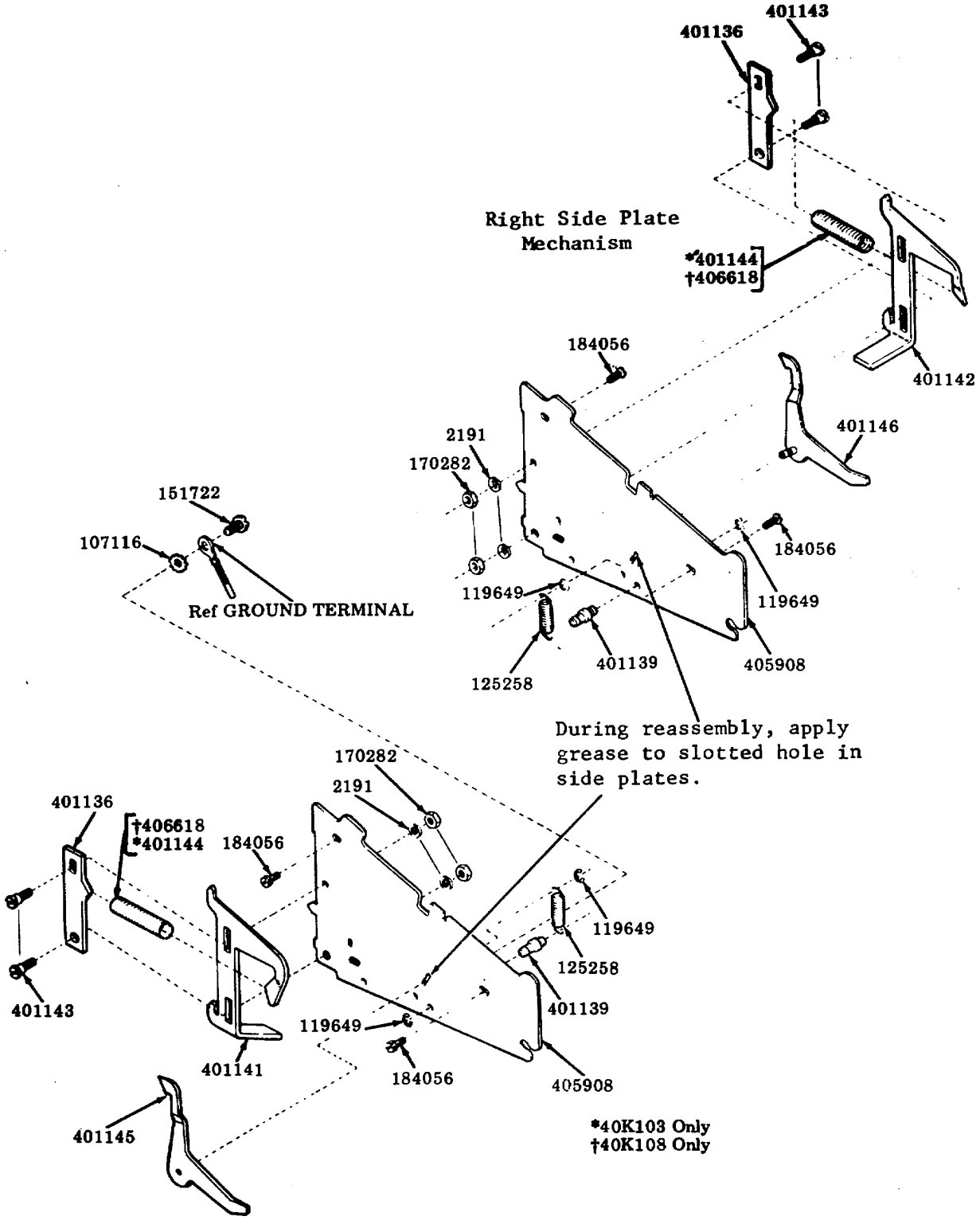
NOTE: Early design keyswitches have the part number stamped on the keyswitch housing.



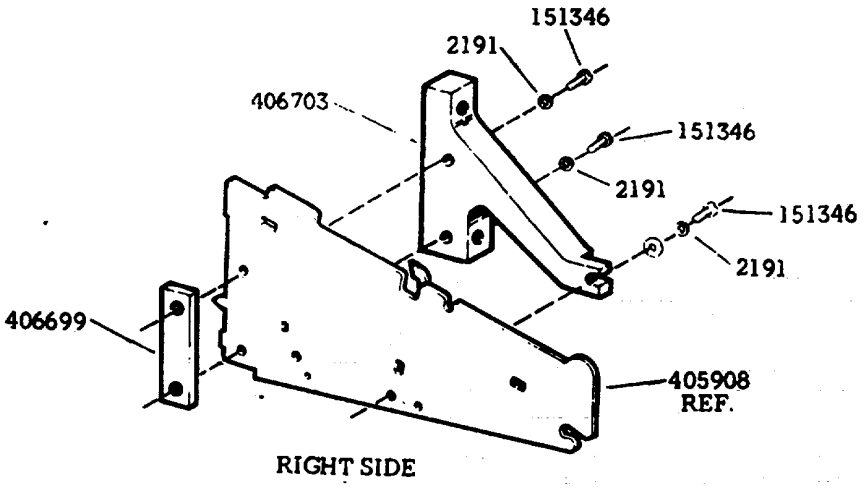
F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

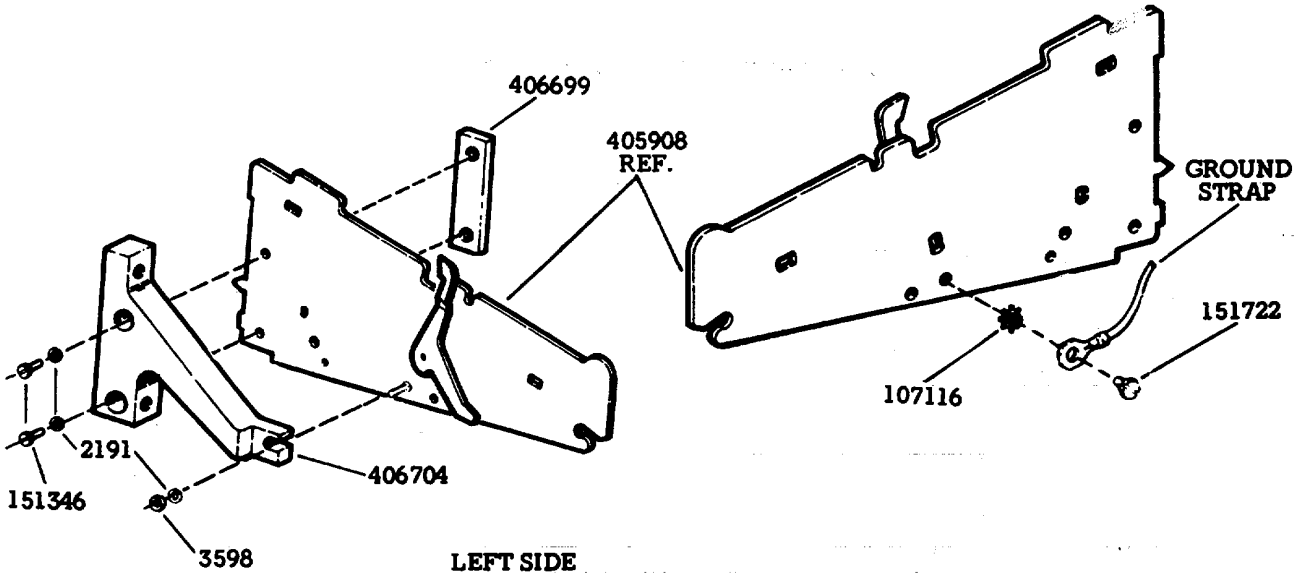
5. PARTS -- KD (Contd)

Left and Right Side Plate Mechanism



Left Side Plate Mechanism



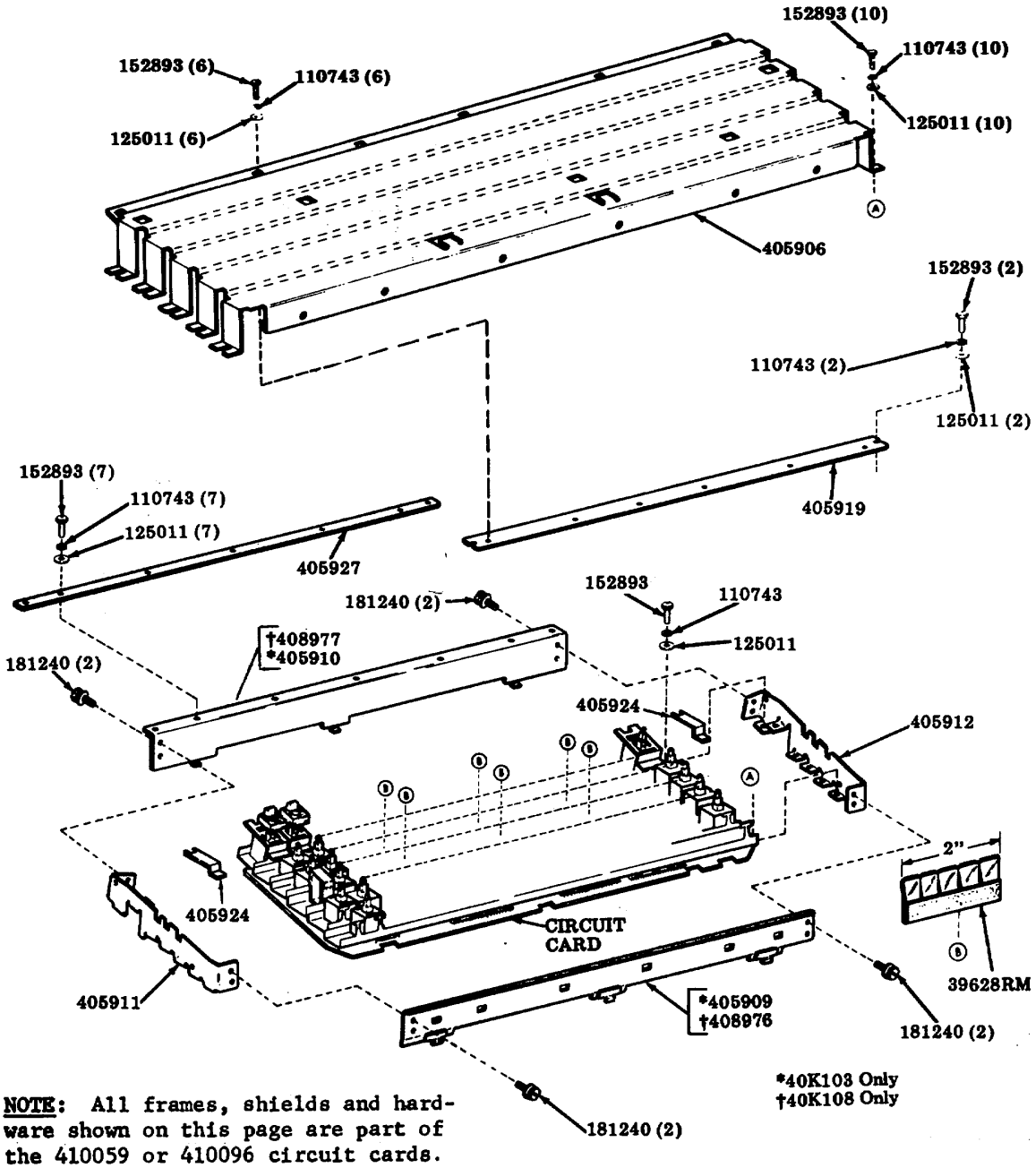


Opcons With Modification Kit 406715 Installed

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

5. PARTS -- KD (Cont)

Keytop Shield and Opcon Frame

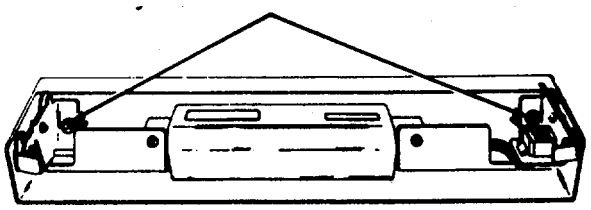


NOTE: All frames, shields and hardware shown on this page are part of the 410059 or 410096 circuit cards.

7. DISASSEMBLY/REASSEMBLY -- RO

401161 Cover

Remove two 184056 screws w/lockwashers mounting cover to keyswitch bracket.

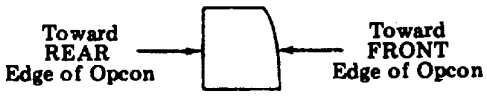


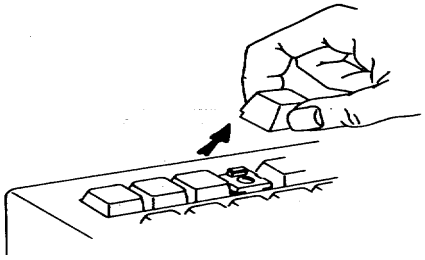
Keytops

(1) Grasp keytop using thumb and index finger.

(2) Exert upward force until keytop releases.

CAUTION: BLOCKING KEYTOPS ARE NOT THE SAME ON THE FRONT AND REAR SIDE AND MUST BE ASSEMBLED WITH THE PROPER ORIENTATION.

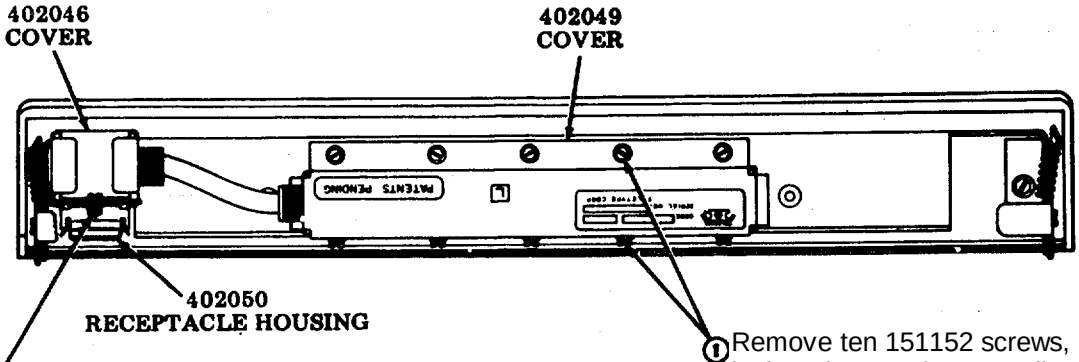




In reassembly of blocking keytops, position blocking keytop over switch housing until ridges are retained by notches in switch body.

Keyswitches

- Remove 401161 cover (see above).
- Remove keytops (see above).



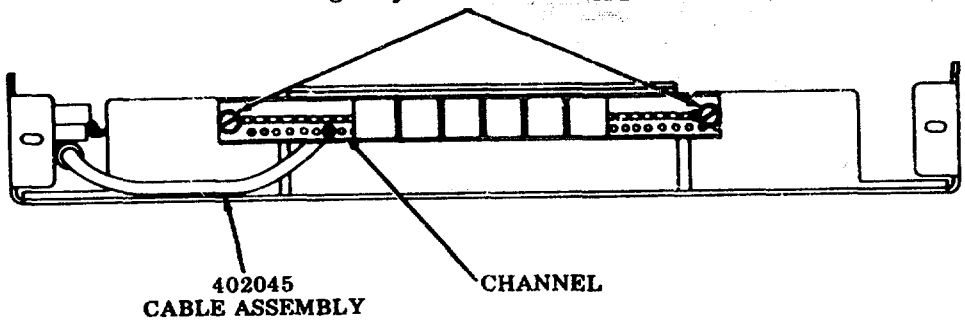
② Remove two 152893 screws, 110743 lockwashers and 3599 nuts. Remove 402050 receptacle housing and 402046 cover. Unsnap 401149 connector from bracket.

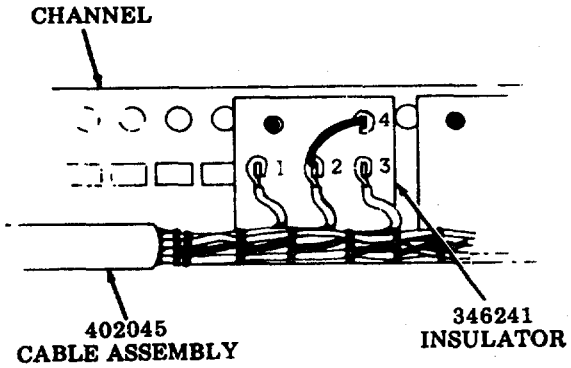
① Remove ten 151152 screws, 110743 lockwashers and 125011 flat washers. Remove 402049 cover.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

7. DISASSEMBLY/REASSEMBLY -- RO (Contd)

③ Remove two 184056 screws w/ lockwashers securing keyswitch channel.

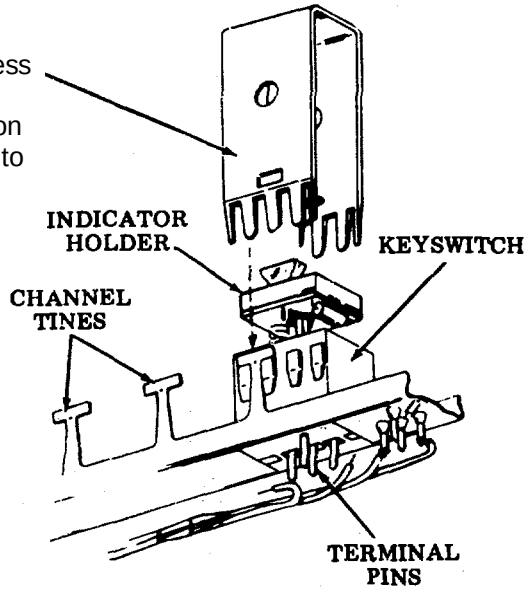




④ Remove solder from terminal pins securing cable leads and jumpers, and remove insulator.

CAUTION: USE LOW WATTAGE SOLDERING IRON (AVOID PROLONGED CONTACT WITH PINS) ALONG WITH A DESOLDERING TOOL TO PREVENT DAMAGE TO CABLE LEADS.

⑤ Place 346257 tool over keyswitch and press downward. When tool bottoms and embossed projections snap into notches on keyswitch, squeeze and pull back on tool to lift keyswitch out.



NOTE: The tool tines must pass between keyswitch housing and inside of channel tines.

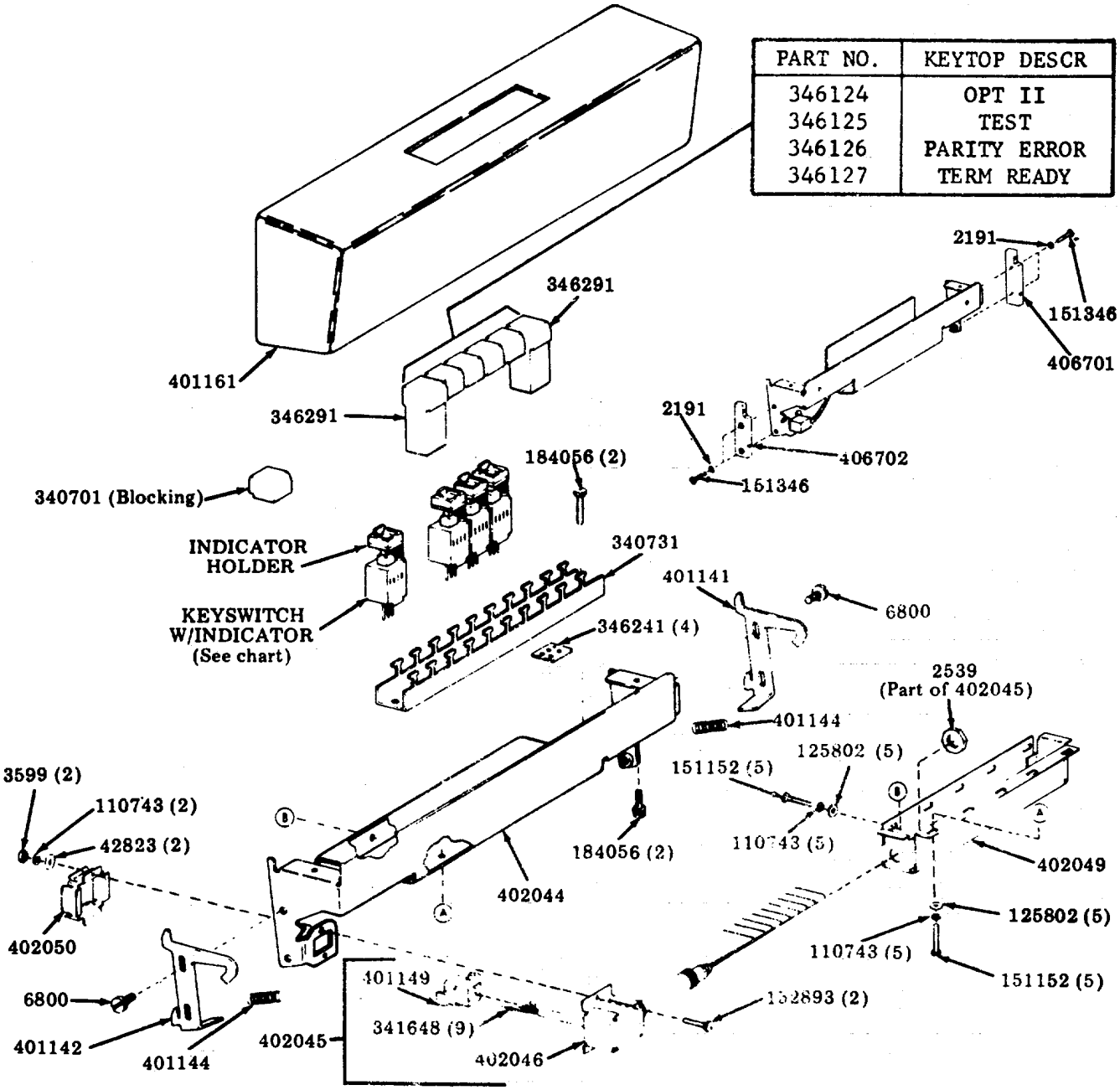
In reassembly, insert new keyswitch, observe position of locating lug, and press keyswitch into channel. Switch must snap fully into front and rear channel tines. Before resoldering, replace insulator, hold keyswitch in place and resolder.

PIN	
1	R
2	Y
3	G
4	W-BL
5	BR
6	O
7	BL
8	W
9	BK

KEYTOP DESCR	SWITCH NO.	INDICATOR HOLDER COLOR	PUSH ROD COLOR
OPT II	346214	White	PURPLE
TEST	346215	Light Gray	PURPLE
PARITY ERROR	346213	Light Gray	BLUE
TERM READY	346212	White	BLUE

NOTE: Early design key-switches have the part number stamped on the keyswitch housing.

PART NO.	KEYTOP DESCR
346124	OPT II
346125	TEST
346126	PARITY ERROR
346127	TERM READY



F. DISASSEHBLY/REASSEMBLY AND PARTS (Contd)

9. COMPONENT PARTS LIST -- KD AND RO

NOTE: When ordering parts, prefix each number with the letters "TP".

Part Number	Description and Page Number	Part Number	Description and Page Number	Part Number	Description and Page Number
2191	LocwuAher 129,132, 133,135,137,143	171567	Capacitor, .005 MFD 137,138	315961	Resistor &82K OHM 136
2539	Nut, 3/8-32 Hex 143	171580	Resistor, 470 OHM 136	315976	Capacitor, 470 PF 136
3598	Nut, 640 Hex 129, 133,135,137,138	177108	Diode 136,137,138	315989	Resistor 136,137, 138,139
3599	Nut, 4-40 Hex 129, 133,141,143	180904	Tab, Terminal 129,135	318801	Resistor, 47000 OHM 137,138,139
6800	Screw, 640 Shoulder 143	181240	Screw w/Lockwasher, 6-40 x 3/16 Hex 134, 136,139	318802	Resistor, 220 OHM 137,138
7002	Washer, Flat 137	181618	Capacitor, .01 MFD 137,138	320026	Resistor, 3.9K OHM 137,138
42823	Washer, Flat 143	182516	Resistor, 91 OHM 136	320273	Resistor, 7.5 OHM 139
92260	Washer, Lock 137,138	184043	Resistor, 800 OHM 136	320275	Resistor, 10000 OHM 136,137,138,139
98718	Washer, Flat 130,131, 139	184056	Screw w/Lockwasher 640 x 1/4 Hex 124, 132,141,142,143	320276	Resistor, 10K OHM 139
107116	Lockwasher 125,129, 132,133,135	197464	Diode 136,137,138, 139	321213	Resistor 136,137, 138,139
110743	Lockwasher 124,129, 134,135,136,139,141, 143	198670	Screw w/Lockwasher, 6.40x 5/16 Hex 129, 135	321507	Resistor, 1.8K OHM 137,138
119649	Ring, Retaining 132	199015	Capacitor, .22 MFD 137,138	321508	Resistor, 100000 OHM 139
121243	Clamp, 3/16 ID Cable 135,137	300092	Resistor 6.8K OHM 137,138,139	323148	Resistor, 18,000 OHM 136,139
125011	Washer, Flat 124,129, 133,135,136,139,141	300102	Diode 136,137,138	323606	Diode 136,139
125258	Spring 132	300256	Capacitor, .001 MFD 137,138	323725	Resistor, 27.4AK OHM 137,138
125802	Washer, Flat 143	305821	Capacitor, .1 MFD 136,137,138	324144	Transistor 136,137,138
129852	Resistor, 2,200 OHM 137,138	305876	Resistor, 35.7K OHM 137,138	324903	Resistor, 7.5K OHM 137,138
137302	Capacitor 136	310921	Capacitor, .022 MFD 139	324908	Resistor, 30.1K OHM 137,138
137440	Resistor, 1,000 OHM 139	310923	Capacitor, .39 MFD 139	325034	Capacitor 137,138
137442	Resistor, 1500 OHM 136,137,138	310929	Capacitor, 18 MFD 137,138	325077	Transistor 139
137603	Resistor, 510 OHM 139	315939	Capacitor, .002 MFD 139	325163	Connector 137,138
148832	Capacitor, .47 MFD 137,138	315946	Connector 136	326553	Spacer 137,138
151152	Screw, 6-40 x 3/16 Hex 141,143	315948	Resistor, 100 OHM 137,138,139,140	326573	Resistor 136,137,138, 139
151346	Screw, 640x 3/8 Fil 133,143	315951	Resistor, 560 OHM 136	326602	Resistor, 360 OHM 137,138
151631	Screw, 640 x 5/16 Hex 137,138	315954	Resistor 139	326751	Resistor, 22 OHM 136,137,138
151632	Screw, 6.40 x 3/8 Hex 137	315957	Resistor, 3300 OHM 139	326823	Circuit, Integrated 137,138
151722	Screw, 6-40 x 3/16 Hex 125,132,133	315959	Resistor, 4700 OHM 136,137,138,139	326846	Circuit, Integrated 137,138
152893	Screw, 6-40 x 1/4 Hex 124,129,134, 135,136,139,141, 143			326852	Circuit, Integrated 136,137
170282	Nut, 6-40 Hex 132			326853	Circuit, Integrated 137,138

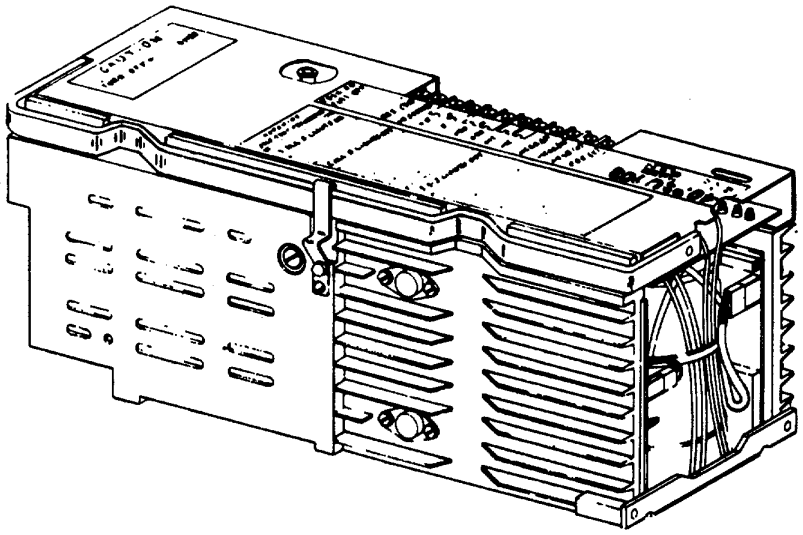
Part Number	Description and Page Number
328783	Resistor 137,138
328785	Resistor 136,139
330640	Resistor, 150 OHM 137,138,139
330641	Resistor 139
330645	Resistor, 560, 000 OHM 136
333241	Transistor 137,138, 139
333407	Resistor, 620 OHM 137,138
333410	Resistor 137,140
333411	Resistor 136
333416	Resistor 137,138
333417	Resistor 137,138
333481	Capacitor 137,138
333482	Capacitor 137,138
333727	Capacitor 136,139
333736	Diode 136,137,138
334665	Diode 136
335622	Resistor 137,138
335800	Capacitor 136
336470	Strap 136,137,138, 139
336810	Plate, Identification 135
336948	Capacitor 136
337330	Capacitor 136
337336	Capacitor 137,138
337871	Plate, Identification 135
339002	Circuit, Integrated 136
339408	Circuit, Integrated 137,138
339601	Circuit, Integrated 137,138
339602	Circuit, Integrated 137,138
339716	Circuit, Integrated 137,138
340701	Keytop 143
340720	Keyswitch, Basic 130, 131,136,139
340721	Keyswitch, Repeat 130,131,136,139
340722	Keyswitch, Latching 130,131,136,139
340730	Channel 130,131, 136,139
340731	Channel 143
340762	Housing 130,131, 136,139
340764	Spring, Compression 127,130,131,136,139
340767	Keytop Assembly 127
340770	Guide 130,131,136, 139
340777	Bumper 130,131, 136,139
341075	Resistor 136
341089	Crystal 137,138
341091	Transistor 136,137, 138
341097	Keyswitch, Combination 130,136
341622	Capacitor 137,138
341648	Terminal 143
342236	Circuit, Integrated 139
342244	Circuit, Integrated 139
342280	Circuit, Integrated 139
342288	Logic Assembly 136
342289	Amplifier 136
342506	Logic Assembly 136
342553	Logic Assembly 136
346124	Keytop 143
346125	Keytop 143
346126	Keytop 143
346127	Keytop 143
346212	Keytop 143
346213	Keytop 143
346214	Keytop 143
346215	Keytop 143
346238	Capacitor 136,139
346241	Insulator 142,143
346257	Extractor, Keyswitch 128,142
346260	Extractor, Keytop 126
346261	Sink, Heat 136
346262	Sink, Heat 136
346263	Sink, Heat 136
346264	Sink, Heat 136
346270	Post 137,138
346271	Sink, Heat 136
346291	Spacer 143
346311	Bumper 137,138
346351	Capacitor 139
346370	Crystal 139
346394	Diode 139
401000	Capacitor 137,138
401066	Resistor 137,138
401067	Resistor 137,138
401100	Cover 123,124, 126.128
401136	Plate, Spring 132
401139	Post, Spring 132
401141	Latch, Left Plate 132,143
401142	Latch, Right Plate 132,143
401143	Screw, 6-40x 11/32 Shoulder 132
401144	Spring 132,143
401145	Latch, Left Cover 132
401146	Latch, Right Cover 132
401149	Connector 129,141, 143
401161	Cover 140,141,143
401733	Capacitor 137,138
401734	Diode 137,138
401735	Transistor 137,138
401737	Inductor 137
402044	Bracket 143
402045	Cable Assembly 140,142,143
402046	Cover 141,143
402049	Cover 141,143
402050	Housing, Receptade 141,143
402255	Pan 123,124,125, 128,129,135
402256	Plate 124
402257	Housing, Receptacle 135
402258	Bracket 135
403611	Receptacle 140
403658	Transformer 140
404027	Driver 139
405324	Capacitor 136,137, 138,139,140
405688	Diode 139
405800	Filter 135
405870	Cap 130,131,136, 139
405906	Shield, Keytop 127, 128,134,136,139
405908	Plate 132,133
405909	Frame, Front 134, 136
405910	Frame, Rear 134,136
405911	Frame, Left 134,136, 139
405912	Frame, Right 134, 136,139
405913	Bail 126,130,131, 136,139
405914	Spring 130,131, 136,139
405915	Shield 139
405919	Bar 127,134,136, 139
405920	Spacer 130,131, 134,136,139
405921	Spacer 130, 131, 136,139
405922	Spacer 130,131, 136,139
405923	Cable Assembly 135,140

F. DISASSEBLY/RE&SSEI BLY AID PARTS (Contd)

9. COMPONENTS PARTS LIST -- KD AND RO (Contd)

Part Number	Description and Page Number	Part Number	Description and Page Number	Part Number	Description and Page Number
405924	Filler 136,139	406703	Support Right 133	410051	Card, Circuit 123, 130
405925	Keyswitch, Indicator 130,131,136,139	406704	Support Left 133		
		406959	Extactor 127	410059	Card, Circuit 134, 136
405926	Cable Asemly 123, 125,129,137,138	408961	Cable Assembly 139	410074	Card, Circuit 123, 128,137,138
405927	Bar 127,134,136, 139	408962	Keyswitch 131,139		
		406976	Frame, Front 134, 139	410086	Card Circuit 123
405930	Choke, R.F. 140			410096	Card, Circuit 131, 134,139
405931	Cover Assembly 123,129,135	408977	Frame, Rear 134, 139	410566	Card, Circuit 123, 129,140
405999	Spacebar 126,139	409054	Board, Circuit 136		
406618	Spring 132	409055	Board, Circuit 137, 138	410590	Card, Circuit 140
406699	Plate, Nut 133			410599	Card, Circuit 123, 129,135,140
406701	Support, Right 143	409070	Board, Circuit 139		
406702	Support, Left 143	409599	Board, Circuit 140		

PART 6 -- TEMPEST MODEL 40 POWER SUPPLY 40PSU103



INDEX PAGE

PART 6 -- TEMPEST MODEL 40 P(OWER SUPPLY 40PSU103
A. GENERAL

1. DESCRIPTION

The 40PSU103 Power Supply furnishes the following regulated voltages and currents for the 40C400 Controller Logic and attached keyboards under the listed operating limits.

Operating Limits

Cabinet Temperature (forced air) -- O°C to 450°C
Input Voltage -- 103 V ac to 127 V ac (115 V ac nominal)
Humidity -- 2% to 95% (no condensation)
Altitude -- 0 to 10,000 feet
Line Frequency -- 49 to 62 Hz

Regulated Voltages and Currents

Nominal	Limits	Current Limits	Max Ripple and/or Noise
+5 V dc	4.90 V to 5.10 V	5 amps to 25 amps	0.25 V P-P
+12 V dc	11.58 V to 12.42 V	0.4 amps to 4 amps	0.24 V P-P
-12 V dc	-11.58 V to -12.42 V	0.4 amps to 4 amps	0.24 V P-P

2. TOOLS AND TEST EQUIPMENT

Tools

The tools listed below are supplementary to common type such as pliers, screwdrivers, etc, and may be procured locally or ordered from Teletype Corporation.

NOTE: When ordering parts, prefix each number with the letters TP unless specified otherwise.

Description	Part No.
•Screwdriver (6 Inch Medium)	100982
•Nut Driver Wrench 5/16 Inch	89955
•Nut Driver Wrench 1/4 Inch	89954
•Open-End Wrench 1/4 Inch	129534
•Open-End Wrench 5/16 Inch	152835
•Open-End Wrench 3/8 Inch	125765
•Aligator Clip Lead (procure locally)	
•Soldering Iron, Weller Model W-MCP-750 with MP2C Tip, or equivalent (procure locally)	
•Desoldering Tool, EDSYN Model MMSOO5 Soldapullt@, or equivalent (procure locally)	

Test Equipment

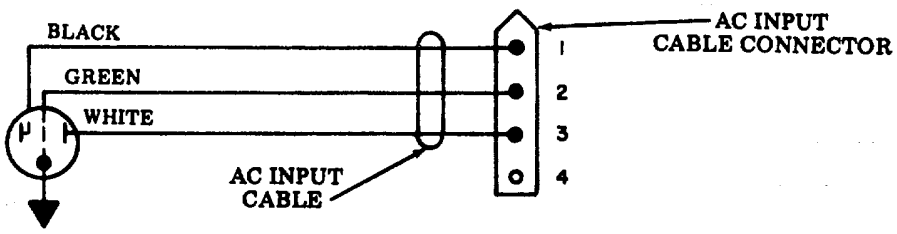
The following equipment or equivalent is required for testing, troubleshooting, and adjusting the power supply.

- Digital Multimeter, Fluke Model 8100A
- Oscilloscope, Tektronix Model 7904, e/w:
  2 -- 7A16A Single Trace Amplifier
  1 -- 7B70 Time Base Unit
- Model 40 Power Supply Test Base CP10.009.001.1
  Supplied by: Teletype Corporation
  Custom Product Division
  Skokie, Illinois 60077
  Telephone No. (312) 982-2499

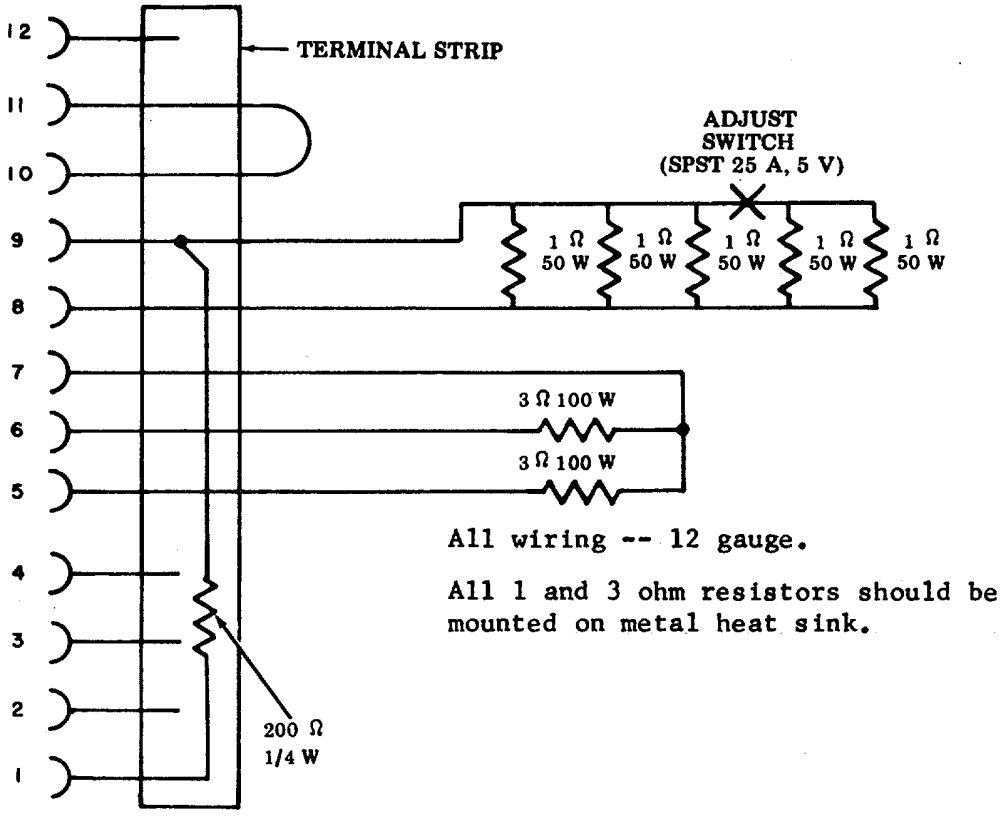
Alternate Test Equipment

The following ac input cable and dummy load resistance circuit can be used to test power supplies when a Model 40 power supply test set is not available.

•AC Input Cable



•Dummy Load Resistance

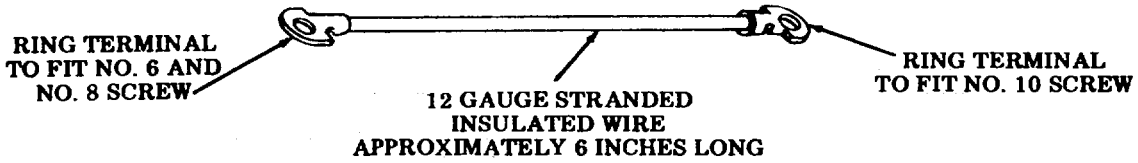


A. GENERAL (Cont)

Miscellaneous

Items a., b., and c. may be procured locally. Item d. may be ordered from Teletype Corporation, Part No. 401608, or fabricated locally as shown.

a. Glyptol® , General Electric, Type 1201, Red
b. Alligator Clip Lead 3 Foot
c. Capacitor, 0.22 Microfarad, 100 W V dc, Mylar® or Polyester Film, e/w spade terminals
d. Wire with Ring Terminals (401608)



B. SHOP PROCEDURES

1. GENERAL

This section details the cleaning, refinishing, and inspection procedures to be followed prior to testing and troubleshooting the power supply. In many cases, careful inspection in particular, will save later troubleshooting by revealing broken or loose connections, damaged electrical components, possible short circuits, etc.

The packing materials detailed in this section are designed for protection against damage from rough handling in shipping.

2. CLEANING AND REFINISHING

Cleaning

Immersion type cleaning is not recommended for the power supply.

The exterior of the power supply unit may be cleaned by wiping the case with a water dampened cloth, followed by wiping with a dry cloth. Solvents are not recommended.

Interior cleaning without removing the cover can be accomplished by, air blowing.

CAUTION: THE AIR SUPPLY SHOULD NOT EXCEED 20 PSI. HIGHER AIR PRESSURES MAY DAMAGE SMALL COMPONENTS.

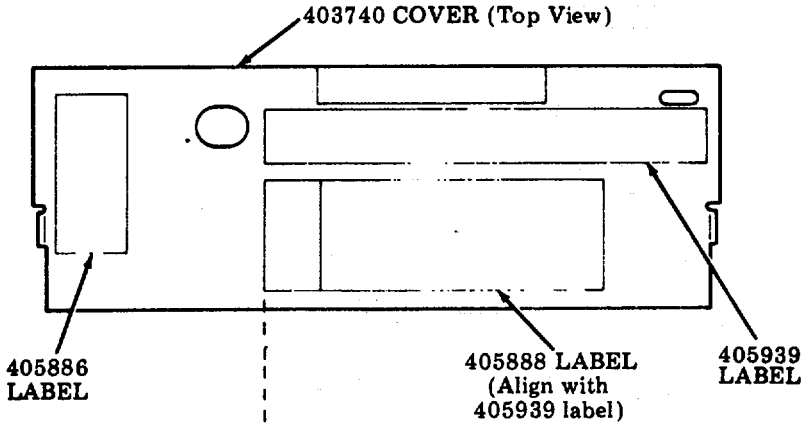
Interior cleaning, with the cover removed, can be accomplished by brushing lightly with a clean dry 1/2-inch nylon-bristle paint brush followed by air blowing.

Refinishing

Damaged labels:

a. Scrape off the old label with.a putty knife. Make sure all the glue from the old label is scraped off before the new label is applied.

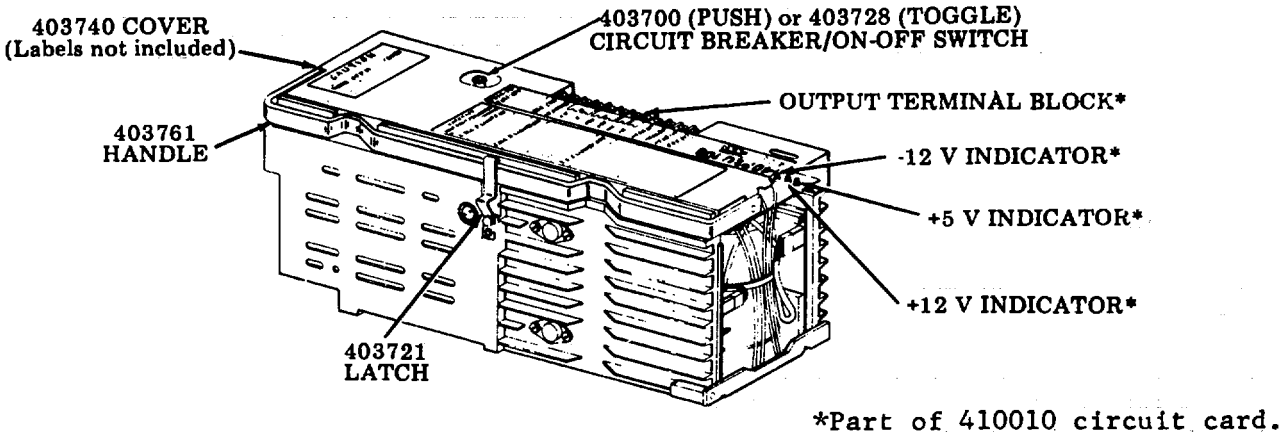
b. Peel off the backing of the new label and apply the new label to the power supply cover. Make sure the label is applied so it is smooth with no trapped air bubbles present. Also the edges of all labels should be in line with the top edges of the power supply cover.



3. INSPECTION

External Inspection

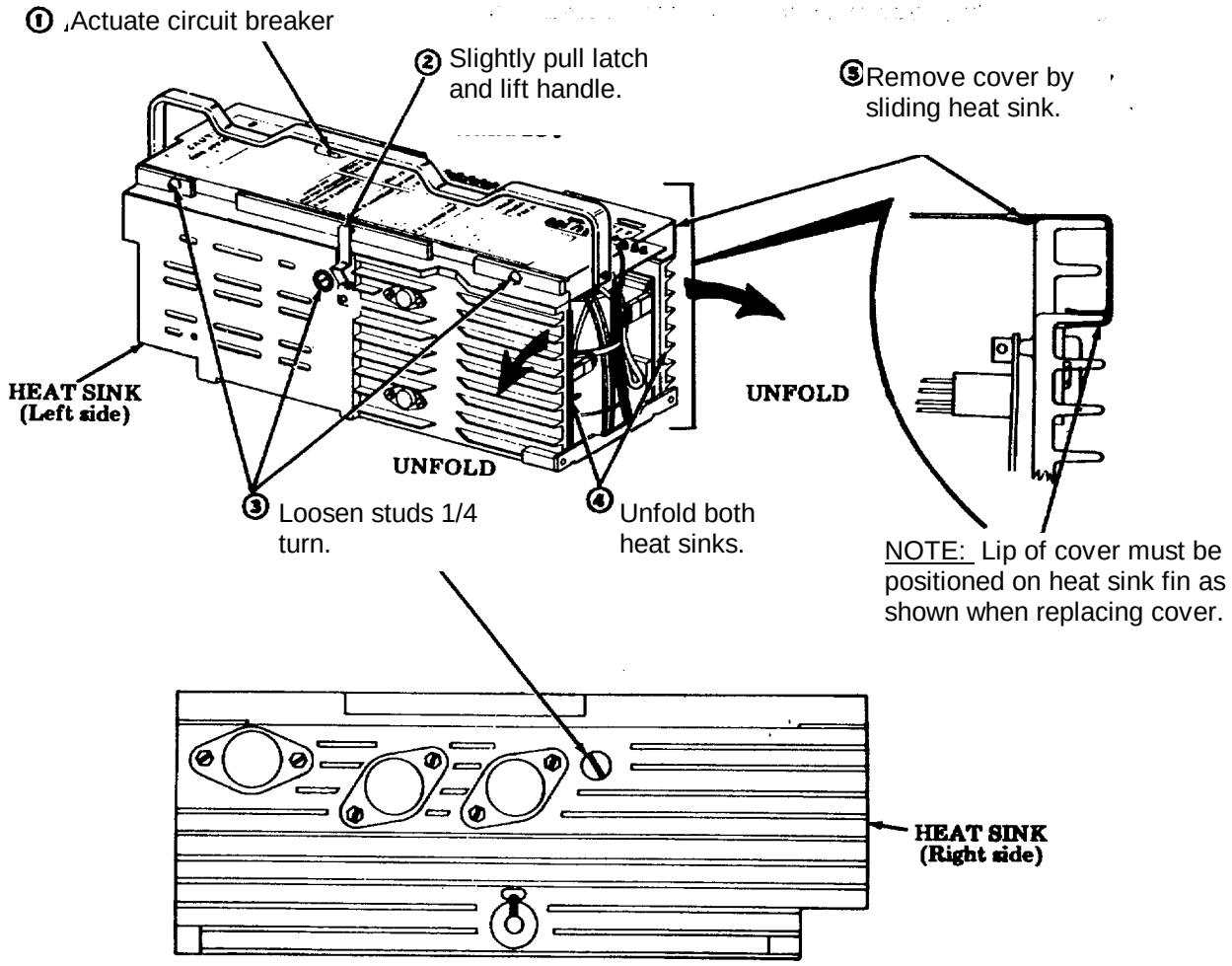
Examine the components detailed and replace any components missing or damaged.
Refer to Page 6-43, F. DISASSEMBLY/REASSEMBLY AND PARTS.



B. SHOP PROCEDURES (Cont)

3. INSPECTION (Cont)

403740 Cover Removal



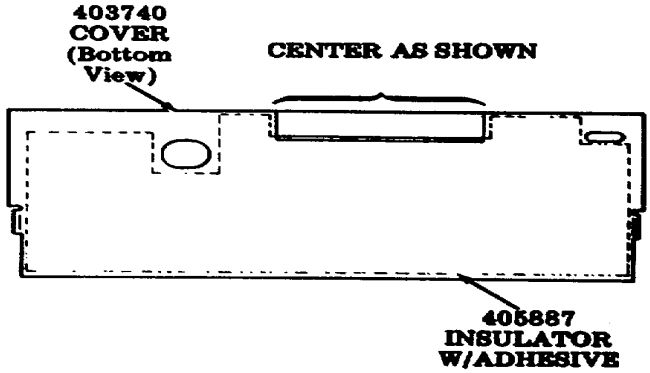
Internal Inspection

Examine the internal components detailed below, replacing any showing signs of damage.

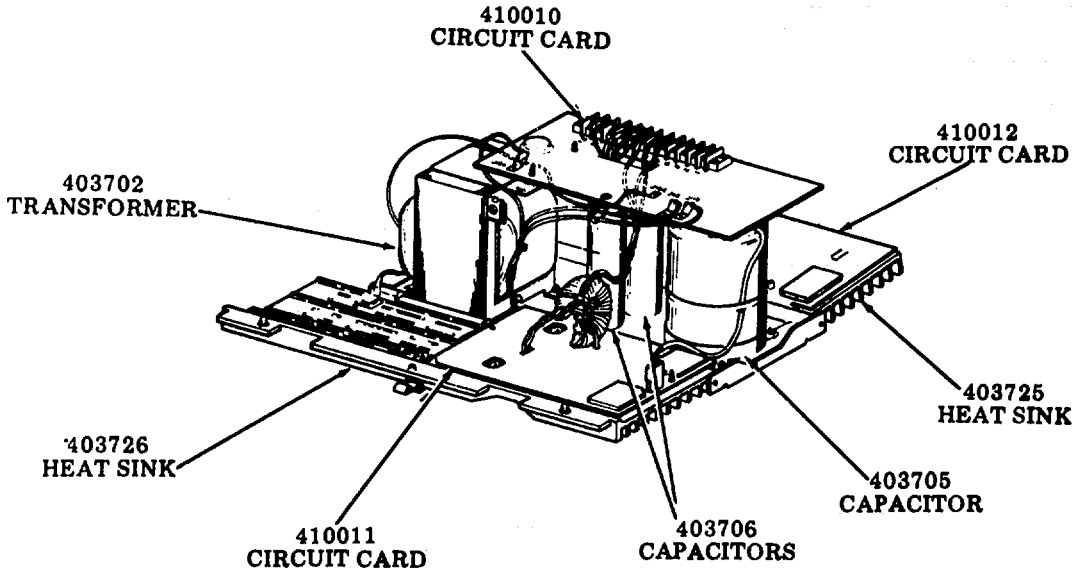
a. All wiring, particularly at the connector points.

b. All circuit cards and components. Refer to Pages 6-58, 6-59 and 6-60, 3. PARTS for layouts and part numbers.

c. Check the condition of the 405887 insulator on the underside of the 403740 cover. Any breaks, tears or skinned areas could result in short circuits between the 410010 circuit card and cover. Make sure that the insulator is present and in good condition.



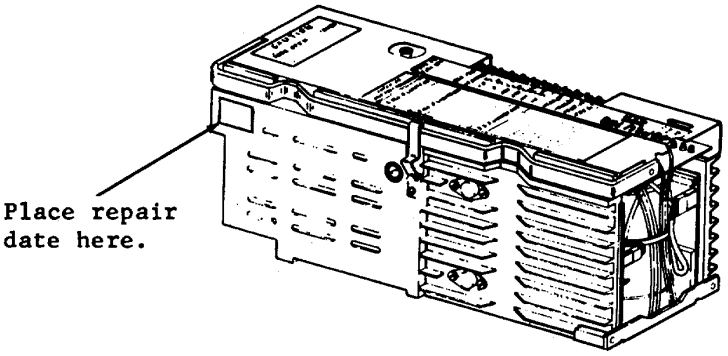
d. Fuses F1, F2, and F3 with an ohmmeter to insure continuity.
e. 403702 transformer.
f. 403705 and 403706 filter capacitors for ruptured vents.
g. Bridge rectifier diode assembly and all transistors mounted on 403725 and 403726 heat sinks.



4. MARKING AND PACKING

Marking

For record keeping purposes, the repair date may be marked on the heat sink as shown. Use locally provided adhesive backed labels.



Packing

Factory-type packing may be duplicated by ordering the required PK materials from Teletype Corporation and applying as follows.

Qty	Material Required	Qty	Material Required
1	9362PK Corrugated Carton	1	71692RM RH Machine Screw,
1	9822PK Corrugated Shipping Container		10-32 x 1-1/4" Long
1	28212PK Plywood Pallet	1	2669RM No. 10 Lockwasher
1	28213PK Corrugated Detail	1	72295RM No. 10 Steel Flat Washer
8	28153PK Plastic Corners	-	Glue or 2" Minimum Width Sealing Tape (as required)

B. SHOP PROCEDURES (Cont)

4. MARKING AND PACKING (Cont)

(1) Assemble 28212PK pallet to bottom of power supply with one 71692RM screw, 72295RM flat washer and 2669RM lockwasher as illustrated

(2) Form 9362PK carton. Close and seal bottom flaps with glue or 2 inch minimum width sealing tape.

(3) Place palletized unit in carton. Form 28213PK detail and place in carton as illustrated.

(4) Close and seal top flaps of carton.

(5) Form 9822PK shipping container. Form bottom flaps outward and place over inner container.

(6) Position a 28153PK corner detail on each of the four corners of the inner container as illustrated.

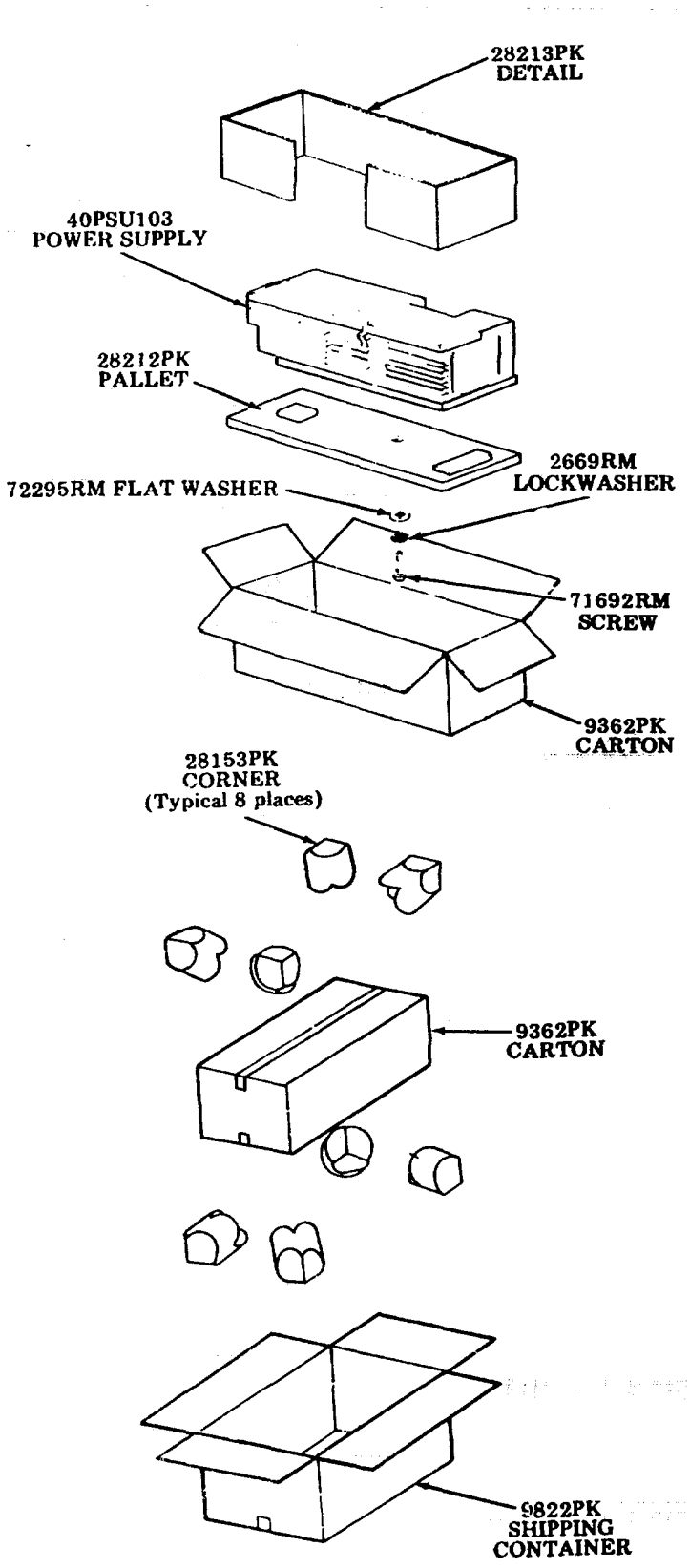
(7) Close and seal top flaps. Invert shipping container and contents.

(8) Position a 28153PK corner detail on each of the four corners of the inner container as illustrated.

(9) Close and'seal bottom flaps. Invert shipping container and contents.

(10) Mark each shipping container with quantity, code number and description of contents, for example:

"One
40PSU103 Power Supply"



C. TESTING

1. GENERAL

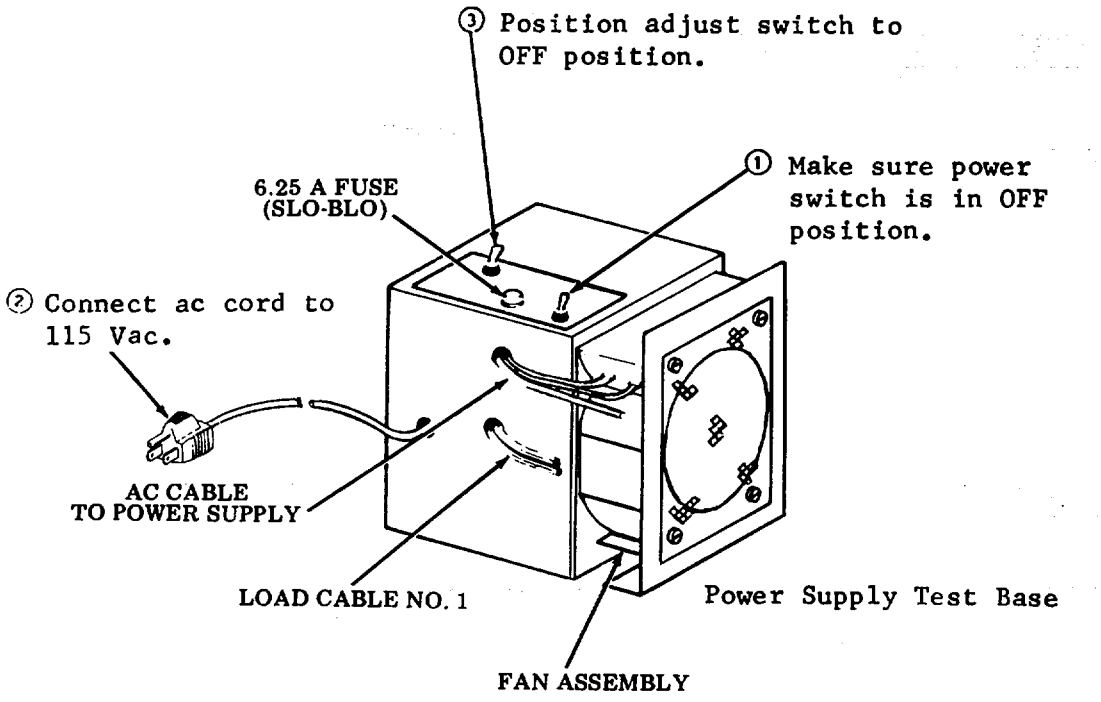
Functional testing of the power supply is accomplished with the power supply test base which provides static loading for the different voltages and an air stream for cooling. An alternate test circuit may be substituted, if desired (see Page 6-3, Alternate Test Equipment.

Functional testing provides a means for testing the power supply to determine if it meets its operational requirements. Certain test points will be probed with either an oscilloscope or a digital multimeter to determine operational status of power supply.

Each test procedure should be performed from start to finish with no omissions.

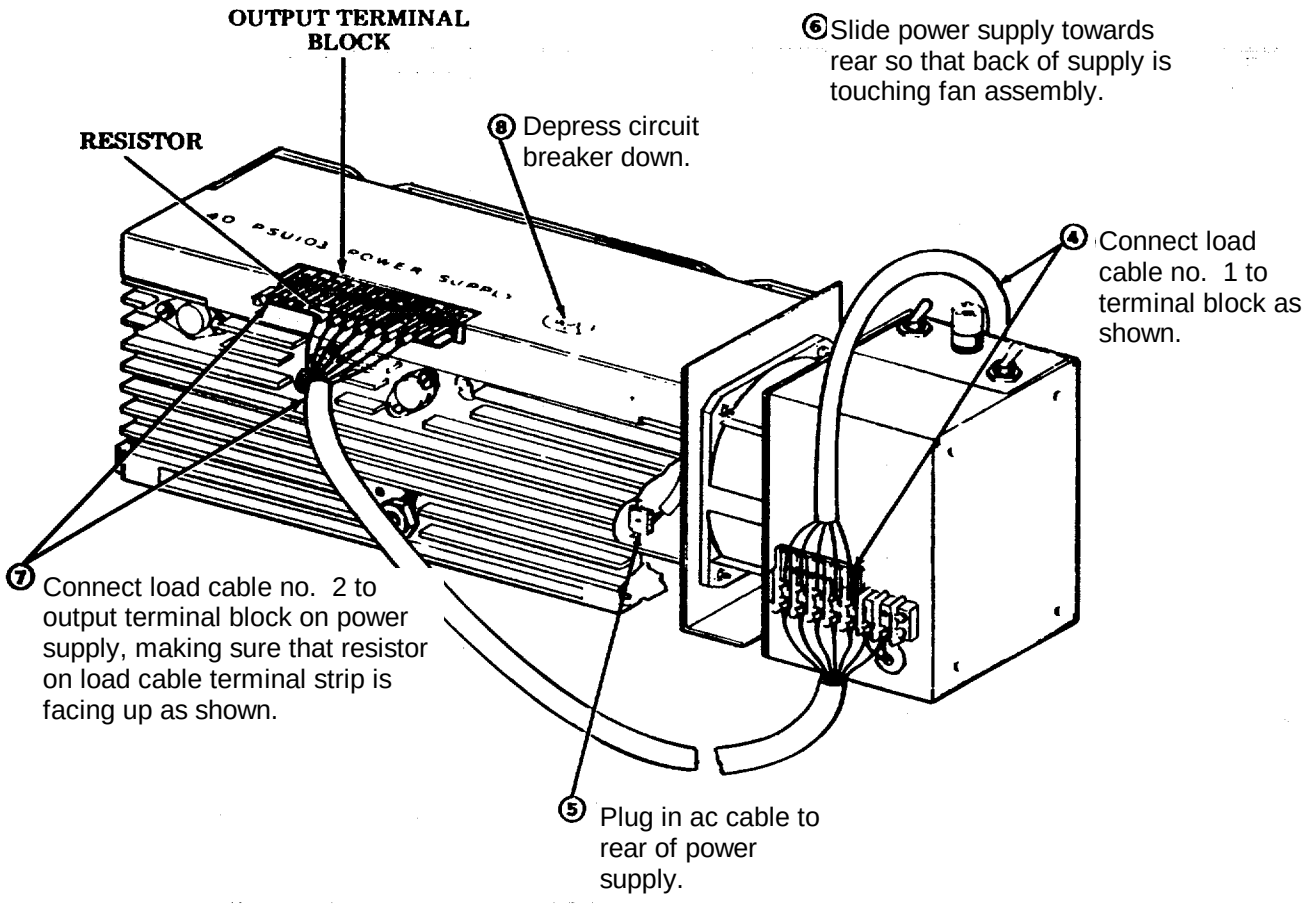
Whenever the power supply fails a particular test, refer to Page 6-14, D. TROUBLE-SHOOTING and/or Page 6-42, E. ADJUSTMENTS to locate the trouble. After the trouble has been located and corrected, repeat the test that disclosed the trouble and if found ok, resume testing from that point.

2. FUNCTIONAL TESTING METHOD (Using Power Supply Test Base)



C. TESTING (Cont)

2. FUNCTIONAL TESTING METHOD (using Power Supply Test Base) (Cont)



If the alternate test circuit is used for testing the power supply, the following steps should be performed.

(1) Place a fan at rear of power supply so that air is drawn through the power supply -- front to rear.

(2) Connect terminal strip of dummy load to power supply.

(3) Turn adjust switch on.

(4) Make sure power supply circuit breaker is in the up position.

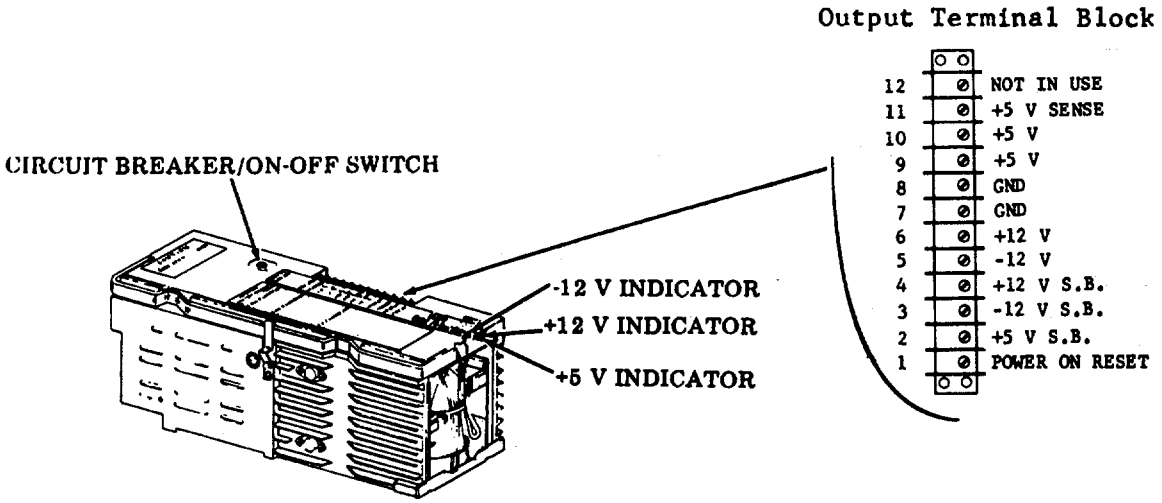
(5) Connect ac input cable to rear of power supply and then to 115 V ac outlet.

(6) Turn power supply on by depressing circuit breaker.

3. FUNCTIONAL, TESTING

Preliminary- Bench Test

PROCEDURE	RESPONSE
Turn on ac power to power supply test base.	LED indicators for +5 V, +12 V, and -12 V dc voltages should be lit.



The following field test is to be used to determine overall condition of the power supply (when assemblied in a station). The logic cards mentioned in the test are those found in the system controller.

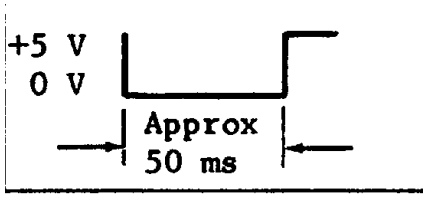
PROCEDURE	RESPONSE
All 3 lights on.	Power supply operative; go to logic card "SELF TESTS".
All 3 lights off.	Check: Main power switch, disconnected or condition of power cord and inoperable fan(s).
1 or 2 lights off.	Turn power switch off. Remove leads from screw terminals, then retighten screws. Turn power switch on. (a) If all lights off, replace power supply. (b) If all lights on, turn power switch off and reconnect all terminal leads. Pull one logic card from controller. Turn power on. 1. If all lights on, replace card pulled. 2. If one or more lights off, continue pulling more logic cards (one at a time) and checking for condition (b) 1.

C. TESTING (Cont)

3. FUNCTIONAL TESTING (Cont)

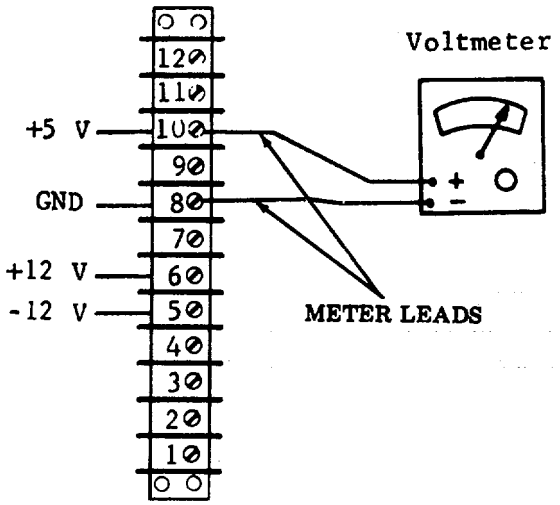
Testing

Using a digital multimeter or oscilloscope, measure the output voltages present on each terminal of the power supply output terminal block. Attach the common lead of the test equipment to the CND terminal.

STEP	PROCEDURE	RESPONSE:
1	Measure +12 Vdc voltage on +12 V and +12 V S.B. terminals of terminal block. See illustration on Page 6-11.	Correct voltage must be present; +11.58 V to +12.42 V.
2	Measure +5 Vdc voltage on +5 V and +5 V S.B. terminals of terminal block. See illustration on Page 6-11.	Correct voltage must be present; +4.9 V to +5.1 V.
3	Measure -12 Vdc voltage on -12 V and -12 V S.B. terminals of terminal block. See illustration on Page 6-11.	Correct voltage must be present; -11.58 V to -12.42 V.
Using an oscilloscope (or equivalent), measure the ripple on each of the dc voltages shown below. Ground the oscilloscope to the GND terminal of the terminal block. Terminal — Maximum Ripple Measurements (Oscilloscope) +12 V — 0.24 V Peak-to-Peak +5 V — 0.25 V Peak-to-Peak -12 V — 0.24 V Peak-to-Peak		
4	Measure ripple present on +12 V terminal of terminal block.	Ripple less than 0.24 V peak-to-peak.
5	Measure ripple present on +5 V terminal of terminal block.	Ripple less than 0.25 V peak-to-peak.
6	Measure ripple present on -12 V terminal of terminal block.	Ripple less than 0.24 V peak-to-peak.
7	With scope lead on terminal 1 of the terminal block, turn power supply off; then on. +5 V NOTE: Using an R X 1 probe, exter nally trigger on terminal 1 of output terminal block.	Observe a negative pulse, approxi-mately 50 ms long. 

As on alternate method of measuring the ripple at each output terminal of the power supply, use an ac (RMS) voltmeter. The maximum ripple measurements should be as follows

Terminal	Maximum Ripple Measurements (RMS)
+12 V	0.085 V (RMS)
+5 V	0.089 V (RMS)
-12 V	0.085 V (RMS)



D. TROUBLE SHOOTING

1. GENERAL

This section provides the methods used for correction of operational problems encountered in testing the 40PSU103 Power Supply.

All corrective steps for each trouble analysis for a particular trouble should be performed before proceeding to another trouble/symptom. After the trouble has been corrected, the unit should be tested to insure satisfactory operation.

Refer to Page 6-33, 4. FUNCTIONAL SCHEMATICS AND COMPONENT LAYOUT which is furnished to aid in troubleshooting the power supply. Use of the functional schematics and component layout are explained on Page 6-16, 3. TROUBLESHOOTING CHARTS.

Troubleshooting of the power supply should be done under no-load conditions.

Obtain the following equipment:

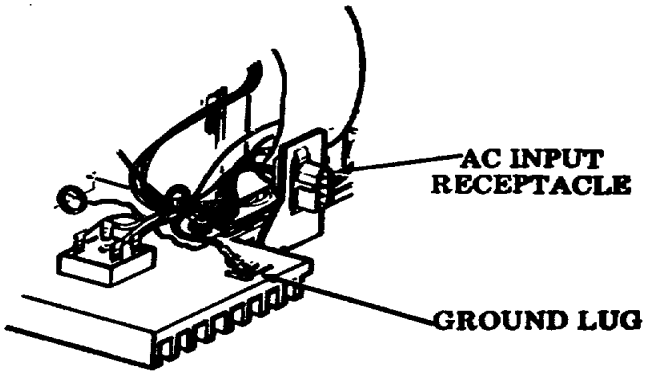
- Digital Multimeter
- Oscilloscope
- Power Supply Test Base or Alternate Test Circuit (see Page 6-3)

There are two distinct areas in the Troubleshooting Guide of Section D.4., the Major Component Troubleshooting Guide and the Regulator Circuit Card Troubleshooting Guide. The analysis and correction for each trouble or symptom in either area gives the specific checks and measurements necessary to isolate and correct that trouble.

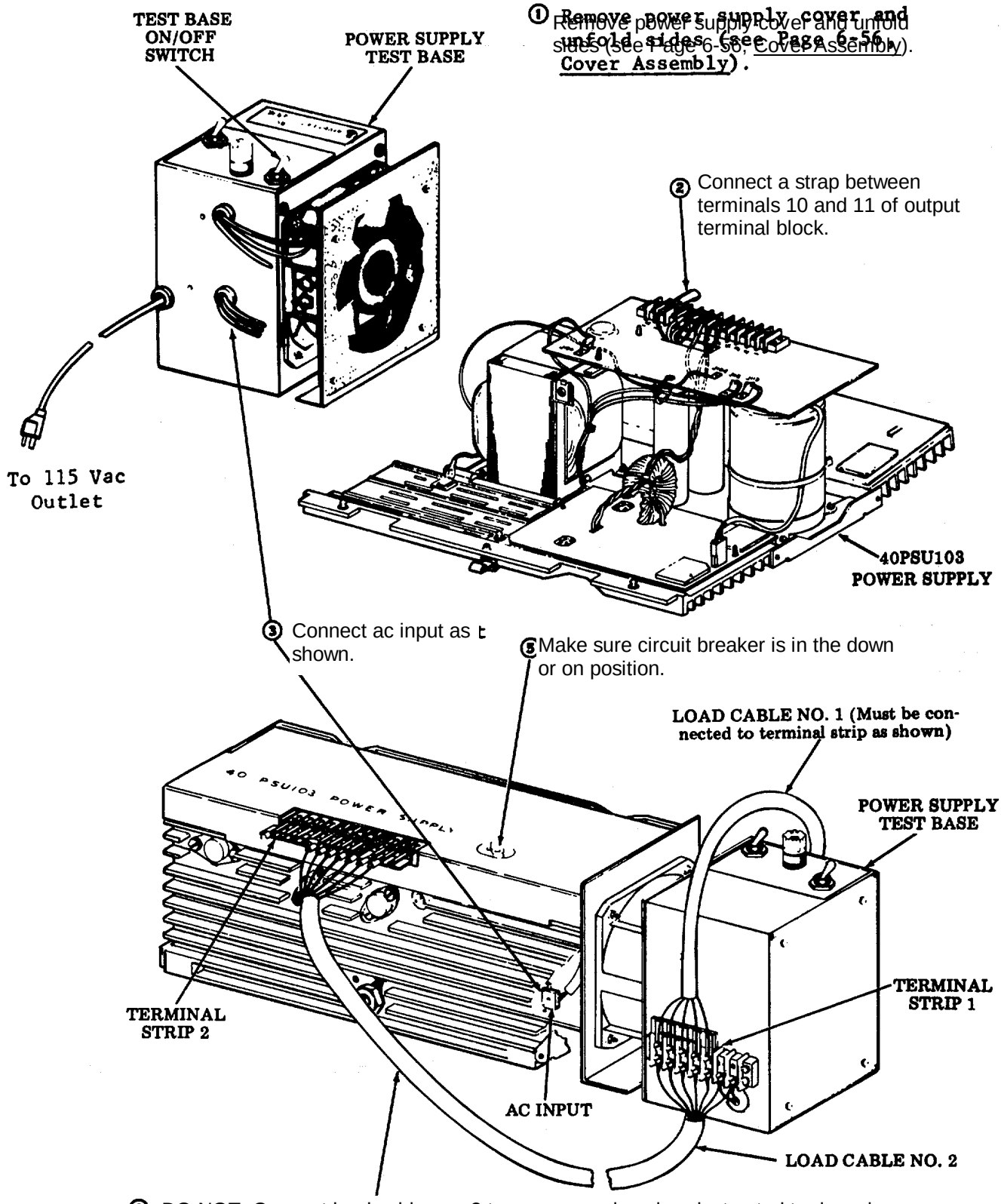
The basic troubleshooting approach is to begin at the outputs of the power supply and work toward the input. Trouble isolation is largely confined to the major subcomponents (transformer, circuit card, etc) with additional aids given for troubles relating to the 410600 regulator circuit card, 410010, 410011 and 410012 circuit cards.

Ground Wire Continuity Failure

Select the R X 1 scale of the digital multimeter and check continuity of green wire from pin 2 of ac power receptacle to grounding terminal connected to power supply base. The reading should be essentially zero ohms.



2. EQUIPMENT PREPARATION AND LAYOUT



D. TROUBLESHOOTING (Cont)

2. EQUIPMENT PREPARATION AND LAYOUT (Cont)

Using Alternate Test Equipment

(1) Remove power supply cover and unfold sides (see Page 6-45, Cover Assembly).

(2) Connect a strap between terminals 10 and 11 of output terminal block.

(3) Making sure circuit breaker is in the up or off position, connect ac input cable to rear of power supply, and then connect ac input cable to 115 Vac source.

(4) Activate circuit breaker to ON position.

3. TROUBLESHOOTING CHARTS

When using the troubleshooting charts, refer to Page 6-33, 4. FUNCTIONAL SCHEMAT-ICS AND COMPONENT LAYOUT.

Example: If told to check Q1-B transistor on the 410012 circuit card, go to the 410012 circuit card layout, find Q1 transistor and probe point B.

For any removal and/or replacement of components mentioned in the troubleshooting charts, refer to Page 6-43, F. DISASSEMBLY/REASSEMBLY AND PARTS.

Use the following charts for troubles observed while testing the 40PSU103 Power Supply.

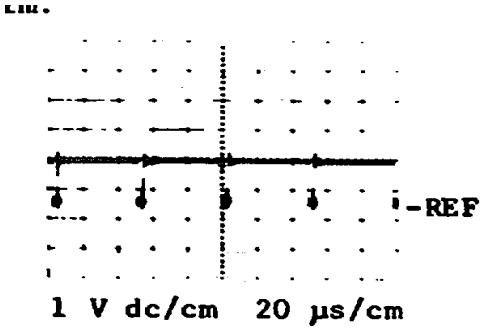
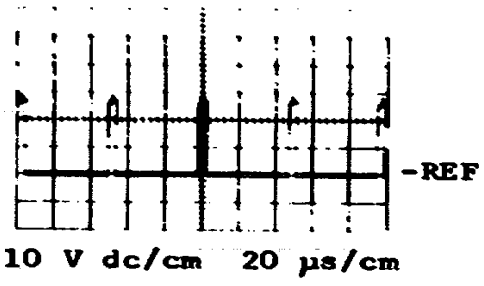
No Output (+12 Vdc, -12 Vdc and +5 Vdc) (Page 6-17)
No +5 Vdc (Page 6-19)
No +12 Vdc (Page 6-22)
No -12 Vdc (Page 6-26)
No POR (Power On Reset) (Page 6-30)
Excessive Ripple on +5 Vdc Circuit (Page 6-30)
Excessive Ripple on +12 Vdc Circuit (Page 6-31)
Excessive Ripple on -12 Vdc Circuit (Page 6-31)
Low Outputs Under Load (Page 6-33)

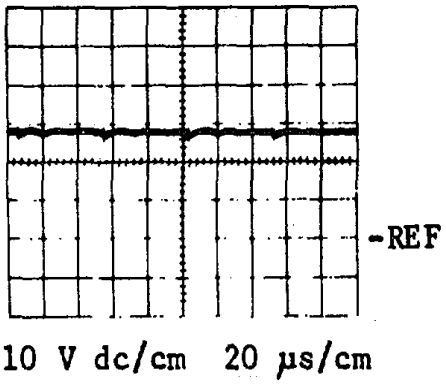
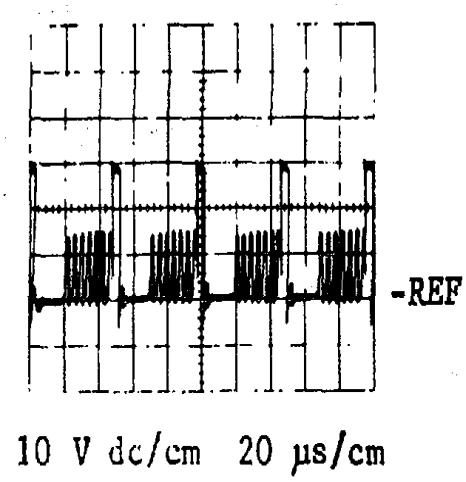
No Output (+-12 V dc, -12 V dc and +5 V dc)

STEP	ACTION	CORRECTIVE PROCEDURE
1	Check for +12 V dc at terminal 116 of 410010 circuit card.	If present, check all wiring from 410010 circuit card to 410011 and 410012 circuit cards. If not present, go to Step 2.
2	Check for +24 V dc at terminal 115 of 410010 circuit card.	If present, replace 402201 ML1 regulator chip on 410010 circuit card. If not present, go to Step 3.
3	Check for +24 V dc at F1-A fuse on 410010 circuit card.	If present, replace 403707 Fl fuse. Go to Step 4. If not present, go to Step 5.
4	Did new fuse blow?	Yes -- Go to Step 8. No -- Test power supply.
5	Check for 22 V ac between terminals 106 and 107 of CR101 bridge rectifier located on 403725 heat sink.	If present, replace 401002 CR101 bridge rectifier. If not present, go to Step 6.
6	Check for 115 V ac between terminal 2 of 403700 or 403728 CB1 circuit breaker and terminal 3 of ac input connector.	If present, replace 405940 T1 transformer. If not present, go to Step 7.
7	Check for 115 V ac between terminals 1 and 3 of ac input connector.	If present, replace 403700 or 403738 CB1 circuit breaker or 405936 line filter. If not present, problem is not in power supply.
8	Check for -15 V dc at terminal 121 of 410010 circuit card.	If present, go to Step 9. If not present, go to Step 10.
9	Check for -15 V dc at ML2-4 located on 410012 circuit card.	If present, go to Step 12. If not present, check wiring between terminal 121 of 410010 circuit card and ML2-4 located on 410012 circuit card. Replace 403707 Fl fuse.

D. TROUBLESHOOTING (Cont)

3. TROUBLESHOOTING CHARTS, No Output (+12 V dc, -12 V dc- and +

STEP	ACTION	CORRECTIVE PROCEDURE
10	Check for -48 V dc at 402208 F3-A fuse on 410010 circuit card.	If present, replace 402200 CR7 diode on 410010 circuit card. Replace 403707 F1 fuse on 410010 circuit card. If not present, go to Step 11.
11	Check for 41 V ac between terminals 104 and 105 of the 410010 circuit card.	If present, check all 403709 diodes. (CR2, CR3, CR8 and CR9) on 410010 circuit card. Replace defective diode and 403707 F1 fuse. If not present, replace 403702 T1 transformer and 403707 F1 fuse.
12	Remove 403712 Ql transistor from 403725 heat sink. Insert new 403707 F1 fuse. Turn power on. Did new fuse blow?	Yes -- Replace 403750 CR1 diode assembly on 403725 heat sink. Replace 403707 F1 fuse on 410010 circuit card. Also check 319999 C1 and 194606 C2 capacitors on 410012 circuit card for shorts. Replace if defective. No -- Go to Step 13.
13	Check NL1-25 on 410012 circuit card for the following or similar wave-form.  	If present, go to Step 14. If not present (or at constant 0 V), replace 403722 ML1 regulator chip on 410012 circuit card.
14	Check Q4-C transistor on 410012 circuit card for the following or similar waveform.  	If present, go to Step 15. If 04-C does not switch to ground, replace 321517 Q4 transistor on 410012 circuit card.

STEP	ACTION	CORRECTIVE PROCEDURE
15	Check Q3-C transistor on 410012 circuit card for following or similar waveform.  	If present, go to Step 16. If Q3-C does not switch to +24 V dc, replace 403714 Q3 transistor on 410012 circuit card.
16	Check Q2-C transistor on 410012 circuit card for following or similar waveform.  	If present, replace 403712 Q1 transistor on. 403725 heat sink. If Q2-C is at a constant +24 V dc, replace 403713 Q2 transistor on 403725 heat sink.

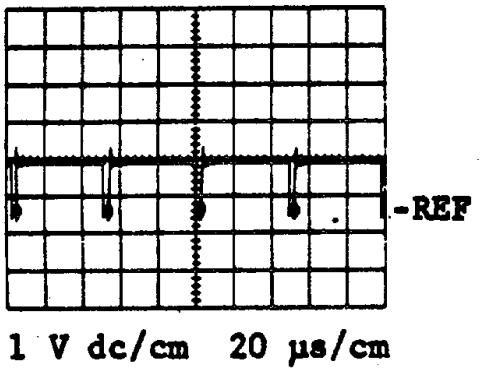
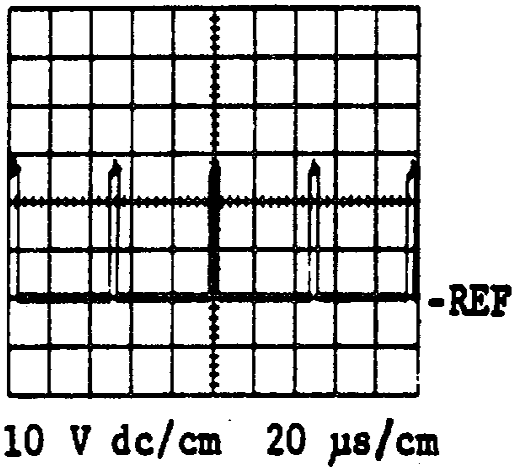
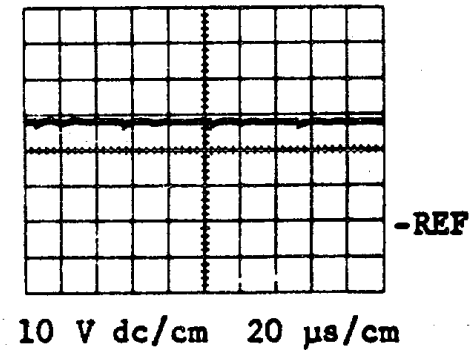
No +5 V dc

STEP	ACTION	CORRECTIVE PROCEDURE
1	Check for +5 V dc at terminal 9 of TB102 output terminal block.	If present, replace 341636 CR4 diode on 410010 circuit card. If not present, go to Step 2.
2	Check for +24 V dc at Q1-C transistor on 410012 circuit card and ground at terminal 7 of 410012 circuit card.	If present, go to Step 3. If not present, check wiring between terminals 115 of 410010 circuit card and 11 of 410012 circuit card. Check wiring between terminals 112 of 410010 circuit card and 7 of 410012 circuit card.

D. TROUBLESHOOTING (Cont)

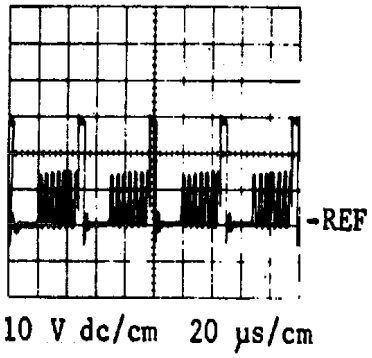
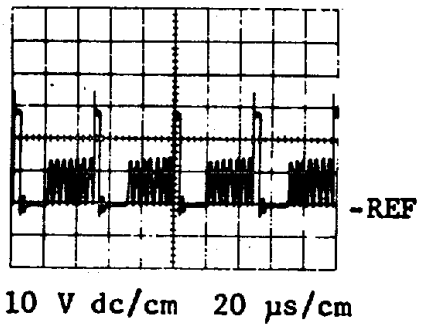
3. TROUBLESHOOTING CHARTS, No Output (+12 V dc, -12 V dc and 45 V dc) (Cont)

STEP	ACTION	CORRECTIVE PROCEDURE
3	Check for +12 V dc at ML1-14 on 410012 circuit card.	If present, go to Step 4. If not present, check wiring between terminal 116 of 410010 circuit card and connector 113-2 on 410012 circuit card.
4	Check for ground at ML1-24 on 410012 circuit card.	If present, go to Step 5. If not present, check wiring between terminal 7 of 410010 circuit card and connector 113-3 on 410012 circuit card.
5	Disconnect blue lead at terminal 123 of 410012 circuit card. If +5 V dc now present at terminal 9 of TB102 output terminal block?	If present, replace 403735 TS-1 thermal sensor assembly on 403725 heat sink. If not present, connect blue lead back to terminal 123 of 410012 circuit card. Go to Step 6.
6	Disassemble Q8 SCR from 403725 heat sink. Check for +5 V dc at terminal 9 of TB102 output terminal block.	If present, replace 403716 Q8 transistor and save. Go to Step 7. If not present, reassemble original Q8 SCR to 403725 heat sink. Go to Step 8.
7	Check for +5 V dc at terminal 9 of TB102 output terminal block.	If present, scrap previously removed Q8 SCR. Test power supply. If not present, original Q8 SCR was probably OK. Replace 326823 ML3 regulator chip on 410012 circuit card.
8	Check for +2 V dc at MLl-15 on 410012 circuit card.	If present, go to Step 11. If not present, go to Step 9.
9	Check for voltage level more negative than +2 V dc at Q5-B transistor on 410012 circuit card.	If present, replace 339741 ML2 regulator chip on 410012 circuit card. If not present, go to Step 10.
10	Check for ground at Q5-E transistor on 410012 circuit card.	If present, replace 315931 Q5 transistor. If not present, replace 403722 ML1 regulator chip on 410012 circuit card.

STEP	ACTION	CORRECTIVE PROCEDURE
11	Check for following or similar waveform at M1LI-25 on 410012 circuit card.  	If present, go to Step 12. If not present, replace 403722 ML1 regulator chip on 410012 circuit card.
12	Check for following or similar waveform at Q4-C transistor on 410012 circuit card.  	If present, go to Step 13. If not present, replace 321517 Q4 transistor on 410012 circuit card.
13	Check for following or similar waveform at Q3-C transistor on 410012 circuit card.  	If present, go to Step 14. If not present, replace 403714 Q3 transistor on 410012 circuit card.

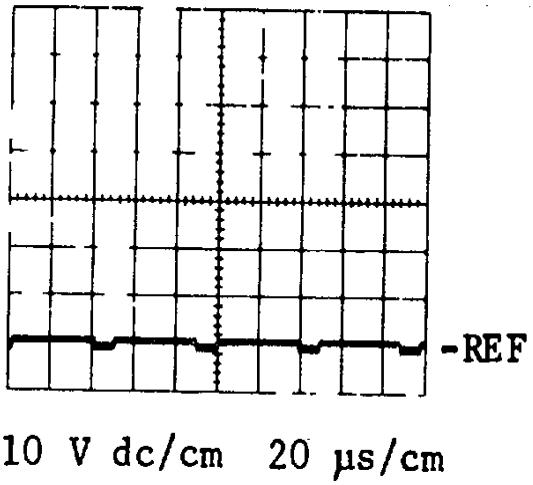
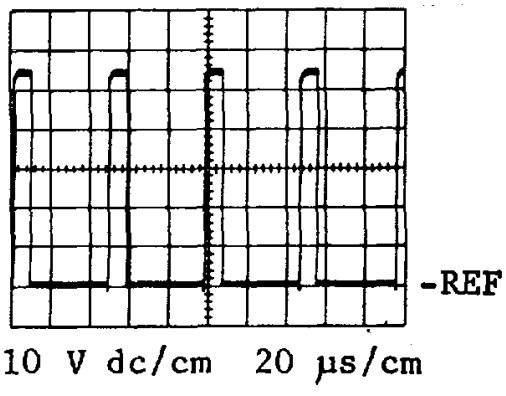
D. TROUBLESHOOTING (Cont)

3. TROUBLESHOOTING CHARTS, No +5 V dc (Cont)

STEP	ACTION	CORRECTIVE PROCEDURE
14	Check for following or similar waveform at Q2-C transistor on 410012 circuit card. 	If present, go to Step 15. If not present, replace 403713 Q2 transistor on 403725 heat sink.
15	Check for following or similar waveform at Q1-E transistor on 410012 circuit card. 	If present, replace 403719 C8 capacitor on 410012 circuit card. If not present, replace 403712 Q1 transistor on 403725 heat sink.

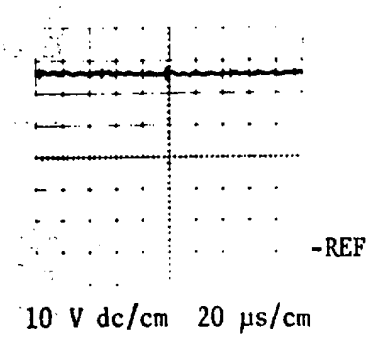
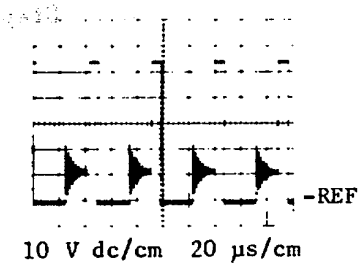
No +12 V dc

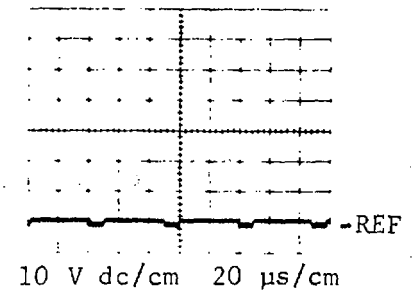
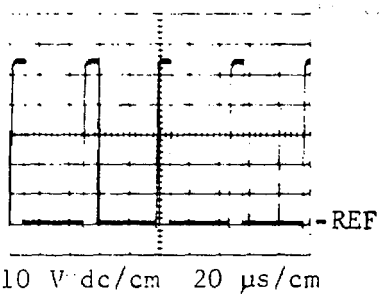
STEP	ACTION	CORRECTIVE PROCEDURE
1	Check for +12 V dc at terminal 6 of TB102 output terminal block.	If present, replace 341636 CR6 diode on 410010 circuit card. If not present, go to Step 2.
2	Check for +48 V dc at terminal 118 of 410010 circuit card.	If present, go to Step 3. If not present, go to Step 13.
3	Check for +48 V dc at Q2-E transistor on 410011 circuit card and ground at terminal 135-2 on 410011 circuit card.	If present, go to Step 4. If not present, check wiring between terminal 6 of 410011 circuit card and terminal 118 of 410010 circuit card. Check wiring between terminal 5 of 410011 circuit card and terminal 119 of 410010 circuit card.

STEP	ACTION	CORRECTIVE PROCEDURE
4	Check for ground at ML1-24 on 410011 circuit card.	If present, go to Step 5. If not present, check wiring between terminal 7 of 410011 circuit card and terminal 7 of TB102 output terminal block.
5	Check for +24 V dc at MLl-14 on 410011 circuit card.	If present, go to Step 6. If not present, check wiring between terminal 1 of connector 122 on 410011 circuit card ;and terminal 116 of 410010 circuit card.
6	Check for following or similar wave-form at ML1-25 on 410011 circuit card.	If present, go to Step 7. If not present, go to Step 10.
		
7	Check for following or similar wave-form at Q3-C transistor on 410011 circuit card. 	If present, go to Step 8. If not present, replace 334133 Q3 transistor on 410011 circuit card.-

D. TROUBLESHOOTING (Cont)

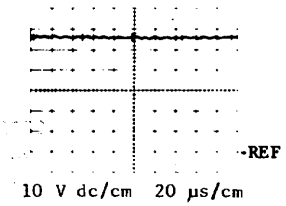
3. TROUBLESHOOTING CHARTS, No +12 V dc (Cont)

STEP	ACTION	CORRECTIVE PROCEDURE
8	Check for following or similar waveform at Q2-C transistor on 410011 circuit card.  	If present, go to Step 9. If not present, replace 325077 Q2 transistor on 410011 circuit card.
9	Check for following or similar waveform-at terminal 135-1 on 410011 circuit card.  	If present, replace 403751 C5 capacitor on 410011 circuit card. If not present, replace 403727 Ql transistor on 403726 heat sink.
10	Check for +2 V dc at MLl-15 on 410011 circuit card.	If present, go to Step 11. If not present, replace 403722 ML1 regulator chip on 410011 circuit card.
11	Check for 0 V dc at ML1-26 on 410011 circuit card.	If present, replace 403722 ML1 regulator chip on 410011 circuit card. If not present, go to Step 12.
12	Check for more negative voltage at Q10-B transistor than at Q10-E on 410011 circuit card.	If present, replace 334133 Q4 transistor on 410011 circuit card. If not present, replace 321261 Q10 transistor on 410011 circuit card.
13	Check for +48 V dc at F2-A fuse on 410010 circuit card.	If present, replace 402208 F2 fuse on 410010 circuit card. Go to Step 14. If not present, go to Step 16.
14	Did new fuse blow?	Yes -- Go to Step 15. No -- Test power supply.

STEP	ACTION	CORRECTIVE PROCEDURE-
15	Remove 403727 Q1 transistor from 403726 heat sink. Insert new 402208 F2 fuse on 410010 circuit card. Turn power on. Did new fuse blo,w?	Yes - Check 405884 Cl and 319999 C2 capacitors on 410011 circuit card for shorts. Replace if defective. Re place 402208 F2 fuse on'100:10 cir-cuit card. No -- Go to Step 17.
16	Check for approximately 41 V ac between terminals 103 and 104 on 410010 circuit card.	If present, check all 403709 diodes (CR2, CP3, CR8 and CR9) on 410010 circuit card. Replace defective diode. If not present, replace 405940 T1 transformer.
17	Check for following or similar wave-form at ML1-25 on 410011 circuit card.  	If present, go to Step 18. If not present, replace 403722 ML1 regulator chip on 410011 circuit card.
18	Check for following or similar wave-form at Q3-C transistor on 410011 circuit card.  	If present, go to Step 19. If not present, replace 334133 Q3 transistor on 410011 circuit card.

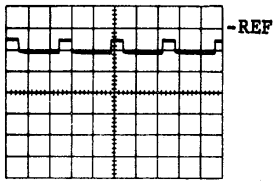
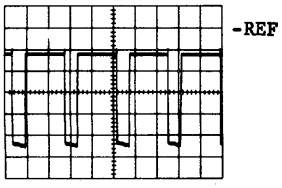
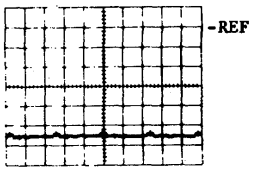
D. TROUBLESHOOTING (Cont)

3. TROUBLESHOOTING CHARTS, No +12 V dc (Cont)

STEP	ACTION	CORRECTIVE PROCEDURE
19	Check for following or similar waveform-at Q2-C transistor on 410011 circuit card.  	If present, replace 403727 Q1 transistor on 403726 heat sink. If not present, replace 325077 Q2 transistor on 410011 circuit card.

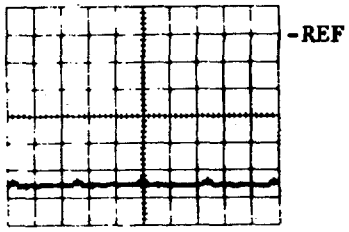
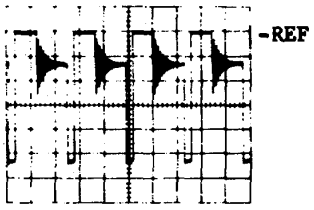
No -12 V dc

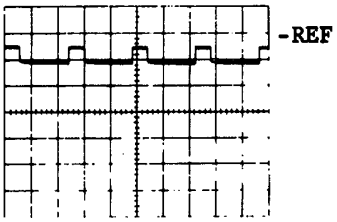
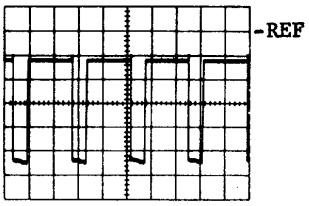
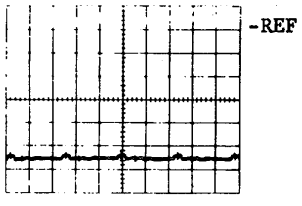
STEP	ACTION	CORRECTIVE PROCEDURE
1	Check for -12 V dc at terminal 5 of TB102;output terminal block.	If present, replace 341636 CR5 diode on 410010 circuit card.
2	Check for -48 V dc at terminal 120 of 410010 circuit card.	If not present, go to Step 2. If present, go to Step 3. If not present, replace 402208 F3 fuse on 410010 circuit card. Go to Step 15.
3	Check for -48 V dc at terminal 140-4 of 410011 circuit card and ground at terminal 140-2 of 410011 circuit card.	If present, go to Step 4. If not present, check wiring between terminal 4 of 410011 circuit card and terminal 120 of 410010 circuit card. Check wiring between terminal 5 of 410011 circuit card and terminal 119 of 410010 circuit card.
4	Check for ground at terminal 7 of 410011 circuit card.	If present, go to Step 5. If not present, check wiring between terminal 7 of 410011 circuit card and terminal 7. of TB102 output terminal block.
5	Check for +12 V dc at R13-A resistor on 410011 circuit card.	If present, go to Step 6. If not present, check wiring between terminal 116 of 410010 circuit card and terminal 1 of connector 122 on 410011 circuit card.

STEP	ACTION	CORRECTIVE PROCEDURE
6	Check for approximately +1.6 V dc at ML2-25 on 410011 circuit card.	If present, go to Step 7. If not present, replace 302844 CR1 diode on 410011 circuit card.
7	Check for following or similar waveform at ML2-24 on 410011 circuit card.  10 V dc/cm 20 µs/cm	If present, go to Step 8. If not present, go to Step 12.
8	Check for following or similar waveform at Q8-B transistor on 410011 circuit card.  10 V dc/cm 20 µs/cm	If present, go to Step 9. If not present, replace 321161 CR7 diode on 410011 circuit card.
9	Check for following or similar waveform at Q8-C transistor on 410011 circuit card.  10 V dc/cm 20 µs/cm	If present, go to Step 10. If not present, replace 325077 Q8 transistor on 410011 circuit card.

D. TROUBLESHOOTING (Cont)

3. TROUBLESHOOTING CHARTS, No -12 V dc (Cont)

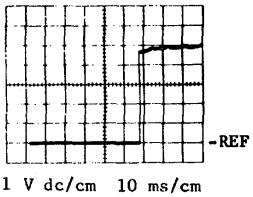
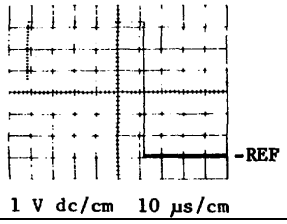
STEP	ACTION	CORRECTIVE PROCEDURE
10	Check for following or similar waveform at Q7-C transistor on 410011 circuit card.  10 V dc/cm 20 µs/cm	If present, go to Step 11. If not present, replace 325101 Q7 transistor on 410011 circuit card.
11	Check for following or similar waveform at terminal 140-1 on 410011 circuit card.  10 V dc/cm 20 µs/cm	If present, replace 403751 C11 capacitor on 410011 circuit card. If not present, replace 403730 Q6 transistor on 403726 heat sink.
12	Check for -10 V dc at ML2-15 on 410011 circuit card.	If present, go to Step 13. If not present, replace 403722 ML2 regulator chip on 410011 circuit card.
13	Check for -12 V dc at ML2-26 on 410011 circuit card.	If present, replace 403722 ML2 regulator chip on 410011 circuit card. If not present, go to Step 14.
14	Check for a more negative voltage at Q9-B transistor than at Q9-E.	If present, replace 321517 Q5 transistor on 410011 circuit card. If not present, replace 325077 Q9 transistor on 410011 circuit card.
15	Did new fuse blow?	Yes -- Go to Step 16. No -- Test power supply.

STEP	ACTION	CORRECTIVE PROCEDURE
16	Remove 403730 Q6 transistor from 403726 heat sink. Insert new 402208 F3 fuse. Turn power on. Did new fuse blow?	Yes -- Check 405884 C7 and 319999 C8 capacitors on 410011 circuit card. Replace defective capacitor. Replace 402208 F3 fuse. No -- Go to Step 17.
17	Check for following or similar waveform at ML2-24 on 4L0011 circuit card.  10 V dc/cm 20 µs/cm	If present, go to Step 18. If not present, replace 403722 ML2 regulator chip on 410011 circuit card.
18	Check for following or similar waveform at Q8-C transistor on 410011 circuit card.  10 V dc/cm 20 µs/cm	If present, go to Step 19. If not present, replace 325077 Q8 transistor on 410011 circuit card.
19	Check for following or similar waveform at Q7-C transistor on 410011 circuit card.  10 V dc/cm 20 µs/cm	If present, replace 403730 Q6 transistor on 403726 heat sink. If not present, replace 325101 Q7 transistor on 410011 circuit card.

D. TROUBLESHOOTING (Cont)

3. TROUBLESHOOTING CHARTS, (Cont)

No POR (Power on Reset)

STEP	ACTION	CORRECTIVE PROCEDURE
1	To check POR circuit, power supply must be fully connected to power supply test set (load cables connected). Alternate test circuit may be used if power supply test base is not available. Connect terminal strip of dummy load to power supply. At the same time power is turned on, check for the following waveform at terminal, on TB102 output terminal block. **NOTE: Use R X 1 scope probe and externally trigger on terminal 1 of TB102 output terminal block.**  	If present, POR circuit is OK. If not present, go to Step 2.
2	Check for following waveform at ML2-3 on 410010 circuit card.  	If present, replace 315930 Q1 transistor on 410010 circuit card. If not present, replace 404555 -L2 regulator chip on 410010 circuit card.

Excessive Ripple on +5 V dc Circuit

ACTION	CORRECTIVE PROCEDURE
Check for excessive ripple at terminal 115 (+24 V dc lead) on 410010 circuit card.	If present, replace 403705 C1 capacitor on power supply base (large capacitor under 410010 circuit card). If not present, replace 403719 C8 capacitor on 410012 circuit card.

Excessive Ripple on +12 V dc Circuit

ACTION	CORRECTIVE PROCEDURE
Check for excessive ripple at terminal 118 (+48 V dc lead) on the 410010 circuit card.	If present, replace 403706 C3 capacitor under 410010 circuit card. If not present, replace 403751 C5 capacitor on 410011 circuit card.

Excessive Ripple on -12 V dc Circuit

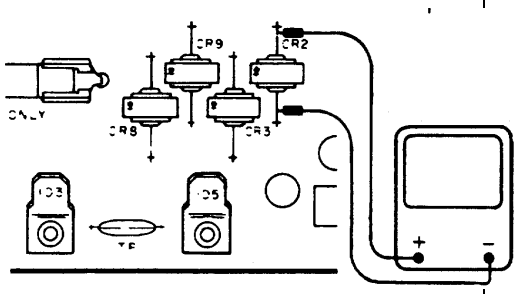
ACTION	CORRECTIVE PROCEDURE
Check for excessive ripple at terminal 120 (-48 V dc lead) on the 410010 circuit card.	If present, replace 403706 C5 capacitor under 410010 circuit card. If not present, replace 403751 C11 capacitor on 410011 circuit card.

D. TROUBLESHOOTING (Cont)

3. TROUBLESHOOTING CHARTS (Cont)

Low Outputs Under Load

STEP	ANALYSIS	CORRECTION
1.	Check for -48 VDC±3v at J-120.	If present, go to Excessive Ripple on -12 V dc, Page 6-31.
2.	If -45 VDC or less, go to Step 2. Check for +48 VDC±3v at J-118.	 If present, replace C5 403706 under 410010 Circuit Card. If +45 VDC or less, go to Step 3.
3.	Check for 70 VAC±5v from J-103 to J-105.	If present, go to Step 5. If 65 VAC or less, go to Step 4.
4.	Check for 117 VAC±10% from J101-1 to J101-3.	If present, replace T1. If low, a low line voltage condition exists.
5.	Measure forward and reverse resistance of CR2, CR3, CR8 and CR9 on 410010 Circuit Board, with J-103 and J-1C5 disconnected.	If ratio is 10:1 or -ore, replace C3 & C5. If ratio is less than 10:1, re-lace bad diode.



Measure forward resistance Reverse lead to measure reverse resistance.

NOTES

E. ADJUSTMENTS

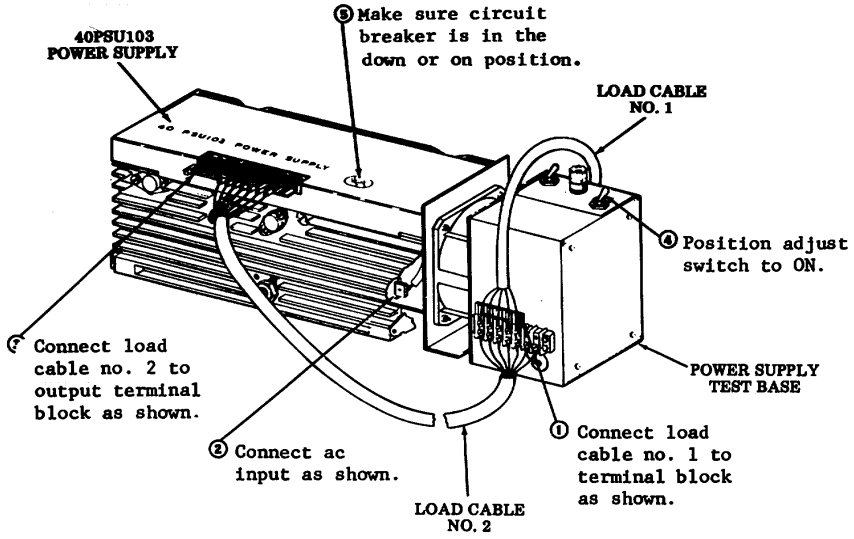
1. GENERAL

If Q1 or Q2 transistors mounted on the 403725 heat sink (right side) are replaced or if the 410012 circuit card is repaired or replaced, refer to Page 6-43,

3. VOLTAGE ADJUSTMENT. This adjustment should be made.

2. EQUIPMENT PREPARATION AND LAYOUT

Connect power supply to power supply test base as shown.



Use of Alternate Test Circuit for Making Adjustment on Power Supply

(1) Connect terminal strip to power supply.

(2) Turn adjust switch OFF.

(3) Making sure circuit breaker is in the up or off position, connect ac input cable to rear of power supply, and then to 115 V ac source.

(4) Turn circuit breaker on.

3. VOLTAGE ADJUSTMENT

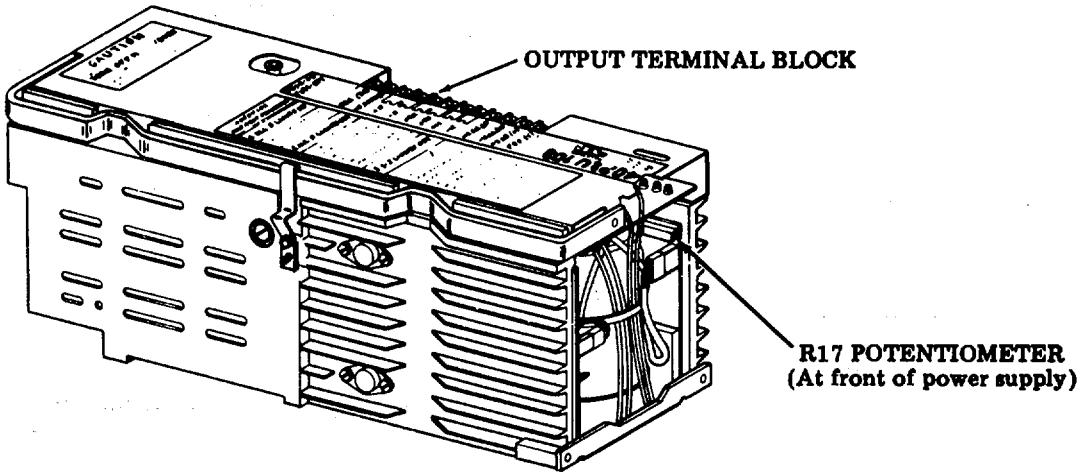
The adjustment should be made with the power supply connected to the power supply test base with the adjust switch ON or the alternate test circuit with the adjust switch OFF.

Obtain the digital multimeter and select the 10 V dc range.

With the ac power supplied to the power supply, adjust R17 potentiometer (as shown) until the voltage at the +5 V terminal of the output terminal block reads +5 V dc ±0.01 V dc as measured on the digital multimeter.

NOTE

Connect the common side of the digital multimeter to the GND terminal of the terminal strip.



F. DISASSEMBLY/REASSEMBLY AND PARTS

1. GENERAL

This section provides disassembly/reassembly 2nd parts information for the major components of the 40PSU103 Power Supply.

Drawings are used to identify the replaceable components, and numbered instructions describe the procedures necessary to disassemble and reassemble those replaceable components.

Refer to Page 6-2, Tools for a complete listing of the various types of hand tools required to perform the disassembly/reassembly procedures of the 40PSU103 Power Supply.

When removing a replaceable component, do not force or pry any parts to provide the necessary clearance for removal.

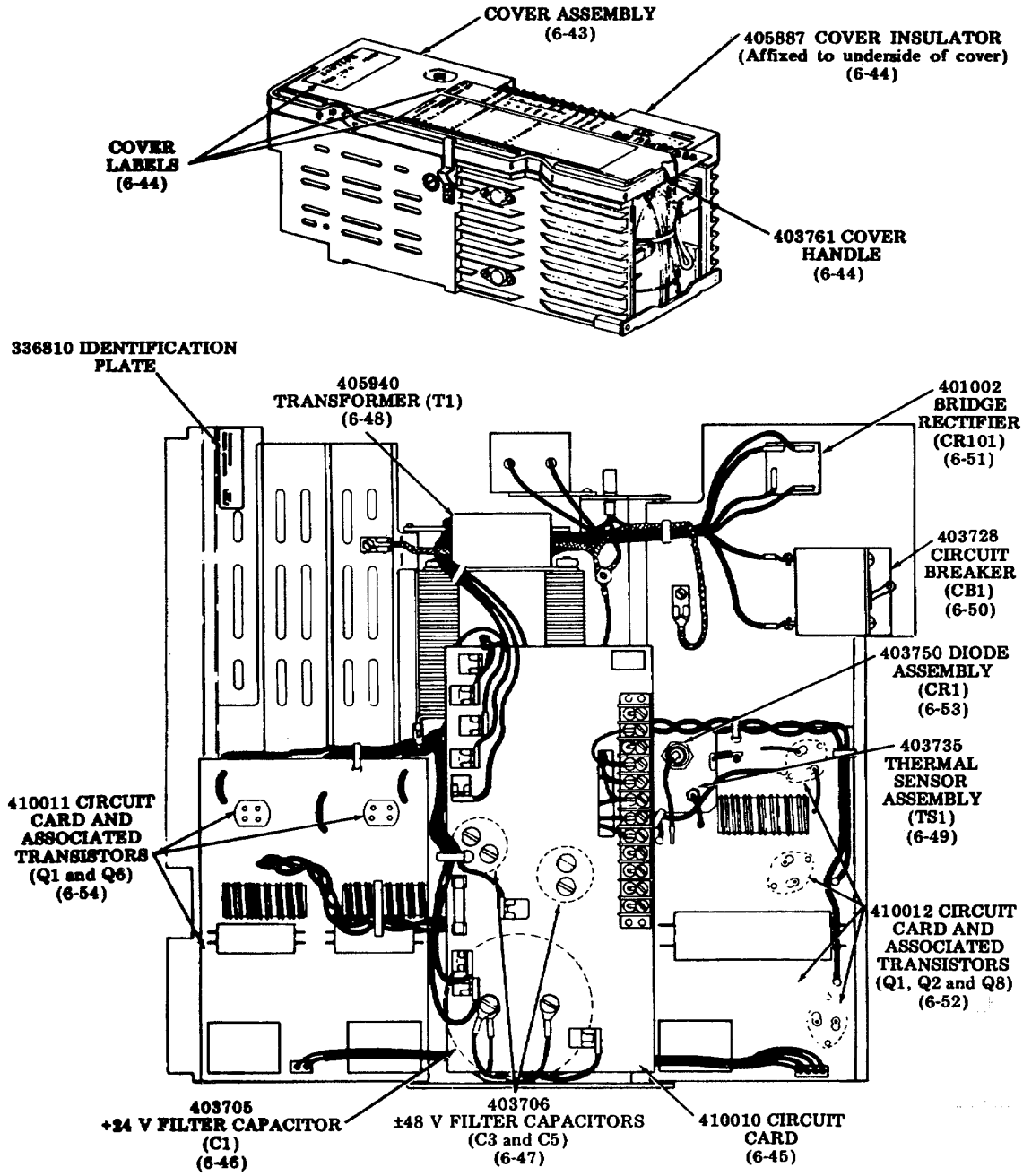
In reassembly, reverse the disassembly procedures except where specified otherwise.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. SUBASSEMBLY IDENTIFICATION

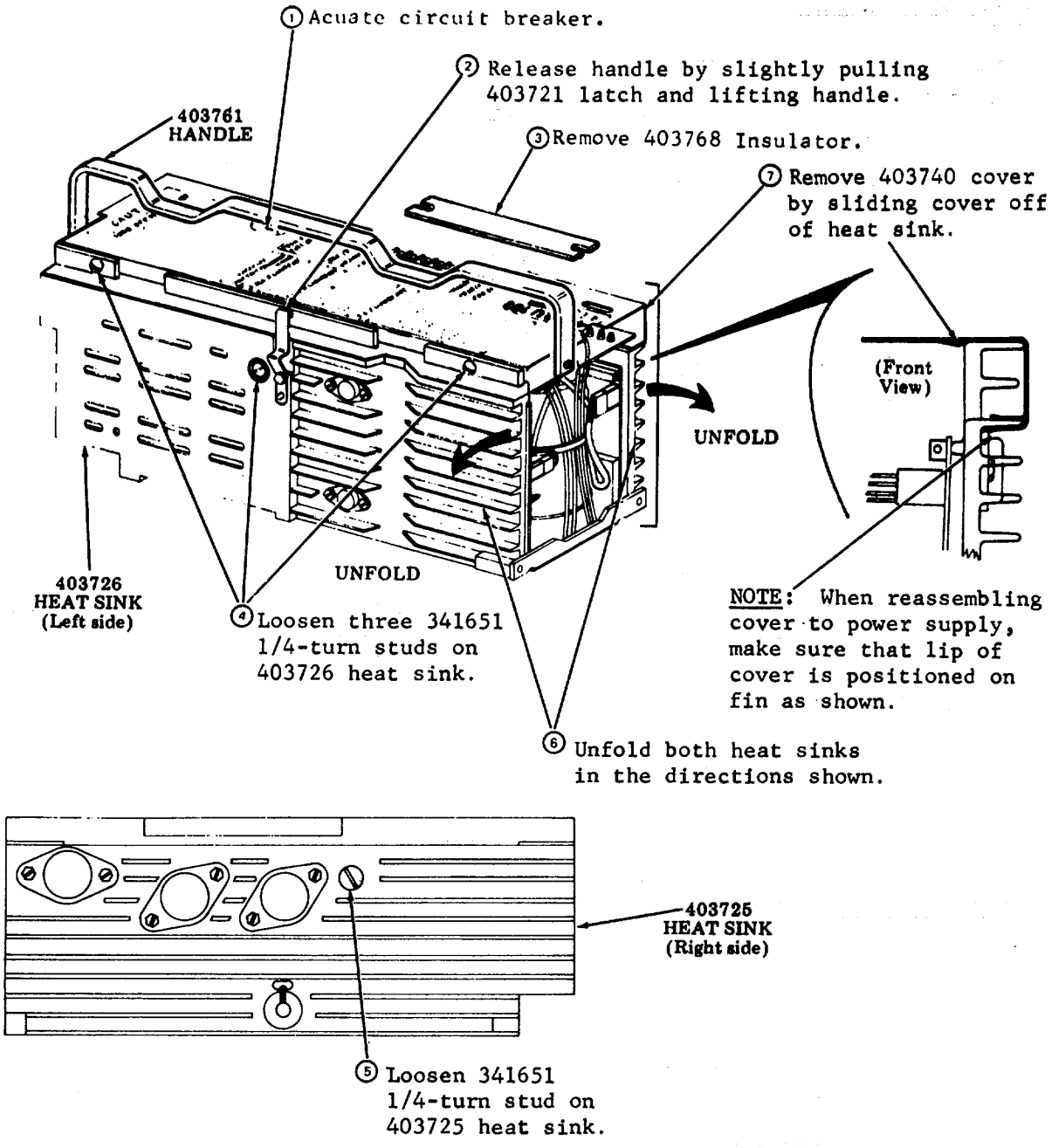
NOTE

The number indicated in parentheses after each assembly designates the page covering the disassembly/reassembly procedures.



3. DISASSEMBLY/ REASSEMBLY

Cover Assembly



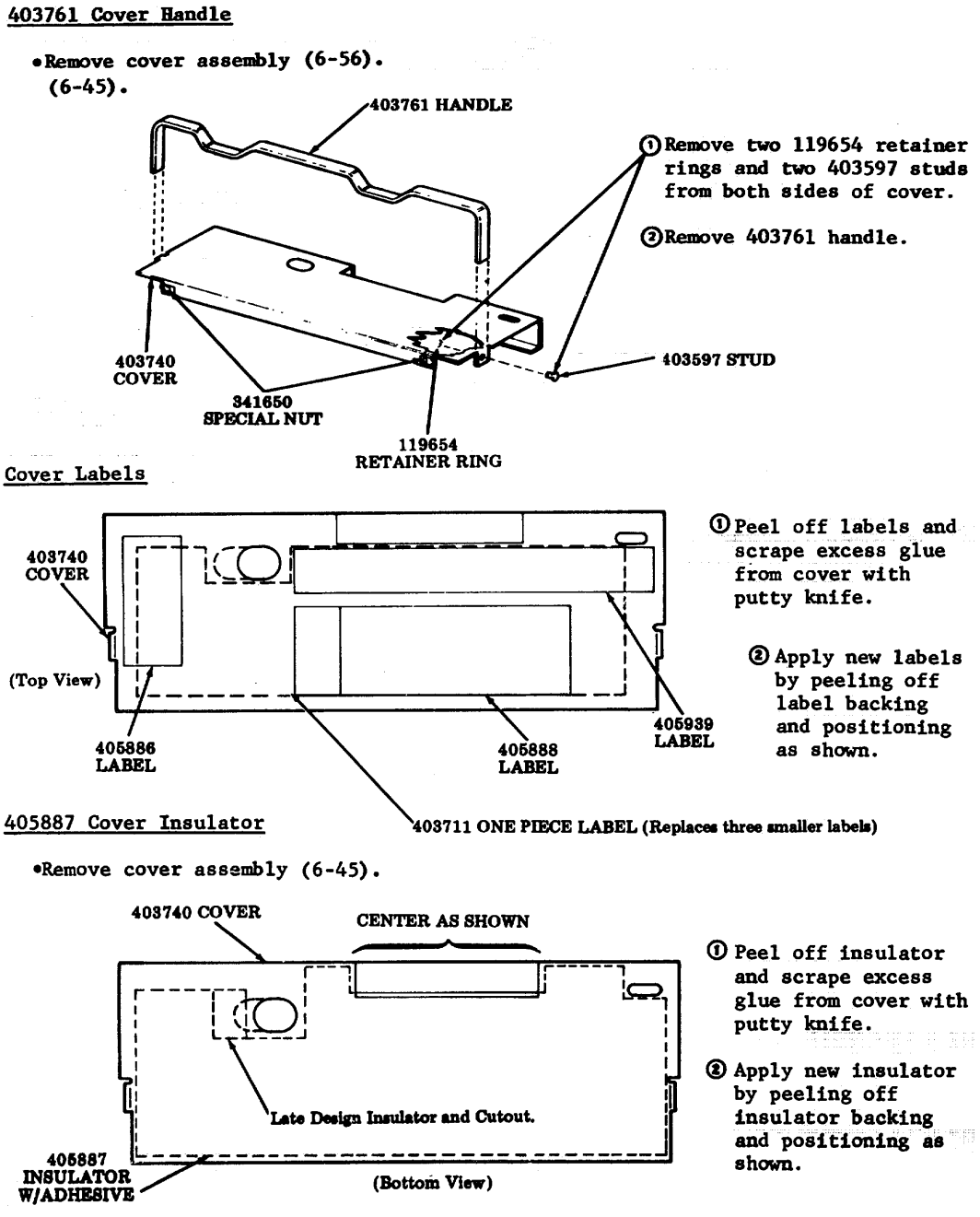
In reassembly, make sure circuit breaker is depressed. See Note above.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. DISASSEMBLY/REASSEMLY (Cont)

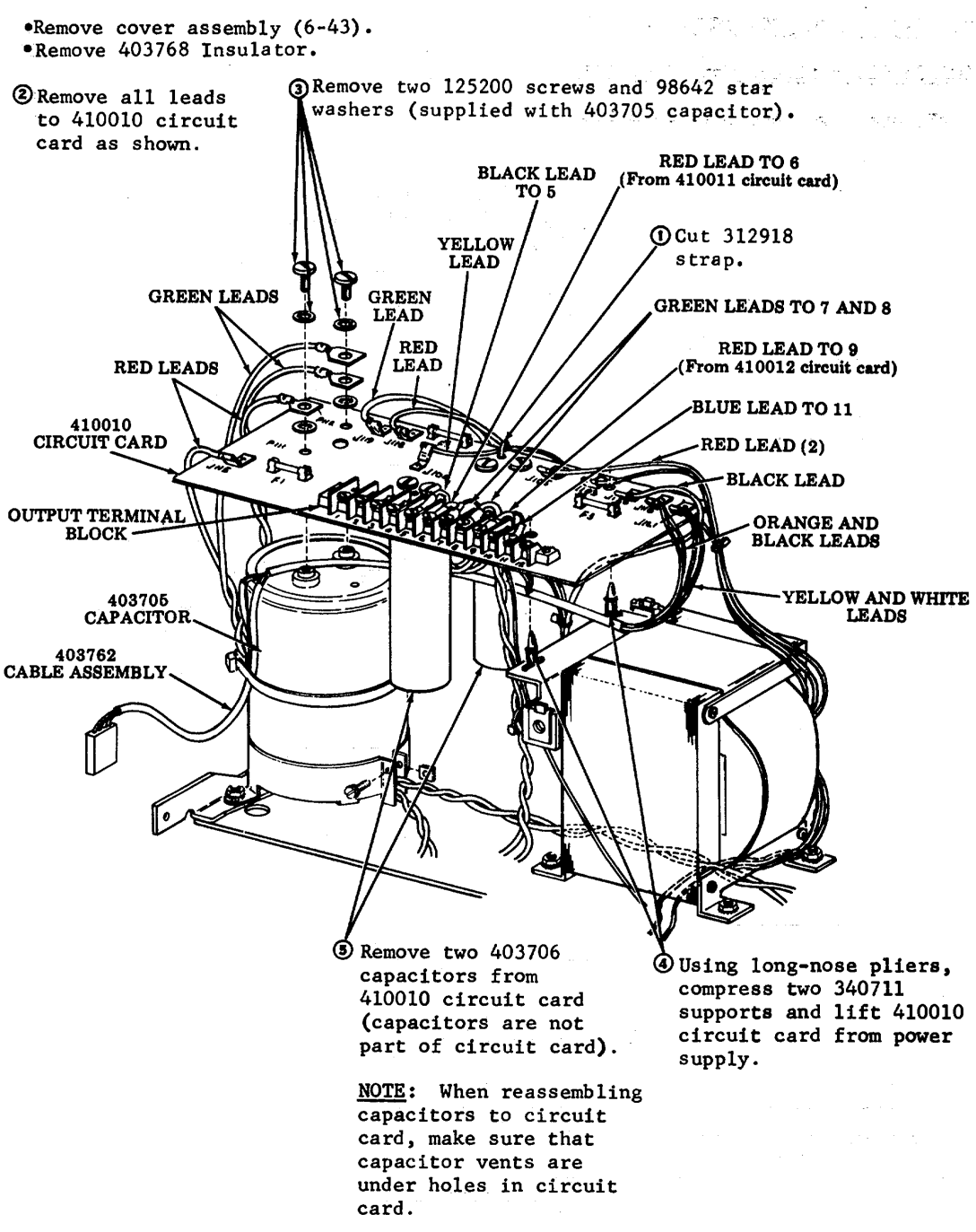
403761 Cover Handle

- Remove cover assembly (6-56). (6-45).



410010 Circuit Card

- Remove cover assembly (6-43).
- Remove 403768 Insulator.



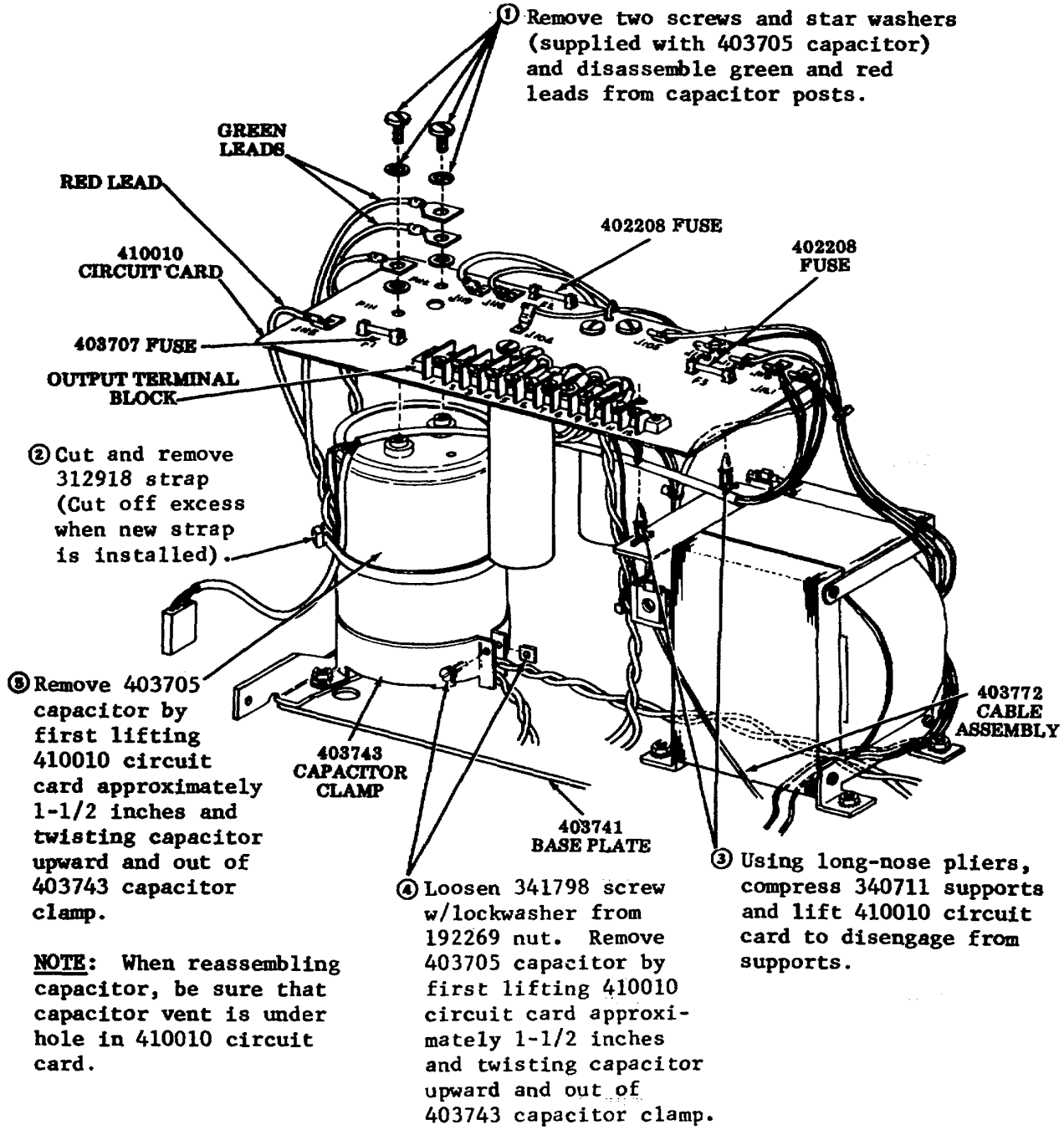
In reassembly, make sure that all leads are twisted as shown. See Note above.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. DISASSEMBLY/REASSEMBLY (Cont)

403705 +24 V Filter Capacitor (C1)

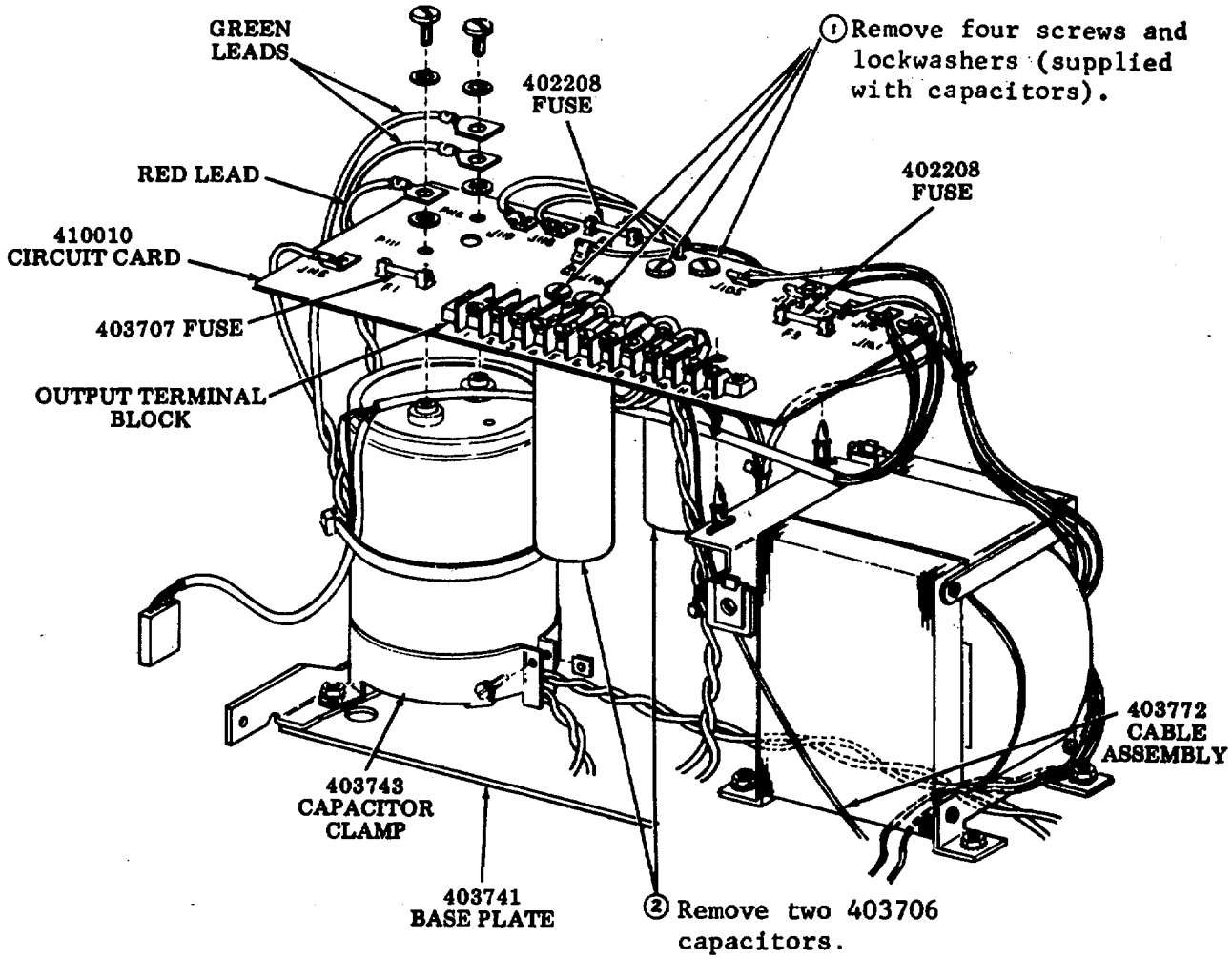
- Remove cover assembly (6-43).



In reassembly, make sure that all leads are twisted as shown. See Note above.

403706 +48 V Filter Capacitors (C3 and C5)

- Remove cover assembly (6-45).



NOTE: When reassembling capacitors to 410010 circuit card, make sure that capacitor vents are under holes in circuit card.

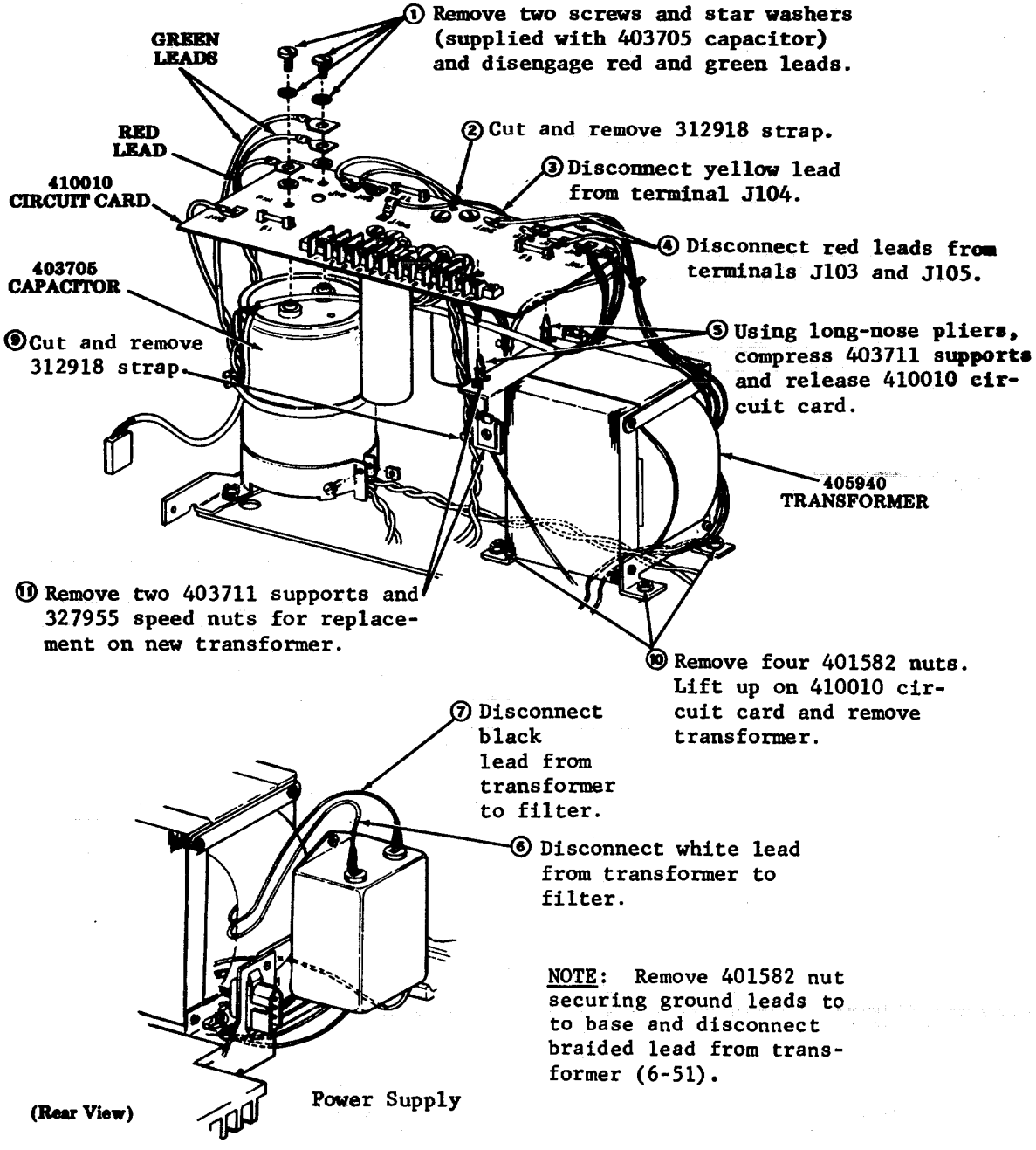
In reassembly, see Note above.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. DISASSEMBLY/REASSEMBLY (Cont)

405940 Transformer (T1)

- Remove cover assembly (6-45).

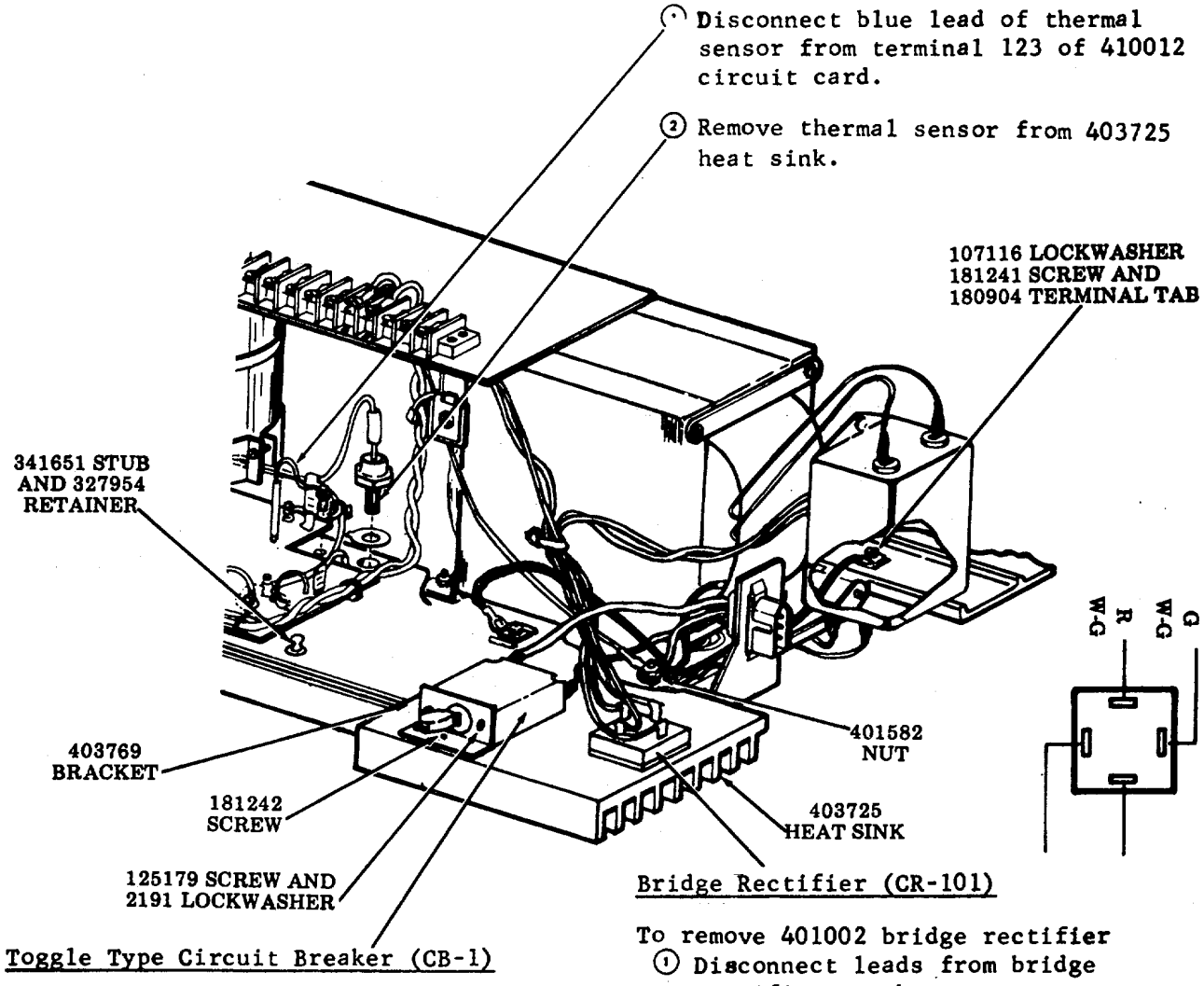


In reassembly, make sure that all leads are positioned and twisted as shown.

401002 Bridge Rectifier (CR-101)

403728 Toggle Type Circuit Breaker (CB1)
403735 Thermal Sensor Assembly (TS1)

- Remove cover assembly (6-45).



To remove 403728 circuit breaker.

(1) Disconnect two black leads to circuit breaker by removing screws and lockwashers.

(2) Either remove 125129 screws and 2191 lockwashers from 403769 bracket or 181242 screws from and heat sink.

Thermal Sensor (TS-1)

To remove 403735 thermal sensor assembly:

(1) Disconnect blue lead of thermal sensor from terminal 123 of 410012 circuit card.

(2) Remove thermal sensor from 403725 heat sink.

(2) Remove bridge rectifier from 403725 heat sink by removing 181246 screw.

NOTE

When replacing bridge rectifier, apply thermal compound between bridge rectifier and heat sink.

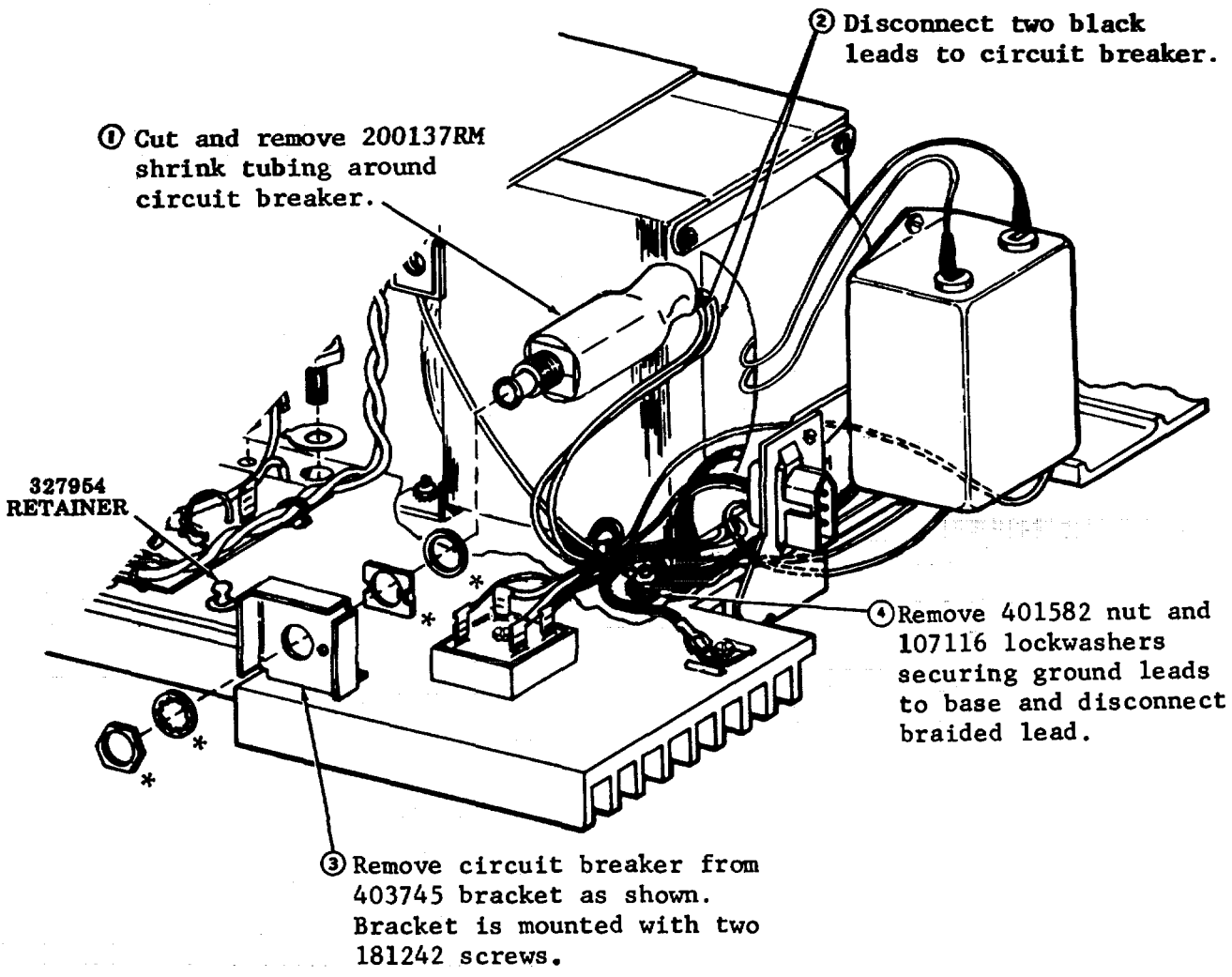
To replace thermal sensor, circuit breaker, or bridge rectifier the above procedures.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. DISASSEMBLY/REASSEMBLY (Cont)

403700 Circuit Breaker (CB1) - Early Design Push Type

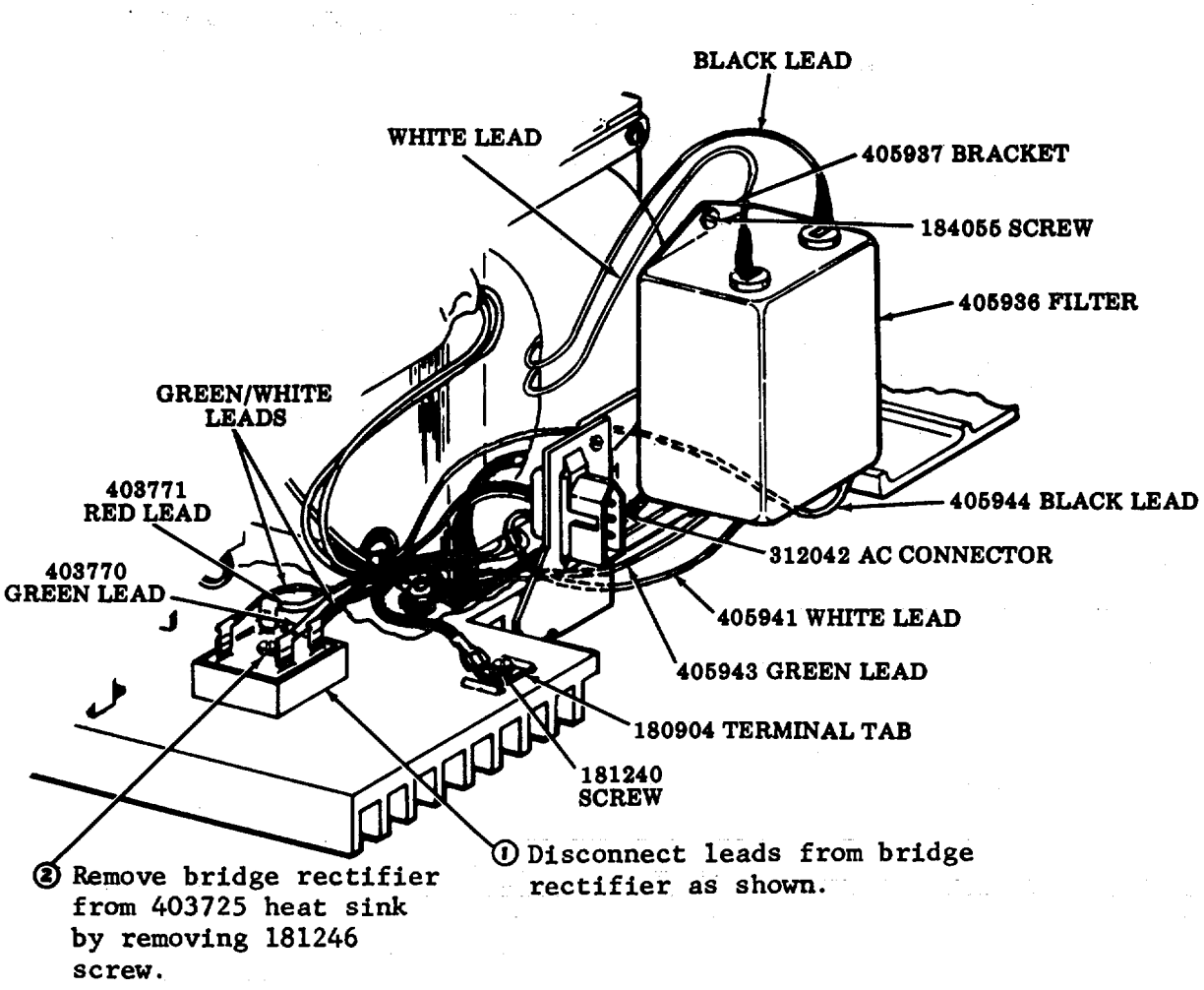
- Remove cover assembly (6-45).



*Part of 403700 circuit breaker.

401002 Bridge Rectifier (CR101) -- Early Design

- Remove cover assembly (6-45).



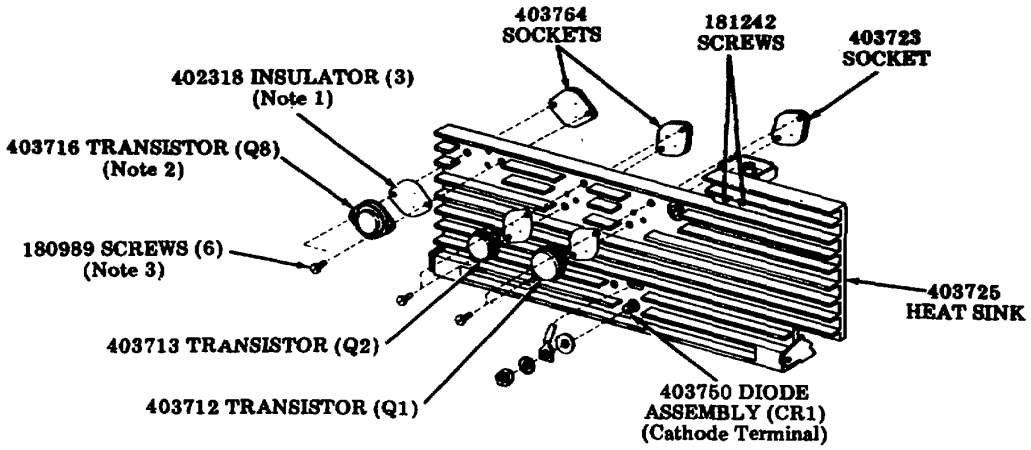
In reassembly, apply thermal compound between bridge rectifier and heat sink.

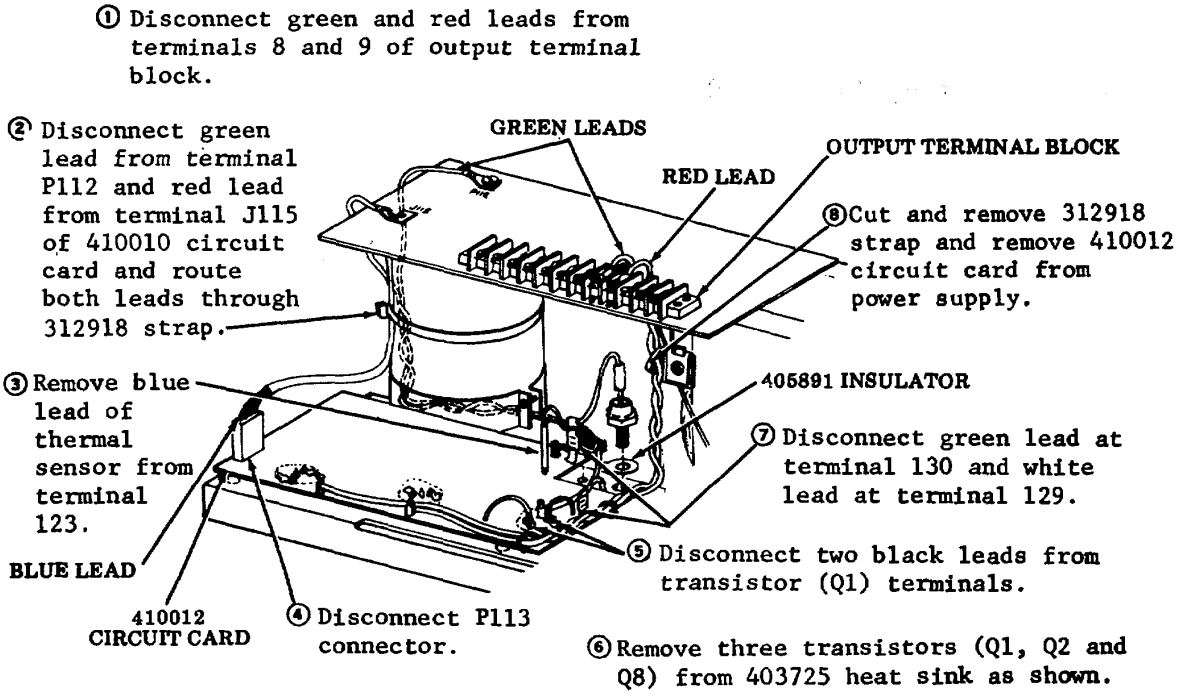
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. DISASSEMBLY/REASSEMBLY (Cont)

410012 Circuit Card and Associated Transistors (Q1, Q2 and Q8)

- Remove cover assembly (6-45).





NOTE 1

Use new insulators when replacing transistors.

NOTE 2

When replacing 403712 transistor, apply thermal compound between new insulator and heat sink.

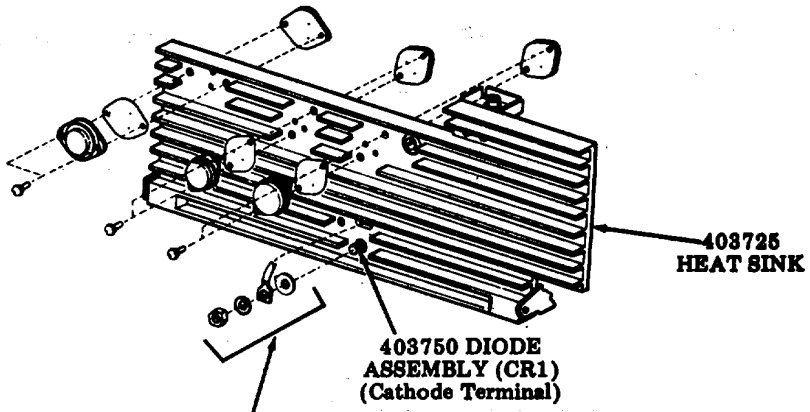
NOTE 3

Tighten screws to approximately 4 inch pounds torque to avoid damaging sockets,

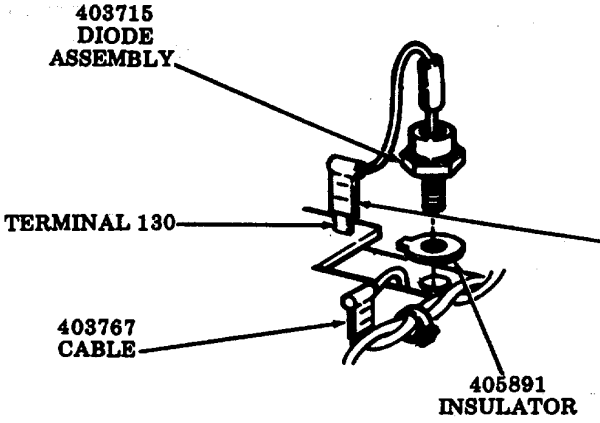
In reassembly, make sure all leads are twisted as shown.

403750 Diode Assembly (CR1)

- Remove cover assembly (6-45).



① Remove 405891 insulator, 403767 cable assembly, 82832 star washer, and 334874 nut.



② Disconnect green lead to terminal 130 of 410012 circuit card and remove diode assembly and 405891 insulator.

NOTE 1: When reassembling diode assembly, apply thermal compound between 405891 insulators (two used) and 403725 heat sink.

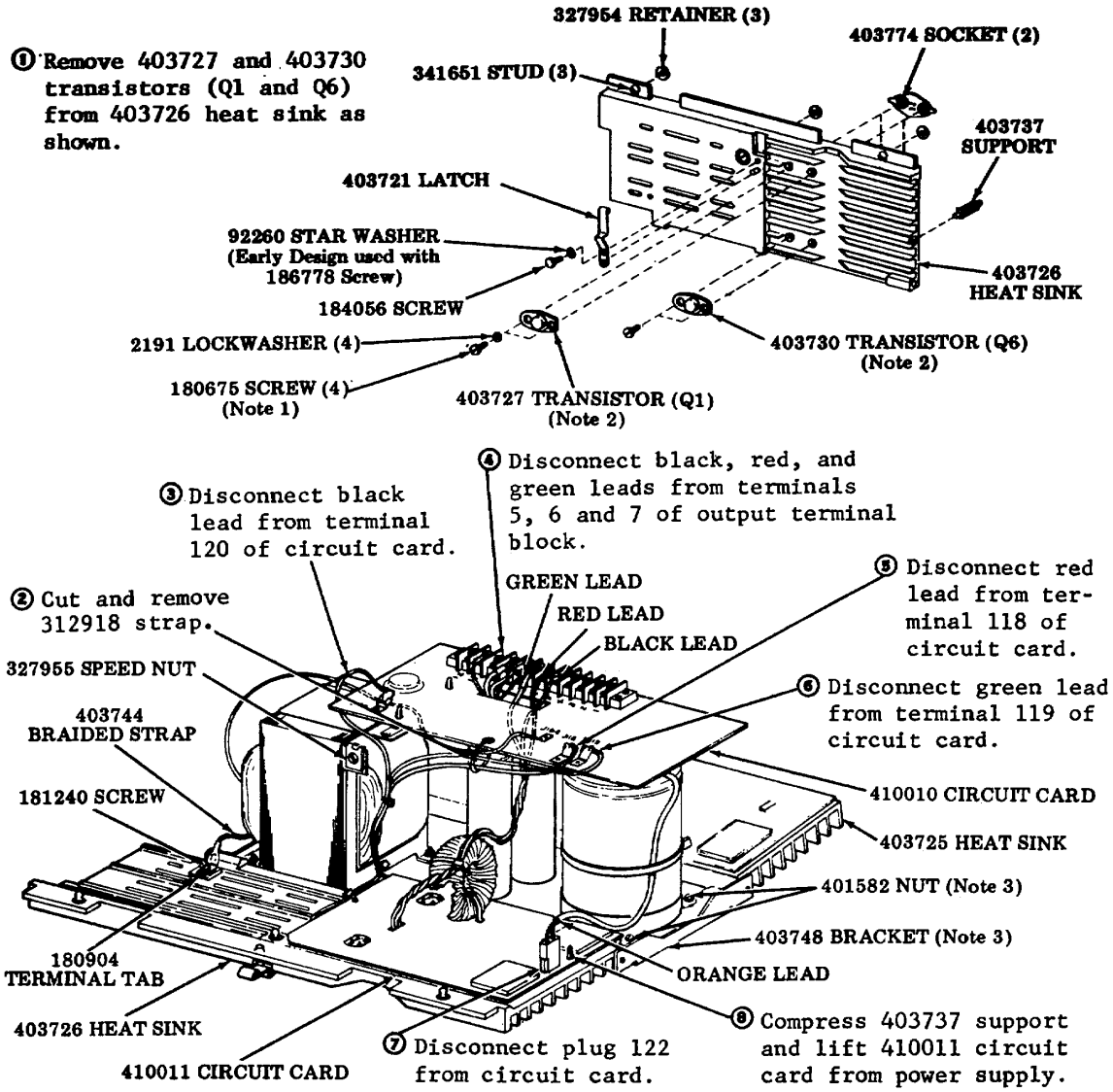
NOTE 2: The 403715 diode is susceptible to static discharge damage.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. DISASSEMBLY/REASSEMLY (Cont)

410011 Circuit Card and Associated Transistors (Q1 and Q6)

- Remove cover assembly (6-45).



NOTE 1:

Tighten screws to approximately 4 inch pound torque to avoid damaging sockets.

NOTE 2:

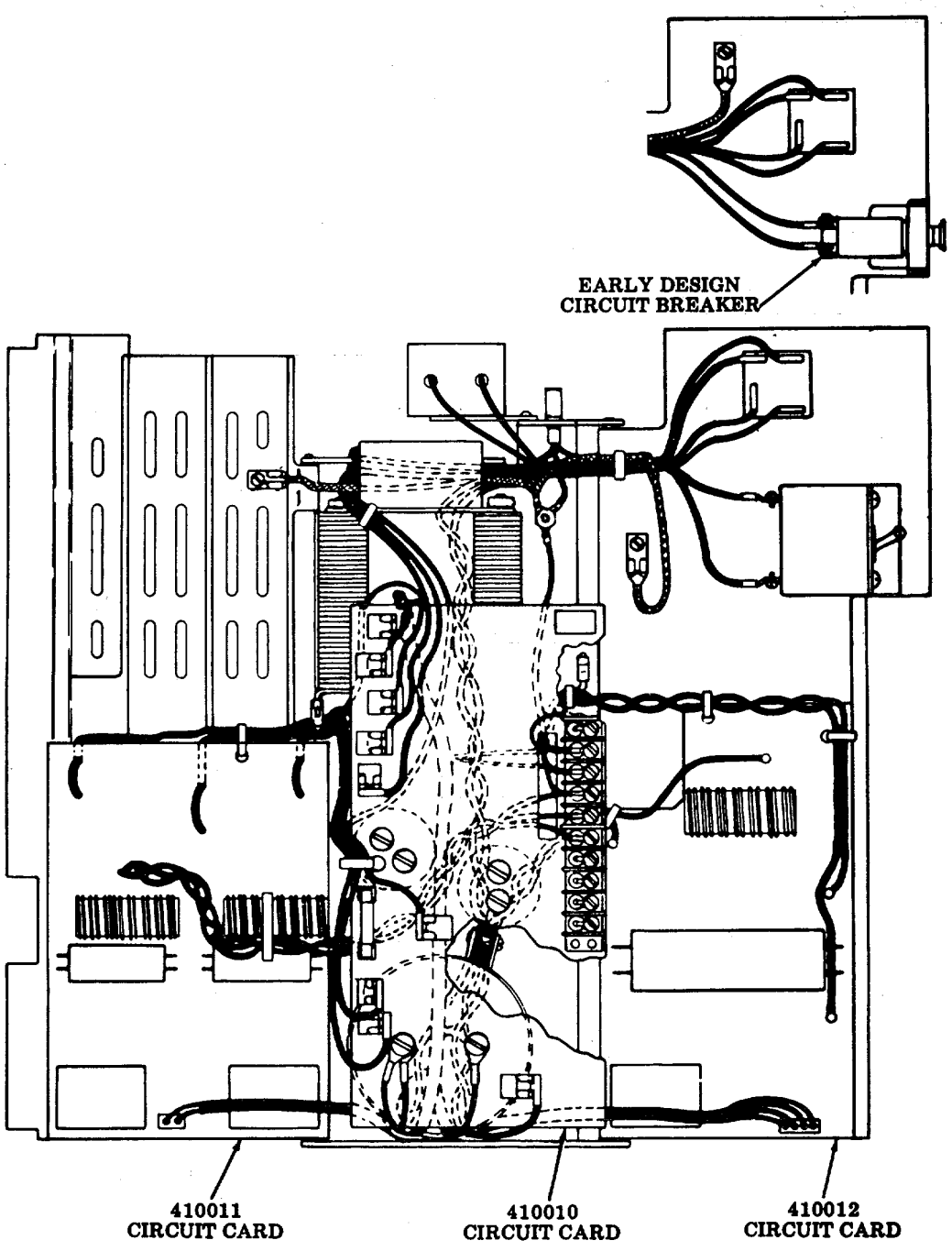
When replacing 403727 and 403730 transistors, make sure that flat edges of transistors are facing toward the front of power supply.

NOTE 3:

Removal of 403725 or 403726 heat sink can be accomplished by removing two 401582 nuts and removing 403748 bracket. Heat sinks can then be slid forward and out.

General Wiring Layout

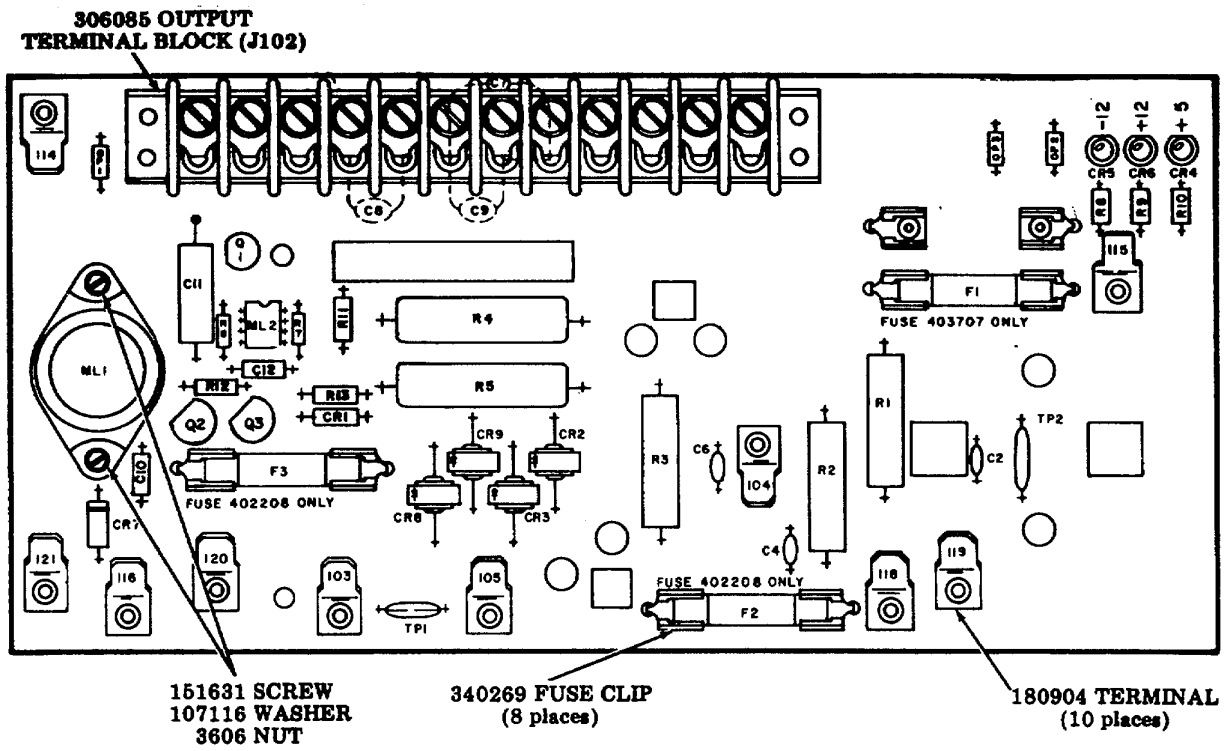
All wiring must be routed and twisted as shown below.



F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

4. PARTS

410010 Circuit Card Components



REF. DESIG.	PART NO. REQ.	DESCRIPTION
TP1	403703	TRANSIENT PROTECTOR
TP2	403704	TRANSIENT PROTECTOR
Q1	315930	TRANSISTOR
Q2,Q3		SAME AS Q1
CR1	403769	DIODE, ZENER 12V 1W
CR4	341636	DIODE, LED
CR5		SAME AS CR4
CR6		SAME AS CR4
CR7	402200	DIODE, ZENER
CR8	403709	DIODE
CR9		SAME AS CR8
CR2		SAME AS CR8
CR3		SAME AS CR8
C2	319999	CAPACITOR, .01MFD
C4		SAME AS C2

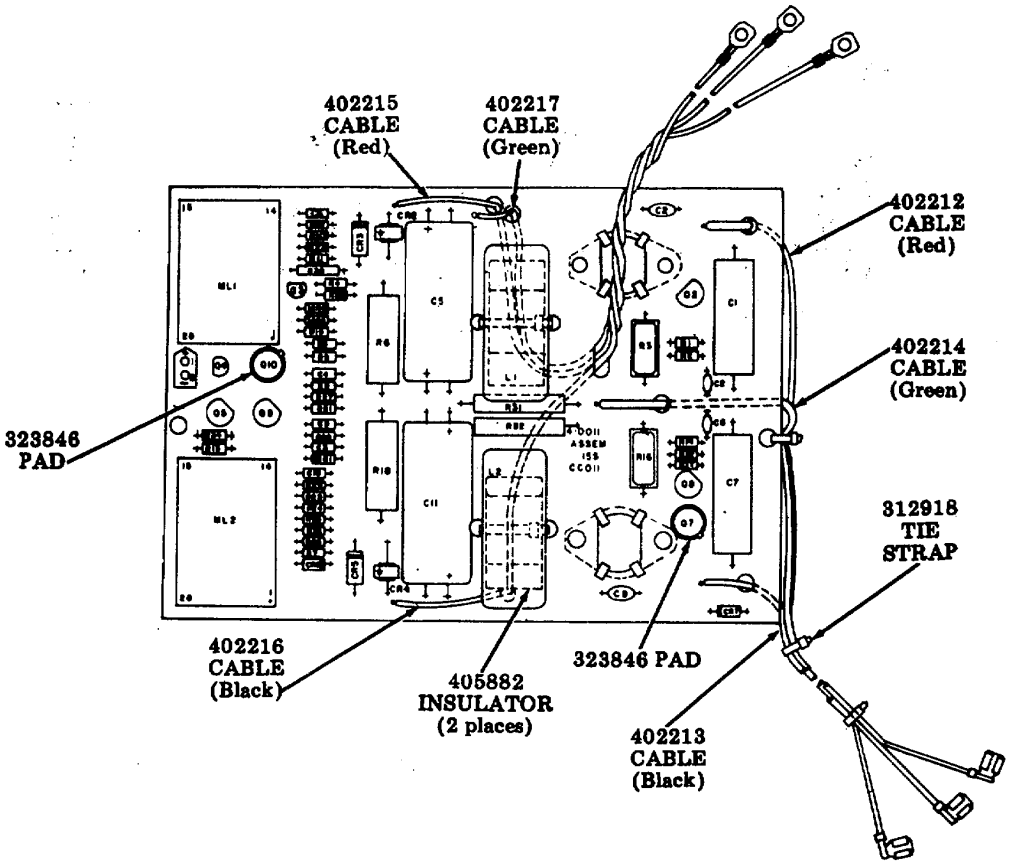
REF. DESIG.	PART NO. REQ.	DESCRIPTION
C6		SAME AS C2
C7	335678	CAPACITOR, .47MFD
C8		SAME AS C7
C9		SAME AS C7
C10	333727	CAPACITOR, 6.8MFD
C11	320281	CAPACITOR, .047MFD
C12	405324	CAPACITOR, .1MFD
R1	171523	RESISTOR, 5000 5W
R2	333474	RESISTOR, 1.8K 5W
R3		SAME AS R2
R4	182770	RESISTOR, 2700 4W
R5		SAME AS R4
R6	330641	RESISTOR, 1 MEG.
R7	321213	RESISTOR, 1K

REF. DESIG.	PART NO. REQ.	DESCRIPTION
R8	315971	RESISTOR, 680Ω
R9		SAME AS R8
R10	328783	RESISTOR, 180Ω
R11	315959	RESISTOR, 4.7K
R12	326958	RESISTOR, 56Ω
ML1	402201	VOLTAGE REG. 12V
ML2	404555	TIMER 555
R13	104214	RESISTOR, 390Ω 2W
F1	403707	FUSE,
F2	402208	FUSE,
F3		SAME AS F2
OP1	336470	STRAP, OPTION
OP2		SAME AS OP1
OP3		SAME AS OP1

NOTE

All power resistors larger than 1/2 watt to be spaced 0.062 inch from board. Leads to R4 and R5 resistors to be insulated.

410011 Circuit Card Components



REF. DESIG.	PART NO. REQ.	DESCRIPTION
C1	405884	CAPACITOR, 5MFD.
C2	315999	CAPACITOR, .01MFD
C3	405324	CAPACITOR .1MFD
C4		SAME AS C3
C5	403751	CAPACITOR, 4 TERM.
C6		SAME AS C3
C7		SAME AS C1
C8		SAME AS C2
C9		SAME AS C3
C10		SAME AS C3
C11		SAME AS C5
CR1	302844	DIODE, ZENER 13V
CR2	403709	DIODE, RECTIFIER
CR3	403732	DIODE, ZENER 14V
CR4		SAME AS CR2
CR5		SAME AS CR3
CR6	335674	DIODE, ZENER 3.3V
CR7	321161	DIODE, ZENER 3.9V
CR8		SAME AS CR6
CR9	197464	DIODE, SIGNAL
L1	403733	INDUCTOR

REF. DESIG.	PART NO. REQ.	DESCRIPTION
L2		SAME AS L1
ML1	403722	REGULATOR
ML2		SAME AS ML1
Q2	325077	TRANSISTOR, 2N4355
Q3	334133	TRANSISTOR, 2N4410
Q4		SAME AS Q3
Q5	321517	TRANSISTOR, 2N3642
Q7		SAME AS Q5
Q8		SAME AS Q2
Q9		SAME AS Q2
Q10	321261	TRANSISTOR, 2N4036
R1	321213	RESISTOR, 1K
R2	315961	RESISTOR, 8.2K
R3	178883	RESISTOR, 1.5K 3W
R4	318801	RESISTOR, 47K
R5		SAME AS R1
R6	401069	RESISTOR, .090 5W
R7		SAME AS R1
R8	320275	RESISTOR, 10K
R9		SAME AS R8

REF. DESIG.	PART NO. REQ.	DESCRIPTION
R10	337324	RESISTOR, 1.5 MEG
R11		SAME AS R8
R12	333410	RESISTOR 68K
R13	137803	RESISTOR 510 Ω 1W
R14		SAME AS R1
R15		SAME AS R2
R16		SAME AS R5
R17		SAME AS R4
R18		SAME AS R6
R19	320026	RESISTOR, 3.9K
R20		SAME AS R1
R21	321545	RESISTOR, 12K
R22	315959	RESISTOR, 4.7K
R23		SAME AS R22
R24		SAME AS R8
R25	401066	RESISTOR, 1K
R26		SAME AS R22
R27		SAME AS R21
R28	324905	RESISTOR, 10K
R29		SAME AS R12
R30		SAME AS R21
R31	171532	RESISTOR, 500 5W
R32		SAME AS R31
R33	324911	RESISTOR, 4.99K

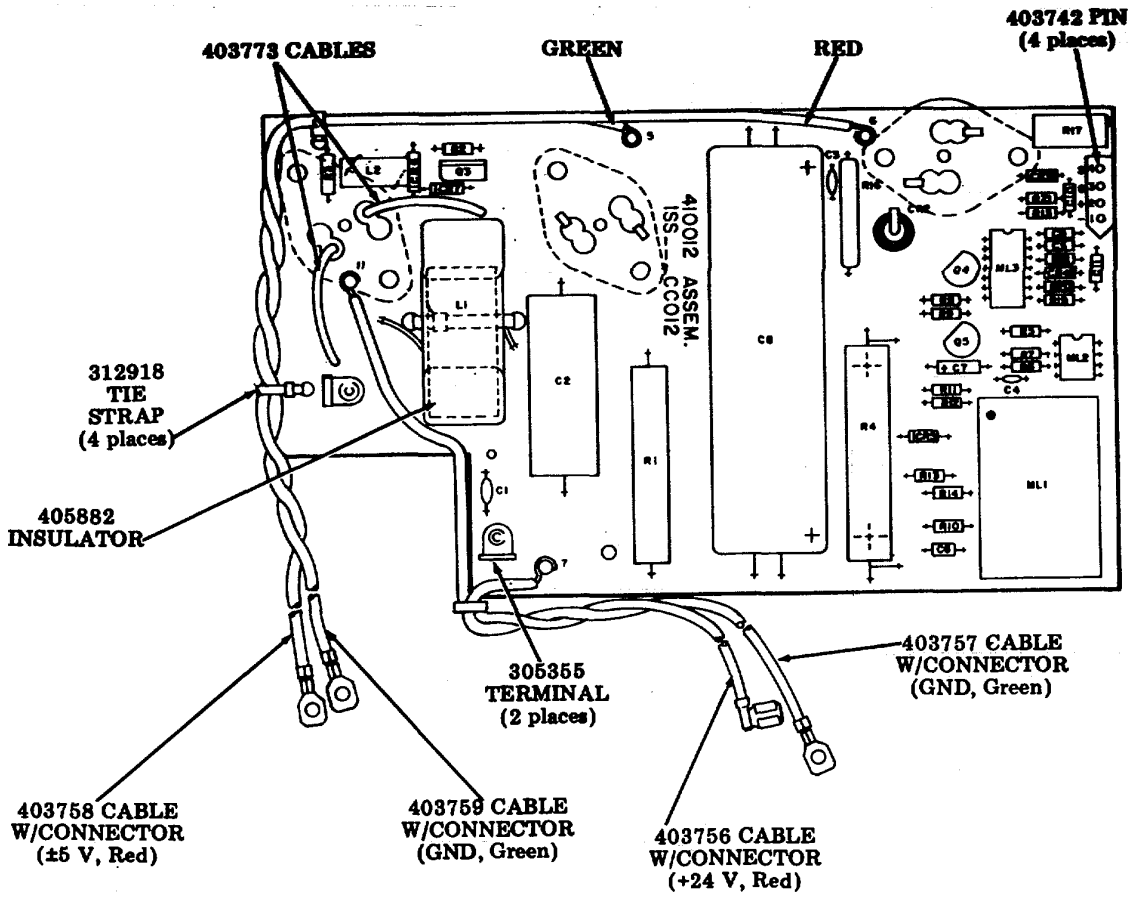
NOTE

All power resistors larger than 1/2 watt and C5 and C11 capacitors to be spaced 0.062 inch from board.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

4. PARTS (Cont)

410012 Circuit Card Components



REF. DESIG.	PART NO. REQ.	DESCRIPTION
R1	147687	RESISTOR, 150Ω 10W
R2	321213	RESISTOR, 1K 1/4W
R3	129852	RESISTOR, 2.2K 1/2 W
R4	403720	RESISTOR, .01Ω 10W
R5	324893	RESISTOR, 221Ω 1/8W 1%
R6	315949	RESISTOR, 300Ω 1/4W
R7	324896	RESISTOR, 2610 1/8W 1%
R8	315961	RESISTOR, 8.2K 1/4W
R9	315959	RESISTOR, 4.7K 1/4W
R10	300292	RESISTOR, 6.8K 1/4W
R11	337324	RESISTOR, 1.5 MEG. 1/4W
R12	322275	RESISTOR, 10K 1/4W
R13	401067	RESISTOR, 2.4K 1/4W .5%
R14		SAME AS R12
R15	329783	RESISTOR, 180Ω 1/4W
R16	122272	RESISTOR, 10Ω 5W
R17	401077	RESISTOR, VARIABLE

REF. DESIG.	PART NO. REQ.	DESCRIPTION
R18	315988	RESISTOR, 27K 1/4W
R19	324899	RESISTOR, 681Ω
R20	324911	RESISTOR, 4.99K 1/8W 1%
R21	315955	RESISTOR, 2.2K 1/4 W
C1	319999	CAPACITOR, .01MFD
C2	194606	CAPACITOR, 10 MFD
C3		SAME AS C1
C4	335678	CAPACITOR, .47MFD
C5	405324	CAPACITOR, .1MFD
C6	305821	CAPACITOR, .1MFD
C7	336948	CAPACITOR, 1MFD
C8	403719	CAPACITOR, 4 TERM.
C9		SAME AS C5
C10,C11		SAME AS C7
Q3	403714	TRANSISTOR

REF. DESIG.	PART NO. REQ.	DESCRIPTION
Q4	321517	TRANSISTOR
Q5	315931	TRANSISTOR
CR2	403709	DIODE (NEW)
CR2	324663	DIODE (OLD)
CR3	197464	DIODE
CR4		SAME AS CR3
CR5		SAME AS CR3
CR6	400902	DIODE ZENER 3.9V
CR7	171541	DIODE
ML1	403722	REGULATOR
ML2	339741	IC, OP. AMP.
ML3	326823	REGULATOR
L1	403717	INDUCTOR
L2	403754	INDUCTOR

NOTE

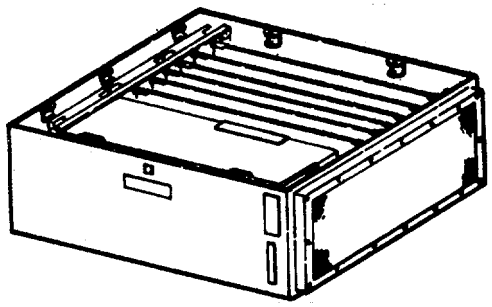
All power resistors larger than 1/2 watt and C2 and C8 capacitors to be spaced 0.062 inch-from board.

5. COMPONENT PARTS LIST

Note:
When ordering parts, prefix each number with the letters "TP"

Part Number	Description and Page Number
2191	Lockwasher 56
3606	Nut, 6-40 Hex 58
82832	Lockwasher 55
92260	Lockwasher 56
98642	Starwasher 47
107116	Lockwasher 51, 52, 58
119654	Ring, Retaining 46
125200	Screw, 10-32 x 1/2 RD 47
125179	Screw, 6-32 x 3/16 RD 51
151631	Screw, 6-40 x 5/16 Hex 58
180675	Screw 6 Self-Tapping 56
180904	Tab, Terminal 51, 53, 56
180989	Screw 6 Spl 54
181240	Screw w/Lockwasher, 6-40 x 3/16 53, 56
181241	Screw w/Lockwasher, 640 x 1/4 Hex 51
181242	Screw w/Lockwasher, 6-40 x 5/16 Hex 51, 52, 54
181246	Screw w/Lockwasher, 640 x 5/8 Hex 51, 53
184055	Screw w/Lockwasher, 6-40 x 3/16 Hex 53
184056	Screw w/Lockwasher, 640 x 1/4 Hex 56
186778	Screw, 640 x 7/32 Hex 56
192269	Nut, Speed 48
305355	Terminal 60
306085	Board, Terminal 58
312042	Connector, 4 Pt Plug 53
312918	Cable, Strap 47, 48, 50, 54, 59, 60
323846	Pad, Transistor Mounting 59
327954	Retainer, Split Ring 51, 52, 56
327955	Nut, Speed 50, 56
334874	Nut, 1/4-28 Hex 55
336810	Plate, Identification 44
340269	Clip, Fuse 58
340711	Support 47, 48
341650	Nut, Special 46
341651	Stud 45, 51, 56
341798	Screw w/Lockwasher, 6-32 x 9/16 Hex 48
401002	Rectifier 44, 51, 53
401582	Nut, 8-32 Spl 50, 51, 52, 56
402208	Fuse 48, 49
402212	Wire 59
402213	Wire 59
402214	Wire 59
402215	Wire 55, 59
402216	Wire 59
402217	Wire 59
402318	Insulator 54
403597	Stud 46
403700	Breaker, Circuit 52
403705	Capacitor 44, 47, 48, 50
403706	Capacitor 44, 47, 49
403707	Fuse 48, 49
403711	Support 46, 50, 56
403712	Transistor 54
403713	Transistor 54
403715	Diode Assembly 55
403716	Rectifier 54
403721	Latch 45, 56
403723	Socket 54
403725	Sink, Heat 45, 51, 53, 54, 55, 56
403726	Sink, Heat 45, 46
403727	Transistor 56
403728	Circuit Breaker 44, 51
403730	Transistor 56
403735	Thermostat 44, 51
403737	Support 56
403740	Cover 45, 46
403741	Plate 48, 49
403742	Pin 60
403743	Clamp 48, 49
403744	Wire 56
403745	Bracket 52
403748	Bracket 56
403750	Diode Assembly 44, 54, 55
493756	Wire 60
403757	Wire 60
403758	Wire 60
403759	Wire 60
403761	Handle 45, 46
403762	Cable Assembly 47
403764	Socket, Transistor 54
403767	Cable Assembly 55
403768	Insulator 45, 47
403769	Bracket 51
403770	Lead, 24-1/2" Lg Green 53
403771	Lead, 25" Lg Red 53
403772	Jumper, 7-3/4" Lg 48, 49
403773	Cable 60
403774	Socket, Transistor 56
405882	Insulator 69, 60
405886	Label 46
405887	Insulator 46
405888	Label 46
405891	Insulator 54, 55
405936	Filter 53
405937	Bracket 53
405939	Label 46
405940	Transformer 44, 50
405941	Cable Assembly 53
405943	Strap, 7-1/2" Lg 53
405944	Strap, 11" Lg 53
410010	Card, Circuit 44, 47, 48, 49, 50, 54, 56, 57, 58
410011	Card, Circuit 44, 50, 56, 57
410012	Card, Circuit 44, 47, 51, 54, 55, 57

PART 7 -- TEMPEST MODEL 40 CONTROLLER LOGIC



INDEX PAGE

A. GENERAL

1. DESCRIPTION

This section covers shop repair actions to be followed for Tempest Model 40 Controllers listed below. The scope of repair activity covered in this shop manual is limited to replacement of circuit cards, the printed circuit card frame, and components of the wired frame. Controller circuit card repair is not covered. More in depth circuit card analysis can be achieved through use of wiring diagram packages (WDPs), listed below (available from Teletype Corporation).

WDP	DESCRIPTION
0461	40C430/ZZZ/000 Controller Without Cards
0464	40C431/ZZZ/000 Controller Without Cards
0465	40C432/ZZZ/000 Controller Without Cards
0469	40C430/AAT/017 Controller
0470	40C431/ABE/026 and 40C432/ABF/027 Controllers
0471	40C430/ABD/025 Controller
0476	40C433/ZZZ/000 Controller Without Cards
0478	40C433/ACS/059 Controller
0484	40C434/ZZZ/000 Controller Without Cards
0485	40C434/ACW/063 Controller
0488	40C435/ZZZ/000 Controller Without Cards
0489	40C435/ACS/059 Controller
0495	40C435/AEE/091 and 40C437/AEE/091 Controllers
0519	40C436/ADK/075 Controller (SCC)
0520	40C436/ADU/095 Controller (DCC-ASCI)
0521	40C436/ADN/094 Controller (DCC-EBCDIC)
0522	40C436/ADD/093 Controller (MCC-ASCII)
0523	40C436/ADA/092 Controller (MCC-EBCDIC)
0524	40C436/ZZZ/000 Controller Without Cards
0551	40C434/AEK/101 Controller
0554	40C437/ZZZ/000 Controller Without Cards
0581	40C437/AEL/106 Controller
0582	40C431/AEM/103 Controller
0583	40C432/AEN/104 Controller
0584 and 0585	40C438/AEP/105 Controller
0592	40C437/AEL/107 Controller

The controller consists of plug-in circuit cards with edge-type connectors mounted in a printed circuit card frame, a power supply, a ventilation system and an interconnection module. The controller is contained in a metal container with a removable top. Connections to associated devices are made through connectors mounted on the interconnection module. Signals to and from the various devices are transformer coupled on circuit cards mounted on the right wall of the controller container. Data and control lead signals to the external interface unit are optically coupled on a circuit card mounted on the right wall of the controller container.

All power for the controller operations is received from the associated power supply mounted in the left section of the controller container. The required voltages are +12 Vdc, -12 Vdc and +5 Vdc along with a circuit common. The ac power for the ventilation assembly and the power supply is brought in through a 3 pin connector on the interconnection module.

The ventilation assembly provides the necessary cooling for the power supply and the controller circuit cards.

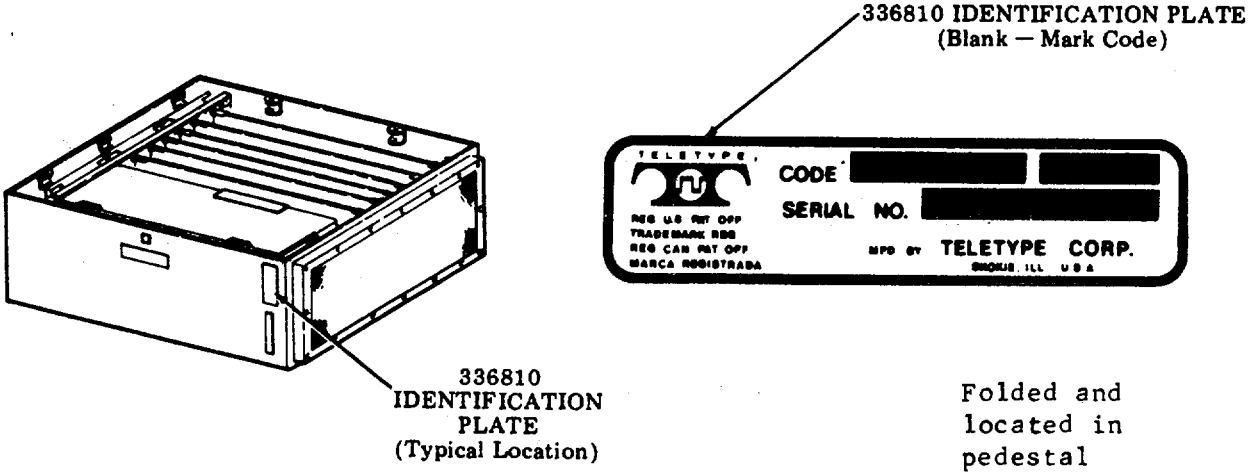
The signals between the printer, the full opcon, the cassette drives and the controller are in the form of Teletype Corporation Standard Serial Interface (SSI). The signals between the controller and the RO opcon are in the form of dc levels. The signal between the controller and the associated interface unit are in the form of optical isolator input and output signals. The associated interface unit converts these signals into MIL Standard 188C signals for use on-line. (Refer to Part 8 for description of interface).

Identity

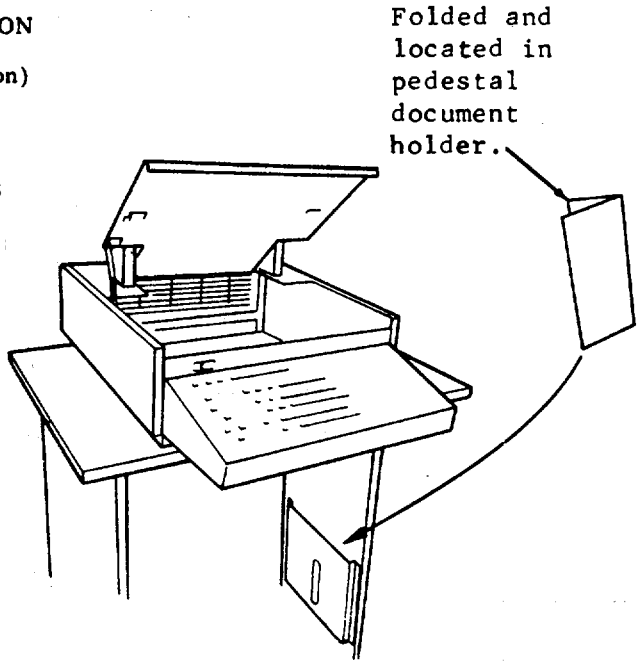
Exact identity of the controller must be known before servicing or repair is begun.

Identification plates are present on the lower portion of the wired frame. The code stamped on the plate identifies the complete assembly (with circuit cards).

Controllers modified with modification kits have modification kit number labels attached to the rear card extractor of the modified circuit card, or mounted to the left of the identification plate.



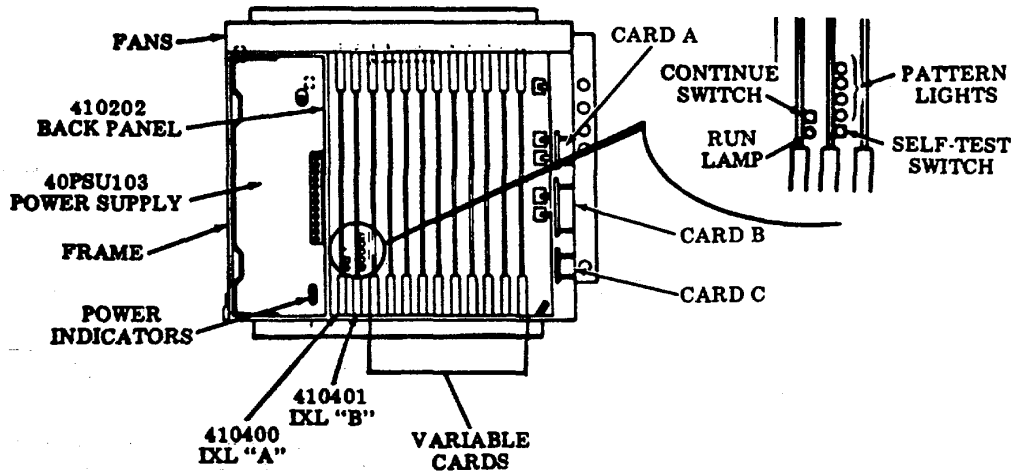
To aid in identifying a set or station, a Set Features and Options Record should be filled out and inserted in the pedestal document holder.



A. GENERAL (Cont)

1. DESCRIPTION, Identity (Cont)

Controller identity is aided by observing the quantity and part numbers of circuit cards included in controller and size of interconnection module. Refer to chart below for circuit card part number, location, and quantity for each controller.



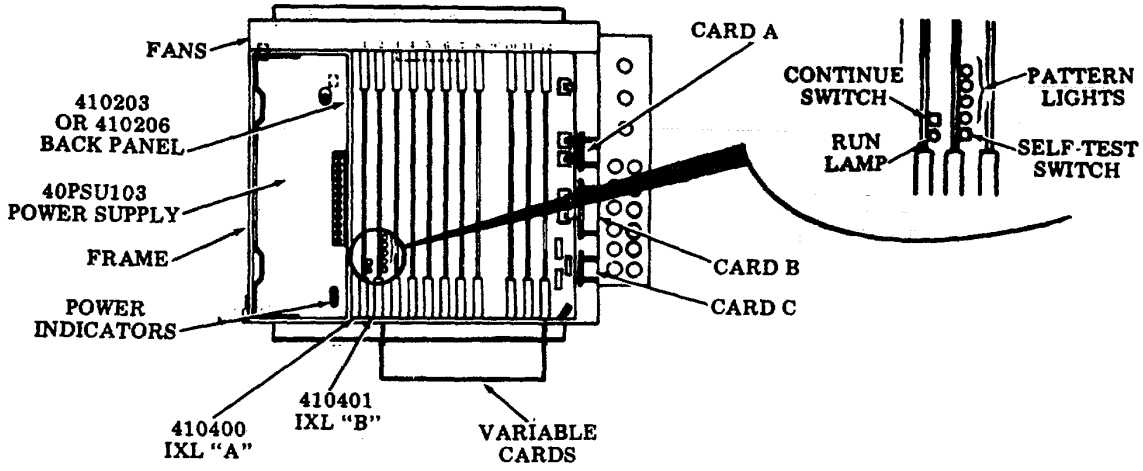
2.CONTROLLER CODES

CONTROLLER CODE	CARD SLOT											
	1	2	3	4	5	6	7	8	9	10	11	12
40C430/ABD/025 EARLY DESIGN	410400	410401	410408	410433	410406	410403	410461	410908	410806	--	--	--
40C430/ABD/025 LATE DESIGN	410400	410401	410411	410433	410406	--	410461	410908	410806	--	--	--
40C430/AAT/017 EARLY DESIGN	410400	410401	410408	410433	410406	410403	410461	410906	410805	--	--	--
40C430/AAT/017 LATE DESIGN	410400	410401	410411	410433	410406	--	410461	410906	410805	--	--	--
40C431/ABE/026 EARLY DESIGN	410400	410401	410408	410403	410406	--	--	410461	410807	--	--	--
40C431/ABE/026 LATE DESIGN	410400	410401	410411	410406	--	--	--	410461	410807	--	--	--
40C431/AEM/103	410400	410401	410411	410406	--	410461	410536	--	--	--	--	--
40C431/AEM/103 WITH ADDITIONAL 410403	410400	410401	410411	410406	410403	410461	410536	--	--	--	--	--
40C432/ABF/027 EARLY DESIGN	410400	410401	410408	410403	410597	--	--	410461	410807	--	--	--
40C432/ABF/027 LATE DESIGN	410400	410401	410411	410597	--	--	--	410461	410807	--	--	--
40C432/AEN/104	410400	410401	410411	410597	--	410461	410536	--	--	--	--	--
40C432/AEN/104 WITH ADDITIONAL 410403	410400	410401	410411	410597	--	410461	410536	410403	--	--	--	--
40C433/ACS/059	410400	410401	410437	410406	410411	410461	410461	410912	410913	410811	--	--

CONTROLLER CODE	CARD		
	A	B	C
40C430/ABD/025	410596	410592	410555
40C430/AAT/017	410596	410592	410555
40C431/ABE/026	410596	410593	--
40C431/AEM/103	410596	410592	--
40C432/ABF/027	410596	410590	--
40C432/AEN/104	410596	410590	--
40C433/ACS/059	410596	410593	410555

A. GENERAL (Cont)

2. CONTROLLER CODES (Cont)



CONTROLLER CODE	CARD SLOT											
	1	2	3	4	5	6	7	8	9	10	11	12
40C434/ACW/063	410400	410401	410406	410433	410433	410421	410464	410406	410464	410507	410506	--
40C434/AEK/101	410400	410401	410406	410433	410433	410421	410464	410406	410464	410530	410531	--
40C435/ACS/059	410400	410401	410437	410406	410411	410461	410461	410912	410913	410811	--	--
40C435/AEE/091	410400	410401	410437	410406	410411	410464	410520	410521	--	--	--	--
40C435/AEE/091 WITH ADDITIONAL 410406	410400	410401	410437	410406	410406	410411	410464	410520	410521	--	--	--
40C436/ADA/092	410400	410401	410411	410435	410464	410406	410523	410512	--	--	--	--
40C436/ADA/092 WITH ADDITIONAL 410435	410400	410401	410411	410435	410435	410406	410464	410525	410512	--	--	--
40C436/ADD/093	410400	410401	410411	410431	410464	410406	410525	410512	--	--	--	--
40C436/ADD/093 WITH ADDITIONAL 410431	410400	410401	410411	410431	410431	410406	410464	410525	410512	--	--	--
40C436/ADK/075	410400	410401	410411	410465	410406	--	410508 or 410535	--	--	--	--	--
40C436/ADK/075 WITH ADDITIONAL 410406	410400	410401	410411	410465	410406	410406	410508 or 410535	--	--	--	--	--
40C436/ADN/094	410400	410401	410435	410406	410464	410509	--	--	--	--	--	--
40C436/ADN/094 WITH ADDITIONAL 410435	410400	410401	410435	410435	410464	410406	410509	--	--	--	--	--
40C436/ADN/094 WITH ADDITIONAL 410406	410400	410401	410435	410406	410406	410464	410509	--	--	--	--	--
40C436/ADN/094 WITH ADDITIONAL 410435 AND 410406	410400	410401	410435	410435	410464	410406	410406	410509	--	--	--	--

CONTROLLER CODE	CARD SLOT											
	1	2	3	4	5	6	7	8	9	10	11	12
40C436/ADU/095	410400	410401	410431	410406	410464	410509	--	--	--	--	--	--
40C436/ADU/095 WITH ADDITIONAL 410431	410400	410401	410431	410431	410464	410406	410509	--	--	--	--	--
40C436/ADU/095 WITH ADDITIONAL 410406	410400	410401	410431	410406	410406	410464	410509	--	--	--	--	--
40C436/ADU/095 WITH ADDITIONAL 410431 AND 410406	410400	410401	410431	410431	410464	410406	410406	410509	--	--	--	--
40C437/AEE/091†	410400	410401	410437	410406	410411	410464	410520	410521	--	--	--	--
40C437/AEE/091 WITH ADDITIONAL 410406	410400	410401	410437	410406	410406	410411	410464	410520	410521	--	--	--
40C437/AEL/106	410400	410401	410437	410406	410411	410464	410465	410532	410533	--	--	--
40C437/AEL/106 WITH ADDITIONAL 410406	410400	410401	410437	410406	410406	410411	410464	410465	410532	410533	--	--
40C437/AEL/107	410400	410401	410437	410406	410411	410464	410465	410577	410578	--	--	--
40C437/AEL/107 WITH ADDITIONAL 410406	410400	410401	410437	410406	410406	410411	410464	410465	410577	410578	--	--
40C437/AEL/107 WITH ADDITIONAL 410403 ‡	410400	410401	410437	410406	410411	410464	410465	410577	410578	--	410403	--
40C438/AEP/105§	410400	410401	410421	410406	410403	--	--	410464	--	--	--	410536

CONTROLLER CODE	CARD		
	A	B	C
40C434/ACW/063	410555	410555	410158
40C434/AEK/101	410555	410555	410158
40C435/ACS/059	--	410555	410157
40C435/AEE/091	--	410555	410157
40C436/ADA/092	410555	410555	410157*
40C436/ADD/093	410555	410555	410157*
40C436/ADK/075	410555	410555	410157*
40C436/ADN/094	410555	410555	410157*
40C436/ADU/095	410555	410555	410157*
40C437/AEE/091	--	410555	410157
40C437/AEL/106	--	410555	410157
40C437/AEL/107	--	410555	410157
40C438/AEP/105	--	--	410158

40C435, 40C437 or 40C438 series controllers have 410203 backpanel.

40C436 series controllers have 410206 backpanel.

* 40C436 series controllers require Issue 2A or higher of 410157 circuit card.

† The 40C437/AEE/091 is identical to the 40C435/AEE/091, but contains a narrow interconnection module for rack mounting application.

* Various arrangements of additional 410403 cards are available. Refer to 3. CONTROLLER ARRANGEMENT FORMS for variations.

§ Many arrangements of the 40C438/AEP/105 are available. Refer to 3. CONTROLLER ARRANGEMENT FORMS for variations.

A. GENERAL (Cont)

2. CONTROLLER CODES (Cont)

Options

Controller options are activated by positioning rocker switches on the 410408 Communication Interface Unit (CIU) circuit card and the 410403 Programmable Interval Timer/Station Identification Device (PIT/SID) circuit card on early design controllers and on the 410411 CIU/PIT/SID circuit card on late design controllers. The options and switch settings are listed below.

Refer to Pages 7-9 through 7-79, Controller Arrangement Forms for the following information:

a. Circuit cards required,
b. Placement of circuit cards, d
c. Mandatory position of switches (on or off) on circuit cards,
d. Controller options selected.

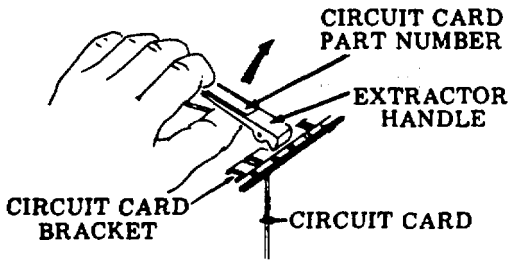
Using the Controller Arrangement Forms, check each controller in the station for the following:

a. Circuit cards are in their proper positions,
b. Switches on circuit cards are on or off (i.e., as entered on Controller Arrangement Form).

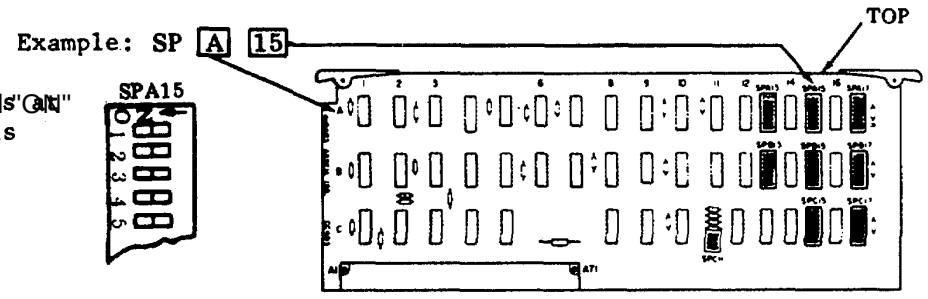
Extracting circuit cards from controller.

(1) Lift up on the extractor handles of the circuit card.

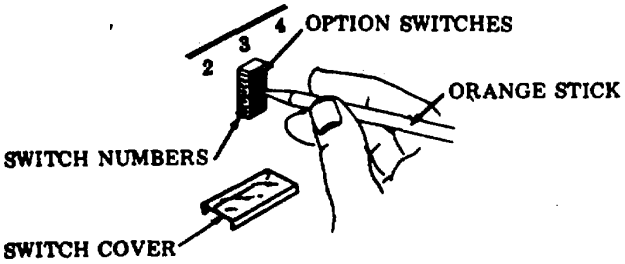
(2) Lift circuit card straight up.



Locating switch packs on circuit cards.

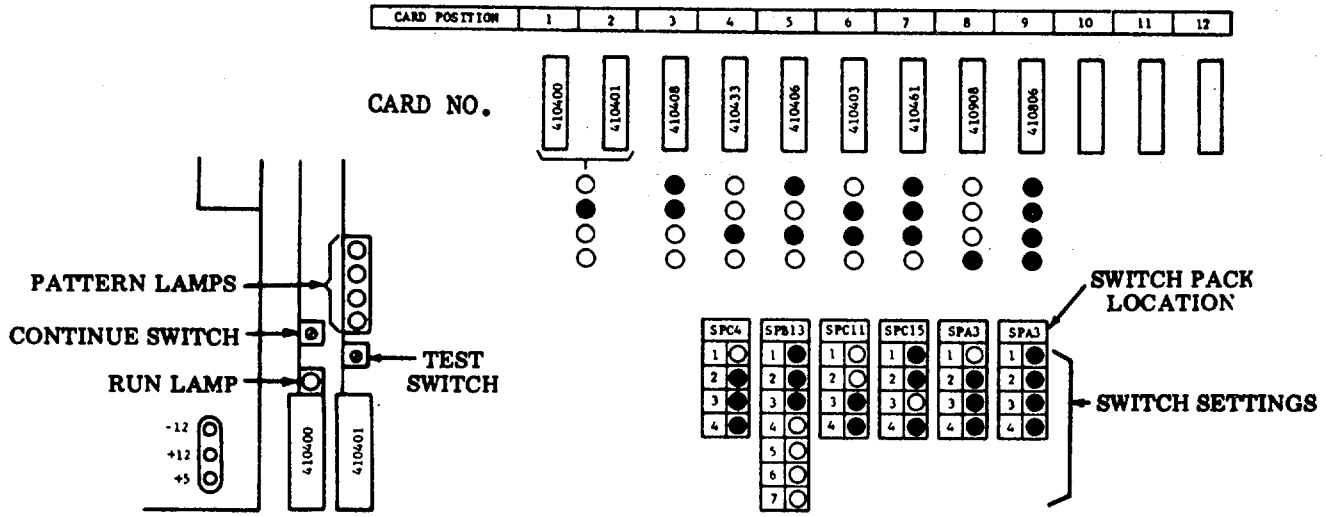


Activating options.



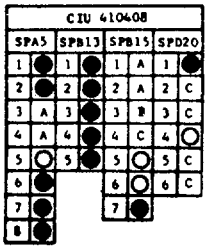
3. CONTROLLER ARRANGEMENT FORMS

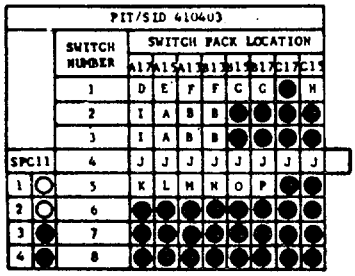
Controller 40C430/ABD/025 With 410408 and 410403 Circuit Cards



LIGHT PATTERNS
AND SWITCH POSITIONS
● "ON"
○ "OFF"

"CONTINUE"
LIGHT PATTERNS
NONE





Options

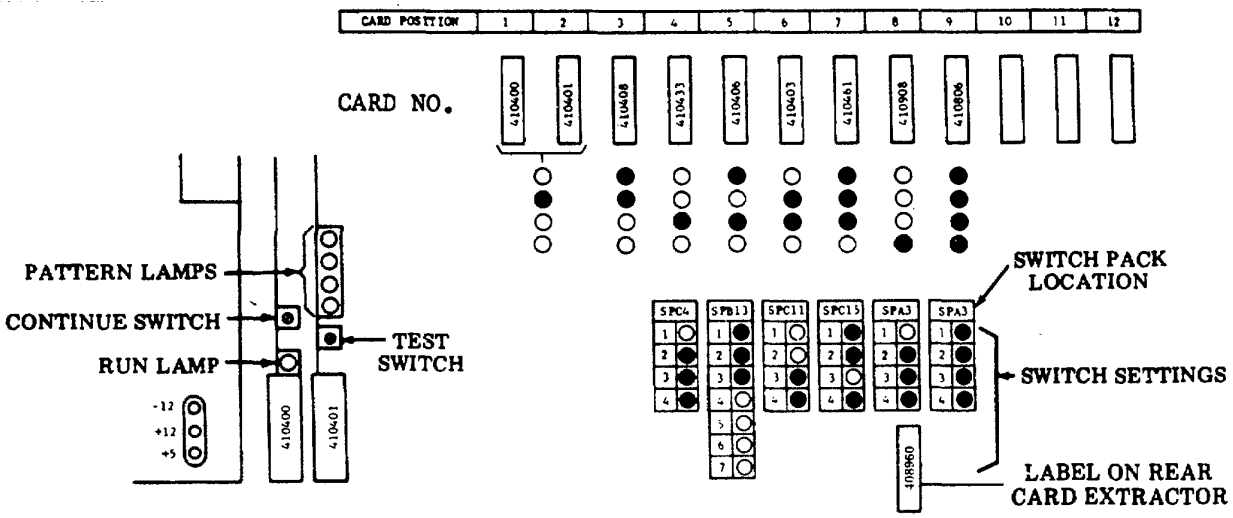
Refer to Pages 7-80 and 7-81, Option Switch Settings.

A. Line code
B. Transmit stop bit
C. Transmission mode
D. Pre-empt local on receipt of receive data
E. Substitute asterisk (*) for parity errored character
F. Line parity on ITA5 data
G. Transmit answer-back character on receipt of ENQ
H. Line feed printer on receipt of carriage return
I. Asynchronous transmission speeds
J. Answer-back character
If used, indicate answer-back character in box at right of chart.
K. Insert line feed after 79th character from display.
L. Mode KD switches to after sending
M. Line copied by printer in on-line mode
N. Send extended characters on-line in S/R mode
O. Allow sending only if ETX is on display
P. Mode KD switches to on receipt of ETX

A. GENERAL (Cont)

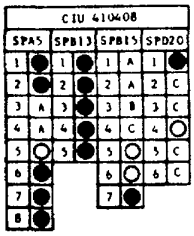
3. CONTROLLER ARRANGEMENT FORMS (Cont)

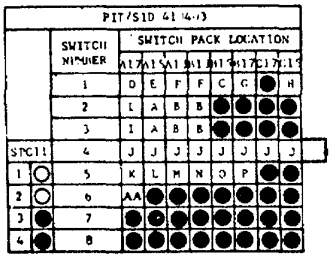
Controller 40C430/ABD/025 With 410408 and 410403 Circuit Cards and 408960 Modification Kit



LIGHT PATTERNS
AND SWITCH POSITIONS
● "ON"
○ "OFF"

"CONTINUE"
LIGHT PATTERNS
NONE



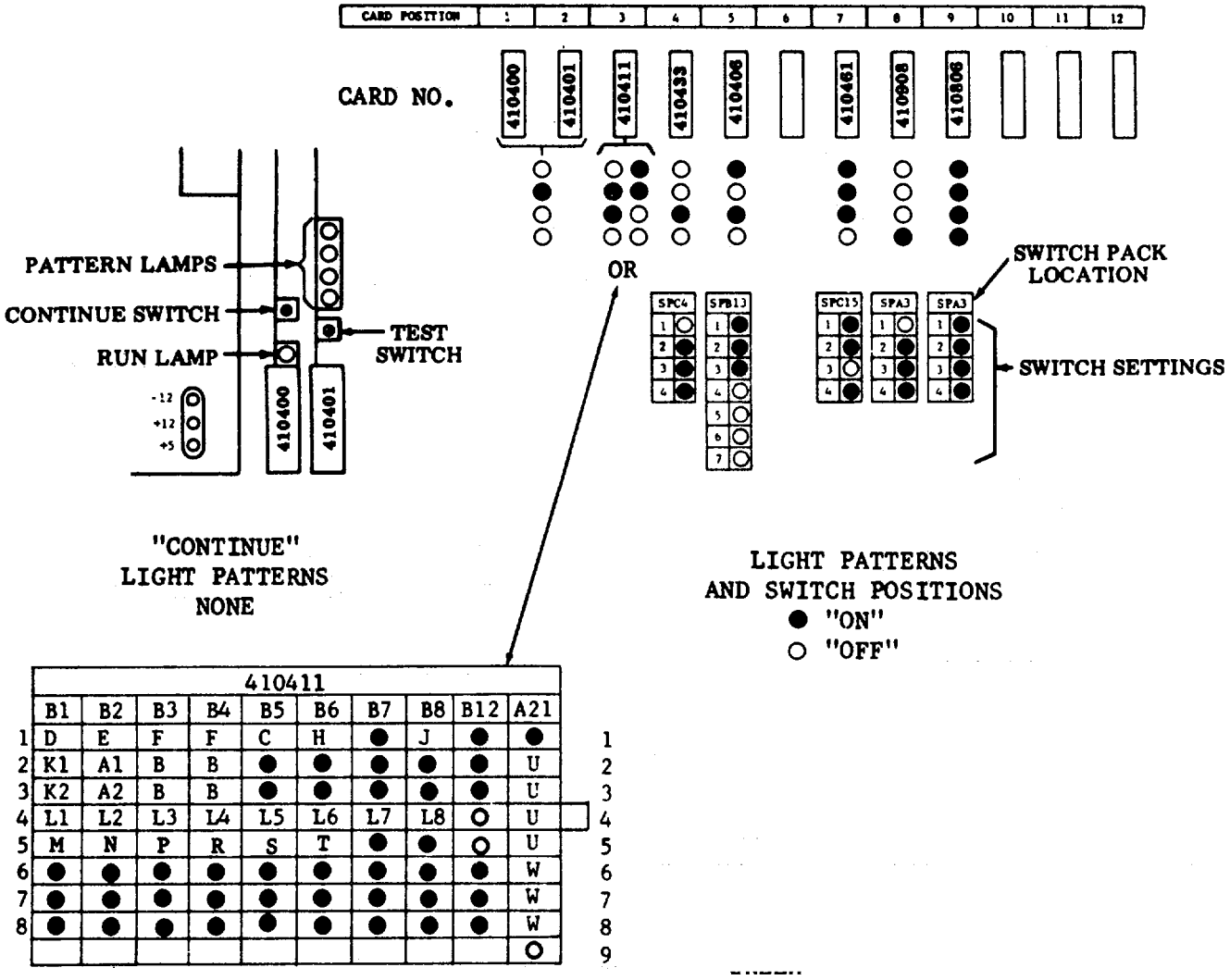


Options

Refer to Pages 7-82 and 7-83, Option Switch Setting.

A. Line code
B. Transmit stop bit
C. Transmission mode
D. Pre-empt local on receipt of receive data
E. Substitute asterisk (*) for parity errored character
F. Line parity on ITA5 data
G. Transmit answer-back character on receipt of ENQ
H. Line feed printer on receipt of carriage return
I. Asynchronous transmission speeds
J. Answer-back character
If used, indicate answer-back character in box at right of chart.
K. Insert line feed after 79th character from display.
L. Mode KD switches to after sending
M. Line copied by printer in on-line mode
N. Send extended characters on-line in S/R mode
O. Allow sending only if ETX is on display
P. Mode KD switches to on receipt of ETX
AA.. Printer ON/OFF Control

Controller 40OC430/ABD/025 With 410411 Circuit Card



410411

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	D	E	F	F	C	H	●	J	●	●	1
2	K1	A1	B	B	●	●	●	●	●	U	2
3	K2	A2	B	B	●	●	●	●	●	U	3
4	L1	L2	L3	L4	L5	L6	L7	L8	○	U	4
5	M	N	P	R	S	T	●	●	○	U	5
6	●	●	●	●	●	●	●	●	●	W	6
7	●	●	●	●	●	●	●	●	●	W	7
8	●	●	●	●	●	●	●	●	●	W	8
										○	9

Options

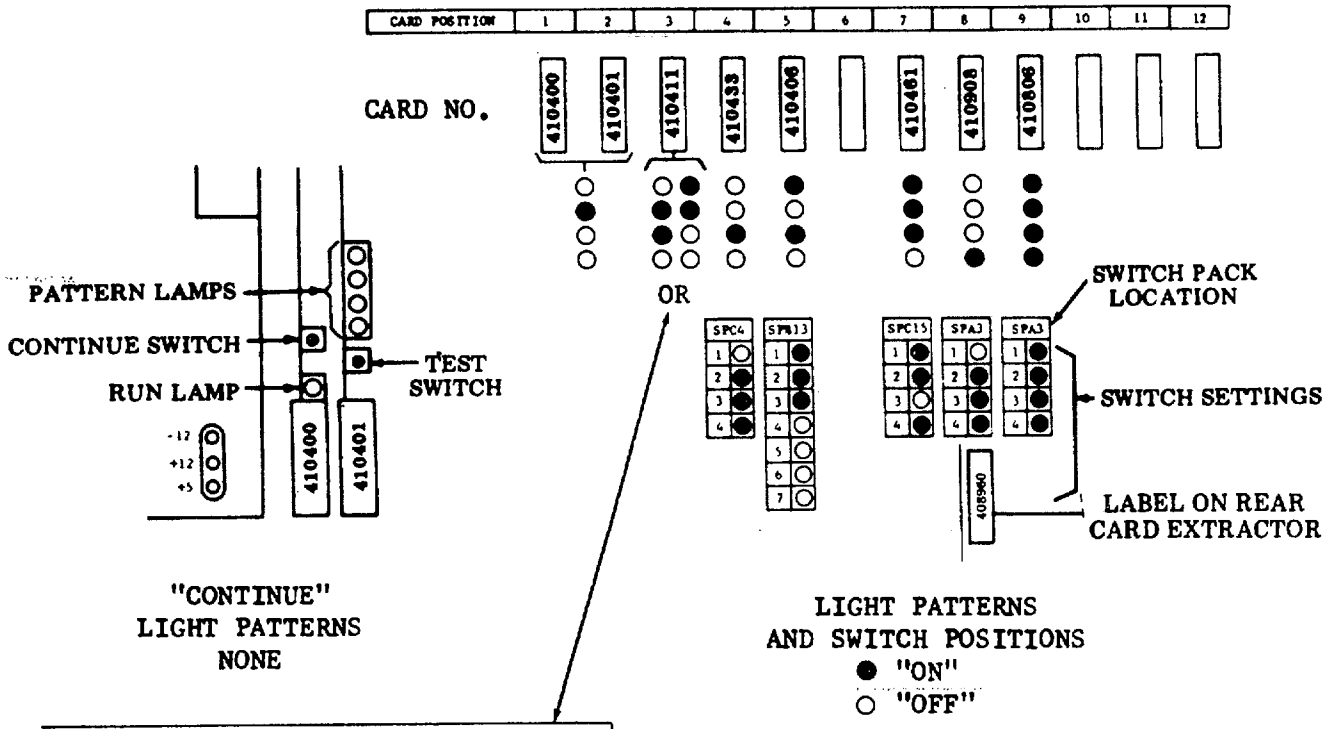
Refer to Pages 7-86 through 7-88, Option Switch Setting.

A1. Line code (Power Up)
A2. Line code (Option II)
B. Transmit stop bit
C. Transmission mode
D. Pre-empt local on receipt of receive data
E. Substitute asterisk (*) for parity errored character
F. Line parity on ITA5 data
H. Transmit answer-back character on receipt of ENQ
J. Line feed printer on receipt of carriage return
K1. Power up asynchronous transmission speed
K2. Option II asynchronous transmission speed
L1. Answer-back character -back
to If used, indicate answer
L8. character in box at right of chart
M. Insert line feed after 79th character from display
N. Mode KD switches to after sending
P. Line copied by printer in on-line mode
R. Send extended characters on-line in S/R mode
S. Allow sending only if ETX is on display
T. Mode KD switches to on receipt of ETX
U. High speed asynchronous baud rate
W. Low speed asynchronous baud rate

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C430/ABD/025 With 410411 Circuit Card and 408960 Modification Kit



410411

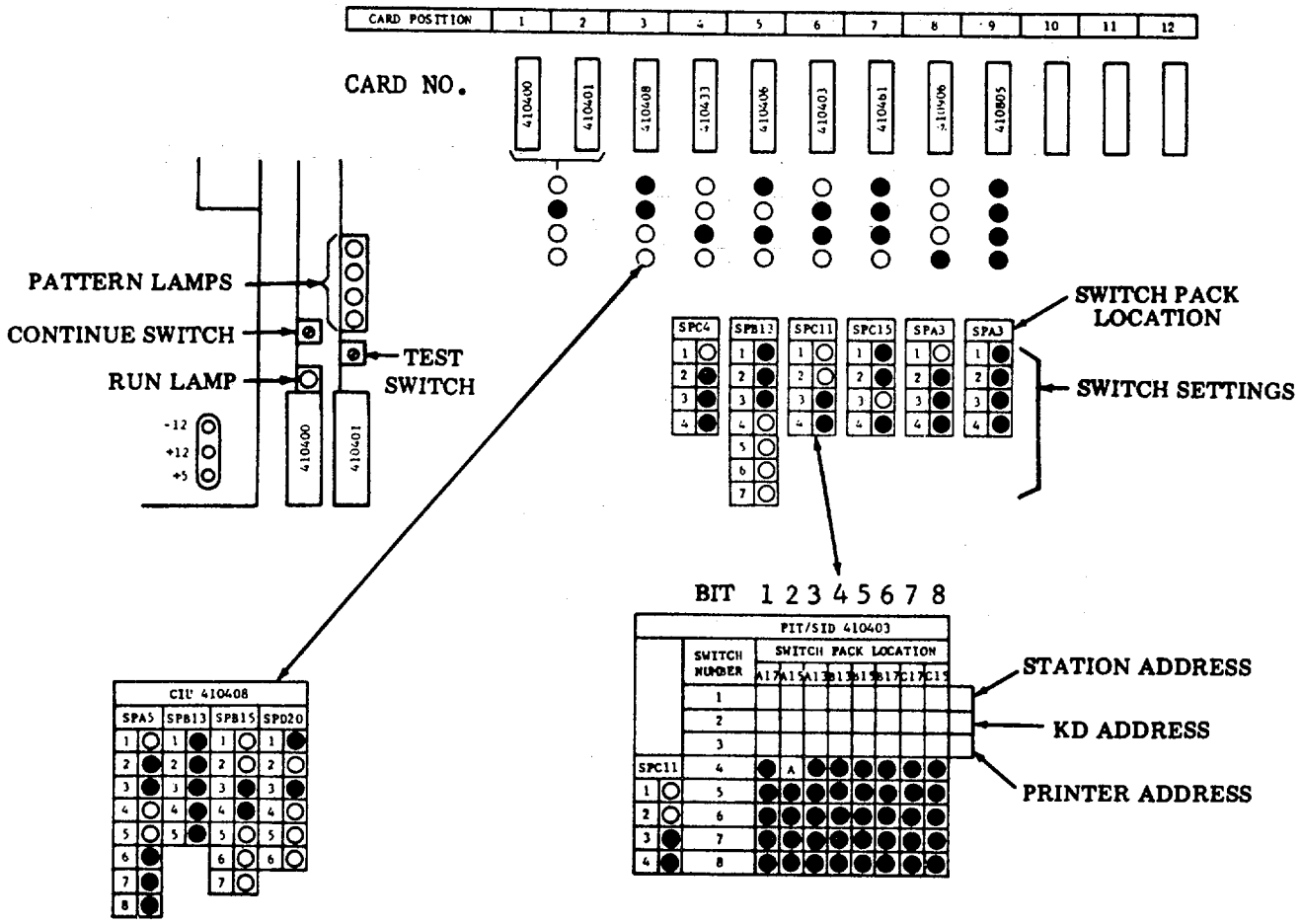
	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	D	E	F	F	C	H	●	J	●	●	1
2	K1	A1	B	B	●	●	●	●	●	U	2
3	K2	A2	B	B	●	●	●	●	●	U	3
4	L1	L2	L3	L4	L5	L6	L7	L8	○	U	4
5	M	N	P	R	S	T	●	●	○	U	5
6	AA	●	●	●	●	●	●	●	●	W	6
7	●	●	●	●	●	●	●	●	●	W	7
8	●	●	●	●	●	●	●	●	●	W	8
										○	9

Options

Refer to Pages 7-89 through 7-91, Option Switch Setting

A1. Line code (Power Up)
A2. Line code (Option II)
B. Transmit stop bit
C. Transmission mode
D. Pre-empt local on receipt of receive data
E. Substitute asterisk (*) for parity errored character
F. Line parity on ITA5 data
H. Transmit answer-back character on receipt of ENQ
J. Line feed printer on receipt of carriage return
K1. Power up asynchronous transmission speed
K2. Option II asynchronous transmission speed
L1. Answer-back character
to If used, indicate answer-back
L8. character in box at right of chart.
M. Insert line feed after 79th character from display.
N. Mode KD switches to after sending
P. Line copied by printer in on-line mode
R. Send extended characters on-line in S/R mode
S. Allow sending only if ETX is on display
T. Mode KD switches to on receipt ofETX
U. High speed asynchronous baud rate
W. Low speed asynchronous baud rate
AA.. Printer ON/OFF control

Controller 40C430/AAT/017 With 410408 and 410403 Circuit Cards



LIGHT PATTERNS AND SWITCH POSITIONS
● "ON"
○ "OFF"

"CONTINUE" LIGHT PATTERNS
NONE

(1) Determine terminal and device addresses from system installation information.

(2) Program the bits of each address per chart above. Program bit 8 for odd parity.
Mark = Switch Off
Space-= Switch On

(3) Record switch settings by writing o for mark, • for space in the appropriate box in chart above.

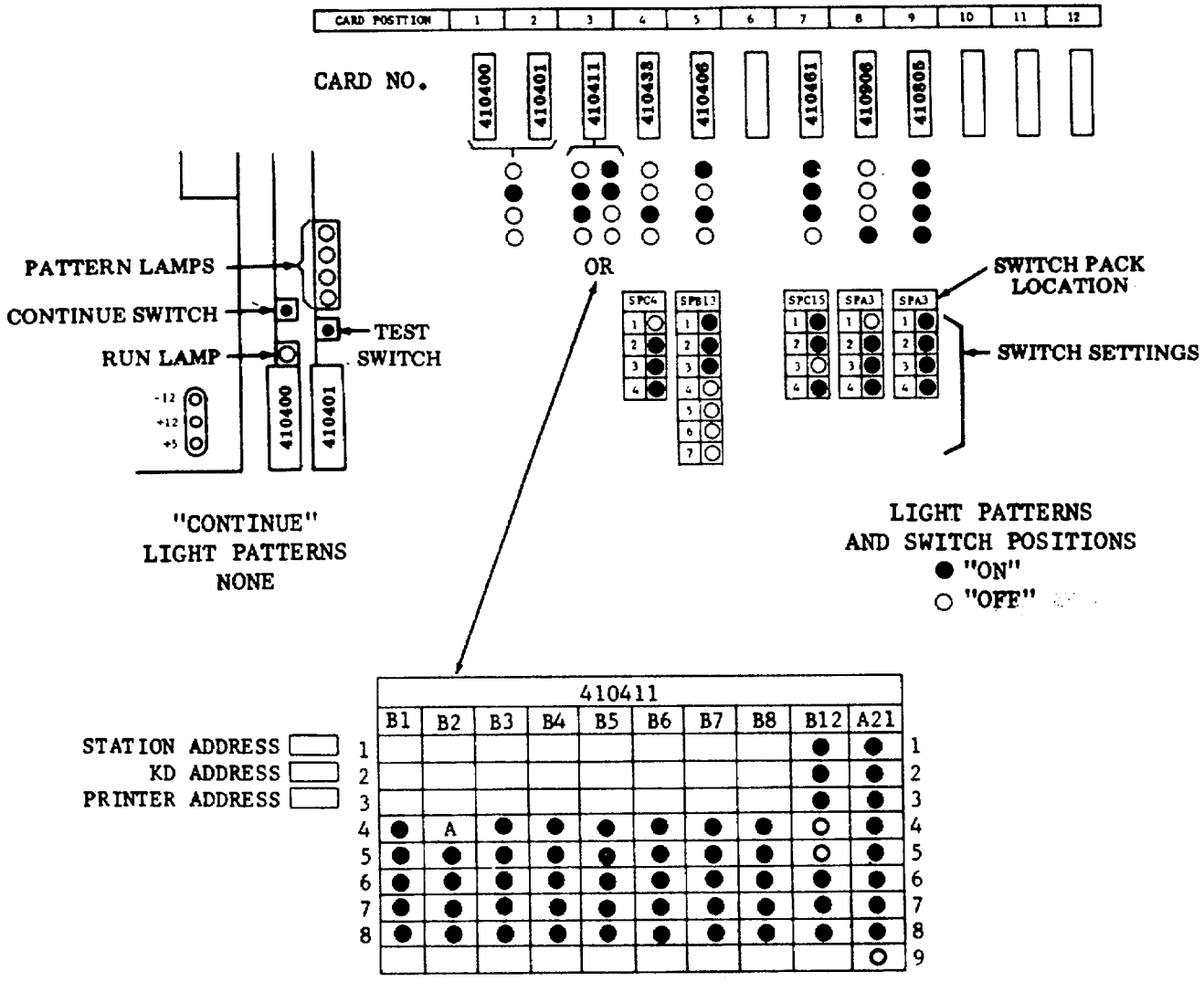
(4) Write the character programmed for each address in box at right of chart.

Option A (SPA15-4) switch off (o) inserts terminal and device address in first block of transmit data.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C430/AAT/017 With 410411 Circuit Card



(1) Determine terminal and device addresses from system installation information.

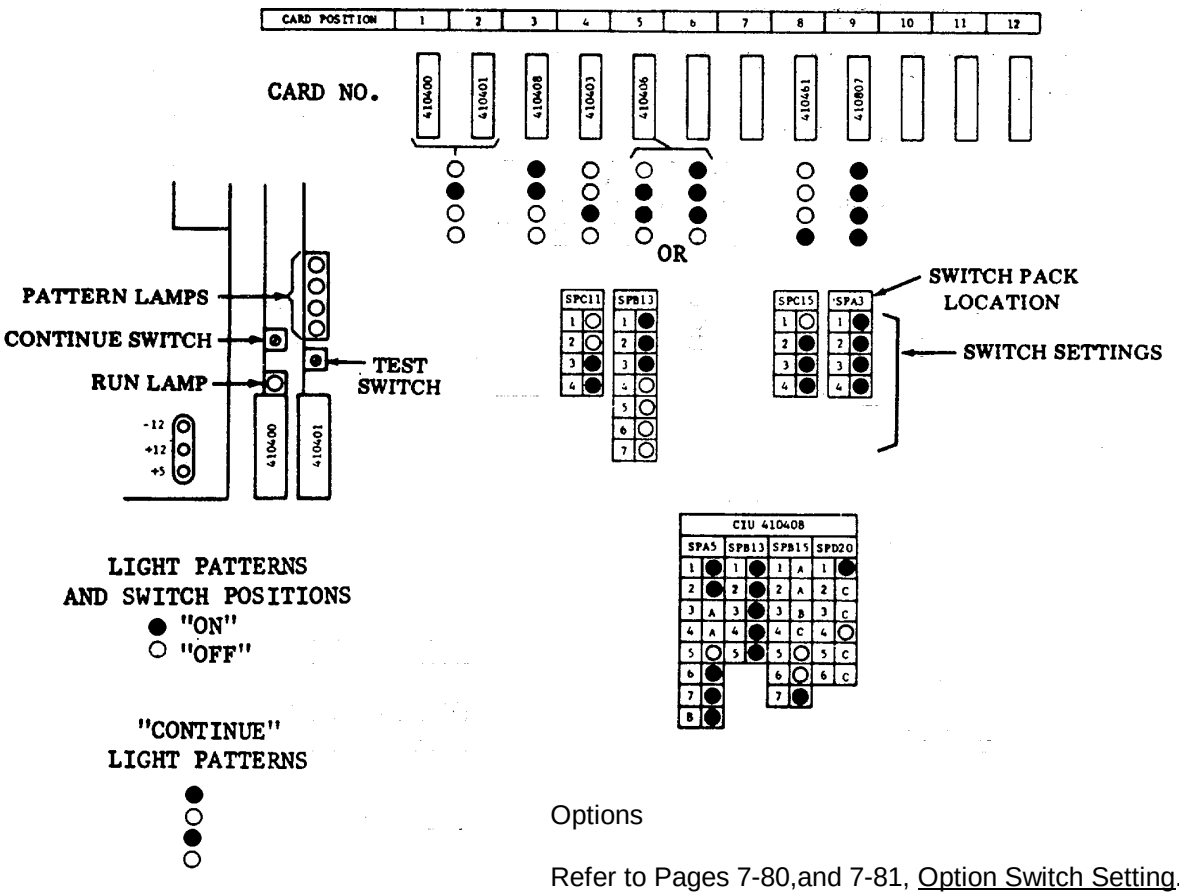
(2) Program the bits of each address per chart above. Program bit 8 for odd parity.
Mark = Switch Off
Space = Switch On

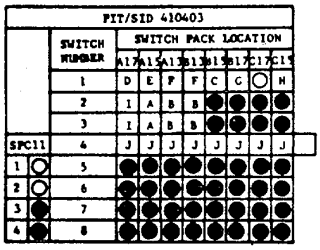
(3) Record switch settings by writing O for mark, · for space in the appropriate box in chart above.

(4) Write the character programmed for each address in box at right of chart.

Option A (SPB2-4) switch off (**O**) inserts terminal and device address in first block of transmit data.

Controller 40C431/ABE/026 With 410408 and 410403 Circuit Cards





Options

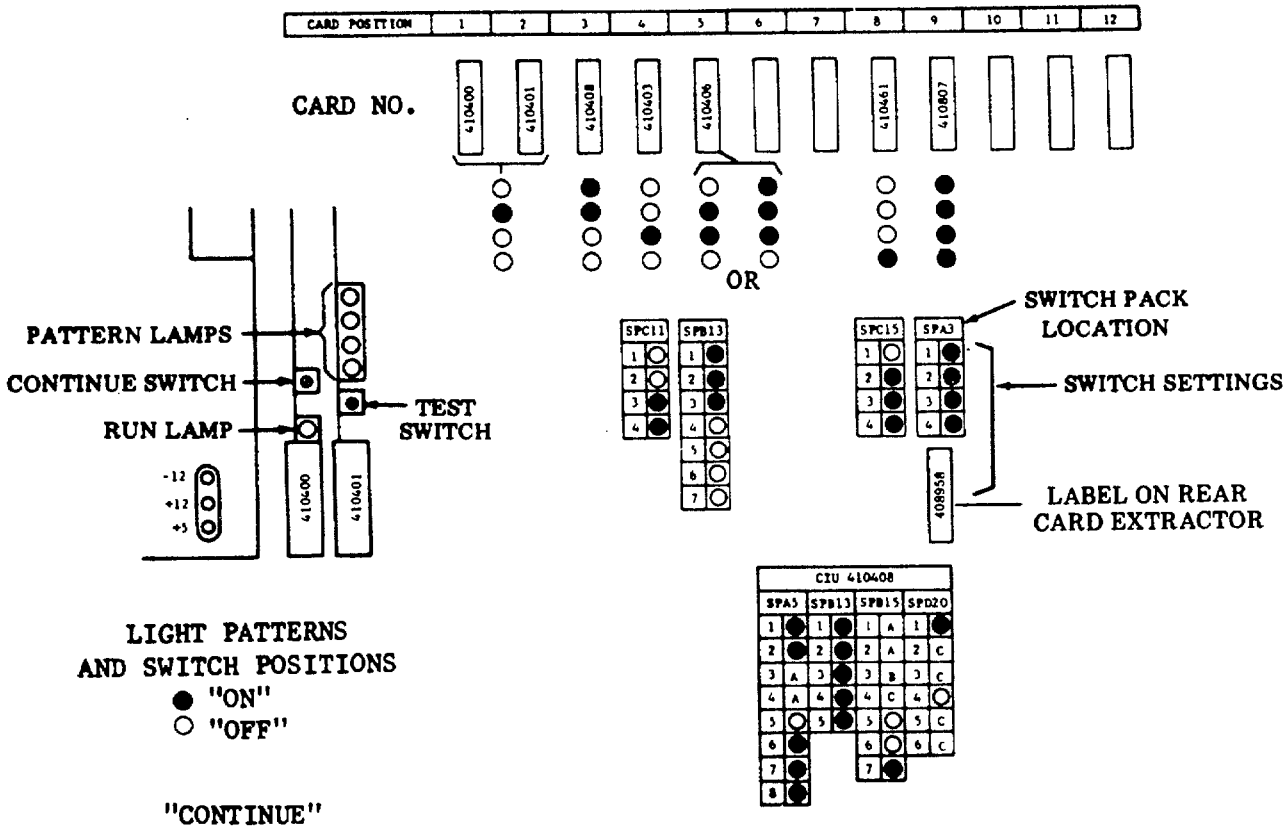
Refer to Pages 7-80,and 7-81, Option Switch Setting.

A. Line code
B. Transmit stop bit
C. Transmission mode
D. Pre-empt local on receipt of receive data
E. Substitute asterisk (*) for parity errored character
F. Line parity on ITA5 data
G. Transmit answer-back character on receipt of ENQ
H. Line feed printer on receipt of carriage return
I. Asynchronous transmission speeds
J. Answer-back character
If used, indicate answer-back character in box at right of chart.

A. GENERAL (Cont)

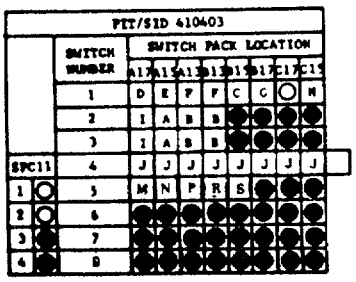
3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C431/ABE/026 With 410408 and 410403 Circuit Cards and 408958 Modification Kit



LIGHT PATTERNS
AND SWITCH POSITIONS
● "ON"
○ "OFF"

"CONTINUE"
LIGHT PATTERNS

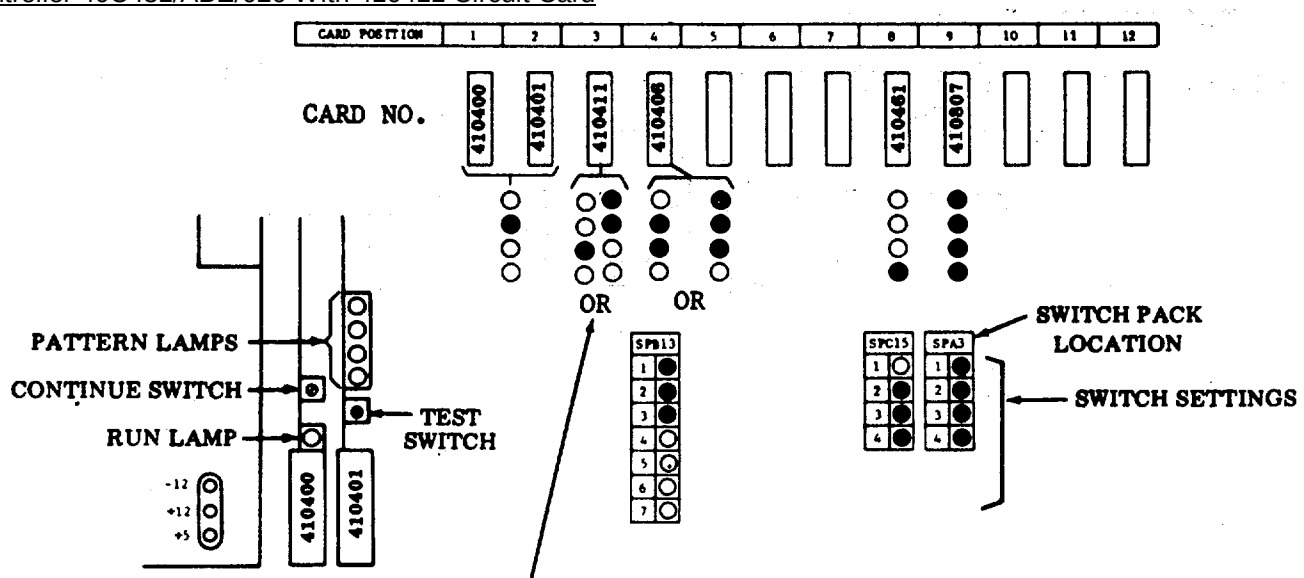


Options

Refer to Pages 7-84 and 7-85, Option Switch Setting.

A. Line code
B. Transmit stop bit
C. Transmission mode
D. Pre-empt local on receipt of receive data
E. Substitute asterisk (*) for parity errored character
F. Line parity on ITA5 data
G. Transmit answer-back character on receipt of ENQ
H. Line feed printer on receipt of carriage return
I. Asynchronous transmission speeds
J. Answer-back character
   If used, indicate answer-back character in box at right of chart.
M. Short buffer
N. Printer paging
P. Printer double line feed
R. Printer formout on ETX and paper sequence (LF, LF, N, N, N, N)
S. Printer formout on motor off

Controller 40C431/ABE/026 With 410411 Circuit Card



LIGHT PATTERNS
AND SWITCH POSITIONS
● "ON"
○ "OFF"

"CONTINUE"
LIGHT PATTERNS

410411

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	D	E	F	F	C	H	○	J	●	●	1
2	K1	A1	B	B	●	●	●	●	●	U	2
3	K2	A2	B	B	●	●	●	●	●	U	3
4	L1	L2	L3	L4	L5	L6	L7	L8	○	U	4
5	●	●	●	●	●	●	●	●	○	U	5
6	●	●	●	●	●	●	●	●	●	W	6
7	●	●	●	●	●	●	●	●	●	W	7
8	●	●	●	●	●	●	●	●	●	W	8
										○	9

Options

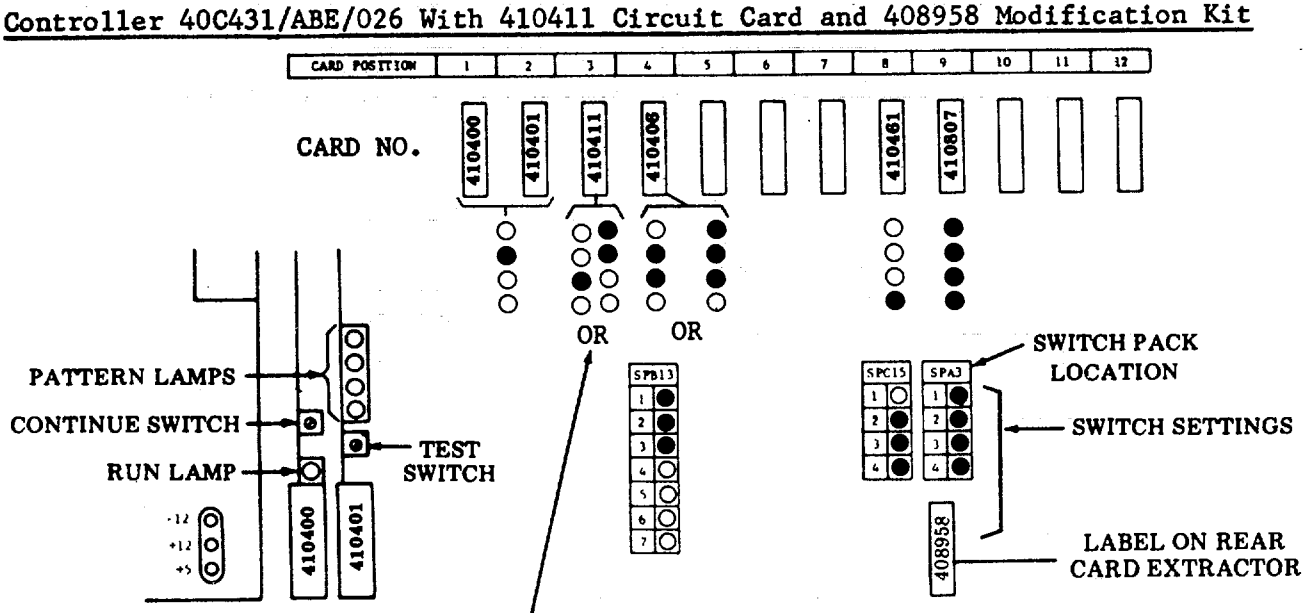
Refer to Pages 7-86 through 7-88, Option Switch Setting.

A1. Line code (Power Up)
A2. Line code (Option II)
B. Transmit stop bit
C. Transmission mode
D. Pre-empt local on receipt of receive data
E. Substitute asterisk (*) for parity errored character
F. Line parity on ITA5 data
H. Transmit answer-back character on receipt of ENQ
J. Line feed printer on receipt of carriage return
K1. Power up asynchronous transmission speed
K2. Option II asynchronous transmission speed
L1. Answer-back character
to If used, indicate answer-back:
L8. character in box at right of chart.
U. High speed asynchronous baud rate
W. Low speed asynchronous baud rate

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C431/ABE/026 With 410411 Circuit Card and 408958 Modification Kit



410411

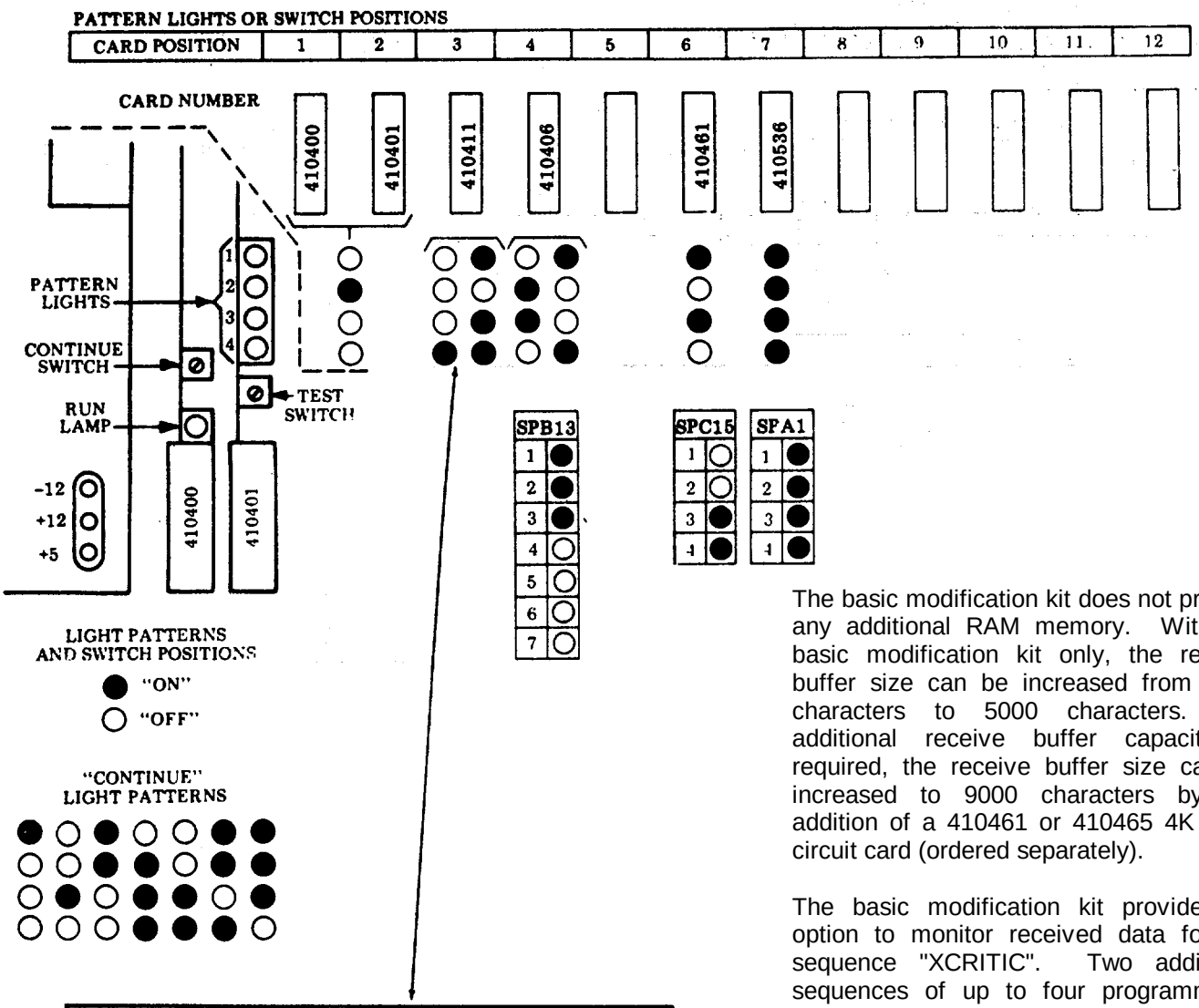
	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	D	E	F	F	C	H	○	J	●	●	1
2	K1	A1	B	B	●	●	●	●	●	U	2
3	K2	A2	B	B	●	●	●	●	●	U	3
4	L1	L2	L3	L4	L5	L6	L7	L8	○	U	4
5	M	N	P	R	S	●	●	●	○	U	5
6	●	●	●	●	●	●	●	●	●	W	6
7	●	●	●	●	●	●	●	●	●	W	7
8	●	●	●	●	●	●	●	●	●	W	8
										○	9

Options

Refer to Pages 7-92 and 7-93, Option Switch Setting.

A1. Line code (Power Up)
A2. Line code (Option II)
B. Transmit stop bit
C. Transmission mode
D. Pre-empt local on receipt of receive data
E. Substitute asterisk (*) for parity errored character
F. Line parity on ITA5 data
H. Transmit answer-back character on receipt of ENQ
J. Line feed printer on receipt of carriage return
K1. Power up asynchronous transmission speed
K2. Option II asynchronous transmission speed
L1. Answer-back character
to If used, indicate answer-back
L8. character in box at right of chart.
U. High speed asynchronous baud rate
W. Low speed asynchronous baud rate
M. Short buffer
N. Printer paging
P. Printer double line feed
R. Printer formout on ETX and paper sequence (LF, LF, N, N, N, N)

Controller 40C431/ABE/026 With 403019 Modification Kit



410411										
	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	O	BB	●	DD	U1	U2	EE	FF	O	●	1
2	E	F	G1	G2	H	J	O	L	O	ZZ	2
3	A1	B1	B2	C1	D1	O	O	O	●	ZZ	3
4	A2	B3	B4	C2	D2	O	O	O	●	ZZ	4
5	M	N	O	O	O	O	O	O	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										O	9

The basic modification kit does not provide any additional RAM memory. With the basic modification kit only, the receive buffer size can be increased from 1000 characters to 5000 characters. If additional receive buffer capacity is required, the receive buffer size can be increased to 9000 characters by the addition of a 410461 or 410465 4K RAM circuit card (ordered separately).

The basic modification kit provides an option to monitor received data for the sequence "XCRITIC". Two additional sequences of up to four programmable characters may be added by the addition of a 410403 PIT/SID circuit card (ordered separately).

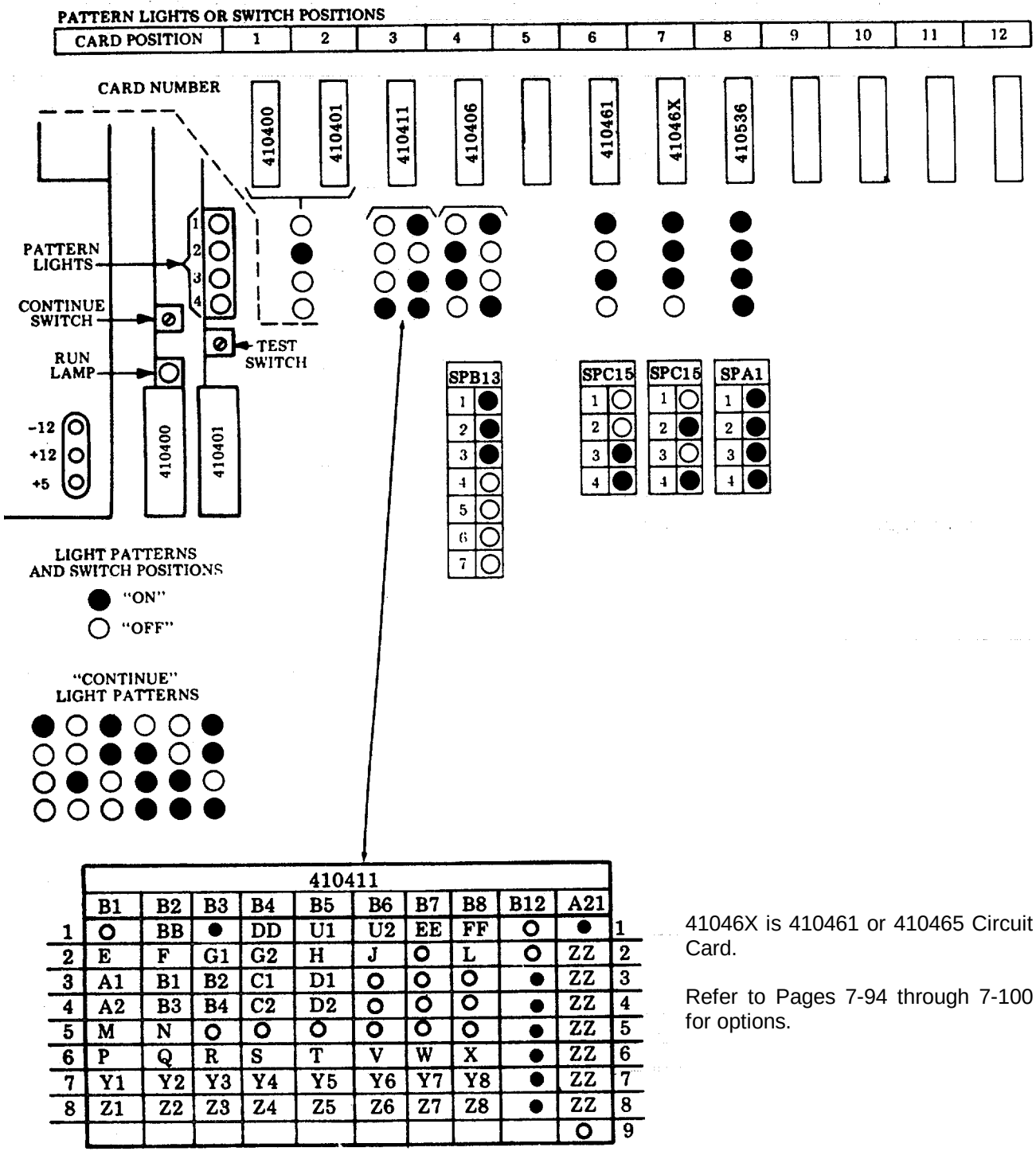
Refer to Pages 7-94 through 7-100 for options.

The identification label for this modification kit is found on the front left side of the controller, near the controller identification label.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C431/ABE/026 With 403019 Modification Kit and Additional RAM Circuit Card



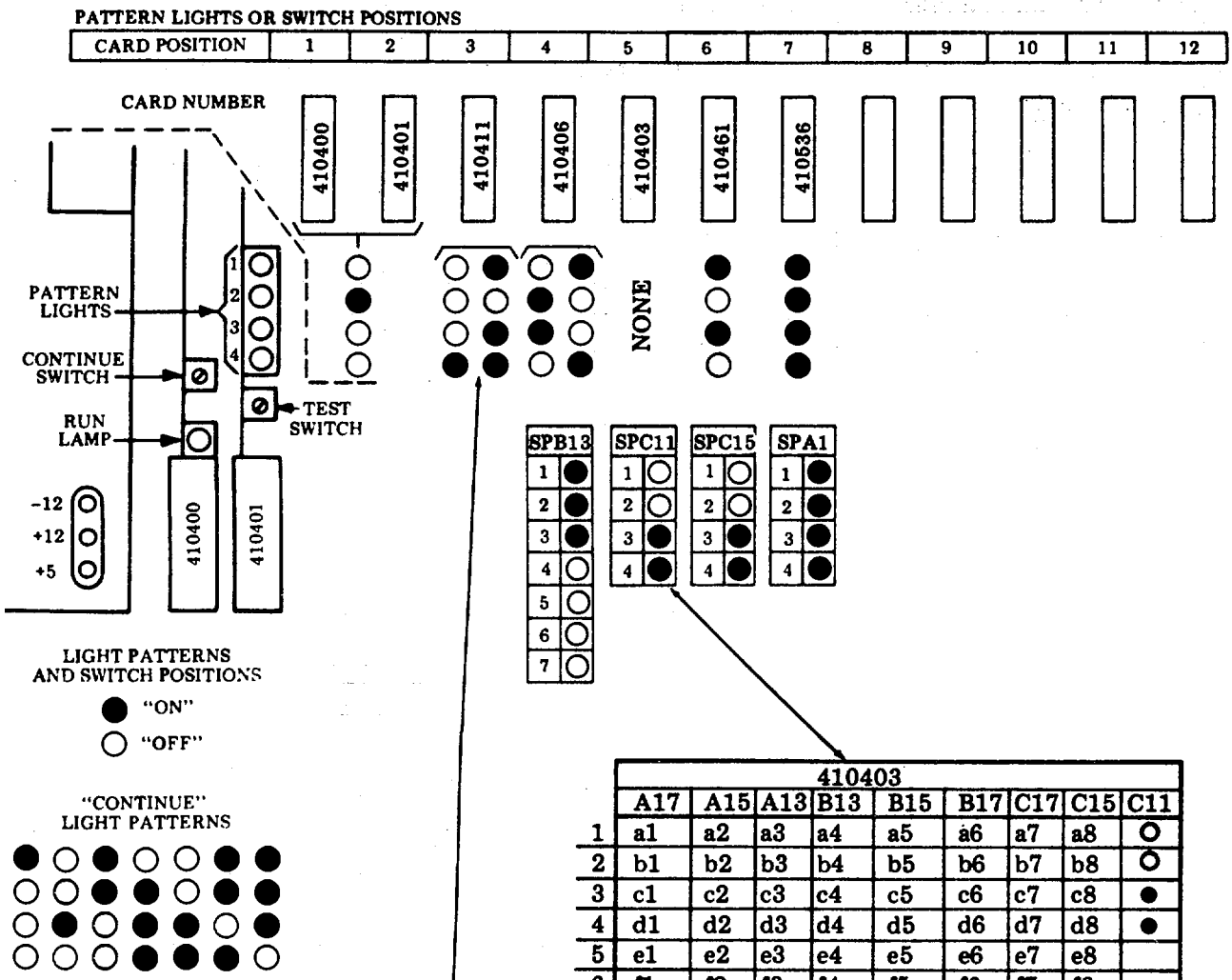
410411

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	O	BB	●	DD	U1	U2	EE	FF	O	●	1
2	E	F	G1	G2	H	J	O	L	O	ZZ	2
3	A1	B1	B2	C1	D1	O	O	O	●	ZZ	3
4	A2	B3	B4	C2	D2	O	O	O	●	ZZ	4
5	M	N	O	O	O	O	O	O	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										O	9

41046X is 410461 or 410465 Circuit Card.

Refer to Pages 7-94 through 7-100 for options.

Controller 40C431/ABE/026 With 403019 Modification Kit and 410403 Circuit Card



410403

	A17	A15	A13	B13	B15	B17	C17	C15	C11
1	a1	a2	a3	a4	a5	a6	a7	a8	○
2	b1	b2	b3	b4	b5	b6	b7	b8	○
3	c1	c2	c3	c4	c5	c6	c7	c8	●
4	d1	d2	d3	d4	d5	d6	d7	d8	●
5	e1	e2	e3	e4	e5	e6	e7	e8	
6	f1	f2	f3	f4	f5	f6	f7	f8	
7	g1	g2	g3	g4	g5	g6	g7	g8	
8	h1	h2	h3	h4	h5	h6	h7	h8	

Refer to Pages 7-94 through 7-100 for options.

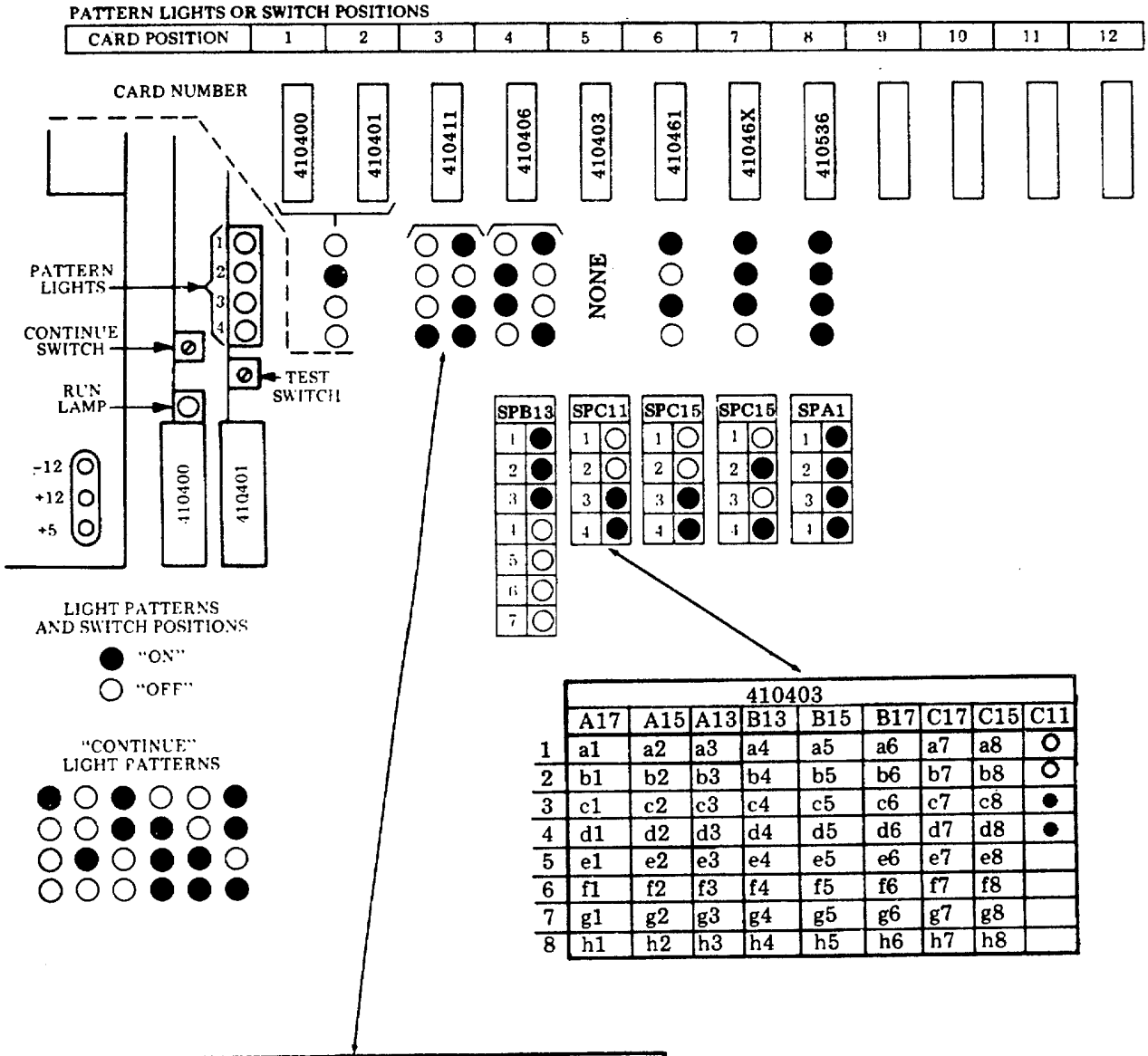
410411

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	○	BB	●	DD	U1	U2	EE	FF	○	●	1
2	E	F	G1	G2	H	J	○	L	○	ZZ	2
3	A1	B1	B2	C1	D1	○	○	○	●	ZZ	3
4	A2	B3	B4	C2	D2	○	○	○	●	ZZ	4
5	M	N	○	○	○	○	○	○	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										○	9

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C431/ABE/026 With 403019 Modification Kit With 410403 and Additional RAM Circuit Card



410403

	A17	A15	A13	B13	B15	B17	C17	C15	C11
1	a1	a2	a3	a4	a5	a6	a7	a8	○
2	b1	b2	b3	b4	b5	b6	b7	b8	○
3	c1	c2	c3	c4	c5	c6	c7	c8	●
4	d1	d2	d3	d4	d5	d6	d7	d8	●
5	e1	e2	e3	e4	e5	e6	e7	e8	
6	f1	f2	f3	f4	f5	f6	f7	f8	
7	g1	g2	g3	g4	g5	g6	g7	g8	
8	h1	h2	h3	h4	h5	h6	h7	h8	

410411

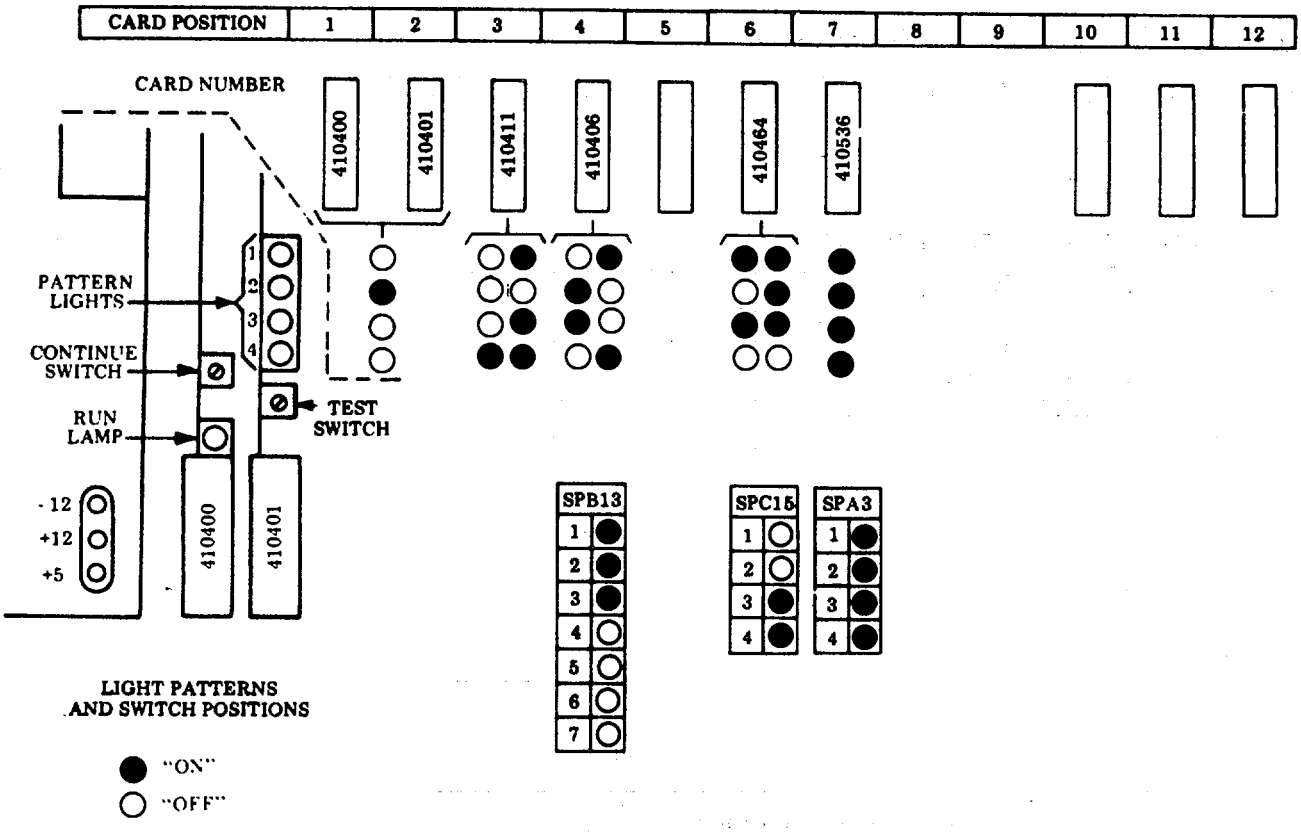
	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	○	BB	●	DD	U1	U2	EE	FF	○	●	1
2	E	F	G1	G2	H	J	○	L	○	ZZ	2
3	A1	B1	B2	C1	D1	○	○	○	●	ZZ	3
4	A2	B3	B4	C2	D2	○	○	○	●	ZZ	4
5	M	N	○	○	○	○	○	○	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										○	9

41046X is 410461 or 410465 Circuit Card.

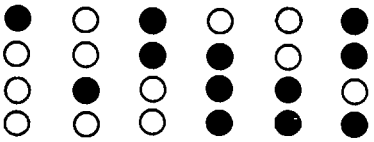
41046X is 410461 or 410465 Circuit Card.

Refer to Pages 7-94 through 7-100 for options.

Controller 40C431/AEM/103



"CONTINUE" LIGHT PATTERNS



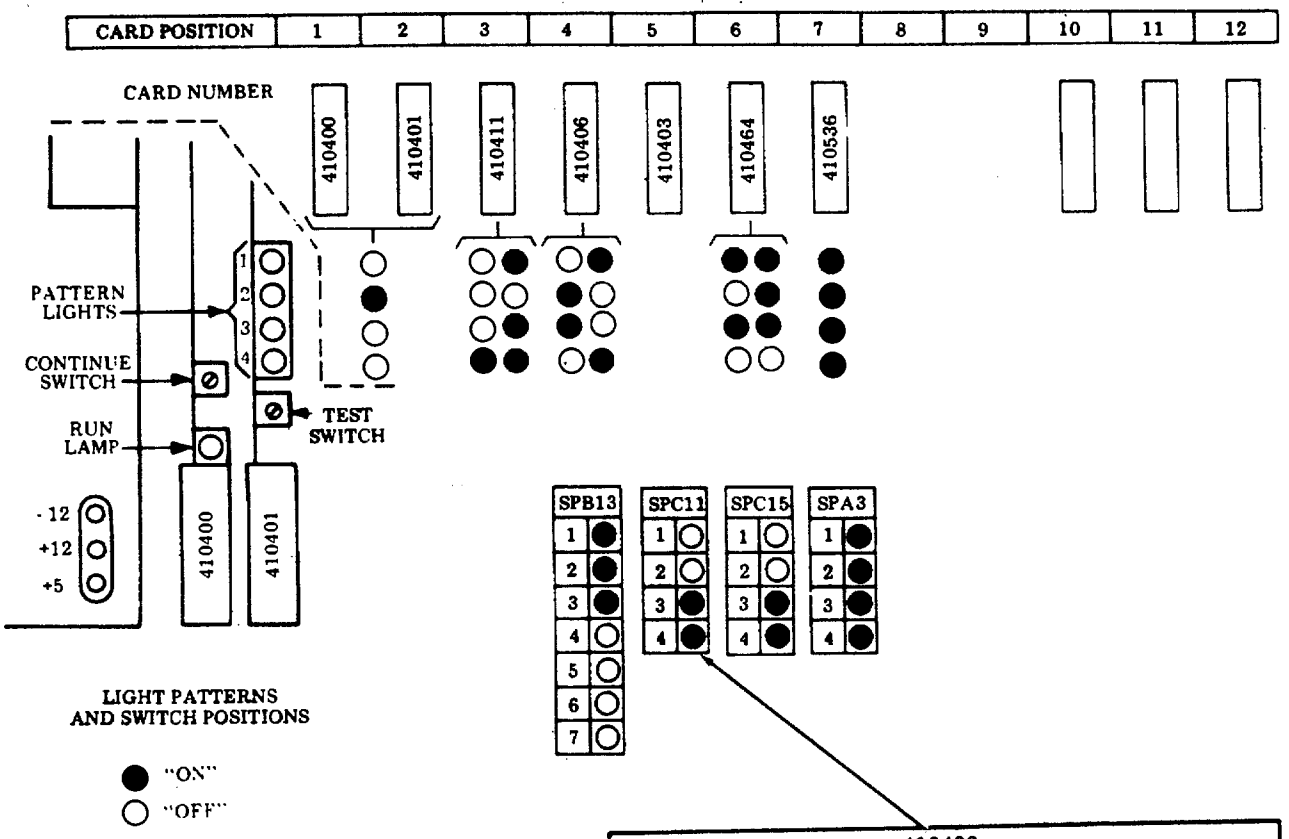
	410411										
	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	○	BB	●	DD	U1	U2	EE	FF	○	●	1
2	E	F	G1	G2	H	J	○	L	○	ZZ	2
3	A1	B1	B2	C1	D1	○	○	○	●	ZZ	3
4	A2	B3	B4	C2	D2	○	○	○	●	ZZ	4
5	M	N	○	○	○	○	○	○	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										○	9

Refer to Pages 7-94 through 7-100 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C431/AEM/103 With Additional 410403 Circuit Card



410403

	A17	A15	A13	B13	B15	B17	C17	C15	C11	
1	a1	a2	a3	a4	a5	a6	a7	●	○	
2	b1	b2	b3	b4	b5	b6	b7	●	○	
3	c1	c2	c3	c4	c5	c6	c7	●	●	
4	d1	d2	d3	d4	d5	d6	d7	●	●	
5	e1	e2	e3	e4	e5	e6	e7	●		
6	f1	f2	f3	f4	f5	f6	f7	●		
7	g1	g2	g3	g4	g5	g6	g7	●		
8	h1	h2	h3	h4	h5	h6	h7	●		

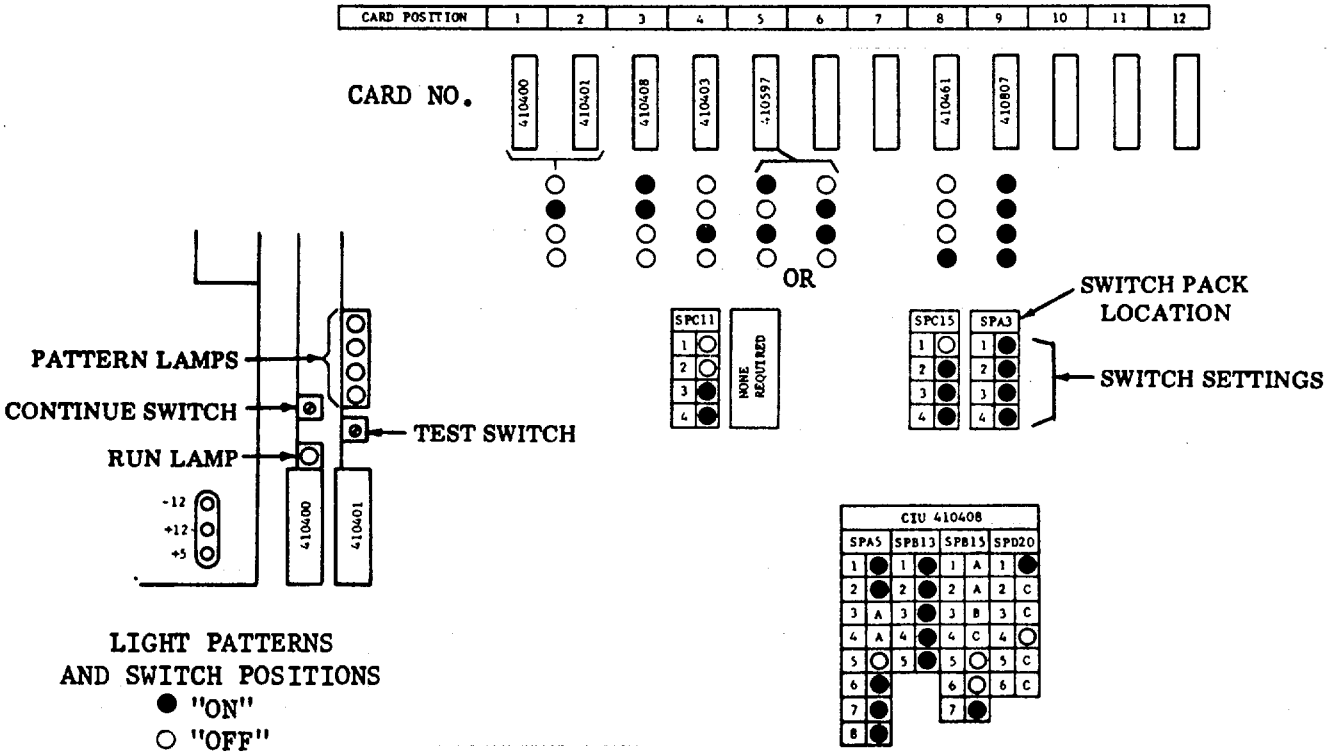
410411

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	○	BB	●	DD	U1	U2	EE	FF	○	●	1
2	E	F	G1	G2	H	J	○	L	○	ZZ	2
3	A1	B1	B2	C1	D1	○	○	○	●	ZZ	3
4	A2	B3	B4	C2	D2	○	○	○	●	ZZ	4
5	M	N	○	○	○	○	○	○	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										○	9

The 410403 circuit card in slot 5 is a separately edited card to provide detection of additional Urgent Traffic Sequences and is ordered separately.

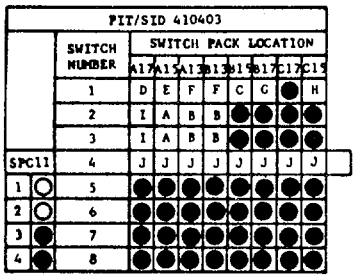
Refer to Pages 7-94 through 7-100 for options.

Controller 40C432/ABF/027 With 410408 and 410403 Circuit Cards



LIGHT PATTERNS
AND SWITCH POSITIONS
● "ON"
○ "OFF"

"CONTINUE"
LIGHT PATTERNS



Options

Refer to Pages 7-80 and 7-81, Option Switch Setting.

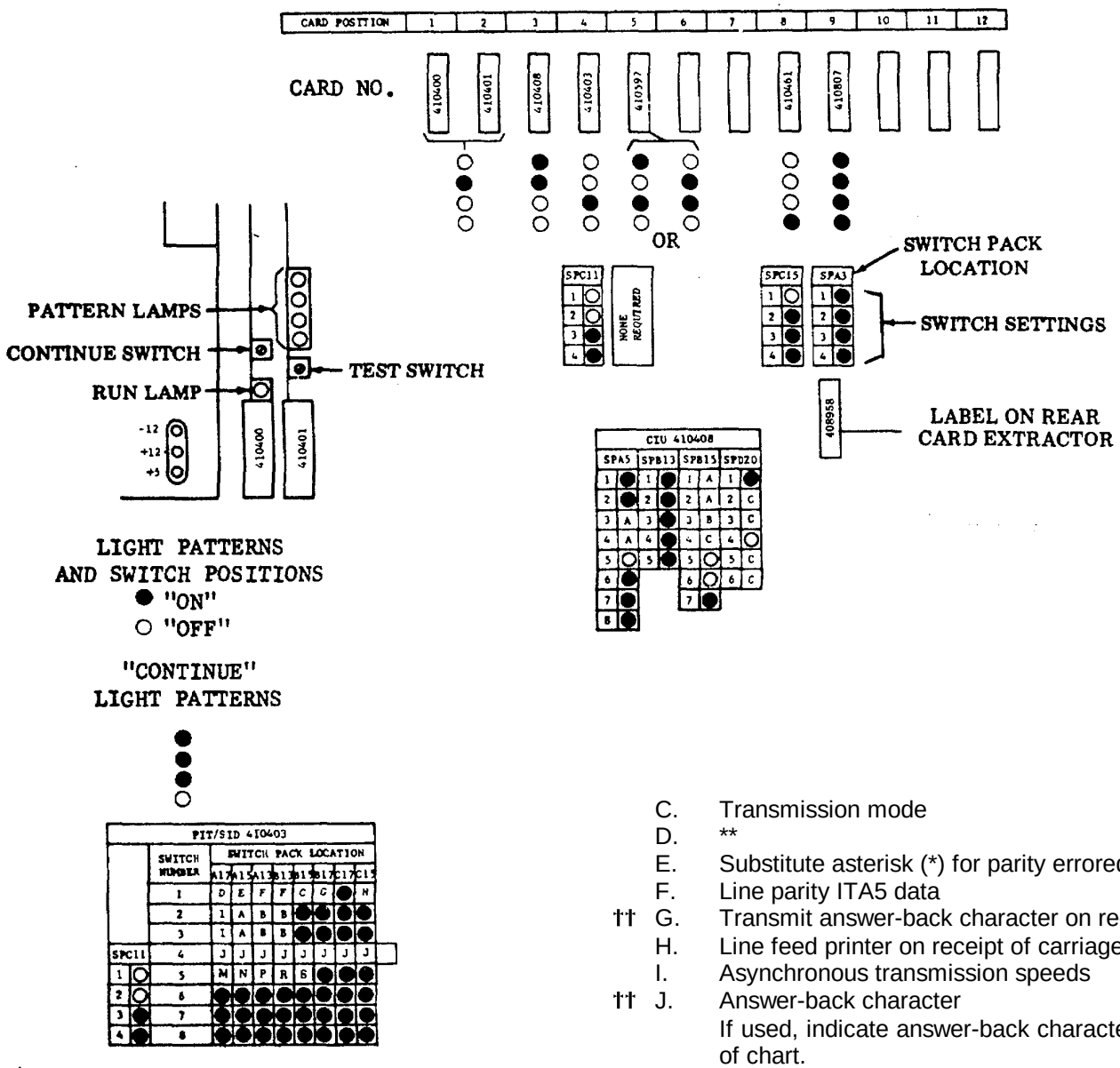
A. Line code
B. Transmit stop bit
C. Transmission mode
D. **
E. Substitute asterisk (*) for parity errored character
F. Line parity ITA5 data
††G. Transmit answer-back character on receipt of ENQ
H. Line feed printer on receipt of carriage return
I. Asynchronous transmission speeds
J. Answer-back character
If used, indicate answer-back character in box at right of chart.

**Not applicable to ROP. Leave switch on (•).
††Requires an additional line keyer card in interface and send line.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C432/ABF/027 With 410408 and 410403 Circuit Cards and 408958 Modification Kit



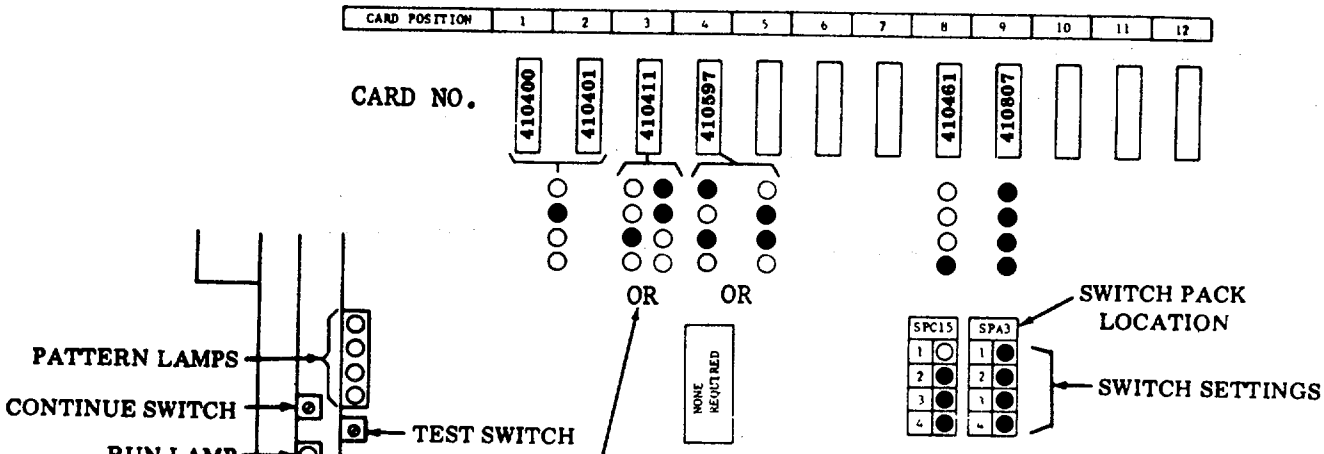
Options

Refer to Pages 7-84 and 7-85, Option Switch Setting.

A. Line code
B. Transmit stop bit
C. Transmission mode
D. **
E. Substitute asterisk (*) for parity errored character
F. Line parity ITA5 data
†† G. Transmit answer-back character on receipt of ENQ
H. Line feed printer on receipt of carriage return
I. Asynchronous transmission speeds
†† J. Answer-back character
If used, indicate answer-back character in box at right of chart.
M. Short buffer
N. Printer paging
P. Printer double line feed
R. Printer formout on ETX and paper sequence (LF, LF, N, N, N, N)
S. Printer formout on motor off

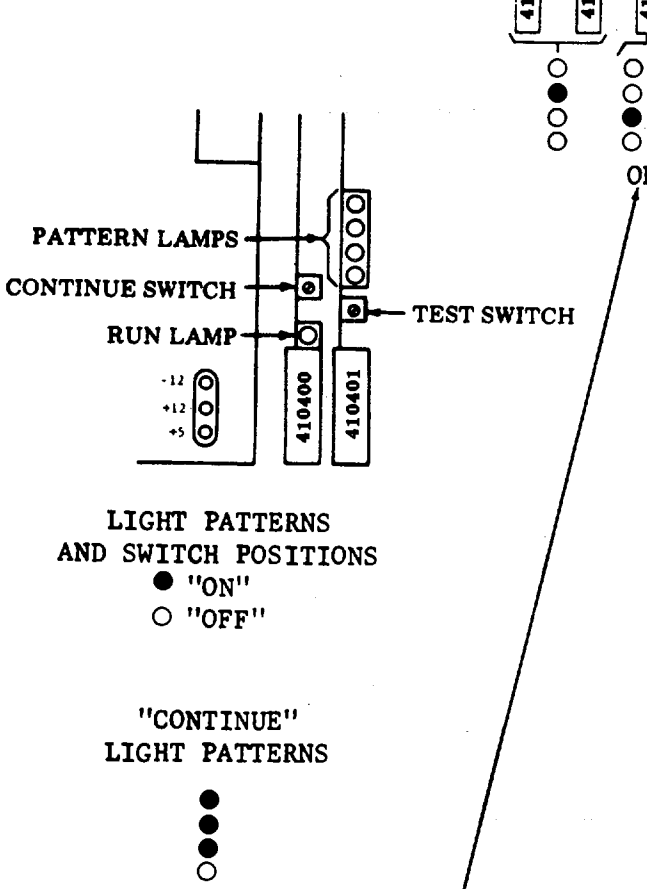
**Not applicable to ROP. Leave switch on (0).
†† Requires an additional line keyer card in interface and send line.

Controller 40C432/ABF/027 With 410411 Circuit Card



LIGHT PATTERNS
AND SWITCH POSITIONS
● "ON"
○ "OFF"

"CONTINUE"
LIGHT PATTERNS



410411

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	D	E	F	F	C	H	●	J	●	●	1
2	K1	A1	B	B	●	●	●	●	●	U	2
3	K2	A2	B	B	●	●	●	●	●	U	3
4	L1	L2	L3	L4	L5	L6	L7	L8	○	U	4
5	●	●	●	●	●	●	●	●	○	U	5
6	●	●	●	●	●	●	●	●	●	W	6
7	●	●	●	●	●	●	●	●	●	W	7
8	●	●	●	●	●	●	●	●	●	W	8
										○	9

Options

Refer to Pages 7-86 through 7-88, Option Switch Setting.

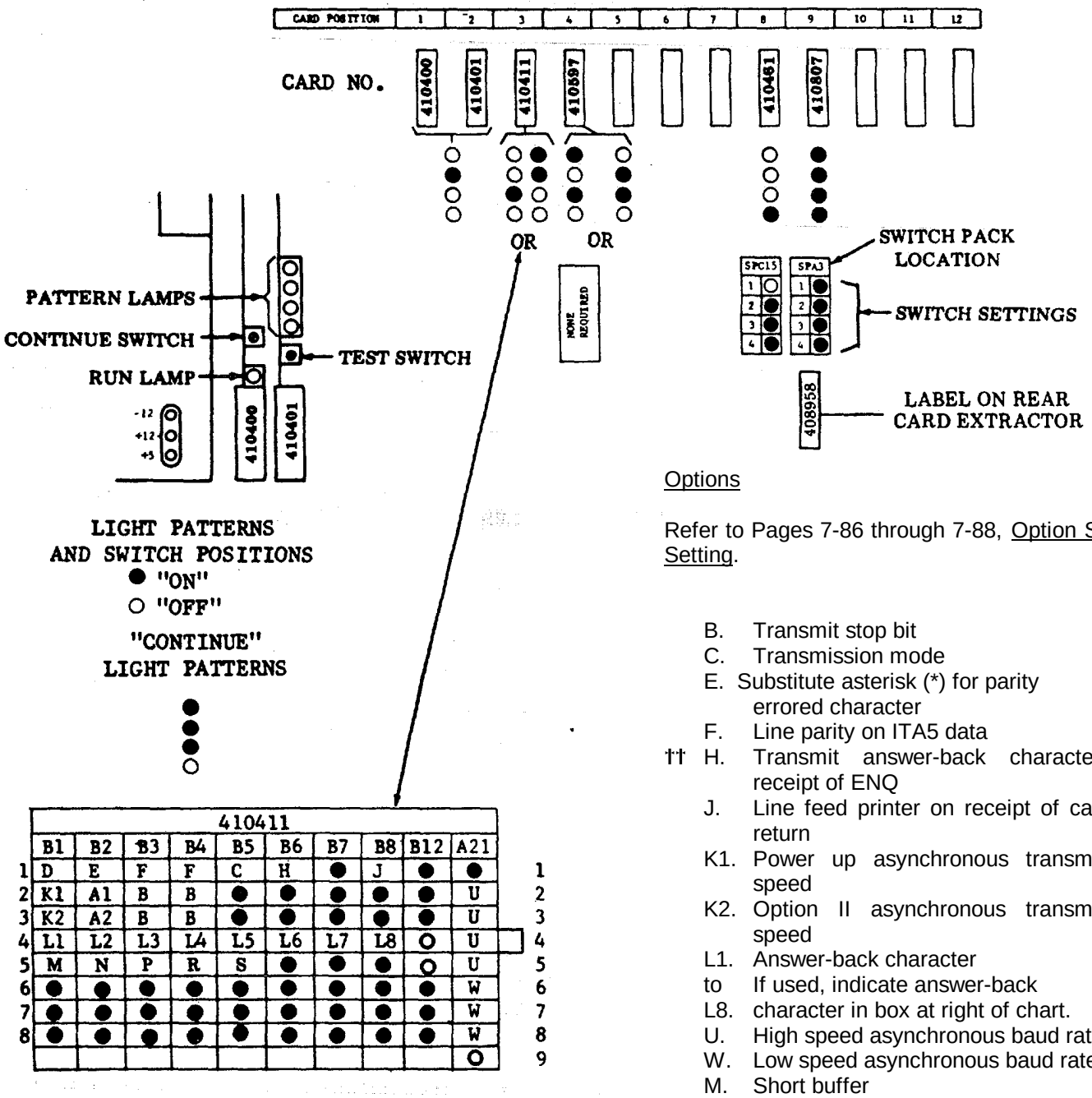
A1. Line code (Power Up)
A2. Line code (Option II)
B. Transmit stop bit
C. Transmission mode
D. **
E. Substitute asterisk (*) for parity errored character
F. Line parity on ITA5 data
†† H. Transmit answer-back character on receipt of ENQ
J. Line feed printer on receipt of carriage return
K1. Power up asynchronous transmission speed
K2. Option II asynchronous transmission speed
L1. Answer-back character
to If used, indicate answer-back
L8. character in box at right of chart.
U. High speed asynchronous baud rate
W. Low speed asynchronous baud rate

**Not applicable to ROP. Leave switch on (•).
††Requires an additional line keyer card in interface and send line.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C432/ABF/027 With 410411 Circuit Card and 408958 Modification Kit



410411

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	D	E	F	F	C	H	●	J	●	●	1
2	K1	A1	B	B	●	●	●	●	●	U	2
3	K2	A2	B	B	●	●	●	●	●	U	3
4	L1	L2	L3	L4	L5	L6	L7	L8	○	U	4
5	M	N	P	R	S	●	●	●	○	U	5
6	●	●	●	●	●	●	●	●	●	W	6
7	●	●	●	●	●	●	●	●	●	W	7
8	●	●	●	●	●	●	●	●	●	W	8
										○	9

Options

Refer to Pages 7-92 and 7-93 Option Switch Setting.

A1. Line code (Power Up)
A2. Line code (Option II)

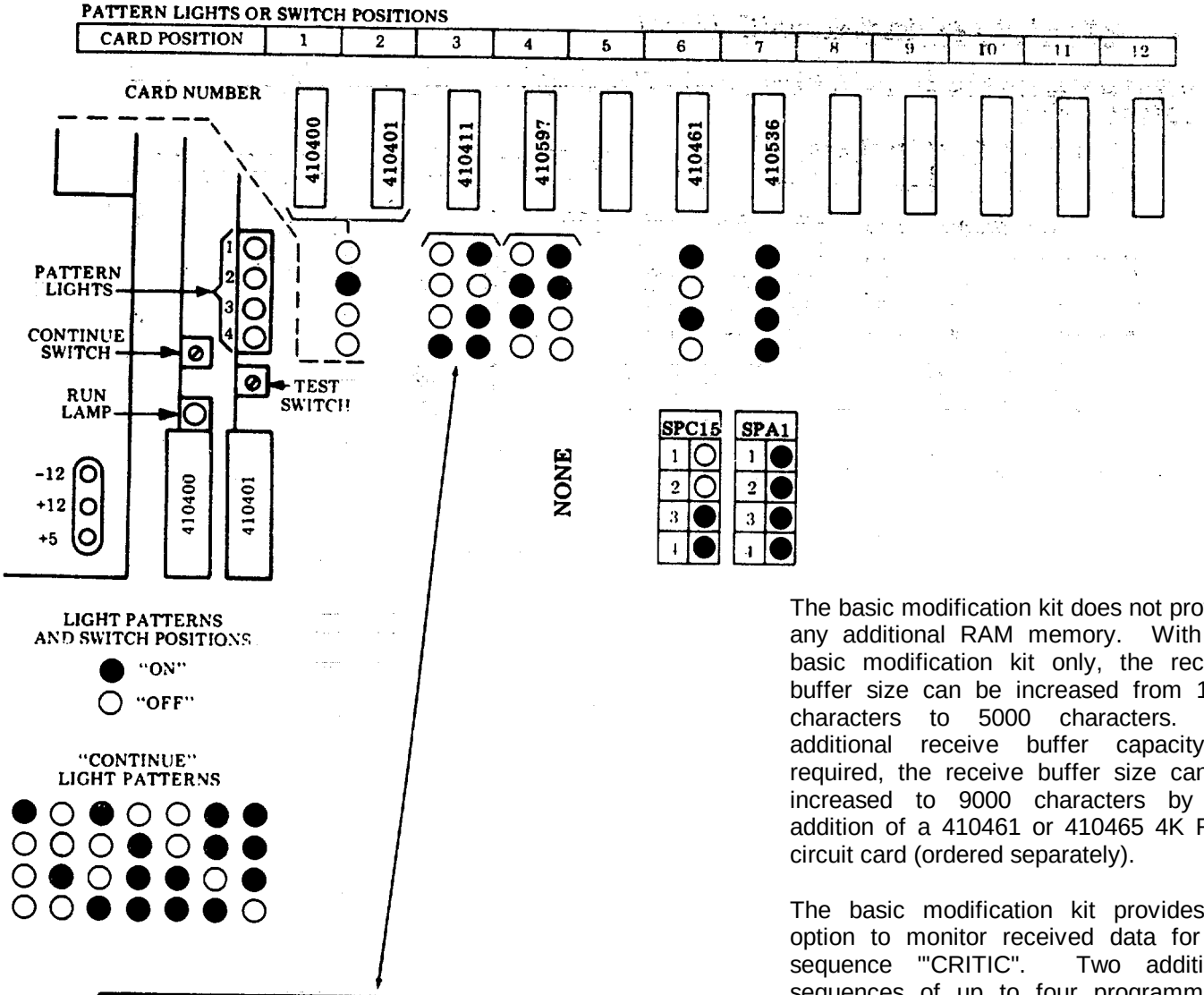
Options

Refer to Pages 7-86 through 7-88, Option Switch Setting.

B. Transmit stop bit
C. Transmission mode
E. Substitute asterisk (*) for parity errored character
F. Line parity on ITA5 data
†† H. Transmit answer-back character on receipt of ENQ
J. Line feed printer on receipt of carriage return
K1. Power up asynchronous transmission speed
K2. Option II asynchronous transmission speed
L1. Answer-back character
to If used, indicate answer-back
L8. character in box at right of chart.
U. High speed asynchronous baud rate
W. Low speed asynchronous baud rate
M. Short buffer
N. Printer paging
P. Printer double line feed
R. Printer formout on ETX and paper sequence (LLF, N. N, N. N)
S. Printer formout on motor off

**Not applicable to ROP. Leave switch on (•).
††Requires an additional line keyer card in interface and send line.

Controller 40C432/ABF/027 With 403019 Modification Kiti



410411											
	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	O	BB	●	DD	U1	U2	EE	FF	O	●	1
2	O	F	G1	G2	H	J	●	L	O	ZZ	2
3	A1	B1	B2	C1	D1	O	O	O	●	ZZ	3
4	A2	B3	B4	C2	D2	O	O	O	●	ZZ	4
5	O	N	O	O	O	O	O	O	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										O	9

The basic modification kit does not provide any additional RAM memory. With the basic modification kit only, the receive buffer size can be increased from 1000 characters to 5000 characters. If additional receive buffer capacity is required, the receive buffer size can be increased to 9000 characters by the addition of a 410461 or 410465 4K RAM circuit card (ordered separately).

The basic modification kit provides an option to monitor received data for the sequence '"CRITIC". Two additional sequences of up to four programmable characters may be added by the addition of a 410403 PIT/SID circuit card (ordered separately).

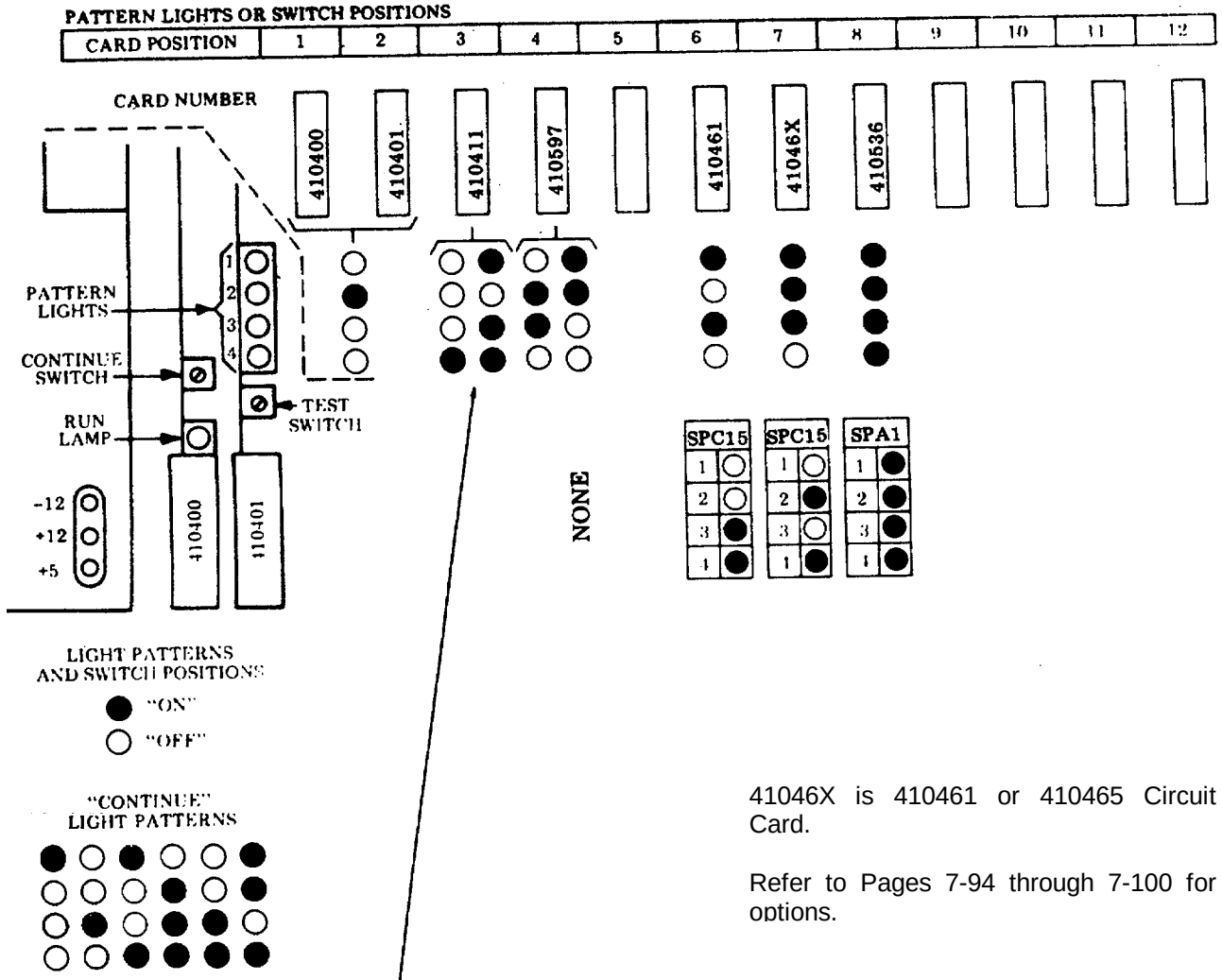
Refer to Pages 7-94 through 7-100 for options.

The identification label for this modification kit is found on the front left side of the controller, near the controller identification label.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C432/ABF/027 With 403019 Modification Kit With Additional RAM Circuit Card



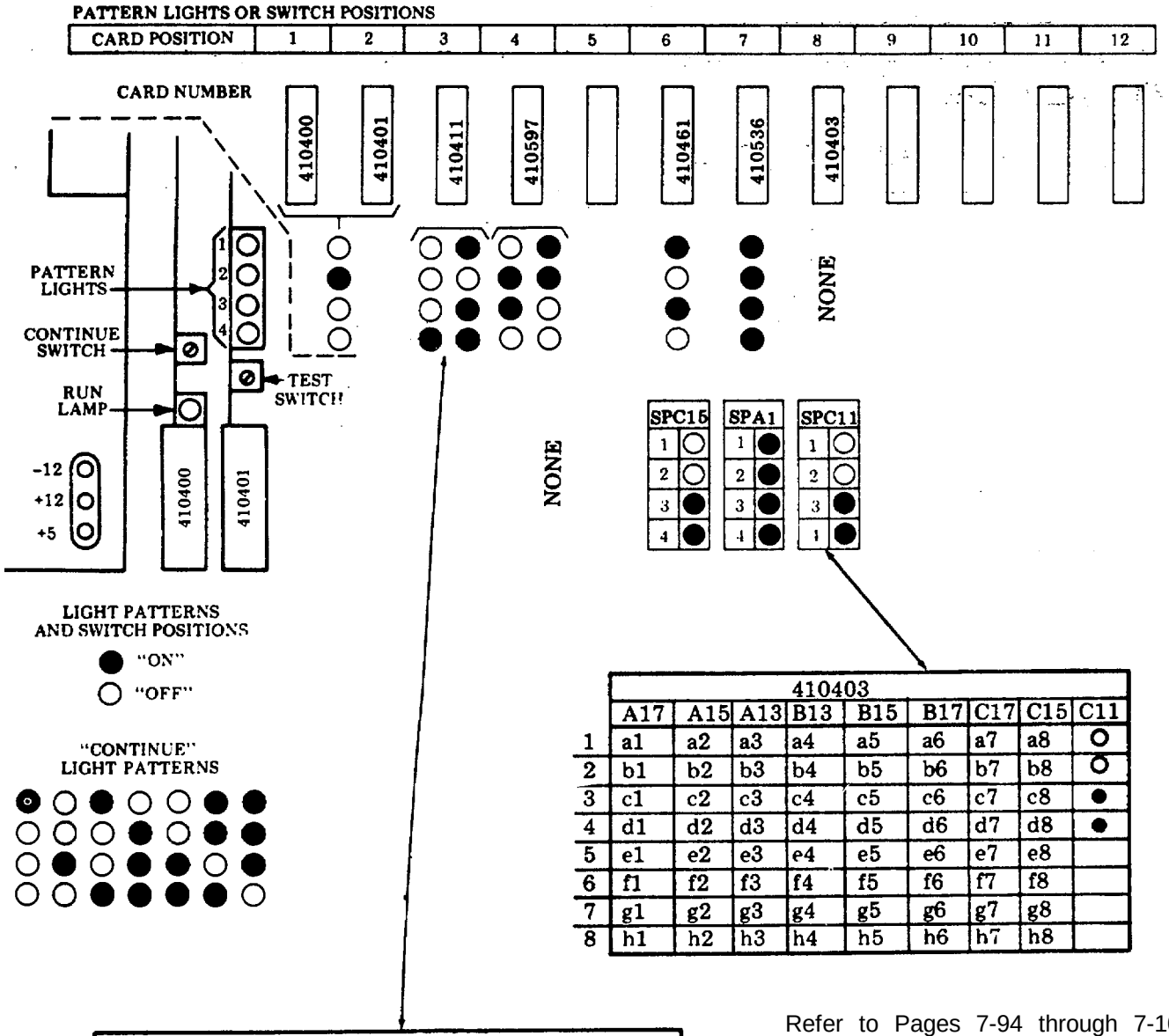
41046X is 410461 or 410465 Circuit Card.

Refer to Pages 7-94 through 7-100 for options.

410411

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	O	BB	●	DD	U1	U2	EE	FF	O	●	1
2	O	F	G1	G2	H	J	●	L	O	ZZ	2
3	A1	B1	B2	C1	D1	O	O	O	●	ZZ	3
4	A2	B3	B4	C2	D2	O	O	O	●	ZZ	4
5	O	N	O	O	O	O	O	O	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										O	9

Controller 40C432/ABF/027 With 403019 Modification Kit and 410403 Circuit Card



410403

	A17	A15	A13	B13	B15	B17	C17	C15	C11
1	a1	a2	a3	a4	a5	a6	a7	a8	○
2	b1	b2	b3	b4	b5	b6	b7	b8	○
3	c1	c2	c3	c4	c5	c6	c7	c8	●
4	d1	d2	d3	d4	d5	d6	d7	d8	●
5	e1	e2	e3	e4	e5	e6	e7	e8	
6	f1	f2	f3	f4	f5	f6	f7	f8	
7	g1	g2	g3	g4	g5	g6	g7	g8	
8	h1	h2	h3	h4	h5	h6	h7	h8	

410411

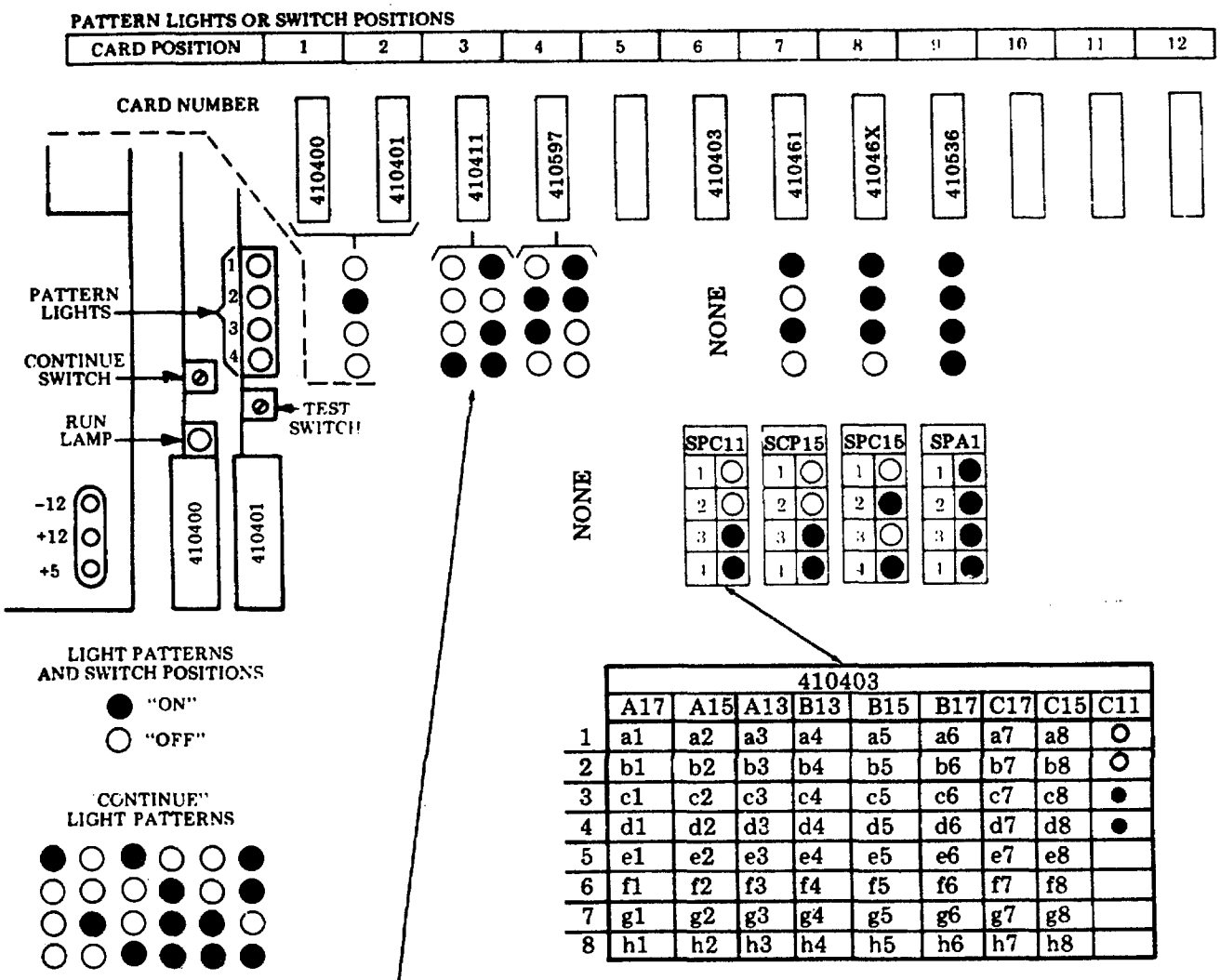
	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	○	BB	●	DD	U1	U2	EE	FF	○	●	1
2	○	F	G1	G2	H	J	●	L	○	ZZ	2
3	A1	B1	B2	C1	D1	○	○	○	●	ZZ	3
4	A2	B3	B4	C2	D2	○	○	○	●	ZZ	4
5	○	N	○	○	○	○	○	○	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										○	9

Refer to Pages 7-94 through 7-100 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C432/ABF/027 With 403019 Modification Kit With 410403 and Additional RAM Circuit Card



410403

	A17	A15	A13	B13	B15	B17	C17	C15	C11
1	a1	a2	a3	a4	a5	a6	a7	a8	○
2	b1	b2	b3	b4	b5	b6	b7	b8	○
3	c1	c2	c3	c4	c5	c6	c7	c8	●
4	d1	d2	d3	d4	d5	d6	d7	d8	●
5	e1	e2	e3	e4	e5	e6	e7	e8	
6	f1	f2	f3	f4	f5	f6	f7	f8	
7	g1	g2	g3	g4	g5	g6	g7	g8	
8	h1	h2	h3	h4	h5	h6	h7	h8	

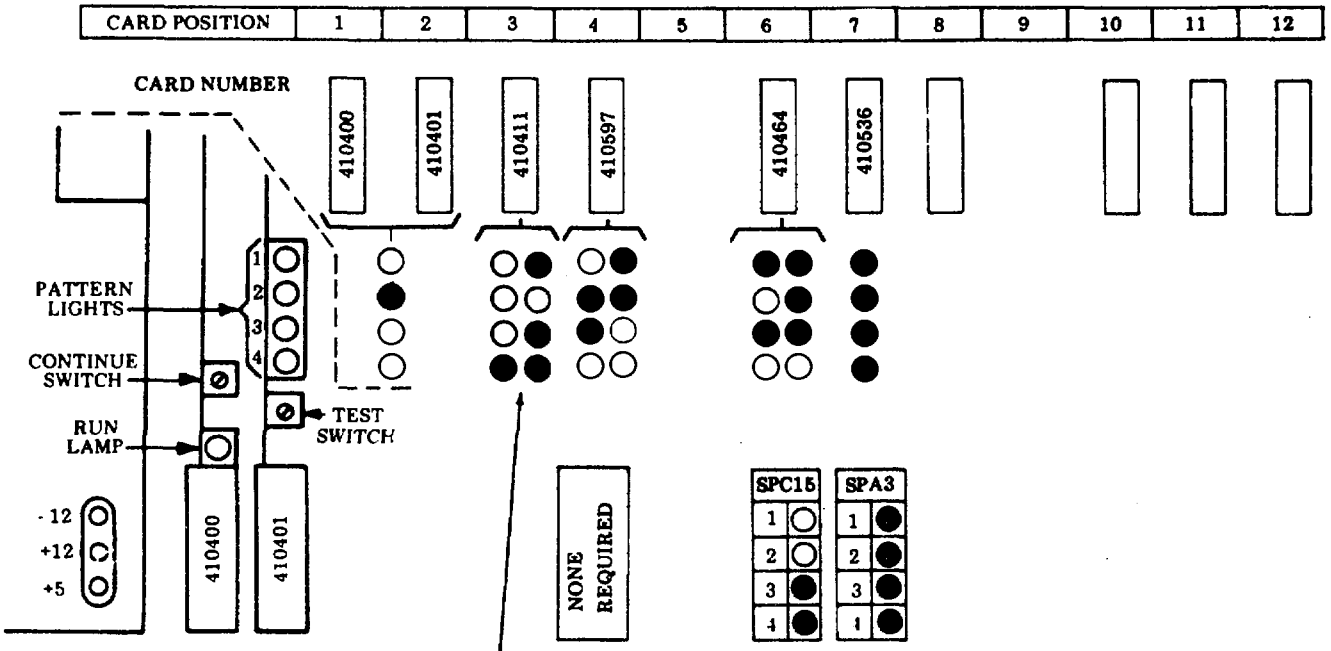
41046X is 410461 or 410465 Circuit Card.

410411

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	○	BB	●	DD	U1	U2	EE	FF	○	●	1
2	○	F	G1	G2	H	J	●	L	○	ZZ	2
3	A1	B1	B2	C1	D1	○	○	○	●	ZZ	3
4	A2	B3	B4	C2	D2	○	○	○	●	ZZ	4
5	○	N	○	○	○	○	○	○	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										○	9

Refer to Pages 7-94 through 7-100 for options.

Controller 40C432/AEN/104

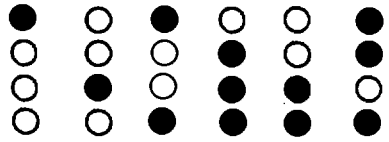


LIGHT PATTERNS AND SWITCH POSITIONS

● "ON"

○ "OFF"

"CONTINUE" LIGHT PATTERNS



410411

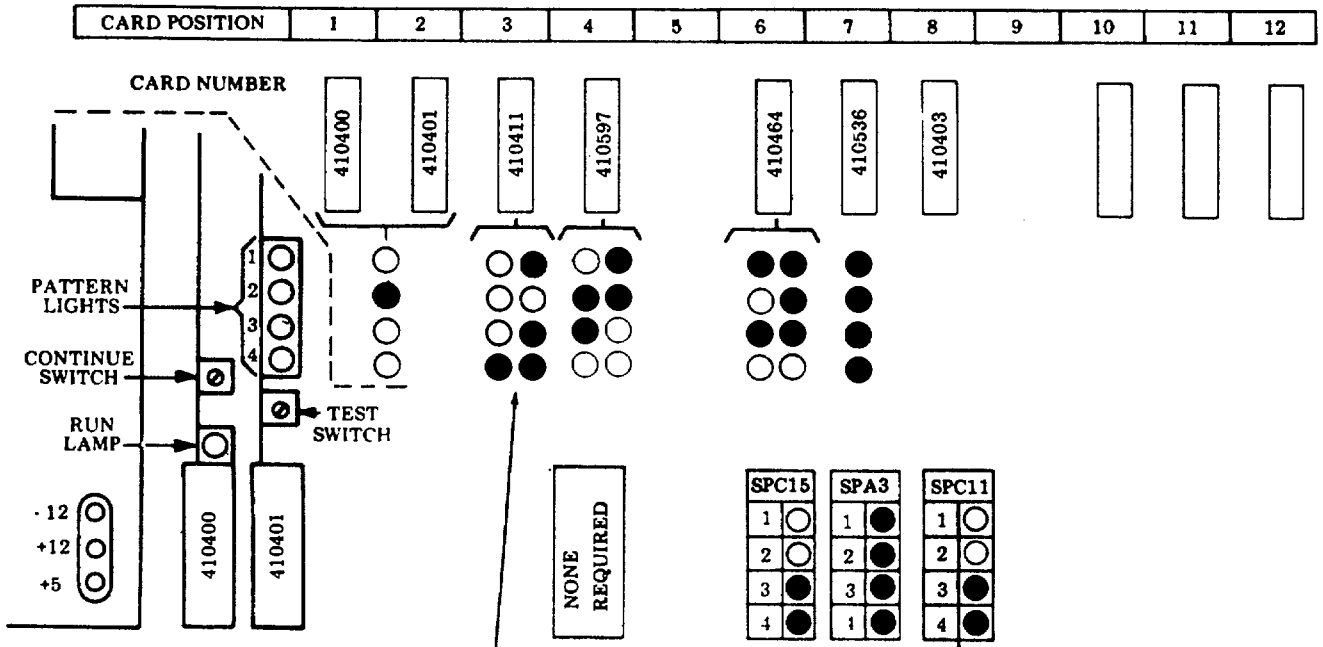
	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	○	BB	●	DD	U1	U2	EE	FF	○	●	1
2	E	F	G1	G2	H	J	●	L	○	ZZ	2
3	A1	B1	B2	C1	D1	○	○	○	●	ZZ	3
4	A2	B3	B4	C2	D2	○	○	○	●	ZZ	4
5	M	N	○	○	○	○	○	○	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										○	9

Refer to Pages 7-94 through 7-100 for options

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C432/AEN/104 With Additional 410403 Circuit Card



410403

	A17	A15	A13	B13	B15	B17	C17	C15	C11	
1	a1	a2	a3	a4	a5	a6	a7	●	○	
2	b1	b2	b3	b4	b5	b6	b7	●	○	
3	c1	c2	c3	c4	c5	c6	c7	●	●	
4	d1	d2	d3	d4	d5	d6	d7	●	●	
5	e1	e2	e3	e4	e5	e6	e7	●		
6	f1	f2	f3	f4	f5	f6	f7	●		
7	g1	g2	g3	g4	g5	g6	g7	●		
8	h1	h2	h3	h4	h5	h6	h7	●		

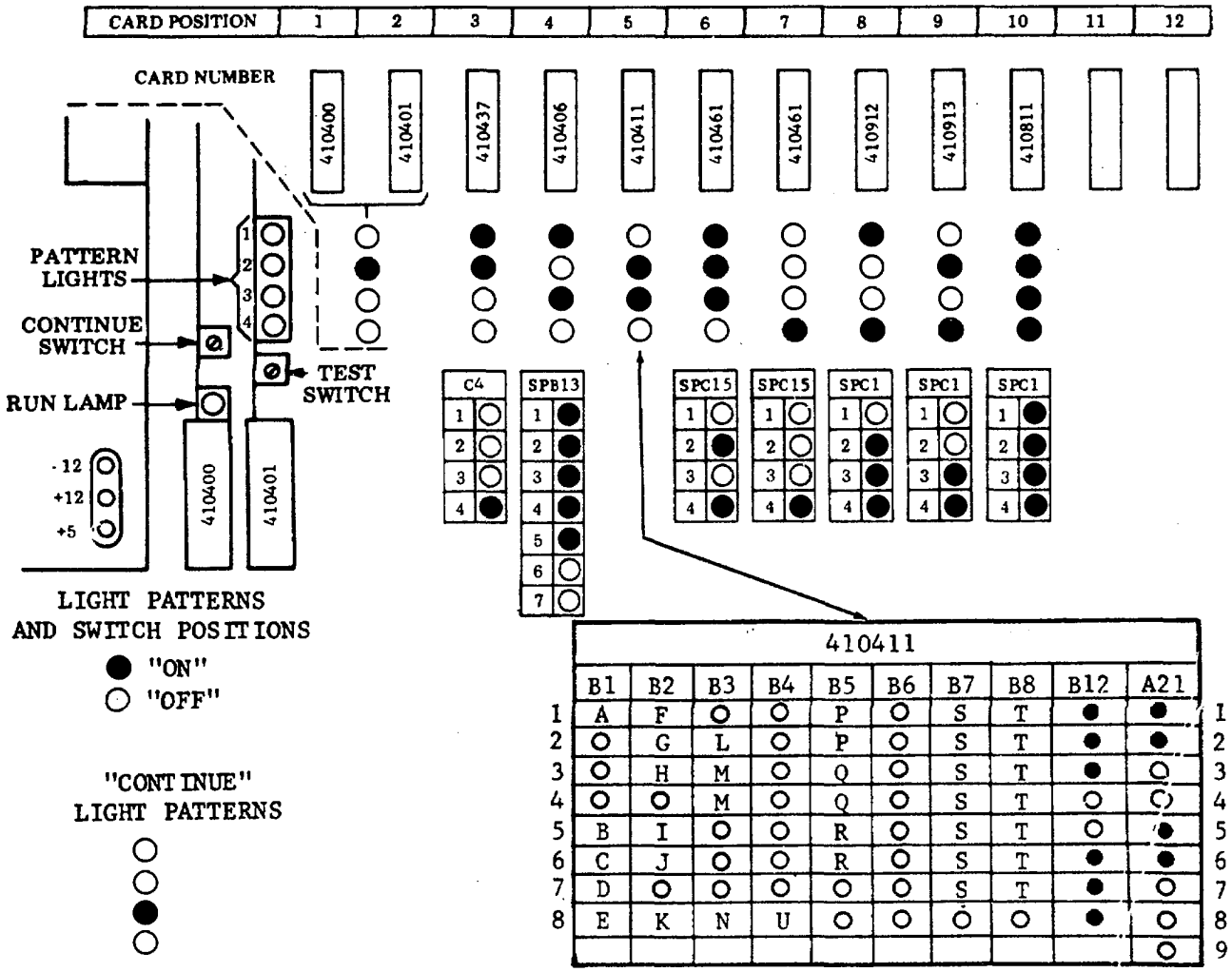
410411

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	○	BB	●	DD	U1	U2	EE	FF	○	●	1
2	E	F	G1	G2	H	J	●	L	○	ZZ	2
3	A1	B1	B2	C1	D1	○	○	○	●	ZZ	3
4	A2	B3	B4	C2	D2	○	○	○	●	ZZ	4
5	M	N	○	○	○	○	○	○	●	ZZ	5
6	P	Q	R	S	T	V	W	X	●	ZZ	6
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	●	ZZ	7
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	●	ZZ	8
										○	9

The 410403 circuit card in slot 8 is a separately edited card to provide detection of additional Urgent Traffic Sequences and is ordered separately.

Refer to Pages 7-94 through 7-100 for options.

Controller 40C433/ACS/059 ‡‡



410411

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	○	○	P	○	S	T	●	●	1
2	○	G	L	○	P	○	S	T	●	●	2
3	○	H	M	○	Q	○	S	T	●	○	3
4	○	○	M	○	Q	○	S	T	○	○	4
5	B	I	○	○	R	○	S	T	○	●	5
6	C	J	○	○	R	○	S	T	●	●	6
7	D	○	○	○	○	○	S	T	●	○	7
8	E	K	N	U	○	○	○	○	●	○	8
										○	9

OPTIONS: Refer to Pages 7-101 through 7-103 for Option Switch Settings.

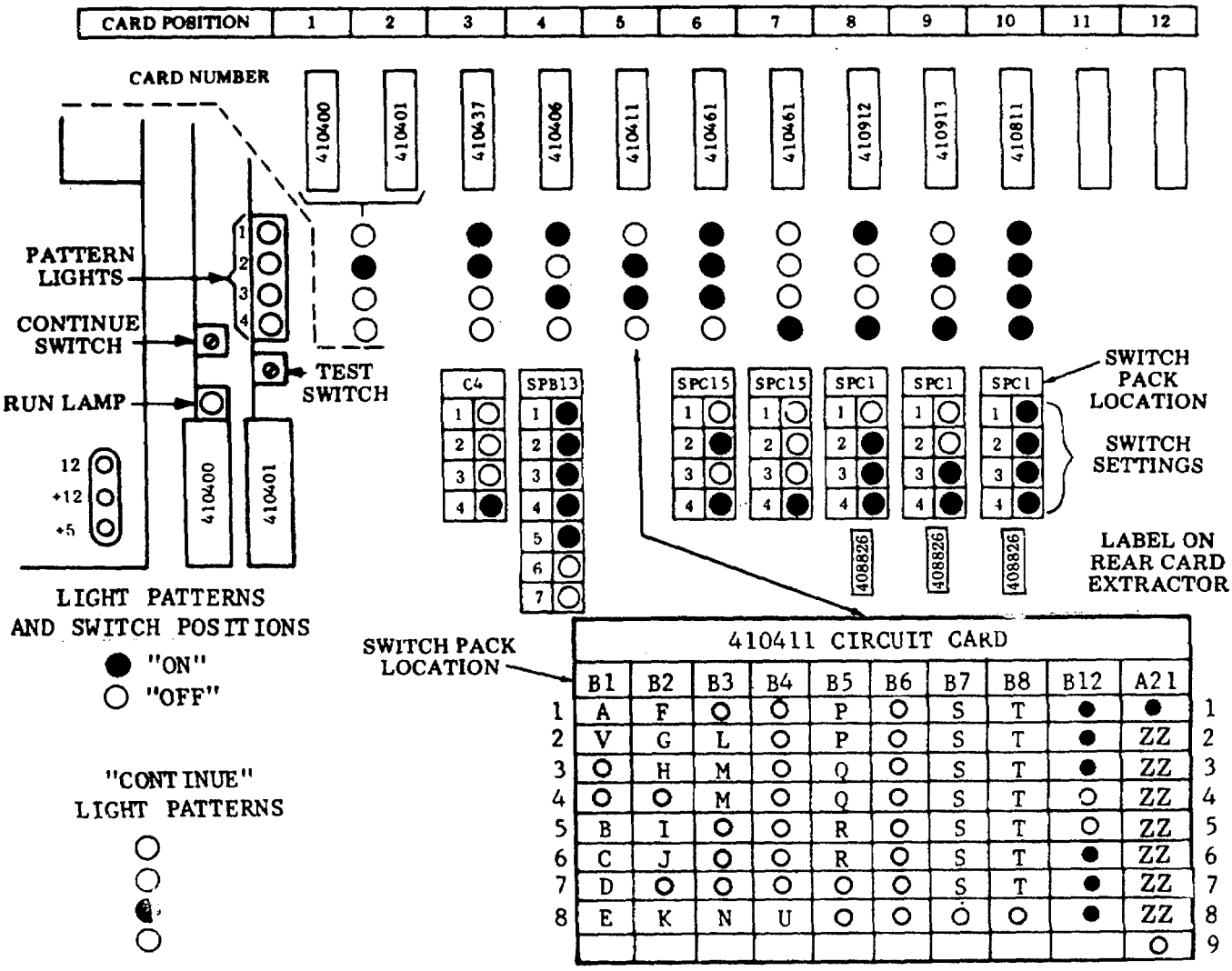
A. Line monitor by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (58 line/page)
J. Printer optioned for double line feed
K. Keep letter-figtires shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
O. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending

‡‡ The 40C433/ACS/059 is identical to the 40C435/ACS/059 with the exception that the 40C433/ACS/059 contains a narrow interconnection module for rack mounted applications.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

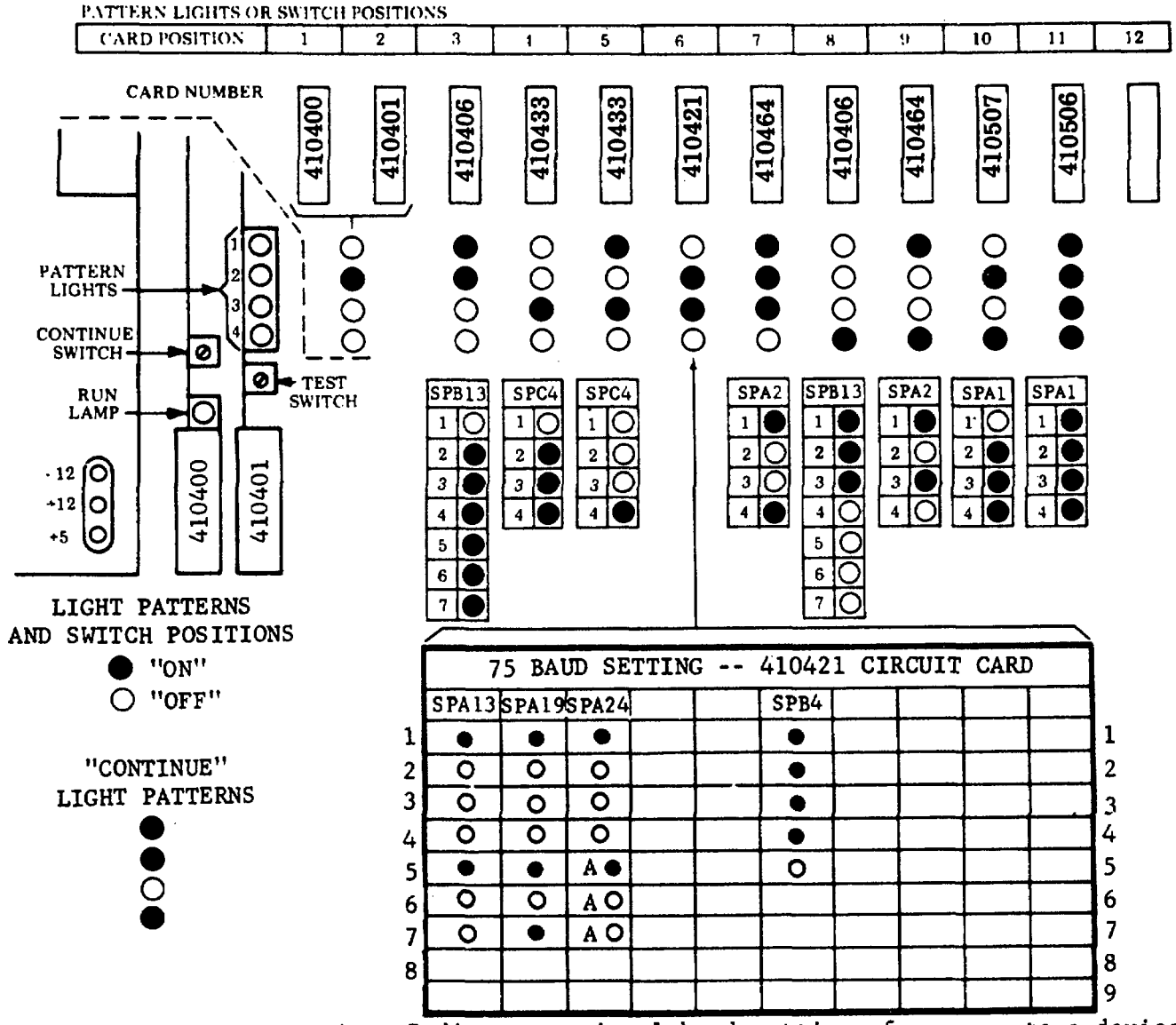
Controller 40C433/ACS/059 With 408826 Modification Kit



OPTIONS: Refer to Pages 7-101 through 7-103 for Option Switch Settings.

A. Line monitor by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (58 line/page)
J. Printer optioned for double line feed
K. Keep letter-figures shift characters (SI, S_0)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate
V. Transmission mode

Controller 40C434/ACW/063



OPTIONAL BAUD SETTINGS FOR PAPER TAPE DEVICE

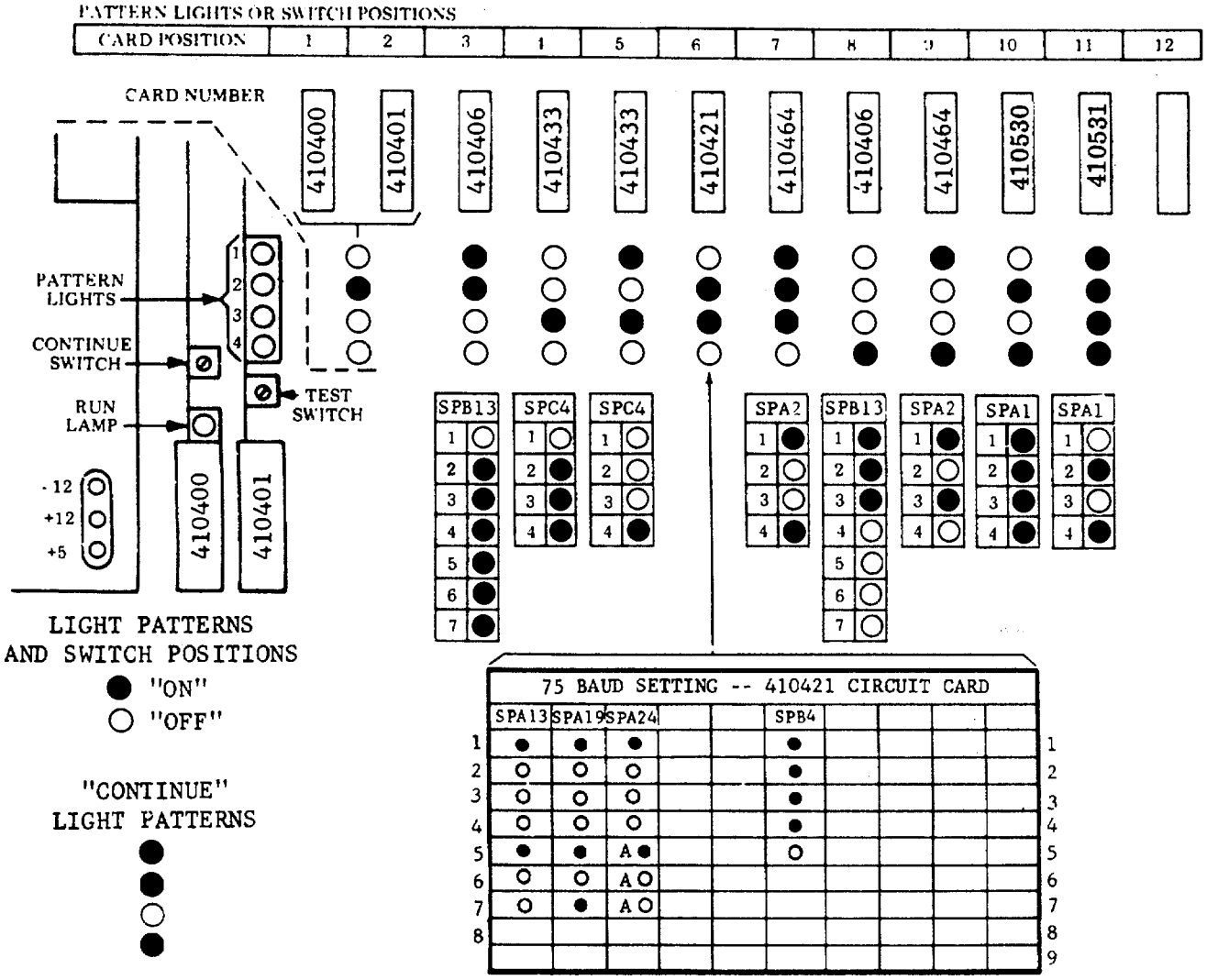
SPEED FOR INTF 3 (Paper Tape Punch and Reader)

BAUD RATE	SPA24-5	SPA24-6	SPA24-7
50	○	○	○
75	●	○	○
100	○	●	○
110	●	●	○
150	○	○	●
300	●	○	●
450	○	●	●
600	●	●	●

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C434/AEK/101



A -- Indicates optional baud settings for paper tape device.

OPTIONAL BAUD SETTINGS FOR PAPER TAPE DEVICE

SPEED FOR INTF 3 (Paper Tape Punch and Reader)

BAUD RATE	SPA24-5	SPA24-6	SPA24-7
50	O	O	O
75	●	O	O
100	O	●	O
110	●	●	O
150	O	O	●
300	●	O	●
450	O	●	●
600	●	●	●

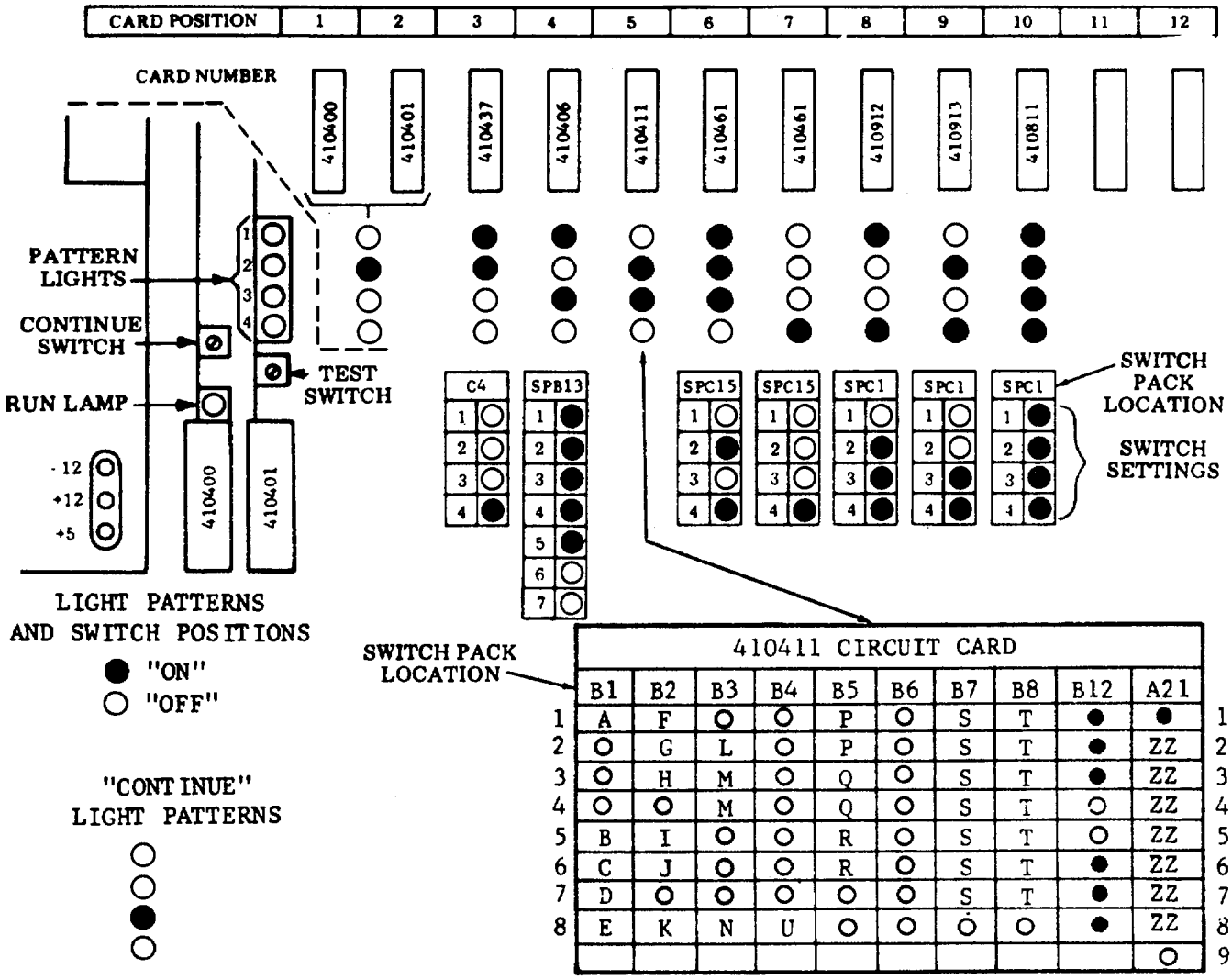
Note 1: The half-duplex strap in the 403628 interface assembly between Pins 2 and 3 of TB101 must be removed for proper terminal operation.

Note 2: For proper printer operation use the blue belt with switch setting 1.

Note 3: For proper printer operation, forms switch must be on and the line feed switch set to 1.

Note 4: If memory system is a 40M103/BC use SSI cable assembly 406592. If memory system is a 40M803/BC use SSI cable assembly 405785.

Controller 40C435/ACS/059 (Identical to the 40C433/ACS/059, but with wide interconnection module.)



	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	O	O	P	O	S	T	●	●	1
2	O	G	L	O	P	O	S	T	●	ZZ	2
3	O	H	M	O	Q	O	S	T	●	ZZ	3
4	O	O	M	O	Q	O	S	T	O	ZZ	4
5	B	I	O	O	R	O	S	T	O	ZZ	5
6	C	J	O	O	R	O	S	T	●	ZZ	6
7	D	O	O	O	O	O	S	T	●	ZZ	7
8	E	K	N	U	O	O	O	O	●	ZZ	8
										O	9

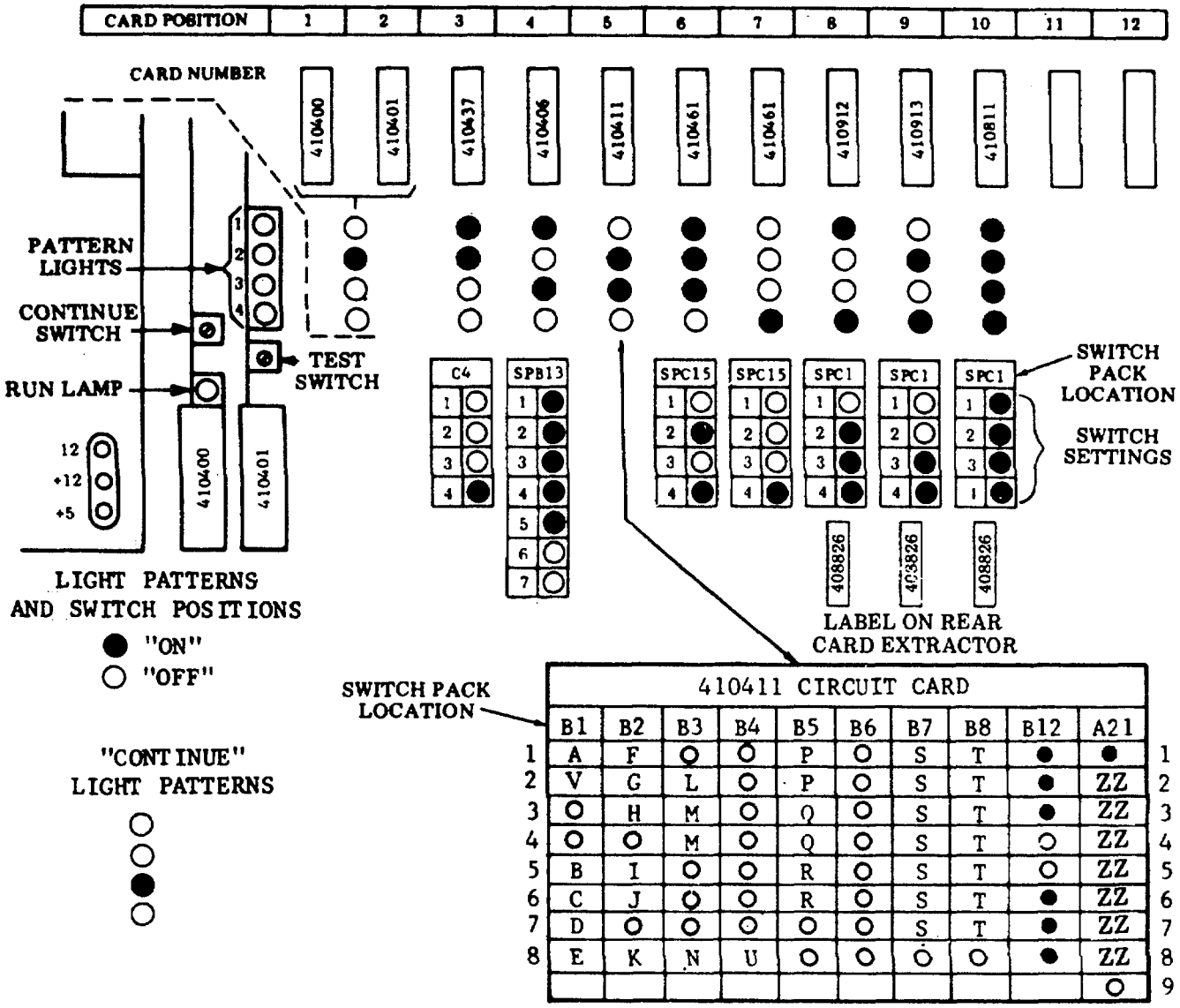
OPTIONS: Refer to pages 7-104 through 7-106 for Option Switch Settings.

A. Line monitor by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard -R.
H. Monitor tape on required to send
I. Automatic paging of printer (58 line/page)
J. Printer optioned for double line feed
K. Keep letter-figures shift characters (SI, SO)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
O. Controller port for receive tape
Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
ZZ. Eight level asynchronous baud rate
ZZ. Five level asynchronous baud rate

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C435/ACS/059 With 408826 Modification Kit

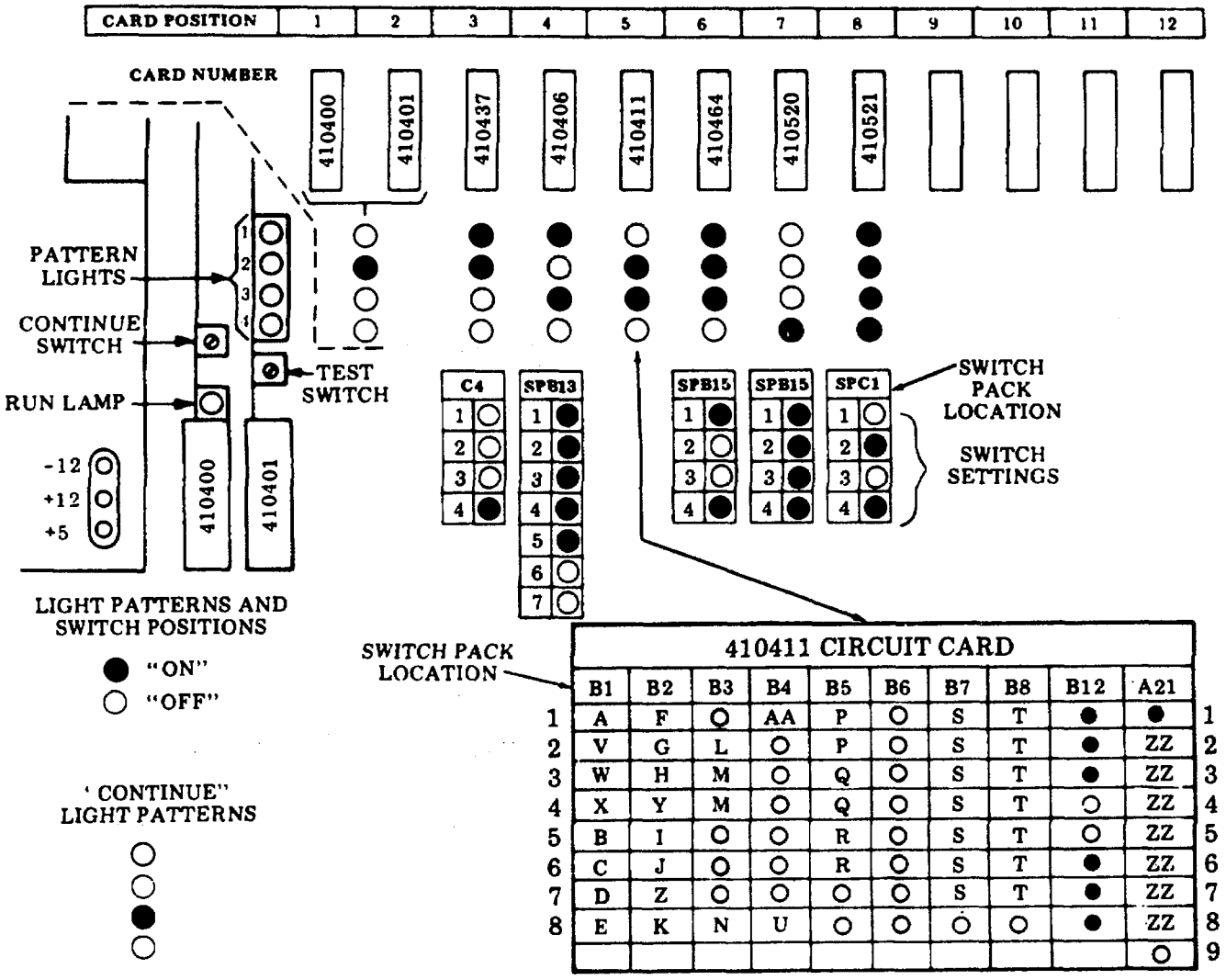


	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	O	O	P	O	S	T	●	●	1
2	V	G	L	O	P	O	S	T	●	ZZ	2
3	O	H	M	O	Q	O	S	T	●	ZZ	3
4	O	O	M	O	Q	O	S	T	O	ZZ	4
5	B	I	O	O	R	O	S	T	O	ZZ	5
6	C	J	O	O	R	O	S	T	●	ZZ	6
7	D	O	O	O	O	O	S	T	●	ZZ	7
8	E	K	N	U	O	O	O	O	●	ZZ	8
										O	9

OPTIONS: Refer to Pages 7-104 through 7-106 for Option Switch Settings.

A. Line monitor by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboardon4ine transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (58 line/page)
J. Printer optioned for double line feed
K. Keep letter-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate
V. Transmission mode

Controller 40C435/AEE/091



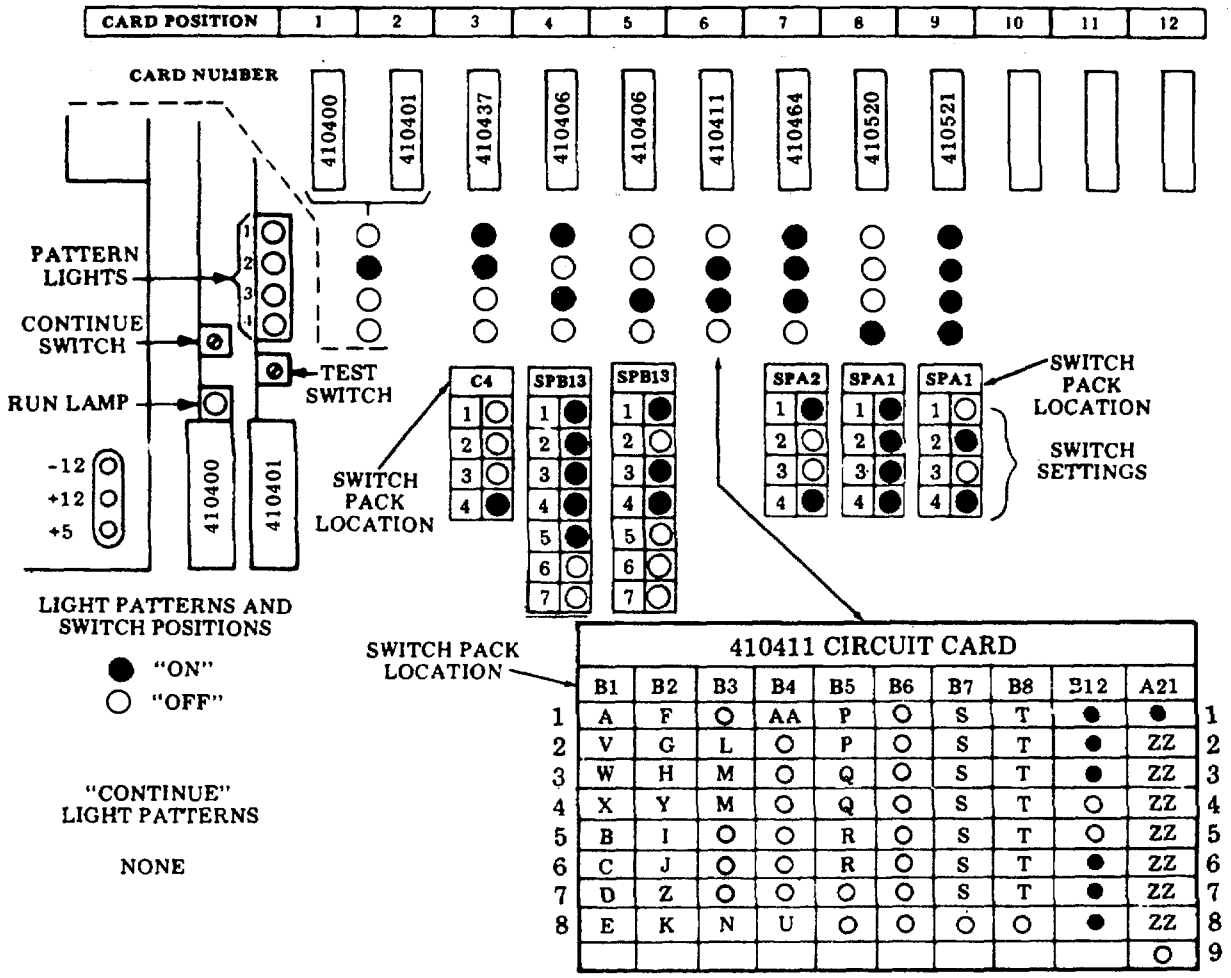
OPTIONS: Refer to Pages 7-117 through 7-122 for Option Switch Settings.

- A. Line monitored by printer on send data
- B. ETX on premature end of message
- C. Colon lower case, semicolon upper case
- D. Keyboard on-line transmits blind
- E. Display received escape sequences
- F. Printer on-line required to send
- G. Send extended characters from keyboard
- H. Monitor tape on required to send
- I. Automatic paging of printer (54 line/page)
- J. Printer optioned for double line feed
- K. Keep letters-figures shift characters (S_I, S_O)
- L. Printer select also selects receive tape
- M. Terminal on-line parity
- N. Mode display stays in at end of receive message
- P. Controller port for send tape
- Q. Controller port for receive tape
- R. Controller port for monitor tape
- S. 1st station identity character
- T. 2nd station identity character
- U. Mode display goes to after sending
- V. Isochronous/Asynchronous operation
- W. Data terminal ready control
- X. Line wrap on display
- Y. Reject received Nulls
- Z. Home on send
- AA. Stop bits in five-level operation
- ZZ. Eight-level asynchronous baud rate
- ZZ. Five-level asynchronous baud rate

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C435/AEE/091 With Additional 410406 Circuit Card

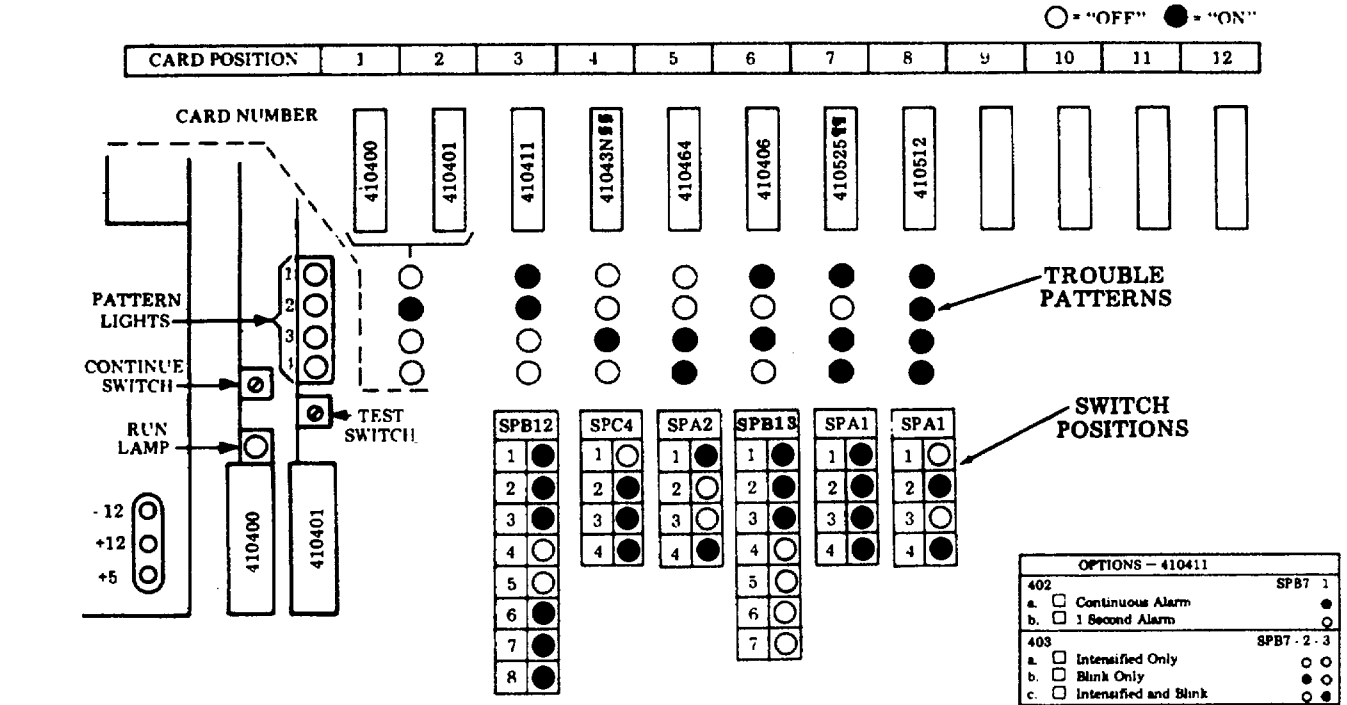


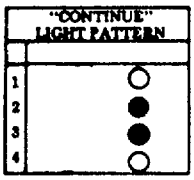
OPTIONS: Refer to Pages 7-117 through 7-122 for Option Switch Settings.

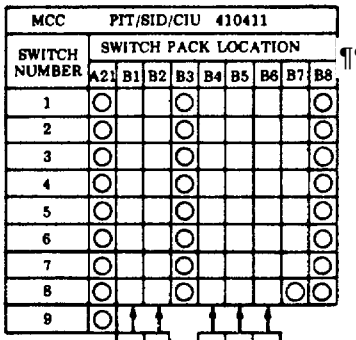
A. Line monitored by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (54 line/page)
J. Printer optioned for double line feed
K. Keep letters-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
V. Isochronous/Asynchronous operation
W. Data terminal ready control
X. Line wrap on display
Y. Reject received Nulls
Z. Home on send
AA. Stop bits in five-level operation
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate

MCC (EPROM Version) - Controller Arrangement Form
LINE CODE: ASCII • EBCDIC •
40C436 Controllers: ADA/092 (EBCDIC) or ADD/093 (ASCII)
HANDLES: 1-KD & Up To 2-PTRs (1 Print Local)

PATTERN LIGHTS OR SWITCH POSITIONS







¶¶ Early design controller may have 410513 in place of 410525. If 410513 card is present, Buffer Lock Override Option 414 is not available. Turn SPB7-7 switch on.

OPTIONS — 410411	
402	SPB7 · 1
a. ☐ Continuous Alarm	●
b. ☐ 1 Second Alarm	○
403	SPB7 · 2 · 3
a. ☐ Intensified Only	○ ○
b. ☐ Blink Only	● ○
c. ☐ Intensified and Blink	○ ●
406	SPB7 · 4
a. ☐ Alpha in Numeric Field	●
b. ☐ Alpha Not in Numeric Field	○
404	SPB7 · 5
a. ☐ Terminate w/ETX	○
b. ☐ Terminate w/Sub Enq.	●
408	SPB7 · 6
a. ☐ ASCII	●
b. ☐ EBCDIC	○
407	
Not Applicable	
414 (Buffer Lock Override)	SPB7 · 7
a. ☐ Override	●
b. ☐ Do Not Override	○

GRAPHIC DESIGNATIONS:

OPTION 401
- STATION POLL ADDRESS
- STATION SELECT ADDRESS

OPTION 405
- 1st DEVICE ADDRESS (KD)
- 2nd DEVICE ADDRESS (PTR)
- 3rd DEVICE ADDRESS (PTR)

§§ 41043N — Any D I/O Circuit Card

410435 — EBCDIC
410431 — ASCII

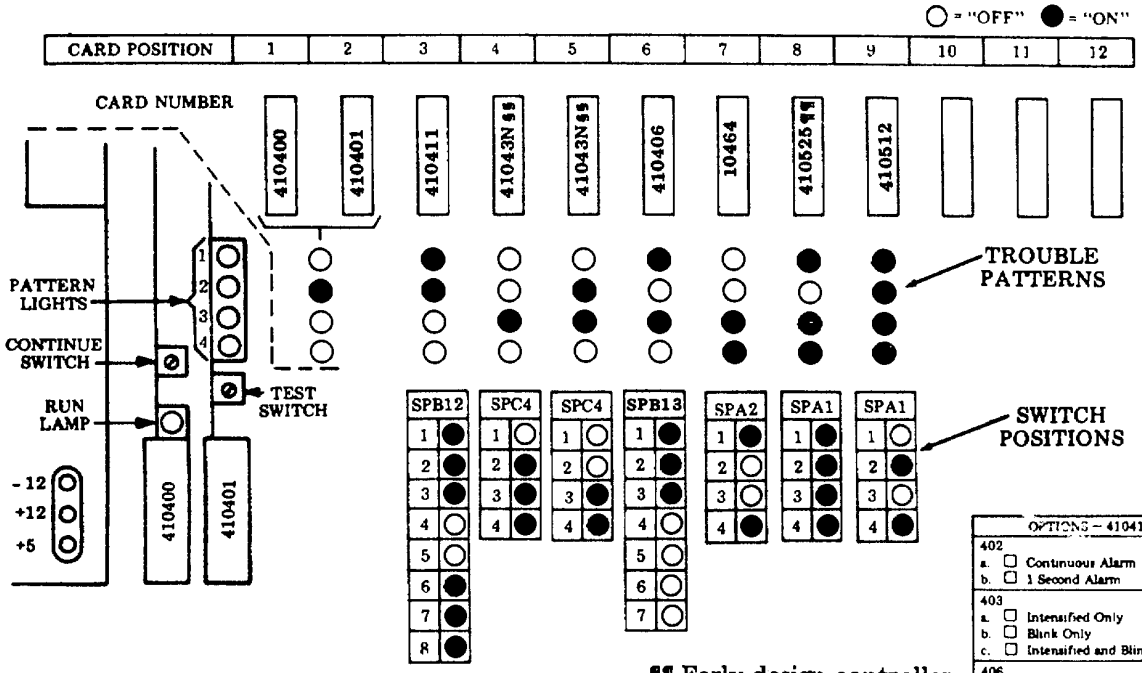
PRINTER OPTIONS		
PRINTER I/O SOCKET	J310	J309
Friction Feed		
Tractor Feed 80 Col		
Tractor Feed 132 Col		
17. Specify Right Margin		
Specify Left Margin		
18.a. No Paper Feed Out		
18.b. Paper FO on "RM" Loss		
18.c. Paper FO on "RM" Loss and ETX		
19.d. 96 Character Set		
19.e. 64 Character Set		
19.f. Ext. ASCII Set		
20.a. Single LF		
20.b. Double LF		
21.a. Lower and Upper Case Print		
21.b. Lower Case Prints as Upper Case		
22.a Lower Case Prints as Error		
22.b. Lower Case Prints as Upper Case		
39.a. Forms on		
39.b. Forms off		
48.a. Paper Out Not Gated W/FF		
48 b. Paper Out Gated W/FF		
58.a. Motor on Indefinitely		
58 b. Motor off After 40 Sec		

Refer to Pages 7-110 through 7-116 for Option Switch Settings.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

MCC (EPROM Version) - Controller Arrangement Form
LINE CODE: ASCII • EBCDIC •
Handles: 2-KDs and 1-PTR (Print Local)
40C436 Controllers: ADA/092 (EBCIC) or ADD/093 (ASCII) With Additional 410435 (EBCDIC) or 410431 (ASCII) Circuit Card.



"CONTINUE" LIGHT PATTERN
There are no "CONTINUE" LIGHT PATTERNS

¶¶ Early design controller may have 410513 in place of 410525. If 410513 card is present, Buffer Lock Override (Option 414) is not available. Turn SPB7-7 switch on.

OPTIONS – 410411	
402	SPB7 - 1
a. ☐ Continuous Alarm	●
b. ☐ 1 Second Alarm	○
403	SPB7 - 2 - 3
a. ☐ Intensified Only	○ ○
b. ☐ Blink Only	● ○
c. ☐ Intensified and Blink	○ ●
406	SPB7 - 4
a. ☐ Alpha in Numeric Field	●
b. ☐ Alpha Not in Numeric Field	○
404	SPB7 - 5
a. ☐ Terminate w/ETX	○
b. ☐ Terminate w/Sub. Enq.	●
408	SPB7 - 6
a. ☐ ASCII	●
b. ☐ EBCDIC	○
407 Not Applicable	
414 ¶¶ (Buffer Lock Override)	SPB7 - 7
a. ☐ Override	●
b. ☐ Do Not Override	○

MCC PIT/SID/CIU 410411									
SWITCH NUMBER	SWITCH PACK LOCATION								
	A2‡	B1	B2	B3	B4	B5	B6	B7	B8
1	○			○					○
2	○			○					○
3	○			○					○
4	○			○					○
5	○			○					○
6	○			○					○
7	○			○					○
8	○			○				○	○
9	○								

GRAPHIC DESIGNATIONS:
OPTION 401 — STATION POLL ADDRESS
STATION SELECT ADDRESS
OPTION 405 — 1st DEVICE ADDRESS (KD)
2nd DEVICE ADDRESS (PTR)
3rd DEVICE ADDRESS (KD)

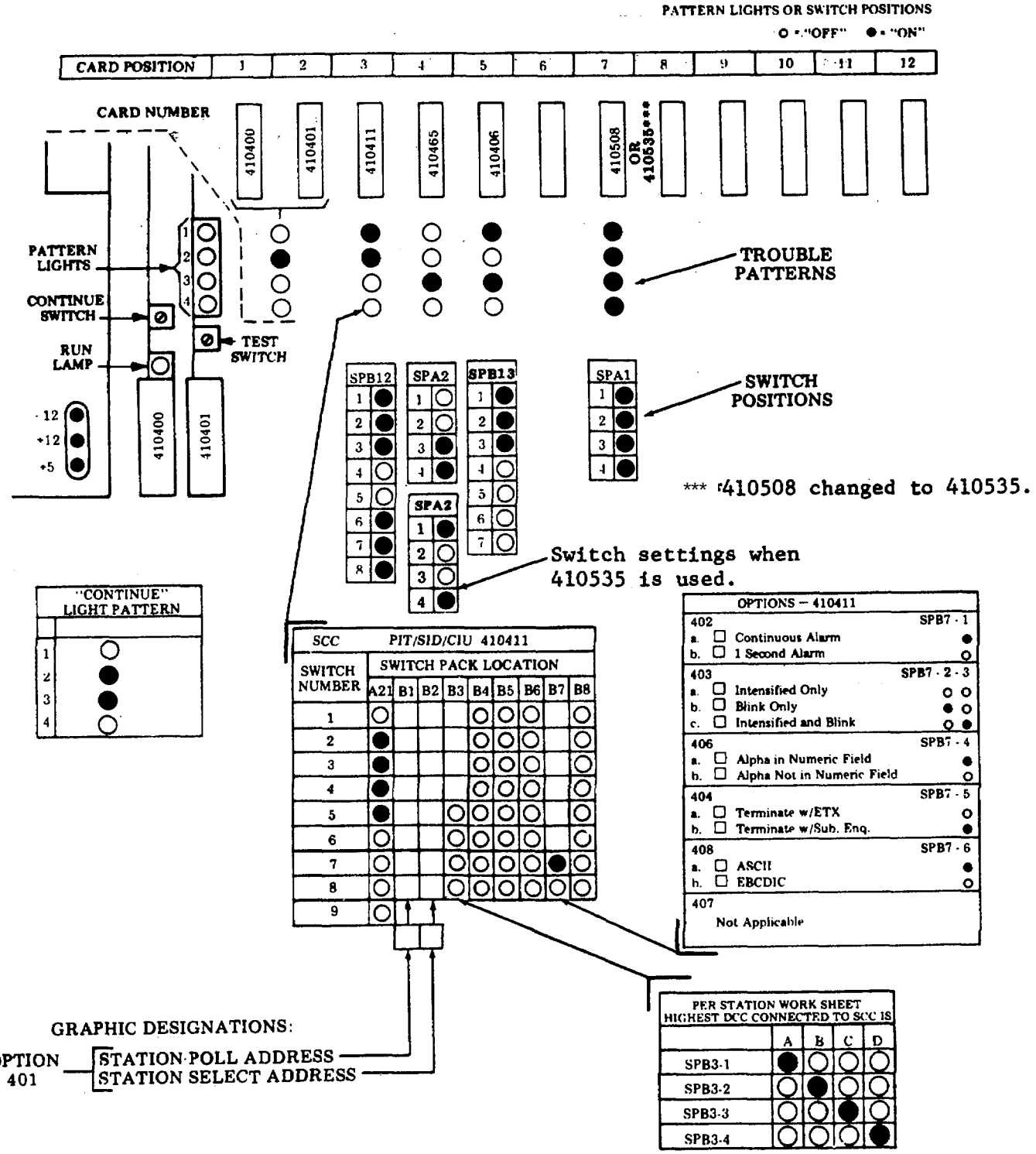
§§41043N — Any D I/O Circuit Card

410435 — EBCDIC
410431 — ASCII

PRINTER OPTIONS	
PRINTER I/O SOCKET	J310
Friction Feed	
Tractor Feed 80 Col	
Tractor Feed 132 Col	
17. Specify Right Margin	
Specify Left Margin	
18.a. No Paper Feed Out	
18.b. Paper FO on "RM" Loss	
18.c. Paper FO on "RM" Loss and ETX	
19.d. 96 Character Set	
19.e. 64 Character Set	
19.f. Ext. ASCII Set	
20.a. Single LF	
20.b. Double LF	
21.a. Lower and Upper Case Print	
21.b. Lower Case Prints as Upper Case	
22.a. Lower Case Prints as Error	
22.b. Lower Case Prints as Upper Case	
39.a. Forms on	
39.b. Forms off	
48.a. Paper Out Not Gated W/FF	
48.b. Paper Out Gated W/FF	
58.a. Motor on Indefinitely	
58.b. Motor off After 40 Sec.	

Refer to Pages 7-110 through 7-116 for Option Switch Settings.

SCC (EPROM Version) - Controller Arrangement Form
LINE CODE: ASCII • EBCDIC •
40C436 Controllers: ADK/075
HANDLES: Up to 4-DCCs

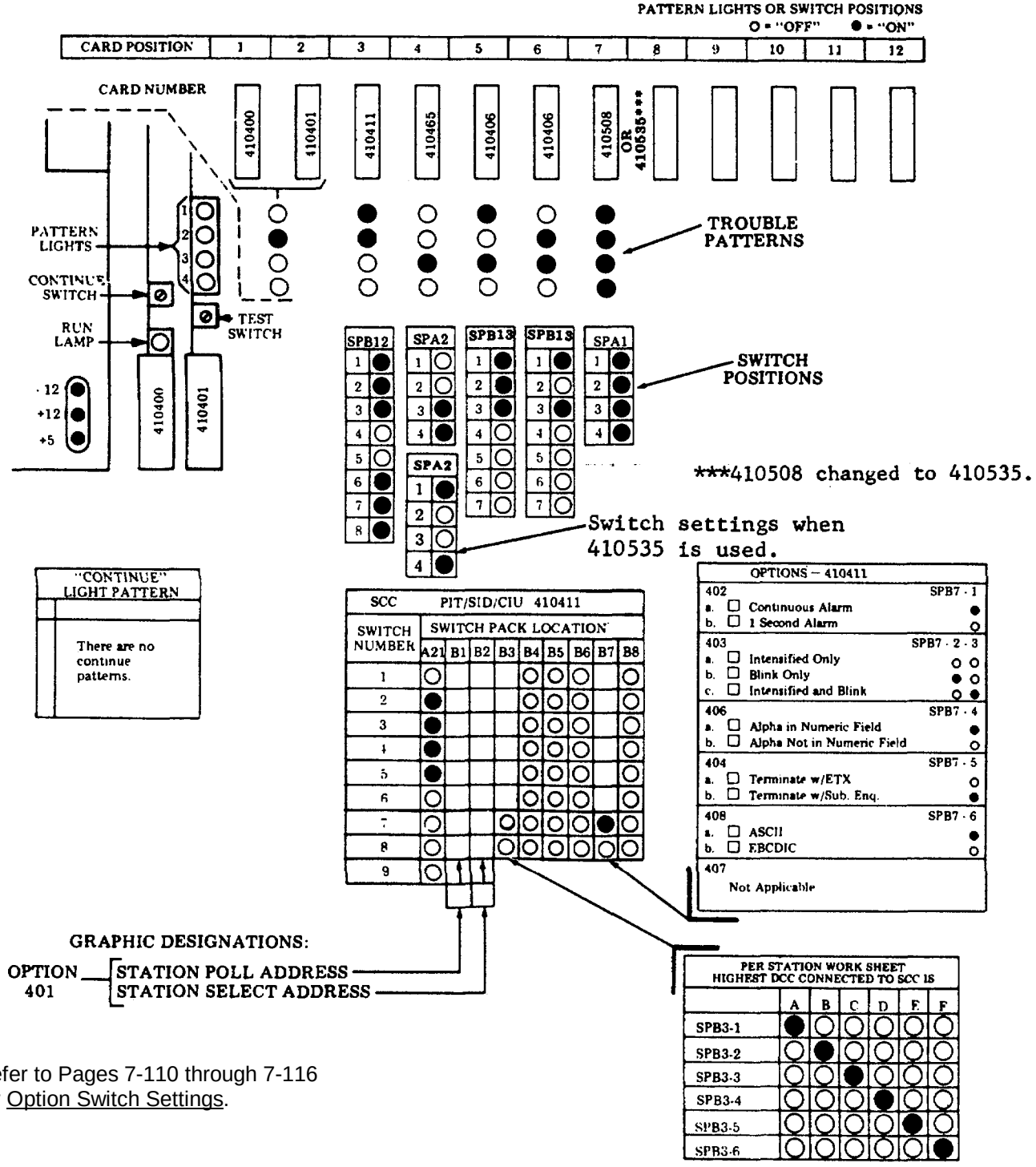


Refer to Pages 7-110 through 7-116
for Option Switch Settings.

A. GENERAL (Cont)

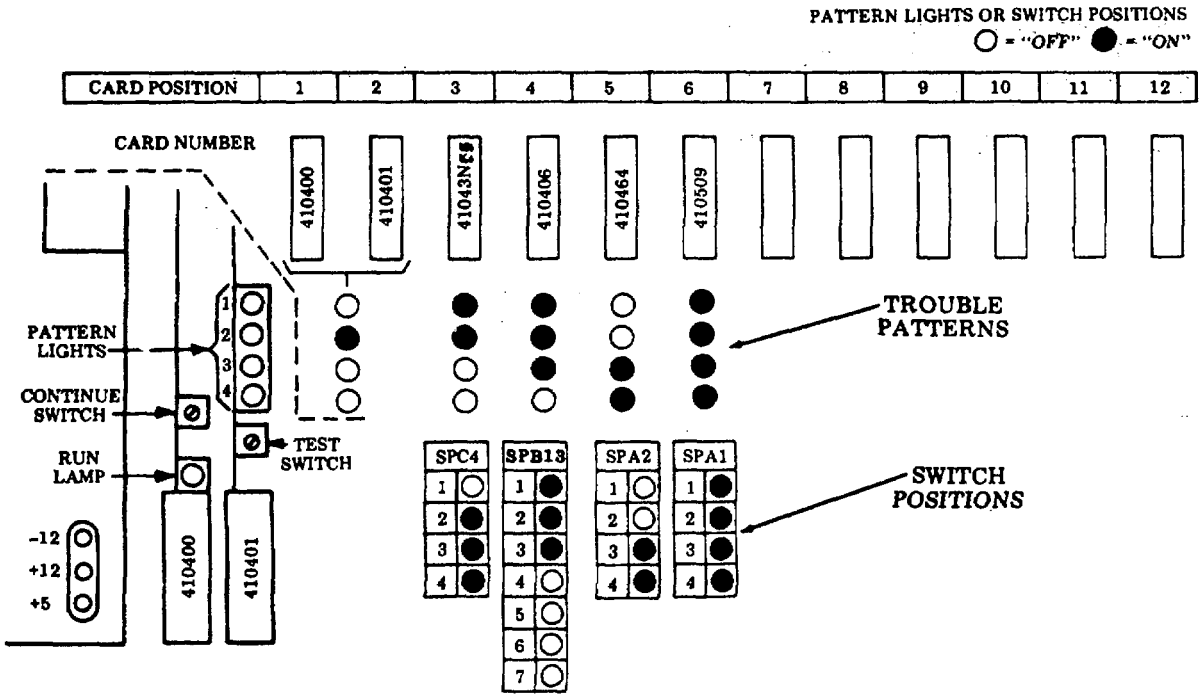
3. CONTROLLER ARRANGEMENT FORMS (Cont)

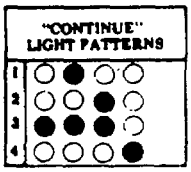
SCC (EPROM Version) - Controller Arrangement Form
LINE CODE: ASCII • EBCDIC •
40C436 Controllers: ADK/075 With Additional 410406 Circuit Card
HANDLES: Up to 6-DCCs



Refer to Pages 7-110 through 7-116 for Option Switch Settings.

DCC (EPROM Version) - Controller Arrangement Form
DCC: A • B • C • D • E • F •
40C436 Controllers: ADN/094 (EBCDIC), ADU/095 (ASCII)
HANDLES: 1-KD & Up To 2-PTRs (1 Print Local)





$$41043N — Any D I/O Circuit Card

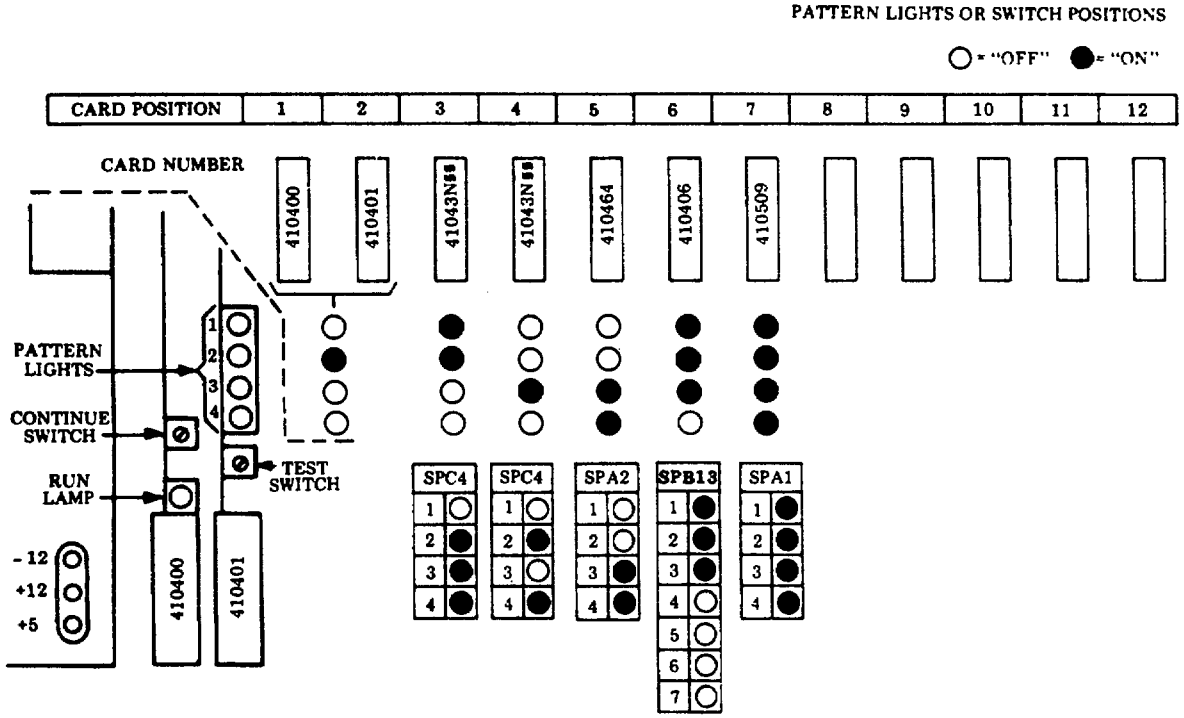
410435 — EBCDIC
410431 — ASCII

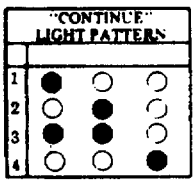
PRINTER OPTIONS			
PRINTER I/O SOCKET		J310	J309
Friction Feed			
Tractor Feed 80 Col			
Tractor Feed 132 Col			
17.	Specify Right Margin		
	Specify Left Margin		
18.a.	No Paper Feed Out		
18.b.	Paper FO on "RM" Loss		
18.c.	Paper FO on "RM" Loss and ETX		
19.d.	96 Character Set		
19.e.	64 Character Set		
19.f.	Ext. ASCII Set		
20.a.	Single LF		
20.b.	Double LF		
21.a.	Lower and Upper Case Print		
21.b.	Lower Case Prints as Upper Case		
22.a.	Lower Case Prints as Error		
22.b.	Lower Case Prints as Upper Case		
39.a.	Forms on		
39.b.	Forms off		
48.a.	Paper Out Not Gated W/FF		
48.b.	Paper Out Gated W/FF		
58.a.	Motor on Indefinitely		
58.b.	Motor off After 40 Sec.		

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

DCC (EPROM Version) - Controller Arrangement Form
DCC: A • B • C • D • E • F •
40C436 Controllers: ADN/094 (EBCDIC) or ADU/095 (ASCII) With Additional DI/O (410435 or 410431) circuit Card.
HANDLES: 2-KD & 1-PTR (Print Local)



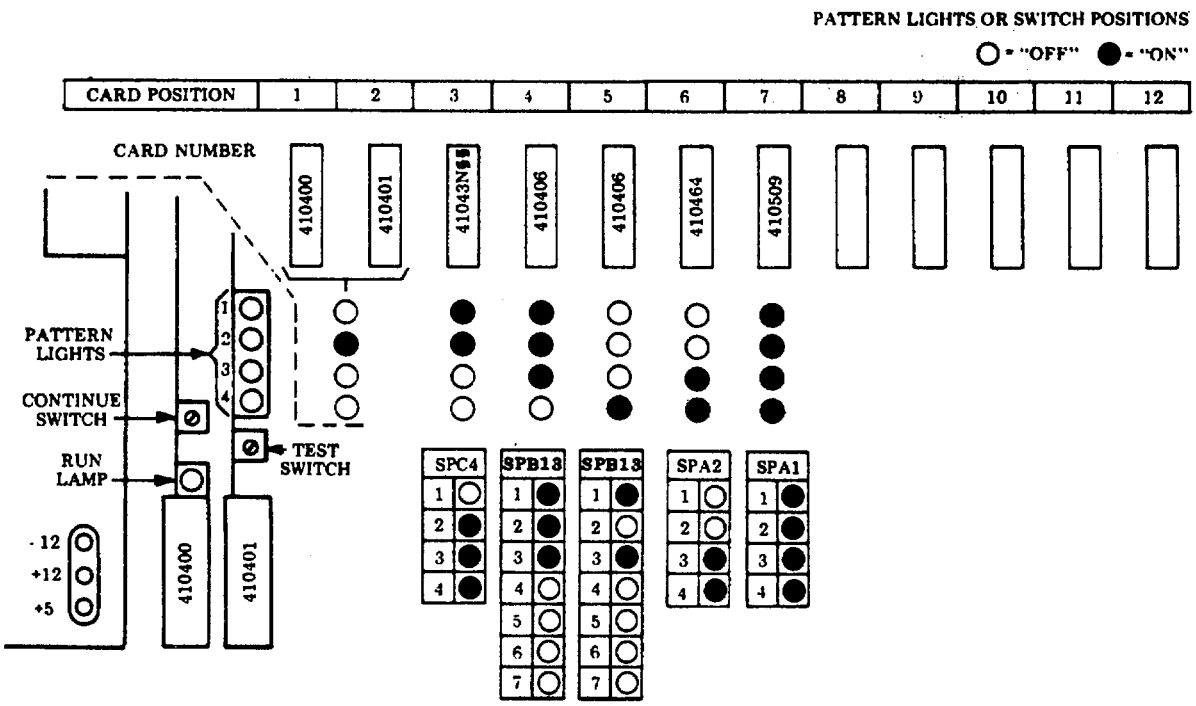


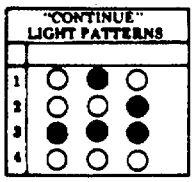
§§41043N — Any D I/O Circuit Card

410435 — EBCDIC
410431 — ASCII

PRINTER OPTIONS	
PRINTER I/O SOCKET	J309
Friction Feed	
Tractor Feed 80 Col	
Tractor Feed 132 Col	
17. Specify Right Margin	
Specify Left Margin	
18.a. No Paper Feed Out	
18.b. Paper FO on "RM" Loss	
18.c. Paper FO on "RM" Loss and ETX	
19.d. 96 Character Set	
19.e. 64 Character Set	
19.f. Ext. ASCII Set	
20.a. Single LF	
20.b. Double LF	
21.a. Lower and Upper Case Print	
21.b. Lower Case Prints as Upper Case	
22.a. Lower Case Prints as Error	
22.b. Lower Case Prints as Upper Case	
39.a. Forms on	
39.b. Forms off	
48.a. Paper Out Not Gated W/FF	
48.b. Paper Out Gated W/FF	
58.a. Motor on Indefinitely	
58.b. Motor off After 40 Sec.	

DCC (EPROM Version)- Controller Arrangement Form
DCC: A • B • C • D • E • F •
40C436 Controllers: ADN/094 (EBCDIC)-- ADU/095 (ASCII) With Additional 410406 Circuit Card.
HANDLES: 1-KD & Up To 5-PTRs (1 Print Local)





$$ 41043N — Any D I/O Circuit Card

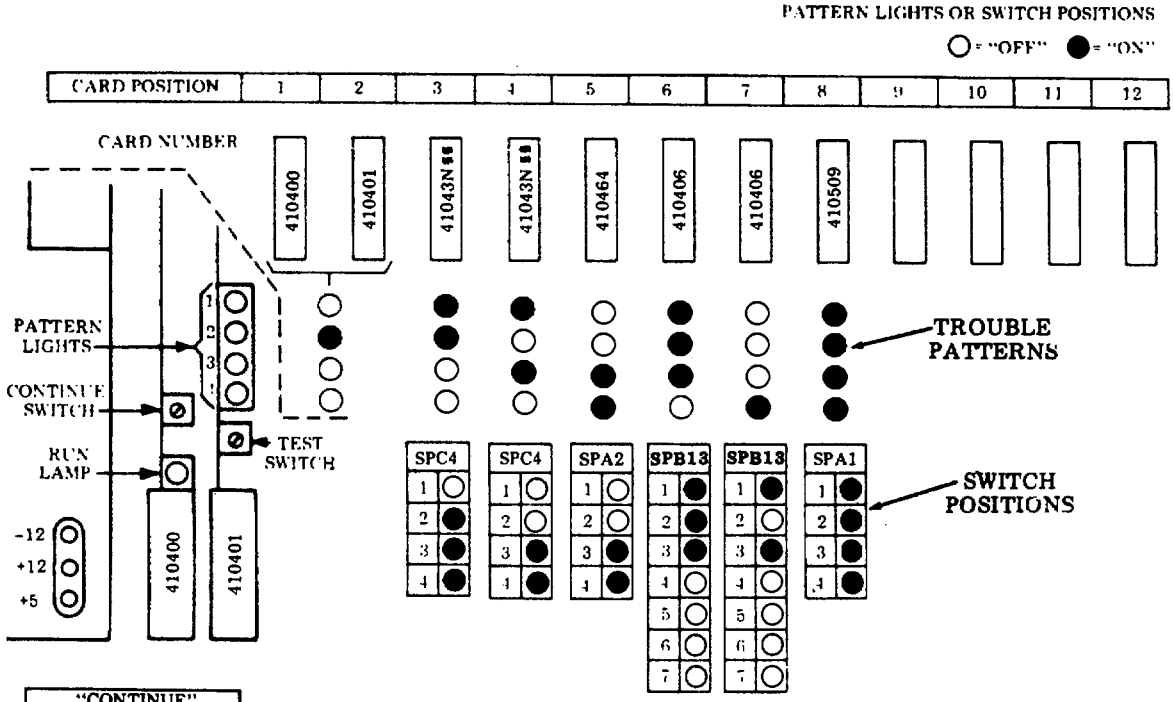
410435 — EBCDIC
410431 — ASCII

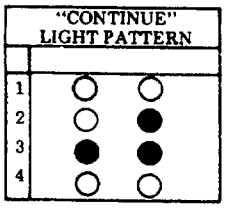
PRINTER OPTIONS					
PRINTER I/O SOCKET	J310	J309	J311	J312	J313
Friction Feed					
Tractor Feed 80 Col					
Tractor Feed 132 Col					
17. Specify Right Margin					
Specify Left Margin					
18.a. No Paper Feed Out					
18.b. Paper FO on "RM" Loss					
18.c. Paper FO on "RM" Loss and ETX					
19.d. 96 Character Set					
19.e. 64 Character Set					
19.f. Ext. ASCII Set					
20.a. Single LF					
20.b Double LF					
21.a. Lower and Upper Case Print					
21.b. Lower Case Prints as Upper Case					
22.a Lower Case Prints as Error					
22.b. Lower Case Prints as Upper Case					
39.a Forms on					
39.b Forms off					
48.a Paper Out Not Gated W/FF					
48.b. Paper Out Gated W/FF					
58.a Motor on Indefinitely					
58.b. Motor off After 10 Sec.					

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENTS FORMS (Cont)

DCC (EPROM Version) - Controller Arrangement Form
DCC: A • B • C • D • E • F •
40C436 Controllers: ADN/094 (EBCDIC) or ADU/095 (ASCII) With Additional 410406 Circuit Card, 410431 (ASCII) or 410435 (EBCDIC) Circuit Cards.
HANDLES: 2-KDs & Up To 4-PTRs (2 Print Local)





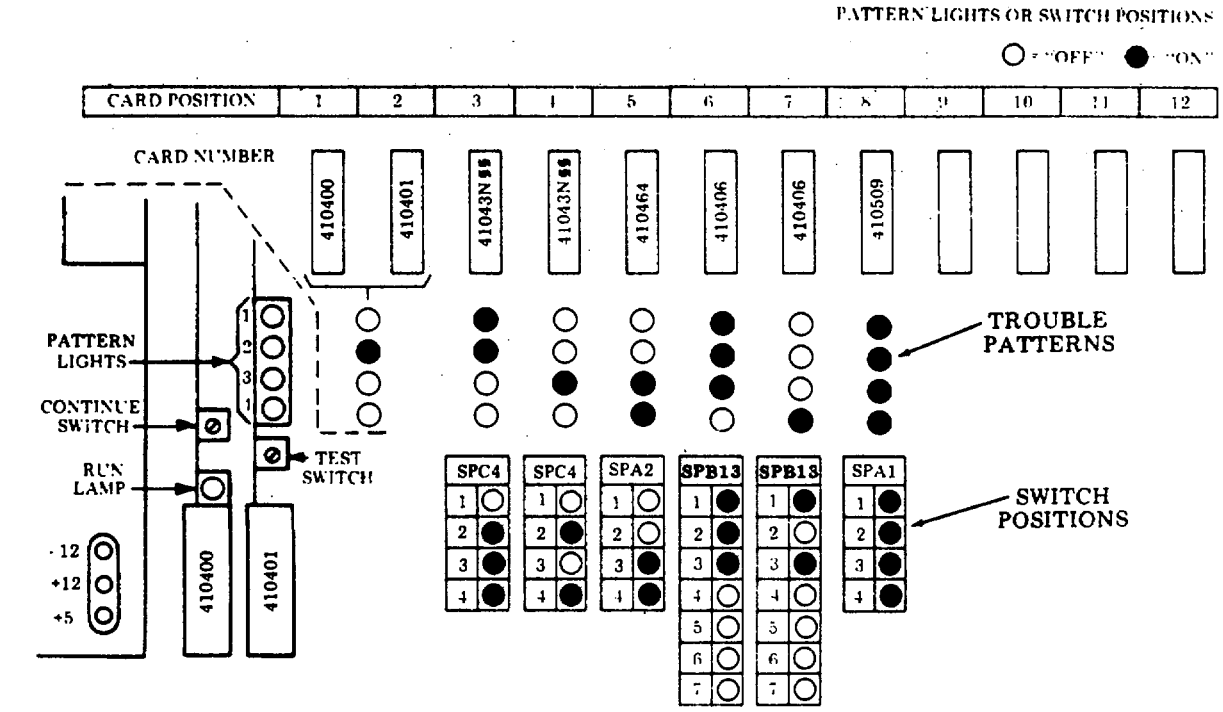
§§ 41043N — Any D I/O Circuit Card

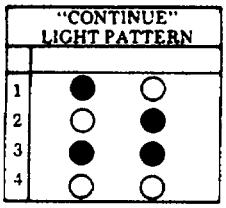
410435 — EBCDIC
410431 — ASCII

Note 1: Printer associated with I/O socket J309 will be print local for KD in I/O socket J308 and J301. Printer in I/O socket J313 is print local to KD in I/O socket J311 and J302. If no printer is in I/O socket J313, the printer in I/O socket J309 will be print local to both KDs.

PRINTER OPTIONS				
PRINTER I/O SOCKET	J310	J309	J312	J313
Friction Feed				
Tractor Feed 80 Col				
Tractor Feed 132 Col				
17. Specify Right Margin				
Specify Left Margin				
18.a. No Paper Feed Out				
18.b. Paper FO on "RM" Loss				
18.c. Paper FO on "RM" Loss and ETX				
19.d. 96 Character Set				
19.e. 64 Character Set				
19.f. Ext. ASCII Set				
20.a. Single LF				
20.b. Double LF				
21.a. Lower and Upper Case Print				
21.b. Lower Case Prints as Upper Case				
22.a. Lower Case Prints as Error				
22.b. Lower Case Prints as Upper Case				
39.a. Forms on				
39.b. Forms off				
48.a. Paper Out Not Gated W/FF				
48.b. Paper Out Gated W/FF				
58.a. Motor on Indefinitely				
58.b. Motor off After 40 Sec.				

DCC (EPROM Version)- Controller Arrangement Form
DCC: A • B • C • D • E • F •
40C436 Controllers: ADN/094 (EBCDIC) or ADU/095 (ASCII) With Additional 410406 Circuit Card and 410435 (EBCDIC) or 410431 (ASCII) Circuit Card.
HANDLES: 2-KDs + Up To 4-PTRs (1 Print Local)





$$ 41043N — Any D I/O Circuit Card

410435 — EBCDIC
410431 — ASCII

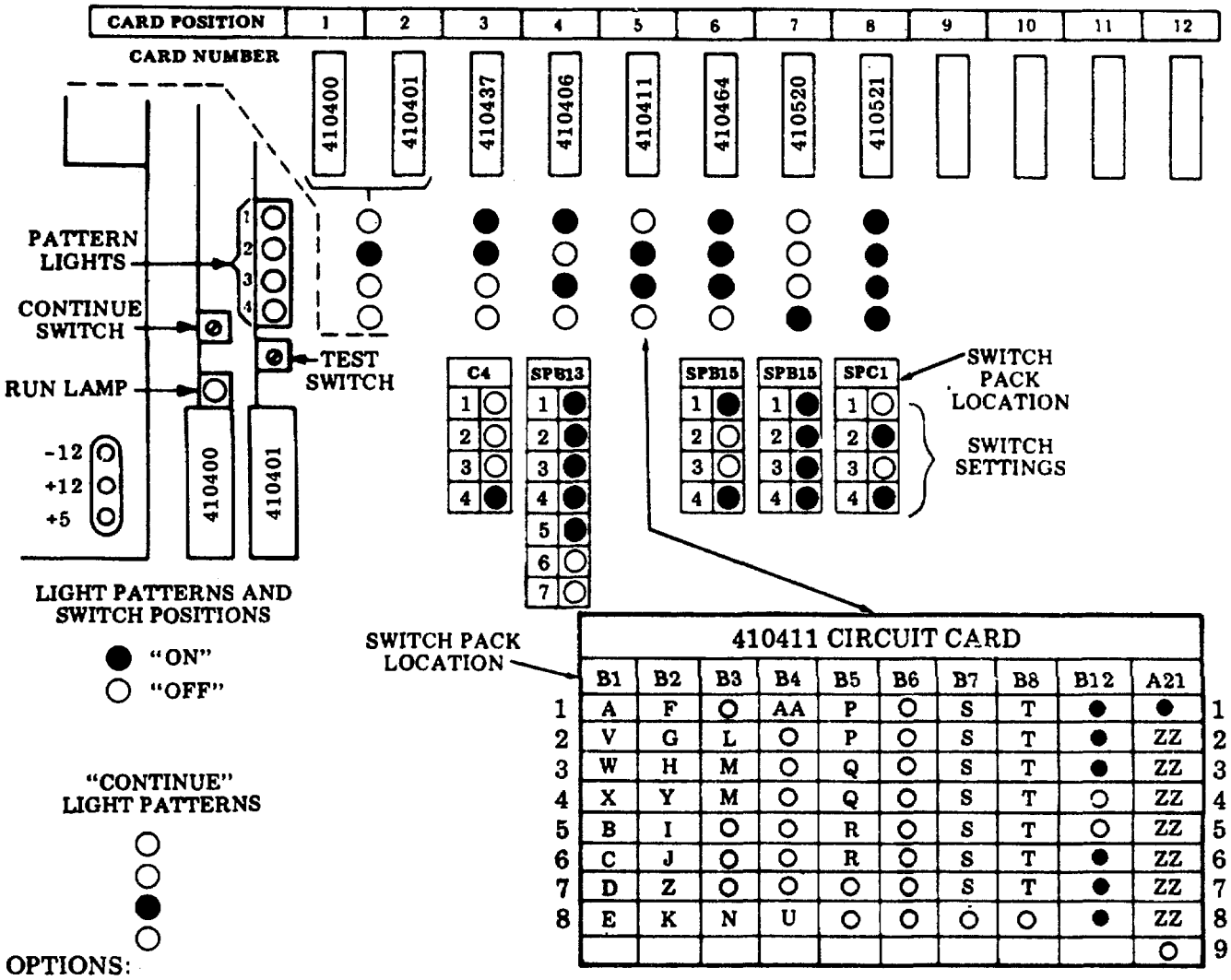
Note 1: Printer associated with I/O socket J309 will be print local for KDs in I/O socket J308 and J301 and J310 and J302.

PRINTER OPTIONS					
PRINTER I/O SOCKET		J309	J311	J312	J313
Friction Feed					
Tractor Feed 80 Col					
Tractor Feed 132 Col					
17.	Specify Right Margin				
	Specify Left Margin				
18.a.	No Paper Feed Out				
18.b	Paper FO on "RM" Loss				
18.c.	Paper FO on "RM" Loss and ETX				
19.d.	96 Character Set				
19.e	64 Character Set				
19.f.	Ext. ASCII Set				
20.a.	Single LF				
20.b.	Double LF				
21.a	Lower and Upper Case Print				
21.b	Lower Case Prints as Upper Case				
22.a	Lower Case Prints as Error				
22.b	Lower Case Prints as Upper Case				
39.a	**Forms on**				
39.b	**Forms off**				
48.a.	**Paper Out Not Gated W/FF**				
48.b.	**Paper Out Gated W/FF**				
58.a.	**Motor on Indefinitely**				
58.b.	**Motor off After 40 Sec.**				

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C437/AEE/091 †††



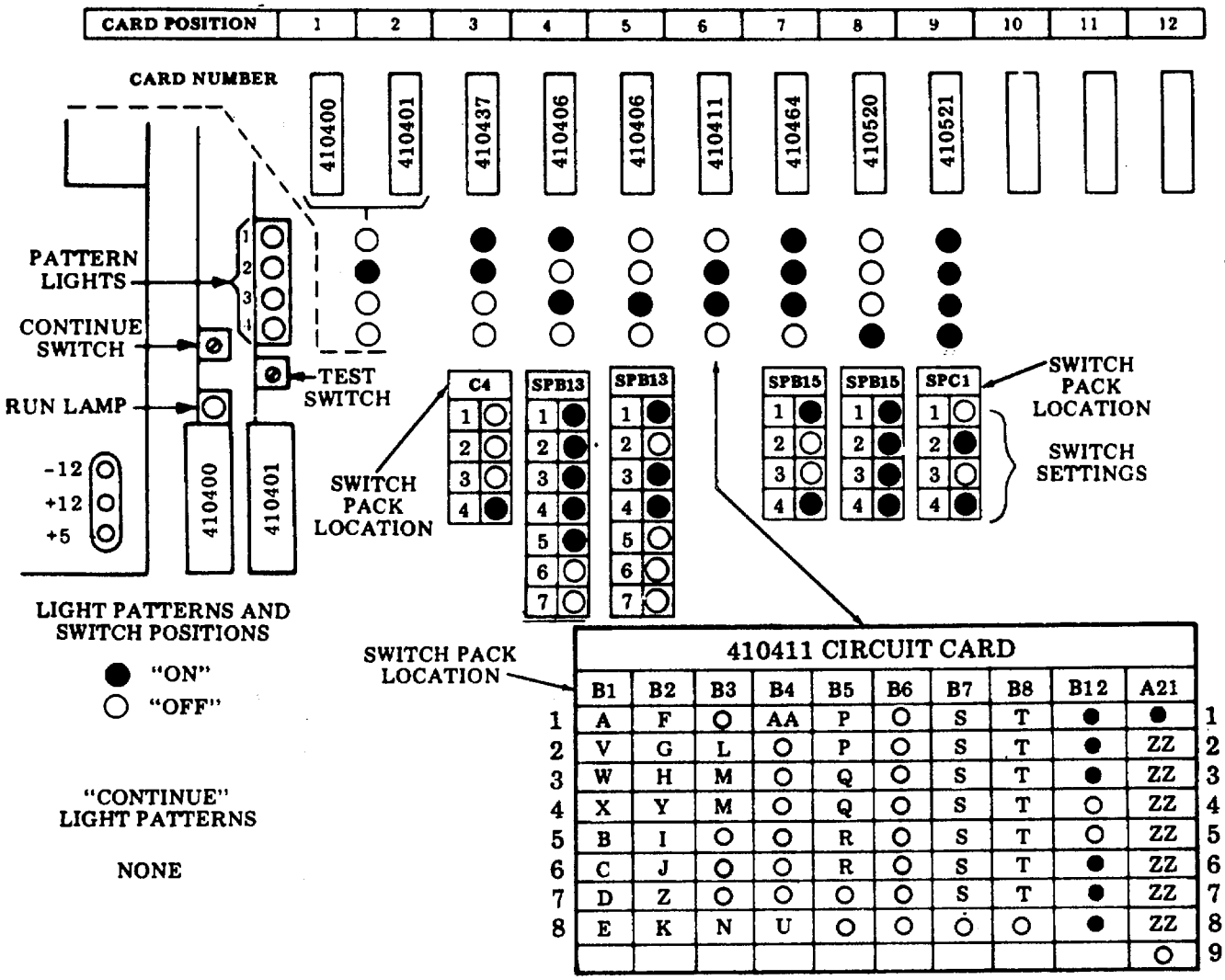
OPTIONS:

A. Line monitored by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (54 line/page)
J. Printer optioned for double line feed
K. Keep letters-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
V. Isochronous/Asynchronous operation
W. Data terminal ready control
X. Line wrap on display
Y. Reject received Nulls
Z. Home on send
AA. Stop bits in five-level operation
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate

Refer to Pages 7-107 through 7-109 for options.

††† The 40C437/AEE/091 is identical to the 40C435/AEE/091 with the exception that the 40C437/AEE/091 contains a narrow interconnection module for rack mounting applications.

Controller 40C437/AEE/091 With Additional 410406 Circuit Card



OPTIONS:

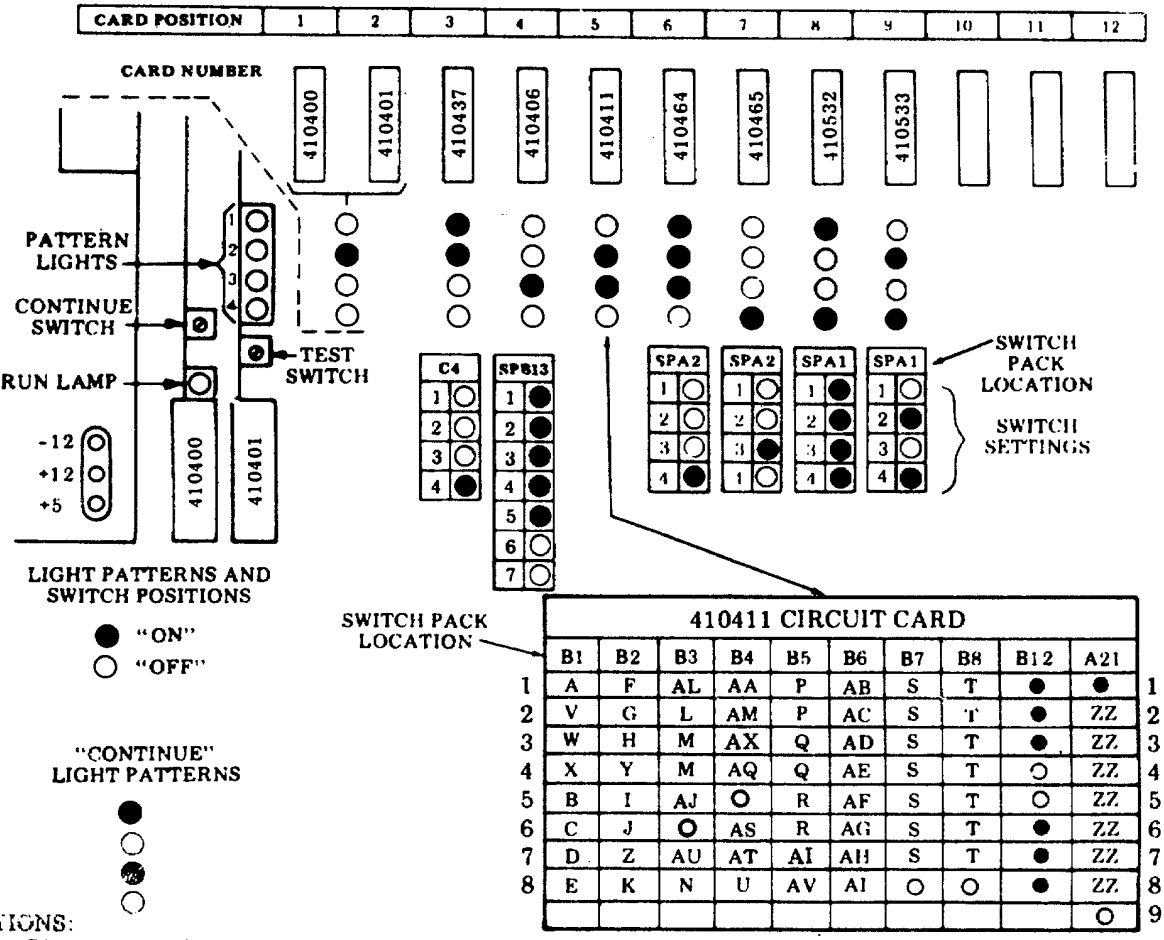
A. Line monitored by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (54 line/page)
J. Printer optioned for double line feed
K. Keep letters-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
V. Isochronous/Asynchronous operation
W. Data terminal ready control
X. Line wrap on display
Y. Reject received Nulls
Z. Home on send
AA. Stop bits in five-level operation
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate

Refer to Pages 7-107 through 7-109 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C435/AEE/091 or 40C437/AEE/091 With 403142 Modification Kit ‡‡‡



	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	W	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	○	R	AF	S	T	○	ZZ	5
6	C	J	○	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	AI	○	○	●	ZZ	8
										○	9

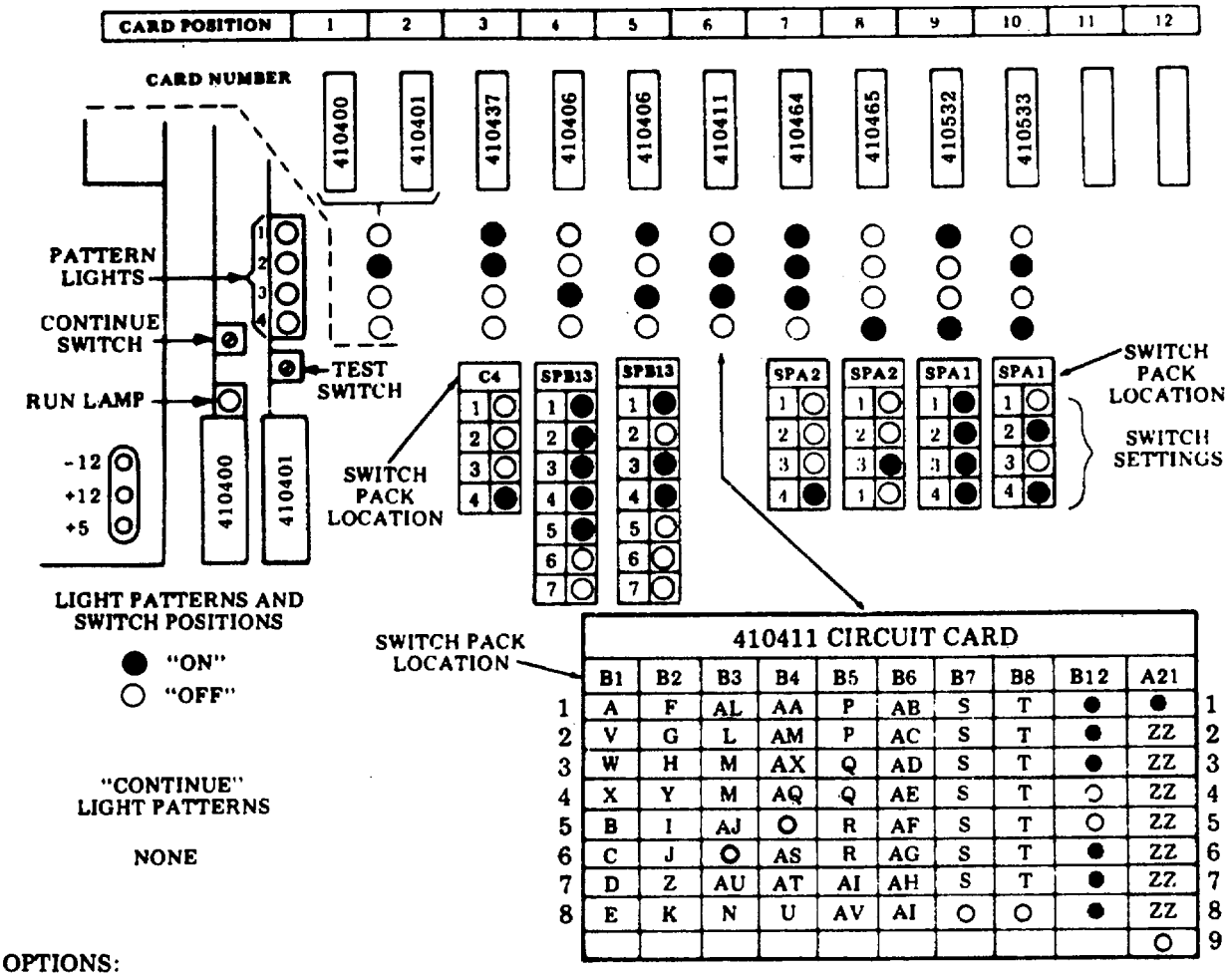
OPTIONS:

A. Line monitored by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (54 line/page)
J. Printer optioned for double line feed
K. Keep letters-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
V. Isochronous/Asynchronous operation
W. Data terminal ready control
X. Line wrap on display
Y. Reject received text Nulls
Z. Home on send
AA. Stop bits in five-level operation
AB. S/R or Poll/Select
AC. Received ETX characters retained
AD. Line terminator option
AE. One second line break
AF. Stop bits in eight-level
AG. Destructive scrolling
AH. Number of display segments
AI. DTR control
AJ. ETX required to send
AL. Preempt display
AM. 40/8A emulator option
AQ. Power-up mode
AS. Local send tape to display option
AT. Reject received text deletes
AU. Location of carriage return/new line keys
AV. Clear display when preempted
AX. LF, L' NNNN message end in ASCII
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate

‡‡‡ The identification label for this modification kit is found on the front left side of the controller, near the controller identification label.

Refer to Pages 7-117 through 7-122 for options.

Controller 40C435/AEE/091 or 40C437/AEE/091 With 403142 Modification Kit and Additional 410406 Circuit Card



410411 CIRCUIT CARD

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	W	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	○	R	AF	S	T	○	ZZ	5
6	C	J	○	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	AI	○	○	●	ZZ	8
										○	9

OPTIONS:

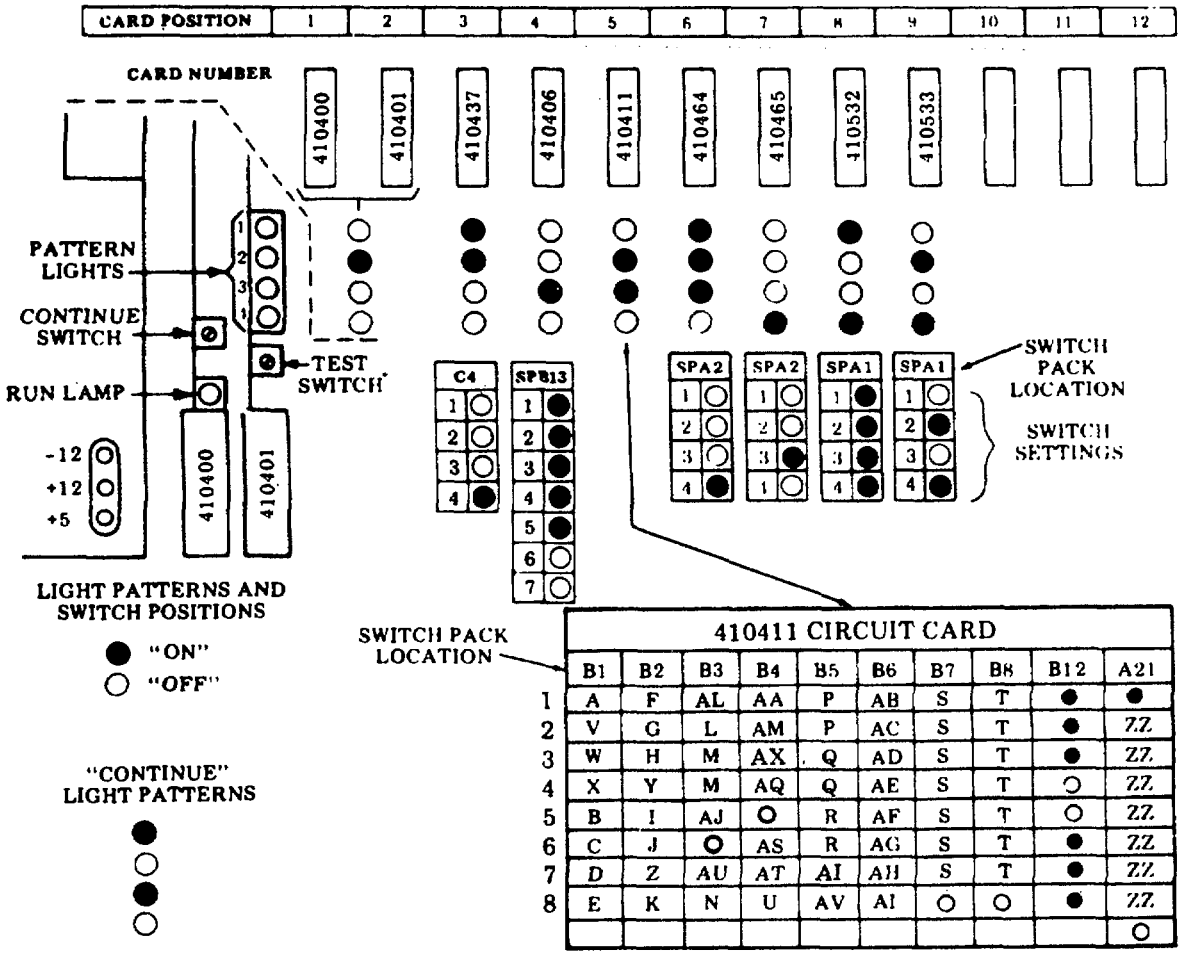
A. Line monitored by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (54 line/page)
J. Printer optioned for double line feed
K. Keep letters-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
V. Isochronous/Asynchronous operation
W. Data terminal ready control
X. Line wrap on display
Y. Reject received text Nulls
Z. Home on send
AA. Stop bits in five-level operation
AB. S/R or Poll/Select
AC. Received ETX characters retained
AD. Line terminator option
AE. One second line break
AF. Stop bits in eight-level
AG. Destructive scrolling
AH. Number of display segments
AI. DTR control
AJ. ETX required to send
AL. Preempt display
AM. 40/8A emulator option
AQ. Power-up mode
AS. Local send tape to display option
AT. Reject received text deletes
AU. Location of carriage return/new line keys
AV. Clear display when preempted
AX. LF, LF, NNNN message end in ASCII
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate

Refer to Pages 7-117 through 7-122 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C437/AEL/106



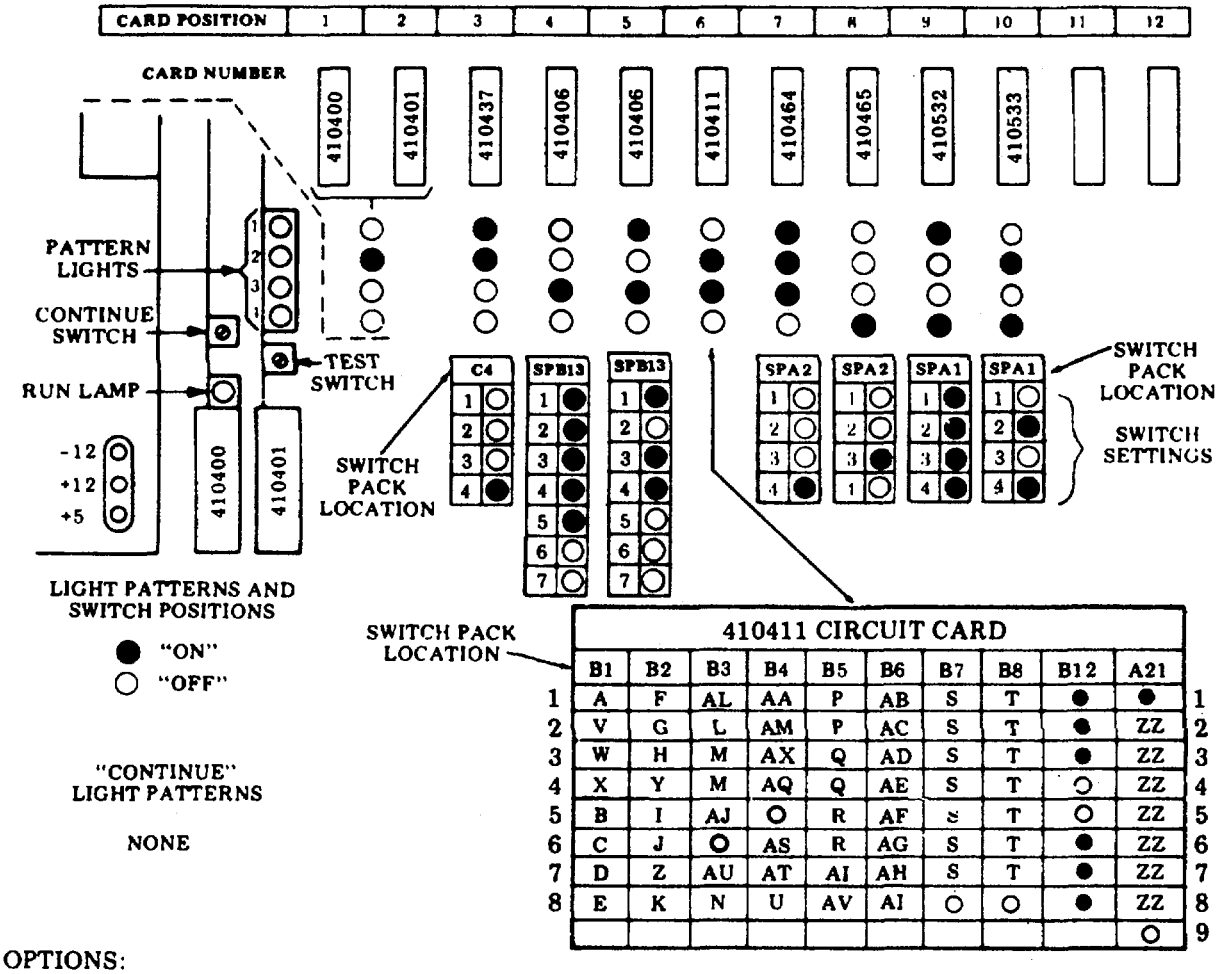
	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	W	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	○	R	AF	S	T	○	ZZ	5
6	C	J	○	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	AI	○	○	●	ZZ	8
										○	9

OPTIONS:

A. Line monitored by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (54 line/page)
J. Printer optioned for double line feed
K. Keep letters-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
V. Isochronous/Asynchronous operation
W. Data terminal ready control
X. Line wrap on display
Y. Reject received text Nulls
Z. Home on send
AA. Stop bits in five-level operation
AB. S/R or Poll/Select
AC. Received ETX characters retained
AD. Line terminator option
AE. One second line break
AF. Stop bits in eight-level
AG. Destructive scrolling
AH. Number of display segments
AI. DTR control
AJ. ETX required to send
AL. Preempt display
AM. 40/8A emulator option
AQ. Power-up mode
AS. Local send tape to display option
AT. Reject received text deletes
AU. Location of carriage return/new line keys
AV. Clear display when preempted
AX. LF, LF, NNNN message end in ASCII
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate

Refer to Pages 7-117 through 7-122 for options.

Controller 40C437/AEL/106 With Additional 410406 Circuit Card



OPTIONS:

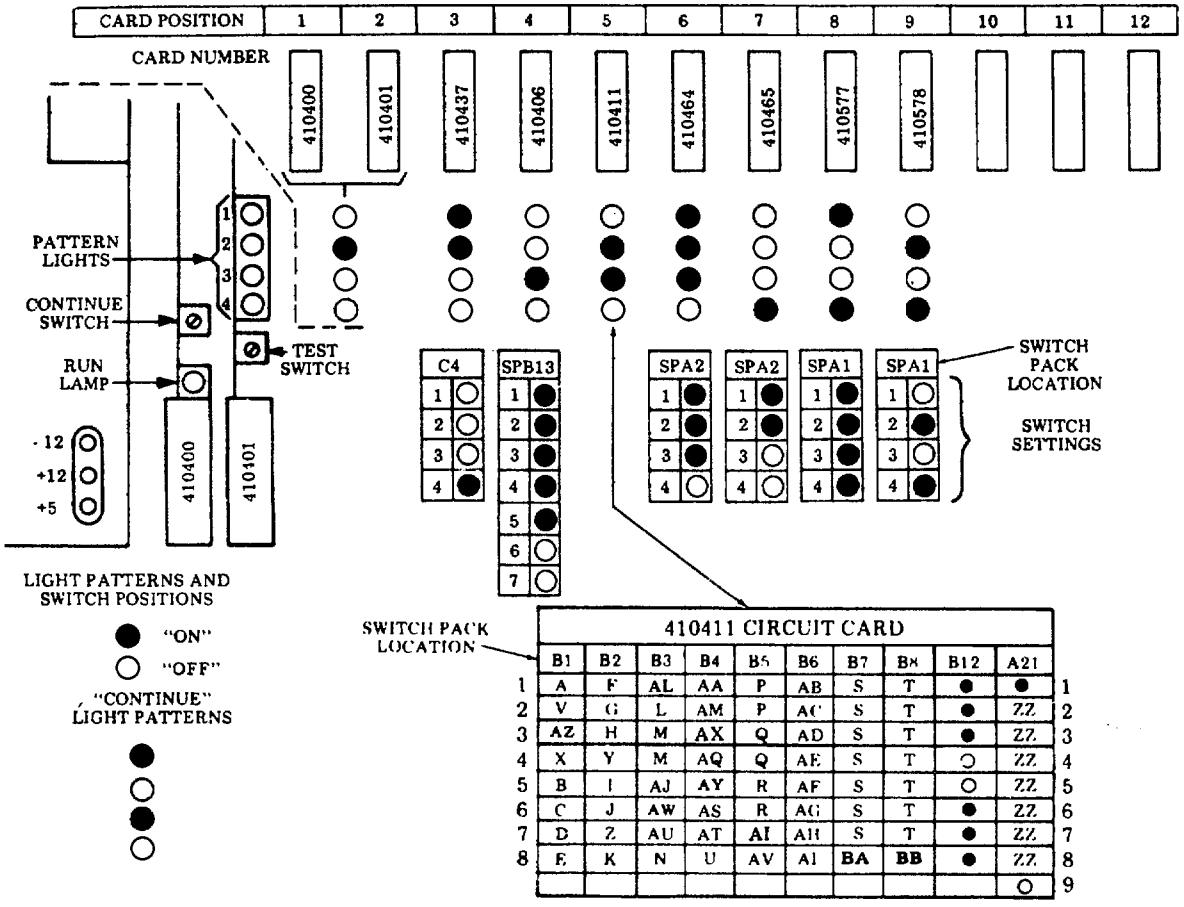
A. Line monitored by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (54 line/page)
J. Printer optioned for double line feed
K. Keep letters-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
V. Isochronous/Asynchronous operation
W. Data terminal ready control
X. Line wrap on display
Y. Reject received text Nulls
Z. Home on send
AA. Stop bits in five-level operation
AB. S/R or Poll/Select
AC. Received ETX characters retained
AD. Line terminator option
AE. One second line break
AF. Stop bits in eight-level
AG. Destructive scrolling
AH. Number of display segments
AI. DTR control
AJ. ETX required to send
AL. Preempt display
AM. 40/8A emulator option
AQ. Power-up mode
AS. Local send tape to display option
AT. Reject received text deletes
AU. Location of carriage return/new line keys
AV. Clear display when preempted
AX. LF, LF, NNNN message end in ASCII
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate

Refer to Pages 7-117 through 7-122 for options.,

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C437/AEL/106 Modified to be a 40C437/AEL/107



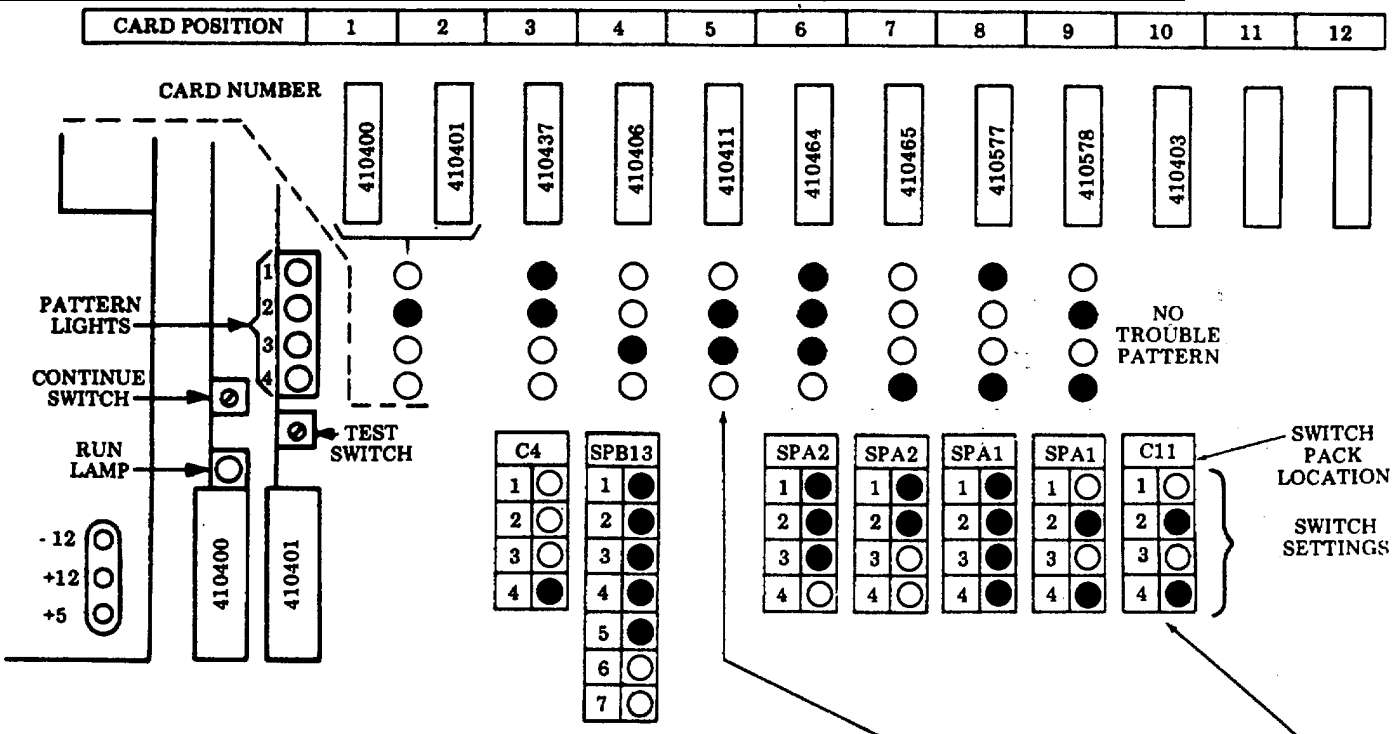
	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	AZ	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	AY	R	AF	S	T	○	ZZ	5
6	C	J	AW	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	A1	BA	BB	●	ZZ	8
										○	9

OPTIONS:

A. Line monitored by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (54 line/page)
J. Printer optioned for double line feed
K. Keep letters-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
V. Isochronous/Asynchronous operation
X. Line wrap on display
Y. Reject received text Nulls
Z. Home on send
AA. Stop bits in five-level operation
AB. S/R or Poll/Select
AC. Received ETX characters retained
AD. Line terminator option
AE. One second line break
AF. Stop bits in eight-level
AG. Destructive scrolling
AH. Number of display segments
AI. DTR control
AJ. ETX required to send
AL. Preempt display
AM. 40/8A emulator option
AQ. Power-up mode
AS. Local send tape to display option
AT. Reject received text deletes
AU. Location of carriage return/new line keys
AV. Clear display when preempted
AW. ZNY transmission control
AX. RTS/DTR control signal
AY. Urgent Traffic and Priority Message monitor
AZ. ZNY EEE transmission control
BA. Low tape indication value
BB. ASCII Recognition of "LF LF NNNN"
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate

Refer to Pages 7-123 through 7-127 for options.

Controller 40C437/AEL/106 Modified to be a 40C437/AEL/107 With Optional Answer-Back Features ¶¶¶



LIGHT PATTERNS AND SWITCH POSITIONS

● "ON"

○ "OFF"

"CONTINUE" LIGHT PATTERNS

● ○ ● ○

SWITCH PACK LOCATION

410411 CIRCUIT CARD

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	AZ	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	AY	R	AF	S	T	○	ZZ	5
6	C	J	AW	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	AI	BA	BB	●	ZZ	8
										○	9

410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15	
1	a1	a2	a3	a4	a5	a6	a7	●	
2	b1	b2	b3	b4	b5	b6	b7	●	
3	c1	c2	c3	c4	c5	c6	c7	●	
4	d1	d2	d3	d4	d5	d6	d7	●	
5	e1	e2	e3	e4	e5	e6	e7	●	
6	f1	f2	f3	f4	f5	f6	f7	●	
7	g1	g2	g3	g4	g5	g6	g7	●	
8	h1	h2	h3	h4	h5	h6	h7	●	

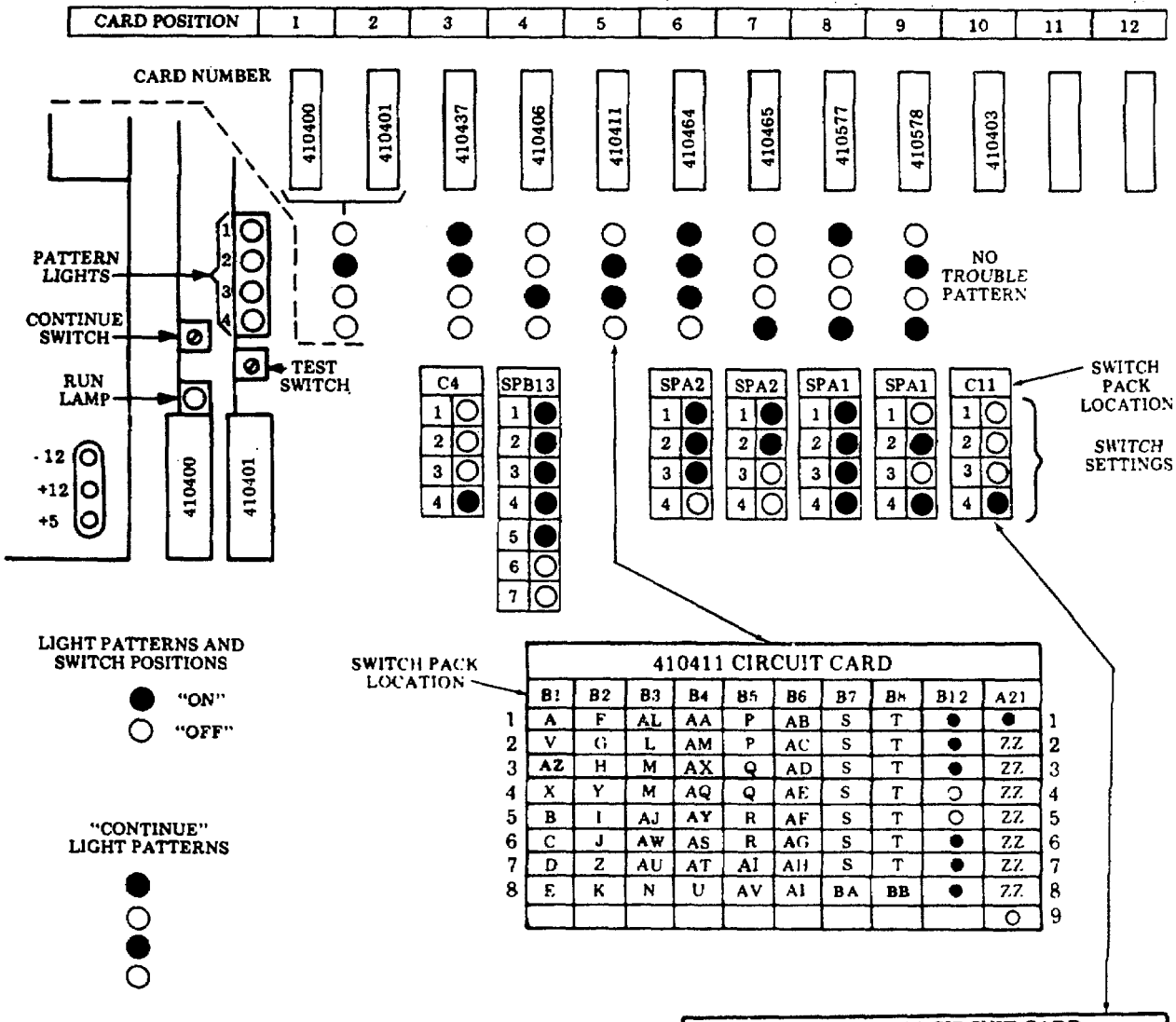
¶¶¶ Controller may contain any combination of three optional 410403 circuit cards providing various features. These cards may be placed in any available slot in the controller, however, the features provided are not "enabled" unless option switch C11 is properly programmed as shown.

Refer to Pages 7-123 through 7-127 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

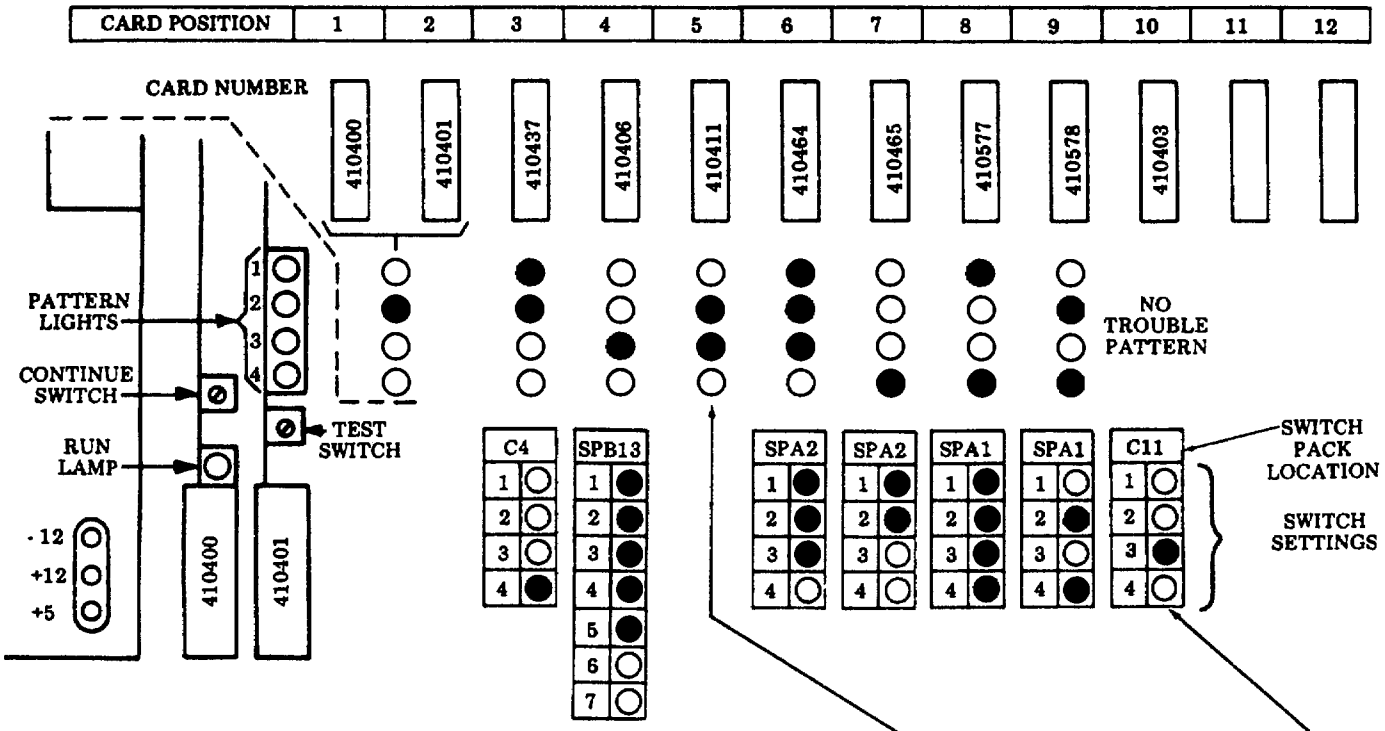
Controller 40C437/AEL/106 Modified to be a 40C437/AEL/107 With Optional Urgent Traffic Detection Feature¶¶¶



¶¶¶ **Controller may contain any combination of three optional 410403 circuit cards providing various features. These cards may be placed in any available slot in the controller, however, the features provided are not "enabled" unless option switch C11 is properly programmed as shown.**

Refer to Pages 7-123 through 7-127 for options.

Controller 40C437/AEL/106 Modified to be a 40C437/AEL/107 With Optional ZNY Feature



LIGHT PATTERNS AND SWITCH POSITIONS

● "ON"

○ "OFF"

"CONTINUE" LIGHT PATTERNS

● ○ ● ○

SWITCH PACK LOCATION

410411 CIRCUIT CARD

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	AZ	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	AY	R	AF	S	T	○	ZZ	5
6	C	J	AW	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	AI	BA	BB	●	ZZ	8
										○	9

410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15	
1	r1	r2	r3	r4	r5	r6	r7	●	
2	s1	s2	s3	s4	s5	s6	s7	●	
3	t1	t2	t3	t4	t5	t6	t7	●	
4	u1	u2	u3	u4	u5	u6	u7	●	
5	w1	w2	w3	w4	w5	w6	w7	●	
6	x1	x2	x3	x4	x5	x6	x7	●	
7	y1	y2	y3	y4	y5	y6	y7	●	
8	z1	z2	z3	z4	z5	z6	z7	●	

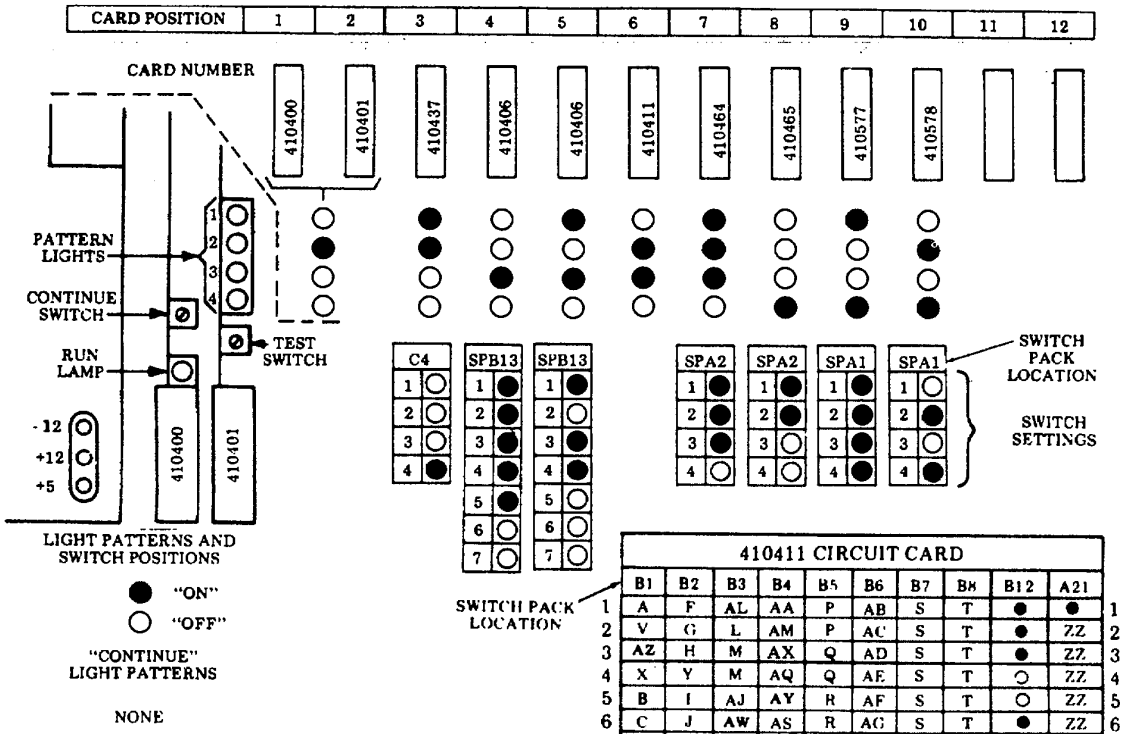
¶¶¶ Controller may contain any combination of three optional 410403 circuit cards providing various features. These cards may be placed in any available slot in the controller, however, the features provided are not "enabled" unless option switch C11 is properly programmed as shown.

Refer to Pages 7-123 through 7-127 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C437/AEL/106 Modified to be a 40C437/AEL/107 With Additional 410406 Circuit Card****



410411 CIRCUIT CARD

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	AZ	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	AY	R	AF	S	T	○	ZZ	5
6	C	J	AW	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	AJ	BA	BB	●	ZZ	8
										○	9

OPTIONS:

A. Line monitored by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (54 line/page)
J. Printer optioned for double line feed
K. Keep letters-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
V. Isochronous/Asynchronous operation
X. Line wrap on display
Y. Reject received text Nulls
Z. Home on send

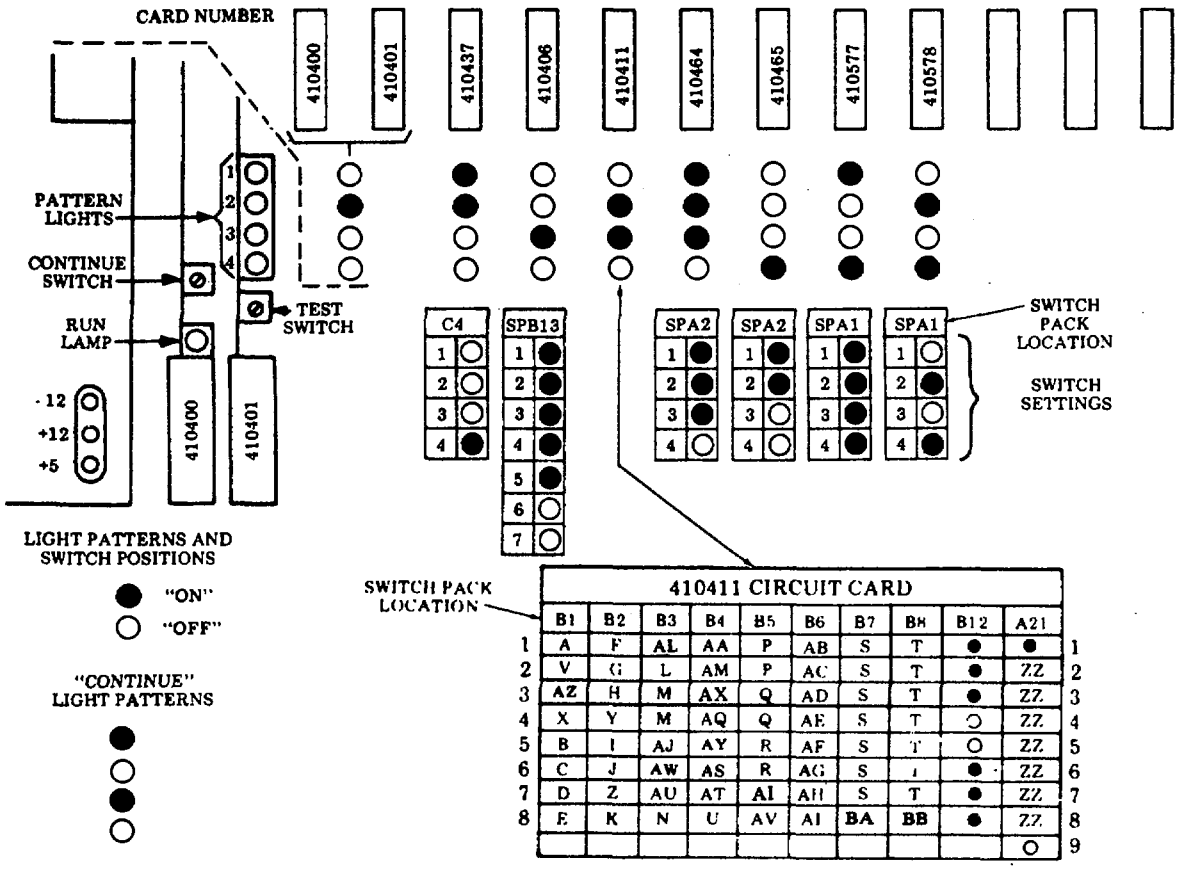
AA. Stop bits in five-level operation
AB. S/R or Poll/Select
AC. Received ETX characters retained
AD. Line terminator option
AE. One second line break
AF. Stop bits in eight-level
AG. Destructive scrolling
AH. Number of display segments
AI. DTR control
AJ. ETX required to send
AL. Preempt display
AM. 40/8A emulator option
AQ. Power-up mode
AS. Local send tape to display option
AT. Reject received text deletes
AU. Location of carriage return/new line keys
AV. Clear display when preempted
AW. ZNY transmission control
AX. RTS/DTR control signal
AY. Urgent Traffic and Priority Message monitor
AZ. ZNY EEE transmission control
BA. Low tape indication value
BB. ASCII Recognition of "LF LF NNNN"
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate

****With an additional 410406 card added, terminal can only accommodate two optional 410403 cards instead of three.

Refer to Pages 7-123 through 7-127 for options.

Controller 40C437/AEL/107

CARD POSITION	1	2	3	4	5	6	7	8	9	10	11	12
CARD NUMBER	410400	410401	410437	410406	410411	410464	410465	410577	410578			



	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	AZ	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	AY	R	AF	S	T	○	ZZ	5
6	C	J	AW	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	AI	BA	BB	●	ZZ	8
										○	9

OPTIONS:

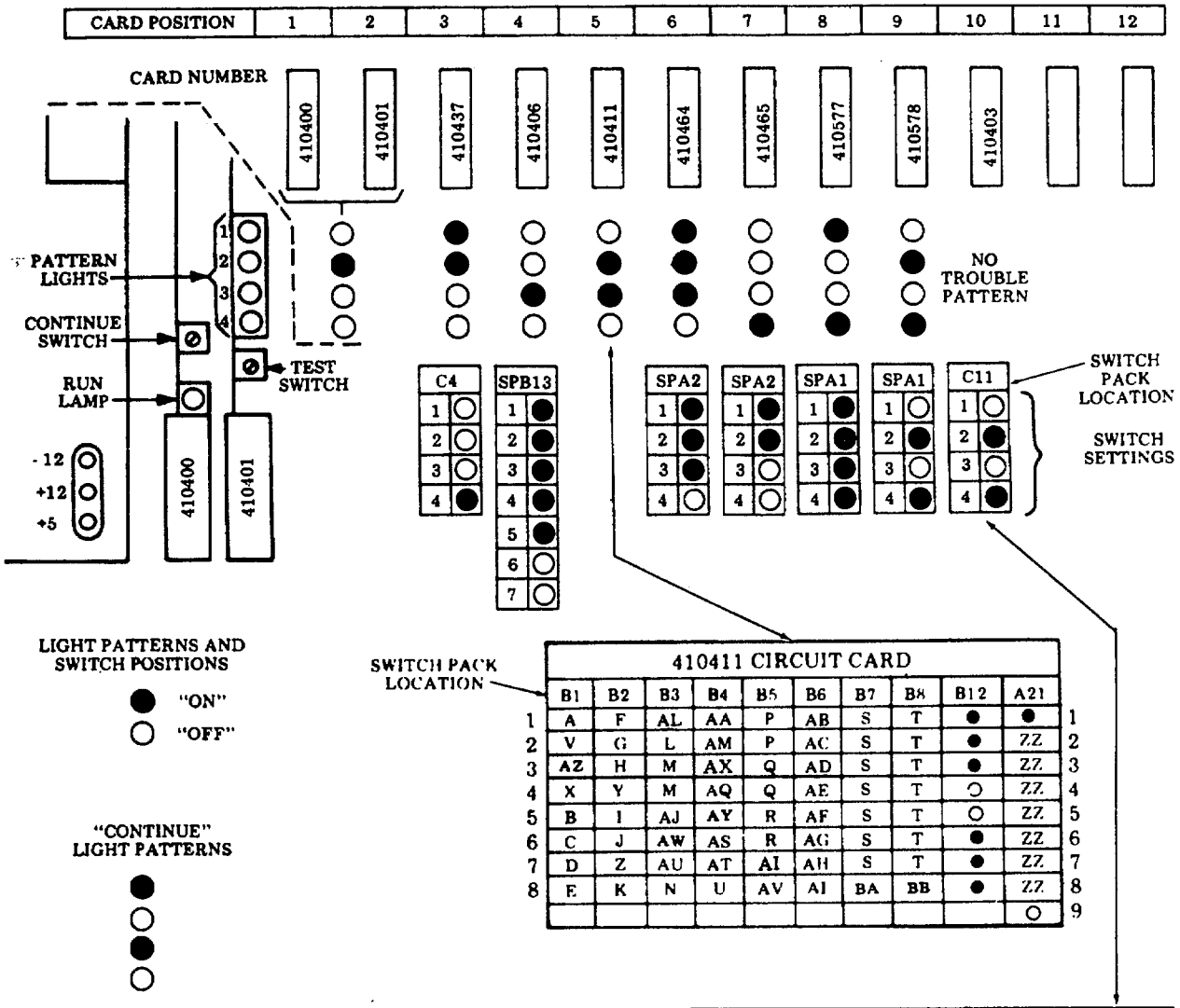
A. Line monitored by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. *Printer on-line required to send*
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (54 line/page)
J. Printer optioned for double line feed
K. Keep letters-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
V. Isochronous/Asynchronous operation
X. Line wrap on display
Y. Reject received text Nulls
Z. Home on send
AA. Stop bits in five-level operation
AB. S/R or Poll/Select
AC. Received ETX characters retained
AD. Line terminator option
AE. One second line break
AF. *Stop bits in eight-level*
AG. Destructive scrolling
AH. Number of display segments
AI. DTR control
AJ. ETX required to send
AL. Preempt display
AM. 40/8A emulator option
AQ. Power-up mode
AS. Local send tape to display option
AT. Reject received text deletes
AU. Location of carriage return/new line keys
AV. Clear display when preempted
AW. ZNY transmission control
AX. RTS/DTR control signal
AY. Urgent Traffic and Priority Message monitor
AZ. ZNY EEE transmission control
BA. Low tape indication value
BB. ASCII Recognition of "LF LF NNNN"
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate

Refer to Pages 7-123 through 7-127 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C437/AEL/107 With Optional Answer-Back Feature



SWITCH PACK LOCATION

410411 CIRCUIT CARD

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	AZ	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	AY	R	AF	S	T	○	ZZ	5
6	C	J	AW	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	AI	BA	BB	●	ZZ	8
										○	9

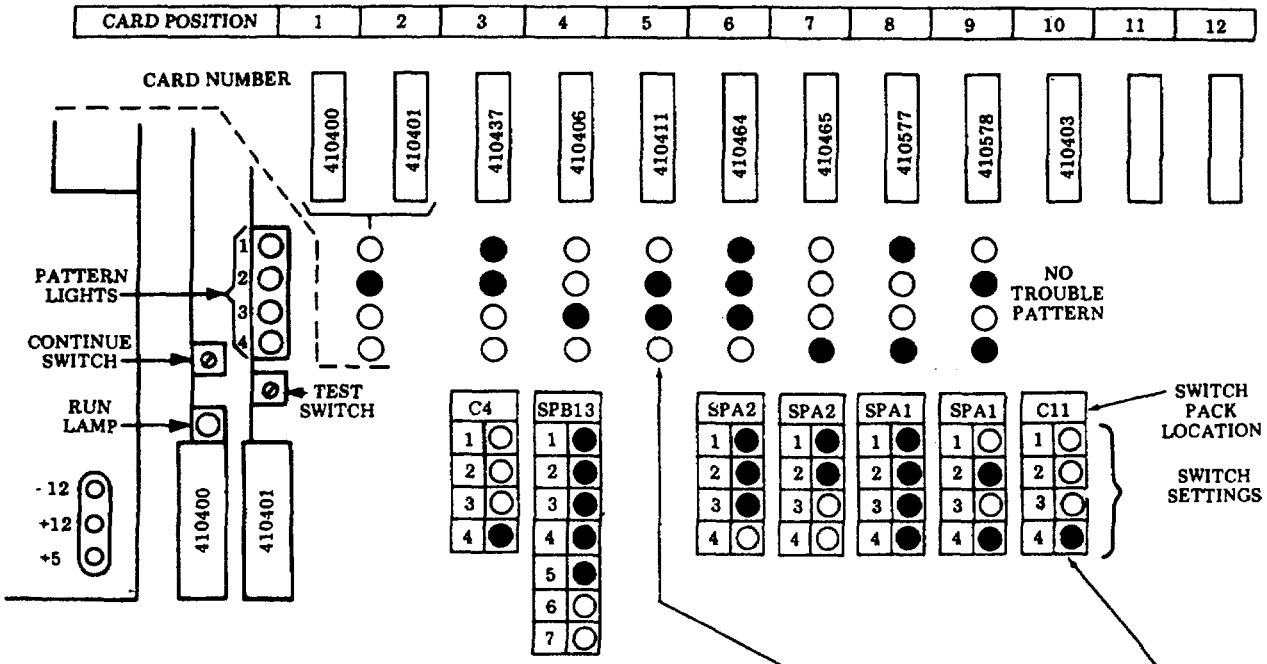
410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15	
1	a1	a2	a3	a4	a5	a6	a7	●	
2	b1	b2	b3	b4	b5	b6	b7	●	
3	c1	c2	c3	c4	c5	c6	c7	●	
4	d1	d2	d3	d4	d5	d6	d7	●	
5	e1	e2	e3	e4	e5	e6	e7	●	
6	f1	f2	f3	f4	f5	f6	f7	●	
7	g1	g2	g3	g4	g5	g6	g7	●	
8	h1	h2	h3	h4	h5	h6	h7	●	

¶¶¶ **Controller may contain any combination of three optional 410403 circuit cards providing various features. These cards may be placed in any available slot in the controller, however, the features provided are not "enabled" unless option switch C11 is properly programmed as shown.**

Refer to Pages 7-123 through 7-127 for options.

Controller 40C437/AEL/107 With Optional Urgent Traffic Detection Feature



LIGHT PATTERNS AND SWITCH POSITIONS

● "ON"

○ "OFF"

"CONTINUE" LIGHT PATTERNS

SWITCH PACK LOCATION

410411 CIRCUIT CARD

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	AZ	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	AY	R	AF	S	T	○	ZZ	5
6	C	J	AW	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	AI	BA	BB	●	ZZ	8
										○	9

410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15	
1	i1	i2	i3	i4	i5	i6	i7	●	
2	j1	j2	j3	j4	j5	j6	j7	●	
3	k1	k2	k3	k4	k5	k6	k7	●	
4	l1	l2	l3	l4	l5	l6	l7	●	
5	m1	m2	m3	m4	m5	m6	m7	●	
6	n1	n2	n3	n4	n5	n6	n7	●	
7	o1	o2	o3	o4	o5	o6	o7	●	
8	p1	p2	p3	p4	p5	p6	p7	●	

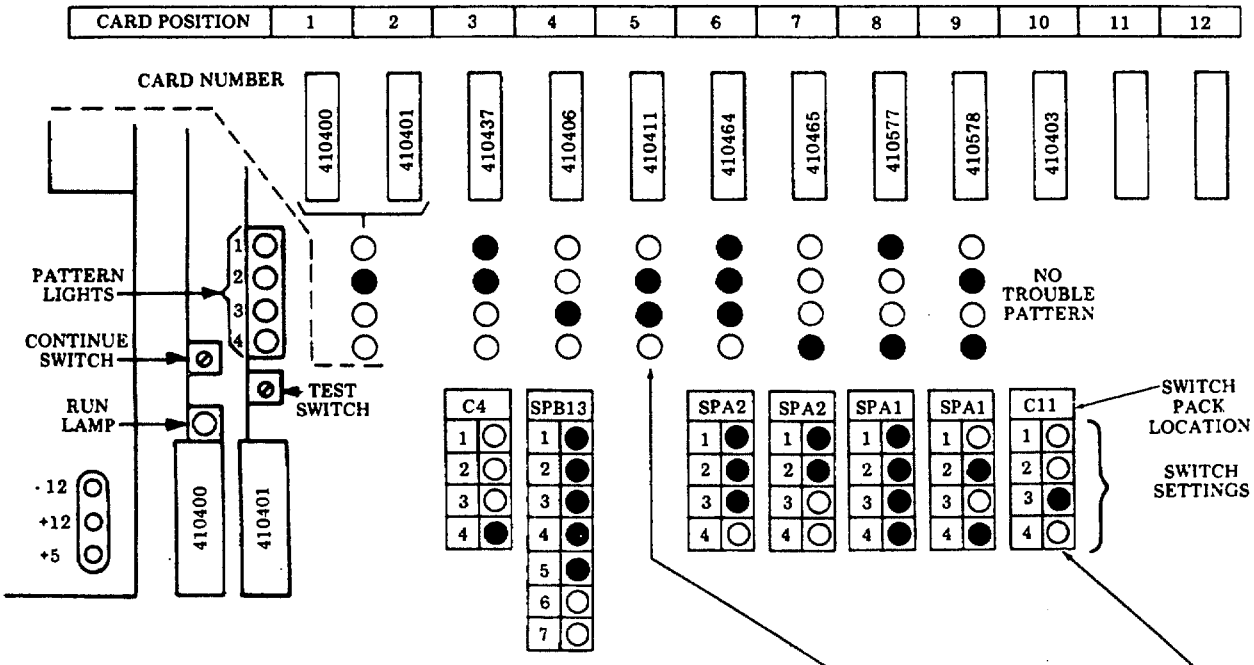
¶¶¶Controller may contain any combination of three optional 410403 circuit cards providing various features. These cards may be placed in any available slot in the controller, however, the features provided are not "enabled" unless option switch C11 is properly programmed as shown.

Refer to Pages 7-123 through 7-127 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

Controller 40C437/AEL/107 With Optional ZNY Feature



LIGHT PATTERNS AND SWITCH POSITIONS

● "ON"

○ "OFF"

"CONTINUE" LIGHT PATTERNS

SWITCH PACK LOCATION

410411 CIRCUIT CARD

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	AZ	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	AY	R	AF	S	T	○	ZZ	5
6	C	J	AW	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	AI	BA	BB	●	ZZ	8
										○	9

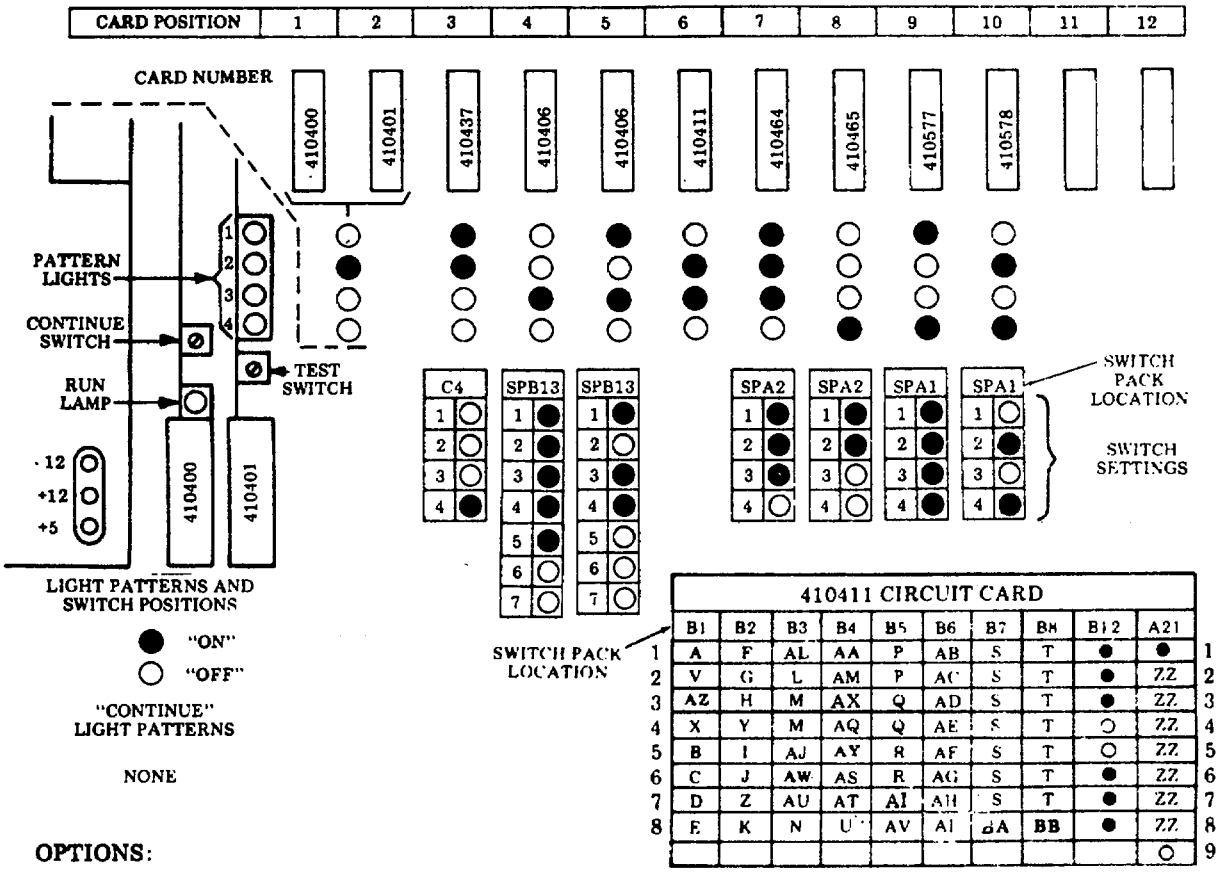
410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15	
1	r1	r2	r3	r4	r5	r6	r7	●	
2	s1	s2	s3	s4	s5	s6	s7	●	
3	t1	t2	t3	t4	t5	t6	t7	●	
4	u1	u2	u3	u4	u5	u6	u7	●	
5	w1	w2	w3	w4	w5	w6	w7	●	
6	x1	x2	x3	x4	x5	x6	x7	●	
7	y1	y2	y3	y4	y5	y6	y7	●	
8	z1	z2	z3	z4	z5	z6	z7	●	

¶¶¶ Controller may contain any combination of three optional 410403 circuit cards providing various features. These cards may be placed in any available slot in the controller, however, the features provided are not "enabled" unless option switch C11 is properly programmed as shown.

Refer to Pages 7-123 through 7-127 for options.

Controller 40C437/AEL/107 With Additional 410406 Circuit Card****



410411 CIRCUIT CARD

	B1	B2	B3	B4	B5	B6	B7	B8	B12	A21	
1	A	F	AL	AA	P	AB	S	T	●	●	1
2	V	G	L	AM	P	AC	S	T	●	ZZ	2
3	AZ	H	M	AX	Q	AD	S	T	●	ZZ	3
4	X	Y	M	AQ	Q	AE	S	T	○	ZZ	4
5	B	I	AJ	AY	R	AF	S	T	○	ZZ	5
6	C	J	AW	AS	R	AG	S	T	●	ZZ	6
7	D	Z	AU	AT	AI	AH	S	T	●	ZZ	7
8	E	K	N	U	AV	AI	BA	BB	●	ZZ	8
										○	9

OPTIONS:

A. Line monitored by printer on send data
B. ETX on premature end of message
C. Colon lower case, semicolon upper case
D. Keyboard on-line transmits blind
E. Display received escape sequences
F. Printer on-line required to send
G. Send extended characters from keyboard
H. Monitor tape on required to send
I. Automatic paging of printer (54 line/page)
J. Printer optioned for double line feed
K. Keep letters-figures shift characters (S_I, S_O)
L. Printer select also selects receive tape
M. Terminal on-line parity
N. Mode display stays in at end of receive message
P. Controller port for send tape
Q. Controller port for receive tape
R. Controller port for monitor tape
S. 1st station identity character
T. 2nd station identity character
U. Mode display goes to after sending
V. Isochronous/Asynchronous operation
X. Line wrap on display
Y. Reject received text Nulls
Z. Home on send

AA. Stop bits in five-level operation
AB. S/R or Poll/Select
AC. Received ETX characters retained
AD. Line terminator option
AE. One second line break
AF. Stop bits in eight-level
AG. Destructive scrolling
AH. Number of display segments
AI. DTR control
AJ. ETX required to send
AL. Preempt display
AM. 40/8A emulator option
AQ. Power-up mode
AS. Local send tape to display option
AT. Reject received text deletes
AU. Location of carriage return/new line keys
AV. Clear display when preempted
AW. ZNY transmission control
AX. RTS/DTR control signal
AY. Urgent Traffic and Priority Message monitor
AZ. ZNY EEE transmission control
BA. Low tape indication value
BB. ASCII Recognition of "LF LF NNNN"
ZZ. Eight-level asynchronous baud rate
ZZ. Five-level asynchronous baud rate

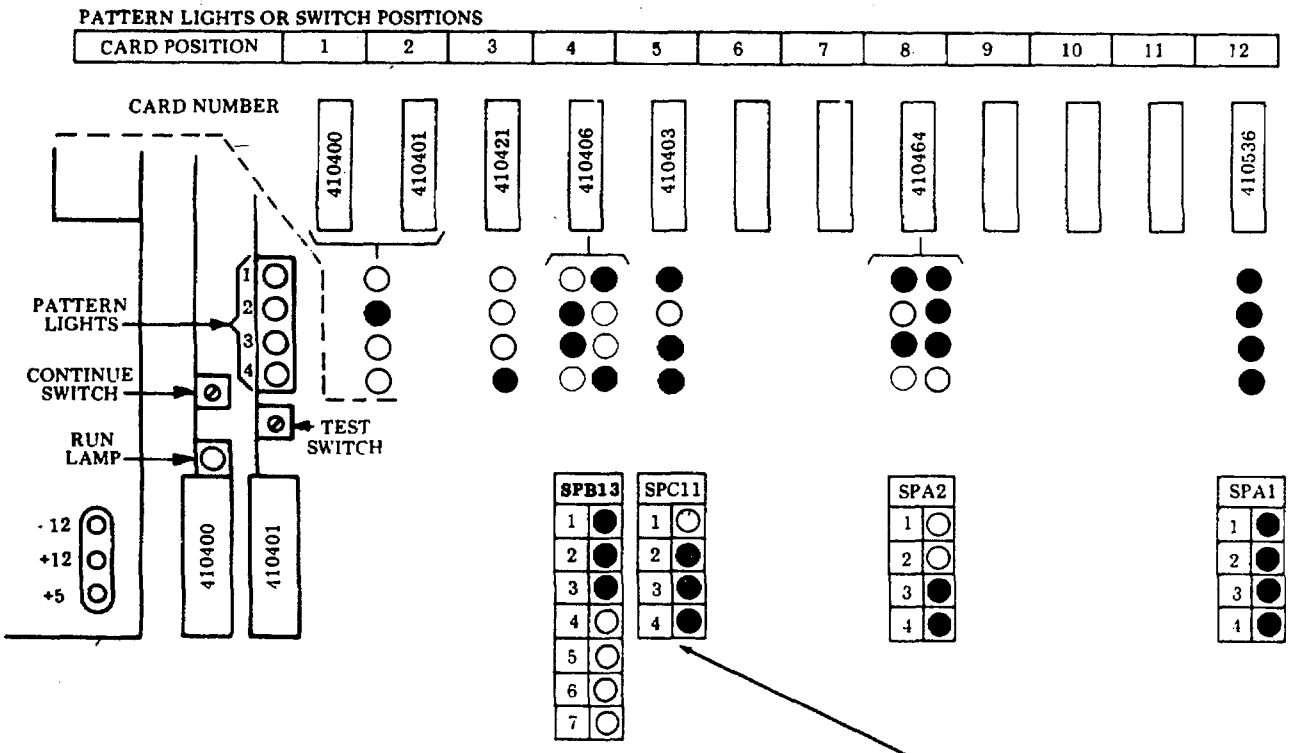
****With an additional 410406 card added, terminal can only accommodate two optional 410403 cards instead of three.

Refer to pages 7-123 through 7-127 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

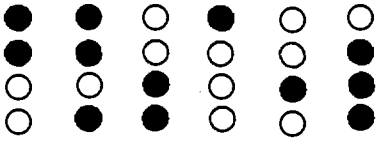
40C438/AEP/105 Controller - Basic-i Line



LIGHT PATTERNS AND SWITCH POSITIONS

● "ON"
○ "OFF"

"CONTINUE" LIGHT PATTERNS



410403 CIRCUIT CARD

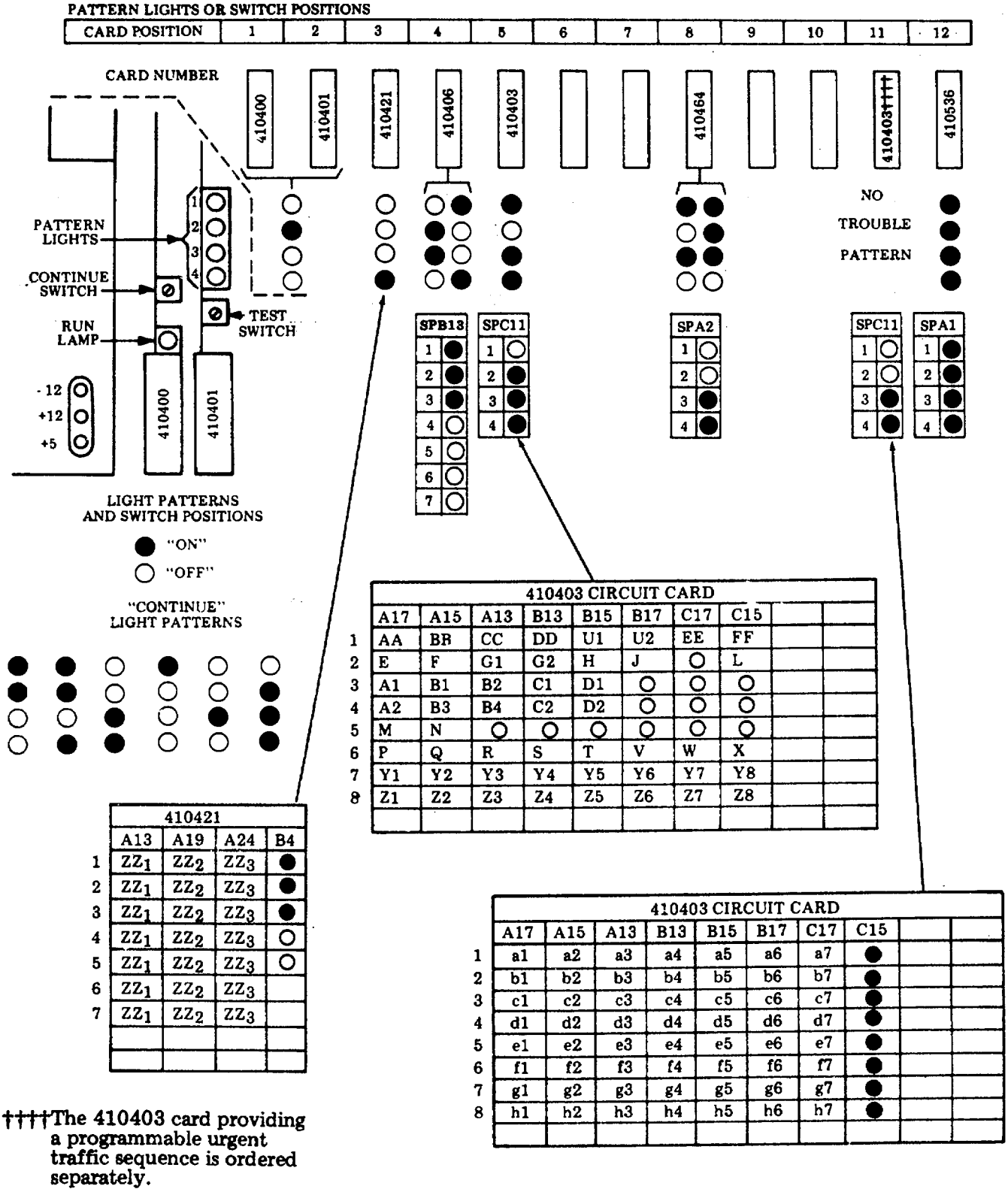
	A17	A15	A13	B13	B15	B17	C17	C15		
1	AA	BB	CC	DD	U1	U2	EE	FF		
2	E	F	G1	G2	H	J	○	L		
3	A1	B1	B2	C1	D1	○	○	○		
4	A2	B3	B4	C2	D2	○	○	○		
5	M	N	○	○	○	○	○	○		
6	P	Q	R	S	T	V	W	X		
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8		
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8		

410421

	A13	A19	A24	B4
1	ZZ_1	ZZ_2	ZZ_3	●
2	ZZ_1	ZZ_2	ZZ_3	●
3	ZZ_1	ZZ_2	ZZ_3	●
4	ZZ_1	ZZ_2	ZZ_3	○
5	ZZ_1	ZZ_2	ZZ_3	○
6	ZZ_1	ZZ_2	ZZ_3	
7	ZZ_1	ZZ_2	ZZ_3	

Refer to Pages 7-94 through 7-100 for options.

40C438/AEP/105 Controller - 1 Line. Urgent Traffic Detector,



410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15		
1	AA	BB	CC	DD	U1	U2	EE	FF		
2	E	F	G1	G2	H	J	○	L		
3	A1	B1	B2	C1	D1	○	○	○		
4	A2	B3	B4	C2	D2	○	○	○		
5	M	N	○	○	○	○	○	○		
6	P	Q	R	S	T	V	W	X		
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8		
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8		

410421

	A13	A19	A24	B4
1	ZZ_1	ZZ_2	ZZ_3	●
2	ZZ_1	ZZ_2	ZZ_3	●
3	ZZ_1	ZZ_2	ZZ_3	●
4	ZZ_1	ZZ_2	ZZ_3	○
5	ZZ_1	ZZ_2	ZZ_3	○
6	ZZ_1	ZZ_2	ZZ_3	
7	ZZ_1	ZZ_2	ZZ_3	

410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15		
1	a1	a2	a3	a4	a5	a6	a7	●		
2	b1	b2	b3	b4	b5	b6	b7	●		
3	c1	c2	c3	c4	c5	c6	c7	●		
4	d1	d2	d3	d4	d5	d6	d7	●		
5	e1	e2	e3	e4	e5	e6	e7	●		
6	f1	f2	f3	f4	f5	f6	f7	●		
7	g1	g2	g3	g4	g5	g6	g7	●		
8	h1	h2	h3	h4	h5	h6	h7	●		

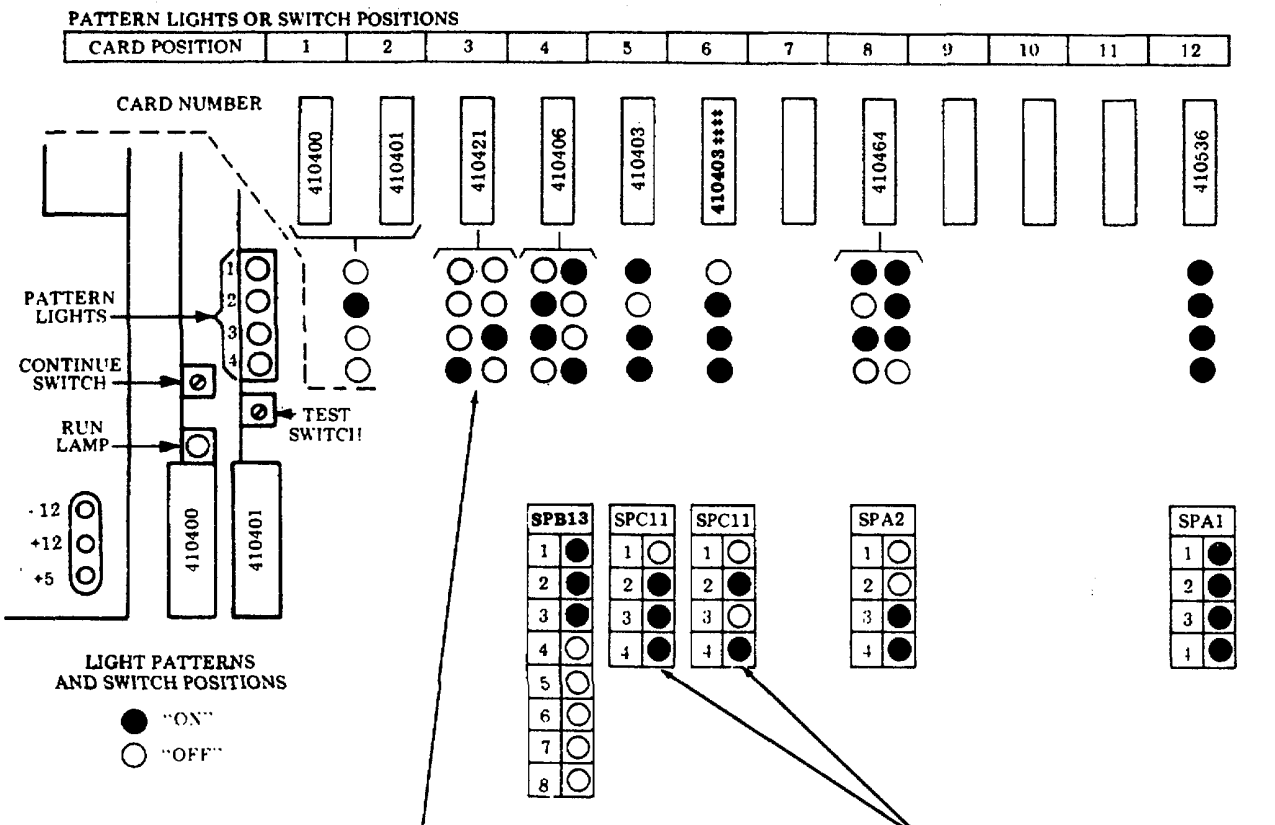
††††The 410403 card providing a programmable urgent traffic sequence is ordered separately.

Refer to Pages 7-94 through 7-100 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

40C438/AEP/105 Controller- Basic-2 Line



410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15		
1	AA	BB	CC	DD	U1	U2	EE	FF		
2	E	F	G1	G2	H	J	○	L		
3	A1	B1	B2	C1	D1	○	○	○		
4	A2	B3	B4	C2	D2	○	○	○		
5	M	N	○	○	○	○	○	○		
6	P	Q	R	S	T	V	W	X		
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8		
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8		

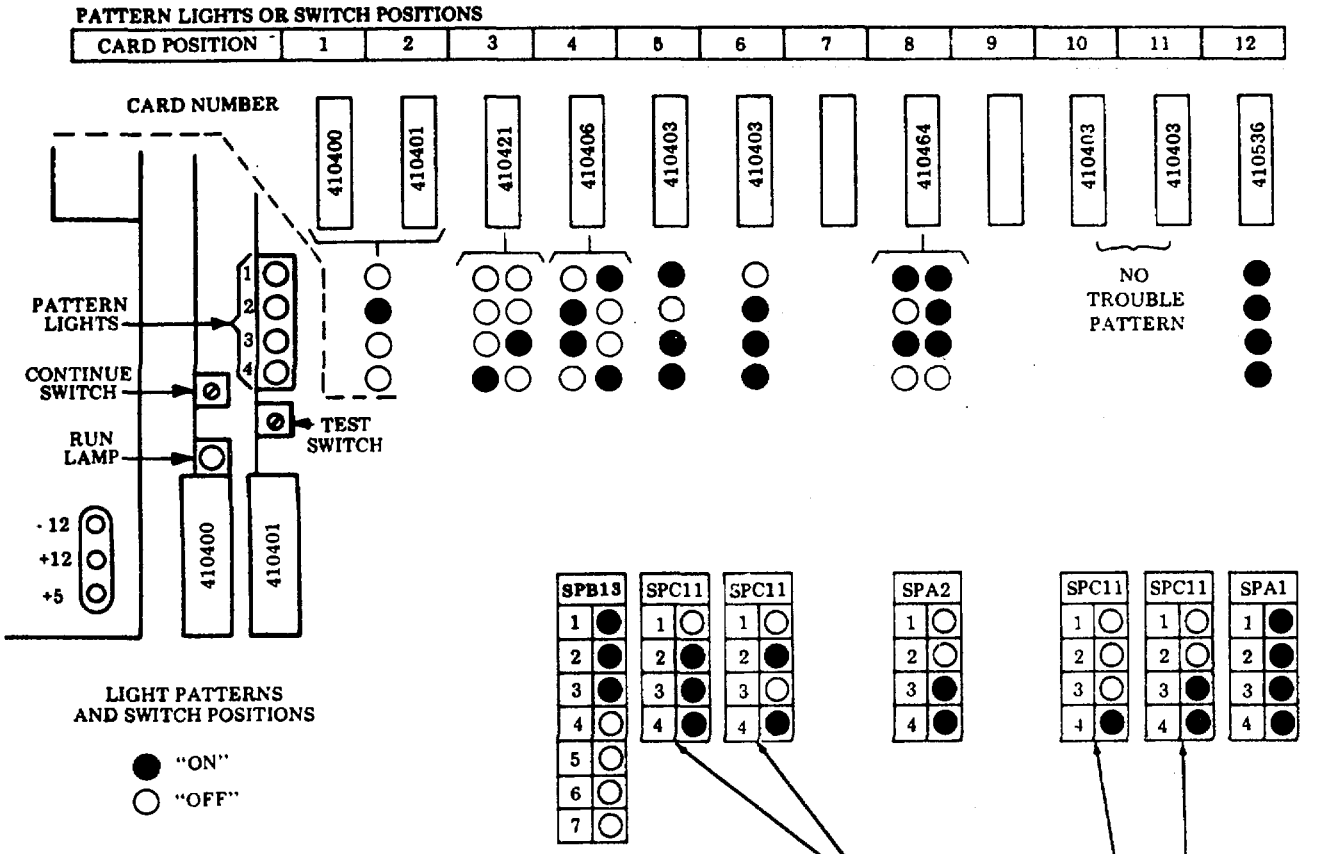
410421

	A13	A19	A24	B4
1	ZZ_1	ZZ_2	ZZ_3	●
2	ZZ_1	ZZ_2	ZZ_3	●
3	ZZ_1	ZZ_2	ZZ_3	●
4	ZZ_1	ZZ_2	ZZ_3	○
5	ZZ_1	ZZ_2	ZZ_3	○
6	ZZ_1	ZZ_2	ZZ_3	
7	ZZ_1	ZZ_2	ZZ_3	

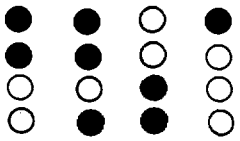
****Each additional traffic line requires an additional 410403 card, which is ordered separately.

Refer to Pages 7-94 through 7-100 for options.

40C438/AEP/105 Controller - 2 Line, Urgent Traffic Detectors Lines 1 and 2



"CONTINUE" LIGHT PATTERNS



410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15
1	AA	BB	CC	DD	U1	U2	EE	FF
2	E	F	G1	G2	H	J	○	L
3	A1	B1	B2	C1	D1	○	○	○
4	A2	B3	B4	C2	D2	○	○	○
5	M	N	○	○	○	○	○	○
6	P	Q	R	S	T	V	W	X
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8

410421

	A13	A19	A24	B4
1	ZZ_1	ZZ_2	ZZ_3	●
2	ZZ_1	ZZ_2	ZZ_3	●
3	ZZ_1	ZZ_2	ZZ_3	●
4	ZZ_1	ZZ_2	ZZ_3	○
5	ZZ_1	ZZ_2	ZZ_3	○
6	ZZ_1	ZZ_2	ZZ_3	
7	ZZ_1	ZZ_2	ZZ_3	

410403 CIRCUIT CARD

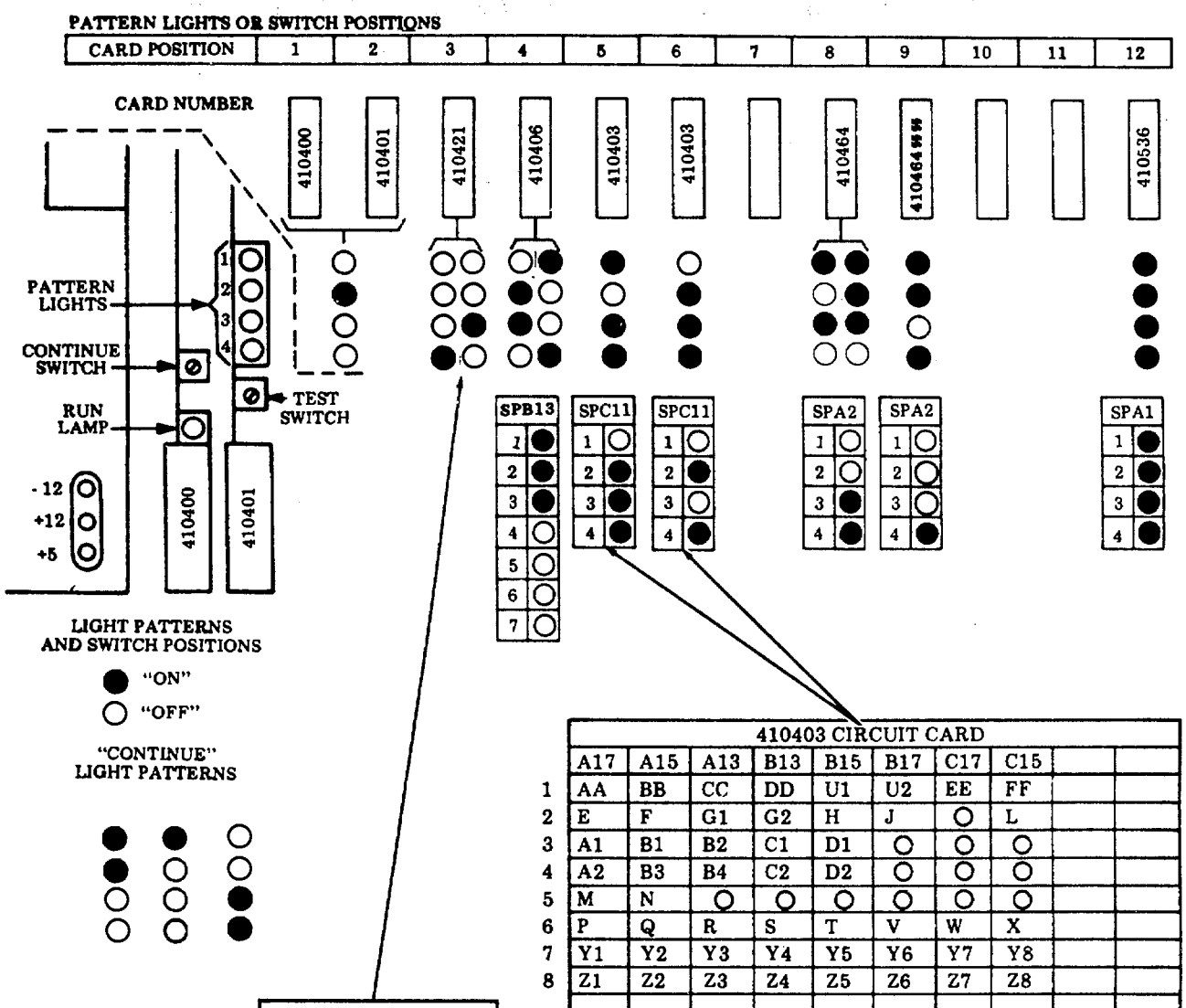
	A17	A15	A13	B13	B15	B17	C17	C15
1	a1	a2	a3	a4	a5	a6	a7	●
2	b1	b2	b3	b4	b5	b6	b7	●
3	c1	c2	c3	c4	c5	c6	c7	●
4	d1	d2	d3	d4	d5	d6	d7	●
5	e1	e2	e3	e4	e5	e6	e7	●
6	f1	f2	f3	f4	f5	f6	f7	●
7	g1	g2	g3	g4	g5	g6	g7	●
8	h1	h2	h3	h4	h5	h6	h7	●

Refer to Pages 7-94 through 7-100 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

40C438/AEP/105 Controller - 2 Line, 9K Buffers



410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15
1	AA	BB	CC	DD	U1	U2	EE	FF
2	E	F	G1	G2	H	J	○	L
3	A1	B1	B2	C1	D1	○	○	○
4	A2	B3	B4	C2	D2	○	○	○
5	M	N	○	○	○	○	○	○
6	P	Q	R	S	T	V	W	X
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8

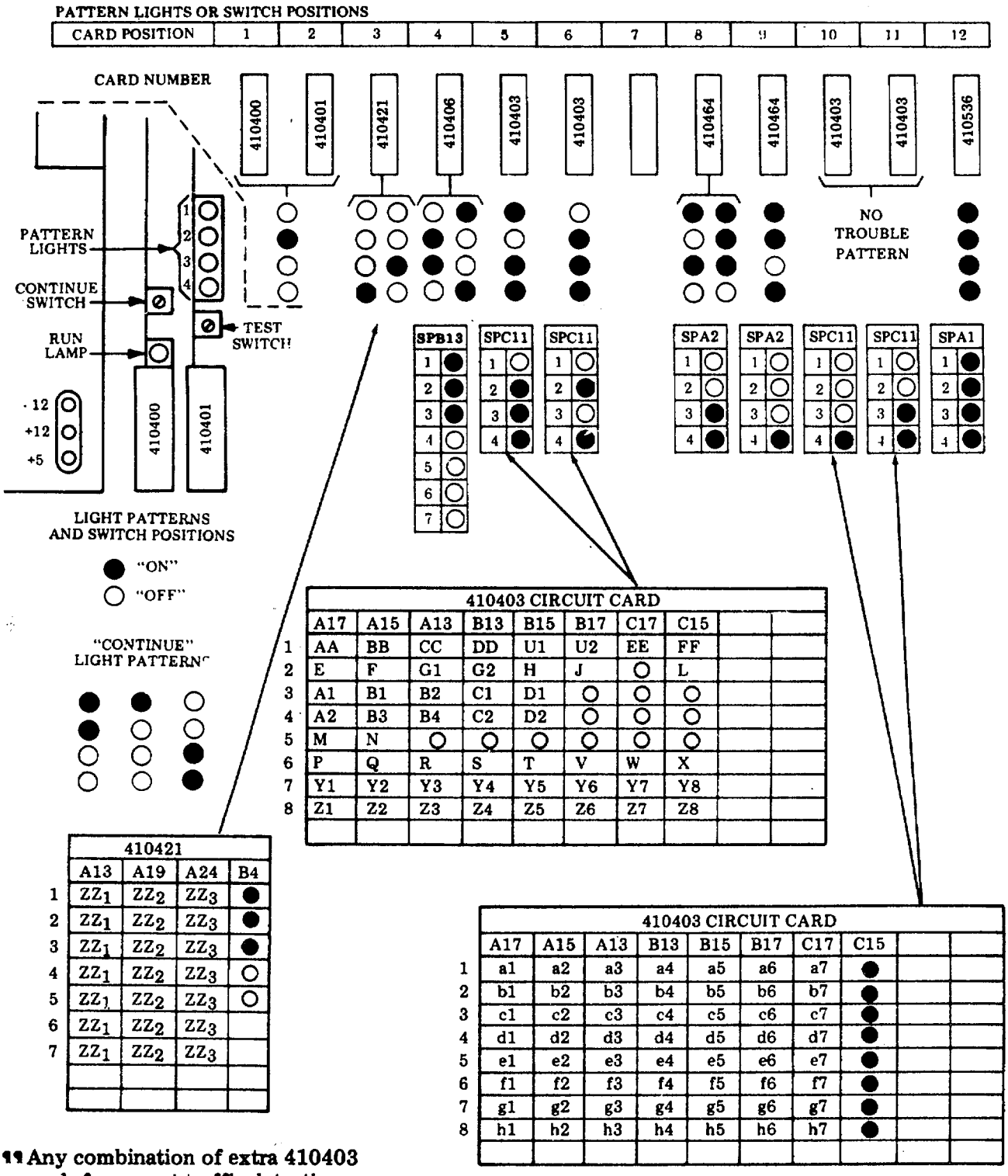
410421

	A13	A19	A24	B4
1	ZZ_1	ZZ_2	ZZ_3	●
2	ZZ_1	ZZ_2	ZZ_3	●
3	ZZ_1	ZZ_2	ZZ_3	●
4	ZZ_1	ZZ_2	ZZ_3	○
5	ZZ_1	ZZ_2	ZZ_3	○
6	ZZ_1	ZZ_2	ZZ_3	
7	ZZ_1	ZZ_2	ZZ_3	

$ The capability of increassing the receive buffer size to 9K when using two or three traffic lines, requires an additional 410464 card, which is ordered separately.

Refer to Pages 7-94 through 7-100 for options.

40C438/AEP/105 Controller - 2 Lines, 9K Buffers and Urgent Traffic Detector Line 1 and 2



410403 CIRCUIT CARD									
	A17	A15	A13	B13	B15	B17	C17	C15		
1	AA	BB	CC	DD	U1	U2	EE	FF		
2	E	F	G1	G2	H	J	○	L		
3	A1	B1	B2	C1	D1	○	○	○		
4	A2	B3	B4	C2	D2	○	○	○		
5	M	N	○	○	○	○	○	○		
6	P	Q	R	S	T	V	W	X		
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8		
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8		

410421				
	A13	A19	A24	B4
1	ZZ_1	ZZ_2	ZZ_3	●
2	ZZ_1	ZZ_2	ZZ_3	●
3	ZZ_1	ZZ_2	ZZ_3	●
4	ZZ_1	ZZ_2	ZZ_3	○
5	ZZ_1	ZZ_2	ZZ_3	○
6	ZZ_1	ZZ_2	ZZ_3	
7	ZZ_1	ZZ_2	ZZ_3	

410403 CIRCUIT CARD										
	A17	A15	A13	B13	B15	B17	C17	C15		
1	a1	a2	a3	a4	a5	a6	a7	●		
2	b1	b2	b3	b4	b5	b6	b7	●		
3	c1	c2	c3	c4	c5	c6	c7	●		
4	d1	d2	d3	d4	d5	d6	d7	●		
5	e1	e2	e3	e4	e5	e6	e7	●		
6	f1	f2	f3	f4	f5	f6	f7	●		
7	g1	g2	g3	g4	g5	g6	g7	●		
8	h1	h2	h3	h4	h5	h6	h7	●		

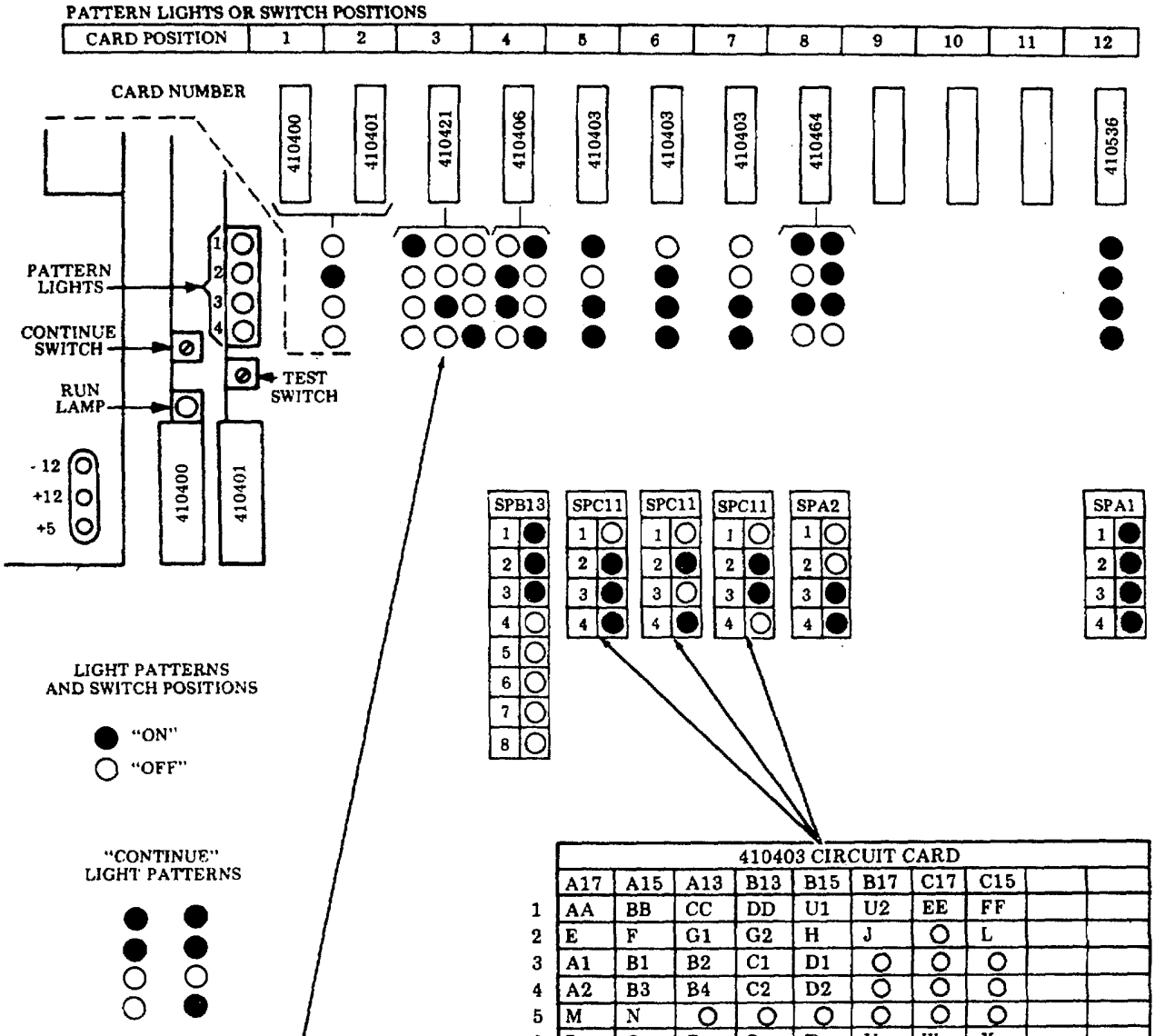
¶¶¶¶ **Any combination of extra 410403 cards for urgent traffic detection feature may be used, eg, line 1 only, line 2 only or both lines etc.**

Refer to Pages 7-94 through 7-100 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

40C438/AEP/105 Controller - Basic-3 Line



410403 CIRCUIT CARD

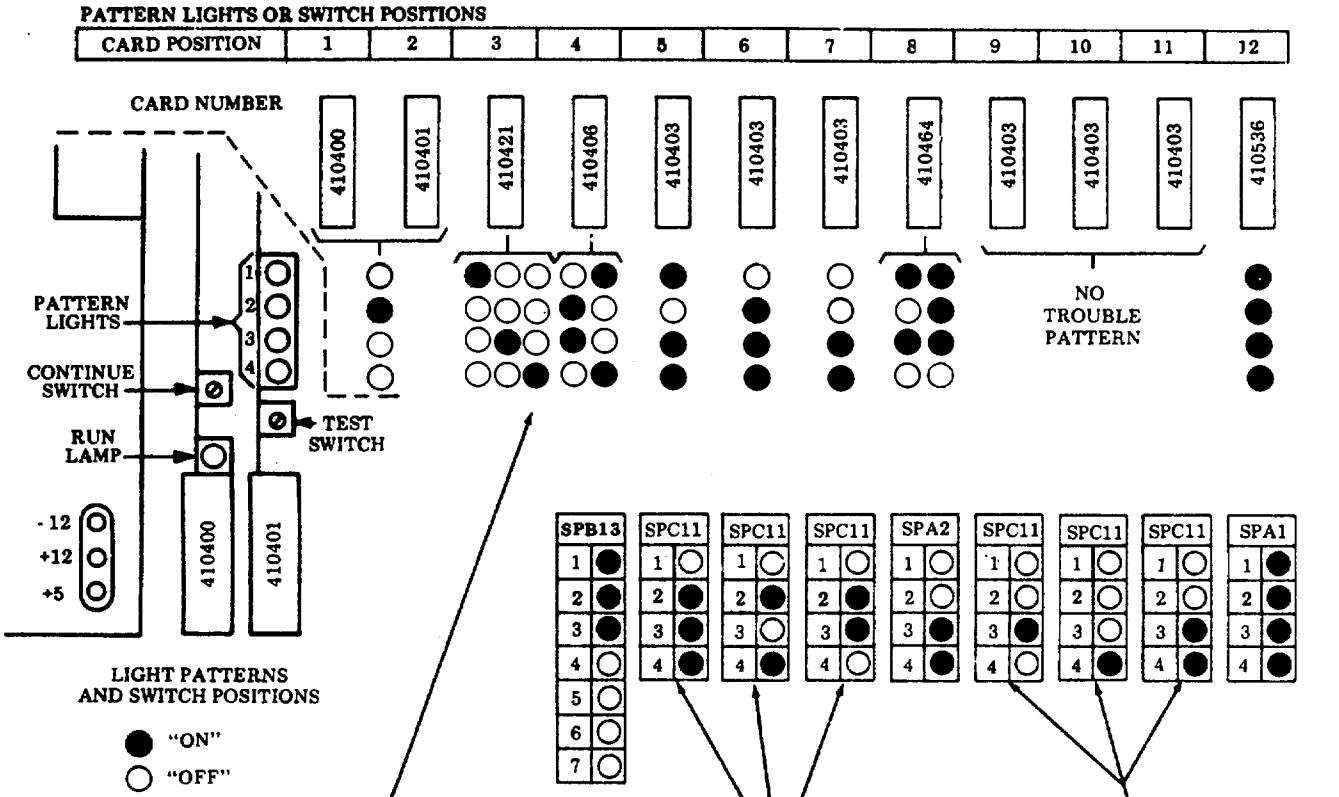
	A17	A15	A13	B13	B15	B17	C17	C15		
1	AA	BB	CC	DD	U1	U2	EE	FF		
2	E	F	G1	G2	H	J	○	L		
3	A1	B1	B2	C1	D1	○	○	○		
4	A2	B3	B4	C2	D2	○	○	○		
5	M	N	○	○	○	○	○	○		
6	P	Q	R	S	T	V	W	X		
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8		
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8		

410421

	A13	A19	A24	B4
1	ZZ_1	ZZ_2	ZZ_3	●
2	ZZ_1	ZZ_2	ZZ_3	●
3	ZZ_1	ZZ_2	ZZ_3	●
4	ZZ_1	ZZ_2	ZZ_3	○
5	ZZ_1	ZZ_2	ZZ_3	○
6	ZZ_1	ZZ_2	ZZ_3	
7	ZZ_1	ZZ_2	ZZ_3	

Refer to Pages 7-94 through 7-100 for options.

40C4381AEP/105 Controller - 3 Lines. Urgent Traffic Detectors Lines 1, 2 and 3



"CONTINUE" LIGHT PATTERNS

410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15		
1	AA	BB	CC	DD	U1	U2	EE	FF		
2	E	F	G1	G2	H	J	○	L		
3	A1	B1	B2	C1	D1	○	○	○		
4	A2	B3	B4	C2	D2	○	○	○		
5	M	N	○	○	○	○	○	○		
6	P	Q	R	S	T	V	W	X		
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8		
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8		

410421

	A13	A19	A24	B4
1	ZZ_1	ZZ_2	ZZ_3	●
2	ZZ_1	ZZ_2	ZZ_3	●
3	ZZ_1	ZZ_2	ZZ_3	●
4	ZZ_1	ZZ_2	ZZ_3	○
5	ZZ_1	ZZ_2	ZZ_3	○
6	ZZ_1	ZZ_2	ZZ_3	
7	ZZ_1	ZZ_2	ZZ_3	

410403 CIRCUIT CARD

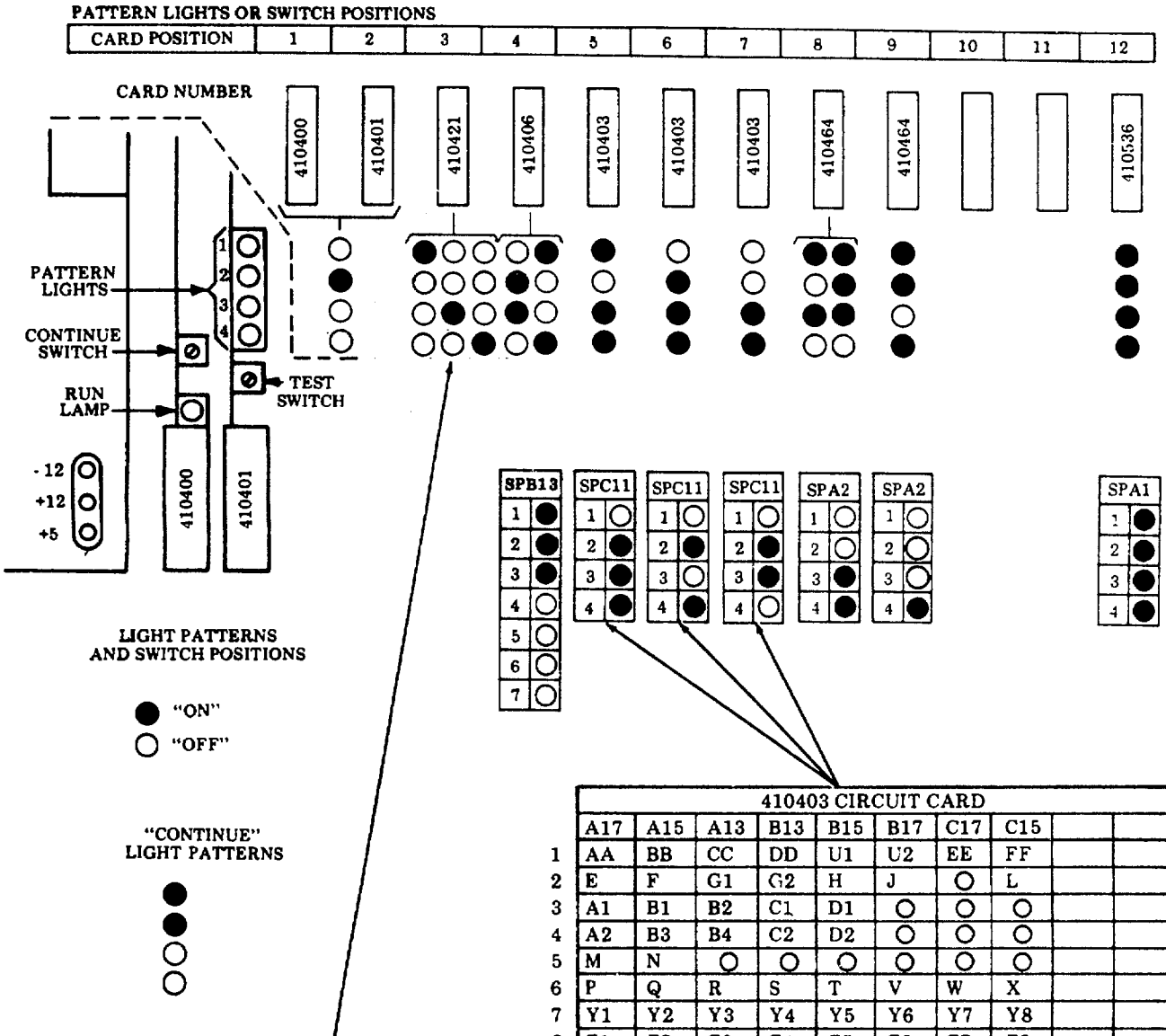
	A17	A15	A13	B13	B15	B17	C17	C15		
1	a1	a2	a3	a4	a5	a6	a7	●		
2	b1	b2	b3	b4	b5	b6	b7	●		
3	c1	c2	c3	c4	c5	c6	c7	●		
4	d1	d2	d3	d4	d5	d6	d7	●		
5	e1	e2	e3	e4	e5	e6	e7	●		
6	f1	f2	f3	f4	f5	f6	f7	●		
7	g1	g2	g3	g4	g5	g6	g7	●		
8	h1	h2	h3	h4	h5	h6	h7	●		

Refer to Pages 7-94 through 7-100 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

40C438/AEP/105 Controller - 3 Line, 9K Buffers***



410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15		
1	AA	BB	CC	DD	U1	U2	EE	FF		
2	E	F	G1	G2	H	J	○	L		
3	A1	B1	B2	C1	D1	○	○	○		
4	A2	B3	B4	C2	D2	○	○	○		
5	M	N	○	○	○	○	○	○		
6	P	Q	R	S	T	V	W	X		
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8		
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8		

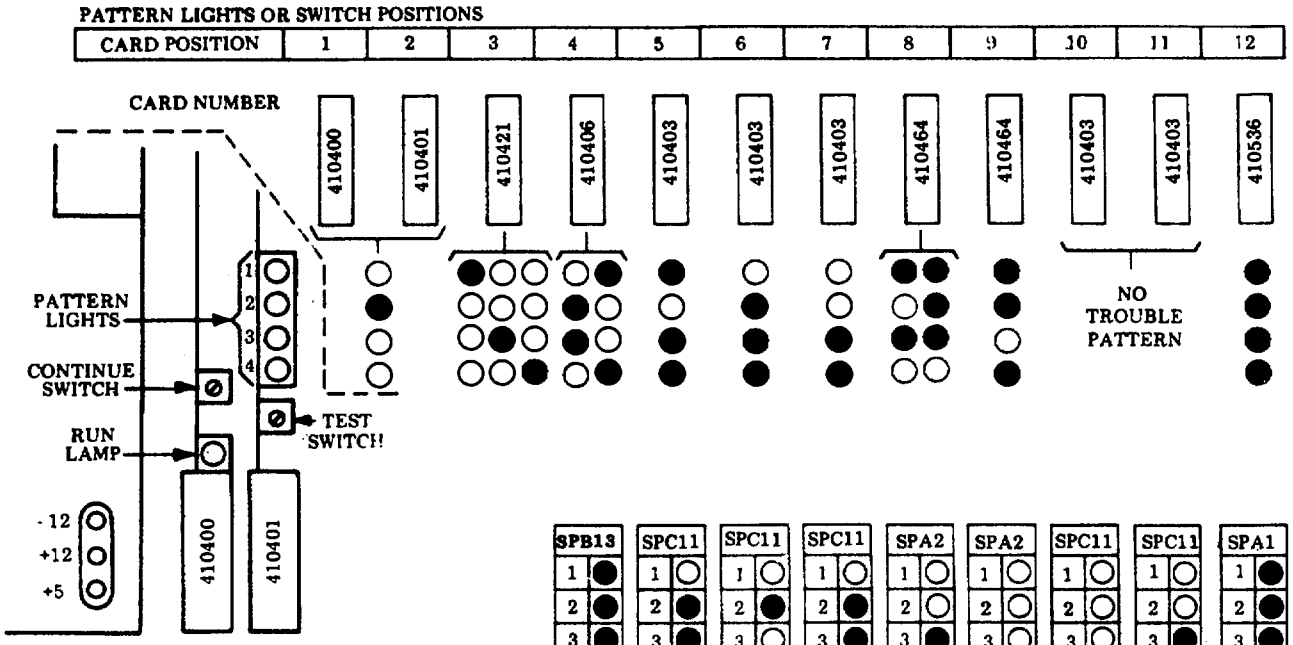
410421

	A13	A19	A24	B4
1	ZZ_1	ZZ_2	ZZ_3	●
2	ZZ_1	ZZ_2	ZZ_3	●
3	ZZ_1	ZZ_2	ZZ_3	●
4	ZZ_1	ZZ_2	ZZ_3	○
5	ZZ_1	ZZ_2	ZZ_3	○
6	ZZ_1	ZZ_2	ZZ_3	
7	ZZ_1	ZZ_2	ZZ_3	

*****With three traffic lines and 9K buffers, only two slots are left in the controller for urgent traffic detection feature cards (410403). The combinations possible are shown on the following pages, however only one or the other may be used instead of both.

Refer to Pages 7-94 through 7-100 for options.

40C4381AEP/105 Controller - 3 Lines. 9K Buffers and Urgent Traffic Detectors Lines 1 and 2



"CONTINUE" LIGHT PATTERNS

410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15
1	AA	BB	CC	DD	U1	U2	EE	FF
2	E	F	G1	G2	H	J	○	L
3	A1	B1	B2	C1	D1	○	○	○
4	A2	B3	B4	C2	D2	○	○	○
5	M	N	○	○	○	○	○	○
6	P	Q	R	S	T	V	W	X
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8

410421

	A13	A19	A24	B4
1	ZZ_1	ZZ_2	ZZ_3	●
2	ZZ_1	ZZ_2	ZZ_3	●
3	ZZ_1	ZZ_2	ZZ_3	●
4	ZZ_1	ZZ_2	ZZ_3	○
5	ZZ_1	ZZ_2	ZZ_3	○
6	ZZ_1	ZZ_2	ZZ_3	
7	ZZ_1	ZZ_2	ZZ_3	

410403 CIRCUIT CARD

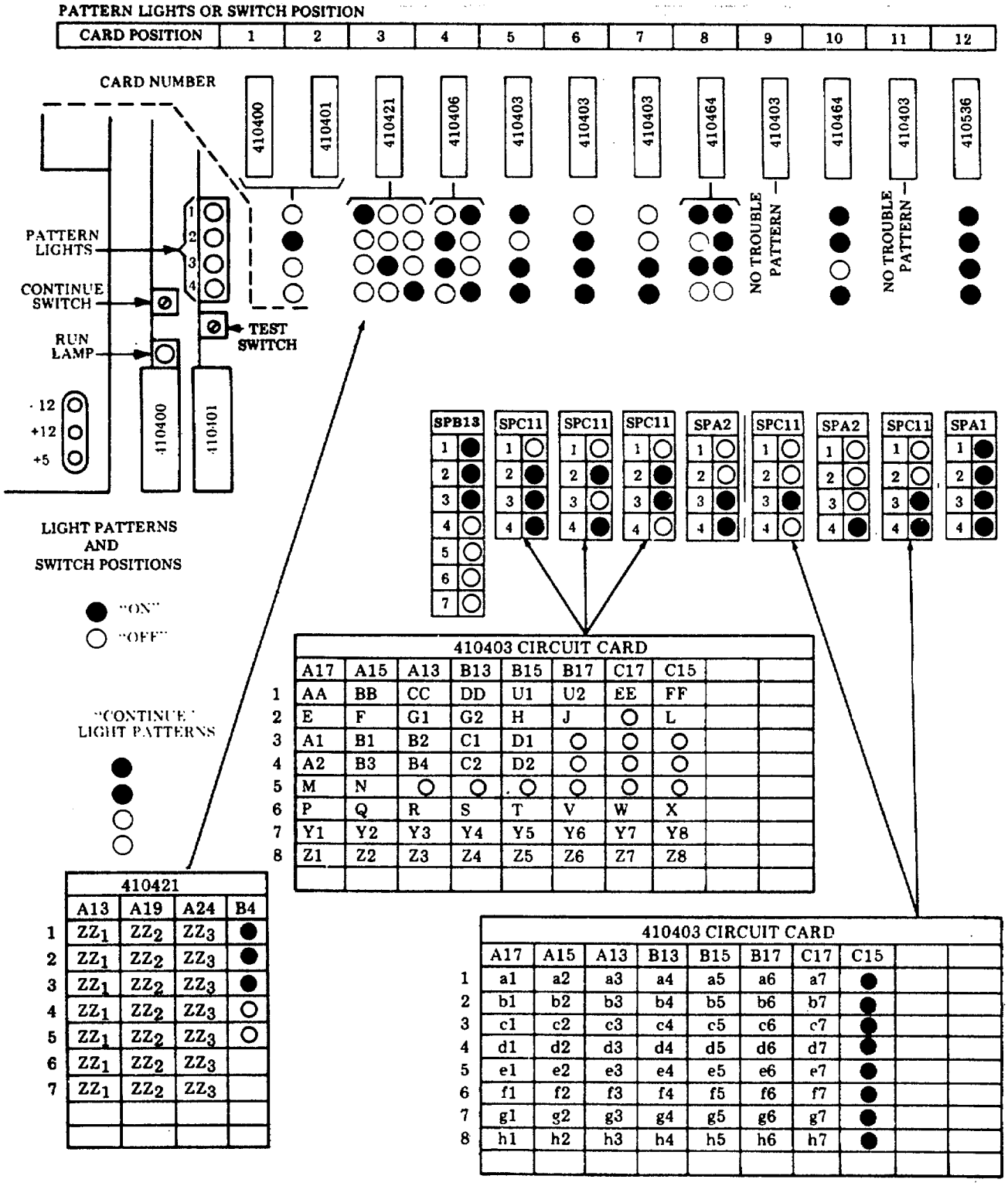
	A17	A15	A13	B13	B15	B17	C17	C15
1	a1	a2	a3	a4	a5	a6	a7	●
2	b1	b2	b3	b4	b5	b6	b7	●
3	c1	c2	c3	c4	c5	c6	c7	●
4	d1	d2	d3	d4	d5	d6	d7	●
5	e1	e2	e3	e4	e5	e6	e7	●
6	f1	f2	f3	f4	f5	f6	f7	●
7	g1	g2	g3	g4	g5	g6	g7	●
8	h1	h2	h3	h4	h5	h6	h7	●

Refer to Pages 7-94 through 7-100 for options.

A. GENERAL (Cont)

3. CONTROLLER ARRANGEMENT FORMS (Cont)

40C438/AEP/105 Controller -- 3 Lines, 9K Buffers and Urgent Traffic Detectors Lines 1 and 3



410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15
1	AA	BB	CC	DD	U1	U2	EE	FF
2	E	F	G1	G2	H	J	○	L
3	A1	B1	B2	C1	D1	○	○	○
4	A2	B3	B4	C2	D2	○	○	○
5	M	N	○	○	○	○	○	○
6	P	Q	R	S	T	V	W	X
7	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8
8	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8

410421

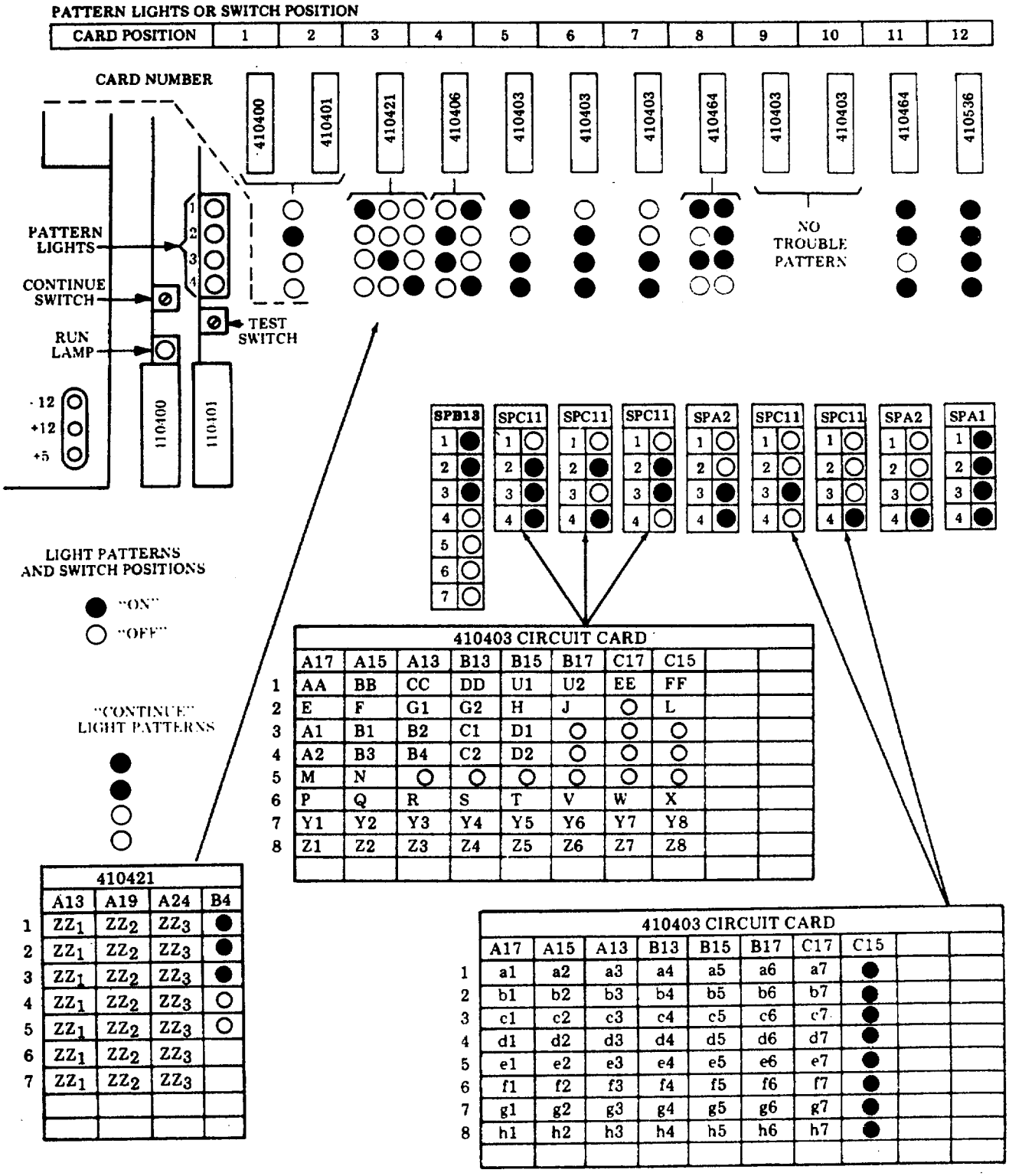
	A13	A19	A24	B4
1	ZZ_1	ZZ_2	ZZ_3	●
2	ZZ_1	ZZ_2	ZZ_3	●
3	ZZ_1	ZZ_2	ZZ_3	●
4	ZZ_1	ZZ_2	ZZ_3	○
5	ZZ_1	ZZ_2	ZZ_3	○
6	ZZ_1	ZZ_2	ZZ_3	
7	ZZ_1	ZZ_2	ZZ_3	

410403 CIRCUIT CARD

	A17	A15	A13	B13	B15	B17	C17	C15
1	a1	a2	a3	a4	a5	a6	a7	●
2	b1	b2	b3	b4	b5	b6	b7	●
3	c1	c2	c3	c4	c5	c6	c7	●
4	d1	d2	d3	d4	d5	d6	d7	●
5	e1	e2	e3	e4	e5	e6	e7	●
6	f1	f2	f3	f4	f5	f6	f7	●
7	g1	g2	g3	g4	g5	g6	g7	●
8	h1	h2	h3	h4	h5	h6	h7	●

Refer to Pages 7-94 through 7-100 for options.

40C438/AEP/105 Controller - 3 Lines, 9K Buffers and Urgent Traffic Detectors Lines 2 and 3

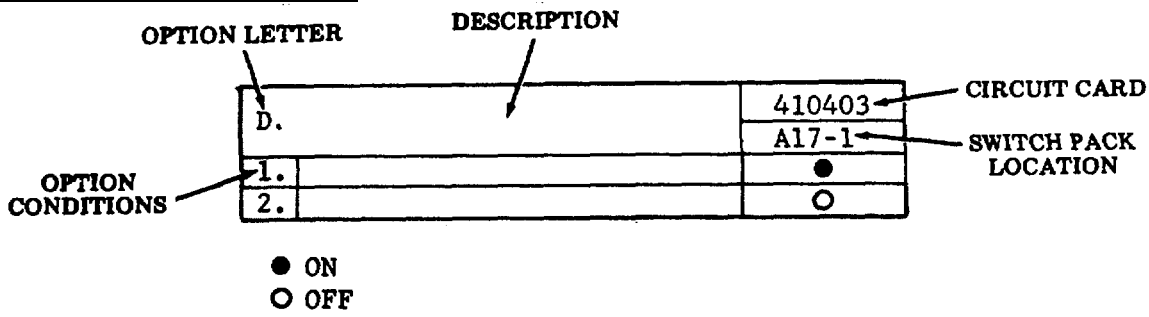


Refer to Pages 7-94 through 7-100 for options.

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS

Controllers 40C430/AAT/017, 40C430/ABD/025. 40C431/ABE/026 and 40C432/ABF/027 With 410408 and 410403 Circuit Cards



A. Line code	410408				410403	
	A5-3	A5-4	B15-1	B15-2	A15-2	A15-3
1. ITA2 AV (Baudot)	○	●	●	●	●	●
2. ITA5 (ASCII)	●	○	○	○	○	○
Self test	●	○	○	○	○	○

B. Transmit stop bit	410408	410403			
	B15-3	A13-2	A13-3	B13-2	B13-3
1. 1 stop bit	●	●	●	●	●
2. 2 stop bits (1.5 on ITA2)	○	○	○	○	○
Self test	●	●	●	●	●

C. Transmission mode	410408					410403
	B15-4	D20-2	D20-3	D20-5	D20-6	B15-1
1. Asynchronous	○	●	○	●	●	●
2. Isochronous	●	○	●	○	○	○
Self test	●	○	●	○	○	○

D. Pre-empt local on receipt of receive data	410403
	A17-1
1. Do not pre-empt	●
2. Pre-empt	○

E. Substitute asterisk (*) for parity errored character	410403
	A15-1
1. Do not substitute	●
2. Substitute	○

F. Line parity on ITA5 data	410403	
	A13-1	B13-1
1. No parity	●	●
2. Odd parity	○	●
3. Even parity	●	○

G. Transmit answer-back character on receipt of ENQ	410403
	B17-1
1. No answer-back	●
2. Answer-back	○

H. Line feed printer on receipt of carriage return	410403
	C15-1
1. No line feed	●
2. Line feed	○

I. Asynchronous Transmission Speeds	410403	
	POWER UP	OPTION II
	A17-2	A17-3
1. 110 baud	●	●
2. 1200 baud	○	○

J. Answer-back character	410403							
	A17-4	A15-4	A13-4	B13-4	B15-4	B17-4	C17-4	C15-4
	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8

Marking bit
● Spacing bit
Bit 8 must be programmed for parity selected in Option F.

K. Insert line feed after 79th character from display	410403 A17-5
1. Insert line feed	O
2. Do not insert line feed	●

L. Mode KD switches to after sending	410403 A15-5
1. Local	●
2. Receive	O

M. Line copied by printer in on-line mode	410403 A13-5
1. Send	O
2. Receive	●

N. Send extended characters on-line in S/R mode	410403 B13-5
1. Send characters	O
2. Do not send characters	●

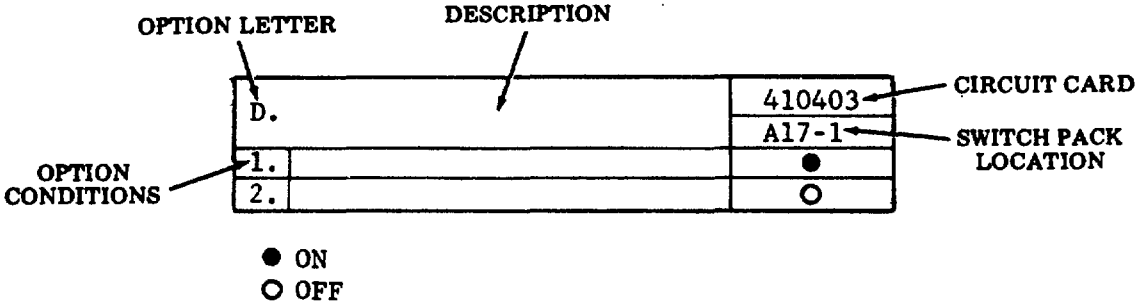
O. Allow sending only if ETX is on display	410403 B15-5
1. Send only if ETX is on display	O
2. Send without ETX on display	●

P. Mode KD switches to on receipt of ETX	410403 B17-5
1. Switch to local	●
2. Stay in receive	O

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

Controller 40C430/ABD/025 with 410408 and 410403 Circuit Cards and 408960 Modification Kit



A.	Line code	410408				410403	
		A5-3	A5-4	B15-1	B15-2	A15-2	A15-3
1.	ITA2 AV (Baudot)	○	●	●	●	●	●
2.	ITA5 (ASCII)	●	○	○	○	○	○
	Self test	●	○	○	○	○	○

B.	Transmit stop bit	410408	410403			
		B15-3	A13-2	A13-3	B13-2	B13-3
1.	1 stop bit	●	●	●	●	●
2.	2 stop bits (1.5 on ITA2)	○	○	○	○	○
	Self test	●	●	●	●	●

C.	Transmission mode	410408					410403
		B15-4	D20-2	D20-3	D20-5	D20-6	B15-1
1.	Asynchronous	○	●	○	●	●	●
2.	Isochronous	●	○	●	○	○	○
	Self test	●	○	●	○	○	○

D.	Pre-empt local on receipt of receive data	410403
		A17-1
1.	Do not pre-empt	●
2.	Pre-empt	○

E.	Substitute asterisk (*) for parity errored character	410403
		A15-1
1.	Do not substitute	●
2.	Substitute	○

F.	Line parity on ITA5 data	410403	
		A13-1	B13-1
1.	No parity	●	●
2.	Odd parity	○	●
3.	Even parity	●	○

G.	Transmit answer-back character on receipt of ENQ	410403
		B17-1
1.	No answer-back	●
2.	Answer-back	○

H.	Line feed printer on receipt of carriage return	410403
		C15-1
1.	No line feed	●
2.	Line feed	○

I.	Asynchronous Transmission Speeds	410403	
		POWER UP	OPTION II
		A17-2	A17-3
1.	110 baud	●	●
2.	1200 baud	○	○

J. Answer-back character	410403							
	A17-4	A15-4	A13-4	B13-4	B15-4	B17-4	C17-4	C15-4
	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8

Marking bit
● Spacing bit
Bit 8 must be programmed for parity selected in Option F.

K. Insert line feed after 79th character from display	410403 A17-5
1. Insert line feed	O
2. Do not insert line feed	●

L. Mode KD switches to after sending	410403 A15-5
1. Local	●
2. Receive	O

M. Line copied by printer in on-line mode	410403 A13-5
1. Send	O
2. Receive	●

N. Send extended characters on-line in S/R mode	410403 B13-5
1. Send characters	O
2. Do not send characters	●

O. Allow sending only if ETX is on display	410403 B15-5
1. Send only if ETX is on display	O
2. Send without ETX on display	●

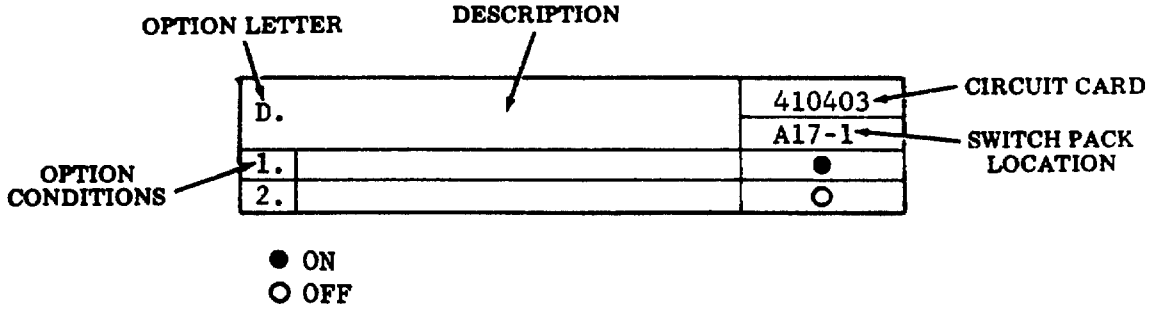
P. Mode KD switches to on receipt of ETX	410403 B17-5
1. Switch to local	●
2. Stay in receive	O

AA. Printer ON/OFF Control	440411 B1-6
1. Printer does not respond to ON/OFF control sequences.	●
2. Printer responds to ON/OFF control sequences.	

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

Controllers 40C431/ABE/026 and 40C432/ABF/027 With 410408 and 410403 and 408958 ,Modification Kit



A. Line Code	410408 Card				410403 Card			
	A5-3	A5-4	B15-1	B15-2	A15-2	A15-3	A13-2	A13-3
ITA2	○	●	●	●	●	●	●	●
6 Level	●	●	●	○	●	●	○	○
ITA5	●	○	○	○	○	○	○	○
Self-Test	●	○	○	○				

B. Transmit Stop Bit	410408	410403 Card	
	B15-3	B13-2	B13-3
1. 1 Stop Bit	●	●	●
2. 2 Stop Bits (1.5 on ITA2)	○	○	○
Self-Test	●		

C. Transmission mode	410408					410403
	B15-4	D20-2	D20-3	D20-5	D20-6	B15-1
1. Asynchronous	○	●	○	●	●	●
2. Isochronous	●	○	●	○	○	○
Self test	●	○	●	○	○	○

D. Pre-empt local on receipt of receive data	410403
	A17-1
1. Do not pre-empt	●
2. Pre-empt	○

E. Substitute asterisk (*) for parity errored character	410403
	A15-1
1. Do not substitute	●
2. Substitute	○

F. Line parity on ITA5 data	410403	
	A13-1	B13-1
1. No parity	●	●
2. Odd parity	○	●
3. Even parity	●	○

G. Transmit answer-back character on receipt of ENQ	410403
	B17-1
1. No answer-back	●
2. Answer-back	○

H. Line feed printer on receipt of carriage return	410403
	C15-1
1. No line feed	●
2. Line feed	○

I. Asynchronous Transmission Speeds	410403	
	POWER UP	OPTION II
	A17-2	A17-3
1. 110 baud	●	●
2. 1200 baud	○	○

J. Answer-back character	410403							
	A17-4	A15-4	A13-4	B13-4	B15-4	B17-4	C17-4	C15-4
	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8

Marking bit
● Spacing bit
Bit 8 must be programmed for parity selected in Option F.

M. Short Buffer		410403 A17-5
1.	24-Character Hysteresis	O
2.	800-Character Hysteresis	●

N. Printer Paging		410403 A15-5
1.	Form Feed After 54 Lines	O
2.	No Printer Paging	●

P. Printer Double Line Feed		410403 A13-5
1.	Double Line Feed	O
2.	Single Line Feed	●

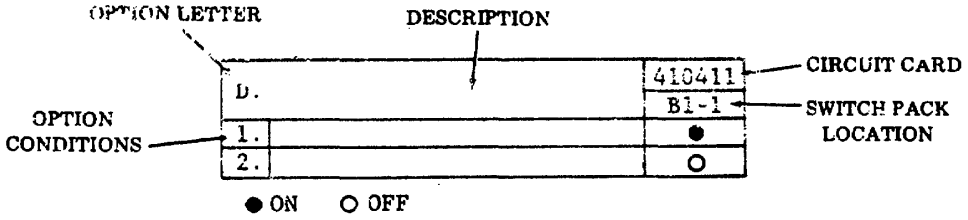
R. Printer Form-out on ETX and Paper Sequence (LF,LF,N,N,N)		410403 B13-5
1.	Printer Does Form-out	O
2.	No Form-out	●

S. Printer Form-out on Motor Off		410403 B15-5
1.	Form-out When Motor goes Off	O
2.	No Form-out	●

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

Controllers 40C430/AAT/017, 400430/ABD/025, 40C431/ABE/026 and 40C432/ABF/027 With 410411 Circuit card



	A1. Line code (Power Up/Option I) A2. Line code (Option II)	410411 POWER UP B2-2	410411 OPTION II B2-3
1.	ITA2 AV (Baudot)	●	●
2.	ITA5 (ASCII)	○	○

	B. Transmit stop bit	410411 OPTION I B3-2	410411 OPTION I B4-2	410411 OPTION II B3-3	410411 OPTION II B4-3
1.	1 stop bit	●	●	●	●
2.	2 stop bits (1.5 on ITA2)	○	○	○	○

	C. Transmission mode	410411 B5-1
1.	Asynchronous	●
2.	Isochronous	○

NOTE: If isochronous transmission mode is selected, turn switches 2 through 8 on switch pack A21 ON and disregard Options U and W.

	D. Pre-empt local on receipt of receive data	410411 B1-1
1.	Do not pre-empt	●
2.	Pre-empt	○

	E. Substitute asterisk (*) for parity errored character	410411 B2-1
1.	Do not substitute	●
2.	Substitute	○

	F. Line parity on ITA5 data	410411 B3-1	410411 B4-1
1.	No parity	●	●
2.	Odd parity	○	●
3.	Even parity	●	○

	H. Transmit answer-back character on receipt of ENQ	410411 B6-1
1.	No answer-back	●
2.	Answer-back	○

	J. Line feed printer on receipt of carriage return	410411 B8-1
1.	No line feed	●
2.	Line feed	○

	K1. Asynchronous Transmission Speed (Power Up) K2. Asynchronous Transmission Speed (Option II)	410411 POWER UP B1-2	410411 OPTION II B1-3
1.	Low speed	●	●
2.	High speed	○	○

L. Answer-back character	410411							
	L-1	L-2	L-3	L-4	L-5	L-6	L-7	L-8
	B1-4	B2-4	B3-4	B4-4	B5-4	B6-4	B7-4	B8-4
	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8

O Marking bit
● Spacing bit
Bit 8 must be programmed for parity selected in Option F.

M. Insert line feed after 79th character from display		410411 B1-5
1.	Insert line feed	O
2.	Do not insert line feed	●

N. Mode KD switches to after sending		410411 B2-5
1.	Local	●
2.	Receive	O

P. Line copied by printer in on-line mode		410411 B3-5
1.	Send	O
2.	Receive	●

R. Send extended characters on-line in S/R mode		410411 B4-5
1.	Send characters	O
2.	Do not send characters	●

S. Allow sending only if ETX is on display		410411 B5-5
1.	Send only if ETX is on display	O
2.	Send without ETX on display	●

T. Mode KD switches to on receipt of ETX		410411 B6-5
1.	Switch to local	●
2.	Stay in receive	O

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (cont)

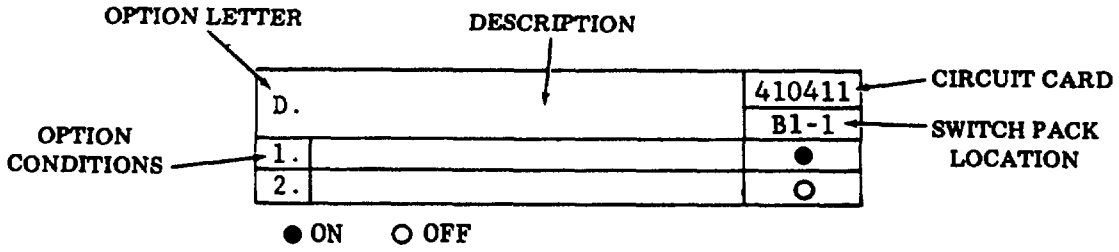
U. High speed asynchronous baud rate (See Option C.)

410411				Baud Rate
A21-2	A21-3	A21-4	A21-5	
○	○	○	●	50
○	○	●	●	75
○	●	○	●	100
○	●	●	●	110
●	○	○	●	150
●	○	●	●	300
●	●	○	●	450
●	●	●	●	600
○	○	○	○	300
○	○	●	○	450
○	●	○	○	600
○	●	●	○	900
●	○	○	○	1200
●	○	●	○	1800
●	●	○	○	2400
●	●	●	○	3600

W. Low speed asynchronous baud rate (See Option C.)

410411			Baud Rate
A21-6	A21-7	A21-8	
○	○	○	50
●	○	○	75
○	●	○	100
●	●	○	110
○	○	●	150
●	○	●	300
○	●	●	450
●	●	●	600

Controller 40C430/ABD/025 with 410411 Circuit Card and 408960 Modification Kit



A1. Line code (Power Up/Option I) A2. Line code (Option II)		410411	
		POWER UP	OPTION II
		B2-2	B2-3
1.	ITA2 AV (Baudot)	●	●
2.	ITA5 (ASCII)	○	○

B. Transmit stop bit		410411			
		OPTION I		OPTION II	
		B3-2	B4-2	B3-3	B4-3
1.	1 stop bit	●	●	●	●
2.	2 stop bits (1.5 on ITA2)	○	○	○	○

C. Transmission mode		410411
		B5-1
1.	Asynchronous	●
2.	Isochronous	○

NOTE: If isochronous transmission mode is selected, turn switches 2 through 8 on switch pack A21 ON and disregard Options U and W.

D. Pre-empt local on receipt of receive data		410411
		B1-1
1.	Do not pre-empt	●
2.	Pre-empt	○

E. Substitute asterisk (*) for parity errored character		410411
		B2-1
1.	Do not substitute	●
2.	Substitute	○

F. Line parity on ITA5 data		410411	
		B3-1	B4-1
1.	No parity	●	●
2.	Odd parity	○	●
3.	Even parity	●	○

H. Transmit answer-back character on receipt of ENQ		410411
		B6-1
1.	No answer-back	●
2.	Answer-back	○

J. Line feed printer on receipt of carriage return		410411
		B8-1
1.	No line feed	●
2.	Line feed	○

K1. Asynchronous Transmission Speed (Power Up) K2. Asynchronous Transmission Speed (Option II)		410411	
		POWER UP	OPTION II
		B1-2	B1-3
1.	Low speed	●	●
2.	High speed	○	○

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

L. Answer-back character	410411							
	L-1	L-2	L-3	L-4	L-5	L-6	L-7	L-8
	B1-4	B2-4	B3-4	B4-4	B5-4	B6-4	B7-4	B8-4
	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8

O Marking bit
● Spacing bit
Bit 8 must be programmed for parity selected in Option F.

M. Insert line feed after 79th character from display		410411 B1-5
1.	Insert line feed	O
2.	Do not insert line feed	●

N. Mode KD switches to after sending		410411 B2-5
1.	Local	●
2.	Receive	O

P. Line copied by printer in on-line mode		410411 B3-5
1.	Send	O
2.	Receive	●

R. Send extended characters on-line in S/R mode		410411 B4-5
1.	Send characters	O
2.	Do not send characters	●

S. Allow sending only if ETX is on display		410411 B5-5
1.	Send only if ETX is on display	O
2.	Send without ETX on display	●

T. Mode KD switches to on receipt of ETX		410411 B6-5
1.	Switch to local	●
2.	Stay in receive	O

U. High speed asynchronous baud rate (See Option C.)				
410411				Baud Rate
A21-2	A21-3	A21-4	A21-5	
○	○	○	●	50
○	○	●	●	75
○	●	○	●	100
○	●	●	●	110
●	○	○	●	150
●	○	●	●	300
●	●	○	●	450
●	●	●	●	600
○	○	○	○	300
○	○	●	○	450
○	●	○	○	600
○	●	●	○	900
●	○	○	○	1200
●	○	●	○	1800
●	●	○	○	2400
●	●	●	○	3600

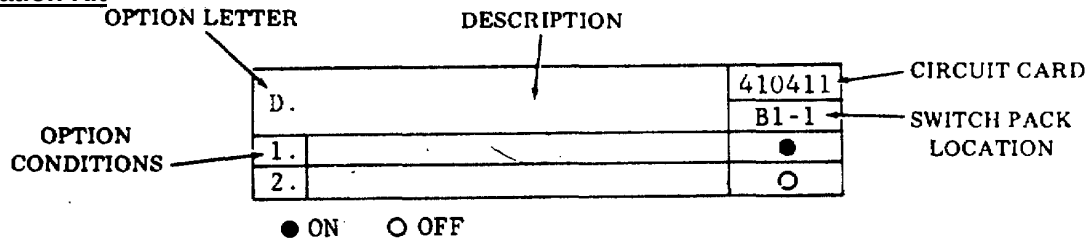
W. Low speed asynchronous baud rate (See Option C.)			
410411			Baud Rate
A21-6	A21-7	A21-8	
○	○	○	50
●	○	○	75
○	●	○	100
●	●	○	110
○	○	●	150
●	○	●	300
○	●	●	450
●	●	●	600

AA. Printer ON/OFF Control	410411 B1-6
1. Printer does not respond to ON/OFF control sequences.	●
2. Printer responds to ON/OFF control sequences.	○

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

Controllers 40C431/ABE/026 and 40C432/ABF/027 With 410411 Circuit Card and 408958 Modification Kit



Power Up and Option 1 Line Code	410411 Card B2-2	410411 Card B3-2
1. ITA2	●	●
2. 6 Level	●	○
3. ITA5	○	○

Option II Line Code	410411 Card B2-3	410411 Card B3-3
1. ITA2	●	●
2. 6 Level	●	○
3. ITA5	○	○

Power Up and Option 1 Stop Bits	410411 B4-2
1. 1 Stop	●
2. 2 (1.5 on ITA2)	○

Option II Stop Bits	410411 B4-3
1. 1 Stop	●
2. (1.5 on ITA2)	○

C. Transmission mode		410411 B5-1
1.	Asynchronous	●
2.	Isochronous	○

NOTE: If isochronous transmission mode is selected, turn switches 2 through 8 on switch pack A21 ON and disregard Options U and W.

D. Pre-empt local on receipt of receive data		410411 B1-1
1.	Do not pre-empt	●
2.	Pre-empt	○

E. Substitute asterisk (*) for parity errored character		410411 B2-1
1.	Do not substitute	●
2.	Substitute	○

F. Line parity on ITA5 data		410411 B3-1	410411 B4-1
1.	No parity	●	●
2.	Odd parity	○	●
3.	Even parity	●	○

H. Transmit answer-back character on receipt of ENQ		410411 B6-1
1.	No answer-back	●
2.	Answer-back	○

J. Line feed printer on receipt of carriage return		410411 B8-1
1.	No line feed	●
2.	Line feed	○

K1. Asynchronous Transmission Speed (Power Up) K2. Asynchronous Transmission Speed (Option II)		410411 POWER UP B1-2	410411 OPTION II B1-3
1.	Low speed	●	●
2.	High speed	○	○

L. Answer-back character	410411							
	L-1	L-2	L-3	L-4	L-5	L-6	L-7	L-8
	B1-4	B2-4	B3-4	B4-4	B5-4	B6-4	B7-4	B8-4
	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8

○ Marking bit
● Spacing bit
Bit 8 must be programmed for parity selected in Option F.

M. Short Buffer		410411 B1-5
1.	24-Character Hysteresis	○
2.	800-Character Hysteresis	●

N. Printer Paging		410411 B2-5
1.	Form Feeding After 54 Lines	○
2.	No Printer Paging	●

P. Printer Double Line Feed		410411 B3-5
1.	Double Line Feed	○
2.	Single Line Feed	●

R. Printer Form-out on ETX and Paper Feed Sequence (LF,LF,N,N,N,N)		410411 B4-5
1.	Printer Does Form-out	○
2.	No Form-out	●

S. Printer Form-out on Motor off		410411 B5-5
1.	Form-out When Motor Goes Off	○
2.	No Form-out	●

U. High speed asynchronous baud rate (See Option C.)

410411				Baud Rate
A21-2	A21-3	A21-4	A21-5	
○	○	○	●	50
○	○	●	●	75
○	●	○	●	100
○	●	●	●	110
●	○	○	●	150
●	○	●	●	300
●	●	○	●	450
●	●	●	●	600
○	○	○	○	300
○	○	●	○	450
○	●	○	○	600
○	●	●	○	900
●	○	○	○	1200
●	○	●	○	1800
●	●	○	○	2400
●	●	●	○	3600

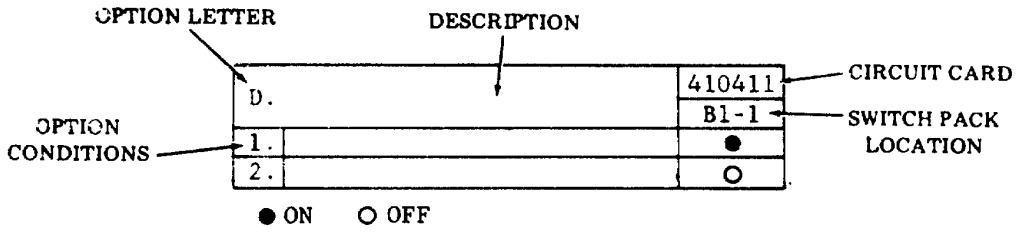
W. Low speed asynchronous baud rate (See Option C.)

410411			Baud Rate
A21-6	A21-7	A21-8	
○	○	○	50
●	○	○	75
○	●	○	100
●	●	○	110
○	○	●	150
●	○	●	300
○	●	●	450
●	●	●	600

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

Option Switch Settings, for Controllers With 410411 or 410403 Circuit Cards



Note: For ROP controllers (40C432/ABF/027 with 403019 modification kit and 40C432/AEN/104) and KP controllers (40C431/ABE/026 with 403019 modification kit and 40C431/AEM/103) terminal options are selected on the 410411 circuit card. For KP^3 controllers (40C438/AEP/105) terminal options are selected on the 410403 associated with each line (card slots, 5-line 1, 6-line 2, and 7-line 3).

A1. Asynchronous Speed (Power Up/Option I) A2. Asynchronous Speed (Option II)		410411		410403	
		POWER UP	OPTION II	POWER UP	OPTION II
		B1-3	B1-4	A17-3	A17-4
1.	Low Speed	●	●	●	●
2.	High Speed	○	○	○	○

B1 2. Line Code (Power Up/Option I)		410411		410403	
		B2-3	B3-3	A15-3	A13-3
1.	ITA2 AV (Baudot)	●	●	●	●
2.	ITA5 (ASCII)	○	●	○	●
3.	6-Level Code	●	○	●	○

B3.-4. Line Code (Option II)		410411		410403	
		B2-4	B3-4	A15-4	A13-4
1.	ITA2 AV (Baudot)	●	●	●	●
2.	ITA5 (ASCII)	○	●	○	●
3.	6-Level Code	●	○	●	○

C1. Stop Bits (Power Up/Option I) C2. Stop Bits (Option II)		410411		410403	
		POWER UP OPTION I	OPTION II	POWER UP OPTION I	OPTION II
		B4-3	B4-4	B13-3	B13-4
1.	1 Stop Bit	●	●	●	●
2.	2 Stop Bits (1.5 Stop Bits for Baudot)	○	○	○	○

Switch Off (○) = Mark
Switch On (●) = Space

D1. Print all for Baudot (Power Up/Option I) D2. Print all for Baudot (Option II)		410411		410403	
		POWER UP OPTION I	OPTION II	POWER UP OPTION I	OPTION II
		B5-3	B5-4	B15-3	B15-4
1.	Print all Characters	●	●	●	●
2.	Standard Character Set	○	○	○	○

E. Preempt Local on Receipt of Data		410411	410403
		B1-2	A17-2
1.	Preempt	●	●
2.	Do not Preempt	○	○

F. Substitute Asterisk (*) for Parity Errored Character		410411	410403
		B2-2	A15-2
1.	Substitute Asterisk	●	●
2.	Do not Substitute Asterisk	○	○

G1.-2. Line Parity on ITA5 (ASCII) Data		410411		410403	
		B3-2	B4-2	A13-2	B13-2
1.	No Parity (8th Bit Spacing)	●	●	●	●
2.	No Parity (8th Bit Marking)	○	●	○	●
3.	Odd Parity	●	○	●	○
4.	Even Parity	○	○	○	○

H. Transmission Mode		410411	410403
		B5-2	B15-2
1.	Asynchronous Transmission	●	●
2.	Isochronous Transmission	○	○

J. Transmit Answer-Back Character on Receipt of ENQ		410411	410403
		B6-2	B17-2
1.	Transmit Answer-Back	●	●
2.	Do not Transmit Answer-Back	○	○

K. Terminal Configuration		410411	410403
		B7-2	C17-2
1.	Receive Only Printer (DC Opcon)	●	—
2.	Keyboard Printer	○	○ ← Required Selection

Switch Off (○) = Mark
Switch On (●) = Space

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

Option Switch Settings for Controllers With 410411 or 410403 Circuit Cards (Cont)

L.	Line Feed Printer on Receipt of CR (Carriage Return)	410411 B8-2	410403 C15-2
1.	Line Feed Printer on CR	●	●
2.	Carriage Return Printer on CR	○	○

M.	15-Second Time Out on Send Mode	410411 B1-5	410403 A17-5
1.	15-Second Time Out Enabled	●	●
2.	15-Second Time Out Disabled	○	○

N.	Data Compression on Receive Buffer 90 Percent Full	410411 B2-5	410403 A15-5
1.	Data Compression Enabled	●	●
2.	Data Compression Disabled	○	○

P.	Short Receive Buffer for DTR	410411 B1-6	410403 A17-6
1.	Short Buffer Enabled	●	●
2.	Short Buffer Disabled	○	○

Q.	Printer Paging	410411 B2-6	410403 A15-6
1.	Printer Paging Enabled	●	●
2.	Printer Paging Disabled	○	○

R.	Printer Line Spacing Selected	410411 B3-6	410403 A13-6
1.	Printer Single Spaced	●	●
2.	Printer Double Spaced	○	○

S.	Printer Form-Out on Receipt of ETX	410411 B4-6	410403 B13-6
1.	Printer Forms Out on ETX	●	●
2.	Printer Ignores ETX	○	○

T.	Printer Form-Out on Motor Off	410411 B5-6	410403 B15-6
1.	Last Page Clears Cabinet	●	●
2.	Last Page Remains in Cabinet	○	○

Switch Off (○) = Mark
Switch On (●) = Space

U1.-2. Receive Buffer Memory Allocation		410411		410403	
		B5-1	B6-1	B15-1	B17-1
1.	1K Buffer (1024 Characters)	●	●	●	●
2.	5K Buffer (5120 Characters)	○	●	○	●
3.	9K Buffer (9216 Characters)	●	○	●	○

V. Monitor Receive Data for Extended ASCII		410411	410403
		B6-6	B17-6
1.	All 8 Bits Sent to Printer	●	●
2.	Normal ASCII Character Sent to Printer	○	○

W. Ignore CR and LF Characters after Receipt of CR		410411	410403
		B7-6	C17-6
1.	Ignore CR and LF After CR	●	●
2.	Retain CR and LF After CR	○	○

X. Delay Answer-Back 10 Milliseconds		410411	410403
		B8-6	C15-6
1.	Delay Answer-Back 10 ms	●	●
2.	Answer-Back Sent Immediately	○	○

Y1.-8. Answer-Back Character or First Station Identification Character								
410411	B1-7	B2-7	B3-7	B4-7	B5-7	B6-7	B7-7	B7-8
410403	A17-7	A15-7	A13-7	B13-7	B15-7	B17-7	C17-7	C15-7
	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8

Z1.-8. Second Station Identification Character								
410411	B1-8	B2-8	B3-8	B4-8	B5-8	B6-8	B7-8	B8-8
410403	A17-8	A15-8	A13-8	B13-8	B15-8	B17-8	C17-8	C15-8
	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8

Switch Off (○) = Mark
Switch On (●) = Space

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS(Cont)

Option Switch Setting for Controllers With 410411 or 410403 Circuit Cards (Cont)

AA. Communication Line Status		410411 B1-1	410403 A17-1
1.	Line Interface not Implemented	–	●
2.	Line Interface Implemented	○	○

Required Selection

BB. Communication Format		410411 B2-1	410403 A15-1
1.	Free Running Mode	●	●
2.	Poll/Select Mode	○	○

CC. Spare Printer On-Line Status (KP3 Only)		410411 B3-1	410403 A13-1
1.	Printer Dedicated to Line Traffic	●	●
2.	Printer Available as Spare	–	○

Required Selection

DD. Monitor Receive Data for Urgent Traffic Sequence		410411 B4-1	410403 B13-1
1.	Monitor Receive Data for Urgent Traffic	●	●
2.	Disable Option	○	○

EE. Print Out Line Options		410411 B7-1	410403 C17-1
1.	Enable Print Out	●	●
2.	Disable Print Out	○	○

FF. Monitor Receive Data for SO and SI Characters (Extended ASCII)		410411 B8-1	410403 C15-1
1.	Enable Monitoring	●	●
2.	Disable Monitoring	○	○

Switch Off (○) = Mark
Switch On (●) = Space

a1.-h7. Urgent Traffic Detection Sequences — 410403 Circuit Card†††††										
Sequence	Character	Switch	Switch Pack							
			A17	A15	A13	B13	B15	B17	C17	C15
1	1	1	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	●
1	2	2	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	●
1	3	3	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	●
1	4	4	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	●
2	1	5	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	●
2	2	6	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	●
2	3	7	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	●
2	4	8	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	●

†††††Slot 5 in ROP or KP Controllers.
Slot 9 — Line 3
Slot 10 — Line 2 In KP3 Controllers
Slot 11 — Line 1

ZZ. High Speed Asynchronous Baud Rate					
410421					
A13-1	A13-2	A13-3	A13-4	Line 1	Baud Rate
A19-1	A19-2	A19-3	A19-4	Line 2	
A24-1	A24-2	A24-3	A24-4	Line 3	
○	○	○	●		50
○	○	●	●		75
○	●	○	●		100
○	●	●	●		110
●	○	○	●		150
●	○	●	●		300
●	●	○	●		450
●	●	●	●		600
○	●	●	○		900
●	○	○	○		1200
●	○	●	○		1800
●	●	○	○		2400
●	●	●	○		3600

ZZ. Low Speed Asynchronous Baud Rate				
410421				
A13-5	A13-6	A13-7	Line 1	Baud Rate
A19-5	A19-6	A19-7	Line 2	
A24-5	A24-6	A24-7	Line 3	
○	○	○		50
●	○	○		75
○	●	○		100
●	●	○		110
○	○	●		150
●	○	●		300
○	●	●		450
●	●	●		600

Switch Off (○) = Mark
Switch On (●) = Space

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

Option Switch Settings for Controllers With 410411 or 410403 Circuit Cards (Cont)

ZZ Low Speed Asynchronous Baud Rate

410411			Baud Rate
A21-6	A21-7	A21-8	
O	O	O	50
●	O	O	75
O	●	O	100
●	●	O	110
O	O	●	150
●	O	●	300
O	●	●	450
●	●	●	600

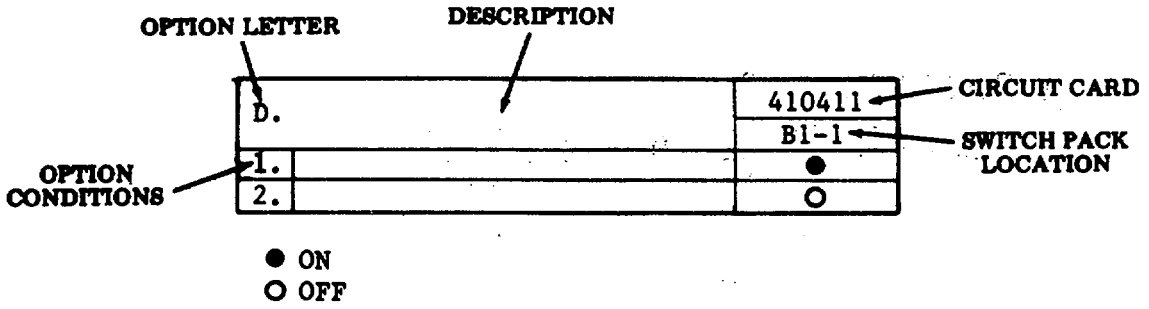
ZZ High Speed Asynchronous Baud Rate

410411				Baud Rate
A21-2	A21-3	A21-4	A21-5	
O	O	O	●	50
O	O	●	●	75
O	●	O	●	100
O	●	●	●	110
●	O	O	●	150
O	O	O	O	300
O	O	●	O	450
O	●	O	O	600
O	●	●	O	900
●	O	O	O	1200
●	O	●	O	1800
●	●	O	O	2400
●	●	●	O	3600

Switch OFF(O) = Mark

Switch ON (●·) Space

Controller 40C433/ACS/059



A. Line printer copies when set is sending	410411 B1 — 1
1. Printer copies data as sent from send line	●
2. Printer copies data echoed back on receive line	○

B. Send ETX on premature end of message	410411 B1 — 5
1. Send ETX	●
2. Do not send ETX	○

C. Colon is lower case and semi-colon is upper on keyboard	410411 B1 — 6
1. Enabled	●
2. Reversed	○

D. Keyboard on-line transmits blind	410411 B1 — 7
1. Keyboard transmit blinded	●
2. Display monitors keyboard	○

E. Display received escape sequences	410411 B1 — 8
1. Display escape sequences	●
2. Do not display escape sequences but function is preformed	○

F. Printer on-line required to transmit	410411 B2 — 1
1. Printer required to transmit	●
2. Printer not required	○

G. Send on-line extended characters from keyboard	410411 B2 — 2
1. Send extended characters as escape sequences	●
2. Do not send extended characters	○

H. Monitor tape on required to transmit	410411 B2 — 3
1. Monitor tape on required	●
2. Monitor tape on not required	○

I. Automatic paging on printer (58 lines per page)	410411 B2 — 5
1. Paging "F_F" sent to printer after 58th line	●
2. No paging	○

J. Printer optioned for double line feed (use with Option I)	410411 B2 — 6
1. Printer optioned for double line feed	●
2. Printer not optioned for double line feed	○

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

Controller 40C433/ACS/059 (Cont)

K. Keep received letters (S_I) and figures (S_O) characters (5 level operation only)		410411 B2 — 8
1.	Keep S_O, S_I characters	●
2.	Discard S_O, S_I characters	○

L. Printer select (=) also selects receive tape		410411 B3 — 2
1.	Receive tape selected with printer on =	●
2.	Printer only selected on =	○

M. Line parity		410411 B3 — 3	410411 B3 — 4
1.	Odd parity	● ●	● ○
2.	Even parity	○	●
3.	No parity	○	○

N. Mode display stays in at END (ETX) of receive message		410411 B3 — 8
1.	Display stays in receive	○
2.	Display switches to off	●

P. Controller port for send tape		410411 B5 — 1	410411 B5 — 2
1.	J305	○	●
2.	J306	●	○
3.	No send tape	○	○

Q. Controller port for receive tape		410411 B5 — 3	410411 B5 — 4
1.	J305	○	●
2.	J306	●	○
3.	No receive tape	○	○

R. Controller port for monitor tape		410411 B5 — 5	410411 B5 — 6
1.	J305	○	●
2.	J306	●	○
3.	No monitor tape	○	○

S.&T. Station identity code (Poll-Select)		410411 Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
	1st character	B7 — 1	B7 — 2	B7 — 3	B7 — 4	B7 — 5	B7 — 6	B7 — 7
	2nd character	B8 — 1	B8 — 2	B8 — 3	B8 — 4	B8 — 5	B8 — 6	B8 — 7

Switch on ● Marking
Switch off ○ Spacing

U. Mode display goes to after sending		410411 B4 — 8
1.	Display goes to on-line receive	●
2.	Display goes off	○

V. Isochronous/Asynchronous Operation		410411 B1-2
1.	Isochronous Operation	●
2.	Asynchronous Operation	○

Available only if 408826 Modification Kit is installed.

Controller 40C433/ACS/059

ZZ. Eight-Level Asynchronous Baud Rate				
410411				Baud Rate
A21-2	A21-3	A21-4	A21-5	
○	○	○	●	50
○	○	●	●	75
○	●	○	●	100
○	●	●	●	110
○	○	○	●	150
●	○	●	●	300
●	●	○	●	450
●	●	●	●	600
○	○	○	○	300
○	○	●	○	450
○	●	○	○	600
○	●	●	○	900
●	○	○	○	1200•

Note: When isochronous mode is selected, switches 2 through 8 on switch pack A21 should be turned on.

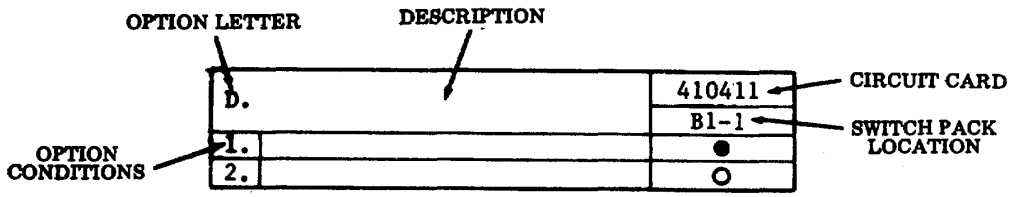
•Available only when Issue 2A or higher 410811, 410912 and 410913 Circuit Cards are used.

ZZ. Five-Level Asynchronous Baud Rate			
410411			Baud Rate
A21-6	A21-7	A21-8	
○	○	○	50
●	○	○	75
○	●	○	100
●	●	○	110
○	○	●	150
●	○	●	300
○	●	●	450
●	●	●	600

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

Controller 40C435/ACS/059



● ON
○ OFF

A. Line printer copies when set is sending	410411 B1 — 1
1. Printer copies data as sent from send line	●
2. Printer copies data echoed back on receive line	○

B. Send ETX on premature end of message	410411 B1 — 5
1. Send ETX	●
2. Do not send ETX	○

C. Colon is lower case and semi-colon is upper case	410411 B1 — 6
1. Enabled	●
2. Reversed	○

D. Keyboard on-line transmits blind	410411 B1 — 7
1. Keyboard transmits blind	●
2. Display monitors keyboard	○

E. Display received escape sequences	410411 B1 — 8
1. Display escape sequences	●
2. Do not display escape sequences but function is performed	○

F. Printer on-line required to transmit	410411 B2 — 1
1. Printer required to transmit	●
2. Printer not required	○

G. Send on-line extended characters from keyboard	410411 B2 — 2
1. Send extended characters as escape sequences	●
2. Do not send extended characters	○

H. Monitor tape on required to transmit	410411 B2 — 3
1. Monitor tape on required	●
2. Monitor tape on not required	○

I. Automatic paging on printer (58 lines per page)	410411 B2 — 5
1. Paging "FF" sent to printer after 58th line	●
2. No paging	○

J. Printer optioned for double line feed use with Option I	410411 B2 — 6
1. Printer optioned for double line feed	●
2. Printer not optioned for double line feed	○

K. Keep received letters (S_I) and figures (S_O) characters (5-level operation only)		410411 B2 — 8
1.	Keep S_O, S_I characters	●
2.	Discard S_O, S_I characters	○

L. Printer select (=) also selects receive tape		410411 B3 — 2
1.	Receive tape selected with printer on =	●
2.	Printer only selected on =	○

M. Line parity		410411 B3 — 3	410411 B3 — 4
1.	Odd parity	● ●	● ○
2.	Even parity	○	●
3.	No parity	○	○

N. Mode display stays in at end (ETX) of receive message		410411 B3 — 8
1.	Display stays in receive	○
2.	Display switches to off	●

P. Controller port for send tape		410411 B5 — 1	410411 B5 — 2
1.	J307	●	○
2.	J308	○	●
3.	J311	●	●
4.	No send tape	○	○

Q. Controller port for receive tape		410411 B5 — 3	410411 B5 — 4
1.	J307	●	○
2.	J308	○	●
3.	J311	●	●
4.	No receive tape	○	○

R. Controller port for monitor tape		410411 B5 — 5	410411 B5 — 6
1.	J307	●	○
2.	J308	○	●
3.	J311	●	●
4.	No monitor tape	○	○

S.&T. Station identity code (Poll-Select)		410411 Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
	1st character	B7 — 1	B7 — 2	B7 — 3	B7 — 4	B7 — 5	B7 — 6	B7 — 7
	2nd character	B8 — 1	B8 — 2	B8 — 3	B8 — 4	B8 — 5	B8 — 6	B8 — 7

Switch on ● Marking
Switch off ○ Spacing

V. Isochronous/Asynchronous Operation		410411 B1-2
1.	Isochronous Operation	●
2.	Asynchronous Operation	○

Available only if 408826 Modification Kit is installed.

U. Mode display goes to after sending		410411 B4 — 8
1.	Display goes to on-line receive	●
2.	Display goes off	○

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

Controller 40C435/ACS/059 (Cont)

ZZ. Eight-Level Asynchronous Baud Rate

410411				Baud Rate
A21-2	A21-3	A21-4	A21-5	
○	○	○	●	50
○	○	●	●	75
○	●	○	●	100
○	●	●	●	110
○	○	○	●	150
●	○	●	●	300
●	●	○	●	450
●	●	●	●	600
○	○	○	○	300
○	○	●	○	450
○	●	○	○	600
○	●	●	○	900
●	○	○	○	1200♦

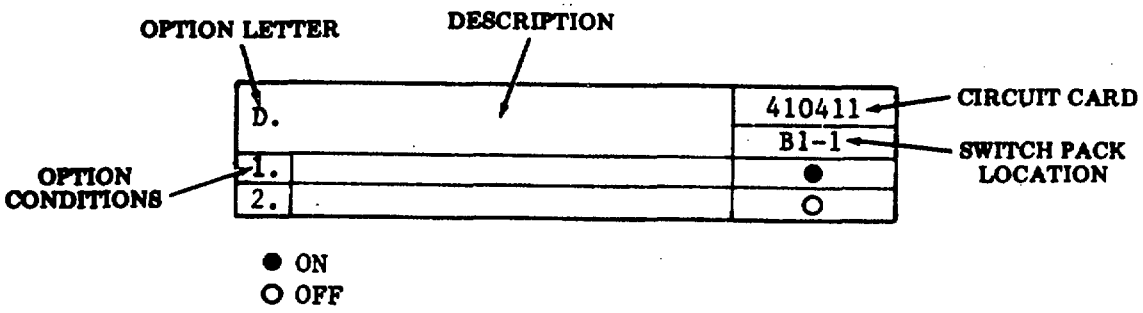
Note: When isochronous mode is selected, switches 2 through 8 on switch pack A21 should be turned on.

♦Available only when Issue 2A or higher 410811, 410912 and 410913 circuit cards are used.

ZZ. Five-Level Asynchronous Baud Rate

410411			Baud Rate
A21-6	A21-7	A21-8	
○	○	○	50
●	○	○	75
○	●	○	100
●	●	○	110
○	○	●	150
●	○	●	300
○	●	●	450
●	●	●	600

Controller 40C435/AEE/091 or 40C437/AEE/091



A. Line printer copies when set is sending	410411 B1 — 1
1. Printer copies data as sent from send line	●
2. Printer copies data echoed back on receive line	○

B. Send ETX on premature end of message	410411 B1 — 5
1. Send ETX	●
2. Do not send ETX	○

C. Colon is lower case and semi-colon is upper on keyboard	410411 B1 — 6
1. Enabled	●
2. Reversed	○

D. Keyboard on-line transmits blind	410411 B1 — 7
1. Keyboard transmit blinded	●
2. Display monitors keyboard	○

E. Display received escape sequences	410411 B1 — 8
1. Display escape sequences	●
2. Do not display escape sequences but function is performed	○

F. Printer on-line required to transmit	410411 B2 — 1
1. Printer required to transmit	●
2. Printer not required	○

G. Send on-line extended characters from keyboard	410411 B2 — 2
1. Send extended characters as escape sequences	●
2. Do not send extended characters	○

H. Monitor tape on required to transmit	410411 B2 — 3
1. Monitor tape on required	●
2. Monitor tape on not required	○

I. Automatic paging on printer (54 lines per page)	410411 B2 — 5
1. Paging "F_F" sent to printer after 54th line	●
2. No paging	○

J. Printer optioned for double line feed use with Option I	410411 B2 — 6
1. Printer optioned for double line feed	●
2. Printer not optioned for double line feed	○

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

Controller 40C435/AEE/091 or 40C437/AEE/091 (Cont)

K. Keep received letters (S_I) and figures (S_O) characters (5-level operation only)		410411 B2 — 8
1.	Keep S_O, S_I characters	●
2.	Discard S_O, S_I characters	○

L. Printer select (=) also selects receive tape		410411 B3 — 2
1.	Receive tape selected with printer on =	●
2.	Printer only selected on =	○

M. Line parity		410411 B3 — 3	410411 B3 — 4
1.	Odd parity	● ●	● ○
2.	Even parity	○	●
3.	No parity	○	○

N. Mode display stays in at end (ETX) of receive message		410411 B3 — 8
1.	Display stays in receive	○
2.	Display switches to off	●

P. Controller port for send tape		410411 B5 — 1	410411 B5 — 2
1.	J307	●	○
2.	J308	○	●
3.	J311	●	●
4.	No send tape	○	○

Q. Controller port for receive tape		410411 B5 — 3	410411 B5 — 4
1.	J307	●	○
2.	J308	○	●
3.	J311	●	●
4.	No receive tape	○	○

R. Controller port for monitor tape		410411 B5 — 5	410411 B5 — 6
1.	J307	●	○
2.	J308	○	●
3.	J311	●	●
4.	No monitor tape	○	○

S.&T. Station identity code (Poll-Select)		410411 Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
	1st character	B7 — 1	B7 — 2	B7 — 3	B7 — 4	B7 — 5	B7 — 6	B7 — 7
	2nd character	B8 — 1	B8 — 2	B8 — 3	B8 — 4	B8 — 5	B8 — 6	B8 — 7

Switch on ● Marking
Switch off ○ Spacing

U.	Mode display goes to after sending	410411 B4 — 8
1.	Display goes to on-line receive	●
2.	Display goes off	○

V.	Isochronous/Asynchronous Operation	410411 B1-2
1.	Isochronous Operation	●
2.	Asynchronous Operation	○

W.	Data Terminal Ready Control	410411 B1-3
1.	REC buffer controls DTR	●
2.	DTR not controlled by Rec. buffer	○

X.	Line Wrap on Display	410411 B1-4
1.	Display wraps when cursor reaches End of Line	●
2.	Display does not wrap	○

Y.	Reject Received Nulls	410411 B2-4
1.	Terminal rejects Received Nulls	●
2.	Terminal does not reject Received Nulls	○

Z.	Home on Send	410411 B2-7
1.	Cursor goes Home before sending from Display	●
2.	Display Send from Cursor	○

AA.	Stop Bits in 5-Level Operation	410411 B4-1
1.	Terminal Send/Receive 1.5 Stop Bits	●
2.	Terminal Send/Receive 1.0 Stop Bits	○

ZZ. Eight-Level Asynchronous Baud Rate

410411				Baud Rate
A21-2	A21-3	A21-4	A21-5	
○	○	○	●	50
○	○	●	●	75
○	●	○	●	100
○	●	●	●	110
○	○	○	●	150
●	○	●	●	300
●	●	○	●	450
●	●	●	●	600
○	○	○	○	300
○	○	●	○	450
○	●	○	○	600
○	●	●	○	900
●	○	○	○	1200
●	○	●	○	1800
●	●	○	○	2400

Note: When isochronous mode is selected, switches 2 through 8 on switch pack A21 should be turned on.

ZZ. Five-Level Asynchronous Baud Rate

410411			Baud Rate
A21-6	A21-7	A21-8	
○	○	○	50
●	○	○	75
○	●	○	100
●	●	○	110
○	○	●	150
●	○	●	300
○	●	●	450
●	●	●	600

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

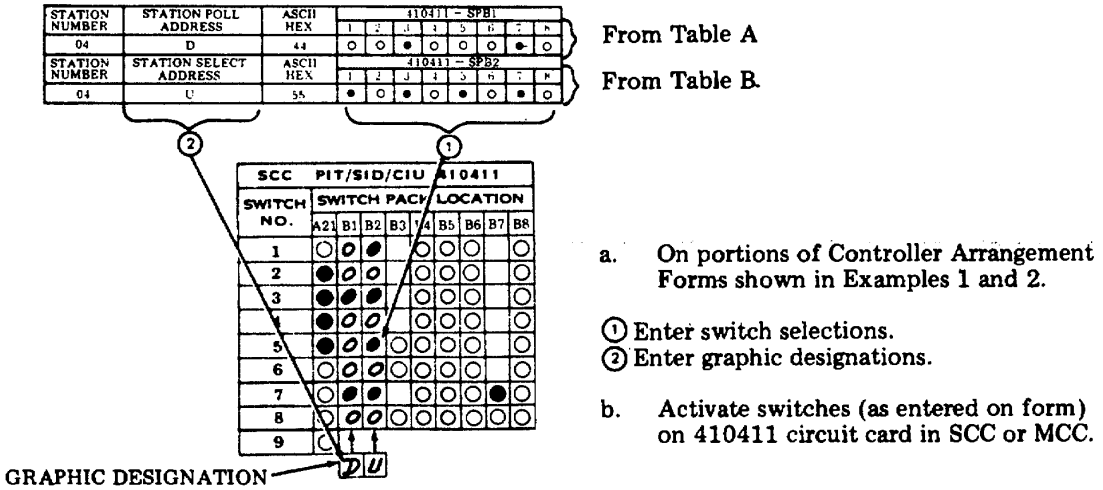
Controllers 40C436/ADA/092, 40C436/ADD/093. and 40C436/ADK/075

Controller Option 401 - Station Poll and Select Addresses

Option 401 is determined by the station number entered in the SCC or MCC portion of the Station Configuration Worksheet.

401 — Station Poll and Select Address		410411 (SPB1, 2)
a.	None (Does Not Provide Proper Operation)	(See Tables A and B for ASCII and Tables C and D for EBCDIC.)
b.	Station Number (Specify a Station Number From 00 to 31)	

Example 1: Station Number = "04", Line Code = ASCII



Example 2: Station Number = "02", Line Code = EBCDIC

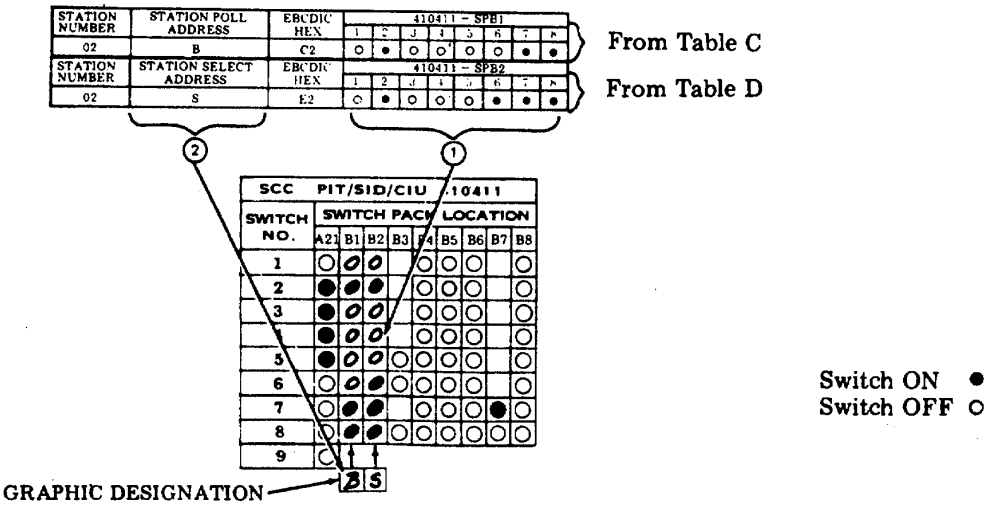


TABLE A

ASCII

STATION POLL ADDRESS (SCC or MCC)

STATION NUMBER	STATION POLL ADDRESS CHARACTER	HEX	410411 — SPB1 1	2	3	4	5	6	7	8
00	SPACE	20	○	○	○	○	○	●	○	○
01	A	C1	●	○	○	○	○	○	●	○
02	B	C2	○	●	○	○	○	○	●	○
03	C	43	●	●	○	○	○	○	●	○
04	D	C4	○	○	●	○	○	○	●	○
05	E	45	●	○	●	○	○	○	●	○
06	F	46	○	●	●	○	○	○	●	○
07	G	C7	●	●	●	○	○	○	●	○
08	H	C8	○	○	○	●	○	○	●	○
09	I	49	●	○	○	●	○	○	●	○
10	[	5B	●	●	○	●	●	○	●	○
11	.(PERIOD)	AE	○	●	●	●	○	●	○	○
12	<	BC	○	○	●	●	●	●	○	○
13	(	A8	○	○	○	●	○	●	○	○
14	+	AB	●	●	○	●	○	●	○	○
15	!	A1	●	○	○	○	○	●	○	○
16	&	26	○	●	●	○	○	●	○	○
17	J	4A	○	●	○	●	○	○	●	○
18	K	CB	●	●	○	●	○	○	●	○
19	L	4C	○	○	●	●	○	○	●	○
20	M	CD	●	○	●	●	○	○	●	○
21	N	CE	○	●	●	●	○	○	●	○
22	O	4F	●	●	●	●	○	○	●	○
23	P	D0	○	○	○	○	●	○	●	○
24	Q	51	●	○	○	○	●	○	●	○
25	R	52	○	●	○	○	●	○	●	○
26	]	5D	●	○	●	●	●	○	●	○
27	$	44	○	○	●	○	○	●	○	○
28	*	2A	○	●	○	●	○	●	○	○
29	)	29	●	○	○	●	○	●	○	○
30	;	3B	●	●	○	●	●	●	○	○
31	^	5E	○	●	●	●	●	○	●	○

Note: The "HEX" addresses shown above do not necessarily relate to the setting of the switches.

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

TABLE B

ASCII

STATION SELECT ADDRESS (SCC or MCC)

STATION NUMBER	STATION SELECT ADDRESS		410411 – SPB2							
	CHARACTER	HEX	1	2	3	4	5	6	7	8
00	- (MINUS)	AD	●	○	●	●	○	●	○	○
01	/	2F	●	●	●	●	○	●	○	○
02	S	D3	●	●	○	○	●	○	●	○
03	T	54	○	○	●	○	●	○	●	○
04	U	D5	●	○	●	○	●	○	●	○
05	V	D6	○	●	●	○	●	○	●	○
06	W	57	●	●	●	○	●	○	●	○
07	X	58	○	○	○	●	●	○	●	○
08	Y	D9	●	○	○	●	●	○	●	○
09	Z	DA	○	●	○	●	●	○	●	○
10	¦ (VERTICAL LINE)	7C	○	○	●	●	●	●	●	○
11	, (COMMA)	2C	○	○	●	●	○	●	○	○
12	%	25	●	○	●	○	○	●	○	○
13	_(UNDERSCORE)	DF	●	●	●	●	●	○	●	○
14	>	3E	○	●	●	●	●	●	○	○
15	?	BF	●	●	●	●	●	●	○	○
16	0 (ZERO)	B0	○	○	○	○	●	●	○	○
17	1 (ONE)	31	●	○	○	○	●	●	○	○
18	2	32	○	●	○	○	●	●	○	○
19	3	B3	●	●	○	○	●	●	○	○
20	4	34	○	○	●	○	●	●	○	○
21	5	B5	●	○	●	○	●	●	○	○
22	6	B6	○	●	●	○	●	●	○	○
23	7	37	●	●	●	○	●	●	○	○
24	8	38	○	○	○	●	●	●	○	○
25	9	B9	●	○	○	●	●	●	○	○
26	:	BA	○	●	○	●	●	●	○	○
27	#	23	●	●	○	○	○	●	○	○
28	@	40	○	○	○	○	○	○	●	○
29	'	A7	●	●	●	○	○	●	○	○
30	=	3D	●	○	●	●	●	●	○	○
31	"	A2	○	●	○	○	○	●	○	○

Note: The "HEX" addresses shown above do not necessarily relate to the setting of the switches.

TABLE C.

EBCDIC

OPTION 401 - STATION POLL ADDRESS (SCC OR MCC)

STATION NUMBER	STATION POLL ADDRESS	EBCDIC HEX	410411 — SPB1							
			1	2	3	4	5	6	7	8
00	SPACE	40	○	○	○	○	○	○	●	○
01	A	C1	●	○	○	○	○	○	●	●
02	B	C2	○	●	○	○	○	○	●	●
03	C	C3	●	●	○	○	○	○	●	●
04	D	C4	○	○	●	○	○	○	●	●
05	E	C5	●	○	●	○	○	○	●	●
06	F	C6	○	●	●	○	○	○	●	●
07	G	C7	●	●	●	○	○	○	●	●
08	H	C8	○	○	○	●	○	○	●	●
09	I	C9	●	○	○	●	○	○	●	●
10	¢	4A	○	●	○	●	○	○	●	○
11	(PERIOD)	4B	●	●	○	●	○	○	●	○
12	<	4C	○	○	●	●	○	○	●	○
13	(	4D	●	○	●	●	○	○	●	○
14	+	4E	○	●	●	●	○	○	●	○
15	| (VERTICAL BAR)	4F	●	●	●	●	○	○	●	○
16	&	50	○	○	○	○	●	○	●	○
17	J	D1	●	○	○	○	●	○	●	●
18	K	D2	○	●	○	○	●	○	●	●
19	L	D3	●	●	○	○	●	○	●	●
20	M	D4	○	○	●	○	●	○	●	●
21	N	D5	●	○	●	○	●	○	●	●
22	O	D6	○	●	●	○	●	○	●	●
23	P	D7	●	●	●	○	●	○	●	●
24	Q	D8	○	○	○	●	●	○	●	●
25	R	D9	●	○	○	●	●	○	●	●
26	!	5A	○	●	○	●	●	○	●	○
27	$	5B	●	●	○	●	●	○	●	○
28	*	5C	○	○	●	●	●	○	●	○
29	)	5D	●	○	●	●	●	○	●	○
30	;	5E	○	●	●	●	●	○	●	○
31	¬	5F	●	●	●	●	●	○	●	○

LEGEND: | is "logical OR" (see Station No. 15).

¬ is "logical NOT" (see Station No. 31).

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

TABLE -D

EBCDIC

OPTION 401 - STATION SELECT ADDRESS (SCC OR MCC)

STATION NUMBER	STATION SELECT ADDRESS	EBCDIC HEX	410411 — SPB2							
			1	2	3	4	5	6	7	8
00	– (MINUS)	60	○	○	○	○	○	●	●	○
01	/	61	●	○	○	○	○	●	●	○
02	S	E2	○	●	○	○	○	●	●	●
03	T	E3	●	●	○	○	○	●	●	●
04	U	E4	○	○	●	○	○	●	●	●
05	V	E5	●	○	●	○	○	●	●	●
06	W	E6	○	●	●	○	○	●	●	●
07	X	E7	●	●	●	○	○	●	●	●
08	Y	E8	○	○	○	●	○	●	●	●
09	Z	E9	●	○	○	●	○	●	●	●
10	¦ (VERTICAL LINE)	6A	○	●	○	●	○	●	●	○
11	, (COMMA)	6B	●	●	○	●	○	●	●	○
12	%	6C	○	○	●	●	○	●	●	○
13	_ (UNDERSCORE)	6D	●	○	●	●	○	●	●	○
14	>	6E	○	●	●	●	○	●	●	○
15	?	6F	●	●	●	●	○	●	●	○
16	0 (ZERO)	F0	○	○	○	○	●	●	●	●
17	1 (ONE)	F1	●	○	○	○	●	●	●	●
18	2	F2	○	●	○	○	●	●	●	●
19	3	F3	●	●	○	○	●	●	●	●
20	4	F4	○	○	●	○	●	●	●	●
21	5	F5	●	○	●	○	●	●	●	●
22	6	F6	○	●	●	○	●	●	●	●
23	7	F7	●	●	●	○	●	●	●	●
24	8	F8	○	○	○	●	●	●	●	●
25	9	F9	●	○	○	●	●	●	●	●
26	:	7A	○	●	○	●	●	●	●	○
27	#	7B	●	●	○	●	●	●	●	○
28	@	7C	○	○	●	●	●	●	●	○
29	'	7D	●	○	●	●	●	●	●	○
30	=	7E	○	●	●	●	●	●	●	○
31	"	7F	●	●	●	●	●	●	●	○

Controller Options - 402-411

Options 402-411 are determined from the Service Order and Station Configuration Worksheet and apply to either ASCII or EBCDIC Stations. The 410411 is present.

402 — Type of Alarm on Receipt of Alarm Write Control or Copy Control Character		410411 SPB7-1	
a.	Continuous — ("Local" Must be Depressed to Stop Alarm)	●	
b.	One Second (Alarm Sounds Only Once)	O	£

403 — Display Field Intensities		410411		
		SPB7-2	SPB7-3	
a.	Intensified and Blink Fields are Intensified	O	O	£
b.	Intensified and Blink Fields are Blinked	●	O	
c.	Blink Fields are Blinked. Intensified Fields are Intensified. Mixed Intensified and Blinked Fields on the same Display are Blinked.	O	●	

404 — Type of Block Abort Procedure Used When Station Abnormally Stops Sending On-Line+		410411 SPB7-5	
a.	Terminate With ETX	O	£
b.	Terminate With SUB ENQ and Prime Alarm Flag	●	

405 — Device Addresses (MCC Only)		410411 SPB4, B5, or B6
a.	None (Does Not Provide Proper Operation)	(See Table E for ASCII and Table F for EBCDIC.)
b.	First Device (Specify Device No.)	
c.	Second Device (Specify Device No.)	
d.	Third Device (Specify Device No.)	

406 — Numeric Field Override (Applies to typewriter style opcons)		410411 SPB7-4	
a.	Alpha Data Can be Entered in Numeric Field	●	
b.	Alpha Data Cannot be Entered in Numeric Field	O	£

Note: In Option 406 a. or b.; when entering or trying to enter alpha data in numeric field, alarm will sound.

407 — Numeric Lock Special Feature (Applies to internal numeric cluster style opcons)	410411 SPB7-8
Does Not Apply	

● = ON O=OFF

£ Factory optioned.
+ Install Option 404b. unless otherwise specified.

A. GENERAL (Cont)

4. OPTION-SWITCH SETTINGS (Cont)

Controller Options - 402-411 (Cont)

408.	Line Code	410411 SPB7-6
a.	ASCII	●
b.	EBCDIC	○ £

409.	Up-Low/Monocase Font for KD	Type of D I/O Card Required in DCC or MCC	
		ASCII	EBCDIC
a.	Up-Low	410431	410435
b.	Does Not Apply		

410.	Typewriter/Internal Numeric Cluster Opcon	Does Not Apply

411.	External Data Set/Internal Modem	Does Not Apply

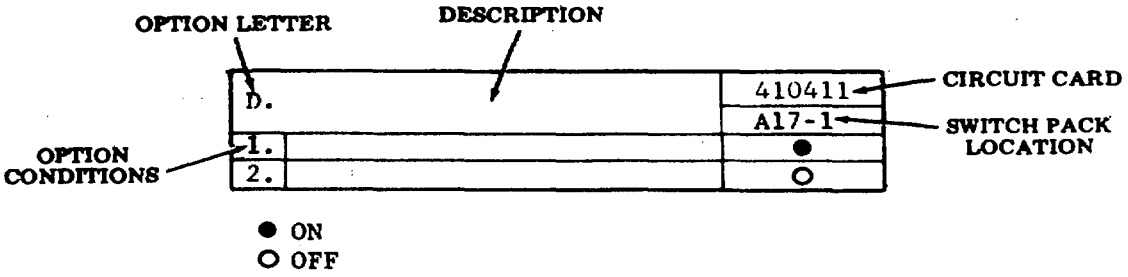
412.	Station Identification Sequence	Does Not Apply

413.	Disconnect Time Out	Does Not Apply

414.	Buffer Lock Override MCC w/410525 Only	410411 SPB7-7
a.	Allows Print Local or Copy of Locked Buffer	●
b.	Does not allow Print Local or Copy of Locked Buffer	○ £

● Indicates ON
○ Indicates OFF
£ Factory optioned

Controllers 40C435/AEE/091 or 40C437/AEE/091 With 403142 Modification Kit, or Controller 40C437/AEL/106.



A. Line printer copies when set is sending	410411 B1 — 1
1. Printer copies data as sent from send line	●
2. Printer copies data echoed back on receive line	○

C. Colon is lower case and semi-colon is upper on keyboard	410411 B1 — 6
1. Enabled	●
2. Reversed	○

E. Display received escape sequences	410411 B1 — 8
1. Display escape sequences	●
2. Do not display escape sequences but function is performed	○

G. Send on-line extended characters from keyboard	410411 B2 — 2
1. Send extended characters as escape sequences	●
2. Do not send extended characters	○

I. Automatic paging on printer (54 lines per page)	410411 B2 — 5
1. Paging "F_F" sent to printer after 54th line	●
2. No paging	○

B. Send ETX on premature end of message	410411 B1 — 5
1. Send ETX	●
2. Do not send ETX	○

D. Keyboard on-line transmits blind	410411 B1 — 7
1. Keyboard transmit blinded	●
2. Display monitors keyboard	○

Note: Select this option if display is to copy send data in S/R mode.

F. Printer on-line required to transmit (Poll/Select mode only)	410411 B2 — 1
1. Printer required to transmit	●
2. Printer not required	○

H. Monitor tape on required to transmit	410411 B2 — 3
1. Monitor tape on required	●
2. Monitor tape on not required	○

J. Printer optioned for double line feed (use with Option I)	410411 B2 — 6
1. Printer optioned for double line feed	●
2. Printer not optioned for double line feed	○

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

K. Keep received letters (S_I) and figures (S_O) characters (5-level operation only)	410411 B2 – 8
1. Keep S_O, S_I characters	●
2. Discard S_O, S_I characters	○

L. Printer select (=) also selects receive tape	410411 B3 – 2
1. Receive tape selected with printer on =	●
2. Printer only selected on =	○

M. Line parity	410411 B3 – 3	410411 B3 – 4
1. Odd parity	●	●
2. Even parity	○	●
3. No parity - 8th bit mark	●	○
4. No parity - 8th bit space	○	○

N. Mode display stays in at end (ETX) of receive message	410411 B3 – 8
1. Display switches to off	●
2. Display stays in receive	○

P. Controller port for send tape	410411 B5 – 1	410411 B5 – 2
1. J307	●	○
2. J308	○	●
3. J311	●	●
4. No send tape	○	○

Q. Controller port for receive tape	410411 B5 – 3	410411 B5 – 4
1. J307	●	○
2. J308	○	●
3. J311	●	●
4. No receive tape	○	○

R. Controller port for monitor tape	410411 B5 – 5	410411 B5 – 6
1. J307	●	○
2. J308	○	●
3. J311	●	●
4. No monitor tape	○	○

S.&T. Station identity code (Poll-Select)		410411 Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
	1st character	B7 – 1	B7 – 2	B7 – 3	B7 – 4	B7 – 5	B7 – 6	B7 – 7
	2nd character	B8 – 1	B8 – 2	B8 – 3	B8 – 4	B8 – 5	B8 – 6	B8 – 7

Set Switch 8 to OFF position for both characters.

Switch on ● Marking
Switch off ○ Spacing

U. Mode display goes to after sending	410411 B4 – 8
1. Display goes to on-line receive	●
2. Display goes off	○

V. Isochronous/Asynchronous Operation	410411 B1-2
1. Isochronous Operation	●
2. Asynchronous Operation	○

W. Data Terminal Ready Control	410411 B1-3
1. REC buffer controls DTR	●
2. DTR not controlled by Rec. buffer	○

Refer to DTR Chart Page 122.

Y. Reject Received Text Nulls	410411 B2-4
1. Terminal rejects Received Text Nulls	●
2. Terminal does not reject Received Nulls	○

AA. Stop Bits in 5-Level Operation	410411 B4-1
1. Terminal Send/Receive 1.5 Stop Bits	●
2. Terminal Send/Receive 1.0 Stop Bits	○

AC. Received ETX Character Retained	410411 B6-2
1. ETX character retained	●
2. ETX character discarded	○

AE. One Second Line Break on NAK or INT From Keyboard	410411 B6-4
1. Line break enabled	●
2. Line break disabled	○

AG. Destructive Scrolling	410411 B6-6
1. Destructive scrolling enabled	●
2. Destructivescrolling disabled	○

AI. Refer to Data Terminal Ready Chart on Page 122.	410411 ●

AM. 40/8A Emulator - Display Action	410411 B4-2
1. Emulate 40/8A operation	●
2. Standard 40/8B operation	○

X. Line Wrap on Display	410411 B1-4
1. Display wraps when cursor reaches End of Line	●
2. Display does not wrap	○

Z. Home on Send	410411 B2-7
1. Cursor goes Home before sending from Display	●
2. Display Send from Cursor	○

AB. Send/Receive or Poll/Select	410411 B6-1
1. Send/Receive	●
2. Poll/Select	○

AD. Refer to Line Terminator Chart on Page 121.	410411 ●

AF. Stop Bits in 8-Level	410411 B6-5
1. Transmits/Receives with 2.0 Stop Bits	●
2. Transmits/Receives with 1.0 Stop Bits	○

AH. Number of Display Segments	410411 B6-7
1. 6 Segment display	●
2. 3 Segment display	○

AJ. ETX Required to Send	410411 B3-5
1. ETX required at end of message to send from display	●
2. ETX not required to send from display	○

AL. Preempt Display on Receipt of Data (S/R Mode Only)	410411 B3-1
1. Receive data will pre-empt display from Local or Control mode to On-Line receive	●
2. No preempt operation	○

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

AQ. Power up mode	410411 B4 — 4
1. Terminal powers up in 5 level mode	●
2. Terminal powers up in 8 level mode	○

AS. Local send tape to display option	410411 B4 — 6
1. A full display loaded from send tape to display (72/144 lines)	●
2. Partial display loaded from send tape to display (61/128 lines)	○

AU. Location of carriage return and line feed on keyboard	410411 B3 — 7
1. Carriage return is wide key	●
2. Line feed is wide key	○

AT. Reject received text "Deletes"	410411 B4 — 7
1. Terminal discards received text "Deletes"	●
2. Terminal accepts received "Deletes"	○

AV. Clear display when Preempted	410411 B5 — 8
1. Display is cleared and cursor is homed	●
2. Received data is displayed at cursor location	○

AX. Sequence LF, LF, NNNN as message end (ETX) in ASCII	410411 B4 — 3
1. Terminal recognizes LF, LF, NNNN as message end in ASCII	●
2. Terminal does not recognize sequence as message end	○

ZZ. Eight-Level Asynchronous Baud Rate

410411				
A21-2	A21-3	A21-4	A21-5	Baud Rate
○	○	○	●	50
○	○	●	●	75
○	●	○	●	100
○	●	●	●	110
●	○	○	●	150
●	○	●	●	300
●	●	○	●	450
●	●	●	●	600
○	●	●	○	900
●	○	○	○	1200
●	○	●	○	1800
●	●	○	○	2400

ZZ. Five-Level Asynchronous Baud Rate

410411			
A21-6	A21-7	A21-8	Baud Rate
○	○	○	50
●	○	○	75
○	●	○	100
●	●	○	110
○	○	●	150
●	○	●	300
○	●	●	450
●	●	●	600

Note: When isochronous mode is selected, switches 2 through 8 on switch pack A21 should be turned on.

W. Data Terminal Ready Control	410411 B1-3
1. REC buffer controls DTR	●
2. DTR not controlled by Rec. buffer	○

Refer to DTR Chart Page 122.

Y. Reject Received Text Nulls	410411 B2-4
1. Terminal rejects Received Text Nulls	●
2. Terminal does not reject Received Nulls	○

AA. Stop Bits in 5-Level Operation	410411 B4-1
1. Terminal Send/Receive 1.5 Stop Bits	●
2. Terminal Send/Receive 1.0 Stop Bits	○

AC. Received ETX Character Retained	410411 B6-2
1. ETX character retained	●
2. ETX character discarded	○

AE. One Second Line Break on NAK or INT From Keyboard	410411 B6-4
1. Line break enabled	●
2. Line break disabled	○

AG. Destructive Scrolling	410411 B6-6
1. Destructive scrolling enabled	●
2. Destructivescrolling disabled	○

AI. Refer to Data Terminal Ready Chart on Page 122.	410411 ●

AM. 40/8A Emulator - Display Action	410411 B4-2
1. Emulate 40/8A operation	●
2. Standard 40/8B operation	○

X. Line Wrap on Display	410411 B1-4
1. Display wraps when cursor reaches End of Line	●
2. Display does not wrap	○

Z. Home on Send	410411 B2-7
1. Cursor goes Home before sending from Display	●
2. Display Send from Cursor	○

AB. Send/Receive or Poll/Select	410411 B6-1
1. Send/Receive	●
2. Poll/Select	○

AD. Refer to Line Terminator Chart on Page 121.	410411 ●

AF. Stop Bits in 8-Level	410411 B6-5
1. Transmits/Receives with 2.0 Stop Bits	●
2. Transmits/Receives with 1.0 Stop Bits	○

AH. Number of Display Segments	410411 B6-7
1. 6 Segment display	●
2. 3 Segment display	○

AJ. ETX Required to Send	410411 B3-5
1. ETX required at end of message to send from display	●
2. ETX not required to send from display	○

AL. Preempt Display on Receipt of Data (S/R Mode Only)	410411 B3-1
1. Receive data will pre-empt display from Local or Control mode to On-Line receive	●
2. No preempt operation	○

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

AQ. Power up mode	410411 B4 — 4
1. Terminal powers up in 5 level mode	●
2. Terminal powers up in 8 level mode	○

AS. Local send tape to display option	410411 B4 — 6
1. A full display loaded from send tape to display (72/144 lines)	●
2. Partial display loaded from send tape to display (61/128 lines)	○

AU. Location of carriage return and line feed on keyboard	410411 B3 — 7
1. Carriage return is wide key	●
2. Line feed is wide key	○

ZZ. Eight-Level Asynchronous Baud Rate				
410411				Baud Rate
A21-2	A21-3	A21-4	A21-5	
○	○	○	●	50
○	○	●	●	75
○	●	○	●	100
○	●	●	●	110
●	○	○	●	150
●	○	●	●	300
●	●	○	●	450
●	●	●	●	600
○	●	●	○	900
●	○	○	○	1200
●	○	●	○	1800
●	●	○	○	2400

AT. Reject received text "Deletes"	410411 B4 — 7
1. Terminal discards received text "Deletes"	●
2. Terminal accepts received "Deletes"	○

AV. Clear display when Preempted	410411 B5 — 8
1. Display is cleared and cursor is homed	●
2. Received data is displayed at cursor location	○

AX. Sequence LF, LF, NNNN as message end (ETX) in ASCII	410411 B4 — 3
1. Terminal recognizes LF, LF, NNNN as message end in ASCII	●
2. Terminal does not recognize sequence as message end	○

ZZ. Five-Level Asynchronous Baud Rate			
410411			Baud Rate
A21-6	A21-7	A21-8	
○	○	○	50
●	○	○	75
○	●	○	100
●	●	○	110
○	○	●	150
●	○	●	300
○	●	●	450
●	●	●	600

Note: When isochronous mode is selected, switches 2 through 8 on switch pack A21 should be turned on.

LINE TERMINATOR FUNCTIONS TABLE

LINE ENDING CONTROL		SENT ON LINE	REC FROM LINE	FUNCTION PERFORMED ON		POLL/SEL MODE (OPTION AB OFF)	S/R MODE OPTION AB ON)
KEY	SYMBOL			CRT	PRINTER	B6-3	B6-3
Return	←	CR	CR	Return cursor to start of next line.	Return	Off	Off
Line Feed	↓	LF	LF	Return cursor to start of next line.	New Line		
New Line	≡	CR CR LF	CR CR LF	Return cursor to start of next line.	New Line		
Return	←	CR	CR	Cursor is incremented one position.	Return		On
Line Feed	↓	LF	—	Return cursor to start of next line.	New Line		
New Line	≡	LF	LF	Return cursor to start of next line.	New line		

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS (Cont)

	DTR CONDITION	OPTION		
		W B1-3	AI-1 B6-8	AI-2 B5-7
SEND/RECEIVE MODE (Option AB "ON")	DTR on at all times.	Off	Off	Off
	DTR on if receive buffer ready and all receivers assigned to line are capable of receiving.	On	On	On
	DTR on if receive buffer ready and any receiver assigned to line is capable of receiving.	On	On	Off

DTR TABLE

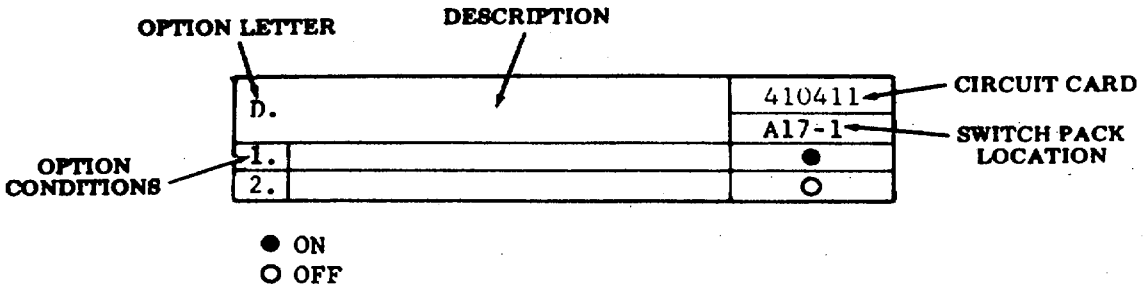
FOR CONTROLLER 40C437/AEL/107
SEND/RECEIVE MODE

DTR CONDITION	OPTION	
	AI — 1 B6—8	AI — 2 B5—7
DTR ON AT ALL TIMES	OFF	OFF
DTR ON IF RECEIVE BUFFER READY	OFF	ON
DTR ON IF RECEIVE BUFFER READY AND ALL RECEIVERS ASSIGNED TO LINE ARE CAPABLE OF RECEIVING	ON	ON
DTR ON IF RECEIVE BUFFER READY AND ANY RECEIVER ASSIGNED TO LINE IS CAPABLE OF RECEIVING	ON	OFF

POLL/SELECT MODE

DTR CONDITION	OPTION	
	AI — 1 B6—8	AI — 2 B5—7
DTR ON AT ALL TIMES	OFF	OFF
DTR ON IF RECEIVE BUFFER READY	OFF	ON

Controller 40C437/AEL/107



A. Line printer copies when set is sending	410411 B1 — 1
1. Printer copies data as sent from send line	●
2. Printer copies data echoed back on received line	○

C. Colon is lower case and semi-colon is upper on keyboard	410411 B1 — 6
1. Enabled	●
2. Reversed	○

E. Display received escape sequences	410411 B1 — 8
1. Display escape sequences	●
2. Do not display escape sequences but function is performed	○

G. Send on-line extended characters from keyboard	410411 B2 — 2
1. Send extended characters as escape sequences	●
2. Do not send extended characters	○

I. Automatic paging on printer (54 lines per page)	410411 B2 — 5
1. Paging "F_F" sent to printer after 54th line	●
2. No paging	○

B. Send ETX on premature end of message	410411 B1 — 5
1. Send ETX	●
2. Do not send ETX	○

D. Keyboard on-line transmits blind	410411 B1 — 7
1. Keyboard transmit blinded	●
2. Display monitors keyboard	○

Note: Select this option switch on, if display is to copy send data in S/R mode, half-duplex operation.

F. Printer on-line required to transmit	410411 B2 — 1
1. Printer required to transmit	●
2. Printer not required	○

H. Monitor tape on required to transmit	410411 B2 — 3
1. Monitor tape on required	●
2. Monitor tape on not required	○

J. Printer optioned for double line feed use with Option I	410411 B2 — 6
1. Printer optioned for double line feed	●
2. Printer not optioned for double line feed	○

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS, Controller 40C437/AEL/107 (Cont)

K. Keep received letters (S_I) and figures (S_O) characters (5-level operation only)	410411 B2 – 8
1. Keep S_O, S_I characters	●
2. Discard S_O, S_I characters	○

L. Printer select (=) also selects receive tape	410411 B3 – 2
1. Receive tape selected with printer on =	●
2. Printer only selected on =	○

M. Line parity	410411 B3 – 3	410411 B3 – 4
1. Odd parity	●	●
2. Even parity	○	●
3. No parity - 8th bit mark	●	○
4. No parity - 8th bit space	○	○

N. Mode display stays in at end (ETX) of receive message	410411 B3 – 8
1. Display switches to off	●
2. Display stays in receive	○

P. Controller port for send tape	410411 B5 – 1	410411 B5 – 2
1. J307	●	○
2. J308	○	●
3. J311	●	●
4. No send tape	○	○

Q. Controller port for receive tape	410411 B5 – 3	410411 B5 – 4
1. J307	●	○
2. J308	○	●
3. J311	●	●
4. No receive tape	○	○

R. Controller port for monitor tape	410411 B5 – 5	410411 B5 – 6
1. J307	●	○
2. J308	○	●
3. J311	●	●
4. No monitor tape	○	○

S.&T. Station identity code (Poll-Select)		410411 Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
	1st character	B7 – 1	B7 – 2	B7 – 3	B7 – 4	B7 – 5	B7 – 6	B7 – 7
	2nd character	B8 – 1	B8 – 2	B8 – 3	B8 – 4	B8 – 5	B8 – 6	B8 – 7

Set Switch 8 to OFF position for both characters.

Switch on ● Marking
Switch off ○ Spacing

U. Mode display goes to after sending	410411 B4 – 8
1. Display goes to on-line receive	●
2. Display goes off	○

V. Isochronous/Asynchronous Operation	410411 B1-2
1. Isochronous Operation	●
2. Asynchronous Operation	○

Y. Reject Received Text Nulls	410411 B2-4
1. Terminal rejects Received text Nulls	●
2. Terminal does not reject Received Null	○

AA. Stop Bits in 5-Level Operation	410411 B4-1
1. Terminal Send/Receive 1.5 Stop Bits	●
2. Terminal Send/Receive 1.0 Stop Bits	○

AC. Received ETX Character Retained	410411 B6-2
1. ETX characters retained	●
2. ETX character discarded	○

AE. One Second Line Break on NAK or INT From Keyboard	410411 B6-4
1. Line break enabled	●
2. Line break disabled	○

AG. Destructive Scrolling	410411 B6-6
1. Destructive scrolling enabled	●
2. Destructivescrolling disabled	○

AI. Refer to Data Terminal Ready Chart on Page 122	410411 ●

[illegible]. 40/8A Emulator - Display Action	410411 B4-2
1. Emulate 40/8A operation	●
2. Standard 40/8B operation	○

X. Line Wrap on Display	410411 B1-4
1. Display wraps when cursor reaches End of Line	●
2. Display does not wrap	○

Z. Home on Send	410411 B2-7
1. Cursor goes Home before sending from Display	●
2. Display Send from Cursor	○

AB. Send/Receive or Poll/Select	410411 B6-1
1. Send/Receive	●
2. Poll/Select	○

AD. Refer to Line Terminator Chart on Page 121	410411 ●

AF. Stop Bits in 8-Level	410411 B6-5
1. Transmits/Receives with 2.0 Stop Bits	●
2. Transmits/Receives with 1.0 Stop Bits	○

AH. Number of Display Segments	410411 B6-7
1. 6 Segment display	●
2. 3 Segment display	○

AJ. ETX Required to Send	410411 B3-5
1. ETX required at end of message to send from display	●
2. ETX not required to send from display	○

AL. Preempt Display on Receipt of Data (S/R Mode Only)	410411 B3-1
1. Receive data will pre-empt display from Local or Control mode to On-Line receive	●
2. No preempt operation	○

A. GENERAL Cont)

4. OPTION SWITCH SETTINGS, Controller 40C437/AEL/107 (Cont)

AQ. Power up mode.	410411 B4-4
1. Terminal powers up in 5-level mode.	●
2. Terminal powers up in 8-level mode.	○

AS. Local send tape to display option.	410411 B4-6
1. A full display loaded from send tape to display (72/144 lines).	●
2. Partial display loaded from send tape to display (61/128 lines).	○

AU. Location of carriage return and line feed on keyboard.	410411 B3-7
1. Carriage return is wide key.	●
2. Line feed is wide key.	○

AX. RTS/DTR control signal	410411 B4-3
1. Terminal outputs "RTS" on "DTR" control lead.	●
2. Terminal outputs "DTR".	○

AZ. "ZNY EEE" Transmission Control.	410411 B1-3
1. Sequence "ZNY EEE" is not allowed to be sent by terminal.	●
2. Sequence "ZNY EEE" is allowed to be sent.	○

BA. Low tape indication value.	410411 B7-8
1. Low tape is indicated when tape is 100 blocks from end of tape.	●
2. Low tape is indicated when tape is 25 blocks from end of tape.	○

AT. Reject received text "Deletes".	410411 B4-7
1. Terminal discards received text "Deletes".	●
2. Terminal accepts received "Deletes".	○

AV. Clear display when preempted.	410411 B5-8
1. Display is cleared and cursor is homed.	●
2. Received data is displayed at cursor location.	○

AW. "ZNY" Transmission Control	410411 B3-6
1. Operator is prevented from transmitting a character sequence containing the characters "ZNY".	●
2. No "ZNY" control.	○

AY. Urgent Traffic and Priority Message monitor.	410411 B4-5
1. Terminal alarms upon receipt of Urgent Traffic or Priority Message indicators.	●
2. No monitoring for Urgent Traffic or Priority Message.	○

BB. ASCII Recognition of "LF LF NNNN"	410411 B8-8
1. Terminal does not recognize "LF LF NNNN" as message ending sequence.	●
2. Terminal recognizes "LF LF NNNN" as message ending sequence.	○

ZZ. Five-Level Asynchronous Baud Rate			
410411			Baud Rate
A21-6	A21-7	A21-8	
○	○	○	50
●	○	○	75
○	●	○	100
●	●	○	110
○	○	●	150
●	○	●	300
○	●	●	450
●	●	●	600

Note: When isochronous mode is selected, switches 2 through 8 on switch pack A21 should be turned on.

ZZ. Eight-Level Asynchronous Baud Rate				
410411				Baud Rate
A21-2	A21-3	A21-4	A21-5	
○	○	○	●	50
○	○	●	●	75
○	●	○	●	100
○	●	●	●	110
●	○	○	●	150
●	○	●	●	300
●	●	○	●	450
●	●	●	●	600
○	●	●	○	900
●	○	○	○	1200
●	○	●	○	1800
●	●	○	○	2400
●	●	●	○	3600

A. GENERAL (Cont)

4. OPTION SITCH SETTINGS, Controller 40C437/AEL/107 (Cont)

PROGRAMMABLE URGENT TRAFFIC CHARACTERS

SEQUENCE 1		BIT							
OPTION	CHAR	1	2	3	4	5	6	7	8
i1 - i8	1	A17-1	A15-1	A13-1	B13-1	B15-1	B17-1	C17-1	C15-1
j1 - j8	2	A17-2	A15-2	A13-2	B13-2	B15-2	B17-2	C17-2	C15-2
k1 - k8	3	A17-3	A15-3	A13-3	B13-3	B15-3	B17-3	C17-3	C15-3
l1 - l8	4	A17-4	A15-4	A13-4	B13-4	B15-4	B17-4	C17-4	C15-4

SEQUENCE 2		BIT							
OPTION	CHAR	1	2	3	4	5	6	7	8
m1 - m8	1	A17-5	A15-5	A13-5	B13-5	B15-5	B17-5	C17-5	C15-5
n1 - n8	2	A17-6	A15-6	A13-6	B13-6	B15-6	B17-6	C17-6	C15-6
o1 - o8	3	A17-7	A15-7	A13-7	B13-7	B15-7	B17-7	C17-7	C15-7
p1 - p8	4	A17-8	A15-8	A13-8	B13-8	B15-8	B17-8	C17-8	C15-8

NOTE 1: Circuit card may be inserted in any available slot in controller.

NOTE 2: Sequence characters must be programmed in ASCII.

NOTE 3: Switch ON bit spacing (0), switch OFF = bit marking (1).

NOTE 4: Neither sequence may contain an imbedded "NUL" character.

NOTE 5: If either sequence contains less than four characters, the last valid character in that sequence must be followed by a “NUL" character.

NOTE 6: If the first character of a sequence is programmed as a "NUL", that sequence will be ignored.

NOTE 7: The eighth bit of each character must be set spacing (ON).

NOTE 8: Programmed sequences may be verified using the terminals Control mode menu.

ANSWER-BACK CHARACTERS.

		BIT							
OPTION	CHAR	1	2	3	4	5	6	7	8
a1 - a8	1	A17-1	A15-1	A13-1	B13-1	B15-1	B17-1	C17-1	C15-1
b1 - b8	2	A17-2	A15-2	A13-2	B13-2	B15-2	B17-2	C17-2	C15-2
c1 - c8	3	A17-3	A15-3	A13-3	B13-3	B15-3	B17-3	C17-3	C15-3
d1 - d8	4	A17-4	A15-4	A13-4	B13-4	B15-4	B17-4	C17-4	C15-4
e1 - e8	5	A17-5	A15-5	A13-5	B13-5	B15-5	B17-5	C17-5	C15-5
f1 - f8	6	A17-6	A15-6	A13-6	B13-6	B15-6	B17-6	C17-6	C15-6
g1 - g8	7	A17-7	A15-7	A13-7	B13-7	B15-7	B17-7	C17-7	C15-7
h1 - h8	8	A17-8	A15-8	A13-8	B13-8	B15-8	B17-8	C17-8	C15-8

NOTE 1: Circuit card may be inserted in any available slot in the controller.

NOTE 2: Sequence characters must be programmed in ASCII.

NOTE 3: Switch ON = bit spacing (0), switch OFF = bit marking (1).

NOTE 4: Sequence may not contain an imbedded 'NUL" character.

NOTE 5: The use of the "ENQ" character in the sequence is discouraged.

NOTE 6: If the sequence contains less than eight characters, the last valid character in the sequence must be followed by a “NUL" character.

NOTE 7: If the first character of the sequence is a "NUL", the answer-back sequence will not be transmitted.

NOTE 8: The eighth bit of each character must be set spacing (ON).

A. GENERAL (Cont)

4. OPTION SWITCH SETTINGS, Controller 40C437/AEL/107 (Cont)

PROGRAMMABLE "ZNY" CHARACTERS

		BIT							
OPTION	CHAR	1	2	3	4	5	6	7	8
r1 - r8	1	A17-1	A15-1	A13-1	B13-1	B15-1	B17-1	C17-1	C15-1
s1 - s8	2	A17-2	A15-2	A13-2	B13-2	B15-2	B17-2	C17-2	C15-2
t1 - t8	3	A17-3	A15-3	A13-3	B13-3	B15-3	B17-3	C17-3	C15-3
u1 - u8	4	A17-4	A15-4	A13-4	B13-4	B15-4	B17-4	C17-4	C15-4
w1 - w8	5	A17-5	A15-5	A13-5	B13-5	B15-5	B17-5	C17-5	C15-5
x1 - x8	6	A17-6	A15-6	A13-6	B13-6	B15-6	B17-6	C17-6	C15-6
y1 - y8	7	A17-7	A15-7	A13-7	B13-7	B15-7	B17-7	C17-7	C15-7
z1 - z8	8	A17-8	A15-8	A13-8	B13-8	B15-8	B17-8	C17-8	C15-8

NOTE 1: Circuit card may be inserted in any available slot in controller.

NOTE 2: Classification characters must be programmed in ASCII.

NOTE 3: Switch ON = bit spacing (O), switch OFF = bit marking (1).

NOTE 4: The eighth bit of each character must be set spacing (ON).

NOTE 5: Each character programmed will represent a three character "ZNY" classification. (R=ZNY RRR).

NOTE 6: If less than eight characters are to be programmed, the last valid character must be followed by a "NUL".

NOTE 7: All characters programmed after a "NUL" will be ignored.

NOTE 8: Verification of all programmed classifications can be made through the terminals Control mode menu.

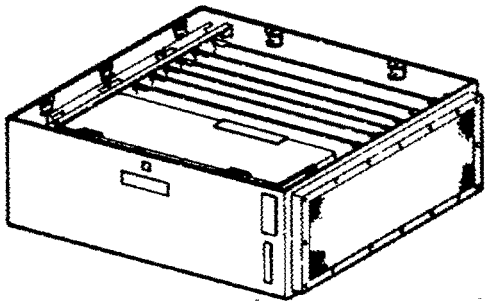
NOTES

B. SHOP PROCEDURES

1. CLEANING AND REFINISHING

Cleaning is to be done with a damp cotton cloth (mild detergent solution) followed by buffing dry with a soft cloth or dusting using a soft brush and blow off with an air duster (not to exceed 20 pounds pressure). Open any lids, covers, door or panels that allow access to the interior of the electronics package. Look for dust accumulations, lint, ribbon particles, paper dust or foreign materials that may be visible only during servicing. Remove obstructions to ventilation in air ducts, grills, channels, vanes or the areas between the circuit cards.

Removal of circuit cards is required when cleaning the circuit card frame. Then, hand wipe all top and bottom surfaces of the frame. Dust away any particles or loose foreign material from this bottom area.



Refinishing

Since the controller is mounted inside a cabinet or a pedestal, is-not externally visible, and has only one painted part, refinishing is not necessary.

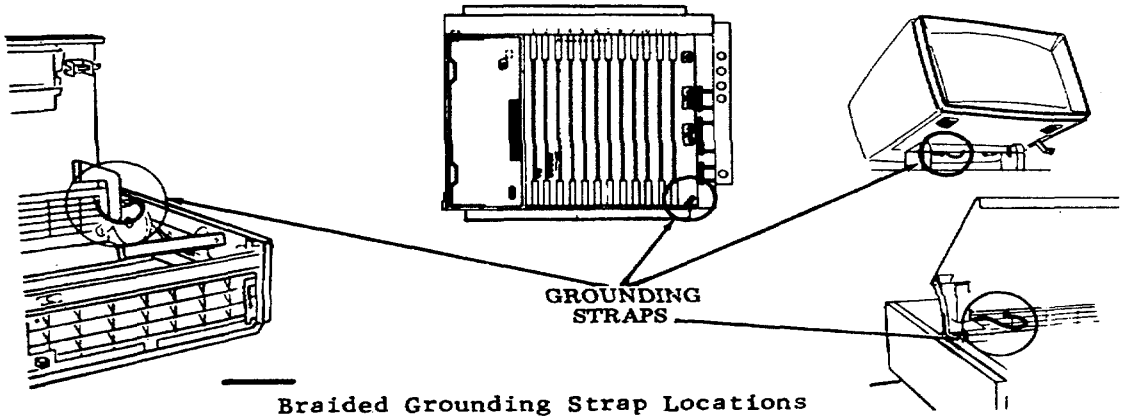
2. INSPECTION

Visual Checks
The following visual checks are made to maintain proper set condition:

a. Visually inspect all card connector terminals and insulators for abnormal characteristics -- replace if necessary.
b. Visually inspect all connectors, cables, and wire leads for proper termination, no pinched, shorted, broken, or disconnected wires, etc, replace if necessary.

Protective Grounds
All Tempest Model 40 Sets require protective ground checks, to insure that potential shock hazards are not present. These checks are to be made before power is turned on.

NOTE: Prior to operational checkout, make sure all grounding straps are connected.
The protective ground terminal of the main ac power cable should have continuity to each unit frame in the station.



Braided Grounding Strap Locations

NOTE: After cleaning and correction of all visually apparent defects, an operational checkout should be performed (Page 7-134, C. TESTING). Also refer to Page 7-135, D. TROUBLESHOOTING.

3. CONVERSIONS AND VARIATIONS

Conversions

Converting a controller from one terminal-configuration code to another is possible by replacing or adding circuit cards in the controller frames. Different controller configuration possibilities are shown on Page 7-3, Identity.

Variations

Variations of the controller refers to changes in the options of the circuit cards or added cabling and Teletype Corporation units (printer, monitor, etc). The Model 40 equipment design makes terminal reconfiguration a simple plug-in operation, see Part 10 for examples of terminal configurations.

4. PACKING FOR SHIPMENT OR STORAGE

A repaired Tempest Model 40 Controller may be installed and shipped (or stored) in its appropriate position in the pedestal.

If a controller is to be packaged for individual shipment or storage, the following packing materials (available from Teletype Corporation) are required:

For 40C430, 40C431, 40C432, 40C433, 40C437 and 40C438 Controllers.

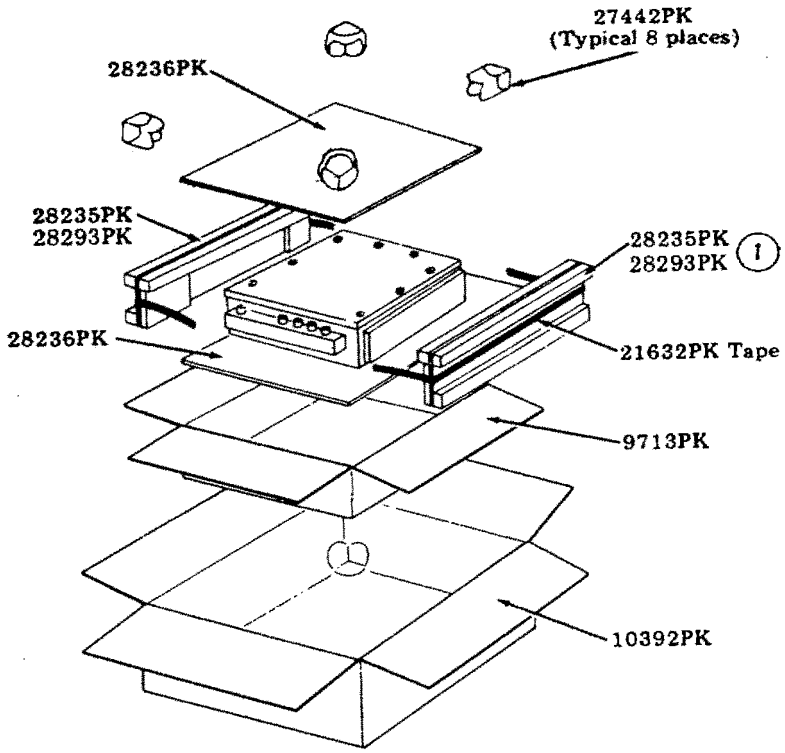
Materials Required		Qty	Materials Required		Qty
10392PK	Corrugated Carton	1	27643PK	Labels	2
9713PK	Corrugated Carton	1	21719PK	Tape (as required)	
28235PK	Plywood Details	2	21298PK	Tissue Paper (as required)	
28236PK	Plywood Details	2	21632PK	Tape (as required)	
27442PK	Plastic Corners	8			

For 40C434, 40C435 and 40C436 Controllers.

Same as above except:
Omit
28235PK Plywood Details 2
Add
28293PK Plywood Details 2

B. SHOP PROCEDURES (Cont)

4. PACKING FOR SHIPMENT OR STORAGE (Cont)



(1). Use 28235PK Details for 40C430, 40C431, 40C432, 40C433, 40C437 and 40C438 Controllers
Use 28293PK Details for 40C434, 40C435 and 40C436 Controllers

C. TESTING

1. GENERAL

An operational checkout should be performed on all repaired controllers. To be tested, the controller must be installed in a full capability Tempest Model 40 KD or KDP Set of known good condition. Refer to Page 7-197, **F. DISASSEMBLY/REASSEMBLY AND PARTS**.

If there is sufficient repair volume, it may be desirable to make extension cables such that the controller can be operated alongside the Tempest Model 40 Set without physically installing the controller into the set.

Before starting any tests, check that all cards and cable connectors are fully seated. If a printer is present check that paper and a ribbon are installed. Turn on power switches. Turn up the brightness control for the monitor.

Always perform the steps in the order given. A satisfactory result is based on all previous steps being satisfactory. If the desired response is not obtained at any step, repeat the step to make sure that the step was performed correctly.

2. FUNCTIONAL TESTS

If operational failure occurs, go directly to Page 7-136, 2. **TROUBLESHOOTING CHARTS** and perform the analysis indicated. Note that there are cases where the test results vary due to the option used.

D. TROUBLESHOOTING

1. GENERAL

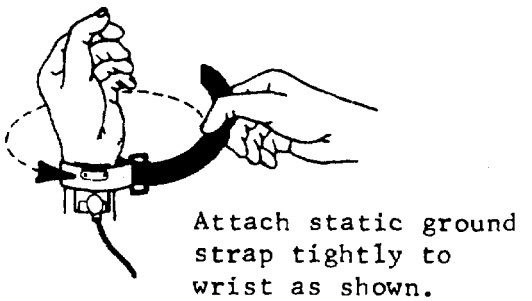
Use the troubleshooting chart as follows:

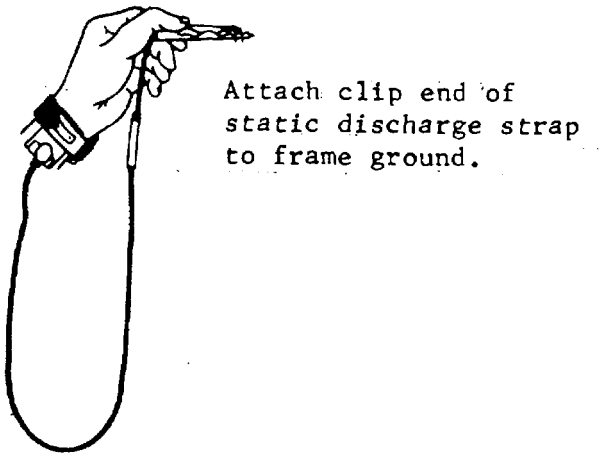
a. Always start with Analysis. Question 1.
b. Answer analysis questions and follow proper response directive to isolate and correct trouble.
c. Where more than one component is specified for replacement, substitute one at a time in the order' specified. The, original component shall be replaced if the' trouble is not corrected before making the next indicated substitution. When installing a replacement component, make certain that all options (if present) in this' component are .programmed for proper operation. If replacement of the part or subcomponent indicated does not correct the trouble, replace the next higher order' of component (ie, circuit card, wired frame, or entire controller).

The following caution procedures must be observed' when troubleshooting.

CAUTION 1: TURN OFF ALL PO F£R OR SIGNAL SOURCES BEFORE REMOVING OR REPLACING ANY COMPONENT.

CAUTION 2: TO AVOID POSSIBLE INTERNAL DAMAGE TO CIRCUITRY, WEAR A 346392 STATIC DISCHARGE STRAP CONNECTED TO GROUND TO ALLOW STATIC DISCHARGE BEFORE HANDLING CIRCUIT CARDS FOR REMOVAL OR REPLACEMENT. AVOID TOUCHING CIRCUIT LANDS AND CARD COMPONENTS AS MUCH AS POSSIBLE.





NOTE: Once the trouble has been corrected, repeat the operational checkout procedures to assure correct performance.

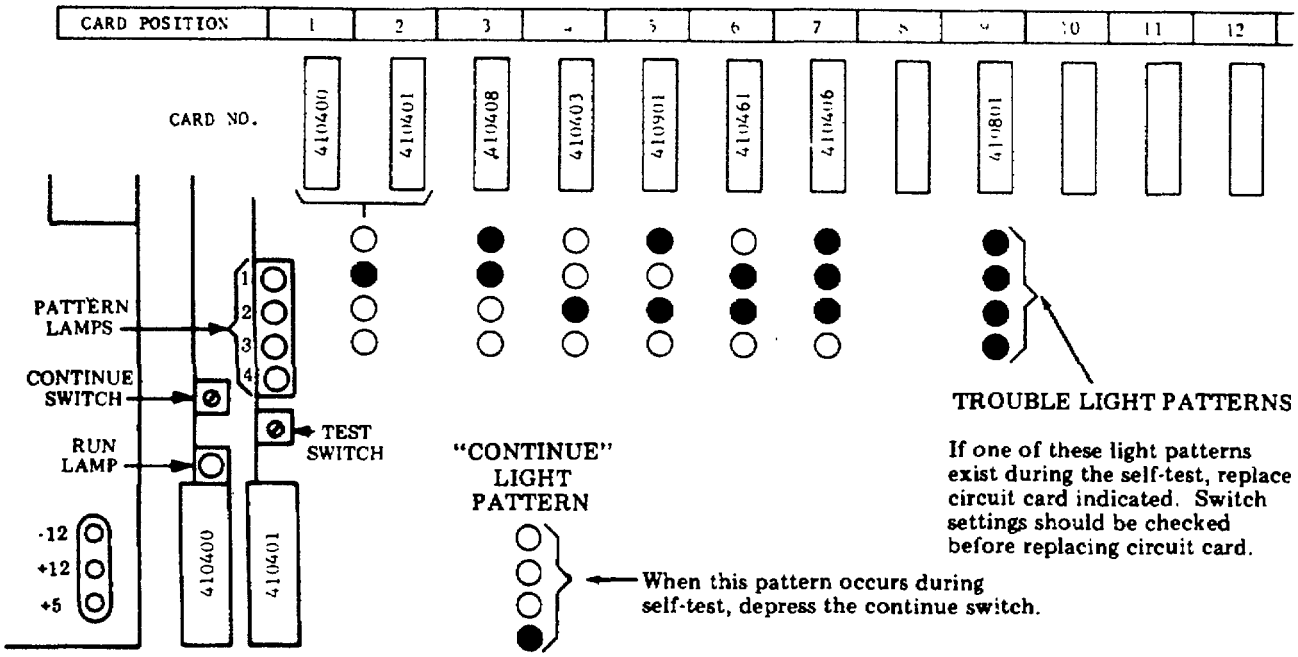
D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS

CHART 1
Controller Self-Test

The use of Controller Arrangement Forms is necessary to troubleshoot controller using controller self-test. Refer to Pages 7-9 through 7-79, Controller Arrangement Forms.

Sample Controller Arrangement Form



NOTE: Some arrangements have more than one continue light pattern.

For Controllers 40C430/AAT/017, 40C430/ABD/025, 40C431/ABE/026 and 40C432/ABF/027 only: For the self-test program to properly test the 410408 circuit card, the card must be programmed for the ITA5 code, isochronous mode with one stop bit (factory option).

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. Do all three voltage indicators light on power supply when power is turned on?	Go to 2.	Go to Part 6 POWER SUPPLY, **3. TROUBLESHOOTING CHARTS**.
2. Depress and hold test switch. Do all pattern and run lamps light?	Go to 7.	Go to 3.
3. Do correct voltages appear at power supply output terminals? Refer to Part 6 POWER SUPPLY, **3. TROUBLESHOOTING CHARTS**.	Go to 4.	Go to Part 6 POWER SUPPLY, **3. TROUBLESHOOTING CHARTS**.

CHART 1 (Cont)

CONTROLLER SELF-TEST

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
4. Replace 410401 circuit card in slot 2 of controller. Depress test switch. Do all pattern lamps and run lamp light?	Go to 7.	Go to 5.
5. Replace 410400 circuit card in slot 1 of controller. Depress test switch. Do all pattern lamps and run lamp light?	Go to 7.	Go to 6.
6. Remove remaining cards one At a time. After each card is removed, push test switch to see if all pattern lamps and run lamp light. Replace defective card and go to 7.	Go to 7.	Go to 7.
7. Release test switch. Controller will automatically run self-test. Does a trouble light pattern appear on pattern lamps?	Go to 8.	Go to 10.
8. Before removing circuit card indicated by trouble light pattern, be sure card is properly seated in card connector. Does trouble light pattern repeat when test is run again?	Go to 9.	Go to 10.
9. Remove circuit card indicated by trouble light pattern. Check setting of address switches on card. Also check that all connector pins are straight, not bent over because they will not make contact. Refer to Pages 7-9 through 7-79, Controller Arrangement Forms for appropriate form. Were switch settings correct?	Replace circuit card.	Correct switch settings and/or straighten connector pins and retest.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

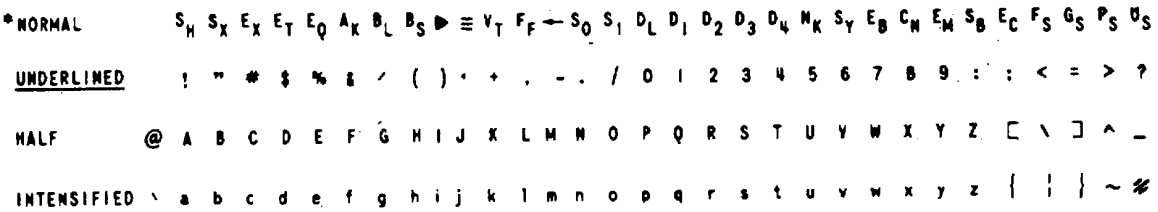
CHART 1 (Cont)

CONTROLLER SELF-TEST

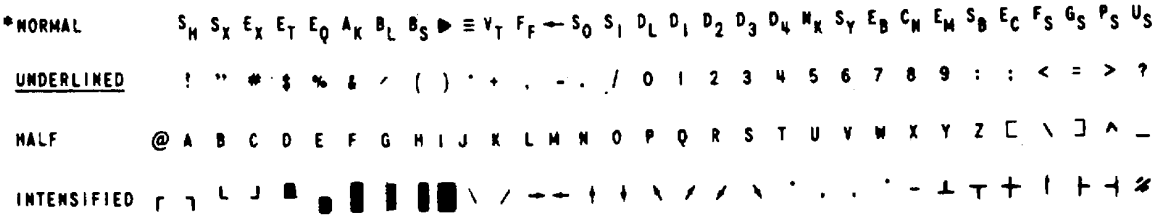
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
10. Does controller arrangement have continue light pattern? Refer to Pages 7-9 through 7-79, Controller Arrangement Forms. Does a continue light pattern appear on pattern lamps?	Push continue switch. Go to.11.	Go to 11.
11. At the end of the Controller Self-Test, the Pattern lamps and the Run lamp will flash sequentially. If controller does not have an associated monitor the controller will automatically enter the idle mode at end of Controller Self-Test. If controller has an associated monitor(s) a test pattern will be displayed on the first monitor. Refer to chart below for correct pattern for the DI/O card(s) in controller under test. Is display pattern correct?	If controller has second monitor go to 12. If controller has one monitor, depress continue switch and controller returns to its normal idle mode.	Replace associated DI/O card and retest.
12. Depress continue switch and test pattern will appear on second monitor. Is test pattern correct for second monitor?	Push continue switch to return controller to its normal idle mode,	Replace associated DI/O card and retest.

Display Patterns

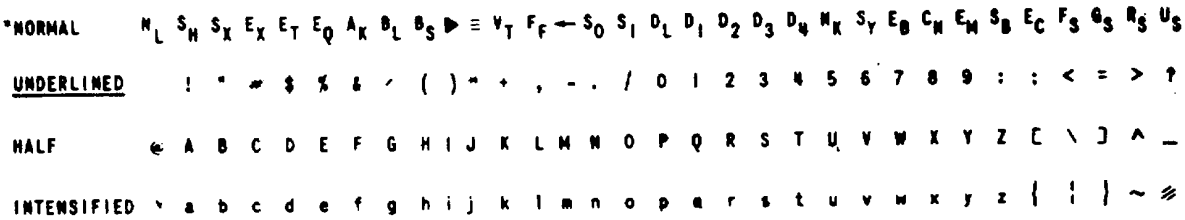
Display Pattern for a 410431 D I/O Circuit Card — ASCII — Up-Low



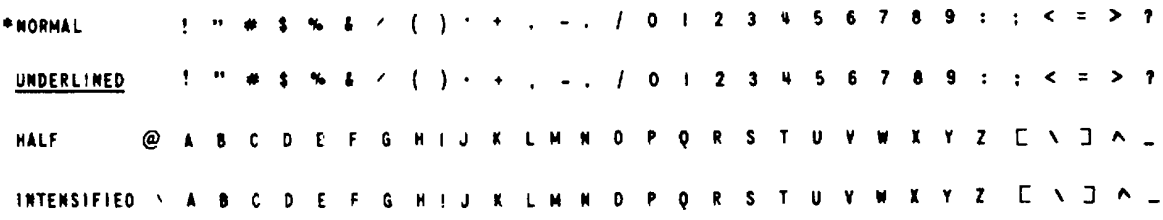
Display Pattern for a 410432 D I/O Circuit Card — ASCII — Line Drawing



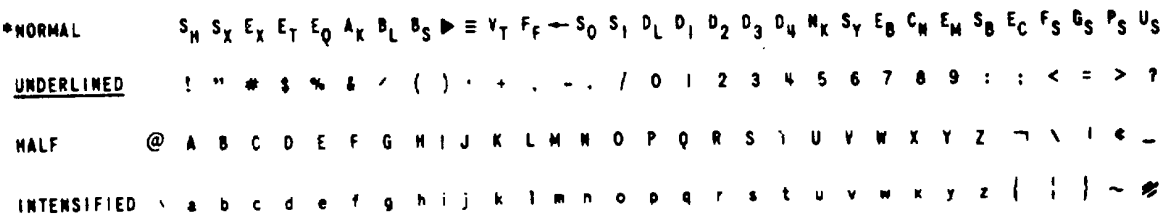
Display Pattern for a 410433 D I/O Circuit Card



Display Pattern for a 410434 D I/O Circuit Card — ASCII — Monocase



Display Pattern for a 410435 D I/O Circuit Card — EBCDIC — Up-Low



D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

Display Pattern for a 410436 D I/O Circuit Card – EBCDIC -- Monocase

*NORMAL	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
UNDERLINED	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
HALF	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	¬	\	¦	¢	_	
INTENSIFIED	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	¬	\	¦	¢	_	

Display Pattern for a 410437-D I/O Circuit Card

*NORMAL	N_L	S_H	S_X	E_X	E_T	E_Q	A_K	B_L	B_S	▶	≡	V_T	F_F	←	S_O	S_I	D_L	D_1	D_2	D_3	D_4	N_K	↓	E_B	C_N	E_M	S_B	E_C	F_S	G_S	R_S	U_S	
UNDERLINED	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?		
HALF	¢	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_	
INTENSIFIED	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	{	¦	}	~	▨	

After the Controller Self-Test has been run, go to the chart indicated below for the controller under test.

CONTROLLER CODE	CHART
40C430/AAT/017	1
40C430/ABD/0 25	2
40C431/ABE/026	3
40C431/AEM/103	3
40C432/ABF/027	4
40C432/AEN/104	4
40C433/ACS/059	5
40C434/ACW/063	6
40C434/AEK/ 101	6
40C435/ACS/059	5
40C435/AEE/091	7
40C436/ADA/092	8
40C436/ADD/093	8
40C436/ADK/075	8
40C436/ADN/094	8
40C436/ADU/095	8
40C437/AEE/091	7
40C437/AEL/106	7
40C437/AEL/107	7
40C438/AEP/105	9

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 2

CONTROLLER ANALYSIS -- 40C430/ABD/025

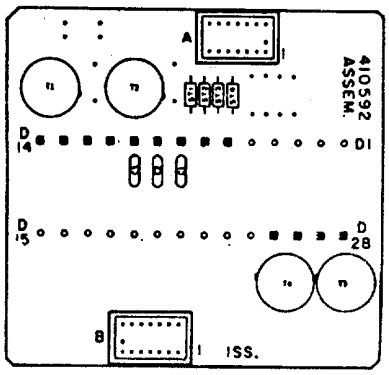
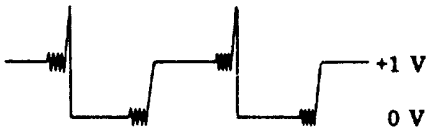
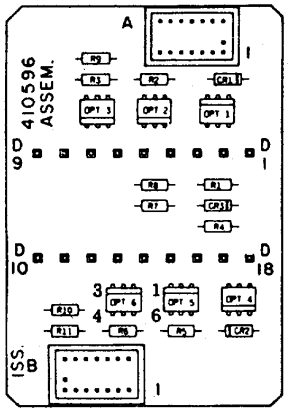
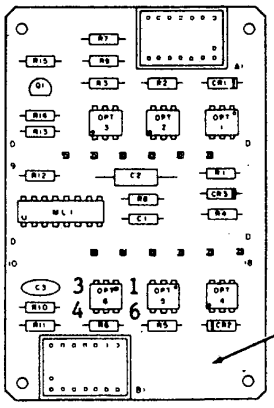
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. In local mode do characters generated on opcon appear on monitor?	Go to 3.	Go to 2.
2. Do SSI signals appear at posts D25, 26, 27, and 28 and D11, 12, 13, and 14 of 410592 circuit card on right wall of controller?   	Check wiring to opcon. Check wiring to printer. Refer to WDPs supplied with set. 56K BIT/SEC	Replace 410406 circuit card. Replace 410592 circuit card.

CHART 2 (Cont)

CONTROLLER ANALYSIS -- 40C430/ABD/025

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
3. Can information on display be transferred to printer by depressing PRINT LOCAL? (Place ETX at end of message, home cursor, depress PRINT LOCAL.)	Go to 4.	Go to 2.
4. Depress S/R key. If set is full duplex, temporarily add a strap between terminals 2 and 3 of TB101 terminal block in interface assembly. In above modes, do characters generated on keyboard appear on monitor?	Go to 12.	Go to 5.
5. When sending characters do the send mark and space lamps on 410408 or 410411 CIU circuit card flicker?	Go to 12.	Go to 6.
6. Is there approximately a +5 V dc signal at pin 5 of OPT 6 on 410596 circuit card on right wall of controller?  OLD STYLE 410596 CIRCUIT CARD  NEW STYLE 410596 CIRCUIT CARD	Go to 9.	Go to 7.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 2 (Cont)

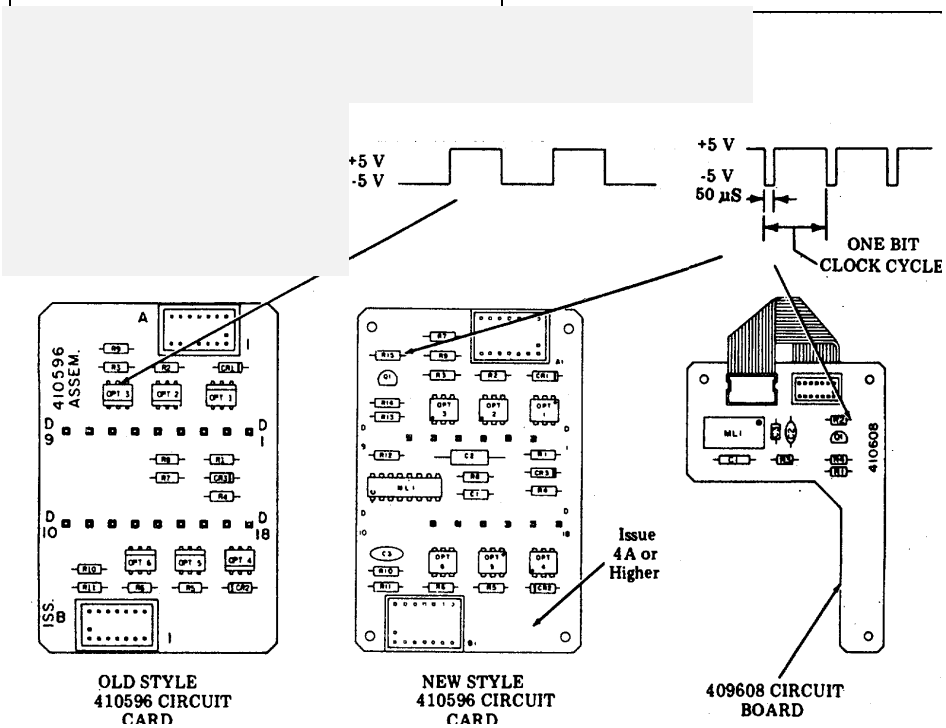
CONTROLLER ANALYSIS -- 40C430/ABD/025

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
7. Is the clear-to-send input being used in this set? Check if there is a card in card connector Z4 of interface.	Go to 8.	Check wiring in interface. Refer to 9575WD in WDP supplied with set. Replace 410596 circuit card.
8. Is there a +1.5 V dc signal at post D14 of 410596 circuit card?	Clear to Send input is off. Turn Clear to Send On or remove circuit card in slot 4 of Interface.	Check wiring in interface. Refer to 9575WD in WDP supplied with set.- Replace 410596 circuit card.
9. Is set programmed for isochronous operation?	Go to 10.	Go to 12.
10. Is there a 0 to +1.5 V dc clock signal at post D16 410596 circuit card? **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**  	Go to 11.	Check wiring in interface. Refer to 9575WD in WDP supplied with set. Check that send clock is being supplied to interface.
11. Is there a 0 to +5 V dc clock signal at pin 5 of OPT 5 of 410596 circuit card?	Replace 410408 or 410411 circuit card. card.	Replace 410596 circuit
12. When sending a character, do the receive mark and space lamps flicker on 410408 CIU circuit card?	Replace 410408 or 410411 circuit card.	Go to 13.
13. Is there a 0 to +1.5 V dc Inverted character signal at post D5 of 410596 circuit card? **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**	Go to 14.	Check wiring in interface. Refer to 9575WD in WDP supplied with set.

CHART 2 (Cont)

CONTROLLER ANALYSIS -- 40C430/ABD/025

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
14. Is there a 0 to +5 V dc character signal at pin 4 of OPT 2 on 410596 circuit card? **<u>NOTE</u>: For Sets modified with the 406621 modification kit, remove the 410608 circuit card from mounting posts, leave cables connected and swing out of the way for access to OPT2 on 410596 circuit card.**	Go to 15.	Replace 410596 circuit card.
15. Is set programmed for isochronous operation?	Go to 16.	Replace 410408 or 410411 circuit card.
16. If there a -5 V dc to +5 V dc clock signal at pin 5 of OPT 3 on old style 410596 circuit card or resistor 15 on the new style 410596 circuit card or resistor 2 of the 410608 circuit card for sets modified with the 406621 modifi cation kit?	Replace 410408 or 410411 circuit card.	Go to 17.



D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 2 (Cont)

CONTROLLER ANALYSIS -- 40C430/ABD/025

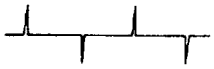
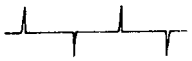
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
17. Is there a 0 to +1.5 V dc clock signal at post D7 of 410596 circuit card? **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**	Replace 410596 circuit card.	Check wiring in interface. Refer to 9575WD in WDP supplied with set. Check that receive clock is being supplied to the interface.
18. Is there a +5 V dc signal at post J3 of 410555 circuit card mounted on right side of controller?	Go to 19.	Check wiring to back panel. Check 405807 cable assembly.
19. Are the following signals present at posts indicated below? POST J2 VIDEO  POST J4 HORIZ  POST J9 VERT 	Check wiring in interface. Refer to 9575WD in WDP supplied with set. Check wiring to monitor. Replace 410433 D I/O circuit card.	Go to 20.

CHART 2-(Cont)

CONTROLLER ANALYSIS -- 40C430/ABD/025

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
20. Remove cable plugged into connector A of 410555 circuit card. Are the following signals present at pins indicated below? PIN 6 VIDEO  PIN 1 HORIZ  PIN 13 VERT 	Replace 410555 circuit card.	Replace 410433 D I/O circuit card.
21. When Set has PRINT ON LINE on, does TERM READY lamp light?	Go to 24.	Go to 22.
22. Is there a 0 V dc signal at pin 1 of OPT 1 of 410596 circuit card on right wall of controller?	Go to 23.	Check wiring to back panel. Replace 410408 CIU circuit card.
23. Is there approximately a +5 V dc signal at post D2 of 410596 circuit card? **<u>NOTE:</u> When checking this signal, the scope or meter common should be connected to post D6.**	Check wiring in interface. Refer to 9575WD in WDP supplied with set.	Replace 410596 circuit card.
24. When Set has PRINT ON LINE off, is TERM READY lamp off?	Go to 25.	Check SSI signal to opcon.
25. Is there approximately a +1.5 V dc signal at pin 1 of OPT 1 on 410596 circuit card?	Go to 26.	Check wiring to back panel. Replace 410408 CIU circuit card.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 2 (Cont)

CONTROLLER ANALYSIS -- 40C430/ABD/025

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
26. Is there approximately a 0 V dc signal at post D2 of 410596 circuit card? **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**	Place controller in service.	Replace 410596 circuit card.

CHART 3

CONTROLLER ANALYSIS - 40C431/ABE/026 AND 40C431/AEM/103

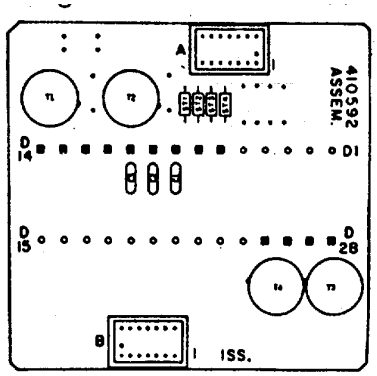
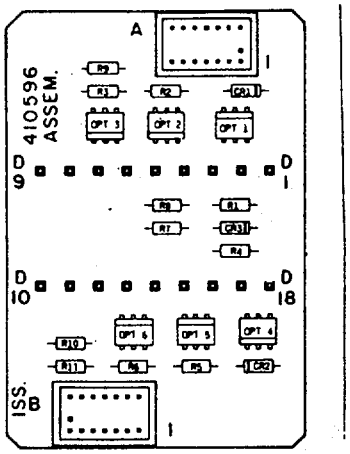
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. In local mode do characters generated on opcon appear on printer?	Go to 3.	Go to 2.
2. Do SSI signals appear at posts D25, 26, 27, and 28 and D11, 12, 13, and 14 of 410592 circuit card on right wall of controller?	Check wiring to opcon. Check wiring to printer.	Replace 410406 circuit card. Replace 410592 circuit card.
 	Refer to WDPs supplied with set. (Continuity test) 56K BIT/SEC	

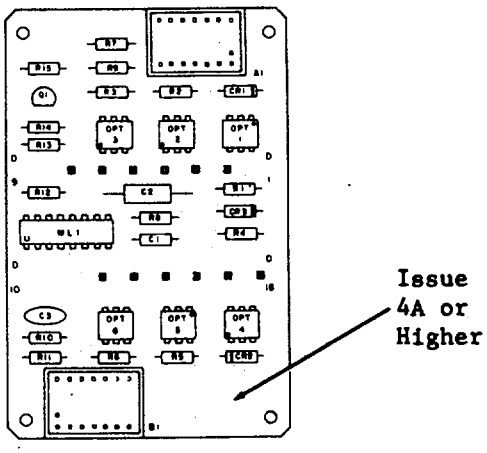
CHART 3 (Cont)

CONTROLLER ANALYSIS -- 40C431/ABE/026 AND 40C43i1AEM/103

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
3. Place KP Sets in SEND. If set is full duplex, temporarily add a strap between terminals 2 and 3 of TB101 terminal block in interface assembly. In above mode, do characters generated on keyboard appear on printer?	Go to 17.	Go to 4.
4. When sending characters do the send mark and space lamps on 410408 or 410411 CIU circuit card flicker?	Go to 8.	Go to 5.
5. Is there approximately a +5 V dc signal at pin 5 of OPT 6 on 410596 circuit card on right wall of controller?	Go to 8	Go to 6



OLD STYLE
410596 CIRCUIT
CARD



NEW STYLE
410596 CIRCUIT
CARD

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 3 (Cont)

CONTROLLER ANALYSIS -- 40C431/ABE/026 AND 40C431/AEM/103

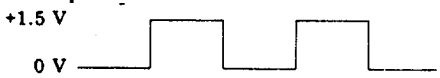
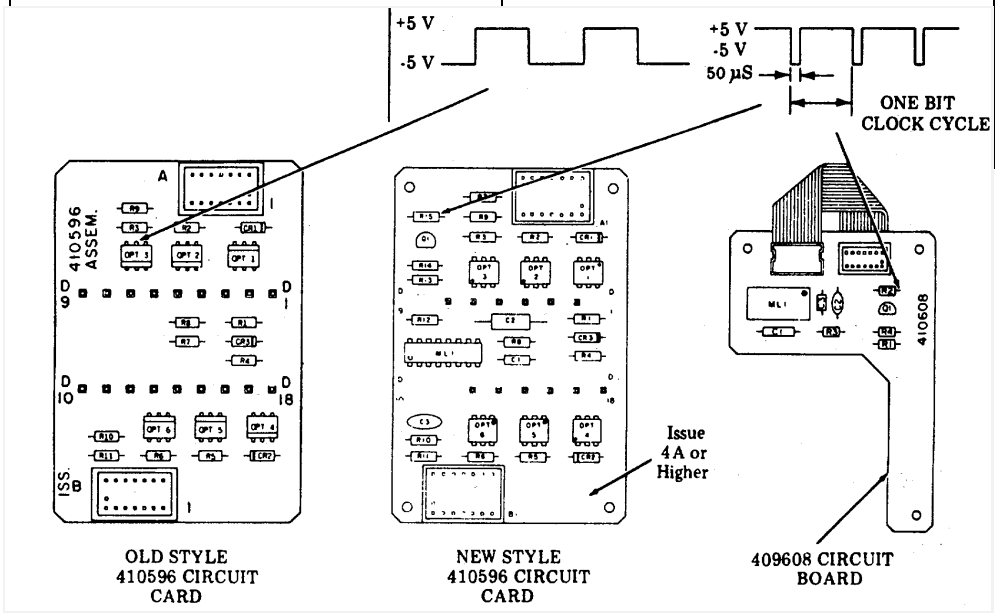
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
6. Is the clear-to-send input being used in this set? Check if there is a card in card connector Z4 of interface.	Go to 7.	Check wiring in interface. Refer to 9575WD in WDP supplied with set. Replace 410596 circuit card.
7. Is there a +1.5 V dc signal at post D14 of 410596 circuit card?	Check that Clear-to-Send signal is being supplied to interface.	Check wiring in interface. Refer to 9575WD in WDP supplied with set. Replace 410596 circuit card.
8. Is set programmed for isochronous operation?	Go to 9.	Go to 11.
9. Is there a 0 to +1.5 V dc bit clock signal at post D16 of 410596 circuit card? **NOTE: When checking this signal, the scope.or meter common could be connected to post D6.**  	Go to 10	Check wiring in interface. Refer to 9575WD in WDP supplied with set. Check that bit clock is being supplied to interface.
10. Is there a 0 to +5 V dc clock signal at pin 5 of OPT 5 of 410596 circuit card?	Replace 410408 or 410411 circuit card.	Replace 410596 circuit card.
11. When sending a character, do the receive mark and space lamps flicker on 410408 or 410411 CIU circuit card?	Replace 410408 or 410411 circuit card.	Go to 12.
12. Is there a 0 to +1.5 V dc inverted character signal at post D5 of 410596 circuit card? **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**	Go to 13.	Check wiring in interface. Refer to 9575WD in WDP supplied with set.

CHART 3 (Cont)

CONTROLLER ANALYSIS -- 40C431/ABE/026 AND 40C431/AEM/103

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
13. Is there a 0 to +5 V dc character signal at pin 4 of OPT 2 on 410596 circuit card? **<u>NOTE:</u> For Sets modified with the 406621 modification kit, remove the 410608 circuit card from mounting. posts, leave cables connected and swing out of the way for access to OPT2 on 410596 circuit card.**	Go to 14.	Replace 410596 circuit card.
14. Is set programmed for isochronous operation?	Go to 15.	Replace 410408 or 410411 circuit card.
15. Is there a -5 V dc to +5 V dc clock signal at pin 5 of OPT 3 on old style 410596 circuit card or resistor 15 on the new style 410596 circuit card or resistor 2 of the 410608 circuit card for sets modified with the 406621 modification kit.	Replace 410408 or 410411 circuit card.	Go to 16.



D. TROUBLESHOOTTNG (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

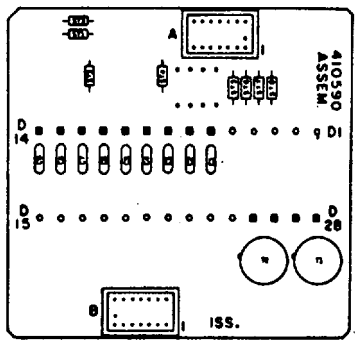
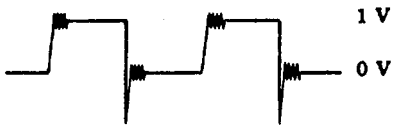
CHART 3 (Cont)

CONTROLLER ANALYSIS -- 40C431/ABE/026 AND 40C431/AEM/103

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
16. Is there a 0 to +1.5 V dc clock signal at post D7 of 410596 circuit card? **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**	Replace 410596 cir-cuit card.	Check wiring in interface. Refer to 9575WD in WDP supplied with set. Check that bit clock is being supplied to interface.
17. When KP Set is in RE-CEIVE, does TERM READY lamp light?	Go to 20.	Go to 18.
18. Is there a 0 V dc signal at pin 1 of OPT 1 of 410596 circuit card on right wall of controller?	Go to 19.	Check wiring to back panel. Replace 410408 or 410411 CIU circuit card.
19. Is there approximately .a +5 V dc signal at post D2 of 410596 circuit card? **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**	Check wiring in interface. Refer to 9575WD in WDP supplied with set.	Replace 410596 circuit card.
20. When KP Set is in LOCAL, is TERM READY lamp off?	Go to 21.	Check SSI signal to opcon.
21. Is there approximately a +1.5 V dc signal at pin 1 of OPT 1 on 410596 circuit card?	Go to 22.	Check wiring to back panel. Replace 410408 or 410411 CIU circuit card.
22. Is there approximately a 0 V dc signal at post D2 **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**	Place controller in service.	Replace 410596 circuit card.

CHART 4

CONTROLLER ANALYSIS -- 40C432/ABF/027 AND 40C432/AEN/104

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. After completing controller self-test, does TERM READY lamp light? (Paper in printer, printer cover closed.)	Go to 6.	Go to 2.
2. Did all lamps flash during controller self-test?	Go to 3.	Check wiring from back panel to 410592 circuit card. Check wiring in inter-connection module. Check wiring from controller to opcon.
3. Do SSI signals appear at posts D28 and 27 of 410590 circuit card mounted on right wall of controller?   	Go to 5. 56K BIT/SEC	Go to 4.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

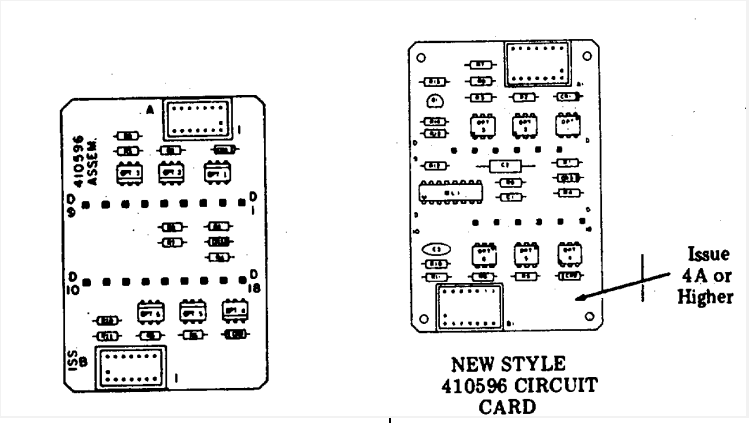
CHART 4 (Cont)

CONTROLLER ANALYSIS -- 40C432/ABF/027 AND 40C432/AEN/104

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
4. Disconnect ribbon connector B from 410590 circuit card. Are SSI signals present at pins 1 and 2 of connector?	Replace 410590 circuit card.	Check wiring to back panel.
5. Are SSI signals present on posts D25 and D26 of 410590 circuit cards?	One SSI lead from printer could be open. Check wiring to printer.	SSI circuit to printer open. Check wiring in interconnection module. Check wiring to printer. Refer to wiring diagrams furnished with set.
6. When test switch is depressed, does printer print U*U* or RYRY test pattern?	Go to 8.	Go to 7.
7. Does a 0 V dc signal appear at post D10 of 410590 circuit card when test switch is depressed?	Check wiring to back panel. Replace 410590 circuit card.	Check wiring of interconnection module. Check wiring to opcon. Check keyswitch in opcon.
8. When OPT II key is depressed, does 0 V at post D13?	Go to 9. appear	Check wiring of interconnection module. Check wiring to opcon. Check keyswitch in opcon.
9. When set is receiving data from an external source, does printer copy message correctly?	Place set in service.	Go to 10.
10. When receiving a character, do receive mark and space lamps on 410408 or 410411 circuit card flash?	Replace 410408 or 410411 circuit card.	Go to 11.

CHART 4 (Cont)

CONTROLLER ANALYSIS -- 40C432/ABF/027 AND 40C432/AEN/104

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
11. Is there a 0 to +1.5 V dc inverted character signal at post D5 of 410596 circuit card? **<u>NOTE</u>: When checking this signal, the scope or meter common should be connected to post D6.**  	Go to 12.	Check wiring in interface. Refer to 9575WD in WDP supplied with set.
12. Is there a 0 to +5 V dc character signal at pin 4 of OPT 2 on 410596 circuit card?	Go to 13.	Replace 410596 circuit card.
13. Is set programmed for iso-chronous operation?	Go to 14.	Replace 410408 circuit card or 410411 circuit card.
14. Is there a 0 to +5 V dc clock signal at pin 5 of OPT 3 on 410596 circuit card?	Replace 410408 circuit card or 410411 circuit card.	Go to 15.
15. Is there a 0 to +1.5 V dc clock signal at post D7 of 410596 circuit card? **<u>NOTE</u>: When checking this signal, the scope or meter common should be connected to post D6.**	Replace 410596 circuit card.	Check wiring in interface. Refer to 9575WD in WDP supplied with set. Check that receive character clock is being supplied to the interface.

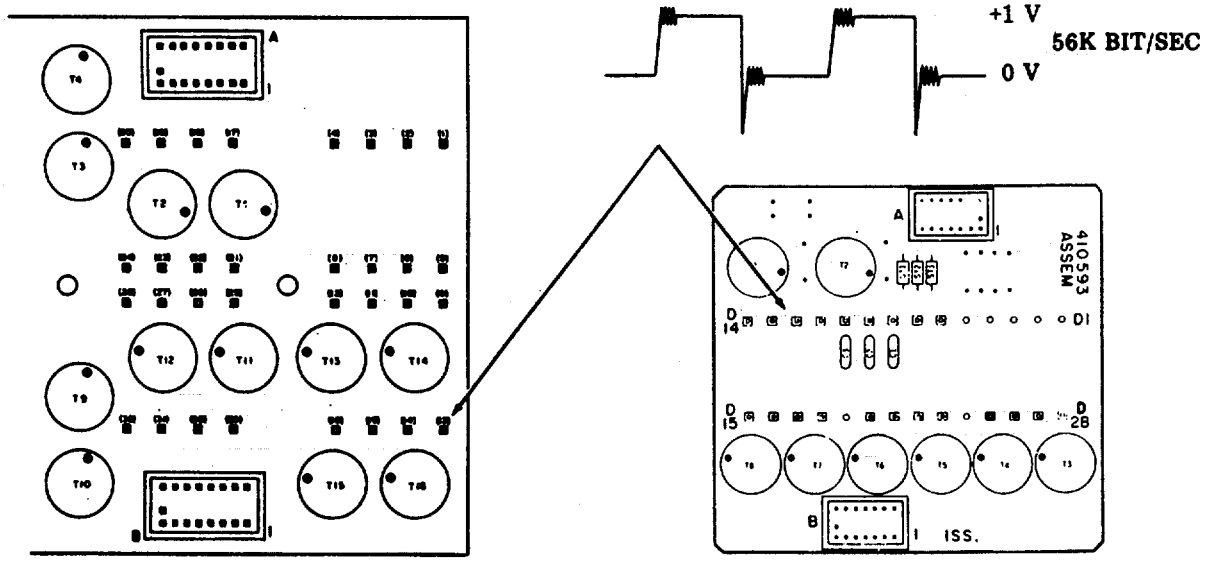
D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 5

CONTROLLER ANALYSIS -- 40C433/ACS/059 AND 40C435/ACS/059

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. In keyboard display mode, do characters generated on opcon appear on display?	Go to 3.	Go to 2.
2. Do SSI signals appear at posts 13, 14, 15, and 16 (opcon SSI) of 410157 circuit card on right wall of 40C435 Controllers or do SSI signals appear at posts D11, .12, 13, and 14 (Opcon SSI) of 410593 circuit card on right wall of 40C433 Controllers.	Check wiring to opcon. Refer to WDPs supplied with set. (Continuity test) Go to 18.	Replace 410406 circuit card in slot 4. Replace 410157 or 410593 circuit card.



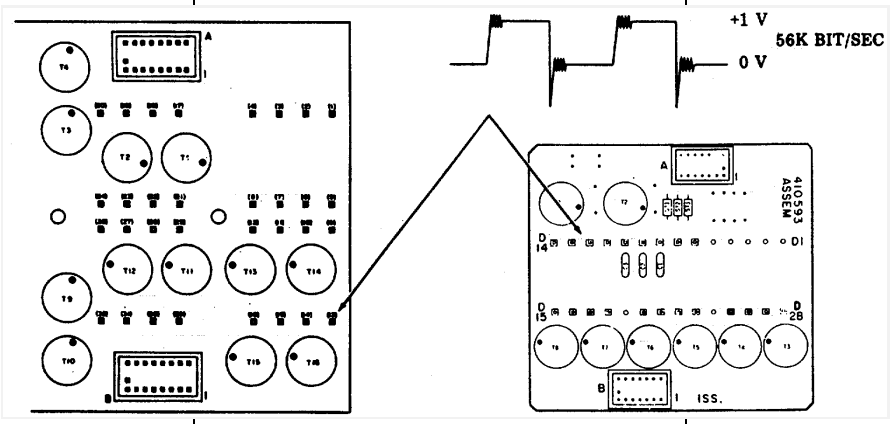
410157 Circuit Card
40C435 Controller

410593 Circuit Card
40C433 Controller

CHART 5 (Cont)

CONTROLLER ANALYSIS -- 40C433/ACS/059 AND, 40C435/ACS/059

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
3. On sets with printers, can information-on display be transferred to printer by depressing PTR LCL? (Place EXT at end of message, home cursor, depress PTR LCL, DISP SEND, and DISP LCL.)	Go to 5.	Go to 4.
4. Do SSI signals appear at posts 9, 10, 11, and 12 (printer SSI) of 410157 circuit card on right wall of 40C435 controller or do SSI signals appear at. posts D25, 26, 27, and 28 (Printer SSI), of 410593 circuit card on right wall of 40C433 controller?	Check wiring to printer Refer to WDPs supplied with set. (Continuity test)	Replace 410406 circuit card in slot 4. Replace 410157 or 410593 circuit card.
410157 Circuit Card 40C435 Controller	410593 Circuit Card 40C433 Controller	
5. On KDPM[3] Sets, when in control mode, do block numbers appear for send, receive and monitor tape block numbers?	Go to 7.	Go to 6.



D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 5 (Cont)

CONTROLLER ANALYSIS -- 46C433/ACS/059 AND 40C435/ACS/059

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
6. Do SSI signals appear at posts 29, 30, 31 and 32 (send cassette), and 25, 26, 27 and 28 (receive cassette), and 21, 22, 23 and 24 (monitor cassette) of 410157 circuit card mounted on right wall of the 40C435 controllers or do SSI signals appear at terminal posts D15, 16, 17, and 18 (SEND CASSETTE) and posts D20, 21, 22, and 23 (Rec. Cassette) of the 410593 circuit card on the right wall of the 40C433 controller?	Check wiring to each cassette drive (continuity check). Refer to wiring diagrams supplied with set.	Replace 410406 circuit card in slot 4 for send and receive cassettes. Replace 410406 circuit card in slot 5 for monitor cassette (40C435 Controllers only). Replace 410157 or 410593 circuit card.

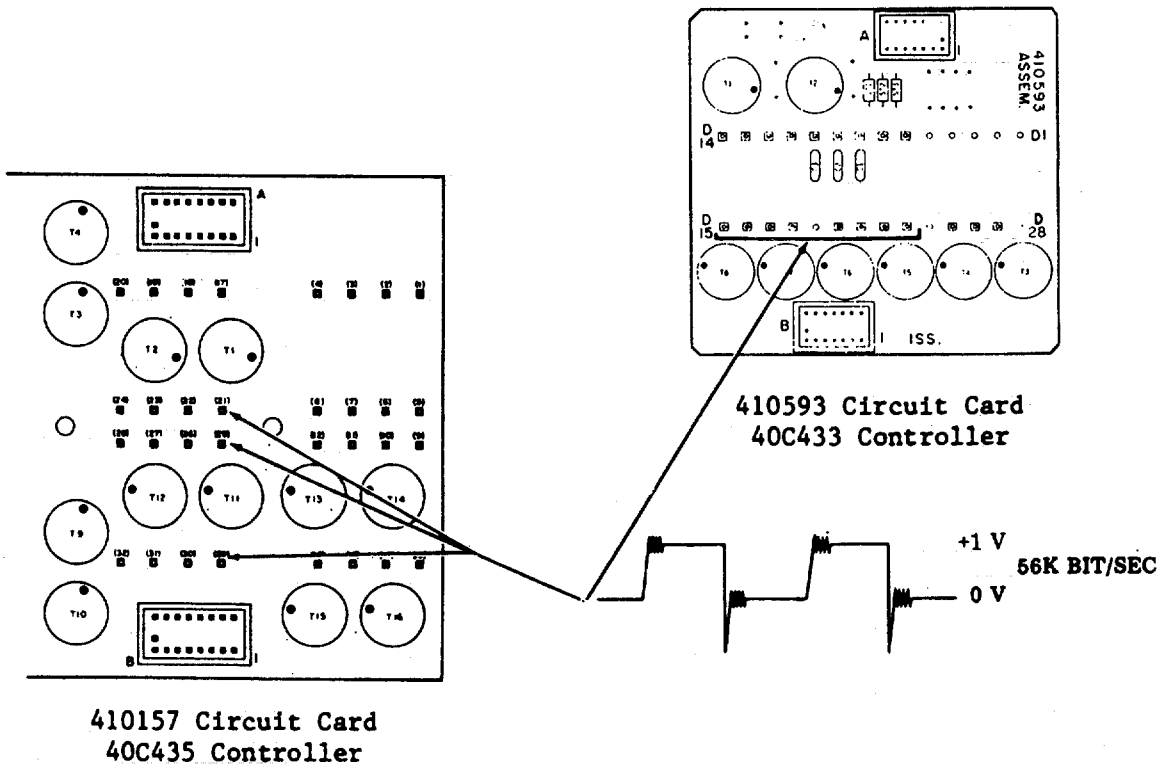


CHART 5 (Cont)

CONTROLLER ANALYSIS -- 40C433/ACS/059 AND 40C435/ACS/059.

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
7. Can messages be sent from display to receive tape locally? (1) Prepare message ending with ETX. (2) Home cursor. (3) Depress REC TAPE LCL. (4) Depress DISP SEND. (5) Depress DISP LCL. Check receive tape by listing receive tape headings and checking first 55 characters of message.	Go to 9.	Check receive tape cassette drive.
8. Can message be transferred from send tape to display locally? (1) Position send tape to a recorded block and select single message mode. (2) DISP SEND lamp not lit. (3) Depress DISP LCL. (4) Depress SEND TAPE LCL.	Go to 9.	Check send tape cassette drive.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 5 (Cont)

CONTROLLER ANALYSIS -- 40C433/ACS/059 AND 40C435/ACS/059 L

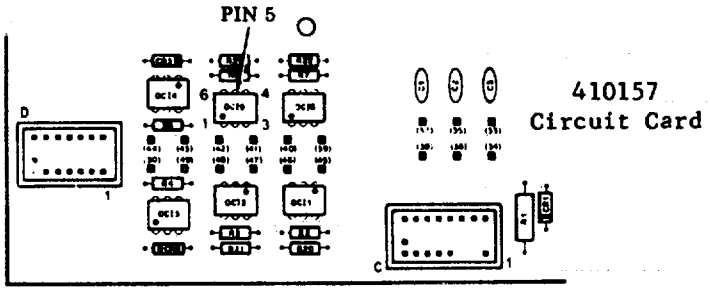
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
9. Place set in manual on-line mode (POLL/SEL lamp not lit). If set is full dup--lex, temporarily add a strap between terminals 2 and 3 of TB101 in interface assembly. For this test, clear-to-send input must be turned on or temporarily remove 303181 circuit card in slot Z4 of interface assembly. (1) Select keyboard on-line mode. (2) Disp Rec (DISP SEND lamp not lit). (3) Depress DISP LINE. (4) Depress PTR LINE (if set has printer). (5) Depress REC TAPE LINE (if set has cassette drive). Do characters generated on the keyboard appear on dis play printer and receive tape?	Place in service: (1) Remove strap on TB101 if instal led. (2) Replace 303181 circuit card in slot Z4 of inter-face assembly if removed.	Go to 10.
10. When sending characters, do the send mark and space lamps on 410411 CIU circuit card flicker?	Go to 13.	Go to 11.
11. Is there approximately a +5 V dc signal at pin 5 of OPT5 on 410157 circuit card on right wall of the 40C435 Controller or is there ap-proximately a +5 V dc sig-nal at pin 5 of OPT 6 on 410596 circuit card on right wall of the 40C433 Controller?	Replace 410411 cir-cuit card.	If 303181 circuit card was removed from interface assembly, replace 410157 circuit card. If clear-to-send input to set was turned on, go to 12.

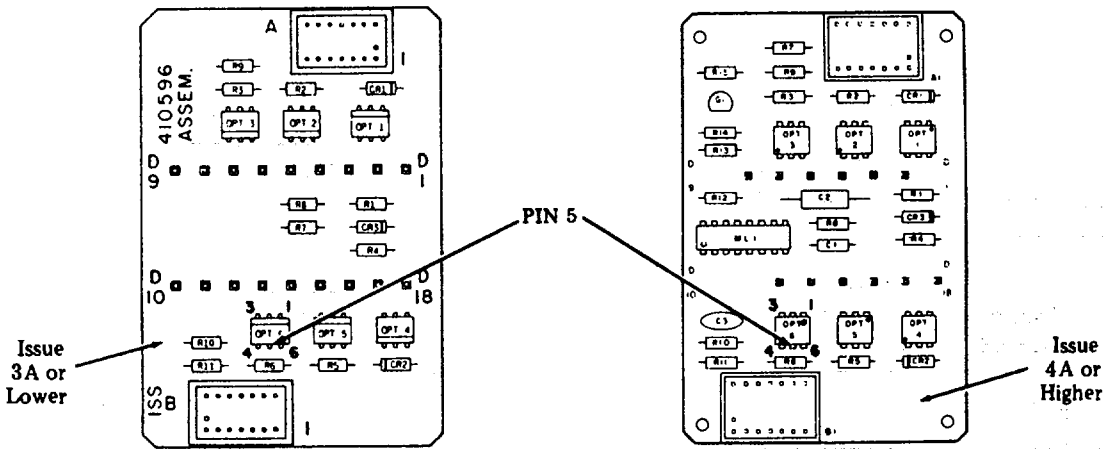
CHART 5 (Cont)

CONTROLLER ANALYSIS -- 40C433/ACS/059 AND 40C435/ACS/059

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE

11. (Cont)





OLD STYLE
410596 CIRCUIT
CARD

NEW STYLE
410596 CIRCUIT
CARD

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 5 (Cont)

CONTROLLER ANALYSIS -- 40C433/ACS/059 AND 40C435/ACS/059

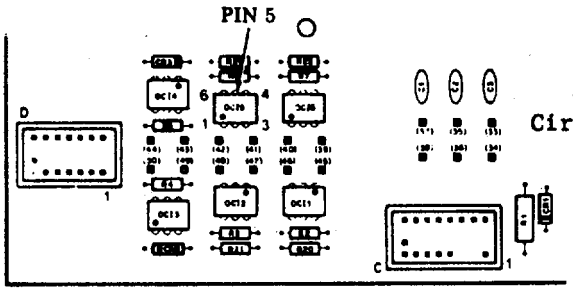
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
12. 40C435 Controller Is there a +1.5 V dc signal at post 42 of 410157 circuit card? **NOTE: When checking this signal, the scope or meter common should be connected to post 38.** **40C433 Controller** **Is there a +1.5 V dc signal at post D14 of 410596 circuit card?** **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**	Replace 410157 circuit card. Replace 410596 circuit card.	Check wiring to interface. Refer to 9617WD in WDP supplied with set. Check that Clear-To-Send signal is being supplied to interface. Check wiring in interface. Refer to 9575WD in WDP supplied with set. Check that Clear-To-Send signal is being supplied to interface.
13. 40C435 Controller Is there a 0 to +1.5 V dc inverted data signal at pin 1 of OPT4 on 410157 circuit card? 40C433 Controller Is there a 0 to +1.5 V dc inverted data signal at pin 1 of OPT4 on 410596 circuit card.	Go to 14.	Check cable to 410157 circuit card. Replace 410411 circuit card. Check cable to 410596 circuit card. Replace 410411 circuit card.
14. 40C435 Controller Is there a 0 to +1 V dc inverted data signal at post 43 of 410157 circuit card? **NOTE: When checking this signal, the scope or meter common should be connected to post 38.** **40C433 Controller** **Is there a 0 to +1 V dc inverted data signal at post D17 of 410596 circuit card?** **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**	Go to 15. Go to 15.	Replace 410157 circuit card. Replace 410596 circuit card.

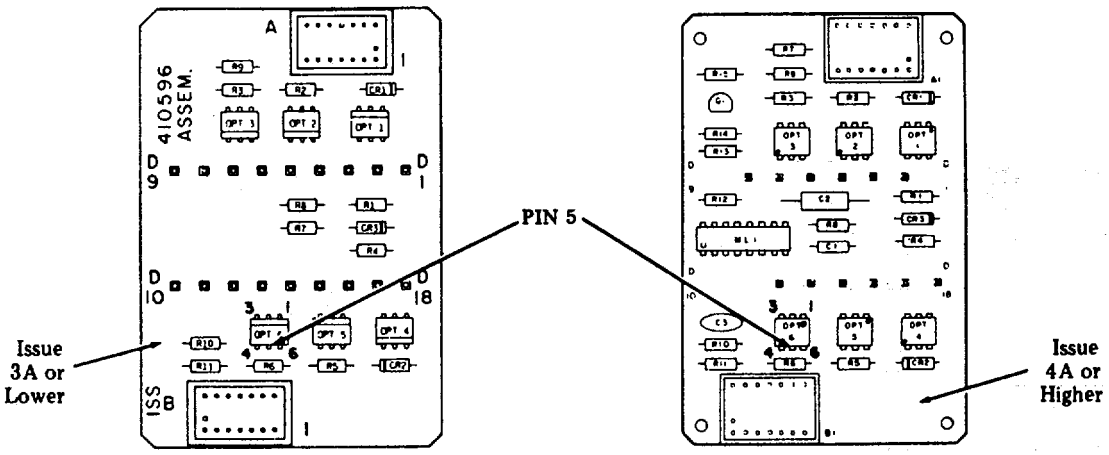
CHART 5 (Cont)

CONTROLLER ANALYSIS -- 4oC433/ACS/059 AND 40C435/ACS/059

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE

11. (Cont)





OLD STYLE
410596 CIRCUIT
CARD

NEW STYLE
410596 CIRCUIT
CARD

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 5 (Cont)

CONTROLLER ANALYSIS -- 40C433/ACS/059 AND 40C435/ACS/059

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
12. 40C435 Controller Is there a +1.5 V dc signal at post 42 of 410157 circuit card? **NOTE: When checking this signal, the scope or meter common should be connected to post 38.** **40C433 Controller** **Is there a +1.5 V dc signal at post D14 of 410596 circuit card?** **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**	Replace 410157 circuit card. Replace 410596 circuit card.	Check wiring to interface. Refer to 9617WD in WDP supplied with set. Check that Clear-To-Send signal is being supplied to interface. Check wiring in interface. Refer to 9575WD in WDP supplied with set. Check that Clear-To-Send signal is being supplied to interface.
13. 40C435 Controller Is there a 0 to +1.5 V dc inverted data signal at pin 1 of OPT4 on 410157 circuit card? 40C433 Controller Is there a 0 to +1.5 V dc inverted data signal at pin 1 of OPT4 on 410596 circuit card.	Go to 14.	Check cable to 410157 circuit card. Replace 410411 circuit card. Check cable to 410596 circuit card. Replace 410411 circuit card.
14. 40C435 Controller Is there a 0 to +1 V dc inverted data signal at post 43 of 410157 circuit card? **NOTE: When checking this signal, the scope or meter common should be connected to post 38.** **40C433 Controller** **Is there a 0 to +1 V dc inverted data signal at post D17 of 410596 circuit card?** **NOTE: When checking this signal, the scope or meter common should be connected to post D6.**	Go to 15. Go to 15.	Replace 410157 circuit card. Replace 410596 circuit card.

CHART 5- (Cont)

CONTROLLER ANALYSIS -- 40C433/ACS/059 AND 40C435/ACS/059

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
15. When sending a character, do the receive mark and space lamps on 410411 CIU circuit card flicker?	Replace 410411 circuit card.	Go to 16
16. 40C435 Controller Is there a 0 to +1.5 V dc inverted character signal at post 47 of 410157 circuit card?	Go to 17.	Check wiring in interface. Refer to 9619WD in WDP supplied with set.
40C433 Controller Is there a 0 to +1.5 V dc inverted character signal at post D5 of 410596 circuit card?	Go to 17.	Check wiring in interface. Refer to 9575WD in WDP supplied with set.
17. 40C435 Controller Is there a -5 to +5 V dc character signal at pin 4 of OPT2 on 410157 circuit card?	Replace 410411 circuit card.	Replace 410157 circuit card.
40C433 Controller Is there a -5 to +5 V dc character signal at pin 4 of OPT 2 on 410596 circuit card?	Replace 410411 circuit card.	Replace 410596 circuit card.
18. Is there a +5 V dc signal at post J3 of 410555 circuit card mounted on right side of controller?	Go to 19.	Check wiring to back panel. Check 407548 cable assembly (40C435 Controller) or 405807 Cable Assembly (40C433 Controller).

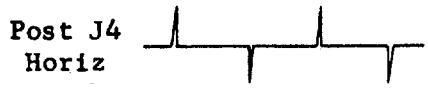
D. TROUBLESHOOTING (Cont)

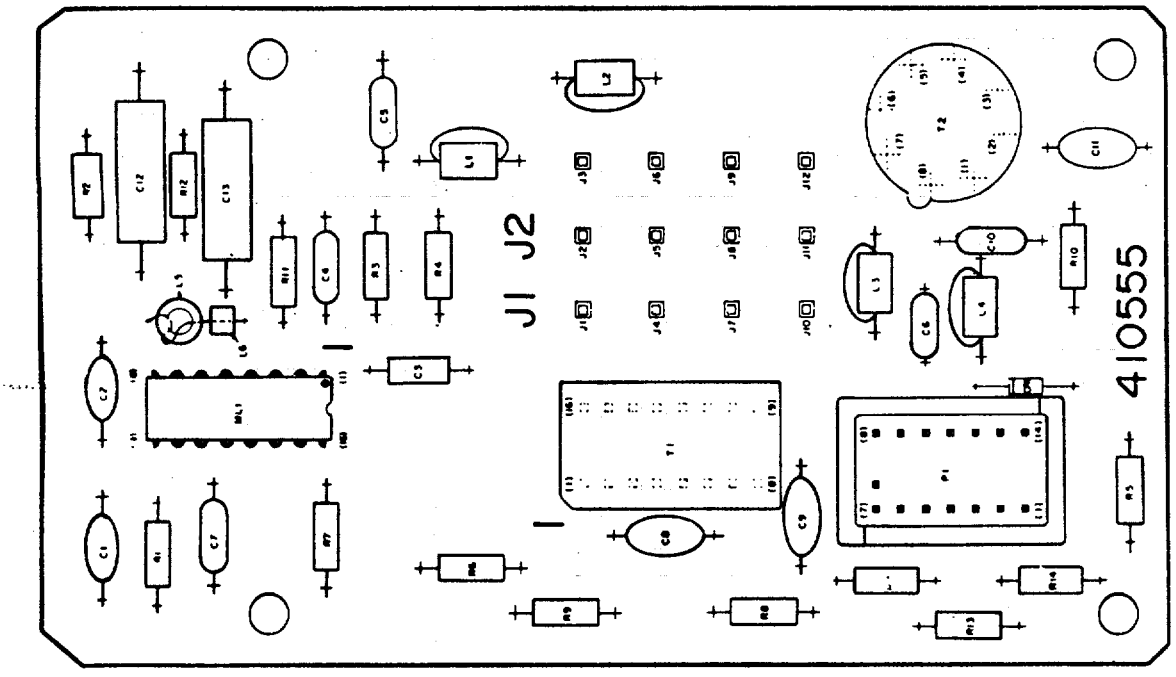
2. TROUBLESHOOTING CHARTS (Cont)

CHART 5 (Cont)

CONTROLLER ANALYSIS -- 40C433/ACS/059 AND 40C435/ACS/059

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
19. Are the following signals present at posts indicated below?	Check wiring to monitor.	Go to 20.

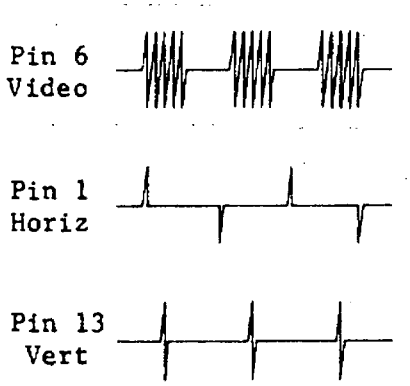




410555 Circuit Card

CHART 5 (Cont)

CONTROLLER ANALYSIS -- 40C433/ACS/059 AND 40C435/.ACS/059

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
20. Remove cable plugged into connector A of 410555 circuit card.. Are the following signals present at pins of the cable indicated below? 	Replace 410555 circuit card.	Replace 410437 D I/O circuit card.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 6

CONTROLLER ANALYSIS -- 40C434/ACW/063 AND 40C434/AEK/101

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. Has Station Start Up and Initialization procedure been done?	Go to 2.	Refer to Manual 371 for Start Up and Initialization Procedure.
2. In local mode, do characters generated on opcon appear on display?	Go to 4.	Go to 3.
3. Do SSI signals appear at posts 29, 30, 31 and 32 (Printer A SSI), posts 9, 10, 11 and 12 (Printer B SSI), and posts 25, 26, 27 and 28 (Opcon 1 SSI), posts 13, 14, 15 and 16 (Opcon 2 SSI) on the 410158 circuit card on right wall of controller?	Check wiring to opcon. Check wiring to printer. Refer to WDPs supplied with set. (Continuity test)	Replace 410406 circuit card. Replace 410158 circuit card.
4. Can information on display be transferred to printer? (Place ETX at end of message, home cursor and depress PRINT A or PRINT B.)	Go to 5.	Go to 3-
5. Using CMND/V can messages be recalled from CD1, 2 and 3 to either display? Using CMND/O can OTL be recalled from CD4 to either display?	Go to 7.	Go to 6.

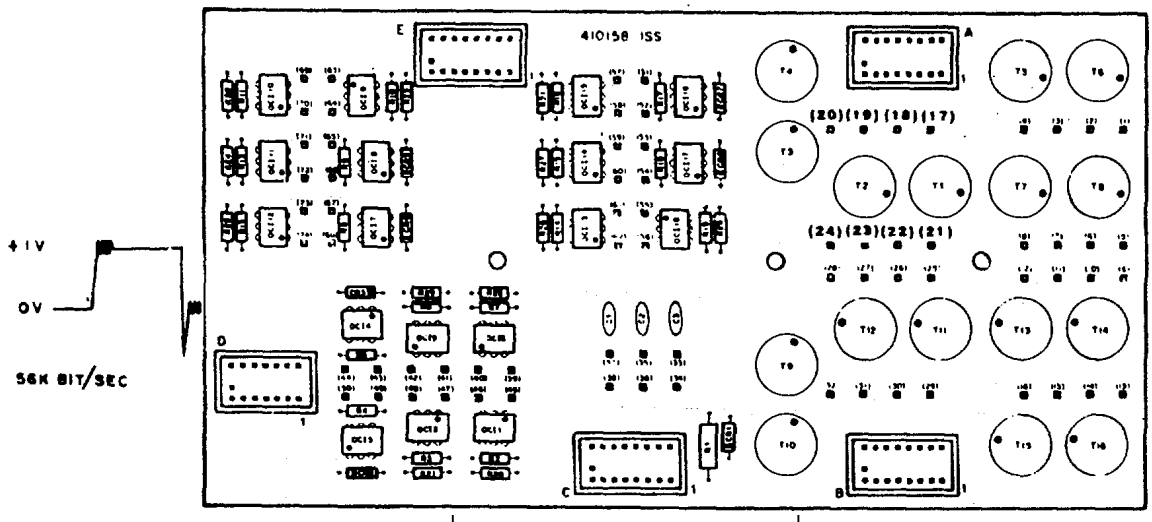
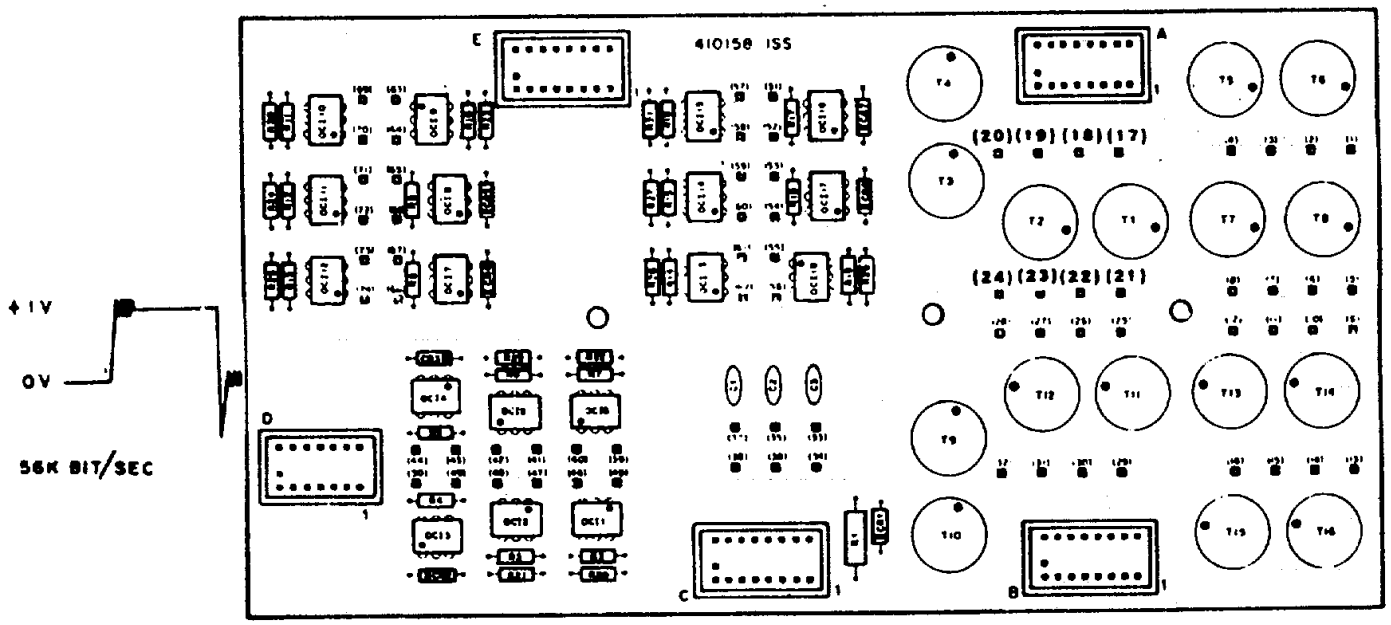


CHART 6 (Cont.)
CONTROLLER ANALYSIS -- 40C434I/ACW/063 AND, 40C434,/AK/101

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
6. Do SSI signals appear at posts 17, 18, 19 and- 20 (CDI SSI), posts '21?: 22-i .23 and 24 (CD2 SSI), posts 1; 2, 3 and 4 (CD3 SSI) and posts 5, 6, 7 and 8 (CD4 SSI) of the 410158 circuit card on the right wall of controller?	Check wiring to each cassette drive (continuity check). , Refer, to wiring diagrams supplied with set.	Replace.-410'158 circuit card. Replace 410406 circuit card.
7. Can messages be sent from display to receive tape (CD1) locally? (1) Prepare message ending with ETX (ACP127 Format). (2) Home cursor. (3) Depress LOCAL. (4) Depress SEND. NOTE: Check by depressing CMND @ and recheck the display.	Go. to 8.	Check cassette drive 1. KD goes from SEND back to LOCAL. ERROR lamp on indicates improper format.



D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 6 (Cont)
CONTROLLER ANALYSIS -- 40C434/ACW/063 A-ND 40C434/AEK/101

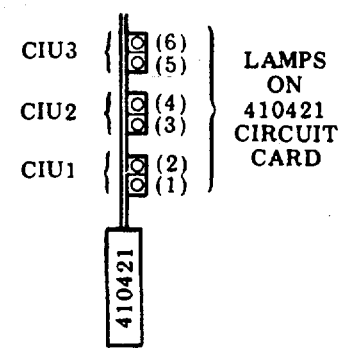
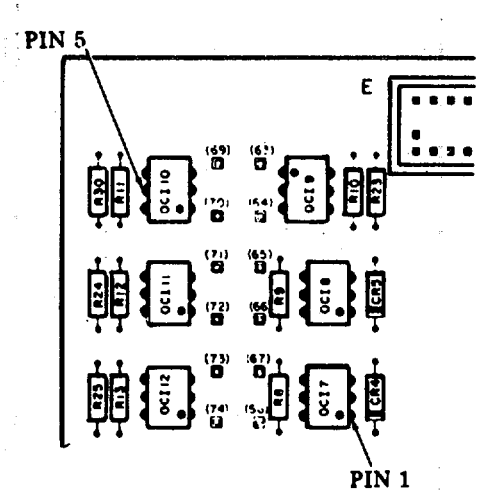
ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
8. Can messages be transferred from (Send) CD2 tape to display locally? (1) Depress LOCAL. (2) Depress CMND/V "WHICH TAPE _____", type 2. "WHICH BLOCK _____", type recorded block number (1, 2, 3, etc). (3) Depress RETURN. NOTE: Depressing CMND/N displays next block.	Go to 9	Check cassette drive 2.
9. Can messages be transferred to the paper tape devices? (1) Depress LOCAL. (2) Type message with ETX. (3) Depress CMND/P (CHECK CLASS may be displayed, if so, depress CMND/P again).	Go to 15.	Go to 10.
10. When sending a character to the paper tape punch (CIU3), does the Send Space lamp flicker (lamp 5) on the 410421 circuit card?  	Go to 13.	Go to 11.

CHART 6 (Cont)

CONTROLLER ANALYSIS – 40C434/ACW/063 .AND 40C434/AEK/101

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
11. Is there approximately +5.V dc on pin 5 of OCI10 on the 410158 circuit card mounted on the right wall of the controller? 	Go to 13.	Go to 12.
12. Is there 0 V dc at post 70 of the 410158 circuit card? supplied with set. NOTE: Ground scope to post 69 when checking this signal.	Replace 410158 circuit card.	Check wiring to inter-face. Refer to WDP
13. Is there a 0 to +1.5 V dc data signal (0 V mark, +1.5 V space) at pin 1 of OC17 of the 410158 circuit card?	Go to 14.	Check wiring from controller back panel to 410158 circuit card. Replace 410421 circuit card.
14. Is-there a 0 to +5 V data signal at post 68 of the 410158 circuit card? NOTE: Ground scope to post 69 when checking this signal.	Check wiring to interface. Refer to WDP supplied with set.	Replace 410158 circuit card.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 6 (Cont)

CONTROLLER ANALYSIS -- 40C434/ACW/063 AND 40C434/AEK/101

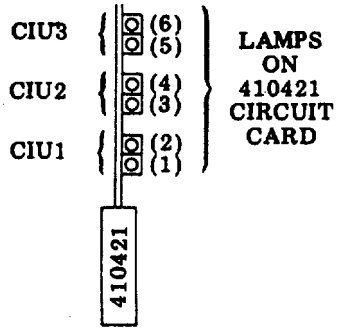
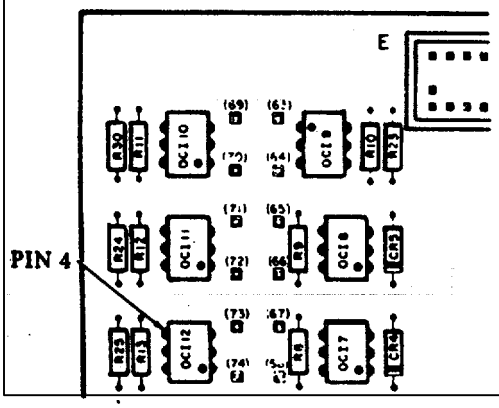
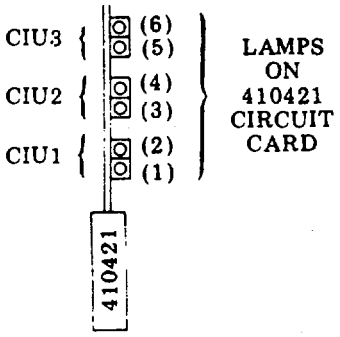
ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
15. Can paper tape reader be accessed? (1) Place message tape in reader, bat handle to run position. (2) Depress LOCAL and CMND/R ("READ" is displayed). (3) Message is displayed. (4) Depress LOCAL to disable mode.	Go to 21.	Same as 16.
16. When receiving from the tape reader (CIU3), does the receive space lamp flicker (lamp 6) on the 410421 circuit card? 	Replace 410421 circuit card.	Go to 17.
17. Does a -5 V to +5 V data signal (-5 V mark, +5 V space) appear at pin 4 of OCI12 of the 410158 circuit card mounted on the right wall of the controller? 	Check wiring from controller back panel to 410158 circuit card. Replace the 410421 circuit card.	Go to 30.

CHART 6 (Cont)

CONTROLLER ANALYSIS -- 40C434/ACW/063 AND 40C434/AEK/101

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
18. Does a 0 to +1.5 V data signal appear-at post 74 of 410158 circuit card ? NOTE: Ground scope at post 69 when checking this signal.	Replace 410158 circuit card.	Go to 19.
19. Is there a 0 to 1.5 V dc voltage on pin 1 of OCI8 on 410158 circuit card ?	Go to 20. circuit card.	Replace the 410421
20. Is there approximately 0 V at post 66 of 410158 circuit card? NOTE: Ground scope at post 69 when checking this signal.	Check wiring to interface. Refer to WDP supplied with set.	Replace 410158 circuit card.
21. Can message be received from the OCR page reader? (1) Place message in OCR reader. (2) Depress NEXT OUTGO. (3) Message appears on display.	Go to 27.	Go to 22.
22. When receiving from the OCR reader (CIU2), does the receive space (lamp 4) flicker on the 410421 circuit card? 	Replace 410421 circuit card.	Go to 23.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 6 (Cont)

CONTROLLER ANALYSIS -- 40C434/ACW/063 AND 40C434/AEK/101

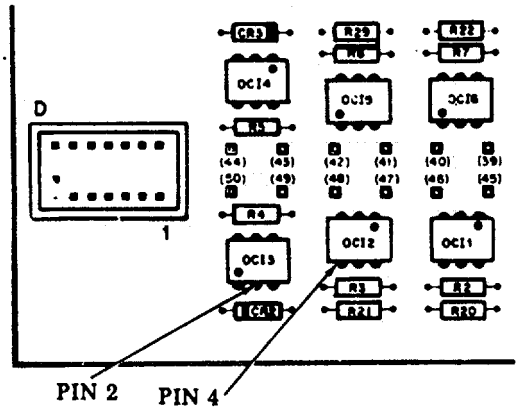
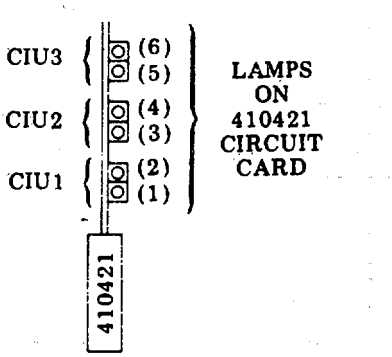
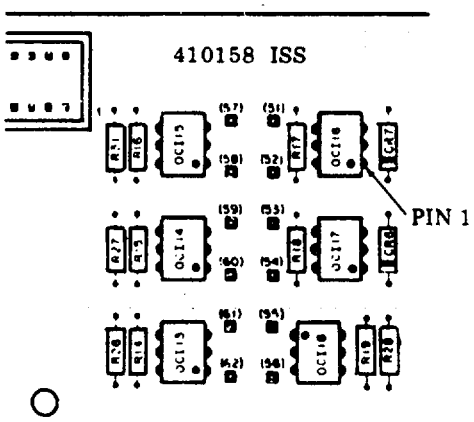
ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
23. Is there a -5 V to + 5 V data signal (-5 V mark, k +5 V space) at pin 4 of OCI2 on the 410158 circuit card mounted on the right wall of the controller.? circuit card. 	Check wiring from controller back panel to 410158 circuit card. Replace the 410421	Go to 24.
24. Is there a 0 to +1.5 V data signal (O V mark, +1.5 V space) at post 47 of the 410158 circuit card? NOTE: Ground scope at post 39 when checking this signal.	Replace the 410158 circuit card.	Go to 25.
25. Is there a 0 to +1.5 V dc at pin 2 of OCI3 of the 410158 circuit card?	Go to 26. panel to 410158 circuit card.	Check wiring from back Replace the 410421 circuit card.
26. Is there a +5 V at post 66 of 410158 circuit card? NOTE: Ground scope at post 39 when checking this signal.	Check wiring to interface. Refer to WDP supplied with set.	Replace the 410158 circuit card.

CHART 6 (Cont)

CONTROLLER ANALYSIS -- 40C434/ACW/063 AND 40C434/AEK/101

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
27. Can message be sent on-line properly?	Go to 36.	Go to 28.
28. When sending on-line (CIU1), does the send space lamp (lamp 1) flicker on the 410421 circuit card? 	Go to 29.	Go to 31.
29. Does a 0 to +1.5 V data signal (O V mark, +1.5 V space) appear at pin 1 of OCI16 of the 410158 circuit card? 	Go to 30.	Check wiring from controller back panel to 410158 circuit card. Replace the 410421 circuit card.
30. Does a 0 to +5 V data signal (O V space, +5 V mark) appear at post 52 of the 410158 circuit card? NOTE: Ground scope at post 57 when checking this signal.	Check wiring to interface. Refer to WDP supplied with set.	Replace the 410158 circuit card.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 6 (Cont)

CONTROLLER ANALYSIS -- 40C434/ACW/063 AND 40C434/AEK/101

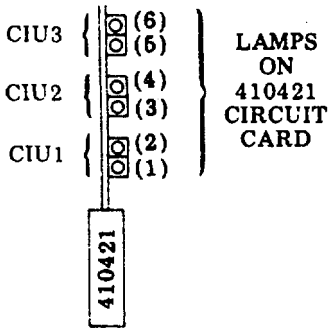
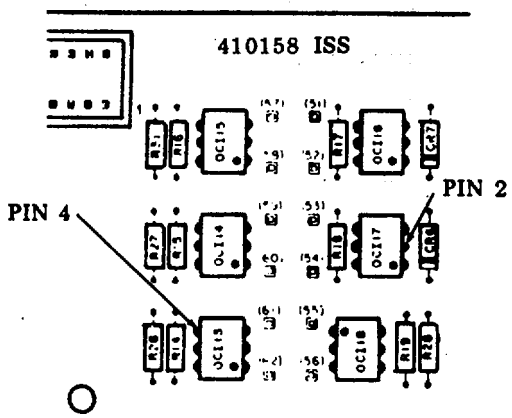
ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
31. Is there a +5 V voltage at pin 5 of OCI15 of the 410158 circuit card?	Check wiring from controller back panel to 410158 circuit card. Replace 410421 circuit card.	Go to 32.
32. Is there a O V voltage at post 58 of the 410158 circuit card? NOTE: Ground scope at post 57 when checking this signal,	Replace the 410158 circuit card.	Check wiring to interface. Refer to WDP supplied with set.
33. Can message be received from the line properly?	Place in service.	Go to 34.
34. When receiving a message, does the receive space lamp (CIU1, lamp 2) flicker in the 410421 circuit card?  	Replace the 410421 circuit card.	Go to 35.
35. Does a -5 V to +5 V data signal (-5 V mark, +5 V space) appear at pin 4 of OCI14 on the 410158 circuit card ?	Check wiring from controller back panel to 410158 circuit card. Replace- the 410421 circuit card.	Go to 36.

CHART 6 (Cont)

CONTROLLER ANALYSIS -- 40C434/ACW/063 AND 40C434/AEK/101

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
		
36. Is there a 0 to +1.5 V data signal (O V mark, +1.5 V space) at post 60 of the 410158 circuit card? NOTE: Ground scope at post 57 when checking this signal.	Replace the 410158 circuit card.	Go to 37.
37. Is there a 0 V voltage at pin 2-of OCI17 on the 410158 circuit card?	Go to 38.	Check wiring from controller back panel to 410158 circuit card. Replace the 410421 circuit card.
38. Is there a +5 V voltage at post 54 of the 410158 circuit card? NOTE: Ground scope at post 57 when checking this signal.	Check wiring to interface. Refer to WDP supplied with set.	Replace the 410158 circuit card.
39. Is there a +5 V dc signal at post J3 of 410555 circuit card mounted on right side of controller?	Go to 40.	Check wiring to back panel. Check 407548 cable assembly.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 6 (Cont)
CONTROLLER ANALYSIS -- 40C434/ACW/063 AND 40C434/AEK/101

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
40. Are the following signals present at posts indicated below? POST J2 VIDEO POST J4 HORIZ POST J9 VERT	Check wiring in interface. Refer to WDP supplied with set. Check wiring to monitor. Replace 410433 D 1/O circuit card.	Go to 41.
41. Remove cable plugged into connector A of 410555 circuit card. Are the following signals present at pins indicated below? PIN 6 VIDEO PIN 1 HORIZ PIN 13 VERT	Replace 410555 circuit card.	Replace 410433 D I/O circuit card.

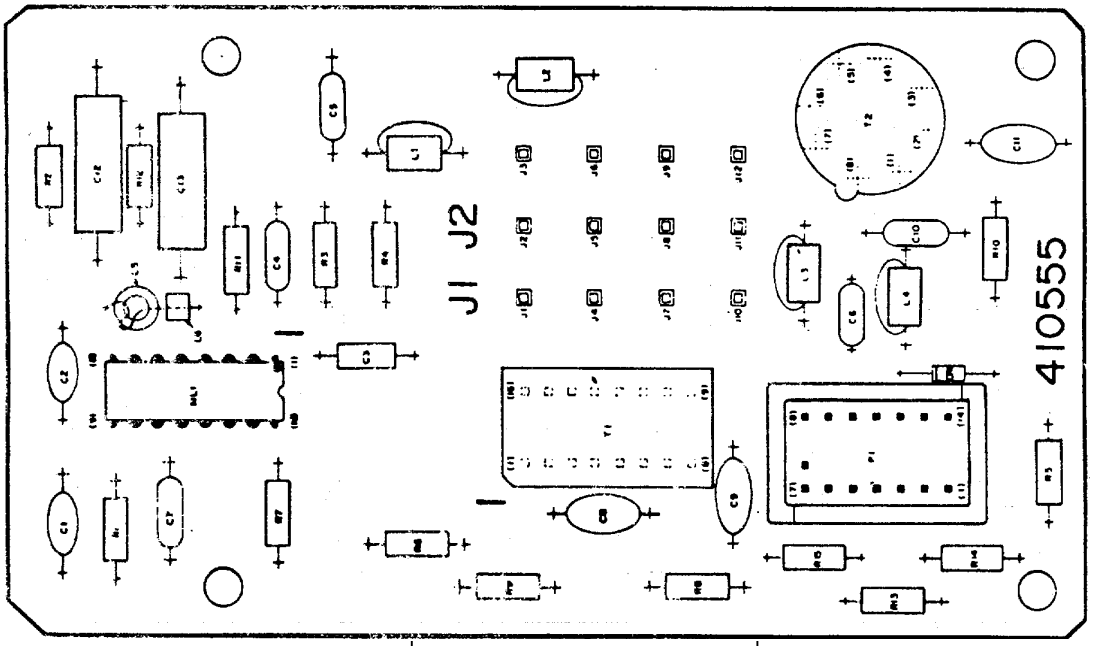
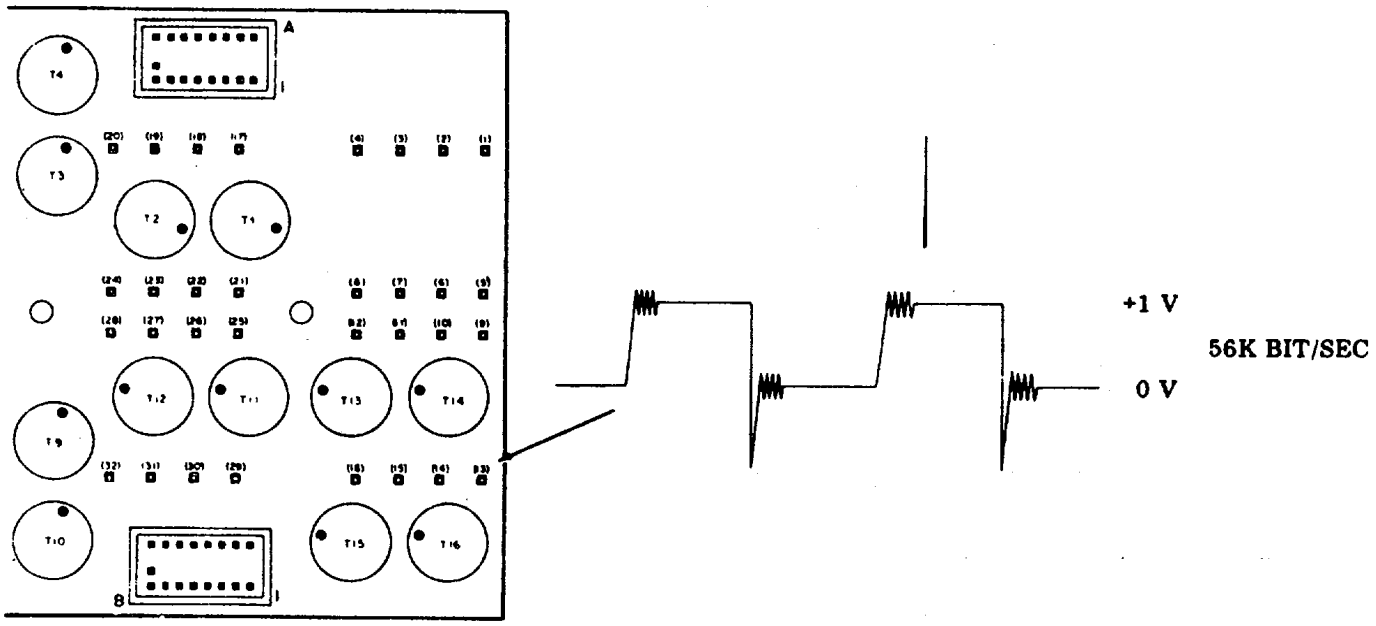


CHART 7
CONTROLLER ANALYSIS -- 40C435/AEE/091,
40C437/AEE/091, 40C437/AEL/106, AND 40C437/AEL/107

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. In keyboard display mode, do characters generated on opcon appear on display?	Go to 3.	Go to 2.
2. Do SSI signals appear at posts 13, 14, 15, and 16 (opcon SSI) of 410157 circuit card on right wall of controller?	Check wiring to opcon. Refer to WDPs supplied with set. (Continuity test) Go to 21.	Replace 410406 circuit card in slot 4. Replace 410157 circuit card.



410157 Circuit Card

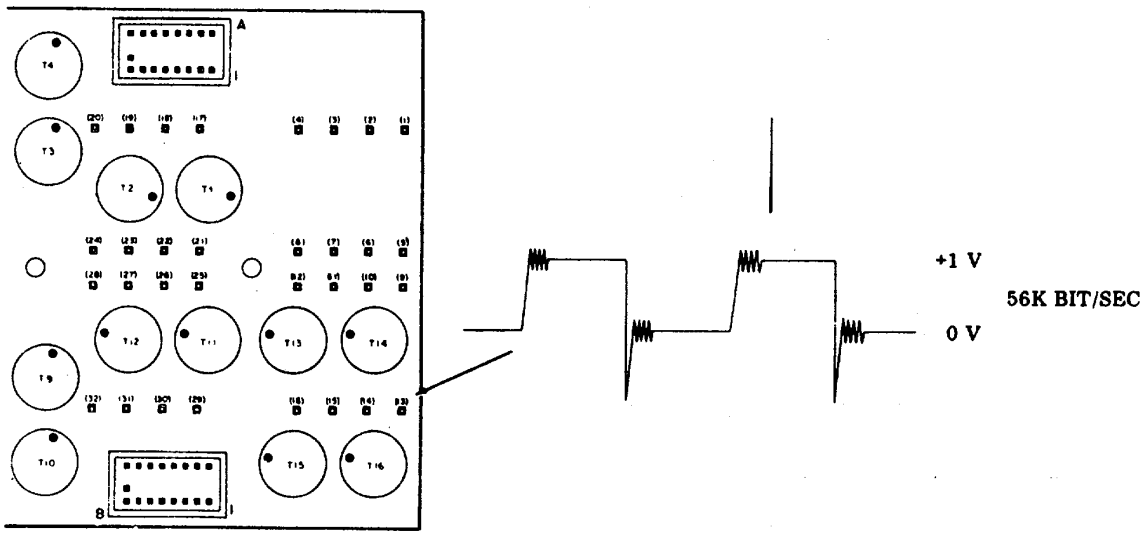
D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 7 (Cont)

CONTROLLER ANALYSIS -- 40C435/AEE/091,
40C437/AEE/091, 40C437/AEL/106, AND 40C437/AEL/107

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
3. On sets with printers, can information on display be transferred to printer by depressing PTR LCL? (Place ETX at end of message, home cursor, depress PTR LCL, DISP SEND, and DISP LCL.)	Go. to 5.	Go to 4.
4. Do SSI signals appear at posts 9, 10, 11, and 12 (printer SSI) of 410157 circuit card on right wall of controller?	Check wiring to printer. Refer to WDPs supplied with set. (Continuity test)	Replace 410406 circuit card in slot 4. Replace 410157 circuit card.
5. On KDPM3 Sets, when in control mode, do block numbers appear for send, receive and monitor tape block numbers?	Go to 7.	Go to 6.
6. Do SSI signals appear at posts 29, 30, 31 and 32(send cassette), and 25, 26, 27 and 28(receive cassette), and 21, 22, 23 and 24 (monitor cassette) of 410157 circuit card mounted on right wall of controller?	Check wiring to each cassette drive (continuity check). Refer to wiring diagrams supplied with set.	Replace 410436 circuit card in slot 4 for send and receive cassettes. Replace 410406 circuit card in slot 5 for monitor cassette. Replace 410157 circuit card.

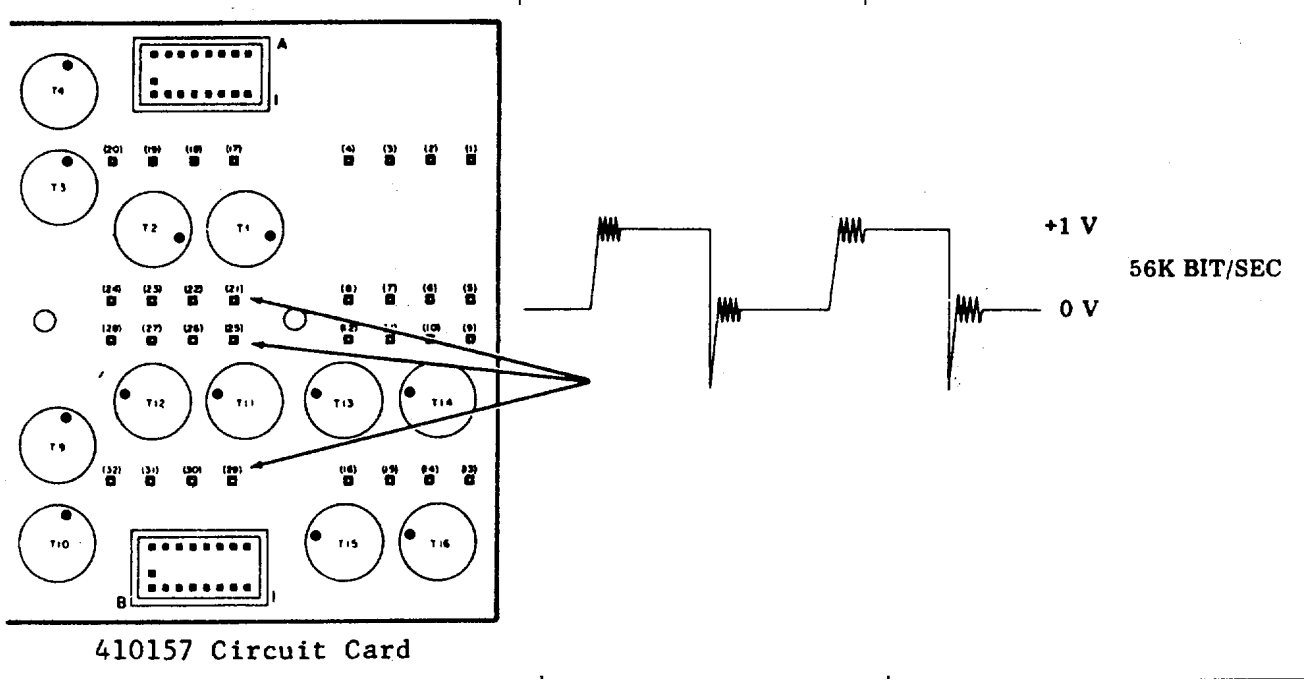


410157 Circuit Card

CHART 7 (Cont)

CONTROLLER ANALYSIS -- 40C435/AEE/091,

40C437/AEE/091, 40C437/AEL/106, AND 40C437/AEL/107

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
6. (Cont)  410157 Circuit Card		
7. Can messages be sent from display to receive tape locally? (1) Prepare message ending with ETX. (2) Home cursor. (3) Depress REC TAPE LCL. (4) Depress DISP SEND. (5) Depress DISP LCL. Check receive tape by listing receive tape heading and checking first 55 characters of message .	Go to 9 .	Check operation of cassette drive.
8. Can message be transferred from send tape to display locally? (1) Position send tape to a recorded block and select single message mode. (2) DISP SEND lamp not lit. (3) Depress DISP LCL. (4) Depress SEND TAPE LCL.	Go to 9.	Check operation of cassette drive.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 7 (Cont)

CONTROLLER ANALYSIS -- 40C435/AEE/091,

40C437/AEE/091, 40C437/AEL/106, AND 40C437/AEL/107

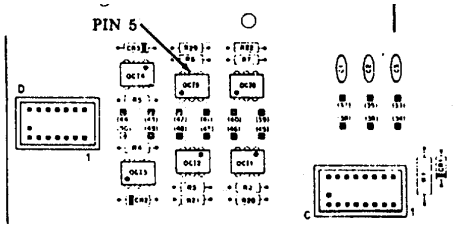
ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
9. Place set in manual on-line mode (POLL/SEL lamp not lit). If set is full duplex, temporarily add a strap between terminals 2 and 3 of TB101 in interface assembly. For this test, clear-to-send. input must be turned on or temporarily remove 303181 circuit card in slot Z4 of interface assembly. If Option V1 has been installed, the external bit clock will have to be turned on. (1) Select keyboard on-line mode. (2) Disp Rec (DISP SEND lamp not lit). (3) Depress DISP LINE. (4) Depress PTR LINE (if set has printer). (5) Depress REC TAPE LINE (if set has cassette drive). Do characters generated on the keyboard appear on display printer and receive tape?	Place in service: (1) Remove strap on TBO11 if installed. (2) Replace 303181 circuit card in slot Z4 of interface assembly if removed.	Go to 10.
10. When sending characters, do the send mark and space lamps on 413411 CIIU circuit card flicker?	Go to 13.	Go to 11.
11. Is there approximately a +5 V dc signal at pin 5 of 	Replace 410411 circuit card.	If 303181 circuit card was removed from interface assembly, replace 410157 circuit card. If clear-to-send input to set was turned on, go to 12.

CHART 7 (Cont)

CONTROLLER ANALYSIS -- 40C435/AEE/091,

40C437/AEE/091, 40C437/AEL/106, AND 40C437/AEL/107

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
12. Is there a 0 V dc signal at post 42 of 410157 circuit card? NOTE: When checking this signal, the scope or meter common should be connected to post 38.	Replace 410157 circuit card.	Check wiring to interface. Refer to 9617WD in WDP supplied with set. Check that Clear-To-Send signal is turned on to interface.
13. Is there a 0 to +1.5 V dc inverted data signal at pin 1 of OCI4 on 410157 circuit card?	Go to 14.	Check cable to 410157 circuit card. Replace 410411 circuit card.
14. Is there a 0 to +1 V dc inverted data signal at post 43 of 410157 circuit card? NOTE: When checking this signal, the scope or meter common should be connected to post 38.	Go to 15.	Replace 410157 circuit card.
15. Is Option V1 (Isochronous operation) installed in the set ?	Go to 16;	Go to 18.
16. Is there an inverted bit clock signal (O to 1.5 V dc) at post 45 (send clock) and post 40 (receive clock) of the 410157 circuit card? interface.	Go to 17.	Check wiring to interface. Refer to 9617WD in WDP supplied with set. Check that external bit clock is turned on to
17. Is there a bit clock signal (+5 V to -5 V) at pin 5 of OCI1 (send clock) and pin 5 of OCI6 (receive clock) on the 410157 circuit card?	Go to 18.	Replace the 410157 circuit card.
18. When sending a character, the receive mark and space lamps on 410411 CIU circuit do card flicker?	Replace 410411 circuit card.	Go to 19.

D. TROUBLESHOOTING (Cont)

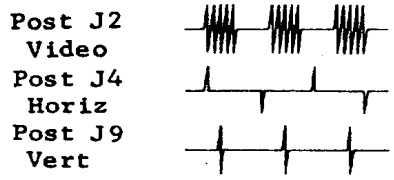
2. TROUBLESHOOTING CHARTS (Cont)

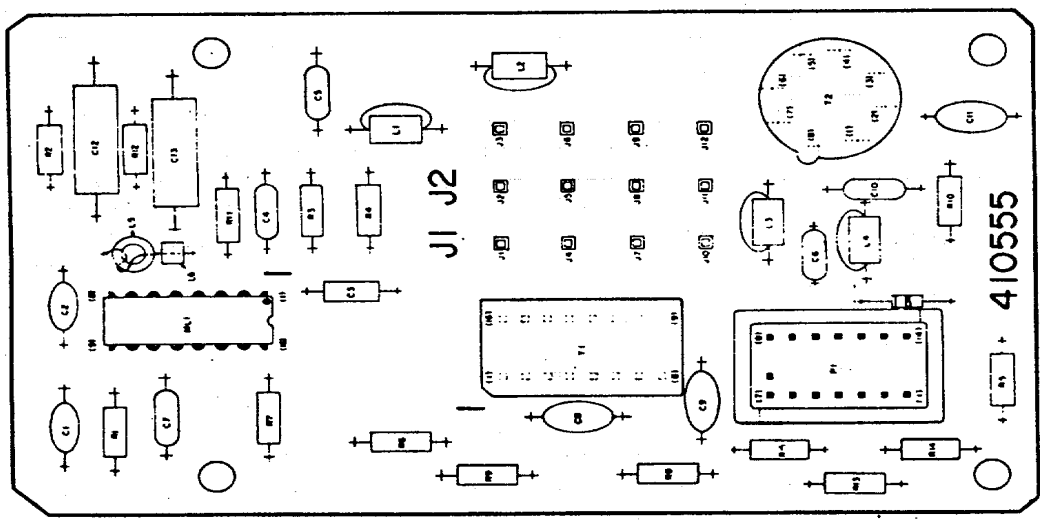
CHART 7 (Cont)

CONTROLLER ANALYSIS -- 40C435/AEE/091,

40C437/AEE/091, 40C437/AEL/106, AND 40C437/AEL/107

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
19. Is there a.0 to +1.5 V dc inverted character signal at post 47 of 410157 circuit card?	Go to 21.	Check wiring in interface. Refer to 9619WD in WDP supplied with set.
20. Is there a -5 to +5 V dc character signal at pin 4 of OCI2 on 410157 circuit card?	Replace 410411 circuit card.	Replace 410157 circuit card.
21. Is there a +5 V dc signal at post J3 of 410555 circuit card mounted on right side of controller? assembly.	Go to 22.	Check wiring to back panel. Check 407548 cable
22. Are the following signals present at posts indicated below?	Check wiring to monitor.	Go to 23.



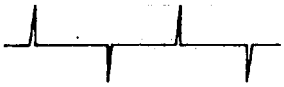


410555 Circuit Card

CHART 7 (Cont)

CONTROLLER ANALYSIS -- 40C435/AEE1/091,

40C437/AEE/091, 40C437/AEL/106, AND 40C437/AEL/107

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
23. Remove cable plugged into connector A of 410555 circuit card. Are the following signals present at pins of the cable indicated below? **Pin 6 Video**  **Pin 1 Horiz**  **Pin 13 Vert** 	Replace 410555 circuit card.	Replace 410437 D I/O circuit card.

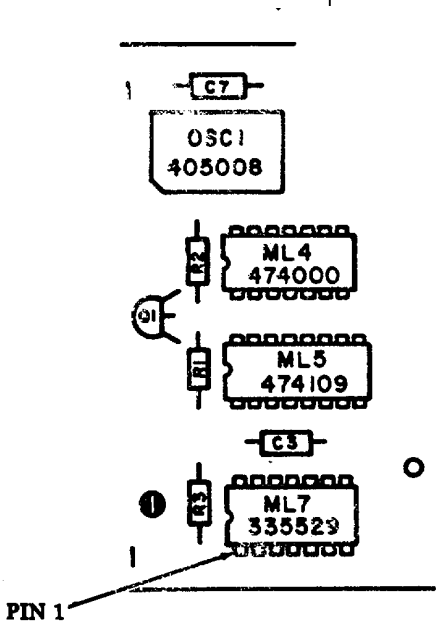
D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 8

CONTROLLER ANALYSIS -- 40C436/ADA/092, 40C436/ADD/093, 40C436/ADK/075, 40C436/ADN/094 AND 40C436/ADU/095

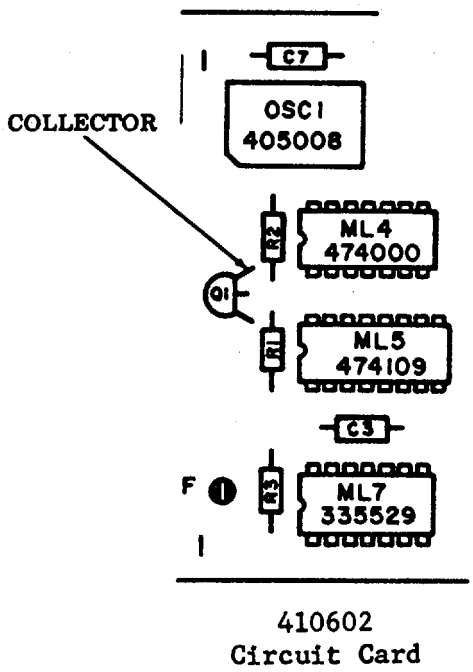
ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. Does controller contain the 413330 modification kit (distinguished by a 410602 circuit card connected to the 410157 circuit card on right sidewall of controller)?	Go to 2.	Go to 5.
2. Is there a -5 V to +5 Vdc bit clock signal at Pin 1 of ML7 of the 410602 circuit card?	Go to 3.	Go to 3.



410602
Circuit Card

CHART 8 (Cont)

CONTROLLER ANALYSIS -- 40C436/ADA/092, 40C436/ADD/093,
40C436/ADK/075, 40C436/ADN/094 AND 40C436/ADU/095

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
3. Is there a -5 V to +5 Vdc bit clock signal at collector of Q1?  410602 Circuit Card	Go to 4.	Replace 410602 circuit card.
4. Remove 410602 circuit card for access to 410157 circuit card. Refer to Page 7-203 for procedure. Connect cables to 410157 as shown. Go to 5.		

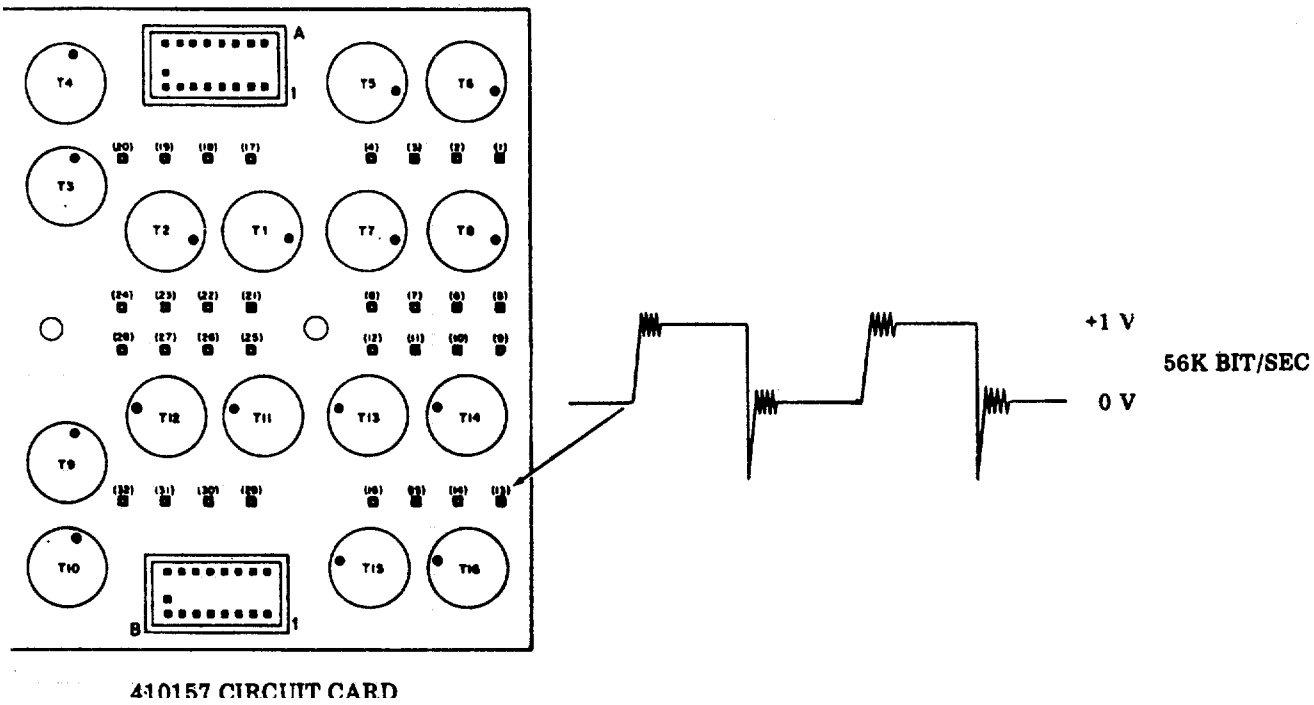
D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 8 (Cont)

CONTROLLER ANALYSIS -- 40C436/ADA/092, 40C436/ADD/093, 40C436/ADK/075, 40C436/ADN/094 AND 40C436/ADU/095

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
5. Is controller under test a DCC?	Go to 6.	Go to 10.
6. In the local mode, do characters generated on opcon appear on display?	Go to 8.	Go to 7.
7. Do SSI signals appear at posts 13, 14, 15, and 16 (opcon SSI) for opcon connected to J309 or posts 25, 26, 27 and 28 for opcon connected to J308 or posts 9, 10, 11 and 12 for opcon connected to J310 or post 21, 22, 23 and 24 for opcon connected to J311 of 410157 circuit card on right wall of controller?	Check wiring to opcon. Refer to WDPs supplied with set. (Continuity test) Go to 24.	Replace 410406 circuit card in slot 4. Replace 410157 circuit card.

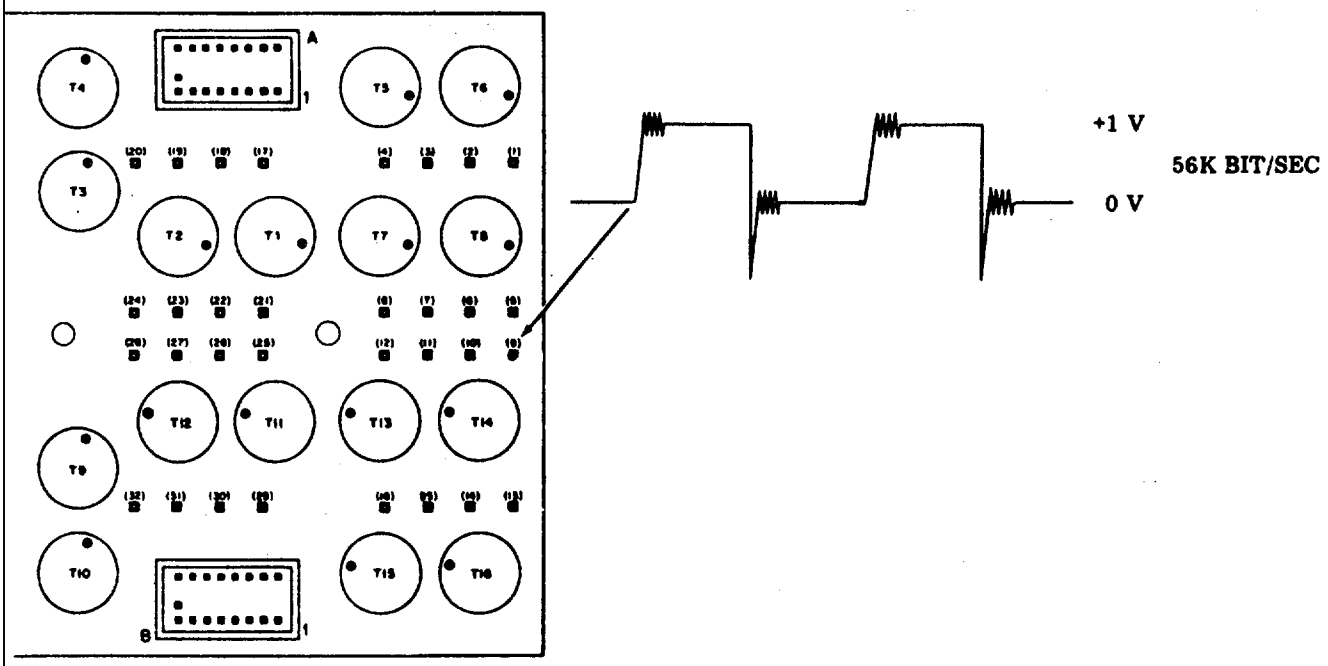


410157 CIRCUIT CARD

CHART 8 (Cont)

CONTROLLER ANALYSIS -- 40C436/ADA/092, 40C436/ADD/093,
40C436/ADK/075, 40C436/ADN/094 AND 40C436/ADU/095

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
8. On sets with printers, can information on display be transferred to printer by depressing PRINT LOCAL? NOTE: The printer under test must be connected to a Print Local controller part. Refer to applicable controller arrangement form.	Place DCC in service	Go to 9.
9. Do SSI signals appear at posts 9, 10, 11, and 12 (printer SSI) for printer connected to J310, posts 13, 14, 15 and 16 for printer connected to J309 or posts 1, 2, 3 and 4 for printer connected to J310 of 410157 circuit card on right wall of controller?	Check wiring to printer. Refer to WDPs supplied with set. (Continuity test)	Replace 410406 circuit card in slot 4. Replace 410157 circuit card.



D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 8 (Cont)

CONTROLLER ANALYSIS -- 40C436/ADA/092, 40C436/ADD/093, 40C436/ADK/075, 40C436/ADN/094 AND 40C436/ADU/095

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
10. SCC or MCC CONTROLLER When the station is connected to the line and the LCU is polling the station and station is not responding to poll do the receive mark and space lamps flash on the 410411 circuit card in the SCC or MCC?	Go to 12.	Go to 11.
11. Is there a -5 to +5 V dc (-5 V mark +5 V space) character signal at pin 4 of OCI2 on the 410157 circuit card mounted on the right wall of the controller container?	Go to 12.	Go to 14.
12. Is there -5 to +5 V dc bit clock signal at pin 5 of OCI6 of the 410157 circuit card.	Check wiring to controller back-panel. Replace 410411 circuit card.	Go to 13.
13. Is there a 0 to +1.5 V bit clock signal at Post 40 of the 410157 circuit card. NOTE: Ground scope to Post 39 to measure this signal.	Replace 410157 circuit card.	Check wiring to interface assembly. Check that bit clock is being supplied to interface.

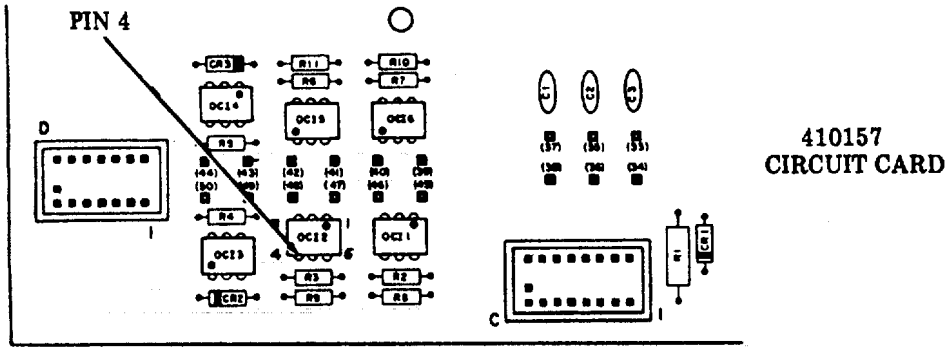


CHART 8 (Cont)

CONTROLLER ANALYSIS -- 40C436/ADA/092, 40C436/ADD/093,
40C436/ADK/075, 40C436/ADN/094 AND 40C436/ADU/095

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
14. Is the 0 to 1.5 V (O V mark + 1.5 V dc space) character signal at post 47 of the 410157 circuit card. NOTE: Ground scope at post 48 to measure this signal.	Replace 410157 circuit card.	Check wiring to interface assembly.
15. When the station is sending, do the send mark and space lamps flash on the 410411 circuit card?	Go to 16;	Go to 18.
16. Is the 0 to +1.5 V dc (O V mark, +1.5 V space) character signal at pin 1 of OCI4 of the 410157 circuit card mounted on the right wall of the controller.	Go to 17. Replace 410411 circuit card.	Check wiring to controller back panel.
17. Is there a 0 V to +1 V (O V mark , 1 V space) at post 43 of the 410157 circuit card? NOTE: Connect scope ground to post 39 to measure this signal.	Check wiring to interface assembly.	Replace 410157 circuit card.
18. Is there a -5 to +5 V dc bit clock signal at pin 5 of OCI1 on the 410157 circuit card?	Go to 20.	Go to 19.
19. Is there a 0 to +1.5 V dc character clock signal at post 45 of the 410157 circuit card. NOTE: Ground scope at post 48 to measure the signal.	Replace 410157 circuit card.	Check wiring to interface assembly. Check that bit clock is being supplied to interface.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 8 (Cont)

CONTROLLER ANALYSIS -- 40C436/ADA/092, 40C436/ADD/093, 40C436/ADK/075, 40C436/ADN/094 AND 40C436/ADU/095

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
20. Is there a +5 V dc signal at pin 5 of OCI5 on the 410157 circuit card?	Go to 18.	Go to 17.
21. Is there 0 V dc signal at post 42 of the 410157 circuit card. NOTE: Ground scope at post 41 to measure this signal.	Replace 410157 circuit card.	Check wiring to interface. Check that Clear-to-Send signal is being supplied to interface.
22. Is there a +1.5 V dc signal at pin 2 of OCI3 on the 410157 circuit card?	Go to 19.	Replace 410411 circuit card.
23. Is there approximately a I V dc signal at post 50 on the 410157 circuit card. NOTE: Ground scope at post 49 to measure this signal.	Check wiring to interface.	Replace the 410151 circuit card.
24. Is there a +5 V dc signal at post J3 of 410555 circuit cards mounted on right side of controller?	Go to 25.	Check wiring to back panel. Check 407548 and 407549 cables.

CHART 8 (Cont)

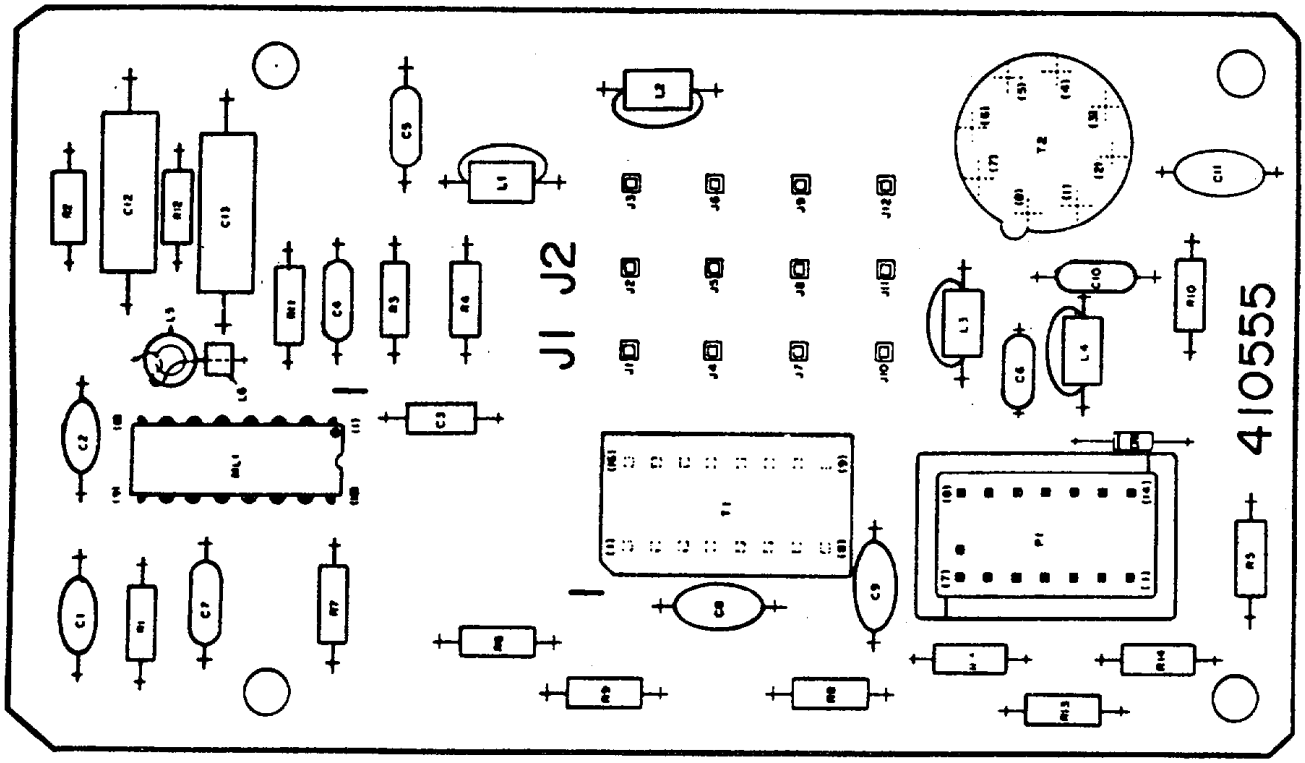
CONTROLLER ANALYSIS -- 40C436/ADA/092, 40C436/ADD/093,
40C436/ADK/075, 40C436/ADN/094 AND 40C436/ADU/095

ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
25. Are the following signals present at posts indicated below?	Check wiring to monitor.	Go to 26.

POST J2
VIDEO

POST J4
HORIZ

POST J9
VERT



410555 Circuit Card

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 8 (Cont)

CONTROLLER ANALYSIS -- 40C436/ADA/092, 40C436/ADD/093, 40C436/ADK/075, 40C436/ADN/094 AND 40C436/ADU/095

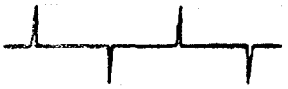
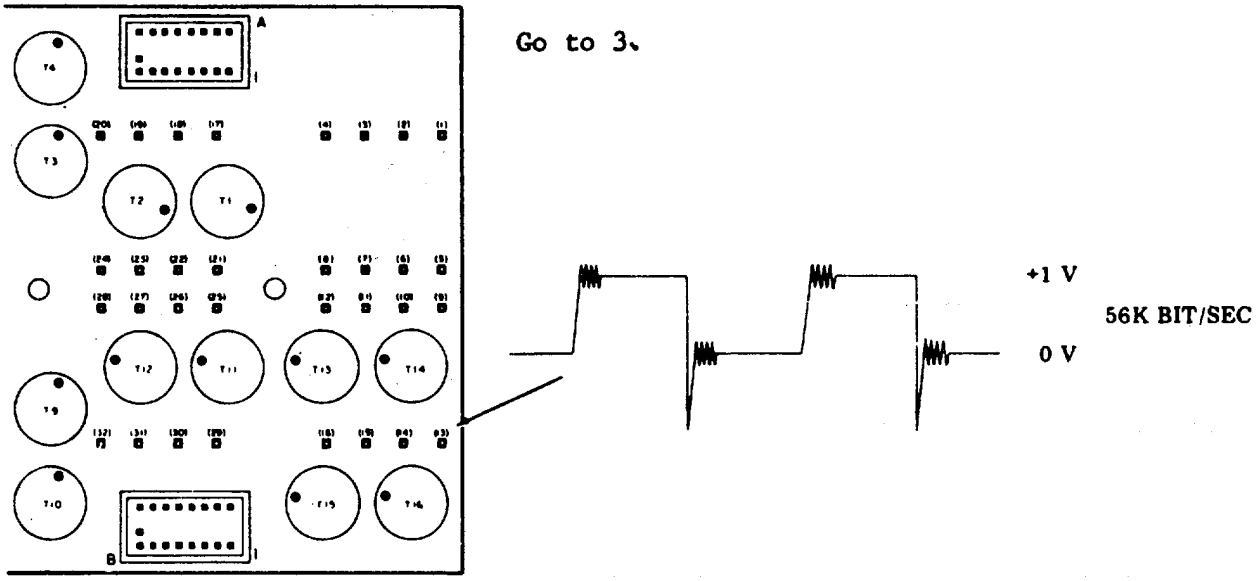
ANALYSIS QUESTION	"YES" 'RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
26. Remove cable plugged into connector A of 410555 circuit card. Are the following signals present at pins of the cable indicated below? Pin 6 Video  Pin 1 Horiz  Pin 13 Vert 	Replace 4104555 circuit card.	Replace D I/O circuit card.

CHART 9

CONTROLLER ANALYSIS -- 40C438/AEP/105

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO"' RESPONSE DIRECTIVE
1. Does set have a full opcon?	Go to 2.	
2. Do SSI signals appear at posts 13, 14, 1'5, and 16 (opcon SSI) of 410158 circuit card on right wall of controller?	Check wiring. to opcon. Refer to WDPs supplied with set. (Continuity test)	Replace 410406 circuit card in slot 4. Replace 410158 circuit card.



D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 9 (Cont)

CONTROLLER ANALYSIS -- 40C438/AEP/105

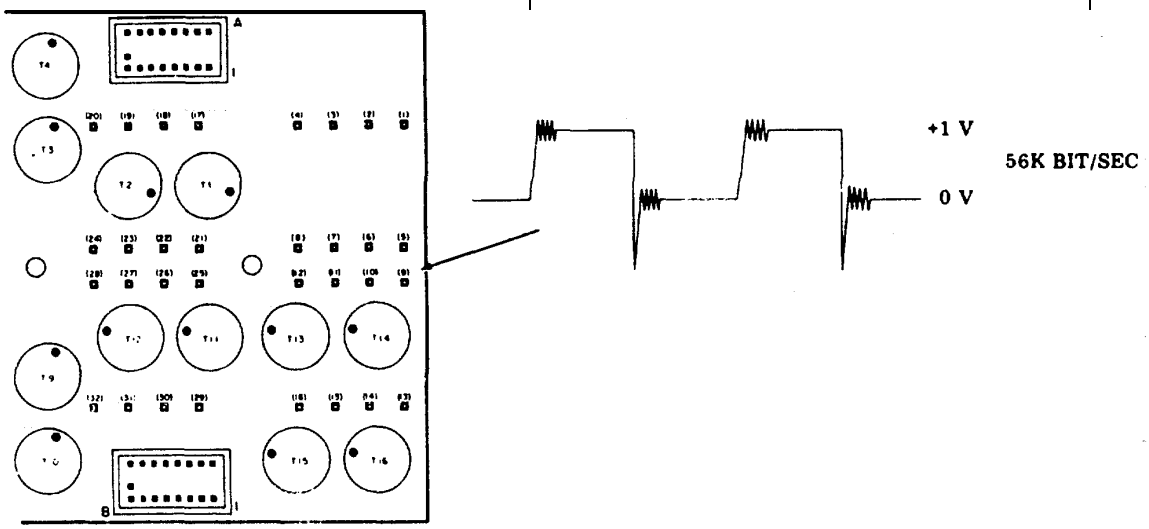
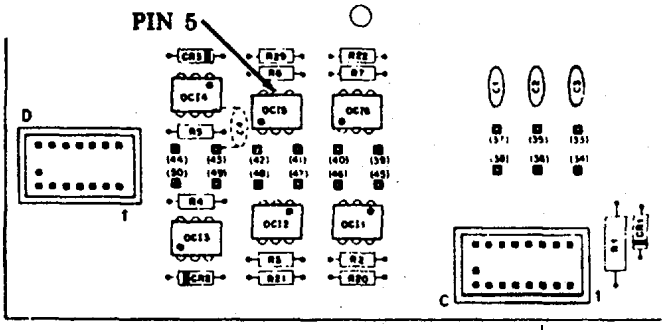
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
3. Do SSI signals appear at posts 9, 10, 11, and 12 (printer SSI) of 410158 circuit card on right wall of controller?	Check wiring to printer. Refer to supplied with set. card. (Continuity test)	Replace 410406 circuit card in slot 4. Replace 410158 circuit
 410158 Circuit Card		
4. Place set in LOCAL mode. If set is full duplex, temporarily add a strap between terminals 2 and 3 of TB101 in interface assembly. For this test, clear-to-send input must be turned on or temporarily remove 303181 circuit card in slot Z4 of interface assembly. Do characters generated on the keyboard appear on printer?	Place in service: (1) Remove strap on TB101 if installed. (2) (Replace 303181 circuit card in slot Z4 of interface assembly if removed.	Go to 5.

CHART 9 (Cont)
CONTROLLER ANALYSIS -- 40C438/AEP/105

ANALYSIS QUESTION	YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
5. When sending characters, do the send mark and space lamps on 410411 CIU circuit card flicker?	Go to 8.	Go to 6.
6. Is there approximately a +5 V dc signal at pin 5 of OCI5 on 410158 circuit card on right wall of controller?  410158 CIRCUIT CARD	Replace 410411 circuit card.	If 303181 circuit card was removed from interface assembly, replace 410158 circuit card. If clear-to-send input to set was turned on, go to 7. 410158
7. Is there a 0 V dc signal at post 42 of 410158 circuit card? set. NOTE: When checking this signal, the scope or meter common should be connected to post 38.	Replace 410158 circuit card. in WDP supplied with	Check wiring to interface. Refer to 9617WD
8. Is there a 0 to +1.5 V dc inverted data signal at pin 1 of OCI4 on 410158 circuit card?	Go to 9. Replace 410411 circuit	Check cable to 410158 circuit card. card.
9. Is there a 0 to +1 V dc inverted data signal at post 43 of 410158 circuit card? NOTE: When checking this signal, the scope or meter common should be, connected to post 38.	Go to 10.	Replace 410158 circuit card.
10. Is Option VI (Isochronous operation) installed in the set?	Go to 11.	Go to 13.

D. TROUBLESHOOTING (Cont)

2. TROUBLESHOOTING CHARTS (Cont)

CHART 9 (Cont)

CONTROLLER ANALYSIS -- 40C438/AEP/105

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
11. Is there an inverted bit clock signal (O to 1.5 V dc) at post 45 (send clock) and post 40 (receive clock) of the 410158 circuit card?	Go to 12.	Check. wiring to interface. Refer to 9617WD in WDP supplied with set.
12. Is there a bit clock signal (+5 V to -5 V) at pin 5 of OCI1 (send clock) and pin 5 of OCI6 (receive clock) on the 410158 circuit card?	Go to 13.	Replace the 410158 circuit card.
13. When sending a character, do the receive mark and space lamps on 410411 CIU circuit card flicker?	Replace 410411 circuit card.	Go to 14.
14. Is there a 0 to +1.5 V dc inverted character signal at post 47 of 410158 circuit card?	Go to 15.	Check wiring in interface. Refer to 9619WD in WDP supplied with set.
15. Is there a -5 to +5 V dc character signal at pin 4 of 0CI2 on 410158 circuit card?	Replace 410411 circuit card.	Replace 410158 circuit card.

E. ADJUSTMENTS AND LUBRICATION

There are no adjustments in the Tempest Model 40 Controller, except that the circuit cards should be seated firmly to assure proper connection.

The controller and back panel should be free of lubrication.

The fans in the ventilation assembly contain sealed bearing assemblies and do not require lubrication.

F. DISASSEMBLY/REASSEMBLY AND PARTS

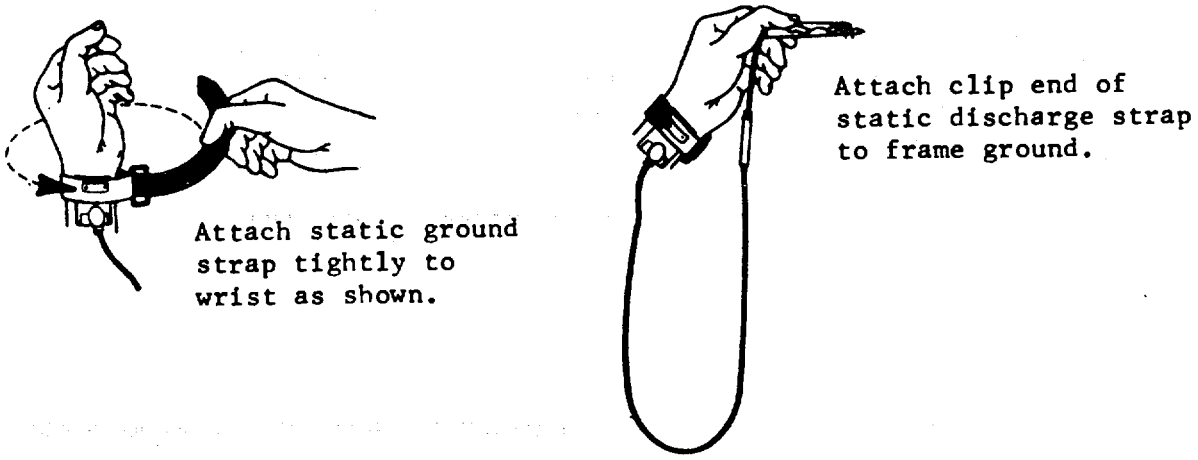
1. GENERAL

This section provides the disassembly/reassembly and parts replacement information needed to service the Tempest Model 40 Controller. Step-by-step procedures are given for all component removal. Disassembly/reassembly of components are given in the form of exploded views.

The following caution procedures must be observed when disassembling.

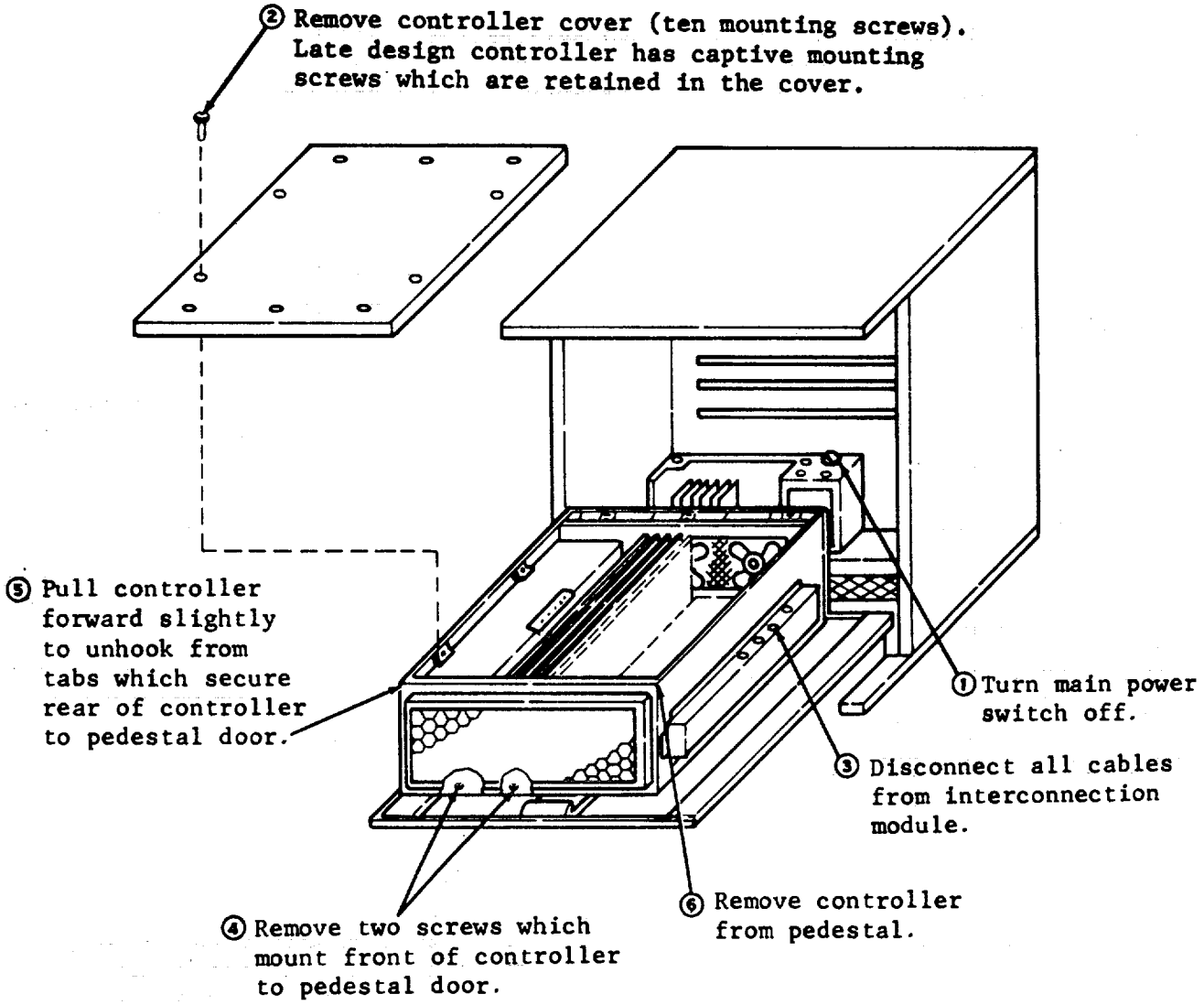
CAUTION 1: TURN OFF ALL POWER OR SIGNAL SOURCES BEFORE REMOVING OR REPLACING ANY COMPONENT.

CAUTION 2: TO AVOID POSSIBLE INTERNAL DAMAGE TO CIRCUITRY, WEAR A 346392 STATIC DISCHARGE STRAP CONNECTED TO GROUND TO ALLOW STATIC DISCHARGE BEFORE HANDLING CIRCUIT CARDS FOR REMOVAL OR REPLACEMENT. AVOID TOUCHING CIRCUIT LANDS AND CARD COMPONENTS AS MUCH AS POSSIBLE.



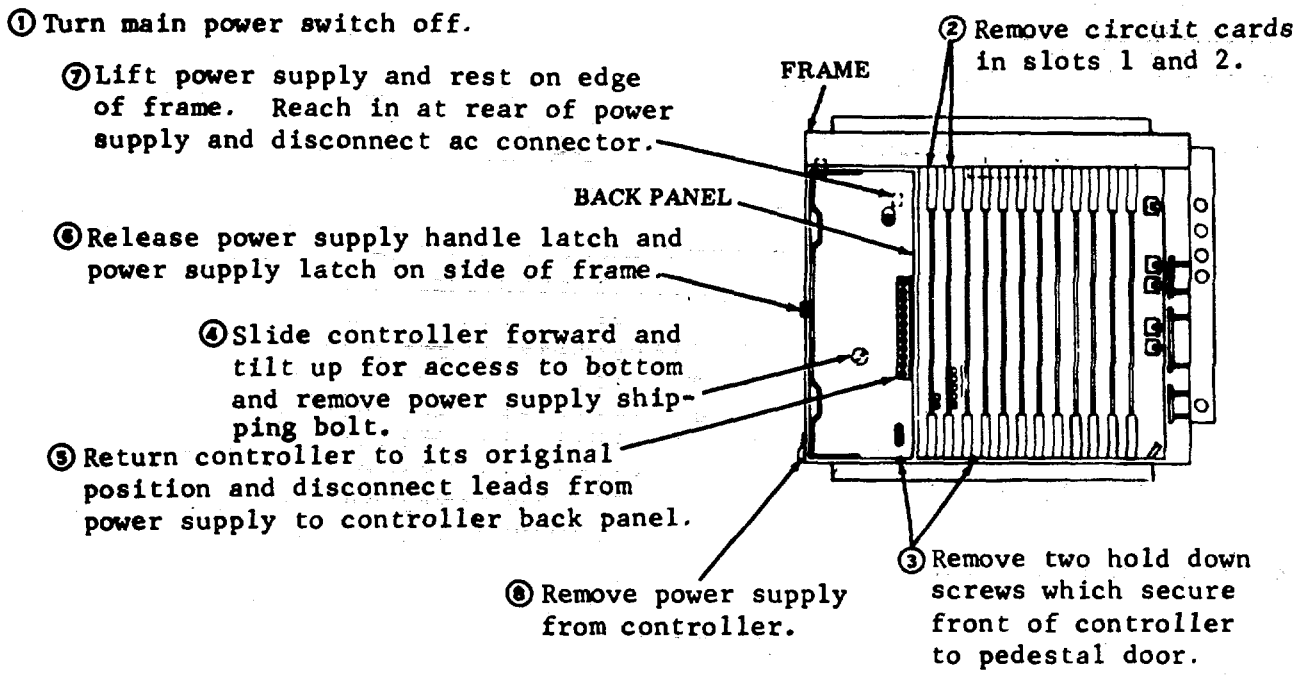
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. REMOVAL AND REPLACEMENT



To install controller in pedestal reverse removal procedures.

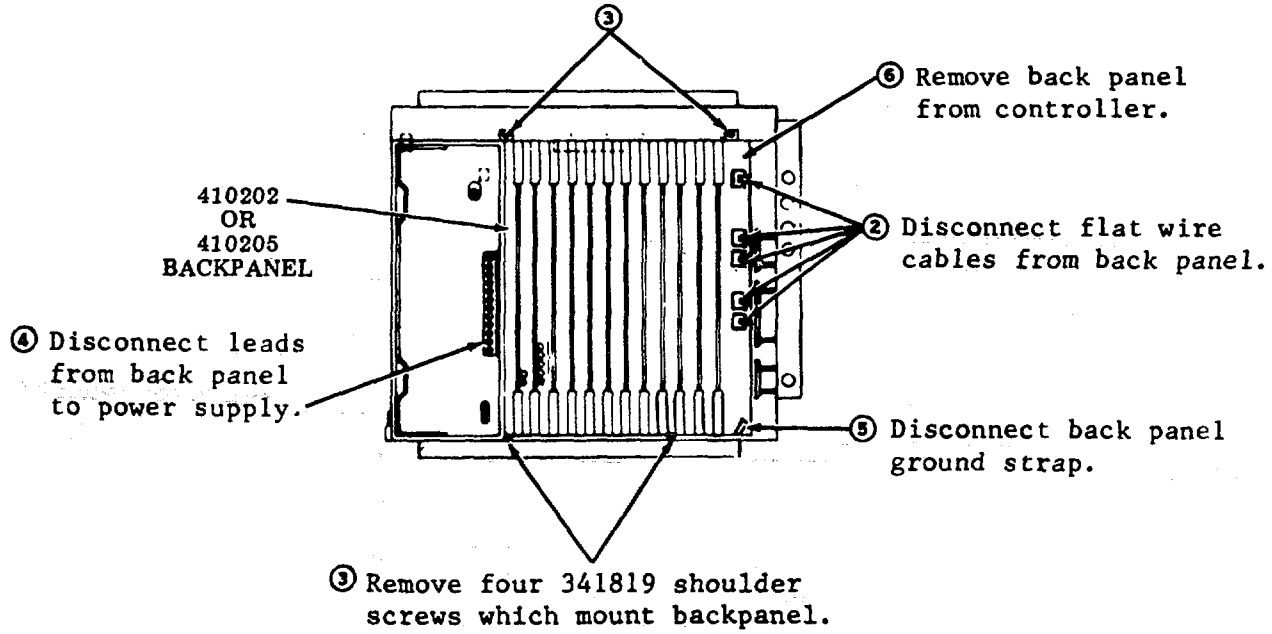
40PSU103 Power Supply (All Controllers)



To install power supply reverse removal procedures.

410202 Backpanel or 410205 Backpanel (40C430, 40C431, 40C432 and 40C433 Controllers.)

(1) Turn main power switch off.

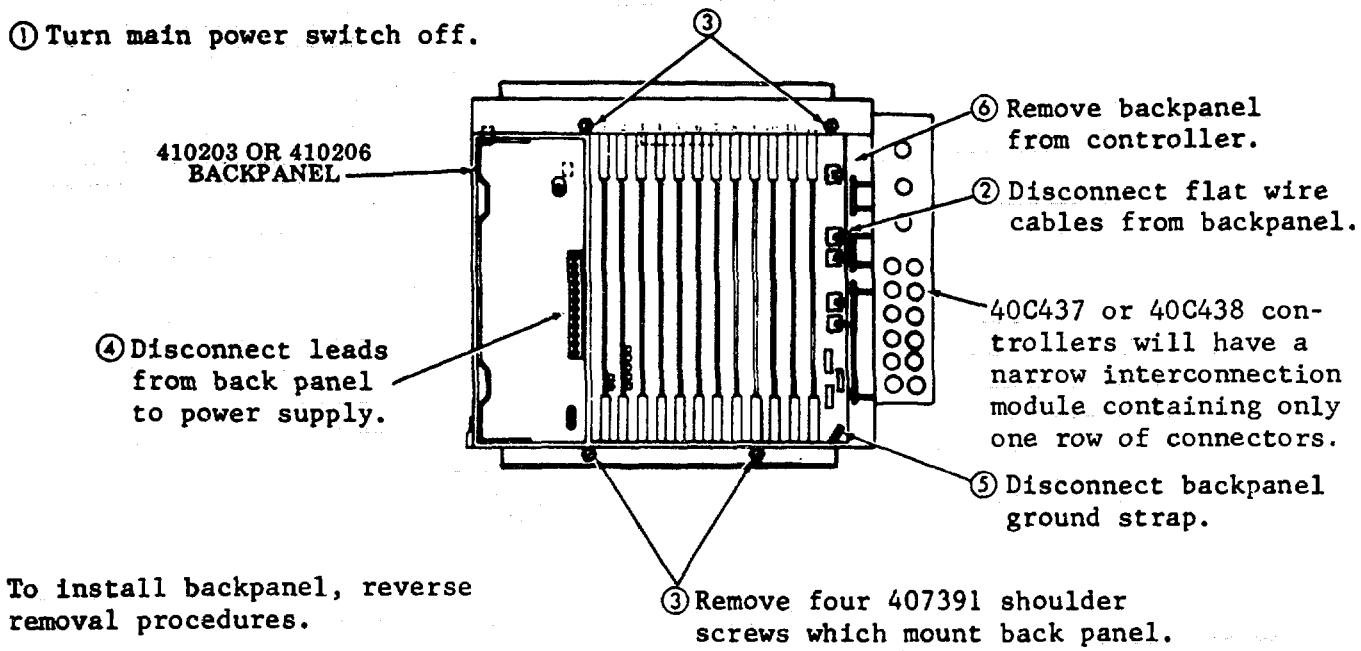


To install backpanel reverse removal procedures.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. REMOVAL AND REPLACEMENT (Cont)

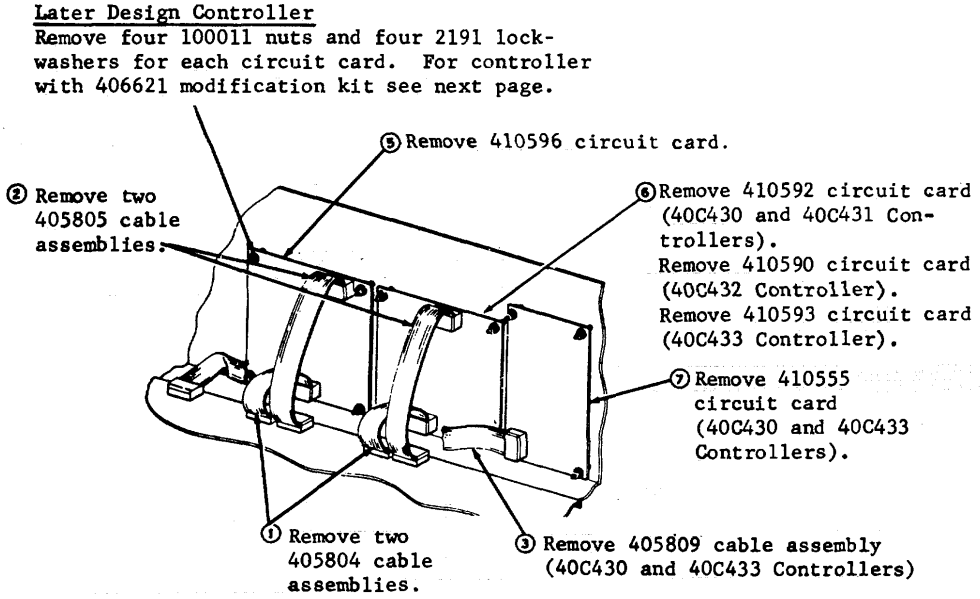
410203 Backpanel (40C434, 40C435, 40C437 or 40C438 Controllers).
410206 Backpanel (400C36 Controller).



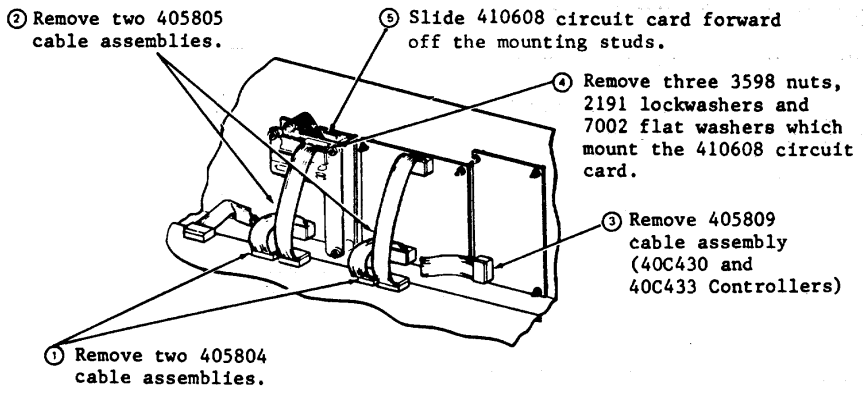
Controller Interface Cards (40C430, 40C431, 40C432 and 40C433 Controllers)

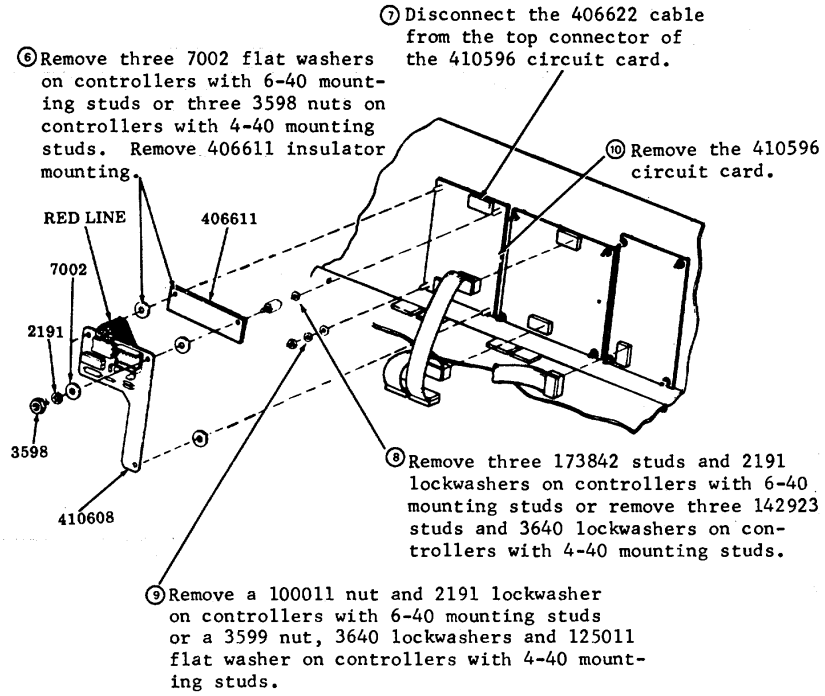
(4) Early Design Controllers

Remove four 3599 nuts, 3640 lockwashers and 125011 flat washers for each circuit card.



Controllers Equipped with 406621 Modification Kit.

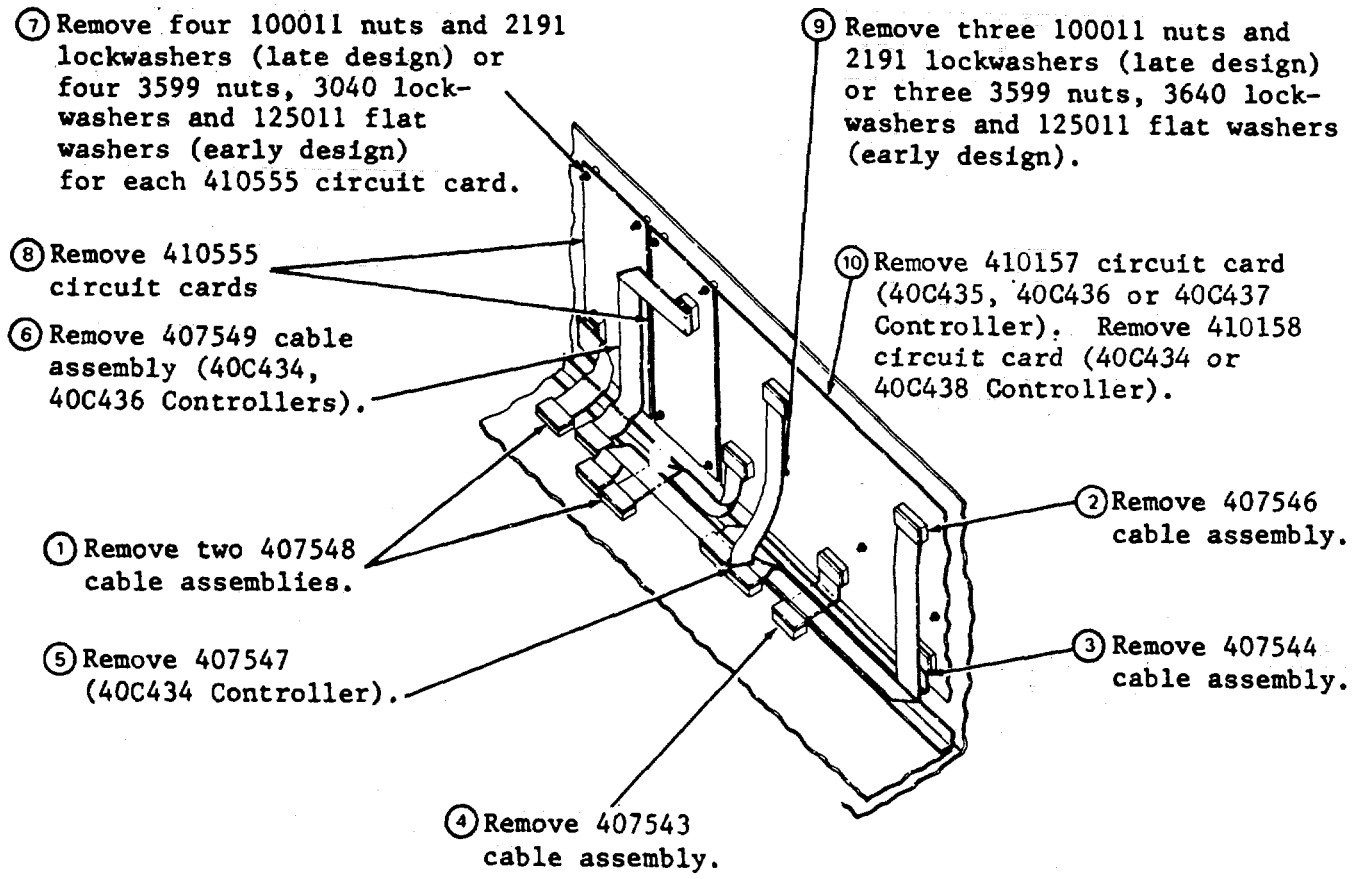




F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

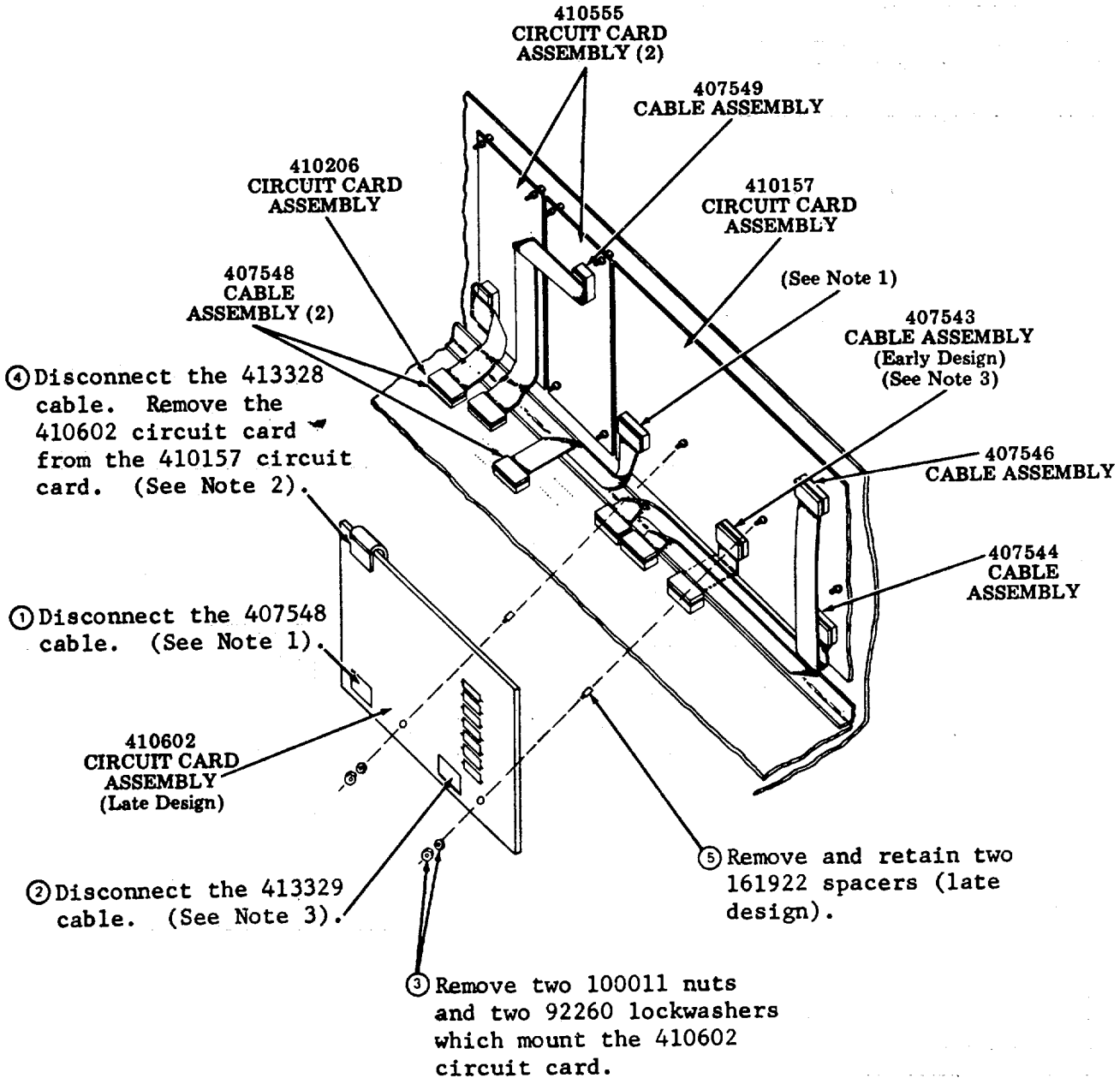
2. REMOVAL AND REPLACEMENT (Cont)

Controller Interface Cards (40C434, 40C435, 40C436, 40C437 and 40C438 Controllers)



To install circuit cards, reverse removal procedures.

40C436 Controllers Equipped With 413330 Modification Kit



NOTE 1: (Early design) 407548 cable connects 410206 and 410157 circuit cards. (Late design) 407548 cable connects 410206 and 410602 circuit cards.

NOTE 2: (Late design) 413328 cable connects 410602 and 410157 circuit cards. (413328 is part of 410602 card).

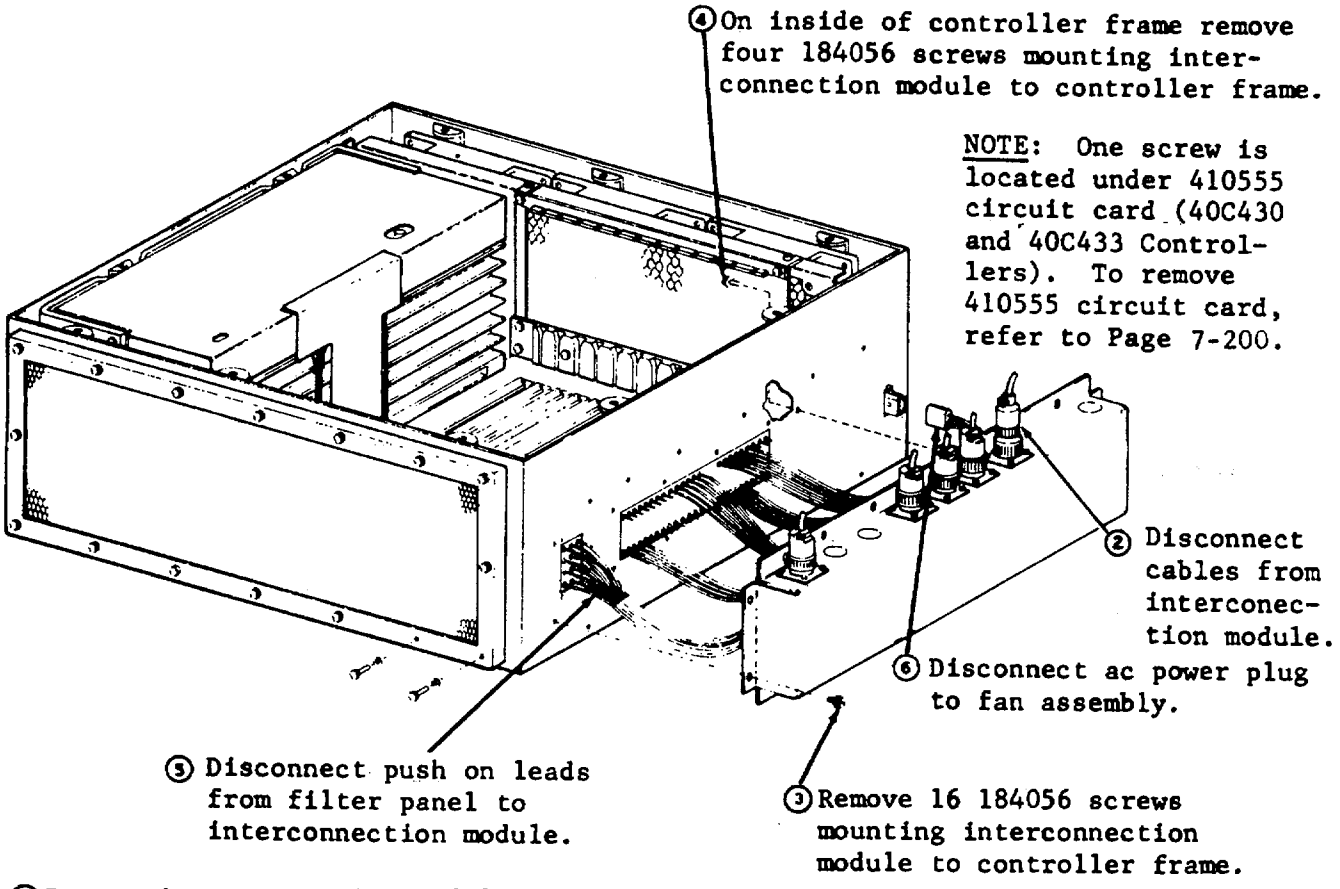
NOTE 3: (Late design) 413329 cable connects 410206 to 410602 to 410157.
To install the 413330 modification kit (comprised of the 410602 circuit card) reverse the removal procedure.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. REMOVAL AND REPLACEMENT (Cont)

Interconnection Module (40C430, 40C431, 40C432 and 40C433 Controllers)

(1)Turn main power switch off.

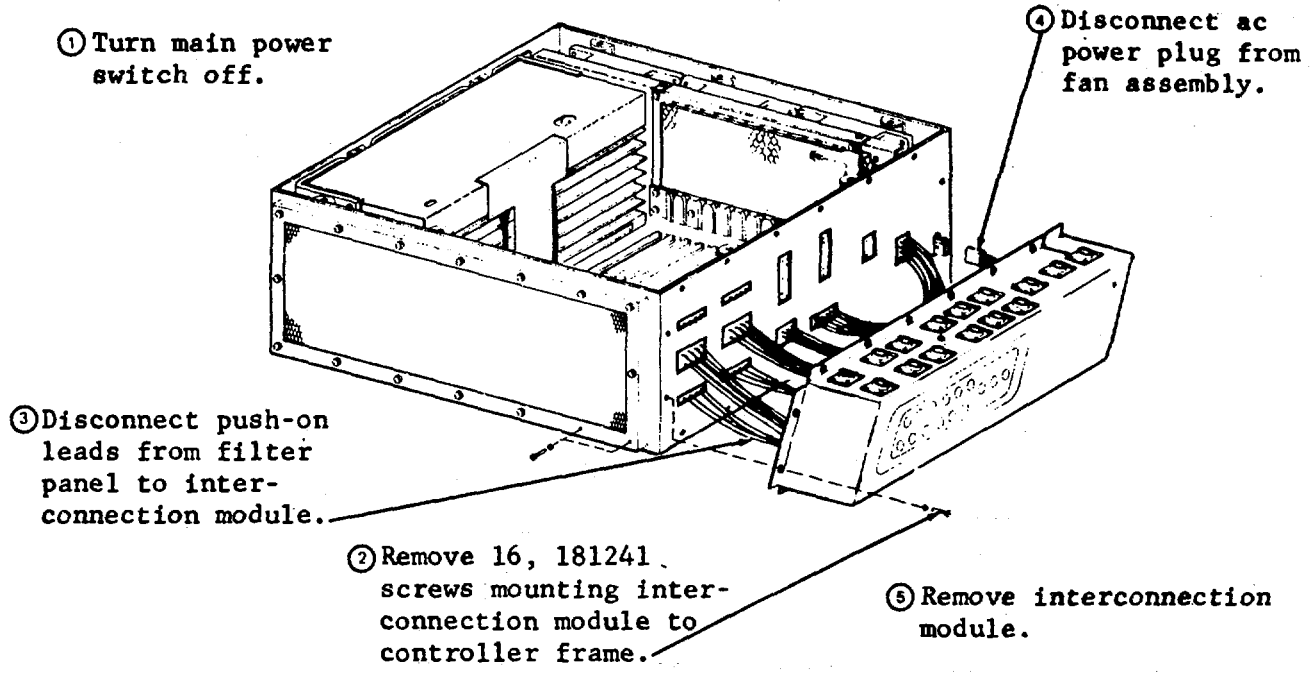


⑦ Remove interconnection module.

To install interconnection module reverse removal procedures. Refer to 9575WD in WDP0461 for 40C430 Controllers, 9575WD in WDP0464 for 40C431 Controllers, 9575WD in WDP0465 for 40C432 Controllers and 9609WD in WDP0476 for 40C433 Controllers.

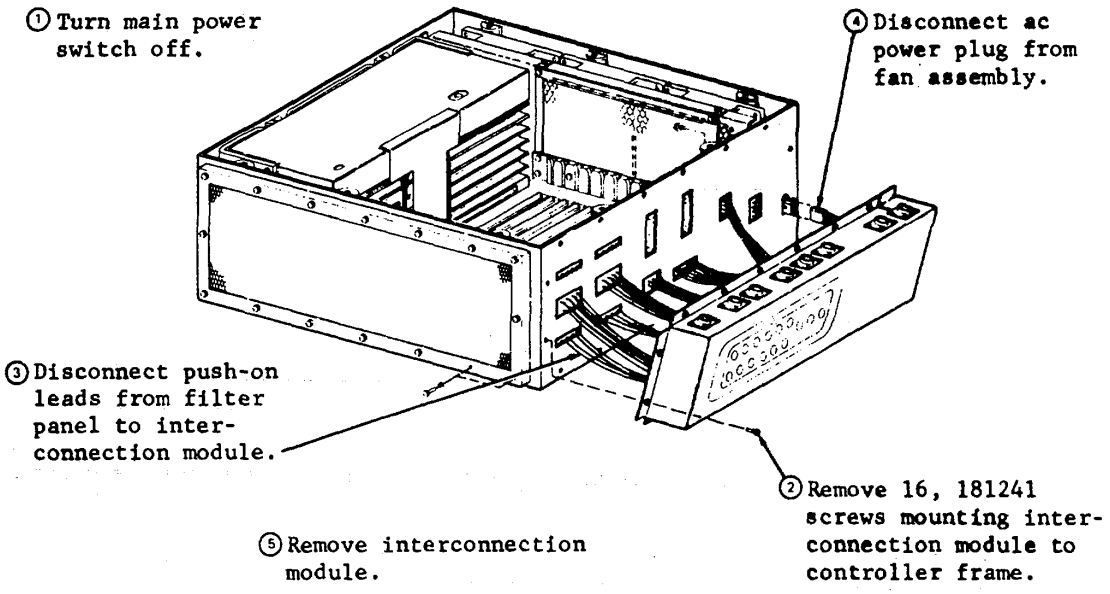
To install interconnection module reverse removal procedures. Refer to 9575WD in WDP0461 for 40C430 Controllers, 9575WD in WDP0464 for 40C431 Controllers, 9575WD in WDP0465 for 40C432 Controllers and 9609WD in WDP0476 for 40C433 Controllers.

Interconnection Module (40C434, 40C435 and 40C436 Controller)



To install interconnection module, reverse removal procedures. For wiring of filter assemblies, refer to WDP0484 for 40C434 Controller, WDP0488 for 40C435 Controller and WDP0524 for 40C436 Controller.

Interconnection Module (40C437 and 40C438 Controllers)

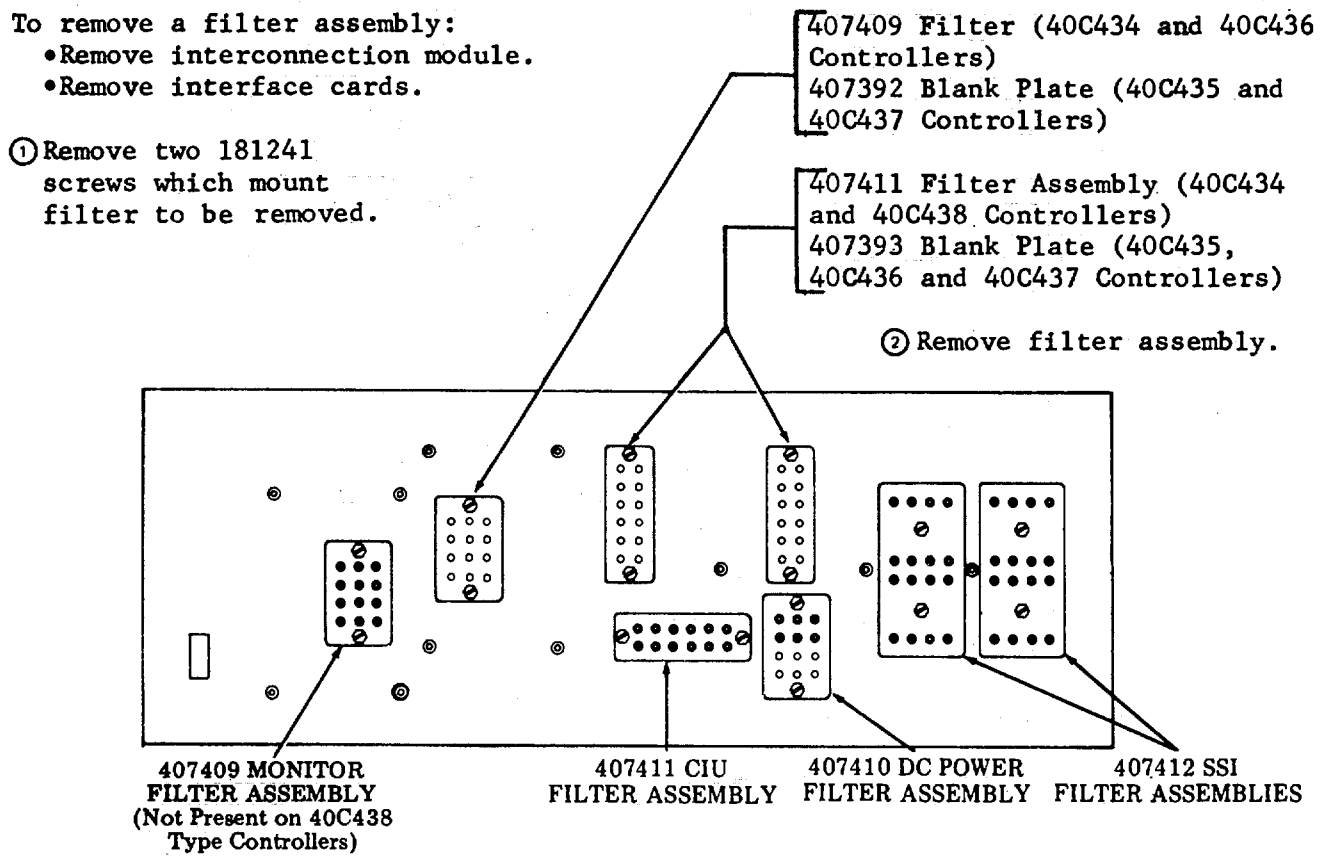


To install interconnection module, reverse removal procedures. For wiring of filter assemblies, refer to WDP0554 for 40C437-Controller and WDP0584 for 40C438 Controller.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. REMOVAL AND REPLACEMENT (Cont)

Filter Assemblies

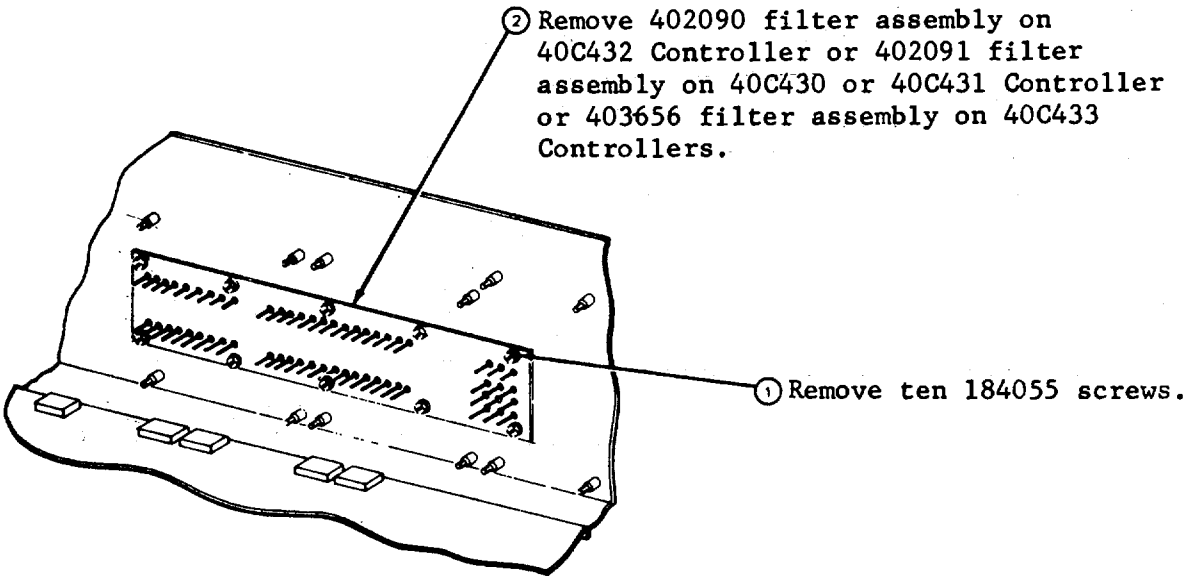


When installing filter assemblies, orientate assembly so that the long filter pins are toward the inside of the controller container.

When installing the 407409 filter assembly in position 1, it must be orientated with the long filter pins toward the inside of the controller and the top row must have two feed-through connectors in positions 2 and 3. When installing the 407409 filter assembly in position 2, it must be orientated with the long filter pins toward the inside of the controller and the bottom row must have feed-through connectors in positions 2 and 3. Feed-through connectors are identified by a glass bead at bottom of connector pin.

402090, 402091 or 403656 Filter Assembly

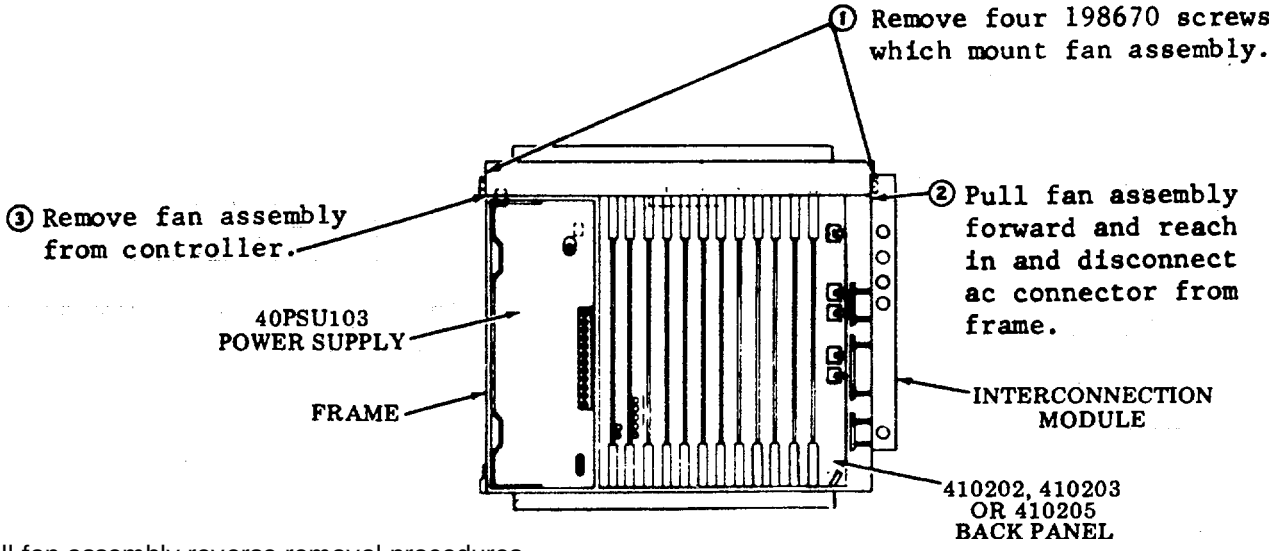
- Remove controller interface cards.



Fan Assembly (40C430, 40C431, 40C432, 40C433, 40C437 and 40C438 Controllers)

- Remove interconnection module. Only disconnect fan ac connector.
- Remove 40PSU103 power supply.
- Remove 410202, 410203, or 410205 back panel.

NOTE: On late design controllers the upper right fan assembly mounting screw is also used to mount a clamp/ground for the 402236 or 402237 monitor cables.

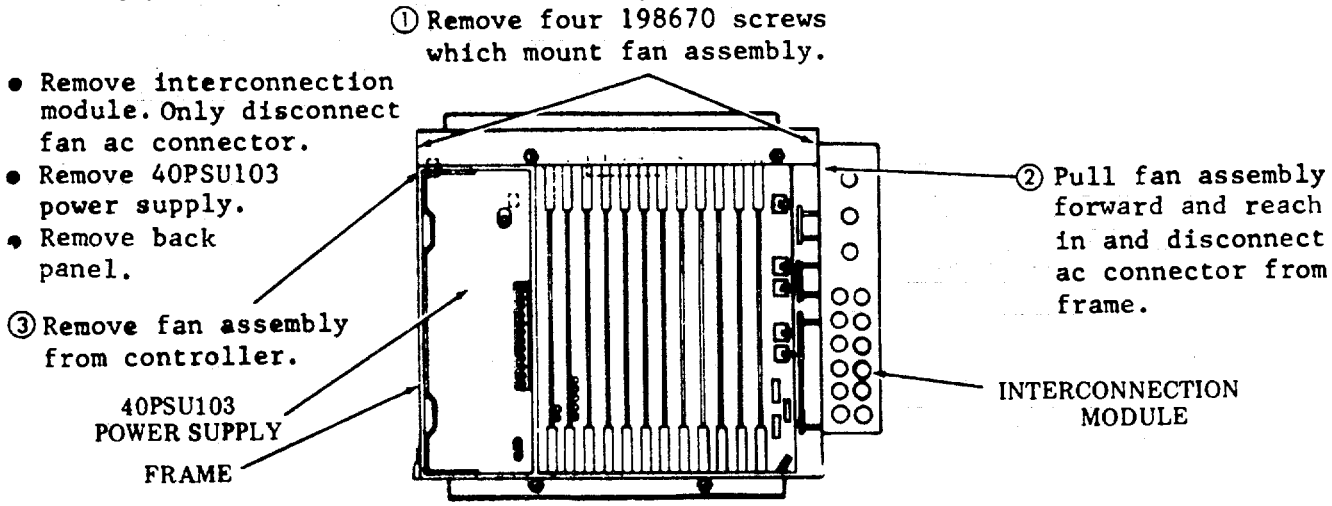


To install fan assembly reverse removal procedures.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. REMOVAL AND REPLACEMENT (Cont)

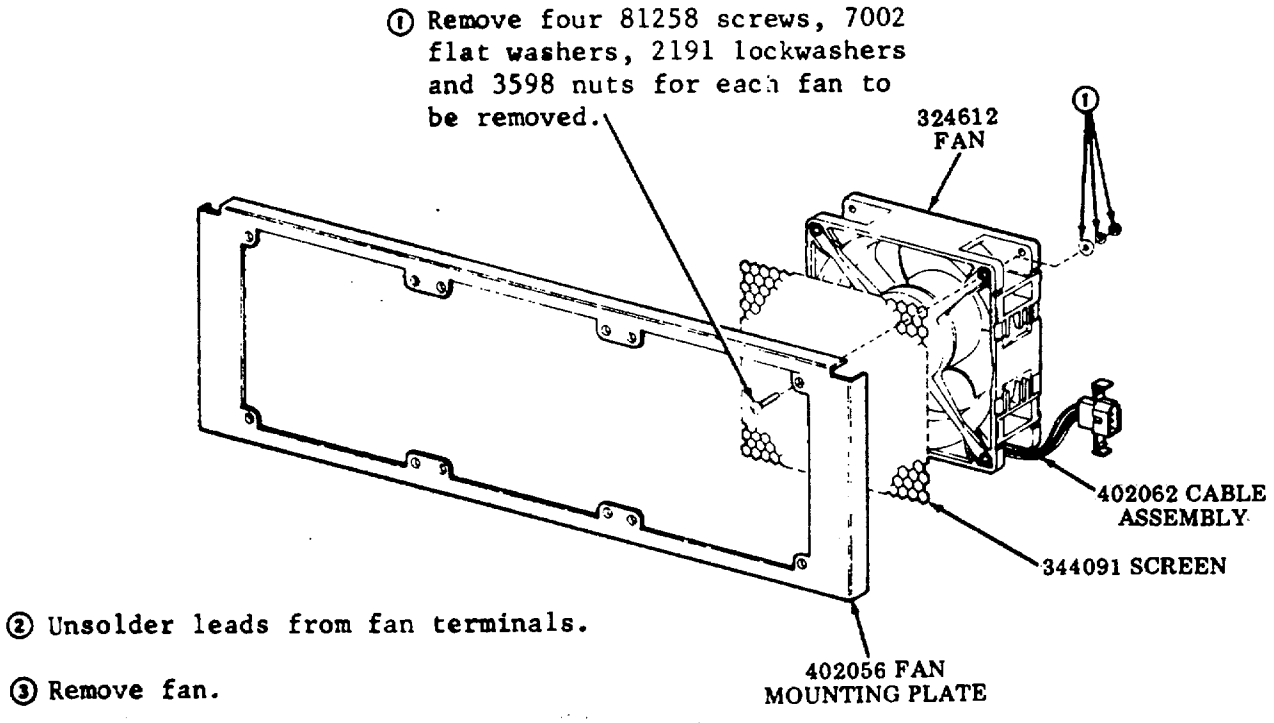
Fan Assembly (40C434, 40C435 and 40C436 Controllers)



To install fan assembly, reverse removal procedures.

3. DISASSEMBLY/REASSEMBLY

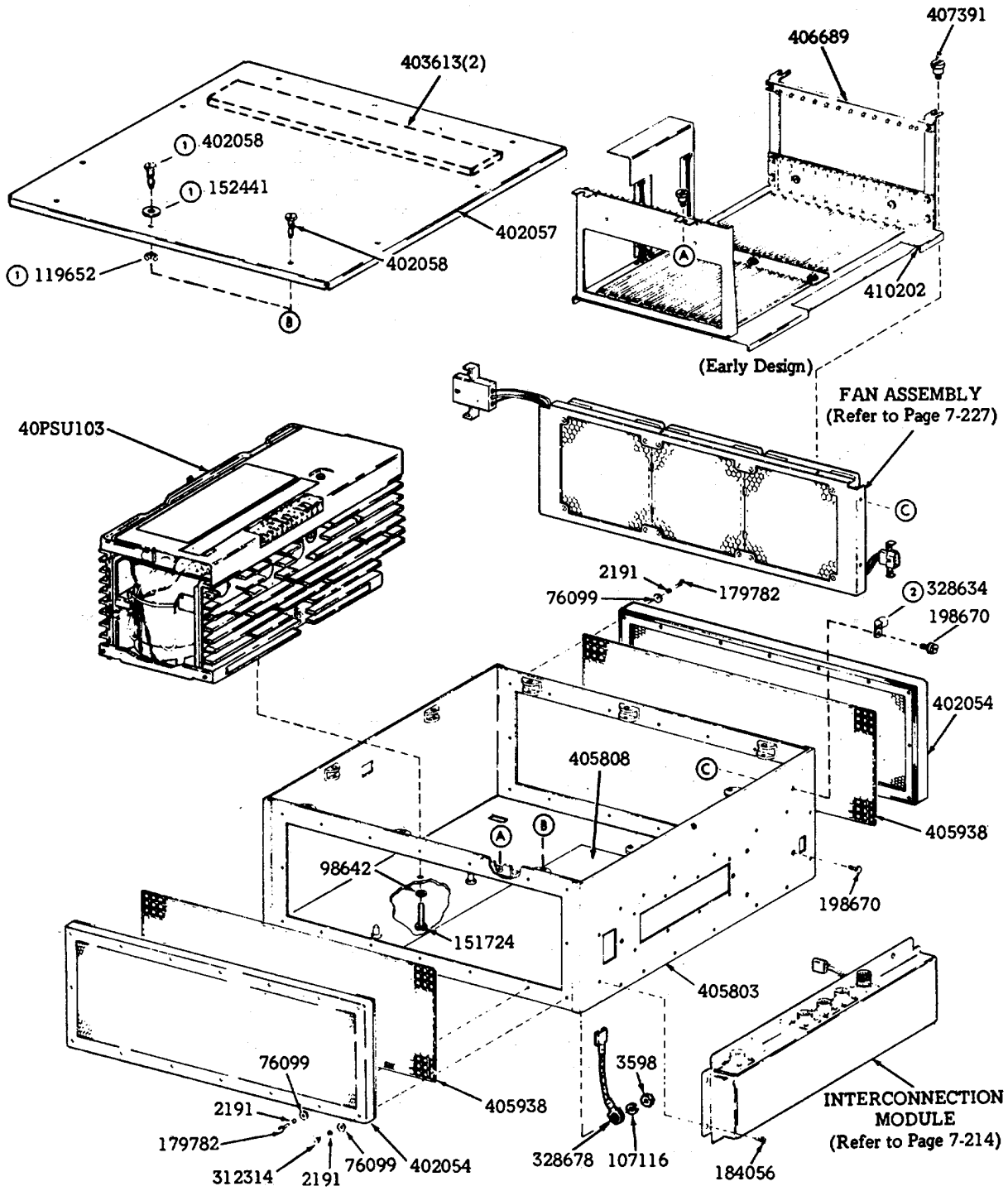
Fan Assembly (All Controllers)



To reassemble fan assembly reverse disassembly procedures. Refer to 9562WD in WDP0461, 0464, 0465, or 0476 for wiring of fan.

4. PARTS

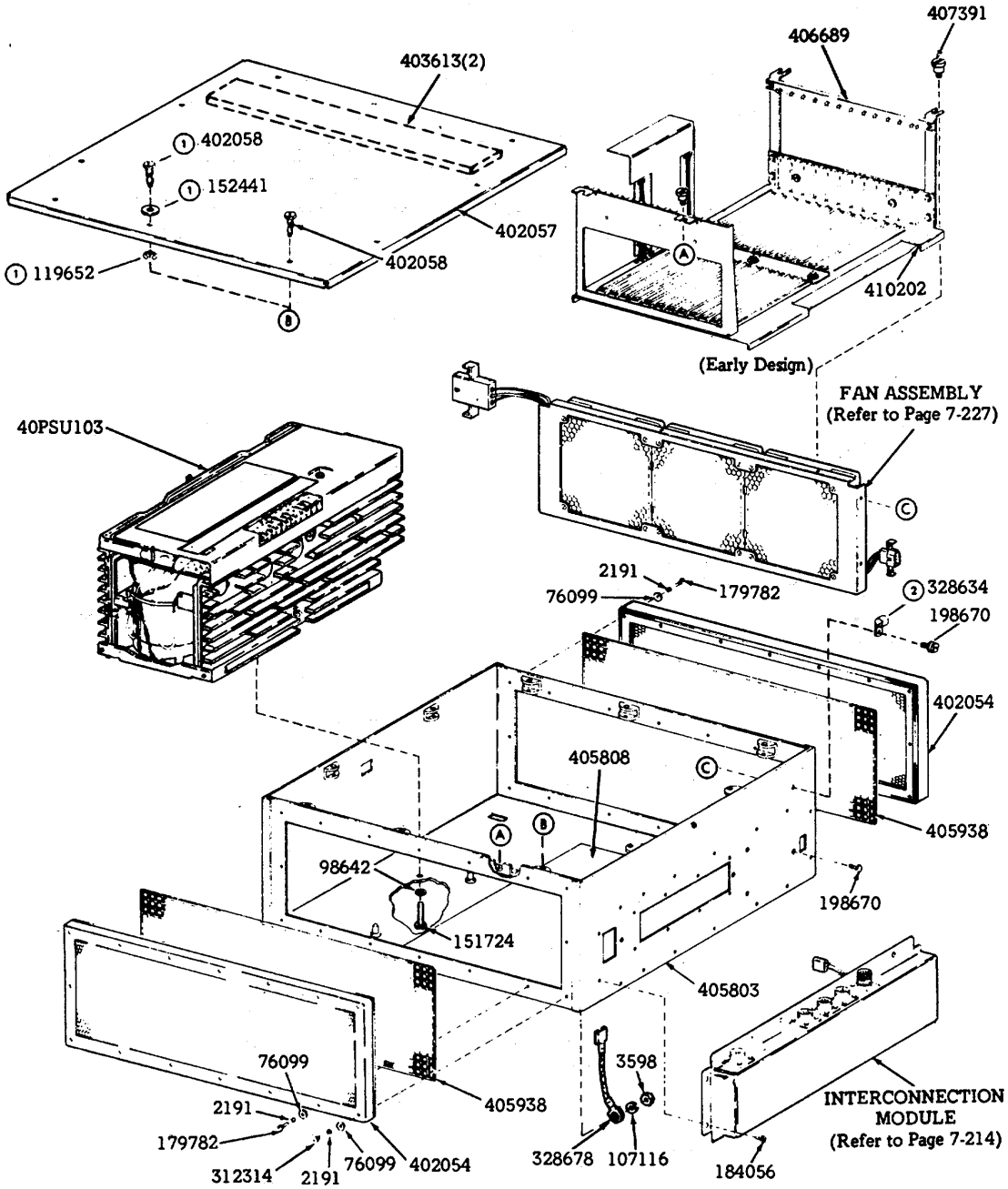
Controller



① Early design controllers were supplied with ten 402058 shoulder screws to mount cover.
Later design controllers have ten 402058 shoulder screws with E-ring and washer to be captive to mount cover.
② Later design controllers have 328634 metal cable clamp for clamping monitor cable.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

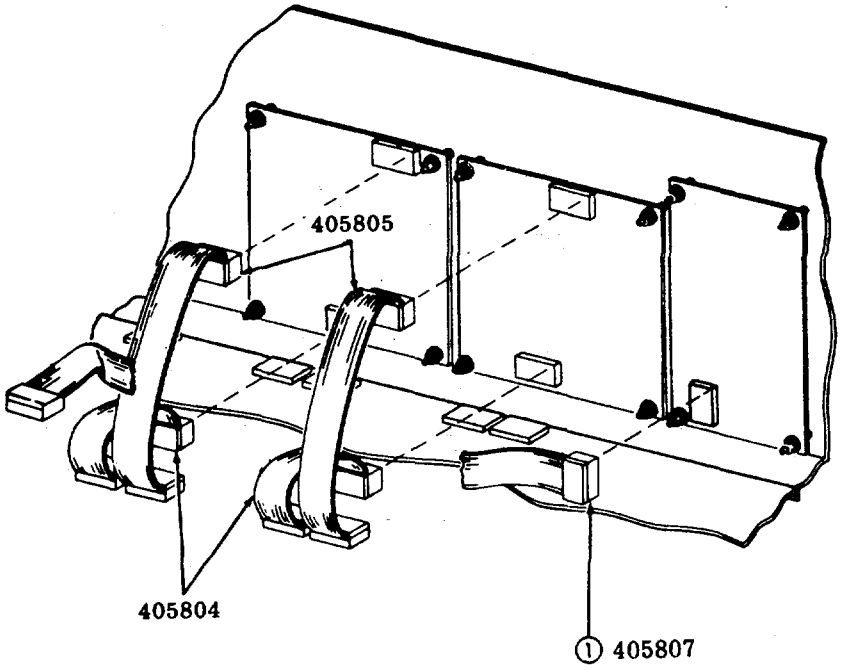
4. PARTS, Controller (Cont)



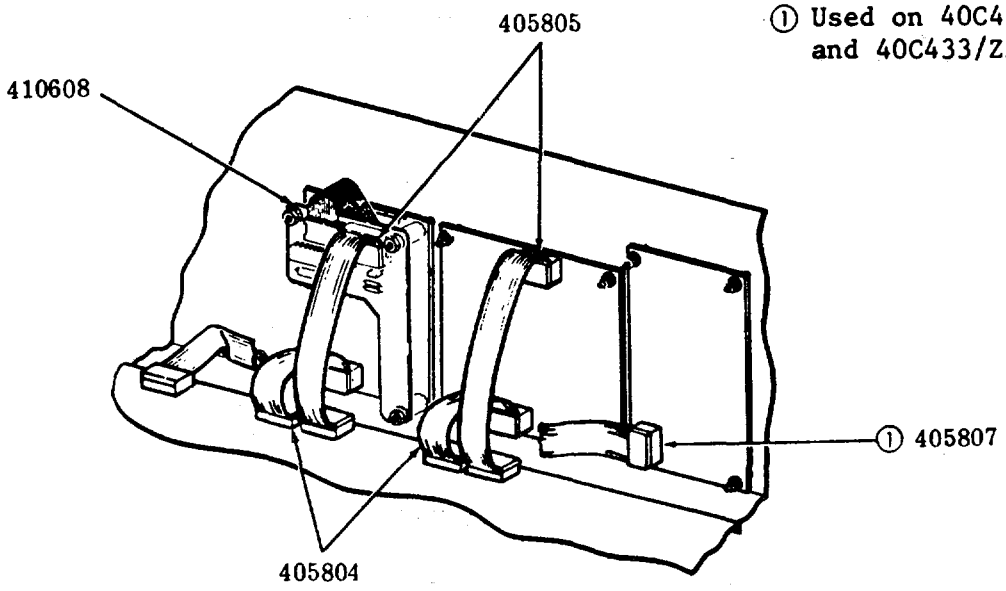
① Early design controllers were supplied with ten 402058 shoulder screws to mount cover.
Later design controllers have ten 402058 shoulder screws with E-ring and washer to be captive to mount cover.
② Later design controllers have 328634 metal cable clamp for clamping monitor cable.

40C430, 40C431, 40C432 and 40C433 Controllers

Connector Cables



① Used on 40C430/ZZZ/000 and 40C433/ZZZ/000.

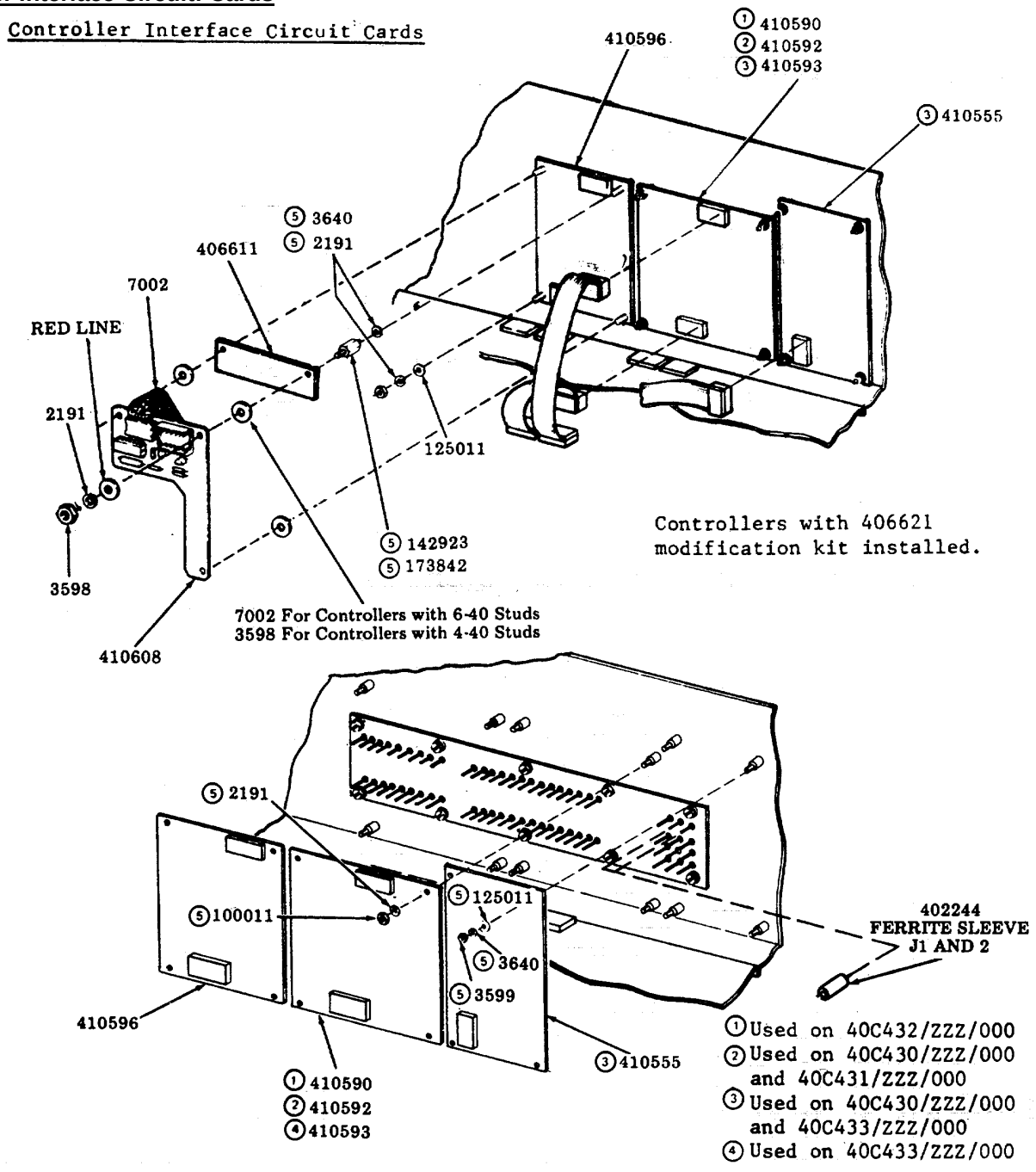


Controllers with 406621 modification kit installed 40C430, 40C431, 40C432 and 40C433 Controllers.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

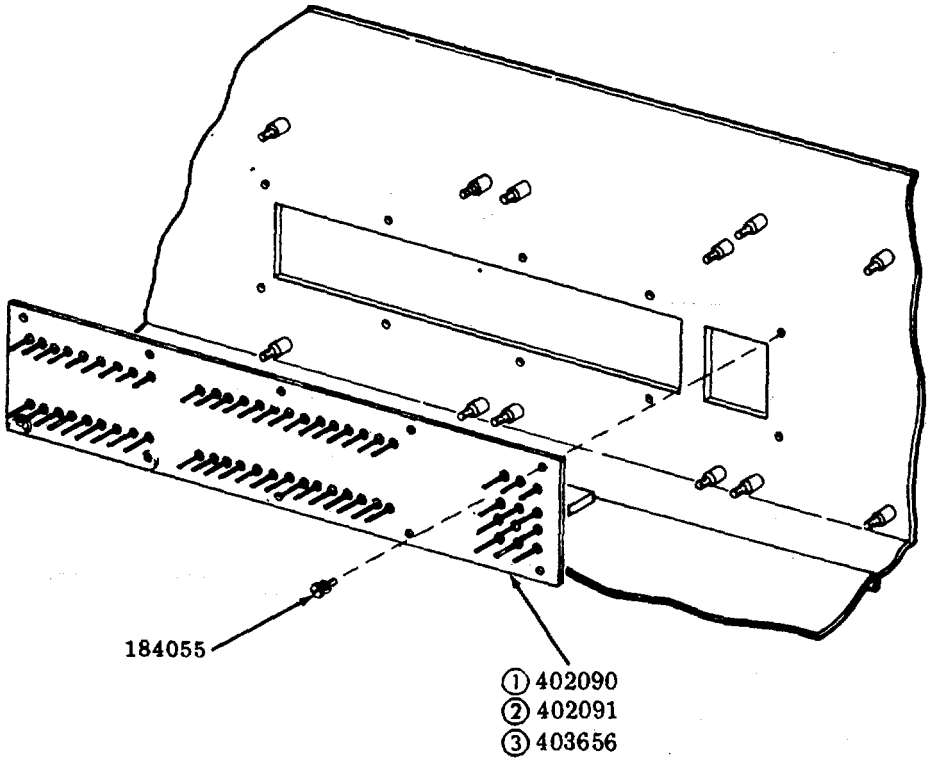
4. PARTS (Cont)

Controller Interface Circuit: Cards



⑤ Early design controllers have interface cards mounted with 125011 flat washers, 3640 lockwashers and 3599 nuts (4-40). Later design controllers have interface cards mounted with 2191 lockwashers and 100011 nuts (6-40).

Feed-Through Panel



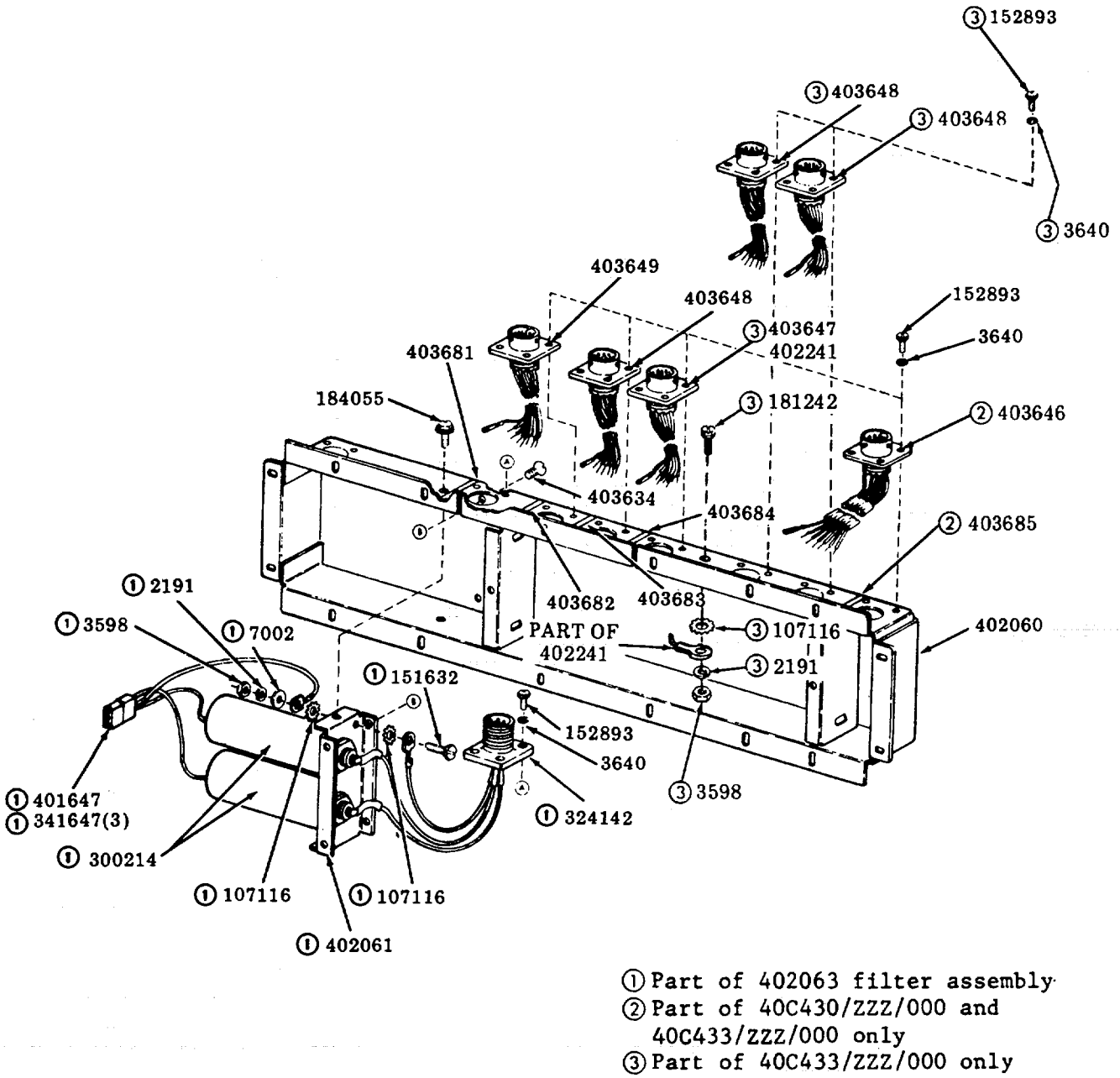
① Used on 40C431/ZZZ/000
and 40C432/ZZZ/000
② Used on 40C430/ZZZ/000
③ Used on 40C433/ZZZ/000

40C430, 40C431, 40C432 and 40C433 Controllers

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

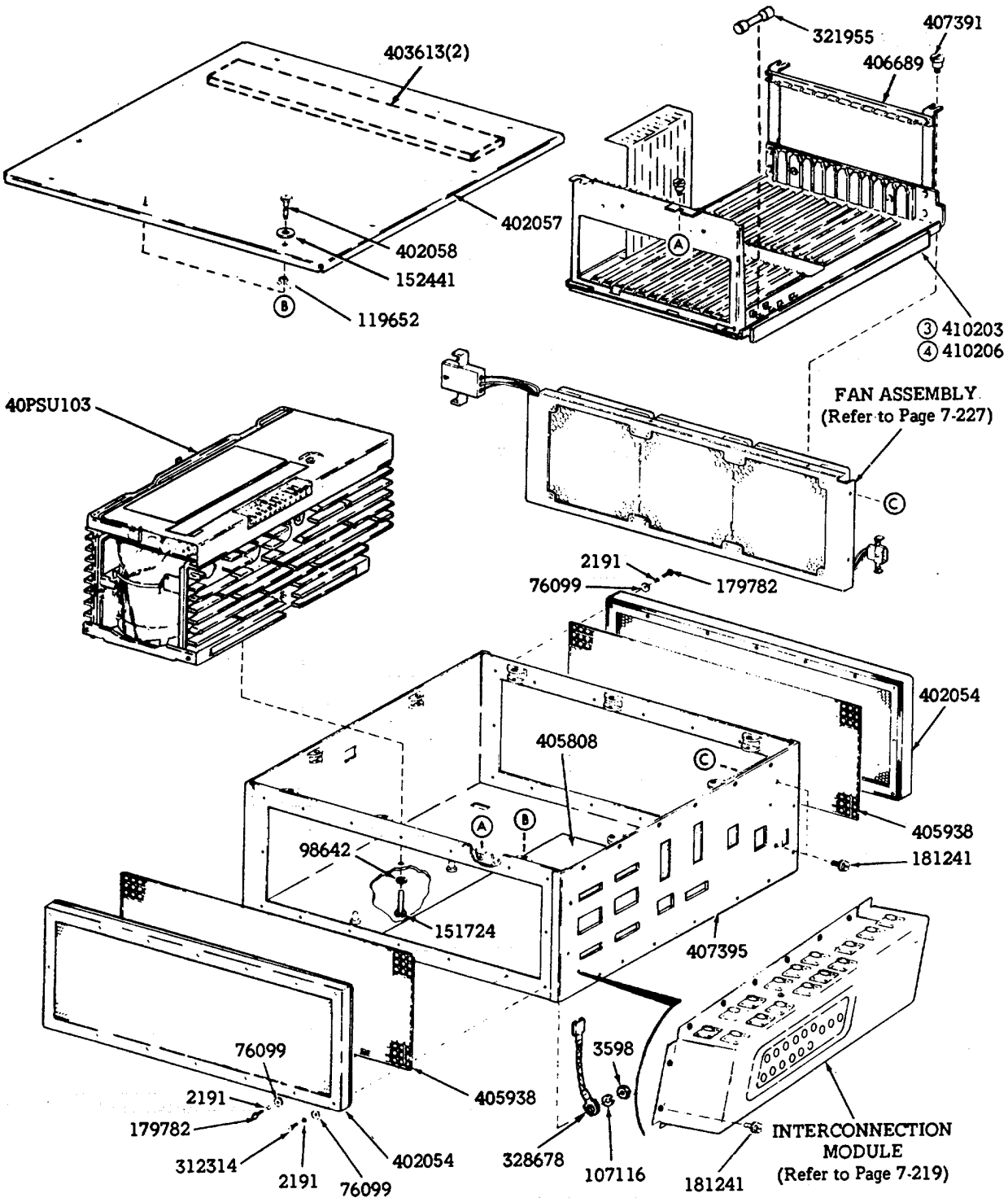
4. PARTS (Cont)

Interconnection Module



40C430, 40C431, 40C432 and 40C413 Controllers

Controller



③ Used on 40C434 and 40C435 Controllers.

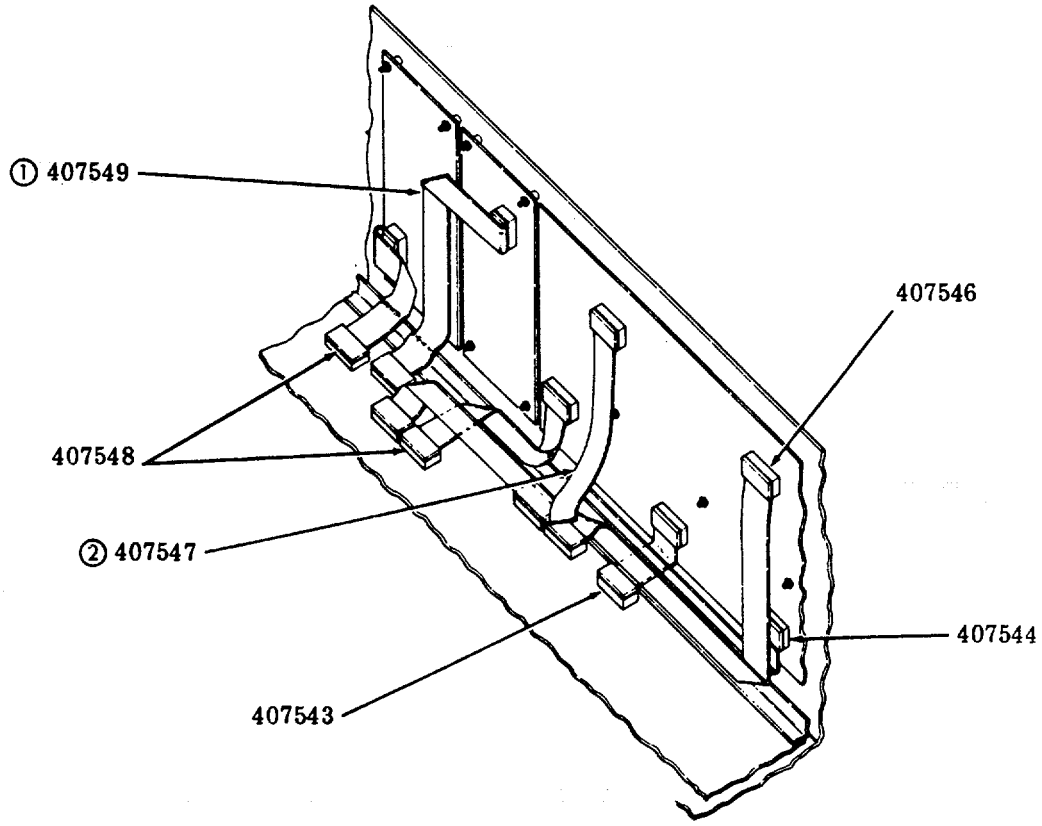
④ Used on 40C436 Controller.

40C434, 40C435 and 40C436 Controllers

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

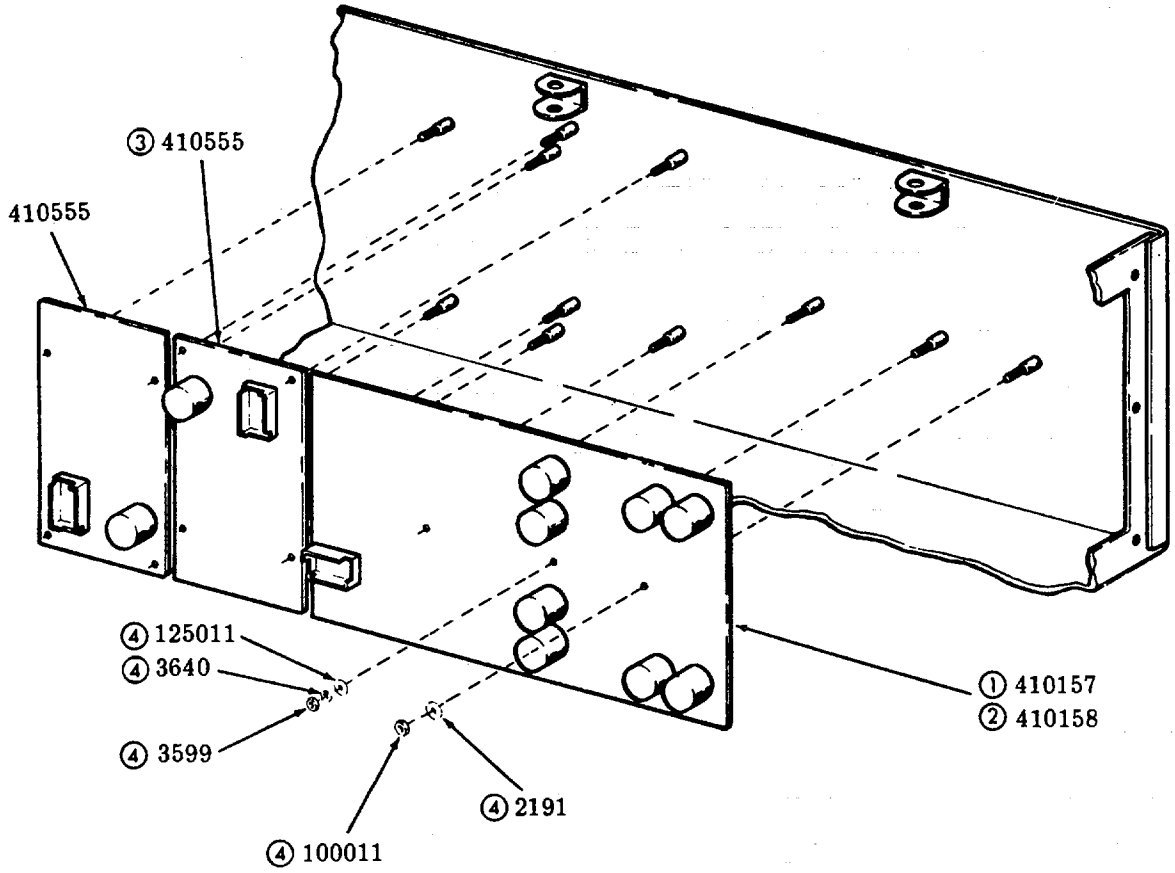
4. PARTS (Cont)

Connector Cables



① Used on 40C434 and 40C436 Controllers.
② Used on 40C434 Controller.

Controller Interface Cards



① Used on 40C435 and 40C436 Controllers.

② Used on 40C434 Controller.

③ Used on 40C434 and 40C436 Controllers.

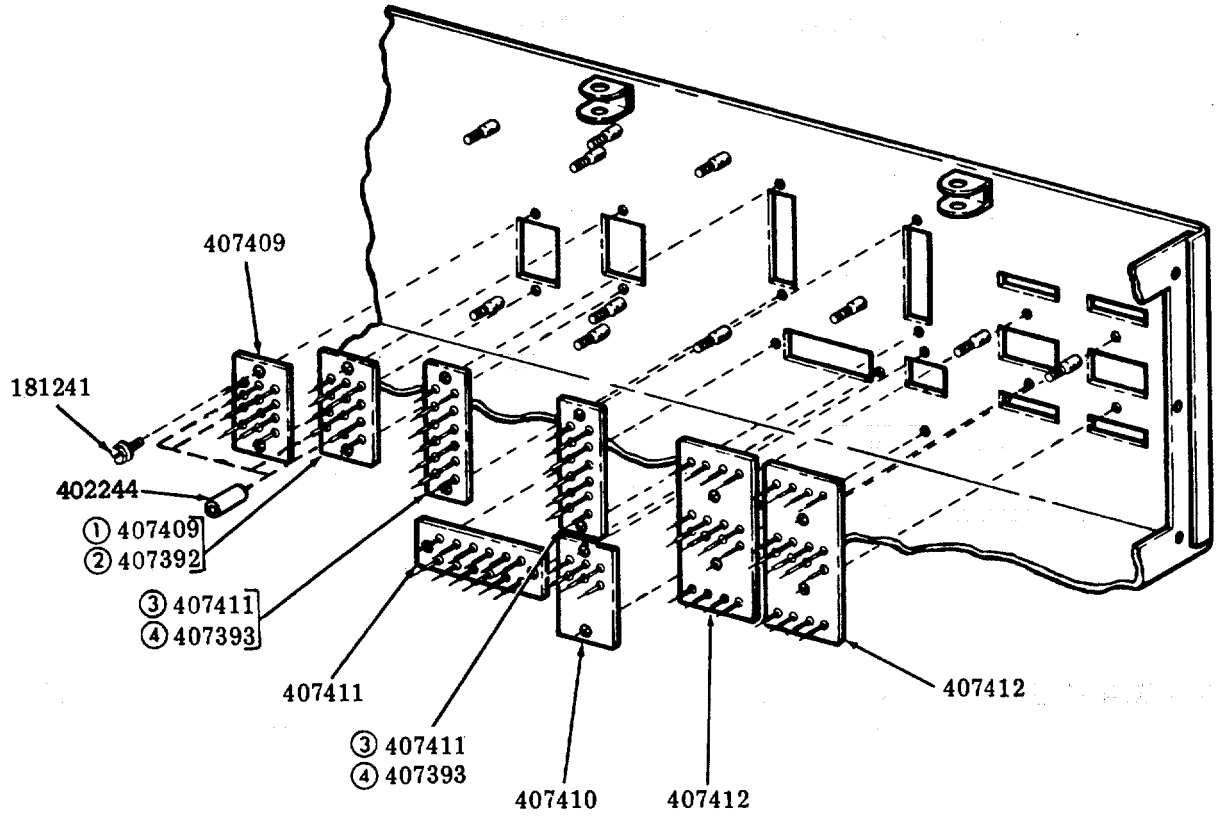
④ Early design controllers have interface cards mounted with 125011 flat washers, 3640 lockwashers and 3599 nuts (4-40). Later design controllers have interface cards mounted with 2191 lockwashers and 100011 nuts (6-40).

40C434, 40C435 and 40C436 Controllers

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

4. PARTS (Cont)

Filter Assemblies



① Used on 40C434 and 40C436 Controllers.

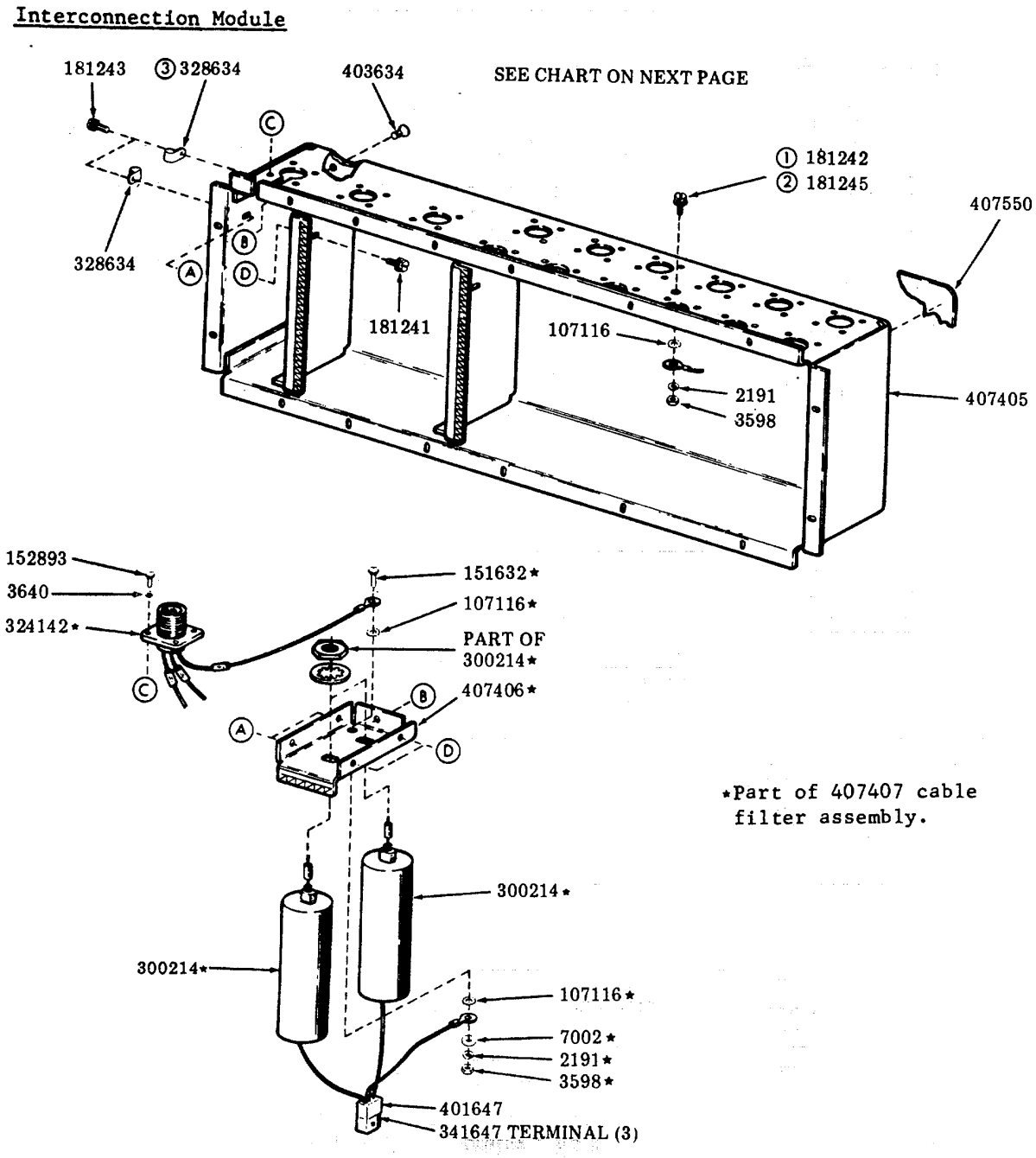
② Used on 40C435 Controller.

③ Used on 40C434 Controller.

④ Used on 40C435 and 40C436 Controllers.

40C434, 40C435 and 40C436 Controllers

Interconnection Module



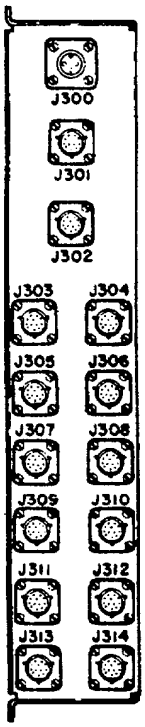
① Used on 40C434 and 40C435 Controllers.

② Used on 40C436 Controllers.

③ Used on 40C434 and 40C436 Controllers.

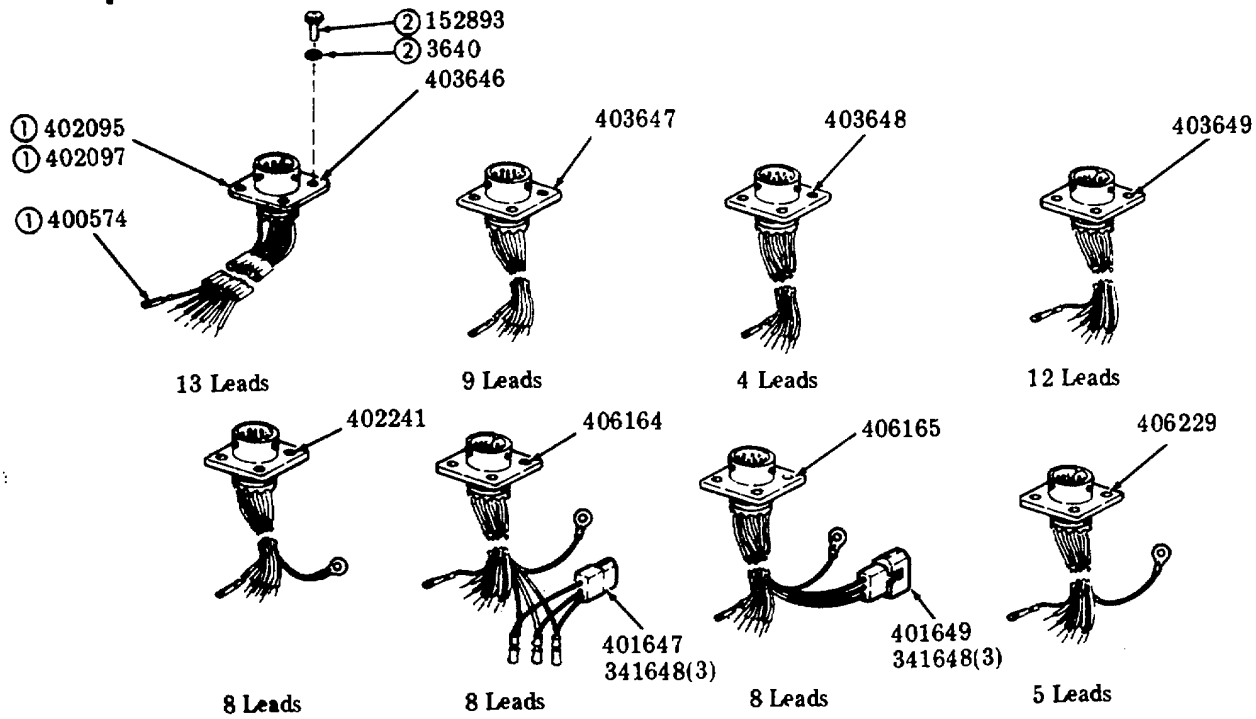
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

4. PARTS (Cont)



TOP VIEW OF INTERCONNECTION MODULE

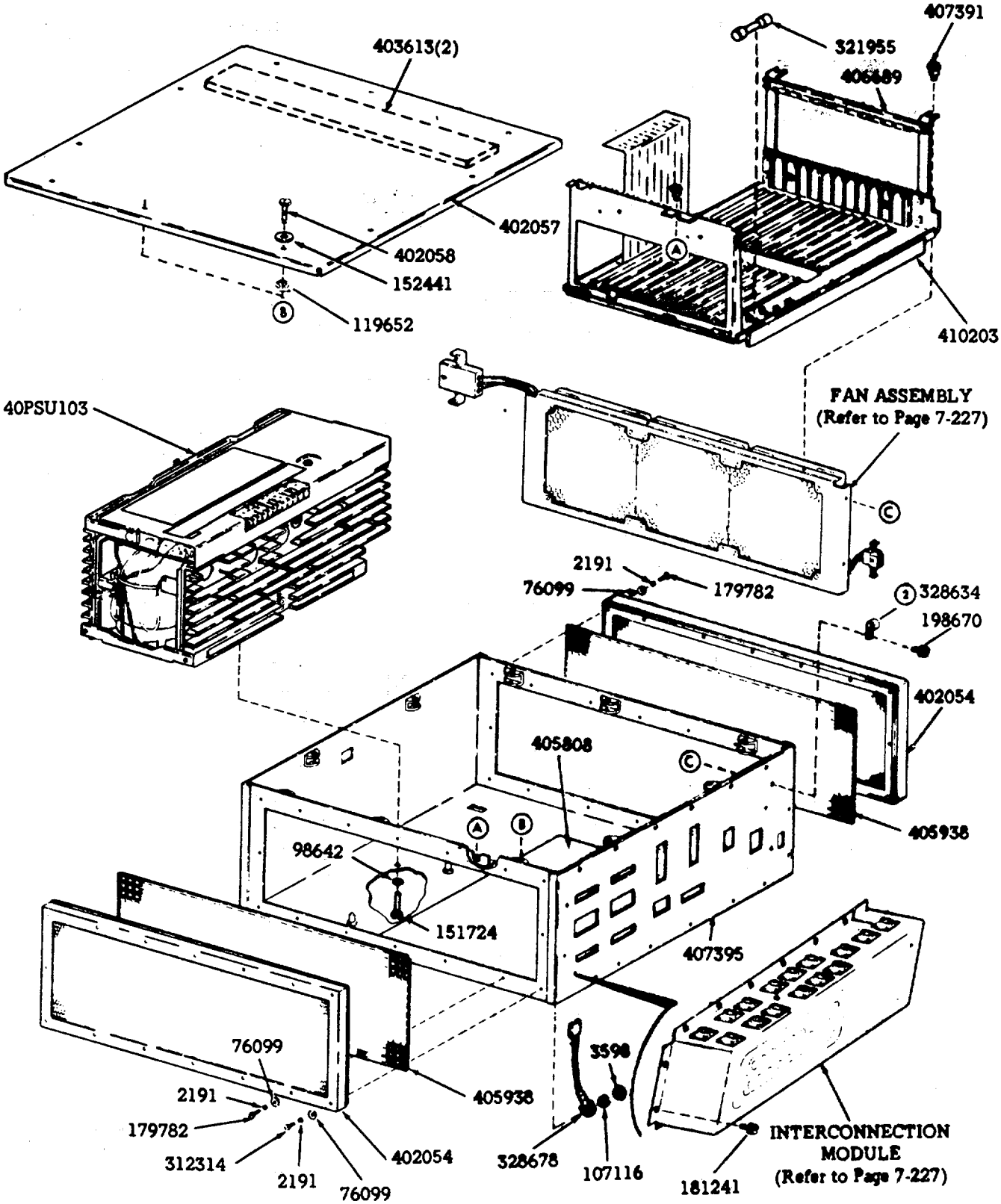
CONNECTOR POSITION	CABLE ASSEMBLY		
	40C434	40C435	40C436
J301	403646	403646	403646
J302	403646	--	403646
J303	--	--	--
J304	403649	--	--
J305	403649	403649	403649
J306	403649	--	--
J307	403648	403648	406229
J308	402241	403648	406164
J309	402241	402241	406165
J310	403648	403648	406164
J311	403648	403648	406165
J312	403648	--	403648
J313	403648	--	403648
J314	403648	--	403648



①402095 Connector, 402097 Terminal and 400574 Push-On Terminal common to all Cable Assemblies.

②Common mounting hardware for all Cable Assemblies, 4 each required.

Controller



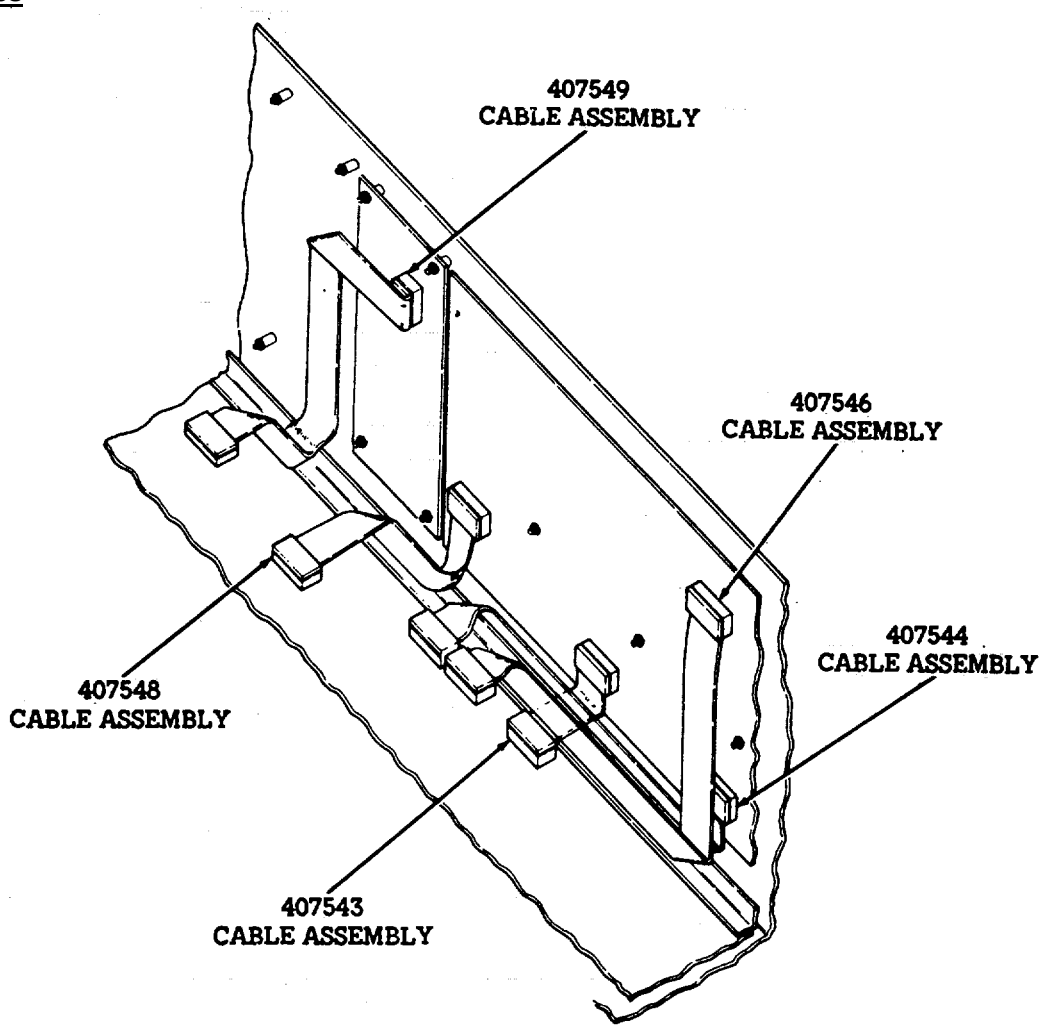
NOTE: Later design controllers have 328634 metal cable clamp for clamping monitor cable.

40C437 and 40C48 Control

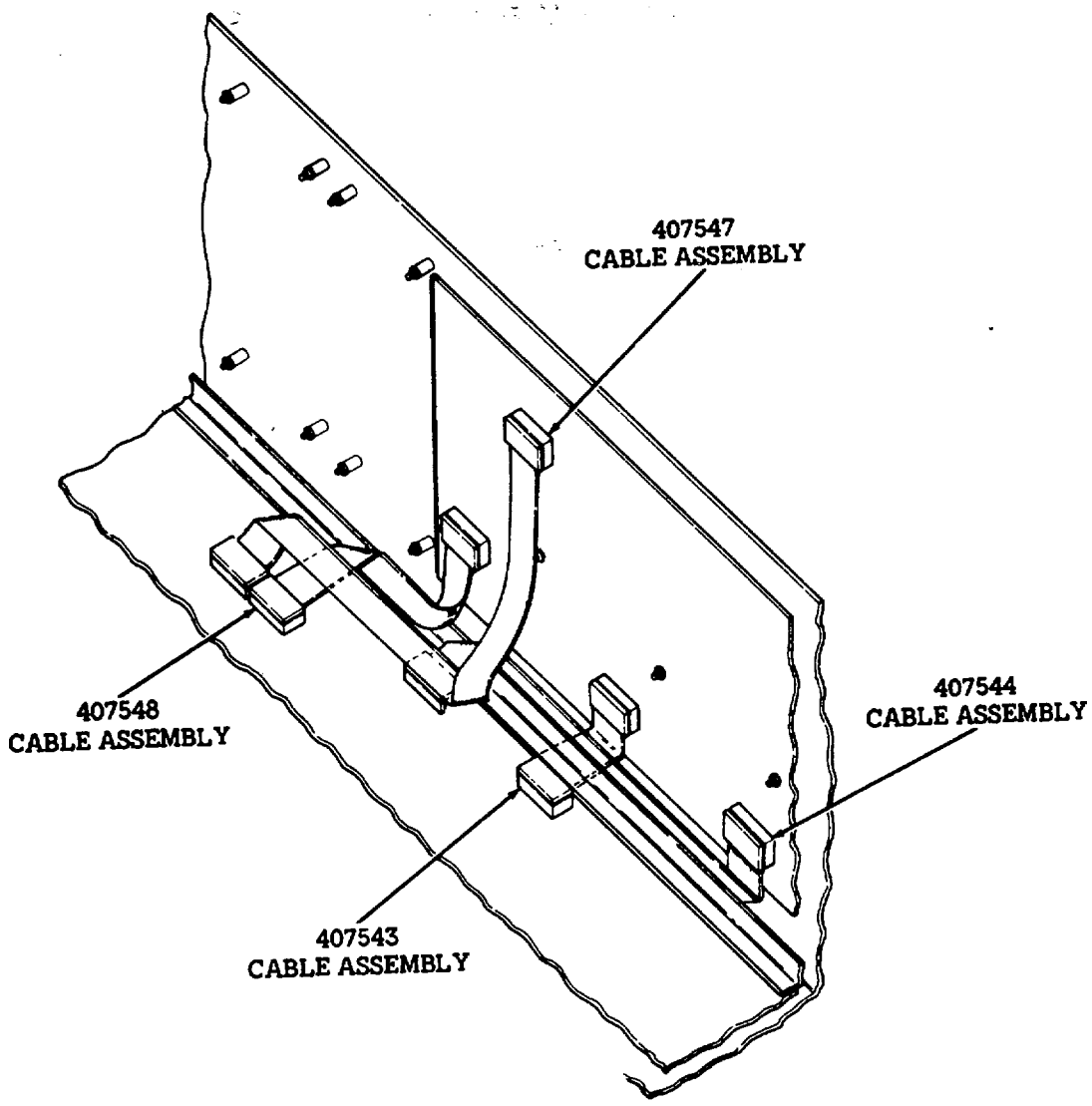
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

4. PARTS (Cont)

Connector Cables



40C437

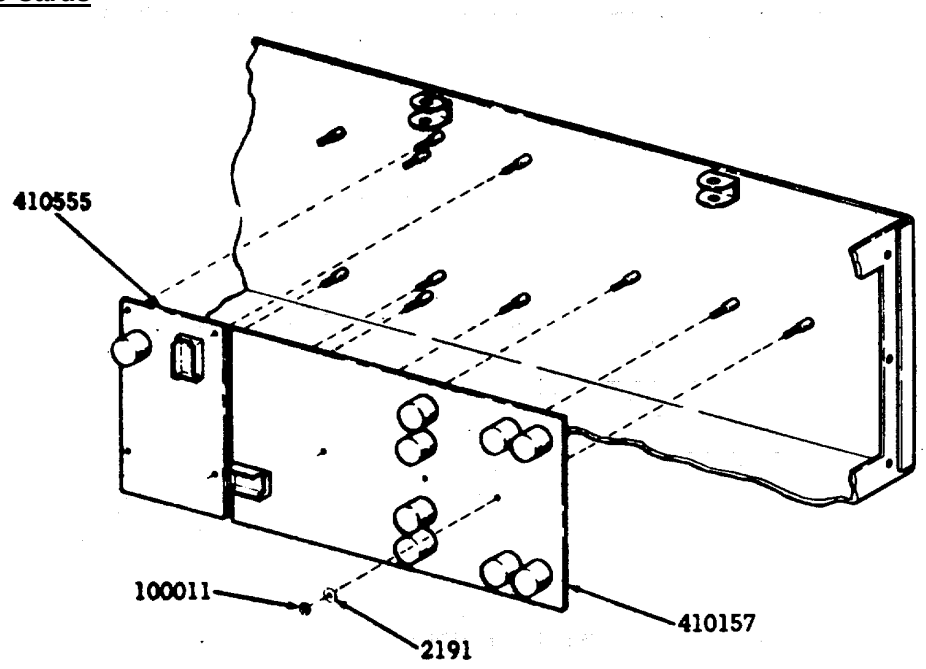


40C438 Controllers

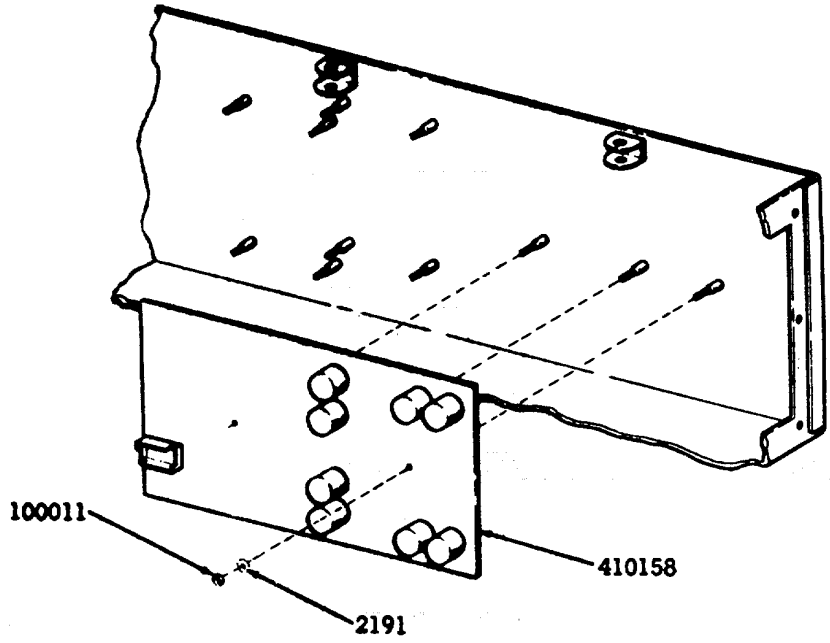
F. DISASSEBLY/REASSEMBLY AND PARTS (Cont)

4. PARTS (Cont)

Controller Interface Cards

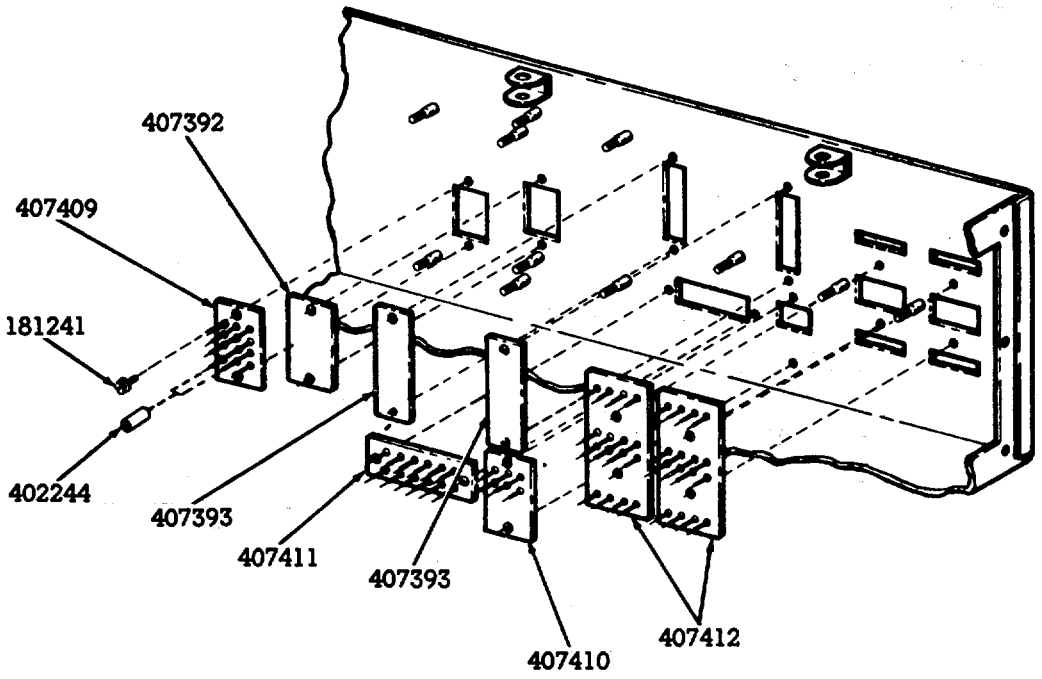


40C437 Controllers

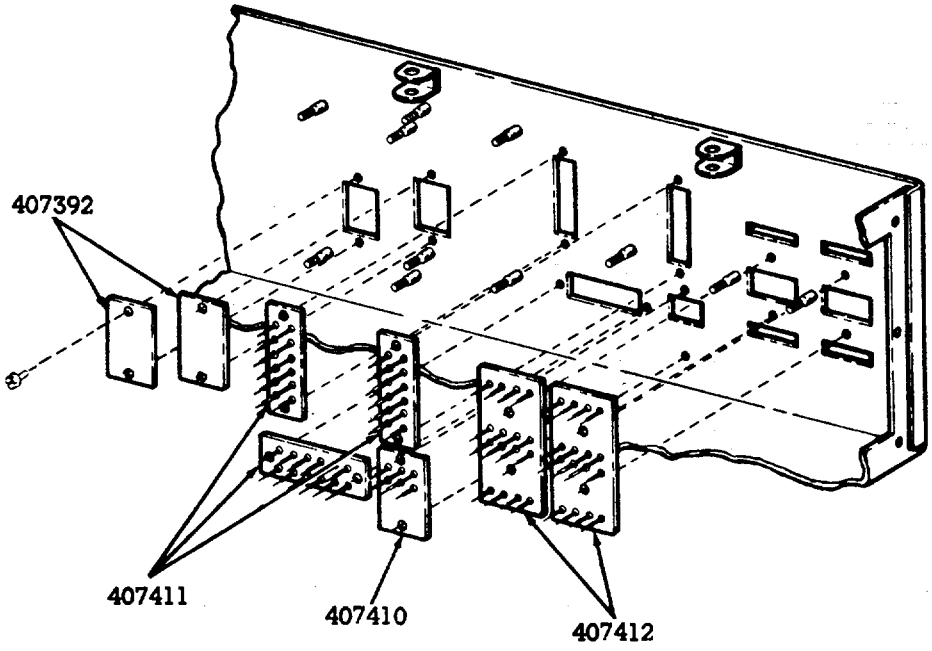


40C438 Controllers

Filter Assemblies



40C437 Controllers



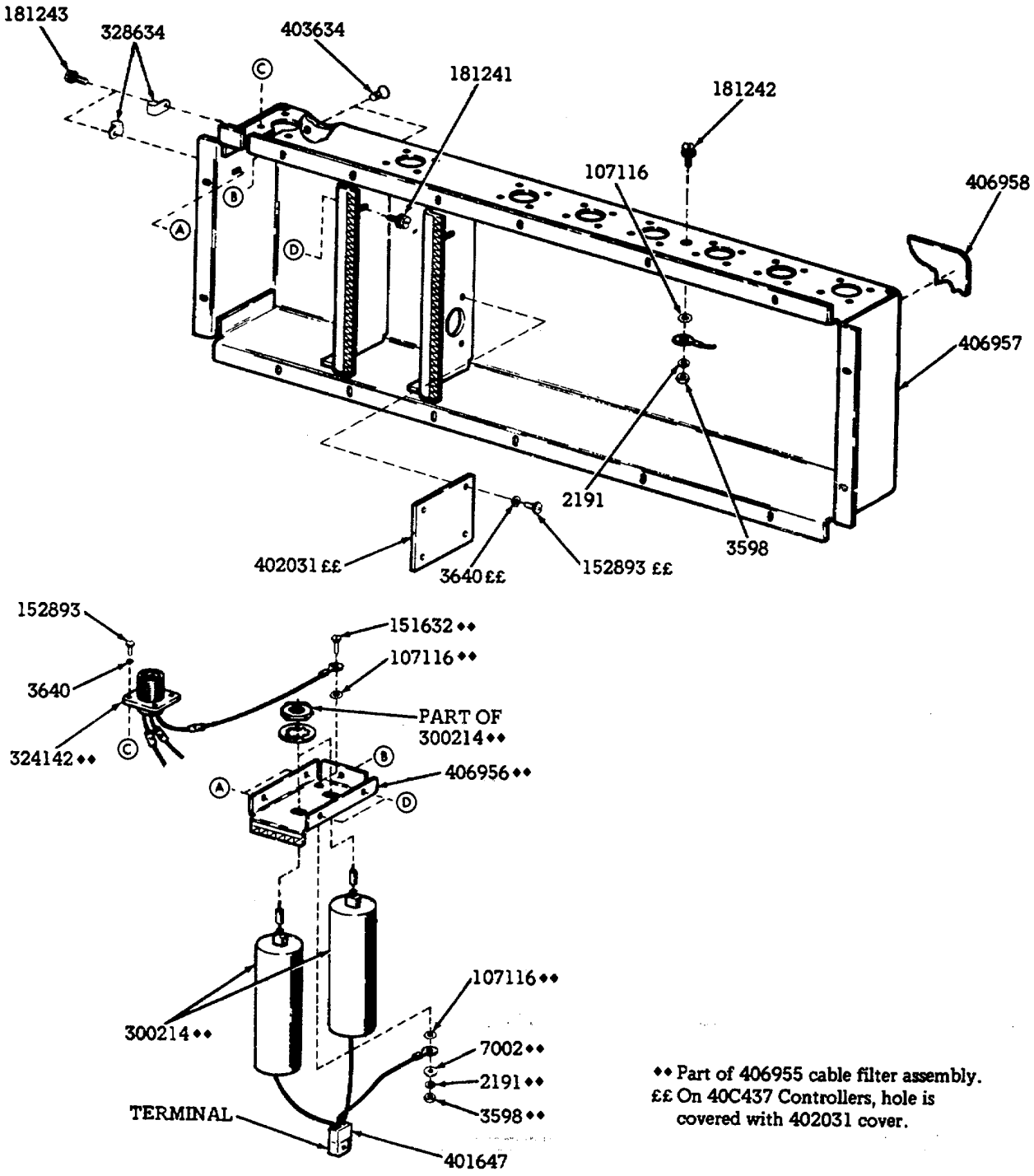
40C438 Controllers

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

4. PARTS (Cont)

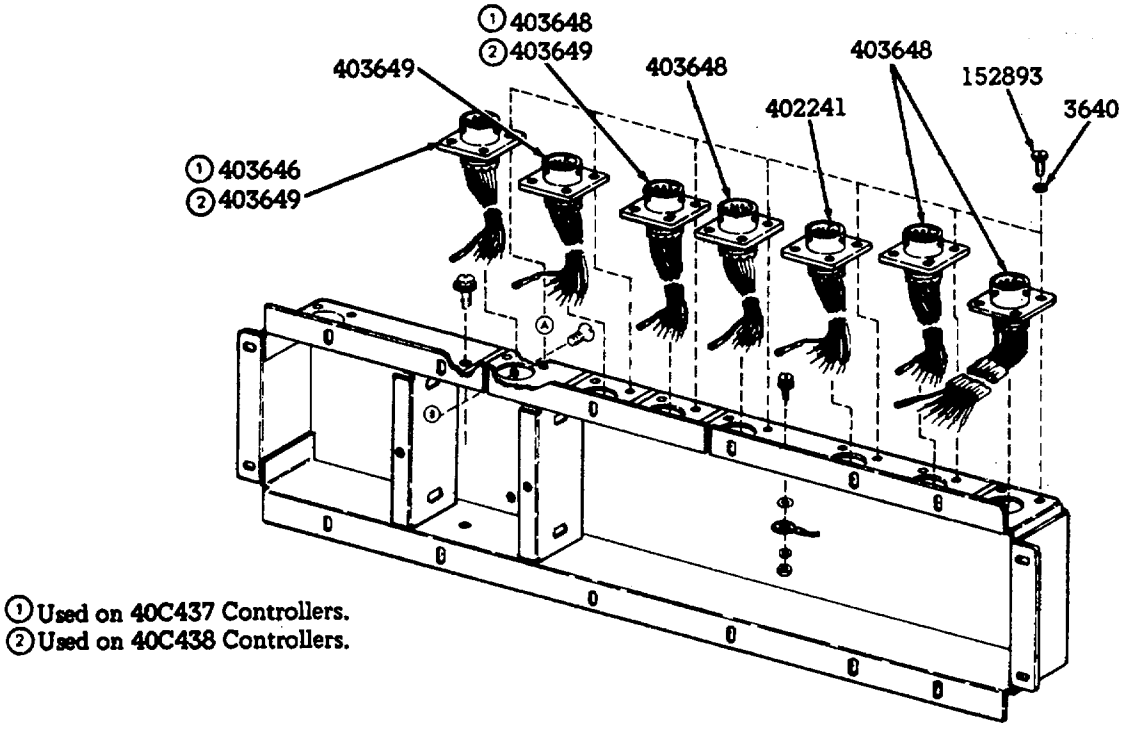
Interconnection Module

(See Next Page)



•• Part of 406955 cable filter assembly.
££ On 40C437 Controllers, hole is covered with 402031 cover.

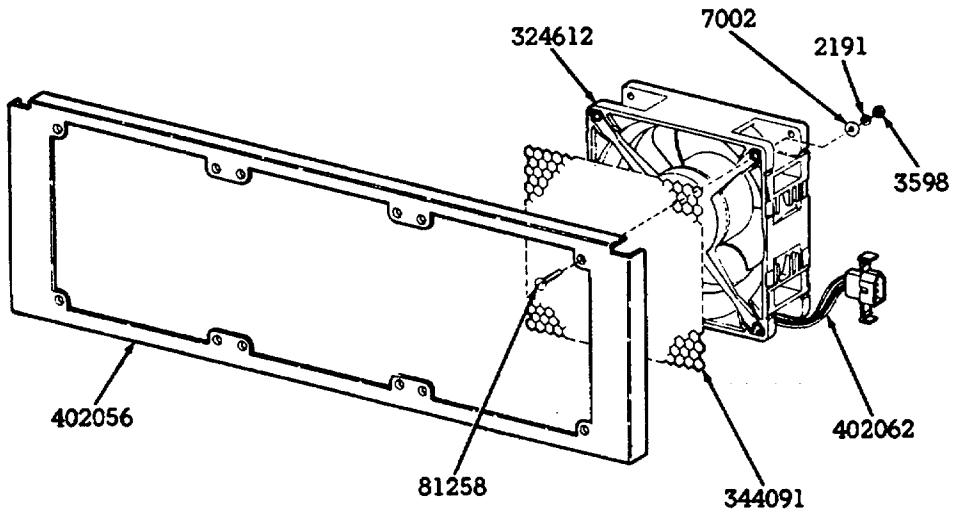
40C437 and 40C438 Controllers



①Used on 40C437 Controllers.
②Used on 40C438 Controllers.

40C437 and 40C438 Controllers

Fan Assembly



All Controllers

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

5. NUMERICAL INDEX

Note: When ordering replaceable parts or components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP410055).

PART 8 -- TEMPEST MODEL 40 CABINETS, PAPER WINDER. AND FACILITIES

INDEX **PAGE**

PART 8 -- TEMPEST MODEL 40 CABINETS, PAPER WINDER, AND FACILITIES

A. GENERAL

1. DESCRIPTION

The Tempest Model 40 Cabinets covered in this manual provide mounting and housing facilities for Model 40 Printers. In reviewing the cabinets illustrated in this section, note that many, though similar in size and general appearance, are equipped for different applications in sets and stations.

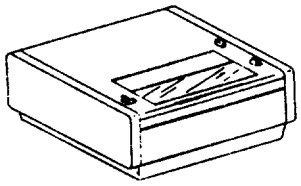
The 40PWU101 and 40PWU102 Paper Winder mounts on friction feed printer cabinets and serves to take up and store single-ply paper issuing from Model 40 Friction Feed Printer. Several paper guide and storage rack combinations are available for handling fanfold page copy issuing from Model 40 Tractor Feed Printer.

Facilities covered in this section are cable assemblies for interconnecting Model 40 components and the hardware and cables for mounting and connecting to data sets or modems.

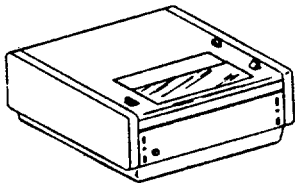
The following pages illustrate typical Tempest Model 40 Cabinets, Paper Winder, and Facilities covered in this part.

NOTE: When ordering replaceable components, unless otherwise specified, prefix each part number with the letters "TP" (ie, TP410055).

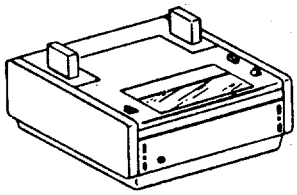
Friction Feed Printer Cabinets (Table Top)



40CAB202/RC
Printer Adjacent

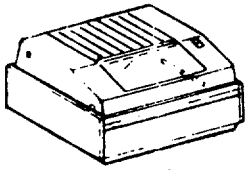


40CAB202/RA
RO Printer

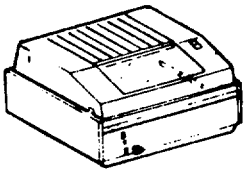


40CAB252/RA
Monitor and Opcon
Mounting

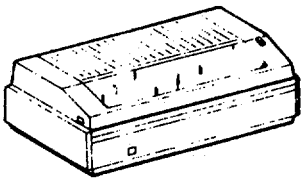
Tractor Feed Printer Cabinets (Table Top)



40CAB352/RC
RO Printer
(80 column)



40CAB352/RA Printer With
Provision for Opcon
(80 column)

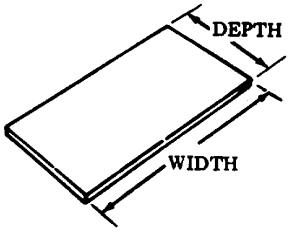


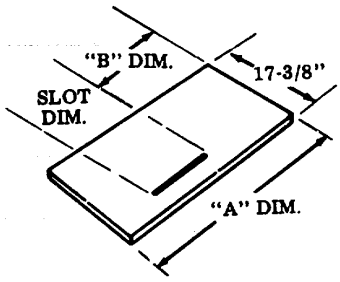
40CAB354/RA RO Printer
(132 column)

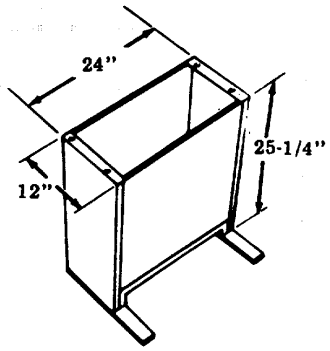
Pedestals With Table Tops

CODE	TYPE	WIDTH	SLOTTED	INTERFACE
40CAB902/AA*	RO Printer Only	20"	X	--
40CAB903/RH	KDP (Friction Feed)	34"	-	403628
40CAB903/RJ	ROP (80 Column)	24"	X	403612
40CAB903/RK	KP, KD, KPP (Tractor Feed)	24"	X	403628
40CAB903/RL	ROP	24"	X	405917
40CAB903/RM	KP, KD, KDP (Tractor Feed)	24"	X	405932
40CAB903/RN	ROP (132 Column)	27"	X	403612
40CAB903/RP	ROP (132 Column)	27"	X	405917
40CAB903/RQ	KDPM (2 Cassettes)	24"	X	403628
40CAB903/RR	KDPM (3 Cassettes)	34"	-	403628
40CAB903/RS	KDPM (3 Cassettes)	34"	-	405932
40CAB903/RT	KD Device Only	24"	X	406230
40CAB903/RU	KP (132 Column)	27"	X	406328
40CAB903/RV	KP (132 Column)	27"	X	405932

*Used with tractor feed KDP Sets. Uses 403802 20 inch wide table.





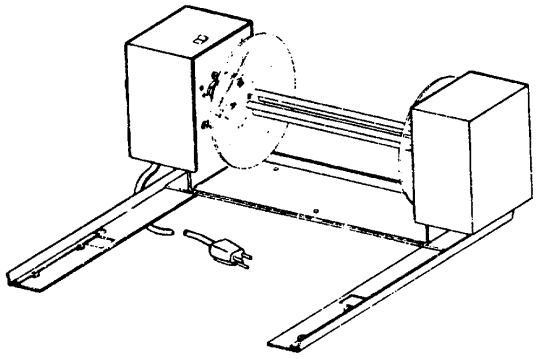


401152 Table Used on 40CAB903/** Cabinets

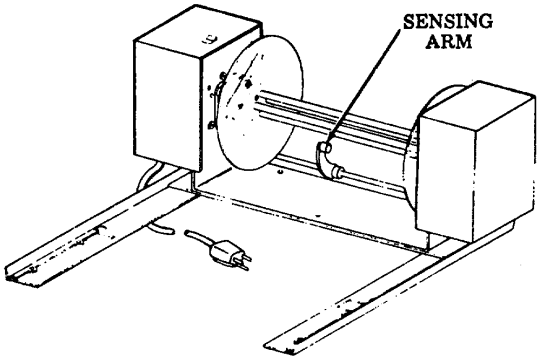
TABLE TOPS FOR PEDESTALS		
PART NO.	WIDTH	DEPTH
401531	24"	17-3/8"
401532	29"	17-3/8"
401533	34"	17-3/8"

TABLE TOPS FOR PEDESTALS (For Tractor Feed Printers Only)			
PART NO.	"A" DIM.	"B" DIM.	SLOT DIM.
401911	20"	4-1/2"	11"
401912	31-1/2"	16"	11"
401914	24-1/2"	7"	11"
401913	27-1/4"	5-1/4"	17"
401915	39"	17"	17"

40PWU101 Paper Winder (Early Design)



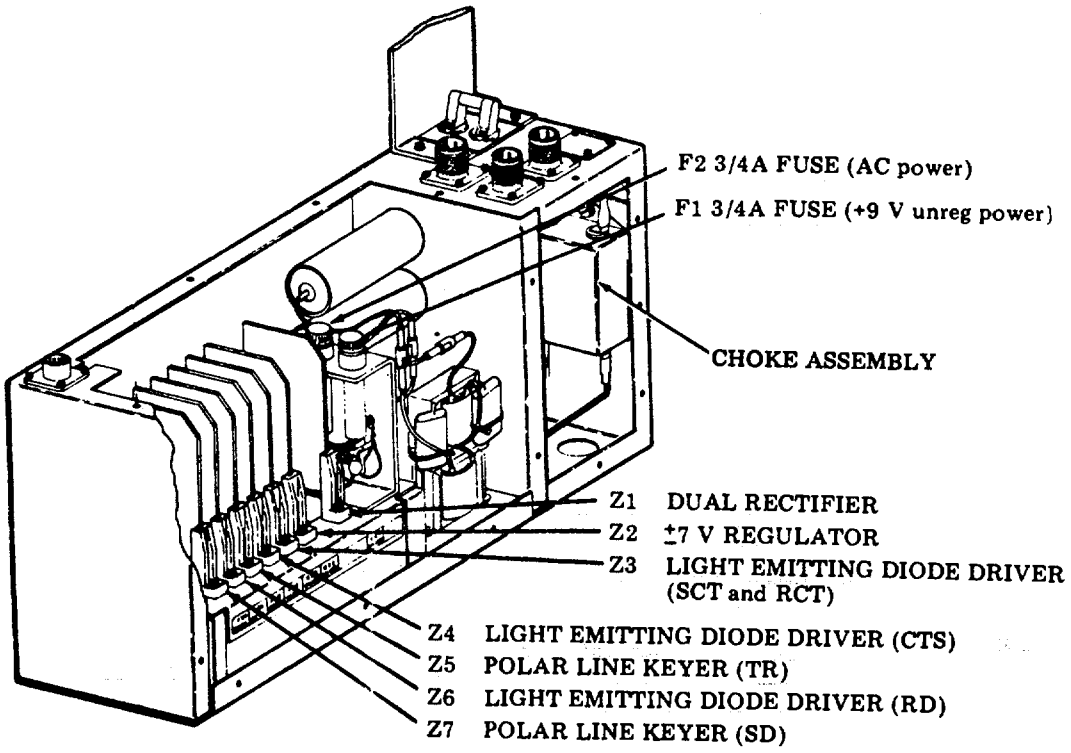
40PWU101 (Late Design) or 40PWU102 Paper Winders



A. GENERAL (Cont)

1. DESCRIPTION (Cont)

Interface Modules



INTERFACE ASSEMBLY PART NO.	CARD SLOT						
	Z1	Z2	Z3	Z4	Z5	Z6	Z7
403612	303169	303168	303181	--	303180	303181	--
403628	303169	303168	303181	303181	303180	303181	303180
405917	303169	303168	303181	--	303185	303181	--
405932	303169	303168	303181	303184	303185	303181	303180
406230	No Cards, AC Only						

2. TOOLS AND TEST EQUIPMENT

Tools

The tools listed below are supplementary to common types such as pliers, screw-drivers, etc, and may be procured locally or ordered from Teletype Corporation.

Description	Part No.
• Spring Hook, Pull	75765
• Nut Driver Wrench 1/4 Inch	89954
• Nut Driver Wrench 5/16 Inch	89955
• Nut Driver Wrench 3/16 Inch	125752
• Open-End Wrench 1/4 Inch	129534
• Open-End Wrench 5/16 Inch	152835
• Retaining Ring Pliers	160396
• Terminal Extractor	182697
• Terminal Extractor (Miniature)	402840
• Scale 6 Inch, L.S. Starrett No. 338, or equivalent (procure locally)	
• Soldering Iron, Weller Model W-MCP-750 with MP2C Tip, or equivalent (procure locally)	
• Desoldering Tool, EDSYN Model MMSOO05 Soldapullt®, or equivalent (procure locally)	
• Soft-Bristle Brush 1/2 Inch (procure locally)	

Test Equipment

• Volt-Ohm-Milliameter, Triplett Model 630 APL or equivalent
• Oscilloscope, Tektronic Model 7904 e/w:
2 -- 7A16A Single Trace Amplifiers
1 -- 7B70 Time Base Unit
or equivalent

B. PROCEDURES

1. GENERAL

This section details cleaning, refinishing, and inspection procedures to be followed prior to testing and troubleshooting Tempest Model 40 Cabinets, Pedestals, etc. In many cases careful inspection will save later trouble by revealing defective or damaged cabling, connectors, or other components.

Refer to Page 8-57, F. DISASSEMBLY/REASSEMBLY AND PARTS whenever detailed information on removing assemblies or parts is required.

The packing materials described in this section are designed for protection against damage from rough handling in shipping.

B. PROCEDURES (Cont)

2. CLEANING AND REFINISHING

Cleaning

Immersion type cleaning is NOT recommended for Tempest Model 40 Cabinets, Pedestals, Paper Winders, o- Facilities.

CAUTION: AVOID THE USE OF HARSH OR ABRASIVE CLEANING AGENTS OR SOLVENTS WHICH COULD SCRATCH OR DAMAGE EXTERIOR PLASTIC OR PAINTED SURFACES.

Cleaning can be accomplished as follows:

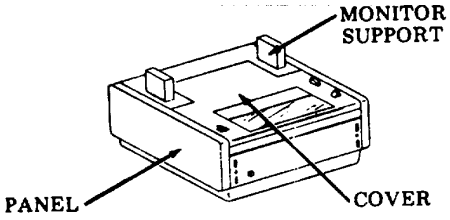
Exterior Surfaces -- Wash and Wipe Dry.

Interior Surfaces -- Vacuum or Air Dust.

Clean all surfaces as indicated.

Exterior Surfaces

a. Wash with mild detergent solution.
b. Rinse with damp cloth.
c. Buff dry with soft cloth.

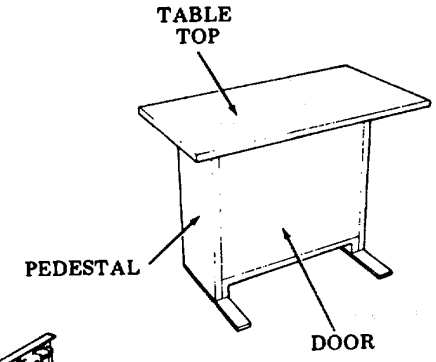


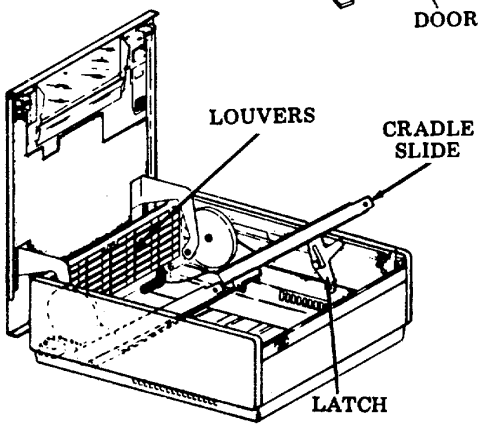
Interior Surfaces

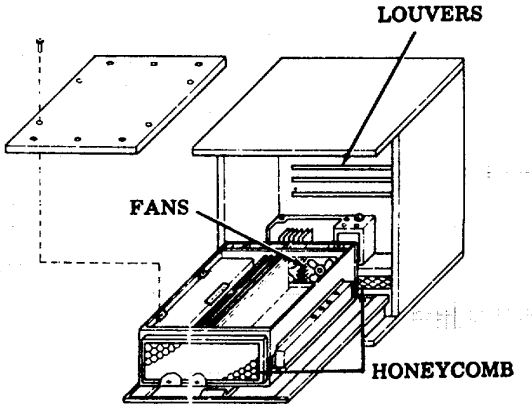
a. Remove large particles or foreign objects by hand.
b. Lightly brush with a clean, dry 1/2-inch brush and follow with air blowing or vacuum cleaning.

CAUTION: THE AIR SUPPLY SHOULD NOT EXCEED 20 PSI. HIGHER AIR PRESSURES MAY DAMAGE SMALL COMPONENTS.

c. Dust all corners, crevices, fan screens, louvers, duct and ventilation openings.







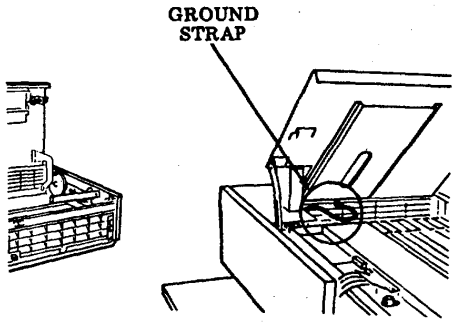
Refinishing

Scuffed or scratched painted surfaces may be touched up with air-dry brush lacquer. Matching lacquer may be ordered from Teletype Corporation. Specify: 344963 (KB) Black Spattered Texture Brushing Lacquer.

3. INSPECTION

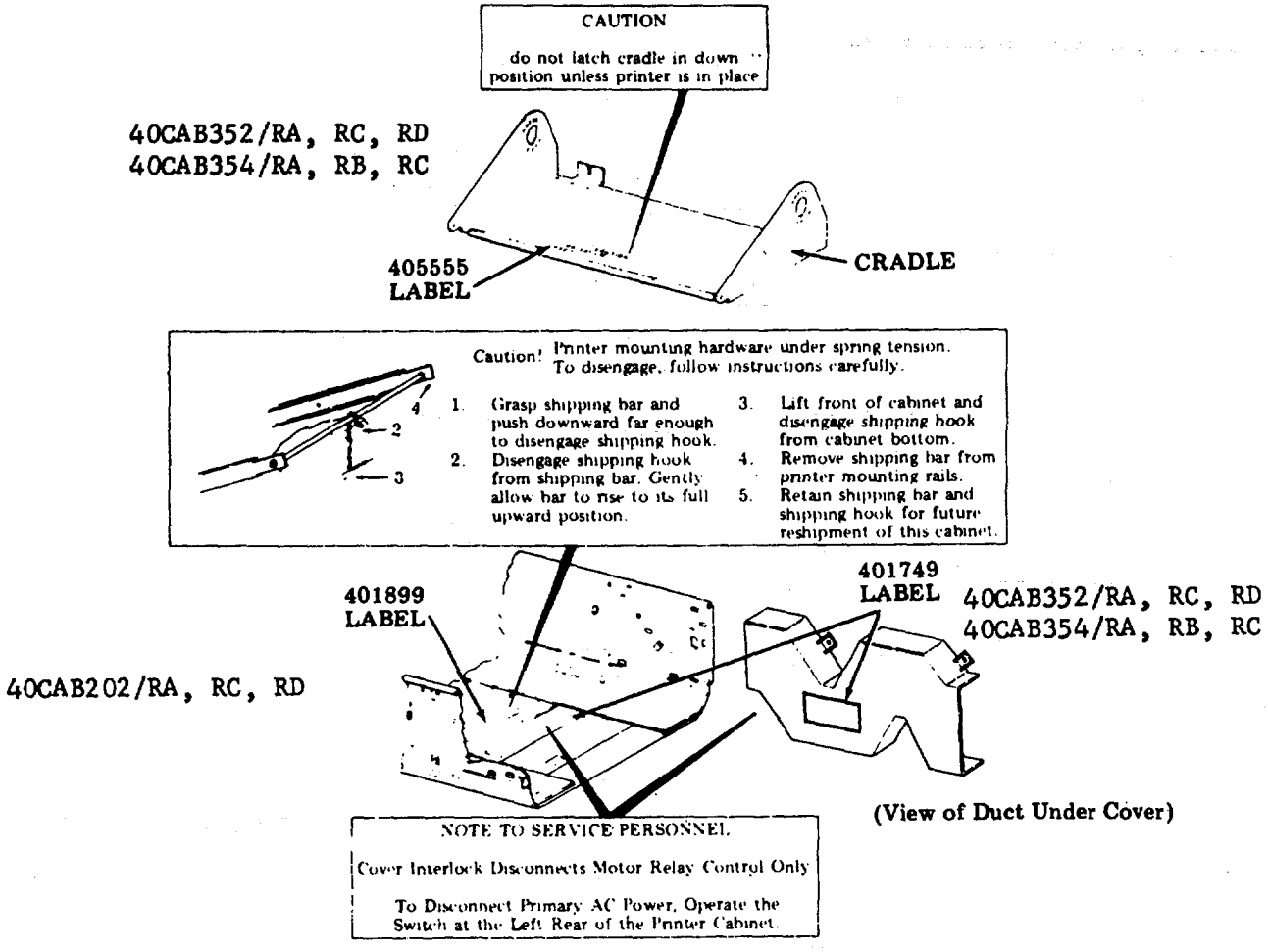
Ground Straps

Verify that cabinet or pedestal ground straps are in good condition and securely fastened at each end. To check electrically, measure continuity between connected parts with multimeter set on R X 1 scale. The reading must be essentially zero ohms.



Warning Labels

Check for the presence and legibility of all warning labels.



B. PROCEDURES (Cont)

3. INSPECTION (Cont)

Mechanical Checks

Check all doors and panels for proper opening and closing without binds or interferences and for proper alignment.

Check all latches, hinges, interlock switches, etc, for proper alignment of mating surfaces.

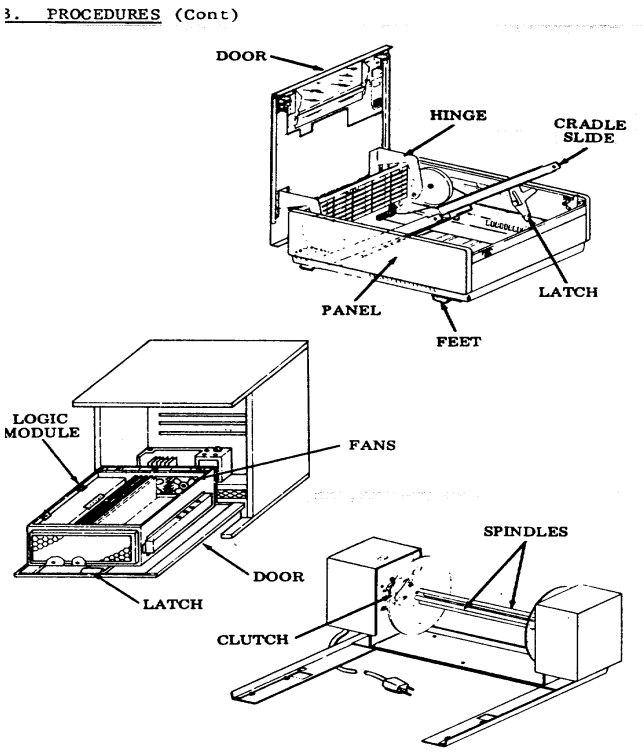
Check all slides, guides, and mounting surfaces for proper alignment and configuration.

Check for the presence and proper condition of all feet, bumpers, and padding.

All padding should adhere and conform to cabinet interior surfaces.

Check fan assemblies for free rotation, no binding, wobble or eccentricity.

Check that two spindles of paper spool are mated and that spool is seated properly and engages with drive clutch.



4. CONVERSIONS

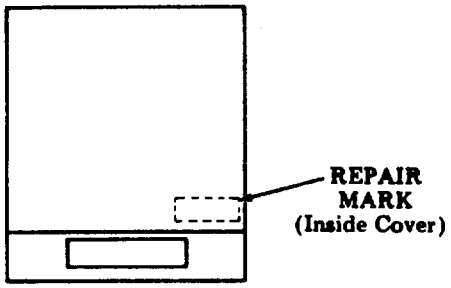
Cabinets or pedestals may be converted to types having different features and functions. This will ordinarily require removal and/or addition of certain components, cables, assemblies, or modification kits. Refer to Page 8-57, F. DISASSEMBLY/REASSEMBLY AND PARTS for detailed part numbered views of various cabinets, pedestals and related apparatus. Also see Page 8-3, Pedestals With Table Tops for dimensional data on pedestals and available table tops.

5. MARKING AND PACKING

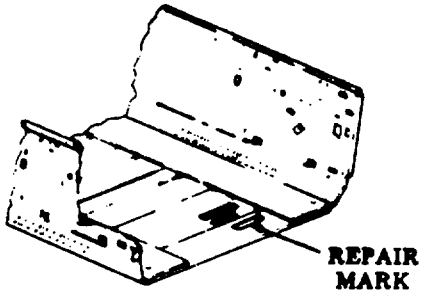
Marking

For record keeping purposes, the repair date may be marked in REPAIR MARK designated areas.

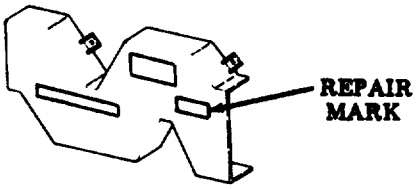
(Side View — End Opposite Motor)



40PWU101 and 40PWU102 Paper Winder

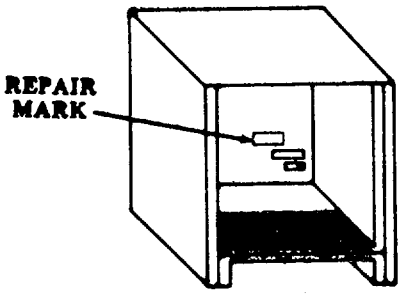


40CAB202/RA, RC, RD
40CAB252/RA



(View of Duct Under Cover)

40CAB352/RA, RC, RD
40CAB354/RA, RB, RC



40CAB903/RH, RJ, RK, RL,
RM, RN, RP, RQ, RR,
RS, RT, RU, RV

B. SHOP PROCEDURES (Cont)

5. MARKING AND PACKING (Cont)

Packing

Factory-type packing may be duplicated by ordering materials listed for each group of equipment and applying as described. PK designated items are available from Teletype Corporation.

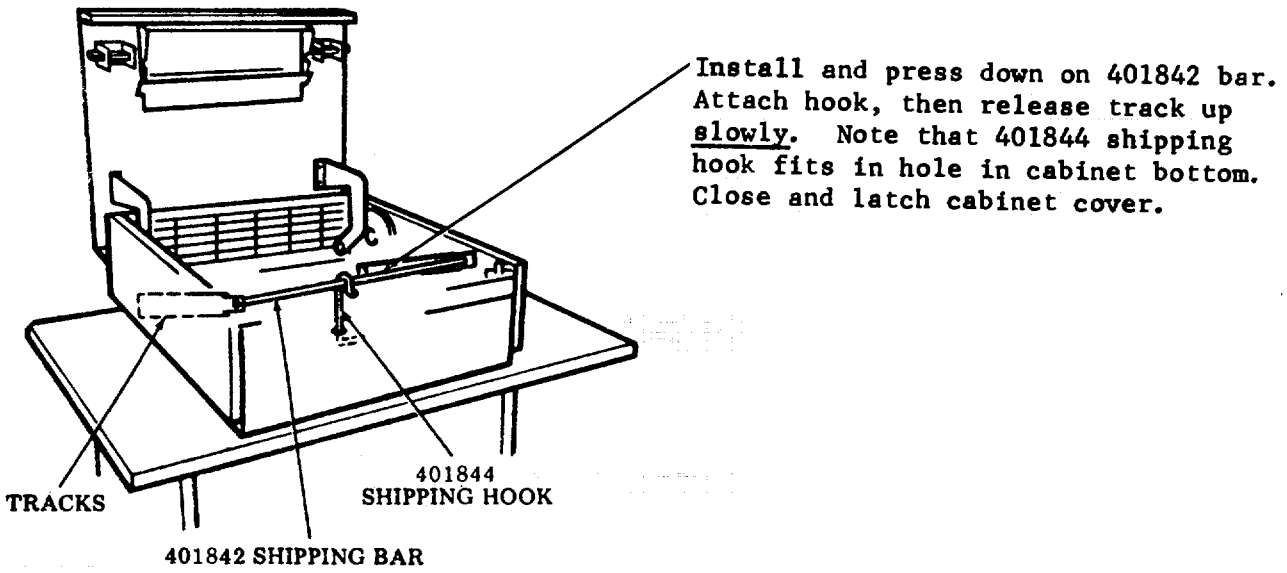
40CAB202/RA. RC. RD
40CAB252/RA

Materials Required

(1) 9867PK Carton
(1) 28218PK Set of Polystyrene Details
(1) 28130PK Label
(1) 27542PK Label
(1) 23457PK Plastic Bag

As Required
21719PK Tape
21480PK Tape
21298PK Tissue Paper

NOTE: Required for printer cabinets. Install 401842 shipping bar and 401844 shipping hook as shown. Fold copy of TC-113 Unpacking Instruction Sheet around shipping bar and fasten with 21480PK tape. TC-113 Unpacking Instruction Sheet (following page) may be duplicated locally.



CAUTION

READ BEFORE COMPLETING UNPACKING OPERATIONS

PRINTER MOUNTING HARDWARE UNDER SPRING TENSION

TO DISENGAGE, PERFORM THE FOLLOWING STEP BY STEP INSTRUCTIONS.

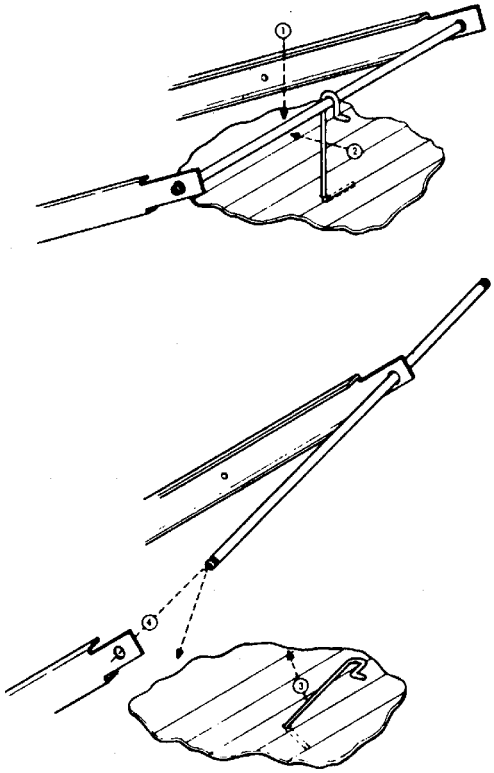
1. Grasp shipping bar and push downward far enough to disengage shipping hook.

2. Disengage shipping hook from shipping bar. Gently allow bar to rise to its full upward position.

3. Lift front of cabinet and disengage shipping hook from cabinet bottom.

4. Remove shipping bar from printer mounting rails.

5. Retain shipping bar and shipping hook for future reshipments of this cabinet.



B, SHOP PTOCEDURES (Cont)

5. MARKING AND PACKING, Packing (Cont)

40CAB202/RA. RC. R

Packing, Procedures

Step 1. Form a 9867PK carton. Clos and seal bottom flaps with glue or sealing tape.

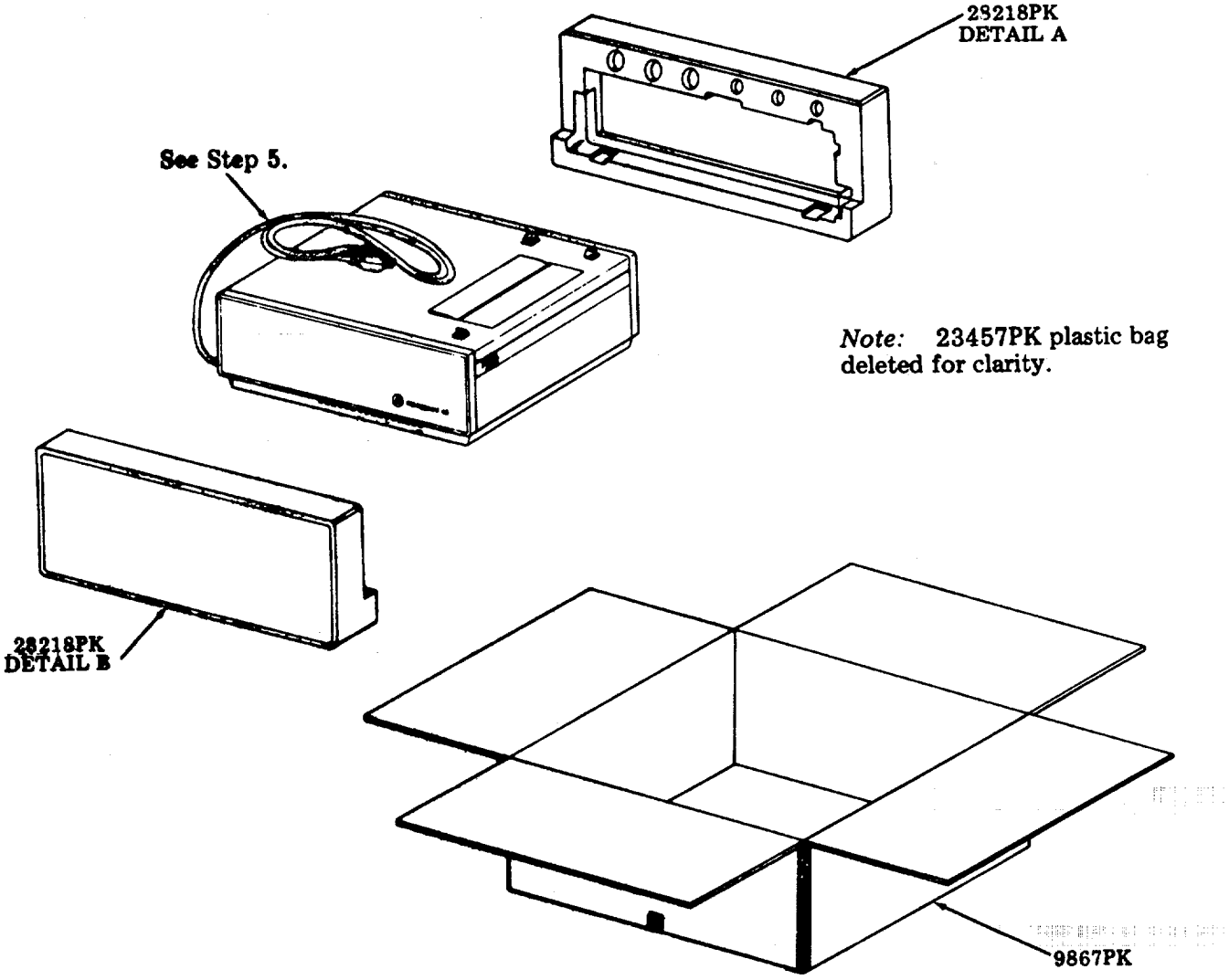
Step 2. Make certain shipping latches and bar on cabinet are properly installed. Cover cabinet with 23457PK plastic bag.

Step 3. Position a plastic 28218PK Detail A on right side of cabinet.

Step 4. Position a plastic 28218PK Detail B on left side of cabinet.

Step 5. Coil cable on top of cabinet and position prepacked cabinet in shipping container.

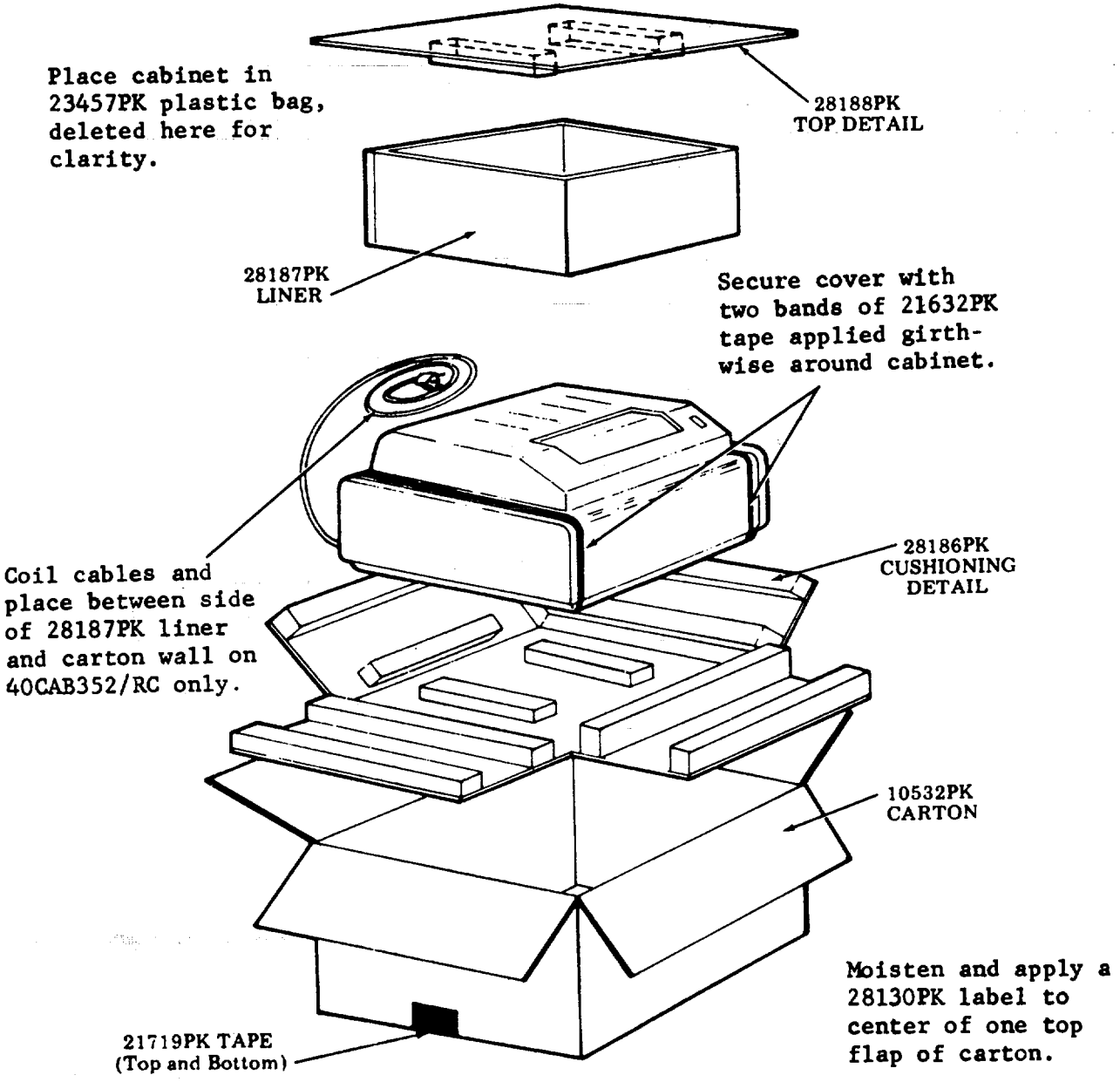
Step 6. Clow and seal top flaps of shipping container as outlined in Step 1.



40CAB352/RA, RC, RD

Materials Required

Qty			Qty		
1	10532PK	Corrugated Carton	1	23457PK	Plastic Bag
1	28186PK	Cushioning Detail	1	28130PK	Unpacking Instruction Label
1	28187PK	Corrugated Liner		21719PK	Tape (as required)
1	28188PK	Top Detail		21632PK	Tape (as required)



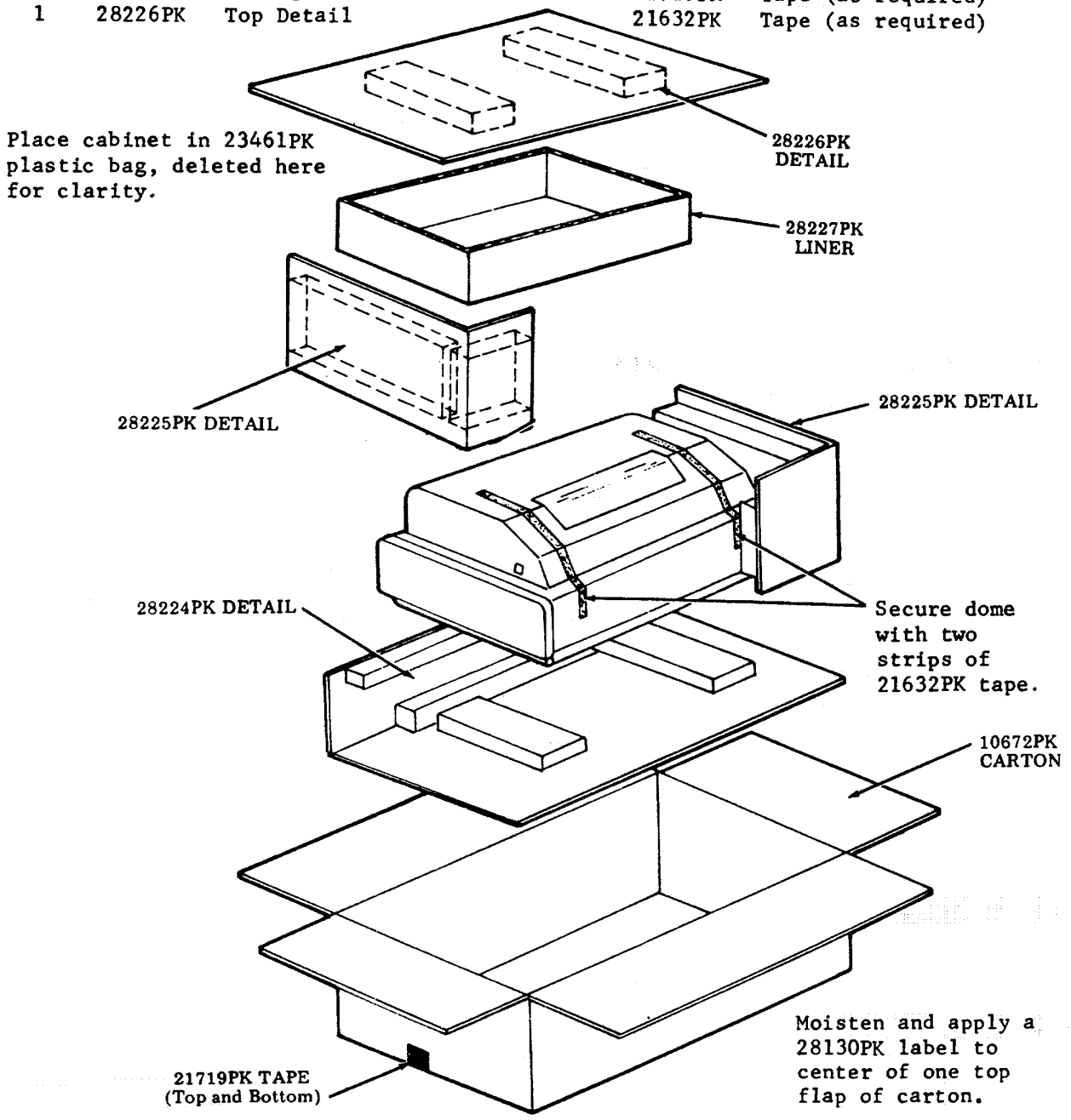
B. SHOP PROCEDURES (Cont)

5. MARKING AND PACKING, Packing (Cont)

40CAB354/RA, RB, RC

Materials Required

Qty			Qty		
1	10672PK	Corrugated Carton	1	23461PK	Plastic Bag
1	28224PK	Cushioning Detail	1	28130PK	Unpacking Instruction Label
2	28225PK	Cushioning Detail		21719PK	Tape (as required)
1	28227PK	Corrugated Liner		21632PK	Tape (as required)
1	28226PK	Top Detail			



40CAB902/AA

Materials Required

Qty		
(1)	70144PK Detail "A" Carton	
(1)	70144PK Detail "B" End Cap	As Required
(1)	28253PK Polystyrene Detail "A"	21719PK Tape
(1)	23461PK Plastic Bag	50136PK Twist Tie
(1)	28253PK Polystyrene Detail "B"	21207PK Steel Strapping
(2)	28253PK Polystyrene Detail "C"	
(1)	21431PK Clip Seal	

Step 1. Cover cabinet with a 23461PK plastic bag (not shown).

Step 2. Place one 70144PK Detail B end cap on floor.

Step 3. Position cabinet on top of bottom end cap.

Step 4. Lift left side of cabinet and place a 28253PK Detail A onto the left foot. Set cabinet with detail back down on end cap.

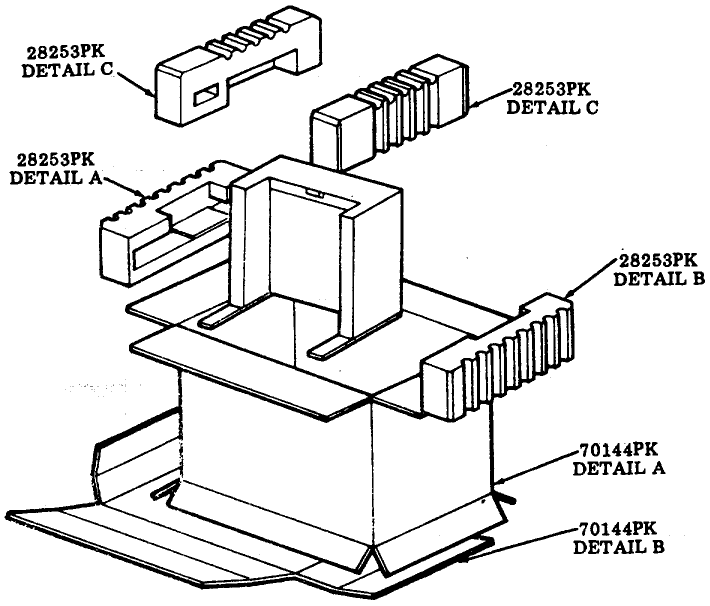
Step 5. Lift right side of cabinet and place a 28253PK Detail B onto the right foot as indicated in Step 4.

Step 6. Place a 28253PK Detail C on left and right top corner of the cabinet.

Step 7. Form a 70144PK carton Detail A and with bottom flanges down and outward, place carton over top of cabinet nd details and slide to bottom.

Step 8. Interlock flanges of bottom end cap with corrugated carton flanges. Standard procedure is to apply a band of 21207PK strapping around center of flanges of end cap.. For standard removal, use nylon reinforced tape.

Step 9. Close top flaps of carton and seal center seam with a strip of 21719PK tape. The tape should extend approximately three inches down the side of the carton.



B. SHOP PROCEDURES (Cont)

5. MARKING AND PACKING, Packing (Cont)

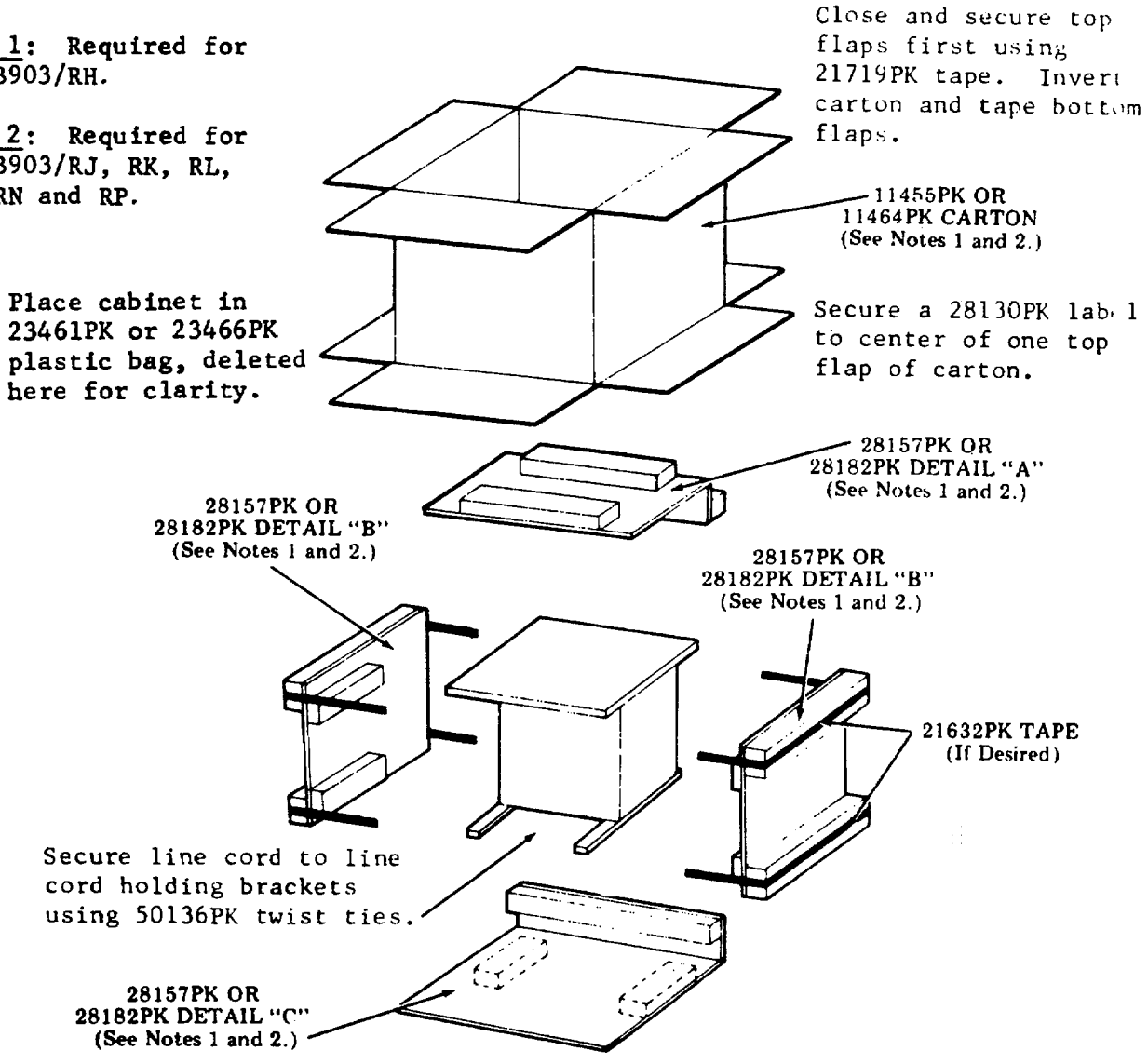
40CAB903/RH, RJ, RK, RL, RM, RN, RP, RQ, RS, RT, RU, RV

Materials Required

Qty			Qty		
1	11455PK	Corrugated Carton (See Note 1)	1	23466PK	Plastic Bag (See Note 1)
1	11464PK	Corrugated Carton (See Note 2)	1	28130PK	Unpacking Instruction Label
1	28157PK	Set of Details (See Note 1)		21719PK	Tape (as required)
1	28182PK	Set of Details (See Note 2)		21632PK	Tape (as required)
1	23461PK	Plastic Bag (See Note 2)		50136PK	Twist Tie (as required)

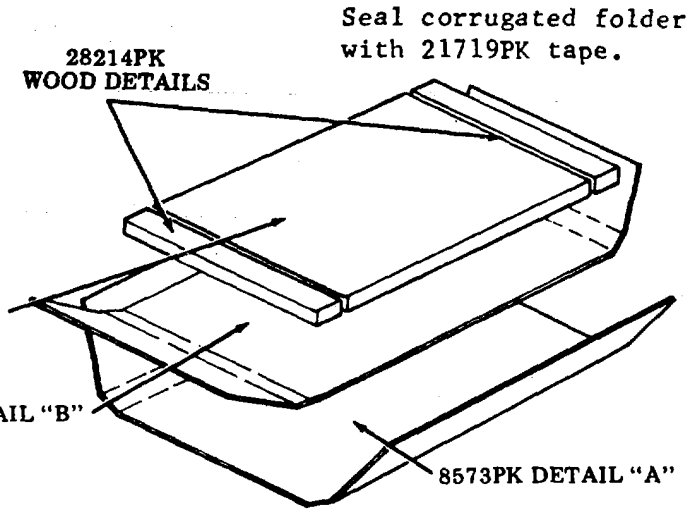
NOTE 1: Required for 40CAB903/RH.

NOTE 2: Required for 40CAB903/RJ, RK, RL, RM, RN and RP.



401915 Table Top

Qty	Materials Required	
1	8573PK	Set of Details
2	28214PK	Wood Detail
	21719PK	Tape (as required)



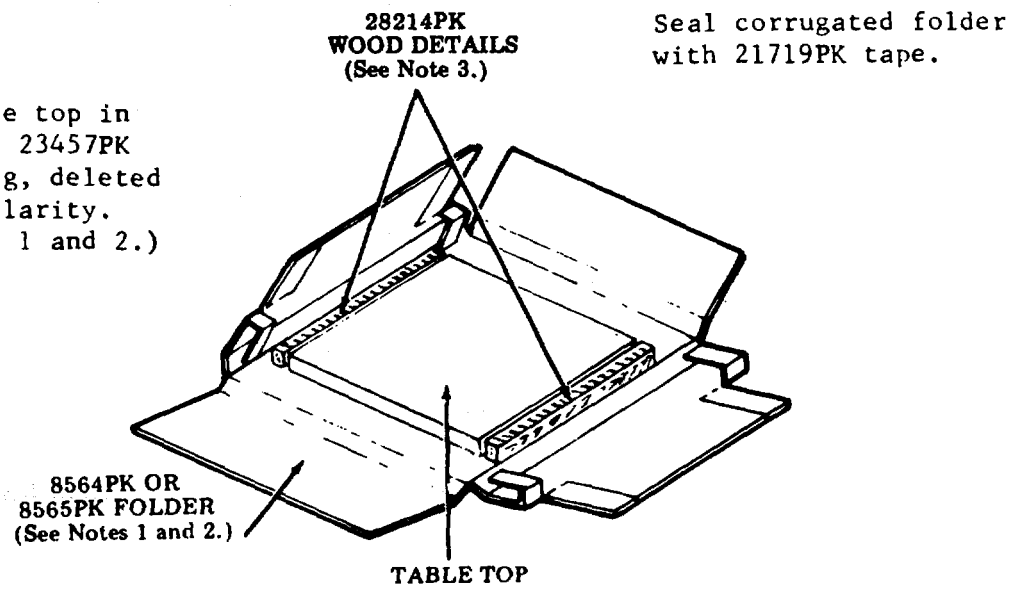
401530, 401531, 401532, 401533, 401911, 401912, 401914 Table Tops

Qty		Materials Required	Qty		
1	8564PK	Corrugated Folder (See Note 1)	1	23451PK	Plastic Bag (See Note 1)
			1	23457PK	Plastic Bag (See Note 2)
1	85b5PK	Corrugated Folder (See Note 2)	2	28214PK	Wood Details (See Note 3)
				21719PK	Tape (as required)

NOTE 1: Required for 401532, 401533 and 401912.

NOTE 2: Required for 401530, 401531, 401911 and 401914.

NOTE 3: Required for 401911.



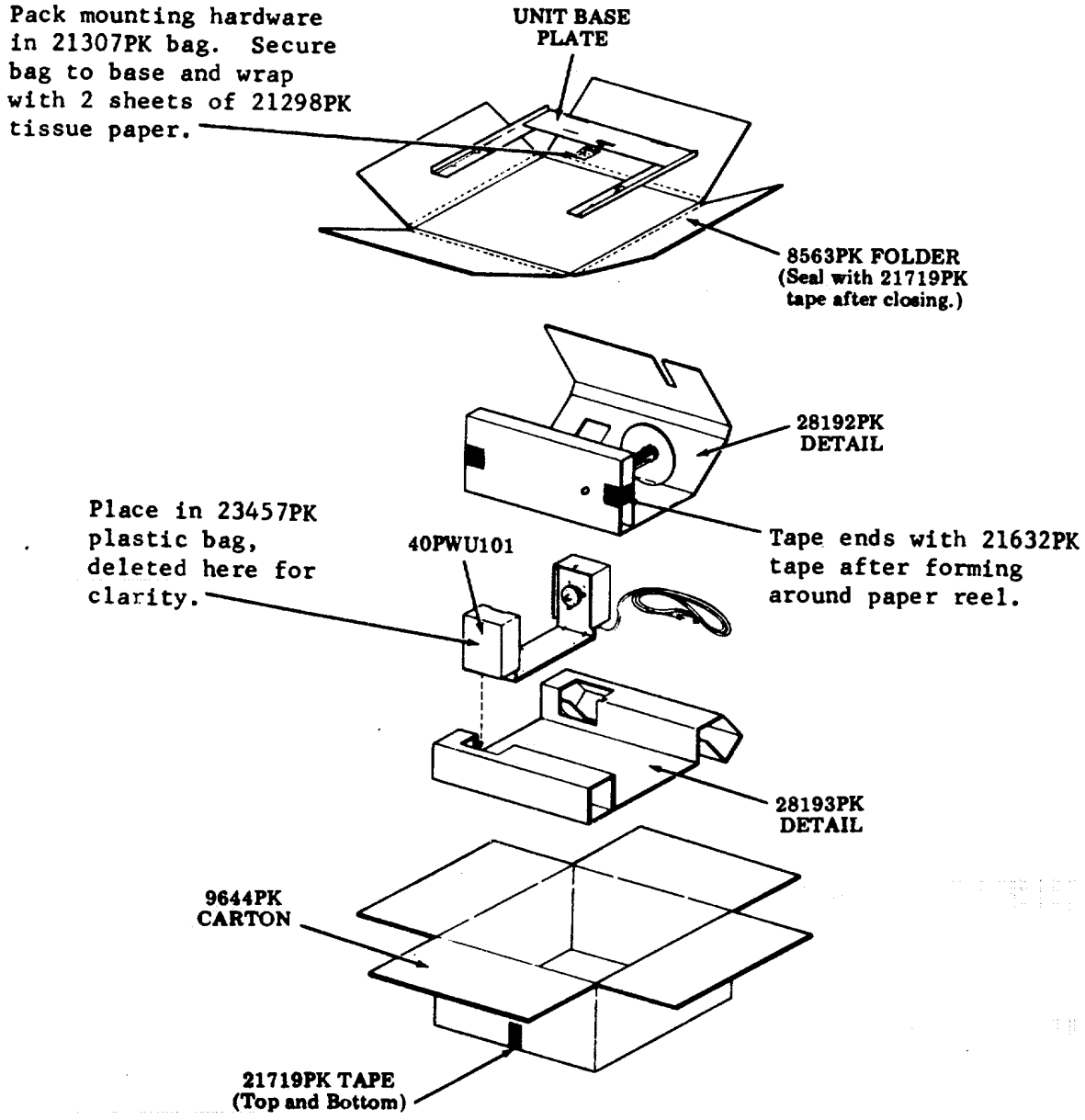
B. SHOP PROCEDURES (Cont)

5. MARKING AND PACKING, Packing (Cont)

40PWU101 and 401PWU102 Paper Winder

Materials Required

Qty			Qty		
1	9644PK	Corrugated Carton	1	21307PK	Muslin Bag
1	8563PK	Corrugated Folder		21719PK	Tape (as required)
1	28192PK	Corrugated Detail		21632PK	Tape (as required)
1	28193PK	Corrugated Detail		21298PK	Tissue Paper (as required)
1	23457PK	Plastic Bag			



C. TESTING

1. GENERAL

Testing of the Tempest Model 40 Cabinets consists primarily of making certain continuity checks, using a volt-ohm-milliammeter (VOM) switched to the appropriate range. Whenever a check fails, refer to schematic diagrams beginning on Page 8-24 for point-to-point wiring information.

Testing of the Tempest Model 40 Pedestals requires the mechanical checks outlined on Page 8-7, 3. INSPECTION. Each repaired interface assembly should be given an operational check in a known good Tempest Model 40 Set. Refer to Page 8-57, F. DISASSEMBLY/REASSEMBLY AND PARTS for disassembly/reassembly procedures.

Before starting any test, check that all circuit cards and connectors are fully seated. If a printer is present check that paper and ribbon are properly installed.

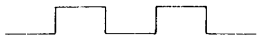
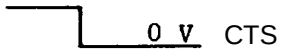
Always perform the steps in the order given. A proper test result is based on all previous steps being satisfactory. If the desired response is not obtained, repeat the step to make sure the step was performed correctly.

Preparation for Testing

a. Remove interface cover.
b. Disassemble card connector frame and place upside down in front of unit for access to card connector pins. (Refer to Page 8-57, F. DISASSEMBLY/REASSEMBLY AND PARTS.

STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	TROUBLE ANALYSIS
1	With power applied, do the proper voltages appear at the proper pins?	-7 V dc Pin — Card Connector N and K — Z3 N — Z4 F — Z5 F — Z7 +7 V dc Pin — Card' Connector D — Z5 D — Z7 +9 to +11 V dc Pin — Card Connector A — Z3 A — Z4 A — Z6	+7 volt regulator +7 volt regulator F1 fuse Q1 transistor	Refer to Page C 8-24, D. TROUBLE-SHOOTING
2	With a MIL STD 188 data signal applied to pin 5 of TB101O terminal block, does a 0 to +1.5 V square wave signal appear at pin L of card in card connector Z6?	Pin L card connector Z6 		

STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	TROUBLE ANALYSIS
2 (Cont)	Input Signal +6 V 0 V -6 V 	If pin L is steady 0 V, +1.5 V or +5 V. If pin L, waveform is: +5 V 0 V 	303181 circuit card Open output wiring to controller.	Refer to Page 8-24, D. TROUBLE-SHOOTING.
3	Temporarily move input data lead from terminal 5 to terminal 3. Remove strap from terminal 2 to terminal 3 of TB101 terminal block. Repeat Step 2. Replace strap between terminals 2 and 3. Return input data lead to terminal 5 of TB1Ol terminal block.	Same as Step 2.	Same as Step 2.	
4	Send characters from set.	Does a 0 V to 1 V signal appear at pin M of card connector Z7?	Open wiring from controller.	Check wiring.

STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	TROUBLE ANALYSIS
4 (Cont)	Mark +6 V Space -6 V 	Does a +6 V to -6 V signal appear at terminal 2 of TB101 terminal block.	Open wiring from pin M of card connector Z7 to terminal 2 of TB101 terminal block. 303180 circuit card	Check wiring. Refer to Page 8-24, D. TROUBLE SHOOTING.
5	Apply a MIL STD 188 signal to terminals 1 (send clock) and 3 (receive clock) of TB102 terminal block. Input Signal +6 V -6 V 	Pin L and C card connector Z3 normal signal +1.5 V O V  If pin L or C is steady O V, +1.5 V or +5 V. If pin L or C, waveform is: +5 V O V 	303181 circuit card Open wiring to controller.	Refer to Page 8-24, D. TROUBLE SHOOTING Check wiring.
6	Place a +5 V dc signal on terminal 4 of TB102 terminal block.	Pin L of card connector Z4 should go from +1.5 V to O V.  +1.5 V CTS 0 V CTS If initial condition of pin L is +5 V.	303181 circuit card Open wiring to controller.	Refer to Page 8-24, D. TROUBLE SHOOTING. Check wiring.

STEP	PROCEDURE	RESPONSE	POSSIBLE CAUSE OF TROUBLE	TROUBLE ANALYSIS
7	With TERM READY lamp on the set on, check input to pin M of card connector Z5.	Pin M should be approximately +1 V dc.	Open wiring to controller.	Check wiring.
	Check output pin H of card connector Z5.	Pin H should be +6 V dc. Terminal 4 of TB102 terminal block should be +6 V also.	303180 circuit card	Refer to Page 8-24, D. TROUBLESHOOTING.
			Open wiring between card connector and terminal block.	Check wiring.
	Push TERM READY keyswitch			
	On opcon, TERM READY lamp extinguishes.	Pin M should go to 0 V.	Open wiring to controller.	Check wiring
		Pin H should go to -6 V.	303180 circuit card	Refer to Page 8-24, D. TROUBLESHOOTING.
	Push TERM READY keyswitch again.	TERM READY lamp lights. Pin M should go approximately +1 V dc. 0 Pin H should go to +6 V dc.		

D. TROUBLESHOOTING

1. GENERAL

This section provides information for locating troubles encountered in testing Tempest Model 40 Cabinet, Paper Winders and Facilities. This section is divided into two parts. The printer cabinet troubleshooting guide will normally consist of isolating wiring and/or cable problems encountered in testing in accordance with Page 8-19, C. TESTING or when testing other Model 40 components after assembly into their cabinets. Refer to the appropriate diagram in this section and use the VOM as a continuity checker (R X 1 range) to find wiring opens, crosses or grounds. For locating intermittent troubles, manually moving the cabling or connectors involved may be helpful.

CAUTION: WHEN MAKING CONTINUITY CHECKS MAKE SURE ALL 115 V AC POWER IS DISCONNECTED.

The troubleshooting guide for the interface assembly is a step-by-step question and response sequence, which determines the correct directive for the repair of the trouble. Use the troubleshooting guide in the following manner:

a. Always start with Analysis Question 1.
b. Answer analysis questions and follow proper response directive to isolate and correct the trouble.
c. Where more than one component is specified for replacement, substitute one at a time in the order specified. The original component should be replaced if the trouble is not corrected before making the next indicated substitution. When installing a replacement component, make certain that all options (if present) in this component are programmed for proper operation. If replacement Of the part or subcomponent indicated does not correct the trouble, replace the next higher order of component (ie, circuit card, wired frame, or entire interface).

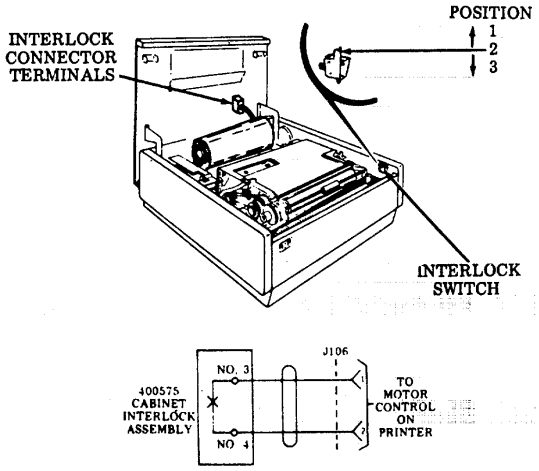
Once the trouble is corrected, repeat the checkout to assure correct performance. Remember, in all trouble analysis, response is directly affected by the options selected. The actual response should always be checked against how the interface is optioned to response.

2. PRINTER CABINETS

Cabinets -Friction Feed Printer

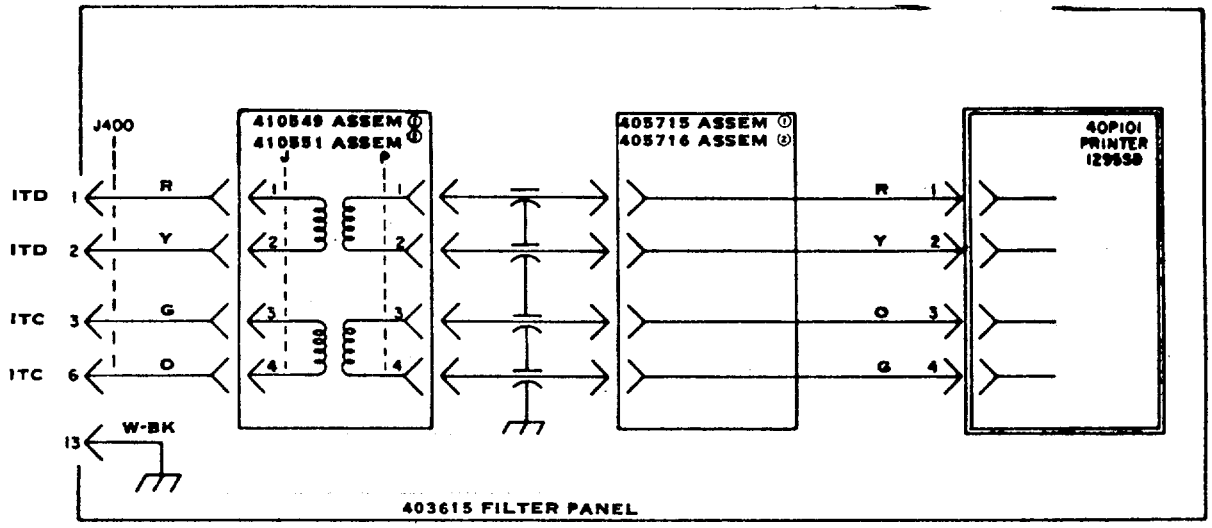
The interlock switch has a three position activator. Check for continuity at interlock connector terminals 1 and 2 when activator is lifted to position 1 and held down (audible click) in position 3. No continuity should be observed in position 2.

Check for continuity of the SSI cable at connector (terminals 1 to'2 and 3 to 6) at rear of printer cabinet and at printer connector (J400).



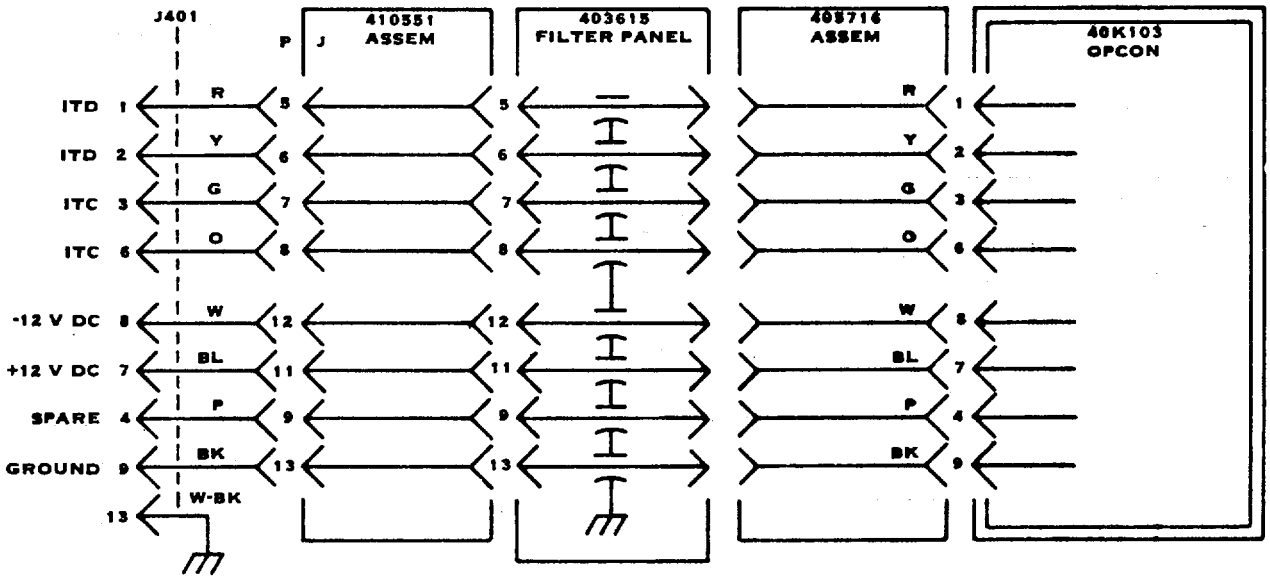
400598 Interlock Cable Assembly

SSI Schematic for Friction Feed Printer in 40CAB202 Cabinet



① Used on 40CAB202/RC, RD
② Used on 40CAB202/RA

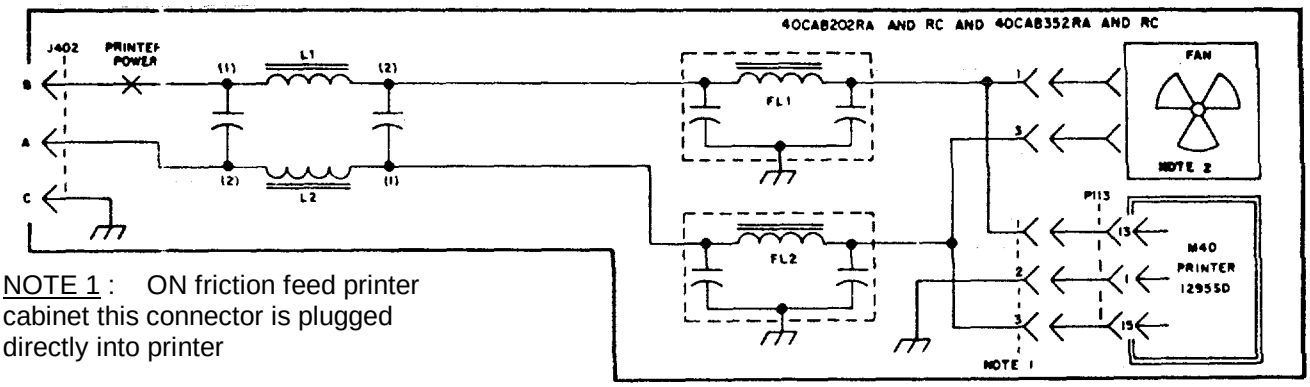
Opcon Wiring -- Friction and Tractor Feed Printer Cabinets



D. TROUBLESHOOTING (Cont)

2. PRINTER CABINETS (Cont)

AC Wiring -- Friction and Tractor Feed Printer Cabinets



NOTE 1 : ON friction feed printer cabinet this connector is plugged directly into printer

NOTE 2: Fan and connector not used on friction feed printer cabinet.

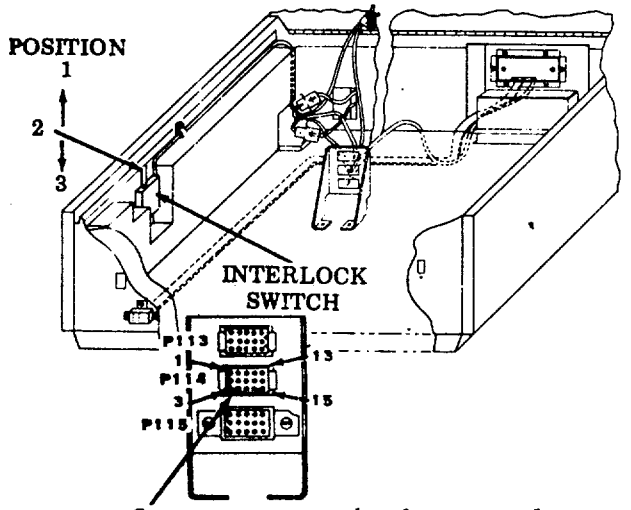
Cabinets -- Tractor Feed Printer

Check for continuity of SSI cable connector (terminals 1 to 2 and 3 to 6) at rear of printer cabinet (J400) and at printer connector (J115).

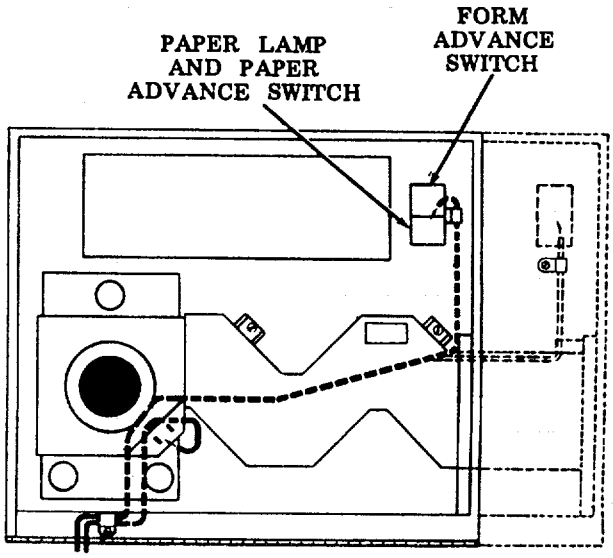
Check for continuity of paper advance switch at connector (P114) terminals 3 to 4 when switch is depressed.

Check for continuity of lamp in paper switch at connector (P114) terminals 1 to 2.

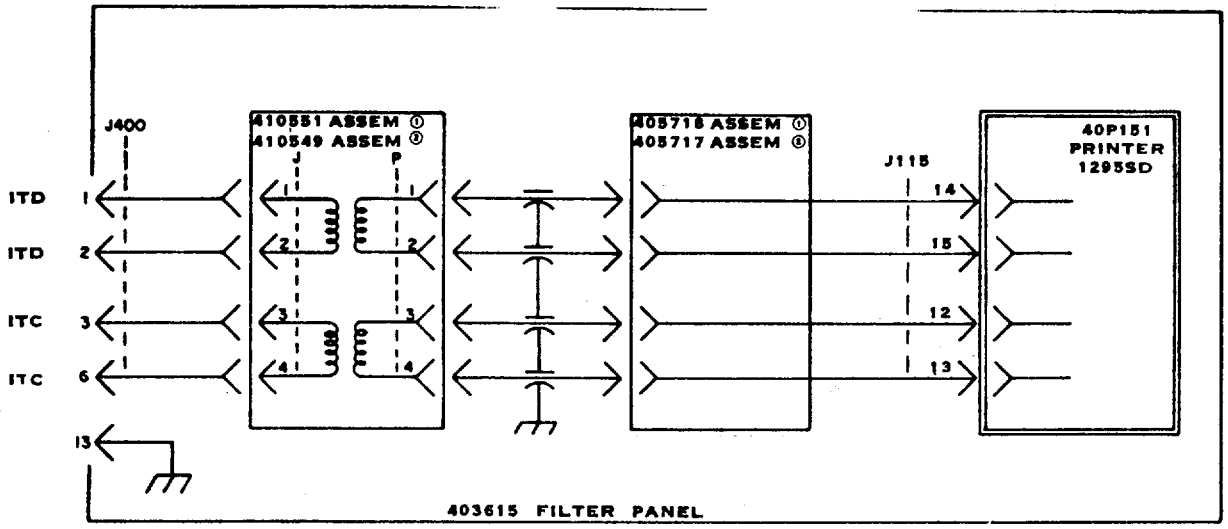
The interlock switch has a three position activator. Check for continuity at connector terminals 6 to 7 and 3 to 5 when activator is lifted to position 1 and held down (audible click) in position 3. No continuity should be observed in position 2.



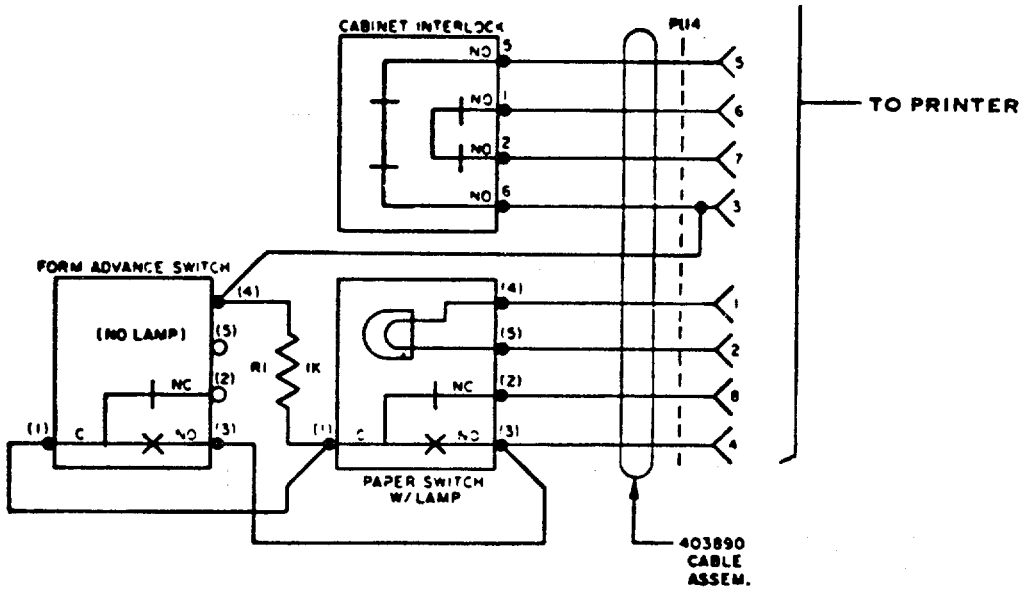
Connector to check paper lamp, paper advance, form advance and interlock switches.



SSI Schematic for Tractor Feed Printer in 40CAB352 and 40CAB354 Cabinets



① Used on 40CAB352/RA, 40CAB354/RS
② Used on 40CAB352/RC, RD and 40CAB354/RB, RC



Opcon Wiring

Refer to Page 8-25, Opcon Wiring -- Friction and Tractor Feed Printer Cabinets.

AC Wiring

Refer to Page 8-26, AC Wiring -- Friction and Tractor Feed Printer Cabinets.

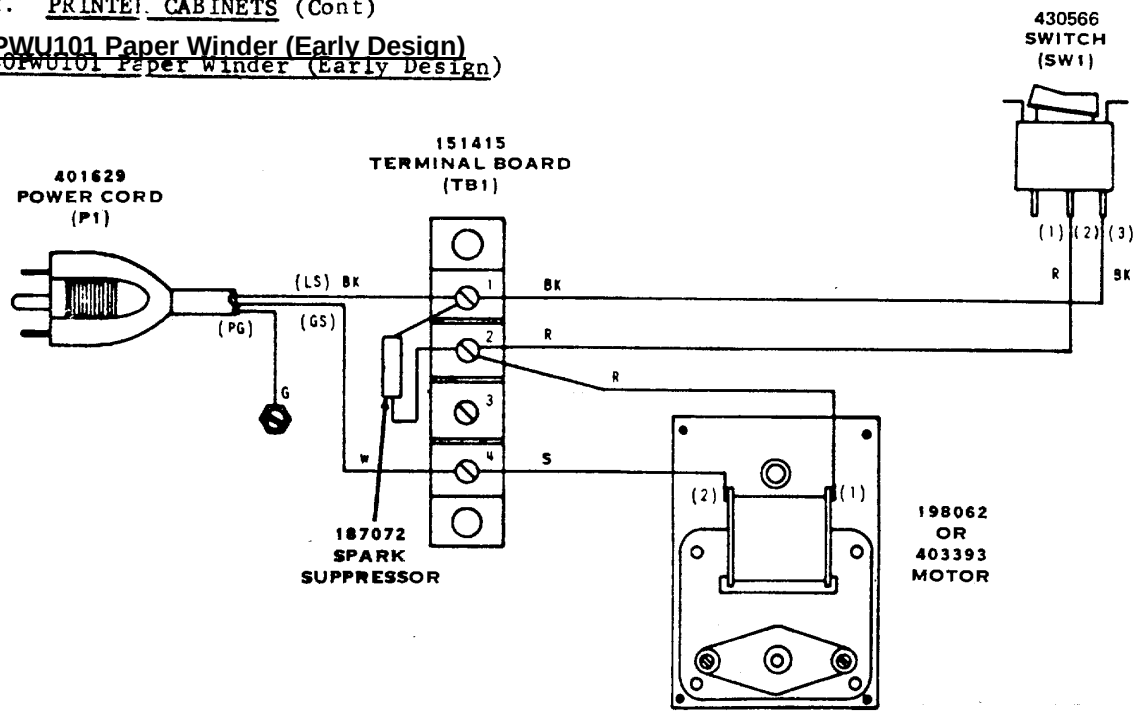
D. TROUBLESHOOTING (Cont)

2. PRINTER CABINETS (Cont)

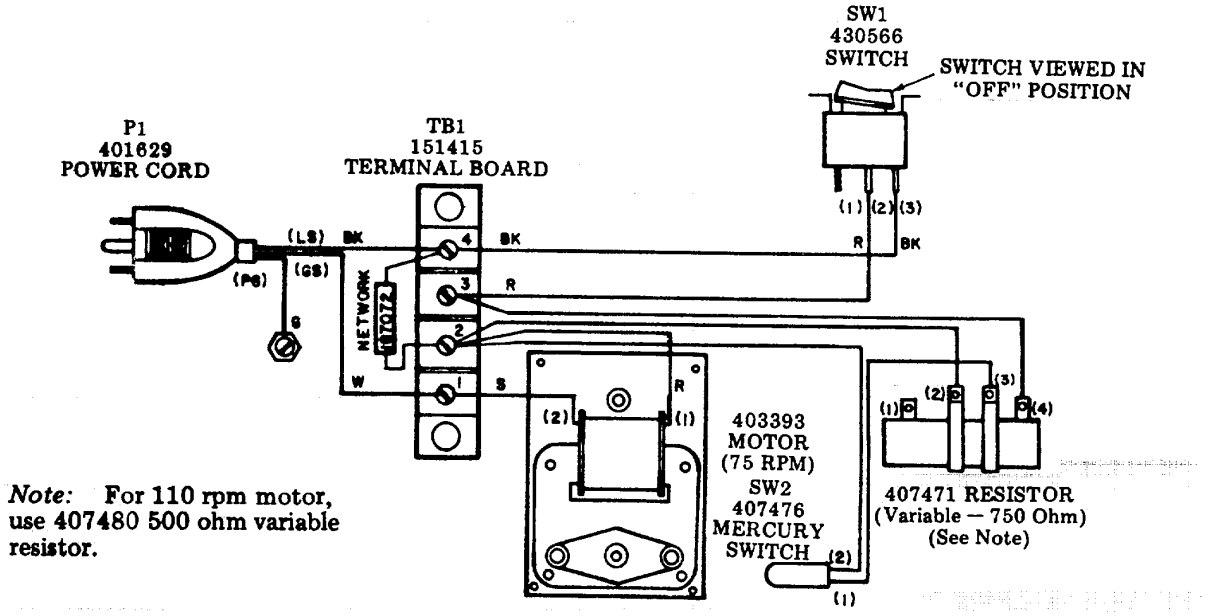
2. PRINTER CABINETS (Cont)

40PWU101 Paper Winder (Early Design)

40PWU101 Paper Winder (Early Design)



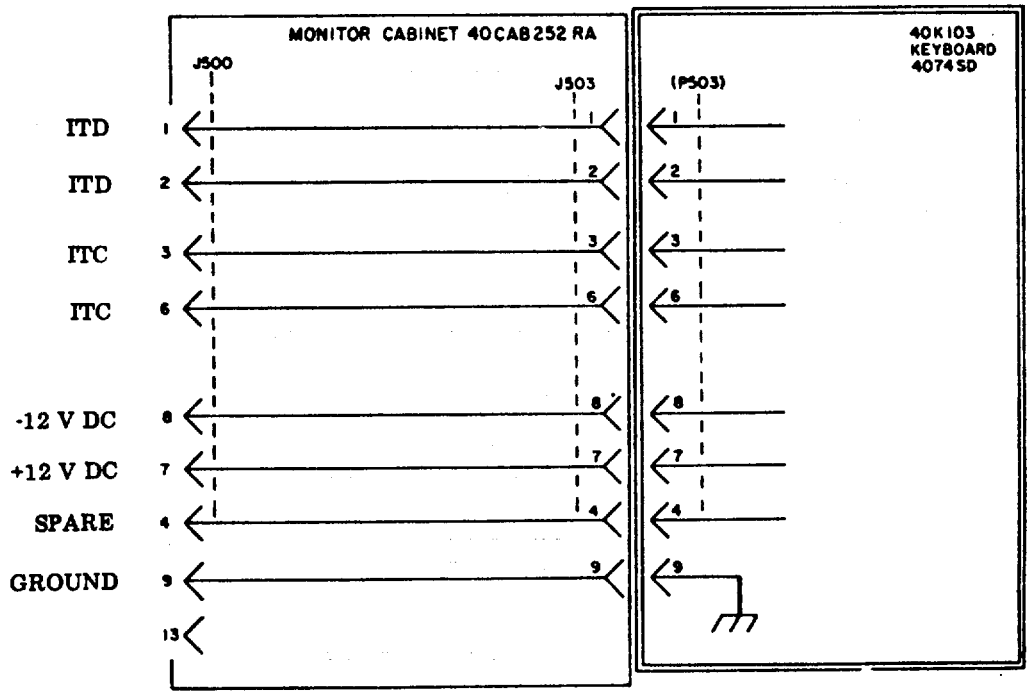
40PWU101 (Late Design) and 40PWU102 Paper Winders



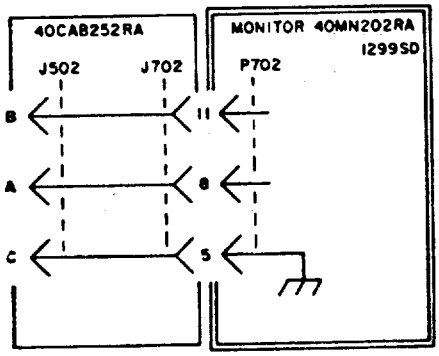
Note: For 110 rpm motor, use 407480 500 ohm variable resistor.

3. MONITOR CABINET

Opcon Wiring for 40CAB252/RA



AC Wiring for 40CAB252/RA



D. TROUBLESHOOTING (Cont)

4. TROUBLE ANALYSIS -- PAPER WINDERS

TABLE A

EARLY DESIGN 40PWU101 PAPER WINDER

SYMPTOM	PROBABLE CAUSE
Paper too loose on paper winder (egg shaped roll).	Clutch Torque adjustment. Lubrication on clutch discs, clutch discs should be dry.
Paper edge ruffled on either side of roll.	Lateral Winder Position adjustment. Paper not tracking correctly on printer paper rollers.
Extraneous or irregular line feed on printer.	Clutch Torque adjustment.

TABLE B

LATE DESIGN 40PWU101 PAPER WINDER

SYMPTOM	PROBABLE CAUSE
Paper too loose on paper winder (egg shaped roll).	High Clutch Torque adjustment. Requirement not met.
Paper edge ruffled on either side of roll.	Lateral Winder Position adjustment. Paper not tracking correctly on printer paper rollers.
Extraneous or irregular line feed on printer.	High clutch torque crossing over before 3 inch diameter roll is on paper winder.

TABLE C

PAPER WINDER (40PWU102)

SYMPTOM	PROBABLE CAUSE
Paper too loose on paper winder (egg shaped roll).	High Motor Torque adjustment. Requirement not met.
Paper edge ruffled on either side of roll.	Lateral Winder Position adjustment. Paper not tracking correctly on printer paper rollers.
Extraneous or irregular line feed on printer.	High motor torque crossing over before 3-inch diameter roll is on paper winder.

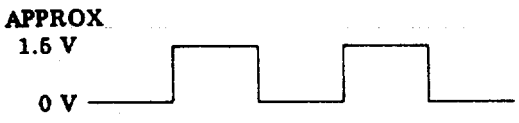
5. TROUBLE ANALYSIS -- INTERFACE

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. Is +7 V dc present at pins H and J of card in card connector Z2 with respect to pins N and P (circuit common) of that card connector?	Go to 2.	Go to 4.
2. Is -7 V dc present at pins L and M of card in card connector Z2 with respect to pins N and P (circuit common) of that card connector?	Go to 3.	Go to 4.
3. Is +9 to +11 V dc present at pin A of card in card connector Z6 with respect to circuit common?	Go to 15.	Go to 11.
4. Is +12 to +22 V dc present at pins A and B of card in card connector Z2 with respect to circuit common? Is -12 to -22 V dc present at pins E and F of card in card connector Z2?	Replace 303168 circuit card in card connector Z2.	Go to 5.
5. Are +12 to +22 V dc present at pins M and N and -12 to -22 V dc present at pins P and R of card in card connector Z1 with respect to circuit common?	Check wiring between card connectors Z1 and Z2. Refer to 9559WD in WDP0457.	Go to 6.
6. Is 28 to 42 V ac present between pins H and S of card in card connector Z1 ?	Replace 303169 circuit card in card connector Z1.	Go to 7.
7. Does F2 fuse check good? (Continuity test)	Go to 8.	Replace 143630 fuse.
8. Is 115 V ac present between connectors J101 and P103? (AC input to filter and transformer assembly)	Check wiring of filter and transformer assembly. Refer to 9559WD in WDP0457.	Go to 9.

D. TROUBLESHOOTING (Cont)

5. TROUBLE ANALYSIS -- INTERFACE (Cont)

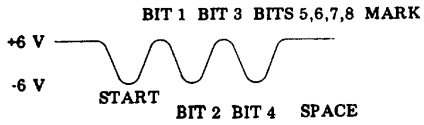
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
8. (Cont)	Replace 366021 transformer. Replace 334187 inductor.	
9. Is 115V ac present between terminals 4 and 5 of TB200 terminal block in ac compartment of interface?	Check wiring of FL100 and FL101 filters. Refer to 9559WD in WDP0457. Replace 402085 FL100 filter. Replace 402086 FL101 filter.	Go to 10.
10. Is 115 V ac present between terminals 1 and 2 of TB200 terminal block in ac compartment of interface?	Check wiring of CB1 circuit breaker. Refer to 9559WD in WDP0457. Replace 402026 CB1 circuit breaker.	AC power is not being supplied to set. Check external ac power circuit.
11. Is +9 to +11 V dc present at emitter of Q1 transistor mounted on heat sink of card connector frame?	Check wiring of card connector frame. Refer to 9559WD in WDP0457.	Go to 12.
12. Does Fl fuse check good? (Continuity test)	Go to 13.	Replace 143630 fuse.
13. Is approximately +13 V dc present at pins A and B of card in card connector Z1?	Check wiring to Q1 transistor. Replace 326594 Q1 transistor (2N3764).	Go to 14.
14. Is 13.5 to 18.5 V ac present between pins C and L of card in card connector Z1 ?	Replace 303169 circuit card in card connector Z1.	Go to 7.

"'YES" RESPONSE ANALYSIS QUESTION	"NO" RESPONSE DIRECTIVE	DIRECTIVE
15. Is -7 V dc present at: Pin Card — Connector N and K — Z3 N — Z4 F — Z5 F — Z7 Is +7 V dc present at: Pin Card — Connector D — Z5 D — Z7 Is +9 to +11 V dc present at: Pin Card — Connector A — Z3 A — Z4 A — Z6	Go to 17.	Check wiring of card connector frame. Refer to 9559WD in WDP0457.
16. Is interface equipped with 303180 and 303181 circuit cards in card connectors Z3 and Z5?	Go to 17.	Go to 33.
17. Are bit clock signals (+6 V to -6 V shaped waveforms) present on terminals 1 and 3 of TB102 terminal block? Refer to Page 9-10a or b, Set Features and Options Record. If Option C.1. (asynchronous transmission mode) is optioned, go to 19.	Go to 18.	External clock is off to set. Check external clock circuit.
18. Does clock signal appear at pins C and L of card in card connector Z3?  	Go to 19.	Check wiring to controller for shorts or opens. Refer to 9559WD in WDP0457 and 9575WD in WDP supplied with controller. Replace 303181 circuit card in card connector Z3.
19. Is a 303181 circuit card in. card connector Z4?	Go to 20	Go to 22.

D. TROUBLESHOOTING (Cont)

5. TROUBLE ANALYSIS -- INTERFACE (Cont)

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
20. Is +6 V dc present at terminal 4 of TB102 terminal block in interface?	Go to 21.	Clear-to-send signal is off to set. Check external clear-to-send circuit.
21. Is approximately +1.5 V dc present at pin L of card in card connector Z4?	Go to 22.	Check wiring to controller for shorts or opens. Refer to 9559WD in WDP0457 and 9575WD in WDP supplied with controller. Replace 303181 circuit card in card connector Z4.
22. Is +6 V dc present on terminal 7 of TB102 terminal block when TERM READY lamp on opcon is lit or paper in printer with cover closed, and in REC mode?	Go to 24.	Go to 23.
23. Is voltage at pin M of card in card connector Z5 approximately 1 V dc or more?	Replace 303180 circuit card in card connector Z5.	Go to 24.
24. Depress TERM READY key on opcon or open printer cover. Does voltage on terminal 7 of TB102 terminal block change from +6 V dc to -6 V dc?	Go to 26.	Go to 25.
25. Is voltage at pin M of card in card connector Z5 less than +0.5 V dc?	Replace 303180 circuit card in card connector Z5.	Check wiring to controller.
26. Is +6 V dc present at terminal 5 of TB101 terminal block in interface?	Go to 27.	Receive line off or open. Check external receive line circuit.
27. Is half-duplex strap installed (strap between terminals 2 and 3 of TB101 terminal block) and is +6 V dc present at terminal 3? If no card in card connector Z7, go to 28.	Go to 28.	Remove half-duplex strap. Go to 28.

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
28. Is approximately +1.5 V dc present at pin L of card in card connector Z6?	Go to 29.	Check wiring to controller. Refer to 9559WD in WDPO457 and 9575WD in WDP supplied with controller. Replace 303181 circuit card in card connector Z6. Replace half-duplex strap if removed.
29. Is there a circuit card in card connector Z7?	Go to 30.	Place interface in service.
30. Is +6 V dc present at terminal 2 of TB101 terminal block in interface?	Go to 32.	Go to 31.
31. Is approximately 1 V present at pin M of card in card connector Z7 when set is not sending?	Replace 303180 circuit card in card connector Z7.	Go to 32.
32. When a character is sent from-the set, does voltage at terminal 2 of TBlO1 terminal block switch from +6 V to -6 V for mark to space bit transitions?  	Place interface in service.	Check wiring to controller.
33. Are bit clock signals (+6 V to -6 V shaped waveforms) present on terminals 1 and 3 of TB102 terminal block? Refer to Page 9-10a or b, Set Features and Options Record. If Option C.1. (asynchronous transmission mode) is optioned, go to 19.	Go to 34.	External clock is off to set. Check external clock circuit.

D. TROUBLESHOOTING (Cont)

5. TROUBLE ANALYSIS -- INTERFACE (Cont)

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
34. Does clock signal appear at pins C and L of card in card connector Z3?	Go to 35.	Check wiring to controller for shorts or opens. Refer to 9559WD in WDP0457 and 9575WD in WDP supplied with controller. Replace 303181 circuit card in card connector Z3.
35. Is a 303184 circuit card	Go to 36.	Go to 38. in card connector Z4?
36. Is +6 V dc present at terminal 4 of TB102 terminal block in interface?	Go to 37.	Clear-to-send signal is off to set. Check external clear-to-send circuit.
37. Is approximately +1.5 V dc present at pin L of card in card connector Z4?	Go to 38.	Check wiring to controller for shorts or opens. Refer to 9559WD in WDP0457 and 9575WD in WDP supplied with controller. Replace 303184 circuit card in card connector Z4.
38. Is -6 V dc present at terminal 7 of TB102 terminal block when TERM READY lamp on opcon is lit or paper in printer with cover closed, and in REC mode?	Go to 40.	Go to 39.
39. Is voltage at pin M of card in card connector Z5 approximately 1 V dc or more?	Replace 303180 circuit card in card connector Z5.	Go to 40.
40. Depress TERM READY key on opcon or open printer cover. Does voltage on terminal 7 of TB102 terminal block change from -6 V dc to +6 V dc?	Go to 26.	Go to 41.
41. Is voltage at pin M of card in card connector Z5 less than +0.5 V dc?	Replace 303180 circuit card in card connector Z5.	Check wiring to controller.

E. ADJUSTMENTS AND LUBRICATION

1. CABINET AND PAPER WINDER ADJUSTMENTS

Door - Friction Feed

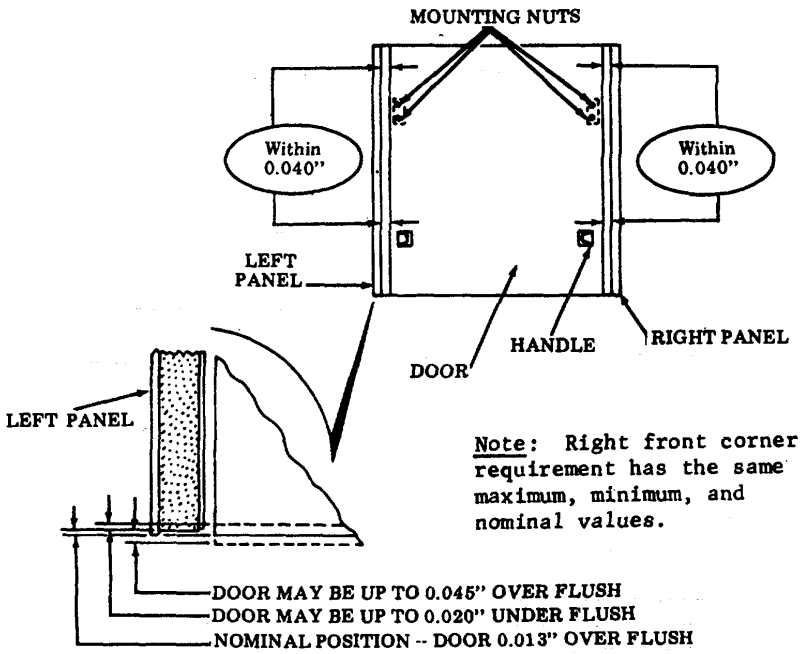
Door closed and latched.

Requirement

Gap between the door and the two end panels should be equal both front and rear to within 0.040 inch, and door may be over flush, under flush, or in nominal position.

To Adjust

Loosen mounting nuts friction tight.
Position door to meet requirement.
Tighten mounting nuts.



E. ADJUSTMENTS AND LUBRICATION (Cont)

1. CABINET AND PAPER WINDER ADJUSTMENTS (Cont)

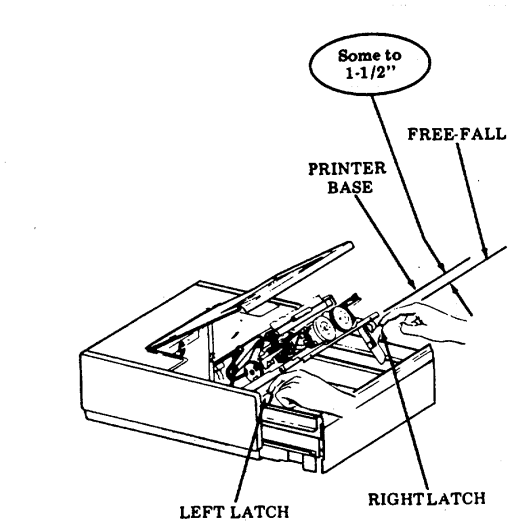
Cradle Torsion Spring - Friction Feed

NOTE: This is a factory Adjustment, adjusted to the optimal force. If it becomes necessary to readjust, then proceed as follows.

Printer installed in the cradle assembly of the cabinet and it is latched up (service position).

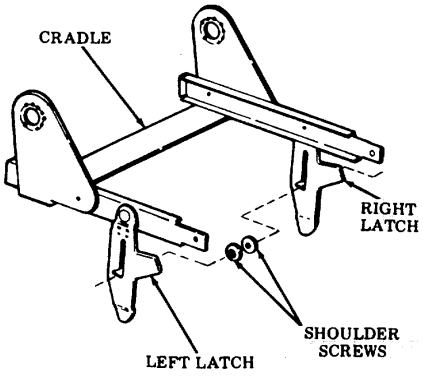
Requirement

When left and right latches are released, printer should free-fall no more than 1-1/2 inch when measured at the front of the printer base. When the left and right catches are released with a printer in the operate position the printer and cradle shall not pop up with sufficient energy to latch in the service position.



To Adjust

Remove printer from cradle assembly. Carefully remove shoulder screws (old design) or shoulder busing and flat head screw that secure left and right latches to the printer cabinet. The cradle assembly should be in the up position when the above removal is accomplished.



To Adjust (Cont)

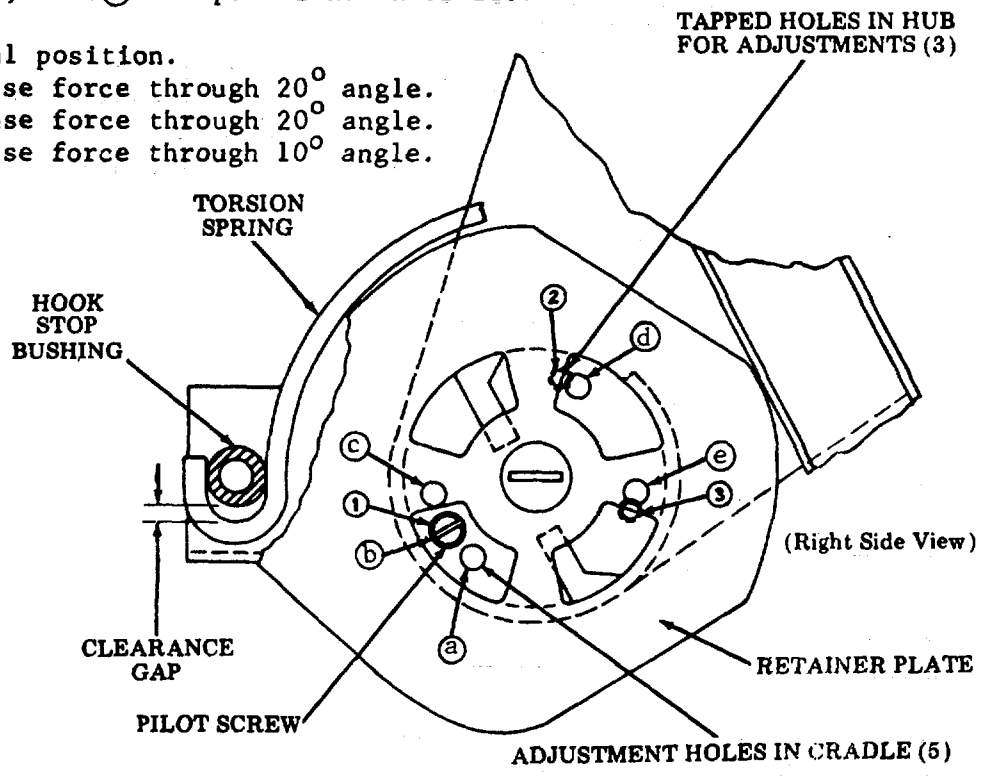
With cradle assembly channels positioned past vertical, check outside hook portion of spring relative to hook stops. Any adjustments that are made to increase or decrease spring force shall be made with the intent of keeping both springs equal in force. In essence, clearance between the hooks of left and right torsion springs and stop bushings should be approximately equal. Therefore, to increase the force, torsion spring whose hook is farther away from stop bushing should be adjusted to decrease clearance. To decrease the force, torsion spring whose hook is closer to the stop bushing should be adjusted to increase clearance. Loosen pilot screw in the hub to be adjusted until pilot is out of the locating hole in the cradle upright. Rotate torsion spring to increase or decrease force.

Note: There are five holes in each cradle upright to accept pilot portion of pilot screw.

It may be necessary to reposition the pilot screw on hub if an angular adjustment of only 10 degrees is required from nominal. Reassemble with care.

LEGEND:
①, ②, and ③ are positions for pilot screw on hub.
ⓐ, ⓑ, ⓒ, ⓓ, and ⓔ are positions on cradle.

①	ⓑ	Nominal position.
①	ⓐ	Decrease force through 20° angle.
①	ⓒ	Increase force through 20° angle.
②	ⓓ	Increase force through 10° angle.
②	ⓔ	--



E. ADJUSTMENTS AND LUBRICATIONS (Cont)

1. CABINET AND PAPER WINDER ADJUSTMENTS (Cont)

Dome-Tractor Feed

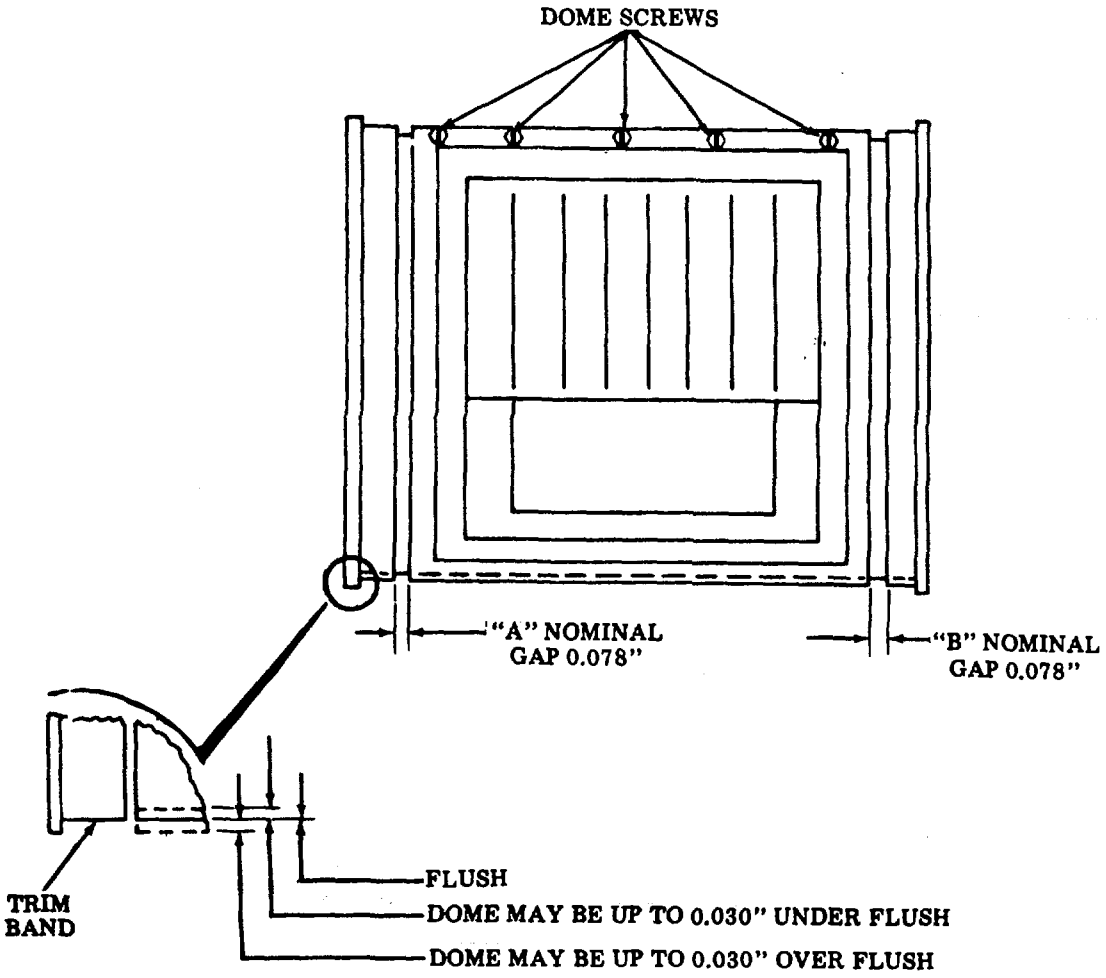
- Door closed and latched.

Requirement

Gap "A" must be equal to Cap "B" within 0.062" and dome may be flush, over flush or under flush with respect to trim band. (Both Sides)

To Adjust

Loosen five dome mounting screws friction tight. Position dome to meet requirement. Tighten mounting screws.



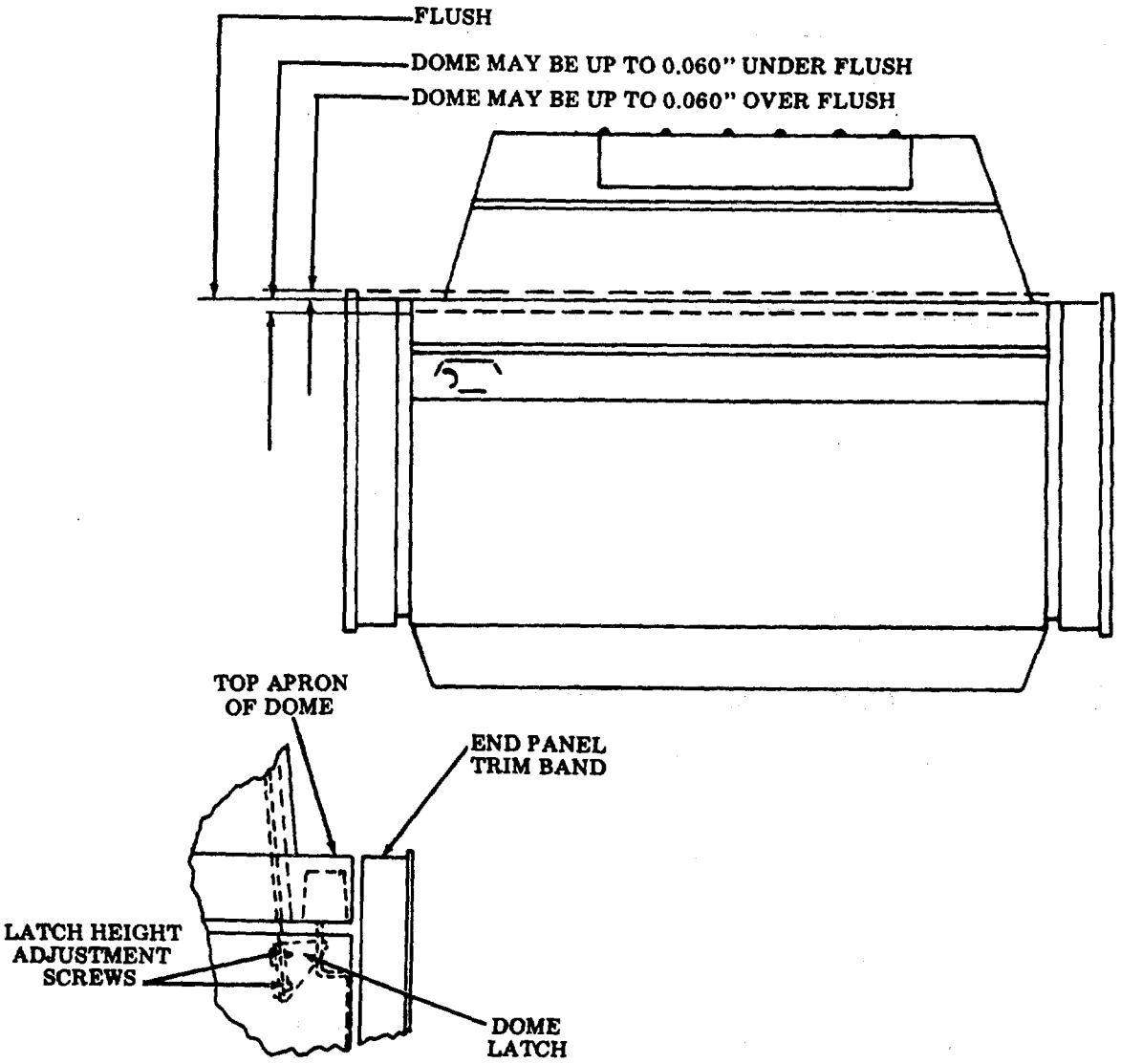
Requirement

The top apron of the dome shall be from 0.060" under flush to 0.060" over flush with respect to the top surface of the end panel trim band. (Both Sides)

To Adjust

Place the left and right dome latches in the middle of their adjustment range and tighten the latch height adjustment screws. Close dome.

Check height requirement. Readjust if necessary.



E. ADJUSTMENTS AND LUBRICATION (Cont)

1. CABINET AND PAPER WINDER ADJUSTMENTS (Cont)

Cradle Torsion Spring - Tractor Feed 80-Column

Note: This is a factory adjustment, adjusted to the optimal force. If it becomes necessary to readjust, then proceed as follows.

- Printer in the cabinet.
- Left and right cradle latches released (pressed inward).

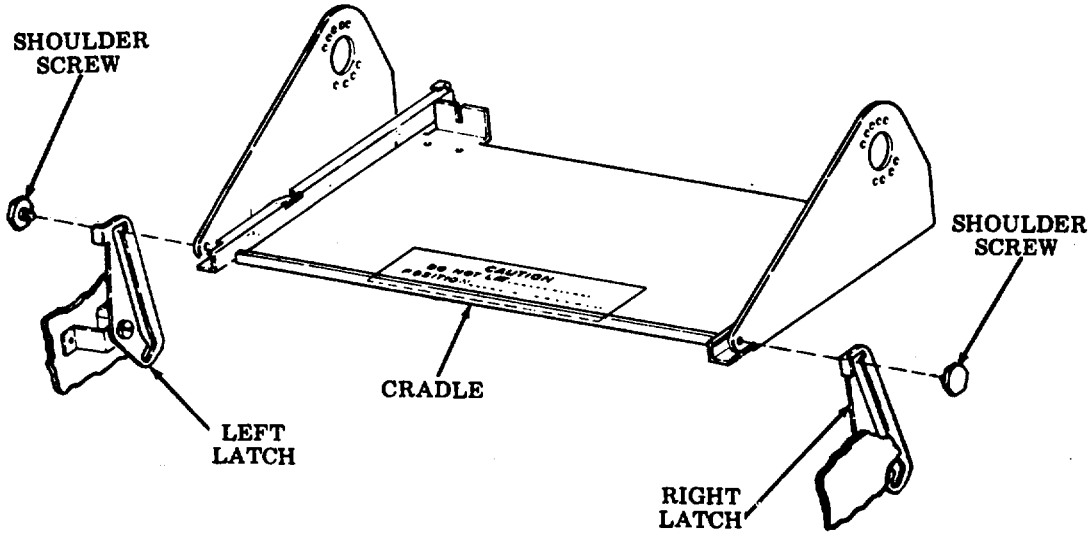
Requirement

(a) Printer shall move out of the latched position.

(b) With the printer in the service position, when the left and right latch lever on each side of the cradle assembly are pushed to the rear, the printer and the cradle shall move out of the latching position by their own weight or a force of Max. 16 oz. applied to each of the cradle front tips.

To Adjust

Use printer to check adjustment. Remove printer from cradle assembly. If cradle assembly fails to remain in up position, raise it up until it latches. Carefully remove shoulder screws that secure left and right latches to the printer cradle.



To Adjust (Cont)

With cradle assembly channels positioned past vertical, check outside hook portion of spring relative to hook stops. Any adjustments that are made to increase or decrease spring force shall be made with the intent of keeping both springs equal in force. In essence, clearance between hooks of left and right torsion springs and stop bushings should be approximately equal. Therefore, to increase the force, torsion spring whose hook is farther away from stop bushing should be adjusted to decrease clearance. To decrease the force, torsion spring whose hook is closer to the stop bushing should be adjusted to increase clearance. Loosen pilot screw in the hub to be adjusted until pilot is out of the locating hole in the cradle upright. Rotate torsion spring to increase or decrease force.

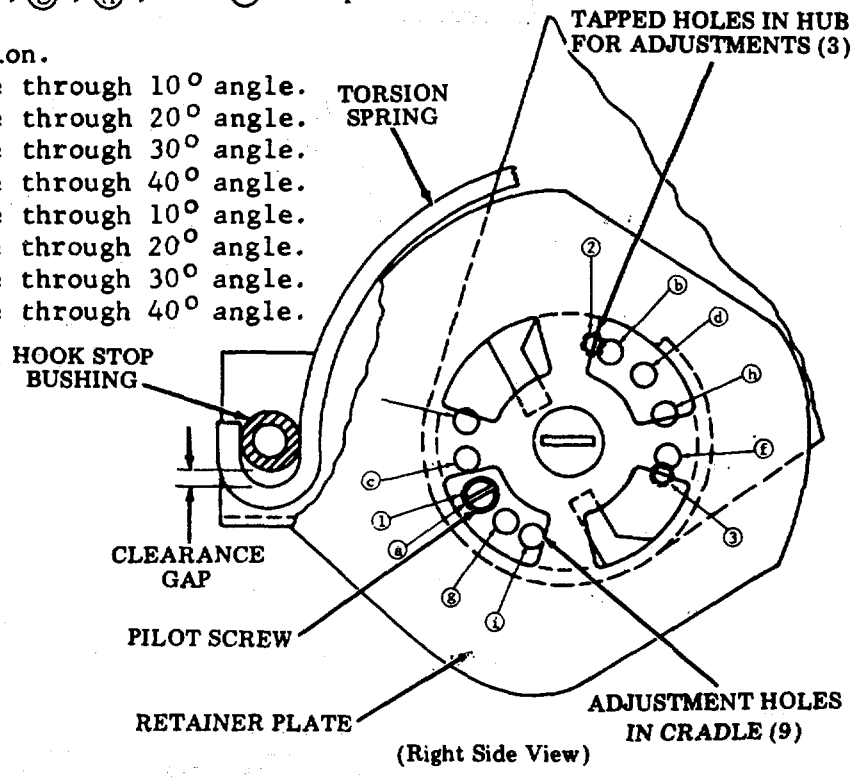
Note: There are nine holes in each cradle upright to accept pilot portion of pilot screw.

It may be necessary to reposition the pilot screw on hub if an angular adjustment of. only 10 degrees or 30 degrees is required from nominal.

Reassemble with care.

LEGEND:
①, ②, and ③ are positions for pilot screw on the hub.
ⓐ, ⓑ, ⓒ, ⓓ, ⓔ, ⓕ, ⓖ, ⓗ, and ⓘ are positions on the cradle.

①	ⓐ	Nominal position.
②	ⓑ	Increase force through 10° angle.
①	ⓒ	Increase force through 20° angle.
②	ⓓ	Increase force through 30° angle.
①	ⓔ	Increase force through 40° angle.
③	ⓕ	Decrease force through 10° angle.
①	ⓖ	Decrease force through 20° angle.
③	ⓗ	Decrease force through 30° angle.
①	ⓘ	Decrease force through 40° angle.



E. ADJUSTMENTS AND LUBRICATION (Cont)

1. CABINET AND PAPER WINDER ADJUSTMENTS (Cont)

Cradle Torsion Sprint - Tractor Feed 132-Column

- Printer in the cabinet.
- Left and right cradle latches released (pressed inward).

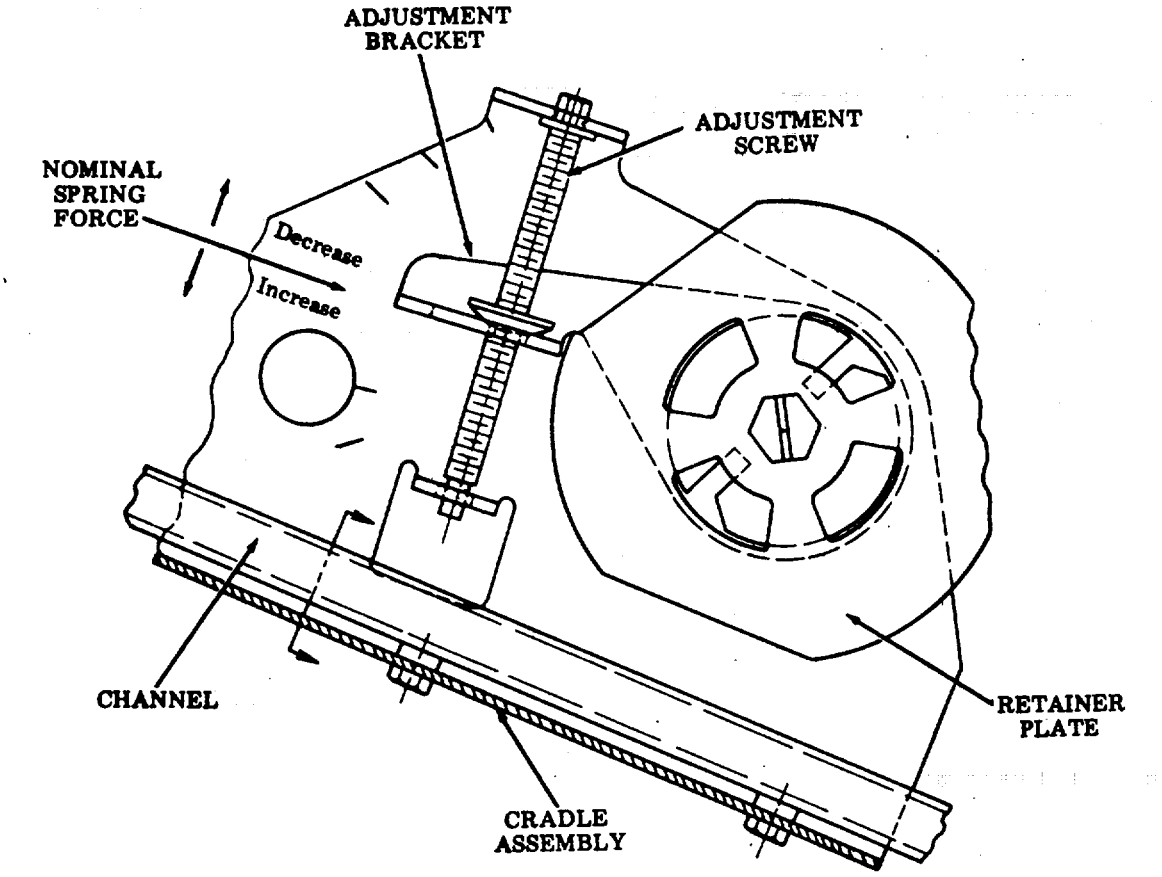
Requirement

(a) The printer and cradle shall move out of the latched position.

(b) With the printer in the service position, depressing the left and right latch lever shall allow the printer and cradle to move out of the latching position by their own weight or a force of Max. 16 oz. applied to each side of the cradle front tip.

To Adjust

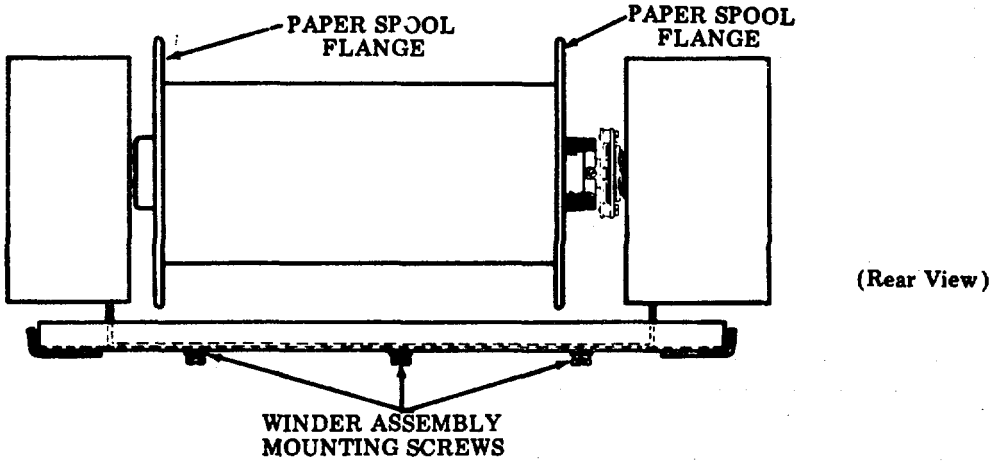
Turn the adjustment screw (one on each side of the cradle) counter- clockwise to increase the torsion spring force and clockwise to decrease the torsion spring force. Any adjustments to increase or decrease the spring force shall be made with the intent of keeping both springs in equal tension.



Lateral Winder Position

Requirement
The paper spool flange must align with spent paper exiting from printer, and the paper should be flat on cabinet top when being wound.

To Adjust
Loosen the three winder assembly mounting, screws. Position the winder left or right to meet requirement.

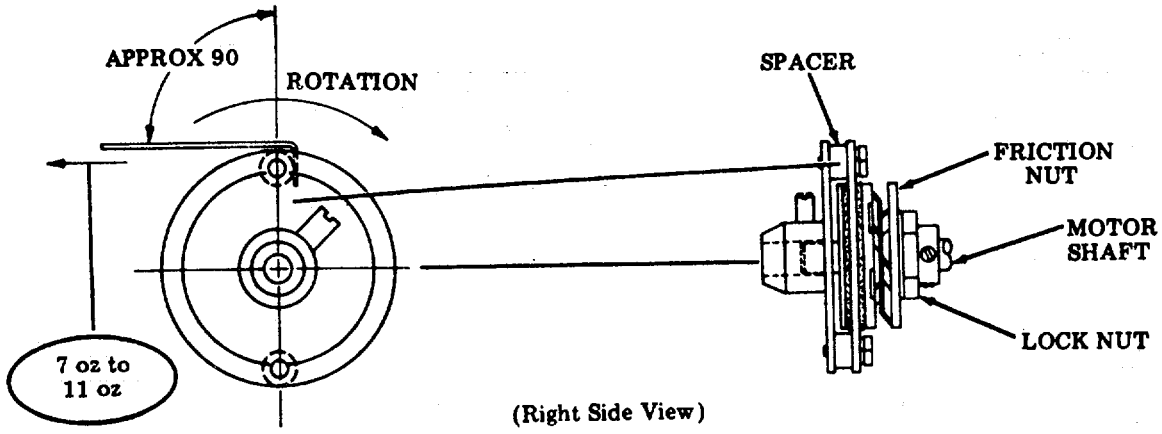


Friction Clutch Torque (40PWU101 Early Design)

Note: Remove paper spool assembly and motor cover.

Requirement
It should require 7 to 11 ounces to stop rotation of the drive brace with hub.

To Adjust
Operate the winder and hook a spring scale over one of the spacers between the drive disc and drive brace w/hub. Loosen the locknut and rotate the friction nut in or our to meet the requirement. Tighten the locknut.



E. ADJUSTMENTS AND LUBRICATION (Cont)

1. CABINET AND PAPER WINDER ADJUSTMENTS (Cont)

Paper Spool Endplay

- Remove motor cover.
- Frame assembly secured to its mounting plate.
- Plastic pivot seated in the retaining spring and drive pin seated in the spool hub.

Requirement

With the plastic pilot seated in the retainer spring on the right and the drive pin seated in the spool hub on the left, there should be a clearance of

Min Some---Max 0.040 inch

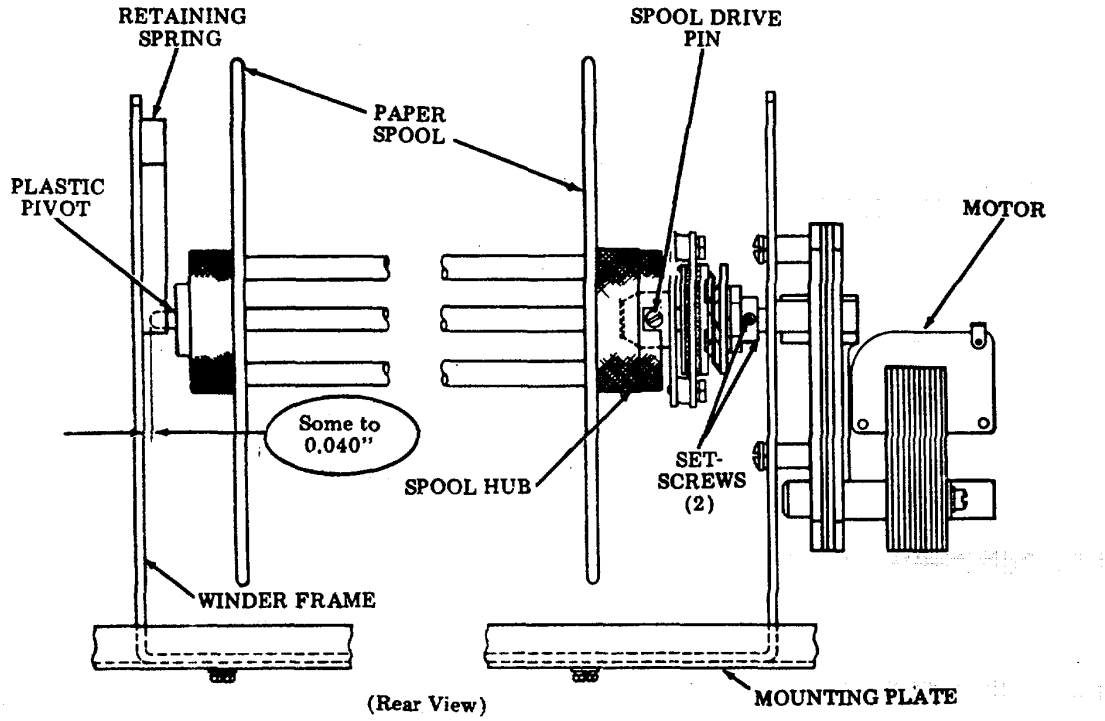
between the plastic pivot and frame when the endplay in the motor shaft is taken up to make the clearance a minimum.

To Adjust

Loosen the two setscrews that secure the clutch assembly to the motor shaft. Position the. clutch assembly to meet the requirement. Tighten both setscrews. Check that the spool drive pin seats in the spool hub and that the spool rotates freely through the complete revolution.

NOTE: Check that the spool rotates freely through the complete revolution.

CAUTION: DO NOT DISTORT THE VERTICAL ENDS OF THE WINDER FRAME WHEN MAKING THE ADJUSTMENT.



Clutch Torque (40PWUl01 Late Design)

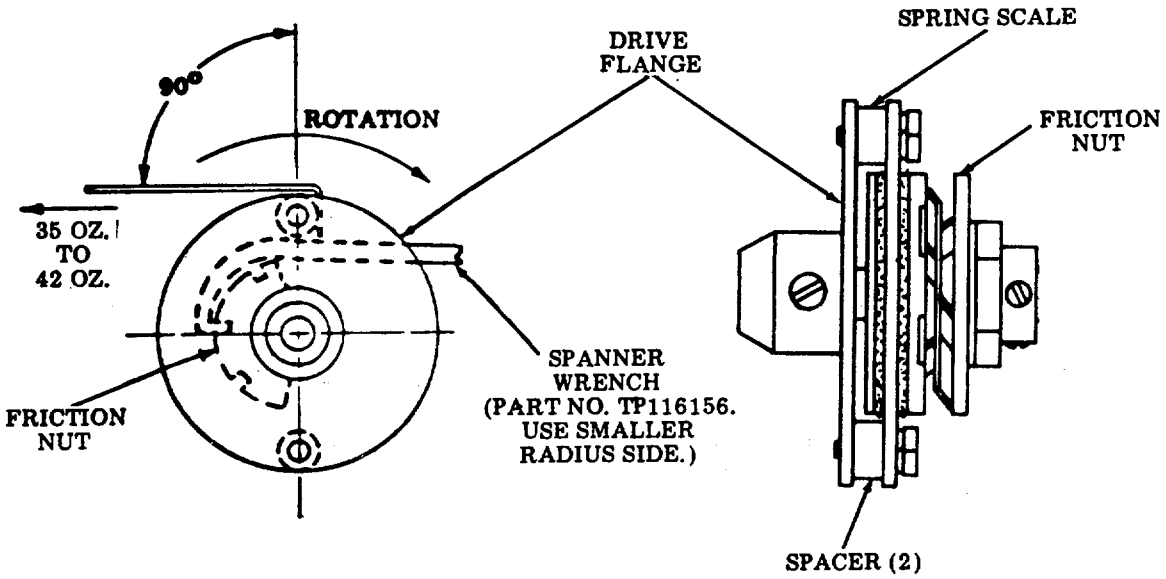
Requirement

With the motor side of the clutch in a locked position (use spanner wrench on friction nut) and the hook of a spring scale applied over the spacer on the clutch, it shall require 40 to 50 ounces to move the drive flange. (Take up play in direction of pull before reading scale.)

To Adjust

Loosen the locknut. Rotate the friction nut in or out to meet the requirement.

Tighten the locknut.



(Right Side View) (Rear View)

E. ADJUSTMENTS AND LUBRICATION (Cont)

1. CABINET AND PAPER WINDER ADJUSTMENTS (Cont)

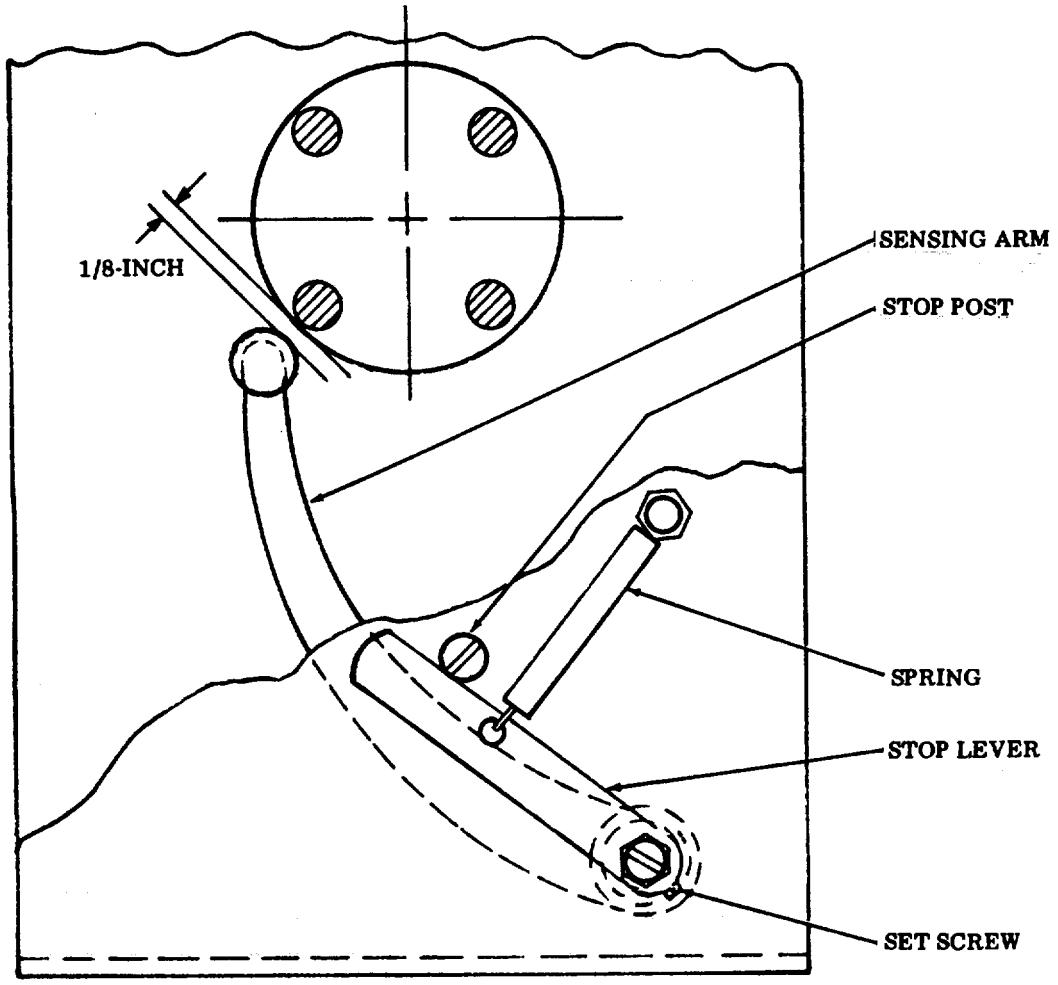
Sensing Arm (40PWU101 Late Design and 40PWU102)

Requirement

With an empty paper spool installed in the winder and the stop lever engaging its stop post, there shall be approximately a 1/8 inch gap between the closest paper spool rod and the sensing arm extension post.

To Adjust

With the set screw associated with the sensing arm friction tight, position the arm to meet the requirement. Tighten the set screw.



(Right Side)

Mercury Switch (40PWU101 Late Design card 40PWU102)

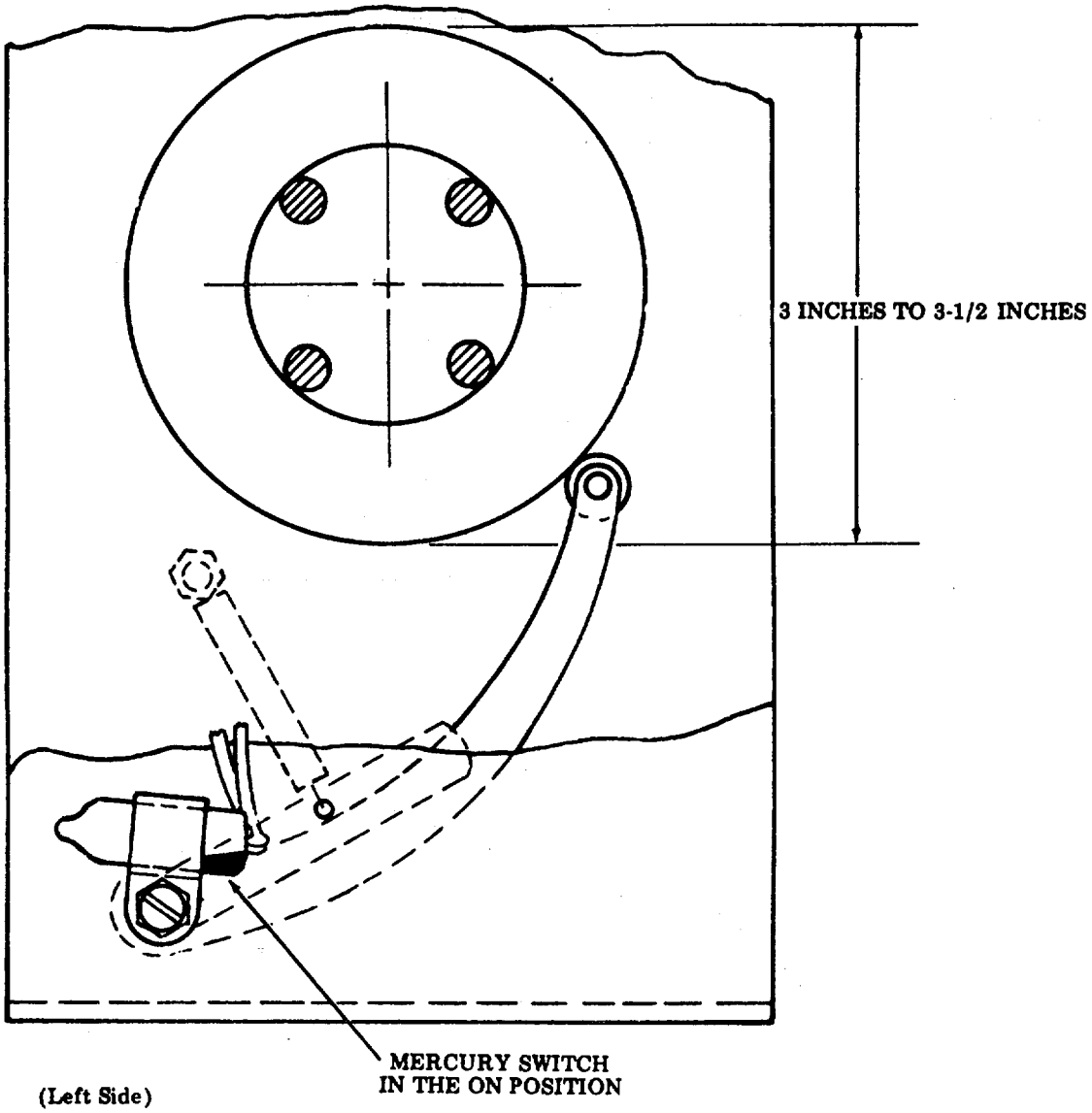
Requirement

The mercury switch shall be activated to the on position at 3 to 3-1/2 inches roll diameter.

To Adjust

DANGER: ADJUSTMENT TO BE MADE WITH THE UNIT IN THE OFF CONDITION.

With the mercury switch friction tight and the sensing arm rotated to obtain a 3 to 3-1/2 inches roll diameter, position the switch to a point of just making contact. Tighten screw and recheck requirement.



E. ADJUSTMENTS AND LUBRICATION (Cont)

1. CABINET AND PAPER WINDER ADJUSTMENTS (Cont)

Low Clutch Torque (40PWU101 Late Design)

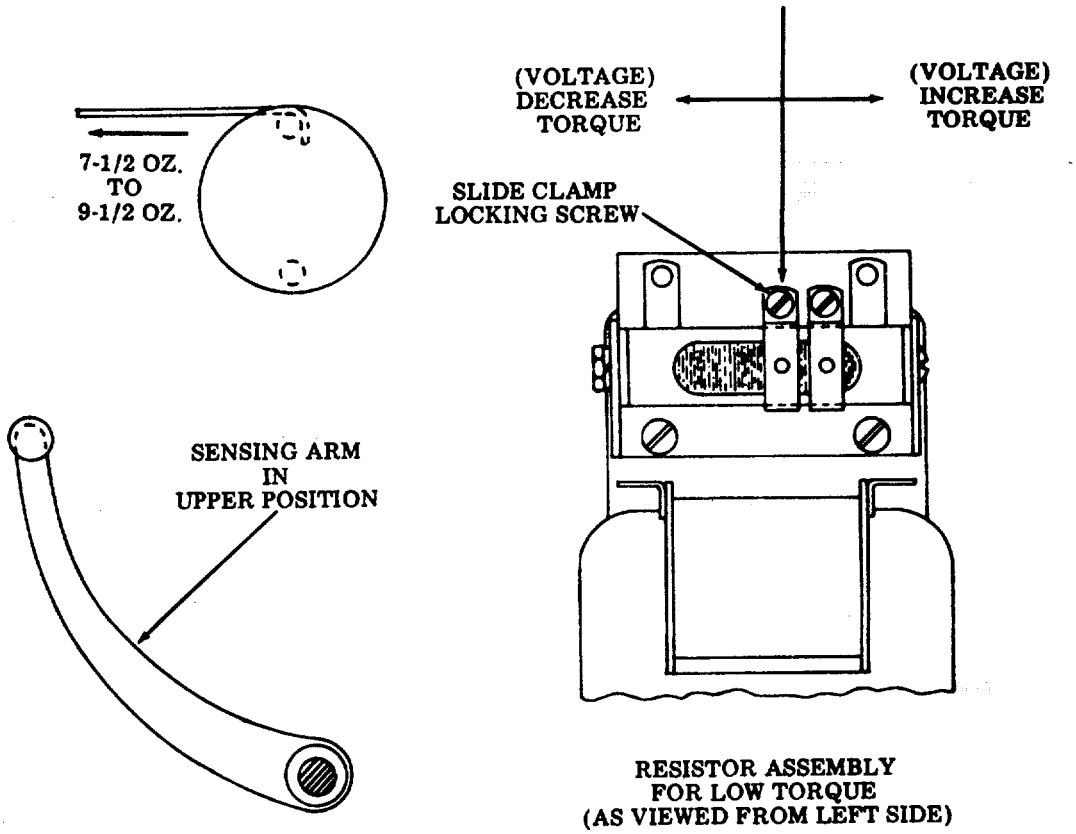
Requirement (without paper spool)

With the unit in the on position, sensing arm in upper position and the hook of a spring scale applied over the spacer on the clutch, it shall require 7-1/2 to 9-1/2 ounces to allow the clutch to rotate. (Apply greater spring tension than required, then relax the tension to obtain values of adjustment.)

To Adjust

DANGER: ADJUSTMENT TO BE MADE WITH UNIT DISCONNECTED FROM THE AC LINE VOLTAGE.

Loosen the clamp locking screw friction tight, position the resistor slide clamp to obtain the requirement. Tighten clamp screw (caution not to damage resistor by over tightening the clamp) and recheck requirement.



RESISTOR ASSEMBLY
FOR LOW TORQUE
(AS VIEWED FROM LEFT SIDE)

High Clutch Torque (40PWU101 Late Design)

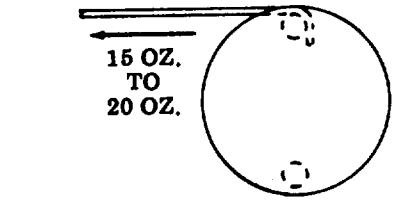
Requirement (without paper spool)

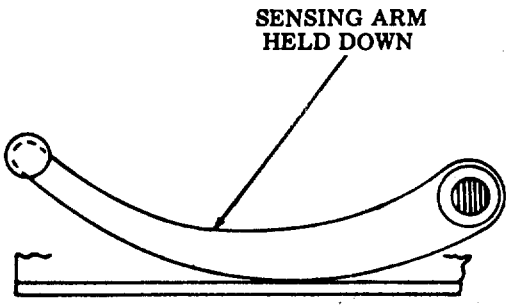
With the unit in the on position, sensing arm held down and the hook of a spring scale applied over the spacer on the clutch, it shall require 15 to 20 ounces to allow the clutch to rotate. (Apply greater spring tension than required, then relax tension to obtain values of adjustment.)

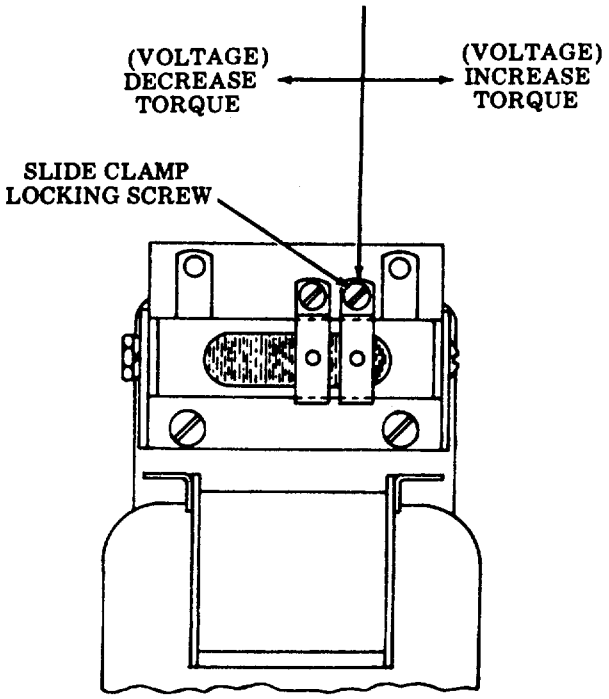
To Adjust

DANGER: ADJUSTMENT TO BE MADE WITH UNIT DISCONNECTED FROM THE AC,LINE VOLTAGE.

Loosen the clamp locking screw friction tight, position the resistor slide clamp to obtain the requirement. Tighten clamp screw (caution not to damage resistor by over tightening the clamp) and recheck torque requirement.







RESISTOR ASSEMBLY
FOR HIGH TORQUE
(AS VIEWED FROM LEFT SIDE)

E. ADJUSTMENTS AND LUBRICATION (Cont)

1. CABINET AND PAPER WINDER ADJUSTMENTS (Cont)

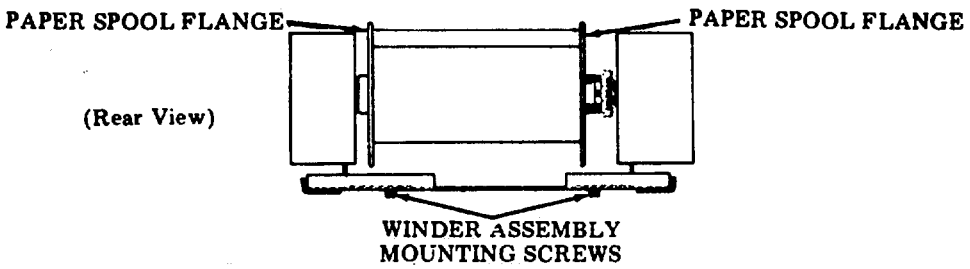
Lateral Winder Position (40PWU102)

Requirement

The paper spool flange must align with spent paper exiting from printer, and the paper should be flat on cabinet top when being -wound.

To Adjust

Loosen the four winder assembly mounting screws. Position the winder left or right to meet requirement.



Clutch Torque (40PWU102)

Requirement (Preliminary)

With motor side of the clutch in a locked position (use spanner wrench on friction nut) and spring scale hook applied over one of the spacers on the clutch, it should require

Min 40 ounces---Max 50 ounces

to move drive flange.

NOTE: Take up play in direction of pull before reading scale.

To Adjust

Loosen locknut. Rotate friction nut in or out to meet requirement.

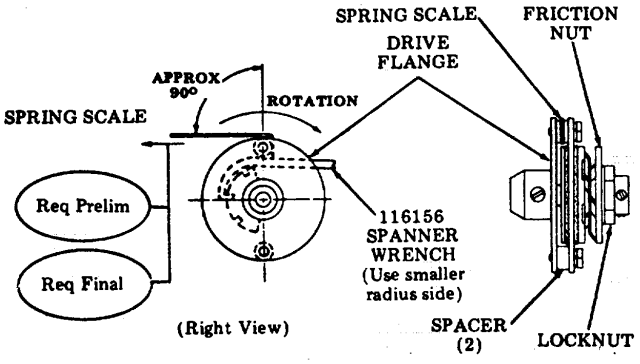
Tighten locknut.

Requirement (Final)

After installing the clutch on motor shaft, and operating unit for a period of time, clutch torque should measure

Min 25 ounces.

If below 25 ounces, readjust clutch.



Low Motor Torque (40PWU102)

Requirement

With unit in the ON position, sensing arm in upper position, and spring scale hook applied into the hole of spool flange, it should require

Min 3 ounces---Max 4 ounces

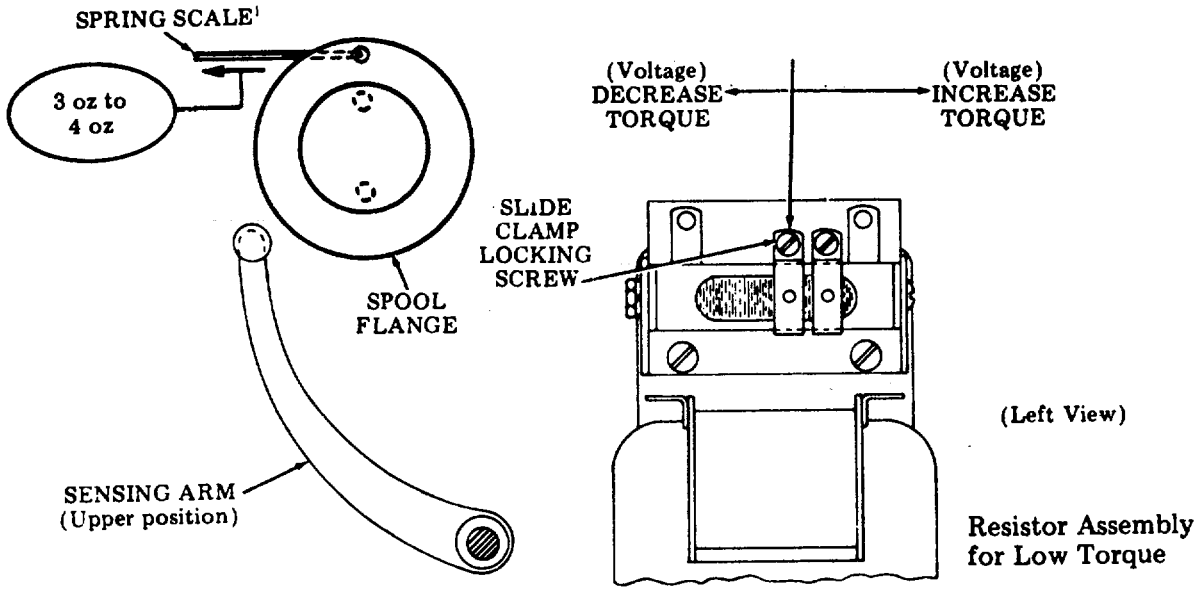
to allow the clutch to rotate.

NOTE: Apply greater spring tension than required, then relax tension to obtain values of adjustment.

DANGER: ADJUSTMENT TO BE MADE WITH UNIT DISCONNECTED FROM AC LINE VOLTAGE.

To Adjust

Loosen slide clamp locking screw friction tight. Position resistor slide clamp to obtain requirement. Tighten clamp screw. (To prevent damage to resistor, do not overtighten clamp.) Recheck requirement.



E. ADJUSTMENTS AND LUBRICATION (Cont)

1. CABINET AND PAPER WINDER ADJUSTMENTS (Cont)

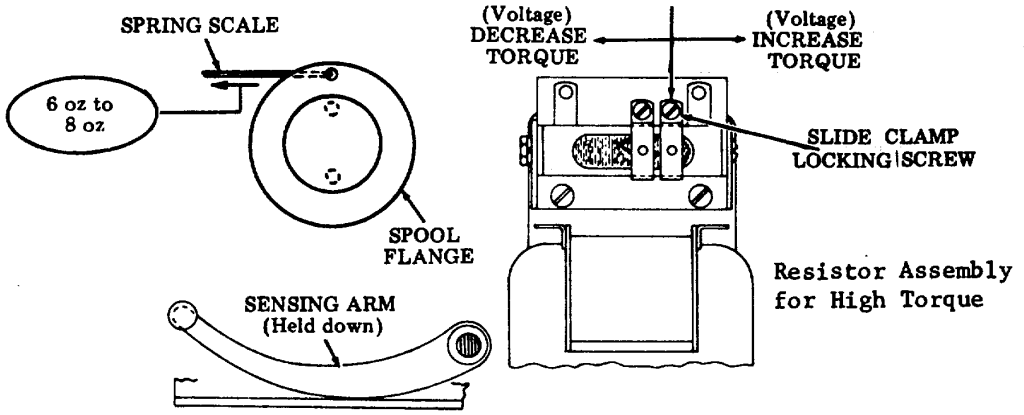
High Motor Torque (40PWU102)

Requirement
With unit in the ON position, sensing arm held down, and spring scale hook applied into the hole of spool flange, it should require
Min 6 ounces---Max 8 ounces
to allow clutch to rotate.

NOTE: Apply greater spring tension than required, then relax tension to obtain values of adjustment.

DANGER: ADJUSTMENT TO BE MADE WITH UNIT DISCONNECTED FROM AC LINE VOLTAGE.

To Adjust
Loosen slide clamp locking screw friction tight. Position resistor slide clamp to obtain requirement. Tighten clamp screw. (To prevent damage to. resistor, do not overtighten clamp.) Recheck requirement.



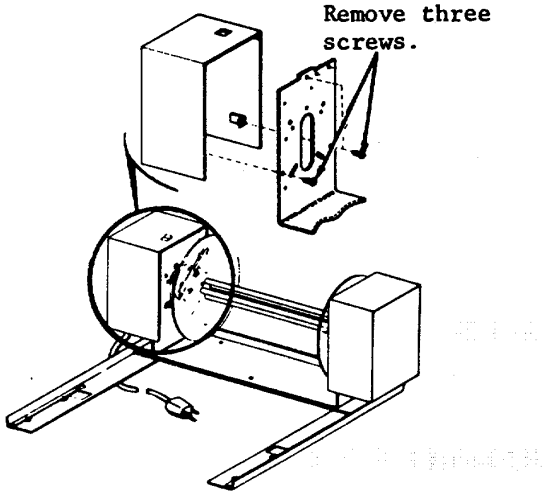
LUBRICATION

NOTE Lubrication interval is 2000 hours or 1 year, whichever comes first.

3.01 The following symbols are used to indicate the kind and quantity of lubricant to be used in a specific area:

SYMBOL	MEANING
02	Apply two drops of KS7470 oil.
015	Apply 15 drops of KS7470 oil.
SAT	Saturate.
D	Dry (no lubricant required).

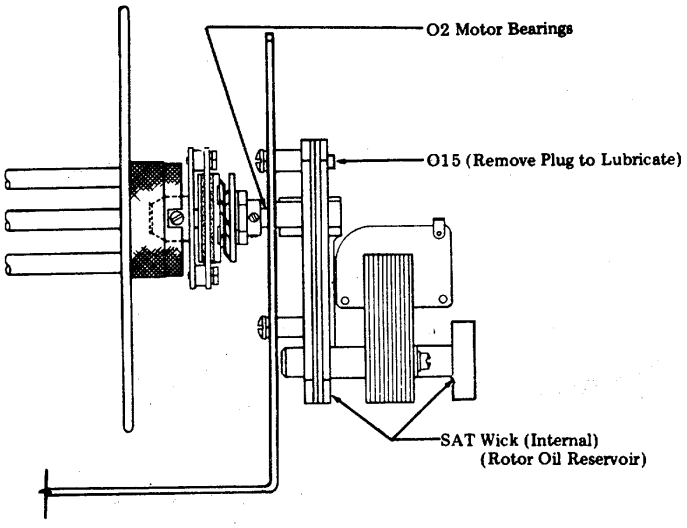
3.02 The paper winder cover must be removed to provide access to lubrication points.



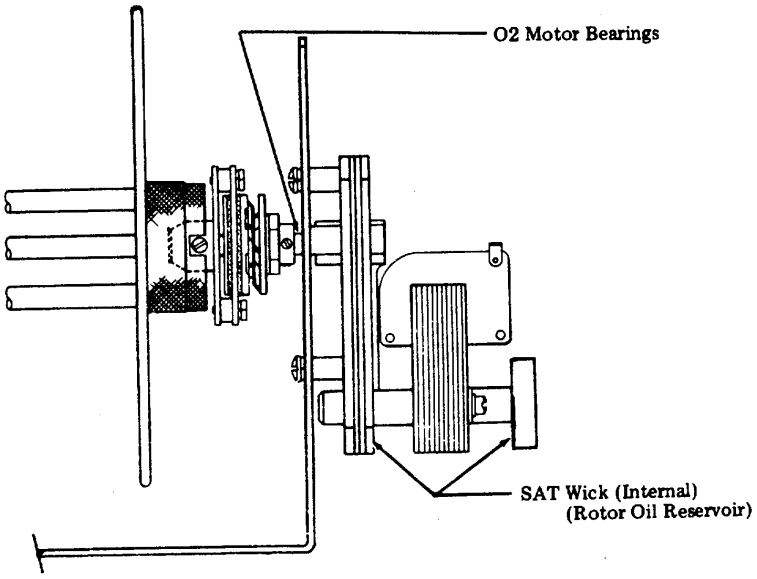
2. CABINET AND PAPER WINDER LUBRICATION

Note: Lubrication interval is 2000 hours or 1 year, whichever comes first.

Motor Assembly (Paper Winder) (Late Design -- TP403393)

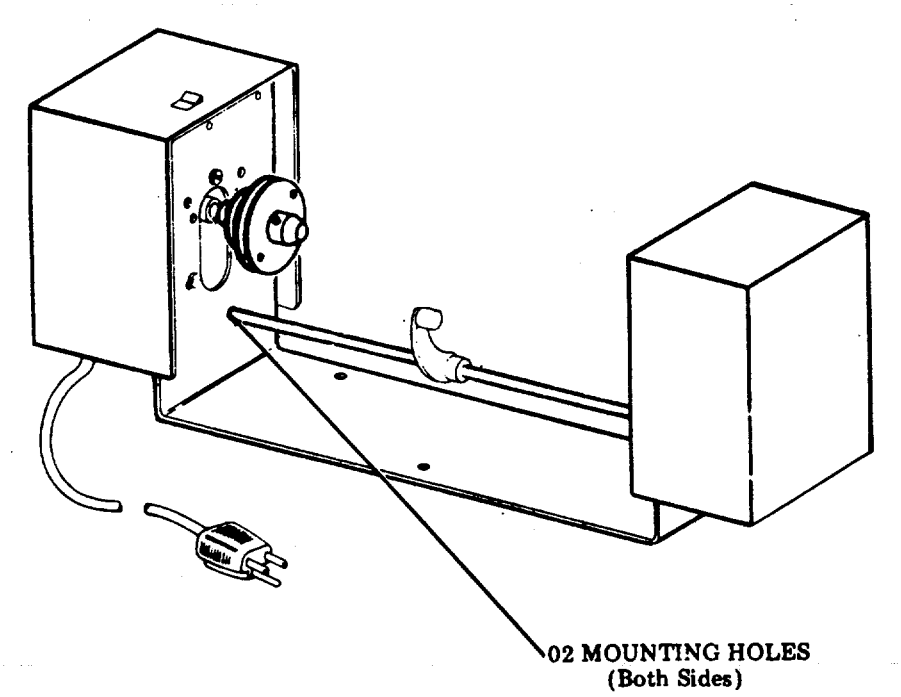


Motor Assembly (Paper Winder) (Early Design -- TP198062)



E. ADJUSTMENTS AND LUBRICATION (Cont)

2. CABINET AND PAPER WINDER LUBRICATION (Cont)
Sensing Arm Shaft Mounting Holes



F. DISASSEMBLY/REASSEIMLY AND PARTS

1. GENERAL

This section provides disassembly/reassembly and parts information for Tempest Model 40 Cabinets, Paper Winders, Pedestals, and also the modification kits for providing rack mounting and ruggedized rack mounting of Tempest Model 40 Terminals.

Included in this section are procedures for disassembly and reassembly of subassemblies. Also, there are included exploded views detailing individual part numbers. A numerical listing of parts referenced to page numbers of the exploded view begins on Page 8-136.

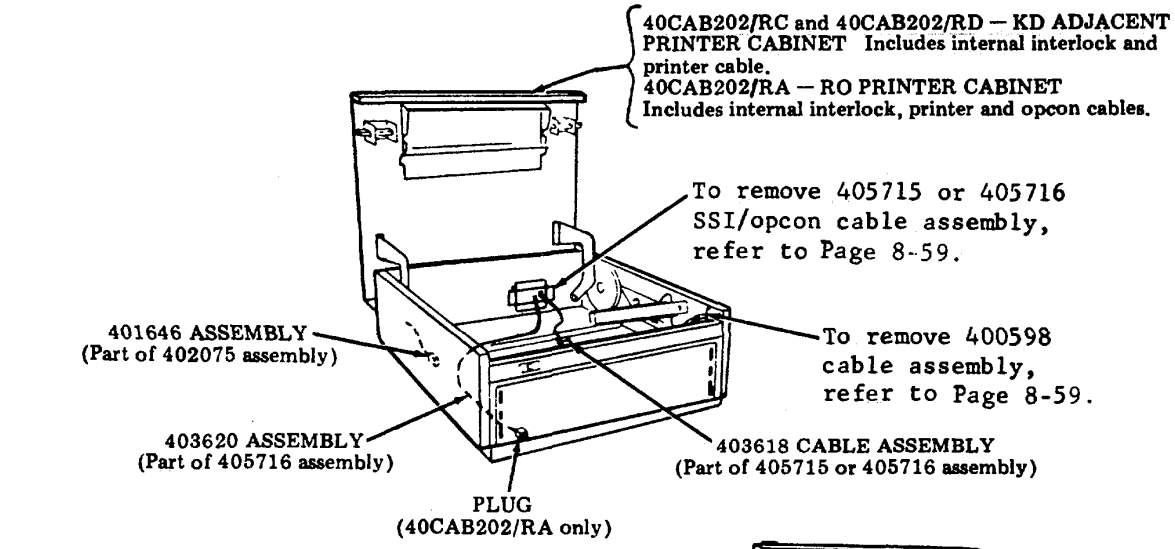
After disassembly and reassembly of a subassembly or component is completed, the associated adjustments should be checked and relubrication (if applicable) should be performed, see Page 8-37, E. ADJUSTMENTS AND LUBRICATION. After cable repairs, the conductors should be checked for continuity using the connector-to-connector wiring diagrams associated with the cable assembly illustrations. Use of VOM set to the R X 1 range is required.

It is recommended that the ac power cord be disconnected during all disassembly or reassembly activity.

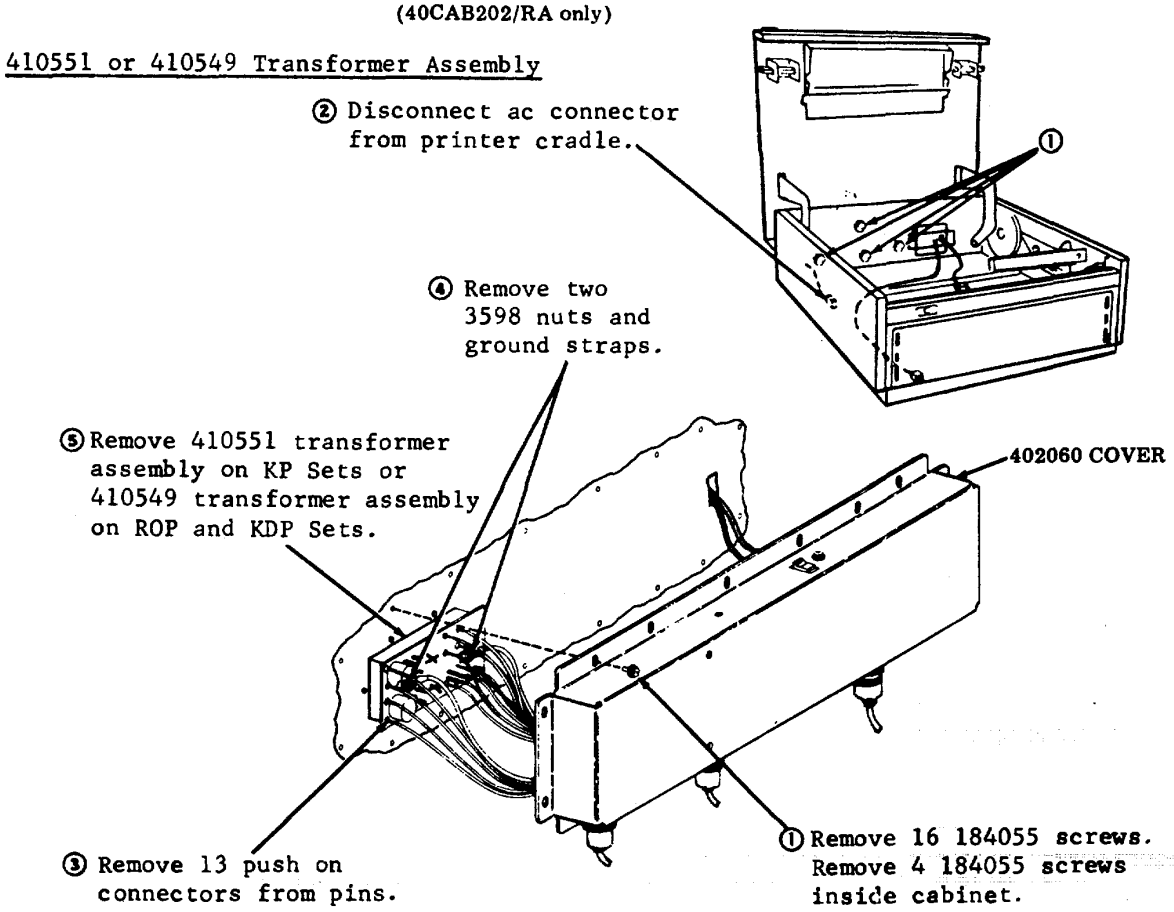
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

2. DISASSEMBLY/REASSEMBLY

40CAB202/RA, 40CAB202/RC and 40CAB202/RD Cabinet Parts

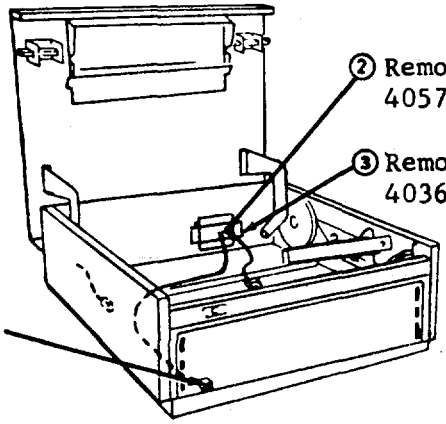


410551 or 410549 Transformer Assembly



To install the transformer assembly reverse the disassembly procedures.

403615 Filter Panel Assembly

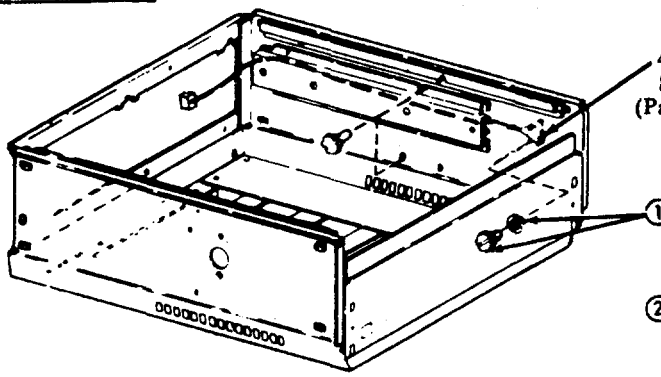


② Remove two 3598 nuts then remove 405715 or 405716 cable assembly.

③ Remove six 184056 screws then remove 403615 filter panel assembly.

① Remove 401150 plug (40CAB202/RA only).

400598 Cable Assembly



400575 INTERLOCK SWITCH ASSEMBLY (Part of 400598 assembly)

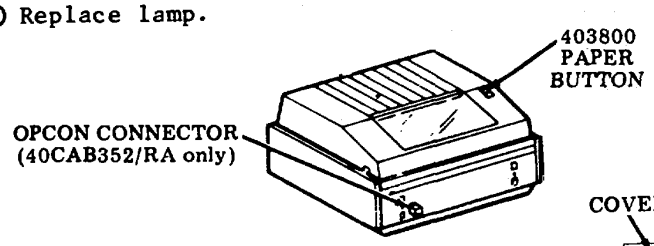
① Remove two 152893 screws and two 3640 lockwashers.

② Remove assembly.

40CAB352/RA, 40CAB352/RC and 40CAB354/RA Cabinet Parts

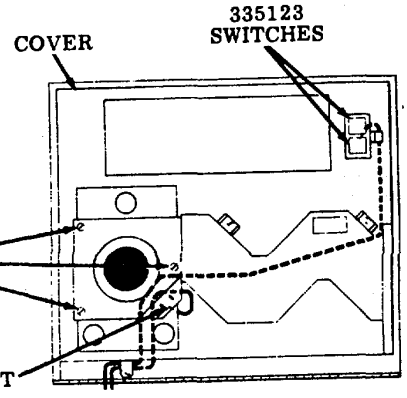
To replace 333588 lamp in 335123 switch:
① Remove 403800 PAPER button.
② Replace lamp.

To remove 335123 switches:
① Remove switch button.
② Remove nut from top of switch.
③ Unsolder leads.
④ Remove switch.



403800 PAPER BUTTON

OPCON CONNECTOR (40CAB352/RA only)



COVER

335123 SWITCHES

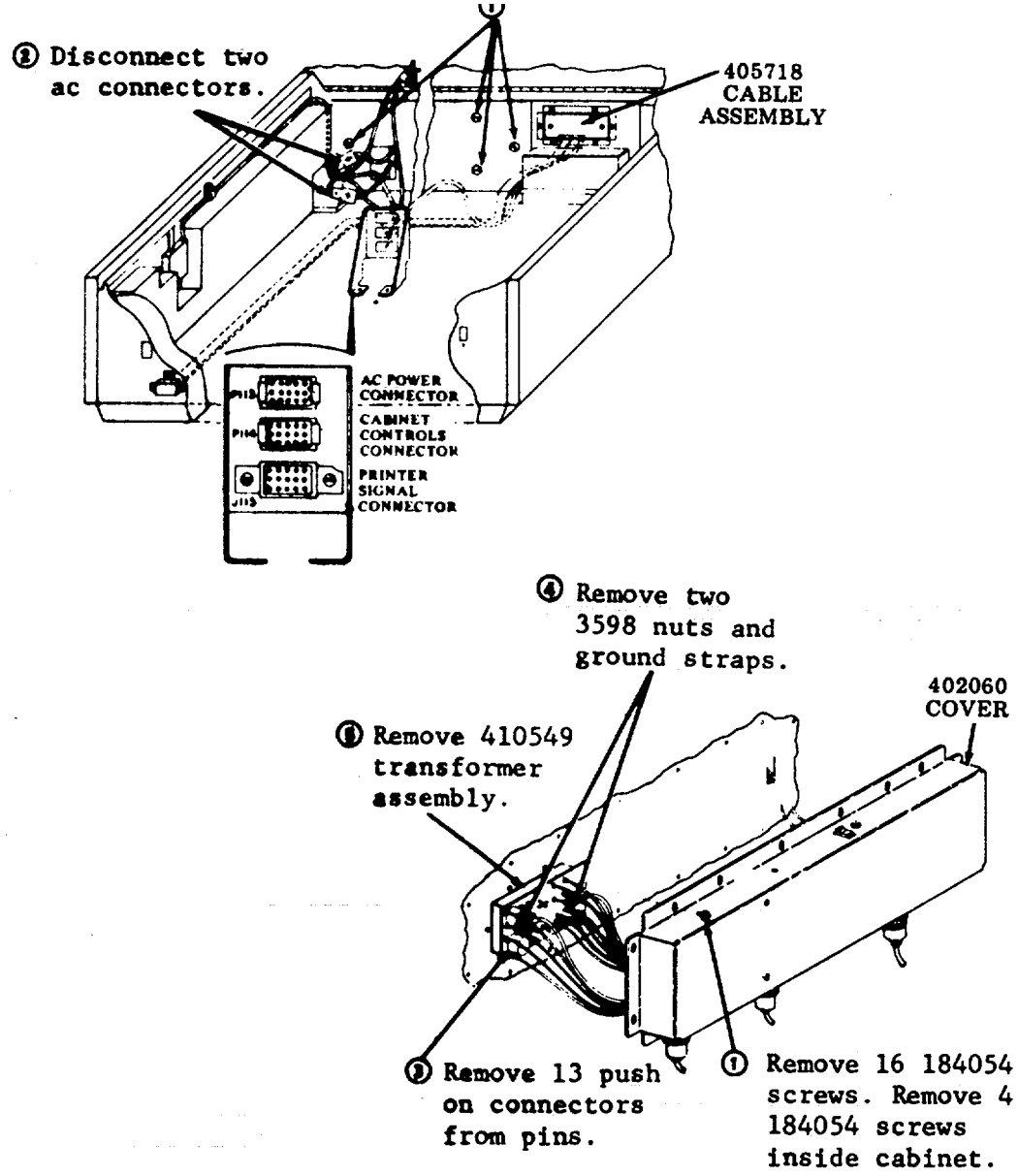
To remove 403785 fan:
① Disconnect plug from ac input.
② Remove three 150978 screws.
③ Remove fan assembly.

AC INPUT

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

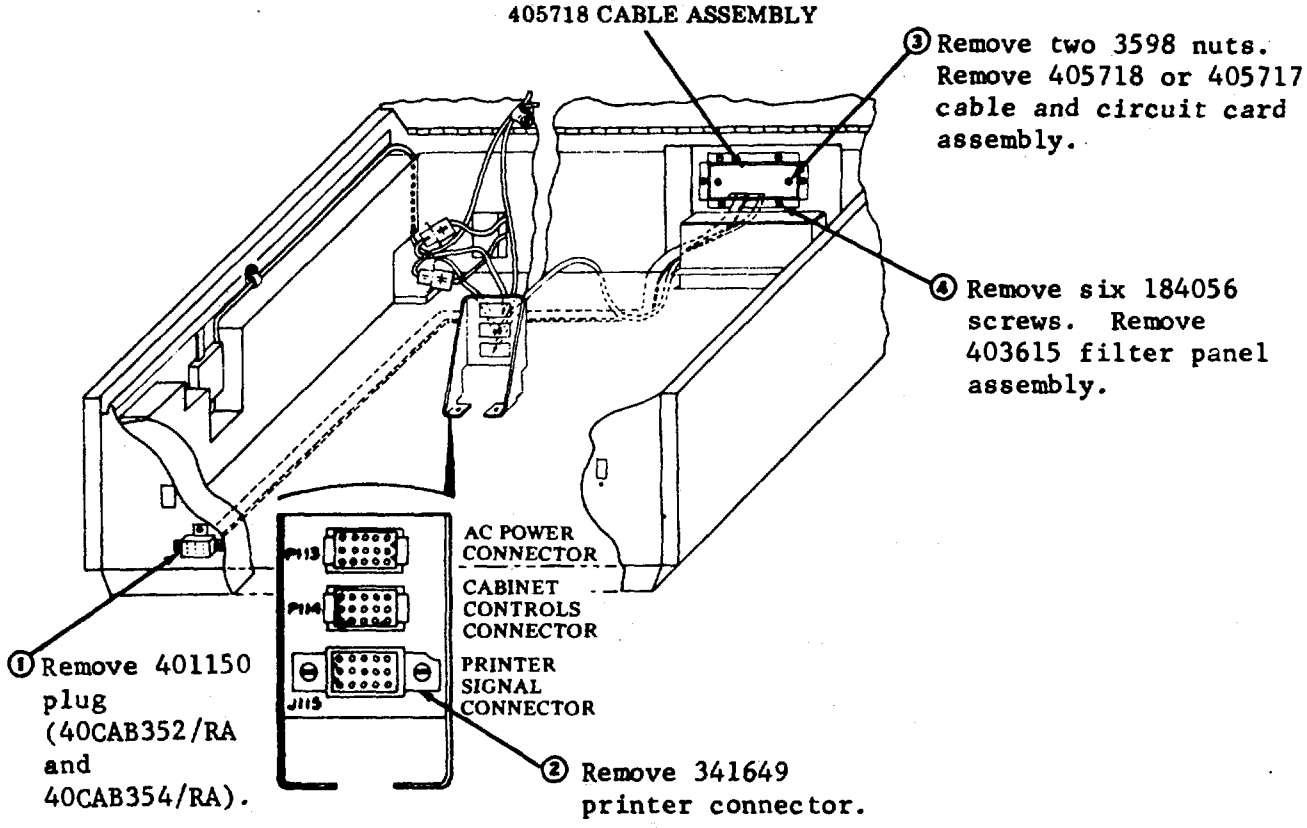
2. DISASSEMBLY/.REASSEMBLY (Cont)

410551 or 410549 Transformer Assembly



To install the transformer assembly reverse the disassembly procedure.

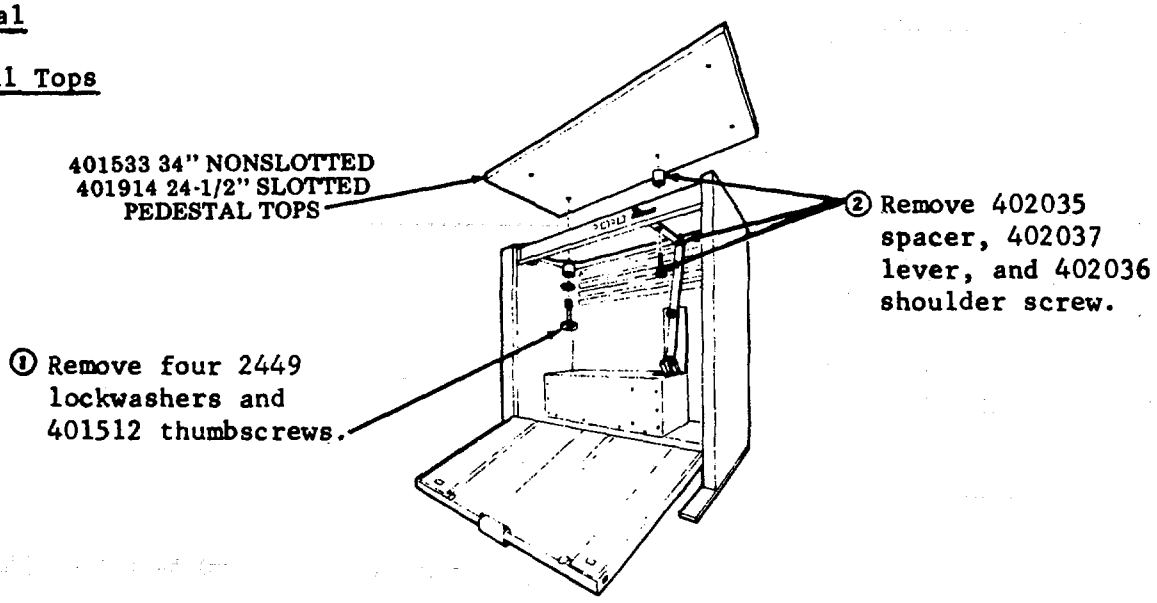
403615 Filter Panel Assembly



To install 403615 filter panel assembly reverse the disassembly procedure.

Pedestal

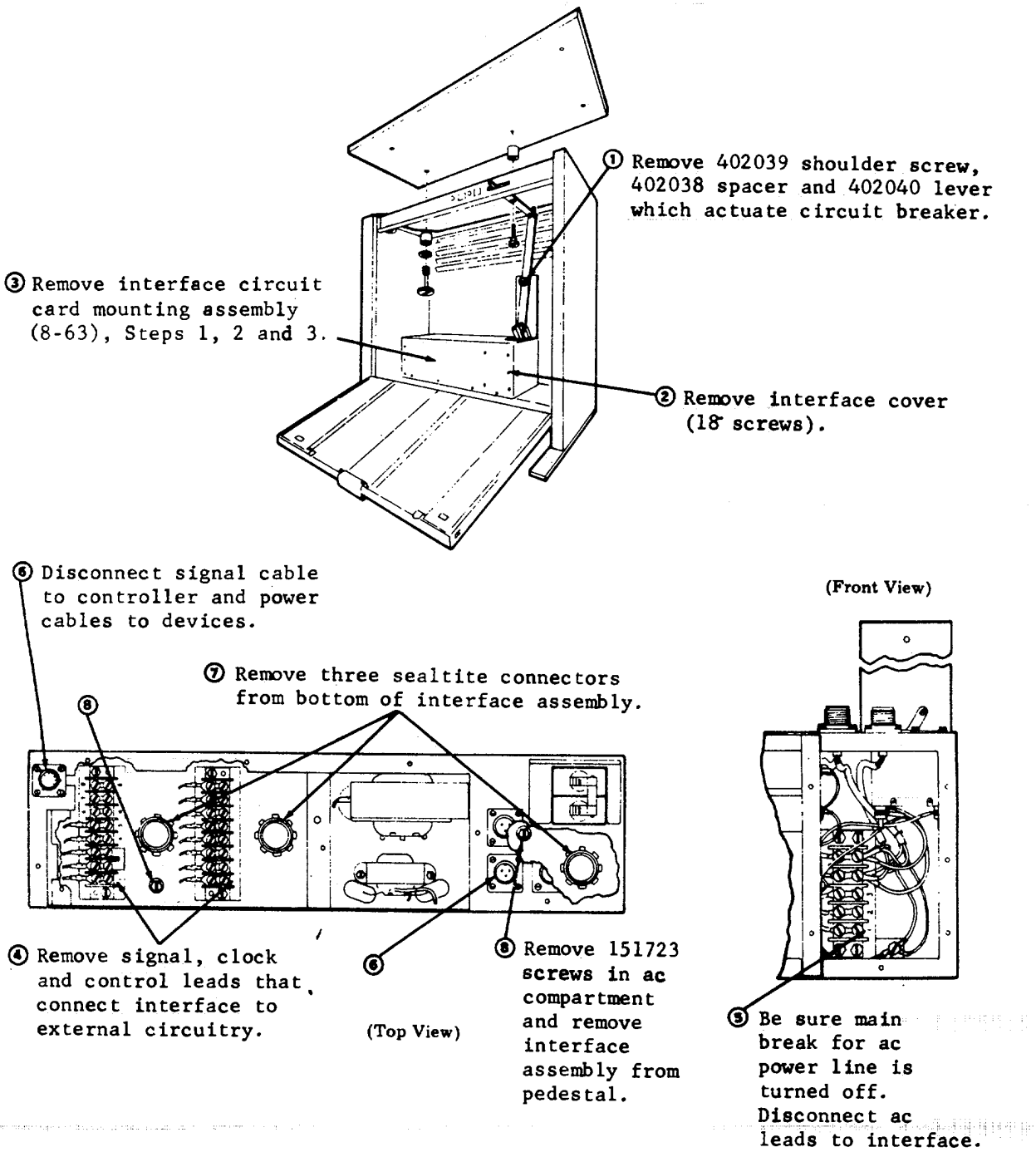
Pedestal Tops



F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

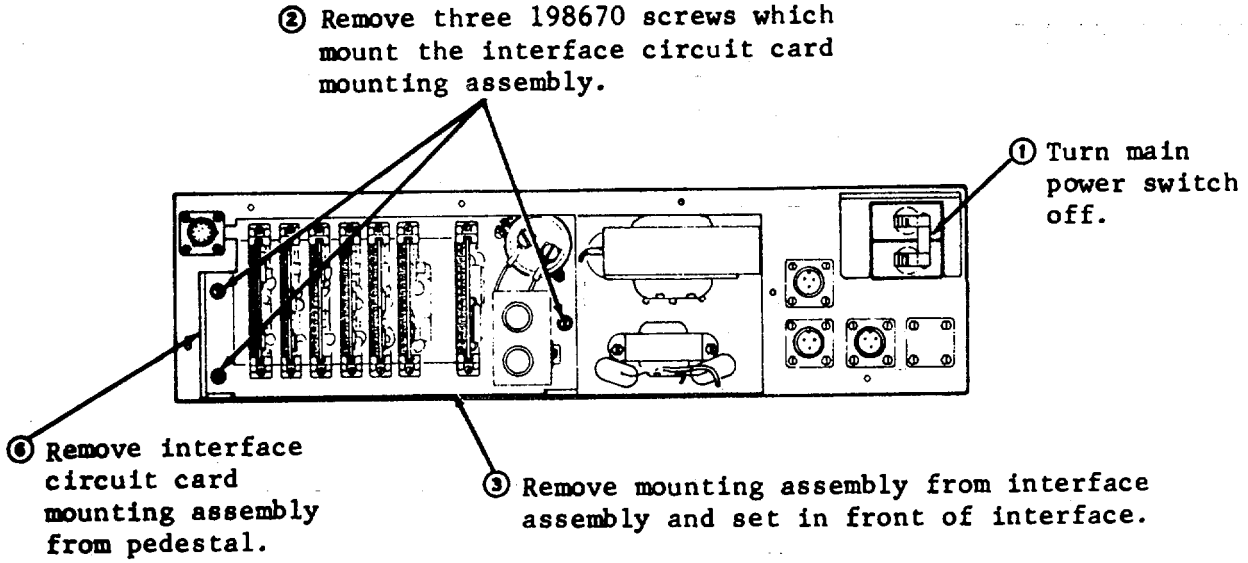
2. DISASSEMBLY/REASSEMBLY (Cont)

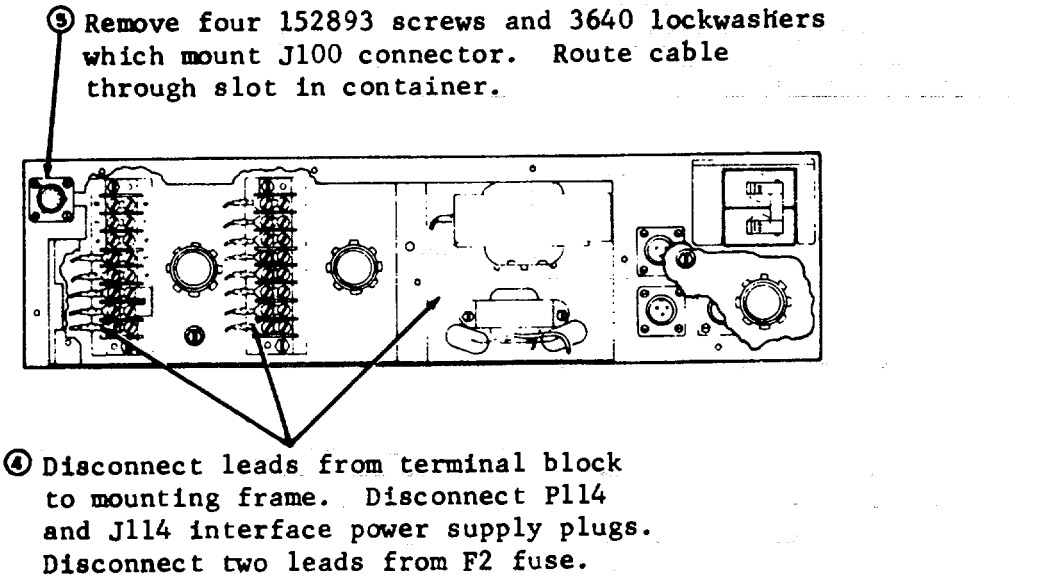
Interface Assembly



To install interface assembly reverse removal procedures.

Interface Circuit Card Mounting Assembly



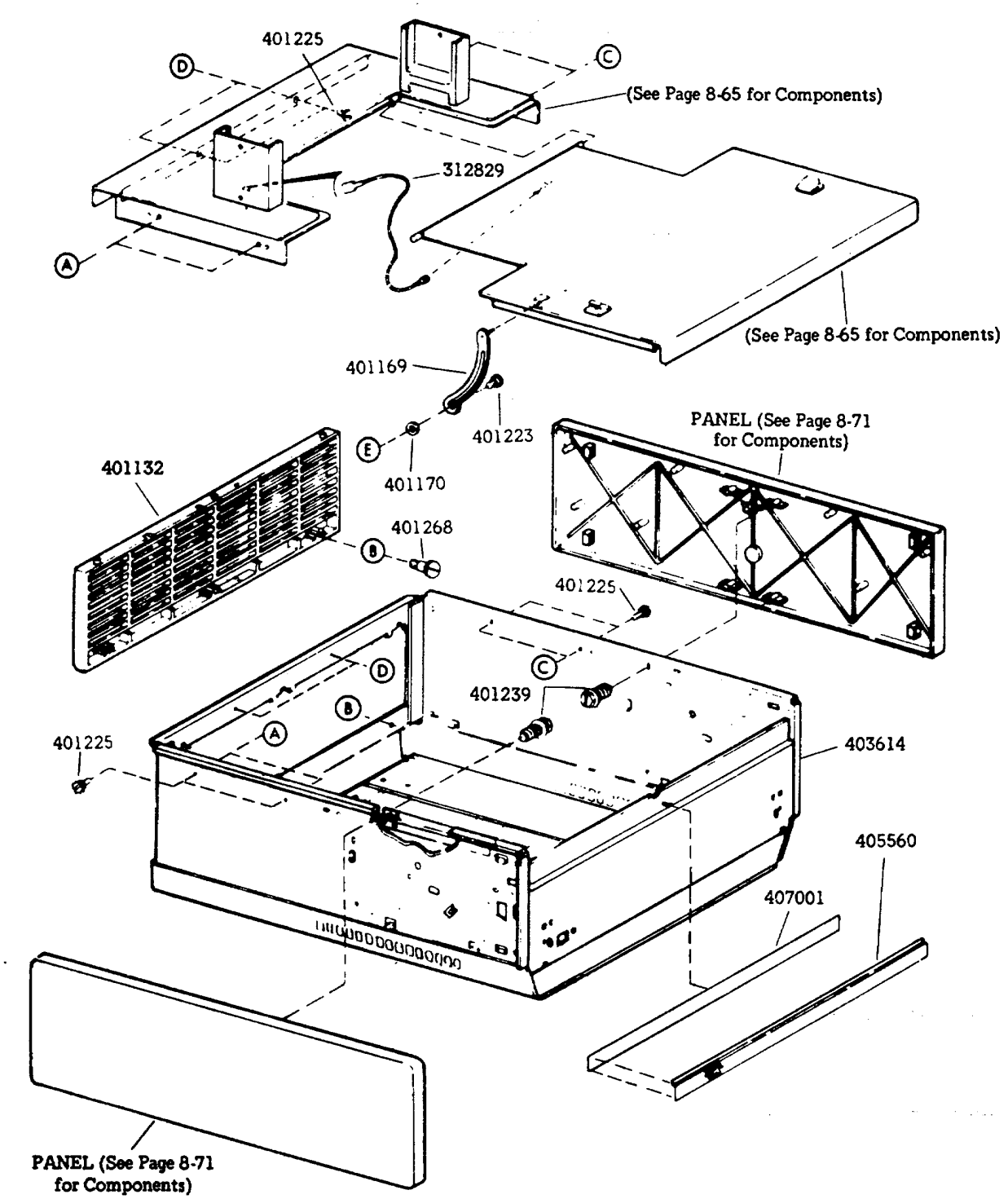


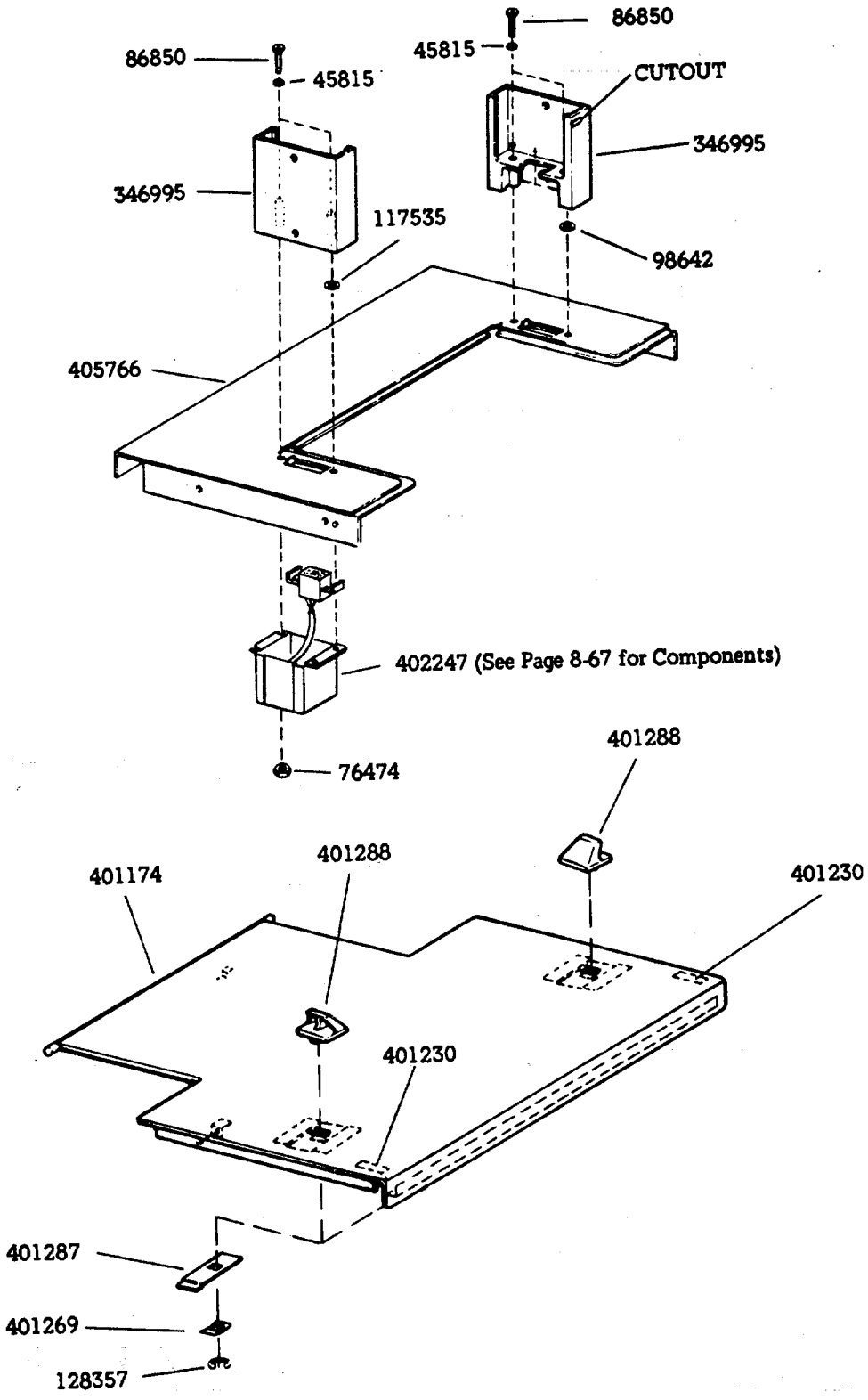
To install interface circuit card mounting assembly reverse removal procedures.
Refer to 9559WD in WDP0457 for reconnecting leads to terminal blocks.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS

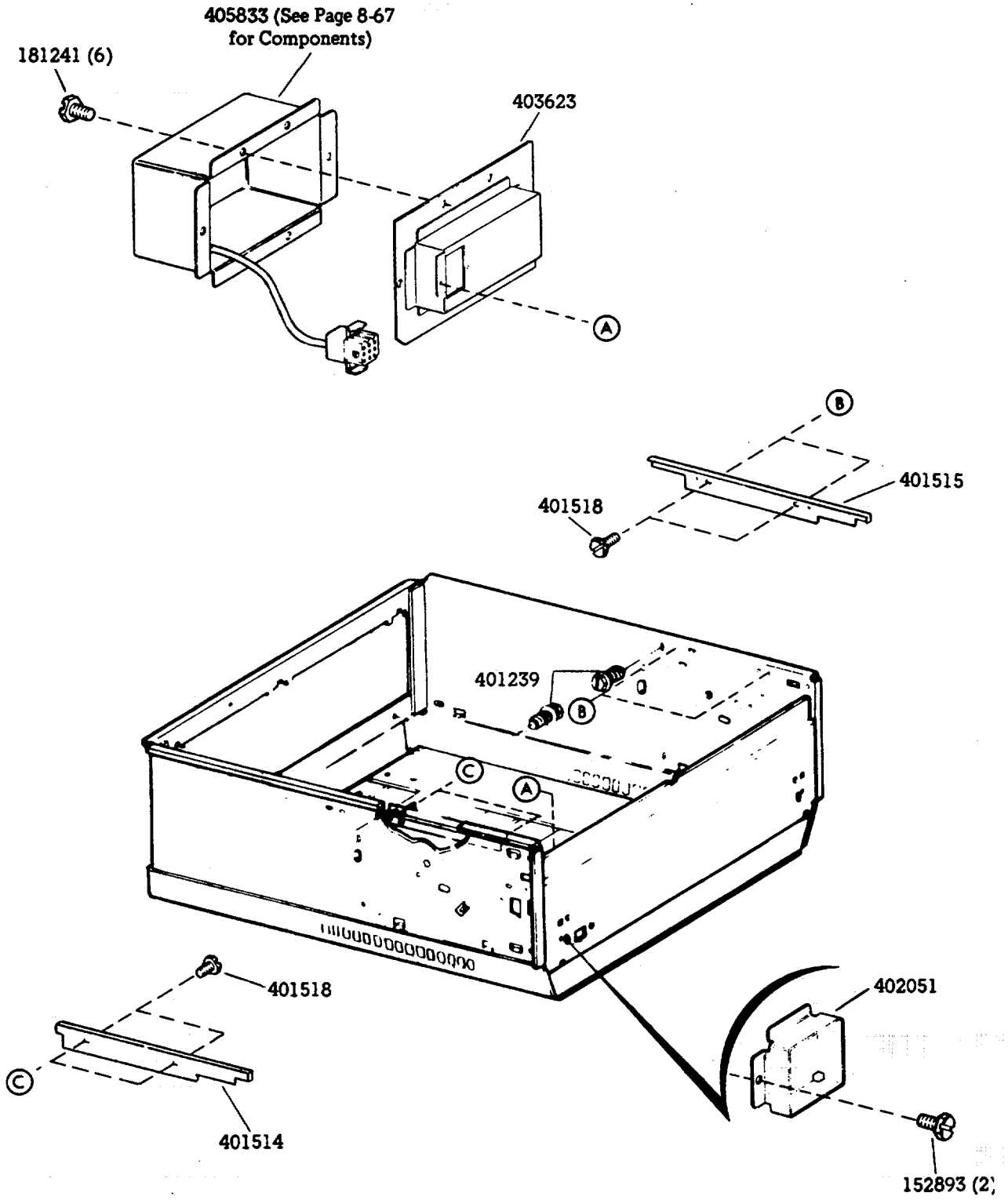
Monitor Support



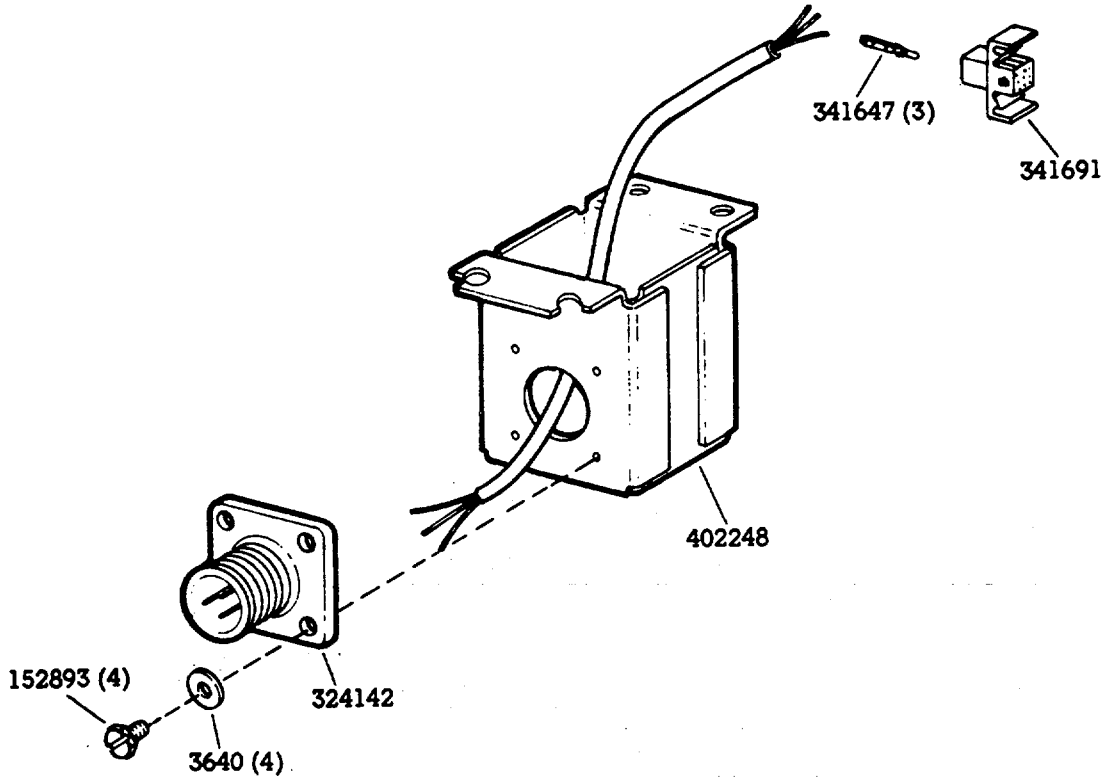

86850
45815
CUTOUT
346995
86850
45815
346995
117535
98642
405766
402247 (See Page 8-67 for Components)
76474
401288
401288
401174
401230
401230
401287
401269
128357

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

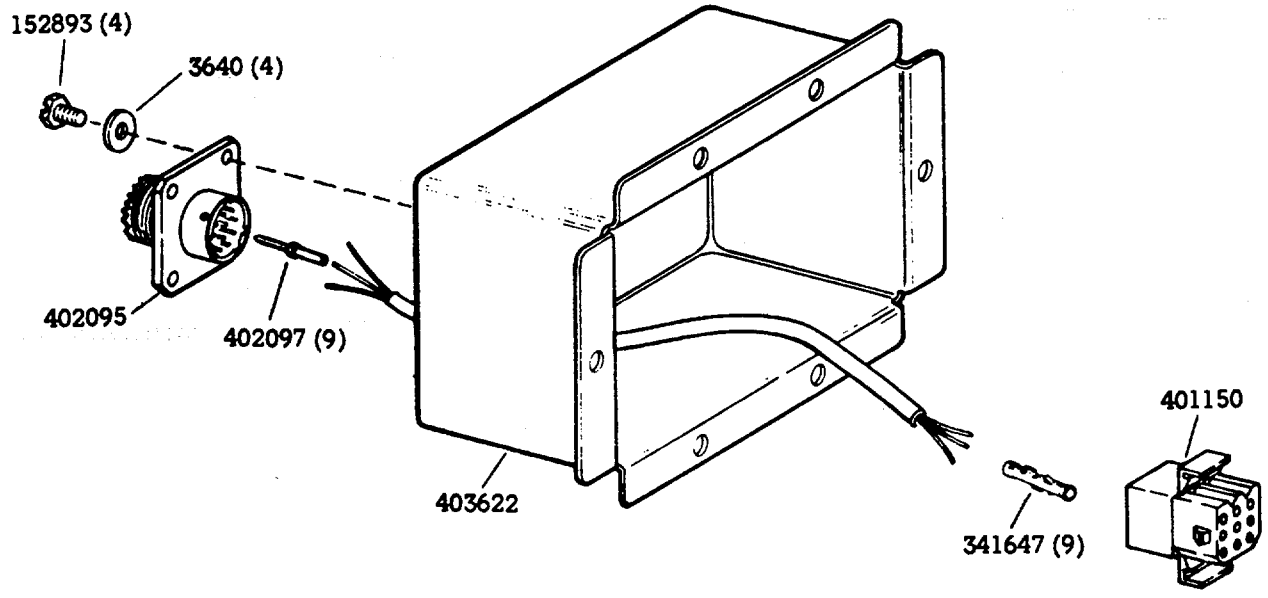
3. PARTS, Monitor Support (Cont)



402247



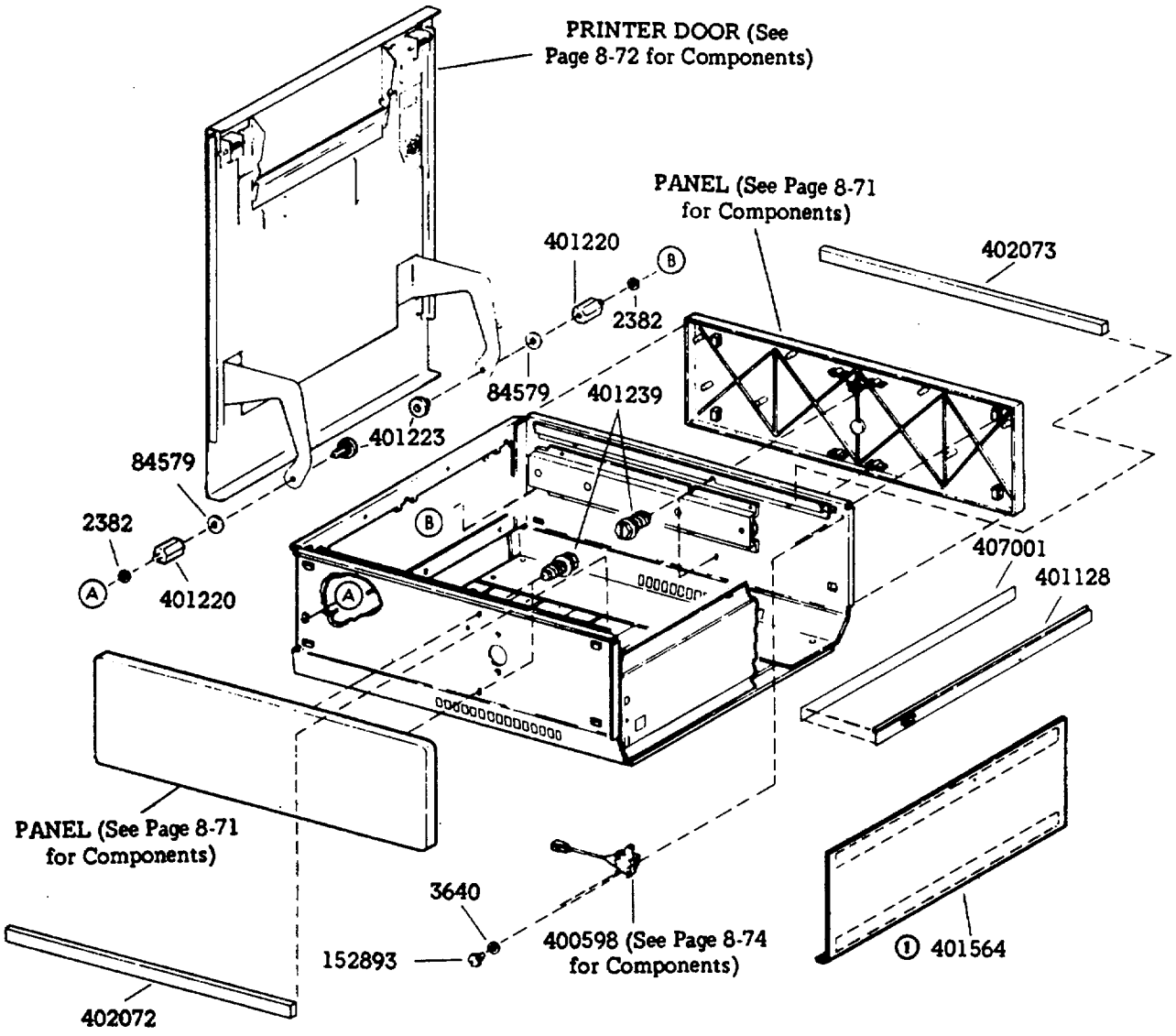
405833



F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

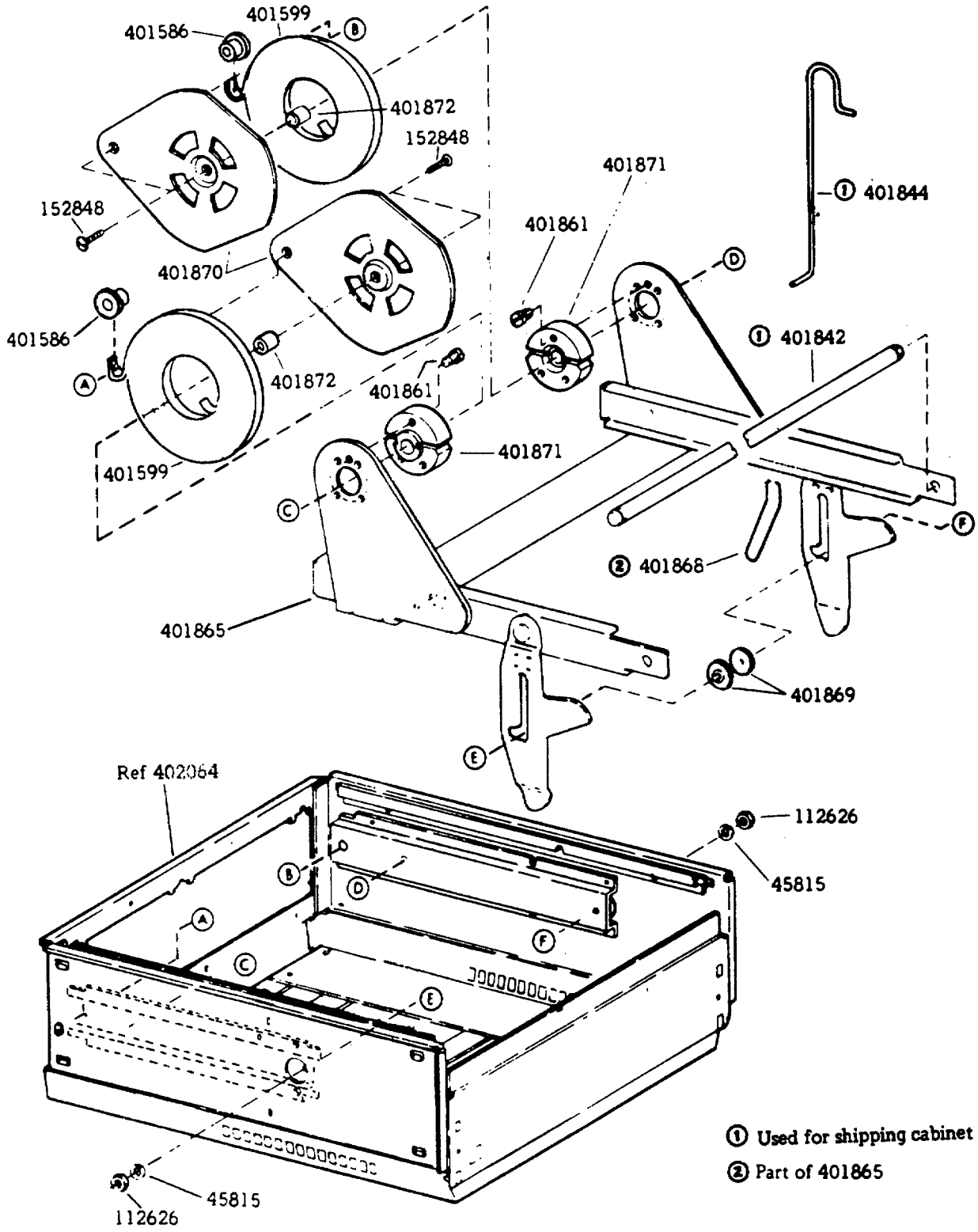
3. PARTS (Cont)

Friction Feed Printer



① Used on 40CAB202/RA only

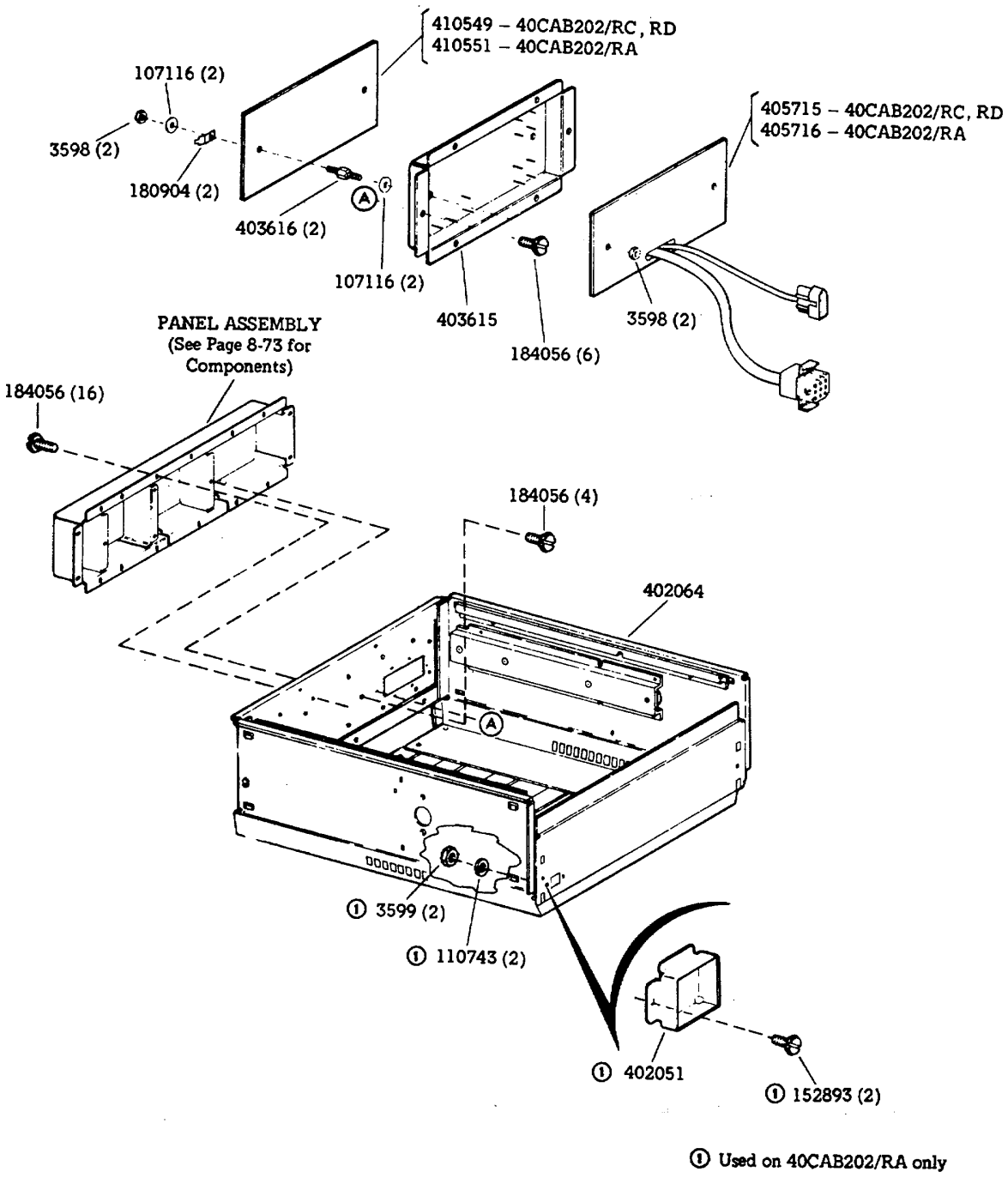
Printer Mounting Cradle -- RO and Adjacent



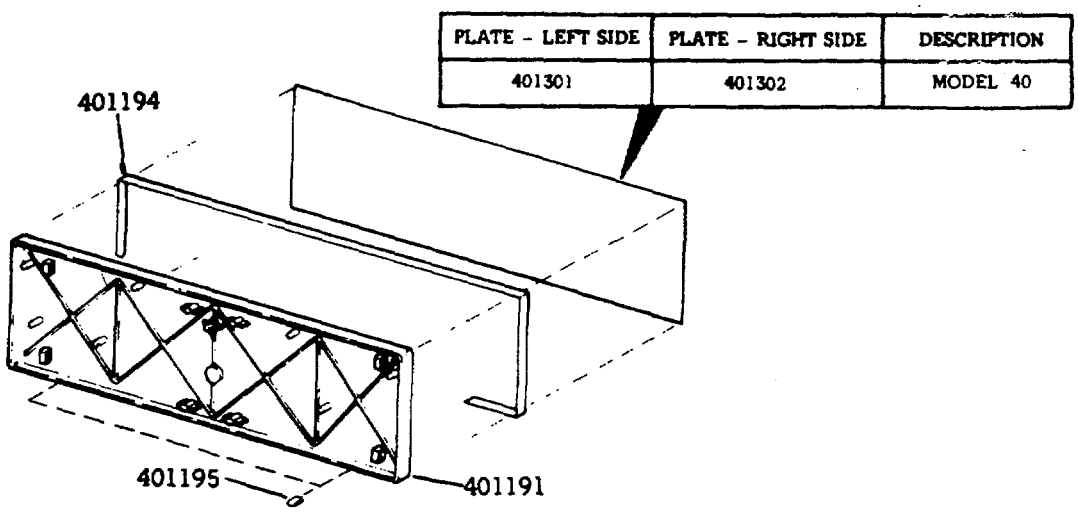
F. DISASSEMBLYIREASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

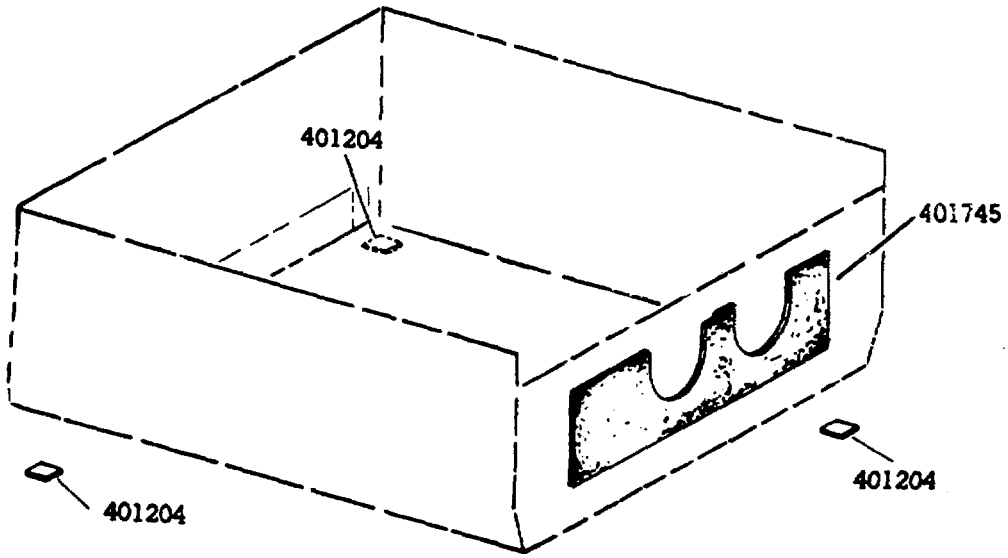
Printer Cabinet -- RO and Adjacent



Panels



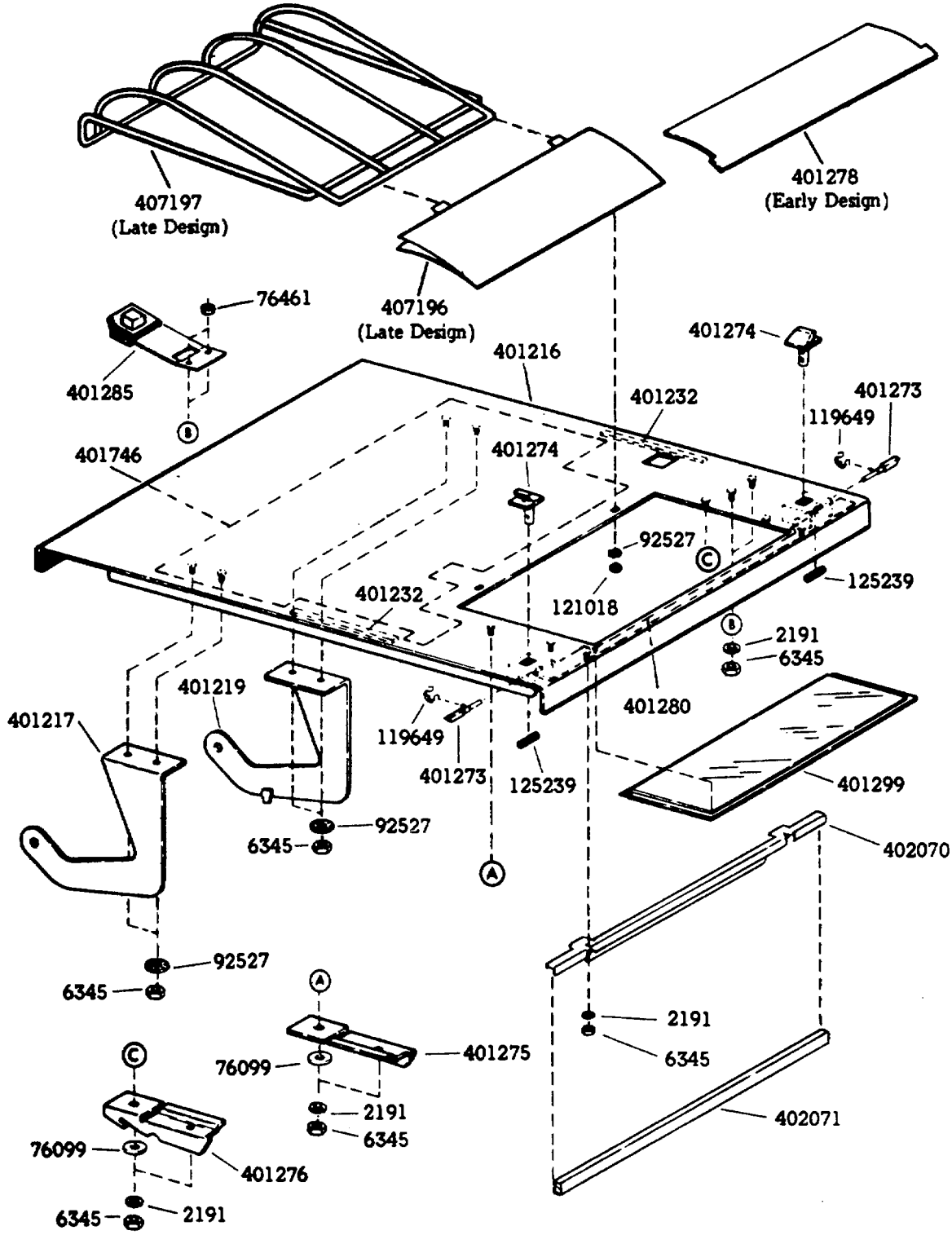
Foot and Foam Pads (Printer RO and Adjacent Cabinet)



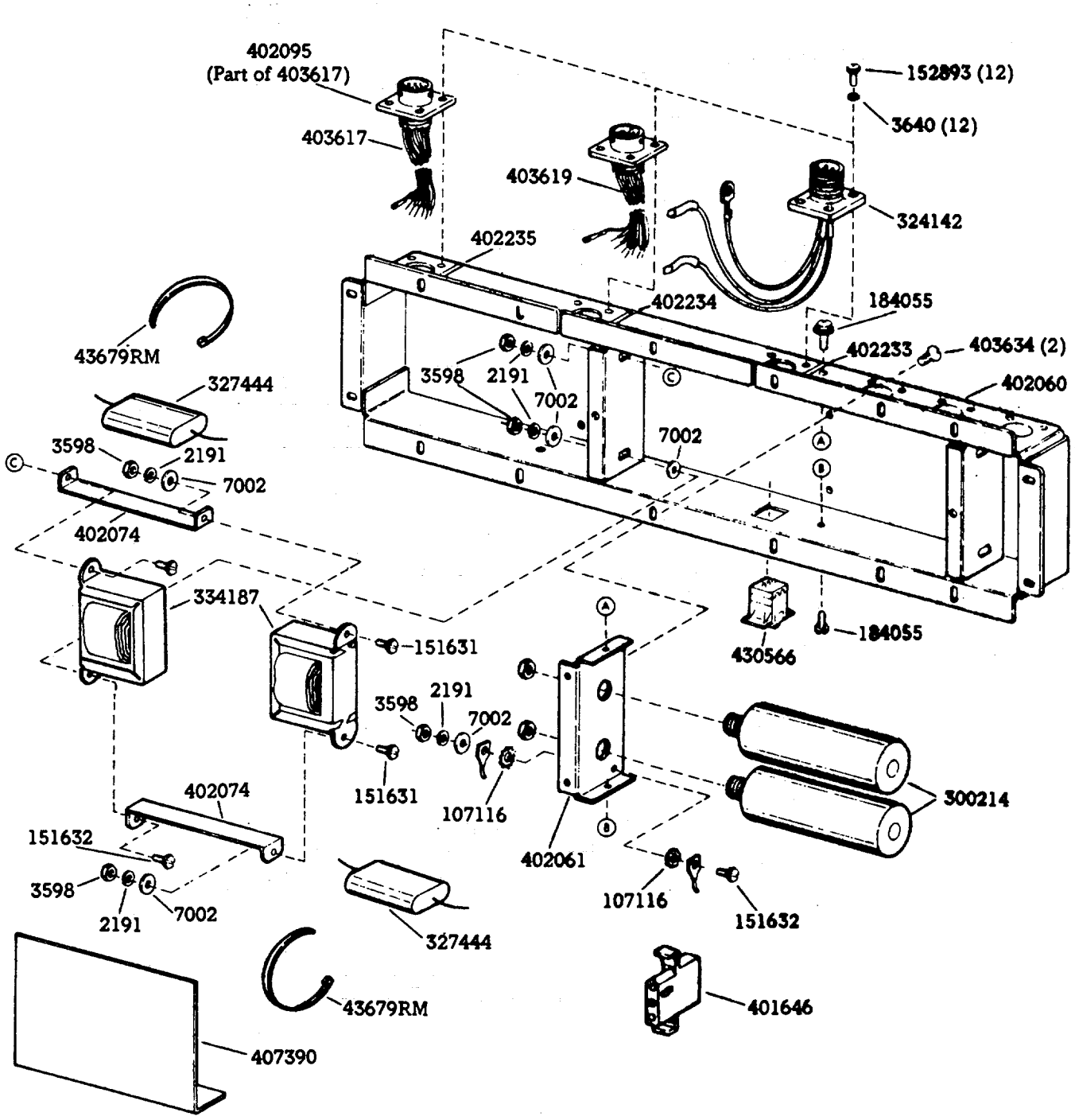
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Printer Door -- RO and Adjacent



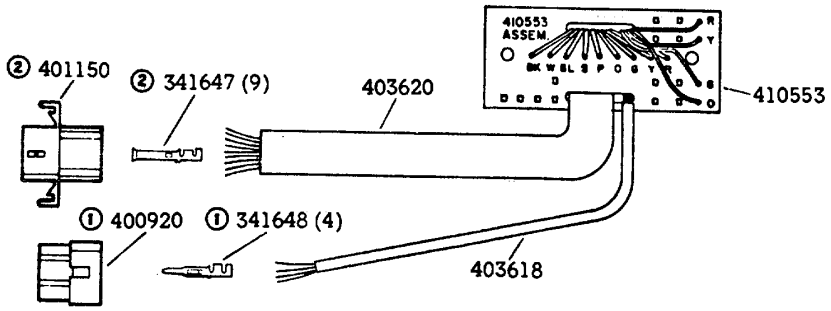
Panel Assembly



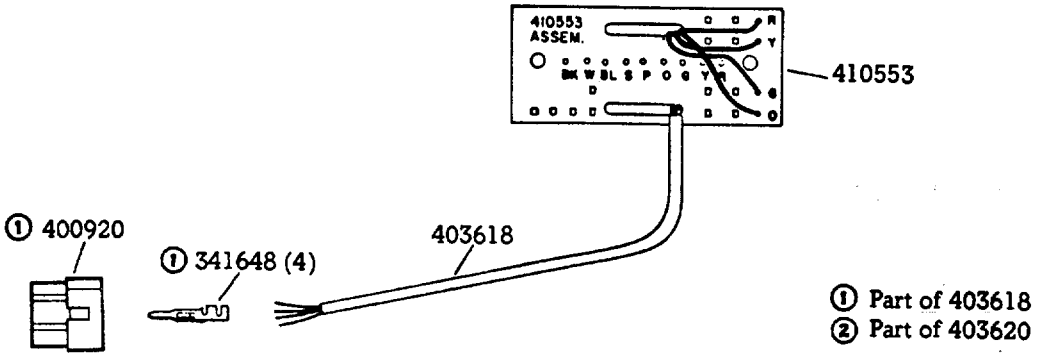
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

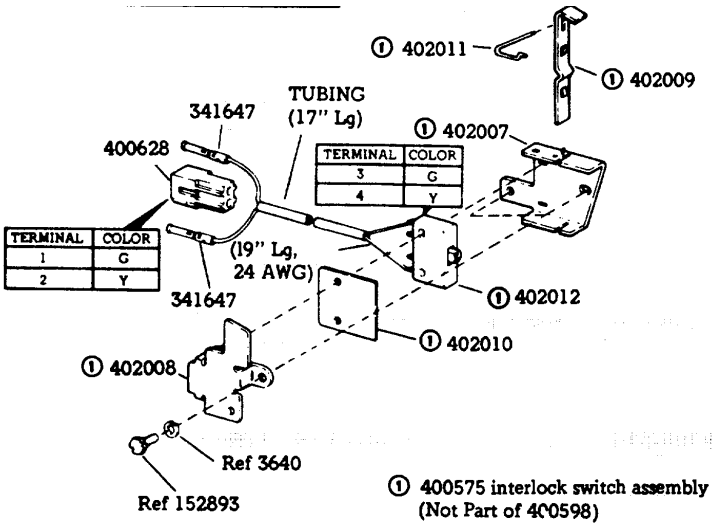
405716 Cable Assembly -- Friction Feed



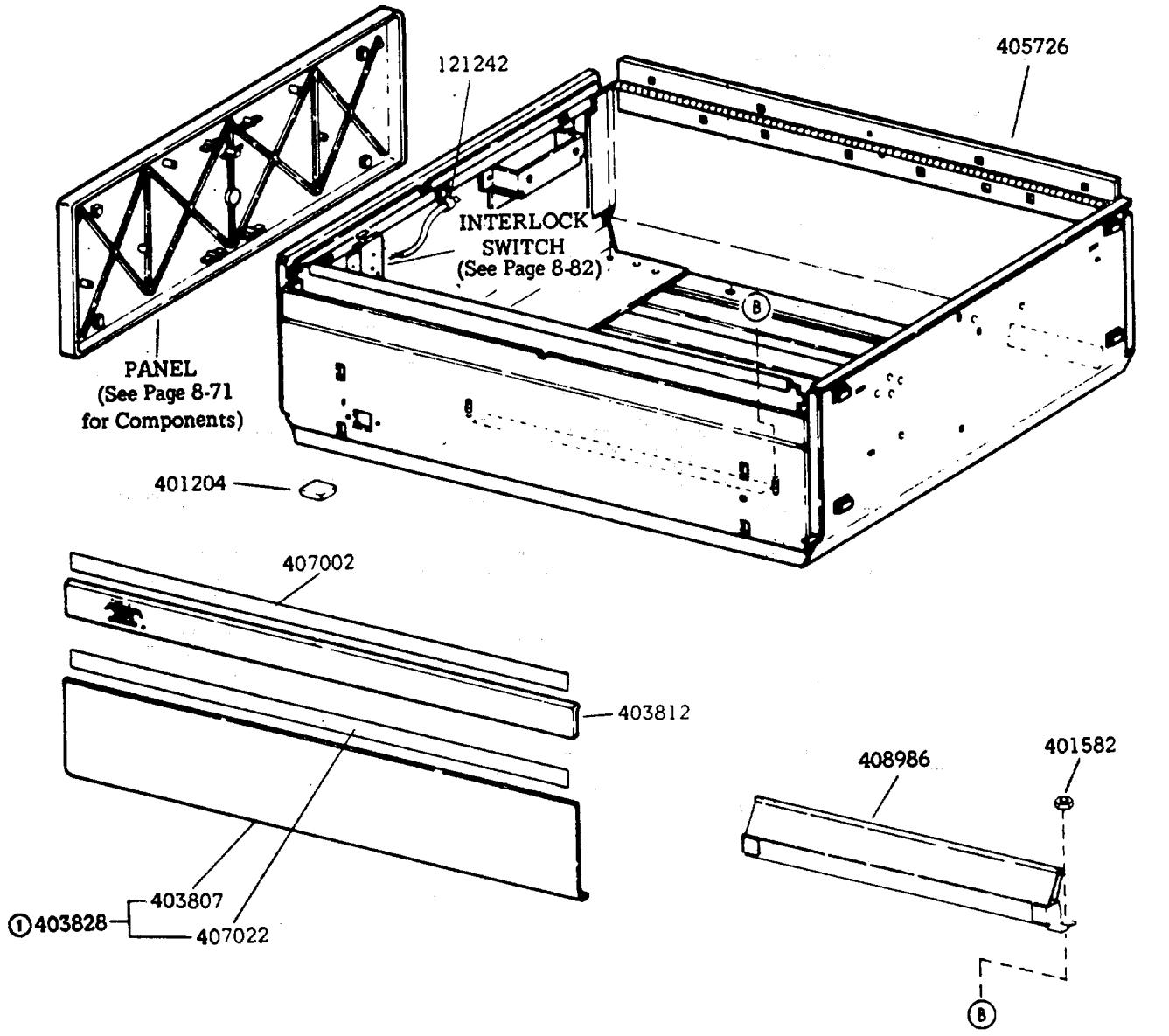
405715 Cable Assembly -- Friction Feed



400598 Interlock Cable Assembly -- Friction Feed



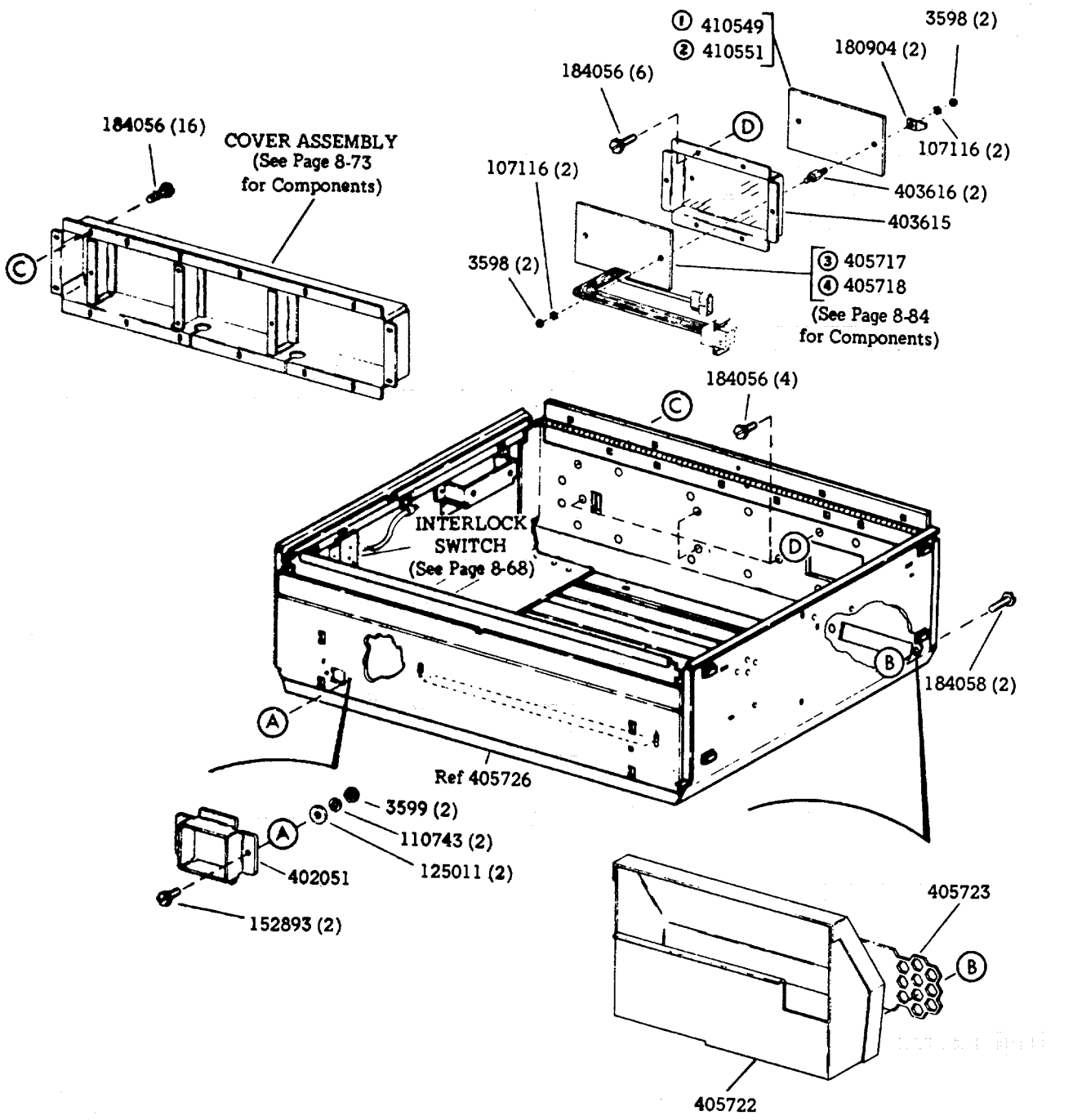
Printer Cabinet -- 80-Column Tractor Feed



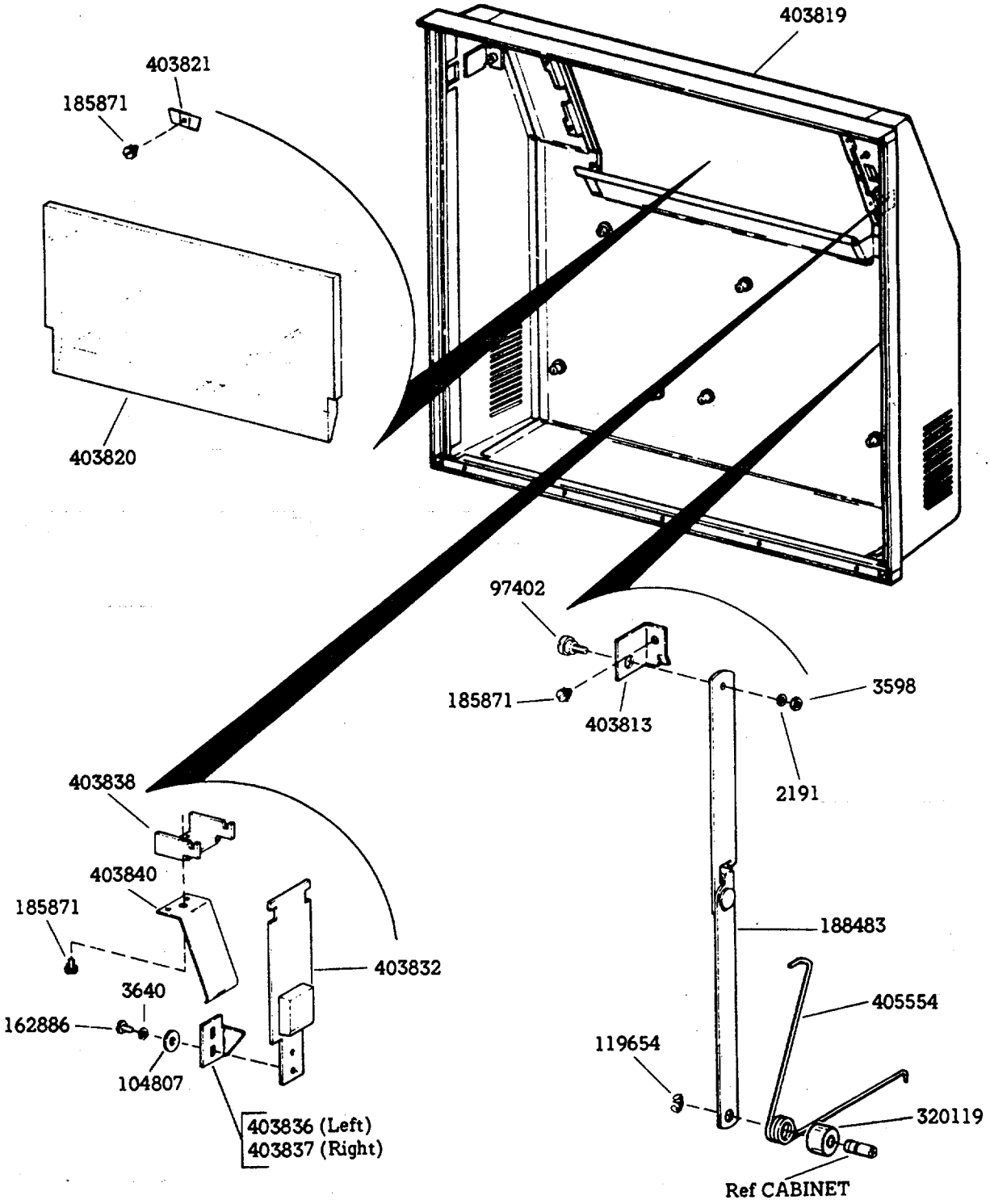
① Used on 40CAB352/RC, RD

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS, Painter Cabinet -- 80-Column Tractor Feed (Cont)



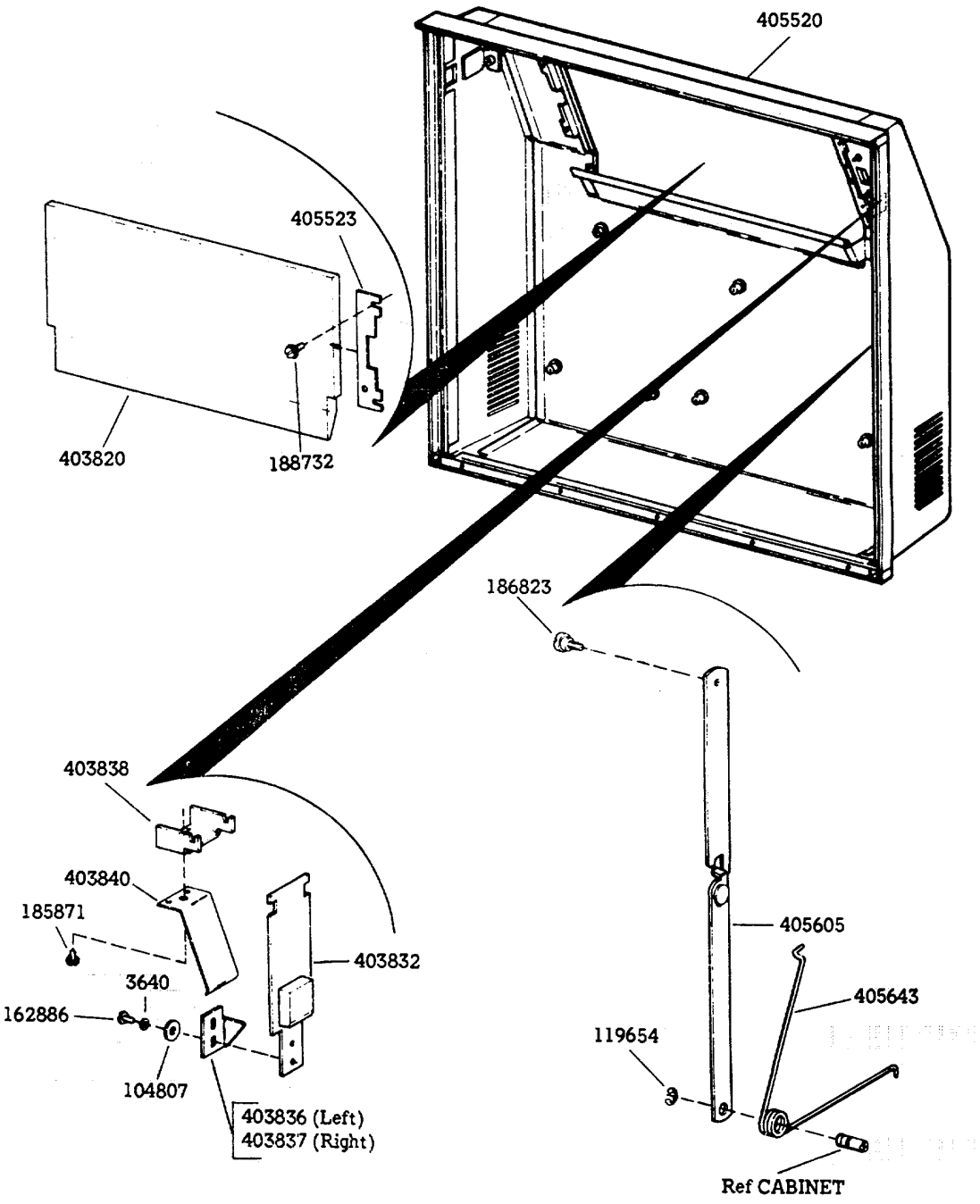
Window, Latch, and Stop Arm -- 80-Columnn Tractor Feed (Early Design -- Sheet Metal



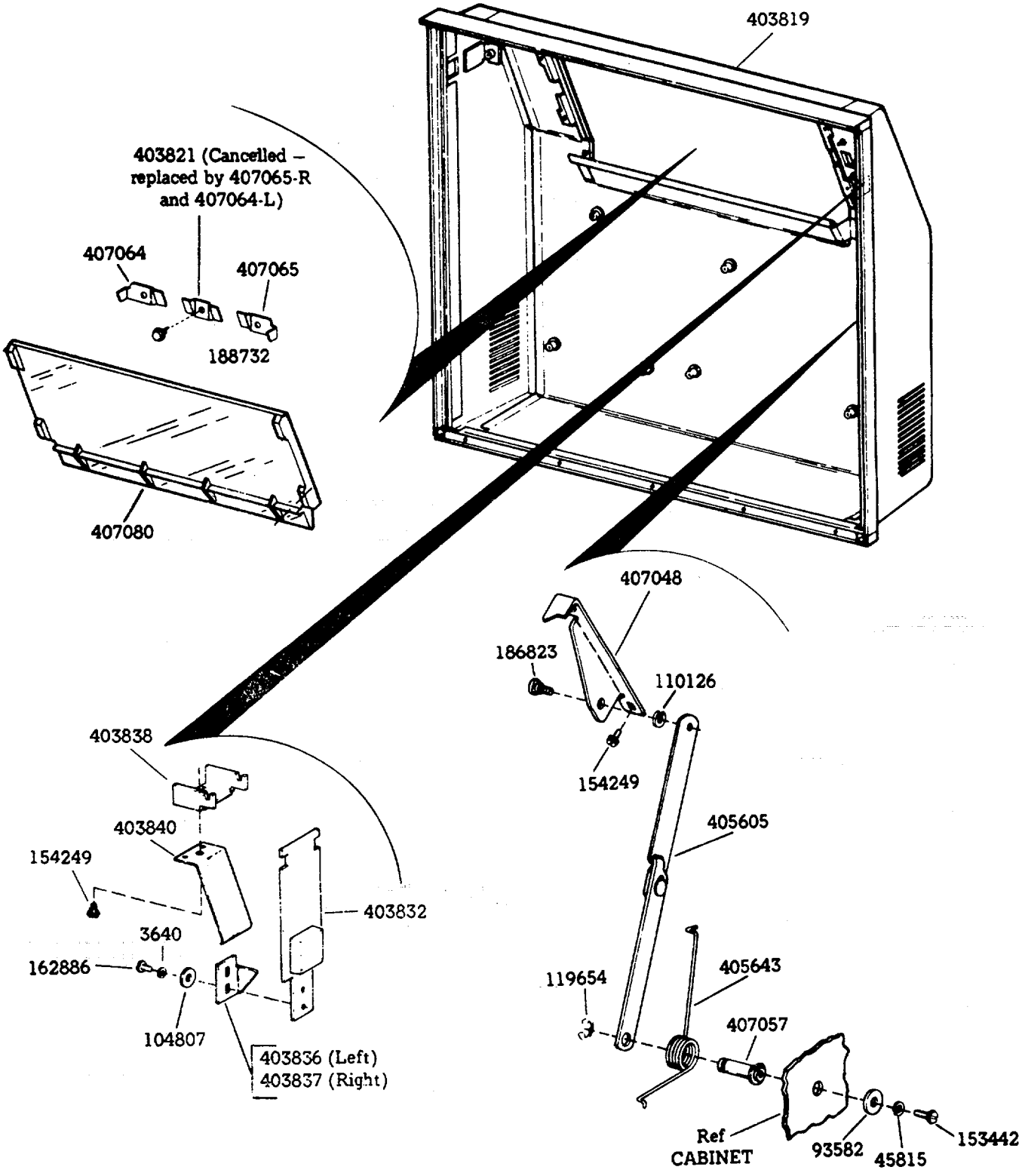
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Window, Latch, and Stop Arm -- 80-Column Tractor Feed (Intermediate Design -- Sheet Metal)



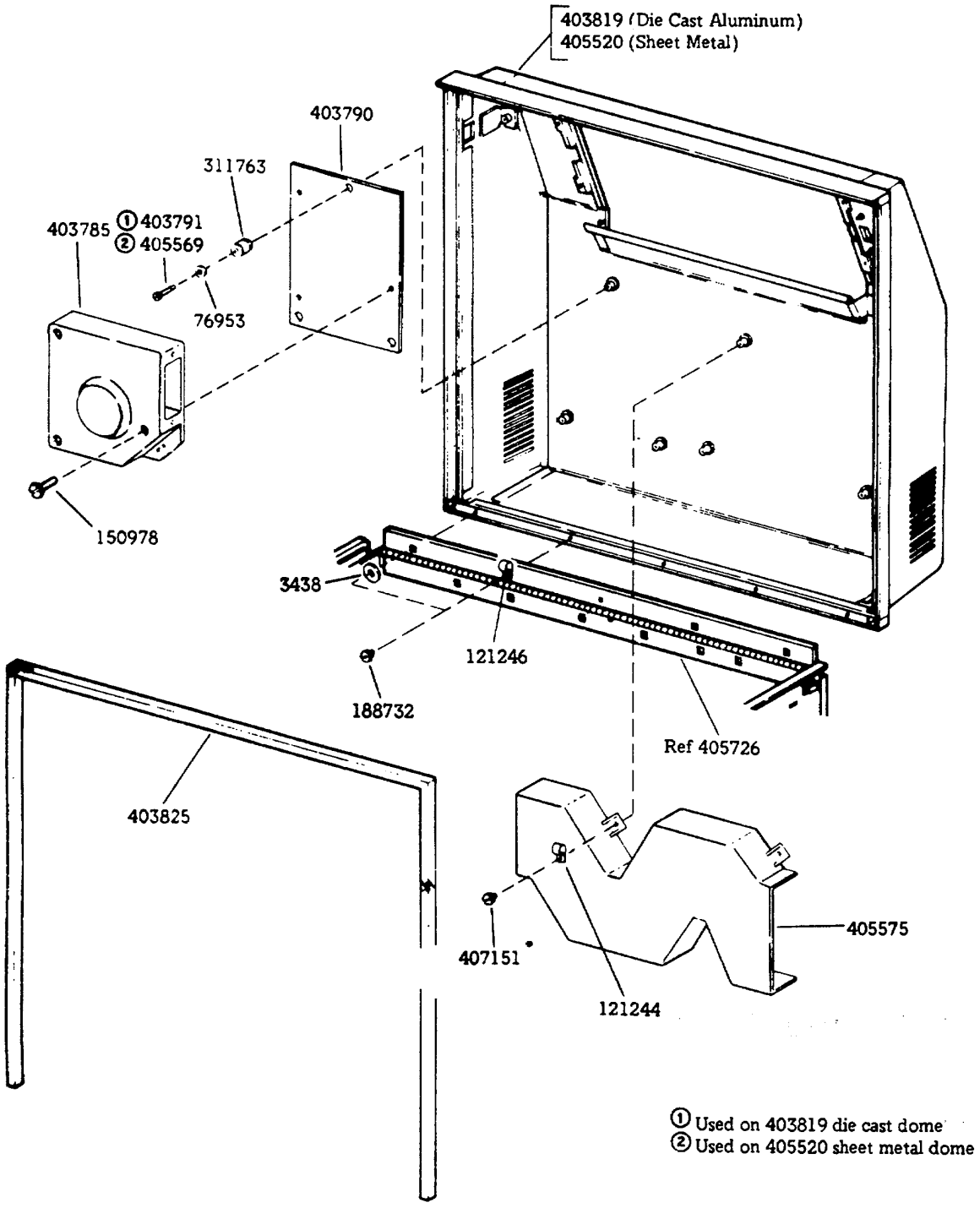
Window, Latch, and Stop Arm -- 80-Column Tractor Feed (Late Design -- Die Cast)



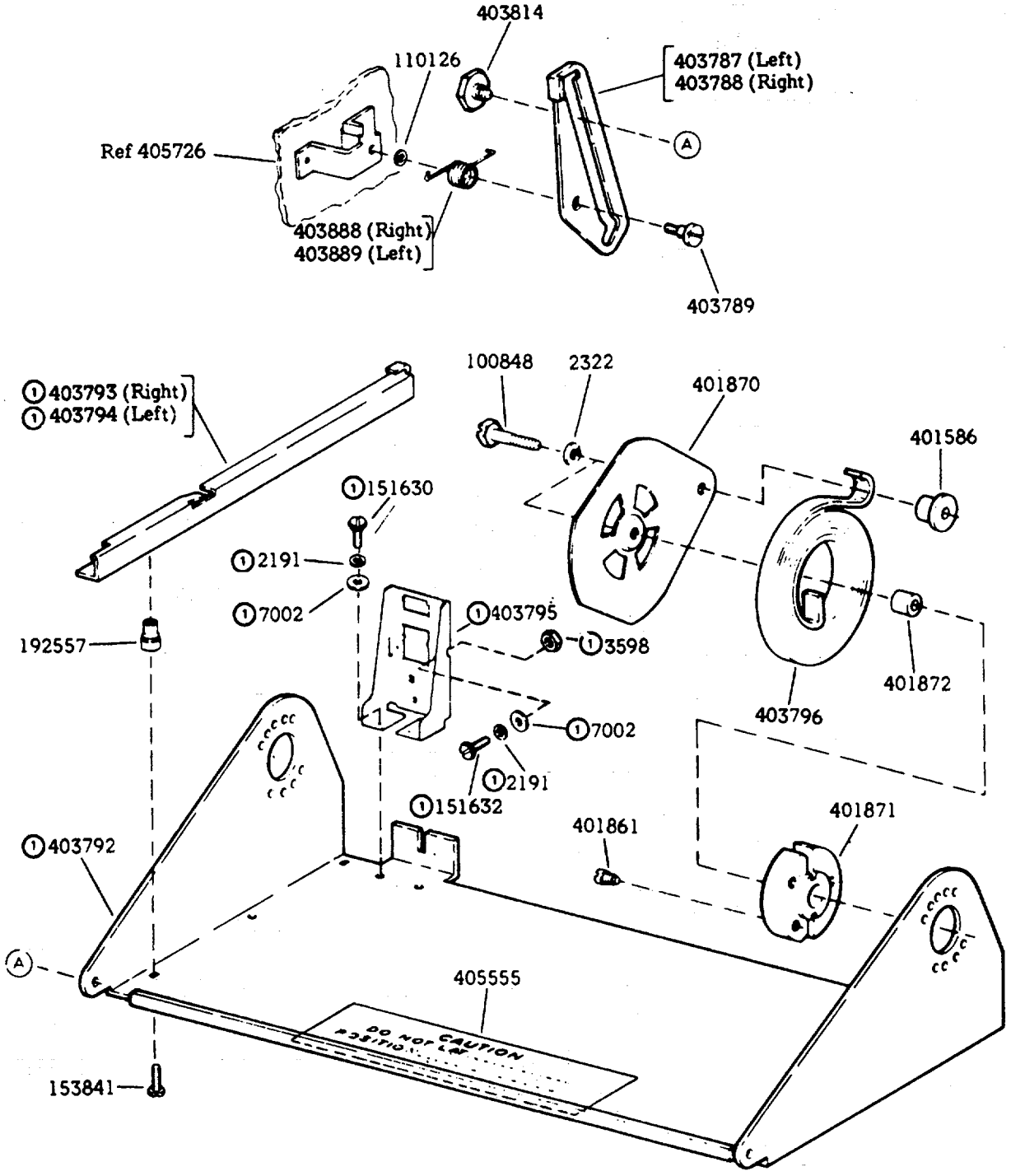
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Dome, Blower, and Duct -- 80-Column Tractor Feed



Cradle Mechanism -- 80-Column Tractor Feed

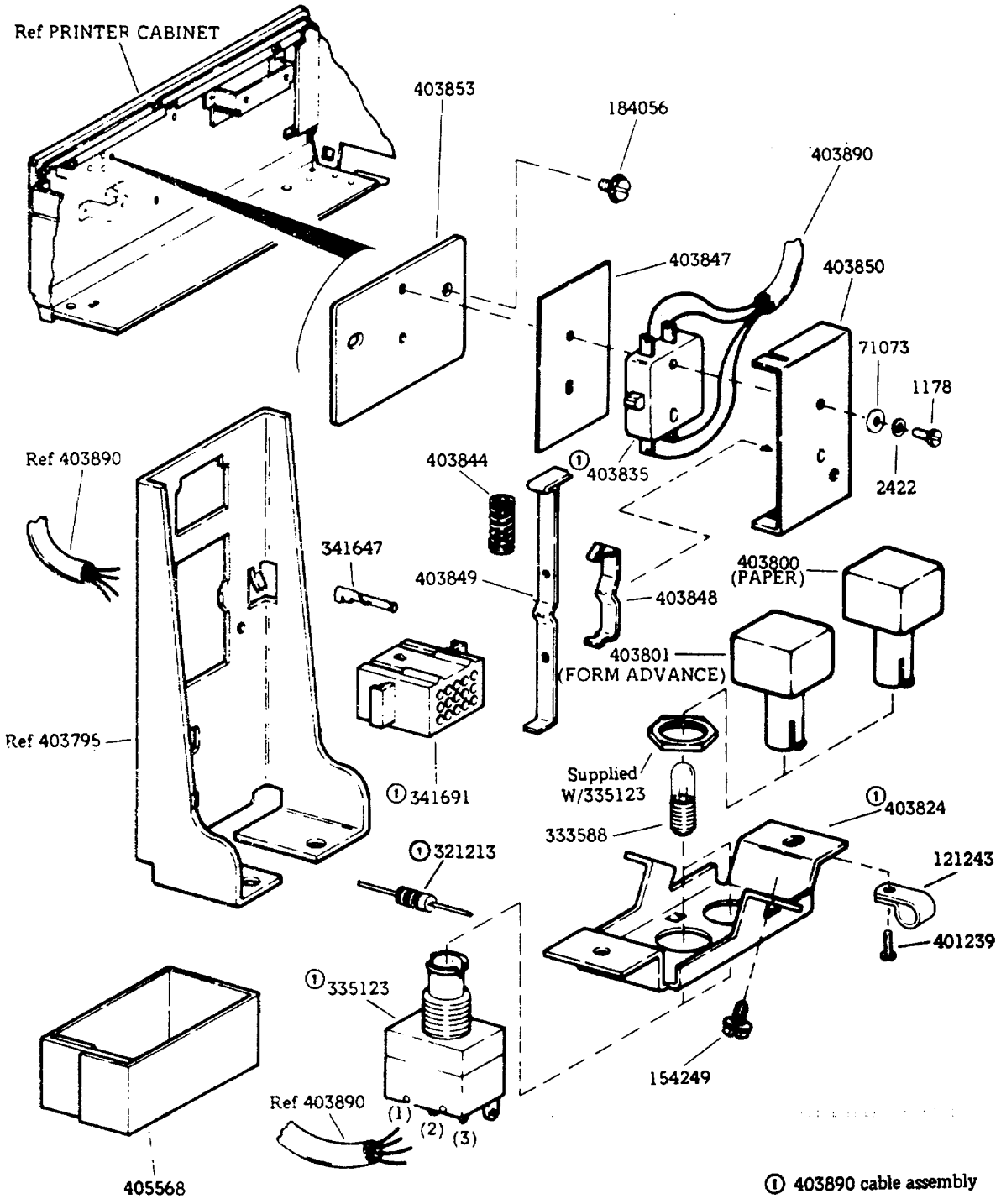


① Early design, for late design parts, see Page 8-101.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

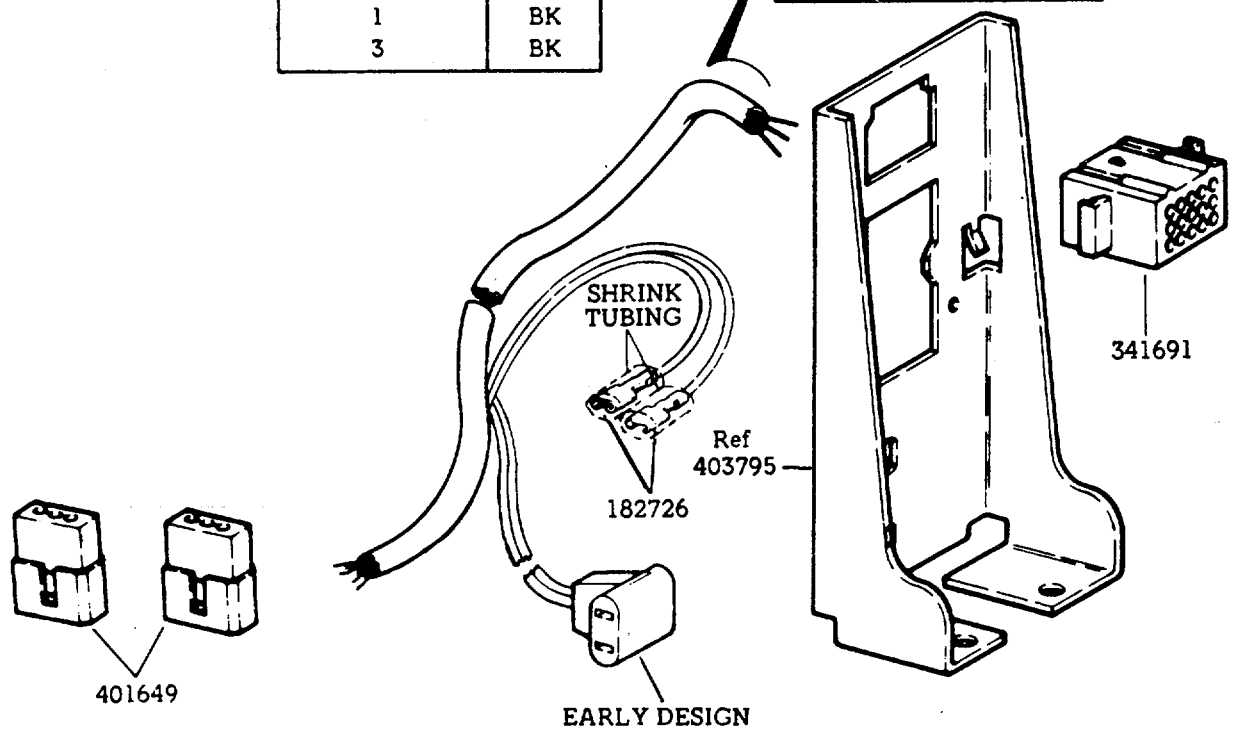
Interlock and Paper Alarm -- 80- and 132-Column Tractor Feed



AC Power Cable -- Tractor Feed

405545 CABLE	
TERMINAL NO.	COLOR
1	BK
2	G
3	W
1	BK
3	BK

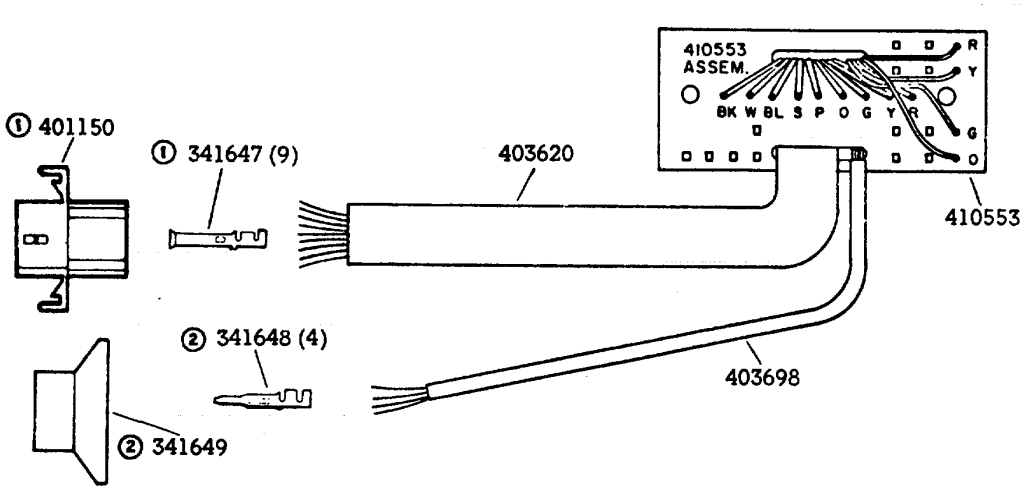
TERMINAL NO.	COLOR
1	G
13	BK
15	W



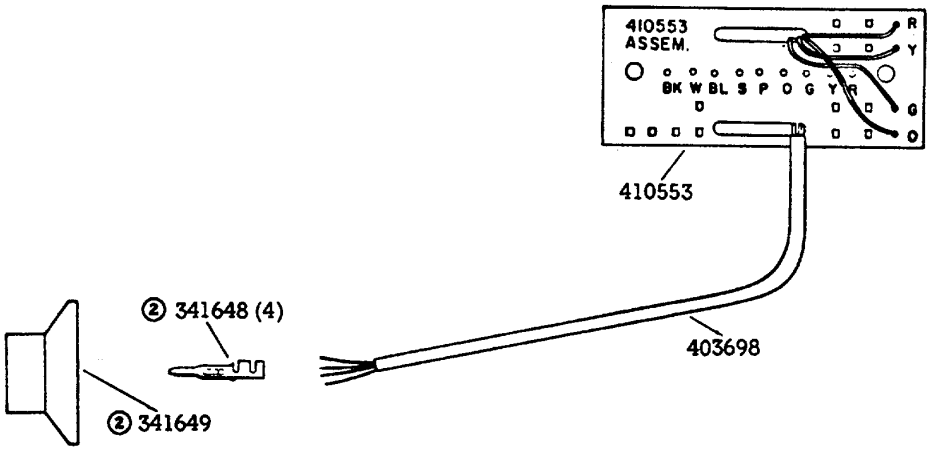
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

405718 Cable Assembly

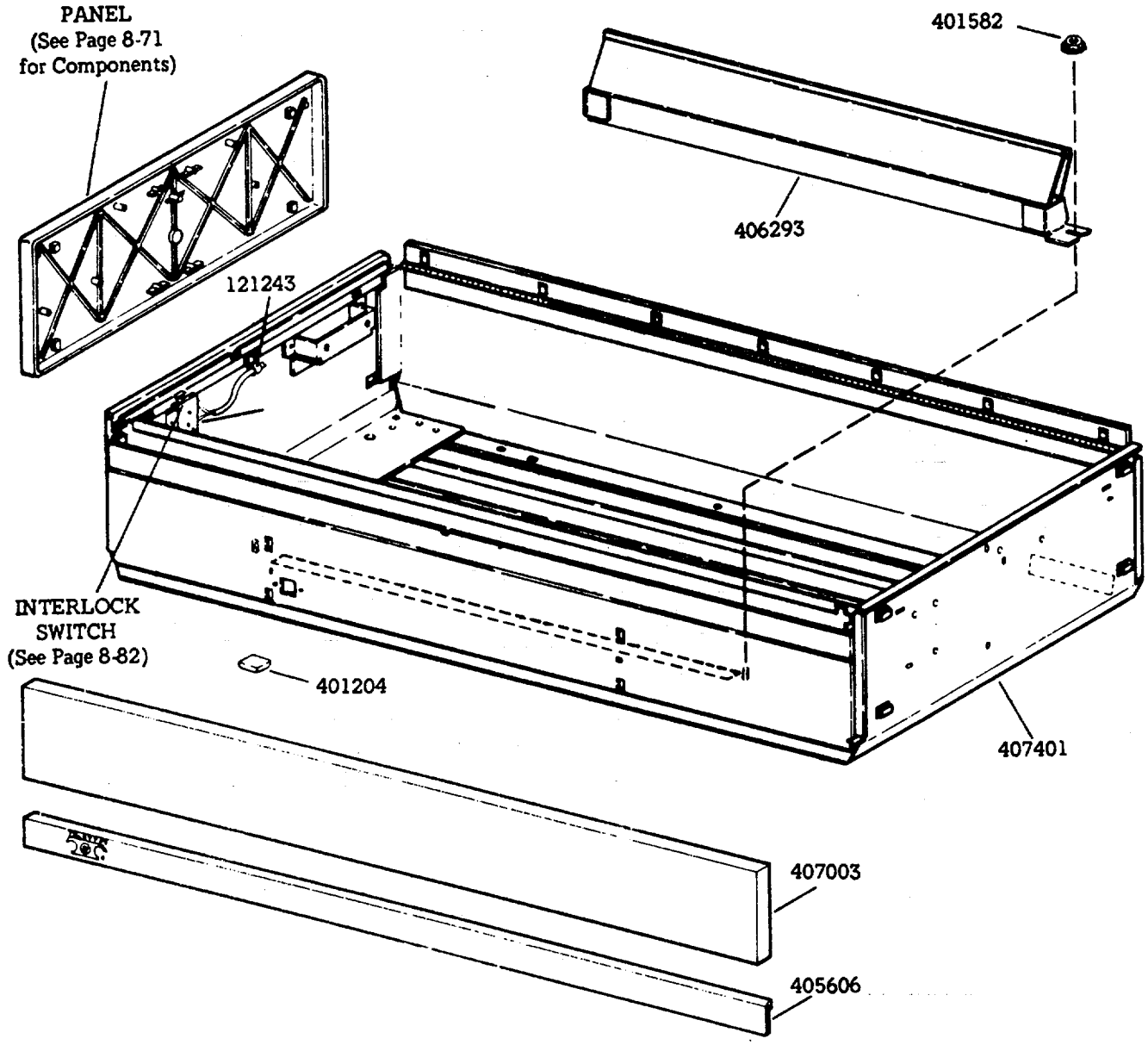


405717 Cable Assembly



① Part of 403620
② Part of 403698

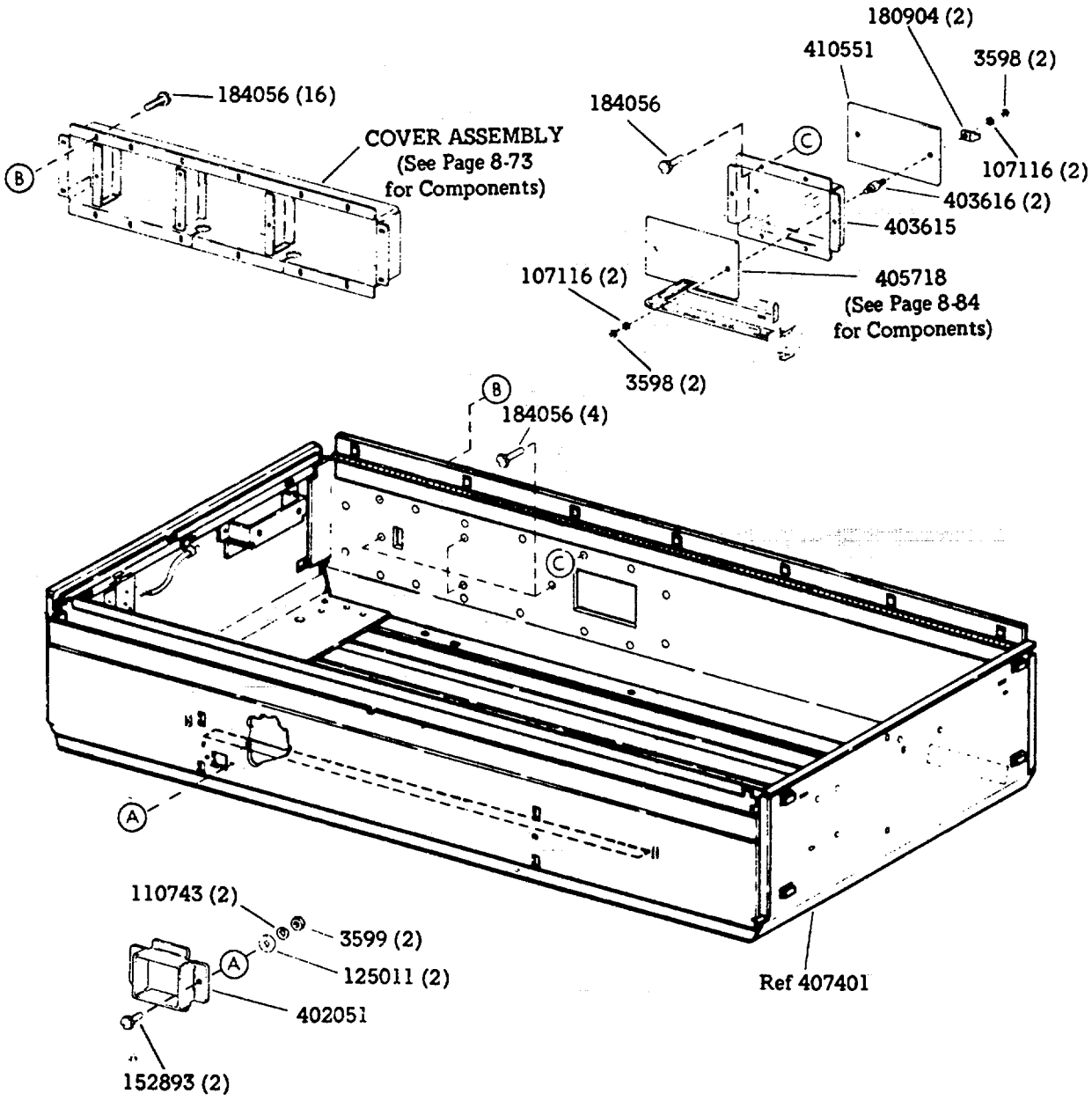
Printer Cabinet -- 132-Column Tractor Feed



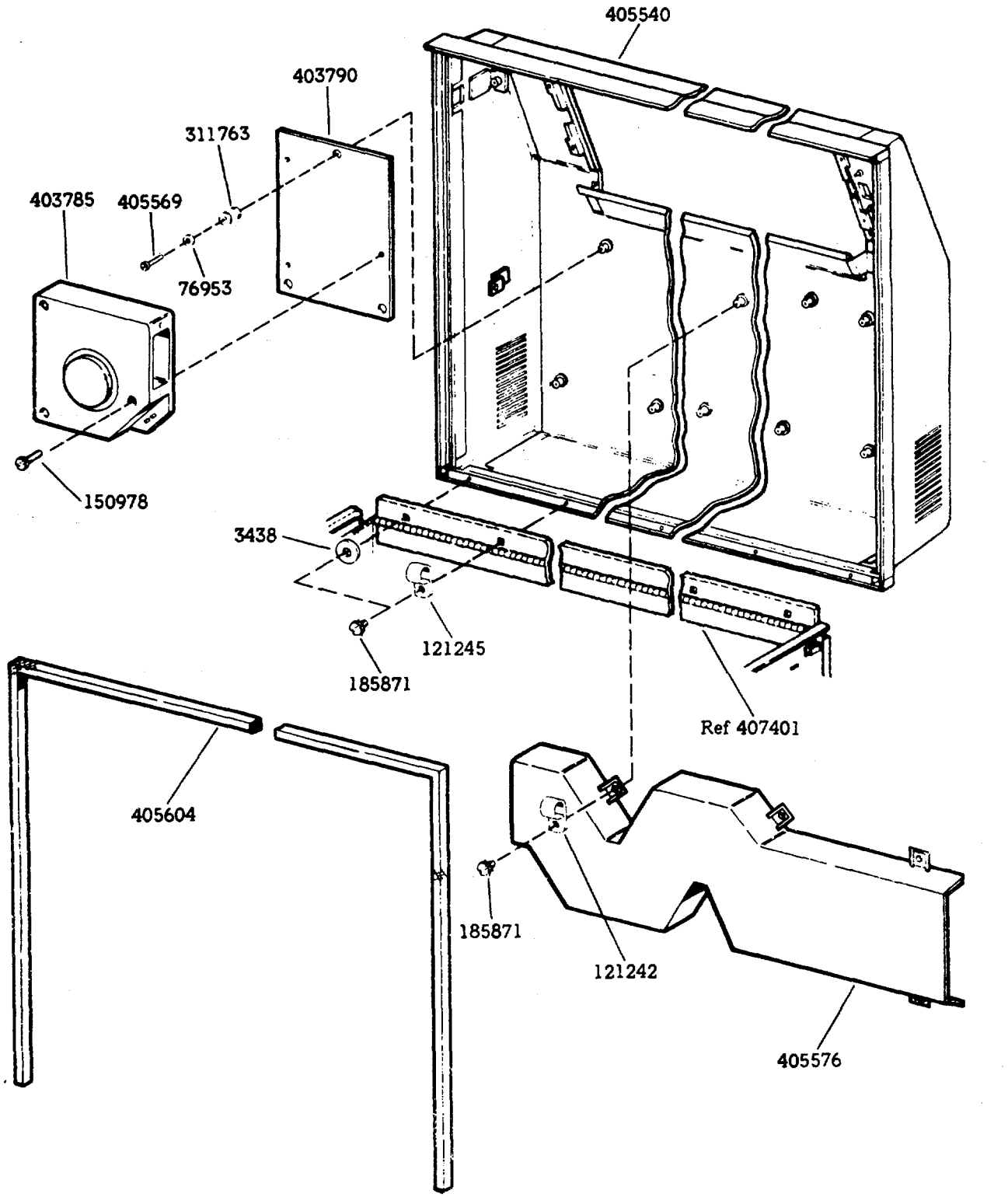
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Printer Cabinet -- 132-Column Tractor Feed (Cont)



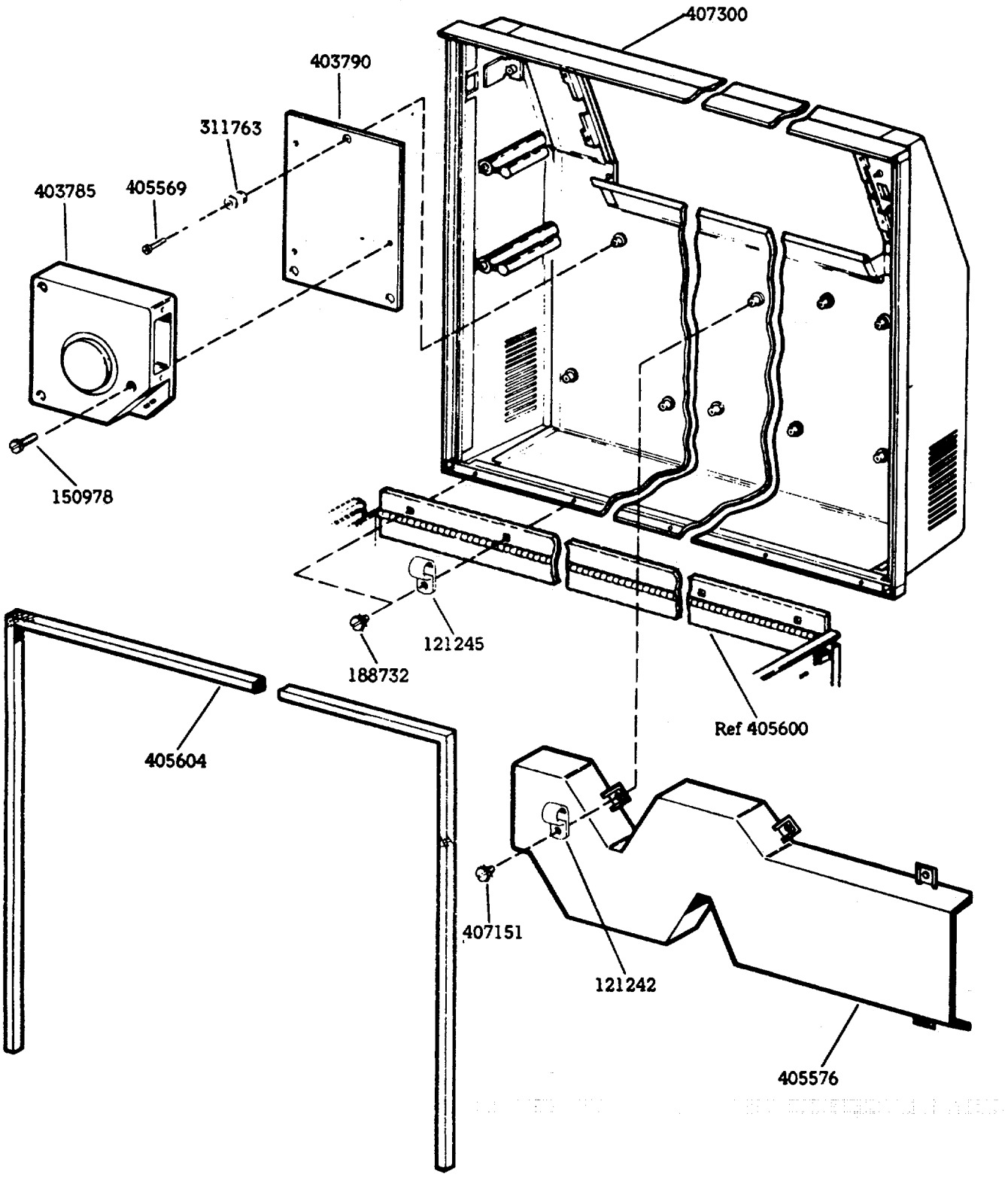
Dome, Blower, and Duct -- 132-Column Tractor Feed (Early Design -- Sheet Metal)



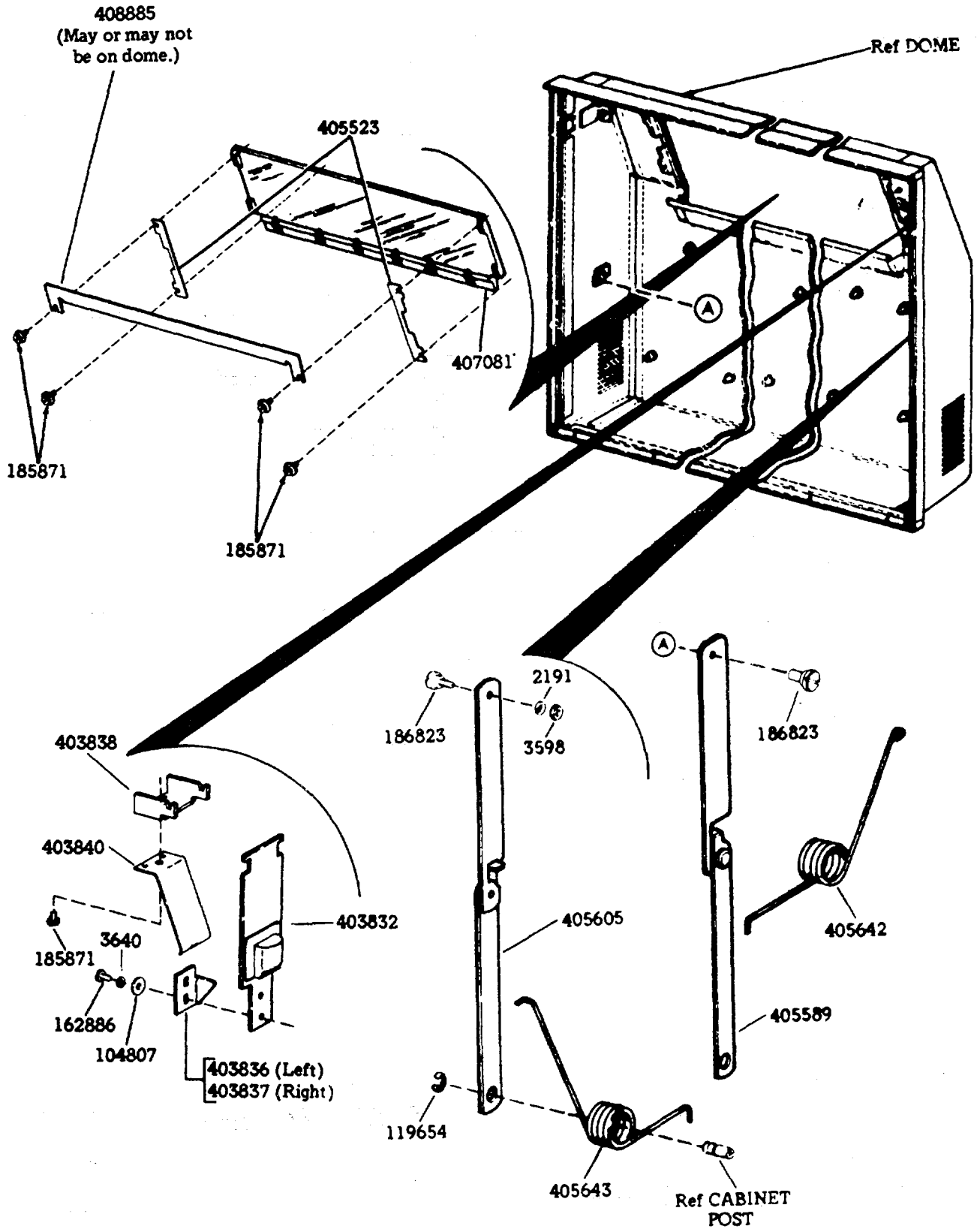
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Dome, Blower, and Duct -- 132-Column Tractor Feed (Late Design -- Die Cast)



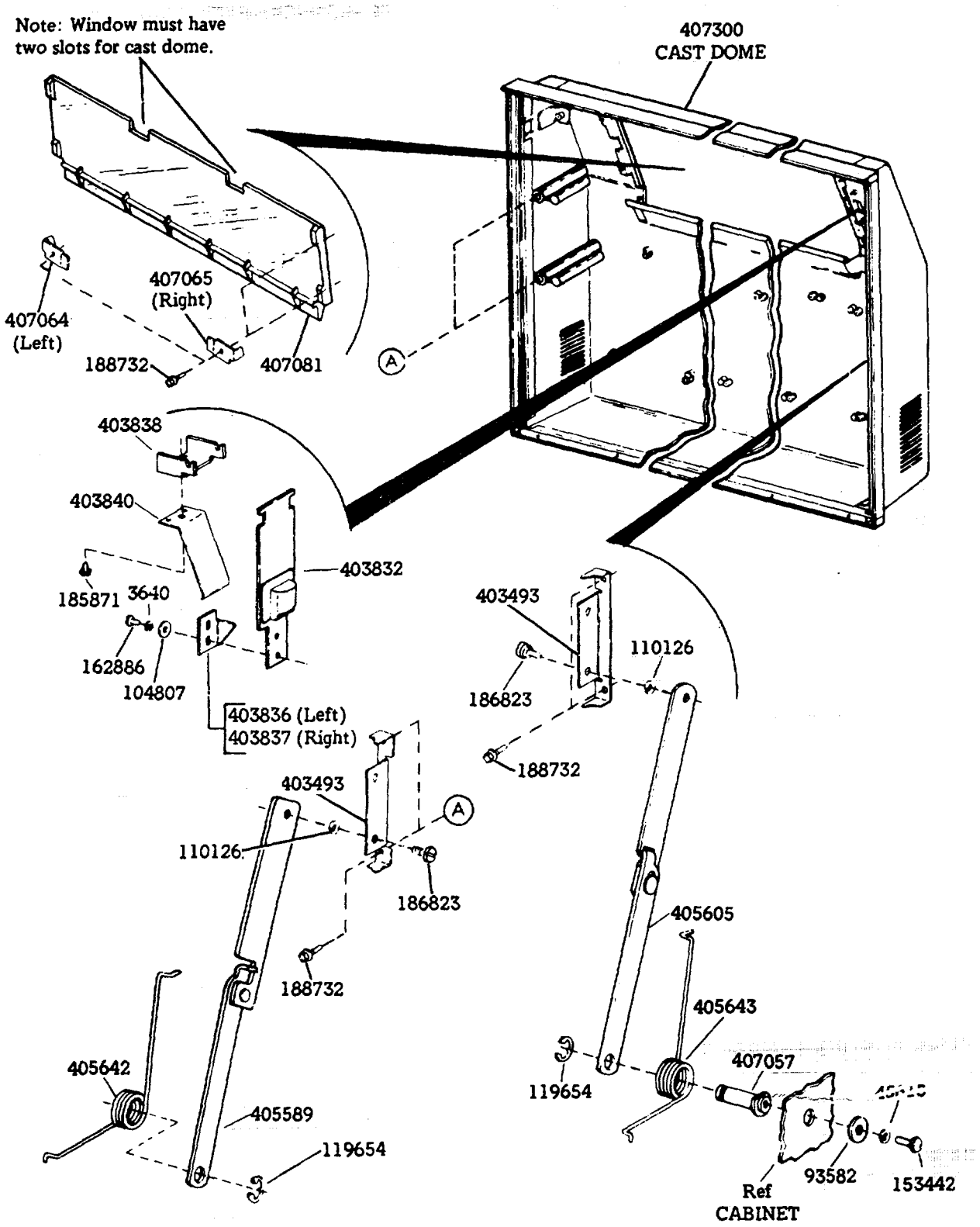
Window, Latch, and Stop Arm -- 132-Column Tractor Feed (Early Design -- Sheet Metal.)



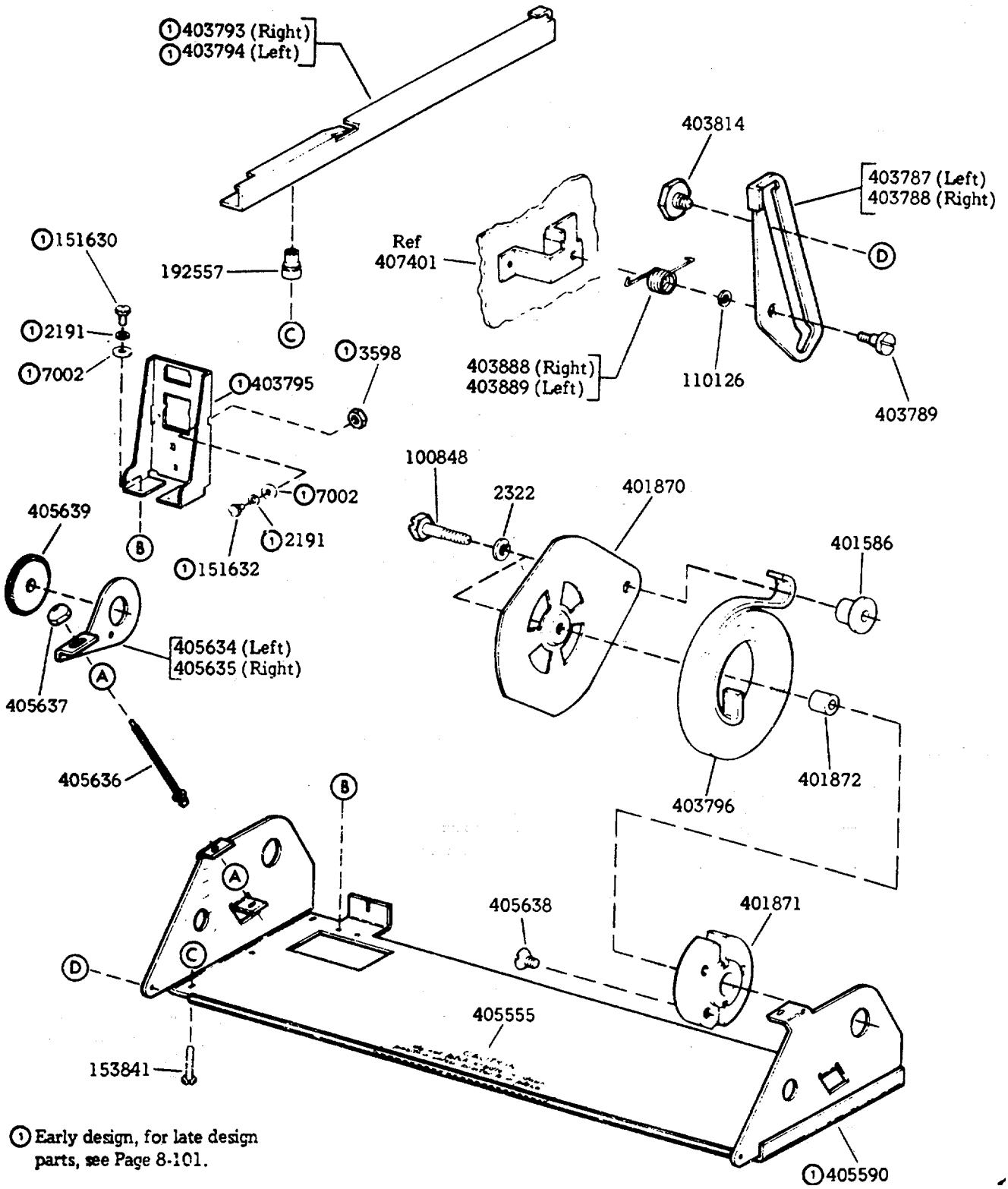
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Window, Latch, and Stop Arm -- 132-Column Tractor Feed (Late Design -- Die Cast)



Cradle Mechanism -- 132-Column Tractor Feed

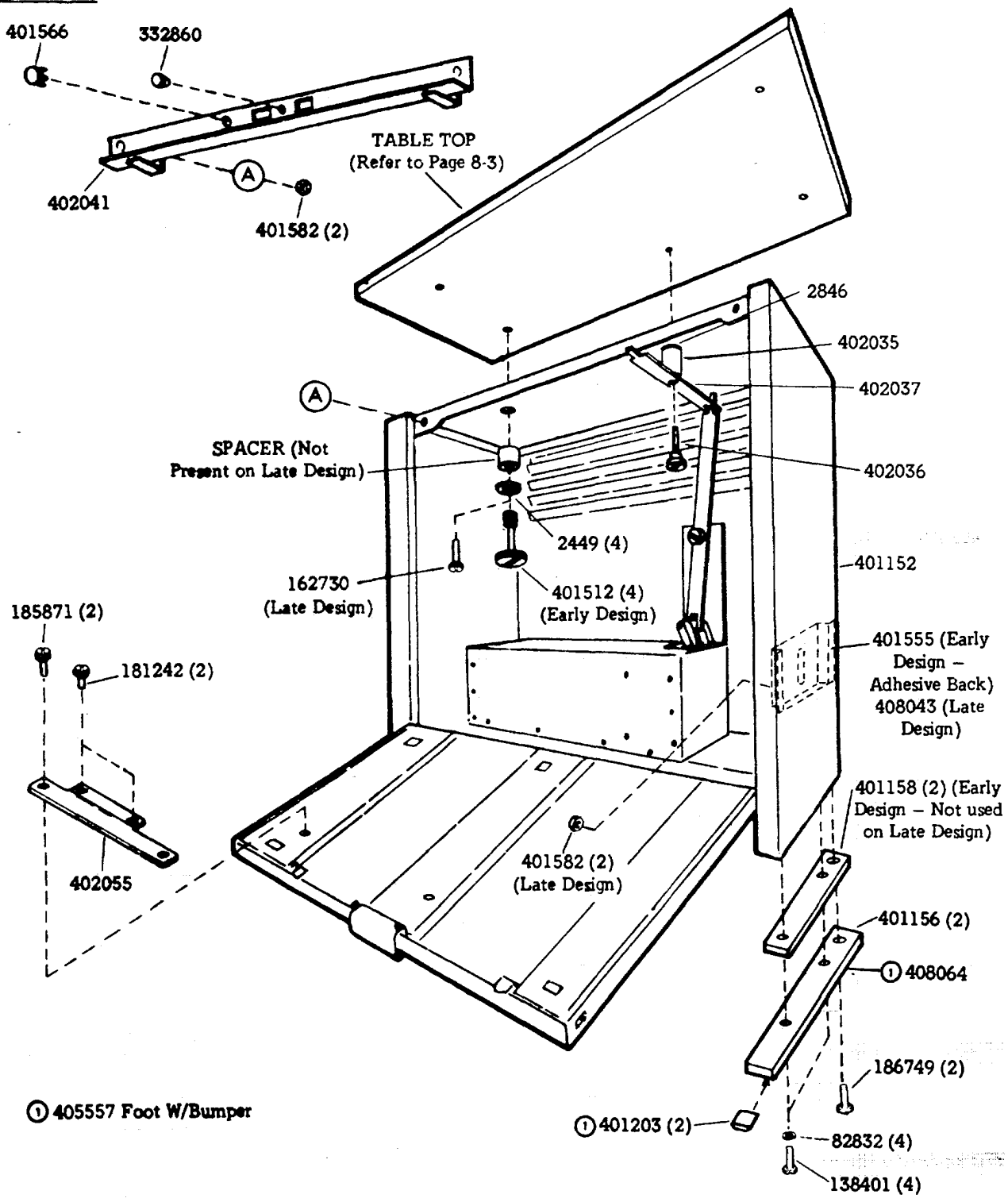


① Early design, for late design parts, see Page 8-101.

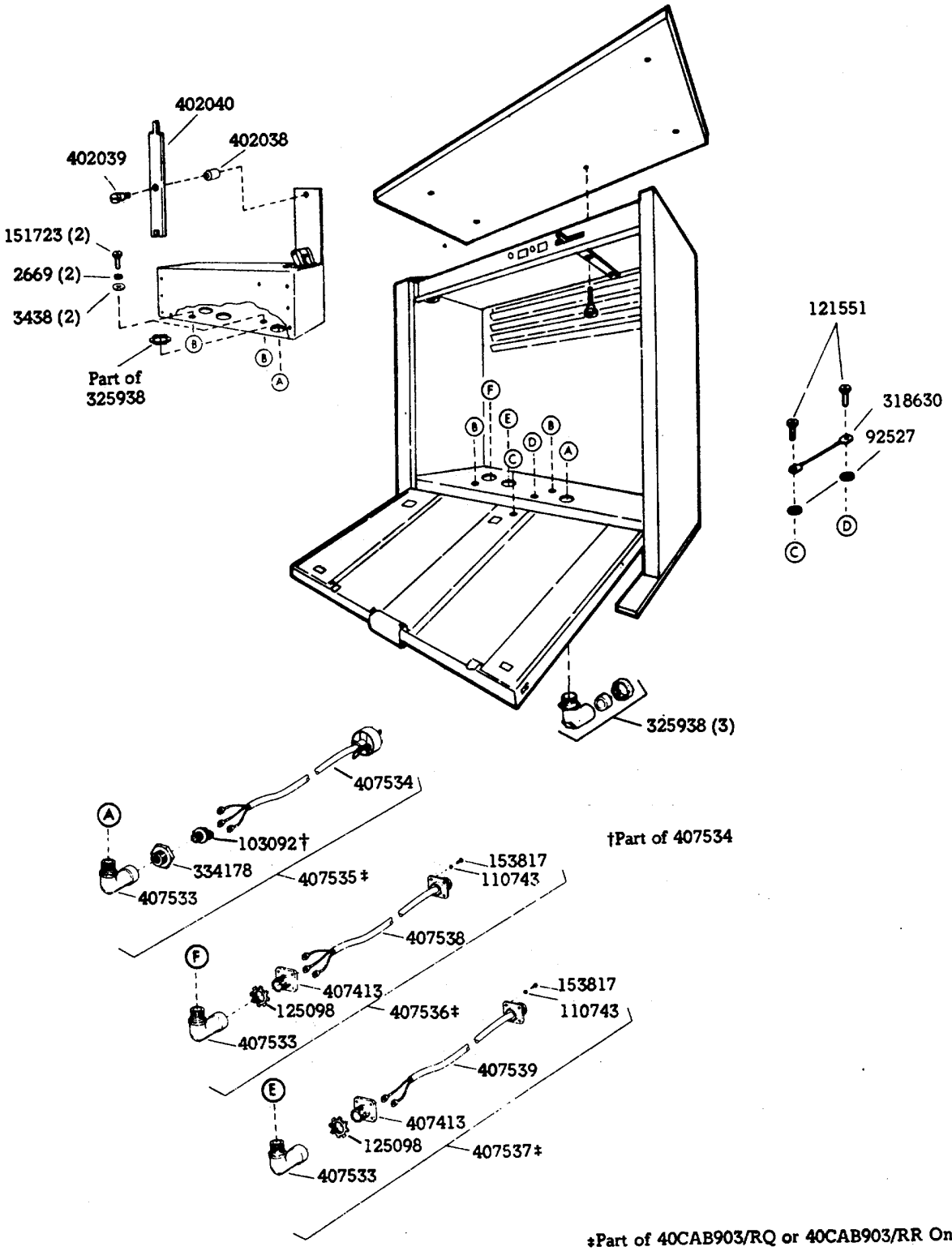
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Pedestal



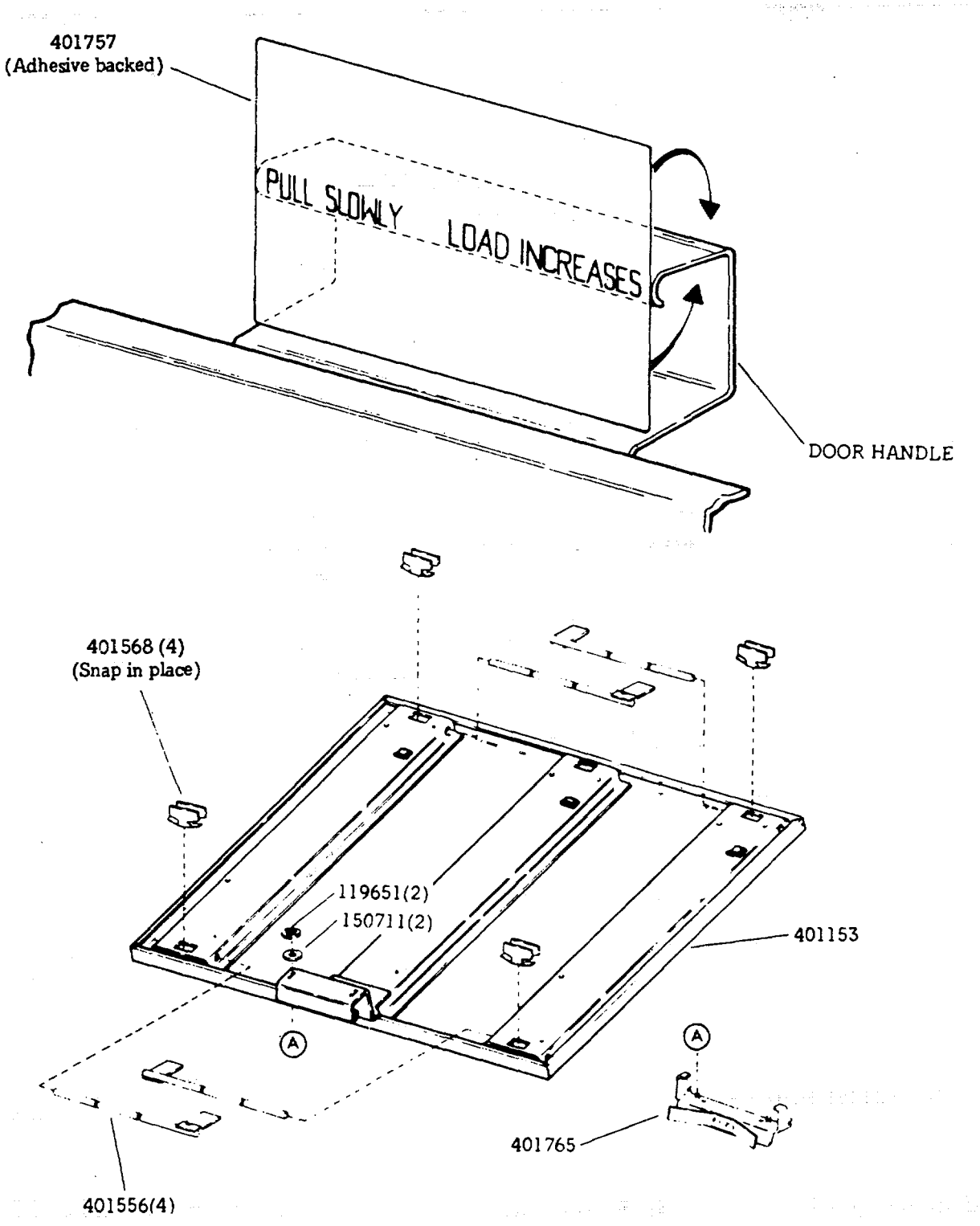
Interface - - Pedestal



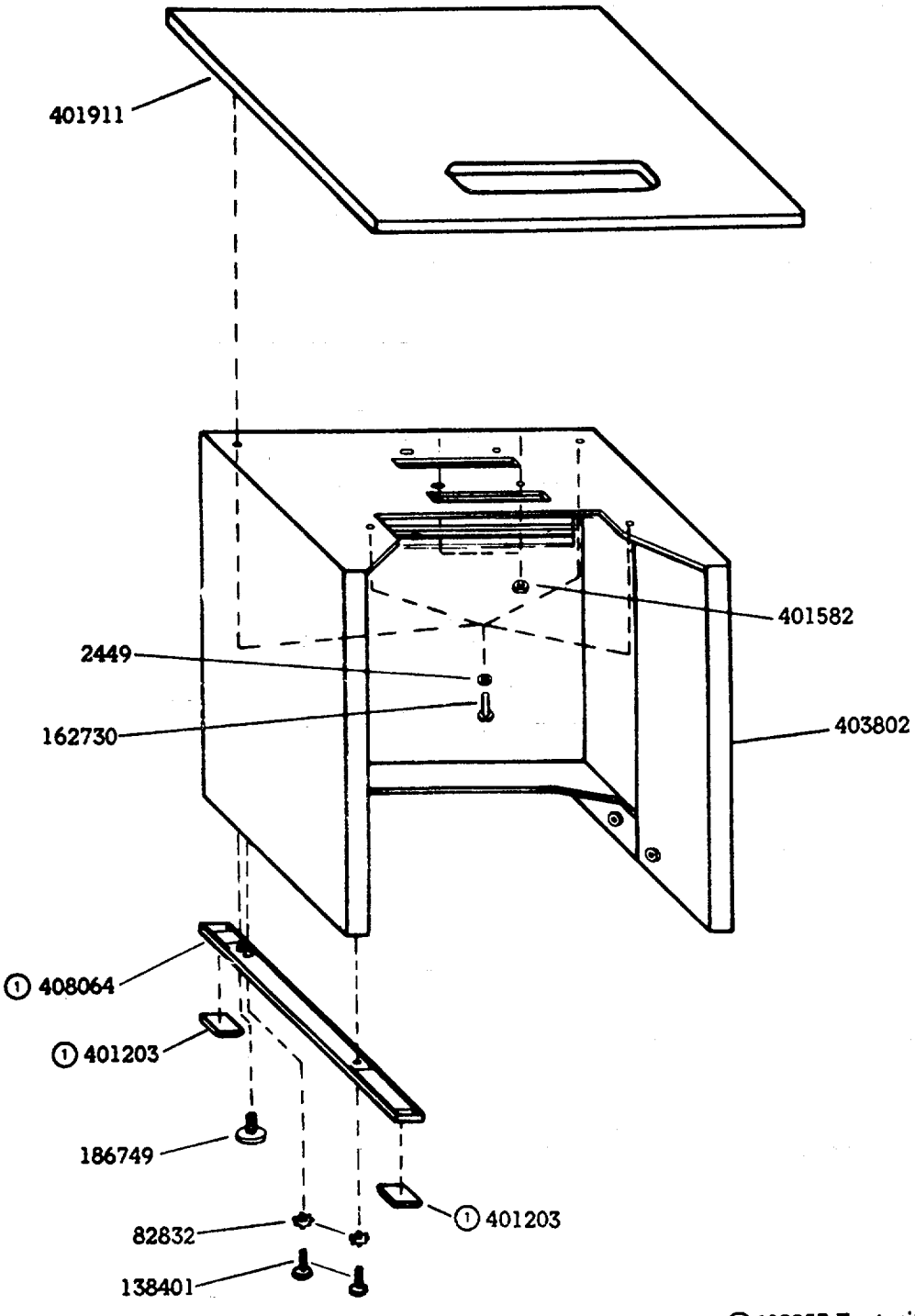
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Pedestal Door Assembly



40CAB902 Pedestal

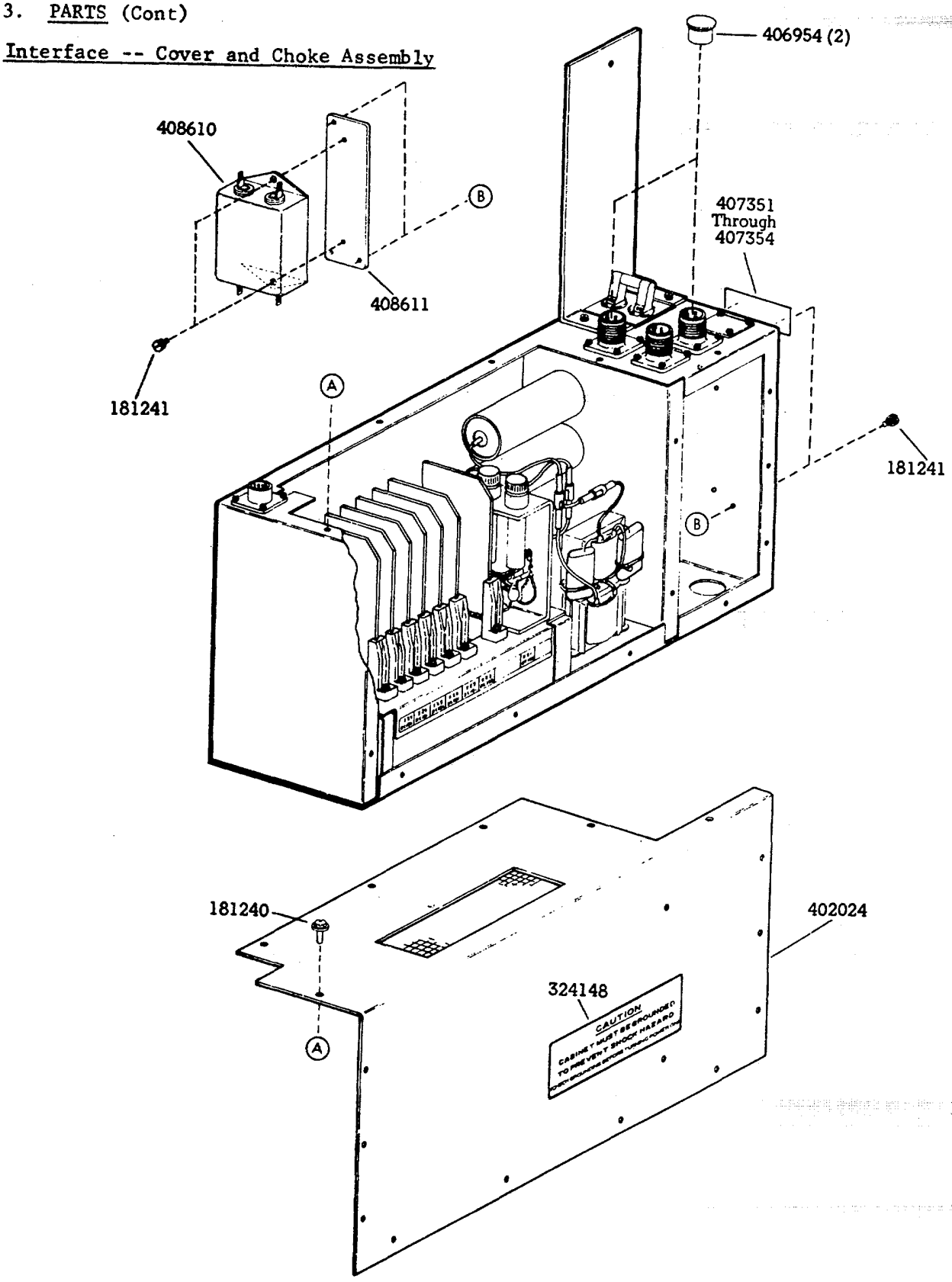


①405557 Foot with Bumper

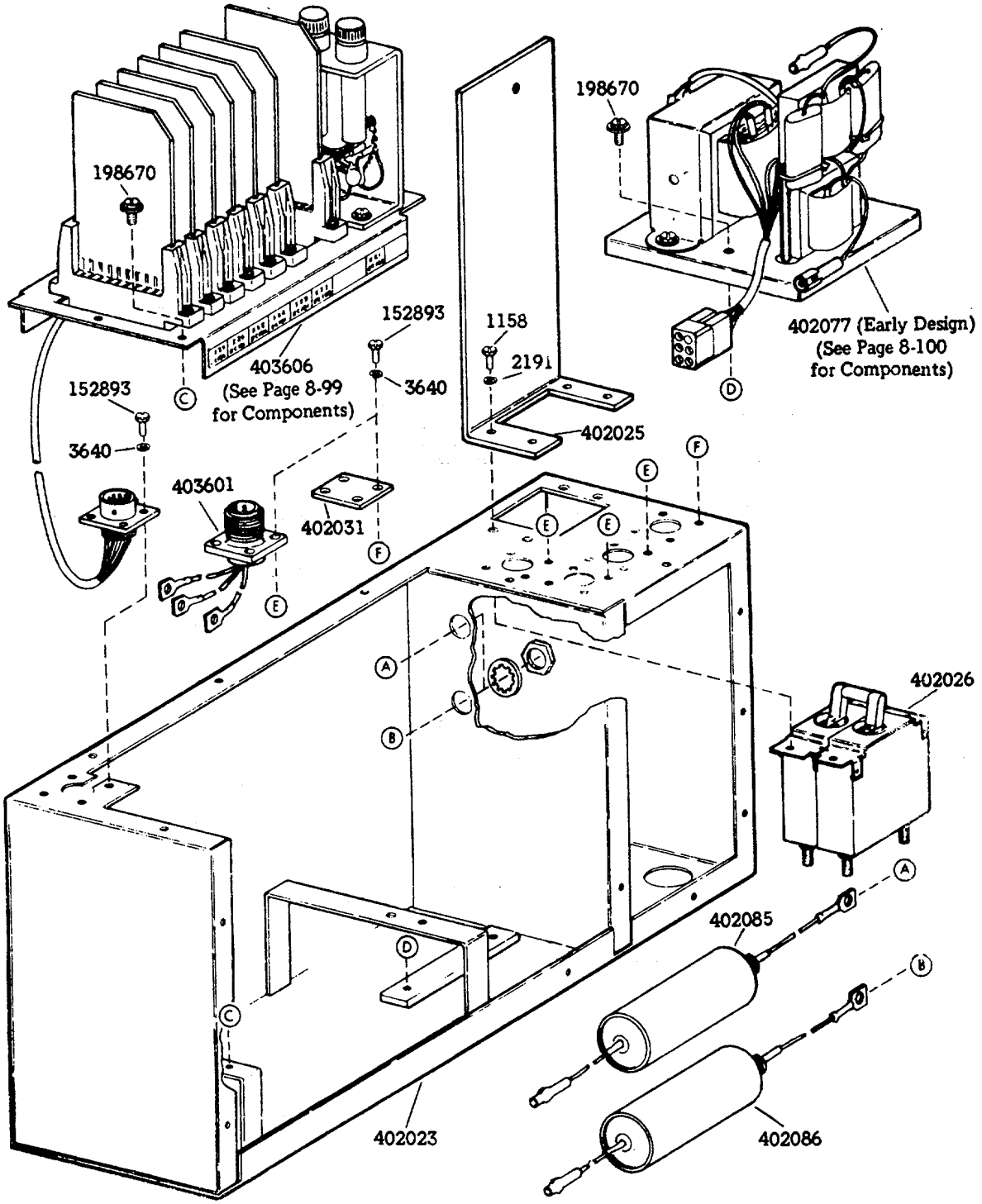
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Interface -- Cover and Choke Assembly



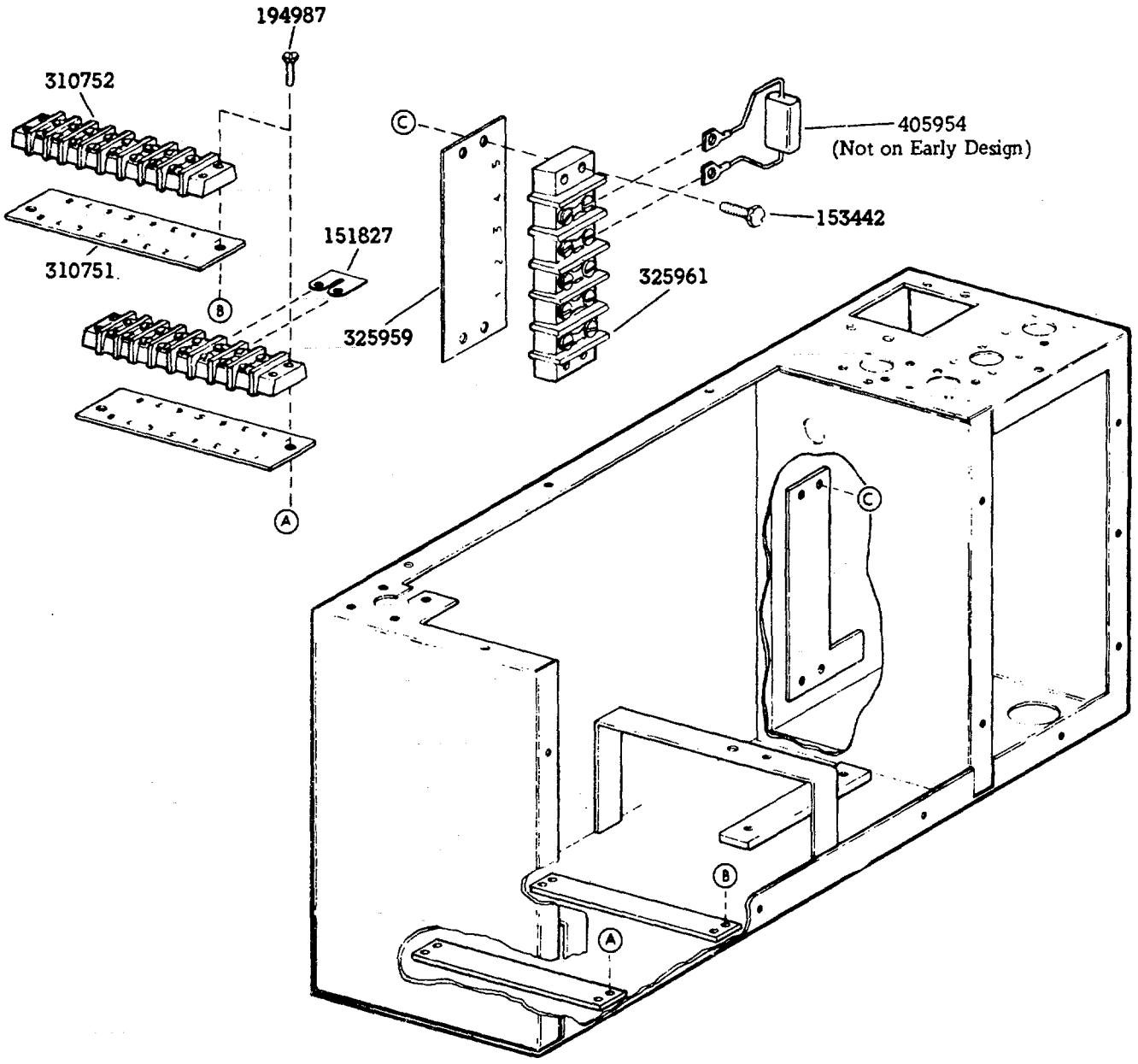
Interface


198670
198670
152893
1158
2191
403606
(See Page 8-99
for Components)
3640
152893
3640
402025
402077 (Early Design)
(See Page 8-100
for Components)
403601
402031
402026
402085
402023
402086

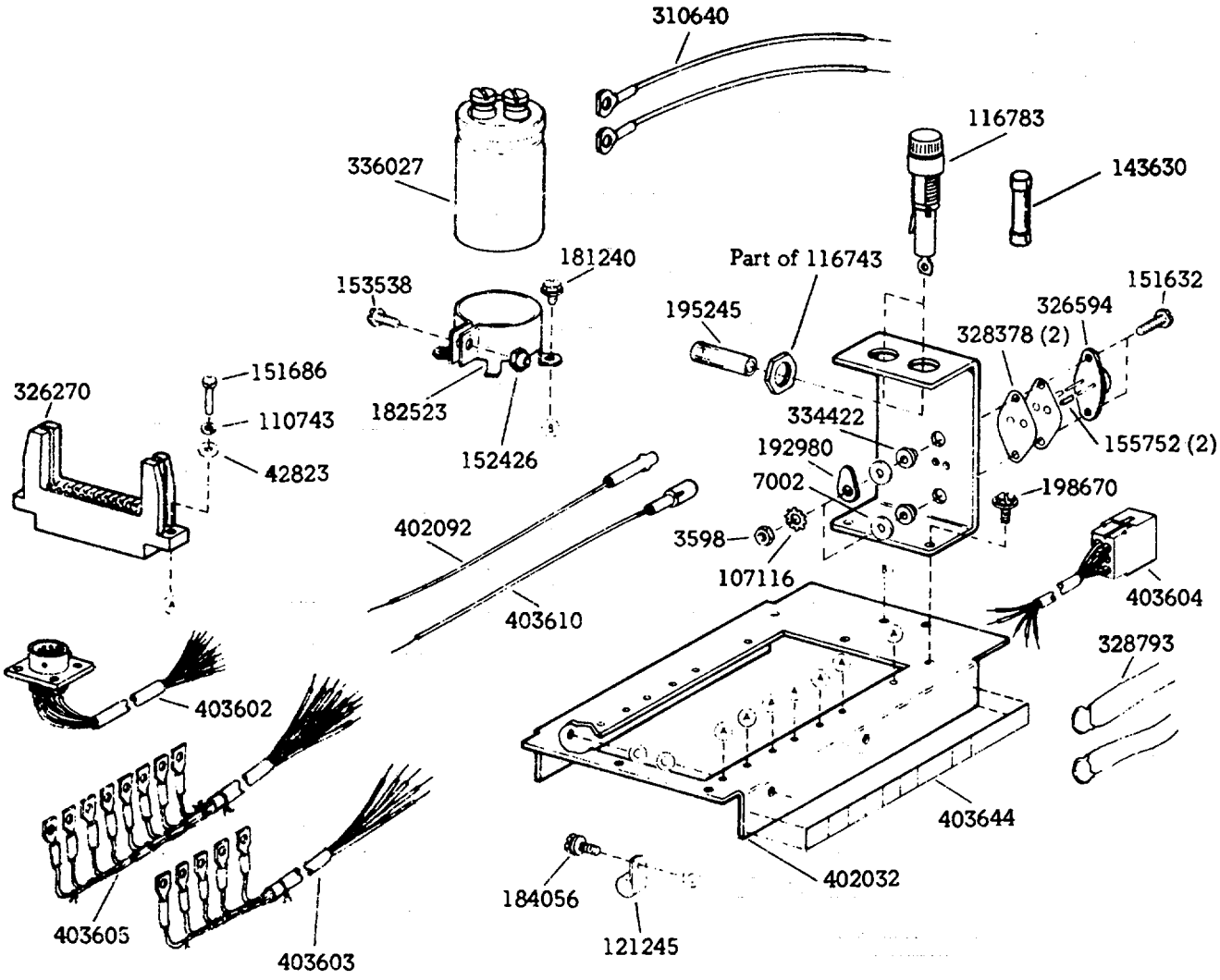
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Interface -- Terminal Blocks



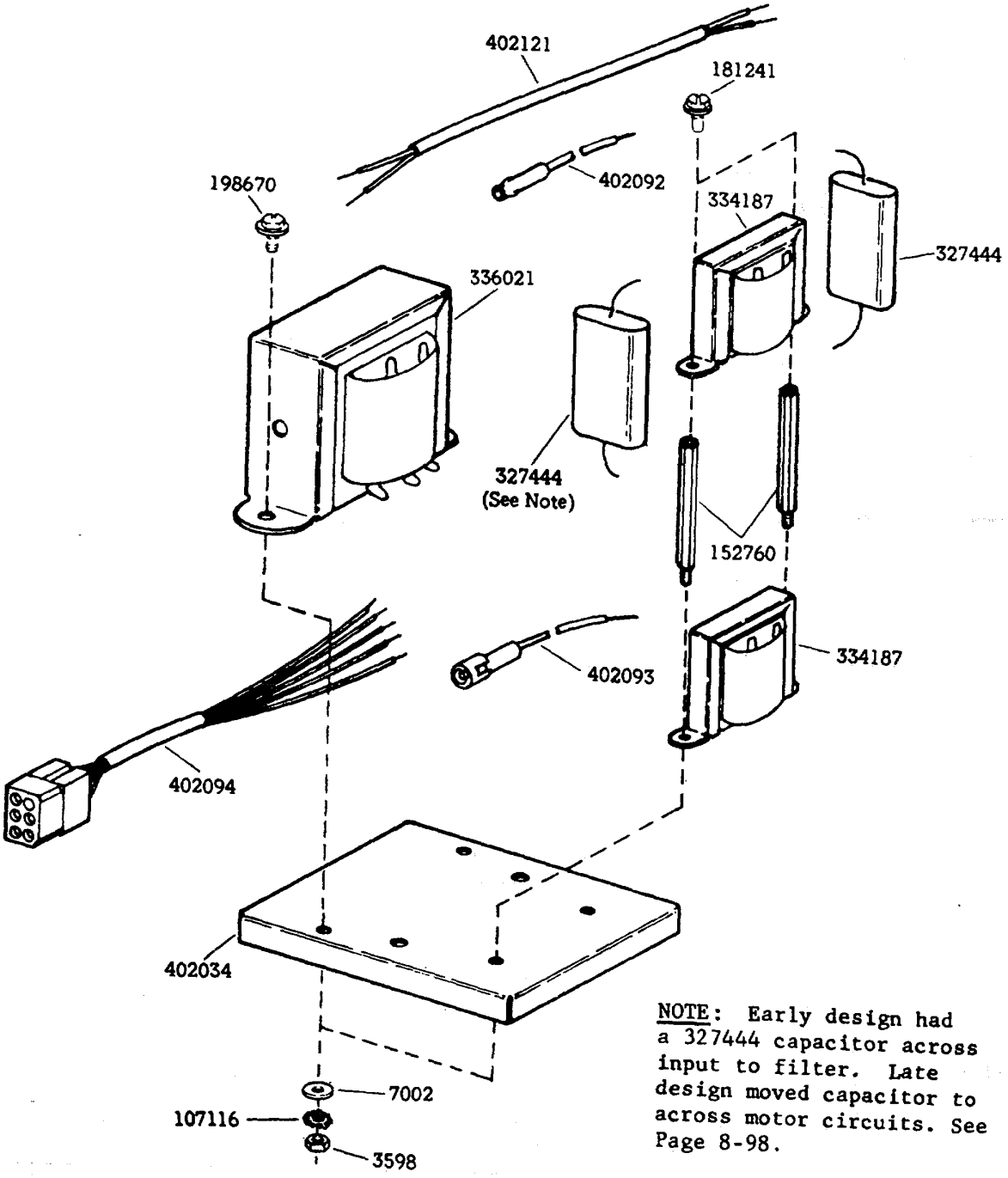
403606 Interface -- Circuit Card Mounting Frame



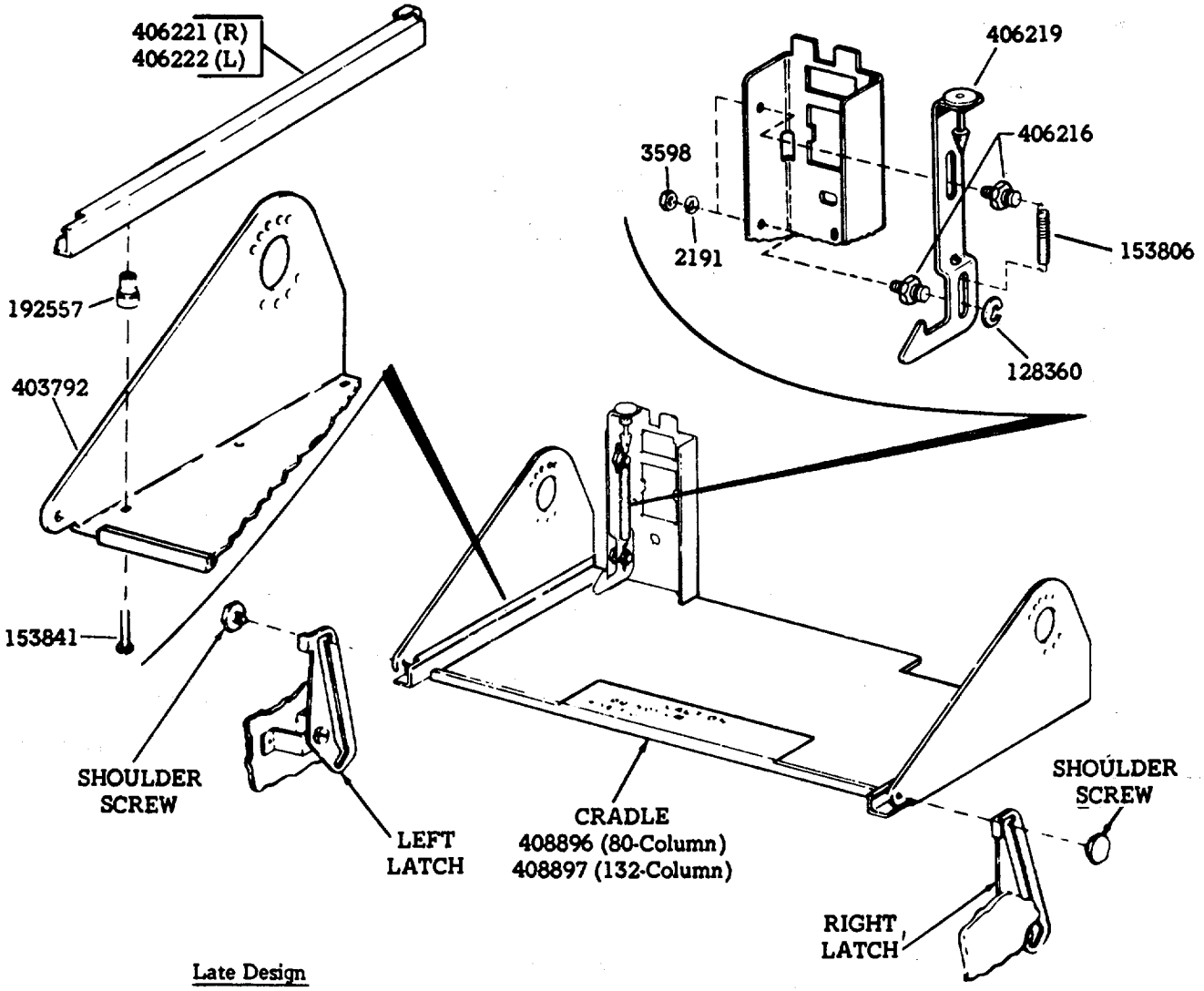
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

402077 Transformer Assembly



Cradle And Latch

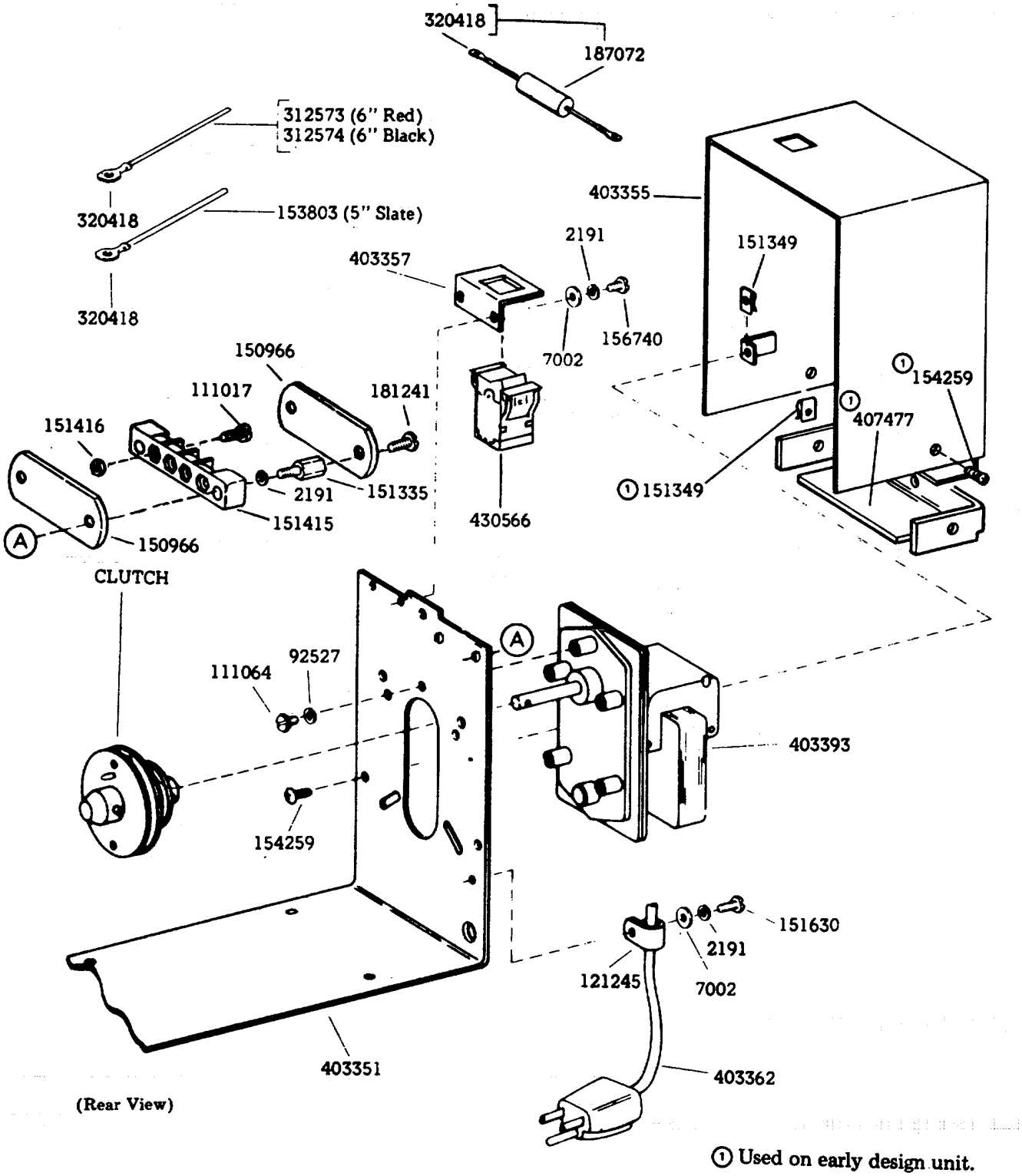


Late Design

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

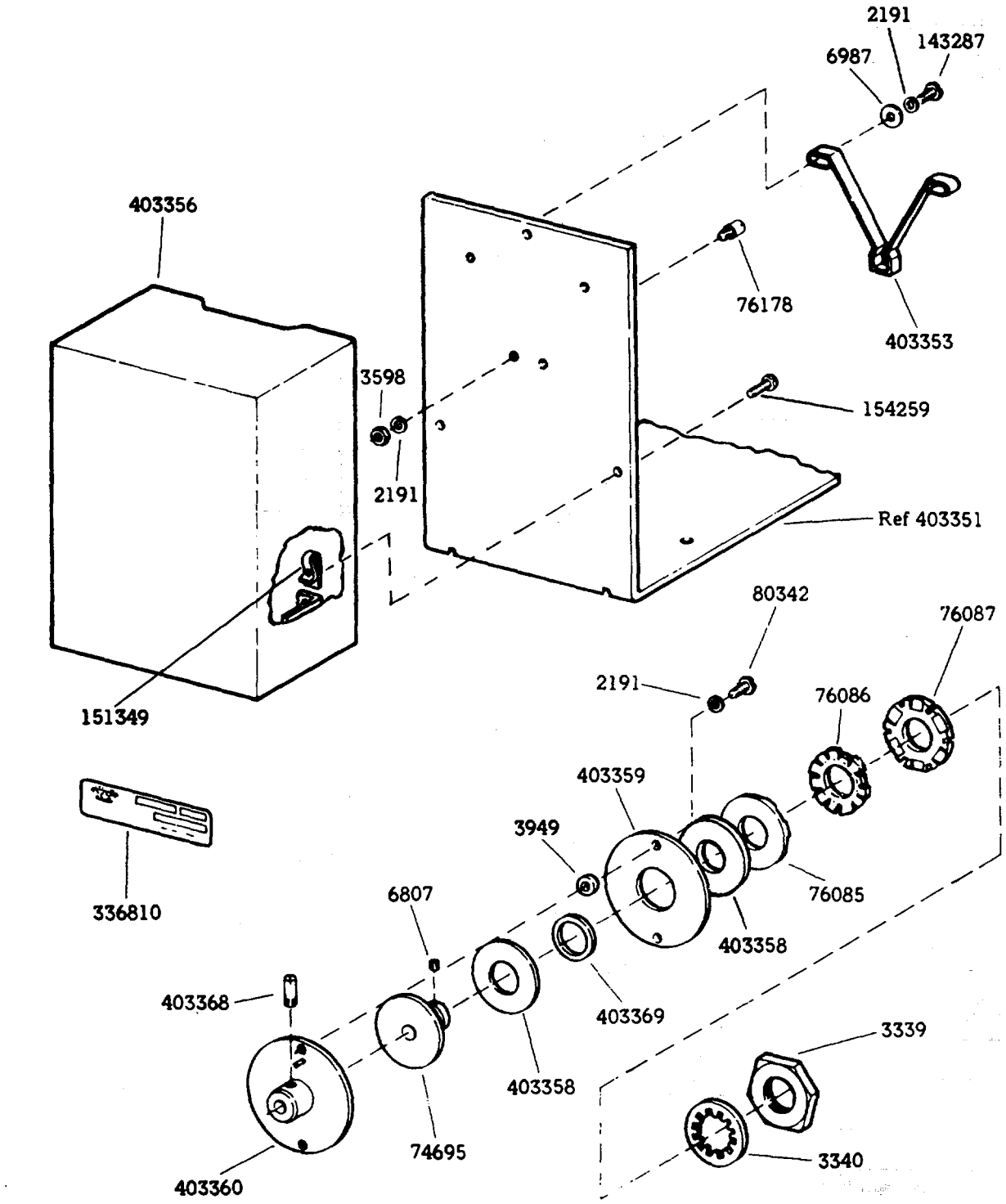
3. PARTS (Cont)

Motor -- Paper Winder



① Used on early design unit.

Clutch Mechanism -- Paper Winder

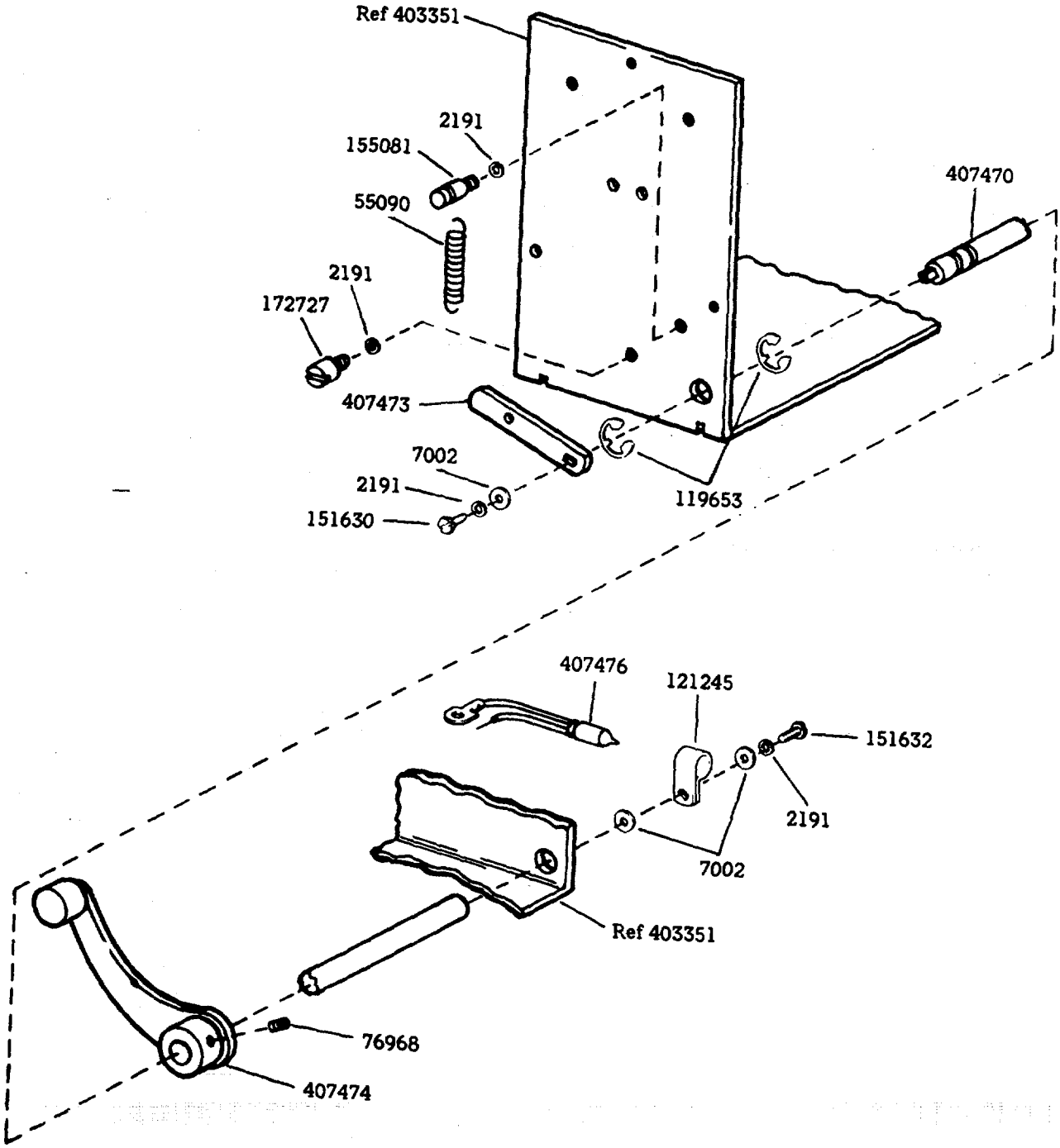


(Rear View)

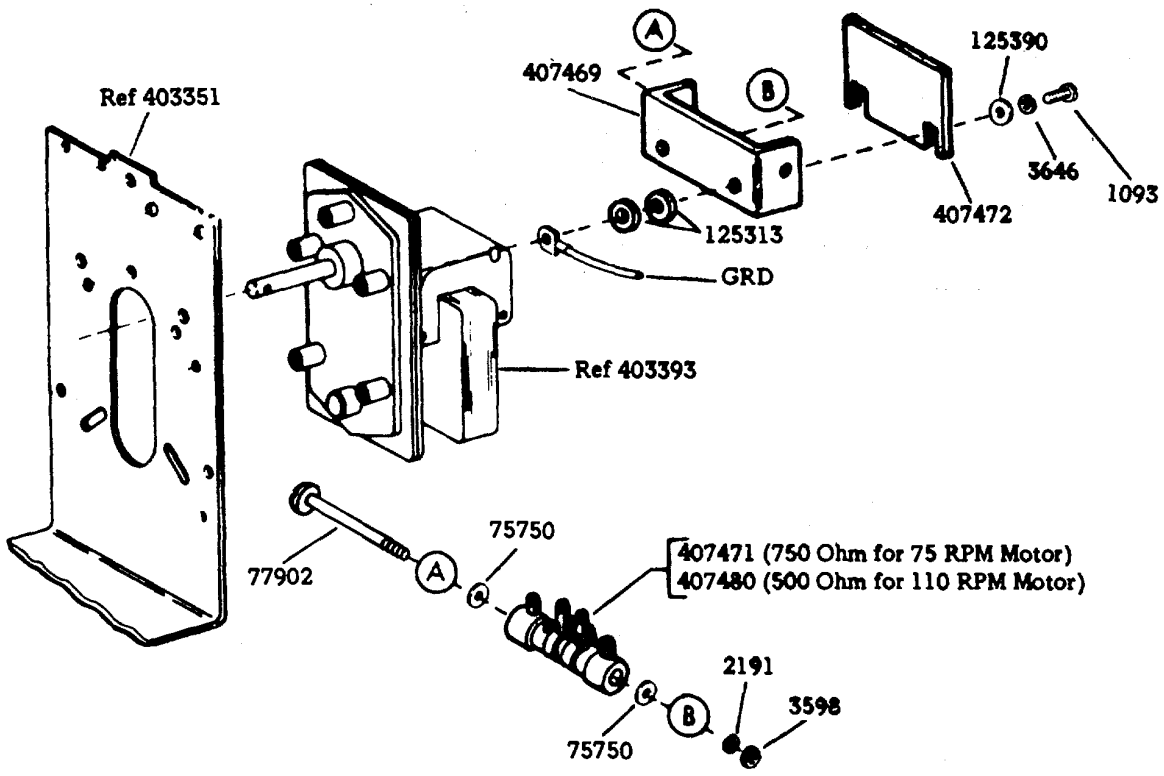
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

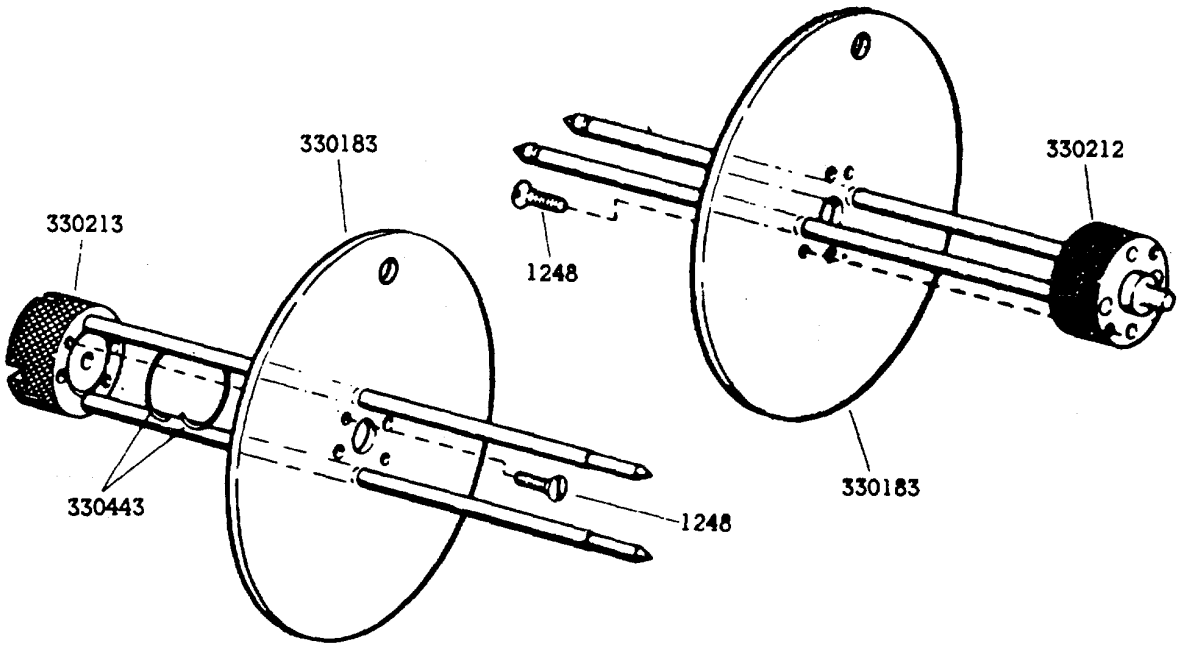
Paper Sensing Arm Mechanism -- Paper Winder



Variable Resistor -- Paper Winder



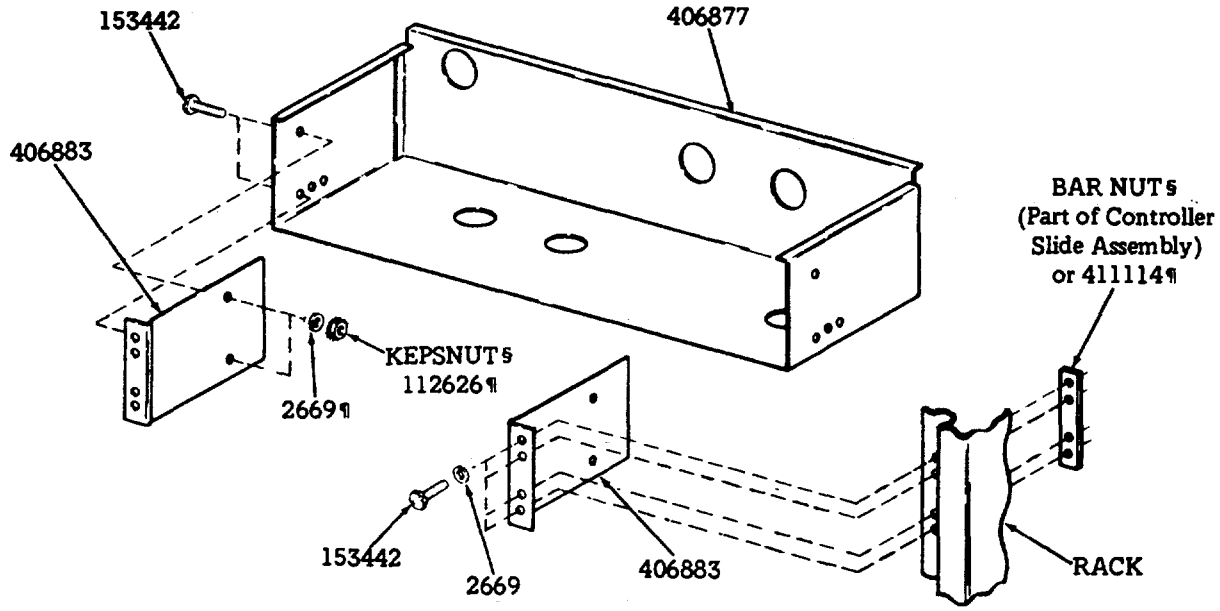
Paper Spool -- Paper Winder



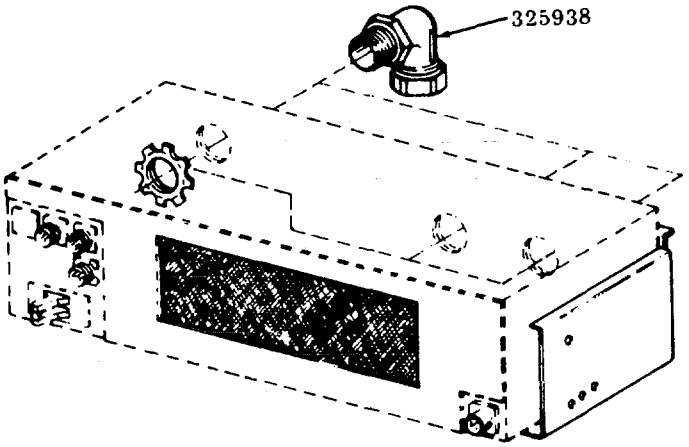
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

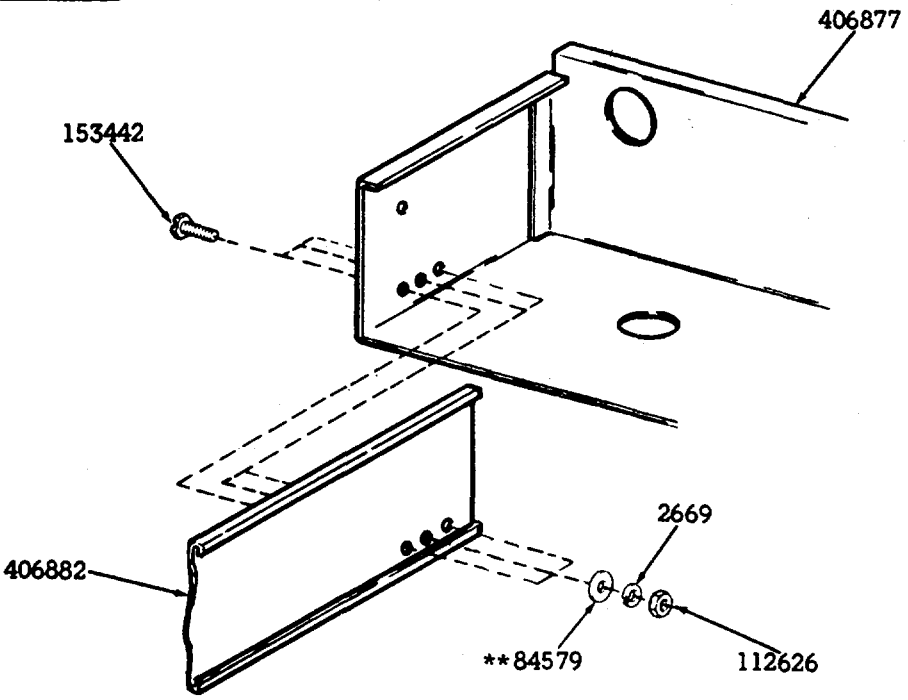
406863 Modification Kit (Interface) Front Accessibility 19 Inch Rack (Part of 406862 Modification Kit Required) and 411097 Modification Kit



§ Hardware used for the 406863 modification kit.
¶ Hardware used for the 411097 modification kit.



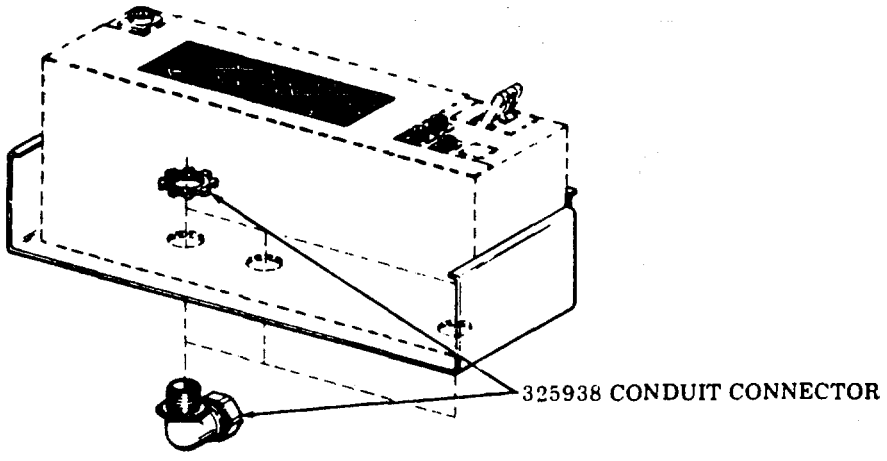
Rear Accessibility (See Note below)



Left Side Shown

**Front hole on each slide assembly only.

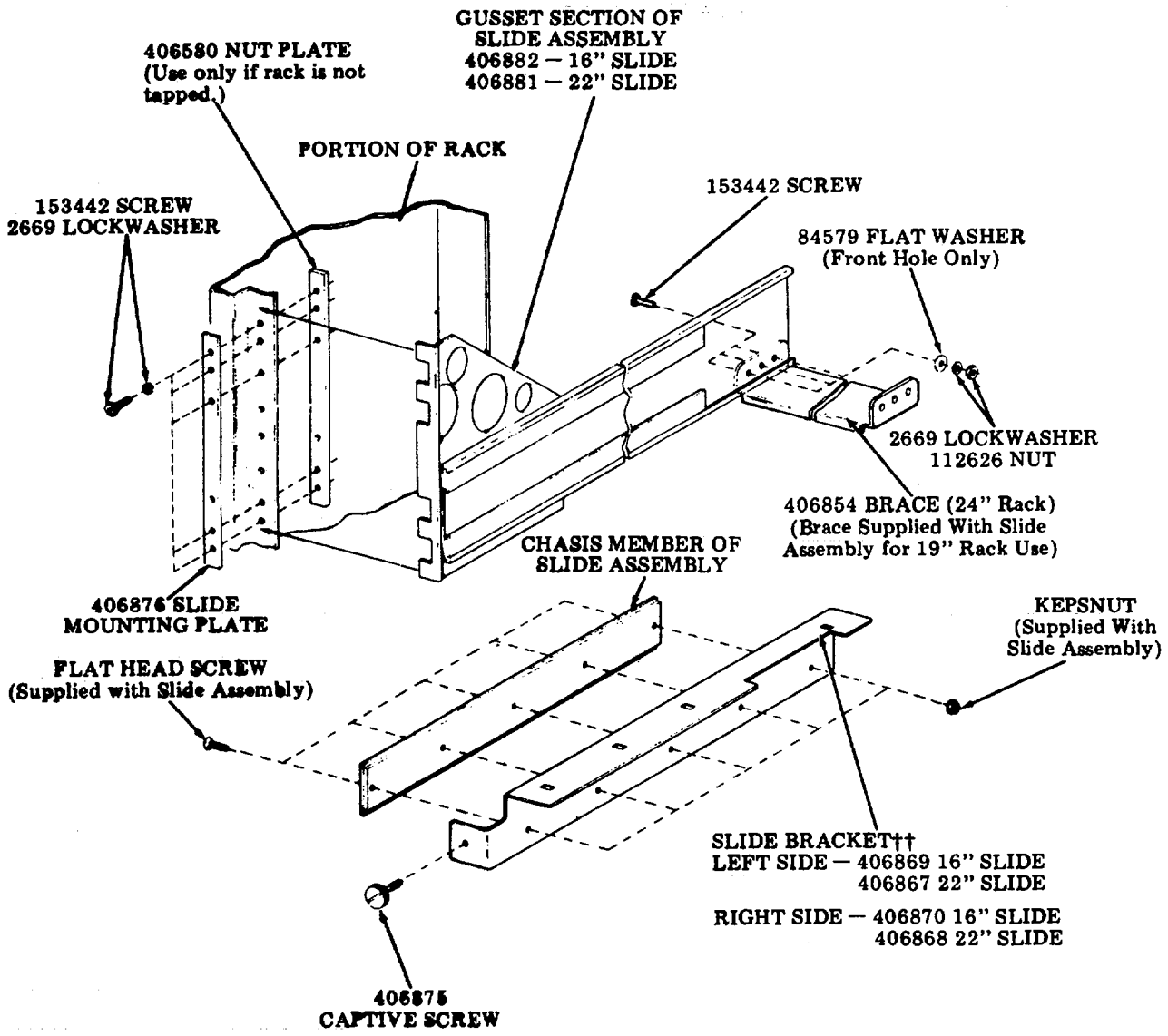
Note: When rear accessibility for the interface assembly is desired, the inter- face pan is mounted on the rear of the controller slide assemblies and replaces the rear slide brace.



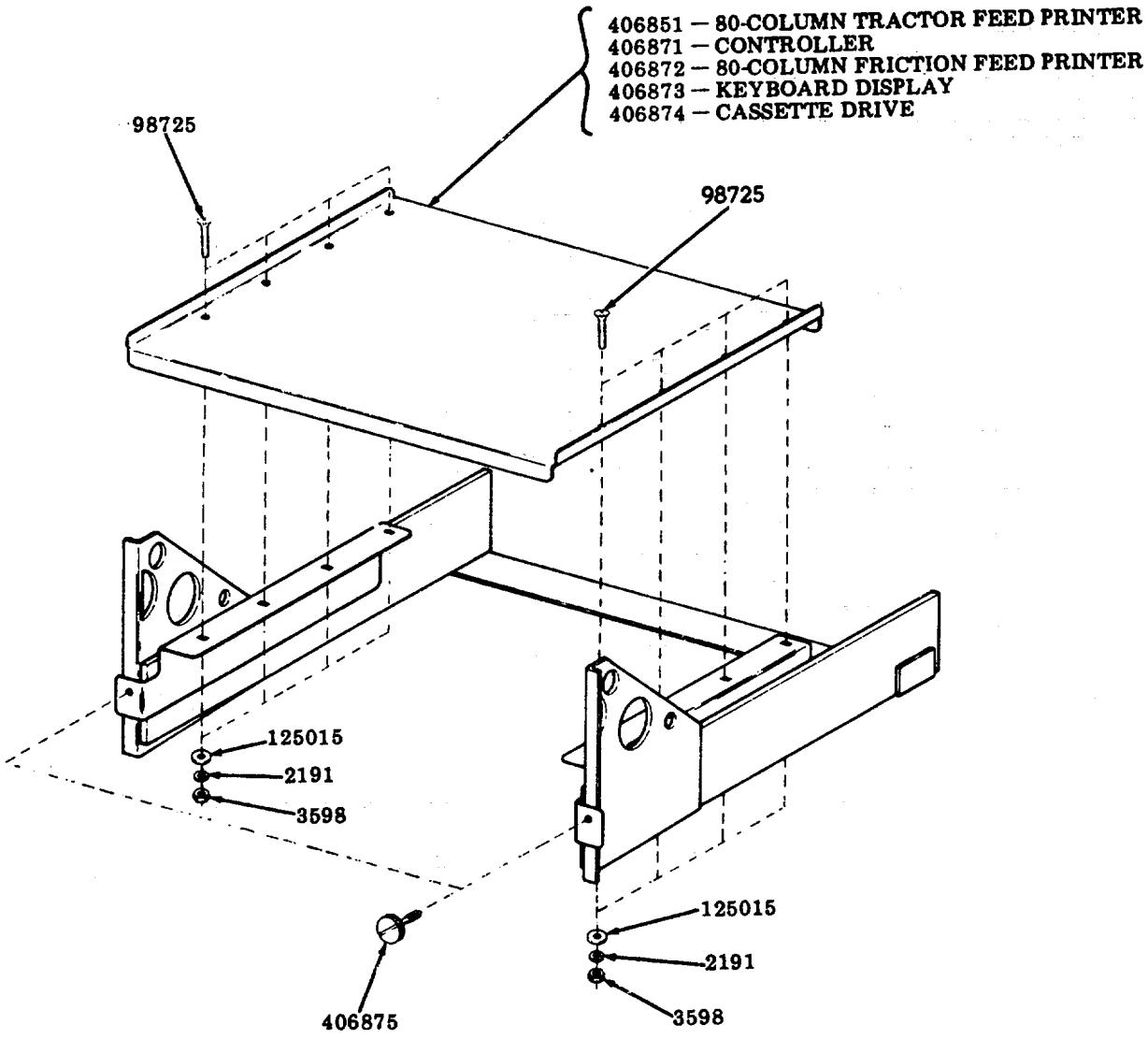
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

406862, 406864, 406865, or 406866 Modification Kits



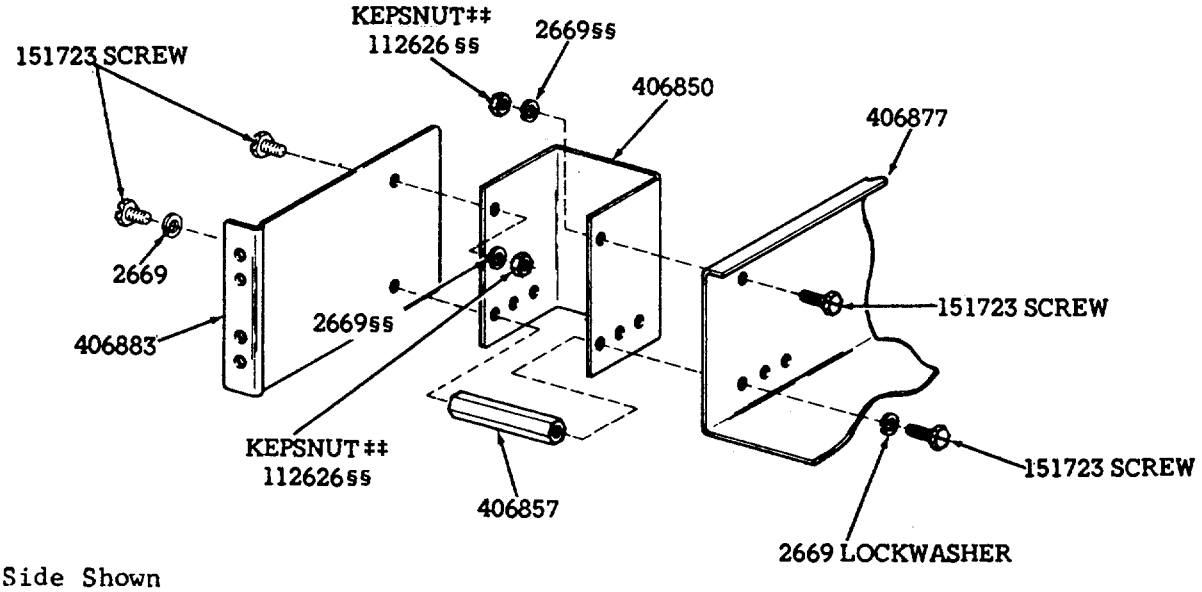
††Mount the slide bracket using flat head screws and Kepsnuts supplied with slide assembly. Use four screws and nuts for 16 inch slides; five screws and nuts for 22 inch slides.


406851 — 80-COLUMN TRACTOR FEED PRINTER
406871 — CONTROLLER
406872 — 80-COLUMN FRICTION FEED PRINTER
406873 — KEYBOARD DISPLAY
406874 — CASSETTE DRIVE
98725
98725
125015
2191
3598
125015
2191
3598
406875

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

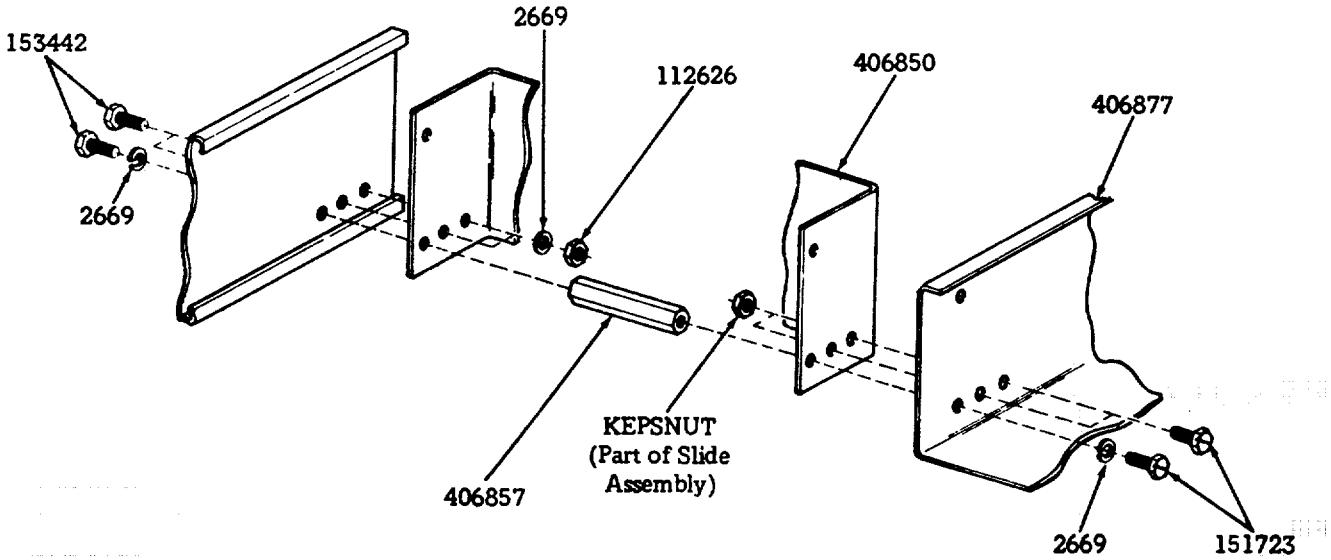
24 Inch Rack Front Accessibility for 406863 Modification Kits Part of 406859 Modification Kit Required (For 411097 Modification Kits the 411098 Modification Kit is Required)



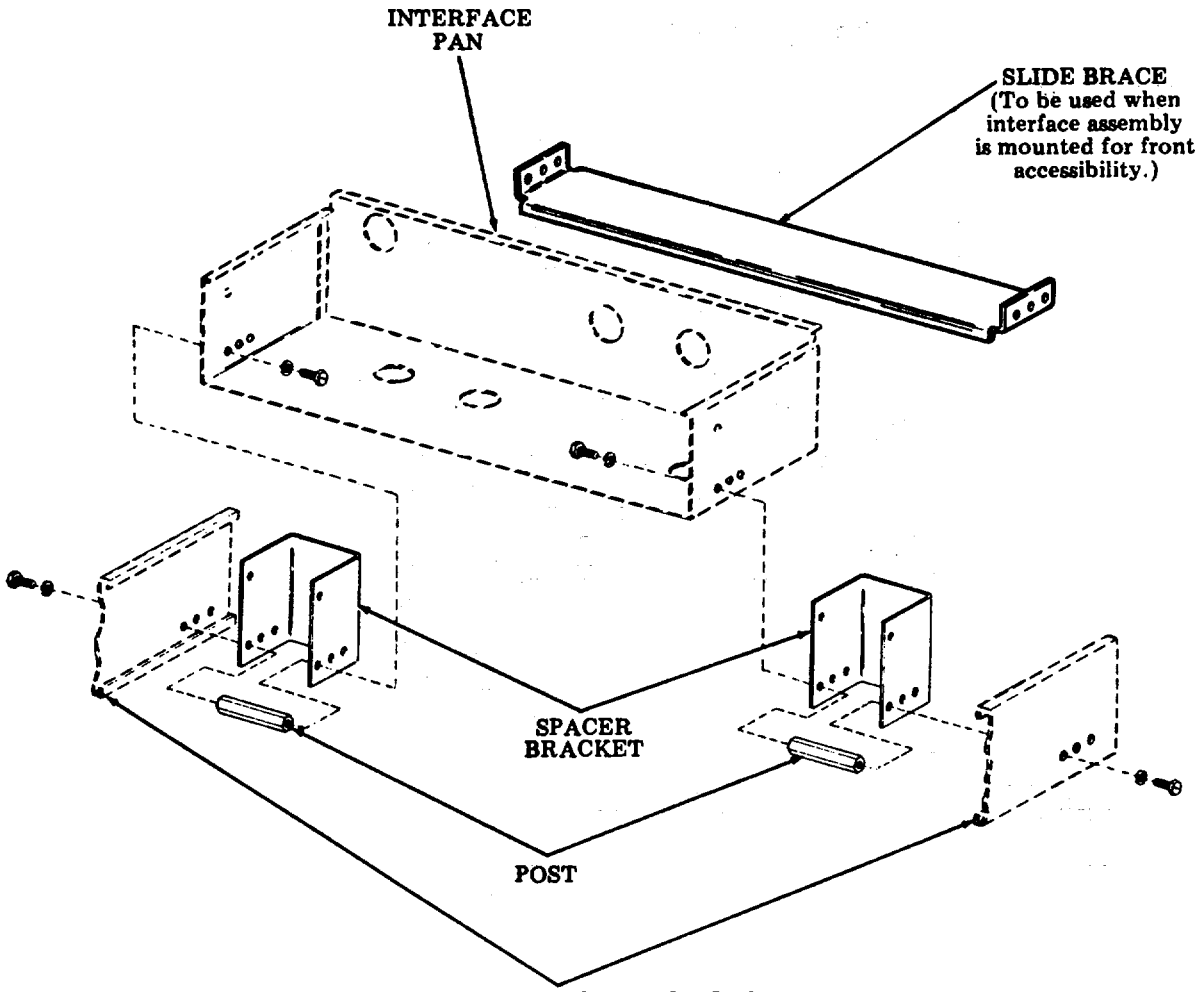
Left Side Shown

‡‡ Mounting hardware for 406863 modification kit, part of 406859 modification kit required.
§§ Mounting hardware for 411097 modification kit using 411098 extender modification kit.

24 Inch Rack Rear Accessibility (Part of 406859 Modification Kit Required)



Left Side Shown

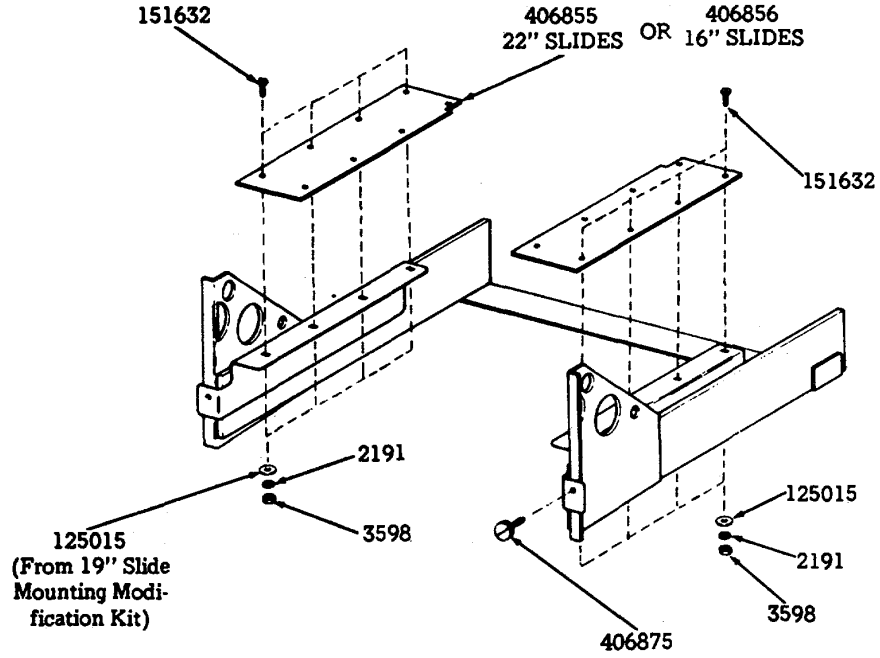


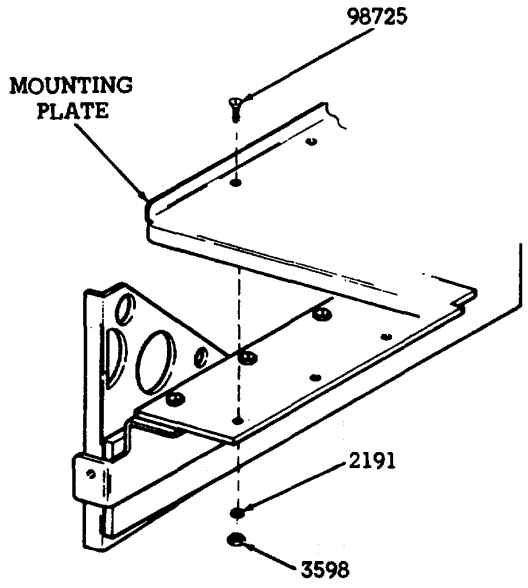
Stationary member of slide assembly or mounting bracket for interface assembly.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

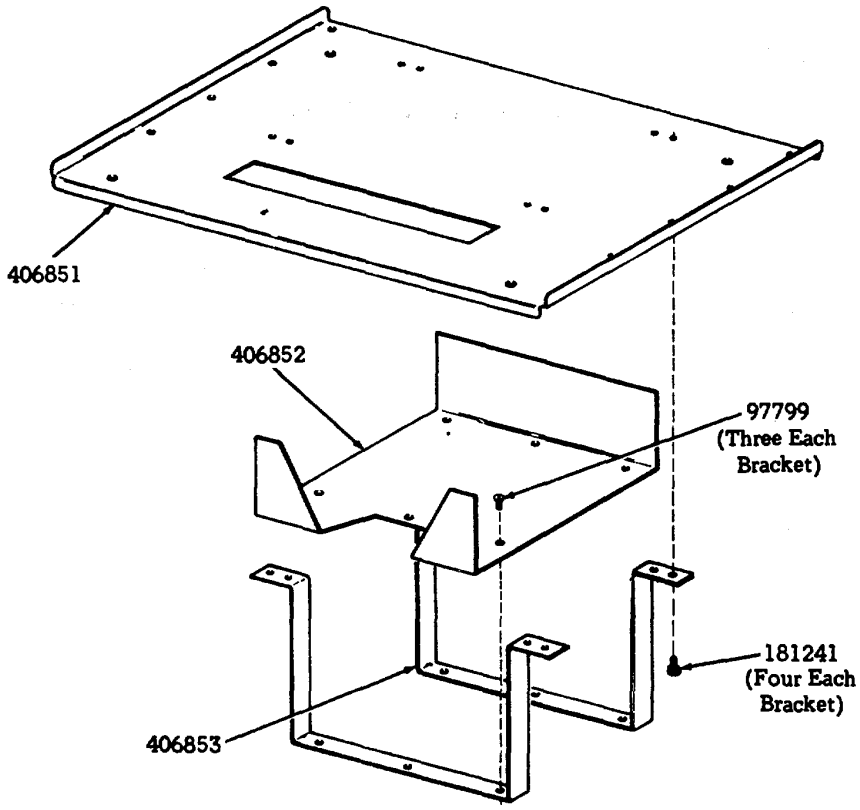
3. PARTS (Cont)

406859, 406860 and 406861 Modification Kits (19 to 24 Inch Extender Modification)

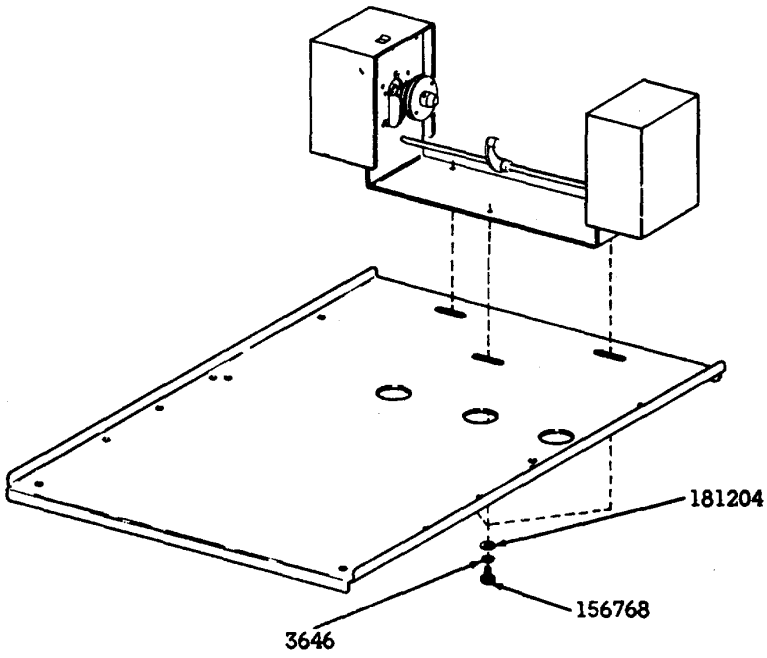




406858 Modification Kit (To Mount an 80-Column Tractor Feed Printer in a 24 Inch Rack)



Mount paper winder to printer mounting plate (if supplied with terminal).

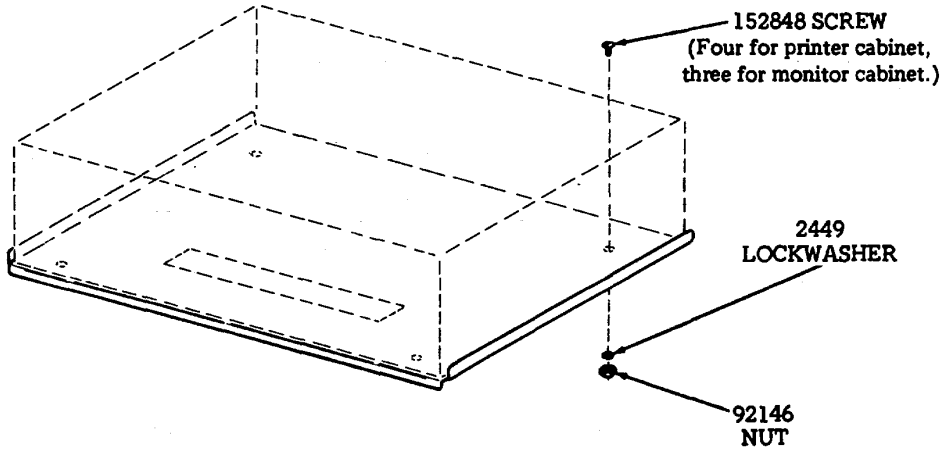


F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

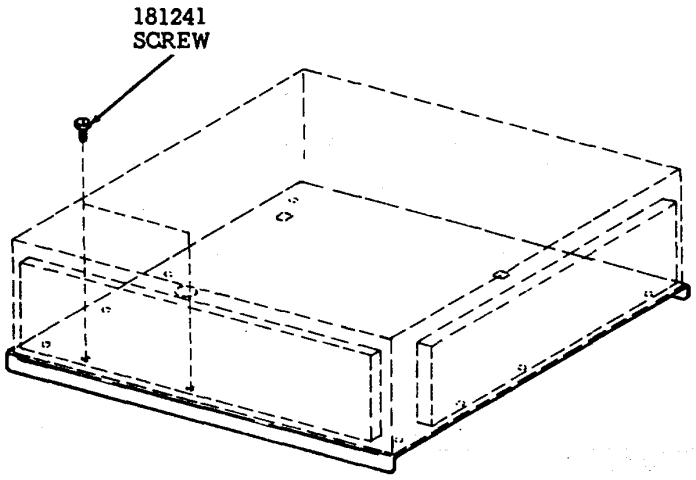
3. PARTS (Cont)

Installation of Units on Mounting Plates

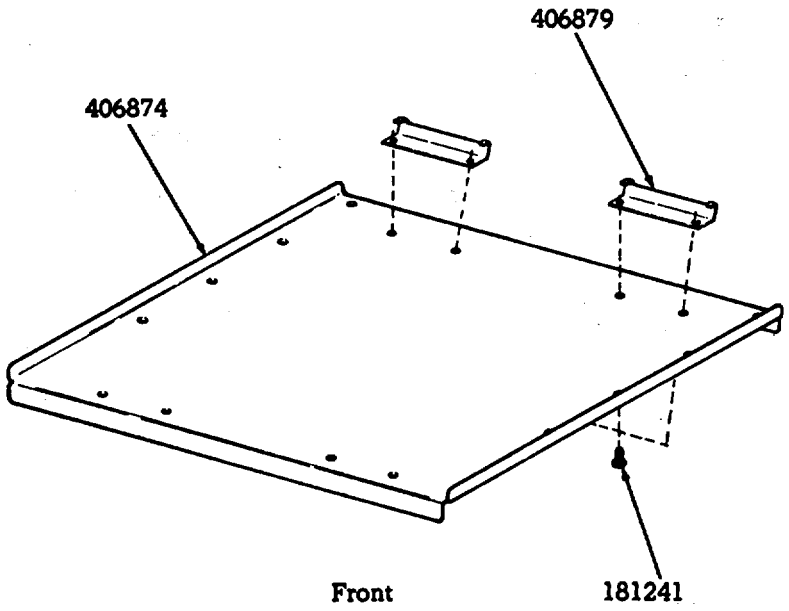
Monitor and Printer Cabinets

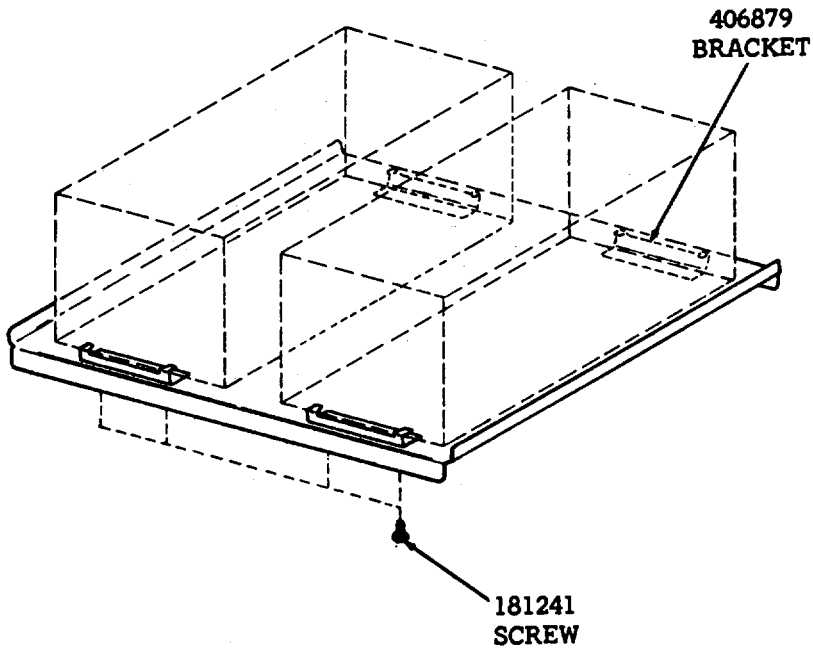


Controller



Cassette Drives

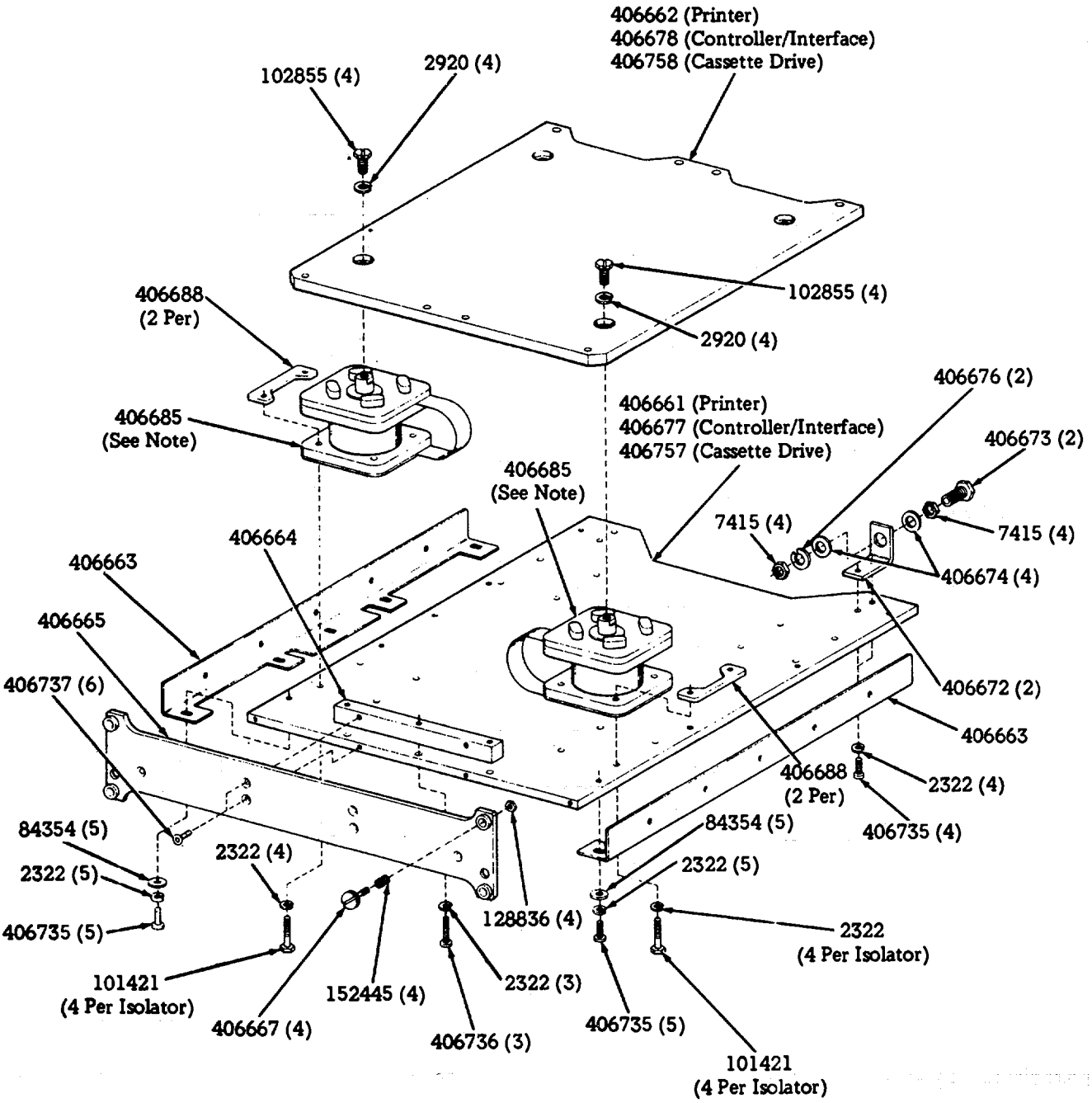




F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

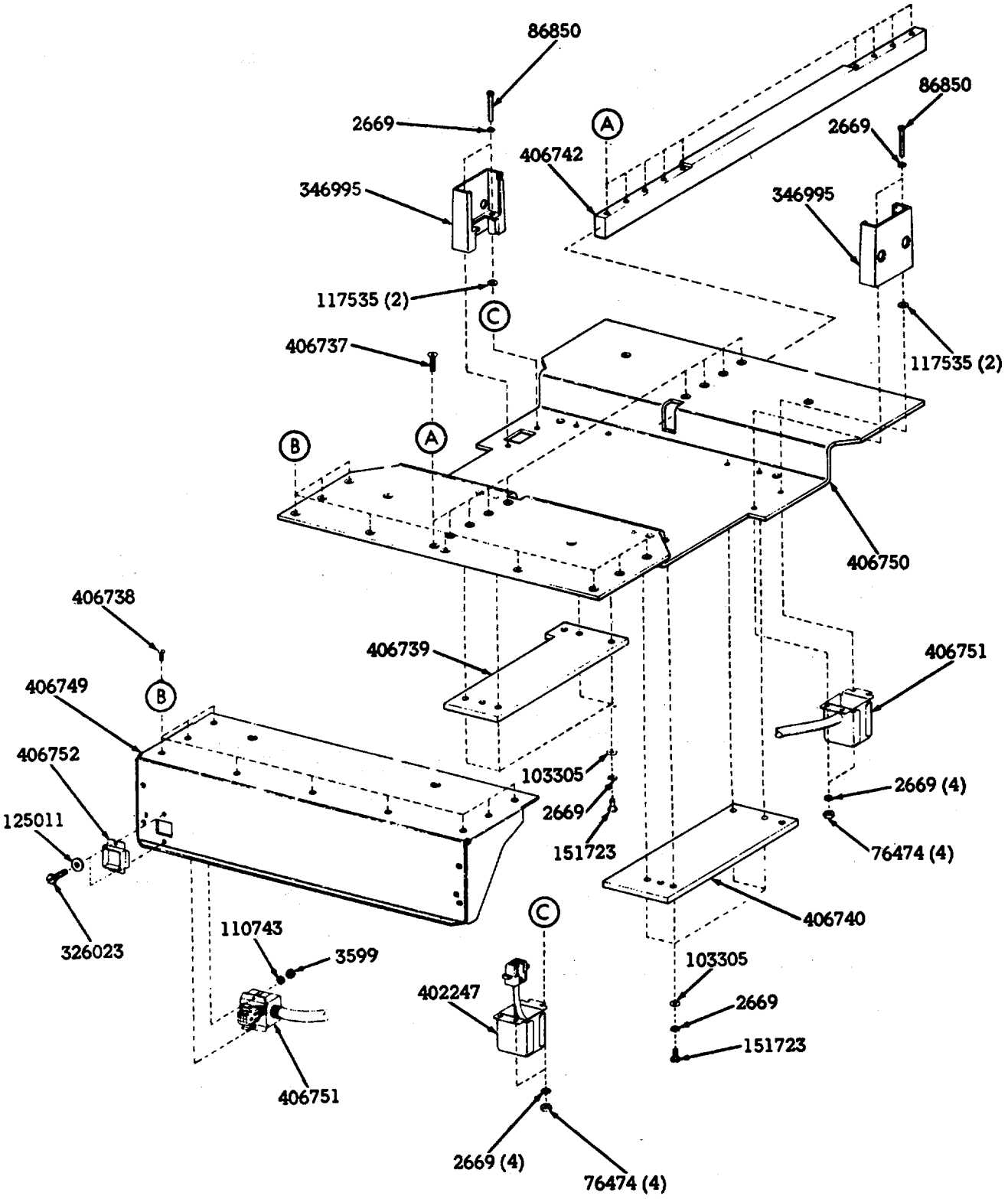
3. PARTS (Cont)

406694, 406719 or 406759 Isolator Assemblies, Part of 406650, 406660, 406670, 406680 or 406760 Modification Kits



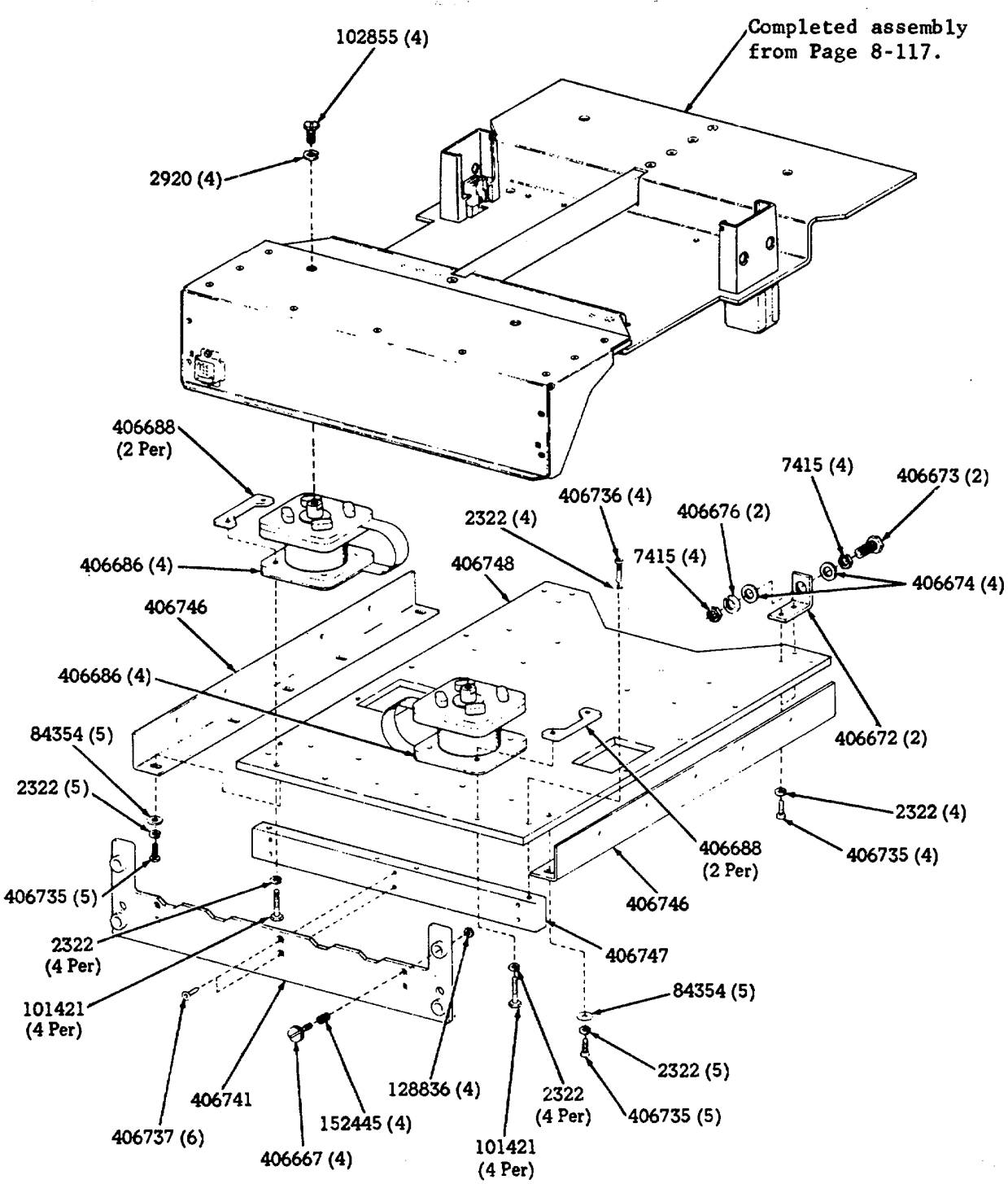
NOTE: In the 406719 assembly for the printer, the two isolator assemblies in the front are 406686 instead of 406685. In all other assemblies, all four isolator assemblies are 406685.

406709 Assembly, Part of 406650, 406660, 406670, 406680 or 406760 Modification Kits

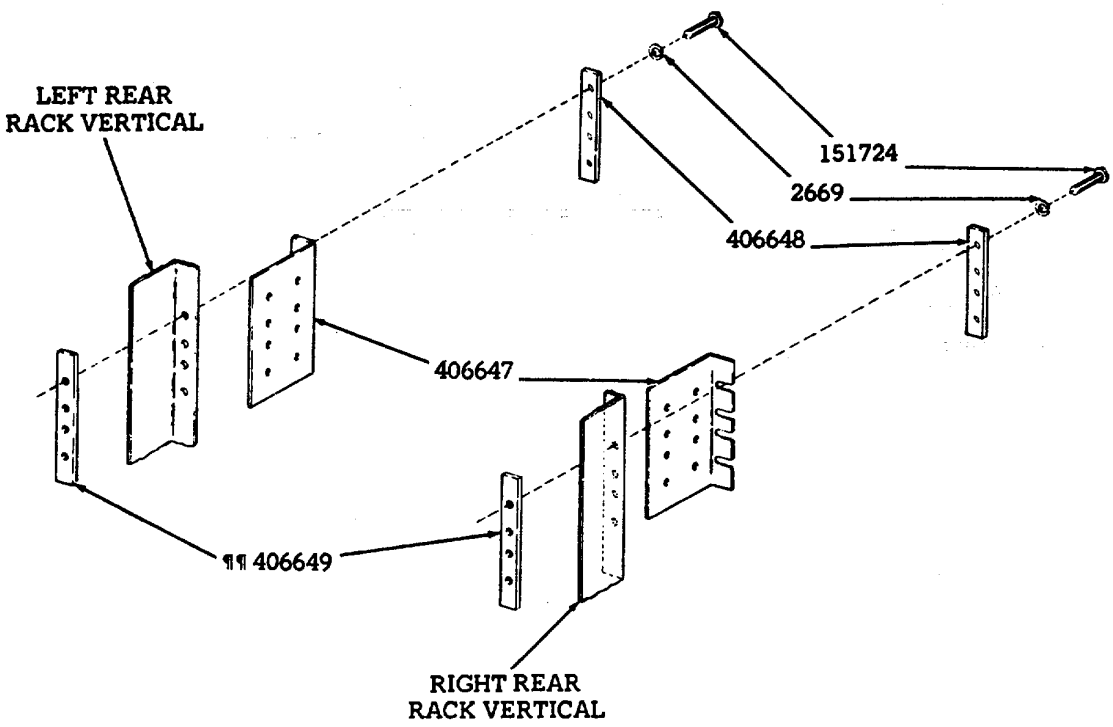


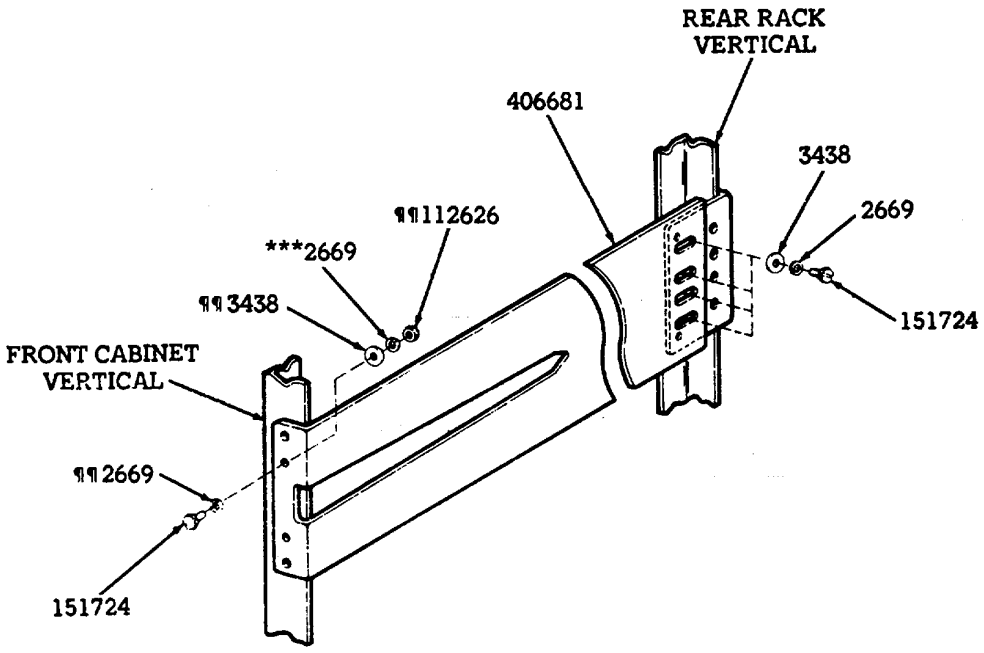
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS, 406709 Assembly, Part of 406650, 406660, 406670, 406680 or 406760 Modification Kits (Cont)



406680 Modification Kit



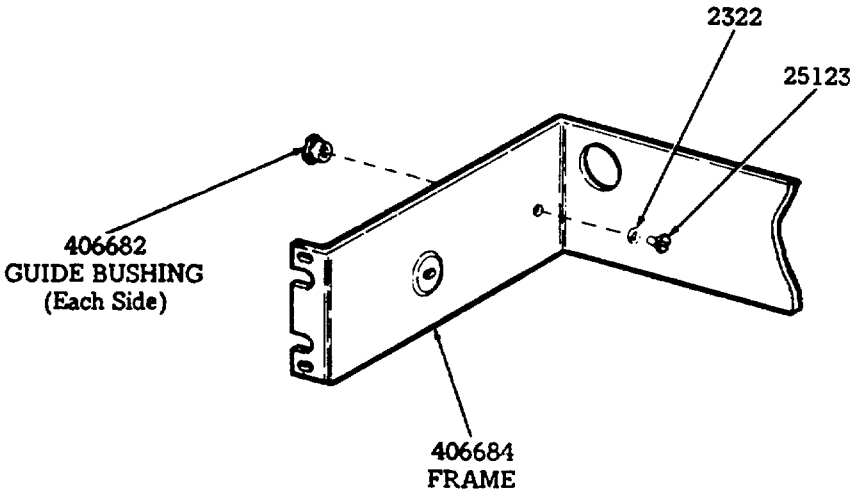


Left Side Shown

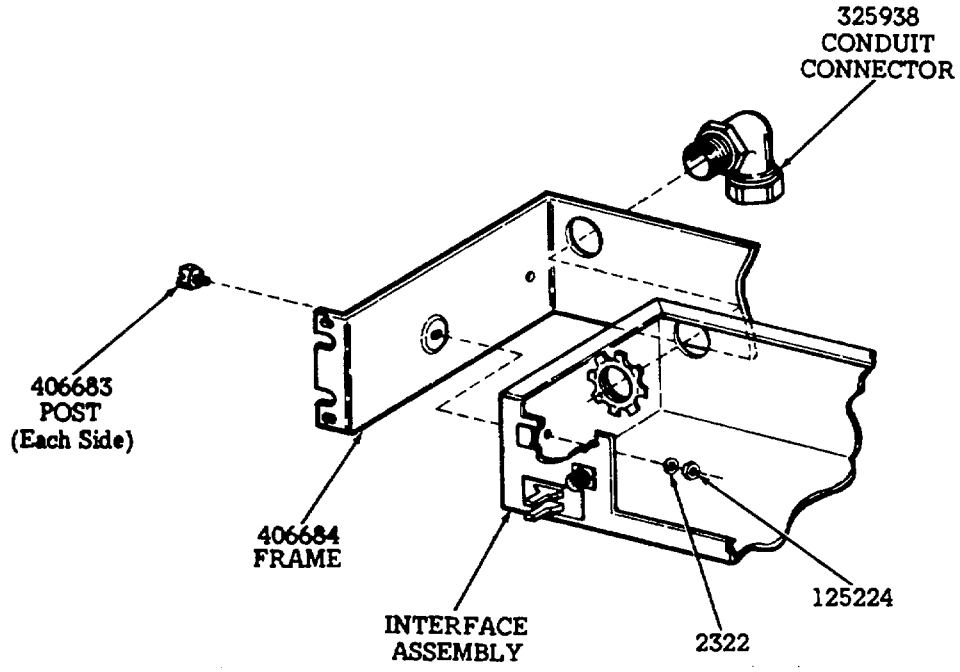
¶¶1 Use only if rack is not tapped.
*** Same lockwasher but at a different location if rack is not tapped.

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

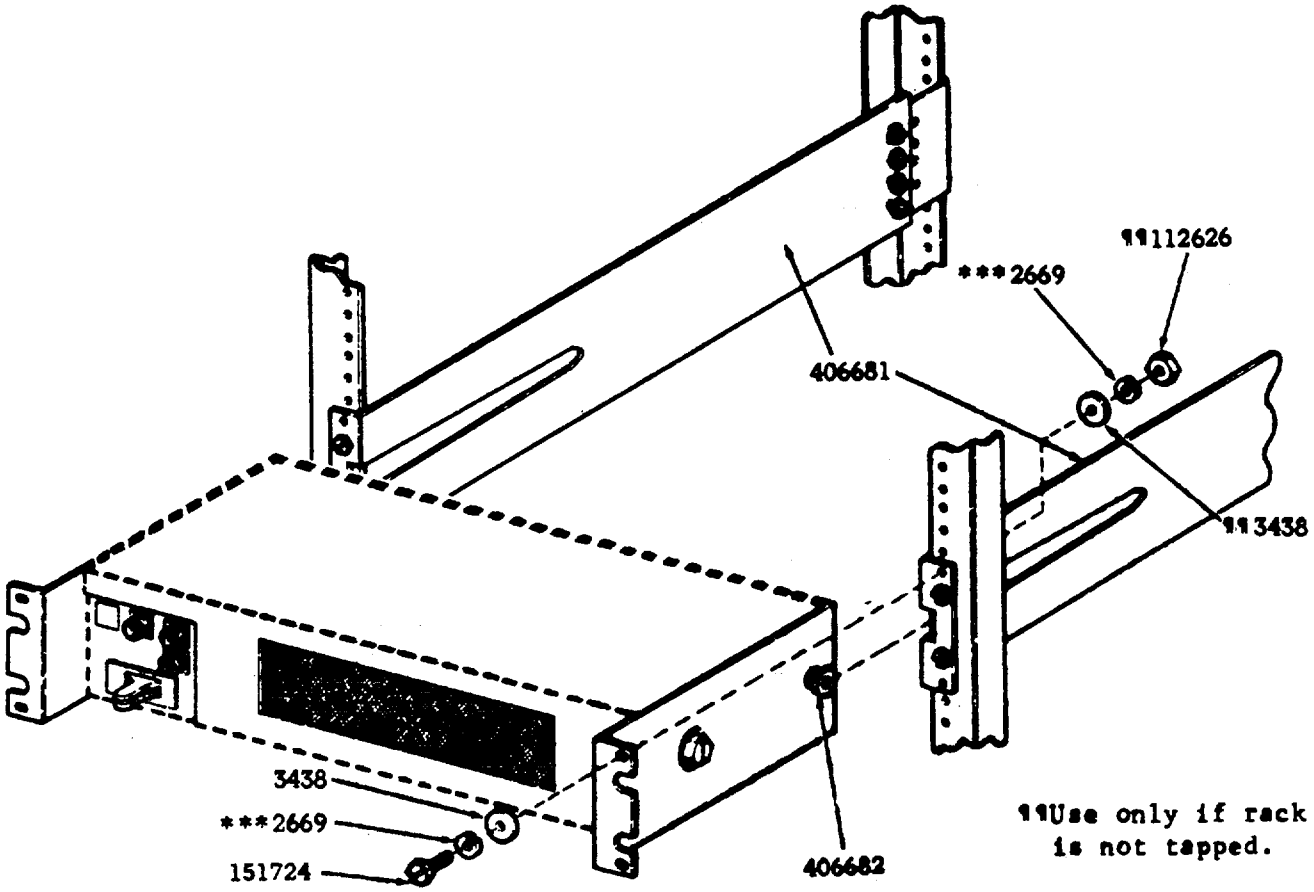
3. PARTS, 406680 Modification Kit (Cont)



Left Side Shown



Left Side Shown

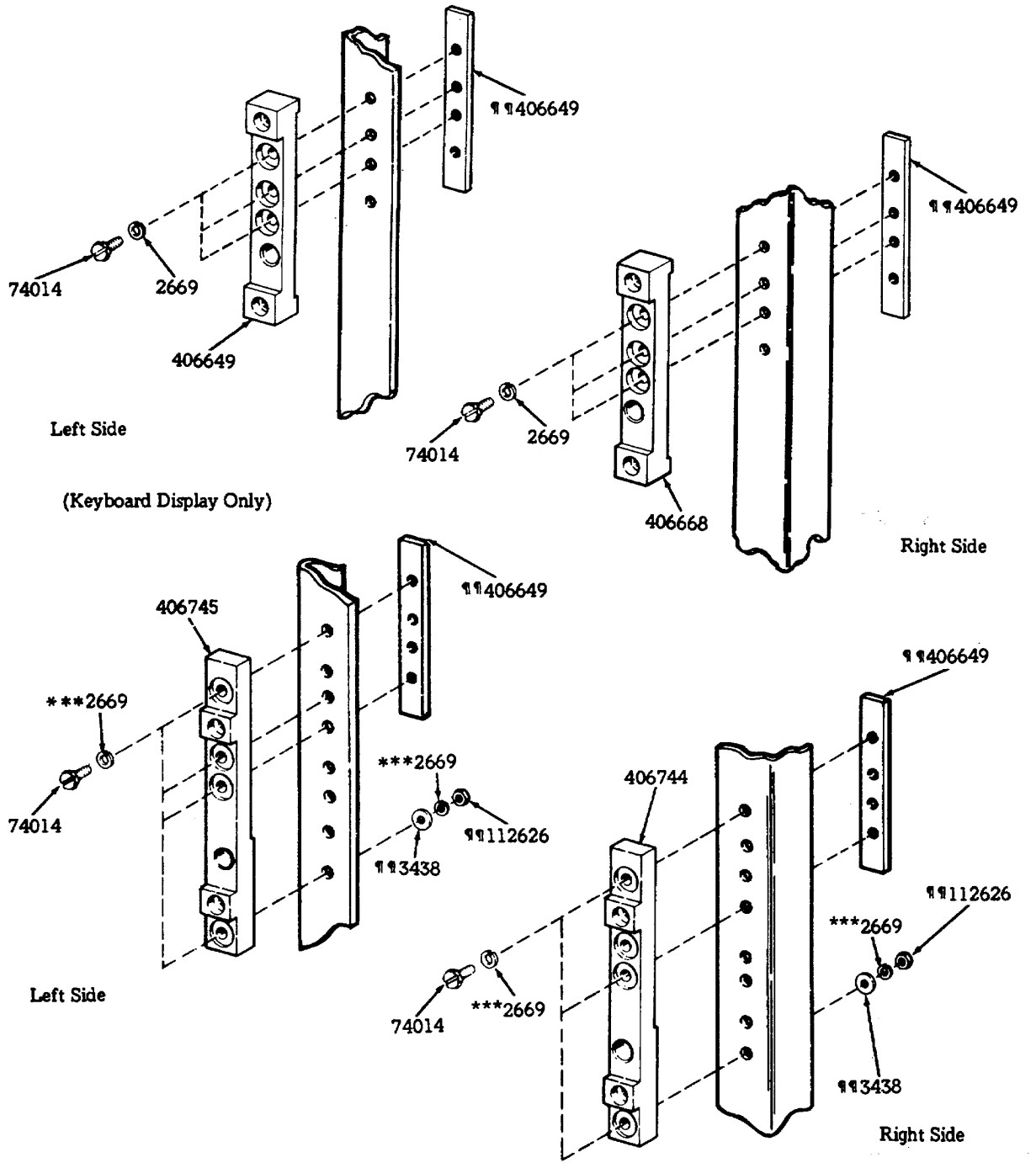


***Same lockwasher but at a different location if rack is not tapped.

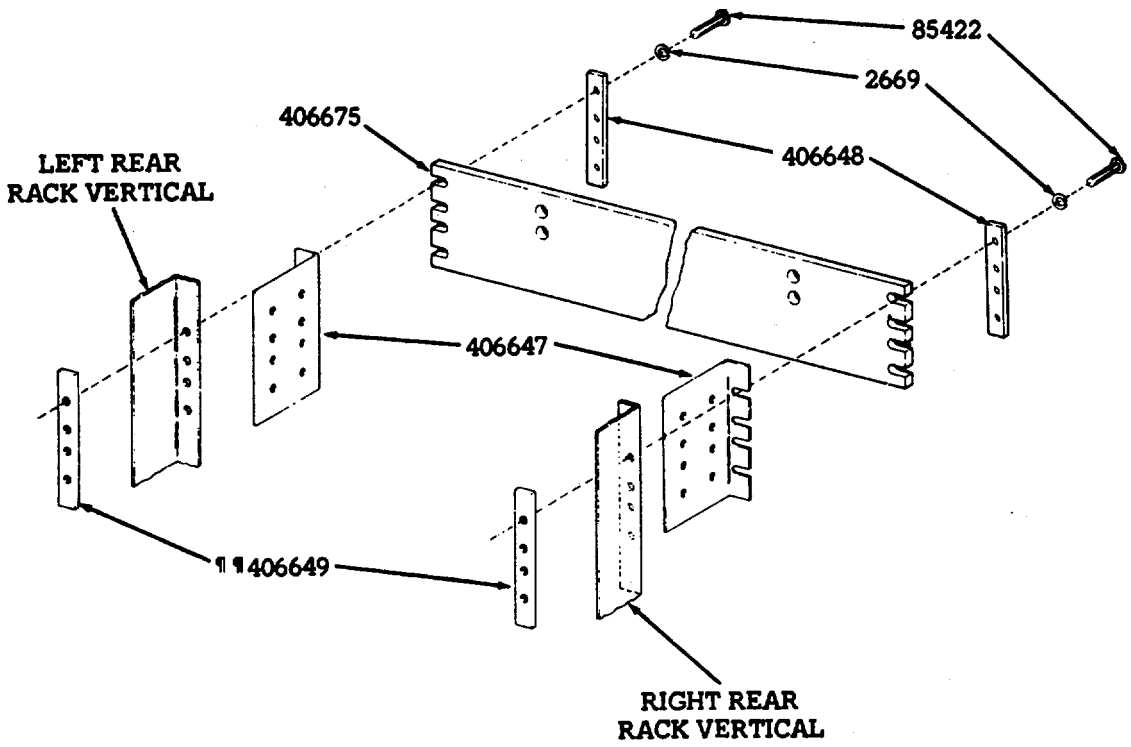
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

406650, 406660, 406670, 406760 Modification Kits



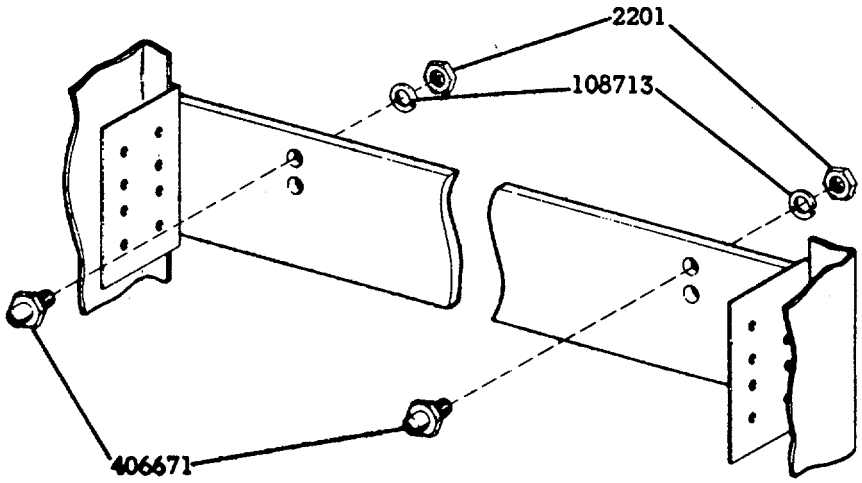
¶¶Use only if rack is not tapped.
***Same lockwasher but at a different location if rack is not tapped.



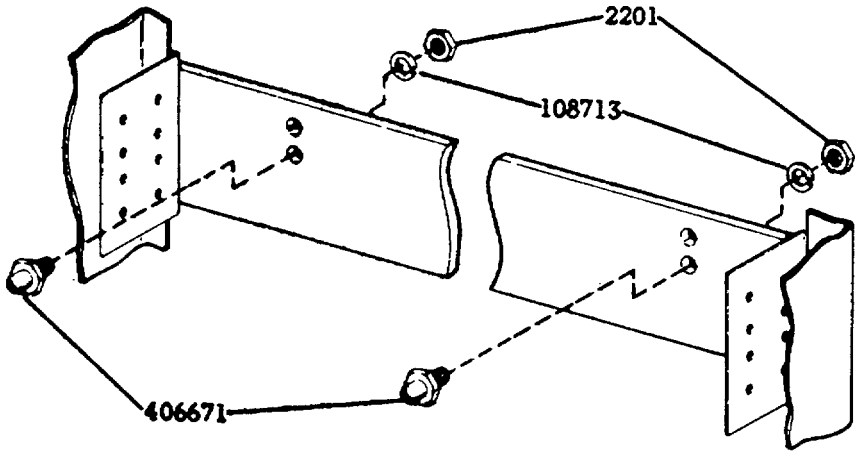
¶¶ Use only if rack is not tapped.

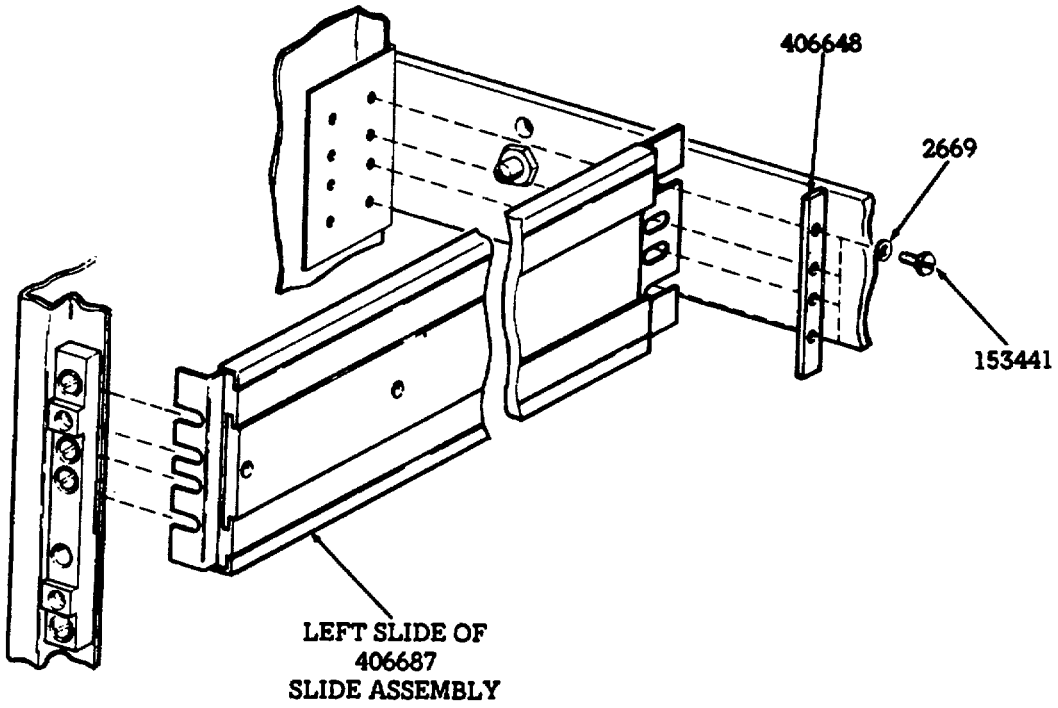
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS, 406650t 406660, 406670, 406760 Modification Kits (Cont)



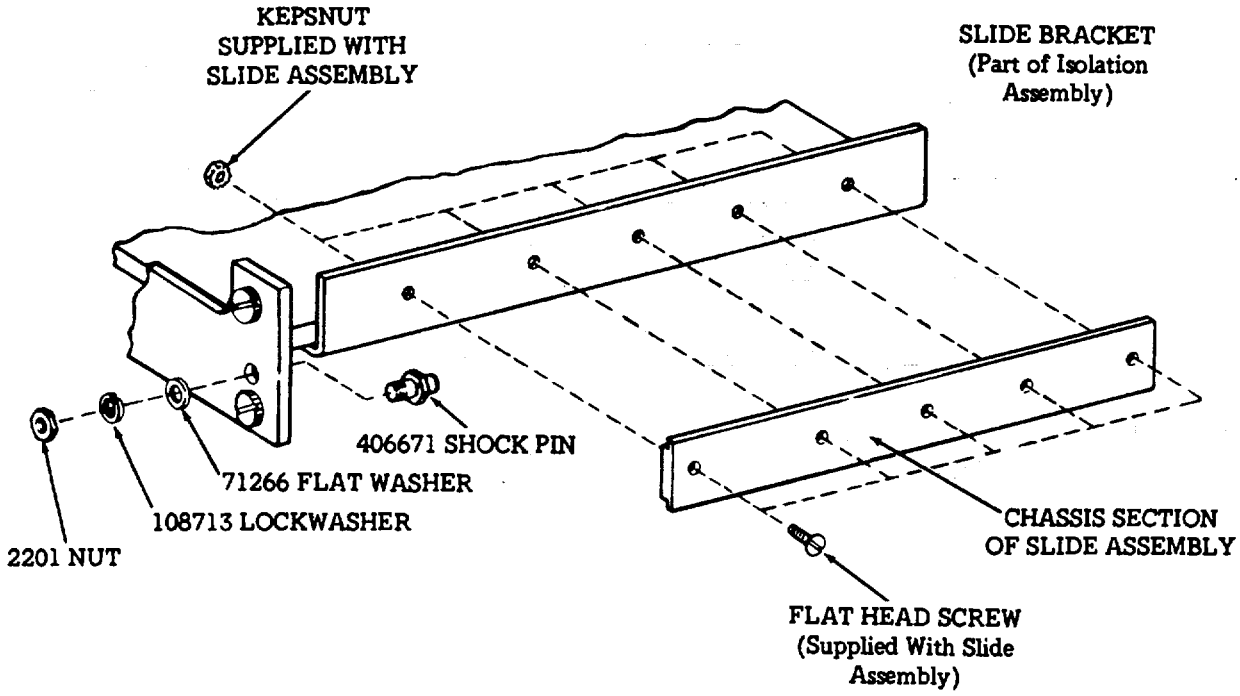
(Keyboard Display Only)



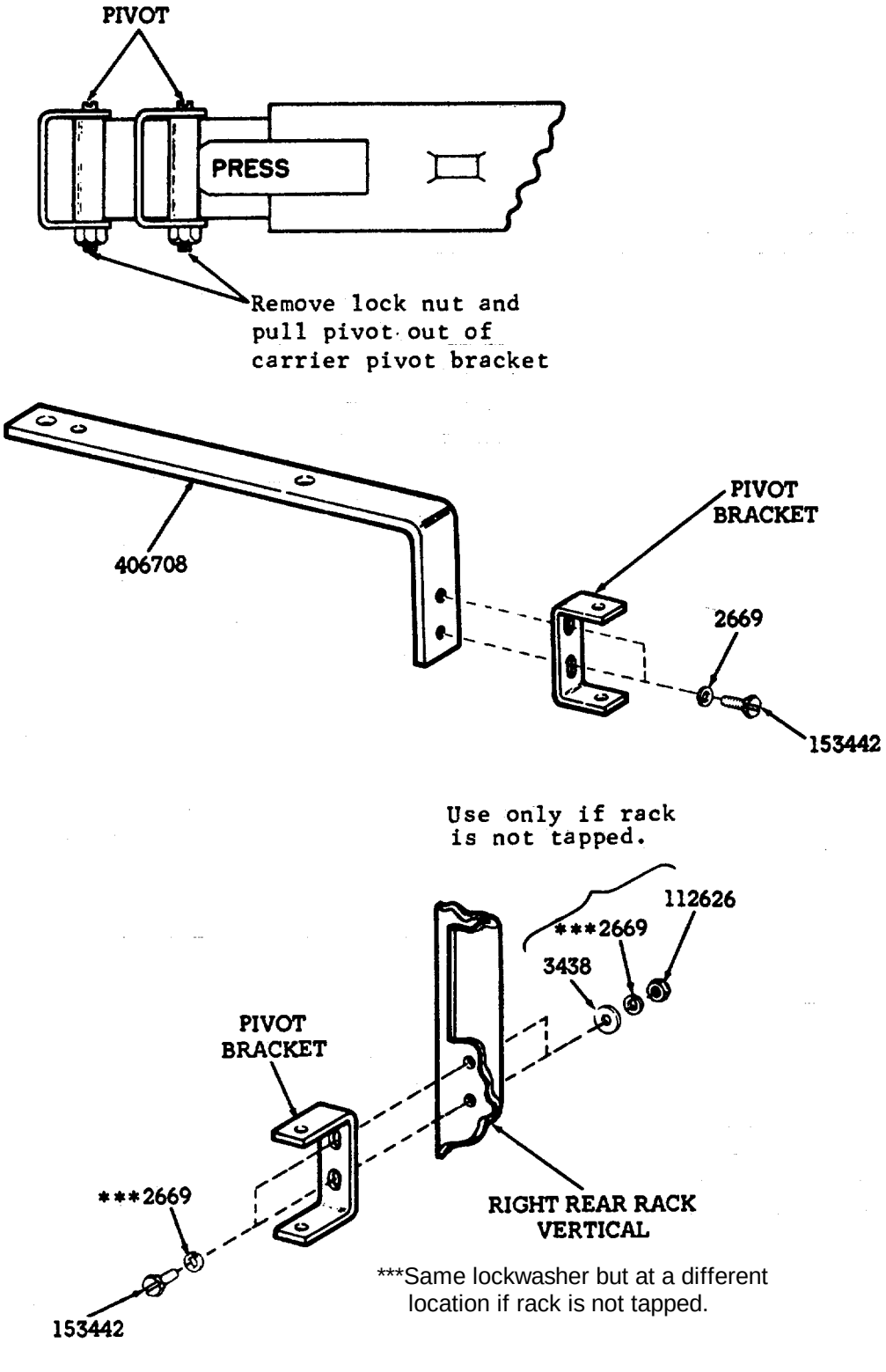

406648
2669
153441
LEFT SLIDE OF
406687
SLIDE ASSEMBLY

F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS, 406650, 406660, 406670, 406760 Modification Kits (Cont)



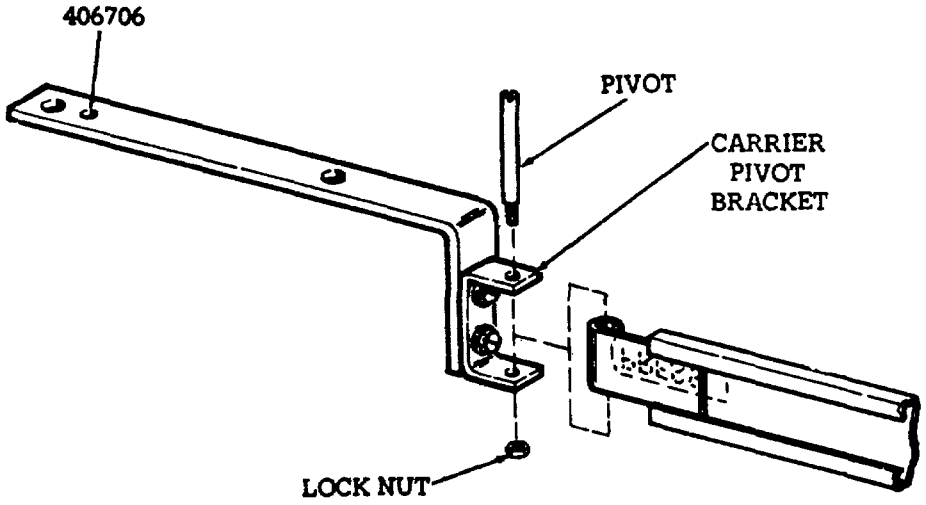
(Right Side Shown)

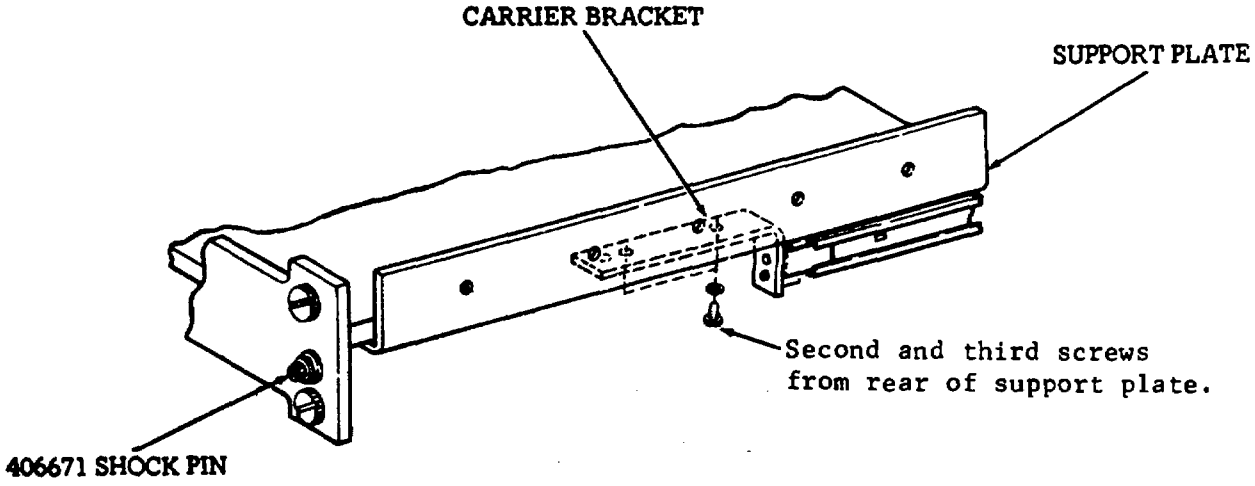


***Same lockwasher but at a different location if rack is not tapped.

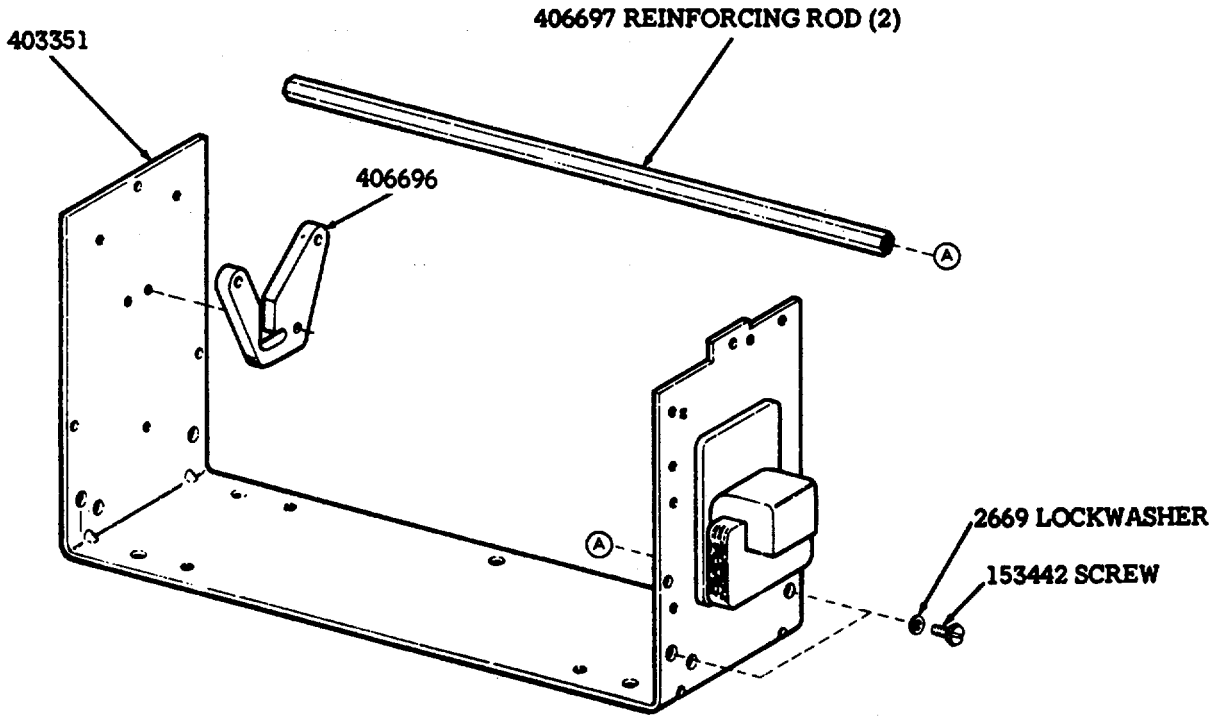
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS, 406650, 406660, 406670, 406760 Modification Kits (Cont)



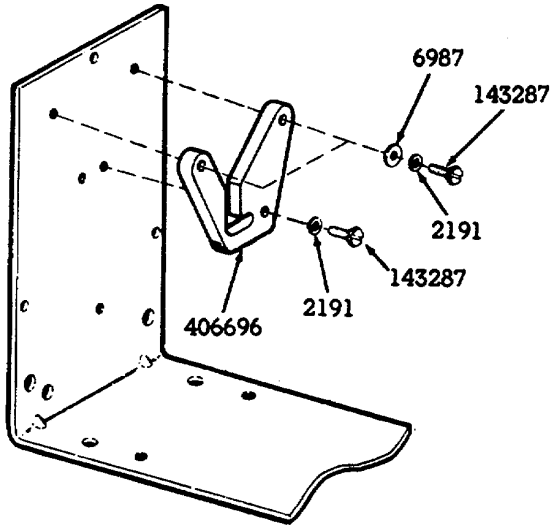


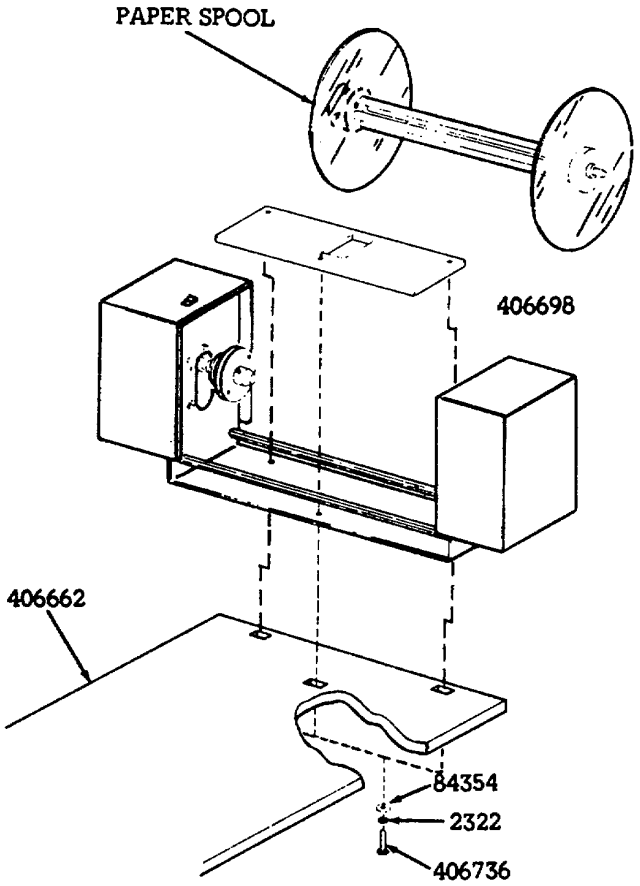
406695 Modification Kit



F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS, 406650, 406660, 406670, 406760 Modification Kits (Cont)

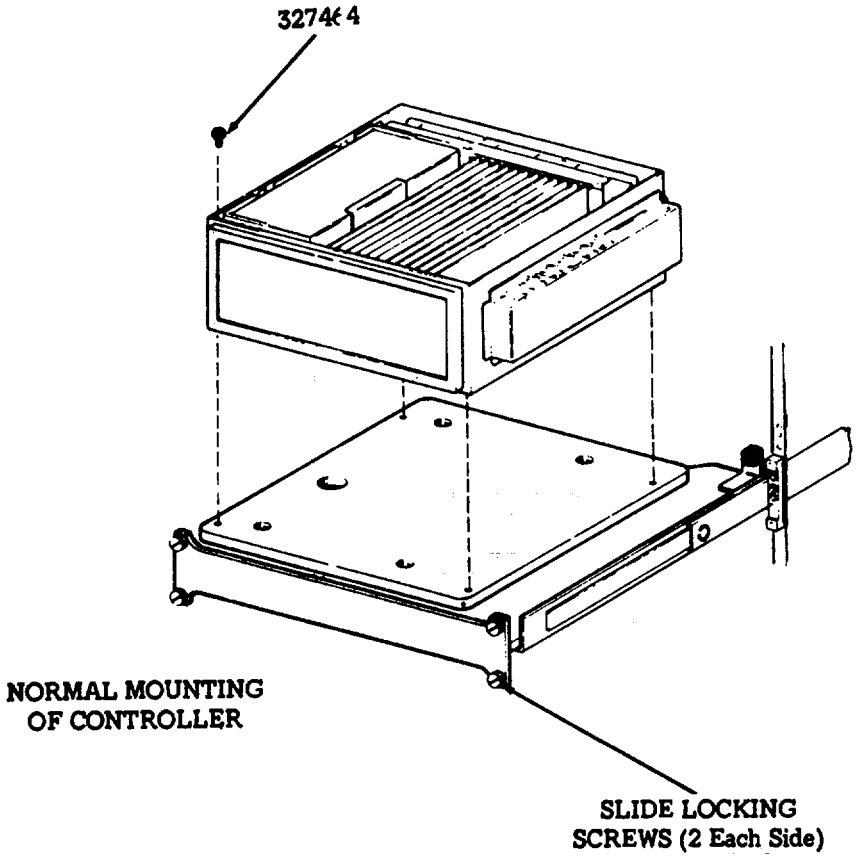




8-130

Mounting of Assemblies Into Rack

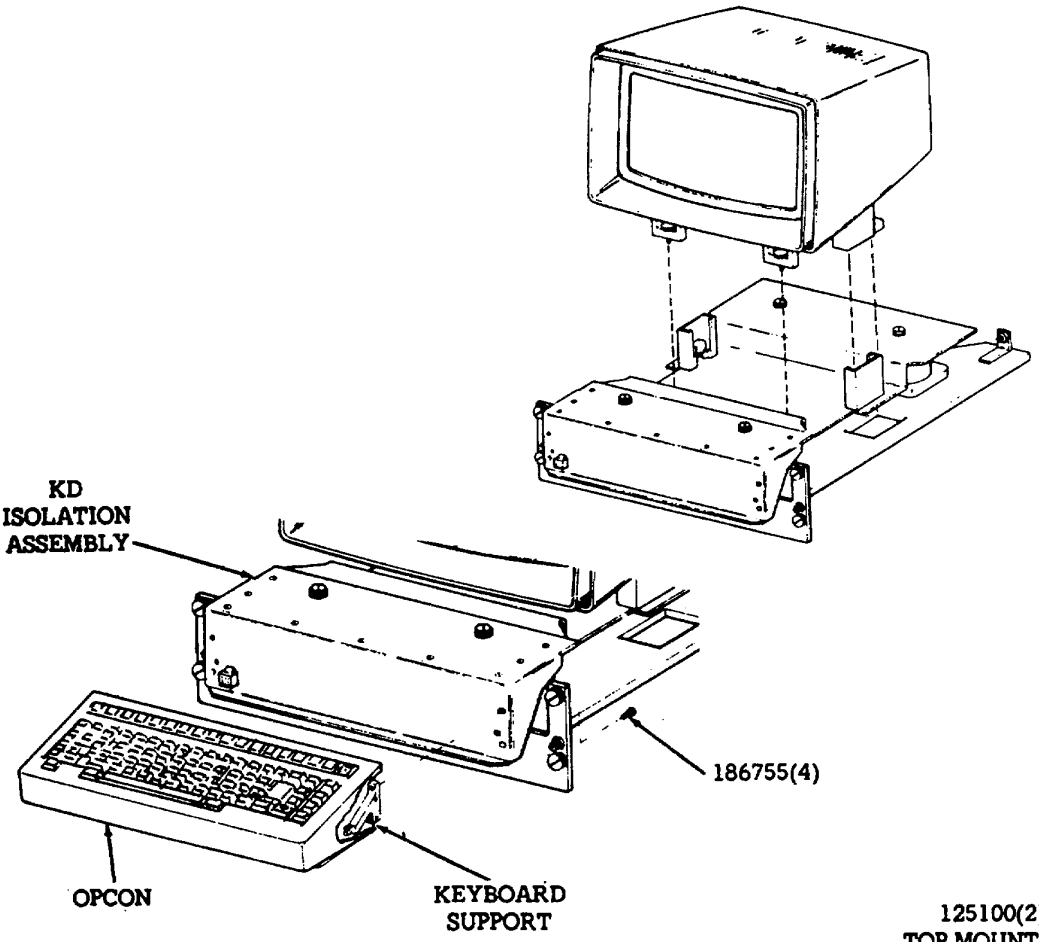
Controller



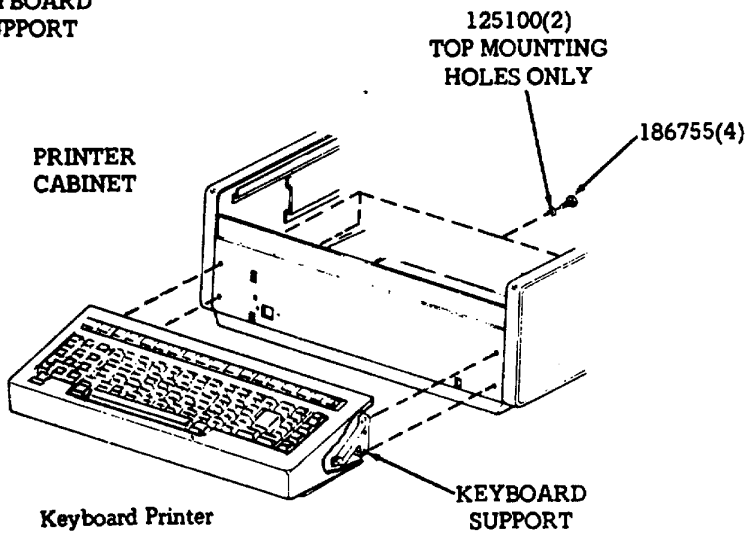
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Display

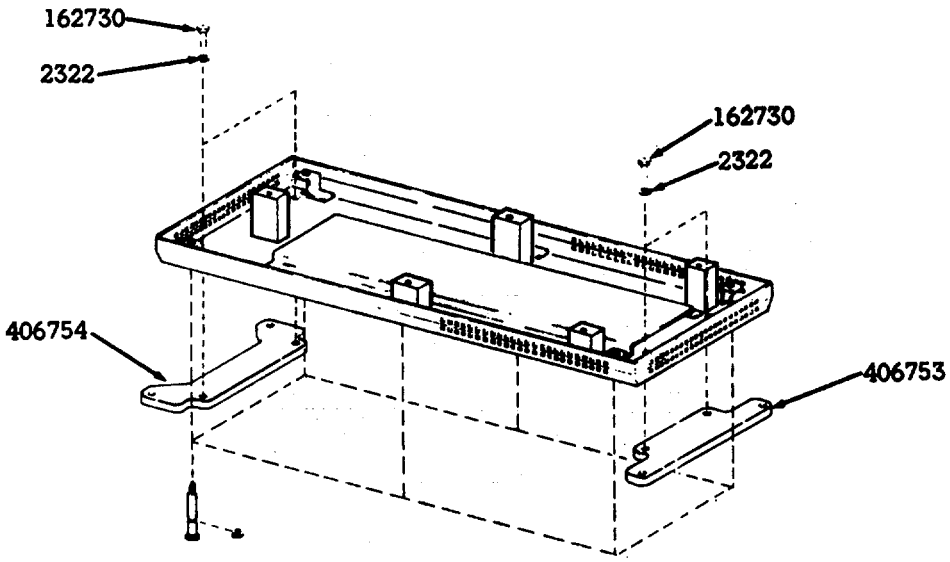


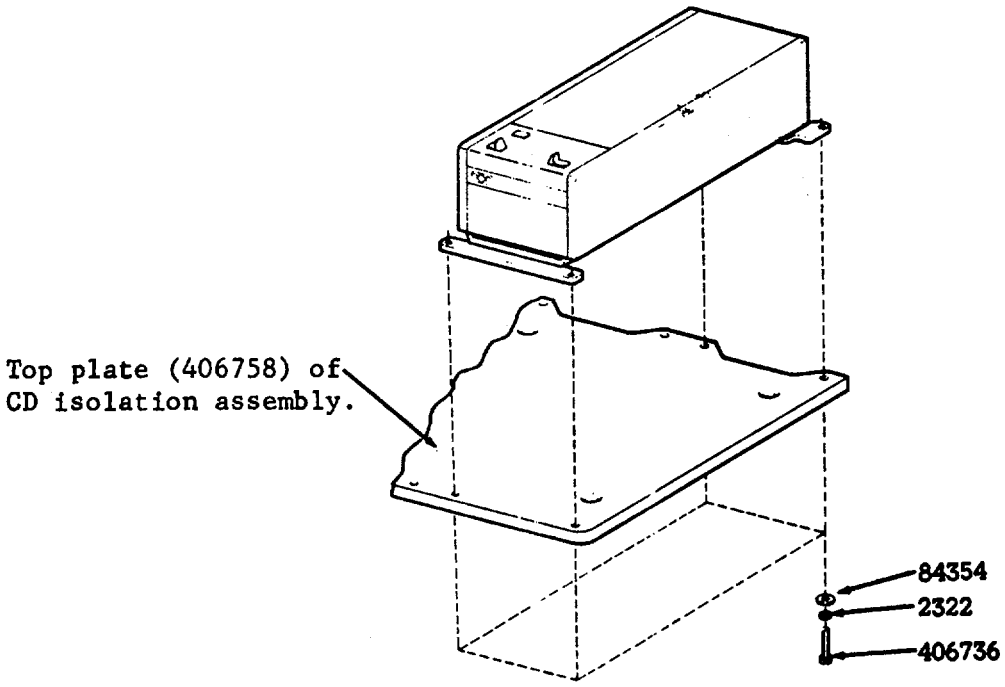
Keyboard Display



Keyboard Printer

Cassette Drive

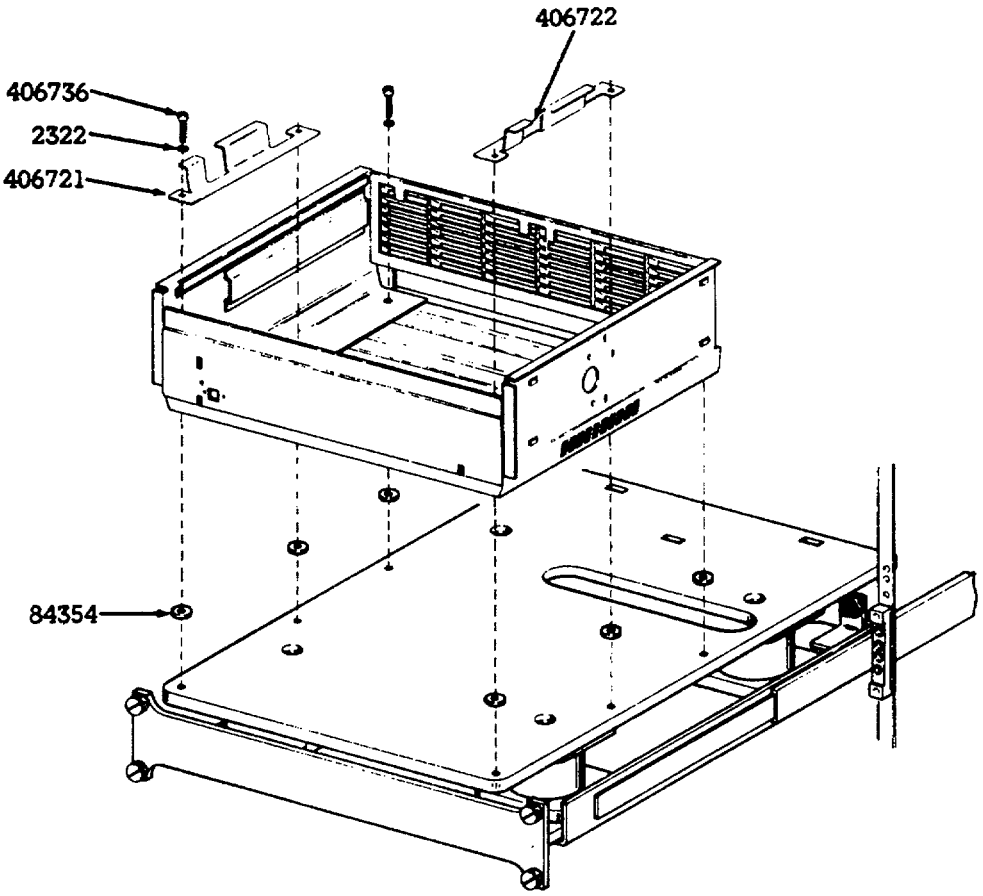




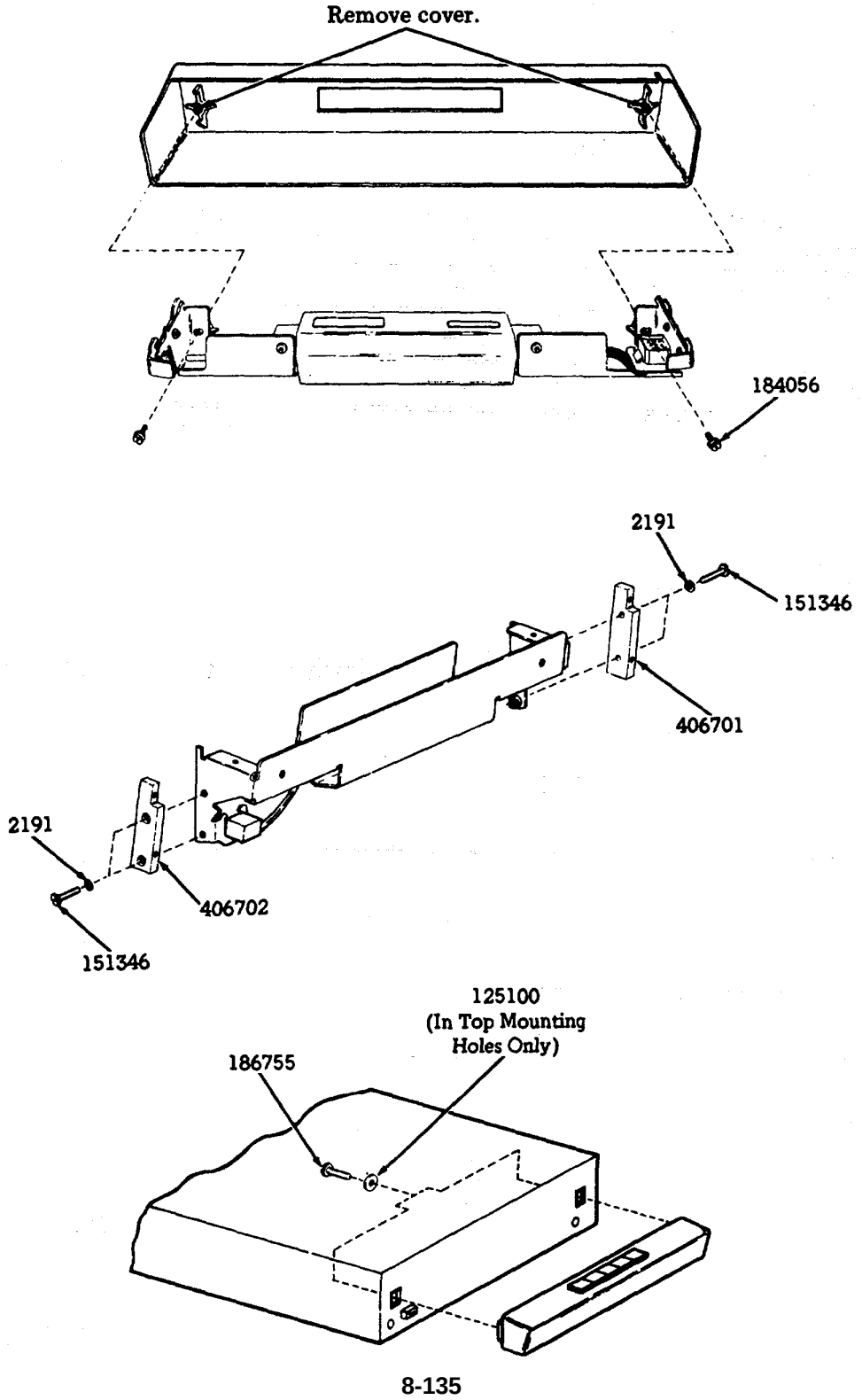
F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

3. PARTS (Cont)

Printer



406700 Modification Kit (Required Only if Printer is Part of an ROP Terminal)



F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

4. COMPONENT PARTS LIST

Note: When ordering replaceable parts or components, unless otherwise specified, prefix each part number with the letters "TP" (i.e., TP410055).

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101421	Screw, 1/4-20 x 1-1/4 Hex 138401
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F. DISASSEMBLY/REASSEMBLY AND PARTS (Cont)

4. COMPONENT PARTS LIST (Cont)

PART 9 -- TEMPEST MODEL 40 SETS

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PART 9 -- TEMPEST MODEL 40 SETS

A. GENERAL

This section provides information to identify the types of Tempest Model 40 Sets and to test, troubleshoot and service them. It includes a description of options that may be implemented and variable features that may be ordered for the set.. Also provided is information on set cable interconnection.

NOTE: When ordering replaceable components, unless otherwise specified, prefix each part number with the letters "TP" (i.e., TP410055).

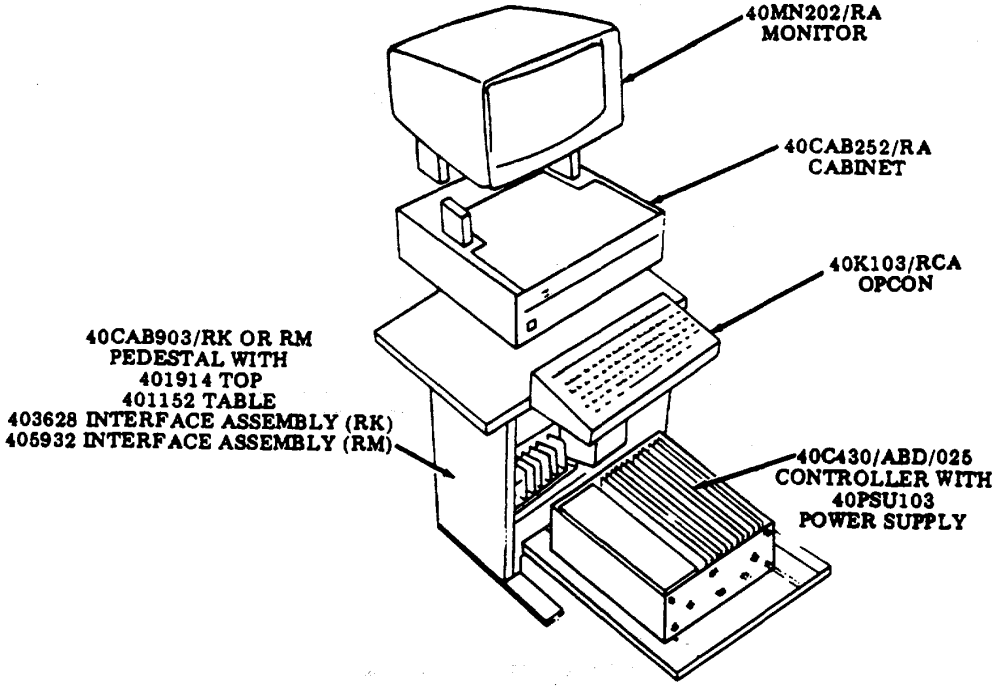
B. SET IDENTIFICATION

1. GENERAL

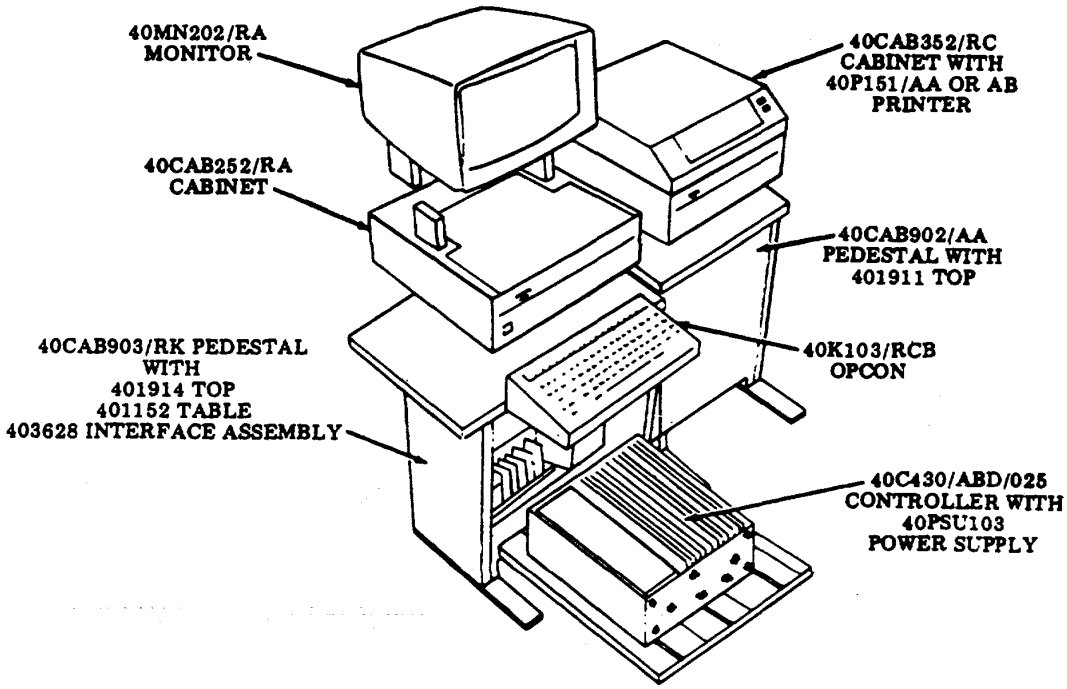
A Tempest Model 40 Set is a combination of modular components (i.e., display monitor, opcon, electronics package, etc.) interconnected to provide data communications on private line applications.

There are four basic set configurations: Keyboard Display (KD), Keyboard Display Printer (KDP), Keyboard Printer (KP) and Receive-Only Printer (ROP). The KD and KDP configurations provide send and receive operation with facilities to prepare and edit data for send operation. The KDP configuration provides a means of obtaining a hard copy of send and/or receive data. The EP configuration provides a full opcon for on-line conversational mode operation and a printer for hard copy of send or receive data. The ROP configuration provides hard copy of received data. The ROP sets can be configured with 80-column friction or tractor feed printer or with a 132-column tractor feed printer.

Keyboard Display (KD)



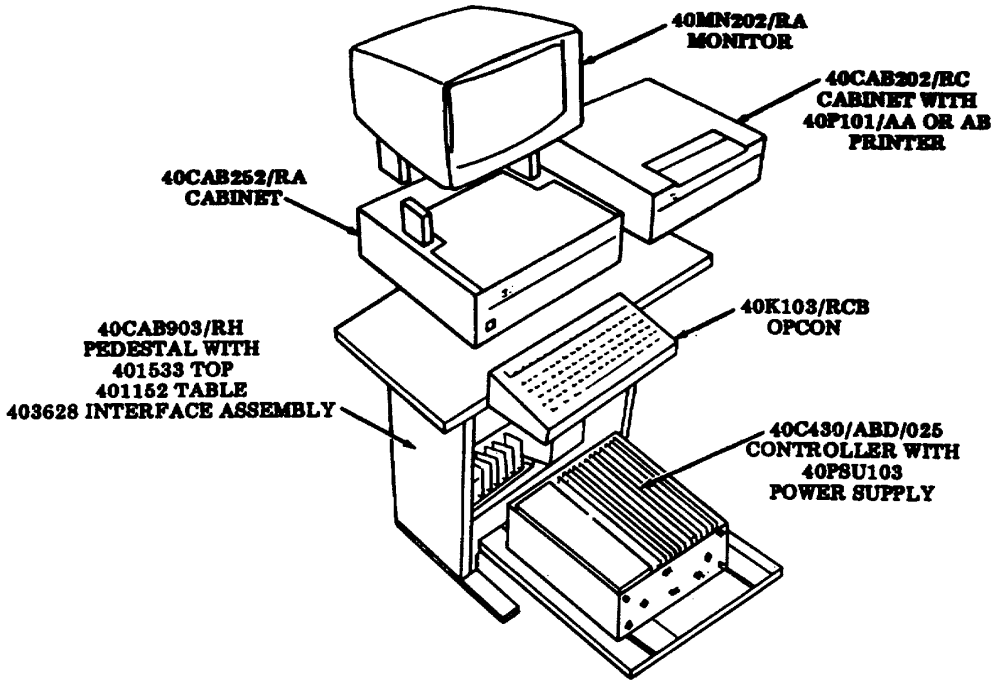
Keyboard Display Printer (KDP) -- Tractor Feed Printer



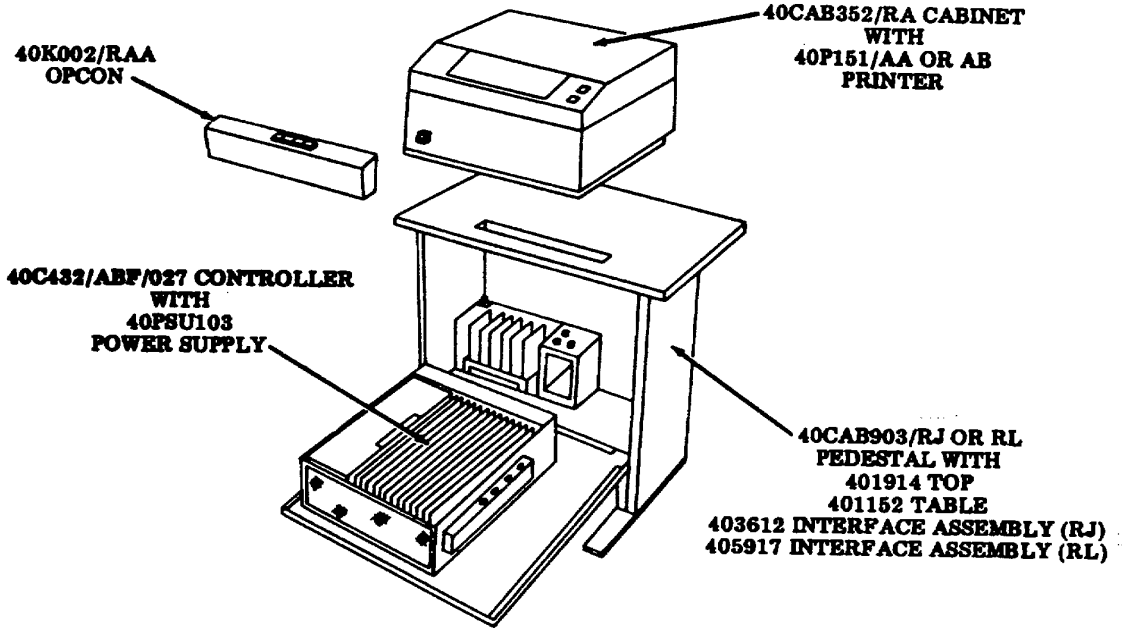
B. SET IDENTIFICATION (Cont)

1. GENERAL (Cont)

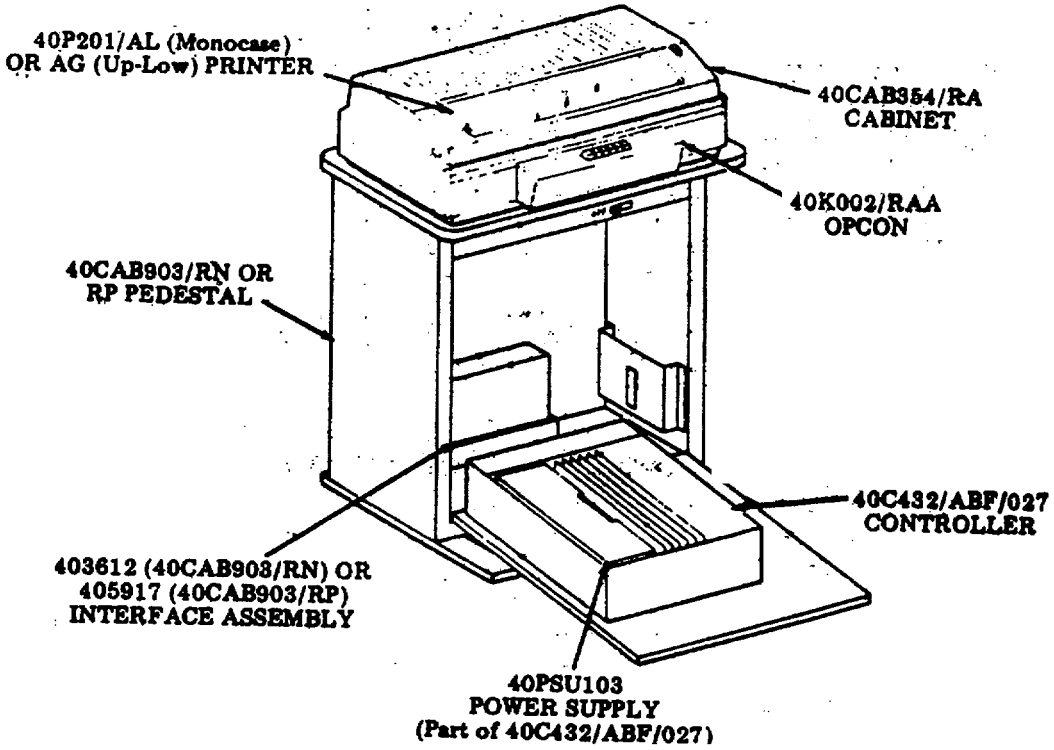
Keyboard Display Printer (KDP) -- Friction Feed Printer



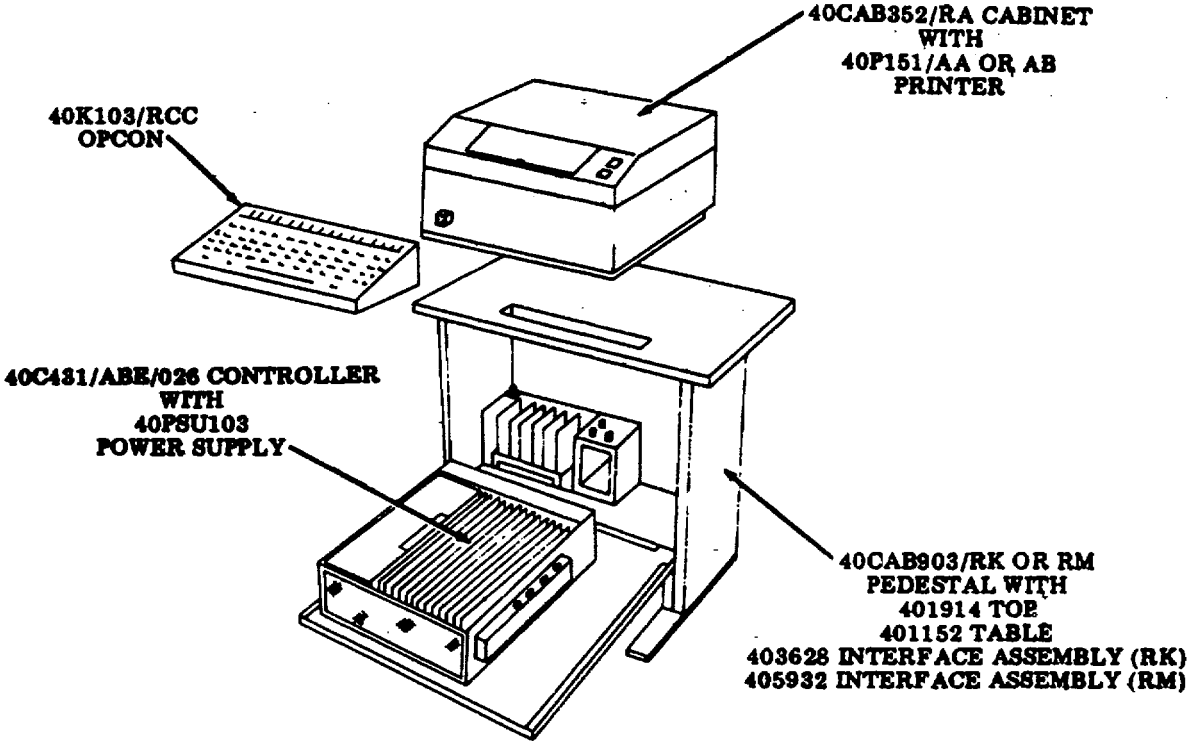
Receive-Only 80-Column Printer (ROP)



Receive-Only 132-Column Printer (ROP)



Keyboard Printer (KP)



B. SET IDENTIFICATION (Cont)

2. IDENTIFICATION

Knowing what features are provided and how those features are programmed to operate is necessary for installation and operational checkout. Several methods are presented in the following paragraphs for determining terminal features and programming.

Features included in a terminal can be identified by observing if certain keytops are provided on the operator console, or if a certain type or quantity of printed circuit boards are present in the controller and display logic circuitry.

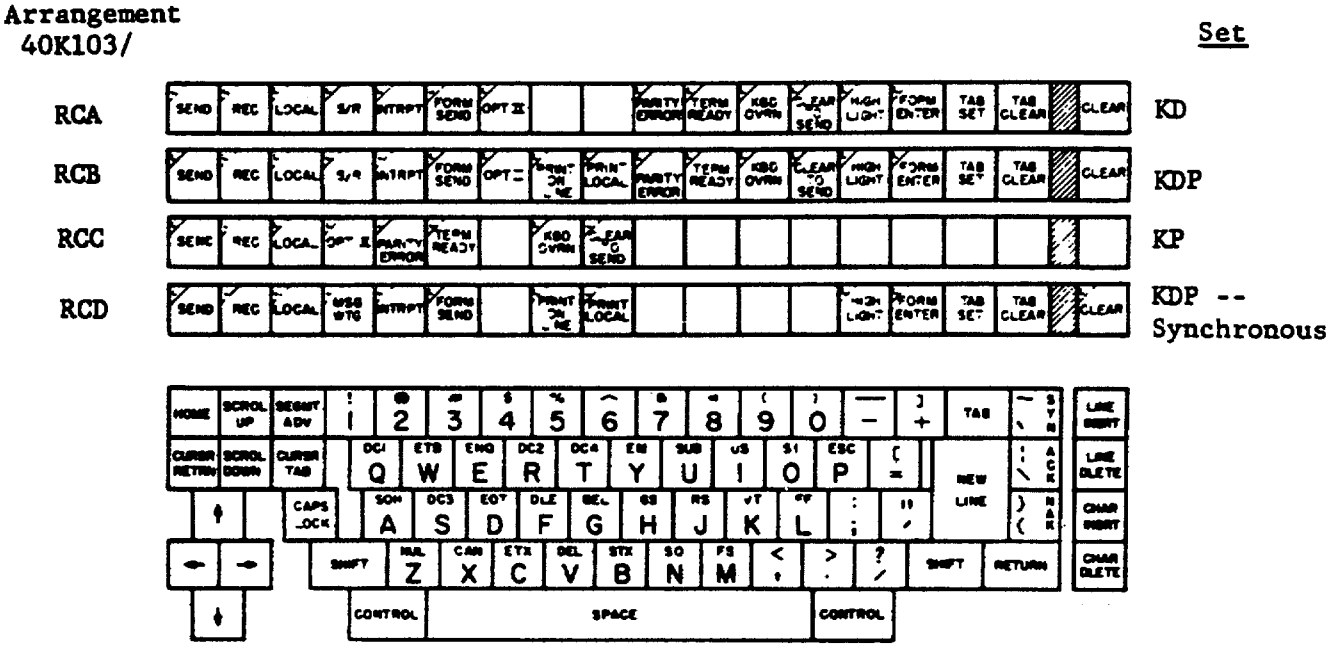
Options programmed in the Tempest Model 40 Set should be recorded on a Set Features and Options Record. Typical forms for this purpose are shown on Pages 9-9 and 9-10, 3. OPTIONS. Storage locations for Set Features and Options Record forms are provided in cabinetry. A record form should be maintained with each terminal to indicate how the optional features are programmed.

NOTE: References in this manual to TELETYPE® Standard Serial Interface (SSI) describe input/output signaling characteristics for devices using high speed SSI signals..

Opcon

NOTE: Actual keytops may be slightly different in appearance. Nomenclature is the same.

Keyboard Arrangement 40K103/



Receive-Only Printer (ROP) Opcon

NOTE: The ROP Sets have an approximate 1000-character storage buffer.

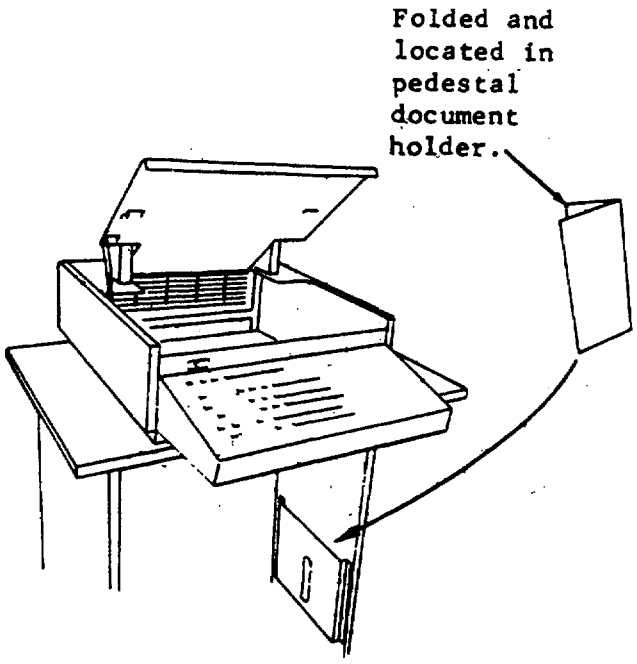
3. OPTIONS

The Tempest Model 40 Set components provide a number of field options to satisfy operating requirements of the user. These options are implemented .by, switches on the logic cards. Location of ail circuit cards with options can be found in the appropriate individual component parts of this manual.

The following options are grouped according to the type of set. The options in any group apply only to the type of set(s') indicated. Any change in options should be entered on the Set Features and Options 'Record.

Before assembly, checkout or servicing, a review of features and field options or other descriptions and records .should be made to determine which options, if any, should be changed from the way -they were furnished by the factory, or altered during earlier service applications.

A Set Features and Options Record (Page 9-lOa or b) should be maintained and attached to -equipment to facilitate checkout or. operation. The blank forms may be duplicated locally, and marked up for this purpose.



B. SET IDENTIFICATION (Cont)

3. OPTIONS (Cont)

NOTES

Set Features and Options Record for KD, KDP. KP and 80-Column ROP Sets

DO NOT REMOVE THIS PAGE FROM MANUAL.

Set:	Printer:	Interface:
ROP ☐	40P101/AA (Monocase) ☐	Clear to Send +6 V (EC181) ☐
KP ☐	40P101/AB (Up-Low) ☐	Clear to Send -6 V (EC184) ☐
KD ☐	40P151/AA (Monocase) ☐	Receive Ready +6 V (EC180) ☐
KDP ☐	40P151/AB (Up-Low) ☐	Receive Ready -6 V (EC185) ☐

Controller

OPTION	DESCRIPTION	OPTION CONDITION	
A.	Line code	1. ITA2 AV (Baudot) ☐	2. ITA6 (ASCII) ☐
B.	Transmit stop bit	1. 1 stop bit ☐	2. 2 stop bits
			(1.56 on ITA2) ☐
C.	Transmission mode	1. Asynchronous ☐	2. Isochronous ☐
D.	Pre-empt local on receipt of data	1. Do not pre-empt ☐	2. Pre-empt ☐
E.	Substitute asterisk (*) for parity errored character	1. Do not substitute ☐	2. Substitute ☐
F.	Line parity on ITA5 data	1. No parity ☐	2. Odd parity ☐
		3. Even parity ☐	
G.	Transmit answer-back character on receipt of ENQ	1. No answer-back ☐	2. Answer-back ☐
H.	Line feed printer on receipt of carriage return	1. No line feed ☐	2. Line feed
I.	Asynchronous transmission speed on power up	1. 110 baud ☐	2. 1200 baud ☐
	Option II speed	3. 110 baud ☐	4. 1200 baud ☐
J.	Answer-back character	Character selected ☐	
		from ASCII code chart	
K.	Insert line feed after 79th character from display	1. Insert line feed	2. Do not insert line ☐
			feed
L.	Mode KD switches to after sending	1. Local ☐	2. Receive ☐
M.	Line copied by printer in on-line mode	1. Send ☐	2. Receive ☐
N.	Send extended characters on-line in S/R mode	1. Send characters ☐	2. Do not send ☐
			characters
O.	Allow sending only if ETX is on display	1. Send only if ETX ☐	2.Send without ETX ☐
		is on display	on display
P.	Mode KD switches to on receipt of ETX	1. Switch to local ☐	2. Stay in receive ☐

Printer

17.	Printer margin and form length	c. Last character on ☐	d. Last character on
		80th column	73rd through 79th ☐
			column
18.	Printer paper feed out	a. No paper feed out ☐	b. Paper feed out on
			RM loss ☐
		c. Paper feed out on ☐	
		RM Ion or ETX	
19.	Printer errored character symbol	c. Not printed on parity ☐	d. Printers with 96 ☐
		error	character set
		e. Printers with 64 ☐	f. Printers with exit- ☐
		character set	ded ASCI character
			set
20.	Line feed on printer	a. Single ☐	b. Double ☐
21.	Foldover on up-low printer	a Upper and lower ☐	b. Lower case prints
		case print	as supper case ☐
22.	Foldover on monocase printer	a. Lower case not ☐	b. Lower case printed
		folded over	as upper case ☐
39.	Form switch (tractor feed printers only)	a. On ☐	b. Off ☐

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B. SET IDENTIFICATION (Cont)

3. OPTIONS (Cont)

Set Features and Options Record for 132-Colum ROP Set

Set: ROP

Printer:
40P101/AA (Monocase) ☐
40P101/AB (Up-Low) ☐

Interface:
Clear to Send +6 V (EC181) ☐
Clear to Send -6 V (EC184) ☐
Receive Ready +6 V (EC180) ☐
Receive Ready -6 V (EC185) ☐

Controller

OPTION	DESCRIPTION	OPTION CONDITION	
A.	Line code	1. ITA2 AV (-Baudot) ☐	2. ITA5(ASCII) ☐
B.	Transmit stop bit	1. 1 stop bit ☐	2 2stop bits (1.5 on ITA2) ☐
C.	Transmission mode	1.Asychronous ☐	2. Isochronous ☐
D.	Not applicable to ROP Set.	1.	2.
E	Substitute asterisk(*) for parity errored character	1. Do not substitute ☐	2 Substitute ☐
F.	Line parity on ITA5 data	1. No parity ☐	2 Odd parity ☐
		3. even parity ☐	
G.	Not applicable to ROP Set.	1.	2.
H	Line feed printer on receipt of carriage return	1. No line feed ☐	2. Line feed ☐
I	Asynchronous transmission speed on power up	1. 110 baud ☐	2. 1200 baud ☐
	Option II speed	3. 110 baud ☐	4. 1200 baud ☐
J. through P	Not applicable to ROP Set		

Printer

17.	Printer margin and form length	e. Last character on132nd column ☐	f.-p. Last character on121st through131st column ☐
18.	Printer paper feed out	a. No paper feed out ☐	b. Paper feed out on RM lose ☐
		c. Paper feed out on RM loss or ETX ☐	
19.	Printer errored character symbol	a. Printed on even parity error ☐	b. Printed on odd parity error ☐
		c. Not printed on parity error ☐	d. Printer with 96 character set ☐
		e. Printers with 64 character set ☐	f. Printers with extended ASCII character set ☐
		g. Printers with longest character set having less than 64 characters ☐	
20.	Line feed on printer	a. Single ☐	b. Double ☐
21.	Foldover on up-low printer	a. Upper and lower case print ☐	b. Lower case prints as upper case ☐
22.	Foldover on monocase printer	a. Lower case prints as error symbol ☐	b. Lower ce printed upper case ☐
23.	Extended ASCII on printer (extended ASCII)	a. Prints extended ASCU characters (no parity check) ☐	b. Does not print extended ASCII (see 19.a., b., or c.) ☐
39.	Forms switch	a On ☐	b. Off
48.	Incomplete form suppresses paper alarm	a No (paper out not gated with form out) ☐	b. Yes (paper out gated with form out) ☐

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Set:	Printer:	Interface:
ROP ☐	40P101/AA (Monocase) ☐	Clear to Send +6 V (EC181) ☐
KP ☐	40P101/AB (Up-Low) ☐	Clear to Send -6 V (EC184) ☐
KD ☐	40P151/AA (Monocase) ☐	Receive Ready +6 V (EC180) ☐
KDP ☐	40P151/AB (Up-Low) ☐	Receive Ready -6 V (EC185) ☐

Controller

OPTION	DESCRIPTION	OPTION CONDITION	
A.	Line code	1. ITA2 AV (Baudot) ☐	2. ITA6 (ASCII) ☐
B.	Transmit stop bit	1. 1 stop bit ☐	2. 2 stop bits
			(1.56 on ITA2) ☐
C.	Transmission mode	1. Asynchronous ☐	2. Isochronous ☐
D.	Pre-empt local on receipt of data	1. Do not pre-empt ☐	2. Pre-empt ☐
E.	Substitute asterisk (*) for parity errored character	1. Do not substitute ☐	2. Substitute ☐
F.	Line parity on ITA5 data	1. No parity ☐	2. Odd parity ☐
		3. Even parity ☐	
G.	Transmit answer-back character on receipt of ENQ	1. No answer-back ☐	2. Answer-back ☐
H.	Line feed printer on receipt of carriage return	1. No line feed ☐	2. Line feed
I.	Asynchronous transmission speed on power up	1. 110 baud ☐	2. 1200 baud ☐
	Option II speed	3. 110 baud ☐	4. 1200 baud ☐
J.	Answer-back character	Character selected ☐	
		from ASCII code chart	
K.	Insert line feed after 79th character from display	1. Insert line feed	2. Do not insert line ☐
			feed
L.	Mode KD switches to after sending	1. Local ☐	2. Receive ☐
M.	Line copied by printer in on-line mode	1. Send ☐	2. Receive ☐
N.	Send extended characters on-line in S/R mode	1. Send characters ☐	2. Do not send ☐
			characters
O.	Allow sending only if ETX is on display	1. Send only if ETX ☐	2.Send without ETX ☐
		is on display	on display
P.	Mode KD switches to on receipt of ETX	1. Switch to local ☐	2. Stay in receive ☐

Printer

17.	Printer margin and form length	c. Last character on ☐	d. Last character on
		80th column	73rd through 79th ☐
			column
18.	Printer paper feed out	a. No paper feed out ☐	b. Paper feed out on
			RM loss ☐
		c. Paper feed out on ☐	
		RM Ion or ETX	
19.	Printer errored character symbol	c. Not printed on parity ☐	d. Printers with 96 ☐
		error	character set
		e. Printers with 64 ☐	f. Printers with exte- ☐
		character set	ded ASCI character
			set
20.	Line feed on printer	a. Single ☐	b. Double ☐
21.	Foldover on up-low printer	a Upper and lower ☐	b. Lower case prints
		case print	as supper case ☐
22.	Foldover on monocase printer	a. Lower case not ☐	b. Lower case printed
		folded over	as upper case ☐
39.	Form switch (tractor feed printers only)	a. On ☐	b. Off ☐

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Set: **Printer:** **Interface:**

ROP‘ ‘ ‘ ‘ **40P101/AA (Monocase)** ☐ **Clear to Send +6 V (EC181)** ☐

‘ ‘40P101/AB (Up-Low) ☐ **Clear to Send -6 V (EC184)** ☐

Receive Ready +6 V (EC180) ☐

Receive Ready -6 V (EC185) ☐

Controller

OPTION	DESCRIPTION	OPTION CONDITION	
A.	Line code	1. ITA2 AV (-Baudot) ☐	2. ITA5(ASCII) ☐
B.	Transmit stop bit	1. 1 stop bit ☐	2 2stop bits (1.5 on ITA2) ☐
C.	Transmission mode	1.Asychronous ☐	2. Isochronous ☐
D.	Not applicable to ROP Set.	1.	2.
E	Substitute asterisk(*) for parity errored character	1. Do not substitute ☐	2 Substitute ☐
F.	Line parity on ITA5 data	1. No parity ☐	2 Odd parity ☐
		3. even parity ☐	
G.	Not applicable to ROP Set.	1.	2.
H	Line feed printer on receipt of carriage return	1. No line feed ☐	2. Line feed ☐
I	Asynchronous transmission speed on power up	1. 110 baud ☐	2. 1200 baud ☐
	Option II speed	3. 110 baud ☐	4. 1200 baud ☐
J. through P	Not applicable to ROP Set		

Printer

17.	Printer margin and form length	e. Last character on132nd column ☐	f.-P. Last character on121st through131st column ☐
18.	Printer paper feed out	a. No paper feed out ☐	b. Paper feed out on RM lose ☐
		c. Paper feed out on RM loss or ETX ☐	
19.	Printer errored character symbol	a. Printed on even parity error ☐	b. Printed on odd parity error ☐
		c. Not printed on parity error ☐	d. Printers with 96 character set ☐
		e. Printers with 64 character set ☐	f. Printers with extended ASCII character set ☐
		g. Printers with longest character set having less than 64 characters ☐	
20.	Line feed on printer	a. Single ☐	b. Double ☐
21.	Foldover on up-low printer	a. Upper and lower case print ☐	b. Lower case prints as upper case ☐
22.	Foldover on monocase printer	a. Lower case prints as error symbol ☐	b. Lower ce printed upper case ☐
23.	Extended ASCII on printer (extended ASCII)	a. Prints extended ASCU characters (no parity check) ☐	b. Does not print extended ASCII (see 19.a., b., or c.) ☐
39.	Forms switch	a On ☐	b. Off
48.	Incomplete form suppresses paper alarm	a No (paper out not gated with form out) ☐	b. Yes (paper out gated with form out) ☐

Controller Optioning

NOTE: The following options apply to controllers other than the 40C430/AAT/017. The 40C430/AAT/017 must be programmed per switch setting shown on Page 7-8. The only options available on this controller are terminal address, KD address, printer address and the option of the automatic insertion of the terminal address and device address at the beginning of each message sent.

Field Options Other than Synchronous

Common to ROP, KP, KD and KDP Sets

Option

A. Line code
   1. ITA2 AV (Baudot)] Choose 1
   2. ITA5 (ASCII)

B. Transmit stop bit
   1. 1 stop bit Choose 1
   2. 2 stop bits (1.5 on ITA2)]

C. Transmission mode
   1. Asynchronous.] Choose 1
   2. Isochronous

D. Pre-empt local on receipt of receive data
   1. Do not pre-empt] Choose 1
   2. Pre-empt

E. Substitute asterisk (*) for parity errored character
   1. Do not substitute] Choose 1
   2. Substitute

F. Line parity on ITA5 data
   1. No parity
   2. Odd parity] Choose 1
   3. Even parity

G. Transmit answer-back character on receipt of ENQ
   1. No answer-back] Choose 1
   2. Answer-back

H. Line feed printer on receipt of carriage return
   1. No line feed] Choose 1
   2. Line feed

I. Asynchronous transmission speeds (see Note) Power up speed
   2. 1200 baud] Choose 1
   2. 1200 baud

NOTE: Option II will be other baud rate.

J. Answer-back character
   Choose any character from the ASCII code chart..

B. SET IDENTIFICATION (Cont)

3. OPTIONS, Field Options Other than Synchronous, Common to ROP, KP, KD and KDP Sets, (Cont)

Option

K. Insert line feed after 79th character from display
   1. Insert Line feed
   2. Do not insert line feed] Choose 1

L. Mode KD switches to after send
   1. Local
   2. Receive] Choose 1

M. Line copied by printer in on-line mode
   1. Send
   2. Receive] Choose 1

N. Send extended characters on-line in S/R mode
   1. Send characters
   2. Do not send characters] Choose 1

O. Allow sending only if ETX is on display
   1. Send only if ETX is on display.]. Choose 1
   2. Send without ETX on display

P. Mode KD switches to on receipt of ETX
   1. Switch to local
   2. Stay in receive] Choose 1

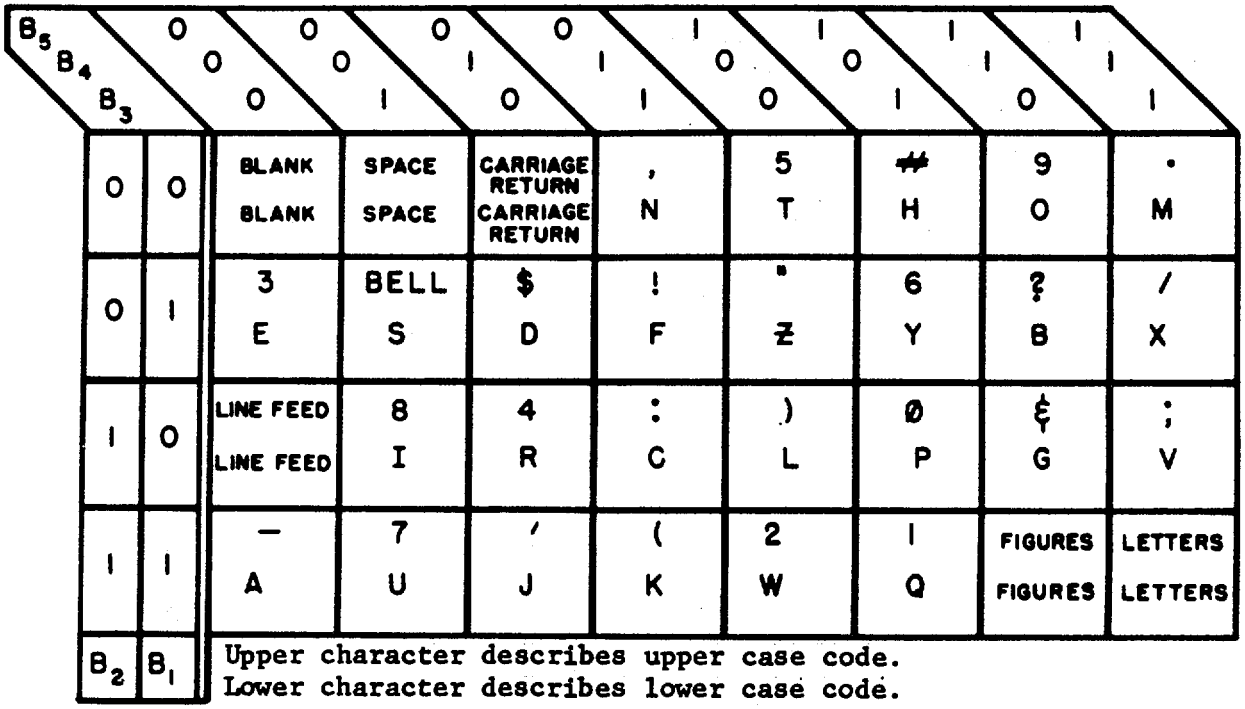
ASCII Code Chart

BITS 7				0				1			
BITS 6				0		1		0		1	
BITS 5				0	1	0	1	0	1	0	1
4	3	2	1	0	1	2	3	4	5	6	7
0	0	0	0	NUL	DLE	SP	0	@	P	`	p
			1	SOH	DC1	!	1	A	Q	a	q
		1	0	STX	DC2	"	2	B	R	b	r
			1	ETX	DC3	#	3	C	S	c	s
	1	0	0	EOT	DC4	$	4	D	T	d	t
			1	ENQ	NAK	%	5	E	U	e	u
		1	0	ACK	SYN	&	6	F	V	f	v
			1	BEL	ETB	'	7	G	W	g	w
1	0	0	0	BS	CAN	(	8	H	X	h	x
			1	HT	EM	)	9	I	Y	i	y
		1	0	LF	SUB	*	:	J	Z	j	z
			1	VT	ESC	+	;	K	[	k	{
	1	0	0	FF	FS	,	<	L	\	l	|
			1	CR	GS	-	=	M	]	m	}
		1	0	SO	RS	.	>	N	^	n	~
			1	SI	US	/	?	O	_	o	DEL

NUL -- Null
SOH -- Start of Heading
STX -- Start of Text
ETX -- End of Text
EOT -- End of Transmission
ENQ -- Enquiry
ACK -- Acknowledge
BEL -- Bell
BS -- Backspace (1)
HT -- Horizontal Tabulation
LF -- Line Feed
VT -- Vertical Tabulation
FF -- Form Feed
CR -- Carriage Return
SO -- Shift Out
SI -- Shift In
DLE -- Data Link Escape
DC1 -- Device Control 1
DC2 -- Device Control 2
DC3 -- Device Control 3
DC4 -- Device Control 4
NAK -- Negative Acknowledge
SYN -- Synchronous Idle
ETB -- End of Transmission Block
CAN -- Cancel
EM -- End of Medium
SUB -- Substitute
ESC -- Escape
FS -- File Separator
GS -- Group Separator
RS -- Record Separator
US -- Unit Separator
SP -- Space
DEL -- Delete

(1). Performs cursor left function on display device.

Baudot (ITA2) Code Chart



B_5 B_4 B_3	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
0 0	BLANK BLANK	SPACE SPACE	CARRIAGE RETURN CARRIAGE RETURN	, N	5 T	# H	9 O	. M
0 1	3 E	BELL S	$ D	! F	" Z	6 Y	? B	/ X
1 0	LINE FEED LINE FEED	8 I	4 R	: C	) L	Ø P	ξ G	; V
1 1	– A	7 U	' J	(K	2 W	1 Q	FIGURES FIGURES	LETTERS LETTERS

B_2 B_1

Upper character describes upper case code.
Lower character describes lower case code.

4. CODE CONVERSION TABLES

ASCII to Baudot Conversion Table

ASCII (ITA5) INPUT	CONVERTS TO	BAUDOT (ITA2) OUTPUT	ASCII (ITAS) INPUT	CONVERTS TO	BAUDOT (ITA2) OUTPUT
NUL	*	BLANK	NAK	*	BLANK
SOH	*	BLANK	SYN	*	BLANK
STX	*	BLANK	ETB	*	BLANK
ETX	*	BLANK	CAN	*	BLANK
EOT	*	BLANK	EM	*	BLANK
ENQ	*	BLANK	SS (SUB)	*	BLANK
ACK	*	BLANK	ESC	*	BLANK
BEL		BELL (FIGS. S)	FS	*	BLANK
BS	*	BLANK	GS	*	BLANK
HT	*	BLANK	RS	*	BLANK
LF	*	LINE FEED	US	*	BLANK
VT	*	BLANK	SP	*	SPACE
FF	*	BLANK	!		! (FIGS. F)
CR	*	CARRIAGE RETURN	"		" (FIGS. Z)
SO		FIGURES	#		# (FIGS. H)
SI		LETTERS	$		$ (FIGS. D)
DLE	*	BLANK	%	*	BLANK
DC1	*	BLANK	&		& (FIGS. G)
DC2	*	BLANK	'		' (FIGS. J)
DC3	*	BLANK	(		((FIGS. K)
DC4	*	BLANK	)		) (FIGS. L)

B. SET IDENTIFICATION (Cont)

4. CODE CONVERSION TABLES, ASCII to Baudot Conversion Table (Cont)

ASCII (ITA5) INPUT	CONVERTS TO	BAUDOT (ITA2) OUTPUT	ASCII (ITAS) INPUT	CONVERTS TO	BAUDOT (ITA2) OUTPUT
*	*	BLANK	H, h		H
+	*	BLANK	I, i		I
,		, (FIGS. N)	J, j		J
-		- (FIGS. A)	K, k		K
•		• (FIGS. M)	L, 1		L
/		/ (FIGS. X)	M, m		M
0		0 (FIGS. P)	N, n		N
1		1 (FIGS. Q)	O, o		O
2		2 (FIGS. W)	P, p		P
3		3 (FIGS. E)	Q, q		Q
4		4 (FIGS. R)	R, r		R
5		5 (FIGS. T)	S, s		S
6		6 (FIGS. Y)	T, t		T
7		7 (FIGS. U)	U, u		U
8		8 (FIGS. I)	V, v		V
9		9 (FIGS. O)	W, w		W
:		: (FIGS. C)	X, x		X
;		; (FIGS. V)	Y, y		Y
<	*	BLANK	Z, z		Z
=	*	BLANK	[	*	BLANK
>	*	BLANK	\	*	BLANK
?		? (FIGS. B)	]	*	BLANK
@	*	BLANK	^	*	BLANK
A, a		A	`	*	BLANK
B, b		B	{	*	BLANK
C, c		C	|	*	BLANK
D, d		D	}	*	BLANK
E, e		E	~	*	BLANK
F, f		F	-	(Underscore)	LETTERS
G, g		G	DEL	LETTERS	

*Denotes inhibit of LETTERS-FIGURES shifting circuitry.
FIGS. -- FIGURES

Baudot to ASCII Conversion Table

BAUDOT (ITA2) INPUT	CONVERTS TO	ASCII (ITA5) OUTPUT	BAUDOT (ITA2) INPUT	CONVERTS TO	ASCII (ITAS) OUTPUT
A through Z		A through Z (Upper Case)	$ (FIGS. D)		$
			' (FIGS. F)		!
BLANK		NUL	& (FIGS. G)		&
LETTERS		Sets LETTERS flag in controller only	# (FIGS. H)		#
			' (FIGS. J)		‘
			((FIGS. K)		(
FIGURES		Sets FIGURES flag in controller only	) (FIGS. L)		)
			• (FIGS. M)		•
			, (FIGS. N)		,
SPACE		SPACE	BELL (FIGS. S)		BEL
CARRIAGE RETURN		CARRIAGE RETURN	; (FIGS. V)		;
LINE FEED		LINE FEED	/ (FIGS. X)		/
- (FIGS. A)		-	" (FIGS. Z)		"
? (FIGS. B)		?	1 through 9		1 through 9
: (FIGS. C)		:			

FIGS. -- FIGURES

5. SET INTERFACE

General

The Tempest Model 40 Terminals have one basic type of electrical interface:

188C -- MIL STD 188C
Mark +6 Volts l+ Volt
Space -6 Volts +1 Volt

The interface also provides for customer input clocks for send data and receive data. These clocks must also conform to NIL STD 188C signaling requirements (+6 V to -6 V excursion). Where: to + transition is start of bit; + to transition is middle of bit.

Two control leads are provided in the interface:

a. Char to Send Input +6 V Clear to Send
-6 V Stop
b. Receive Ready Input +6 V Ready
-6 V Not Ready

All input/outputs conform to the impedance and wave shaping requirements of MIL STD 188C.

B. SET IDENTIFICATION (Cont)

5. SET INTERFACE (Cont)

Options

Several options are available in the interface of the Tempest Model 40 Terminals. Some units are equipped with interface circuit cards to provide an inverted clear to-send output and inverted terminal ready.

a.	Clear to Send	- 6 V Clear to Send + 6 V Stop
b.	Receiver Ready	- 6 V Ready + 6 V Not Ready

Refer to Page 9-2, **B. SET IDENTIFICATION** for these terminals.

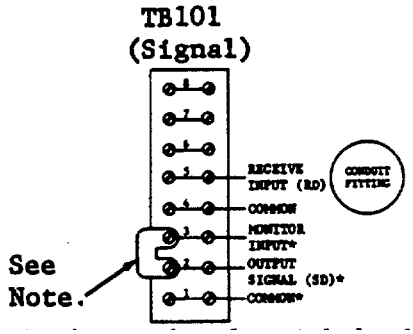
Circuit cards available for modifying interface:

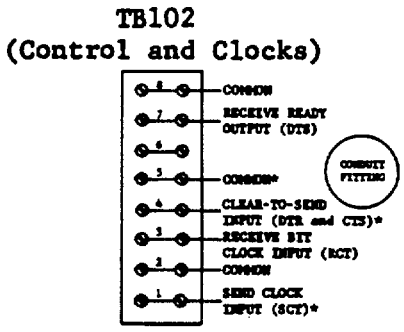
EIA- Receiver (LEDD)	303184
EIA Line Keyer	303185
Neutral Receiver	303182
Neutral Line Keyer	303183

Signal. Control, and Clock Connections

Signal and controls connections are indicated below. Two conduit fittings are provided for separate cable access.

Signal and clock lines are MIL STD 188. Optional circuit cards are available for Electronics Industries Association (EIA) Standard RS-232-C and neutral operation.





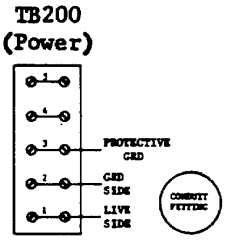
*Terminals used only with keyboard equipped sets.

NOTE:

Half-duplex strap must be removed when the 40C430/AAT/017 controller is used.

AC Power Connections

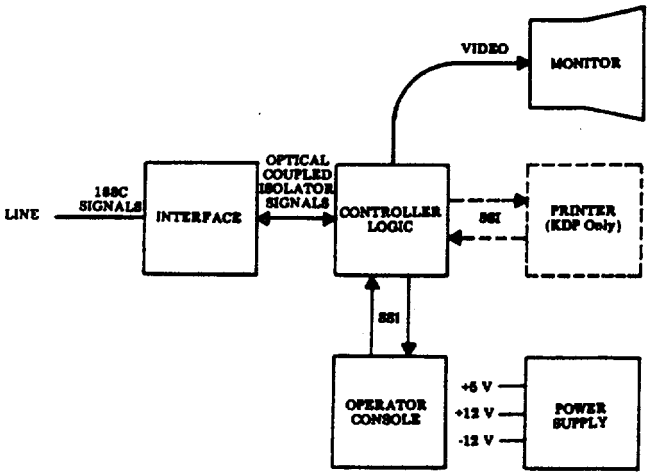
The set requires a 3-wire, single phase, 115 V ac +107., 60 Hz tO.5 Hz, unswitched power source. A conduit fitting is provided for cable access.



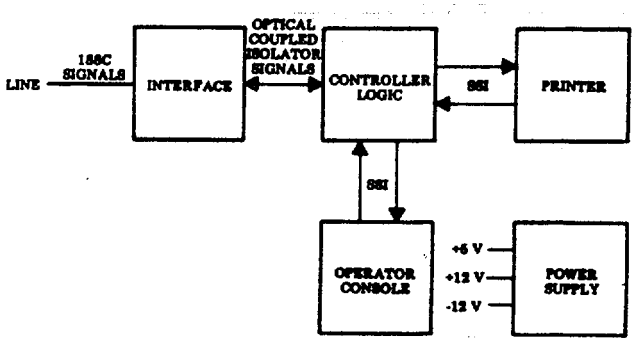
CAUTION:

DO NOT APPLY AC POWER UNTIL INSTALLATION IS COMPLETE AND READY FOR CHECKOUT.

The interface between the controller and KD or KDP operator console, and between the controller and printer, is a SSI interface. This is a special signaling system in which 18-bit "words" convey information to and from a device on two pairs of 2-conductor cables. In the KDP or ROP controller/printer interface, SSI control and data words are transferred from controller to printer, and SSI words defining the status of the printer are transferred from printer to controller. In the KD or KDP controller/operator console interface, SSI control words are transferred from controller to console, and SSI data and status words are transferred from console to controller.

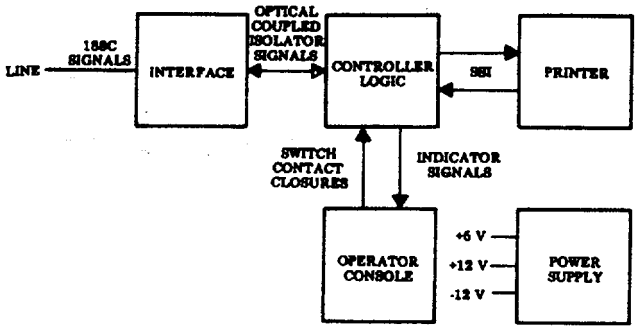


KD and KDP Block Diagram



KP Block Diagram

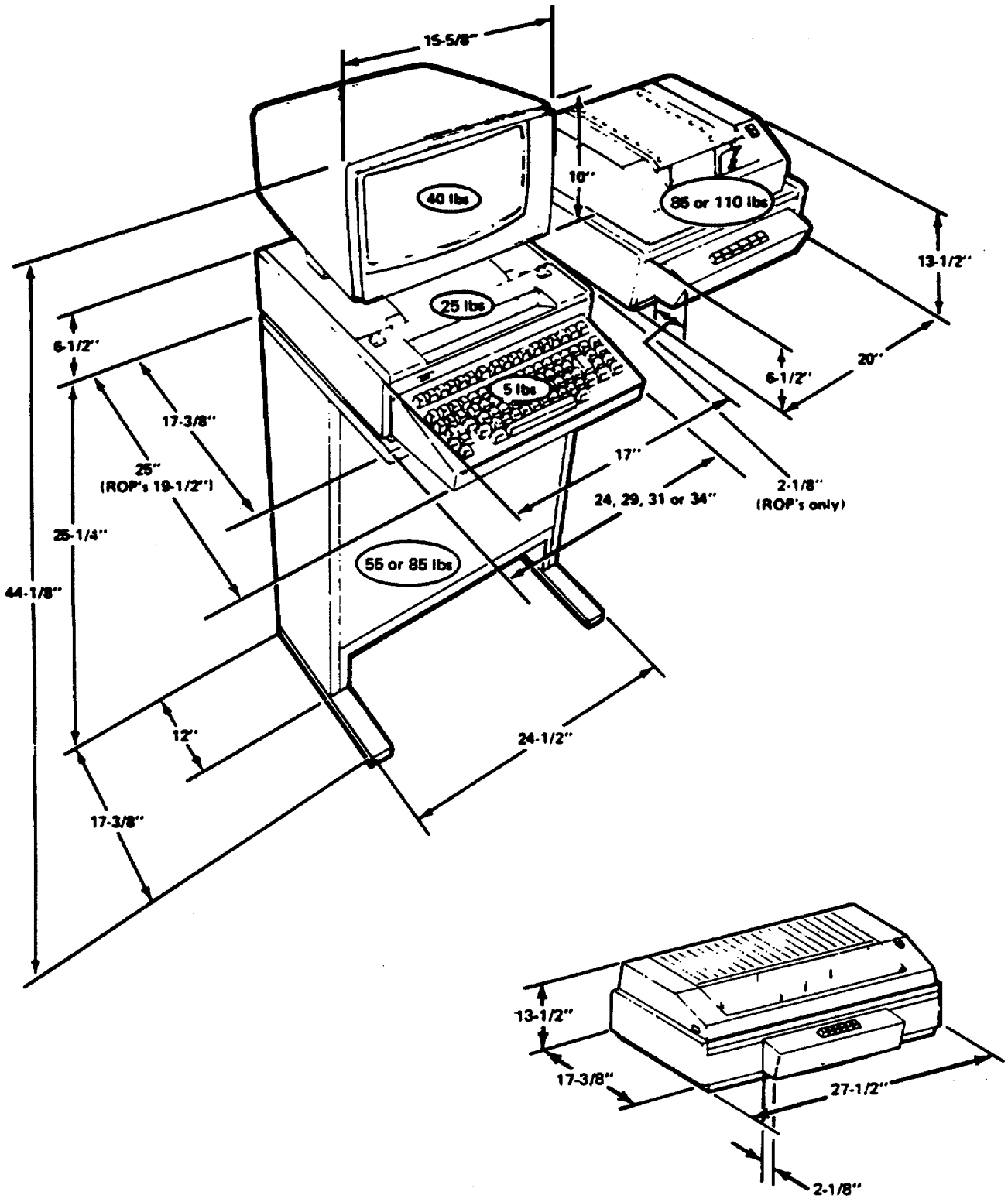
In the RO printer, the signal interchange between operator console and controller is in the form of switch contact closures and indicator signal voltages.



ROP Block Diagram

B. SET IDENTIFICATION (Cont)

6. DIMENSIONS AND WEIGHTS



C. TESTING

1. GENERAL

All standard line checks should be performed before the initial on-line checkout of the Tempest Model 40 Set. If trouble analysis indicates a problem in the line, refer to the appropriate equipment support literature for the trouble analysis.

Before performing checkout procedures make sure that the set is connected to a properly grounded ac power source, all cards and cable connectors are fully seated, the lids are closed, the paper is installed, etc. The power switches should be turned on or off under the direction of the checkout or other procedures. The checkout should always be performed in the sequence given, since the trouble analysis is based on prior requirements being met. If the indicated response is not obtained in any step of a checkout procedure, repeat the step to make sure that the procedure has been performed correctly. If the results are still unsatisfactory, perform the indicated trouble analysis by going to the troubleshooting portion of the indicated part (example: PART 4 -DISPLAY MONITOR).

To quickly locate the appropriate operational checkout procedures for the Tempest Model 40 Set under test, refer to index.

Off-Line Checkout

Off-line checkout procedures are indicated for the various Tempest Model 40 Set configurations. In general, the off-line checkout procedure is to be successfully completed before conducting on-line checkouts. Off-line checkout procedures do not require connection to the line. Since off-line checkout procedures do not check the interface or send and receive capabilities, an on-line checkout is also required to completely test the Tempest Model 40 Sets.

On-Line Checkout

With the Tempest Model 40 Set appropriately interfaced to the system where it will be used, conduct a complete checkout of send and receive capabilities taking into account all option and feature variables. Check all operational modes in sending to or receiving from another station in the system.

Alternatively, a back-to-back configuration can be achieved locally via a special connection (see Page 9-36, 4. BACK-TO-BACK CHECKOUT).

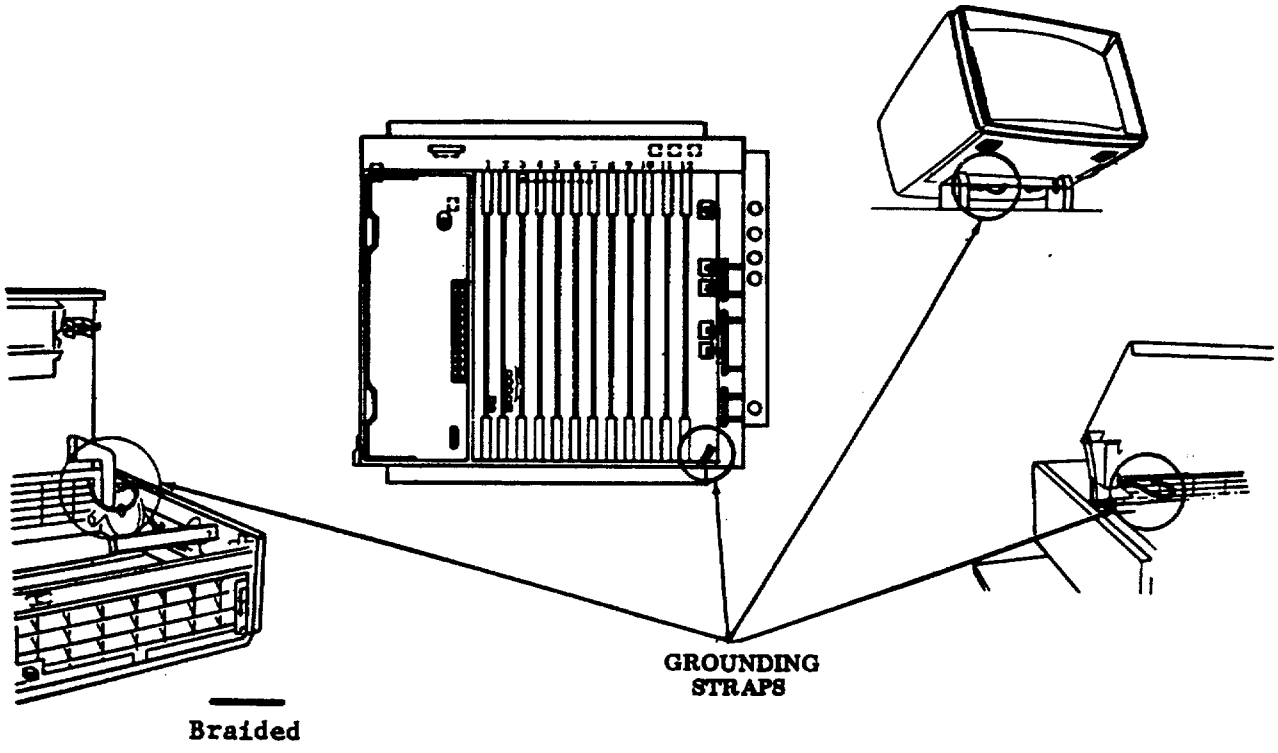
C. TESTING (cont)

2. PROTECTIVE GROUND AND PEROPERATIONAL CHECKS

Protective Ground Checks

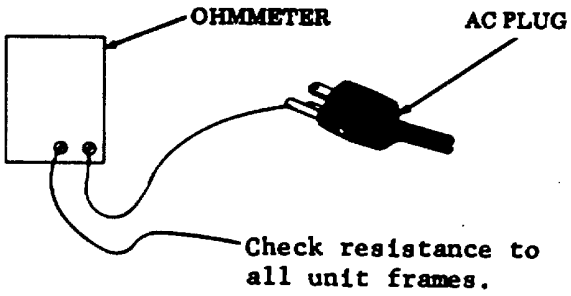
As part of standard repair shop procedure, all Tempest Model 40 Sets should be subjected to a protective ground check prior to operation to insure that there is no potential shock hazard.

Check that the following ground straps are present.



Grounding Strap Locations

Using an ohmmeter, check the resistance between the protective ground lug of the ac line cord and each unit frame in the set. Resistance should not be more than 0.5 ohms. Use R X I scale.



3. OFF-LINE CHECKOUT

Preliminary Checks

Before turning on any equipment, check the following:

a. Are all circuit cards and cable connectors fully seated?
b. Are all fuses in place?
c. Are all cabinet lids and pedestal doors closed?
d. Do all printers have paper and ribbon properly installed?
e. Is the set connected to a properly grounded ac service?
f. Have the set options been installed and are they properly recorded?

Testing C400 Station

1. The first test to be performed is the self-test of the C400 logic cards.
2. The next test to perform is the local test.
3. Perform component operational check.

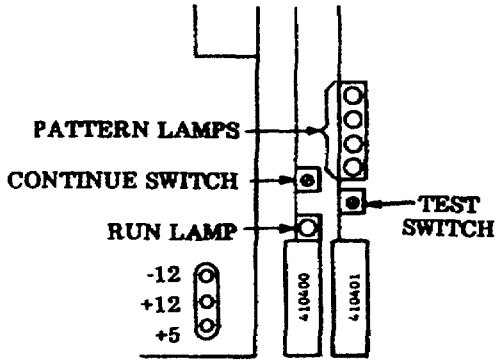
C. TESTING (Cont)

3. OFF-LINE CHECKOUT (Cont)

40C400 Self-Test Procedures

Refer to Pages 7-8 through 7-11, Controller Arrangement Forms.

For the self-test program to properly test the 410408 circuit card, the card must be programmed for the ITA5 code, isochronous mode with one stop bit (factory option).



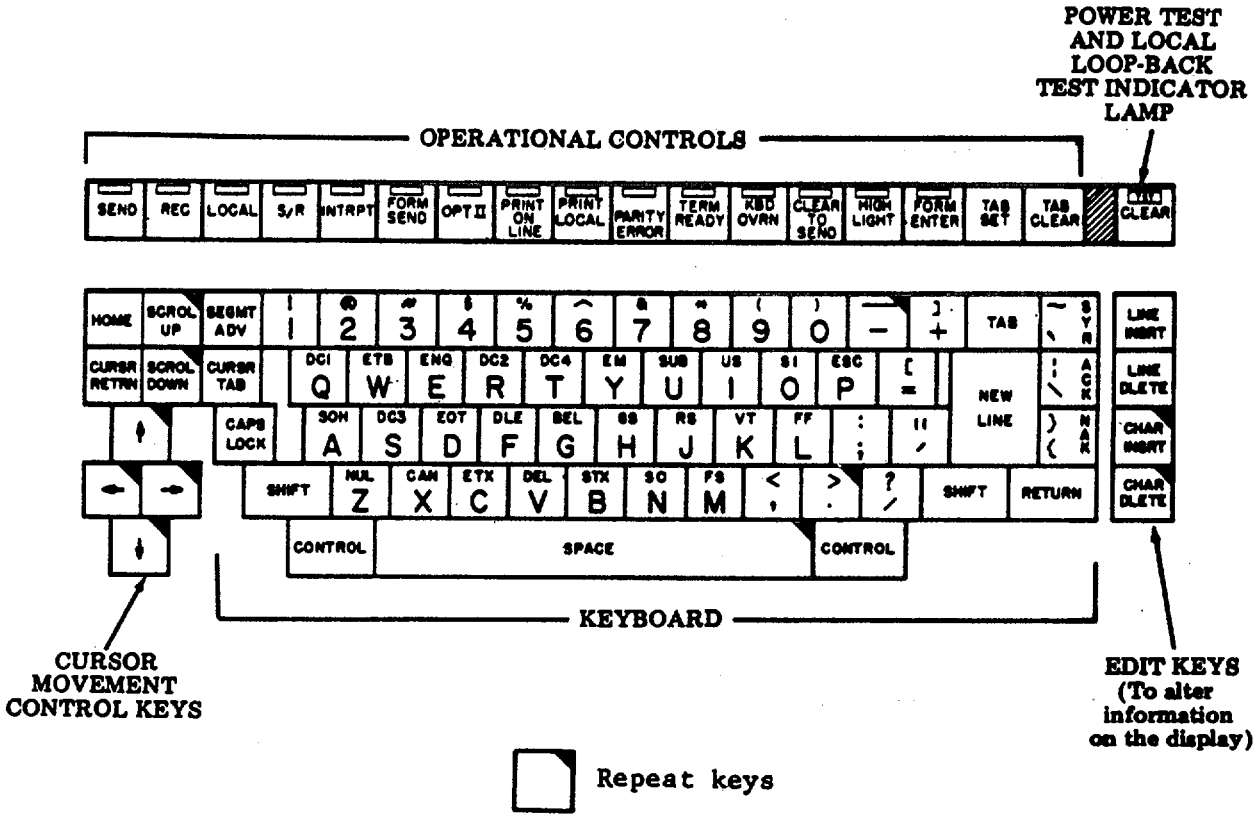
STEP	PROCEDURE	CORRECT RESPONSE	ANALYSIS
1	Apply power to controller.	All PSU voltage lamps lit. Run lamp lit	40PSU103
2	Depress and hold test switch.	All pattern lamps light.	410401, 410400, 40PSU103
3	Release test switch.	Refer to Controller Arrangement Form. If continue pattern exists depress continue switch. After 1-2 minutes, pattern lights blink sequentially. Pattern lamps should extinguish (approximately 15 seconds).	Refer to Controller Arrangement Form
4	If this is a KD or KDP, check monitor.	The display pattern corresponding to 410433 circuit card used. Sample displays follow.-	410433 circuit card associated with monitor.
	*NORMAL NUL SOH STX ETX EOT ENQ ACK BEL BS HT LF VT FF CR SO SI DLE DC1 DC2 DC3 DC4 NAK SYN ETB CAN EM SUB ESC FS GS RS US UNDERLINED ! " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? HALF @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\ ] ^ _ INTENSIFIED ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ DEL Display Pattern for a 410433 D I/0 Circuit Card		
5	To return 40C400 to normal operating mode, push continue switch	Keyboard is unlocked. Cursor in home position on monitor	

Off-Line Checkout Procedures

Terminals

Keytop Layout

The location of the various control and data keys referred to in the checkout procedures can be found in the following illustration.



C. TESTING (Cont)

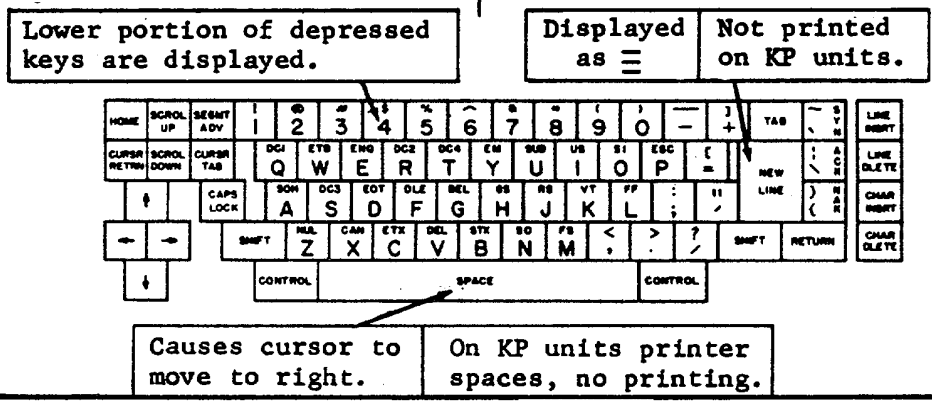
3. OFF-LINE CHECKOUT, Off-Line Checkout Procedures, Terminals (Cont)

NOTE:
When set is equipped with 40C430/ABD/025 controller, the REC lamp lights immediately when power is turned on. When set is equipped with 40C430/AAT/017 controller, the LOCAL lamp lights immediately when power is turned on.

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
1	Depress RETURN and ESC P simultaneously with additional force, and then release.	TST CLEAR lamp lights(brightly) momentarily indicating power supply to opcon	PART 6 POWER SUPPLY, wiring,
2	Depress RETURN and simultaneously with additional force, and then release	TST CLEAR lamp lights(brightly) and remains lit indicating loop-back test mode is activated. NOTE: Occasionally the operational lamps may flash on and then off, or alarm bell may sound when loopback test mode is activated. If this occurs, clear the test by depressing RETURN and ESC P beyond their normal stop, and re-enter test mode.	PART 5 OPCON
a.	Place opcon into the caps mode by depressing and latching CAPS LOCK.		
b.	Depress the following keys while observing lamps for proper indication.		

Depress Keys	Function	Lamp Condition
A	SEND	ON
CONTROL and A (SOH)	SEND	OFF
C	REC	ON
CONTROL and C (ETX)	REC	OFF
D	LOCAL	ON
CONTROL and D. (EOT)	LOCAL	OFF
G	S/R	ON
CONTROL and G (BEL)	S/R	OFF
F	INTRPT	ON
CONTROL and ACK	INTRPT	OFF
E	FORM SEND	ON
CONTROL and E (ENQ)	FORM SEND	OFF
B	OPT II	ON
CONTROL and B (STX)	OPT II	OFF

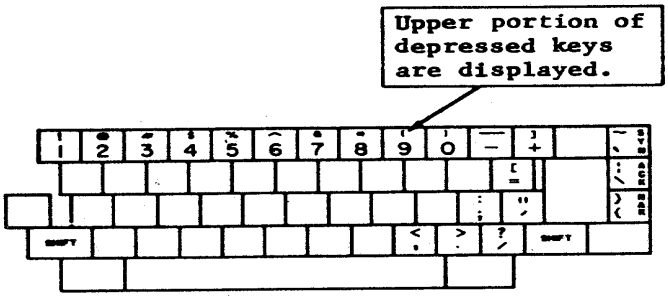
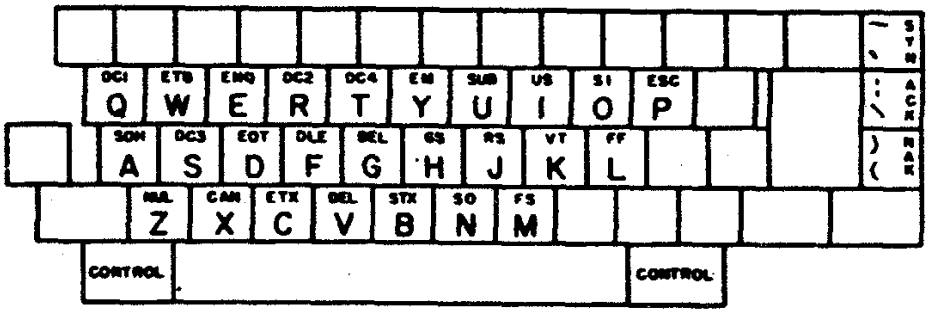
STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS	
2b. (Cont)	J	PRINT ON LINE	ON	
	NEW	PRINT ON LINE	OFF	
	O	PRINT LOCAL	ON	
	CONTROL and O (SI)	PRINT LOCAL	OFF	
	N	PARITY ERROR	ON	
	CONTROL and N (SO)	PARITY ERROR	OFF	
	M	TERM READY	ON	
	RETURN	TERM READY	OFF	
	L	KBD OVRN	ON	
	CONTROL and L (FF)	KBD OVRN	OFF	
	K	CLEAR TO SEND	ON	
	CONTROL and K (VT)	CLEAR TO SEND	OFF	
	I	HIGH LIGHT	ON	
	TAB	HIGH LIGHT	OFF	
	H	FORM ENTER	ON	
	← (Cursor Left)	FORM ENTER	OFF	
	→ (Cursor Right)	REC	≥FLASH≤	
	CONTROL and C (ETX)	REC	OFF	
	CURSR RETRN	S/R	≥FLASH≤	
	CONTROL and G (BEL)	S/R	OFF	
	↓ (Cursor Down)	OPT II	≥FLASH≤	
	CONTROL and B (STX)	OPT II	OFF	
	CLEAR	PRINT ON LINE	≥FLASH≤	
	NEW LINE	PRINT ON LINE	OFF	
	LINE DLETE	TERM READY	≥FLASH≤	
	RETURN	TERM READY	OFF	
	LINE INSRT	KBD OVRN	≥FLASH≤	
	CONTROL and L (FF)	KBD OVRN	OFF	
	HOME	FORM ENTER	≥FLASH≤	
	← (Cursor Left)	FORM ENTER	OFF	
c.	Depress Return and ESC P simultaneously with additional force, and then release.	TST CLEAR 1 lamp extinguishes and return opcon to normal operating mode.		
3	Home the cursor and depress LOCAL. Then depress each key on the keyboard portion of opcon four or five times.	On KD's and KDPs check monitor for character; on KP's check printer		PART 5 OPCON

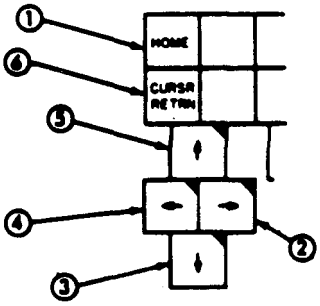
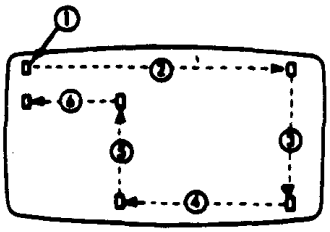


C. TESTING (Cont)

3. OFF-LINE CHECKOUT, Off-Line Checkout Procedures, Terminals (Cont)

Checkout Procedures, Terminals (Cons)

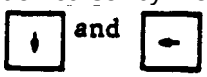
STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
4	Disengage CAPS LOCK by depressing it again momentarily. Again depress each key on keyboard portion of opcon four or five times	Alpha characters described in Step 3 are displayed in lower case (de, abcdef, etc) (if 410433 circuit card is driving monitor) or printer is an AB arrangement. On AA printer arrangements lower case characters will be printed as upper case.	PART 5 - OPCON.
5	Depress left SHIFT together with each nonalpha key (ie,!#$, ect) on keyboard portion of apron.		
			
6	. Depress right SHIFT together with one of the keys depressed in Step	The character on upper portion of depressed key is displayed	
7	KD OR KDP ONLY Depress left CONTROL together with keys containing control characters four or five times each. **NOTE**: On terminals equipped with 40C430/ M AAT/017 controller, ENQ, US, SYN, ACK, EOT, DLE and NAK cannot be generated from the opcon.		
			

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
8	Depress right CONTROL together with one of the keys depressed in Step 7.	The corresponding control character is displayed	
9	Depress , and SPACE with additional force than is normally required.	The SPACE key repeatedly moves the cursor.	
	STEPS 10 THROUGH 58 PERTAIN TO KD AND KDP TERMINAIS ONLY.		
10	Depress HOME. Then in sequence depress momentarily with more force than normally required, each cursor movement key shown. 		PART 5 OPCON PART 7 CONTROLLER LOGIC PART 4 - DISPLAY MONITOR
11	Home the cursor and type alpha characters A through J on the display. Place the cursor over character E and depress CHAR INSERT momentarily; then depress it fully releasing it after characters atop moving	□ **ABCDEFGHIJ**□ **ABCDEFGHIJ** **ABCD**□ **FGHJ** **ABCD**□ **EFGHIJ**	
12	Depress CHAR DLETE momentarily; then depress it fully -	**ABCD**□ **EFGHIJ** **ABCD**□ **EFGHIJ** **ABCD E FGHIJ** **ABCD F GHIJ** **ABCD G HIJ**	
13	Depress LINE INSRT once.	Cursor moves to beginning of line, and the line of data moves down one line.	
14	Depress LINE DLETE once; then depress CLEAR	The line of data moves up, and then display is cleared of all characters.	

C. TESTING (Cont)

3. OFF-LINE CHECKOUT, Off-Line Checkout Procedures, Terminals (Cont)

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
15	Place the cursor away from home position and depress TAB	Cursor moves to first character position of next line (unformatted display).	
16	Place the cursor away from home position and depress TAB.	Cursor moves to first character position of next line	
17 .	Depress BDMe and numeric 1.	Numeric 1 is displayed in home position	
18	Depress NEW LINE 24 times.	Cursor moves down display, displaying new line character at 1st position of each line. On the 24th depression of NEW LINE, the numeric 1 will disappear from display.	
19 .	Type a numeric 2 and depress NEW LINE 24 times	The numeric 2 will move up one line each time NEW LINE is depressed. On the 24th depression of the NEW LINE, the numeric 2 will disappear from screen.	
20	Type a numeric 3.	A numeric 3 is displayed.	
21	Depress HDME.	The cursor moves to the home position and a 1 is displayed under the cursor.	
22	Depress SEGHT ADV.	Cursor does not move, a 2 is displayed under cursor.	
23	Depress SEGMT ADV again.	The cursor does not move, the 2 is replaced by the 3 under the cursor.	
24	Depress SEGMT ADV again.	The cursor does not move, the 3 is replaced by the 1 under the cursor.	
25	Depress SCROL UP once.	The 1 disappears from the display and the 2 appears at bottom left of display.	

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
26	Depress SCROL UP fully.	The 2, then the 3 move up the display. Scrolling stops when the 3 reaches top of display.	
27	Depress SCROL DOWN once, then fully.	The 3 moves down one line, then moves down continuously and disappears as the 2 appears at top of display. Scrolling continues until the 1 appears at top of display.	
28	Depress SEGMT ADV twice.	First the 2 then the 3 appear at top of display.	
29	Position cursor by means of the  to next to the last line of display. Type some Us on this line.	Cursor moves under direction of cursor control key. Us are displayed. .	
30	Depress LINE INSRT once.	The Us move to last line of display. The cursor moves to the 1st character position of the line next to last line of display.	
31	Depress LINE INSRT several times.	Display does not change.	
32	Home cursor and depress TAB . CLEAR.	All tab marks (on all segments) are cleared	
33	Depress HIGH LIGHT.	HIGH LIGHT lamp lights.	
34 . .	Enter a full line of *s at top of display	*s are displayed as intensified Alarm sounds at 73rd and 80th character positions Cursor remains at right end of line.	
35	Depress HIGH LIGHT again.	HIGH LIGHT lamp extinguishes.	
36	Depress LINE INSRT.	Cursor moves to left margin, and highlighted *s move down one line.	

C. TESTING (Cont)

3. OFF-LINE CHECKOUT, Off-Line Checkout Procedures, Terminals (Cont)

STEP	PROCEDURE	RESULTS	TROUBIE ANALYSIS
37	Depress FORM ENTER.	FORM ENTER lamp lights.	
38.	Enter a full line of Us at top of display	Us are displayed at half-intensity (protected). Alarm sounds at 73rd and 80th character positions. Cursor remains at right end of line.	
39	Depress LINE INSRT.	Cursor moves to left margin and lines of *s and Us both move down one position. Cursor remains in home position.	
40	Depress CLEAR.	Screen is cleared.	
41	Depress FORM ENTER.	FORM ENTER lamp extinguishes.	
42	Enter message in lines 1 through 9 of display. (Procedure is indicated on Page 9-31.)	Message appears as shown on Page 9-31. (To observe protected spaces, increase monitor brightness and note that all protected data has darker background than unprotected data.)	
43	Depress CHAR INSRT fully and hold until movement stops.	Word QUICK in line 1 moves to tab column and stops. No other characters affected	
44	Depress CHAR DLETE twice.	Word QUICK in line 1 moves two positions left. No other characters affected.	
45	Depress TAB.	Cursor moves to tab column. Tab symbol (· ▸) appears at original position of cursor. All characters passed over by cursor are erased from display.	

Protected data displayed at half-intensity.

NOTE:
Depress each key once unless number of depressions is indicated in parentheses.

LINE 1

Type QUICK
Depress SPACE (5)
Depress TAB SET
Type UNPROTECTED
Depress SPACE (2)
Depress FORM ENTER
Type PROTECTED
Depress FORM ENTER
Depress SPACE (8)
Depress FORM ENTER
Depress NEW LINE
Depress FORM ENTER

LINE 2

Type QUICK
Depress FORM ENTER
Depress SPACE (4)
Type UNPROTECTED
Depress SPACE (2)
Depress FORM ENTER
Type PROTECTED
Depress FORM ENTER
Depress SPACE (7)
Depress FORM ENTER
Depress NEW LINE

LINE 3

Type INSERT
Depress SPACE until cursor is one character to the left of new line symbol in line 2.
Depress FORM ENTER
Depress NEW LINE
Depress FORM ENTER

LINES 4 AND 5

Depress Cursor Right (⟶) until cursor is under new line symbol.
Depress NEW LINE

(Repeat for line 5)

LINE 6

Depress Cursor Right (⟶-) until cursor is at about 23rd character position.
Depress FORM ENTER
Depress NEW LINE
Depress FORM ENTER

LINE 7

Type MDDEL
Depress SPACE
Type 40

LINE 8

Depress CURSR RETRN
Depress Cursor Down (⇩) twice.
Depress HOME

LINE 9

Depress FORM ENTER
Type PROTECTED
Depress FORM ENTER

C. TESTING (Cont)

3. OFF-LINE CHECKOUT, Off-Line Checkout Procedures, Terminals (Cont)

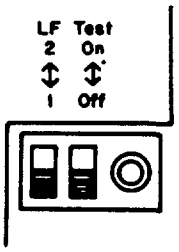
STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
46	Depress CHAR INSRT fully and hold until movement stops.	Word UNPROTECTED moves two positions to right, stopping when it reaches word PRO TECTED. No other characters affected.	
47	Depress CHAR DLETE fully and hold until movement stops.	Word UNPROTECTED is moved left and completely erased No other characters affected	
48	Depress TAB.	Cursor moves to second character position after word PROTECTED. Tab symbol → appears at original position of cursor.	
49	Depress Space once, then depress it fully.	Cursor moves to character position preceding protected new line symbol. Alarm sounds continuously, and cursor dbes not advance beyond this position.	
50	Depress TAB.	Cursor moves to second space after protected word QUICK in line 2.	
51	Depress CURSR TAB three times.	Cursor moves to tab mark on first depression Cursor moves to the second space following word PROTECTED on second depression. Cursor moves to beginning of word INSERT in line 3 on third depression. No characters altered in any way.	
52	Depress LINE INSRT three times.	Word INSERT moves down two lines and stops. Rest of display does not change.	

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
53	Position cursor over M in word MODEL, then depress LINE INSRT twice.	Words MDDEL 40 move down one position and stop	
54	Move cursor over P at beginning of line 9, and type some miscellaneous characters. character space with each key depression.)	Alarm sounds each time a key is depressed. (No characters can overwrite a protected character. Cursor moves one	
55 .	Depress HOME, CLEAR, then TAB CLEAR	Cursor goes to home position. All unprotected characters and tab columns are cleared. Protected characters remain on display.	
56	Depress FORM ENTER.	FORM ENTER lamp lights.	
57 .	Depress CLEAR.	All characters are cleared from display	
58	Depress FORM ENTER.	FORM ENTER lamp extinguishes	

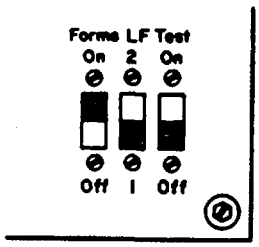
Printer (ROP, KP and KDP)

Preliminary Instructions

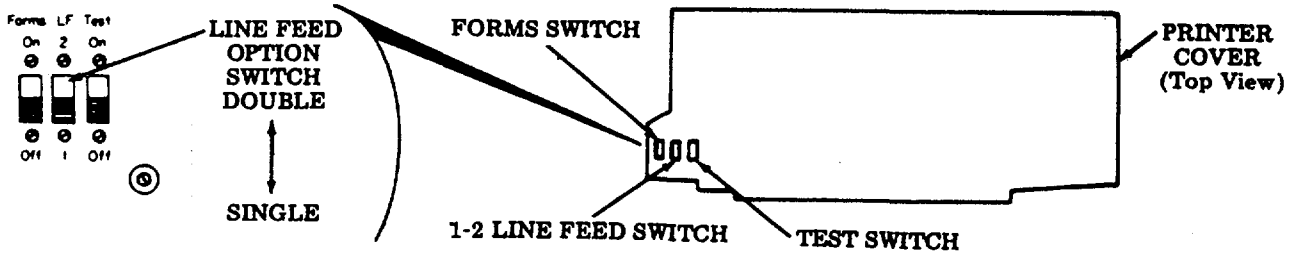
(1) Ribbon and paper should be loaded.
(2) The switches (top right of printer, cabinet cover raised) should be placed in the following positions:
LF -- 1
Test -- Off
Forms (tractor feed only) -- On
(3) Close cabinet cover.
(4) Perform Steps 1 through 9 of checkout procedure.



Friction Feed



80-Column Tractor Feed



132-Column Tractor Feed

C. TESTING (Cont)

3. OFF-LINE CHECKOUT, Off-Line Checkout Procedures, Printer (ROP, KP and KDP) (Cont)

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
1	Momentarily depress PAPER button (red) on printer cabinet cover.	Paper feeds out as long as button is depressed.	PART 2 or 3 PRINTER
2	TRACTOR FEED PRINTER ONLY Depress and release FORM ADVANCE button (black) on printer cabinet cover.	Paper feeds out until first line of next form is reached, then stops.	
3	Unlatch and raise printer cabinet cover.	TERM READY lamp extinguishes.	
4	Raise cover interlock switch to maintenance position.		
5	Set test switch to ON, allow printer to print several lines, then turn test switch OFF.	Printer turns on and prints font identification symbol $\frac{A}{A}$ OR $\frac{A}{B}$ repeatedly until switch is turned off.	
6	FRICTION FEED PRINTER Lift paper roll to simulate a paper alarm. Lower paper roll, guide paper through window, and close cabinet cover. TRACTOR FEED PRINTER Tear off next form under pedestal top, then depress PAPER button on printer cabinet cover until last form passes through printer. Reload forms, guide first form through window, and close cabinet cover.	LOW PAPER lamp lights. LOW PAPER lamp extinguishes. PAPER lamp lights. PAPER lamp extinguishes.	

STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
7	ROP SET ONLY Place a line of Es on top and bottom lines of display. Depress PRINT LOCAL and while cursor is moving through third or fourth line depress PRINT LOCAL again.	PRINT LOCAL lamp lights. Cursor moves through line of Es at top of display, returns to left, and moves through lines of spaces (blank lines). Printer prints line of Es. NOTE 1: Printing may occur in all 80 character positions or some Es may be carried over to next line, depending on Option 17. Printer line feeds but does not print for each line of spaces. When PRINT LOCAL is depressed again, PRINT LOCAL lamp extinguishes and printer stops. NOTE 2: Printer may or may not feed out 16 lines of paper before turning off, depending on Option 18.	
8	ROP SET ONLY Depress TEST key.	TEST key locks in down position and lights. TERM READY lamp extinguishes. Printer starts printing U*U* pattern if ITA5 code was programmed or RYRY pattern if ITA2 code was programmed. Printer will continue to print pattern until TEST key is depressed again.	

C. TESTING (Cont)

3. OFF-LINE CHECKOUT, Off-Line Checkout Procedures, Printer (ROP, KP and KDP) (Cont)

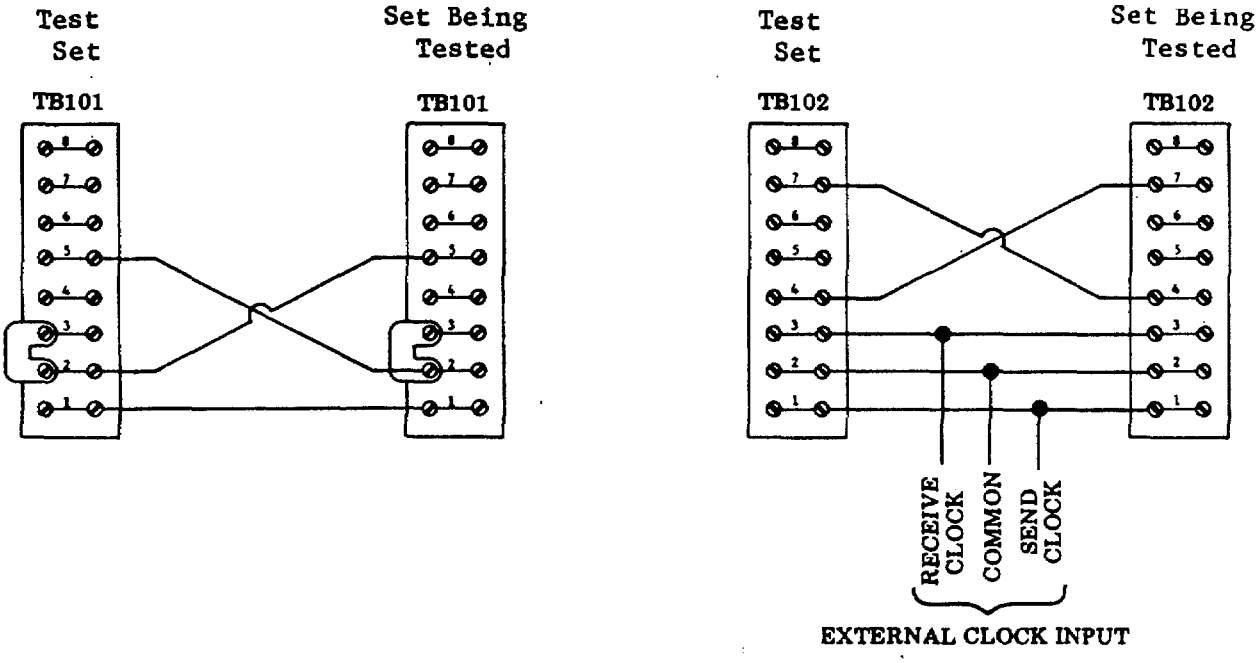
STEP	PROCEDURE	RESULTS	TROUBLE ANALYSIS
9	Depress TEST key again.	TEST key unlatches, lamp extinguishes. Printer stops printing and turns off. TERN READY lamp lights.	

4. BACK-TO-BACK CHECKROUT

If a system is not available for on-line checkout of the set, it is desirable to use a back-to-back checkout of the set. When using the back-to-back checkout procedure, a separate functional KDP Set (referred to as test set) is required. The test set and the unit under test must be optioned for the same type of operation (i.e., 8-level code, asynchronous operation, etc). Refer to Page 9-36, Connections for Back-to-Back Checkout for connections between the test set and the set under test. The cabling between the sets must be supplied locally.

NOTE: If isochronous mode is to be tested, an external 188C bit clock must also be provided.

Connections for Back-to-Back Checkout



NOTE: External clock input required when testing in isochronous mode.

Back-to-Back Checkout Procedure

The back-to-back checkout consists of preparing a message on the test set and sending it to the set under test. If the set under test has a send capability, a message should be sent from the set under test to the test set. Should troubles arise refer to Part 8, Interface Troubleshooting.

To check out terminal ready output and clear to send input of the set under test perform the following procedures.

STEP	PROCEDURE	RESULTS
1	Depress TERM READY keytop on test set.	TERM READY lamp on test set extinguishes, CLEAR TO SEND lamp on set under test lights.
2	Depress TERM READY keytop on test set again.	TERM READY lamp on test set lights, CLEAR TO SEND lamp on set under test extinguishes.
3	Depress TERM READY keytop on set under test.	TERM READY lamp on set under test extinguishes, CLEAR TO SEND lampoon test set lights.
4	Depress TERM READY keytop on set under test again.	TERM READY lamp on set under test lights, CLEAR TO SEND lamp on test set extinguishes.

D. TROUBLESHOOTING

1. GENERAL

To use the troubleshooting information, always start with Analysis Question 1 and follow the indicated procedure to the directive which specifies proceeding to the component troubleshooting. Then follow the specific component troubleshooting indicated (i.e., power supply, display monitor, opcon, etc) starting with Question 1 to isolate and correct the trouble by replacing the indicated defective component.

If replacement of the part or subcomponent indicated in the component troubleshooting does not correct the trouble, replace the next higher order of component (i.e., fuse, power distribution assembly, display monitor, or entire terminal).

When installing a replacement component, make certain that all options (if present) in this component are implemented for proper set operation.

Where more than one component is specified for replacement, they should be substituted one at a time in the order specified. The original component should be replaced if the trouble is not corrected before making the next indicated substitution.

D. TROUBLESHOOTING (Cont)

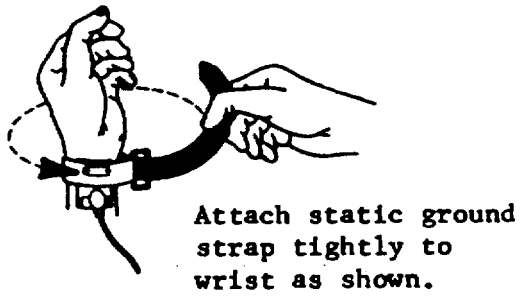
1. GENERAL (Cont)

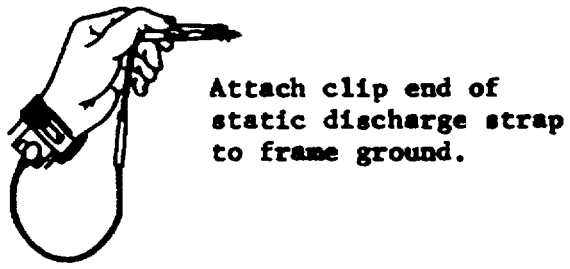
Once the trouble has been corrected, the terminal should be checked out to be sure that it is performing properly. Refer to Page 9-21, 3. OFF-LINE CHECKOUT.

The following caution procedures must be observed when troubleshooting a Tempest Model 40 Set.

CAUTION 1: TURN OFF ALL POWER OR SIGNAL SOURCES BEFORE REDOVING OR REPLACING ANY COMPONENT.

CAUTION 2: TO AVOID POSSIBLE INTERNAL DAMAGE TO CIRCUITRY, WEAR A 346392 STATIC DISCHARGE STRAP CONNECTED TO GROUND TO ALIOW STATIC DISCHARGE BEFORE HANDLING CIRCUIT CARDS FOR REM)VAL OR REPLACEMENT. AVOID TOUCHING CIRCUIT LANDS OR COMPONENTS AS MUCH AS POSSIBLE.





To locate components, circuit cards, connectors, test switches, indicator lamps and other elements indicated in the troubleshooting information, refer to appropriate unit parts.

For wire color codes, cable, connector, and other wiring indicated for continuity checks etc, in troubleshooting, refer to wiring diagrams in applicable wiring diagram packages.

The following test equipment is required for troubleshooting the components.

- Volt-Ohm-Milliameter, Triplett Model 630 APL or equivalent
- Oscilloscope, Tektronic Model 7904 e/w:
  2 -- 7A16A Single Trace Amplifiers
  1 -- 7B70 Time Base Unit

2. SET ANALYSIS

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
1. Does set have a display monitor?	Go to 2.	Go to 17.

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
2. Does LOCAL lamp on opcon light when power is turned on? (On sets with 40C430/AAT/017 controller.) Does REC lamp on opcon light when power is turned on? (On sets with 40C430/ABD/025 controller.)	Go to 5.	Go to 3.
3. Do fans turn when power is turned on?	Go to 4.	Check ac to fan. Refer to wiring diagram. Refer to PART 7 -- CONTROLLER LOGIC. Power cable connected. Power switch on. AC present at fan assembly connector.
4. Are all three LED indicators in power supply on?	Go to PART 5 -- OPCON. Go to PART 7 -- CONTROLLER LOGIC.	Go to PART 6 -- POWER SUPPLY.
5. Is 15 red DRIVE lamp (in display monitor) on?	Go to 6.	Go to PART 4 -- DISPLAY MONITOR.
6. Is I7 red PILOT lamp (next to fuse on power distribution assembly in display monitor) on?	Go to 7.	Go to PART 4 -- DISPLAY MONITOR.
7. With monitor OFF/ON control switch ON (CCW) and operator brightness control to full intensity (CCW) is raster visible?	Go to 9.	Go to 8.
8. Is I6 HIGH VOLTAGE lamp in display monitor on?	Check Master Brightness adjustment (Page 4-63). Go to 9.	Go to PART 4 -- DISPLAY MONITOR.

D. TROUBLESHOOTING (Cont)

2. SET ANALYSIS (Cont)

ANALYSIS QUISTION	"YES" RESPONSE DIRECTIVE	'"NO" RESPONSE DIRECTIVE
9. Is cursor displayed on monitor?	Go to 10.	Go to PART 4 -- DISPLAY MONITOR. Go to PART 7 -- CONTROLLER LOGIC.
10. In local mode, can data (including editing functions) be inputed from the opcon to display monitor on all segments?	Go to 11.	Go to PART 5 -- OPCON. Go to PART 4 -- DISPLAY MONITOR. Go to PART 7 -- CONTROLLER LOGIC.
11. Are characters displayed on display monitor distorted?	Go to PART 4 -- DISPLAY MONITOR. Go to PART 7 -- CONTROLLER LOGIC.	Go to 12.
12. Do characters displayed on display monitor correspond to those generated from opcon?	Go to 13.	Go to PART 7 -- CONTROLLER LOGIC. Go to PART 5 -- OPCON.
13. Does set have a printer?	Go to 14.	Go to 16.
14. Does printer respond properly when the PRINT LOCAL key is depressed?	Go to 16.	Go to 15.
15. Does type carrier symbol (- or) or (=-_ or iA) print in every column when printer TS9 test switch is on and printer cover is closed or TS5 interlock switch is in maintenance position?	Go to 16.	Go to PART 2 -- 80-COLUMN PRINTERS or PART 3 -- 132-COLUMN PRINTER.
16. Does set perform properly on-line?	Place in service.	Go to PART 7 -- CONTROLLER LOGIC.
17. Does set have a full opcon and printer?	Go to 18.	Go to 29.
18. Does REC lamp light when power is turned on?	Go to 21.	Go to 19.

ANALYSIS QUESTION	"'YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
19. Do fans turn when power is turned on?	Go to 20.	Check ac to fan. Refer to wiring diagrams. Refer to PART 7 -- CONTROL-LER LOGIC. Controller power cable connected. Power switch on. AC present at fan assembly connector.
20. Are all three LED indica-tors in power supply on?	Go to PART 7 -- CONTROLLER LOGIC.	Go to PART 6 -- PCWER SUPPLY.
21. Depress LOCAL key. Does REC lamp extinguish and LOCAL lamp light?	Go to 22. LOGIC.	Go to PART 5 -- OPCON. Go to PART 7 -- CONTROLLER
22. Do characters generated on opcon appear on printer? NOTE: Control charac-ters and editing key function will have no effect on printer.	Go to 24.	Go to 23.
23. Does type carrier symbol (-: or or)r (j-: or m-) print in every column when printer TS9 test switch is on and printer cover is closed or TS5 interlock switch is in maintenance position?	Go to PART 5 -- OPCON. Go to PART 7 -- CONTROLLER LOGIC.	Go to PART 2 -- 80-COL-UMN PRINTERS or PART 3 -- 132-COLUMN PRINTER.
24. Depress SEND key. Does LOCAL lamp extinguish and SEND and REC lamps light?	Go to 25. LOGIC.	Go to PART 5 -- OPCON. Go to PART 7 -- CONTROLLER
25. Is CLEAR TO SEND lamp on?	Go to 26.	Go to 28.
26. Is clear-to-send input on? (+6 V on terminal board TB102 of interface assembly.)	Go to PART 8 -- INTERFACE.	System must turn on CTS or remove card in card con-nector Z4 of interface. Go to 27.

D. TROUBLESHOOTING (Cont)

2. SET ANALYSIS (Cont)

ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"'NO" RESPONSE DIRECTIVE
27. Is half-duplex strap installed in interface? (Strap between TBLO1, terminals 2 and 3 in interface.)	Go to 28.	If system permits, temporarily add strap. Go to 28.
28. In send mode, do characters generated on opcon appear on printer?	Place in service. LOGIC.	Go to PART 7 -- CONTROLLER Go to PART 8 -- INTERFACE.
29. Does TERM READY lamp light when power is turned on with paper in printer and printer cover closed?	Go to 32.	Go to 30.
30. Do fans turn when power is turned on?	Go to 31.	Check ac to fan. Refer to wiring diagrams. Refer to PART 7 -- CONTROLLER LOGIC. Power cable connector. Power switch on. AC present at fan assembly connector.
31. Are all three LED indicators in power supply on?	Go to PART 5 -- OPCON. Go to PART 7 -- CONTROLLER LOGIC.	Go to PART 6 -- POWER SUPPLY.
32. Depress TEST key. Does TERM READY lamp extinguish, TEST key latch down and lamp light, and printer start printing U*U*, if ASCII or RYRY, if Baudot?	Go to 34.	Go to 33.

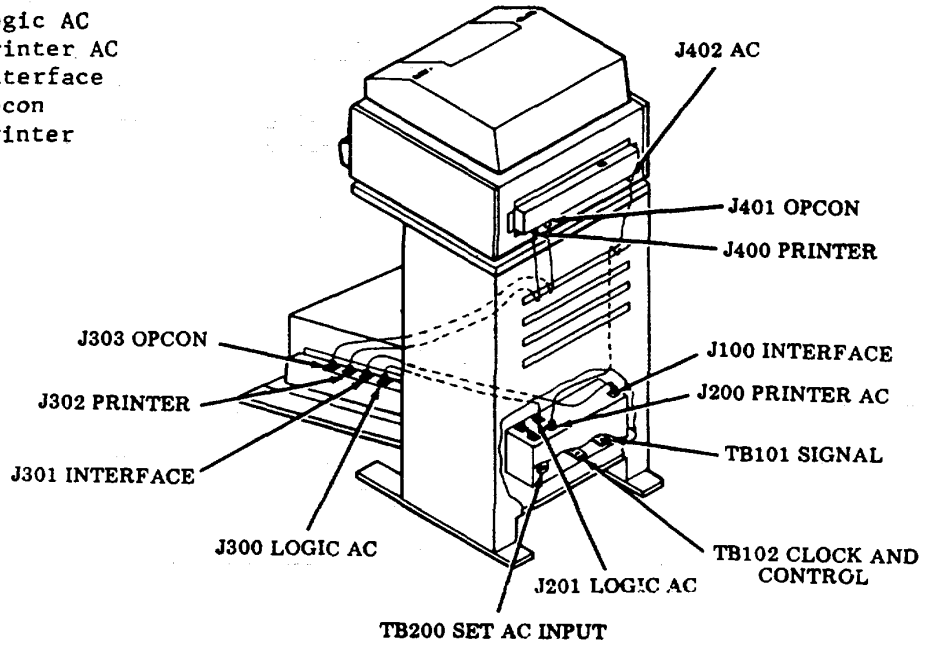
ANALYSIS QUESTION	"YES" RESPONSE DIRECTIVE	"NO" RESPONSE DIRECTIVE
33. Does type carrier symbol (or _:-or r (---, -or a-) print in every column when printer TS9 test switch is on and printer cover is closed or TS5 interlock switch is in maintenance position?	Go to PART 7 -- CONTROLLER LOGIC.	Go to PART 2 -- 80-COLUMN PRINTERS or PART 3 -- 132-COLUMN PRINTER.
34. Depress TEST key again. Does TEST key release, TEST extinguish, and TERM READY lamp light?	Go to 35.	Go to PART 7 -- CONTROLLER LOGIC.
35. Does set receive on-line signals correctly?	Place in service.	Go to PART 7 -- CONTROLLER LOGIC. Go to PART 8 -- INTERFACE.

E. CABLE INTERCONNECTION

1. CABLING FOR ROP (80 AND 132 COLUMN)

Cables Required

405710 Logic AC
405711 Printer AC
405780 Interface
405781 Opcon
405785 Printer

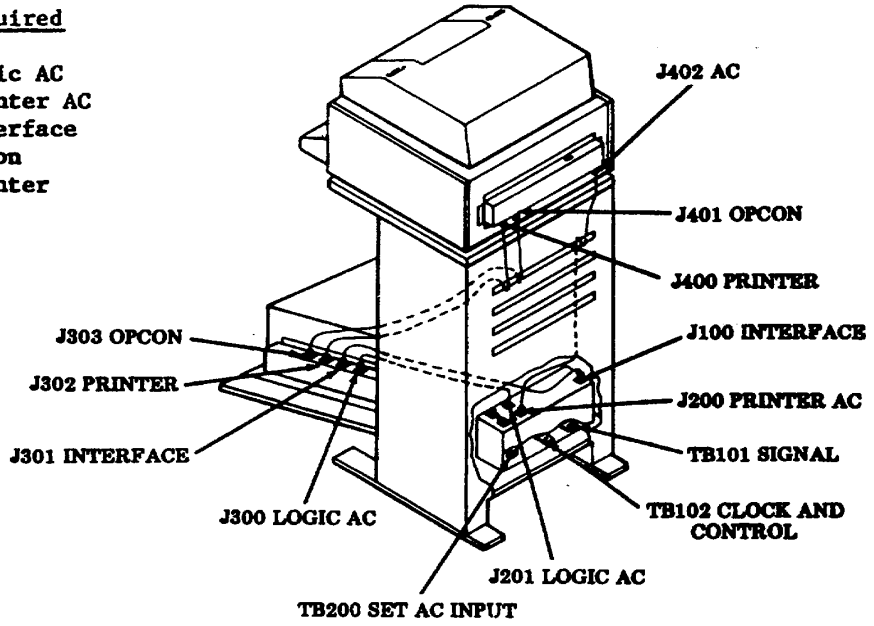


E. CABLE INTERCONNECTION (Cont)

2. **CABLING FOR KP**

Cables Required

405710 Logic AC
405711 Printer AC
405780 Interface
405781 Opcon
405785 Printer

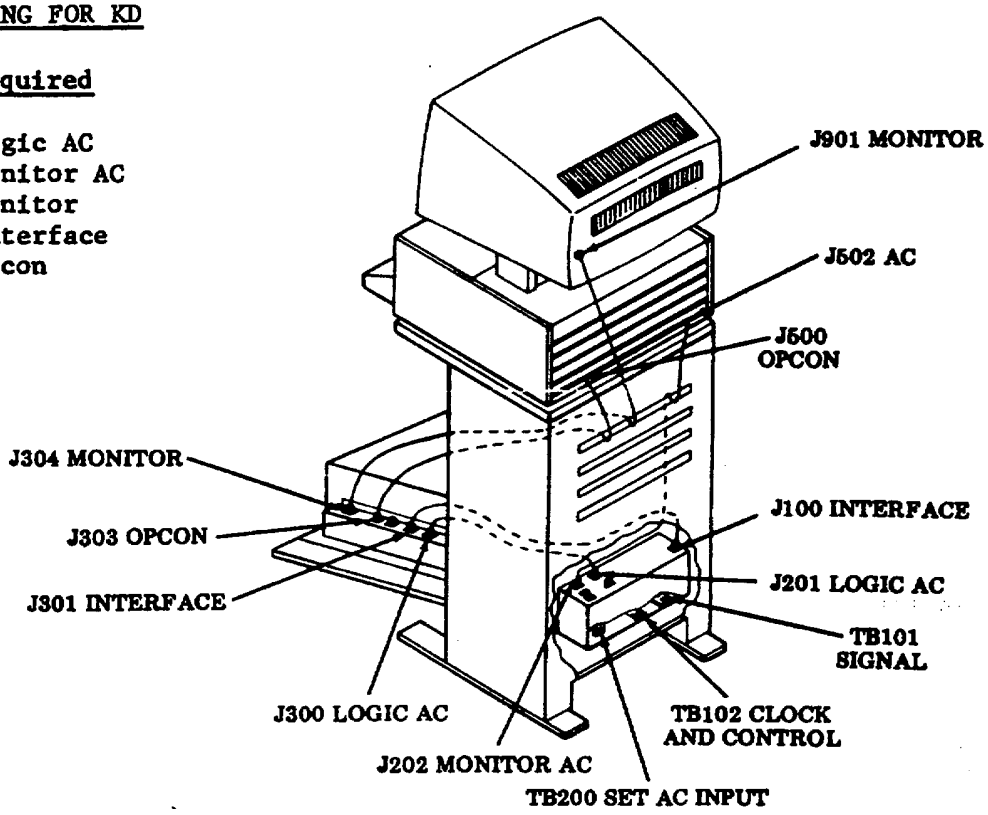


3. **CABLING FOR KD**

3. CABLING FOR KD

Cables Required

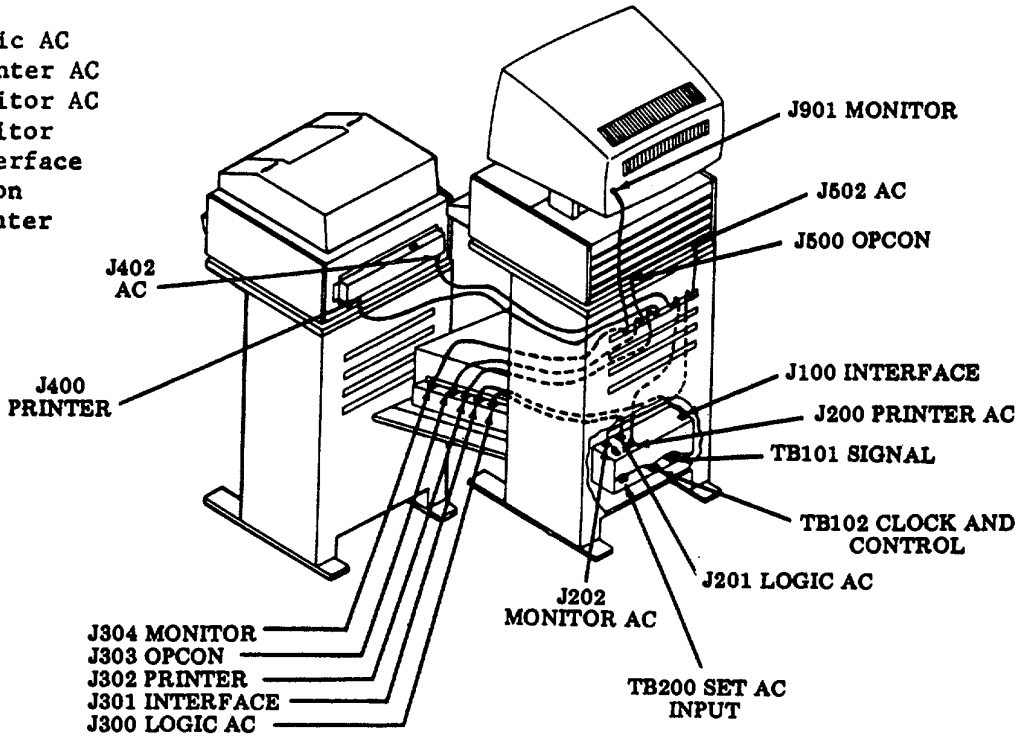
405710 Logic AC
405712 Monitor AC
402236 Monitor
405780 Interface
405782 Opcon



4. CABLING FOR KDP -- TRACTOR FEED PRINTER

Cables Required

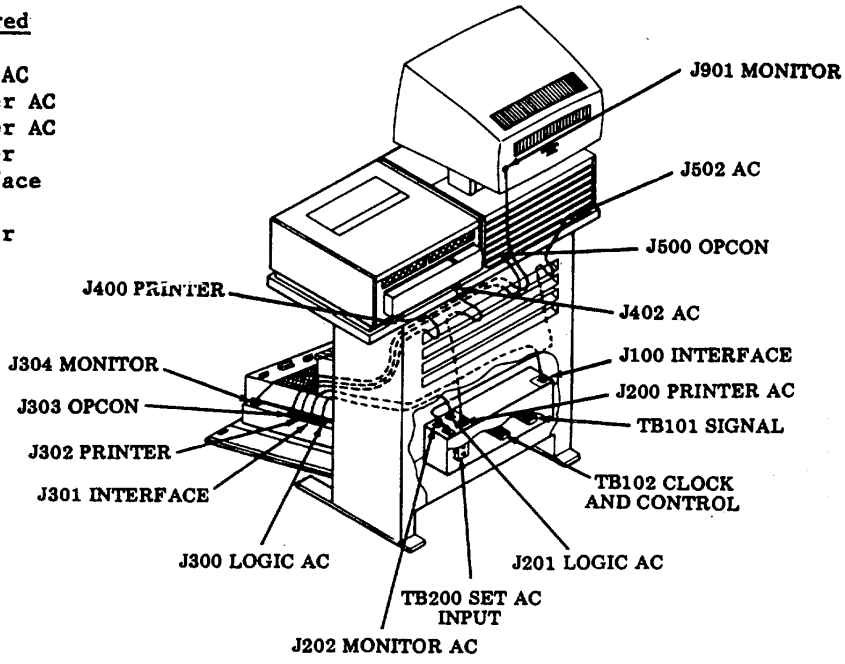
405710 Logic AC
405711 Printer AC
405712 Monitor AC
402236 Monitor
405780 Interface
405782 Opcon
405785 Printer



5. CABLING FOR KDP -- FRICTION FEED PRINTER

Cables Required

405710 Logic AC
405711 Printer AC
405712 Monitor AC
402236 Monitor
405780 Interface
405782 Opcon
405785 Printer



PART 10 -- MASTER COMPONENT PARTS LIST

This part is a combination of the part numbers contained in the individual component parts lists located at the end of Parts 2 through 8. All part numbers are included in this listing except those which are considered general hardware (i.e. screws, washers, nuts, retaining rings, etc). See individual component parts lists for part numbers, descriptions and page numbers of general hardware.

NOTE: When ordering replaceable components, unless otherwise specified, prefix each part number with the letters "TP" (i.e., TP410055).

PART NO.	DESCRIPTION AND PAGE NO.
315M	Coil, Magnet 2-280, 3-107
2836	Spring 2-286, 287, 3-109
6800	Screw, 6-40 Shoulder 5-82
8449	Spacer, .094" Thk 2-276, 285, 8-58
22746	Spring 2-283
41385	Spring 2-289, 3-110
55089	Spring 2-263, 3-84, 107
70885	Washer, Spring 2-289, 3-110
73404	Wrench, Tommy 2-253
74707	Spring 4-100
76296	Spring 4-84, 94
76804	Spring 2-290, 3-111
76966	Setscrew, 10-32 2-274, 275, 3-104
78596	Washer, Friction 2-282
78824	Spring 2-297, 3-113
80403	Screw, Shoulder 2-280, 3-107
82463	Spring 2-290, 3-111
82861	Spring 2-288
84226	Spring 4-91
87402	Spring 2-282, 305
90684	Spacer 3-104
91577	Spring 2-284
97462	Screw, 6-40 Shoulder 8-63
101386	Spring 2-280, 3-107
110438	Spring 2-265, 278, 3-90, 106
111342	Spring 2-275, 277, 3-104, 105
114215	Post, Spring 2-283
116783	Holder, Fuse 8-82
118748	Screw, 6-32 Self-Tapping 2-293
120166	Fuse, 2 Amp 2-291
121409	Washer, Insulating 2-271
123973	Spring 2-278, 3-106
124223	Screw 6-40 Shoulder 2-288
124244	Washer, Felt 2-305
124681	Setscrew, 6-40 2-239, 241, 274, 275, 3-92
125124	Screw, 4-40 Shoulder 4-95
125239	Spring, Compression 8-58
125258	Spring 5-73
125268	Spring 2-286, 287, 3-109
129919	Fuse, SL-BL 4 Amp 2-293
138031	Bushing, Insulating 2-288
138034	Plate, Clamp 2-297, 3-113
140306	Fuse 3-112
143306	Fuse, SL-BL 1 Amp 2-293, 3-88
147877	Terminal, Receptacle Type 3-112
150029	Wick, Felt 2-280, 3-107
150241	Spring 2-280, 3-107
150904	Block, Right Paper Spindle 2-288
151395	Spring 2-258, 273
151565	Bushing, Shoulder 2-297, 3-113
151634	Bearing, Ball 2-276, 277, 3-105
151827	Strap, Terminal 8-81
151939	Grommet, Rubber 2-292
152426	Nut, 6-40 Self-Locking 8-82
152445	Spring, Compression 2-289
152760	Stud 8-83
153484	Screw, 6-32 Special 2-291, 292
153803	Jumper, 5" Slate 2-291
154047	Post, Spring 2-281, 3-108
154156	Grommet, Rubber 4-98
154249	Screw, No. 8B Self-Tapping 8-65, 66, 68
154697	Grommet, Rubber 2-293, 3-112
155752	Sleeve, 5/64 ID x 1/2" Lg Insulating 8-82
156833	Drum Assembly, Clutch 2-280, 3-107
160396	Pliers, Retaining Ring 2-243
163536	Spacer, .562" Thk 2-292
164427	Clip, Capacitor 2-291, 293
173907	Spacer 3-104
173979	Head, Hammer 16B 2-283
177113	Insulator 2-293, 294, 3-88, 112
178306	Relay, Power 2-264, 291, 292, 293
180675	Screw, #6 Self-Tapping 6-52, 53

PART 10 -- MASTER COMPONENT PARTS LIST (Cont)

PART NO.	DESCRIPTION AND PAGE NO.
180714	Screw, #6 Self-Tapping 4-92, 6-54
181266	Bushing, Insulator 3-88
181523	Spring 4-85
181707	Nut, Speed 4-92
181721	Connector, 12 Pt Plug Type 4-92
181842	Nameplate 2-291
181999	Insulator 2-293
182182	Holder, Fuse 2-291, 293, 3-88, 112
182523	Clamp, 1-3/8" ID Mounting 2-292, 8-82
182648	Connector, 12 Pt Receptacle Type 4-93, 94
182726	Terminal, Receptacle Type 8-69
185677	Terminal, Receptacle Type 3-112, 4-93, 94
186749	Bolt w/Cap 8-76
186823	Screw, 8-32 Shoulder 8-64, 65, 74
188230	Spring, Compression 2-275, 3-104
188483	Arm, Stop 8-63
192269	Nut, Speed 6-46
192557	Grommet, Rubber 8-67, 75
194873	Disc, 6 Stop Adjusting 2-280, 3-107
194956	Spring 2-280, 3-107
195245	Sleeve, 1/2 ID x 1-1/2" Lg Insulating 8-82
195272	Screw, 6-40 Special 4-82, 92
196740 thru 196774	Pallet, Type 2-303
196778	Pallet, Type 2-303
300124	Switch 8-59
300214	Filter 7-37
305355	Terminal 6-58
306085	Board, Terminal 6-56
310646	Diode 8-82
310751	Insulator, Terminal Block 8-81
310752	Block, Terminal 8-81
311763	Mount, Vibration 8-66, 73
312042	Connector, 4 Pt Plug 6-51
312315	Thumbscrew, '6-40 2-276
312829	Strap, 2-1/2" Braided 8-50
312918	Strap 3-108
315946	Connector, 6 Pt Receptacle 5-76
318630	Jumper, 6-1/8" Braided 8-77
318821	Bushing, Insulating 2-293, 294, 3-112
318822	Transistor 4-90, 96
318835	Transistor 2-293, 294, 3-79, 88, 112
318845	Jumper 2-270, 279, 291, 4-91
320119	Spacer, .497" Thk 8-63
320416	Terminal, Ring Type 3-112
320418	Terminal, Ring Type 2-293, 3-88, 100, 112
320420	Terminal, Ring Type 3-112
320421	Terminal, Ring Type 3-112
323846	Pad, Transistor Mounting 6-57
324142	Connector, 3 Pt Plug 7-37, 8-53, 59
324148	Label 8-79
324612	Fan 7-32, 38
325163	Connector, 6 Pt Receptacle 5-77, 78
325218	Washer, Insulating 2-293, 294, 3-112
325938	Connector, 3/4" 90 Degree 8-77
325959	Insulator, Terminal Block 8-81
325961	Block, Terminal 8-81
326270	Connector, 15 Pt Circuit Card 8-82
326553	Spacer 5-77, 78
326594	Transistor 8-82
327444	Capacitor, 2 MFD 8-59, 83
327954	Retainer, Split Ring 4-96, 6-50, 54
328282	Fan 2-239, 241, 274, 275, 3-92
328378	Washer, Insulating 8-82
328678	Jumper w/Terminal 7-33
328793	Capacitor, .001 MFD 4r85, 86, 8-82
330299	Clip, Speed 2-288
332167	Clamp 2-276, 277, 3-105
332378	Shoe, Secondary Clutch 2-280, 3-107
332379	Shoe, Primary Clutch 2-280, 3-107
332860	Bumper 8-76
333588	Lamp, 28 V Miniature 8-68
334187	Inductor 8-59, 83
334233	Bar, Pry 2-280, 3-107
334422	Bushing, Shoulder 8-82
335123	Switch, Pushbutton 8-68

PART 10 -- MASTER COMPONENT PARTS LIST (Cont)

PART NO.	DESCRIPTION AND PAGE NO.
400033	Shim 2-272
400034	Shim 3-102
400039	Spacer 2-278, 3-106
400043	Shaft Assembly, Impeller 2-255, 272
400062	Collar 2-278, 3-106
400063	Nut, Adjusting 2-278, 3-106
400065	Gear, 24T 2-278, 3-106
400075	Ring, Retainer 2-278, 3-106
400079	Retainer 2-278, 3-106
400081	Bank Assembly, Armature 2-249, 250, 251, 252, 273
400090	Armature 2-273
400093	Rod 2-258
400098	Screw, Shoulder 2-273
400101	Bank Assembly, Hammer 2-246, 247, 248, 273
400112	Bumper 2-257
400115	Screw, Stop 2-272, 3-101
400116	Rod, Wear 2-258, 273
400121	Gear, 57T 2-276, 277, 3-105'
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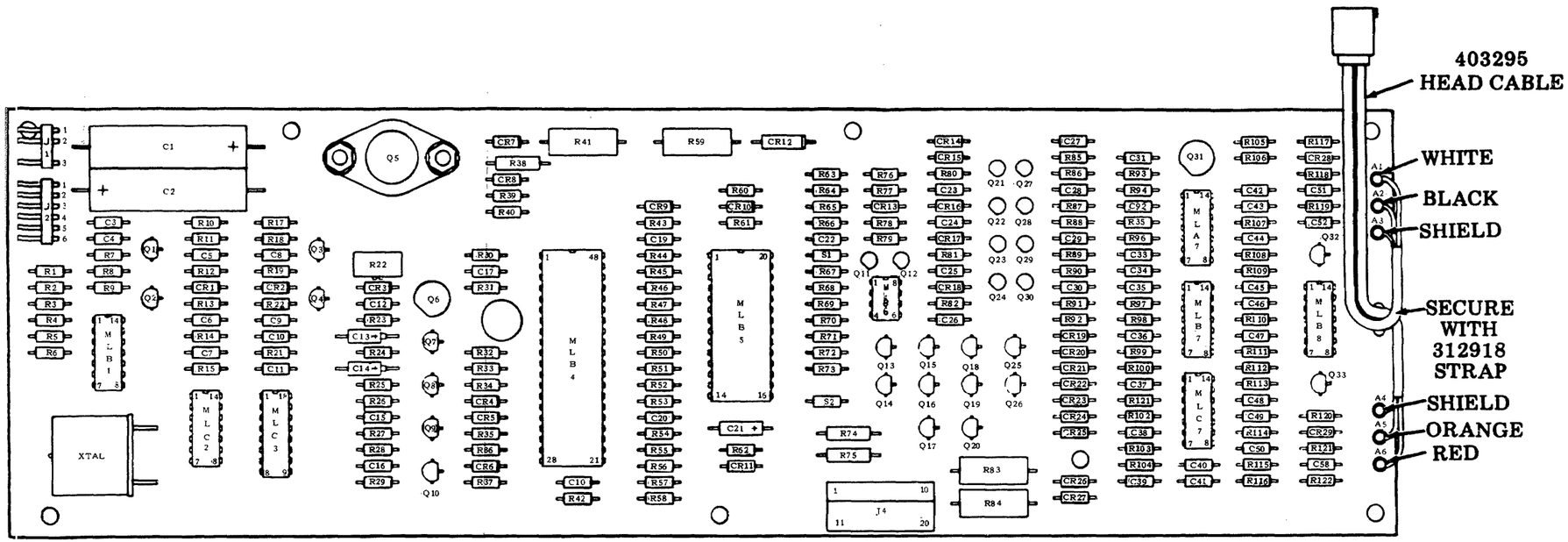
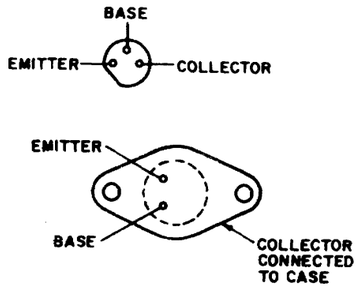
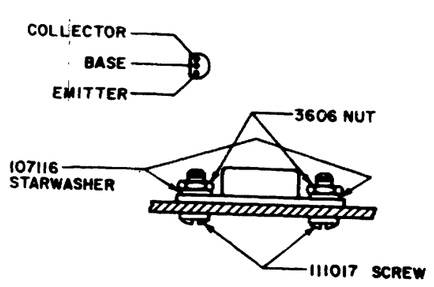
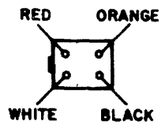


BOTTOM VIEW OF TRANSISTORS





END VIEW OF HEAD CABLE



D. TROUBLESHOOTING (Contd)

5. CIRCUIT CARD ANALYSIS .(410764) (Contd)

REF. DESIG.	PART NO.	REQ.	QTY	DESCRIPTION	REF. DESIG.	PART NO.	REQ.	QTY	DESCRIPTION	REF. DESIG.	PART NO.	REQ.	QTY	DESCRIPTION	REF. DESIG.	PART NO.	REQ.	QTY	DESCRIPTION
MLB1	404239	2	QUAD VOLTAGE COMP.	R51,R52				SAME AS R39	C5	325834	9	CAPACITOR.120PF	CR23,24				SAME AS CR19
MLC2	339388	1	QUAD 2-INPUT NOR	R53				SAME AS R39	C6,C7	485686	2	CAPACITOR..05MFD+80-20%	CR25,26				SAME AS CR19
MLC3	339022	1	DUAL J-K FLIP FLOP	R54				SAME AS R8	C8,C9			SAME AS C5	CR27				SAME AS CR19
MLB4	402279	1	INTERFACE LOGIC	R55,R56				SAME AS R26	C10	321518	1	CAPACITOR.68PF	CR28,29				SAME AS CR1
MLB5	406603	1	CONTROL LOGIC	R57,R58				SAME AS R26	C11,C12			SAME AS C3					
MLB6	404555	1	TIMER	R59	327793	1	RESISTOR.18 OHM.3W.1%	C13	318921	1	CAPACITOR..022MFD	S1,S2	336470	2	STRAP		
MLA7	337347	8	DUAL OPERATIONAL AMP.	R60,R61	315955	2	RESISTOR.2.2K.1/4W	C14	318929	1	CAPACITOR.1.0MFD	Q1,Q2	325076	4	TRANSISTOR.2N3646		
MLB7			SAME AS MLA7	R62			SAME AS R31	C15,C16			SAME AS C5	Q3,Q4			SAME AS Q1		
MLC7			SAME AS MLA7	R63,R64			SAME AS R16	C17	346351	1	CAPACITOR.10PF ±5%	Q5	337348	1	TRANSISTOR.2N5740A		
MLB8			SAME AS MLB1	R65,R66			SAME AS R16	C18,C19			SAME AS C3	Q6	325077	1	TRANSISTOR.2N4355		
				R67,R68			SAME AS R16	C20	388857	6	CAPACITOR..01MFD±20%	Q7,Q8	341638	3	TRANSISTOR, 2N3728		
				R69,R70			SAME AS R16	C21	337335	1	CAPACITOR.15MFD	Q9,Q10	321517	4	TRANSISTOR, 2N3642		
R1,R2	315950	2	RESISTOR.2.7K.1/4W	R71,R72			SAME AS R16	C22	315976	7	CAPACITOR.470PF ±20%	Q11,Q12	323934	10	TRANSISTOR.2N3565		
R3	315986	6	RESISTOR.6.1K.1/4W	R73			SAME AS R16	C23,C24			SAME AS C5	Q13,Q15	315938	5	TRANSISTOR.2N3568		
R4	320707	2	RESISTOR.12K.1/4W	R74	137498	1	RESISTOR.180 OHM.1/2W	C24			SAME AS C20	Q14,Q16	333241	4	TRANSISTOR,2N4401-5		
R5,R6	315957	5	RESISTOR.3.3K.1/4W	R75	388255	1	RESISTOR.120 OHM.1/2W	C25			SAME AS C3	Q17,Q18			SAME AS Q13		
R7,R9			SAME AS R5	R76	315960	1	RESISTOR.5.6K.1/4W	C27,C28			SAME AS C20	Q19,Q20			SAME AS Q14		
R8	320275	19	RESISTOR.10K.1/4W	R77,R79	338643	3	RESISTOR.56K.1/4W	C29,C30			SAME AS C20	Q21,Q22			SAME AS Q11		
R10,R11			SAME AS R8	R78			SAME AS R4	C31	335801	6	CAPACITOR.22PF	Q23,Q24			SAME AS Q11		
R12,R13	315954	10	RESISTOR.1.5K.1/4W	R80,R81			SAME AS R8	C32			SAME AS C22	Q25			SAME AS Q13		
R13,R20	315948	4	RESISTOR 100 OHM.1/4W	R82	315974	3	RESISTOR.300K.1/4W	C33,C34			SAME AS C3	Q26			SAME AS Q7		
R14,R15			SAME AS R8	R83,R84	381767	2	RESISTOR.75 OHM.1W	C35,C37			SAME AS C31	Q27,Q28			SAME AS Q11		
R16	315989	12	RESISTOR.33K.1/4W	R85,R87	326599	4	RESISTOR.36 OHM.1/4W	C36,C38			SAME AS C22	Q29,Q30			SAME AS Q11		
R17,R18			SAME AS R8	R86,R88			SAME AS R3	C39,C40			SAME AS C3	D31	315931	1	TRANSISTOR.2N3638		
R21	320705	1	RESISTOR.330 OHM.1/4W	R89,R91			SAME AS R85	C41,C45			SAME AS C5	Q32,Q33			SAME AS Q9		
R22	341666	1	RESISTOR,VARIABLE .10K	R90,R92			SAME AS R3	C42,C43			SAME AS C3						
R23	315959	1	RESISTOR 4.7K.1/4W	R93,101	333418	2	RESISTOR.68K.1/4W	C43			SAME AS C31						
R24	323148	1	RESISTOR 10K.1/4W	R94,R98			SAME AS R12	C44,C47			SAME AS C22		403412	1	SOCKET,DIP(40 PIN)		
R25	326573	1	RESISTOR 1.8 MEG.1/4W	R95,R96	328273	8	RESISTOR.7.5K.1/4W	C46,C49			SAME AS C31		406869	1	SOCKET,DIP(28 PIN)		
R26,R29	315959	8	RESISTOR 6.8K.1/4 W	R97,R99			SAME AS R55	C50			SAME AS C22						
R27			SAME AS R12	R100,113			SAME AS R26	C51,C53	323141	2	CAPACITOR.680PF	XTAL	406605	1	CRYSTAL,1.792 MHz		
R28	321213	1	RESISTOR 1K.1/4W	R102			SAME AS R12	C52			SAME AS C3						
R30,R33			SAME AS R8	R103,104			SAME AS R55					A1-A8	137471	6	LUG,TERMINAL		
R31,R32	321508	3	RESISTOR 100K.1/4 W	R105			SAME AS R77										
R34			SAME AS R1	R106,109			SAME AS R8	CR1,CR2	197464	17	DIODE.1N4148	J1	405690	1	HEADER.BERG.3 TERM.		
R35,R37			SAME AS R13	R107,114			SAME AS R82	CR3,CR4			SAME AS CR1	J2	405691	1	HEADER.BERG.6 TERM.		
R36			SAME AS R12	R108,111			SAME AS R12	CR5,CR6			SAME AS CR1						
R38	182188	1	RESISTOR.200 OHM.1/2W	R110,112			SAME AS R55	CR7	312922	1	DIODE,ZENER.1N4733A.5.1V.1W	J4	406110	1	HEADER.BERG.19 TERM.		
R39,R40	335408	9	RESISTOR 15K.1/4 W	R115,117			SAME AS R8	CR8	346713	1	DIODE,ZENER.1N4746A.18V.1W						
R41	194953	1	RESISTOR.120 OHM.3W	R116			SAME AS R12	CR9,10			SAME AS CR1		403295	1	CABLE,HEAD		
R42			SAME AS R16	R118,121	328826	2	RESISTOR.3.9K.1/4W	CR11			SAME AS CR1		111017	2	SCREW 6-40X.312 P.. HD		
R43	333413	1	RESISTOR.22K.1/4W	R119			SAME AS R8	CR12	341735	1	DIODE,ZENER.1N5348B.9.1V.5W		107116	2	STARWASHER		
R44			SAME AS R5	R120,122			SAME AS R8	CR13,14			SAME AS CR1		3606	2	NUT,6-40 HEX		
R45	333414	1	RESISTOR 27K 1/4W					CR15,16			SAME AS CR1		312918	1	STRAP, CABLE		
R46	320706	1	RESISTOR 10K 1/4W					CR17,18			SAME AS CR1		409764	1	BOARD ETCHED CIRCUIT		
R47,R48			SAME AS R39	C1, C2	401?-2	2	CAPACITOR.250MFD-50-10%	CR19,2?	312341	9	DIODE, IN4224		144495	3	PAD,TRANSISTOR		
R49,R50			SAME AS R39	C3,C4	405324	14	CAPACITOR..1MFD+80-20%	CR21,22			SAME AS CR19						

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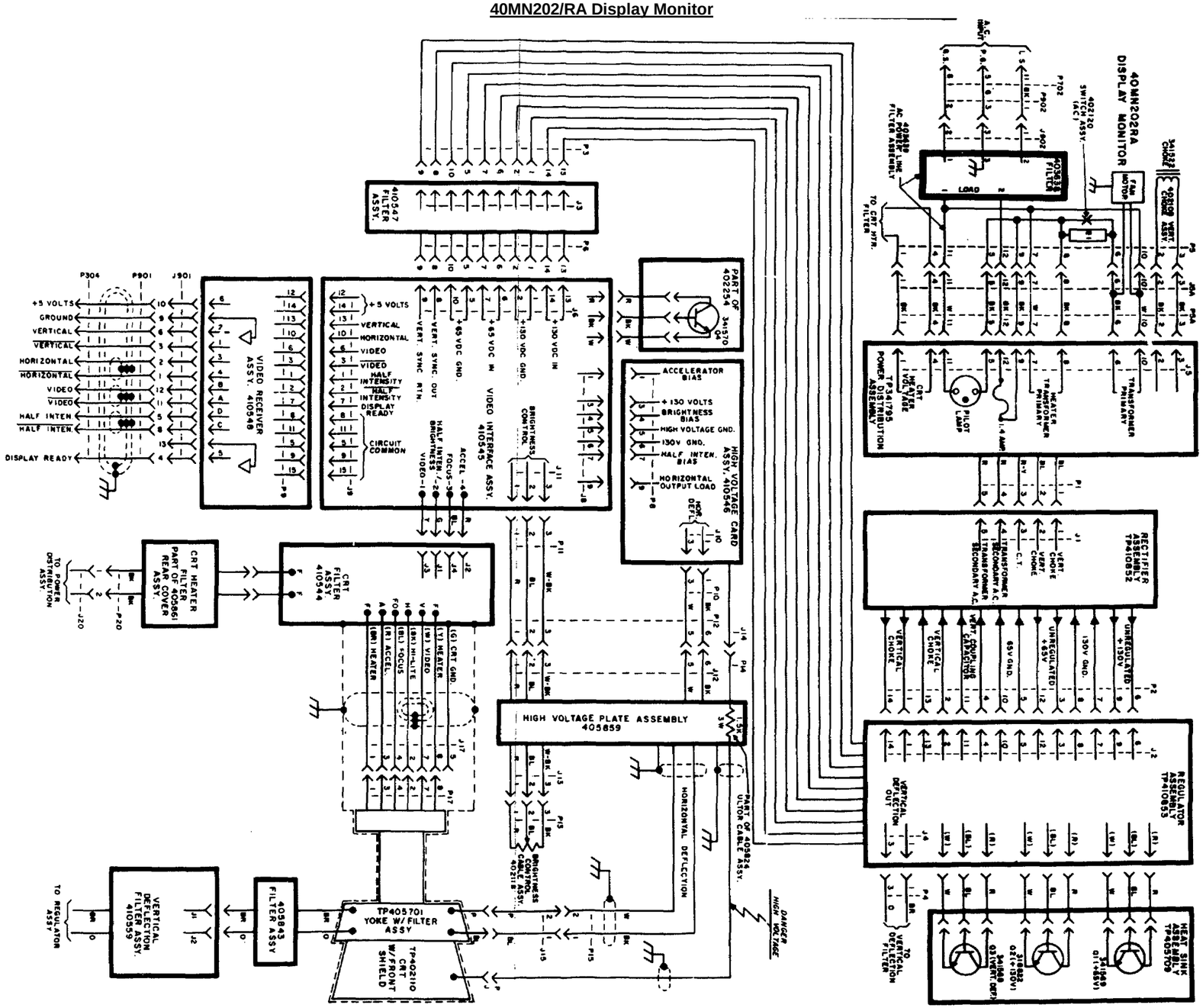
40MN202/RA Display Monitor



E. ADJUSTMENTS AND LUBRICATION

1. ADJUSTMENTS

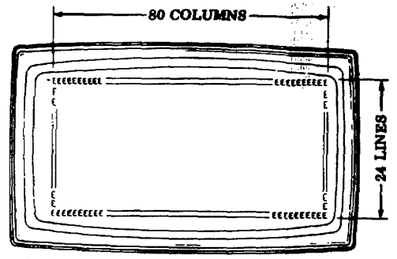
Preliminary

Display monitor electrical adjustments are made in conjunction with a full edit Tempest Model 40 KD Set or a Display Monitor Test Set as described on Page 4-13,

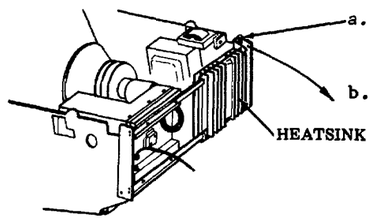
C. TESTING

Before making any of the following electrical adjustments allow approximately 10 minutes of warmup time.

The majority of electrical adjustments require a displayed test pattern consisting of "E" characters derived from the KD set, or " ⊡ " characters derived from the test set, in all positions around the perimeter of the display.

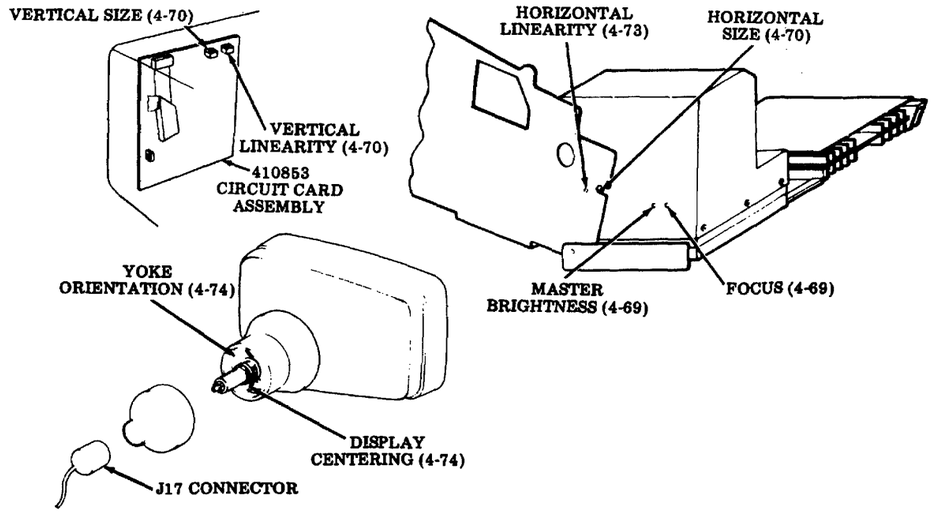


Electrical adjustments are made with monitor housing removed and rear heatsink lowered to a horizontal position.



CAUTION: WEAR SAFETY GLASSES WHEN MONITOR HOUSING IS REMOVED, AND OBSERVE ALL SAFETY PRECAUTIONS TO AVOID ACCIDENTAL ELECTRICAL SHOCK OR BREAKAGE OF THE CATHODE RAY TUBE.

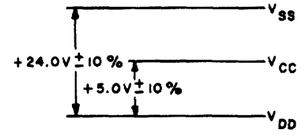
The number indicated in parentheses after each adjustment title designates the page covering the adjustment requirements and procedure.



Circuit Notes -- 40K108 Opcon

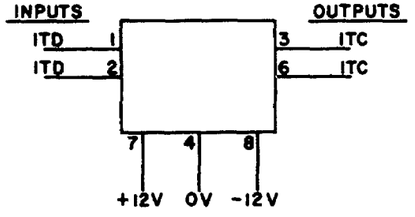
1. Supply Voltages:

   The following voltages are measured in respect to VGG1 (OV).



2. Signal Voltages:

The input signal for pins 1 and 2 is a differential voltage of 1.4 V ±.8 V P-P.
The output signal for pins 3 and 6 is a differential voltage of 1.6 V ± 6 V P-P.



Information Notes - All 40KXXX KD Opcons

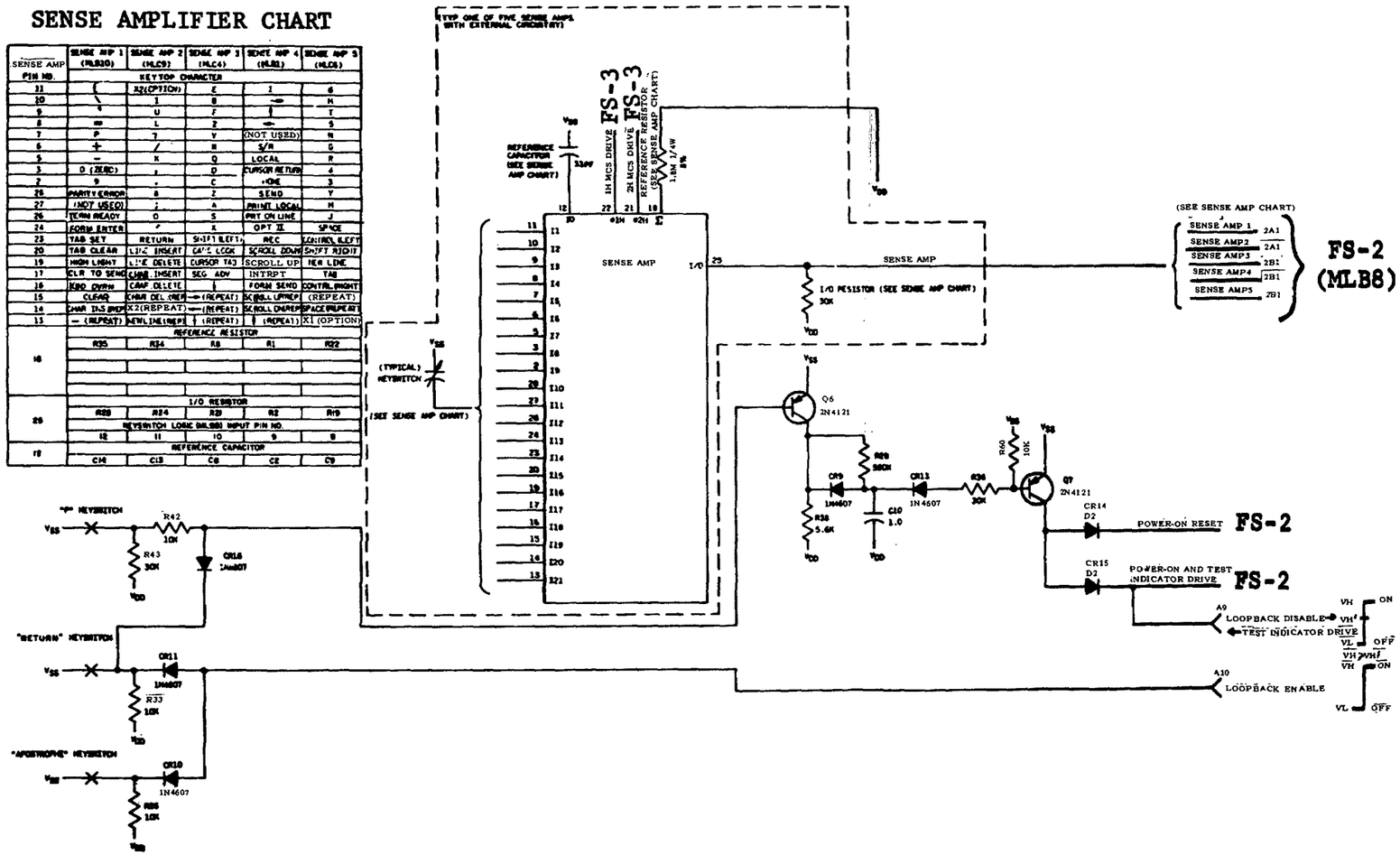
ABBREVIATIONS:

AE--	ASSRESS ENABLE
CREF--	REFERENCE CAPACITOR
DE--	DATA ENABLE
DEP--	DEPRESSION
EOS--	END OF SCAN
I--	NPUT
I/O--	INPUT/OUTPUT
INIT--	INITIALIZE
ITC--	INFORMATION TO CONTROLLER
ITD--	INFORMATION TO DEVICE
KL--	KEYSWITCH LOGIC
LD10--	LAMP DRIVER INPUT OUTPUT
L.LPBK--	LOCAL LOOPBACK
MOS --	METAL-OXIDE SILICON CIRCUIT PACK
MR--	MASTER RESET
NUM--	NUMERIC CLUSTER
OE--	OUTPUT ENABLE
P-P--	PEAK TO PEAK
PNC--	PRESENT NEXT CHARACTER
POR--	POWER ON RESET
ROM--	READ ONLY MEMORY
RREF--	REFERENCE RESISTOR
SCA--	SEND CHARACTER AVAILABLE
SI--	SERIAL INTERFACE
ST--	STRAP, WIRE
--	SUMMATION
TKL--	TELETYPE KEYSWITCH LOGIC

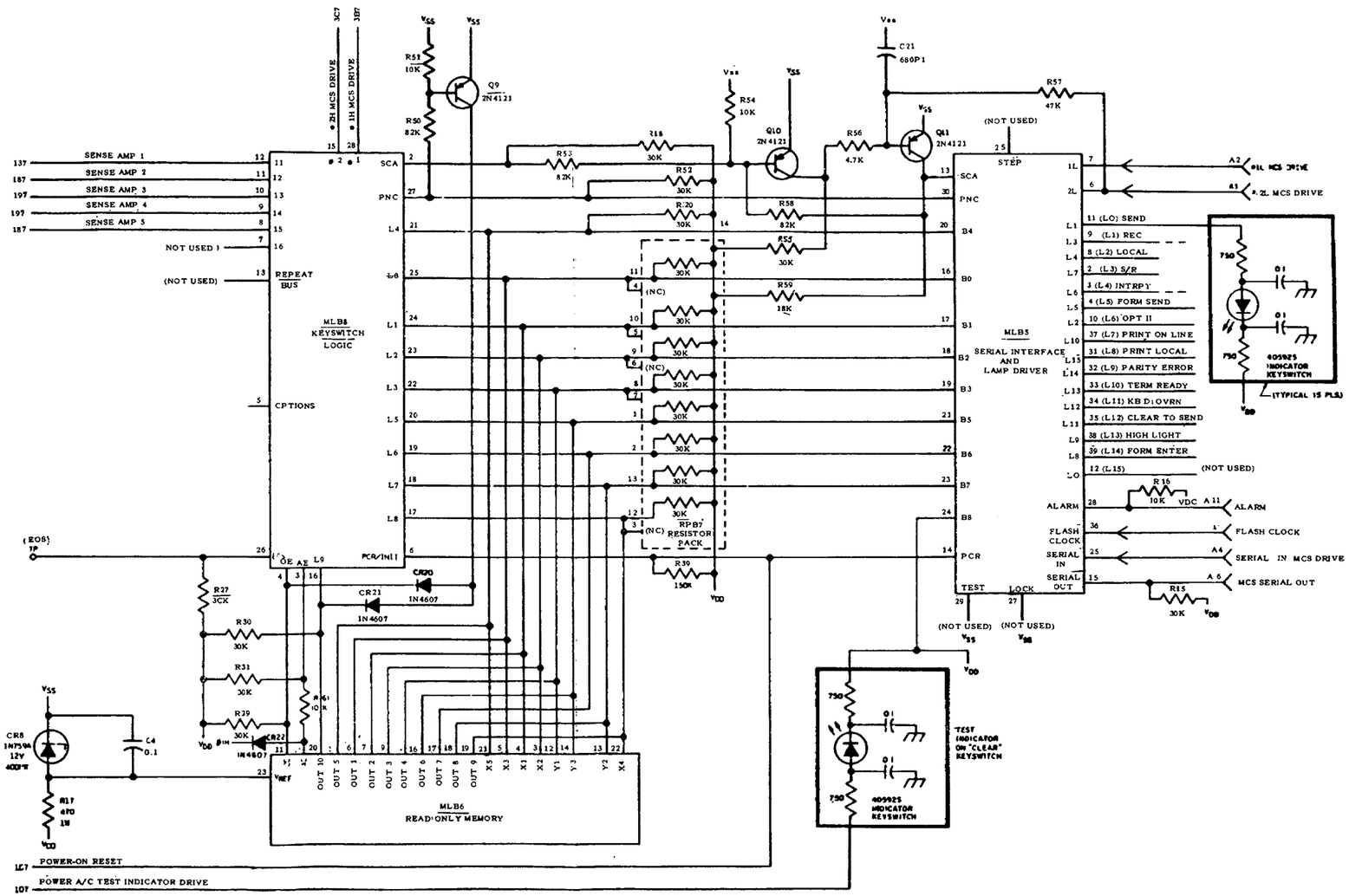
D. TROUBLESHOOTING (Contd)
4. REFERENCE MATERIAL. Functional Schematics (Contd)
Keyswitches and Sense Amplifiers (410059 Circuit Card) (FS-1)

SENSE AMPLIFIER CHART

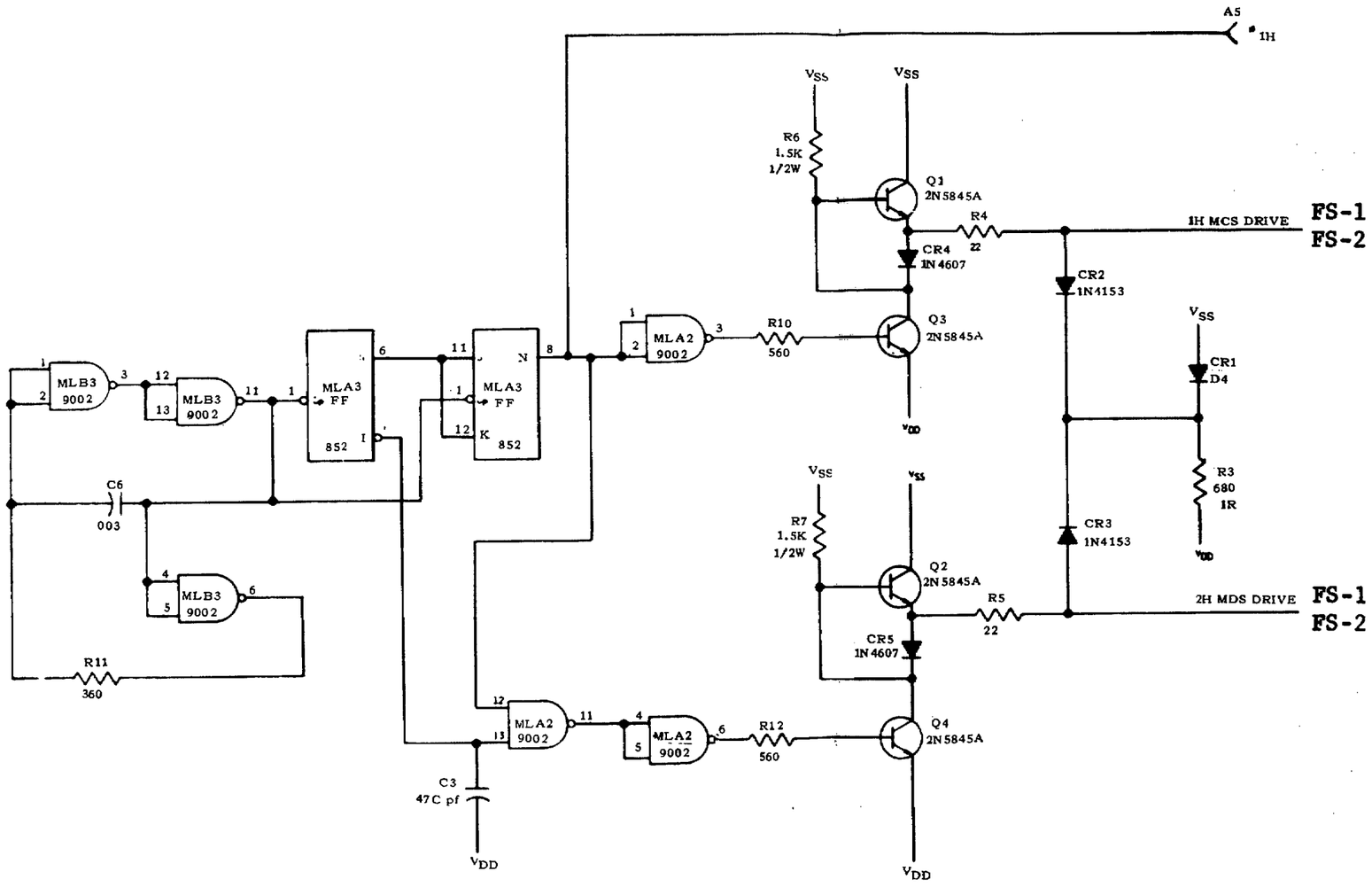
SENSE AMP PIN NO.	SENSE AMP 1 (MLB10)	SENSE AMP 2 (MLC9)	SENSE AMP 3 (MLC4)	SENSE AMP 4 (MLB1)	SENSE AMP 5 (MLC5)
	KEYTOP CHARACTER				
31	(	X2(OPTION)	E	3	6
30	\	1	B	←	H
9	%	U	F	↑	T
8	≠	L	2	→	5
7	P	7	V	(NOT USED)	9
6	+	/	M	S/R	G
5	−	K	Q	LOCAL	R
3	0 (ZERO)	,	D	CURSOR RETURN	4
2	9	.	C	HOME	3
28	PARITY ERROR	8	Z	SEND	Y
27	(NOT USED)	;	A	PRINT LOCAL	N
26	TCMN READY	O	S	PRT ON LINE	J
24	FORM ENTER	'	K	OPT II	SPACE
23	TAB SET	RETURN	SHIFT (LEFT)	REC	CONTROL (LEFT)
20	TAB CLEAR	LINE INSERT	CAPS LOCK	SCROLL DOWN	SHIFT (RIGHT)
19	HIGH LIGHT	LINE DELETE	CURSOR TAB	SCROLL UP	NEW LINE
17	CLR TO SEND	CHAR INSERT	SEG ADV	INTRPT	TAB
16	KBD DWN	CHAR DELETE	↓	FORM SEND	CONTROL (RIGHT)
15	CLEAR	CHAR DEL (REP)	→ (REPEAT)	SCROLL UP (REP)	(REPEAT)
14	CHAR INS (REP)	X2(REPEAT)	← (REPEAT)	SCROLL DN (REP)	SPACE (REPEAT)
13	− (REPEAT)	NEW LINE (REP)	↓ (REPEAT)	↑ (REPEAT)	X1 (OPTION)
	REFERENCE RESISTOR				
16	R35	R34	R8	R1	R22
	I/O RESISTOR				
25	R28	R24	R23	R2	R19
	KEYSWITCH LOGIC (MLB8) INPUT PIN NO.				
	12	11	10	9	8
	REFERENCE CAPACITOR				
17	C14	C13	C6	C2	C9



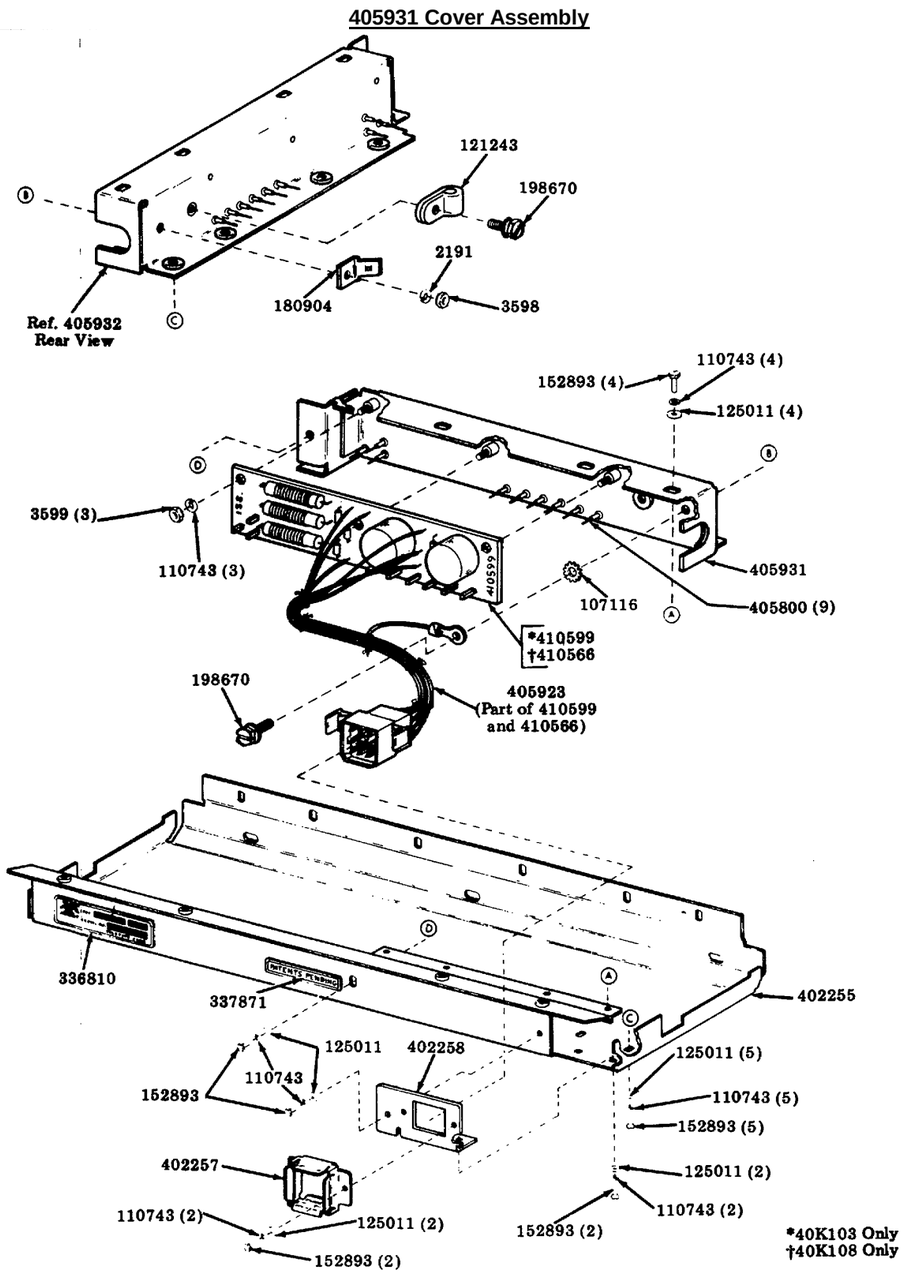
Keyswitch and Serial Interface Logic (410059 Circuit Card) (FS-2)



D. TROUBLESHOOTING ((Contd)
4. REFERENCE MATERIAL, Functional Schematics (Contd)
High frequency Clock and Drivers (410059 Circuit Card) (FS-3)



405931 Cover Assembly

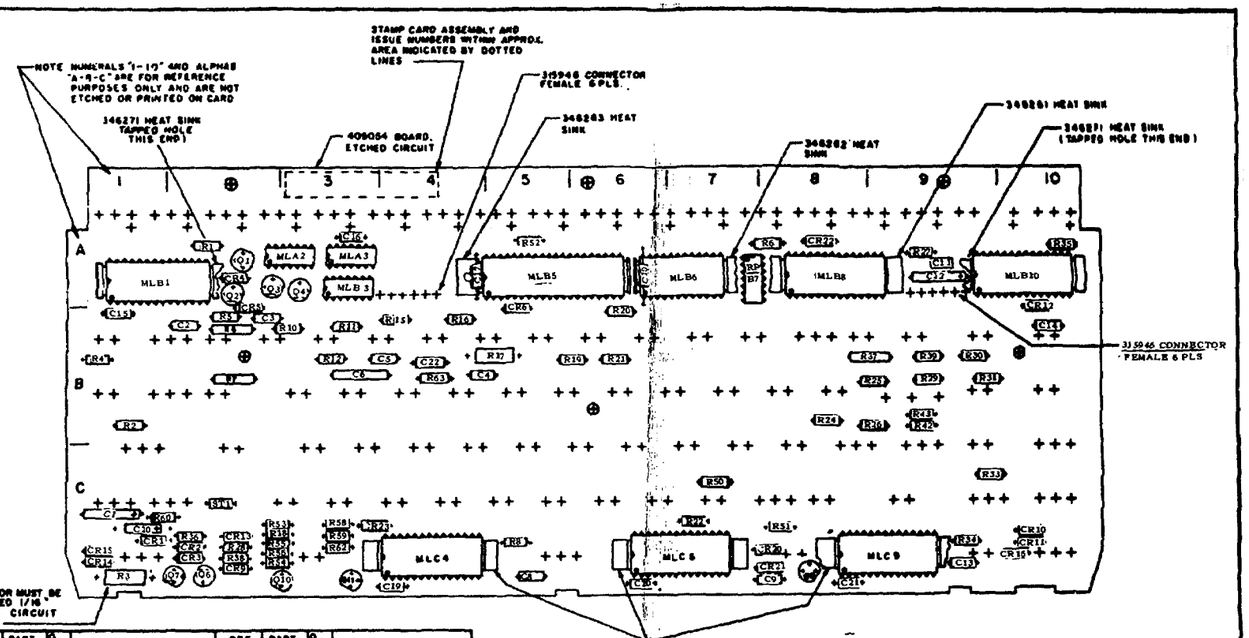


F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

5. Parts – KD (Contd)

410059 Circuit Card

REF. DESIG.	PART NO REQ	Q TY	DESCRIPTION
MLB1	342289	1	SENSE AMPL
MLA2	339002	2	QUAD 2 INPUT GATE (9002)
MLA3	326852	1	DUAL J K FLIP FLOP (852)
MLB3			SAME AS MLA2
MLB4			SAME AS MLB1
MLB5	342553	1	INTRP 3 LAMP DRIVE
MLB6	342506	1	OPCON ROM A
MLC6			SAME AS MLB1
MLB8	342288	1	KEYSW, LOGIC 1
MLC9			SAME AS MLB1
MLB10			SAME AS MLB1
RPR7	341075	1	RESISTOR PACK 30K
R1	326573	1	RESISTOR, 1.8M 1/4W
R2	315089	17	RESISTOR, 30A 1/4W
R3	384043	1	RESISTOR, 800 OHM 3W
R4	326731	2	RESISTOR, 22 OHM 1/4W
R5			SAME AS CR4
R6	137442	2	RESISTOR, 1.5K 1/2W
R7			SAME AS R6
R8			SAME AS R1
R10	315051	2	RESISTOR, 560 OHM 1/4W
R11	328785	1	RESISTOR, 330 OHM 1/4W
R12			SAME AS R10
R15			SAME AS R2
R16	320275	5	RESISTOR, 10K, 1/4W
R17	171580	1	RESISTOR, 470 OHM 1W
R13-R21			SAME AS R2
R22			SAME AS R1
R24-R25			SAME AS R2
R26			SAME AS R16
R27			SAME AS R2
R28	330648	1	RESISTOR, 56CK 1/4W
R29-R31			SAME AS R2
R33			SAME AS R16
R34-R35			SAME AS R1
R36			SAME AS R2
R37	383416	1	RESISTOR, 93 OHM 1W
R38	315090	1	RESISTOR, 5.6K 1/4W
R39			SAME AS R2
R42			SAME AS R16
R43			SAME AS R2
R50	315411	3	RESISTOR, 82K 1/4W
R51			SAME AS R16
R52			SAME AS R2
R53			SAME AS R50
R54			SAME AS R16
R55			SAME AS R2
R56	315059	1	RESISTOR 4.7K 1/4W
R58			SAME AS R50
R59	323148	1	RESISTOR 18K 1/4W
R60-61			SAME AS R16
R62	307819	1	RESISTOR 1K 1/4 W
R63	315091	1	RESISTOR 8.2K 1/4W
C1	339727	2	CAPACITOR 6.8 MFD, 35V.
C2	340736	6	CAPACITOR 33PF 100V
C3	315078	1	CAPACITOR 470PF 200V
C4-C9	308823	2	CAPACITOR .1 MFD, 25V
C6	337302	1	CAPACITOR .0033 MFD 100V
C8-C9			SAME AS C2
C10	338648	1	CAPACITOR 1MF, 25V
C11	337330	1	CAPACITOR .1 MFD 50V
C12			SAME AS C1
C13-C14			SAME AS C2
C15-C21	403334	7	CAPACITOR, .1 MFD 50V
C22	336605	1	CAPACITOR 330 PF
ST1	336479	1	STRAP



REF DESIG	PART NO REQ	Q TY	DESCRIPTION
CR1	300102	1	DIODE, D4
CR2-CR3	323736	2	DIODE, 1N4153
CR4-CR8	397464	1	DIODE, 1N4607 OR 1N914
CR9	334663	1	DIODE, ZENER 1N759A
CR9-11			SAME AS CR4
CR12	323664	1	DIODE, ZENER 1N4742A
CR13			SAME AS CR4
CR14	377103	2	DIODE, D2
CR15			SAME AS CR14
CR16			SAME AS CR4
CR20			SAME AS CR4
CR21-23			SAME AS CR4
Q1-24	341091	4	TRANSISTOR, 2N5845A
Q5-Q7	324144	3	TRANSISTOR, 2N4121
Q8-Q11			SAME AS Q6
315946		12	CONNECTOR, FEMALE
409064		1	BOARD, ETCHED CIRCUIT
340760		6	CHANNEL
409915		2	SHIELD
405806		1	SHIELD, KEYTOP
409813		1	BAR
405827		1	BAR
409824		2	FILLER
405870		1	CAP, FILLER

SIMILAR TO 410084

REF DESIG	PART NO REQ	Q TY	DESCRIPTION
NOTE 1	340720	57	KEYSWITCH, BASIC
NOTE 1	340721	11	KEYSWITCH, REPEAT
NOTE 1	340722	1	KEYSWITCH, LATCHING
NOTE 1	408925	16	KEYSWITCH, INDICATING
NOTE 1	341097	3	KEYSWITCH, COMBINATION
NOTE 1	340762	1	HOUSING ASSEMBLY
NOTE 1	340770	2	GUIDE, SPACE BAR
	401089	1	BAR ASSEM, SPACE
NOTE 1,3	408880	8	SPACER
NOTE 1,3	403921	2	SPACER
NOTE 1,3	403922	2	SPACER
NOTE 5	7394TRH		THERMAL JOINT COMP'D.
NOTE 2	396828MM	2 FT	CONTACT STRIP
NOTE 3	340764	1	SPRING, COMPRESSION
	405913	1	RAIL
	405914	2	SPRING, FLAT
	340777	2	BUMPER
	#97-8	1	WASHER, FLAT
NOTE 6	346261	1	HEAT SINK W/INSULATOR
NOTE 6	346262	1	HEAT SINK W/INSULATOR
NOTE 6	346263	1	HEAT SINK W/INSULATOR
NOTE 6	346264	3	HEAT SINK W/INSULATOR
NOTE 6	346271	2	HEAT SINK W/INSULATOR
	405909	1	FRAME, FRONT
	405910	1	FRAME, REAR
	405911	1	FRAME, LEFT
	405912	1	FRAME, RIGHT
	181240	*	SCREW
	152893	27	SCREW
	110743	27	WASHER, LOCK
	125011	27	WASHER, FLAT

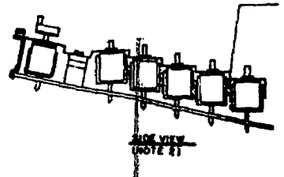
MANUFACTURING NOTES

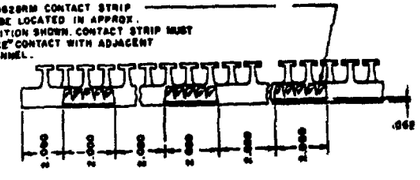
1. REFER TO 405788 ARRANGEMENT DWG. FOR POSITION AND PART NUMBER OF COMPONENTS AND CHANNELS.
2. SEE SIDE VIEW BELOW FOR CONTACT STRIP LOCATION.
3. PLACE IN MUSLIN BAG AND TIE TO ASSEM.
4. VIEW OF CIRCUIT CARD CONNECTIONS LOOKING THROUGH TOP OF ALL TRANSISTORS.

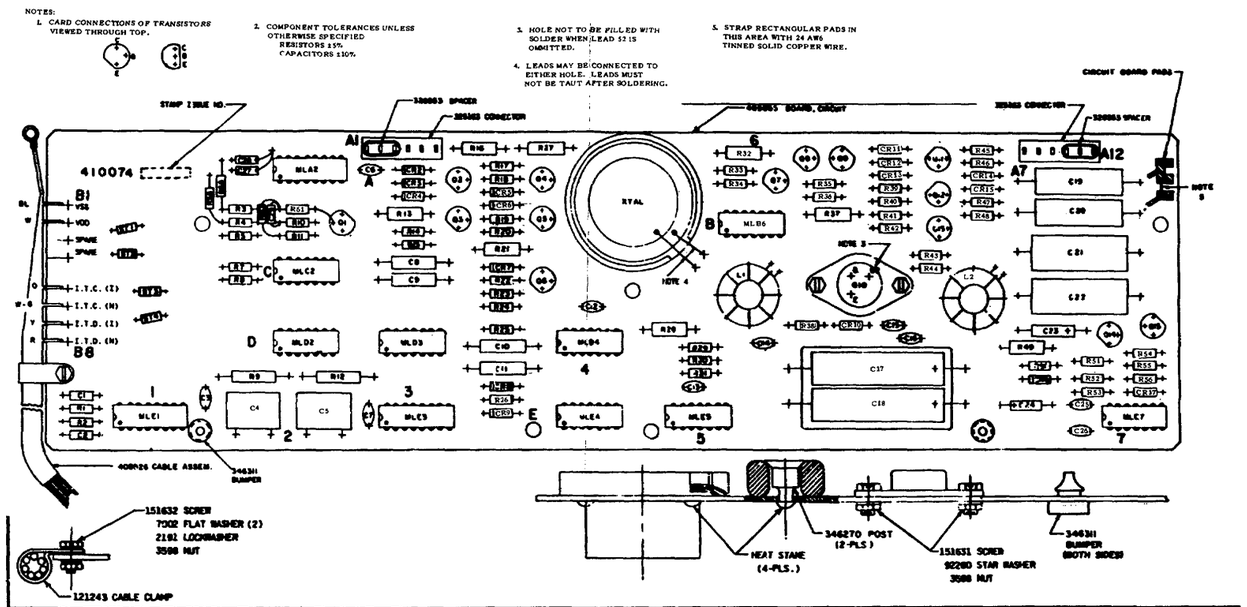
5. APPLY THERMAL JOINT COMPOUND TO AN AREA APPROXIMATELY 3/8 X 3/8 INCHES CENTRALLY LOCATED ON SURFACE OF MOS PACK THAT CONTACTS HEAT SINK (SIDE WITHOUT LUG).
6. EXTRUDED BUTTONS ON HEAT SINKS SHALL BE FULLY SEATED IN MOS PACKS SO THAT HEAT SINK IS HELD FIRMLY AGAINST CIRCUIT BOARD.
7. ETCHED CIRCUIT BOARD IS ISSUE 3 OR HIGHER.

INFORMATION NOTES

- 101. R11 CHANGED FROM 330 OHMS TO 330 OHMS.
- 102. *RESISTOR R3 CHANGED FROM 800 OHM 1 W TO 800 OHM 3W AT ISSUE 8A.



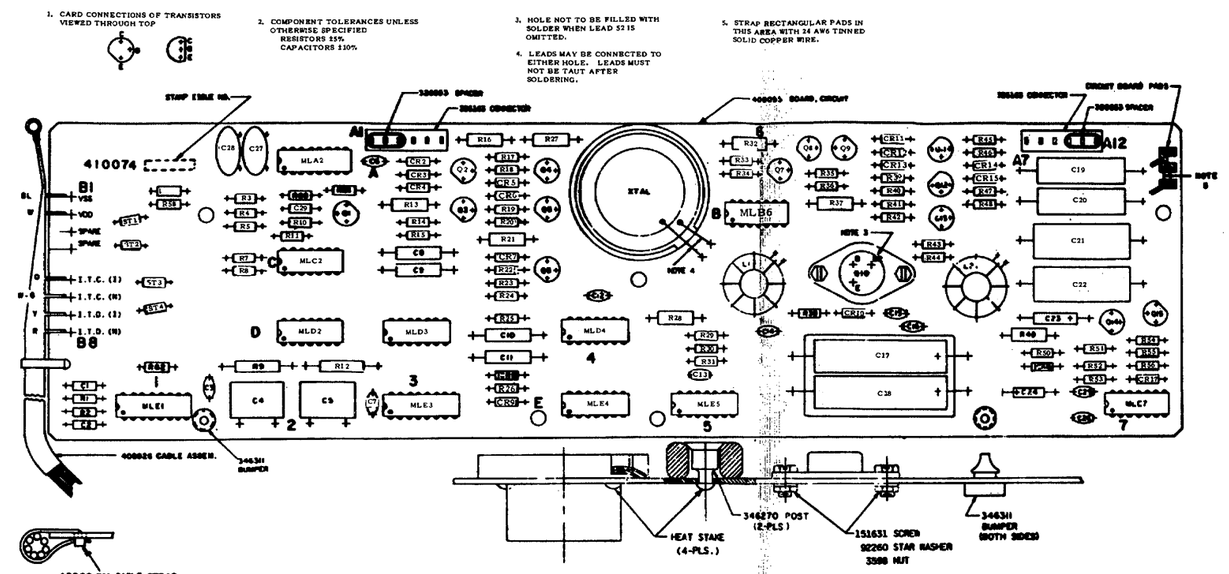




REF DESIG	PART NO REQ	QTY	DESCRIPTION	REF DESIG	PART NO REQ	QTY	DESCRIPTION	REF DESIG	PART NO REQ	QTY	DESCRIPTION	REF DESIG	PART NO REQ	QTY	DESCRIPTION	REF DESIG	PART NO REQ	QTY	DESCRIPTION
MLE1	339602	2	DUAL MONOSTABLE 9602					R24	320028	1	RESISTOR 3.9K 1/4W	R54	315959	1	RESISTOR 4.7K 1/4W				
MLA2	339716	1	TRIPLE LINE REC'R 10116	CR2-3	333736	2	DIODE 1N4153	R25	324908	1	RESISTOR 30.1K 1/8W 1%	R55			SAME AS R3	L1-2	401737	2	INDUCTOR 1.40 MH
MLC2	326853	1	DUAL J-K FLIP FLOP 853	CR4	300102	2	DIODE D4	R26			SAME AS R5	R56	333416	1	RESISTOR 470K 1/4W	XTAL	341089	1	CRYSTAL ASSEMBLY
MLD2	326846	2	QUAD NAND GATE 846	CR5-8	197484	9	DIODE IN4148	R27			SAME AS R13	R58-59	348802	2	RESISTOR 220Ω 1/4W				
MLD3	339408	1	QUAD AND GATE 7408	CR9	177108	2	DIODE D2	R28			SAME AS R21	R60	300092	1	RESISTOR 6.8K 1/4W				
MLE3			SAME AS MLE1	CR10	401734	1	DIODE 1N5803	R29	401066	1	RESISTOR 1K 1/8W 5%	R61	315048	1	RESISTOR 100Ω 1/4W		409055	1	BOARD, CIRCUIT
MLD4	339601	2	SINGLE MONOSTABLE 9601	CR11			SAME AS CR4	R30			SAME AS R3								
MLE4	326862	1	TRIPLE NAND GATE 862	CR12			SAME AS CR9	R31	401067	1	RESISTOR 2.4K 1/8W 5%						348270	2	POST
MLE5	326825	1	VOLTAGE REGULATOR	CR13-17			SAME AS CR5	R32			SAME AS R21	C1-2	325034	2	CAPACITOR, 12C PFD				
MLD6			SAME AS MLD2					R33	333410	3	RESISTOR 68K 1/4W	C3	305421	7	CAPACITOR .1 MFD		325163	2	POST, CONNECTOR
MLE7			SAME AS MLD4					R34			SAME AS R5	C4-5	300256	2	CAPACITOR .001 MFD 5%		326553	2	SPACER
								R35	333622	1	RESISTOR 680Ω 1/4W	C6-7			SAME AS C3				
								R36			SAME AS R3	C8-9	101618	2	CAPACITOR .01 MFD.				
				R1-2	324903	2	RESISTOR 7.5K 1/8W 1%	R37			SAME AS R21	C10	333481	1	CAPACITOR .0015 MFD.				
				R3-4	321213	7	RESISTOR 1K 1/4W	R38	326573	1	RESISTOR 1.8K 1/4W	C11	333482	1	CAPACITOR .0022 MFD.				
				R5	326602	7	RESISTOR 3600 1/4W	R39	315989	2	RESISTOR 30K 1/4W	C12-14			SAME AS C3		405826	1	CABLE ASSEMBLY
Q1	324144	5	TRANSISTOR 2N4121	R7-8	330640	3	RESISTOR 1500 1/4W	R40			SAME AS R23	C15-16	171567	3	CAPACITOR .005 MFD. 100%				
Q2-6	341091	5	TRANSISTOR 2N5845A	R9	305876	1	RESISTOR 35.7K 1/4W 1%	R41			SAME AS R5	C17	401733	1	CAPACITOR 75 MFD.		121243	1	CLAMP, CABLE
Q7-9			SAME AS Q1	R10			SAME AS R3	R42			SAME AS R39	C18	401000	1	CAPACITOR 400 MFD.				
Q10	401735	1	TRANSISTOR, DARLINGTON	R11			SAME AS R5	R43	333407	1	RESISTOR 6200 1/4W	C19-20	148832	2	CAPACITOR 47 MFD 5%				
Q11-14	338241	4	TRANSISTOR	R12	323725	1	RESISTOR 27 4K 1/4W 1%	R44			SAME AS R17	C21-22	199015	2	CAPACITOR .22 MFD.		151631	2	SCREW, HEX. HEAD
				R13	137442	3	RESISTOR 1.5K 1/2W	R45			SAME AS R33	C23	337356	1	CAPACITOR .45 MFD		151632	1	SCREW, HEX. HEAD
Q15			SAME AS Q1	R14-15	328783	2	RESISTOR 180Ω 1/4W	R46-47	333417	2	RESISTOR 680K 1/4W	C24	310929	1	CAPACITOR 1.0 MFD.				
				R16			SAME AS R13	R48			SAME AS R33	C25			SAME AS C15		7002	2	WASHER, FLAT
				R17-18	326751	3	RESISTOR 720 1/4W 1%	R49			SAME AS R21	C26			SAME AS C3		2191	1	WASHER, LOCK
				R19-20	321507	2	RESISTOR 1.8K 1/4W	R50	318801	1	RESISTOR 47K 1/4W	ST1-ST4	336470	4	STRAP		92260	2	WASHER, STAR
				R21	129852	5	RESISTOR 2.2K 1/2W	R51			SAME AS R7	C27-28	341622	2	CAPACITOR .0047 MFD.				
				R22			SAME AS R5	R52			SAME AS R3	C29	405324	1	CAPACITOR .1 MFD		3598	3	NUT, HEX.
				R23	320275	2	RESISTOR 10K 1/4W	R53			SAME AS R5						346311	2	BUMPER

410074 Circuit Card (Early Design)

5. Parts KD (Contd)



REF. DESIG.	PART NO REQ.	QTY	DESCRIPTION
MLE1	339602	2	DUAL MONOSTABLE 9602
MLA2	339716	1	TRIPLE LINE REC'R 10116
MLC2	326853	1	DUAL J-K FLIP FLOP 853
MLD2	326846	2	QUAD NAND GATE 846
MLD3	339408	1	QUAD AND GATE 7408
MLE3			SAME AS MLE1
MLD4	339601	2	SINGLE MONOSTABLE 9601
MLE4	326862	1	TRIPLE NAND GATE 862
MLE5	326823	1	VOLTAGE REGULATOR
MLB6			SAME AS MLD2
MLE7			SAME AS MLD4
Q1	324144	5	TRANSISTOR 2N4121
Q2-6	341091	5	TRANSISTOR 2N3645A
Q7-9			SAME AS Q1
Q10	401735	1	TRANSISTOR, DARLINGTON
Q11-14	533E41	4	TRANSISTOR
Q15			SAME AS Q1

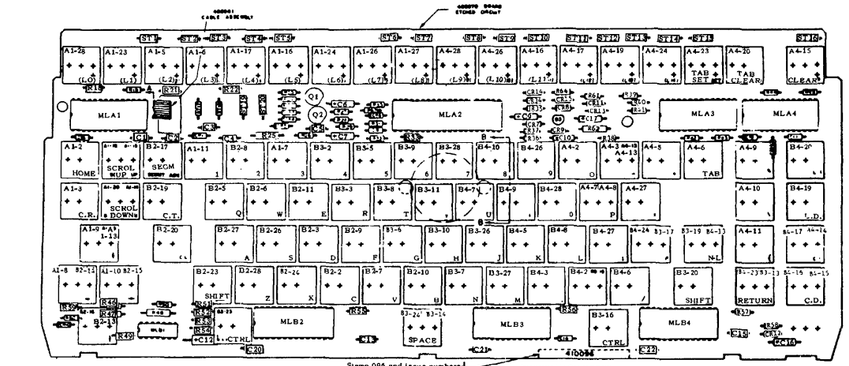
REF DESIG	PART NO REQ	QTY	DESCRIPTION
CR2-3	333736	2	DIODE 1N4153
CR4	300102	2	DIODE D4
CR5-8	197464	9	DIODE BM148
CR9	177108	2	DIODE D2
CR10	401734	1	DIODE 1N5803
CR11			SAME AS CR4
CR12			SAME AS CR9
CR13-17			SAME AS CR5
R1-2	324903	2	RESISTOR 7.5K 1/8W 1%
R3-4	321213	8	RESISTOR 1K 1/4W
R5	326602	7	RESISTOR 3600 1/4W
R7-8	330540	3	RESISTOR 1500 1/4W
R9	305876	1	RESISTOR 35.7K 1/4W 1%
R10			SAME AS R3
R11			SAME AS R5
R12	321725	1	RESISTOR 27.4K 1/4W 1%
R13	137442	3	RESISTOR 1.5K 1/2W
R14-15	328783	2	RESISTOR 180Ω 1/4W
R16			SAME AS R13
R17-18	326751	3	RESISTOR 22K 1/4W 10%
R19-20	321807	2	RESISTOR 1.8K 1/4W
R21	129852	5	RESISTOR 2.2K 1/2W
R22			SAME AS R5
R23	320275	2	RESISTOR 10K 1/4W

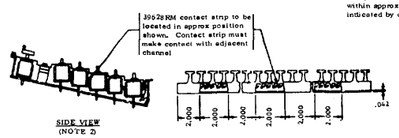
REF DESIG	PART NO REQ	QTY	DESCRIPTION
R24	320026	1	RESISTOR 3.9K 1/4W
R25	324908	1	RESISTOR 30.1K 1/8W 1%
R26			SAME AS R5
R27			SAME AS R13
R28			SAME AS R21
R29	401066	1	RESISTOR 1K 1/8W 5%
R30			SAME AS R3
R31	401067	1	RESISTOR 2.4K 1/8W 5%
R32			SAME AS R21
R33	333410	3	RESISTOR 68K 1/4W
R34			SAME AS R5
R35	335622	1	RESISTOR 680Ω 1/4W
R36			SAME AS R3
R37			SAME AS R21
R38	326573	1	RESISTOR 1.8M 1/4W
R39	315989	2	RESISTOR 30K 1/4W
R40			SAME AS R23
R41			SAME AS R5
R42			SAME AS R39
R43	333407	1	RESISTOR 6200 1/4W
R44			SAME AS R17
R45			SAME AS R33
R46-47	333417	2	RESISTOR 680K 1/4W
R48			SAME AS R33
R49			SAME AS R21
R50	318801	1	RESISTOR 47K 1/4W
R51			SAME AS R7
R52			SAME AS R3
R53			SAME AS R5

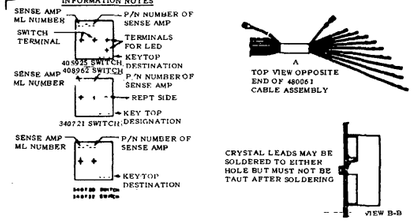
REF DESIG	PART NO REQ	QTY	DESCRIPTION
RR54	315959	1	RESISTOR 4.7K 1/4W
RR55			SAME AS R3
RR56	333416	1	RESISTOR 470K 1/4W
R58-59	318802	2	RESISTOR 220Ω 1/4W
R60	300092	1	RESISTOR 6.8K 1/4W
R61	315948	1	RESISTOR 100Ω 1/4W
R62			SAME AS R3
C1-2	325034	2	CAPACITOR, 12C PFD
C3	305821	7	CAPACITOR .1 MFD
C4-5	300256	2	CAPACITOR .001 MFD 5%
C6-7			SAME AS C3
C8-9	181618	2	CAPACITOR .01 MFD.
C10	333481	1	CAPACITOR .0015 MFD.
C11	333482	1	CAPACITOR .0022 MFD.
C12-14			SAME AS C3
C15-16	171567	3	CAPACITOR .005 MFD. +100% -20%
C17	401733	1	CAPACITOR 75 MFD.
C18	401000	1	CAPACITOR 400 MFD.
C19-20	148832	2	CAPACITOR .47 MFD 5%
C21-22	199015	2	CAPACITOR .22 MFD.
C23	337336	1	CAPACITOR .45 MFD
C24	310929	1	CAPACITOR 1.8 MFD.
C25			SAME AS C15
C26			SAME AS C3
ST1-ST4	336470	4	STRAP
C27-28	341622	2	CAPACITOR .0047 MFD.
C29	405324	1	CAPACITOR .1 MFD

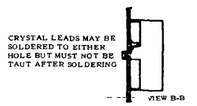
REF DESIG	PART NO REQ	QTY	DESCRIPTION
L1-2	401737	2	INDUCTOR 1.48 MH
XTAL	341089	1	CRYSTAL ASSEMBLY
	409055	1	BOARD, CIRCUIT
	346270	2	POST
	325163	2	POST, CONNECTOR
	326553	2	SPACER
	405926	1	CABLE ASSEMBLY
	43062RM	1	CABLE STRAP
	151631	2	SCREW, HEX. HEAD
	92260	2	WASHER, STAR
	3598	2	NUT, HEX.
	346311	2	BUMPER

410074 Circuit Card (Late Design)









REF. DESIG.	PART NO.	QTY.	DESCRIPTION
MLA1	342280	5	SENSE AMP. TSA-2L
MLA4			Same as MLA1
MLA2	342236	1	LD10
MLA3	342244	1	TKL – 2/40
MLB1	404027	1	Clock Driver
MLB2-4			Same as MLA1
R64			Same as R31
R17			Same as R18
R18	320275	9	Resistor, 10K OHM 1/4W
R19	326573	5	Resistor, 1.5K OHM 1/4W
R20	320273	3	Resistor, 7.5K OHM 1/4W
R21	315954	1	Resistor, 1.5K OHM 1/4W
R22			Same as R18
R24	323148	3	Resistor, 18K OHM 1/4W
R25	137440	2	Resistor, 1K OHM 1/2W
R26	315959	2	Resistor, 4.7K OHM 1/4W
R27			Same as R24
R28			" " R20
R29	330641	1	Resistor, 1M OHM 1/4W
R30			Same as R20
R31-32	321508	8	Resistor, 100K OHM 1/4W
R33			Same as R26
R34	300092	1	Resistor, 6.8K OHM 1/4W
R35	315957	1	Resistor, 3.3K OHM 1/4W
R36			Same as R31
R37	315801	1	Resistor, 47K OHM 1/4W
R38			Same as R31
R39			" " R18
R40			" " R31
R41	315989	1	Resistor, 30K OHM 1/4W
R42-44			Same as R18
R45			" " R19
R46	321313	4	Resistor, 1K OHM 1/4W
R47	320276	1	Resistor, 470 OHM 1/4W
R48			Same as R25
R49			" " R18
R50			" " R46
R52	315948	1	Resistor, 100 OHM 1/4W
R53			Same as R24
R56-57			" " R19
R58			Same as R31

MANUFACTURING NOTES:

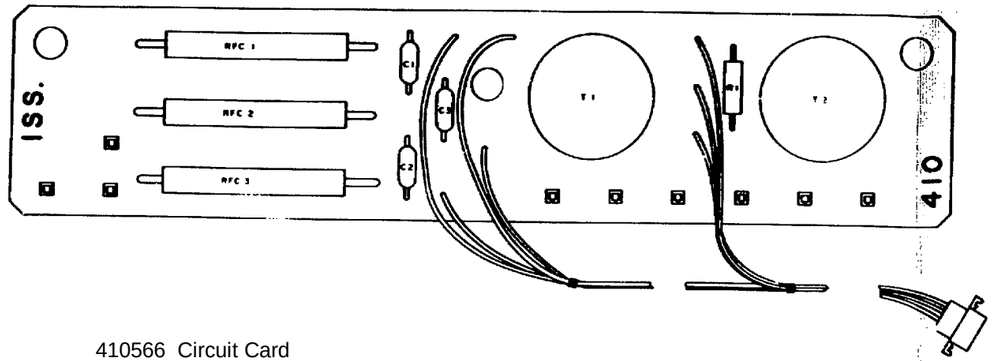
1. Refer to 40K108-AC Analysis Chart for position B part number of components and channel assembly information.
2. See side view for contact strip location.
3. Place in Muslin bag and tie to assembly.
4. Etched circuit board to be issue 4A or higher.
5. Refer to 40K/MC for label location.

REF. DESIG.	PART NO.	QTY.	DESCRIPTION
R59-60			Same as R46
R61			Same as R31
R62	137603	1	Resistor, 510 OHM 1/2W
R63	322785	1	Resistor, 330 OHM 1/4W
R54			Same as R18
CR1	346394	1	Diode, Zener IN4730A
CR2-4	197464	12	Diode, IN4148
CR5	405688	1	Diode, IN756A
CR6-13			Same as CR2
CR14	323606	1	Diode, Zener IN4747A
CR15			Same as CR2
C1	346288	5	Capacitor, 33PF
C2-6	405834	10	Capacitor, 0.1 MFD
C6	310929	3	Capacitor, 1.5 MFD
C7	315930	1	Capacitor, .0022 MFD
C8	346351	1	Capacitor, 10 PF
C9	310921	1	Capacitor, .022 MFD
C10			Same as C2
C11			" " C1
C12	332727	1	Capacitor, 6.8 MFD
C13-15			Same as C1
C16,C17			" " C6
C18-23			Same as C2
Q1-2	328077	2	Transistor, 2N4356
Q3	332341	1	Transistor, 2N4401
ST1-20	326470	20	Strap, Wire
	340730	6	Channel
	405915	2	Shield
	405906	1	Shield, Keytop
	405919	1	Bar
	405927	1	Bar

REF. DESIG.	PART NO.	QTY.	DESCRIPTION
	405924	2	Filler
Note 1	405870	1	Cap, Filler
Note 1,3	405920	5	Spacer
Note 1,3	405921	3	Spacer
Note 1,3	405925	2	Spacer
Note 1	340720	57	Keyswitch, Basic
Note 1	340721	14	Keyswitch, Repeat
Note 1	340722	1	Keyswitch, Latch
Note 1	408962	15	Keyswitch, Indicator
Note 1	405925	1	Keyswitch, Indicator
Note 4	409070	1	Etched Circuit Board
	406876	1	Frame, Front
	406877	1	Frame, Rear
	406911	1	Frame, Left
	406912	1	Frame, Right
	181340	8	Screw W/Washer
Note 1	340762	1	Housing Assembly
Note 1	340770	2	Guide, Space Bar
	405909	1	Bar Assm. Space
Note 2	39628RM	2Ft.	Contact Strip
Note 3	340764	1	Spring, Compression
	405913	1	Rail
	405914	2	Spring, Flat
	340777	2	Bumper
	96718	1	Washer, Flat
	346370	1	Crystal Assembly
	406961	1	Cable Assembly
	183993	27	Screw
	110743	27	Washer, Lock
	125011	27	Washer, Flat

F. DISASSEMBLY/REASSEMBLY AND PARTS (Contd)

5. PARTS -- KD (Contd)



410566 Circuit Card

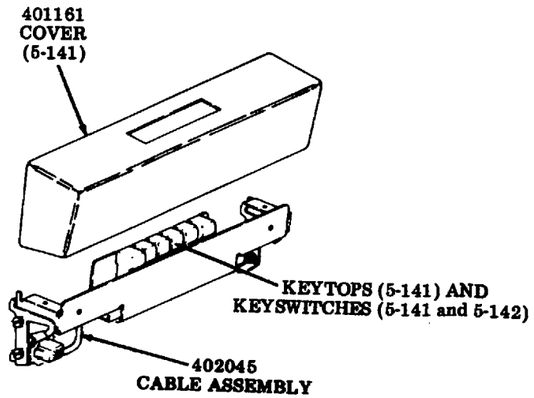
REF DESIG.	PART NO REQ	QTY	DESCRIPTION
R1	315948	1	RESISTOR, 100Ω 1/4W
C1	405324	3	CAPACITOR, .1MFD 50V
C2			SAME AS C1
C3			SAME AS C1
T1	403658	2	TRANSFORMER
T2			SAME AS T1
RFC 1	405930	3	CHOKE, R.F.
RFC 2			SAME AS RFC 1
RFC 3			SAME AS RFC 1
	403611	9	RECEPTACLE
	405923	1	CABLE ASSEMBLY
	409599	1	CIRCUIT BOARD

410590 Circuit Card

REF DESIG.	PART NO REQ	QTY	DESCRIPTION
R1	315948	1	RESISTOR, 100Ω 1/4W
C1	405324	3	CAPACITOR, .1MFD 50V
C2			SAME AS C1
C3			SAME AS C1
T1	403658	2	TRANSFORMER
T2			SAME AS T1
RFC 1	405930	3	CHOKE, R.F.
RFC 2			SAME AS RFC 1
RFC 3			SAME AS RFC 1
	403611	9	RECEPTACLE
	405923	1	CABLE ASSEMBLY
	409599	1	CIRCUIT BOARD

6. SUBASSEMBLY IDENTIFICATION -- RO

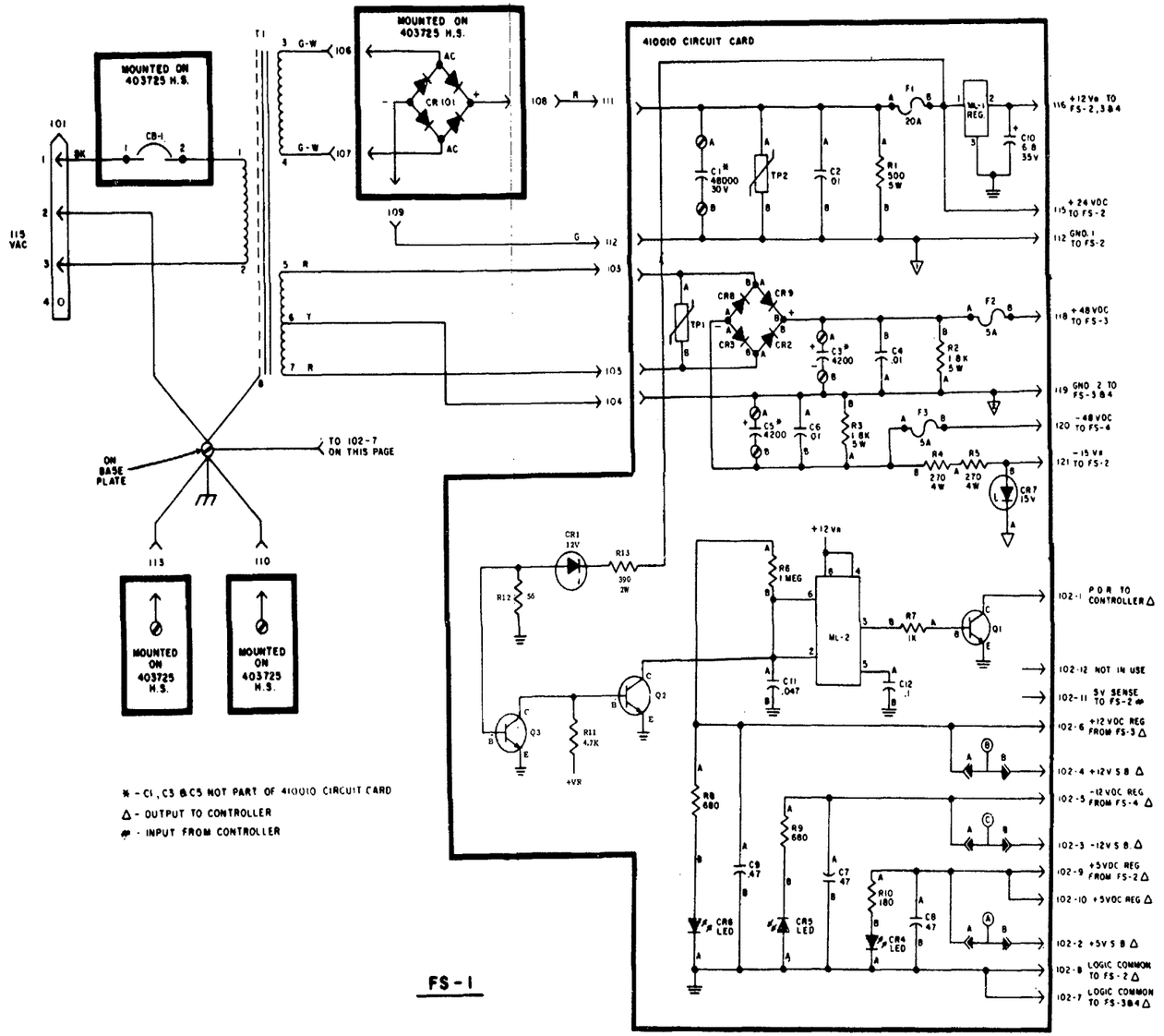
NOTE:
The number indicated in parentheses after each assembly designates the page covering the disassembly/reassembly procedures.



410566 and 410599 Circuit Card

5-140

4.. FUNCTIONAL SCHEMATICS AND COMPONENT LAYOUT FOR 70PSU103 POWER SUPPLY

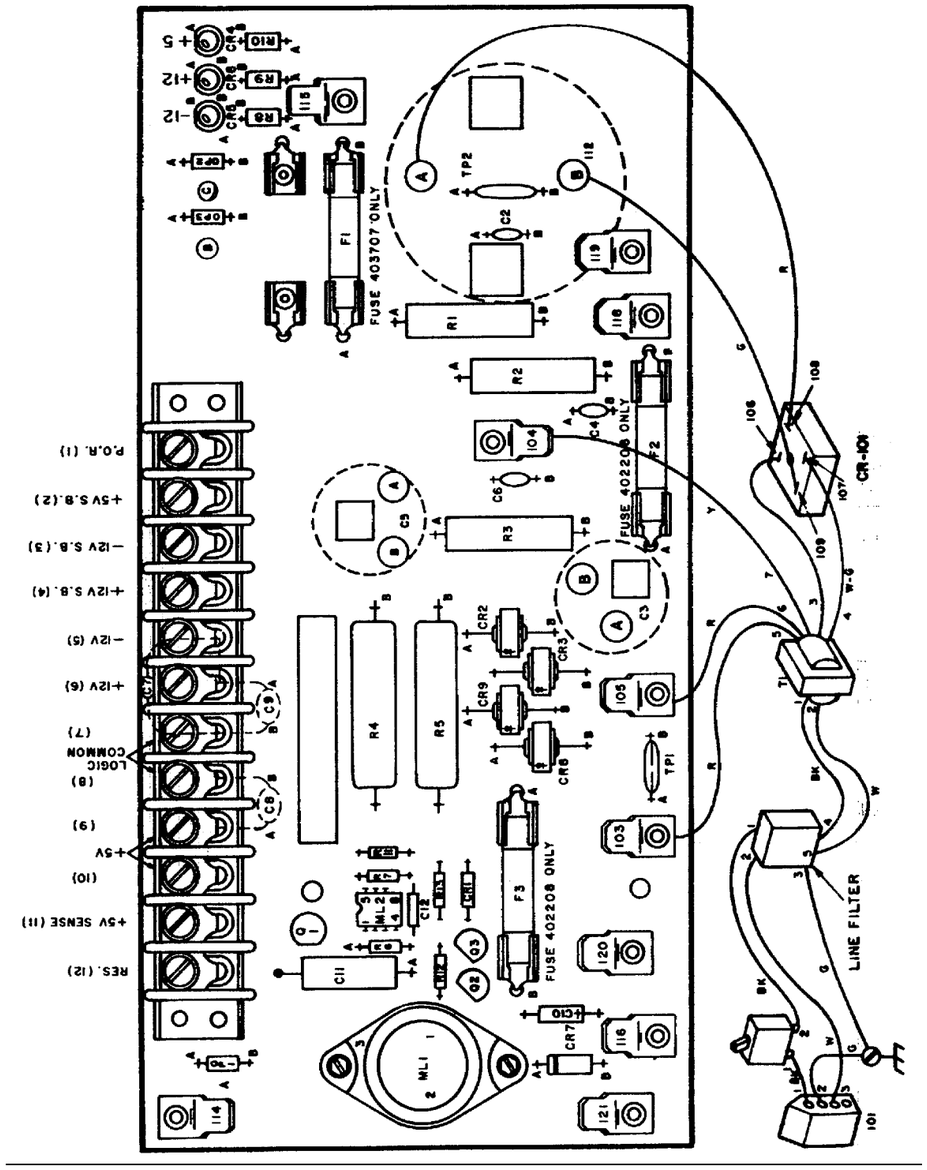


* - C1, C3 & C5 NOT PART OF 410010 CIRCUIT CARD
Δ - OUTPUT TO CONTROLLER
⇐ - INPUT FROM CONTROLLER

FUNCTON SCHEMATIC OF 410010 CIRCUIT CARD AND AC INPUT

D. TROUBLESHOOTING (Cont)

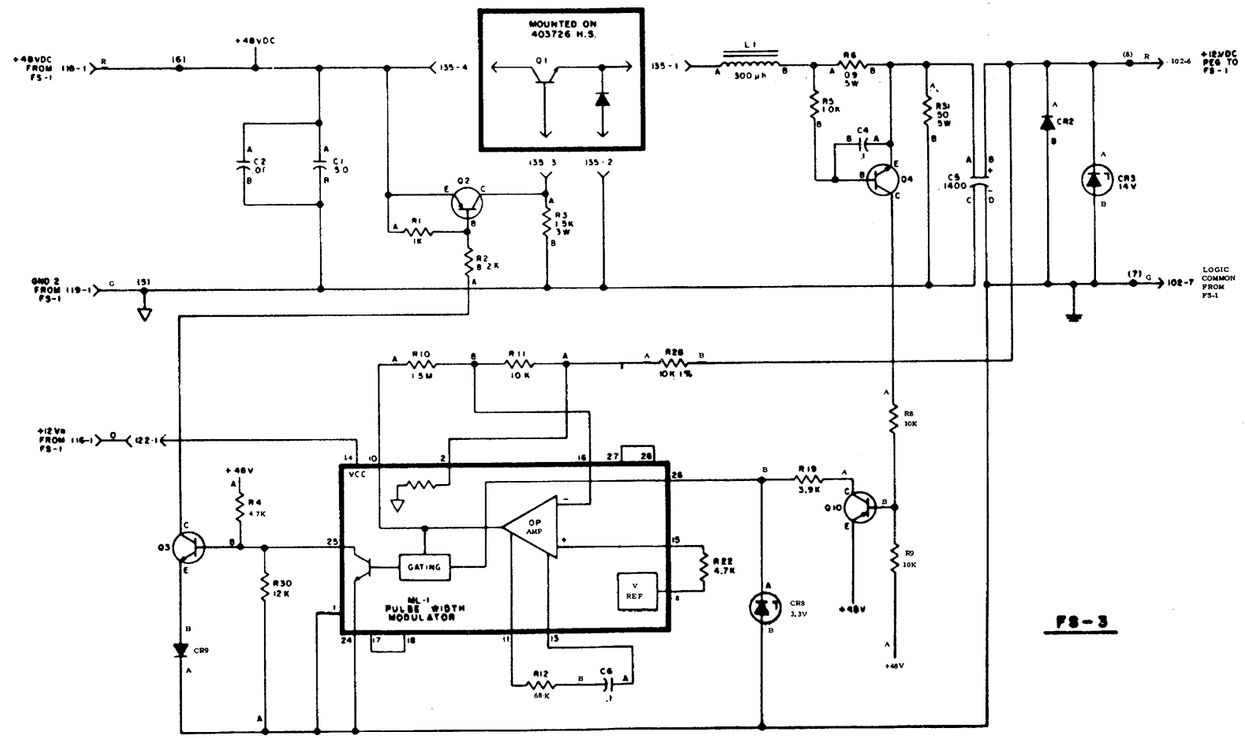
4. FUNCTIONAL SCHEMATICS AND COMPONENT LAYOUT FOR 40PSU103 POWER SUPPLY (Cont)



Component Layout of 410010 Circuit Card and AC Input

D. TROUBLESHOOTING (Cont)

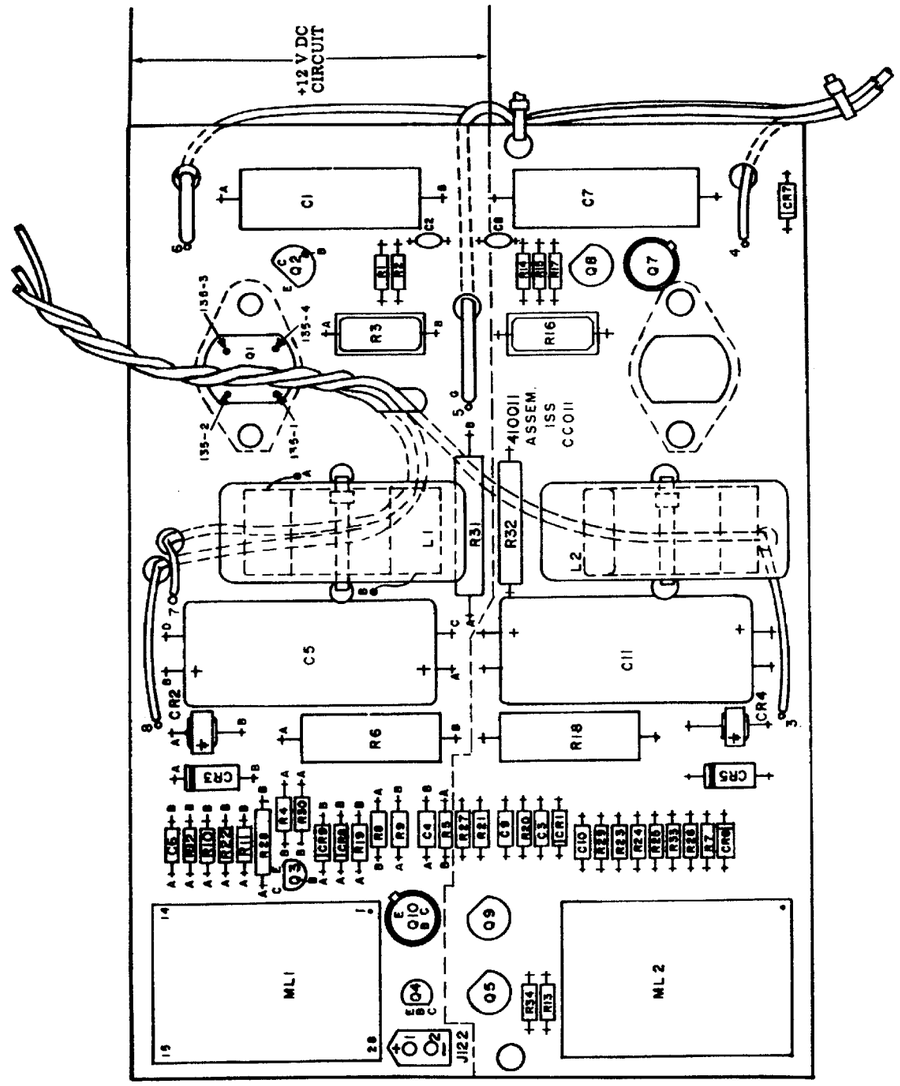
4. FUNCTIONAL SCHEMATICS AND COMPONENT LAYOUT (Cont)



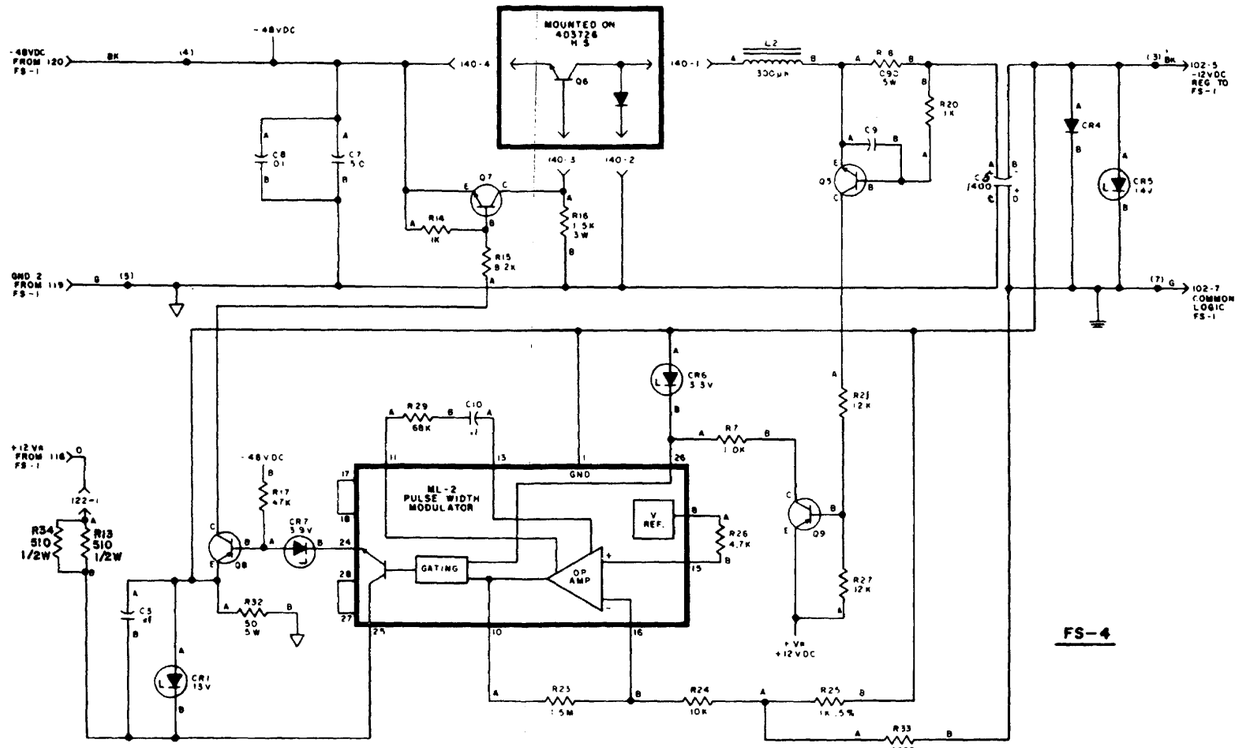
Functional Schematic of +12 V dc Circuit on 410011 Circuit Card

D. TROUBLESI[OOTING (Cont)

4. FUNCTIONAL SCHEMATICS AND COMPONENT LAYOUT FOR 40PSU103 POWER SUPPLY (Contt)



Component Layout of +12 V dc Circuit on 410011 Circuit Card



Functional schematic of -12 V dc Circuit on 410011 Circuit Card

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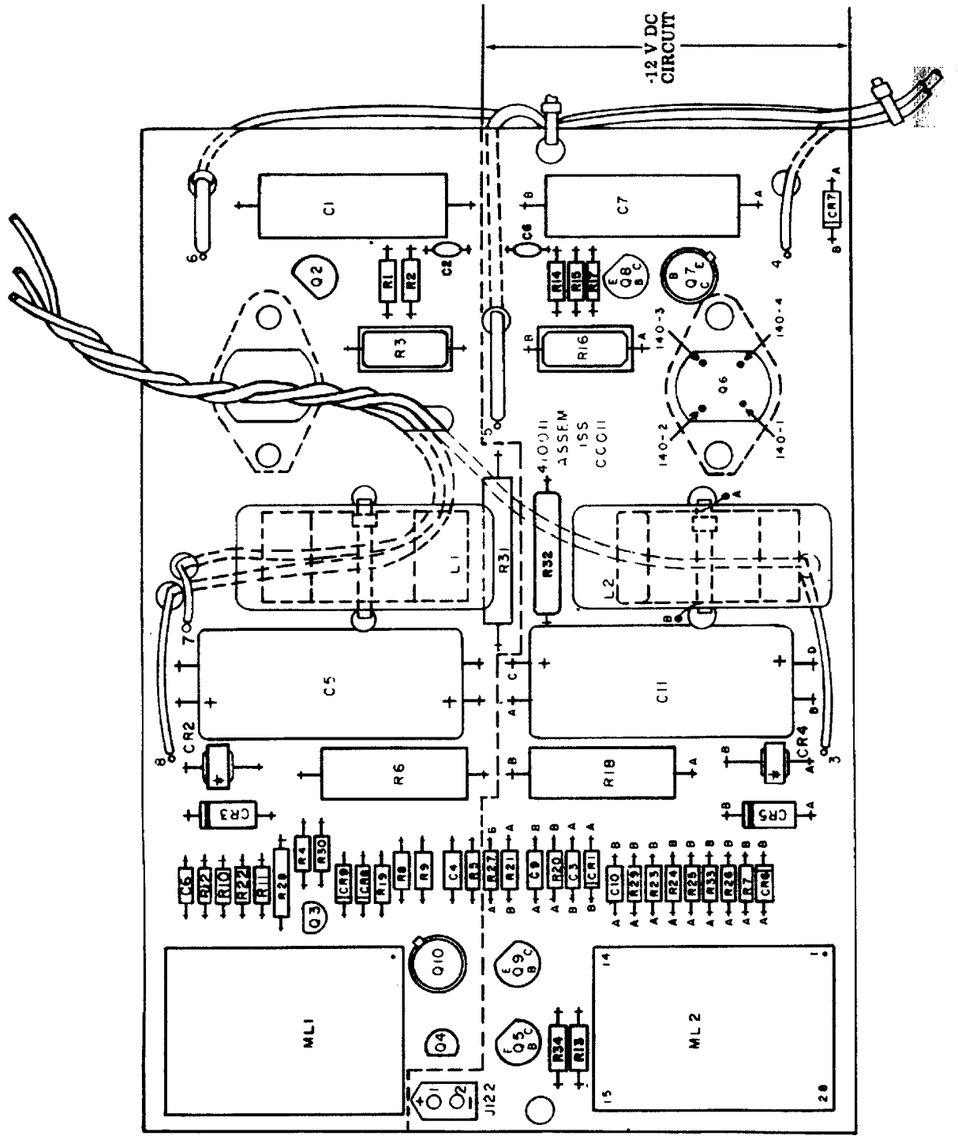
D. TROUBLESHOOTING (Cont)

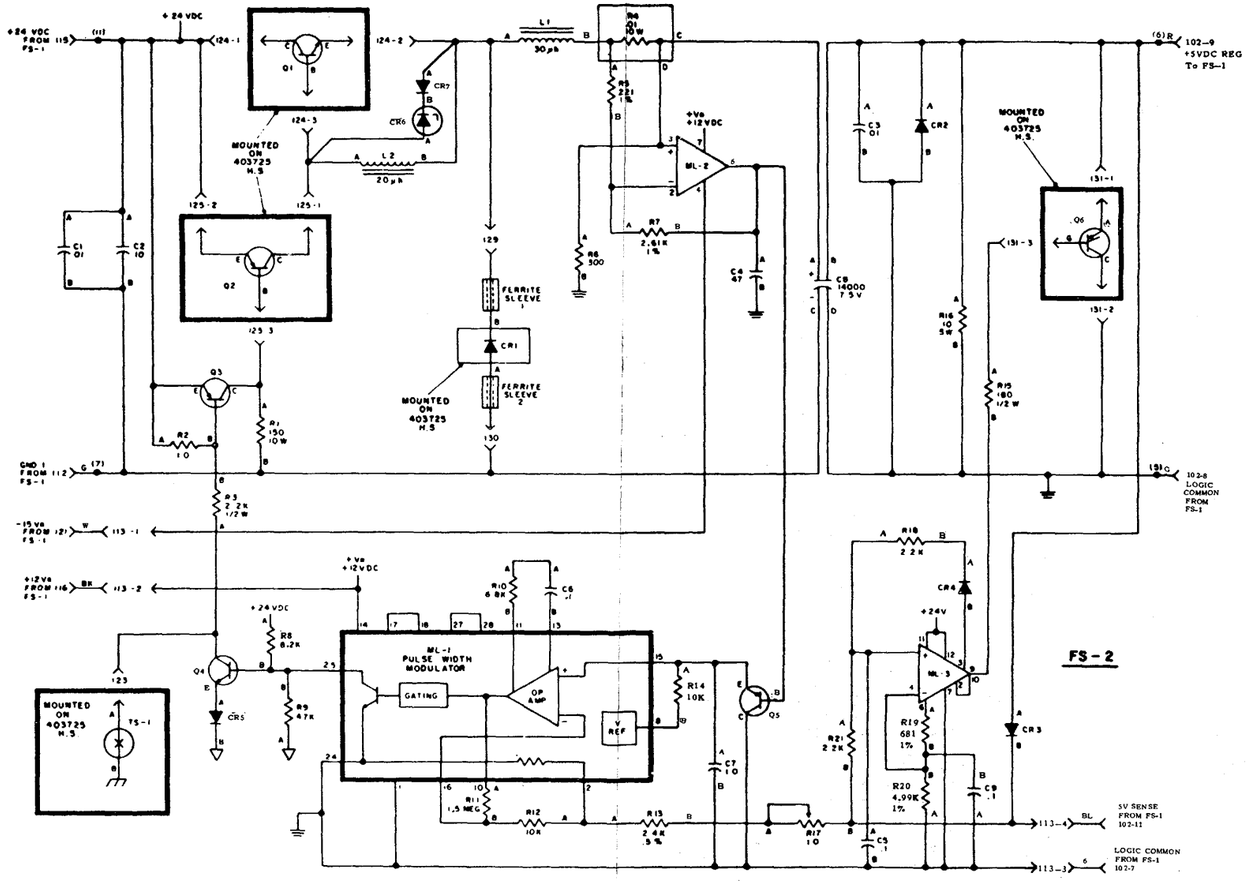
4. FUNCTIONAL SCHEMATICS AND COMPONENT LAYOUT FOR 40PSU103 POWER SUPPLY (Cont)



Component Layout of -12 V dc Circuit on 410011 Circuit Card

D. TROUBLESHOOTING (Cont)

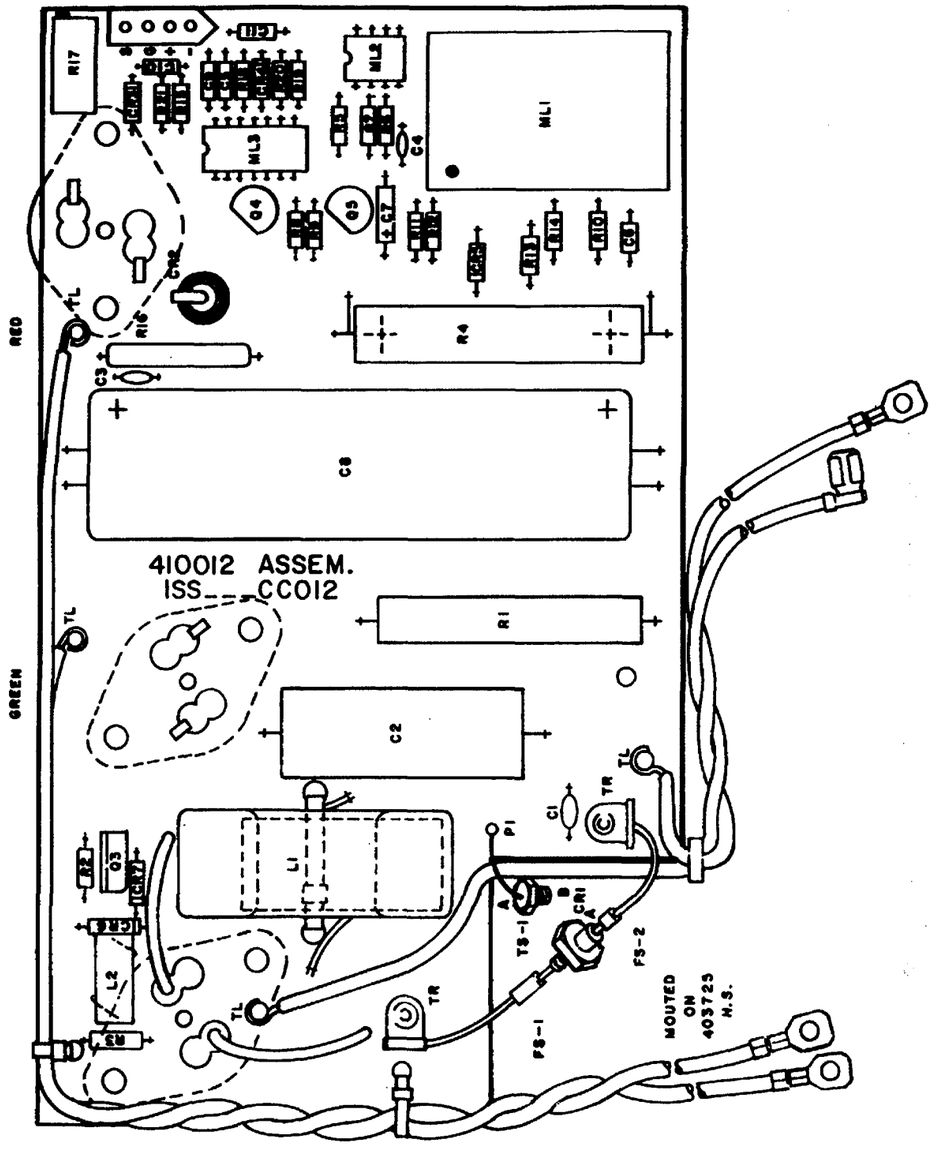
4. FUNCTIONAL SCHEMATICS AND COMPONENT LAYOUT (Cont)



Functional Schematic of 410012 Circuit Card

D. TROUBLESHOOTING (Cont)

4. FUNCTIONAL SCHEMATICS AND COMPONENT LAYOUT FOR 40PSU103 POWER SUPPLY (Cont)



Component Layout of 410012 Circuit Card

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