PLANTRONICS
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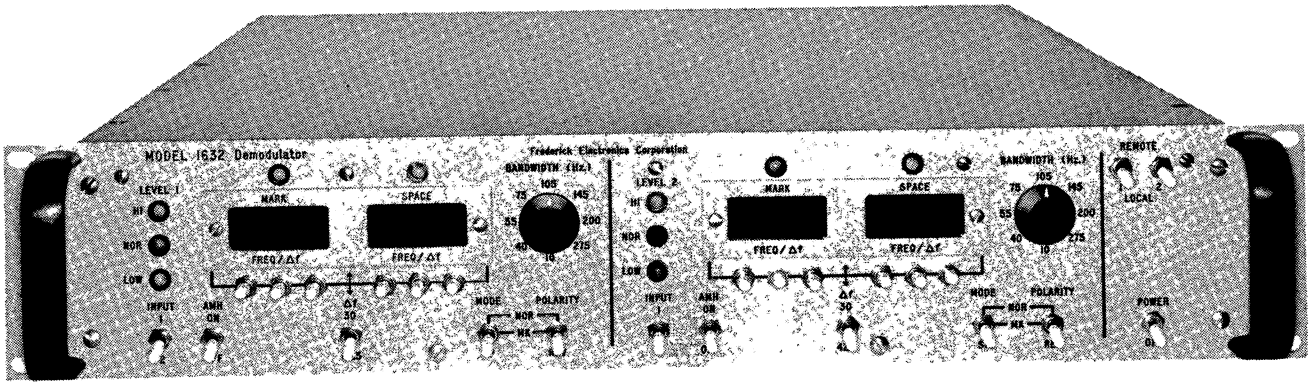
MODEL 1632 DEMODULATOR/

MODEL 1256 DISPLAY UNIT



MODEL 1632 DEMODULATOR

FEATURES

- Copies many CCITT compatible signals
- Copies with only one FSK tone
- Digitally controlled filters
- Fast setup with companion Model 1256

GENERAL

The Model 1632 is an extremely versatile Tone Demodulator which can be readily adjusted to receive signals from most of the FSK or on/off keyed, single or multichannel VFDM schemes presently in use. This versatility makes the device particularly well suited for surveillance, monitoring, and testing activities.

The Model 1632 chassis contains two complete demodulators, each with its own separate operating controls. Each demodulator has two bandpass filters whose center frequencies and bandpass widths are selectable. This latter feature permits independent detection of the mark and space tones which further increases the flexibility of the device, in that, as soon as one tone has been tuned, copying of data may begin. In the case of FSK, a search is then made for the cooperating tone. When located, the

GENERAL (cont.)

second tone enhances the performance of the unit.

The demodulators may be automatically and rapidly set up, to predetermined values, using the Model 1256 display unit. The Model 1256 is discussed on the following pages.

DESIGN

The Model 1632 is an all solid-state device housed in an aluminum cabinet, suitable for mounting in a standard 19-inch EIA rack. A vertical rack space of 3½ inches is required.

The unit without options contains 16 printed circuit boards. Access is provided by a removable top cover. All operating controls and indicators are conveniently located on the front panel.

FREDERICK ELECTRONICS CORPORATION
Hayward Road / Post Office Box 502 / Frederick, Maryland 21701
Telephone· (301) 662-5901 / Cable: FREDCO / Telex: 893438

DATE
2/76

APPLICATIONS

SIGNALING SCHEME

Some of the commonly encountered multi-channel VFDM systems with which the Model 1632 is compatible are those which operate in accordance with CCITT Recommendations R31, R36, R37, R38-A, B and R39. The unit is also capable of demodulating on/off keying such as that covered by Recommendation R35.

Individual filters for center frequencies may be chosen in increments of either 30 Hz or 42.5 Hz, beginning at 300 Hz for the 30 Hz steps and 255 Hz for the 42.5 Hz spacing. Both of these modes have upper limits, which are detailed below. The bandpass filter widths which may be chosen are 10 Hz (for tuning only), 40 Hz, 55 Hz, 75 Hz, 105 Hz, 145 Hz, 200 Hz, and 275 Hz.

In addition to the exact center frequencies mentioned, many more "effective center frequencies" can be copied by selecting the closest exact center frequency and a wide bandpass. Single channel FSK is copied in this manner. IF signals are supplied from the output of a receiver, and the receiver has an adjustable BFO, then the exact center frequency is unimportant.

SPECIFICATIONS

DATA INPUTS

Using Front Panel Controls

ΔF = 30 Hz	300 Hz to 5970 Hz
ΔF = 42.5 Hz	255 Hz to 8457.5 Hz

Controlled from Model 1256

ΔF = 30 Hz	300 Hz to 4770 Hz
ΔF = 42.5 Hz	255 Hz to 6757.5 Hz

Maximum Baud Rate

300 baud or less depending upon bandpass used.

Input Level

+10 dbm to -40 dbm for 600 ohm circuit
1v rms for 10k ohm circuit

Number of Inputs

Two inputs. Either or both demodulators may be switched to either input.

SPECIFICATIONS (cont.)

DATA OUTPUTS

Number of Outputs

Two outputs. One per demodulator or the demodulators may be connected together for a single, diversity output.

Output Circuit Configuration

Standard - Polar voltage (nominally ±6v) compatible with MIL-STD-188C or internally strappable for EIA-RS-232-C.

Optional - Plug-in neutral or polar dry contacts (up to 100 ma at 130 vdc) of solid-state optically isolated high level keyers.

POWER REQUIREMENTS

AC Power

115/230 vac ±10%, 47 to 400 Hz, 55 watts (without optional loop power supply).

OPTIONS

Power Supply

A plug-in power supply is available for use with high level keyers.

Remote Control Input

Consists of a 5-wire, low voltage cable from Model 1256.

PHYSICAL DESCRIPTION

Chassis Dimensions

19 inches (48.3 cm) wide
3½ inches (8.89 cm) high
20 inches (50.8 cm) deep

Weight

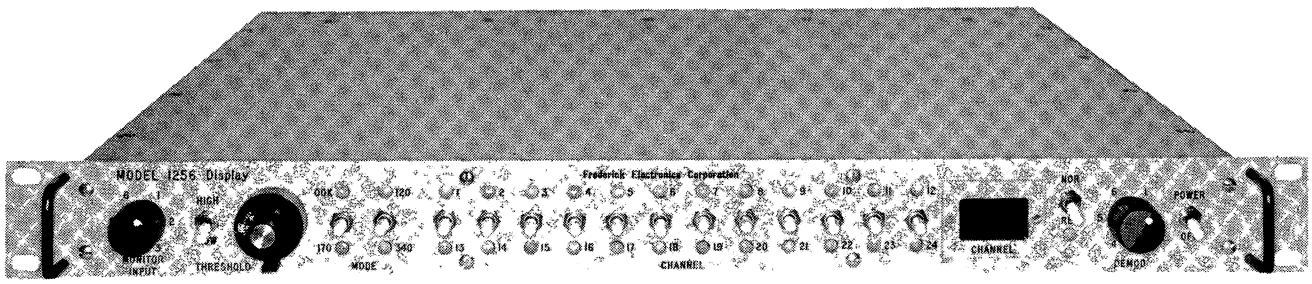
Approximately 20 pounds (9.07 kg)

Finish

Clear irridited aluminum chassis, front panel light gray with black filled engraved markings.

Operating Temperature

0° to +50°C ambient



MODEL 1256 DISPLAY UNIT

FEATURES

- Programmable for various signaling schemes
- Displays status of up to 24 channels
- Provides rapid setup of Model 1632

GENERAL

The Model 1256 scans through a programmed set of frequencies, detects the presence or either a steady state tone or keyed signals at the chosen frequencies, and displays this information on its front panel.

The scanned frequencies are normally a set of tones which form a "Voice Frequency Division Multiplex" system such as those recommended by CCITT. An operator watching this display can readily determine which channels contain traffic. A remotely connected Model 1632 demodulator may be easily and quickly set up on an active channel using the controls of the Model 1256.

Mode switches permit selection of any of four preprogrammed, on/off keying (OOK) or frequency shift keying (FSK) tone frequency sets. Six individual inputs are provided and selection is made via a rotary switch. Up to six remote demodulators may be controlled. The addresses of these units are automatically inserted into the control signal format and are dependent upon the

GENERAL (cont.)

position of a front panel switch. Control instructions are sent to the demodulator whenever one of the channel switches is activated. In addition to the address data, the control instruction contains such information as center frequency and bandwidth of the tone filters and detection mode (i.e., OOK or FSK).

When an instruction has been sent, the channel number which the demodulator is to copy within a given frequency scheme, is displayed on the front panel. Selecting a new demodulator address causes the number of the channel, which that demodulator was last instructed to copy, to be displayed.

DESIGN

The Model 1256 is an all solid-state device housed in an aluminum cabinet for mounting in a standard EIA rack. The unit contains nine printed circuit boards. Access is provided by a removable top cover. All operating controls and indicators are conveniently located on the front panel.

APPLICATIONS

SIGNALING SCHEME AND PROGRAMMING

The Model 1256 is normally programmed for the following frequency schemes:

MODE 1 - 24 channels, on-off keyed beginning at 420 Hz and spaced at 120 Hz intervals (per CCITT R-35);

MODE 2 - 24 channels, ±30 Hz FSK beginning at 420 Hz and spaced at 120 Hz intervals (per CCITT R-31);

MODE 3 - 18 channels, ±42.5 Hz FSK beginning at 425 Hz and spaced at 170 Hz intervals (per CCITT R-39);

MODE 4 - 9 channels, ±85 Hz FSK beginning at 850 Hz and spaced at intervals of 340 Hz.

Programming for other frequency schemes is possible within some limitations (available by special order and quotation only).

SPECIFICATIONS

DATA INPUTS

Input Signals

MODE 1 OOK 300-4110 Hz
MODE 2 FSK 300-4110 Hz
MODE 3 FSK 255-5652.5 Hz
MODE 4 FSK 255-5652.5 Hz
} Depending on program

Input Level

-40 dbm to +10 dbm

Number of Inputs

6 (switch selectable)

Input Impedance

10,000 ohms (balanced and isolated)

SPECIFICATIONS (cont.)

DATA INPUTS (cont.)

Frequency Increments

OOK - 30 Hz
FSK - 30 Hz and 42.5 Hz
} Or multiple thereof

Tone Channels

96 channels programmable in groups of 24

Interface To Demodulators

5-wire low voltage cable

POWER REQUIREMENTS

AC Power

115/230 vac ±10%, 47/400 Hz, 35 watts

PHYSICAL DESCRIPTION

Chassis Dimensions

19 inches (48.3 cm) wide
1-3/4 inches (4.4 cm) high
20 inches (50.8 cm) deep

Weight

Approximately 13 pounds (5.9 kg)

Finish

Clear irridited aluminum chassis, front panel light gray with black filled engraved markings

Operating Temperature

0° to 50°C ambient

ALL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTIFICATION

MODEL 1632A
VOICE FREQUENCY CARRIER TELEGRAPH DEMODULATOR (VFCTD)

INSTRUCTION MANUAL

March 1985

TMC41100

PLANTRONICS/Frederick Electronics Corporation
7630 Hayward Road, P.O. Box 502
Frederick, Maryland 21701-0502

Printed In U.S.A.

PLANTRONICS/FREDERICK ELECTRONICS CORPORATION
7630 Hayward Road, P.O. Box 502
Frederick, Maryland 21701-0502

MANUAL ERRATA SHEET

EQUIP MODEL NO: 1632A **MANUAL PART NO:** TMC41100 **MANUAL DATE:** MAR 85

REFERENCE	CORRECTION
Figure 6-16. Parts List	Item 6: Change MFR from SPRAGUE to KEMET. Change MFR P/N from 150D107X902082 to T310D107M020AS
--- ECN 6824 ---------- SEP 85 ----------	
PROBLEM:	Auto-Mark-Hold (AMH) does not function when the input is a Frequency Division Multiplexed (FDM) signal and when 16 or more tone pairs are being used.
CAUSE:	Nominal level of the AMH was previously set at -55 dBm. The AGC action on the input AMH is not low enough because the threshold is typically 10 dB below the peak power of the bandpass filter signal. When an FDM signal is applied each individual signal may be as much as 25 dB below the composite peak. If this is the case AMH would be engaged at all input levels where the composite peak is higher than 10 to 15 dB above a single tone pairs level.
SOLUTION:	Reduce the AMH Threshold as follows - Set to -60 dBm for single tone pair operation. This will produce nominal threshold levels which would be equivalent to -40 dBm for a full composite (24) tone pairs.
----------APR 86 ----------	

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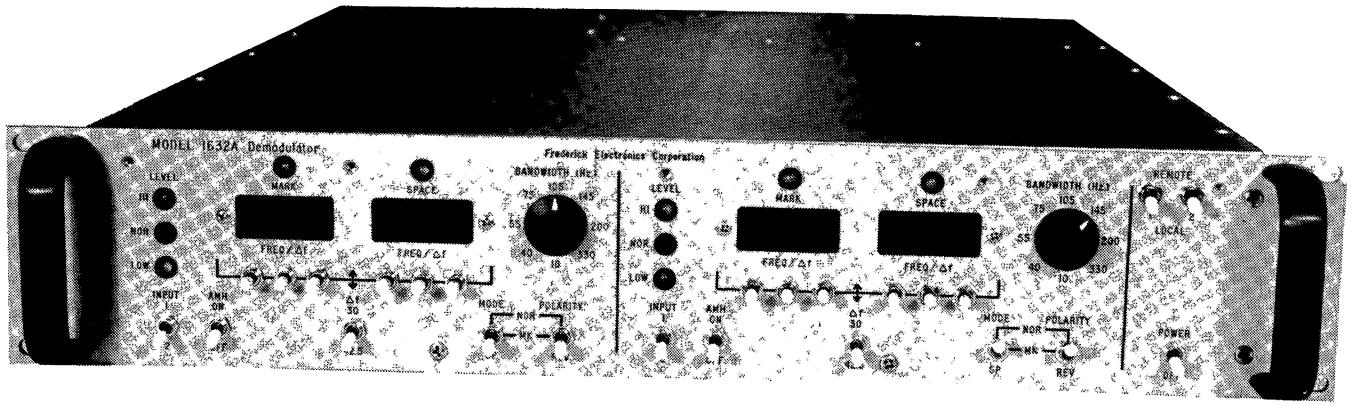


Figure 1-1. Model 1632A Voice Frequency Carrier Demodulator

SECTION I

INTRODUCTION

1.1 PURPOSE OF EQUIPMENT

The Model 1632A is a flexible voice frequency carrier demodulator that provides a means of receiving two multichannel or independent signals.

The tone frequencies and bandwidths are adjustable from the front panel and cover all standard voice frequency channels in increments of 30 or 42.5 Hz and baud rates up to 300.

The individual demodulators may be locally controlled from the front panel or remotely controlled by serial transmission of two 32-bit binary words. This feature allows a remote system to automatically establish receiving parameters that have been set up on a scheduled basis. All front panel controls except input selection and local/remote selection can be remote controlled.

Diversity capability is included so that the two demodulators may be externally tied together or to another similar demodulator.

The tone filter center frequencies are crystal controlled to +2 Hz. The demodulator is a single conversion type with a highly stable frequency synthesizer used for the local oscillator. An AGC circuit is provided for superior performance in a multiplex environment.

Each demodulator has its own sense switch to change the mark-space polarities in the event that they are received inverted. In addition, each demodulator has an auto mark-hold feature to place the output in the mark-hold condition should both the mark and space channels fail.

1.2 PHYSICAL DESCRIPTION

The Model 1632A is an all solid-state device housed in an aluminum rack-mounting cabinet 19 inches wide by 3.5 inches high by 19 inches deep. The unit contains 17 PC boards without options. Access is provided by a removable top cover.

1.3 SPECIFICATIONS

Specifications for the Model 1632A are listed in Table 1-1.

Table 1-1. Specifications Model 1632A

ITEM	DESCRIPTION
LOCAL CONTROL FREQUENCY RANGE	Δf = 30 Hz (from 300 Hz to 5970 Hz) Δf = 42.5 Hz (from 255 Hz to 8457.5 Hz)
REMOTE CONTROL FREQUENCY RANGE	Δf = 30 Hz (from 300 Hz to 4770 Hz) Δf = 42.5 Hz (from 255 Hz to 6757.5 Hz)
TONE FREQUENCY INCREMENTS	Δf = 30 Hz Δf = 42.5 Hz
CHANNEL SPACING	Multiples of 30 Hz or 42.5 Hz depending on Δf.
MAXIMUM BAUD RATE	300 baud (dependent on filter bandwidth).
INPUT LEVEL	+10 dBm to -40 dBm for 600 ohm circuit, nominal 1 volt rms for 10K ohm circuit.
INPUT IMPEDANCE	600 ohms Unbalanced (600 ohms balanced and isolated optional) 10K ohms Unbalanced.
SIGNALLING SCHEMES	FSK or ON/OFF keyed tone.
NUMBER OF INPUTS	Two are provided, either demod may be connected to either input by a front panel switch.
LOW LEVEL	Polar keying (nominally ±6V) compatible with MIL-STD-188C. May be changed to EIA-RS-232-C with jumper.
DIVERSITY	Mark and space low impedance tie points provided for each demodulator.
ENVELOPE	Post detection low-pass filter outputs provided for mark and space tones of each demodulator (10K ohm output impedance).

Table 1-1. Specifications Model 1632A (cont.)

ITEM	DESCRIPTION
MONITOR	Provision for monitoring input signals. These are buffered low impedance signals, not balanced or isolated. Buffer gain is approximately one.
HIGH LEVEL LOOP	Optional neutral or polar dry contacts with plug-in optically isolated keyers.
HIGH LEVEL LOOP SUPPLY	Optional ±65 Vdc 120 ma supply.
BANDPASS FILTER BANDWIDTHS	The available bandwidths are nominally: 10 Hz - Tuning Only 40 Hz 55 Hz 75 Hz 105 Hz 145 Hz 200 Hz 330 Hz
POWER REQUIREMENT	115/230 Vac ±10% 47/400 Hz 55 watts without optional loop supply.
POWER FAIL	9V battery maintains frequency information in storage registers.
CHASSIS DIMENSIONS	19 inches (48.3 cm) wide, 3.5 inches (8.89 cm) high, 19 inches (48.3 cm) deep, overall depth behind front panel approximately 20 inches (50.80 cm).
WEIGHT	Approximately 20 pounds (9.07 kg).
MOUNTING	Suitable for mounting into standard 19 inch (48.3 cm) wide equipment rack.
ENVIRONMENTAL OPERATING TEMPERATURE	0° to 50° C ambient

SECTION II

INSTALLATION

2.1 GENERAL

This section contains instructions for unpacking, mounting, and making all connections to the Model 1632A Demodulator Unit. The unit is adjusted and tested for correct operation prior to shipment from the factory.

2.2 UNPACKING AND INSPECTION

Open the shipping container being careful not to puncture the container with sharp/metallic objects which might damage the contents. Remove the packing and the unit from the container and inspect the unit for damage. If any damage as a result of shipping is observed, file a written claim with the shipping agency and forward a copy of the claim to:

PLANTRONICS/Frederick Electronics Corporation

7630 Hayward Road, P.O. Box 502

Frederick, Maryland 21701-0502

If packing for storage or reshipment is anticipated, replace the packing material in the shipping container and store the container for future use.

2.3 POWER REQUIREMENTS

The Model 1632A will operate on either 115 Vac, 60 Hz or 230 Vac, 60 Hz. Satisfactory operation is possible with 10% line voltage variations, and with frequencies from 47 to 400 Hz. The unit is set to operate on either 115 Vac or 230 Vac by a switch on rear panel. The unit is shipped from the factory with the switch in customer specified position.

CAUTION

The 115/230 Vac switch on the rear panel must be set to the 230 Vac position before the unit can operate on 230 Vac. Otherwise serious damage will result if the unit is connected to a 230 Vac source.

2.4 MOUNTING

The Model 1632A can be mounted in a standard 19-inch rack by inserting four screws through the front panel. A vertical rack space of 3.5 inches is required.

2.5 SIGNAL CONNECTIONS

All connections to the Model 1632A are located on the rear panel of the unit (refer to Figure 2-1). Connections are listed in Table 2-1. Those connections that do not apply to particular operating requirements should be ignored.

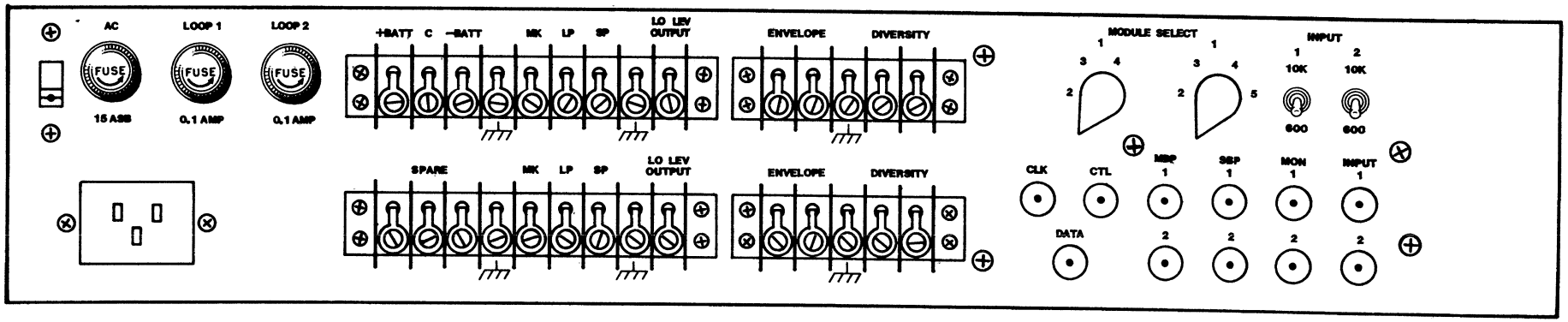


Figure 2-1. Model 1632A Rear Panel

Table 2-1. Rear Panel Connections

CONNECTOR	TERMINAL/PIN	FUNCTION
OUTPUT 1	1	+BATTERY \
	2	BATTERY COMMON > OPTIONAL
	3	-BATTERY /
	4	CHASSIS GROUND
	5	MARK LOOP 1 \
	6	LOOP COMMON 1 > OPTIONAL
	7	SPACE LOOP 1 /
	8	CHASSIS GROUND
	9	LOW LEVEL OUTPUT 1
	10	MARK ENVELOPE 1
	11	SPACE ENVELOPE 1
	12	CHASSIS GROUND
	13	MARK DIVERSITY 1
	14	SPACE DIVERSITY 1
OUTPUT 2	1	SPARE
	2	SPARE
	3	SPARE
	4	CHASSIS GROUND
	5	MARK LOOP 2 \
	6	LOOP COMMON 2 > OPTIONAL
	7	SPACE LOOP 2 /
	8	CHASSIS GROUND
	9	LOW LEVEL OUTPUT 2
	10	SPACE ENVELOPE 2
	11	MARK ENVELOPE 2
	12	CHASSIS GROUND
	13	SPACE DIVERSITY 2
	14	MARK DIVERSITY 2
CLK	BNC	REMOTE CLOCK
DATA	BNC	REMOTE DATA
CTL	BNC	REMOTE CONTROL
MBP (1 & 2)	BNC	MARK BANDPASS 1 & 2
SBP (1 & 2)	BNC	SPACE BANDPASS 1 & 2
MONITOR (1 & 2)	BNC	INPUT MONITOR 1 & 2
INPUT (1 & 2)	BNC	INPUT 1 & 2

2.6 REAR PANEL CONTROLS

Table 2-2 lists the functions of the rear panel controls.

Table 2-2. Rear Panel Controls

CONTROL	FUNCTION
MODULE SELECT 1	Six position rotary switch used to select remote control address for left hand demodulator.
MODULE SELECT 2	As above for right-hand demodulator.
INPUT 1 SWITCH 10K/600	Selects input impedance for input 1.
INPUT 2 SWITCH 10K/600	Selects input impedance for input 2.

2.7 INTERNAL ADJUSTMENTS

The following paragraphs contain the procedures to make the required adjustments to the Model 1632A. Reference Figure 2-2 for circuit board and component location.

2.7.1 Demodulator Board

2.7.1.1 MARK DIVERSITY OFFSET. A potentiometer located near Z14 is used to adjust the mark diversity offset. The adjustment is performed with the demod input switch selecting an input which is shorted. The mark diversity tie point on the rear connector is monitored with an oscilloscope and the potentiometer adjusted for minimum offset.

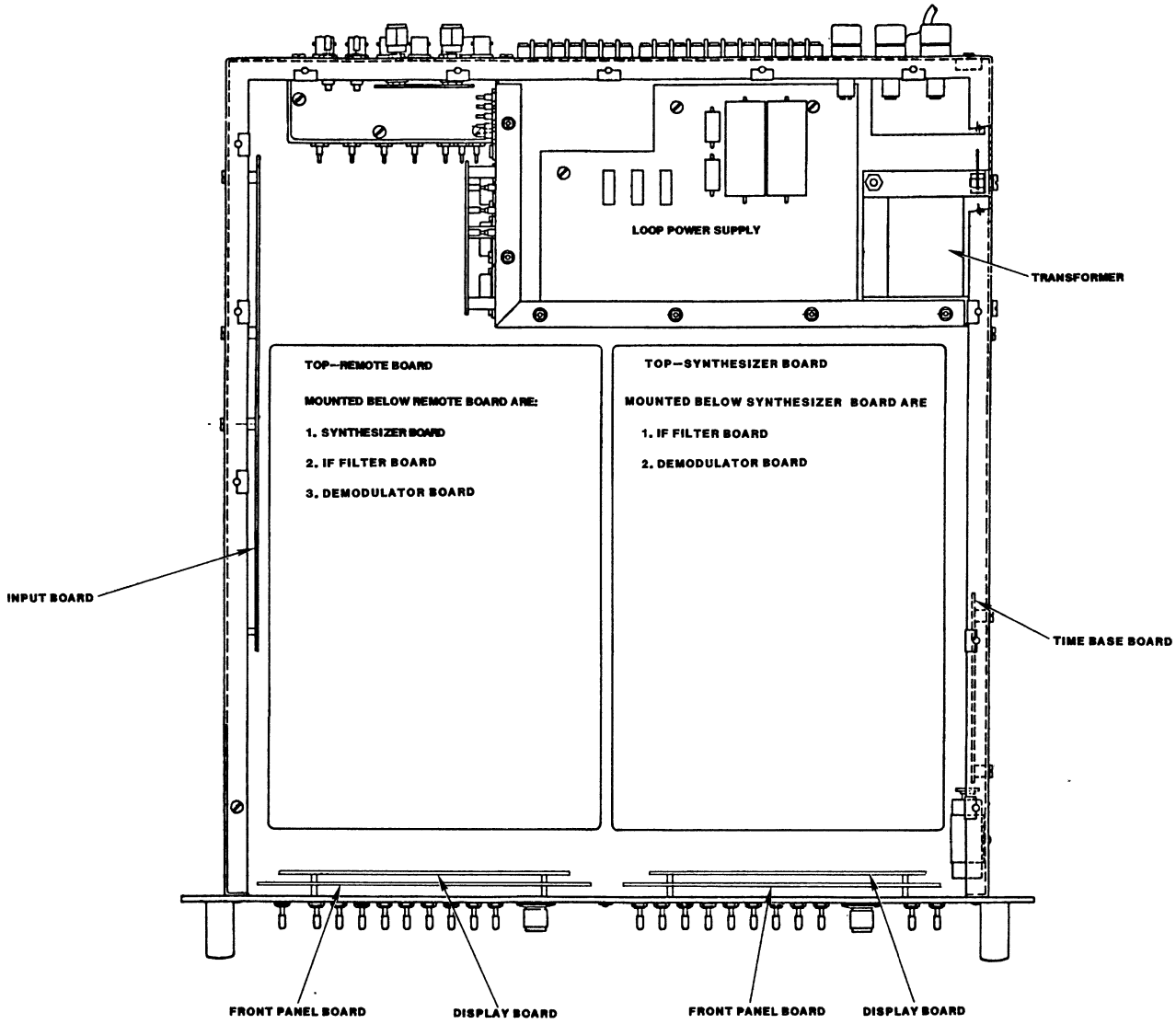


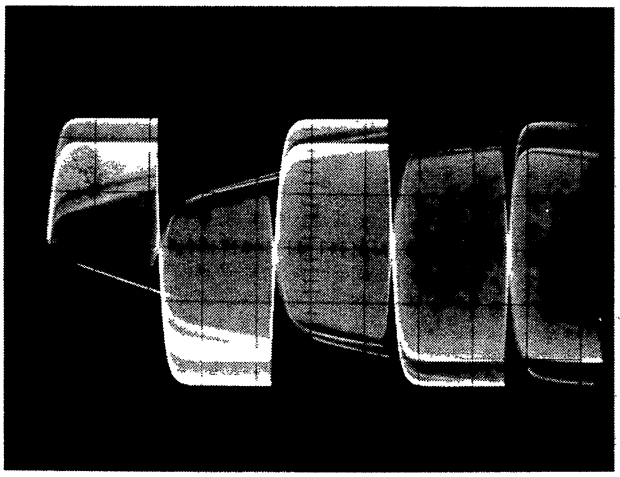
Figure 2-2. Model 1632A Internal View

2.7.1.2 SPACE DIVERSITY OFFSET. A potentiometer located near Z15 is used to adjust the space diversity offset. The adjustment procedure is exactly as above except the space diversity tie point is monitored with the oscilloscope.

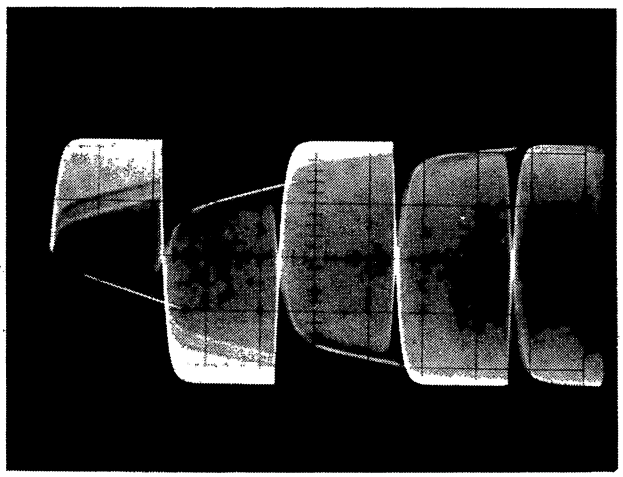
2.7.1.3 AUTO MARK-HOLD THRESHOLD. A potentiometer located near Z22 is used to adjust the auto mark-hold threshold. The demodulator is connected and set up to receive an FSK signal with 600 ohm step attenuator in series with the input. Monitor TP3 with an oscilloscope, reduce the input level slowly from 0 dBm. The signal at TP3 will go from high to low when the threshold is passed. Adjust the potentiometer for the desired threshold (-55 dBm is nominal).

2.7.2 Synthesizer Board

2.7.2.1 MARK MIXER BALANCE. Apply an input signal to unit. Monitor mark mixer output (TP5). Adjust MX and MY pots until the maximum excursions of the signal are superimposed, see Figure 2-3. Then adjust the MZ pot until the signal is centered about zero volts. This can be accomplished by using a slower oscilloscope sweep so that a sine wave eye pattern appears on the scope and adjust for zero crossings at zero volts. Check also for symmetry of waveform, see Figure 2-4.

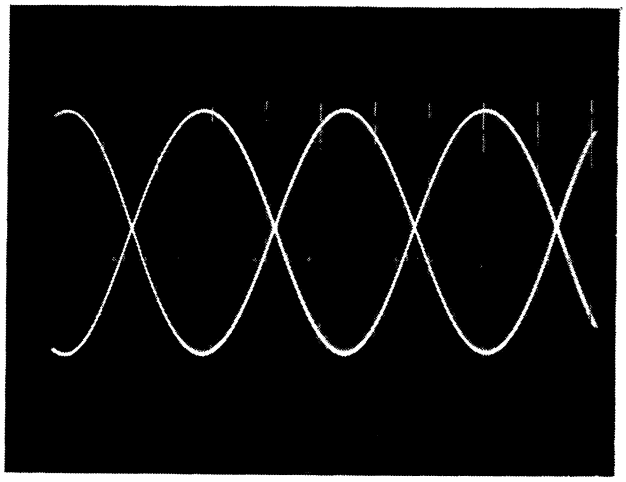


a. Not Superimposed

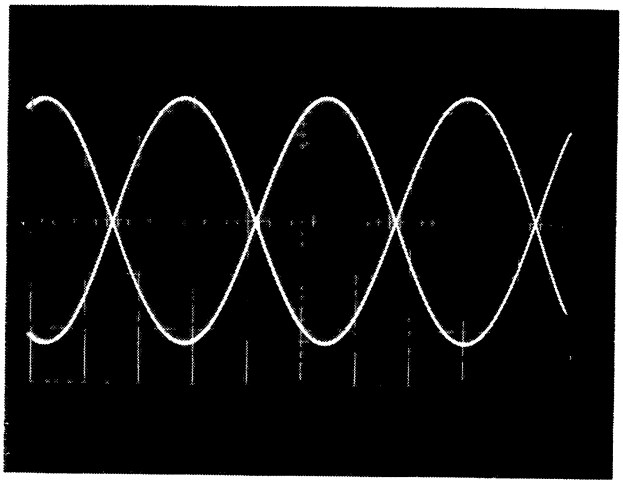


b. Superimposed

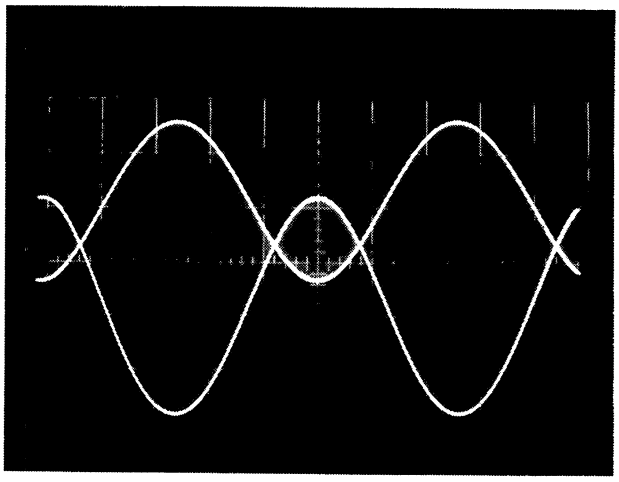
Figure 2-3. Maximum Excursions



a. Offset Eye Pattern



b. Eye Pattern Adjusted Crossings Occur At Zero Volts



c. Distorted Eye Pattern (Readjust X, Y Pots)

Figure 2-4. Sine Wave Eye Patterns

2.7.2.2 SPACE MIXER BALANCE. Repeat for space mixer. Monitor space mixer output (TP6) and adjust SX, SY and SZ pots.

2.7.3 Time Base Board

2.7.3.1 LOOP DELAY CLOCK. A jumper (eyelets A-C) on the time base is used to disable the delay clock if no high level loop keyers are installed. The jumper must be moved to eyelets A-B to enable the delay clock if high level loop keyers are to be used.

2.7.4 Computer Control

2.7.4.1 UNIT SELECT. There are four unit select jumper positions on this board. A jumper must be installed in one of these positions corresponding to the unit select address.

2.7.4.2 REMOTE INPUT THRESHOLD. A potentiometer located near Z1 is used to adjust the threshold of the input circuits. This potentiometer should be adjusted so that the voltage appearing at Z1 pin 2 is at the midpoint of the input signal voltage swing. This adjustment must be made with an oscilloscope or high input impedance VTVM.

2.7.5 Power Supply Board

2.7.5.1 LOW LEVEL OUTPUT POLARITY. There are two sets of jumpers which may be used to select the low level output of each driver to conform to either MIL-188 or RS-232 polarity. The output swing may be increased from $\pm$6V to $\pm$12V by removing one of the zener diodes between pin 2 and pin 6 of the output drivers.

SECTION III

OPERATION

3.1 GENERAL

This section contains a list of controls and indicators and complete operating instructions for the Model 1632A Demodulator.

3.2 CONTROLS AND INDICATORS

Table 3-1 lists the function of each control and indicator on the front panel and rear panel.

Table 3-1. Controls and Indicators

CONTROL/INDICATOR	FUNCTION
AMH ON/OFF switch	When in AMH ON position, activates circuit that places output in mark-hold condition if both mark and space channels are lost. Nominally -55 dBm.
Δf 30 Hz/42.5 Hz switch	Selects 30 Hz or 42.5 Hz frequency increments.
BANDWIDTH (Hz) switch	Selects filter bandwidth in eight increments from 10 Hz to 330 Hz, as follows: 10 Hz BW 40 Hz BW 55 Hz BW 75 Hz BW 105 Hz BW 145 Hz BW 200 Hz BW 330 Hz BW **N O T E** 10 Hz BW for tuning only.

Table 3-1. Controls and Indicators (cont.)

CONTROL/INDICATOR	FUNCTION
LEVEL 1	Indicates input 1 level.
HI LED	Level greater than Ø dBm.
NOR LED	Level between Ø dBm and -2Ø dBm.
LOW LED	Level less than -2Ø dBm.
LEVEL 2	Indicates input 2 level.
HI LED	Level greater than Ø dBm.
NOR LED	Level between Ø dBm and -2Ø dBm.
LOW LED	Level less than -2Ø dBm.
	N O T E Level indicators correspond to setting of input switch.
MARK and SPACE displays	Each may display a number from Ø to 199 and when multiplied by Δf is equal to the tone frequency. Leading zeros are blanked. The units and tens digits are blanked if the corresponding phase locked loop is out of lock.
FREQ/ Δf switches	Three switches for each tone, one corresponding to each digit displayed. Pushing switch down decrements one digit. Pushing the switch up increments one digit. Wraparound from zero to nine and from nine to zero is included for units and tens. Wraparound from zero to one and one to zero is included for the hundreds digit.
MARK and SPACE LEDS (above mark and space displays)	Indicate keying of mark and space tones.

Table 3-1. Controls and Indicators (cont.)

CONTROL/INDICATOR	FUNCTION
INPUT 1/2 switch	Selects input 1 or input 2.
MODE NOR/MK/SP switch	Selects normal mode (mark and space), mark only mode, or space only mode.
POLARITY NOR/MK/REV switch	Selects output polarity; normal polarity, mark-hold for standby operation, or Reverse polarity if signal is inverted.
REMOTE/LOCAL switches 1 and 2	Places either DEMOD under local or remote control. Switch one corresponds to the demodulator on the left, switch two, to the demodulator on the right.
POWER/OFF switch	Applies primary power to the unit.

3.3 OPERATION

3.3.1 Demodulator Controls

Since the front panel controls on each of the two demodulators are alike, their operation is described only once in the following paragraphs.

3.3.1.1 AMH ON/OFF SWITCH. The AMH ON/OFF toggle switch activates the automatic mark-hold circuit in the demodulator. Setting the switch to the ON position activates the circuit that places the output in the mark-hold condition when both the mark and space channel intelligence is lost. This prevents garbled printout by the associated teleprinter.

3.3.1.2 ΔF SWITCH. The Δf 30 Hz/42.5 Hz toggle switch is used to select the basic frequency increment of the tone frequency to be demodulated. In order to set up for a specific tone frequency, the switch must be set to the correct factor (i.e., either 30 Hz or 42.5 Hz). The following formula illustrates the weight of the frequency increment in obtaining a given frequency:

$$\text{Frequency} = \Delta f \times (\text{number dialed}).$$

Tables 3-2 thru 3-7 list all of the possible frequencies that may be obtained.

3.3.1.3 BANDWIDTH SWITCH. The BANDWIDTH rotary switch selects the bandwidths of both the mark and space filters in eight increments ranging from 10 Hz to 330 Hz. The switch may be used in conjunction with the MARK and SPACE switches and the Δf switch to cover tone frequencies not listed in Table 3-1. For example, a FSK signal with a frequency shift of 900 Hz may place one tone at 1000 Hz, and the other at 1900 Hz. Neither of these frequencies is listed in Table 3-1. However, using 30 Hz increments one synthesizer may be tuned for a center frequency of 990 Hz and the other for 1890 Hz. A filter bandwidth somewhat wider than normal for the baud rate to be received may be selected with the BANDWIDTH switch placing the received tone frequencies well within the 3 dB points of the filters.

N O T E

MARK and SPACE filter bandwidths on a given demodulator are not independently selectable.

3.3.1.4 MARK FREQUENCY SWITCHES. The MARK frequency switches permit tuning the mark center frequency. Multiplying by the 30 Hz or 42.5 Hz frequency increment provides the mark center frequency selected.

3.3.1.5 SPACE FREQUENCY SWITCH. The SPACE frequency switches operate in the manner described above to adjust the center frequency of the space channel.

3.3.1.6 KEY INDICATORS. The MARK and SPACE KEY indicators indicate when there is mark or space keying activity by the demodulator.

3.3.1.7 NOR/MK/REV SWITCH. The NOR/MK/REV 3-position toggle switch performs two functions. The NOR and REV positions operate as a mark-space sense switch, reversing the position of the mark and space signals when these signals are received in the incorrect relationship. When set to the center (MK) position, the demodulator output is placed in the mark hold condition.

3.3.1.8 MODE SWITCH. The MODE switch is used to select one of three operating modes for the demodulator. When set to the MK, or SP positions, the switch activates only the mark or space detector, respectively. Set to NOR, it activates both the mark and space detector circuits.

3.3.2 Diversity Operation

The 1632A has the capability of being configured to a diversity system. This is easily accomplished by connecting two demodulator inputs to two receiver/antenna systems tuned to the same signal, and connecting the corresponding demodulator diversity terminals on the rear panel (separate connections for Mark and Space).

Table 3-2. List Of All Possible Tone Frequencies

FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ
30 Hz INCREMENTS					
00 \		46	1380 Hz	92	2760 Hz
01 |		47	1410 Hz	93	2790 Hz
02 |		48	1440 Hz	94	2820 Hz
03 > *		49	1470 Hz	95	2850 Hz
04 |		50	1500 Hz	96	2880 Hz
05 |		51	1530 Hz	97	2910 Hz
06 |		52	1560 Hz	98	2940 Hz
07 |		53	1590 Hz	99	2970 Hz
08 |		54	1620 Hz	100	3000 Hz
09 /		55	1650 Hz	101	3030 Hz
10	300 Hz	56	1680 Hz	102	3060 Hz
11	330 Hz	57	1710 Hz	103	3090 Hz
12	360 Hz	58	1740 Hz	104	3120 Hz
13	390 Hz	59	1770 Hz	105	3150 Hz
14	420 Hz	60	1800 Hz	106	3180 Hz
15	450 Hz	61	1830 Hz	107	3210 Hz
16	480 Hz	62	1860 Hz	108	3240 Hz
17	510 Hz	63	1890 Hz	109	3270 Hz
18	540 Hz	64	1920 Hz	110	3300 Hz
19	570 Hz	65	1950 Hz	111	3330 Hz
20	600 Hz	66	1980 Hz	112	3360 Hz
21	630 Hz	67	2010 Hz	113	3390 Hz
22	660 Hz	68	2040 Hz	114	3420 Hz
23	690 Hz	69	2070 Hz	115	3450 Hz
24	720 Hz	70	2100 Hz	116	3480 Hz
25	750 Hz	71	2130 Hz	117	3510 Hz
26	780 Hz	72	2160 Hz	118	3540 Hz
27	810 Hz	73	2190 Hz	119	3570 Hz
28	840 Hz	74	2220 Hz	120	3600 Hz
29	870 Hz	75	2250 Hz	121	3630 Hz
30	900 Hz	76	2280 Hz	122	3660 Hz
31	930 Hz	77	2310 Hz	123	3690 Hz
32	960 Hz	78	2340 Hz	124	3720 Hz
33	990 Hz	79	2370 Hz	125	3750 Hz
34	1020 Hz	80	2400 Hz	126	3780 Hz
35	1050 Hz	81	2430 Hz	127	3810 Hz
36	1080 Hz	82	2460 Hz	128	3840 Hz
37	1110 Hz	83	2490 Hz	129	3870 Hz
38	1140 Hz	84	2520 Hz	130	3900 Hz
39	1170 Hz	85	2550 Hz	131	3930 Hz
40	1200 Hz	86	2580 Hz	132	3960 Hz
41	1230 Hz	87	2610 Hz	133	3990 Hz
42	1260 Hz	88	2640 Hz	134	4020 Hz
43	1290 Hz	89	2670 Hz	135	4050 Hz
44	1320 Hz	90	2700 Hz	136	4080 Hz
45	1350 Hz	91	2730 Hz	137	4110 Hz

*NOTE: OPERATION IN THIS AREA IS NOT RECOMMENDED.

Table 3-2. List Of All Possible Tone Frequencies (cont.)

FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ
30 Hz INCREMENTS (cont.)					
138	4140 Hz	159	4770 Hz	180	5400 Hz
139	4170 Hz	160	4800 Hz	181	5430 Hz
140	4200 Hz	161	4830 Hz	182	5460 Hz
141	4230 Hz	162	4860 Hz	183	5490 Hz
142	4260 Hz	163	4890 Hz	184	5520 Hz
143	4290 Hz	164	4920 Hz	185	5550 Hz
144	4320 Hz	165	4950 Hz	186	5580 Hz
145	4350 Hz	166	4980 Hz	187	5610 Hz
146	4380 Hz	167	5010 Hz	188	5640 Hz
147	4410 Hz	168	5040 Hz	189	5670 Hz
148	4440 Hz	169	5070 Hz	190	5700 Hz
149	4470 Hz	170	5100 Hz	191	5730 Hz
150	4500 Hz	171	5130 Hz	192	5760 Hz
151	4530 Hz	172	5160 Hz	193	5790 Hz
152	4560 Hz	173	5190 Hz	194	5820 Hz
153	4590 Hz	174	5220 Hz	195	5850 Hz
154	4620 Hz	175	5250 Hz	196	5880 Hz
155	4650 Hz	176	5280 Hz	197	5910 Hz
156	4680 Hz	177	5310 Hz	198	5940 Hz
157	4710 Hz	178	5340 Hz	199	5970 Hz
158	4740 Hz	179	5370 Hz		
42.5 Hz INCREMENTS					
00 \		22	935.0 Hz	44	1870.0 Hz
01 |		23	977.5 Hz	45	1912.5 Hz
02 |		24	1020.0 Hz	46	1955.0 Hz
03 > *		25	1062.5 Hz	47	1997.5 Hz
04 |		26	1105.0 Hz	48	2040.0 Hz
05 |		27	1147.5 Hz	49	2082.5 Hz
06 |		28	1190.0 Hz	50	2125.0 Hz
07 /		29	1232.5 Hz	51	2167.5 Hz
08	340.0 Hz	30	1275.0 Hz	52	2210.0 Hz
09	382.5 Hz	31	1317.5 Hz	53	2252.0 Hz
10	425.0 Hz	32	1360.0 Hz	54	2295.0 Hz
11	467.5 Hz	33	1402.5 Hz	55	2337.5 Hz
12	510.0 Hz	34	1445.0 Hz	56	2380.0 Hz
13	552.5 Hz	35	1487.5 Hz	57	2422.5 Hz
14	595.0 Hz	36	1530.0 Hz	58	2465.0 Hz
15	637.5 Hz	37	1572.5 Hz	59	2507.5 Hz
16	680.0 Hz	38	1615.0 Hz	60	2550.0 Hz
17	722.5 Hz	39	1657.5 Hz	61	2592.5 Hz
18	765.0 Hz	40	1700.0 Hz	62	2635.0 Hz
19	807.5 Hz	41	1742.5 Hz	63	2677.5 Hz
20	850.0 Hz	42	1785.0 Hz	64	2720.0 Hz
21	892.5 Hz	43	1827.5 Hz	65	2762.5 Hz

*NOTE: OPERATION IN THIS AREA IS NOT RECOMMENDED.

Table 3-2. List Of All Possible Tone Frequencies (cont.)

FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ
42.5 Hz INCREMENTS (cont.)					
66	2805.0 Hz	111	4717.5 Hz	156	6630.0 Hz
67	2847.5 Hz	112	4760.0 Hz	157	6672.5 Hz
68	2890.0 Hz	113	4802.5 Hz	158	6715.0 Hz
69	2932.5 Hz	114	4845.0 Hz	159	6757.5 Hz
70	2975.0 Hz	115	4887.5 Hz	160	6800.0 Hz
71	3017.5 Hz	116	4930.0 Hz	161	6842.5 Hz
72	3060.0 Hz	117	4972.5 Hz	162	6885.0 Hz
73	3102.5 Hz	118	4015.0 Hz	163	6927.5 Hz
74	3145.0 Hz	119	5057.5 Hz	164	6970.0 Hz
75	3187.5 Hz	120	5100.0 Hz	165	7012.5 Hz
76	3230.0 Hz	121	5142.5 Hz	166	7055.0 Hz
77	3272.5 Hz	122	5185.0 Hz	167	7097.5 Hz
78	3315.0 Hz	123	5227.5 Hz	168	7140.0 Hz
79	3357.5 Hz	124	5270.5 Hz	169	7182.5 Hz
80	3400.0 Hz	125	5312.5 Hz	170	7225.0 Hz
81	3442.5 Hz	126	5355.0 Hz	171	7267.5 Hz
82	3485.0 Hz	127	5397.5 Hz	172	7310.0 Hz
83	3527.5 Hz	128	5440.0 Hz	173	7352.5 Hz
84	3570.0 Hz	129	5482.5 Hz	174	7395.0 Hz
85	3612.5 Hz	130	5525.0 Hz	175	7437.5 Hz
86	3655.0 Hz	131	5567.5 Hz	176	7480.0 Hz
87	3697.5 Hz	132	5610.0 Hz	177	7522.5 Hz
88	3740.0 Hz	133	5652.5 Hz	178	7565.0 Hz
89	3782.5 Hz	134	5695.0 Hz	179	7607.5 Hz
90	3825.0 Hz	135	5737.5 Hz	180	7650.0 Hz
91	3867.5 Hz	136	5780.0 Hz	181	7692.5 Hz
92	3910.0 Hz	137	5822.5 Hz	182	7735.0 Hz
93	3952.5 Hz	138	5865.0 Hz	183	7777.5 Hz
94	3995.0 Hz	139	5907.5 Hz	184	7820.0 Hz
95	4037.5 Hz	140	5905.0 Hz	185	7862.5 Hz
96	4080.0 Hz	141	5992.5 Hz	186	7905.0 Hz
97	4122.5 Hz	142	6035.0 Hz	187	7947.5 Hz
98	4165.0 Hz	143	6077.5 Hz	188	7990.0 Hz
99	4207.5 Hz	144	6120.5 Hz	189	8032.5 Hz
100	4250.0 Hz	145	6162.5 Hz	190	8075.0 Hz
101	4292.5 Hz	146	6205.0 Hz	191	8117.5 Hz
102	4335.0 Hz	147	6247.5 Hz	192	8160.5 Hz
103	4377.5 Hz	148	6290.0 Hz	193	8202.5 Hz
104	4420.5 Hz	149	6332.5 Hz	194	8245.0 Hz
105	4462.5 Hz	150	6375.0 Hz	195	8287.5 Hz
106	4505.0 Hz	151	6417.5 Hz	196	8330.0 Hz
107	4547.5 Hz	152	6460.0 Hz	197	8372.5 Hz
108	4590.0 Hz	153	6502.5 Hz	198	8415.0 Hz
109	4632.5 Hz	154	6545.0 Hz	199	8457.5 Hz
110	4675.0 Hz	155	6587.5 Hz		

Table 3-3. Frequencies of Voice-Frequency Frequency-Shift Telegraph Channels with Channel Spacing of 120 Hz (Frequency Deviation = ±30 Hz)

CHANNEL	FREQ/Δf SETTING	FREQ	CHANNEL	FREQ/Δf SETTING	FREQ
1 (mk)	13	390	13 (mk)	61	1830
1 (sp)	15	450	13 (sp)	63	1890
2 (mk)	17	510	14 (mk)	65	1950
2 (sp)	19	570	14 (sp)	67	2010
3 (mk)	21	630	15 (mk)	69	2070
3 (sp)	23	690	15 (sp)	71	2130
4 (mk)	25	750	16 (mk)	73	2190
4 (sp)	27	810	16 (sp)	75	2250
5 (mk)	29	870	17 (mk)	77	2310
5 (sp)	31	930	17 (sp)	79	2370
6 (mk)	33	990	18 (mk)	81	2430
6 (sp)	35	1050	18 (sp)	83	2490
7 (mk)	37	1110	19 (mk)	85	2550
7 (sp)	39	1170	19 (sp)	87	2610
8 (mk)	41	1230	20 (mk)	89	2670
8 (sp)	43	1290	20 (sp)	91	2730
9 (mk)	45	1350	21 (mk)	93	2790
9 (sp)	47	1410	21 (sp)	95	2850
10 (mk)	49	1470	22 (mk)	97	2910
10 (sp)	51	1530	22 (sp)	99	2970
11 (mk)	53	1590	23 (mk)	101	3030
11 (sp)	55	1650	23 (sp)	103	3090
12 (mk)	57	1710	24 (mk)	105	3150
12 (sp)	59	1770	24 (sp)	107	3210

Table 3-4. Frequencies of Voice-Frequency Frequency-Shift Telegraph Channels with Channel Spacing of 170 Hz (Frequency Deviation = ±42.5 Hz)

CHANNEL	FREQ/Δf SETTING	FREQ	CHANNEL	FREQ/Δf SETTING	FREQ
1 (mk)	09	382.5	10 (mk)	45	1912.5
1 (sp)	11	467.5	10 (sp)	47	1997.5
2 (mk)	13	552.5	11 (mk)	49	2082.5
2 (sp)	15	637.5	11 (sp)	51	2167.5
3 (mk)	17	722.5	12 (mk)	53	2252.5
3 (sp)	19	807.5	12 (sp)	55	2337.5
4 (mk)	21	892.5	13 (mk)	57	2422.5
4 (sp)	23	977.5	13 (sp)	59	2507.5
5 (mk)	25	1062.5	14 (mk)	61	2592.5
5 (sp)	27	1147.5	14 (sp)	63	2677.5
6 (mk)	29	1232.5	15 (mk)	65	2762.5
6 (sp)	31	1317.5	15 (sp)	67	2847.5
7 (mk)	33	1402.5	16 (mk)	69	2932.5
7 (sp)	35	1487.5	16 (sp)	71	3017.5
8 (mk)	37	1572.5	17 (mk)	73	3102.5
8 (sp)	39	1657.5	17 (sp)	75	3187.5
9 (mk)	41	1742.5	18 (mk)	77	3272.5
9 (sp)	43	1827.5	18 (sp)	79	3357.5

Table 3-5. Frequencies of Voice-Frequency On-Off-Keyed Telegraph Channels (Mark=Tone, Space=Absence of Tone)

CHANNEL SPACING: 120 Hz

CHANNEL	FREQ/ΔF SETTING	FREQ
1	14	420
2	18	540
3	22	660
4	26	780
5	30	900
6	34	1020
7	38	1140
8	42	1260
9	46	1380
10	50	1500
11	54	1620
12	58	1740
13	62	1860
14	66	1980
15	70	2100
16	74	2220
17	78	2340
18	82	2460
19	86	2580
20	90	2700
21	94	2820
22	98	2940
23	102	3060
24	106	3180

Table 3-6. Frequencies of Voice-Frequency Frequency-Shift Telegraph Channels with Channel Spacing of 240 Hz (Frequency Deviation = ±60 Hz)

CHANNEL	FREQ/ΔF SETTING	FREQ
1 (mk)	14	420
1 (sp)	18	540
2 (mk)	22	660
2 (sp)	26	780
3 (mk)	30	900
3 (sp)	34	1020
4 (mk)	38	1140
4 (sp)	42	1260
5 (mk)	46	1380
5 (sp)	50	1500
6 (mk)	54	1620
6 (sp)	58	1740
7 (mk)	62	1860
7 (sp)	66	1980
8 (mk)	70	2100
8 (sp)	74	2220
9 (mk)	78	2340
9 (sp)	82	2460
10 (mk)	86	2580
10 (sp)	90	2700
11 (mk)	94	2820
11 (sp)	98	2940
12 (mk)	102	3060
12 (sp)	106	3180

Table 3-7. Frequencies of Voice-Frequency Frequency-Shift Telegraph Channels with Channel Spacing of 340 Hz (Frequency Deviation = ±85 Hz)

CHANNEL	FREQ/ΔF SETTING	FREQ
1 (mk)	18	765
1 (sp)	22	935
2 (mk)	26	1105
2 (sp)	30	1275
3 (mk)	34	1445
3 (sp)	38	1615
4 (mk)	42	1785
4 (sp)	46	1955
5 (mk)	50	2125
5 (sp)	54	2295
6 (mk)	58	2465
6 (sp)	62	2635
7 (mk)	66	2805
7 (sp)	70	2975
8 (mk)	74	3245
8 (sp)	78	3315
9 (mk)	82	3485
9 (sp)	86	3655

SECTION II

INSTALLATION

2.1 GENERAL

This section contains instructions for unpacking, mounting, and making all connections to the Model 1632A Demodulator Unit. The unit is adjusted and tested for correct operation prior to shipment from the factory.

2.2 UNPACKING AND INSPECTION

Open the shipping container being careful not to puncture the container with sharp/metallic objects which might damage the contents. Remove the packing and the unit from the container and inspect the unit for damage. If any damage as a result of shipping is observed, file a written claim with the shipping agency and forward a copy of the claim to:

PLANTRONICS/Frederick Electronics Corporation

7630 Hayward Road, P.O. Box 502

Frederick, Maryland 21701-0502

If packing for storage or reshipment is anticipated, replace the packing material in the shipping container and store the container for future use.

2.3 POWER REQUIREMENTS

The Model 1632A will operate on either 115 Vac, 60 Hz or 230 Vac, 60 Hz. Satisfactory operation is possible with 10% line voltage variations, and with frequencies from 47 to 400 Hz. The unit is set to operate on either 115 Vac or 230 Vac by a switch on rear panel. The unit is shipped from the factory with the switch in customer specified position.

CAUTION

The 115/230 Vac switch on the rear panel must be set to the 230 Vac position before the unit can operate on 230 Vac. Otherwise serious damage will result if the unit is connected to a 230 Vac source.

2.4 MOUNTING

The Model 1632A can be mounted in a standard 19-inch rack by inserting four screws through the front panel. A vertical rack space of 3.5 inches is required.

2.5 SIGNAL CONNECTIONS

All connections to the Model 1632A are located on the rear panel of the unit (refer to Figure 2-1). Connections are listed in Table 2-1. Those connections that do not apply to particular operating requirements should be ignored.

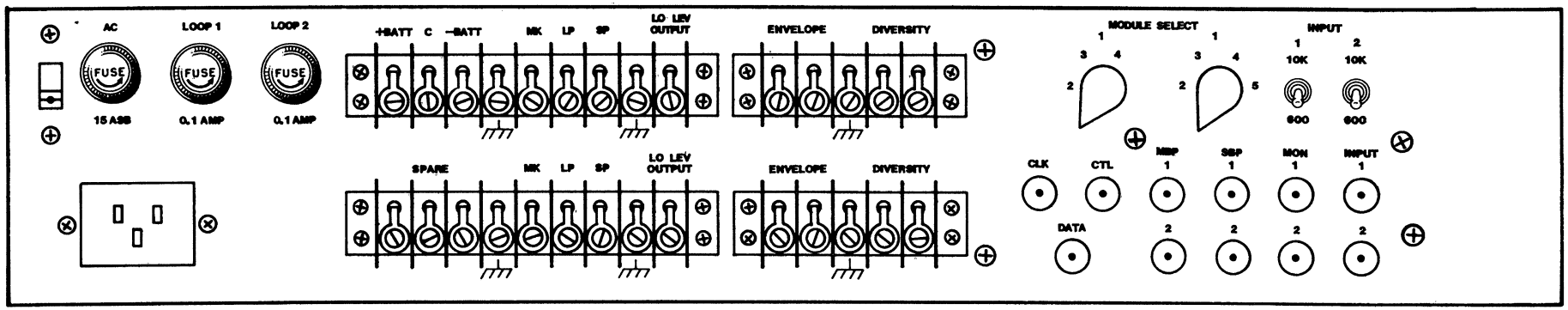


Figure 2-1. Model 1632A Rear Panel

Table 2-1. Rear Panel Connections

CONNECTOR	TERMINAL/PIN	FUNCTION
OUTPUT 1	1	+BATTERY \
	2	BATTERY COMMON > OPTIONAL
	3	-BATTERY /
	4	CHASSIS GROUND
	5	MARK LOOP 1 \
	6	LOOP COMMON 1 > OPTIONAL
	7	SPACE LOOP 1 /
	8	CHASSIS GROUND
	9	LOW LEVEL OUTPUT 1
	10	MARK ENVELOPE 1
	11	SPACE ENVELOPE 1
	12	CHASSIS GROUND
	13	MARK DIVERSITY 1
	14	SPACE DIVERSITY 1
OUTPUT 2	1	SPARE
	2	SPARE
	3	SPARE
	4	CHASSIS GROUND
	5	MARK LOOP 2 \
	6	LOOP COMMON 2 > OPTIONAL
	7	SPACE LOOP 2 /
	8	CHASSIS GROUND
	9	LOW LEVEL OUTPUT 2
	10	SPACE ENVELOPE 2
	11	MARK ENVELOPE 2
	12	CHASSIS GROUND
	13	SPACE DIVERSITY 2
	14	MARK DIVERSITY 2
CLK	BNC	REMOTE CLOCK
DATA	BNC	REMOTE DATA
CTL	BNC	REMOTE CONTROL
MBP (1 & 2)	BNC	MARK BANDPASS 1 & 2
SBP (1 & 2)	BNC	SPACE BANDPASS 1 & 2
MONITOR (1 & 2)	BNC	INPUT MONITOR 1 & 2
INPUT (1 & 2)	BNC	INPUT 1 & 2

2.6 REAR PANEL CONTROLS

Table 2-2 lists the functions of the rear panel controls.

Table 2-2. Rear Panel Controls

CONTROL	FUNCTION
MODULE SELECT 1	Six position rotary switch used to select remote control address for left hand demodulator.
MODULE SELECT 2	As above for right-hand demodulator.
INPUT 1 SWITCH 10K/600	Selects input impedance for input 1.
INPUT 2 SWITCH 10K/600	Selects input impedance for input 2.

2.7 INTERNAL ADJUSTMENTS

The following paragraphs contain the procedures to make the required adjustments to the Model 1632A. Reference Figure 2-2 for circuit board and component location.

2.7.1 Demodulator Board

2.7.1.1 MARK DIVERSITY OFFSET. A potentiometer located near Z14 is used to adjust the mark diversity offset. The adjustment is performed with the demod input switch selecting an input which is shorted. The mark diversity tie point on the rear connector is monitored with an oscilloscope and the potentiometer adjusted for minimum offset.

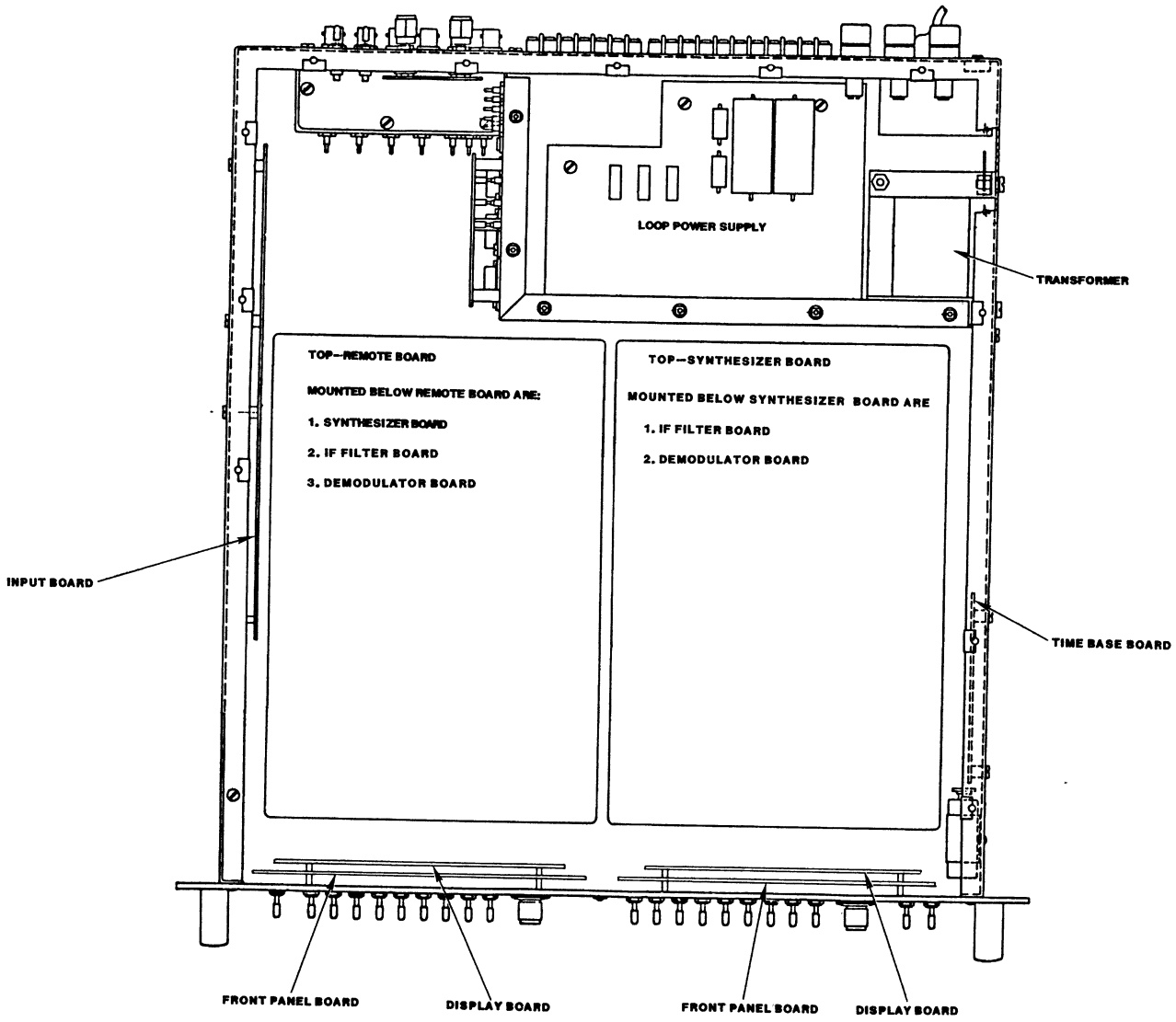


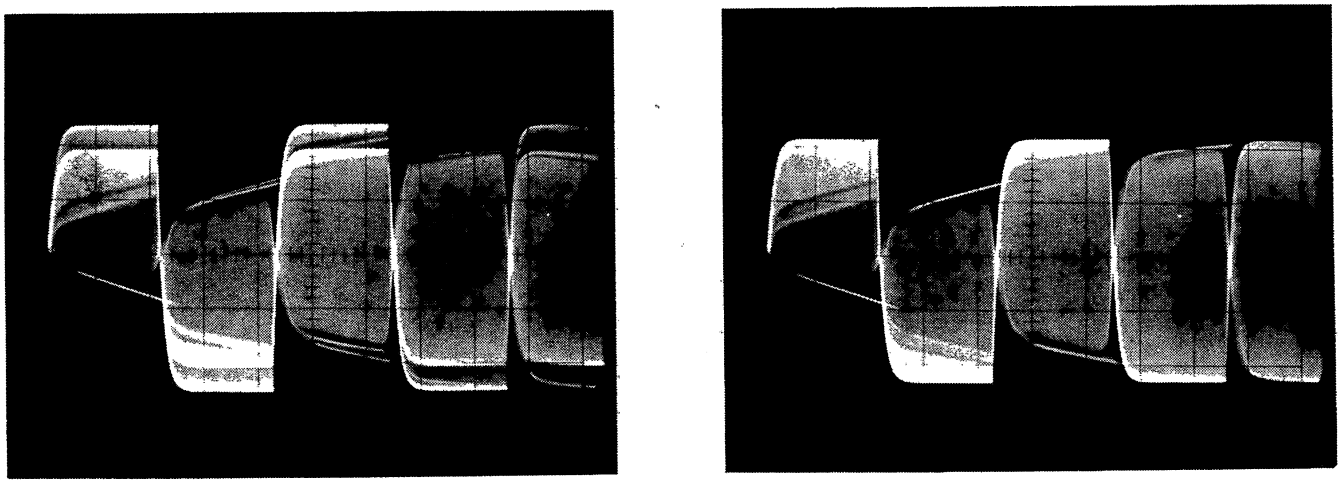
Figure 2-2. Model 1632A Internal View

2.7.1.2 SPACE DIVERSITY OFFSET. A potentiometer located near Z15 is used to adjust the space diversity offset. The adjustment procedure is exactly as above except the space diversity tie point is monitored with the oscilloscope.

2.7.1.3 AUTO MARK-HOLD THRESHOLD. A potentiometer located near Z22 is used to adjust the auto mark-hold threshold. The demodulator is connected and set up to receive an FSK signal with 600 ohm step attenuator in series with the input. Monitor TP3 with an oscilloscope, reduce the input level slowly from 0 dBm. The signal at TP3 will go from high to low when the threshold is passed. Adjust the potentiometer for the desired threshold (-55 dBm is nominal).

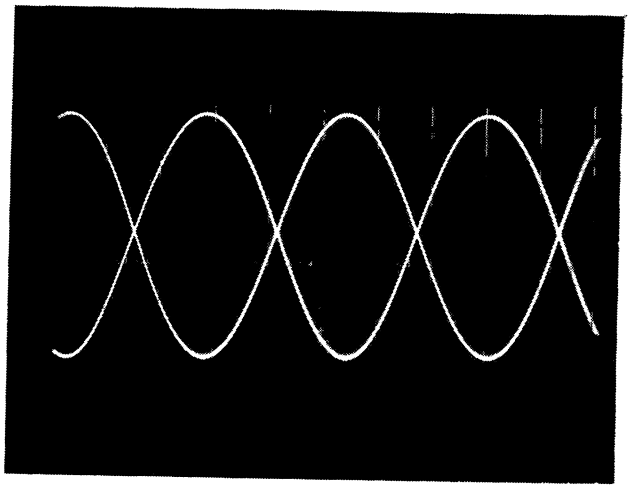
2.7.2 Synthesizer Board

2.7.2.1 MARK MIXER BALANCE. Apply an input signal to unit. Monitor mark mixer output (TP5). Adjust MX and MY pots until the maximum excursions of the signal are superimposed, see Figure 2-3. Then adjust the MZ pot until the signal is centered about zero volts. This can be accomplished by using a slower oscilloscope sweep so that a sine wave eye pattern appears on the scope and adjust for zero crossings at zero volts. Check also for symmetry of waveform, see Figure 2-4.

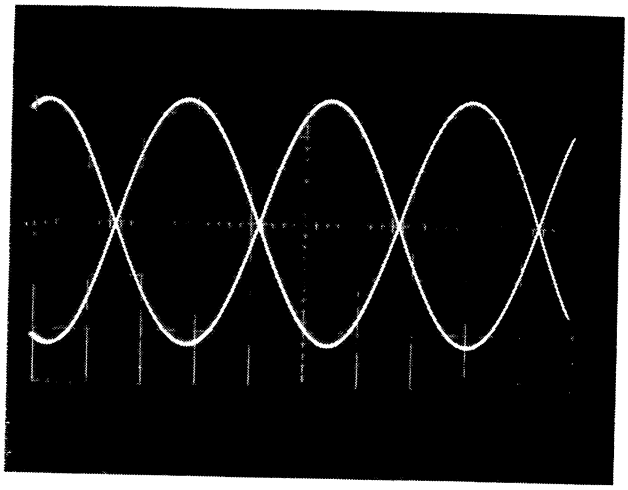


a. Not Superimposed b. Superimposed

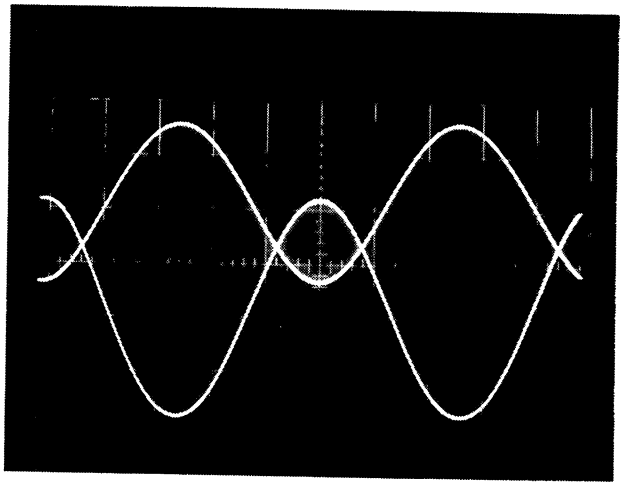
Figure 2-3. Maximum Excursions



a. Offset Eye Pattern



b. Eye Pattern Adjusted Crossings Occur At Zero Volts



c. Distorted Eye Pattern (Readjust X, Y Pots)

Figure 2-4. Sine Wave Eye Patterns

2.7.2.2 SPACE MIXER BALANCE. Repeat for space mixer. Monitor space mixer output (TP6) and adjust SX, SY and SZ pots.

2.7.3 Time Base Board

2.7.3.1 LOOP DELAY CLOCK. A jumper (eyelets A-C) on the time base is used to disable the delay clock if no high level loop keyers are installed. The jumper must be moved to eyelets A-B to enable the delay clock if high level loop keyers are to be used.

2.7.4 Computer Control

2.7.4.1 UNIT SELECT. There are four unit select jumper positions on this board. A jumper must be installed in one of these positions corresponding to the unit select address.

2.7.4.2 REMOTE INPUT THRESHOLD. A potentiometer located near Z1 is used to adjust the threshold of the input circuits. This potentiometer should be adjusted so that the voltage appearing at Z1 pin 2 is at the midpoint of the input signal voltage swing. This adjustment must be made with an oscilloscope or high input impedance VTVM.

2.7.5 Power Supply Board

2.7.5.1 LOW LEVEL OUTPUT POLARITY. There are two sets of jumpers which may be used to select the low level output of each driver to conform to either MIL-188 or RS-232 polarity. The output swing may be increased from $\pm$6V to $\pm$12V by removing one of the zener diodes between pin 2 and pin 6 of the output drivers.

SECTION III

OPERATION

3.1 GENERAL

This section contains a list of controls and indicators and complete operating instructions for the Model 1632A Demodulator.

3.2 CONTROLS AND INDICATORS

Table 3-1 lists the function of each control and indicator on the front panel and rear panel.

Table 3-1. Controls and Indicators

CONTROL/INDICATOR	FUNCTION
AMH ON/OFF switch	When in AMH ON position, activates circuit that places output in mark-hold condition if both mark and space channels are lost. Nominally -55 dBm.
Δf 30 Hz/42.5 Hz switch	Selects 30 Hz or 42.5 Hz frequency increments.
BANDWIDTH (Hz) switch	Selects filter bandwidth in eight increments from 10 Hz to 330 Hz, as follows: 10 Hz BW 40 Hz BW 55 Hz BW 75 Hz BW 105 Hz BW 145 Hz BW 200 Hz BW 330 Hz BW **N O T E** 10 Hz BW for tuning only.

Table 3-1. Controls and Indicators (cont.)

CONTROL/INDICATOR	FUNCTION
LEVEL 1	Indicates input 1 level.
HI LED	Level greater than Ø dBm.
NOR LED	Level between Ø dBm and -2Ø dBm.
LOW LED	Level less than -2Ø dBm.
LEVEL 2	Indicates input 2 level.
HI LED	Level greater than Ø dBm.
NOR LED	Level between Ø dBm and -2Ø dBm.
LOW LED	Level less than -2Ø dBm.
	N O T E Level indicators correspond to setting of input switch.
MARK and SPACE displays	Each may display a number from Ø to 199 and when multiplied by Δf is equal to the tone frequency. Leading zeros are blanked. The units and tens digits are blanked if the corresponding phase locked loop is out of lock.
FREQ/ Δf switches	Three switches for each tone, one corresponding to each digit displayed. Pushing switch down decrements one digit. Pushing the switch up increments one digit. Wraparound from zero to nine and from nine to zero is included for units and tens. Wraparound from zero to one and one to zero is included for the hundreds digit.
MARK and SPACE LEDS (above mark and space displays)	Indicate keying of mark and space tones.

Table 3-1. Controls and Indicators (cont.)

CONTROL/INDICATOR	FUNCTION
INPUT 1/2 switch	Selects input 1 or input 2.
MODE NOR/MK/SP switch	Selects normal mode (mark and space), mark only mode, or space only mode.
POLARITY NOR/MK/REV switch	Selects output polarity; normal polarity, mark-hold for standby operation, or Reverse polarity if signal is inverted.
REMOTE/LOCAL switches 1 and 2	Places either DEMOD under local or remote control. Switch one corresponds to the demodulator on the left, switch two, to the demodulator on the right.
POWER/OFF switch	Applies primary power to the unit.

3.3 OPERATION

3.3.1 Demodulator Controls

Since the front panel controls on each of the two demodulators are alike, their operation is described only once in the following paragraphs.

3.3.1.1 AMH ON/OFF SWITCH. The AMH ON/OFF toggle switch activates the automatic mark-hold circuit in the demodulator. Setting the switch to the ON position activates the circuit that places the output in the mark-hold condition when both the mark and space channel intelligence is lost. This prevents garbled printout by the associated teleprinter.

3.3.1.2 ΔF SWITCH. The Δf 30 Hz/42.5 Hz toggle switch is used to select the basic frequency increment of the tone frequency to be demodulated. In order to set up for a specific tone frequency, the switch must be set to the correct factor (i.e., either 30 Hz or 42.5 Hz). The following formula illustrates the weight of the frequency increment in obtaining a given frequency:

$$\text{Frequency} = \Delta f \times (\text{number dialed}).$$

Tables 3-2 thru 3-7 list all of the possible frequencies that may be obtained.

3.3.1.3 BANDWIDTH SWITCH. The BANDWIDTH rotary switch selects the bandwidths of both the mark and space filters in eight increments ranging from 10 Hz to 330 Hz. The switch may be used in conjunction with the MARK and SPACE switches and the Δf switch to cover tone frequencies not listed in Table 3-1. For example, a FSK signal with a frequency shift of 900 Hz may place one tone at 1000 Hz, and the other at 1900 Hz. Neither of these frequencies is listed in Table 3-1. However, using 30 Hz increments one synthesizer may be tuned for a center frequency of 990 Hz and the other for 1890 Hz. A filter bandwidth somewhat wider than normal for the baud rate to be received may be selected with the BANDWIDTH switch placing the received tone frequencies well within the 3 dB points of the filters.

N O T E

MARK and SPACE filter bandwidths on a given demodulator are not independently selectable.

3.3.1.4 MARK FREQUENCY SWITCHES. The MARK frequency switches permit tuning the mark center frequency. Multiplying by the 30 Hz or 42.5 Hz frequency increment provides the mark center frequency selected.

3.3.1.5 SPACE FREQUENCY SWITCH. The SPACE frequency switches operate in the manner described above to adjust the center frequency of the space channel.

3.3.1.6 KEY INDICATORS. The MARK and SPACE KEY indicators indicate when there is mark or space keying activity by the demodulator.

3.3.1.7 NOR/MK/REV SWITCH. The NOR/MK/REV 3-position toggle switch performs two functions. The NOR and REV positions operate as a mark-space sense switch, reversing the position of the mark and space signals when these signals are received in the incorrect relationship. When set to the center (MK) position, the demodulator output is placed in the mark hold condition.

3.3.1.8 MODE SWITCH. The MODE switch is used to select one of three operating modes for the demodulator. When set to the MK, or SP positions, the switch activates only the mark or space detector, respectively. Set to NOR, it activates both the mark and space detector circuits.

3.3.2 Diversity Operation

The 1632A has the capability of being configured to a diversity system. This is easily accomplished by connecting two demodulator inputs to two receiver/antenna systems tuned to the same signal, and connecting the corresponding demodulator diversity terminals on the rear panel (separate connections for Mark and Space).

Table 3-2. List Of All Possible Tone Frequencies

FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ
30 Hz INCREMENTS					
00 \		46	1380 Hz	92	2760 Hz
01 |		47	1410 Hz	93	2790 Hz
02 |		48	1440 Hz	94	2820 Hz
03 > *		49	1470 Hz	95	2850 Hz
04 |		50	1500 Hz	96	2880 Hz
05 |		51	1530 Hz	97	2910 Hz
06 |		52	1560 Hz	98	2940 Hz
07 |		53	1590 Hz	99	2970 Hz
08 |		54	1620 Hz	100	3000 Hz
09 /		55	1650 Hz	101	3030 Hz
10	300 Hz	56	1680 Hz	102	3060 Hz
11	330 Hz	57	1710 Hz	103	3090 Hz
12	360 Hz	58	1740 Hz	104	3120 Hz
13	390 Hz	59	1770 Hz	105	3150 Hz
14	420 Hz	60	1800 Hz	106	3180 Hz
15	450 Hz	61	1830 Hz	107	3210 Hz
16	480 Hz	62	1860 Hz	108	3240 Hz
17	510 Hz	63	1890 Hz	109	3270 Hz
18	540 Hz	64	1920 Hz	110	3300 Hz
19	570 Hz	65	1950 Hz	111	3330 Hz
20	600 Hz	66	1980 Hz	112	3360 Hz
21	630 Hz	67	2010 Hz	113	3390 Hz
22	660 Hz	68	2040 Hz	114	3420 Hz
23	690 Hz	69	2070 Hz	115	3450 Hz
24	720 Hz	70	2100 Hz	116	3480 Hz
25	750 Hz	71	2130 Hz	117	3510 Hz
26	780 Hz	72	2160 Hz	118	3540 Hz
27	810 Hz	73	2190 Hz	119	3570 Hz
28	840 Hz	74	2220 Hz	120	3600 Hz
29	870 Hz	75	2250 Hz	121	3630 Hz
30	900 Hz	76	2280 Hz	122	3660 Hz
31	930 Hz	77	2310 Hz	123	3690 Hz
32	960 Hz	78	2340 Hz	124	3720 Hz
33	990 Hz	79	2370 Hz	125	3750 Hz
34	1020 Hz	80	2400 Hz	126	3780 Hz
35	1050 Hz	81	2430 Hz	127	3810 Hz
36	1080 Hz	82	2460 Hz	128	3840 Hz
37	1110 Hz	83	2490 Hz	129	3870 Hz
38	1140 Hz	84	2520 Hz	130	3900 Hz
39	1170 Hz	85	2550 Hz	131	3930 Hz
40	1200 Hz	86	2580 Hz	132	3960 Hz
41	1230 Hz	87	2610 Hz	133	3990 Hz
42	1260 Hz	88	2640 Hz	134	4020 Hz
43	1290 Hz	89	2670 Hz	135	4050 Hz
44	1320 Hz	90	2700 Hz	136	4080 Hz
45	1350 Hz	91	2730 Hz	137	4110 Hz

*NOTE: OPERATION IN THIS AREA IS NOT RECOMMENDED.

Table 3-2. List Of All Possible Tone Frequencies (cont.)

FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ
30 Hz INCREMENTS (cont.)					
138	4140 Hz	159	4770 Hz	180	5400 Hz
139	4170 Hz	160	4800 Hz	181	5430 Hz
140	4200 Hz	161	4830 Hz	182	5460 Hz
141	4230 Hz	162	4860 Hz	183	5490 Hz
142	4260 Hz	163	4890 Hz	184	5520 Hz
143	4290 Hz	164	4920 Hz	185	5550 Hz
144	4320 Hz	165	4950 Hz	186	5580 Hz
145	4350 Hz	166	4980 Hz	187	5610 Hz
146	4380 Hz	167	5010 Hz	188	5640 Hz
147	4410 Hz	168	5040 Hz	189	5670 Hz
148	4440 Hz	169	5070 Hz	190	5700 Hz
149	4470 Hz	170	5100 Hz	191	5730 Hz
150	4500 Hz	171	5130 Hz	192	5760 Hz
151	4530 Hz	172	5160 Hz	193	5790 Hz
152	4560 Hz	173	5190 Hz	194	5820 Hz
153	4590 Hz	174	5220 Hz	195	5850 Hz
154	4620 Hz	175	5250 Hz	196	5880 Hz
155	4650 Hz	176	5280 Hz	197	5910 Hz
156	4680 Hz	177	5310 Hz	198	5940 Hz
157	4710 Hz	178	5340 Hz	199	5970 Hz
158	4740 Hz	179	5370 Hz		
42.5 Hz INCREMENTS					
00 \		22	935.0 Hz	44	1870.0 Hz
01 |		23	977.5 Hz	45	1912.5 Hz
02 |		24	1020.0 Hz	46	1955.0 Hz
03 > *		25	1062.5 Hz	47	1997.5 Hz
04 |		26	1105.0 Hz	48	2040.0 Hz
05 |		27	1147.5 Hz	49	2082.5 Hz
06 |		28	1190.0 Hz	50	2125.0 Hz
07 /		29	1232.5 Hz	51	2167.5 Hz
08	340.0 Hz	30	1275.0 Hz	52	2210.0 Hz
09	382.5 Hz	31	1317.5 Hz	53	2252.0 Hz
10	425.0 Hz	32	1360.0 Hz	54	2295.0 Hz
11	467.5 Hz	33	1402.5 Hz	55	2337.5 Hz
12	510.0 Hz	34	1445.0 Hz	56	2380.0 Hz
13	552.5 Hz	35	1487.5 Hz	57	2422.5 Hz
14	595.0 Hz	36	1530.0 Hz	58	2465.0 Hz
15	637.5 Hz	37	1572.5 Hz	59	2507.5 Hz
16	680.0 Hz	38	1615.0 Hz	60	2550.0 Hz
17	722.5 Hz	39	1657.5 Hz	61	2592.5 Hz
18	765.0 Hz	40	1700.0 Hz	62	2635.0 Hz
19	807.5 Hz	41	1742.5 Hz	63	2677.5 Hz
20	850.0 Hz	42	1785.0 Hz	64	2720.0 Hz
21	892.5 Hz	43	1827.5 Hz	65	2762.5 Hz

*NOTE: OPERATION IN THIS AREA IS NOT RECOMMENDED.

Table 3-2. List Of All Possible Tone Frequencies (cont.)

FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ	FREQ/Δf SETTING	FREQ
42.5 Hz INCREMENTS (cont.)					
66	2805.0 Hz	111	4717.5 Hz	156	6630.0 Hz
67	2847.5 Hz	112	4760.0 Hz	157	6672.5 Hz
68	2890.0 Hz	113	4802.5 Hz	158	6715.0 Hz
69	2932.5 Hz	114	4845.0 Hz	159	6757.5 Hz
70	2975.0 Hz	115	4887.5 Hz	160	6800.0 Hz
71	3017.5 Hz	116	4930.0 Hz	161	6842.5 Hz
72	3060.0 Hz	117	4972.5 Hz	162	6885.0 Hz
73	3102.5 Hz	118	4015.0 Hz	163	6927.5 Hz
74	3145.0 Hz	119	5057.5 Hz	164	6970.0 Hz
75	3187.5 Hz	120	5100.0 Hz	165	7012.5 Hz
76	3230.0 Hz	121	5142.5 Hz	166	7055.0 Hz
77	3272.5 Hz	122	5185.0 Hz	167	7097.5 Hz
78	3315.0 Hz	123	5227.5 Hz	168	7140.0 Hz
79	3357.5 Hz	124	5270.5 Hz	169	7182.5 Hz
80	3400.0 Hz	125	5312.5 Hz	170	7225.0 Hz
81	3442.5 Hz	126	5355.0 Hz	171	7267.5 Hz
82	3485.0 Hz	127	5397.5 Hz	172	7310.0 Hz
83	3527.5 Hz	128	5440.0 Hz	173	7352.5 Hz
84	3570.0 Hz	129	5482.5 Hz	174	7395.0 Hz
85	3612.5 Hz	130	5525.0 Hz	175	7437.5 Hz
86	3655.0 Hz	131	5567.5 Hz	176	7480.0 Hz
87	3697.5 Hz	132	5610.0 Hz	177	7522.5 Hz
88	3740.0 Hz	133	5652.5 Hz	178	7565.0 Hz
89	3782.5 Hz	134	5695.0 Hz	179	7607.5 Hz
90	3825.0 Hz	135	5737.5 Hz	180	7650.0 Hz
91	3867.5 Hz	136	5780.0 Hz	181	7692.5 Hz
92	3910.0 Hz	137	5822.5 Hz	182	7735.0 Hz
93	3952.5 Hz	138	5865.0 Hz	183	7777.5 Hz
94	3995.0 Hz	139	5907.5 Hz	184	7820.0 Hz
95	4037.5 Hz	140	5905.0 Hz	185	7862.5 Hz
96	4080.0 Hz	141	5992.5 Hz	186	7905.0 Hz
97	4122.5 Hz	142	6035.0 Hz	187	7947.5 Hz
98	4165.0 Hz	143	6077.5 Hz	188	7990.0 Hz
99	4207.5 Hz	144	6120.5 Hz	189	8032.5 Hz
100	4250.0 Hz	145	6162.5 Hz	190	8075.0 Hz
101	4292.5 Hz	146	6205.0 Hz	191	8117.5 Hz
102	4335.0 Hz	147	6247.5 Hz	192	8160.5 Hz
103	4377.5 Hz	148	6290.0 Hz	193	8202.5 Hz
104	4420.5 Hz	149	6332.5 Hz	194	8245.0 Hz
105	4462.5 Hz	150	6375.0 Hz	195	8287.5 Hz
106	4505.0 Hz	151	6417.5 Hz	196	8330.0 Hz
107	4547.5 Hz	152	6460.0 Hz	197	8372.5 Hz
108	4590.0 Hz	153	6502.5 Hz	198	8415.0 Hz
109	4632.5 Hz	154	6545.0 Hz	199	8457.5 Hz
110	4675.0 Hz	155	6587.5 Hz		

Table 3-3. Frequencies of Voice-Frequency Frequency-Shift Telegraph Channels with Channel Spacing of 120 Hz (Frequency Deviation = ±30 Hz)

CHANNEL	FREQ/Δf SETTING	FREQ	CHANNEL	FREQ/Δf SETTING	FREQ
1 (mk)	13	390	13 (mk)	61	1830
1 (sp)	15	450	13 (sp)	63	1890
2 (mk)	17	510	14 (mk)	65	1950
2 (sp)	19	570	14 (sp)	67	2010
3 (mk)	21	630	15 (mk)	69	2070
3 (sp)	23	690	15 (sp)	71	2130
4 (mk)	25	750	16 (mk)	73	2190
4 (sp)	27	810	16 (sp)	75	2250
5 (mk)	29	870	17 (mk)	77	2310
5 (sp)	31	930	17 (sp)	79	2370
6 (mk)	33	990	18 (mk)	81	2430
6 (sp)	35	1050	18 (sp)	83	2490
7 (mk)	37	1110	19 (mk)	85	2550
7 (sp)	39	1170	19 (sp)	87	2610
8 (mk)	41	1230	20 (mk)	89	2670
8 (sp)	43	1290	20 (sp)	91	2730
9 (mk)	45	1350	21 (mk)	93	2790
9 (sp)	47	1410	21 (sp)	95	2850
10 (mk)	49	1470	22 (mk)	97	2910
10 (sp)	51	1530	22 (sp)	99	2970
11 (mk)	53	1590	23 (mk)	101	3030
11 (sp)	55	1650	23 (sp)	103	3090
12 (mk)	57	1710	24 (mk)	105	3150
12 (sp)	59	1770	24 (sp)	107	3210

Table 3-4. Frequencies of Voice-Frequency Frequency-Shift Telegraph Channels with Channel Spacing of 170 Hz (Frequency Deviation = ±42.5 Hz)

CHANNEL	FREQ/Δf SETTING	FREQ	CHANNEL	FREQ/Δf SETTING	FREQ
1 (mk)	09	382.5	10 (mk)	45	1912.5
1 (sp)	11	467.5	10 (sp)	47	1997.5
2 (mk)	13	552.5	11 (mk)	49	2082.5
2 (sp)	15	637.5	11 (sp)	51	2167.5
3 (mk)	17	722.5	12 (mk)	53	2252.5
3 (sp)	19	807.5	12 (sp)	55	2337.5
4 (mk)	21	892.5	13 (mk)	57	2422.5
4 (sp)	23	977.5	13 (sp)	59	2507.5
5 (mk)	25	1062.5	14 (mk)	61	2592.5
5 (sp)	27	1147.5	14 (sp)	63	2677.5
6 (mk)	29	1232.5	15 (mk)	65	2762.5
6 (sp)	31	1317.5	15 (sp)	67	2847.5
7 (mk)	33	1402.5	16 (mk)	69	2932.5
7 (sp)	35	1487.5	16 (sp)	71	3017.5
8 (mk)	37	1572.5	17 (mk)	73	3102.5
8 (sp)	39	1657.5	17 (sp)	75	3187.5
9 (mk)	41	1742.5	18 (mk)	77	3272.5
9 (sp)	43	1827.5	18 (sp)	79	3357.5

Table 3-5. Frequencies of Voice-Frequency On-Off-Keyed Telegraph Channels (Mark=Tone, Space=Absence of Tone)

CHANNEL SPACING: 120 Hz

CHANNEL	FREQ/ΔF SETTING	FREQ
1	14	420
2	18	540
3	22	660
4	26	780
5	30	900
6	34	1020
7	38	1140
8	42	1260
9	46	1380
10	50	1500
11	54	1620
12	58	1740
13	62	1860
14	66	1980
15	70	2100
16	74	2220
17	78	2340
18	82	2460
19	86	2580
20	90	2700
21	94	2820
22	98	2940
23	102	3060
24	106	3180

Table 3-6. Frequencies of Voice-Frequency Frequency-Shift Telegraph Channels with Channel Spacing of 240 Hz (Frequency Deviation = ±60 Hz)

CHANNEL	FREQ/ΔF SETTING	FREQ
1 (mk)	14	420
1 (sp)	18	540
2 (mk)	22	660
2 (sp)	26	780
3 (mk)	30	900
3 (sp)	34	1020
4 (mk)	38	1140
4 (sp)	42	1260
5 (mk)	46	1380
5 (sp)	50	1500
6 (mk)	54	1620
6 (sp)	58	1740
7 (mk)	62	1860
7 (sp)	66	1980
8 (mk)	70	2100
8 (sp)	74	2220
9 (mk)	78	2340
9 (sp)	82	2460
10 (mk)	86	2580
10 (sp)	90	2700
11 (mk)	94	2820
11 (sp)	98	2940
12 (mk)	102	3060
12 (sp)	106	3180

Table 3-7. Frequencies of Voice-Frequency Frequency-Shift Telegraph Channels with Channel Spacing of 340 Hz (Frequency Deviation = ±85 Hz)

CHANNEL	FREQ/ΔF SETTING	FREQ
1 (mk)	18	765
1 (sp)	22	935
2 (mk)	26	1105
2 (sp)	30	1275
3 (mk)	34	1445
3 (sp)	38	1615
4 (mk)	42	1785
4 (sp)	46	1955
5 (mk)	50	2125
5 (sp)	54	2295
6 (mk)	58	2465
6 (sp)	62	2635
7 (mk)	66	2805
7 (sp)	70	2975
8 (mk)	74	3245
8 (sp)	78	3315
9 (mk)	82	3485
9 (sp)	86	3655

SECTION IV

THEORY OF OPERATION

4.1 GENERAL

This section contains the functional description of the Model 1632A Voice Frequency Carrier Telegraph Demodulator (VFCTD). The explanations are in sufficient detail to permit a trained electronic technican to understand the operation of the unit.

4.2 FUNCTIONAL DESCRIPTION

The VFCTD consists of a mainframe which is subdivided into two compartments. The larger of these two compartments contains the input circuits, computer control logic, timing logic and two identical demodulator units. The smaller compartment contains the power supply and the output circuits. This compartment may also contain the optional high level keyers.

The simplified overall block diagram, Figure 4-1, shows that the external signals are introduced to the input circuits, here they are conditioned and routed via a multiplexer to either one or both demodulator units. The multiplexer selection is controlled through a computer control unit or locally by front panel switch selection.

The signal routed from the input circuits to the demodulator unit is applied to the mixer circuit. Here it is combined with a local oscillator frequency to produce a 20.4 kHz intermediate frequency (IF).

The local oscillator frequency is produced by a highly stable synthesizer which utilizes the time base circuits for reference frequencies. The synthesizer is controlled by the computer control unit or the front panel frequency selection switches.

The mixer output is then routed through a digital filter, which eliminates all components except the 20.4 kHz difference frequency. The filter bandwidth is controlled by front panel switch selection or the computer control unit.

The 20.4 kHz signal is then passed through a 21 kHz low pass filter. From this filter the signal is applied to the demodulator circuits. Here it is rectified, detected and introduced to a slicer circuit which combines the mark and space signals.

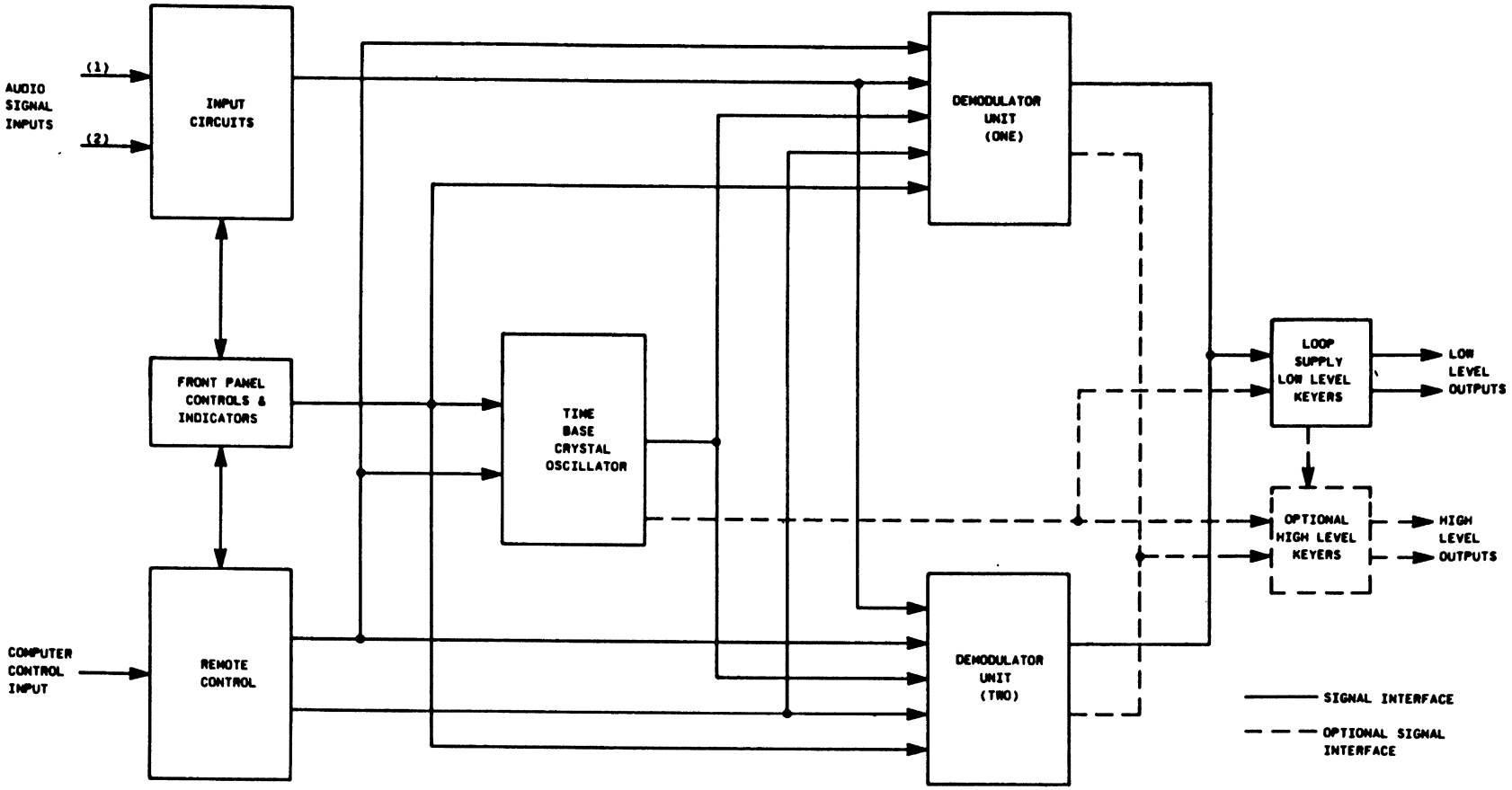


Figure 4-1. Simplified Block Diagram, Model 1632 VFCTD

The combined mark and space signal is derived through output logic circuits and the low level keyers or the optional high level keyers.

4.3 DETAILED FUNCTIONAL ANALYSIS

The following detailed functional descriptions explain how the equipment operates by following the signal through each circuit and explaining each operation. Where the circuits are identical for input signals only one signal will be discussed. Where identical circuits are utilized for the mark and space signals only the mark signal will be discussed.

4.3.1 Input Circuits

The input signal is applied from the rear panel through an impedance matching switch (10K/600 ohm) to the input circuit board (reference Figure 4-2). Here the signal is routed to the input amplifier and AGC circuits. The input amplifier is a single stage of amplification which produces a 3-to-1 voltage gain. The AGC circuit consists of a voltage follower, which produces a 100-to-1 AC gain, and a slow reacting peak detector configured in a feedback loop.

This configuration produces a constant amplitude signal which is applied to the multiplexer where it is routed to either one or both of the demodulator units. The multiplexer is controlled by the front panel demodulator selection switches or by the computer control unit.

The input signal is also applied throught the input amplifier to the level detector circuits. The level detector circuits consist of two operational amplifiers which, according to signal conditions, will activate either the >0 dBm line or the >-20 dBm line (active state is a logic 0). The detected level is applied to multiplexers which routes the signal to selected LEVEL indicators. These signals will cause the corresponding level indicators to illuminate, HI level indicator if the signal is >0 dBm, NOR level indicator if the signal is >-20 dBm. If neither line is active the LOW indicator will illuminate.

4.3.2 Demodulator Unit

Each demodulator unit consists of three printed circuit boards the synthesizer board, the Bandpass Filter board and the Demodulator board. The following paragraphs contain the detailed functional descriptions of each printed circuit board.

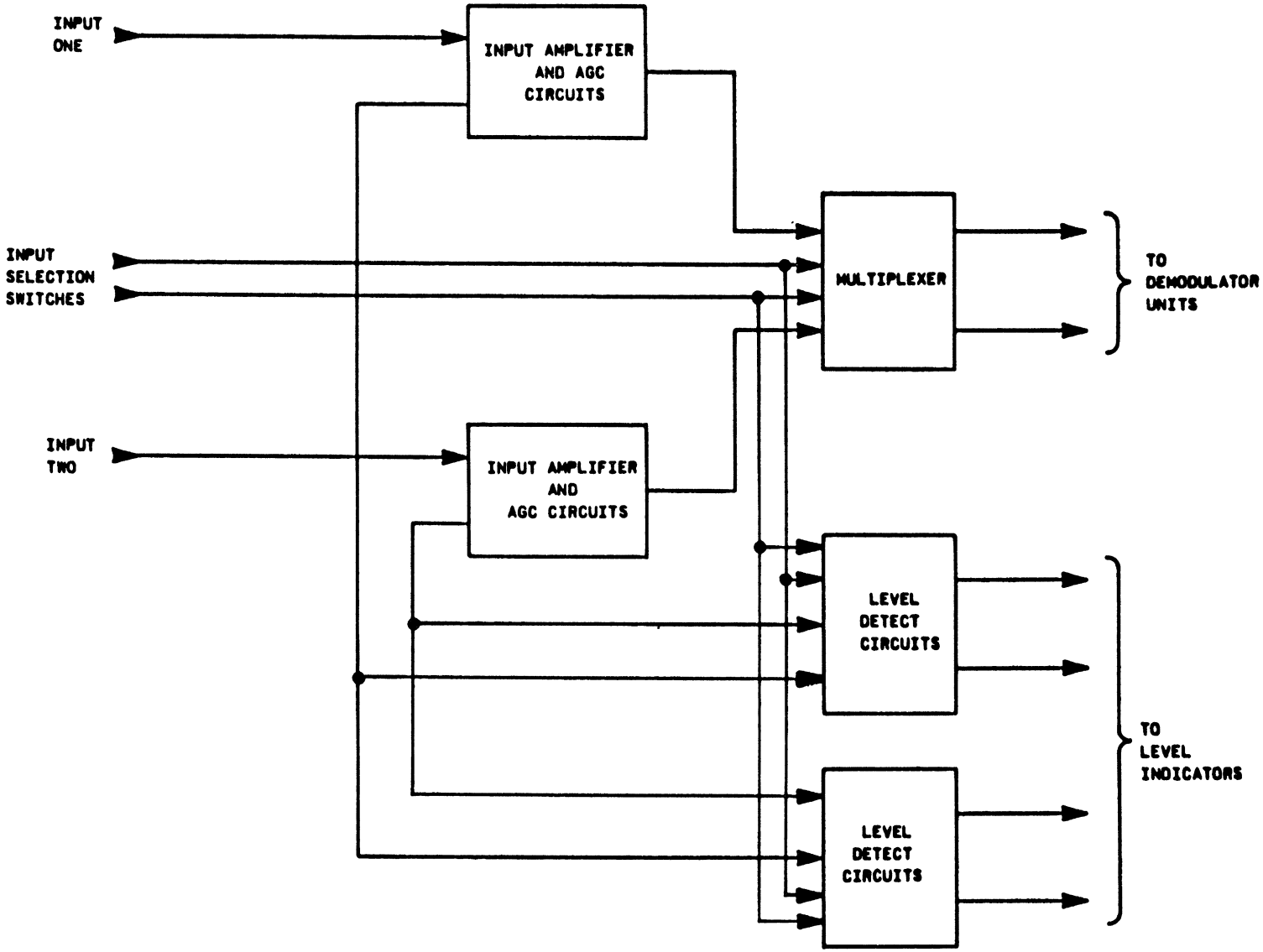


Figure 4-2. Block Diagram, Input/AGC

4.3.2.1 SYNTHESIZER. Since the Mark and Space synthesizers are identical, only the operation of the Mark synthesizer will be discussed. Input instructions are supplied to the synthesizer from either the front panel FREQ/Δf switches (LOCAL MODE) or from portions of two computer words (remote mode). These instructions are placed into the storage registers (reference Figure 4-3). The storage registers drive the front panel frequency display and provide inputs to the magnitude comparators.

The magnitude comparators monitor the storage registers and the counter/dividers. When their respective magnitudes (counts) are equal, the counter/dividers are reloaded, and the count/compare cycle continues. An output of the counter/dividers (the reference frequency) is compared to a tach frequency (300 or 425 Hz, depending upon Δf selection) by the phase comparator.

If a difference exists between the frequency of the counter/dividers and tach frequency (such as the selection of a new frequency by an operator), the phase comparator produces an error voltage, causing the VCO to change frequency. The changing VCO frequency will cause the counter/dividers frequency to change until it again equals the tach frequency.

When the reference frequency and the tach frequency are equal, the VCO output, divided by ten, is that frequency which when mixed with the input signal will produce a difference frequency of 20.4 kHz.

The counter/dividers are preset to 521 for a Δf = 42.5 and 321 for Δf = 30. The total number of counts, therefore, is the Δf present subtracted from 1000 (total capacity of counter/dividers), plus one count for the load pulse, plus the value set in the instruction storage registers multiplied by the selected Δf.

For example, assume a setting of 50 at Δf = 42.5 for the mark center frequency of 2125 Hz. To produce the proper IF frequency of 20.4 kHz the synthesizer frequency should be 22, 525 Hz. To determine if the synthesizer produces 22, 525 Hz for an input of 50 at Δf = 42.5 perform the operation stated in the preceding paragraphs.

1000 (total capacity of the counter/dividers) minus 521 (Δf preset) equals 479, plus 1 (load pulse) equals 480 (total number of counts from Δf preset to 1000), plus 50 (value set into instruction register) equals 530 (total number of counts for desired frequency) times 42.5 equals 22,525 Hz which, as has been determined, is the correct synthesizer frequency to be mixed with an incoming center frequency to give a resultant difference frequency of 20.4 kHz, the IF.

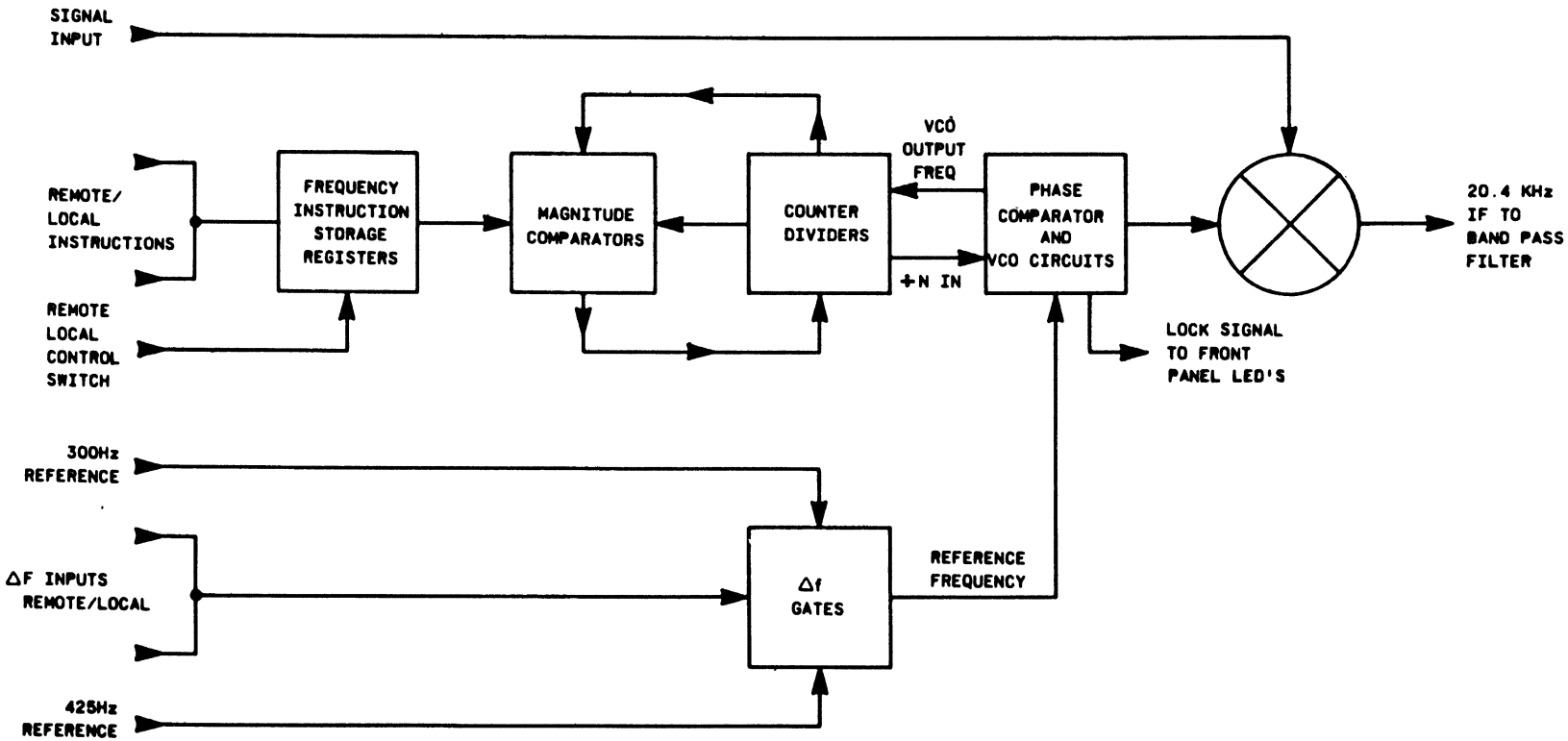


Figure 4-3. Block Diagram, Frequency Synthesizer

In the local mode the reference frequencies are selected by the position of the front panel Δf switch. In remote they are controlled by part of the two computer words. The reference frequencies are supplied by the time base units.

4.3.2.2 BANDPASS FILTER. After the input signal is combined with the synthesizer the mixer components are passed through the bandpass filter printed circuit board. This board contains two identical digital filters for the Mark and Space signals. Again only the Mark circuits will be discussed.

The Mark filter consists of four filter banks. Each bank contains the active components for bandwidth selection and eight commutating circuits (reference Figure 4-4). The commutating circuits are resistor, transistor, capacitor circuits which are turned on, then off in sequence, with no overlap by the commutating clock at a frequency of 20.4 kHz.

During commutation, each capacitor is successively exposed to a portion of the input signal. The charging rate is governed by the input R (selected by active components) commutated C time constant which is several times larger than the clock on periods. Several clock cycles are required to charge the capacitors to the average value of a segment of the input voltage.

Therefore, if the input frequency is equal to the clock frequency, the average value of the sampled segments will ultimately appear on the capacitors and the frequency will be passed by the filter.

However, if the input frequency is not equal to the commutating frequency, the average value of the sampled voltage will be different for each clock cycle and the capacitor bank will charge to some small voltage near zero. As a result, the frequency is rejected by the filter.

It is by this principle the desired difference frequency is passed by the filter, while the sum and primary frequencies from the mixer are rejected.

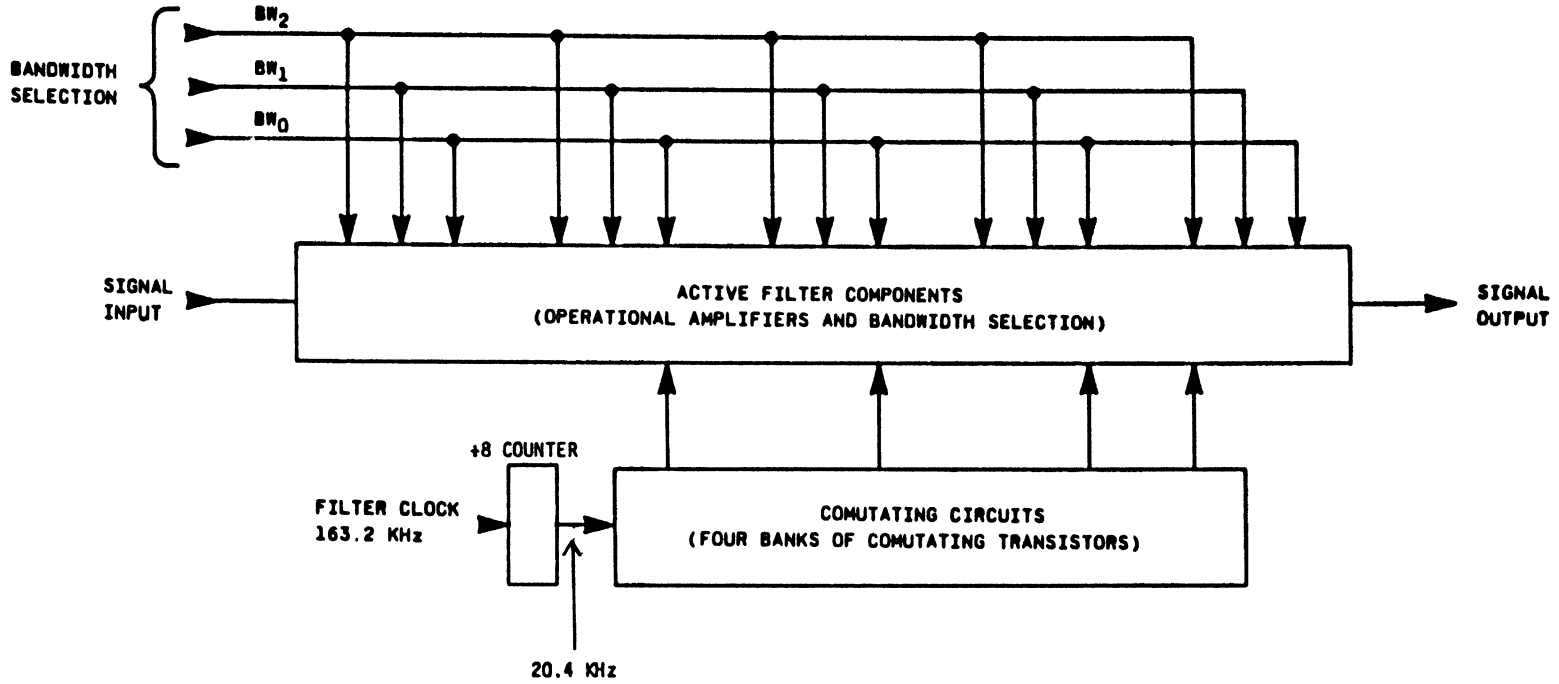


Figure 4-4. Block Diagram, Bandpass Filter

4.3.2.3 DEMODULATOR. The demodulator printed circuit board contains identical circuits for the Mark and Space signals. Again only the mark circuits will be discussed.

The output of the Bandpass filter is a step approximation of the 2Ø.4 kHz frequency as depicted by waveform 1 of Figure 4-5. This signal is passed through a 21 kHz low pass filter which smoothes the step approximation.

The signal is then applied to the Mark detector. The detector operates essentially as a full-wave rectifier, resulting in a negative (space positive) full-wave rectified signal as depicted by waveform 3.

The detected IF is then filtered by a 1.5 kHz low pass filter. This filter smoothes the signal as shown in waveform 4. At this point the Mark signal which was represented by audio frequency pulsations at the input of the VFCTD is converted to a Mark signal which can be recognized by a teleprinter.

The filtered Mark signal is routed to the diversity combiner and is combined with the diversity input signal (if used). The combined signals are applied to the decision threshold computer circuit (DTC). The DTC consists of a peak detector and associated circuits which charge to the average value of the Mark signal. This average value is introduced to a gain control circuit which maintains a switching threshold which is halfway between Ø and the Mark signal amplitude. This threshold will be maintained no matter what the amplitude happens to be or how it varies.

The Mark signal is then routed to the DTC amplifier and the LED driver circuits. The DTC amplifier conditions the keying signal which will be introduced to the slicer. The LED driver circuit is used to drive the Mark Keying LED on the front panel.

At the slicer the Mark and Space signals are combined and routed through the output logic to drive the output keyers.

The operator may control the output of the demodulator for space only or normal signal output and Mark, Space polarity. This is done by manipulating the front panel switch which controls the slicer input and the output logic circuits.

If the operator chooses to activate the auto mark hold circuit (AMH switch), this circuit will cause the output logic to go to a Steady Mark condition if the signal level falls below a specified level.

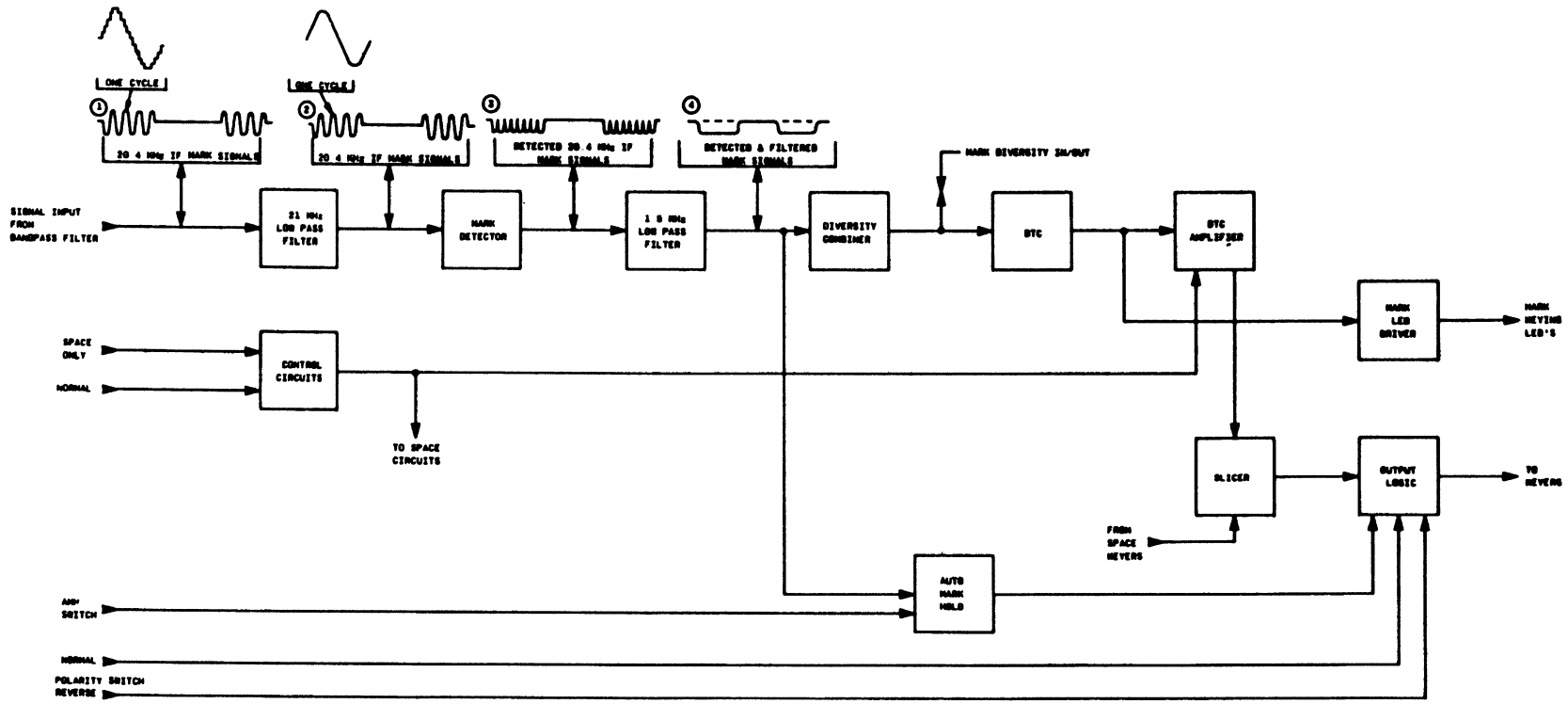


Figure 4-5. Block Diagram, Demodulator

4.3.3 Power Supply and Low Level Keyers

The power supply printed circuit board contains a full wave rectifier circuit which produces a positive and negative 12 volt output. The bipolar 12 volt supply is used to drive the operational amplifiers and the discrete component circuits of the VFCTD.

Also contained on the board are the low level keying circuits for both demodulator units. These circuits may be strapped to produce MIL-188C or EIA standard outputs.

If the optional high level keyers are being used the data is routed to the keyers via inverting amplifiers contained on this board. The delay clock from the time base unit, which is used in conjunction with high level keying is also routed through the power supply board.

4.3.4 Time Base Unit

The time base printed circuit board consists of a crystal oscillator (1,305.6 kHz) and the necessary divider and buffer circuits to produce the clock frequencies used in the VFCTD.

Clock frequencies produced are the reference clocks 300 Hz and 425 Hz, the filter clock and the loop delay clock. The loop delay clock is only used with high level keying and must be strapped on this board.

The power fail circuit consists of a power fail detector and a battery supply which will maintain the frequency instructions in the instruction storage registers until power is returned.

4.3.5 Front Panel Control

Front panel control is carrier to VFCTD via two printed circuit boards. Front panel board contains the switching circuits and the led drivers for the Level indicators. Front panel board contains the drivers and registers for the frequency indicating LED's.

4.3.6 Switching and Connector Circuits

The switching board contains the demodulator 1 and 2 selection switches. These switches are utilized to select one of six addresses for each demodulator when in remote operation.

The connector board is used to carry voltage data and clock signals between the power supply, demodulator units and the time base unit.

4.3.7 Computer Control Logic

The computer control printed circuit board accepts and decodes two 32 bit serial words used for control of the VFCTD. The bit assignments for these two words are listed in Tables 4-1 and 4-2.

The computer control unit accepts clock, data and control signals from an external source (reference Figure 4-6). The data is clocked serially into the Arithmetic logic and decoder circuits. At the same time the control and clock signals are applied to the sequence timing circuits.

The sequence timing is cleared by the control signal and begins to count clock pulses. As the data is available at the output of the Arithmetic logic and decoder, the sequence timing fires timing pulses which will activate the module selection and word control circuits.

This circuit will activate the proper select lines to the strobe gating circuits. With the select lines active the strobe gating circuits will apply the proper strobe to the VFCTD as dictated by the timing sequence signals (reference Figure 4-7 for timing relations).

Table 4-1. Word I

BIT ASSIGNMENT	DESCRIPTION OF USE
Ø - 5	None, Always Zero
6, 7	Word Identity
1 1	Word I
8, 9	None, Always Zero
1Ø, 11	Unit Select
Ø Ø Ø 1 1 Ø 1 1	Unit #1 \ Internal Unit #2 |> jumpers on Unit #3 | Computer Unit #4 / Control board
12	None, Always Zero
13, 14, 15	Module Select
Ø Ø Ø Ø Ø 1 Ø 1 Ø Ø 1 1 1 Ø Ø 1 Ø 1	Module #1 \ Module #2 | Controlled by Module #3 |> MODULE SELECT Module #4 | switches on Module #5 | rear panel Module #6 /
16, 17, 18, 19	Mark Frequency
2^3 2^2 2^1 $2^Ø$	Defines tens and hundreds from $ØØX_{1Ø}$ to $15X_{1Ø}$ in hexidecimal format
20, 21, 22, 23	Mark Frequency
2^3 2^2 2^1 $2^Ø$	Defines units in BCD format
24, 25, 26, 27	Space Frequency
2^3 2^2 2^1 $2^Ø$	Defines tens and hundreds from $ØØX_{1Ø}$ to $15X_{1Ø}$ in hexidecimal format
28, 29, 30, 31	Space Frequency
2^3 2^2 2^1 $2^Ø$	Defines units in BCD format

Table 4-2. Word II

BIT ASSIGNMENT	DESCRIPTION OF USE
Ø - 5	None, Always Zero
6, 7	Word Identity
1 Ø	Word II
8, 9	None, Always Zero
1Ø, 11	Unit Select
Ø Ø	Unit #1 \ Internal
Ø 1	Unit #2 |> jumpers on
1 Ø	Unit #3 | Computer
1 1	Unit #4 / Control board
12	Auto Mark Hold
Ø	Off
1	ON
13, 14, 15	Module Select
Ø Ø Ø	Module #1 \
Ø Ø 1	Module #2 | Controlled by
Ø 1 Ø	Module #3 |> MODULE SELECT
Ø 1 1	Module #4 | switches on
1 Ø Ø	Module #5 | rear panel
1 Ø 1	Module #6 /
16, - 23	Embedded Sync
Ø Ø Ø 1 Ø 1 1 Ø	Set by CCR
24, 25	Normal/Reverse
Ø Ø	Normal
1 Ø	Reverse
26	Channel Increment Frequency Spacing
Ø	30 Hz
1	42.5 Hz

Table 4-2. Word II (cont.)

BIT ASSIGNMENT	DESCRIPTION OF USE
27, 28, 29	Bandwidth Selection
Ø Ø Ø	10 Hz
Ø Ø 1	40 Hz
Ø 1 Ø	55 Hz
Ø 1 1	75 Hz
1 Ø Ø	105 Hz
1 Ø 1	145 Hz
1 1 Ø	200 Hz
1 1 1	330 Hz
30, 31	Mode
Ø Ø	Mark Only
Ø 1	Mark & Space
1 Ø	Space Only

4.3.8 High Level Keyers

The optional loop printed circuit board contains the loop supply and the keying circuits for high level keying. The loop supply is a full wave rectifier which produces a by-polar 55 volt output.

The board also contains the keying circuits for both demodulator units. Incorporated in the keyers is a delay clock circuit which prevents both keyers from being active at the same time. This is a protection feature which will prevent possible damage caused due to activation of the mark and space keyers simultaneously.

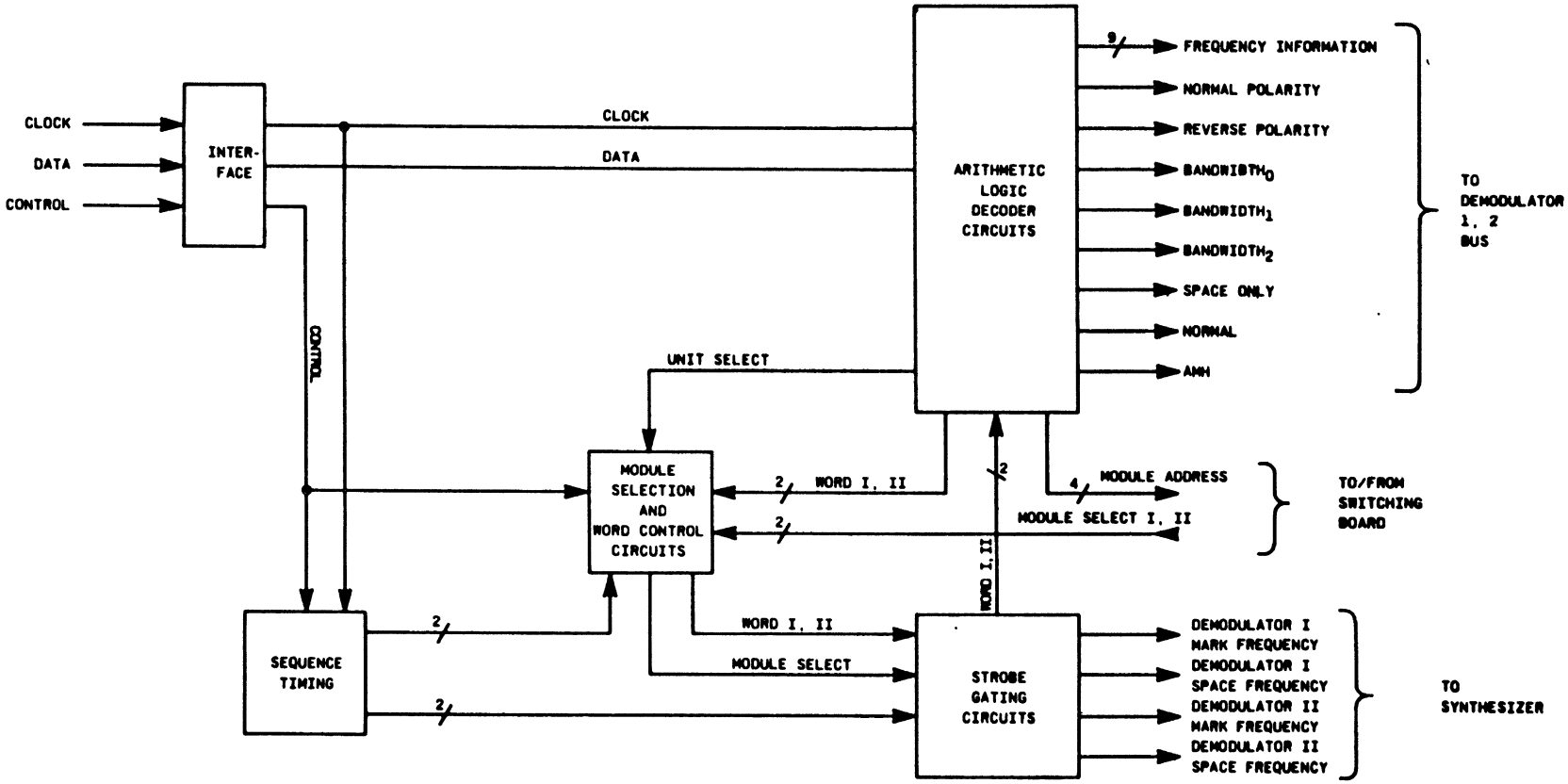
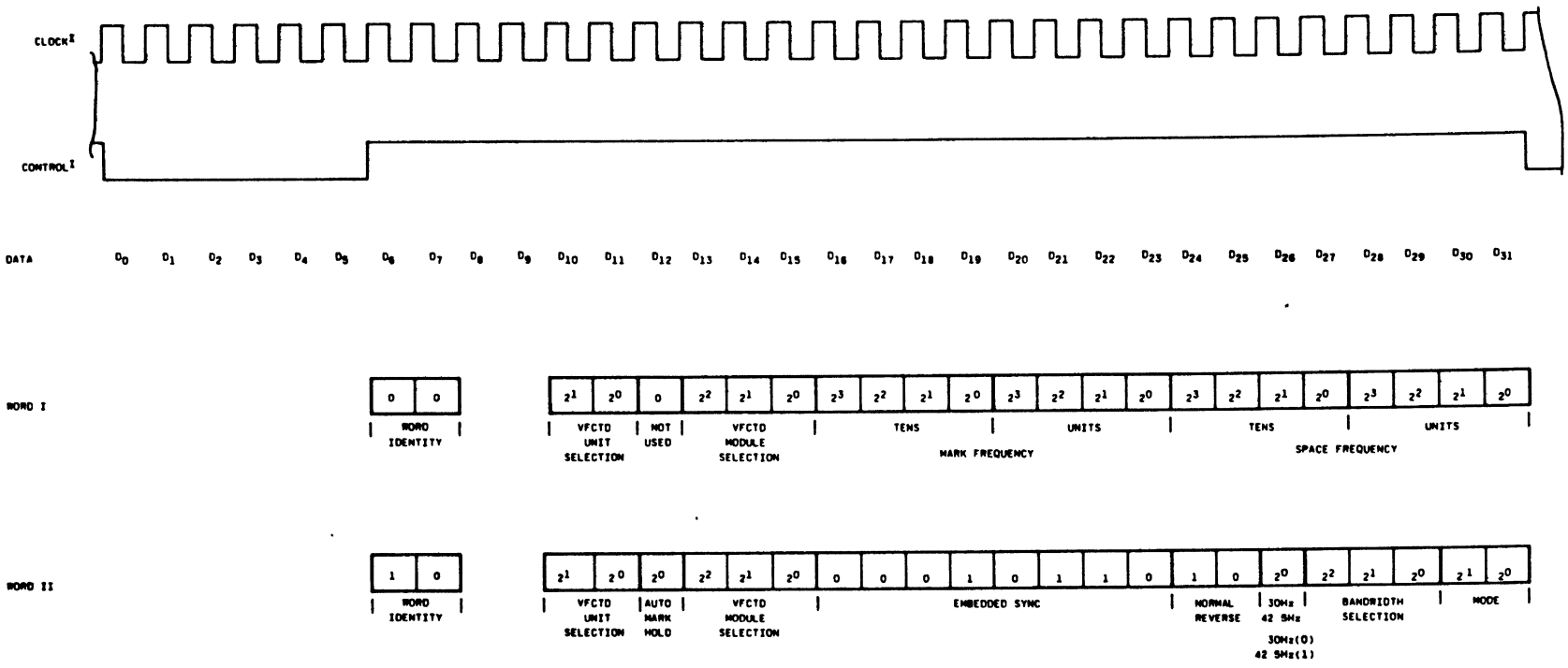


Figure 4-6. Block Diagram, Computer Control



NOTES

1 CLOCK IS 4800 BAUD(200 3usec PERIOD)

2 CONTROL LINE IS TRUE ONLY WHEN DATA WITH APPROPRIATE ADDRESS AND FORMAT IS PRESENT

Figure 4-7. VFCTD Computer Word Format

SECTION V

MAINTENANCE

5.1 GENERAL

The Model 1632A Voice Frequency Carrier Telegraph Demodulator is a solid-state device, designed to operate over long periods of time with little or no routine maintenance. An occasional inspection and cleaning are the only preventive maintenance procedures recommended. Should trouble occur, the information in this section will be helpful to a qualified maintenance technician. The assigned technician should be thoroughly familiar with digital and analog integrated circuits, and have an understanding of the circuit theory of the VFCTD before attempting any troubleshooting. A discussion of the circuit theory is contained in Section IV, schematic diagrams are contained in Section VII, and part location drawings in Section VI of this manual.

*** * * * * * * * ***
*** W A R N I N G ***
*** * * * * * * * ***

The AC input circuit of this unit contains voltages which may be hazardous to life. Exercise caution when working in the unit when protective covers are removed.

5.2 PREVENTIVE MAINTENANCE

Since the VFCTD is a solid-state low-power device, preventive maintenance is not recommended, except for periodic complete external visual inspections for indications of mechanical or electrical defects. Internal component inspection and cleaning is not recommended except during corrective maintenance. However, in locations with extreme environmental conditions, such as sand, dust, and/or large variations in humidity, the unit may require frequent cleaning. Use of a medium bristle brush to clean the interior of the unit is recommended.

- - - - - - - -
C A U T I O N
- - - - - - - -

Do not use harsh cleaning solvents on painted surfaces.

5.3 CORRECTIVE MAINTENANCE

It is recommended that a complete visual inspection of the unit be made for indications of mechanical or electrical defects if the unit is inoperative. Components showing signs of deterioration should be checked and a thorough investigation of the associated circuitry should be made to verify proper operation. Damage to parts due to heat is often the result of other less apparent troubles in the circuit. It is essential that the cause of overheating be determined before replacing the damaged component. Mechanical parts such as switches and connectors should be checked for excessive wear, looseness, misalignment, corrosion, and other signs of deterioration.

If the technician thoroughly understands the operation of the VFCTD, malfunctions in its operation should be readily apparent by monitoring the input versus output traffic.

5.3.1 Required Test Equipment

The test equipment or its equivalent required to test and troubleshoot the VFCTD is listed in Table 5-1.

No special tools other than those normally contained in an electronic technician's toolbox are required.

Table 5-1. Required Test Equipment

EQUIPMENT	MANUFACTURER
Oscilloscope	Tektronix 465
RMS Voltmeter	HP400FL
Message Generator	Digitec 2002-02
Tone Keyer	Frederick Electronics 1215A

5.3.2 Troubleshooting

In troubleshooting the VFCTD, as in all electronic equipment, the technician relies on the fact that a signal progresses in a predetermined fashion from input to output of the unit, while being processed or acted upon in some manner.

The troubleshooting procedures outlined in this section, along with the block and schematic diagrams and the Section IV functional descriptions will enable a qualified technician to isolate a trouble to a specifiic circuit, then to locate the malfunctioning component.

N O T E

After a trouble has been isolated to a defective component, circuits associated with that component should be checked to ensure that they did not cause the problem or have been damaged by the malfunction.

Since many different types of digital malfunctions can be caused by improper supply voltage(s), the outputs of the power supply should be checked prior to delving into the data and control circuitry.

After a visual inspection has been made for obvious trouble or damage, measure the Power Supply voltages (measuring point on connector PC Board). With a nominal input voltage of 115 Vac or 230 Vac, the dc voltages should be as follows:

POINT	VOLTAGE
+12 to GRD	+11.5 to +12.5 Vdc
-12 to GRD	-11.5 to -12.5 Vdc

If the Power supply voltages are within tolerance, and the input data is correct, then the logic or control circuits of the VFCTD are suspect.

Much of the VFCTD circuitry is straightforward digital logic, and needs little in the way of special troubleshooting instructions. However, the details given in the following paragraphs will aid in troubleshooting the particular circuits described.

5.3.2.1 LOCAL/REMOTE CIRCUIT. The Local/Remote circuit should bear close scrutiny during troubleshooting, as its function affects almost every control circuit in the VFCTD.

While the Local/Remote circuit consists of straightforward logic, the symptoms produced by a failure of one enable/disable function could prove baffling if the extensiveness of the circuit were not kept in mind.

5.4 FUNCTIONAL TESTING

The following tables contain functional test procedures which should be followed when troubleshooting the VFCTD.

Table 5-2. Input Circuits Functional Test

ACTION	EFFECT
Connect FSK signal source to INPUT 1	
Adjust source output level to +1Ø dBm	HI LED should illuminate
Adjust source output to Ø dBm	NOR LED should illuminate (tolerance ±3 dBm)
Adjust source output to -2Ø dBm	LOW LED should illuminate (tolerance ±3 dBm)
Check for signal present at monitor one (two) on rear panel	
Check for signal present at TP1 (2) on input board	Approximately 2 Vrms
Repeat test procedure for INPUT 2	

Table 5-3. Demodulator Circuits Functional Test

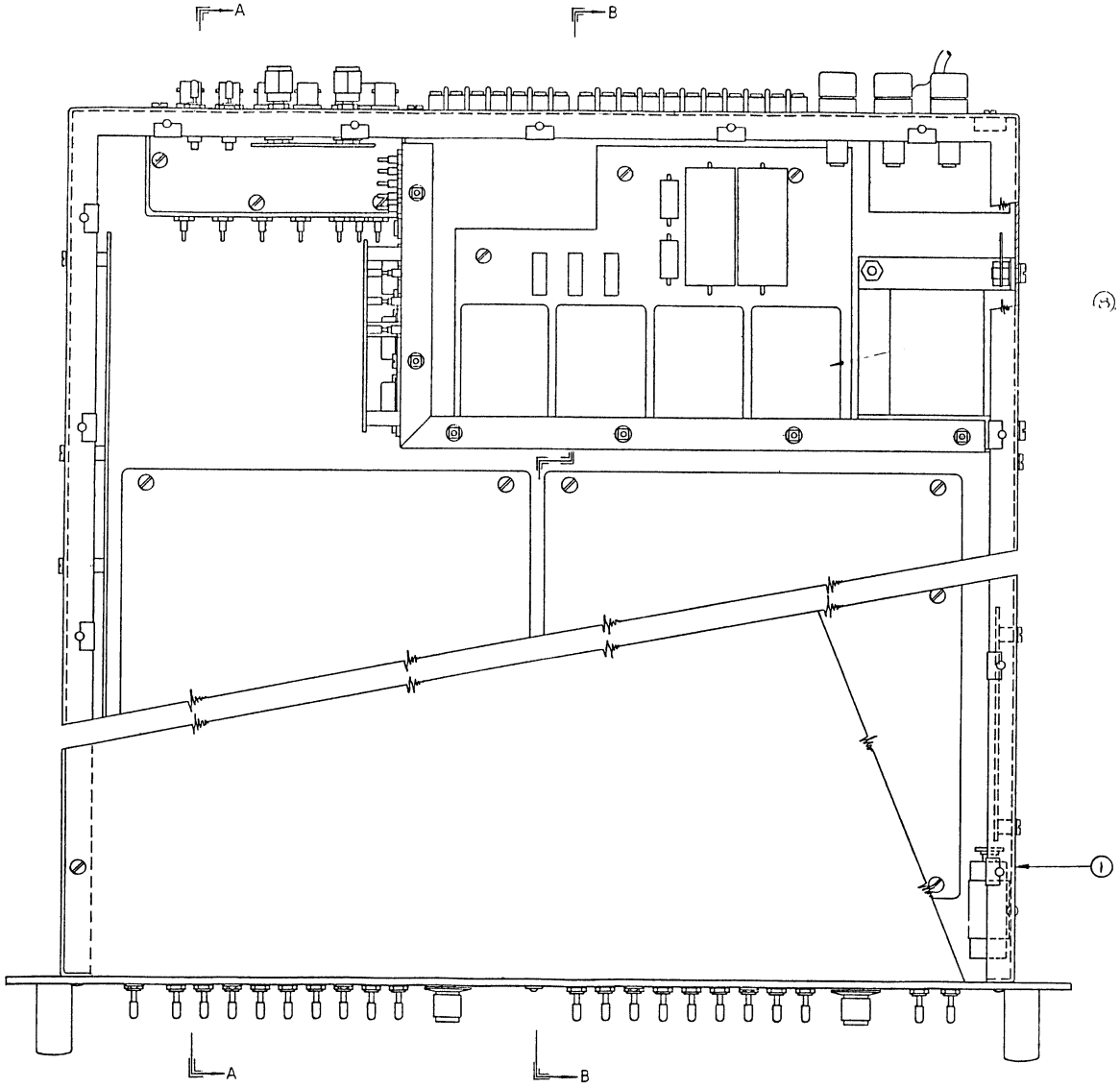
ACTION	EFFECT
Connect FSK source to INPUT 1	
Set source output to Ø dBm Mark Frequency = 1710 Hz Space Frequency = 1770 Hz Baud Rate = 50 Baud	
Set Demodulator front panel controls in the following manner: Δf = 30 Hz MARK FREQ/Δf = 57 SPACE FREQ/Δf = 59 POLARITY = NOR MODE = NOR AMH = OFF LOCAL/REMOTE = LOCAL	
Monitor low level output	Keying should be presented. Front panel MARK and SPACE LED's should indicate keying
Energize Printer	Observe copy, should be correct (source output Ø dBm)
Reduce source output until errors appear	Source output level should be less than -60 dBm
Return source output to Ø dBm	Observe copy is correct
Repeat steps six and seven first with the MODE switch in MARK position and then with the Mode switch in the SPACE position	In both cases source level should be less than -55 dBm
Reverse sense on the FSK source and change Demodulator POLARITY switch to REV	Observe copy is correct

Table 5-3. Demodulator Circuits Functional Test (cont.)

ACTION	EFFECT
On the Demodulator change POLARITY switch to MARK	Printer should lock-up
Return FSK source sense to normal and Demodulator POLARITY switch to NOR	
On the Demodulator place AMH switch to ON	
Reduce source output until printer locks up	Source output should be approximately -55 dBm (may vary according to customer specification)
De-energize printer	
Repeat above procedure for Demodulator two	

SECTION VI

PART REPLACEMENT DRAWINGS



NOTE
1. OPTIONAL ASSY - SELECT QTY - ITEM 1

SEE SEPARATE PARTS LIST: PL-D5801

Figure 6-1. Top Assembly, Sheet 1

D5801A

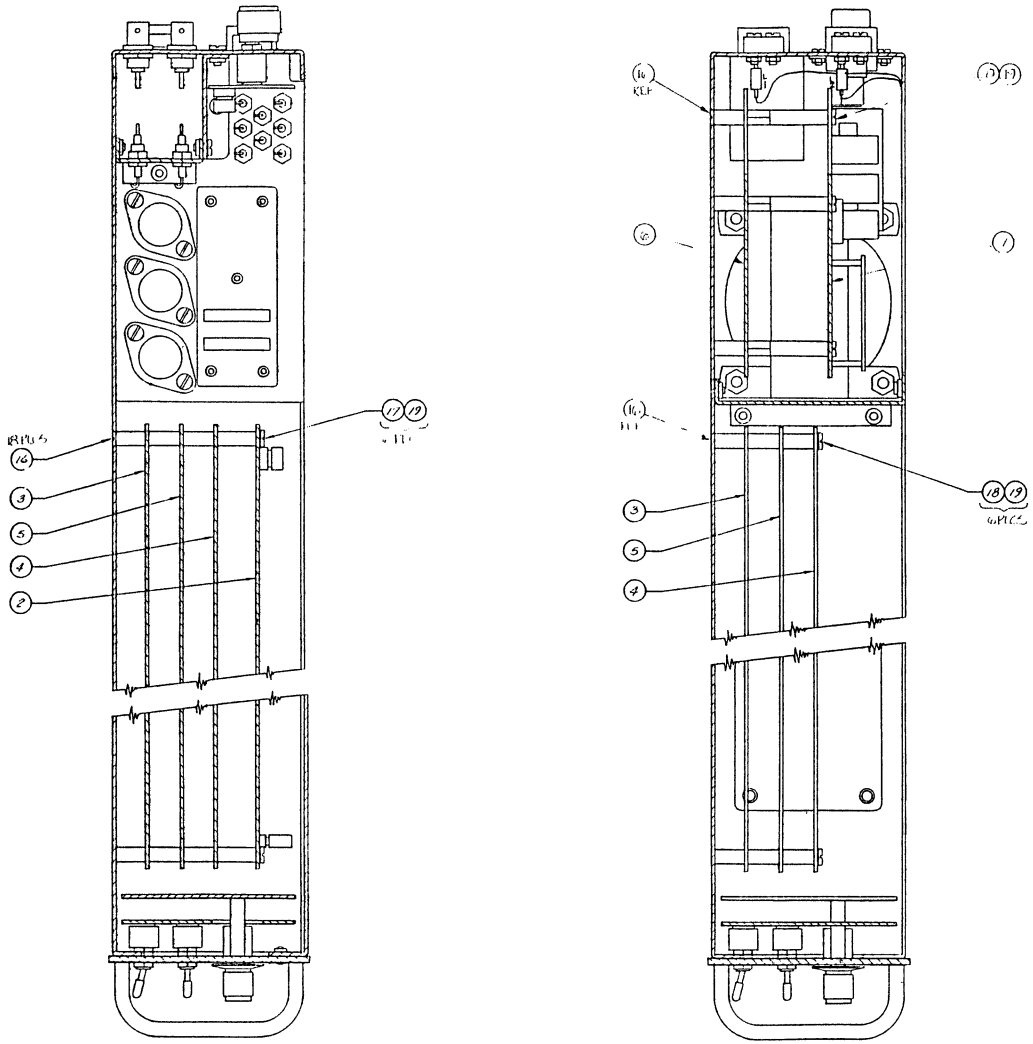
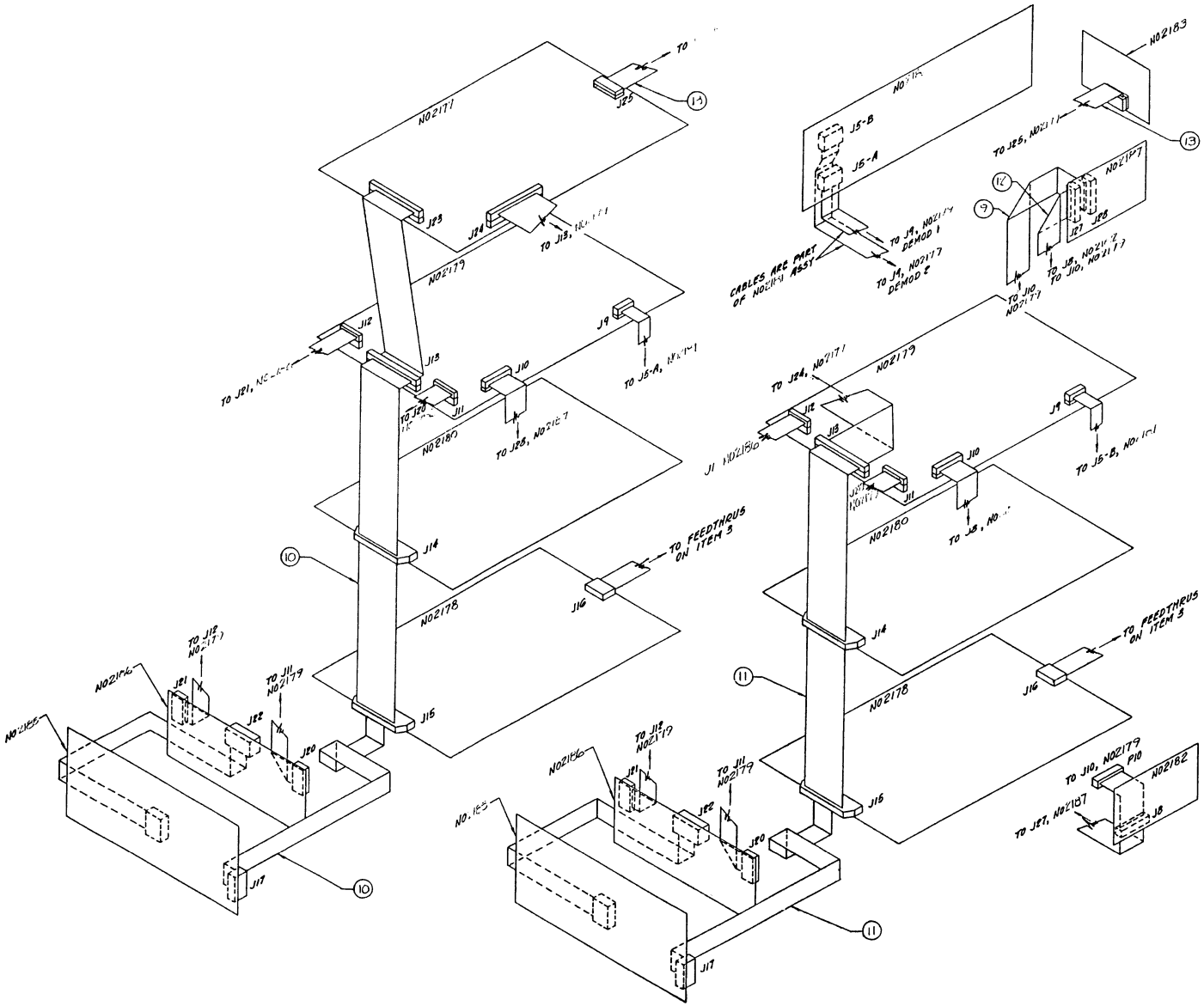


Figure 6-1. Top Assembly, Sheet 2



NOTES:
1. WIRING DIAGRAM REF. D5811

Figure 6-1. Top Assembly, Sheet 3

D5801A

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	D57 66	1		ASSY. CHASSIS	FEC		
	2	D5728	1		ASSY. REMOTE BD.	FEC	NO2177	
	3	D5731	2		ASSY. DEMOD BD.	FEC	NO2178	
	4	D5734	2		ASSY. SYNTHESIZER BD.	FEC	NO2179	
	5	D5737	2		ASSY. IF FILTER BD.	FEC	NO2180	
	6	D5761	1		ASSY. POWER SUPPLY BD.	FEC	NO2188	
	7	D5749	1		ASSY. LOOP POWER SUPPLY BD.	FEC	NO2184	
	8	C3240	Ø		ASSY. LOOP KEYER BD.	FEC	NO1452	△1
	9	C1058	1		ASSY. DEMOD 1 POWER CABLE	FEC		
	10	C4059	1		ASSY. DEMOD 1 BUS CABLE	FEC		
	11	C4060	1		ASSY. DEMOD 2 BUS CABLE	FEC		
	12	C4061	1		ASSY. DEMOD 2 POWER CABLE	FEC		
	13	C1062	1		ASSY. REMOTE BD. CABLE	FEC		
	14	AK1632A	1		ACCESSORY KIT	FEC		

Figure 6-1. Parts List, Sheet 1

PLD58Ø1

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15										
	16	404368				18		SCREW FHUC 6-32 x 5/16	T&C		
	17	404450				6		SCREW PH 6-32 x 2 1/4	T&C		
	18	404436				6		SCREW PH 6-32 x 1 1/2	T&C	1 1/2 MS51957-36	
	19	404893				18		WASHER, INT TOOTH #6	T&C	MS35333-71	
	20	404428				6		SCREW, PH 6-32x1 1/4	T&C	MS51957-35	

Figure 6-1. Parts List, Sheet 2 PLD5801

NOTES.

1 WIRING DIAGRAM REF D5811

2. SEE WIRING DIAGRAM FOR INSTALLATION OF CONNECTORS AND PINS (ITEMS 38 THRU 44) AND WIRE (ITEMS 59 & 60)

ITEM	REQD	PART NO	DESCRIPTION	MFR	VENDOR PART NO	FINISH	FINISH SPEC	CKT
87	1	583439NS	BATTERY NIC CAD, 8.75V	SANYO	6N-75P			
86	4"	500589	1/8" THERMOFIT TUBING	MARKEL	1/8 CLEAR			
85	2	404186	SCREW 4-40 X 3/16 PH	T&C	MS5857-12			
84	4	B1658	INSULATOR	FEC				
83	2	242785	GROUND LUG	ZIERICK	681			
82	1	242750	SOLDER LUG	SMITH	1414-10			
81	15	403180	SPEED NUT	TINNMAN.	C8020-632-24			
80	5	403055	NUT, HEX, 10-32x5/16 A.F.	T&C	MA567I-C8			
79	20	403030	NUT, HEX, 4-40x1/4 A.F.	T&C	MS35649-244			
78	2	403025	NUT, HEX, 4-40x3/16 A.F.	T&C	MA567I-C4			
77	4	404917	WASHER, SPLIT LOCK, NO.10	T&C	MS35338-138			
76	13	404893	WASHER, INT. TOOTH, NO.6	T&C	MS35333-71			
75	30	404878	WASHER, INT. TOOTH, NO.4	T&C	MS35333-70			
74	4	404670	SCREW, BH, 10-32x1/2	T&C	MS1958-69			
73								
72					MS1957-36			
71								
70	30	404368	SCREW, FHUC, 6-32x5/16	T&C				
69	12	404369	SCREW, PH, 6-32x5/16	T&C	MS1957-27			
68	6	404366	SCREW, OH, 6-32x5/16	T&C				
67	22	404220	SCREW, PH, 4-40x1/2	T&C	MS51957-17			
66	12	404203	SCREW, PH, 4-40x5/16	T&C	MS51957-14			
65	5	404200	SCREW, OH, 4-40x5/16	T&C				
64								
63								
62								
61								

LIST OF MATERIAL

ITEM	REQD	PART NO	DESCRIPTION	MATL SPEC OR MFR	MATL SPEC OR CAT PART NO.	FINISH	FINISH SPEC	CKT SYM
60	A/R	366748	WIRE, 2 COND. SHIELDED 20GA	ALPHA				
59	A/R	366912	WIRE, STRANDED 24GA	ALPHA				
58	2	401175	KNOB	RAYTHEON	50 5-1G			
57	2	731001NS	CAP, TOGGLE SWITCH, WHT	C&K	A7062			
56	2	731005NS	SWITCH, TOGGLE	C&K	7101			
55	1	731003NS	SWITCH, SLIDE	SW/CRAFT	46206LFR			
54	1	037011NS	CAPACITOR, 100MFD, 20V	SPRAGUE	150D107X9020S2			
53	4	037005NS	CAPACITOR, 1MFD, 35V	KEMET	T340A105K035AS			
52	2	270YY1NS	RESISTOR, 634OHM, 1/8W 1%	DALE	RCF55			
51	1	748002NS	TRANSFORMER, TM2972	TRANS INC	SC022			
50	A/R	184750	TIE WRAP	PANDUIT	SST-1M			
49	2	329001NS	FUSE, 1A	LIT-FUSE	312.100			
48	1	329003NS	FUSE, 1.5A SLO BLO	LIT-FUSE	31301.5			
47	3	329004NS	FUSEHOLDER	LIT-FUSE	342004			
46	1	370002NS	LINE CORD	BELDEN	17250			
45	1	334002NS	LINE FILTER	SANDERS	EMI-F 219-6			
44	20	714100	PIN, MALE	MOLEX	02-06-2101			
43	47	14MM10	PIN, FEMALE		02-06-1101			
42	4	243021NS	CONNECTOR		1625-1R			
41	1	243021NS			1625-15R1			
40	2	243027NS			1625-9R1			
39	5	243026NS			1625-6R1			
38	2	243025NS	CONNECTOR	MOLEX	1625-3R1			
37	2	243001NS	BARRIER STRIP	CINCH-J	5-140-Y			
36	2	243002NS	BARRIER STRIP	CINCH-J	9-140-Y			
35	11	249018NS	CONNECTOR,[illegible] WASHER	BERGEN	667-6			
34	1	186008NS	BATTERY [illegible] AMP	KEYSTONE	35F 1578	TYPE 79		
33	1	184001NS	BATTERY PLUG	KEYSTONE	35F-1681	TYPE 72		
32	2	689042	[illegible]	[illegible]	T56			
31	8"	500591	1/4 THERMOFIT TUBING	FLEXITE				
30	2	732001NS	680 uh INDUCTOR	MILLER	MS75089-21			
29	1	C4057	ASSY, DEMOD 2 DIV. CABLE	FEC				
28	1	C4056	ASSY, DEMOD 1 DIV. CABLE					
27								
26								
25								
24								
23								
22								
21								
20	1	D5716	ASSY, SWITCH BOARD	FEC	NO. 2143			
19								
18								
17								
16								
15	1	D5710	ASSY, INPUT BOARD		NO. 2101			
14	1	D5715	ASSY, TIME BASE		NO. 2102			
13								
12								
11								
10								
9								
8								
7								
6	1	C3277	ASSY, COVER, SHIELD	FEC				
5	1	C4070	ASSY, INPUT SHIELD					
4	1	C3274	ASSY, COVER					
3	1	D5767	ASSY, P/S SHIELD					
2	1	D5768	ASSY, FRONT PANEL					
1	1	D3751	ASSY, CHASSIS	FEC				

LIST OF MATERIAL JOB NO.

Figure 6-2. Chassis Assembly, Sheet 1 D5766A

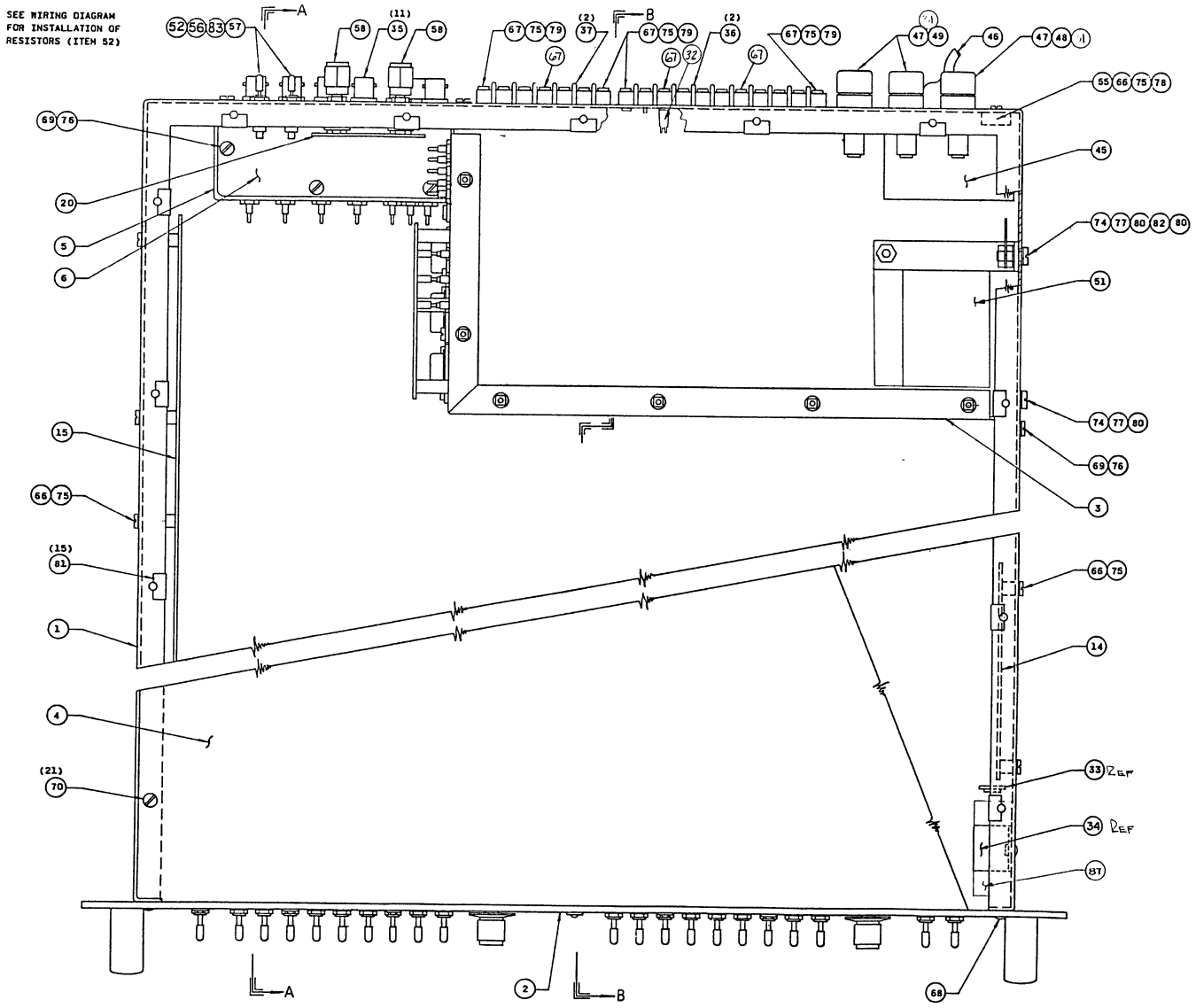


Figure 6-2. Chassis Assembly, Sheet 2

D5766A

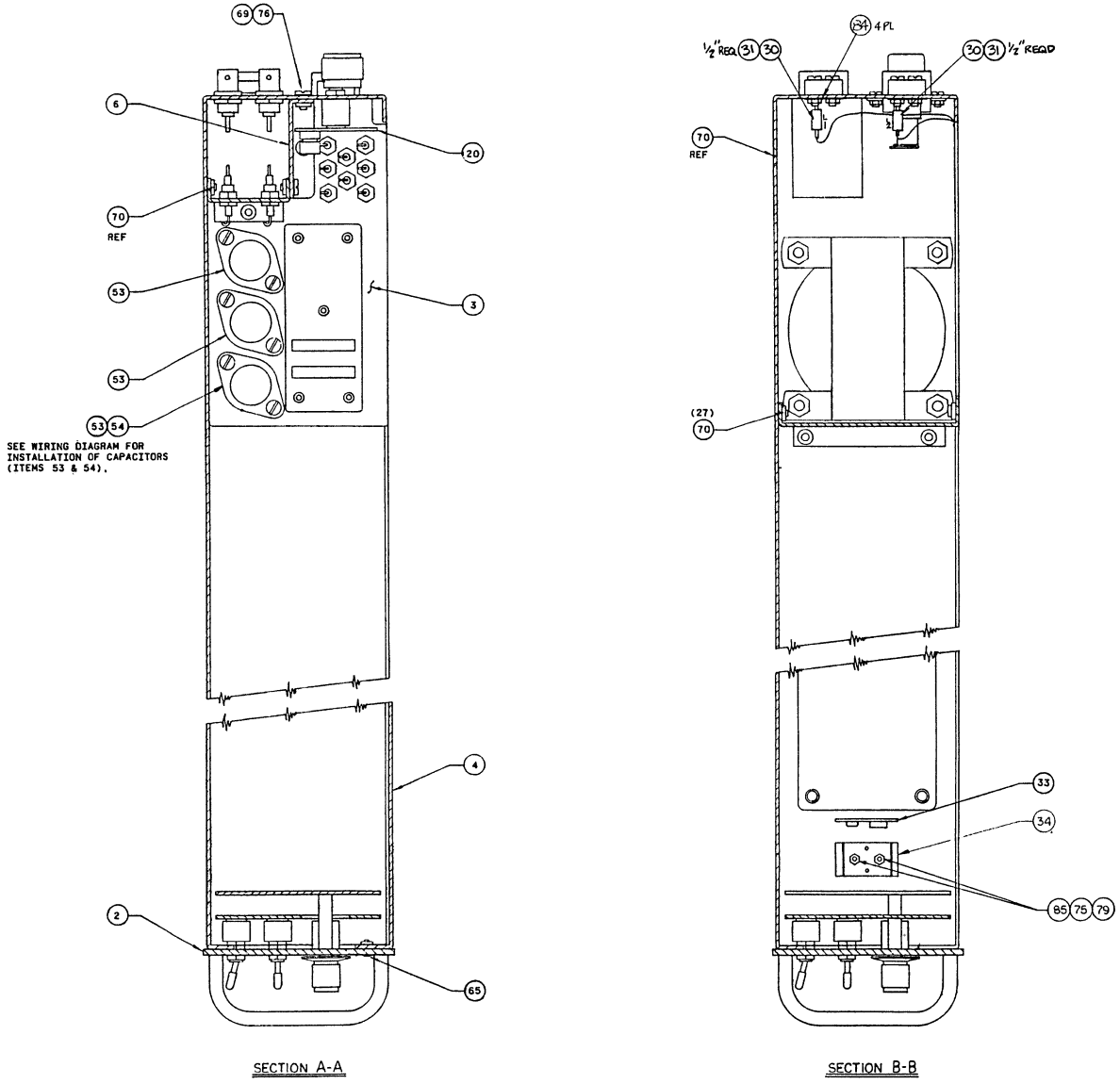


Figure 6-2. Chassis Assembly, Sheet 3 D5766A

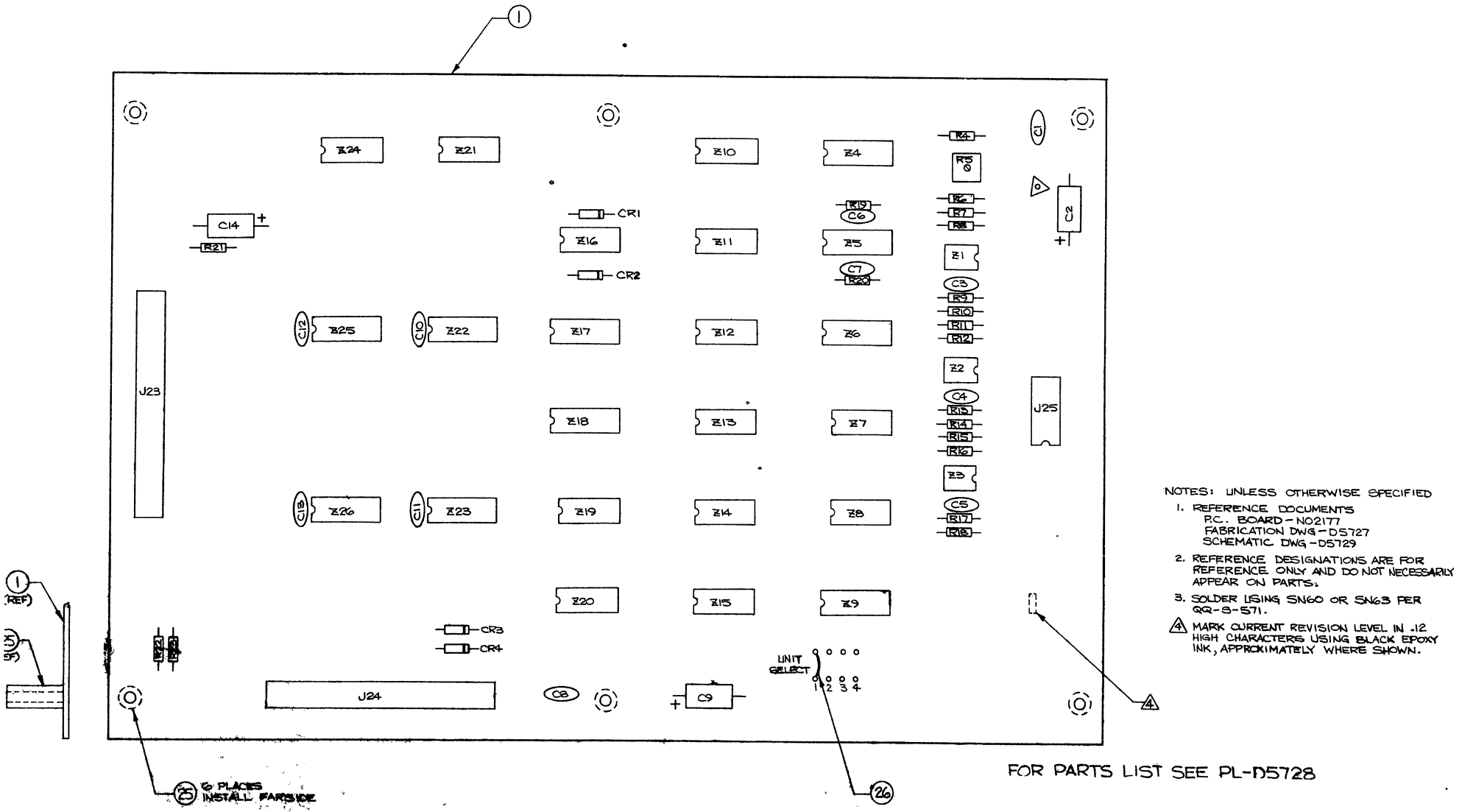


Figure 6-3. Remote P.W.B. Assembly D5728

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02177	1		P.W.B.	FEC	N02177	
	2	D5727	REF		FAB DWG.	FEC	D5727	
	3	D5729	REF		SCHEM DWG.	FEC	D5729	
	4							
	5	032009NS	6		CAP, DISC .022uf, 50V	KEMET	C321C223M5U1CA	C1,C8,C10-C13
	6	037008NS	3		CAP, 22uf, 15V	KEMET	T310B226K015AS	C2,C9,C14
	7	032002NS	3		CAP, 50pf, 1KV	CRL	DD-500	C3,C4,C5
	8	032006NS	2		CAP, .001uf, 500V	TILSONIX	801-000-X5F0-102K	C6,C7
	9							
	10	043002NS	2		DIODE, SIGNAL	FAIRCHILD	IN914	CR1,CR2
	11	040550N2	2		DIODE, RECT, 100V	MOT	IN4002	CR3,CR4
	12							
	13	243037NS	2		HEADER, 50 PIN	AMP	2-87227-5	J23,J24
	14	243041NS	1		I.C. SOCKET, 16 PIN	AUGAT	216-AG-29D	J25

Figure 6-3. Parts List, Sheet 1 PLD5728

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	640023NS	13		RES, 10K, 1/4W, 5%	R-OHM	R25J10K	R4,R6-R8,R10-R12,R14-R16 R18-R20
	16	629003NS	1		POTENTIOMETER, 10K	BOURNS	3386P-1-103	R5
	17	640036NS	3		RES, 1M, 1/4W, 5%	R-OHM	R25J1MEG	R9,R13,R17
	18	640029NS	3		RES, 47K, 1/4W, 5%	R-OHM	R25J47K	R21,R22,R23
	19							
	20	078002NS	3		I.C., 1 OP AMP	NAT	LF351N	Z1,Z2,Z3
	21	074017NT	1		I.C., SYN U/D BIN CTR	NAT	MM74C193NA	Z4
	22	074018NT	1		I.C., DUAL MON/MUL	NAT	MM74C221NA	Z5
	23	074004NS	2		I.C., BCD TO DEC DECODER	NAT	MM74C42N	Z6,Z9
	24							
	25	683378	6		STANDOFF, .625 6-32C/H	AFE	1247-14-04	
	26	366510	1		JUMPER, INSUL.	SQUIRES	J0.250x.250T26	
	27							
	28	074015NT	4		I.C., QUAD 2 INPUT NAND	NAT	MM74C00NA+	Z7,Z11,Z12,Z19

Figure 6-3. Parts List, Sheet 2

PLD5728

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	074006NT	5		I.C., DUAL D-FLIP FLOP	NAT	MM74C74NA+	Z8,Z13,Z14,Z15,Z16
	30	074016NT	2		I.C., 4/2-INPUT NOR GATE	NAT	MM74C02NA+	Z10,Z20
	31	072001NT	1		I.C., DUAL 4 STAT SHIFT	RCA	CD4015BEX	Z17
	32	074007NT	1		I.C., 4 BIT BIN FULLADD	NAT	MM74C83NA+	Z18
	33	072005NS	2		I.C., TRIPLE 3 INPUT	RCA	CD4025BE	Z21,Z24
	34	074011NS	4		I.C., 4/D FLIP-FLOP	NAT	MM74C173N	Z22,Z23,Z25,Z26
	35							
	36							
	37							
	38							
	39							
	40							
	41							
	42							

Figure 6-3. Parts List, Sheet 3

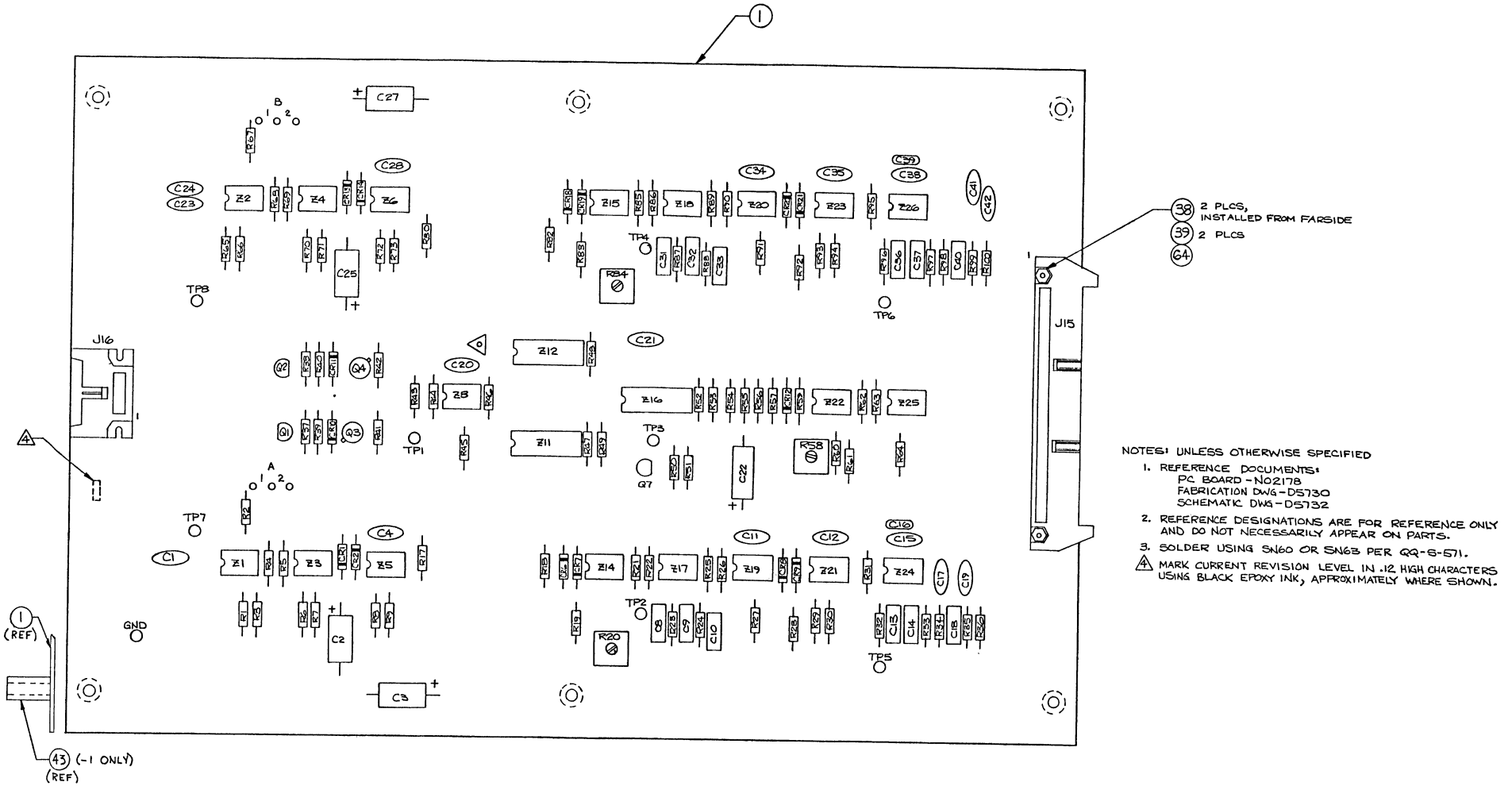


Figure 6-4. Demodulator P.W.B. Assembly D5731A

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
					-2	-1					
	1	N02178			1	1		P.W.B.	FEC	N02178	
	2	D5730			REF	REF		FAB DWG.	FEC	D5730	
	3	D5732			REF	REF		SCHEM DWG.	FEC	D5732	
	4										
	5	032009NS			8	8		CAP, DIS, .022uf, 50V	KEMET	C321C223M5U1CA	C1,C17,C19,C21,C23,C24, C41,C42
	6	037010NS			4	4		CAP, 47uf, 20V	KEMET	T310C476K020AS	C2,C3,C25,C27
	7	032003NS			8	8		CAP, 100pf, 1KV	CRL	DD-101	C4,C11,C12,C15,C28,C34, C35,C38
	8	036008NS			2	2		CAP, .039uf, 100V	IMB	BE16B393J	C8,C31
	9	036003NS			2	2		CAP, .0022uf, 100V	IMB	BP2B222J	C9,C32
	10	036009NS			2	2		CAP, .015uf, 50V	IMB	BP2A153J	C10,C33
	11	036007NS			2	2		CAP, .027uf, 50V	IMB	BP2A273J	C13,C36
	12	036002NS			2	2		CAP, .0015uf, 100V	IMB	BP2B152J	C14,C37
	13	032010NS			2	2		CAP, 1uf, 50V	KEMET	C330C105M5U1CA	C16,C39
	14	036004NS			2	2		CAP, .01uf, 100V	IMB	BE16B103J	C18,C40

Figure 6-4. Parts List, Sheet 1

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY		-2	-1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	032001NS			1	1		CAP, 30pf, 1KV	CRL	DD-300	C20
	16	037011NS			1	1		CAP, 100uf, 20V	KEMET	T310D107M020AS	C22
	17										
	18										
	19	043002NS			15	15		DIODE	FAIRCHILD	1N914	CR1,CR2,CR6-CR14,CR18-CR21
	20										
	21										
	22	243004NS			1	1		CONNECTOR, 50 PIN	3M	3433-1002	J15
	23	243014NS			1	1		CONNECTOR, 10 PIN	3M	3491-1002	J16
	24										
	25										
	26	081006NS			2	2		TRANSISTOR	MOT	2N5461	Q1,Q2
	27	081004NS			2	2		TRANSISTOR	FAIRCHILD	PN2907A	Q3,Q4
	28	081003NS			1	1		TRANSISTOR	FAIRCHILD	PN2369A	Q7

Figure 6-4. Parts List, Sheet 2

PLD5731

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY -2	QUANTITY -1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	640013NS	2	2		RES,560Ω, 1/4W, 5%	R-OHM	R25J560Ω	R1,R65
	30	640023NS	13	13		RES,10K, 1/4W, 5%	R-OHM	R25J10K	R2,R22,R32,R41-R43,R46,R51, R56,R61,R67,R86,R96
	31	640024NS	2	2		RES,15K, 1/4W, 5%	R-OHM	R25J15K	R3,R66
	32	640015NS	4	4		RES,1K, 1/4W, 5%	R-OHM	R25J1K	R4,R37,R38,R68
	33	630023NS	2	2		RES,39.2K, 1/8W, 1%	DALE	CCF553922F	R5,R69
	34	630014NS	12	12		RES,10K, 1/8W, 1%	DALE	CCF551002F	R6, R23-R25,R60,R62-R64, R70,R87-R89
	35								
	36								
	37	744550	9	9		PIN, MALE	BEADCHAIN	R62-3ET	TP1-TP8,GND
	38	404025	2	2		SCREW PH 2-56x3/8	T&C	MS51957-5	
	39	403010	2	2		NUT HEX 2-56x3/16AF CS	T&C	MS35649-224	
	40								
	41								
	42								

Figure 6-4. Parts List, Sheet 3 PLD5731

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY -2	QUANTITY -1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	43	683196	-	6		STANDOFF .500 6-32 TAP	AFE	1246-13-04	
	44								
	45	630019NS	6	6		RES,20K, 1/8W, 1%	DALE	CCF552002F	R7-R9,R71-R73
	46	640029NS	8	8		RES,47K, 1/4W, 5%	R-OHM	R25J47K	R17,R47-R50,R52,R53,R80
	47	640018NS	2	2		RES,2.2K, 1/4W, 5%	R-OHM	R25J2.2K	R18,R82
	48	630003NS	14	14		RES,2K, 1/8W, 1%	DALE	CCF552001F	R19,R21,R26-R30,R83,R85 R90-R94
	49	629003NS	2	2		POTENTIOMETER 10K	BOURNS	3386P-1-103	R20,R84
	50	630002NS	8	8		RES,1K, 1/8W, 1%	DALE	CCF551001F	R31,R33-R35,R95,R97-R99
	51	630026NS	2	2		RES,100K, 1/8W, 1%	DALE	CCF551003F	R36,R100
	52	640036NS	2	2		RES,1M, 1/4W, 5%	R-OHM	R25J1MEG	R39,R40
	53	640027NS	1	1		RES,27K, 1/4W, 5%	R-OHM	R25J27K	R44
	54	640008NS	1	1		RES,100Ω, 1/4W, 5%	R-OHM	R25J100Ω	R45
	55	640019NS	3	3		RES,2.7K, 1/4W, 5%	R-OHM	R25J2.7K	R54,R55,R59
	56	640035NS	1	1		RES,330K, 1/4W, 5%	R-OHM	R25J330K	R57

Figure 6-4. Parts List, Sheet 4

PLD5731

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
					-2	-1					
	57	629001			1	1		POTENTIOMETER 1K	BOURNS	3386P-1-102	R58
	58										
	59										
	60	078004NS			10	1(		I.C., OP AMP	NAT	LM741CN	Z1-Z4,Z14,Z15,Z17,Z18,Z22,Z2
	61	078002NS			9	9		I.C., FET OPT AMP	NAT	LF351N	Z5,Z6,Z8,Z19-Z21,Z23,Z24,Z26
	62	074016NT			2	2		I.C., 4/2-INPUT NOR GATE	NAT	MM74C02NAT+	Z11,Z16
	63	074015NT			1	1		I.C., QUAD 2 INPUT NAN(	NAT	MM74C00NAT+	Z12
	64	801190			A/R	A/R		TORQUE SEAL	ORGANIC PRODUCTS	F900 GREY	
	65										
	66										
	67										
	68										
	69										
	70										

Figure 6-4. Parts List, Sheet 5 PLD5731

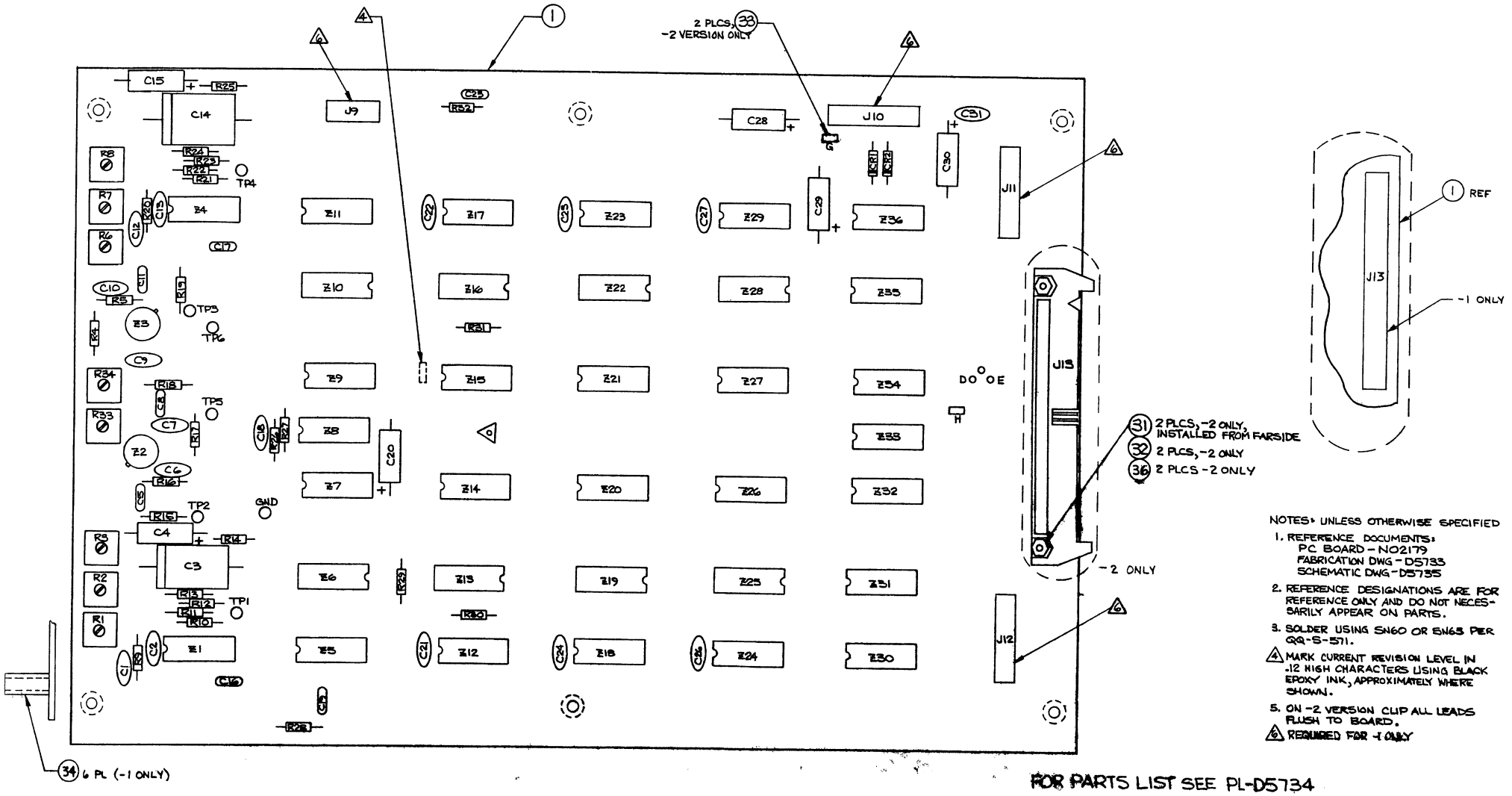


Figure 6-5. Synthesizer P.W.B. Assembly D5734

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY		-2	-1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02179B			1	1		P.W.B.	FEC	N02179	
	2	D5733			REF	REF		FAB DWG.	FEC	D5733	
	3	D5735			REF	REF		SCHEM DWG.	FEC	D5735	
	4										
	5	032009NS			16	16		CAP, DIS, .022uf, 50V	KEMET	C321C223M5U1CA	C1,C2,C6,C7,C9,C10,C12,C13, C18,C21,C22,C24-C27,C31
	6	036001NS			2	2		CAP, .47uf, 200V	TRW	X663F47492W1	C3,C14
	7	037013NS			2	2		CAP, 10uf, 20V	SPRAGUE	150D106X9020B2	C4,C15
	8	032010NS			5	5		CAP, 1uf, 50V	KEMET	C330C105M5U1CA	C5,C8,C11,C19,C23
	9	035008NS			2	2		CAP, 470pf, 500V	SANGAMO	D155C471J0	C16,C17
	10	037008NS			3	3		CAP, 22uf, 15V	KEMET	T310B226K015AS	C20,C28,C29
	11	037009NS			1	1		CAP, 33uf, 20V	KEMET	T310C336K020AS	C30
	12										
	13										
	14	043002NS			1	1		DIODE, SIGNAL	FAIRCHILD	1N914	CR1

Figure 6-5. Parts List, Sheet 1 PLD5734

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY -2	QUANTITY -1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	040550N2	1	1		DIODE, RECT, 100V	MOT	1N4002	CR2
	16								
	17								
	18	243036NS	-	1		HEADER, 10 PIN	AMP	87227-5	J9
	19	243035NS	-	3		HEADER, 20 PIN	AMP	1-87227-0	J10,J11,J12
	20	243037NS	-	1		HEADER, 50 PIN	AMP	2-87227-5	J13
	21	243004NS	1	-		HEADER, 50 PIN	3M	3433-1002	J13
	22								
	23								
	24	629005NS	8	8		POTENTIOMETER, 20K	BOURNS	3386P-1-203	R1-R3,R6-R8,R33,R34
	25	630024NS	2	2		RES, 49.9K, 1/8W, 1%	DALE	CCF554992F	R4,R17
	26	640023NS	8	8		RES, 10K, 1/4W, 5%	R-OHM	R25J10K	R5,R10,R11,R15,R16,R19,R21, R22
	27	640007NS	2	2		RES, 47Ω, 1/4W, 5%	R-OHM	R25J470Ω	R9,R20
	28	630936NS	2	2		RES, 23.2K, 1/8W, 1%	DALE	CCF552322F	R12,R23

Figure 6-5. Parts List, Sheet 2

PLD5734

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY -2	QUANTITY -1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29								
	30	744550	7	7		PIN, MALE	BEADCHAIN	R26-3ET	TP1-TP6,GND
	31	404025	2	-		SCREW PH 2-56x3/8	T&C	MS51957-5	
	32	403010	2	-		NUT HEX 2-56x3/16AF CS	T&C	MS35649-224	
	33	366510	2	-		JUMPER, INSULATED	SQUIRES	JØ.25Ø x.25ØT26	
	34	683364	-	6		STANOFF.500,6-32C/H	AFE	1247-13-04	
	35								
	36	801190	2	-		TORQUE - SEAL	ORGANIC PRODUCTS	F900 GREY	
	37	640016NS	2	2		RES, 3.9K, 1/4W, 5%	R-OHM	R25J3.9K	R13,R24
	38	640001NS	4	4		RES, 4.3K, 1/4W, 5%	R-OHM	R25J4.3K	R14,R25,R30,R31
	39	640032NS	1	1		RES, 100K, 1/4W, 5%	R-OHM	R25J100K	R18
	40	640029NS	5	5		RES, 47K, 1/4W, 5%	R-OHM	R25J47K	R26-R29,R32
	41								
	42								

Figure 6-5. Parts List, Sheet 3

PLD5734

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
					-2	-1					
	43	072007NS			2	2		I.C., PHASE-LOCKED LOOP	RCA	CD4046BE	Z1,Z4
	44	078001NS			2	2		I.C., MIXER	INTERSIL	1CL8013CCTZ	Z2,Z3
	45	074006NT			2	2		I.C., DUAL D FLIP FLOP	NAT	MM74C74NA+	Z5,Z11
	46	074015NT			6	6		I.C., QUAD 2 INPUT NAND	NAT	MM74C00NA+	Z6,Z10,Z30,Z31,Z35,Z36
	47	072002NS			2	2		I.C., PRESET/DIV BY N CTR	RCA	CD4018BE	Z7,Z9
	48	074016NT			3	3		I.C., 4/2-INPUT NOR GATE	NAT	MM74C02NA+	Z8,Z13,Z16
	49	074012NS			12	12		I.C., BIN 4-81 UP/DN D CN	NAT	MM74C192N	Z12,Z14,Z15,Z17,Z18,Z20,Z21, Z23,Z24,Z26,Z27,Z29
	50	074008NS			4	4		I.C., 4 BIT MAGNI COMPAR	NAT	MM74C85N	Z19,Z22,Z25,Z28
	51	646012NS			3	3		R/NET 16 PIN D-I-L 8RES	CTS	761-3R-47K	Z32-Z34
	52										
	53										
	54										
	55										
	56										

Figure 6-5. Parts List, Sheet 4

PLD5734

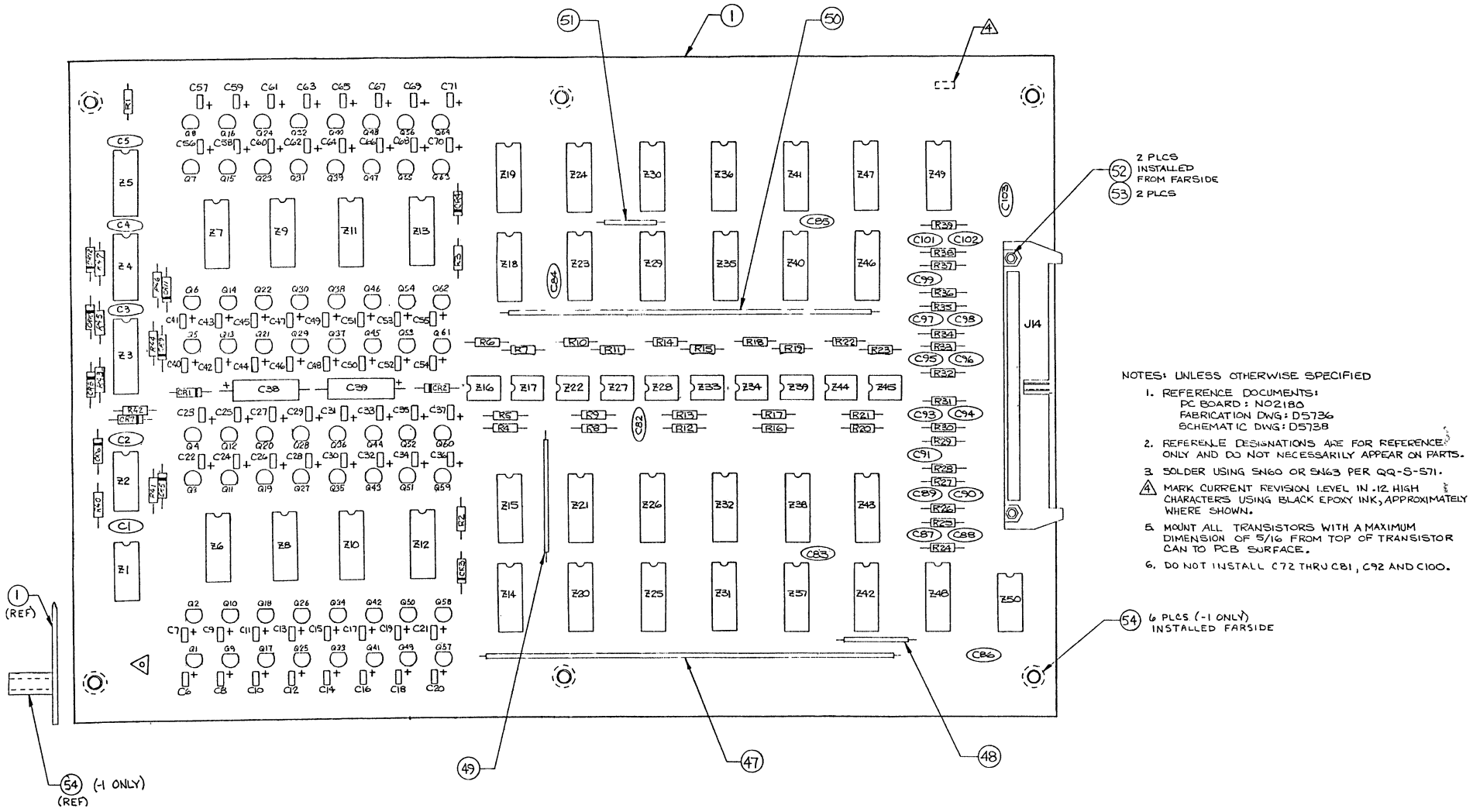


Figure 6-6. IF Filter P.W.B. Assembly D5737A

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY -2	QUANTITY -1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02180	1	1		PWB	FEC	N02180	
	2	D5736	REF	REF		FAB DWG	FEC	D5736	
	3	D5738	REF	REF		SCHEM DWG	FEC	D5738	
	4								
	5	032008NS	5	5		CAP, DISC, .01uf, 50V	KEMET	C321C103M5U1CA	C1-C5
	6	037003NS	64	64		CAP, .22uf, 35V	KEMET	T368A224J035AS	C6-C37, C40-C71
	7	037012NS	2	2		CAP, TANT, 180uf, 10V	KEMET	T310D187M010AS	C38, C39
	8								
	9	032010NS	6	6		CAP, 1uf, 50V	KEMET	C330C105M5U1CA	C82-C86, C103
	10	035010NS	2	2		CAP, 24 pf, 500V	SANGAMO	D155C240J0	C87, C95
	11	035011NS	2	2		CAP, 6pf, 500V	SANGAMO	D155C060D0	C88, C96
	12	035012NS	2	2		CAP, 75pf, 500V	SANGAMO	D105C750J0	C89, C97
	13	035013NS	2	2		CAP, 3pf, 500V	SANAGMO	D155C030D0	C90, C98
	14	035014NS	2	2		CAP,180 pf, 500V	SANGAMO	D155C181J0	C91, C99

Figure 6-6. Parts List, Sheet 1 PLD5737

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY -2	QUANTITY -1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15								
	16	035015NS	2	2		CAP, 39 pf, 500V	SANGAMO	D105C390J0	C93, C101
	17	035016NS	2	2		CAP, 18 pf, 500V	SANGAMO	D155C180D0	C94, C102
	18								
	19								
	20	043007NS	2	2		DIODE, ZENER, 4.7V, 1/4W	MOT	1N4624	CR1, CR2
	21	043009NS	2	2		DIODE, ZENER, 6.8V, 1/4W	MSC	1N4099	CR3, CR4
	22	043002NS	8	8		DIODE SILICON SWITCHING	FAIRCHILD	1N914	CR5-CR12
	23								
	24	243004NS	1	1		CONNECTOR, 50 PIN	3M	3433-1002	J14
	25	801190	A/R	A/R		TOR QUE-SEAL	ORGANIC PRODUCTS	F900,GREY	
	26								
	27	081003NS	64	64		TRANSISTOR	FAIRCHILD	PN2369A	Q1-Q64
	28								

Figure 6-6. Parts List, Sheet 2 PLD5737

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY -2	QUANTITY -1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	640006NS	1	1		RES, 10Ω, 1/4W, 5%	R-OHM	R25J10Ω	R1
	30	640022NS	2	2		RES, 5.6K, 1/4W, 5%	R-OHM	R25J5.6K	R2, R3
	31	630009NS	10	10		RES, 4.75K, 1/8W, 1%	DALE	CCF554751F	R4, R5, R8, R9, R12, R13, R16, R17, R20, R21
	32	630010NS	2	2		RES, 4.99K, 1/8W, 1%	DALE	CCF554991F	R6, R10
	33	630014NS	4	4		RES, 10K, 1/8W, 1%	DALE	CCF551002F	R7, R11, R15, R22
	34	630016NS	2	2		RES, 15K, 1/8W, 1%	DALE	CCF551502F	R14, R23
	35	630011NS	2	2		RES, 6.04K, 1/8W, 1%	DALE	CCF556041F	R18, R19
	36	630027NS	2	2		RES, 7.5 K, 1/8W, 1%	DALE	CCF557501F	R24, R32
	37	630029NS	2	2		RES, 3.65K 1/8W, 1%	DALE	CCF553651F	R26, R34
	38	630030NS	2	2		RES, 19.6K 1/8W, 1%	DALE	CCF551962F	R27, R35
	39	630004NS	2	2		RES, 2.21K 1/8W, 1%	DALE	CCF552211F	R28, R36
	40	630032NS	2	2		RES, 75K 1/8W, 1%	DALE	CCF557502F	R29, R37
	41	630033NS	2	2		RES, 5.23K 1/8W, 1%	DALE	CCF555231F	R30, R38
	42	630034NS	2	2		RES, 10.2K. 1/8W, 1%	DALE	CCF551022F	R31, R39

Figure 6-6. Parts List, Sheet 3

PLD5737

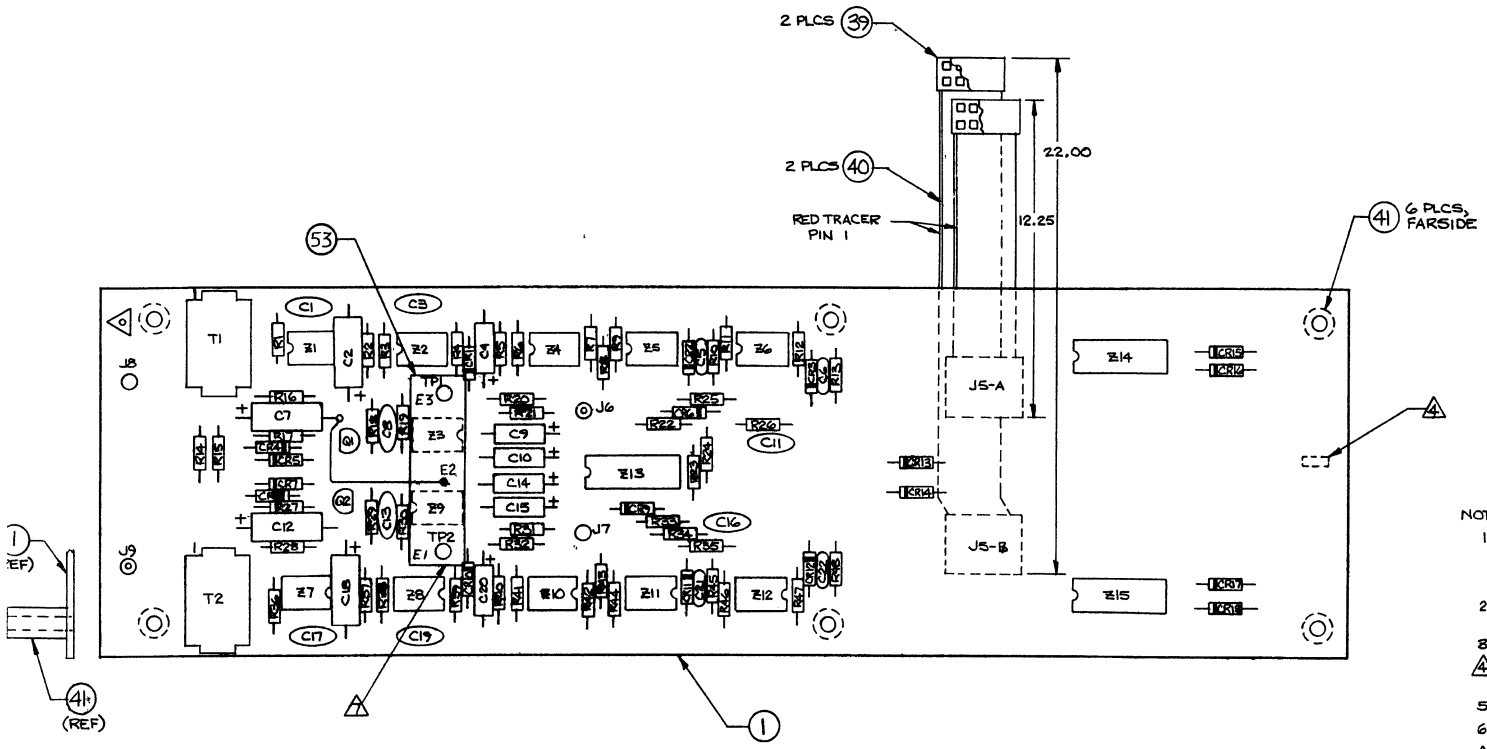
CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY -2	QUANTITY -1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	43	630035NS	2	2		RES. 14.3K 1/8W 1%	DALE	CCF551432F	R25,R33
	44	640037NS	8	8		RES. 8.2K 1/4W 5%	R-OHM	R25J8.2K	R40-R47
	45								
	46								
	47	366597	1	1		JUMPER 4.750	SQUIRES	J4.750X.250T24	
	48	366525	1	1		JUMPER .900	SQUIRES	J0.900X.250T26	
	49	366540	1	1		JUMPER 1.500	SQUIRES	J1.500X.250T26	
	50	366591	1	1		JUMPER 4.250	SQUIRES	J4.250X.250T24	
	51	366522	1	1		JUMPER .750	SQUIRES	J0.750X.250T26	
	52	404025	2	2		SCREW PH 2-56 X 3/8	T&C	MS51957-5	
	53	403010	2	2		NUT HEX 2-56 X 3/16 AF CS	T&C	MS35649-224	
	54	683364	-	6		STANOFF.500,6-32C/H	AFC	1247-13-04	
	55								
	56	646013NS	1	1		R/NET 14 PIN D-1-L 7 RES	CTS	760-3K-47K	Z50

Figure 6-6. Parts List, Sheet 4

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY -2	QUANTITY -1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	57	074013NT	4	4		I.C., HEX NON INV BUF	NAT	MM74C902NA+	Z1, Z2, Z4, Z5
	58	072003NS	1	1		I.C., DIV BY 8 COUNTER	RCA	CD4022BE	Z3
	59	646010NS	10	10		R/NET 16 PIN D-1-L 8 RES	BOURNS	16-1-102	Z6-Z13,Z32,Z36
	60	072009NT	10	10		I.C., 1/8-CHANNEL MULT	RCA	CD4051BEX	Z14, Z15, Z18, Z19, Z42, Z43, Z46 - Z49
	61	078002NS	10	10		I.C., 1 OP AMP	NAT	LF351N	Z16, Z17, Z22, Z27, Z28, Z33, Z34, Z39, Z44, Z45
	62	646008NS	2	2		R/NET 16 PIN D-1-L 8 RES	BOURNS	16-1-682	Z20, Z23
	63	646009NS	2	2		R/NET 16 PIN D-1-L 8 RES	BOURNS	16-1-912	Z21, Z24
	64	646011NS	2	2		R/NET 16 PIN D-1-L 8 RES	CTS	761-3-R33K	Z25, Z29
	65	646007NS	2	2		R/NET 16 PIN D-1-L 8 RES	CGW	D16002-5101G	Z26, Z30
	66								
	67	646016NS	2	2		R/NET 16 PIN D-1-L 8 RES	BOURNS	16-1-272	Z31, Z35
	68								
	69	646015NS	2	2		R/NET 16 PIN D-1-L 8 RES	BOURNS	16-1-182	Z37, Z40
	70	646006NS	2	2		R/NET 16 PIN D-1-L 8 RES	CGW	D16002-3601G	Z38, Z41

Figure 6-6. Parts List, Sheet 5

PLD5737



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   PC BOARD - N02181
   FABRICATION DWG - D5739
   SCHEMATIC DWG - D5741
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING BLACK EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. INSTALL CABLES LAST (DO NOT CLEAN CABLES).
6. INSTALL STAND-OFFS BEFORE T1 AND T2

⚠1 D5958 IS INSTALLED ON D5740B AS SHOWN (E1 TO TP2 AND E3 TO TP1). THE WHITE GROUND WIRE IS WRAPPED AROUND AND SOLDERED TO THE NEGATIVE (-) LEAD OF C7 OF D5740B.

FOR PARTS LIST SEE PL-D5740

Figure 6-7. Input P.W.B. Assembly D5740

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02181	1		PWB	FEC	N02181	
	2	D5739	REF		FAB DWG	FEC	D5739	
	3	D5741	REF		SCHEM DWG	FEC	D5741	
	4							
	5	032001NS	4		CAP, 30pf., 1KV	CRL	DD-300	C1, C3, C17, C19
	6	037015NS	4		CAP, 22uf., 15V	KEMET	T110B226K015AS	C2, C7, C12, C18
	7	037004NS	2		CAP, .33uf., 20V	KEMET	T310A334K035AS	C4, C20
	8	032010NS	4		CAP, 1uf., 50V	KEMET	C330C105M5U1CA	C5, C6, C21, C22
	9	032009NS	4		CAP, .022uf, 50V	KEMET	C321C223M5U1CA	C8, C11, C13, C16
	10	037014NS	4		CAP, 10uf., 20V	KEMET	T322C106K020AS	C9, C10, C14, C15
	11							
	12	043002NS	14		DIODE, SIGNAL	FAIRCHILD	1N914	CR1-CR5, CR7, CR8, CR10-CR12, CR15-CR18
	13	043009NS	2		DIODE, ZENER, 6.8V	MOT	1N4099	CR6, CR9
	14	040550N2	2		DIODE, RECT, 100V	MOT	1N4002	CR13, CR14

Figure 6-7. Parts List, Sheet 1

PLD5740

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15							
	16	744555	2		PIN, FEMALE	BEADCHAIN	M93-102ET	J6, J9
	17	243016NS	2		CONNECTOR	3M	3474-0000	J5A, J5B
	18							
	19	081006NS	2		TRANSISTOR	MOT	2N5461	Q1, Q2
	20							
	21	630022NS	2		RES, 30.1K, 1/8W, 1%	DALE	CCF553012F	R1, R36
	22	640027NS	4		RES, 27K, 1/4W, 5%	R-OHM	R25J27K	R2, R3, R37, R38
	23	640019NS	2		RES, 2.7K, 1/4W, 5%	R-OHM	R25J2.7K	R4, R39
	24	640031NS	2		RES, 68K, 1/4W, 5%	R-OHM	R25J68K	R5, R40
	25	630005NS	2		RES, 3.01K, 1/8W, 1%	DALE	CCF553011F	R6, R41
	26	640015NS	4		RES, 1K, 1/4W, 5%	R-OHM	R25J1K	R7, R12, R42, R47
	27	630021NS	2		RES, 26.7K, 1/8W, 1%	DALE	CCF552672F	R8, R43
	28	630002NS	4		RES, 1K, 1/8W 1%	DALE	CCF551001F	R9, R11, R44, R46

Figure 6-7. Parts List, Sheet 2

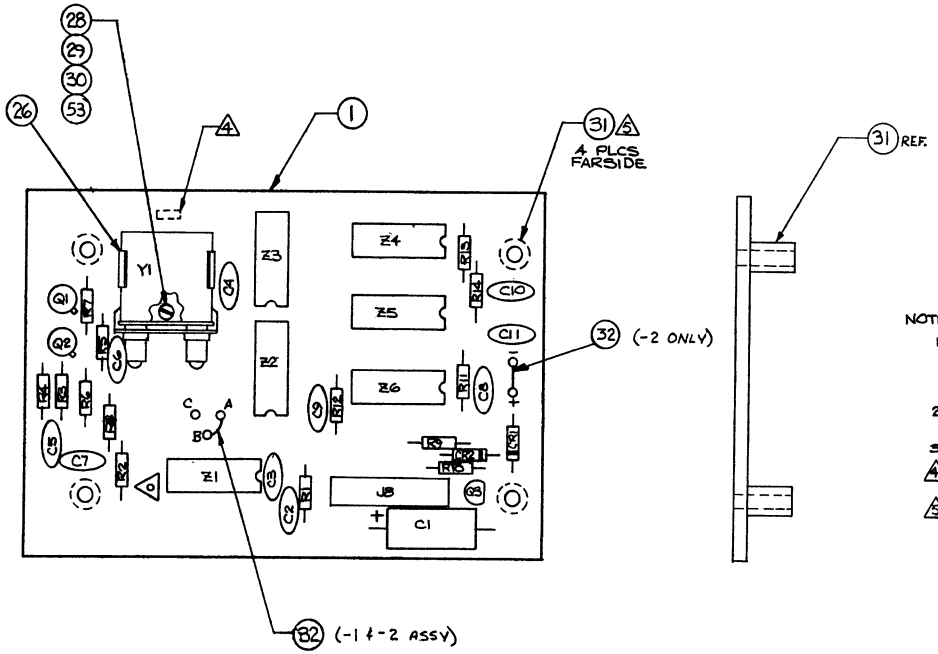
CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	640032NS	4		RES, 100K, 1/4W, 5%	R-OHM	R25J100K	R10, R13, R45, R48
	30	630014NS	2		RES, 10K, 1/8W, 1%	DALE	CCF551002F	R14, R15
	31	640010NS	2		RES, 220Ω, 1/4W, 5%	R-OHM	R25J22000	R16, R28
	32	640030NS	2		RES, 56K, 1/4W, 5%	R-OHM	R25J56K	R17, R27
	33	640020NS	2		RES, 3.3K, 1/4W, 5%	R-OHM	R25J3.3K	R18, R29
	34	640026NS	2		RES, 22K, 1/4W, 5%	R-OHM	R25J22K	R19, R30
	35	640028NS	2		RES, 39K, 1/4W, 5%	R-OHM	R25J39K	R20, R32
	36	640016NS	2		RES, 3.9K, 1/4W, 5%	R-OHM	R25J3.9K	R21, R31
	37	640029NS	4		RES, 47K, 1/4W, 5%	R-OHM	R25J47K	R22, R23, R24, R33
	38							
	39	243015NS	2		CONNECTOR, 10 PIN	3M	3473-6000	
	40	366991	35 "		RIBBON CABLE	3M	3365-10	
	41	683504	6		STANDOFF .500, 4-40TAP	AFE	1300-13-04	
	42							

Figure 6-7. Parts List, Sheet 3

PLD5740

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	43	630013NS			2			RES, 9.09K, 1/8W, 1%	DALE	CCF559091F	R25, R35
	44	640022NS			2			RES, 5.6K, 1/4W, 5%	R-OHM	R25J5.6K	R26, R34
	45										
	46	768001NS			2			TRANSFORMER, AUDIO	UTC-TRW	PC-SO-21	T1, T2
	47										
	48	744550			4			PIN, MALE	BEADCHAIN	R62-3ET	TP1, TP2, J7, J8
	49										
	50	078002NS			4			I.C., 1 OP AMP	NAT	LF351N	Z1, Z2, Z7, Z8
	51	078004NS			8			I.C., OP AMP	NAT	LM741CN	Z3-Z6, Z9-Z12
	52	072010NT			3			I.C., 3/2 CHAN MULT	RCA	CD4053BEX	Z13, Z14, Z15
	53	D5958			1			ASSY, PIGGYBACK BOARD	FEC		REF NO2203
	54										
	55										
	56										

Figure 6-7. Parts List, Sheet 4



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   PC BOARD - NO2182
   FABRICATION DWG - D5742
   SCHEMATIC DWG - D5744
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING BLACK EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. HAND SOLDER ITEM 31 AFTER BOARD HAS BEEN FLOW SOLDERED

FOR PARTS LIST SEE PL-D5743

Figure 6-8. Time Base P.W.B. Assembly D5743

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY -2	QUANTITY -1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02182	1	1		PWB	FEC	N02183	
	2	D5742	REF	REF		FAB DWG	FEC	D5742	
	3	D5744	REF	REF		SCHEM DWG	FEC	D5744	
	4								
	5	037009NS	1	1		CAP, 33uf, 20V	KEMET	T310C336K020AS	C1
	6	032009NS	4	4		CAP, .022 DISC, 50V	KEMET	C321C223M5U1CA	C2-C5
	7	032005NS	5	5		CAP, 500pf, 1KV	CRL	DD-501	C6, C8-C11
	8	032004NS	1	1		CAP, 220pf, 1KV	CRL	DD-221	C7
	9								
	10								
	11	043002NS	1	1		DIODE	FAIRCHILD	1N914	CR1
	12	043006NS	1	1		DIODE, ZENER	MOT	1N4617	CR2
	13								
	14								

Figure 6-8. Parts List, Sheet 1

PLD5743

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	243035NS		1	1			HEADER, 20 PIN	AMP	1-87227-0	J8
	16										
	17	081010NS		2	2			TRANSISTOR	NAT	2N2369A	Q1, Q2
	18	081001NS		1	1			TRANSISTOR	MOT	MPS404	Q3
	19										
	20										
	21	640008NS		5	5			RES, 100Ω, 1/4W, 5%	R-OHM	R25J100Ω	R1, R11-R14
	22	640007NS		1	1			RES, 47Ω, 1/4W, 5%	R-OHM	R25J470Ω	R2
	23	640023NS		1	1			RES, 10K, 1/4W, 5%	R-OHM	R25J10K	R3
	24	640012NS		1	1			RES, 470Ω, 1/4W, 5%	R-OHM	R25J470Ω	R4
	25										
	26	307002NS		1	1			SOCKET, CRYSTAL	AUGAT	8000-AG3	USE WITH Y1
	27										
	28	403010		1	1			NUT HEX 2-56 X 3/16 AF CS	T&C	MS35649-224	(TO INSTALL ITEM 26)

Figure 6-8. Parts List, Sheet 2

PLD5743

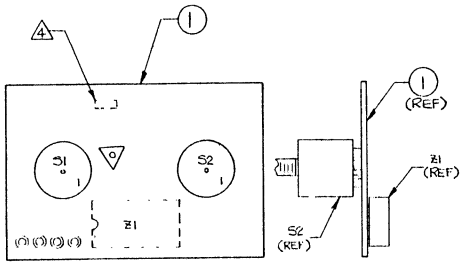
CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY -2	QUANTITY -1	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	404860	1	1		WASHER INT T NO.2 CRES	T&C	MS35333-69	(TO INSTALL ITEM 26)
	30	404010	1	1		SCREW PH 2-56 X 3/16	T&C	MS51957-2	(TO INSTALL ITEM 26)
	31	683476	4	4		STANDOFF	AFE	1300-11-04	
	32	366510	2	1		JUMPER WIRE 26GA.	SQUIRES	J0.250x0250	
	33								
	34								
	35	640014NS	1	1		RES, 820Ω, 1/4W, 5%	R-OHM	R25J820Ω	R5
	36	640019NS	1	1		RES, 2.7K, 1/4W, 5%	R-OHM	R25J2.7K	R6
	37	640026NS	1	1		RES, 22K, 1/4W, 5%	R-OHM	R25J22K	R7
	38	640009NS	1	1		RES, 180Ω, 1/4W, 5%	R-OHM	R25J180Ω	R8
	39	640017NS	1	1		RES, 1.8K, 1/4W, 5%	R-OHM	R25J1.8K	R9
	40	640032NS	1	1		RES, 100K, 1/4W, 5%	R-OHM	R25J100K	R10
	41								
	42								

Figure 6-8. Parts List, Sheet 3

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY				CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	43										
	44										
	45	072011NT		1	1			I.C., HEX INVERTER	NAT	CD4040BCN	Z1
	46	072001NT		1	1			I.C., DUAL 4 STATIC SHIFT REG	RCA	CD4015BEX	Z2
	47	072002NS		1	1			I.C., PRESET/DIV BY N CTR	RCA	CD4018BE	Z3
	48	074016NT		2	2			I.C., 4/2-INPUT NOR GATE	NAT	MM74C02NA+	Z4, Z5
	49	074015NT		1	1			I.C., QUAD 2 INPUT NAND	NAT	MM74C00NA+	Z6
	50										
	51										
	52	307001NS		1	1			CRYSTAL 1,305.6 KHZ	ERIE	SC113	Y1
	53	801190		A/R	A/R			TORQUE SEAL	ORGANIC PRODUCTS	F900 GREY	
	54										
	55										
	56										

Figure 6-8. Parts List, Sheet 4

PLD5743



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   PC BOARD - NO2188
   FABRICATION DWG - D5745
   SCHEMATIC DWG - D5747
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING BLACK EPOXY INK, APPROXIMATELY WHERE SHOWN.

Figure 6-9. Switch Card P.W.B. Assembly D5746

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02183	1		P.W.B.	FEC	N02183	
	2	D5745	REF		FAB DWG.	FEC	D5745	
	3	D5747	REF		SCHEM DWG.	FEC	D5747	
	4							
	5	731003NS	2		SWITCH	GRAYHILL	50P60-01-1-06N	S1,S2
	6							
	7	243041NS	1		I.C. SOCKET	AUGAT	216-AG-29D	Z1
	8							
	9							
	10							
	11							
	12							
	13							
	14							

Figure 6-9. Parts List

PLD5746

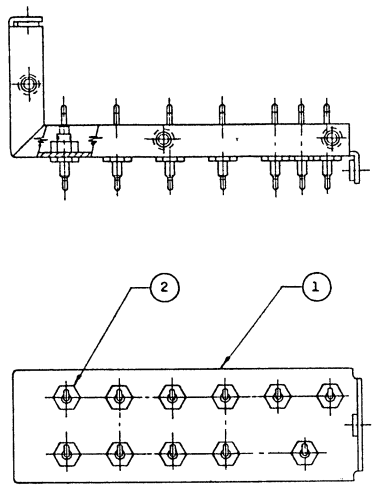
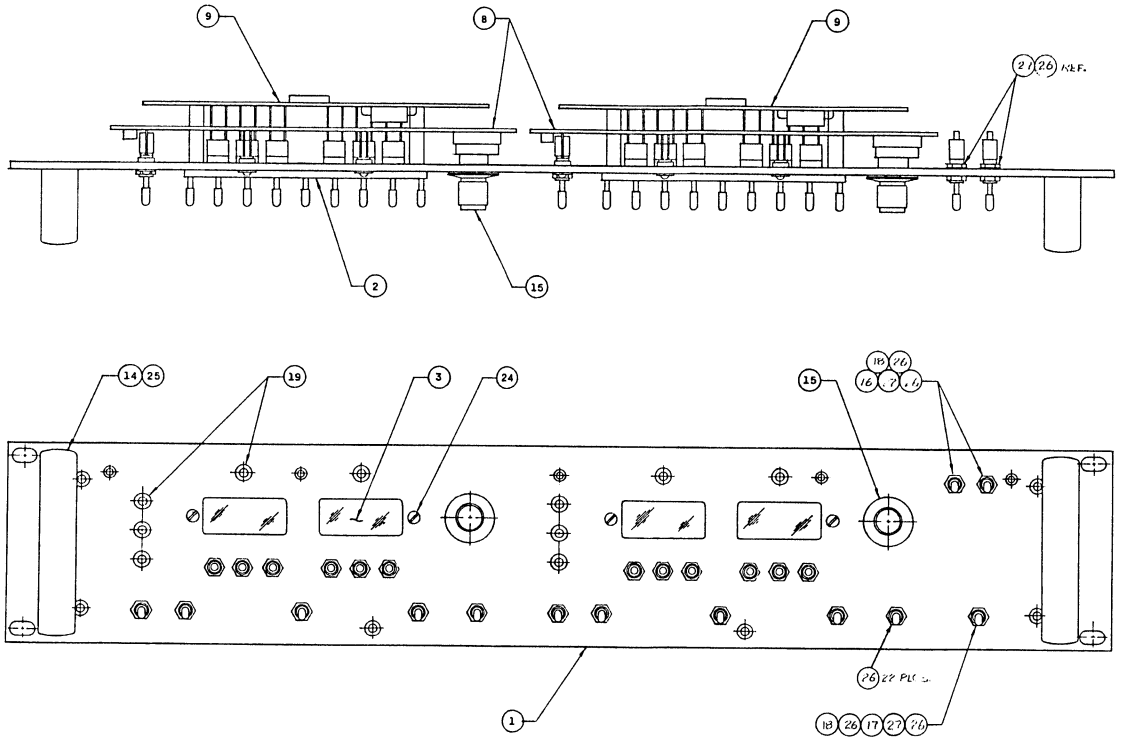


Figure 6-1Ø. Input Shield Assembly C4Ø7Ø

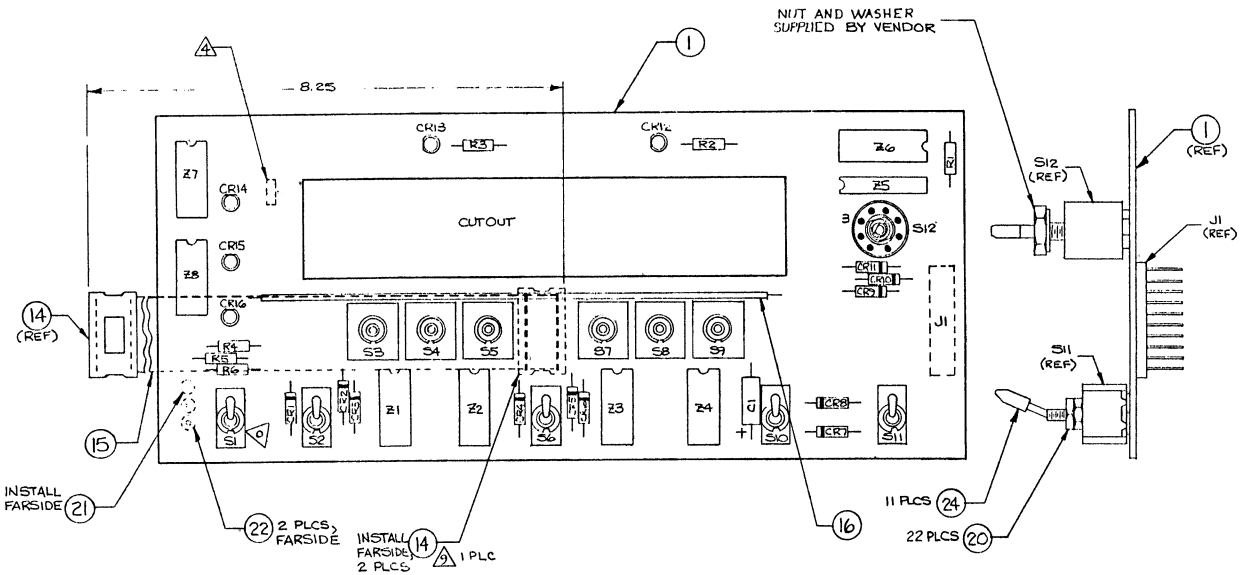


ITEM	REQ'D	PART NO	DESCRIPTION	MATL OR MFR	MATL SPEC OR CAT PART NO	FINISH	FINISH SPEC	CRT SYM
27	3	404853	[illegible]	[illegible]	[illegible]			
26	4	[illegible]	[illegible]	[illegible]	[illegible]			
25	4	404672	SCREW, FH, 10-32x1/2	T&C	MS51060-65			
24	4	404213	SCREW, OH, 4-40x3/8	T&C				
23								
22								
21								
20								
19	10	7743012NS	DIODE HOLDER	DIALCO	515-0002			
18	3	7310109NS	CAP, TOGGLE SWITCH, WHT	C&K	A 162			
17	1	7310108NS	SWITCH, TOGGLE	C&K	7201SY7QE			
16	2	7310105NS	SWITCH, TOGGLE	C&K	7101			
15	2	[illegible]	KNOB	RAYTHEON	50-3-16			
14	2	409080	HANDLE	VEMALINE	OBA 12			
13								
12								
11								
10								
9	2	D5755	DISPLAY BOARD	FEC	N02186			
8	2	D5752	FRONT PANEL BOARD	FEC	N02185			
7								
6								
5								
4								
3	2	B2272 4	FILTER	FEC				
2								
1	1	D3638-1	FRONT PANEL	FEC				

LIST OF MATERIAL

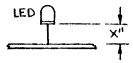
Figure 6-11. Front Panel Assembly

D5768-A



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   PC BOARD - N02185
   FABRICATION DWG - D5751
   SCHEMATIC DWG - D5753
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING BLACK EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. MOUNT SWITCHES IN FIXTURE BEFORE SOLDERING TO BOARD FOR PROPER ALIGNMENT; INSTALL HARDWARE TO SWITCHES AFTER REMOVING FROM PANEL, DO NOT TIGHTEN.
6. LED INSTALLATION: SPACE ITEM 8 7/16" OFF BOARD
   SPACE ITEM 9 13/32" OFF BOARD



7. TRIM IC LEADS FLUSH TO BOARD ON TRACK SIDE.
8. CLEAN BOARD BEFORE INSTALLING SWITCHES AND CABLE.
5. ASSEMBLE CABLE, THEN INSTALL INTO BOARD.

Figure 6-12. Front Panel P.W.B. Assembly D5752A

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02185	1		P.W.B.	FEC	N02185	
	2	D5751	REF		FAB DWG.	FEC	D5751	
	3	D5753	REF		SCHEM DWG.	FEC	D5753	
	4							
	5	037008NS	1		CAP, 22uf, 15V	KEMET	T310B226K015AS	C1
	6							
	7	043002NS	11		DIODE, SIGNAL	FAIRCHILD	1N914	CR1-CR11
	8	043001	4		LED, WHITE	DIALIGHT	521-9166	CR12-CR14,CR16
	9	043011NS	1		LED, GREEN	FAIRCHILD	FLV-350	CR15
	10							
	11							
	12	243035NS	1		HEADER, 20 PIN	AMP	1-87227-0	J1
	13							
	14	243012NS	2		CONNECTOR, 14 PIN	3M	3406-0000	

Figure 6-12. Parts List, Sheet 1 PLD5752

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	366992	9"		RIBBON CABLE	3M	3365-14	
	16	366596	1		INSULATED JUMPER 4.625	SQUIRES	J4.625x.250T24	
	17							
	18							
	19							
	20	403102	22		SW HEX NUT	JBT SWITCHES	W-NU-11	
	21	744550	1		PIN, MALE	BEADCHAIN	R62-3ET	
	22	744555	2		PIN, FEMALE	BEADCHAIN	M93-102ET	
	23							
	24	731009NS	11		CAP, TOGGLE SWITCH,WHT	C&K	A7062	
	25							
	26	640029NS	1		RES, 47K, 1/4W, 5%	R-OHM	R25J47K	R1
	27	640015NS	5		RES, 1k, 1/4W, 5%	R-OHM	R25J1K	R2-R6
	28							

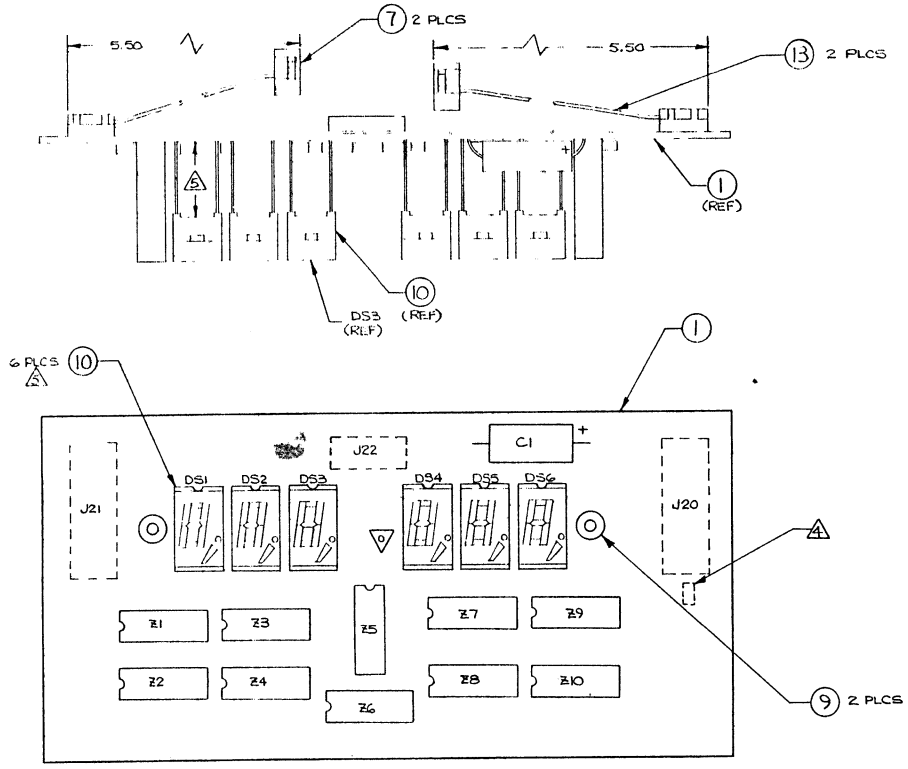
Figure 6-12. Parts List, Sheet 2

PLD5752

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	731011NS	3		SWITCH, TOGGLE	C&K	7101SYWB	S1,S2,S6
	30	731013NS	6		SWITCH, TOGGLE	JBT	T01-235	S3,S4,S5,S7,S8,S9
	31	731010NS	2		SWITCH, TOGGLE	C&K	7103-S-Y-C-B	S10,S11
	32	731002NS	1		SWITCH, ROTARY WITH WASHER & NUT	GRAYHILL	50P45-01-1-8N	S12
	33							
	34							
	35	074001NS	4		I.C., HEX INVERTER	NAT	MM74C04N	Z1-Z4
	36	646001NS	1		R/NET, 8 PIN S-I-L 7RES	CTS	750-81-R473	Z5
	37	073001NS	1		I.C., 8-BIT PRI ENCODER	MOT	MC14532BCP	Z6
	38	074014NT	1		I.C., HEX BUFFER	NAT	MM74C906NA+	Z7
	39	074015NT	1		I.C., QUAD 2 INPUT NAND	NAT	MM74C00NA+	Z8
	40							
	41							
	42							

Figure 6-12. Parts List, Sheet 3

PLD5752



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   PC BOARD: NO2156
   FABRICATION DWG: D5754
   SCHEMATIC DWG: D5756
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.

△4 MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING BLACK EPOXY INK, APPROXIMATELY WHERE SHOWN.

△5 FOR ASSEMBLY D5801 ASSEMBLE ITEM 10 AND 15 AND FIXTURE FLUSH WITH ITEM 9.

6. CLEAN BOARD BEFORE INSTALLING ITEMS 13, ITEM 15 CAN BE INSTALLED BEFORE CLEANING.
7. CUT ALL LEADS FLUSH TO BOARD TO PREVENT ADJACENT RIBBON CABLES FROM BEING PUNCTURED.

Figure 6-13. Display P.W.B. Assembly D5755A

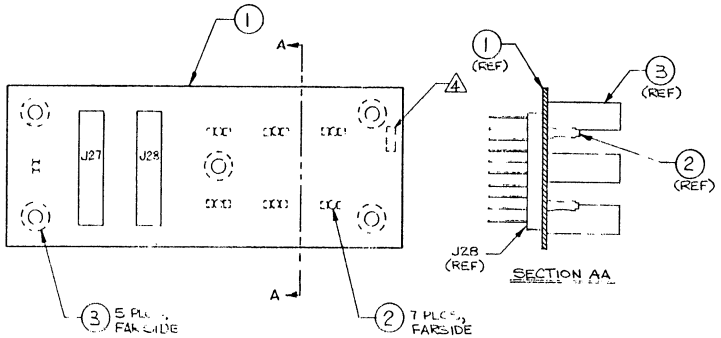
CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02186	1		P.W.B.	FEC	N02186	
	2	D5754	REF		FAB DWG.	FEC	D5754	
	3	D5756	REF		SCHEM DWG.	FEC	D5756	
	4							
	5	037009NS	1		CAP., 33uf, 20V	KEMET	T310C336K020AS	C1
	6							
	7	243010NS	2		SOCKET, 20 PIN	3M	3421-6000	J20 & J21
	8							
	9	683520	2		STANDOFF, 1.000 4-40TAP	AFE	1300-16-04	
	10	243040NS	6		SOCKET, 14 PIN	T.I.	C81-14-04	DS1-DS6
	11							
	12							
	13	366996	11"		RIBBON CABLE	3M	3365-20	
	14							

Figure 6-13. Parts List, Sheet 1 PLD5755

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	078006	6		I.C., CC ORG 7 SEG	GENERL INSTRUMENT	MAN4640A	DS1-DS6
	16							
	17							
	18	243007NS	2		CONNECTOR, 20 PIN	3M	3422-0000	J20,J21
	19	243033NS	1		SOCKET, 14 PIN	AUGAT	241-AG-39D	J22
	20							
	21							
	22	646010NS	4		R/NET 16 PIN D-I-L 8RES	BOURNS	4116R-001-102	Z1,Z3,Z7,Z9
	23	074005NS	4		I.C., BCD TO 7 SEG DECODE	NAT	MM74C48N	Z2,Z4,Z8,Z10
	24	074014NT	1		I.C., HEX BUFFER	NAT	MM74C906NA+	Z5
	25	074015NT	1		I.C., QUAD 2 INPUT NAND	NAT	MM74C00NA+	Z6
	26							
	27							
	28							

Figure 6-13. Parts List, Sheet 2

PLD5755



NOTES: UNLESS OTHERWISE SPECIFIED

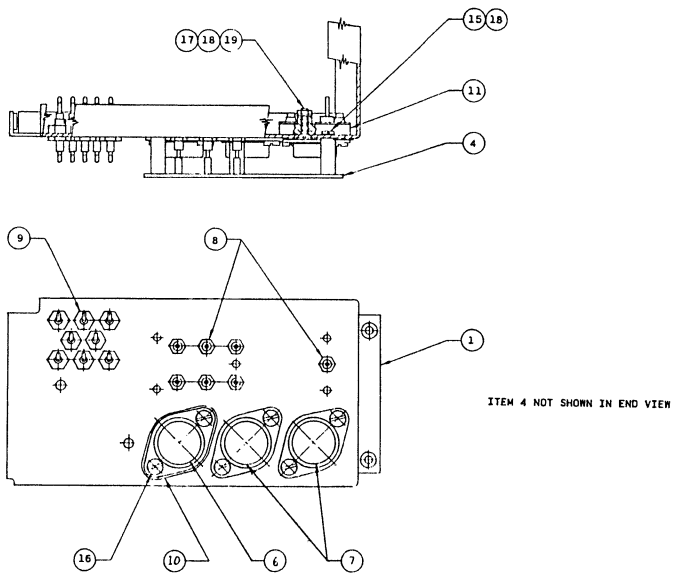
1. REFERENCE DOCUMENTS:
   PC BOART - N02187
   FABRICATION DWG - D5757
   SCHEMATIC DWG - D5759
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN62 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING BLACK EPOXY INK, APPROXIMATELY WHERE SHOWN.

Figure 6-14. Connector P.W.B. Assembly D5758

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02187	1		P.W.B.	FEC	N02187	
	2	243032NS	7		RECEPTACLE	AMP	87105-1	
	3	683518	5		STANDOFF, .625 4-40 TAP	AFE	1300-14-04	
	4							
	5	243035NS	2		HEADER, 20 PIN	AMP	1-87227-0	J27,J28
	6							
	7	D5757	REF		FAB DWG.	FEC	D5757	
	8	D5759	REF		SCHEM DWG.	FEC	D5759	
	9							
	10							
	11							
	12							
	13							
	14							

Figure 6-14. Parts List

PLD5758



ITEM 4 NOT SHOWN IN END VIEW

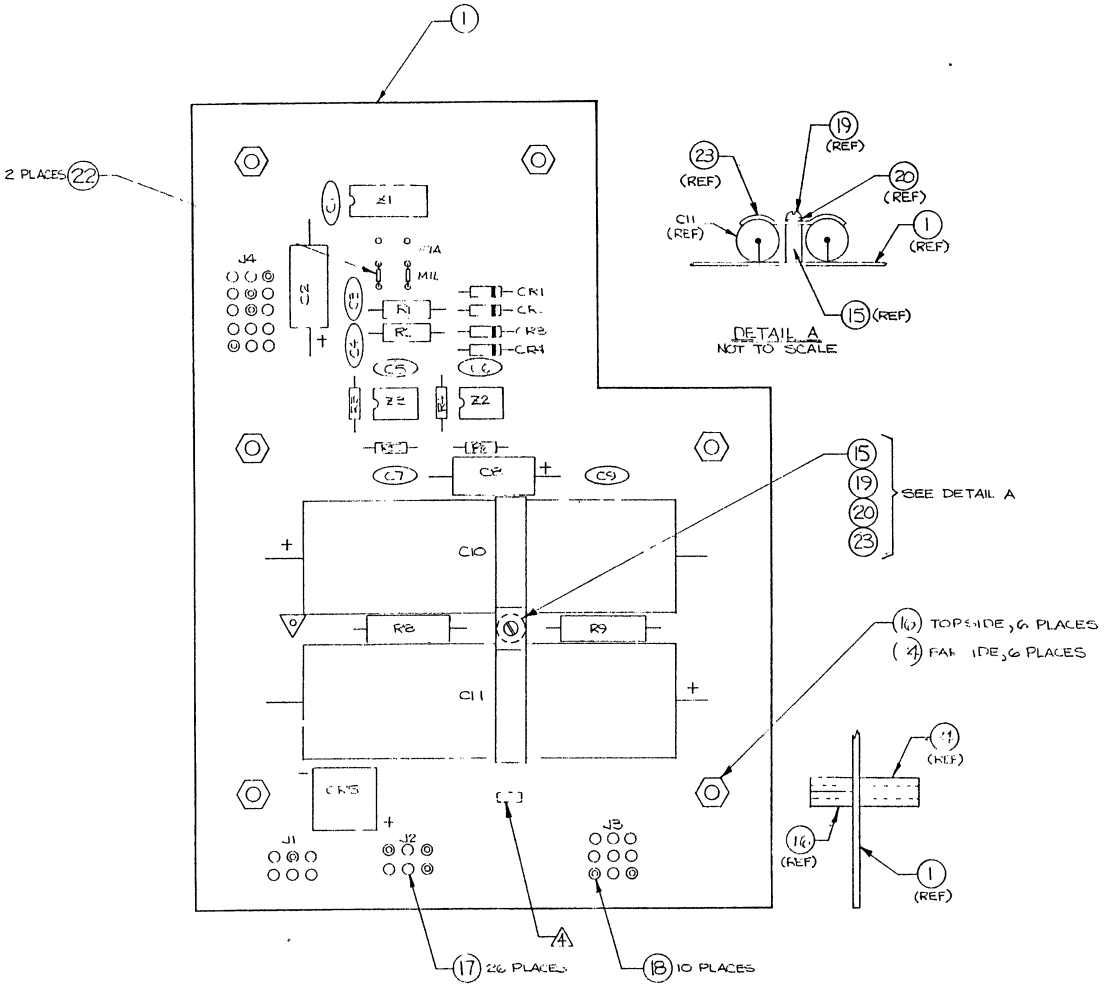
NOTES

1 APPLY DOW CORNING 340 SILICONE HEAT SINK COMPOUND BETWEEN ITEMS 6 AND 7 AND ITEM 1

ITEM	REQ'D	PART NO	DESCRIPTION	MATL OR MFR	MATL SPEC OR CAT PART NO	FINISH	FINISH SPEC	CKT SYM
20								
19	3	403030	NUT HEX, 4 40x.25 A.F.	T&C	[illegible]			
18	8	404878	WASHER, INT TOOTH, NO.4	T&C	[illegible]			
17	3	404221	SCREW, FH, 4 40x.50	T&C	[illegible]			
16	6	404381	SCREW,PH, 6 32x.44	T&C	[illegible]			
15	5	404203	SCREW,PH, 4 40x.31	T&C	[illegible]			
14								
13								
12								
11	3	243036NS	TRANSISTOR SOCKET	AUGAT	8080 1G 1			
10	1	081001NS	INSULATOR	AFT	7304943			
9	8	032012NS	FEED THRU CAP. 1500PF	TDK OR	357-000X5U0-152M			
8	7	032011NS	FEED THRU CAP. 5000PF	[illegible]	2425-001 [illegible]			
7	2	079040NS	I C REGULATOR	NAT	LM [illegible]			
6	1	079[illegible]NS	I.C. REGULATOR	NAT	LM [illegible]			
5								
4	1	D5758	ASSY, CONNECTOR BOARD	FEC	[illegible]			
3								
2								
1	1	D4024	ASSY, SHIELD	FEC				

LIST OF MATERIAL

Figure 6-15. Power Supply Shield Assembly D5767



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   PC BOARD - NO. 15-
   FABRICATION DWG - D5762
   SCHEMATIC DWG - D5762
2. REFERENCE DESIGNATORS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR 62 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING PLASTIC INK APPROXIMATELY WHERE SHOWN.

Figure 6-16. Power Supply P.W.B. Assembly D5761A

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02188	1		PWB	FEC	N02188	
	2	D5760	REF		FAB DWG	FEC	D5760	
	3	D5762	REF		SCHEM DWG	FEC	D5762	
	4							
	5	032008NS	3		CAP, DISC .01uf, 50V	KEMET	C321C103M5U1CA	C1, C7, C9
	6	037011NS	2		CAP, 100uf, 20V	SPRAGUE	150D107X902082	C2, C8
	7	032010NS	2		CAP, MISC 1uf, 50V,20%	KEMET	C330C105M5U1CA	C3, C4
	8	032001NS	2		CAP, DISC 30pf, 1KV,10%	CRL	DD-300	C5, C6
	9	038002NS	2		CAP, ELECT 4000uf, 25V	SPRAGUE	39D408G025JS4	C10, C11
	10							
	11	043008NS	4		DIODE, ZENER, 5.6V, 1/4W	MOT	1N4626	CR1-CR4
	12	043010NS	1		DIODE, BRIDGE RECT	VARO	VH148	CR5
	13							
	14							

Figure 6-16. Parts List, Sheet 1

PLD5761

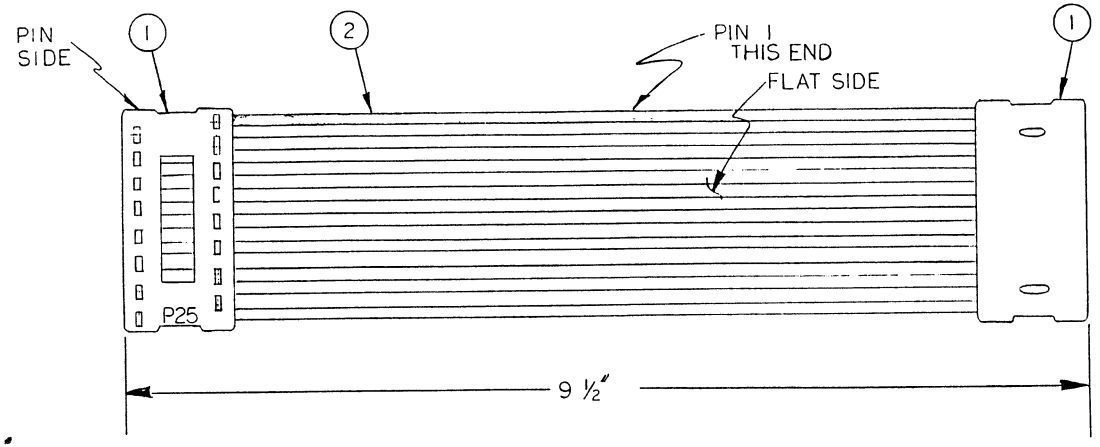
CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15	B1193-14	1		STANDOFF, MODIFIED	FEC	B1193-14	
	16	683885	6		SPACER, 3/8 HEX, .375 THD	SMITH	8249	
	17	744550	26		STAKE PIN, MALE	BEADCHAIN	R62-3ET	
	18	744555	10		STAKE PIN, FEMALE	BEADCHAIN	M93-102ET	
	19	404405	1		SCREW PH, 6-32 X 3/4	T&C	MS51957-32	
	20	404895	1		WASHER SPLIT LOCK No. 6 CRES	T&C	MS35338-136	
	21							
	22	366510	2		INSULATED JUMPER .250	SQUIRES	J0.250X.250T26	
	23	B2075-1	1		CAPACITOR CLAMP	FEC	B2075-1	
	24	683196	6		STANDOFF .500, 6-32TAP	AFE	1246-13-04	
	25							
	26	640001NS	2		RES, 47Ω, 1/2W, 10%	A-B	RC20GF470K	R1, R2
	27	640021NS	2		RES, 4.7K, 1/4W, 5%	R-OHM	R25J4.7K	R3, R4
	28	640023NS	2		RES, 10K, 1/4W, 5%	R-OHM	R25J10K	R5, R6

Figure 6-16. Parts List, Sheet 2 PLD5761

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	29	644001NS	2		RES, .2Ω, 2W, 5%	IRC	BWH	R8, R9
	30							
	31	074001NS	1		I.C., HEX INVERTER	NAT	MM74C04N	Z1
	32	078002NS	2		I.C., 1 OP AMP	NAT	LF351N	Z2, Z3
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
	41							
	42							

Figure 6-16. Parts List, Sheet 3

PLD5761



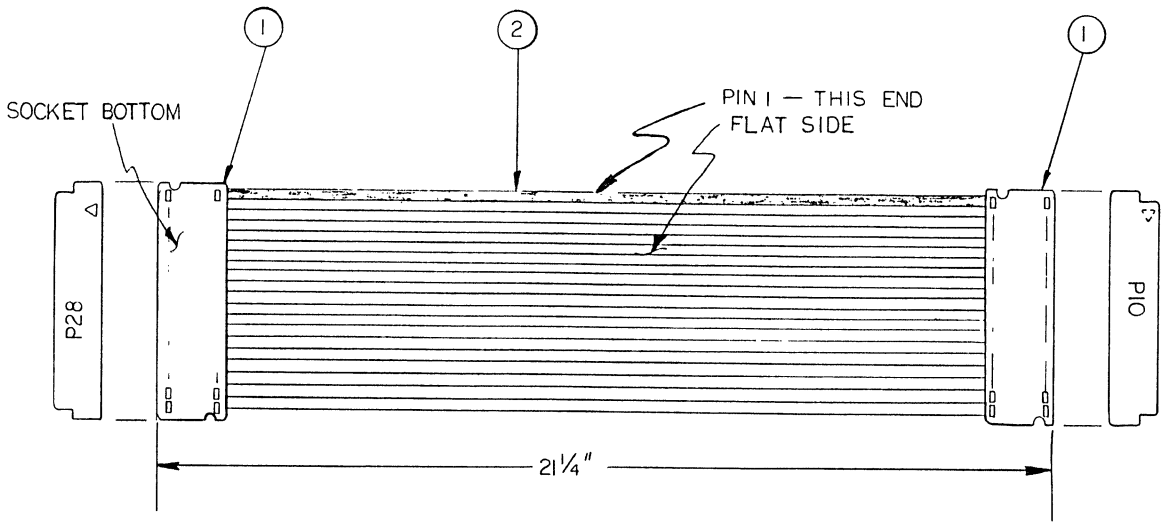
NOTES:

1. CUT CABLE REQ'D. LENGTH AND PRESS TO PLUGS USING APPLICABLE 3M PRESS. ASSURE THAT BOTH PLUGS HAVE PIN 1 POSITIONED AS SHOWN.
2. LABEL P25 ON END SHOWN ON TOP.

ITEM	REQ'D	PART NO	DESCRIPTION	MAT'L OR MFR	MAT'L SPEC OR CAT PART NO.	FINISH	FINISH SPEC	CKT SYM
2	9½"	3365 16	RIBBON CABLE	3M	366995			
1	2	3416 0000	DIP PLUG	3M	243009NS			

Figure 6-17. Remote Board Cable

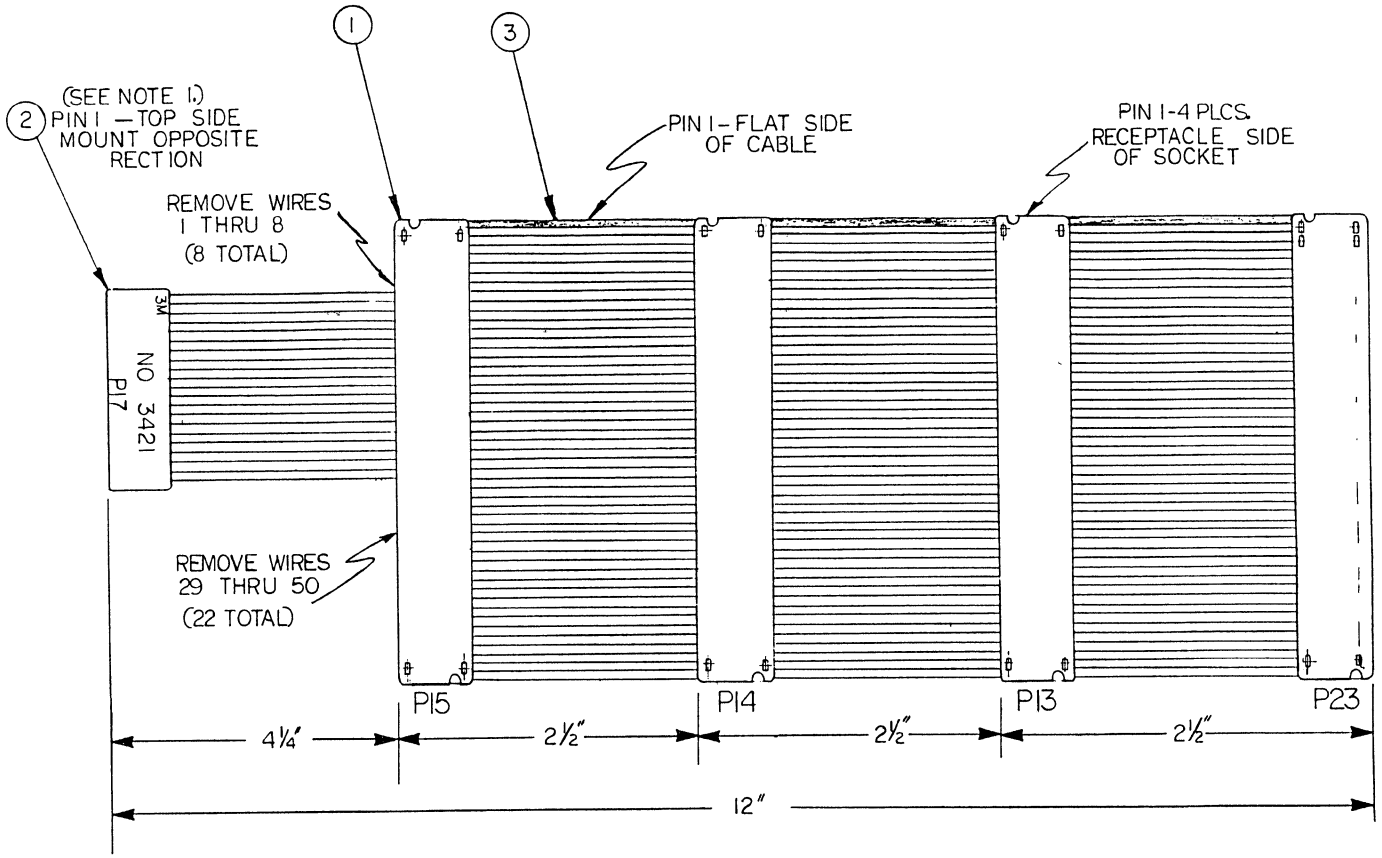
C4062



NOTES:

1. CUT CABLE REQ'D. LENGTH AND PRESS TO SOCKETS USING APPLICABLE 3M PRESS. ASSURE THAT BOTH SOCKETS HAVE PIN 1 POSITIONED AS INDICATED.
2. LABEL "P28" AND 'P10" AS SHOWN.

Figure 6-18. Demod-1 Power Cable C4Ø58A

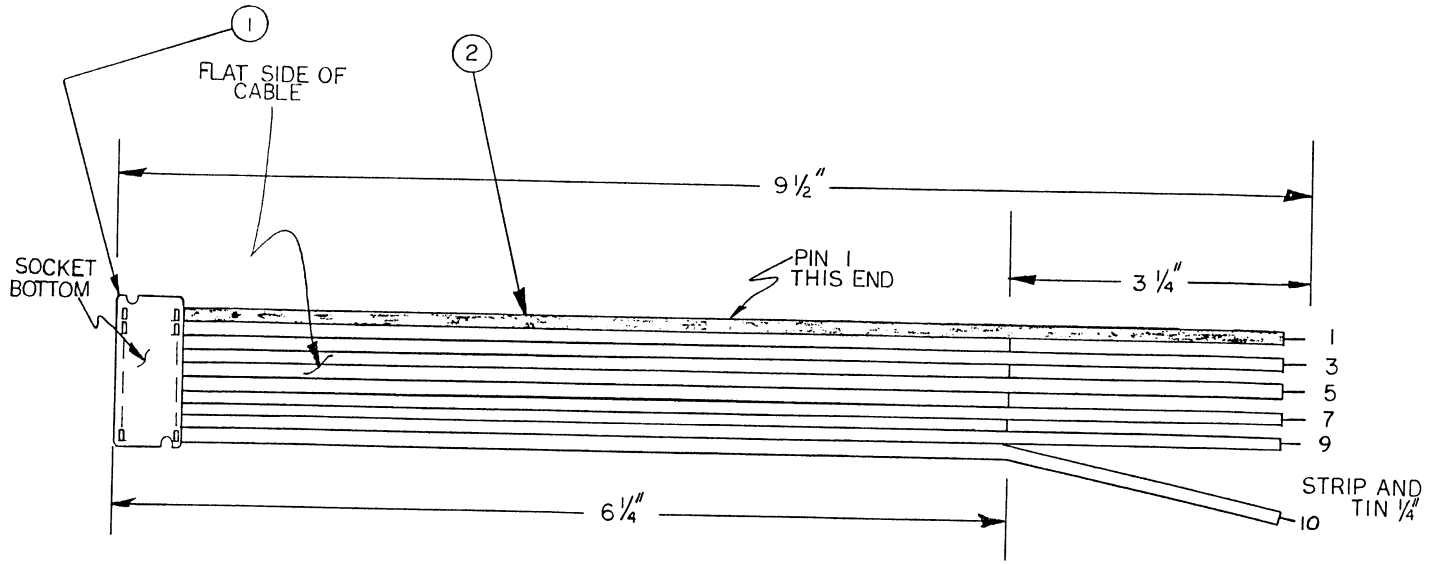


NOTES:

1. CUT CABLE REQ'D. LENGTH AND PRESS SOCKETS (ITEM 1) WITH 3M PRESS. REMOVE WIRES AS INDICATED BEFORE ATTACHING 20 PIN SOCKET (3421-0000).
2. LABEL AS SHOWN ON SOCKET TOPS.

ITEM	REQ'D	PART NO	DESCRIPTION	MAT'L OR MFR	MAT'L SPEC OR CAT PART NO	FINISH	FINISH SPEC	CKT SYM
3	12"	3365-50	RIBBON CABLE — 50 COND	3M	366997			
2	1	3421-6000	SOCKET — 20 PIN	3M	2430IONS			
1	4	3425-6000	SOCKET — 50 PIN	3M	2430IINS			

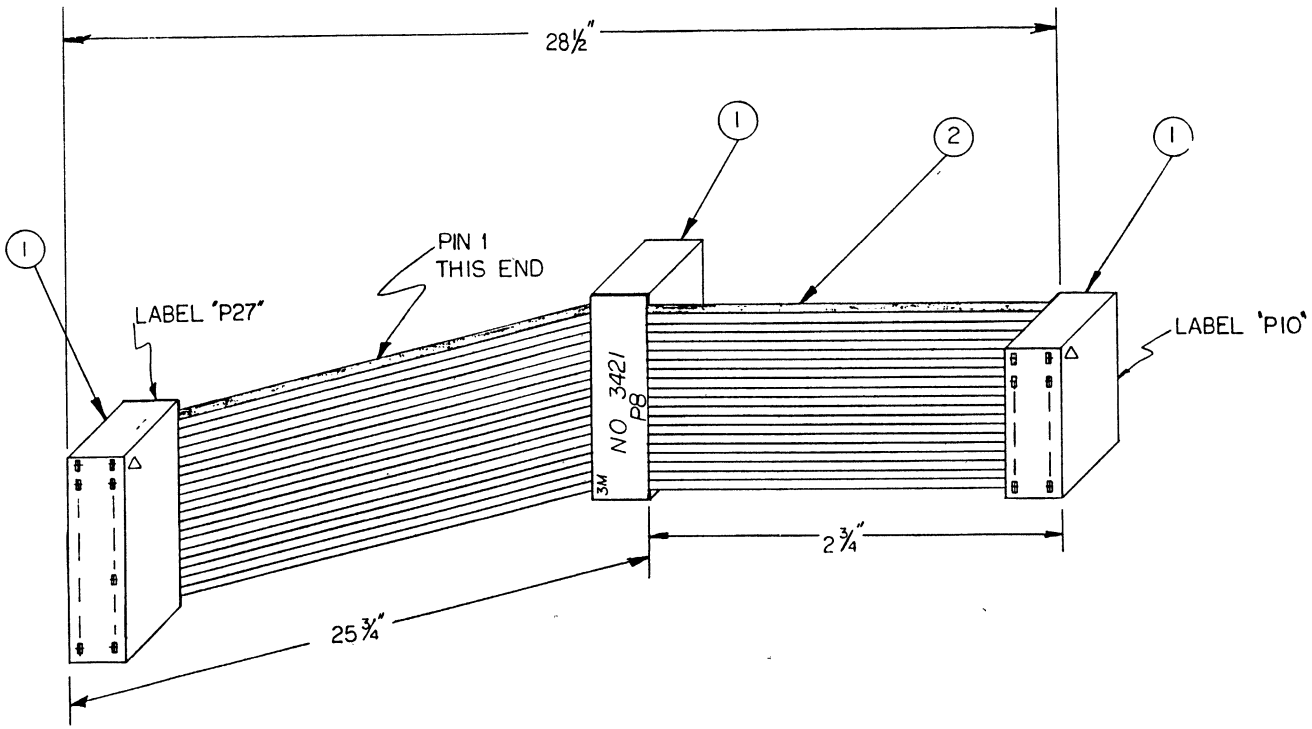
Figure 6-19. Demod-1 Bus Cable Assembly C4059A



NOTES:

1. CUT CABLE REQ'D. LENGTH AND PRESS DIP SOCKET TO ONE END WITH 3M PRESS.
2. AT LENGTH INDICATED, SEPARATE WIRES. REMOVE 2nd, 4th, 6th, & 8th WIRES. STRIP AND TIN REMAINING WIRES AS SHOWN.
3. LABEL "P16" ON TOP OF SOCKET.

Figure 6-20. Demod-1 Diversity Cable C4056A

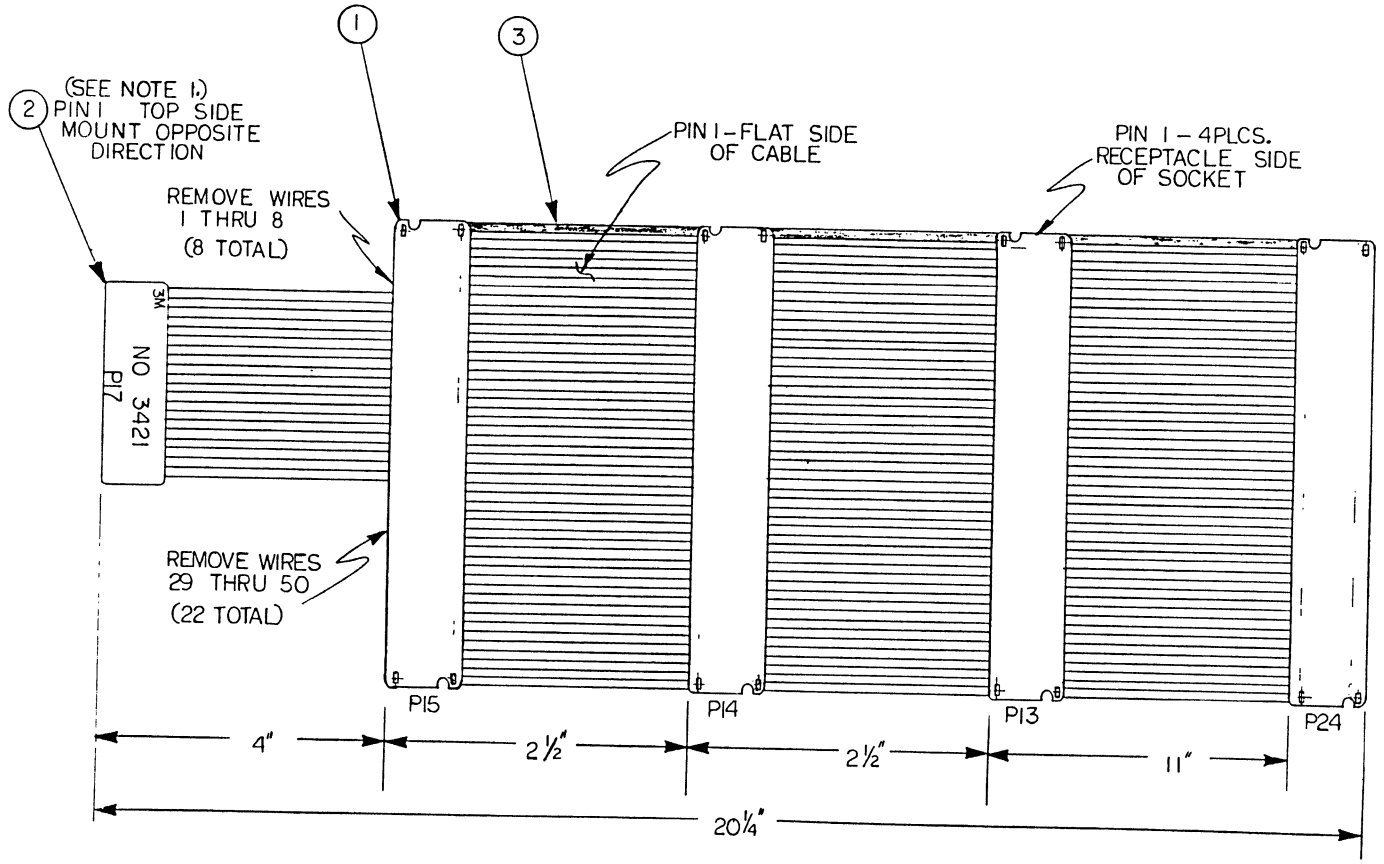


NOTES:

1. CUT CABLE REQ'D. LENGTH AND PRESS SOCKETS IN POSITIONS SHOWN WITH APPLICABLE 3M PRESS.
2. LABEL AS SHOWN.

ITEM	REQ'D	PART NO	DESCRIPTION	MATL OR MFR	MATL SPEC OR CAT. PART NO	FINISH	FINISH SPEC	CKT SYM
2		3365-20	RIBBON CABLE -20 COND.	3M	366996			
1	3	3421-6.000	SOCKET - 20 PIN	3M	2430IONS			

Figure 6-21. Demod-2 Power Cable C4061A



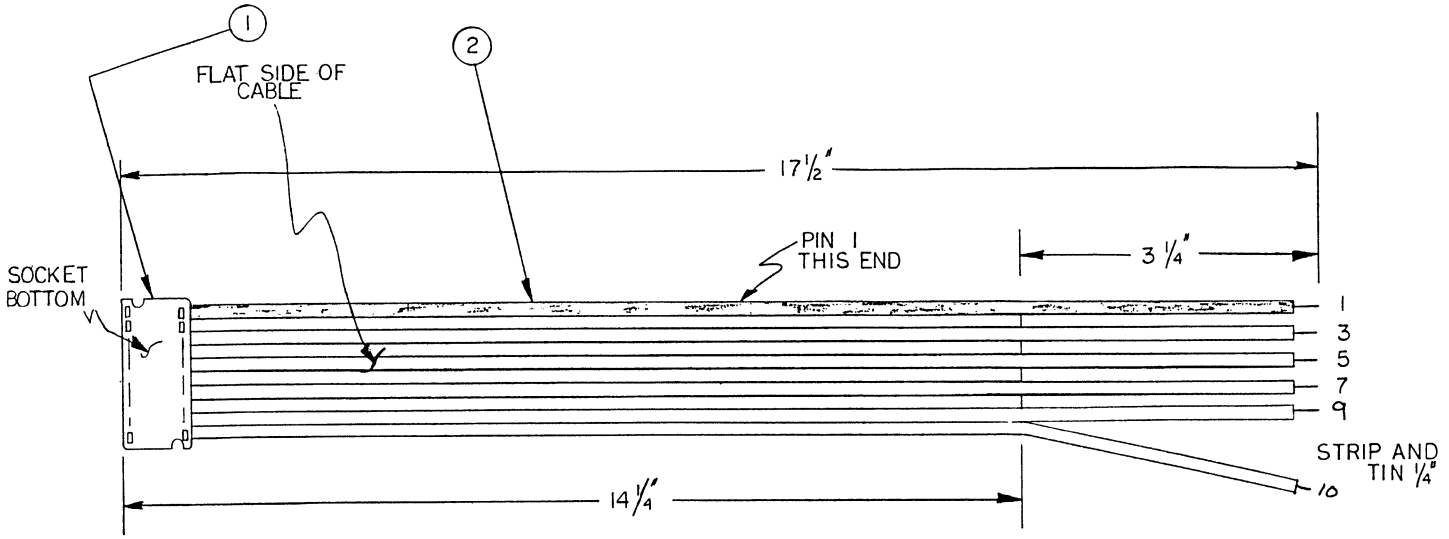
NOTES:

1. CUT CABLE REQ'D. LENGTH AND PRESS SOCKETS (ITEM 1) WITH 3M PRESS. REMOVE WIRES AS INDICATED BEFORE ATTACHING 20 PIN SOCKET (ITEM 2).
2. LABEL AS SHOWN ON SOCKET TOPS.

ITEM	REQ'D	PART NO	DESCRIPTION	MAT'L OR MFR	MAT'L SPEC OR CAT. PART NO.	FINISH	FINISH SPEC	CKT SYM
3		3365-50	RIBBON CABLE - 50 COND	3M	366997			
2	1	3421-6000	SOCKET — 20 PIN	3M	2430ONS			
1	4	3425-6000	SOCKET — 50 PIN	3M	2430IINS			

LIST OF MATERIAL

Figure 6-22. Demod-2 Bus Cable Assembly C4060A

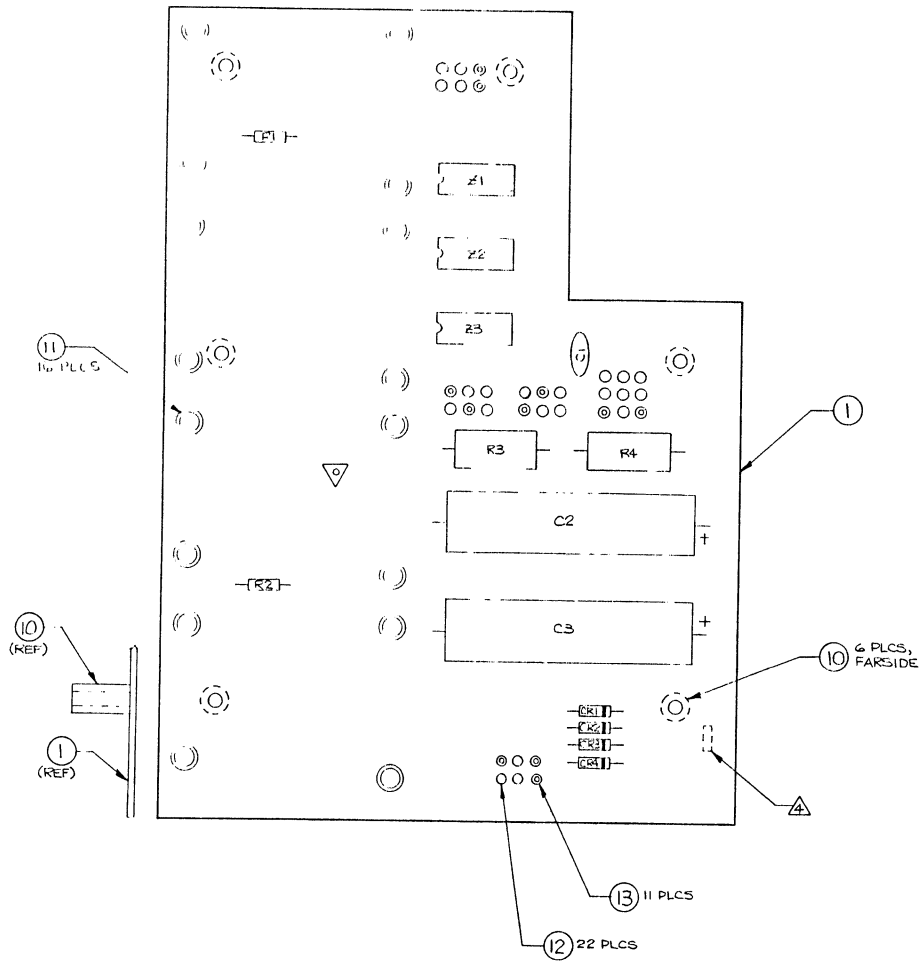


NOTES:

1. CUT CABLE REQ'D. LENGTH AND PRESS DIP SOCKET TO ONE END WITH 3M PRESS.
2. AT LENGTH INDICATED, SEPARATE WIRES. REMOVE 2nd, 4th, 6th, & 8th WIRES. STRIP AND TIN REMAINING WIRES AS SHOWN.
3. LABEL "P16" ON TOP OF SOCKET.

ITEM	REQ'D	PART NO	DESCRIPTION	MAT'L OR MFR	MAT'L SPEC OR CAT PART NO	FINISH	FINISH SPEC	CKT SYM
2	17½"	3365-10	RIBBON CABLE – 10 COND.	3M	366991			
1	1	3473-6000	DIP SOCKET	3M	243015NS			

Figure 6-23. Demod-2 Diversity Cable C4057A



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   PC BOARD – NO2184
   FABRICATION DWG – D5748
   SCHEMATIC DWG: D5750
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN63 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING BLACK EPOXY INK, APPROXIMATELY WHERE SHOWN.
5. STAND 2W RESISTOR 1/4" OFF BOARD.
6. BOARD SHOULD BE BUILT AT A CONDUCTIVE WORK STATION.

Figure 6-24. Loop Power Supply P.W.B. Assembly D5749A

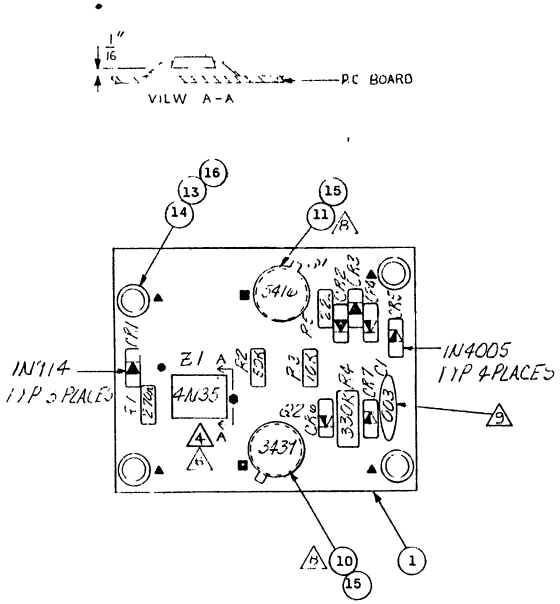
CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02184	1		P.W.B.	FEC	N02184	
	2	D5748	REF		FAB DWG.	FEC	D5748	
	3	D5750	REF		SCHEM DWG.	FEC	D5750	
	4							
	5							
	6	032009NS	1		CAP, DISC, .022uf, 50V	KEMET	C321C223M5U1CA	C1
	7	038001NS	2		CAP, ELECT 580uf, 75V	SANGAMO	066HL581T075B	C2,C3
	8							
	9							
	10	683406	6		STANDOFF	AFE	1247-16-04	
	11		16		EYELETS		A919	
	12	744550	22		PIN, MALE	BEADCHAIN	R62-3ET	
	13	744555	11		PIN, FEMALE	BEADCHAIN	M93-102ET	
	14							

Figure 6-24. Parts List, Sheet 1 PLD5749

CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	15							
	16	043004NS	4		DIODE, RECT, 400V	MOT	1N4004	CR1-CR4
	17							
	18							
	19	640015NS	2		RES, 1K, 1/4W, 5%	R-OHM	R25J1K	R1,R2
	20	644002NS	2		RES, 6.8K, 2W, 10%	A-B	RC42GF682K	R3,R4
	21							
	22							
	23	074006NT	2		I.C., DUAL D FLIP-FLOP	NAT	MM74C74NA+	Z1,Z3
	24	074015NT	1		I.C., QUAD 2 INPUT NAND	NAT	MM74C00NA+	Z2
	25							
	26							
	27							
	28							

Figure 6-24. Parts List, Sheet 2

PLD5749



NOTES

10. BEND CAP. OVER AFTER INSTALLING ON -1 BD. ONLY

1. SCH REF C3308
2. UNLESS OTHERWISE SPECIFIED DRILL ALL HOLES NO55 (052) DR & INSTALL 46410 GRIPLETS
   - ■NO 60 (040) DR 6 PLACES & INSTALL TRANSISTORS
   - ●NO 68 (031) DR - 6 PLACES & INSTALL I C
   - ▲NO 30 (128) DR 4 PLACES & INSTALL STANDOFFS
3. INSTALL STANDOFFS ON COMPONENT SIDE & SOLDER ON TRACK SIDE
4. JOG I C LEADS
5. AFTER PRODUCTION TESTING, SPRAY ENTIRE P C BOARD WITH HUMISEAL TYPE 1B-15 DO NOT SPRAY BANANA PLUGS
6. Z1 INSERT SHOULD BE LEFT OFF UNTIL AFTER WAVE SOLDER.
7. POT MOUNTING SCREW IN BOTTOM OF STANDOFFS BEFORE WAVE SOLDER ON P C BOARDS
8. LEADS ON THESE ITEMS SHOULD NOT BE CRIMPED
9. DO NOT CRIMP ITEM NO 7.

4	17	⊠		SCREW 2-56x5/16	T&C	404020			
4	16	⊠		WASHER NO.2 SPLIT LOCK	SST	404861			
2	15	2	A10020	INSULATOR	ROSS	080836			
4	14	4	2188-12	STANDOFF	CAMBION	683840			
⊠	13	4	192	BANANA PLUG	SMITH	246321			
1	12	1	4N35	INTEGRATED CIRCUIT	GE	07[illegible]NS			
1	11	1	2N5416	TRANSISTOR	RCA	081009NS			
1	10	1	2N3439	TRANSISTOR	RCA	081005NS			
4	9	4	1N4005	DIODE	MOT	043005NS			
3	8	3	1N914	DIODE	FAIRCHILD	043002NS			
1	7	1	DD-302	CAPACITOR .003 MFD 1KV	CRL	032007NS			
1	6	1	RC20CF334J	RESISTOR 330K 1/2W 5%	AB	642002NS			
1	5	1	R25J150K	RESISTOR 150K 1/4W 5%	ROHM	640033NS			
1	4	1	R25J10K	RESISTOR 10K 1/4W 5%	ROHM	640023NS			
1	3	1	R25J270Ω	RESISTOR 270Ω 1/4W 5%	ROHM	640011NS			
1	2	1	R25J22Ω	RESISTOR 22Ω 1/4W 5%	ROHM	640003NS			
1	1	1	N01452	P.C. BOARD	FEC				
REQD	ITEM	REQ'D	PART NO	DESCRIPTION	MAT'L OR MFR	MAT'L SPEC OR CAT. PART NO	FINISH	FINISH SPEC	CKT SYM
-1		STD							

Figure 6-25. High Level Loop P.W.B. Assembly C3240G

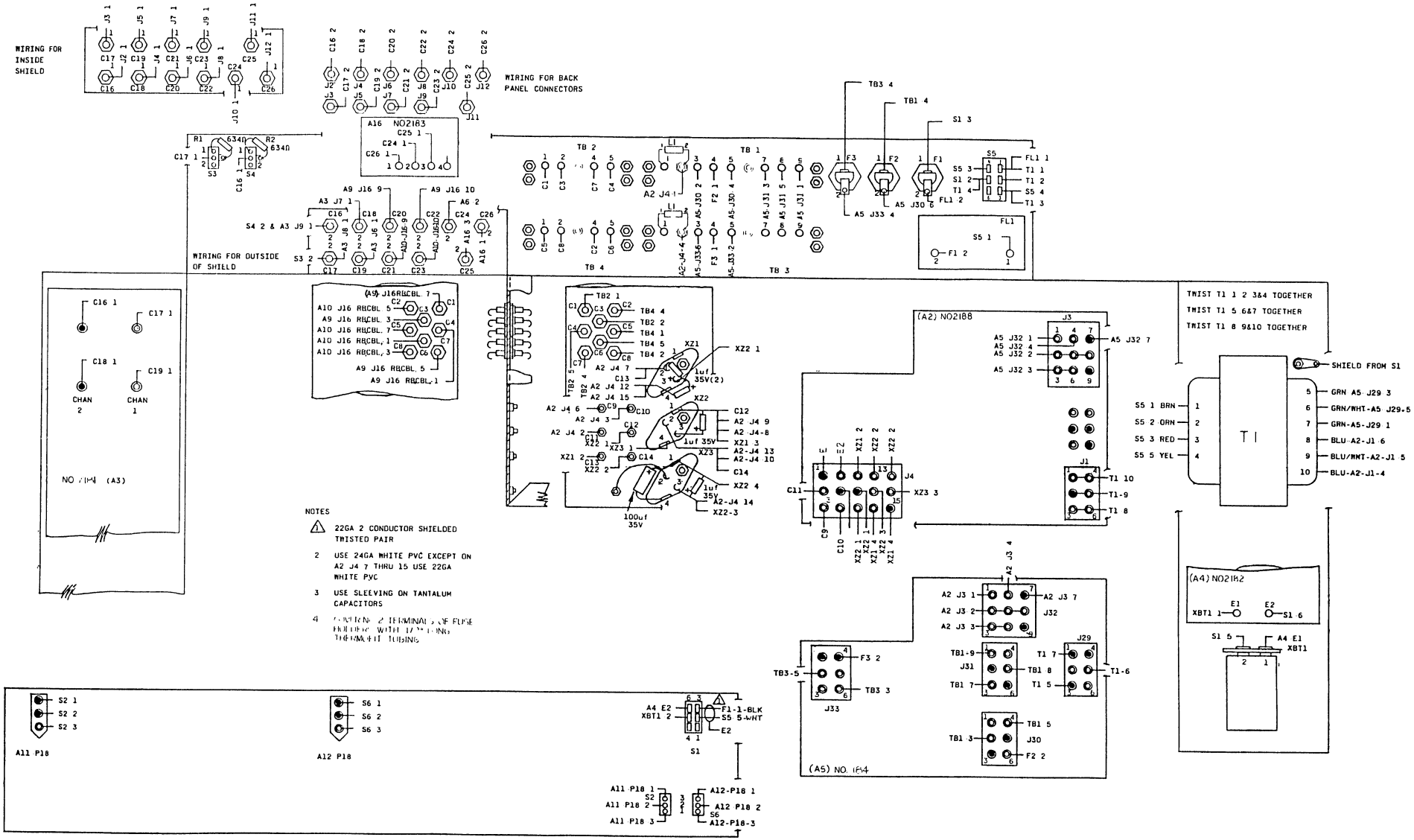
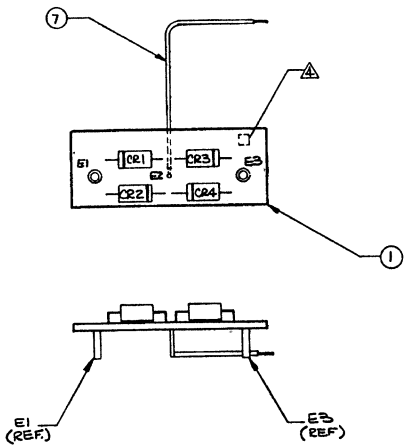


Figure 6-26. Chassis Wiring Diagram D5811



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE DOCUMENTS:
   PC BOARD - N02203
   FABRICATION - D5957
   SCHEMATIC - D5959
2. REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT NECESSARILY APPEAR ON PARTS.
3. SOLDER USING SN60 OR SN62 PER QQ-S-571.
4. MARK CURRENT REVISION LEVEL IN .12 HIGH CHARACTERS USING WHITE EPOXY INK, APPROXIMATELY WHERE SHOWN.

Figure 6-27. Input Piggy Back PWB Assembly D5958

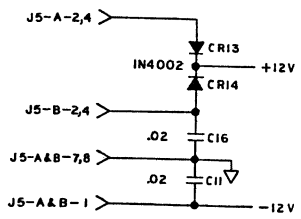
CARD CODE	ITEM NO.	FEC PART NO.	QUANTITY	CHG. CODE	DESCRIPTION	MFR.	MFR. PART NO.	REFERENCE DESIGNATOR
	1	N02203X	1		P.W.B.	FEC		
	2	D5957	REF		FABRICATION	FEC		
	3	D5959	REF		SCHEMATIC	FEC		
	4							
	5	040640	4		ZENER DIODE 4.7V, ¼W	MOTOROLA	1N4624	CR1-CR4
	6	744555	2		STAKE PIN FEMALE	BEAD CHAIN	M93-102ET	E1, E3
	7	366912	2"		24GA. WHITE WIRE, STRANDED	PYRONIC INDUSTRIES	MS16878D-24GA	TO BE INSTALLED A POSITION E2.
	8							
	9							
	10							
	11							
	12							
	13							
	14							

Figure 6-27. Parts List

PL D5958

SECTION VII

SCHEMATIC DIAGRAMS



NOTES:
1) REFERENCE DOCUMENTS:
PC BOARD-NO 2181
FABRICATION DWG.-D5739
ASSEMBLY DWG.-D5740

2) UNLESS OTHERWISE SPECIFIED:
ALL RESISTANCE VALUES ARE IN OHMS
ALL RESISTORS ARE 1/4W, 5%
ALL CAPACITANCE VALUES ARE IN MICROFARADS

Figure 7-1. Input Board Schematic, Sheet 1 D5741

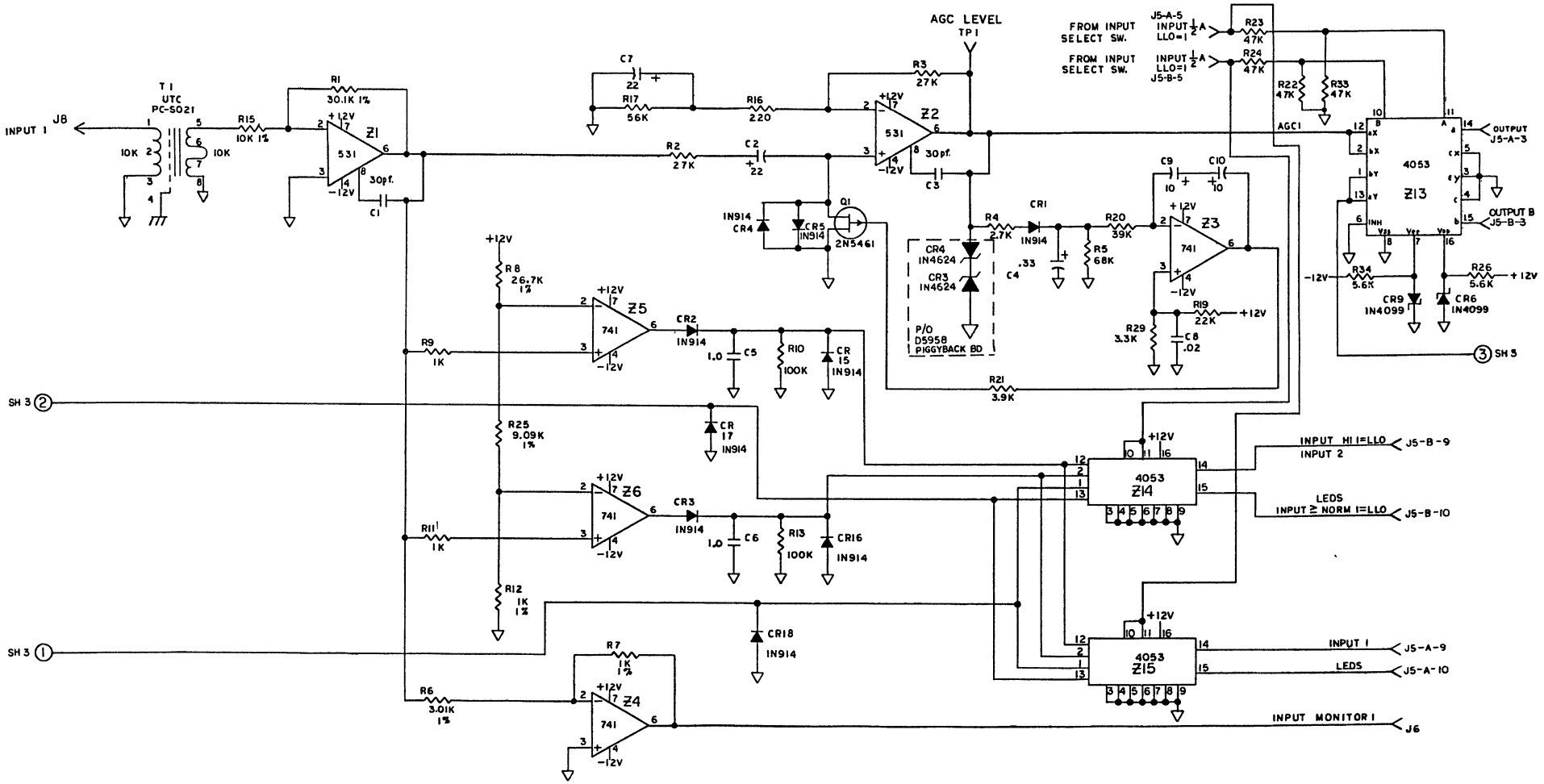


Figure 7-1. Input Board Schematic, Sheet 2 D5741

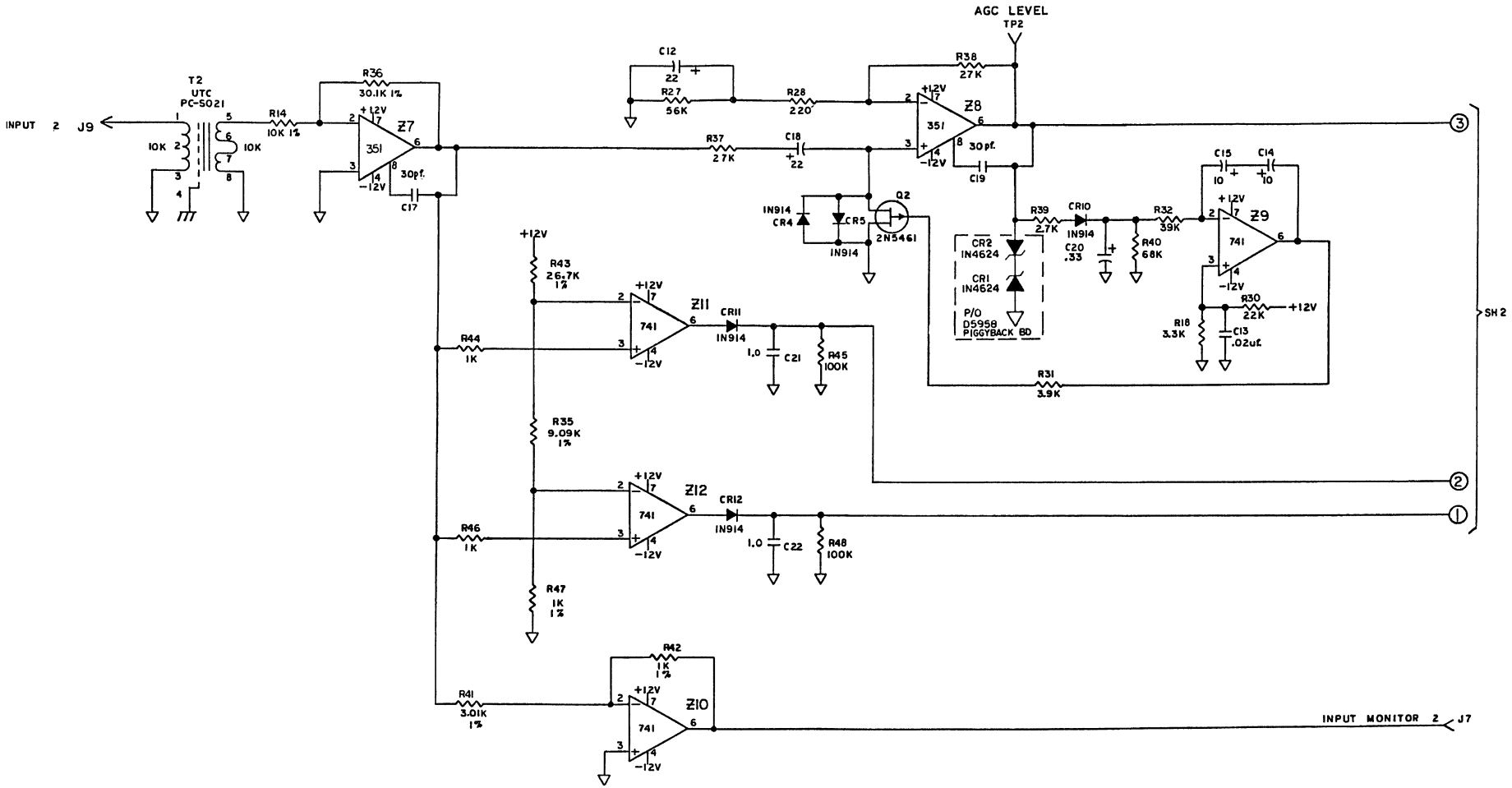
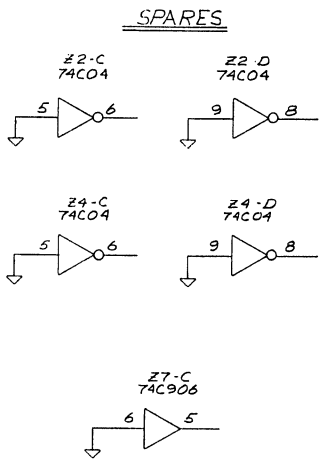


Figure 7-1. Input Board Schematic, Sheet 3 D5741



NOTES
1. PC BOARD REF NO2185
2. FABRICATION REF D5751
3. PC BOARD ASSY D5752
4. UNLESS OTHERWISE SPECIFIED
   A. RESISTORS ARE 1/4 W, 5 %
   B. CAPACITORS ARE IN MICROFARADS
   C. RESISTORS ARE IN OHMS

Figure 7-2. Front Panel Board Schematic, Sheet 1 D5753

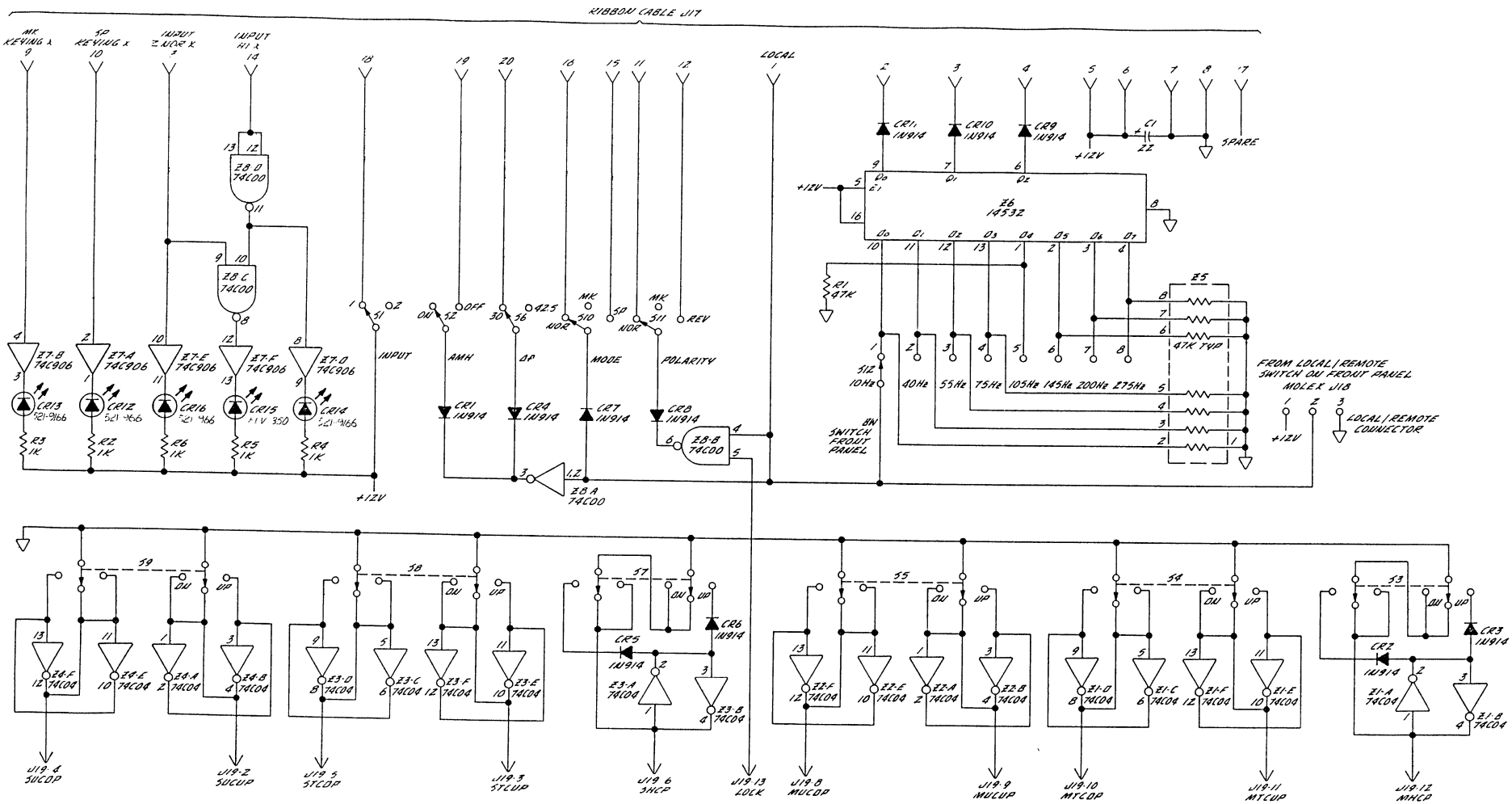
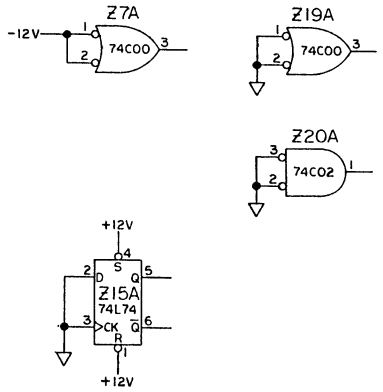
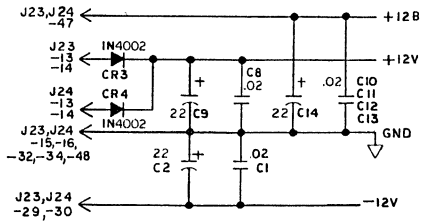


Figure 7-2. Front Panel Board Schematic, Sheet 2 D5753





NOTES:
1) REFERENCE DOCUMENTS:
PC BOARD - N02177
FABRICATION DWG - D5727
ASSEMBLY DWG - D5728
2) UNLESS OTHERWISE SPECIFIED:
ALL RESISTANCE VALUES ARE IN OHMS
ALL RESISTORS ARE 1/4 W, 5%
ALL CAPACITANCE VALUES ARE IN MICROFARADS

Figure 7-3. Remote Board Schematic, Sheet 1 D5729

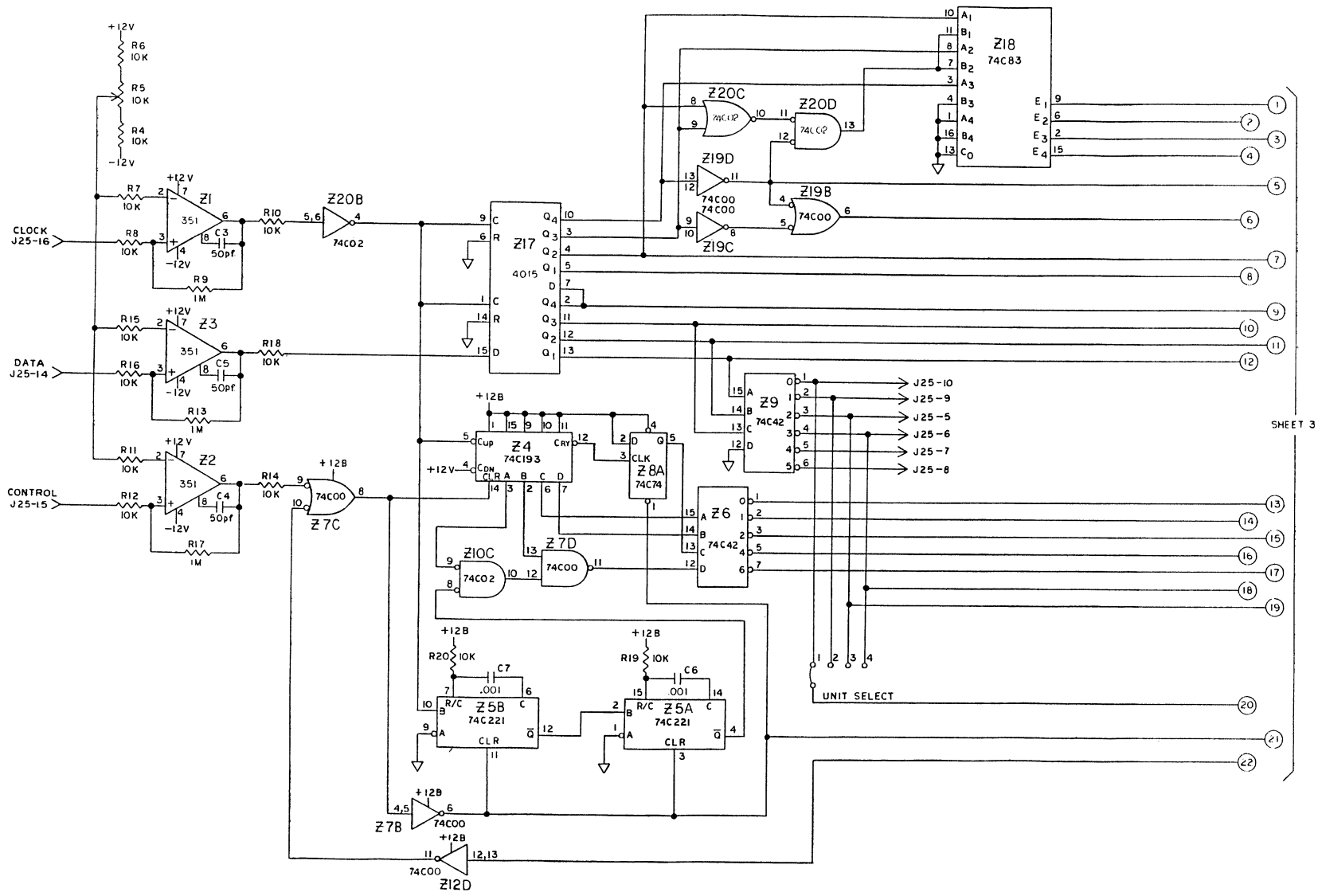


Figure 7-3. Remote Board Schematic, Sheet 2 D5729

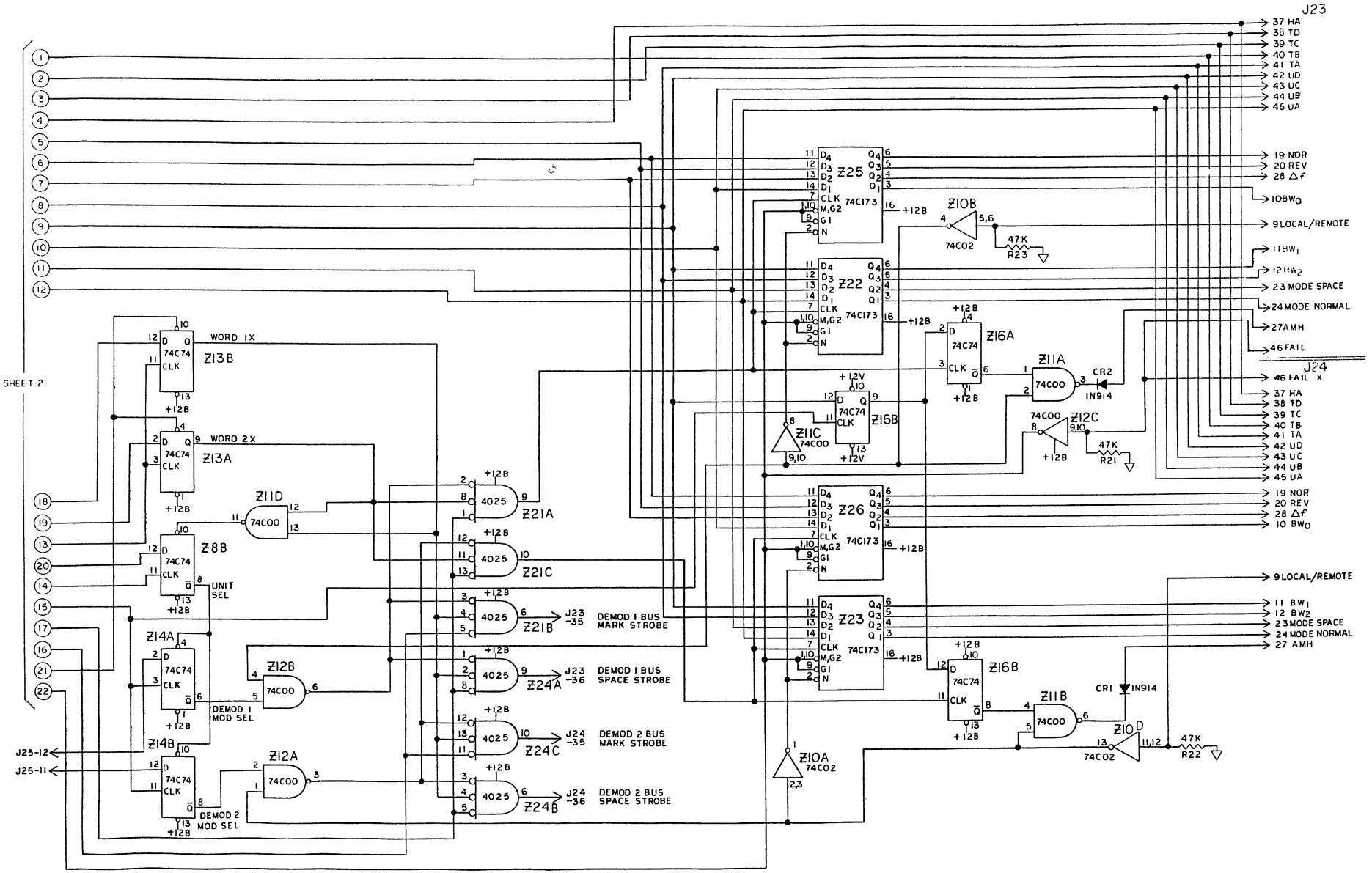
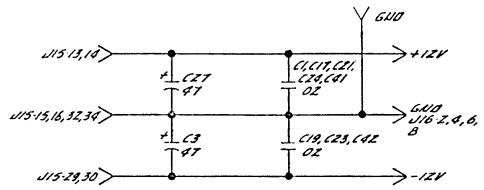
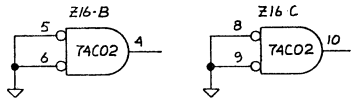


Figure 7-3. Remote Board Schematic, Sheet 3 D5729



SPARES



NOTES:
1) REFERENCE DOCUMENTS:
PC BOARD - N02178
FABRICATION DWG - D5730
ASSEMBLY DWG - D5731
2) UNLESS OTHERWISE SPECIFIED:
ALL RESISTANCE VALUES ARE IN OHMS
ALL RESISTORS ARE 1/4 W, 5%
ALL CAPACITANCE VALUES ARE IN MICROFARADS

Figure 7-4. Demodulator Schematic, Sheet 1 D5732

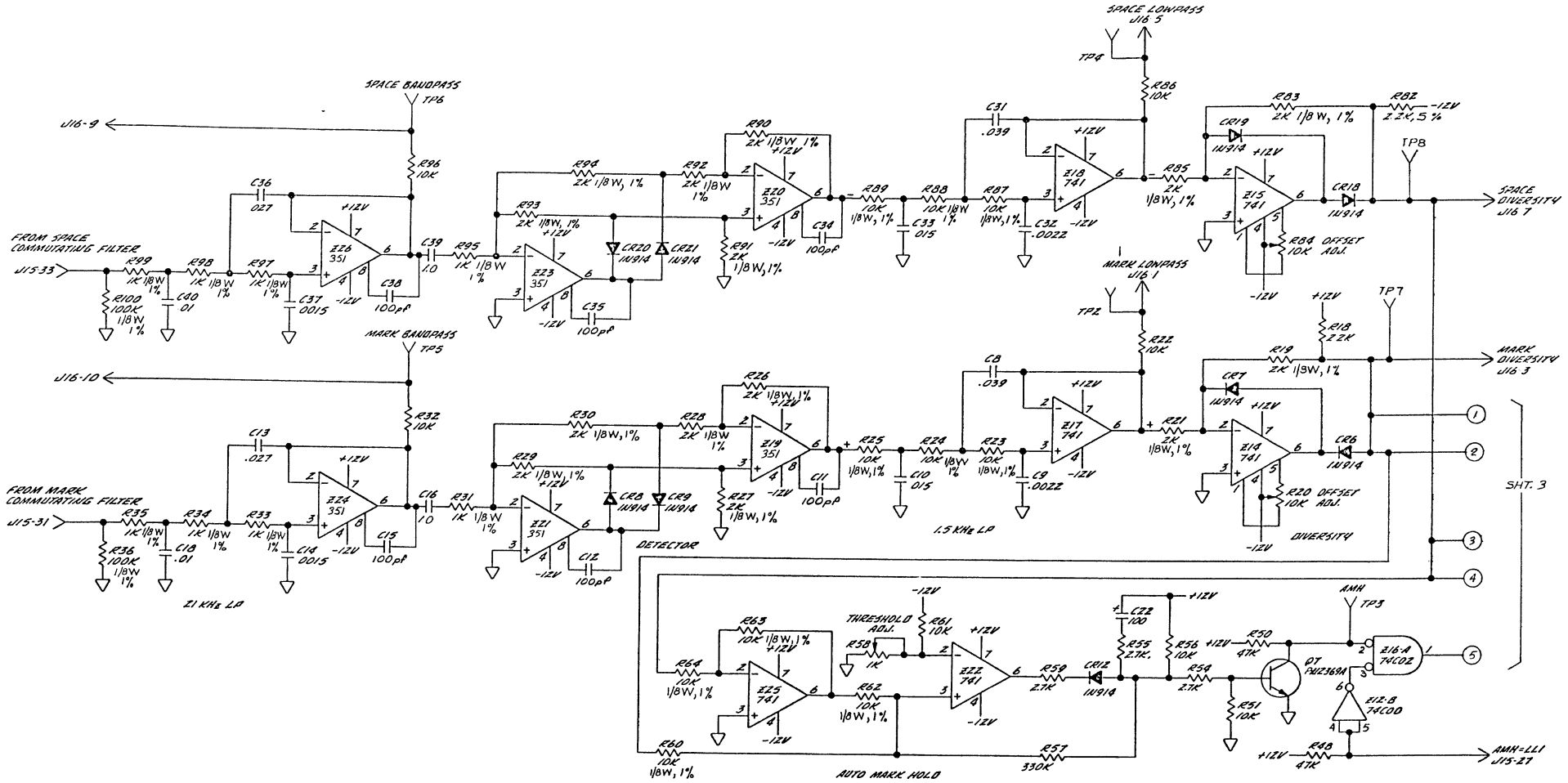


Figure 7-4. Demodulator Schematic, Sheet 2 D5732

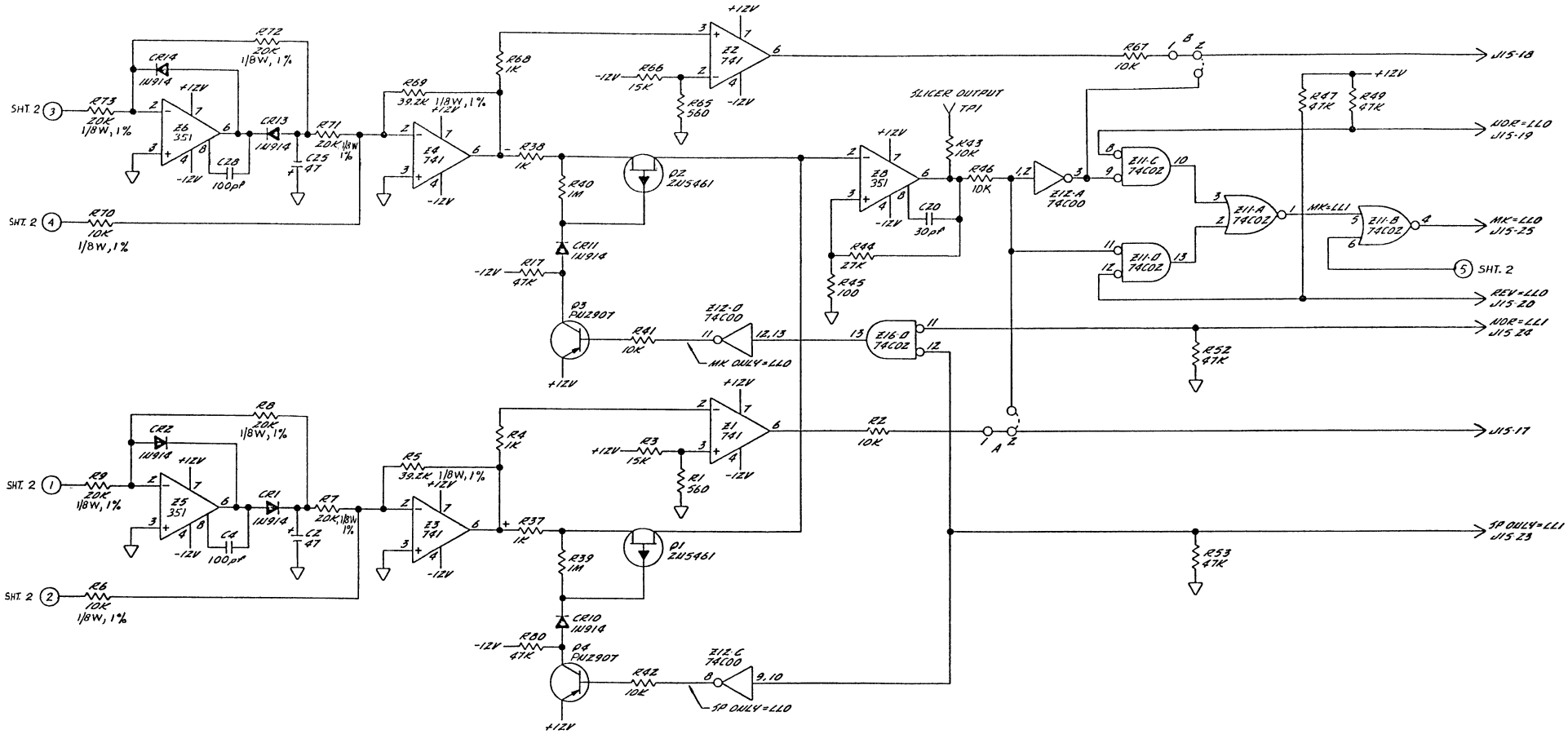
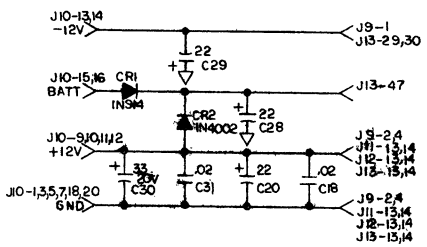
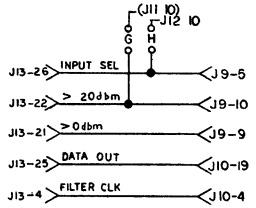
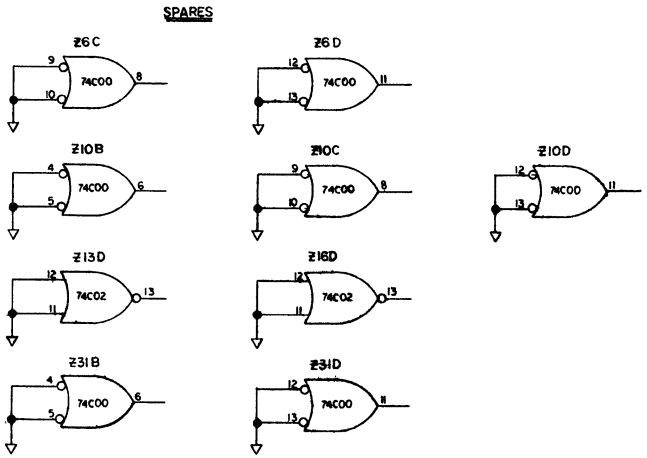


Figure 7-4. Demodulator Schematic, Sheet 3 D5732







NOTES:

1) REFERENCE DOCUMENTS:
   PC BOARD - NO 2179
   FABRICATION DWG. - D5733
   ASSEMBLY DWG. - D5734

2) UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL RESISTORS ARE 1/4W, 5%
   ALL CAPACITANCE VALUES ARE IN MICROFARADS

Figure 7-5. Frequency Synthesizer Schematic, Sheet 1 D5735

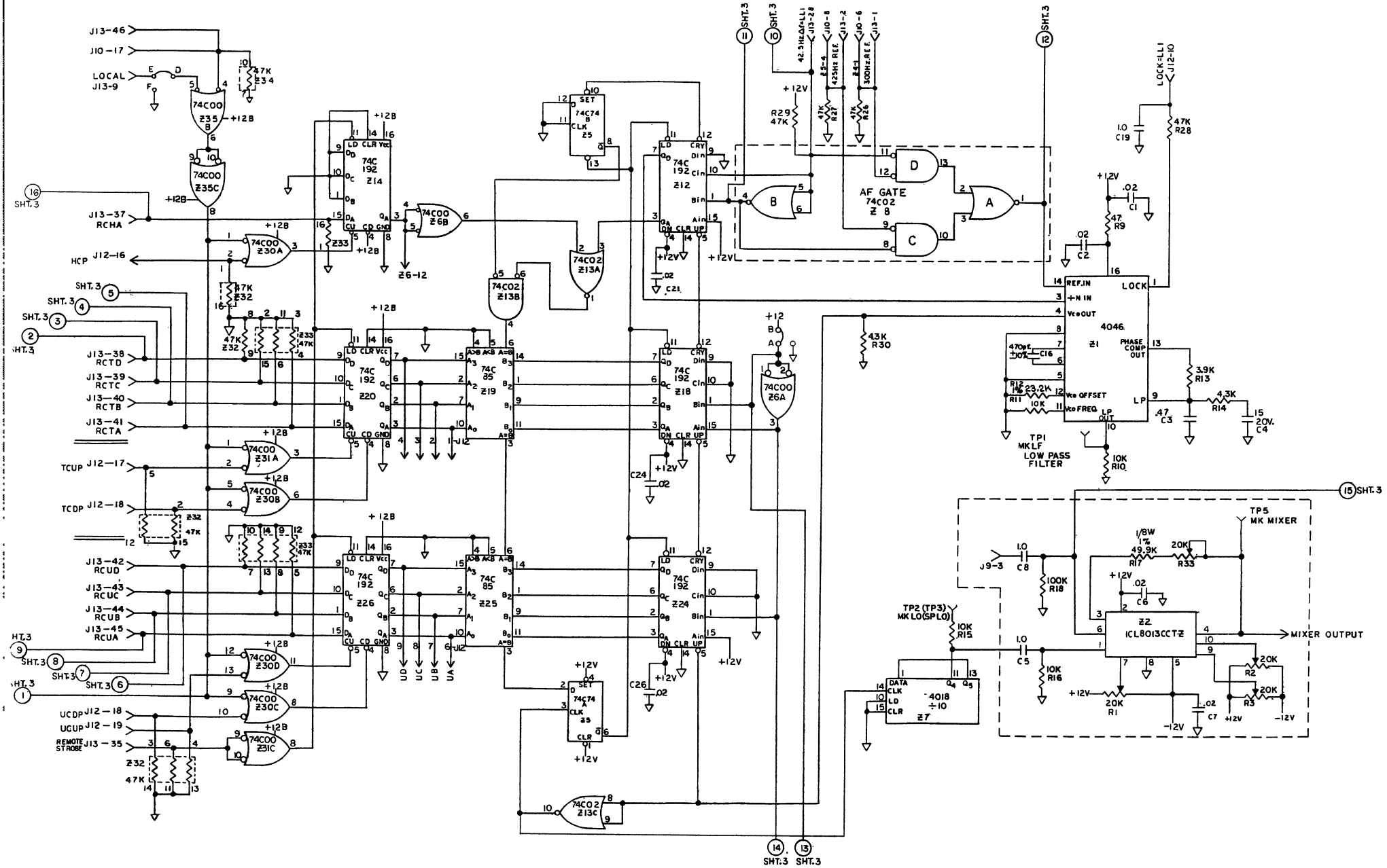


Figure 7-5. Frequency Synthesizer Schematic, Sheet 2 D5735

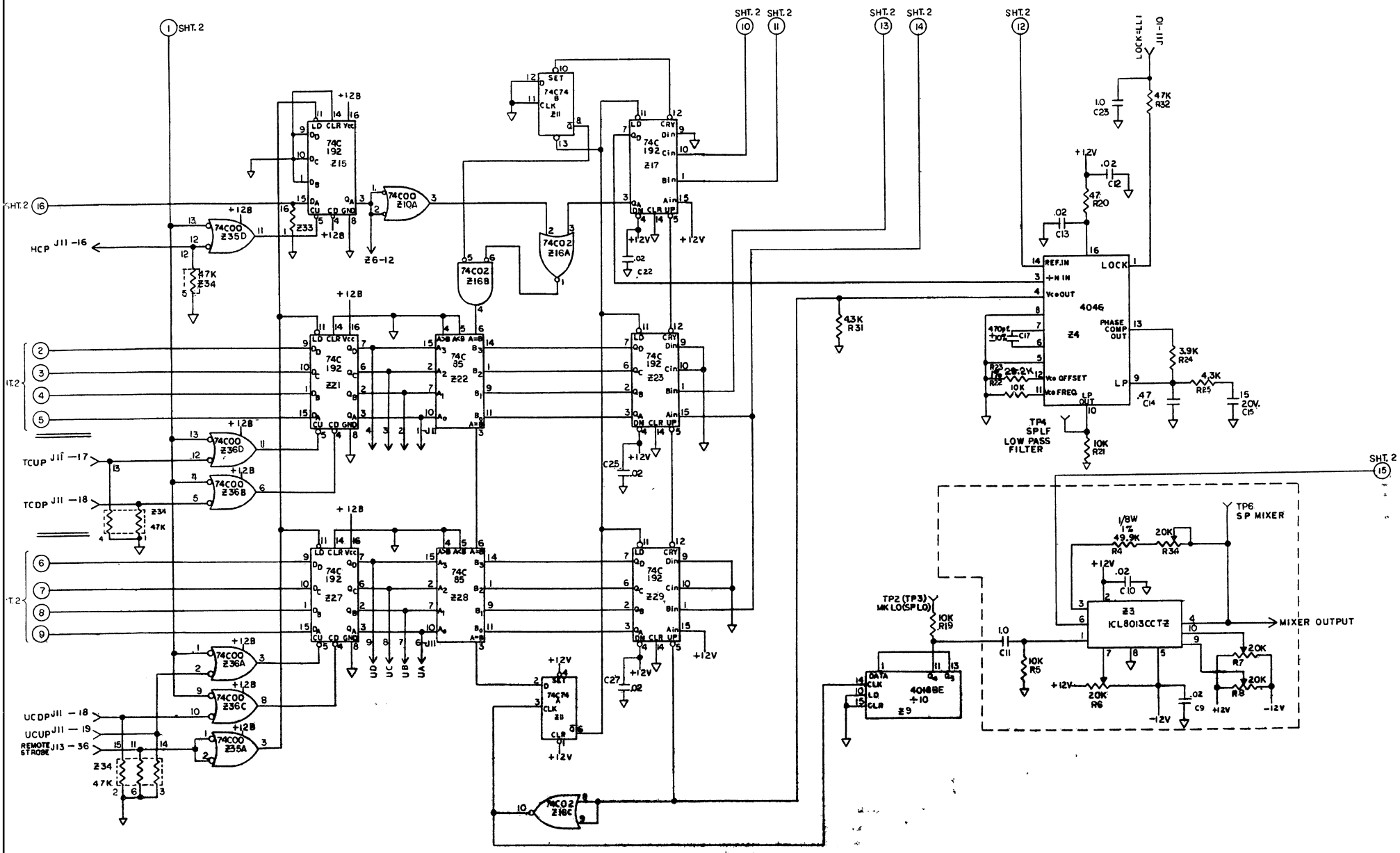
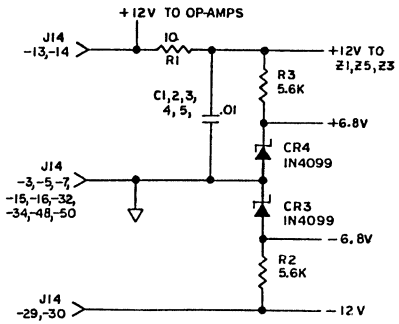


Figure 7-5. Frequency Synthesizer Schematic, Sheet 3 D5735



NOTES:
1) REFERENCE DOCUMENTS:
   PC BOARD - N02180
   FABRICATION DWG. - D5736
   ASSEMBLY DWG - D5737
2) UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL RESISTORS ARE 1/4 W, 5%
   ALL CAPACITANCE VALUES ARE IN MICROFARADS
3) REFERENCE DESIGNATORS IN PARENTHESIS
   APPLY TO SPACE FILTER.

Figure 7-6. IF Filter Schematic, Sheet 1 D5738

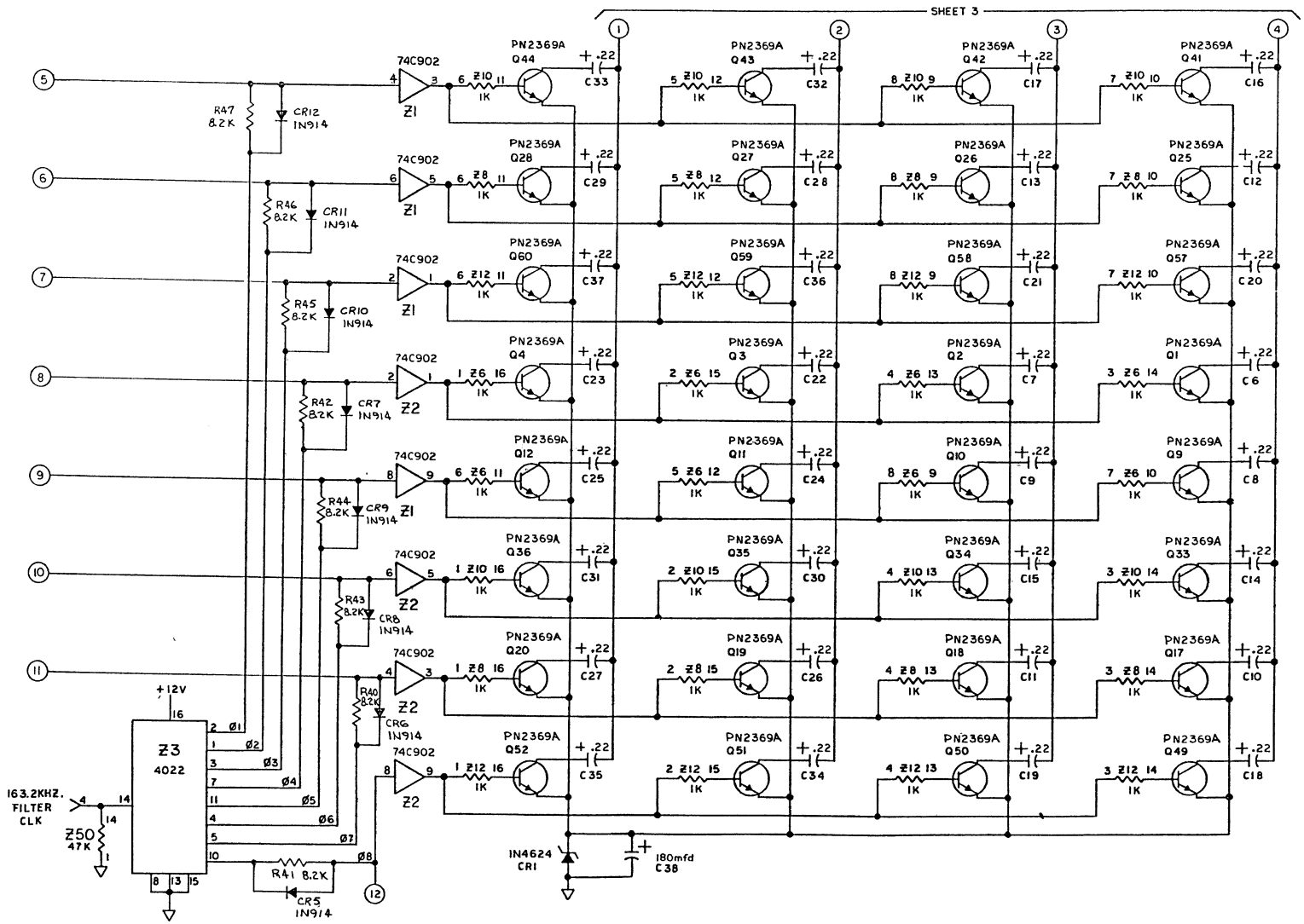


Figure 7-6. IF Filter Schematic, Sheet 2 D5738

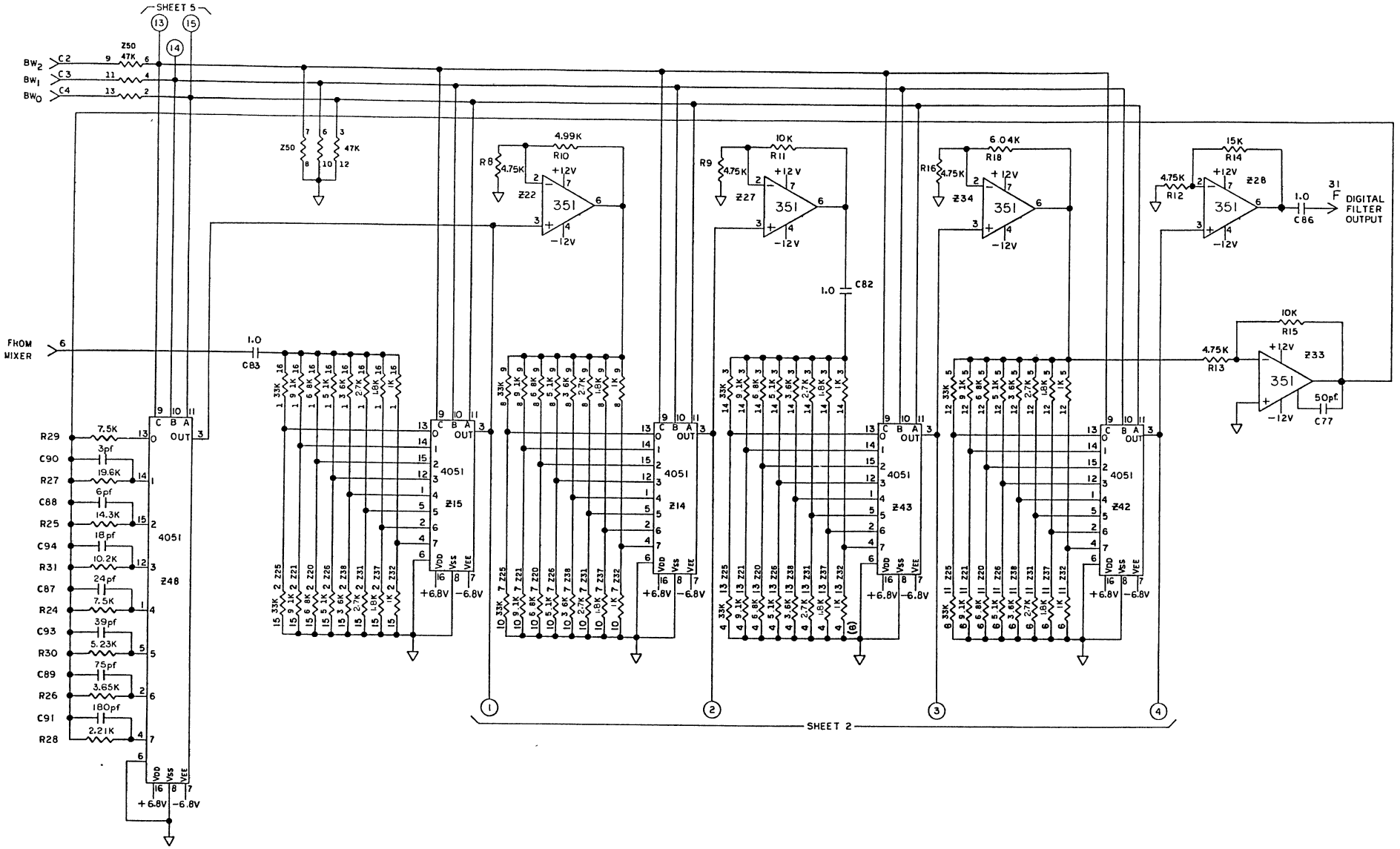


Figure 7-6. IF Filter Schematic, Sheet 3 D5738

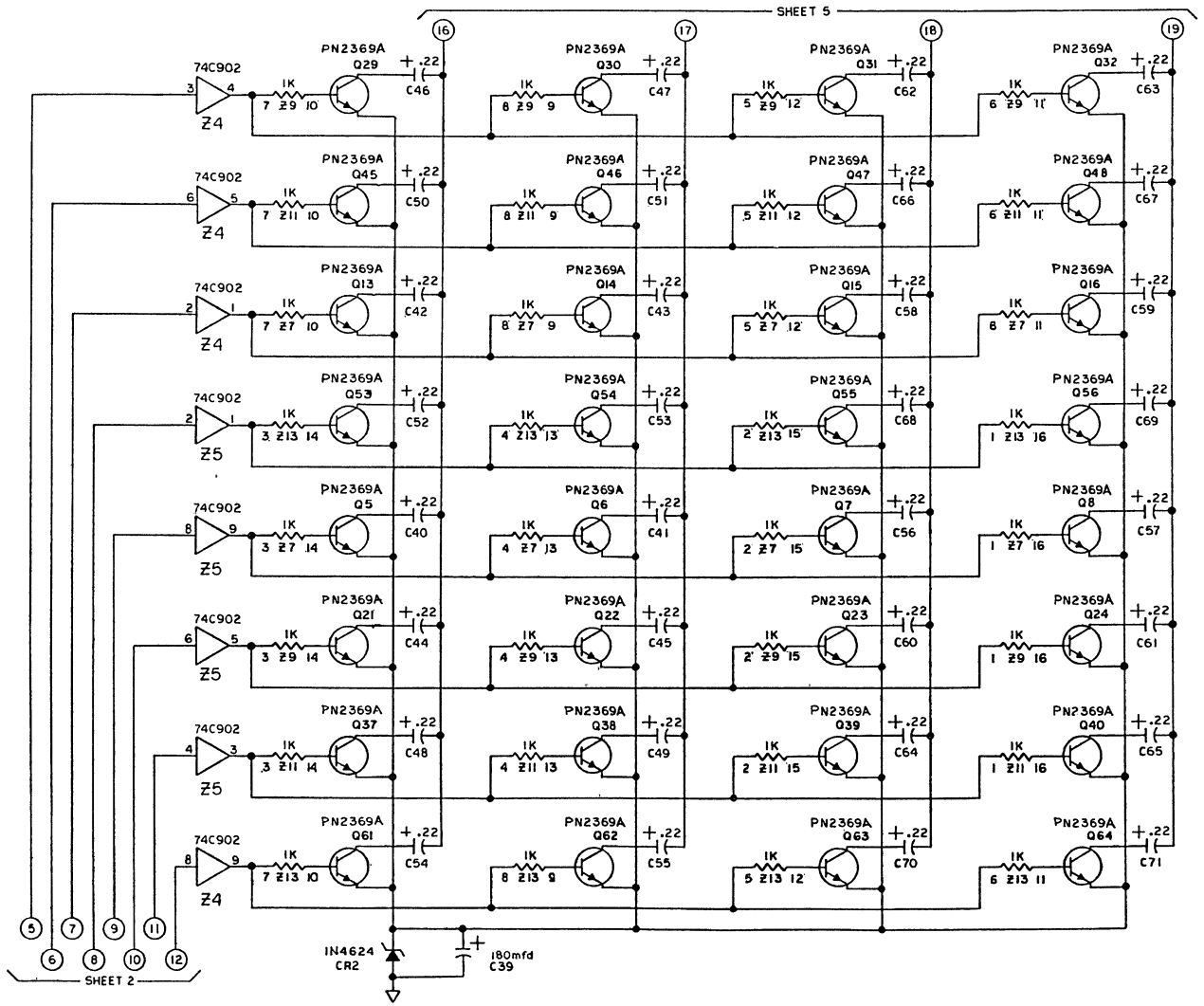


Figure 7-6. IF Filter Schematic, Sheet 4 D5738

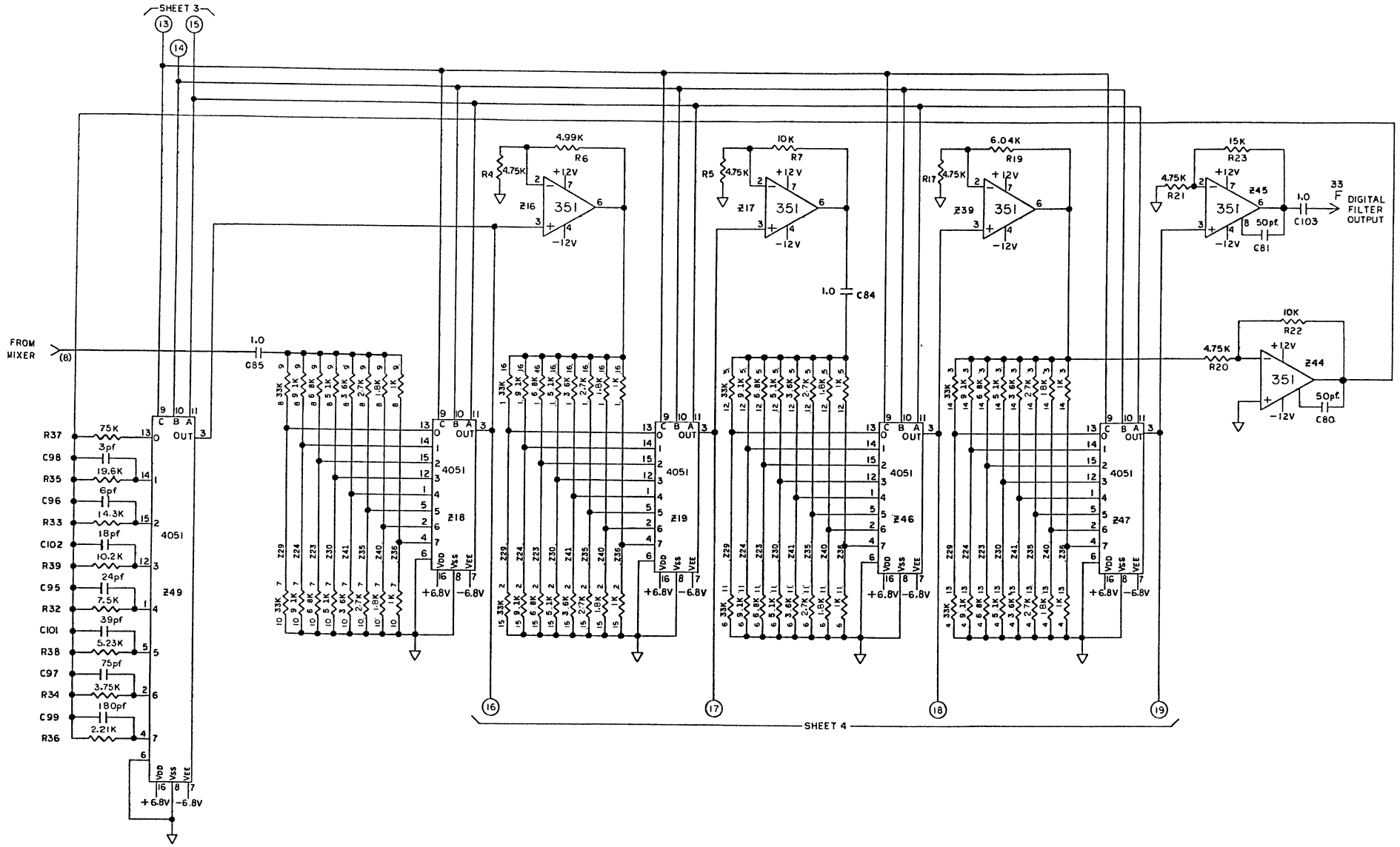


Figure 7-6. IF Filter Schematic, Sheet 5 D5738

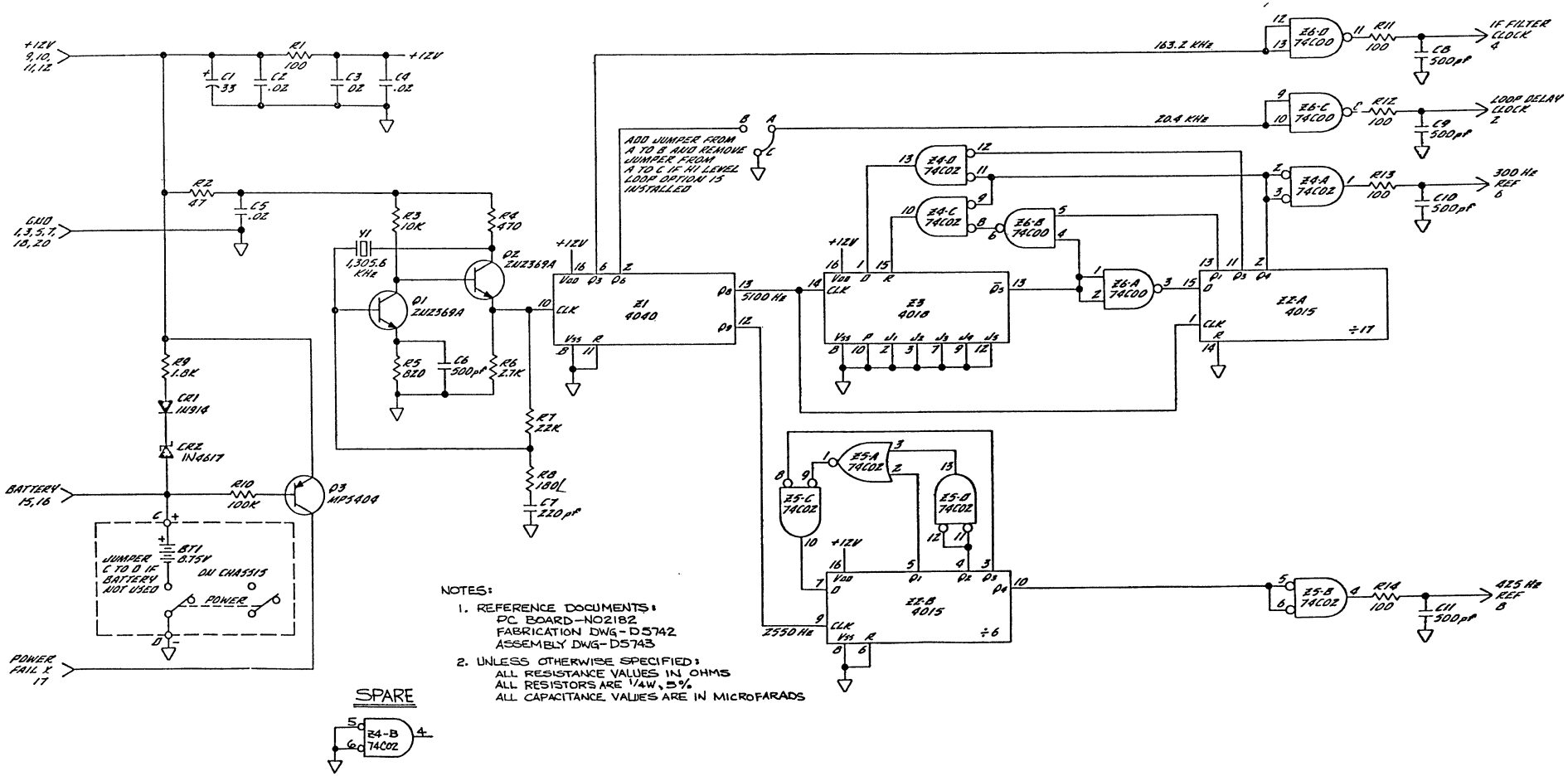
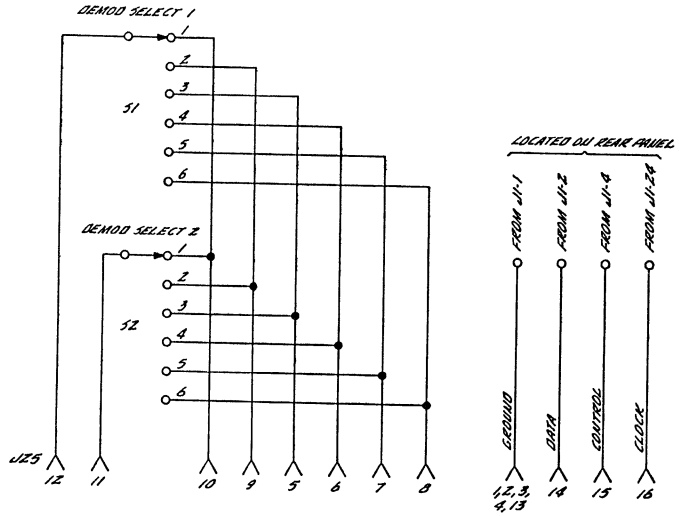


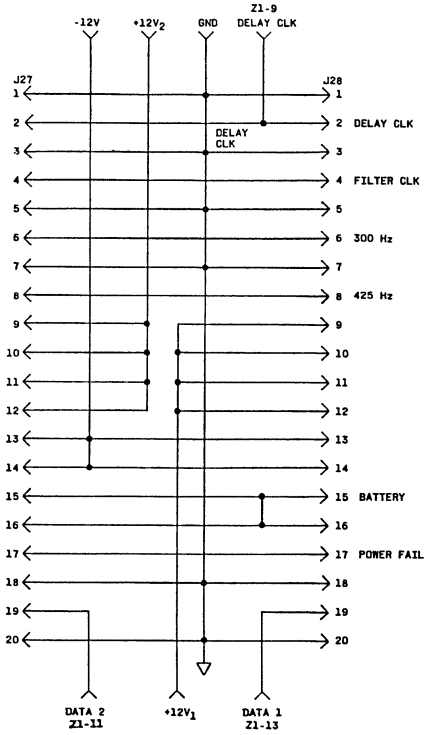
Figure 7-7. Time Base Board Schematic D5744



NOTES:
1. REFERENCE DOCUMENTS:
PC BOARD-NO2183
FABRICATION DWG-D5745
ASSEMBLY DWG-D5746

Figure 7-8. Switch Card Schematic

D5747



NOTES:
1) REFERENCE DOCUMENTS:
PC BOARD - N02187
FABRICATION DWG. - D5757
ASSEMBLY DWG - D5758

Figure 7-9. Connector Board Schematic

D5759

NOTES:

1. REFERENCE DOCUMENTS:
   PC BOARD - N02186
   FABRICATION DWG - D5754
   ASSEMBLY DWG - D5755

Figure 7-10. Display Board Schematic, Sheet 1 D5756

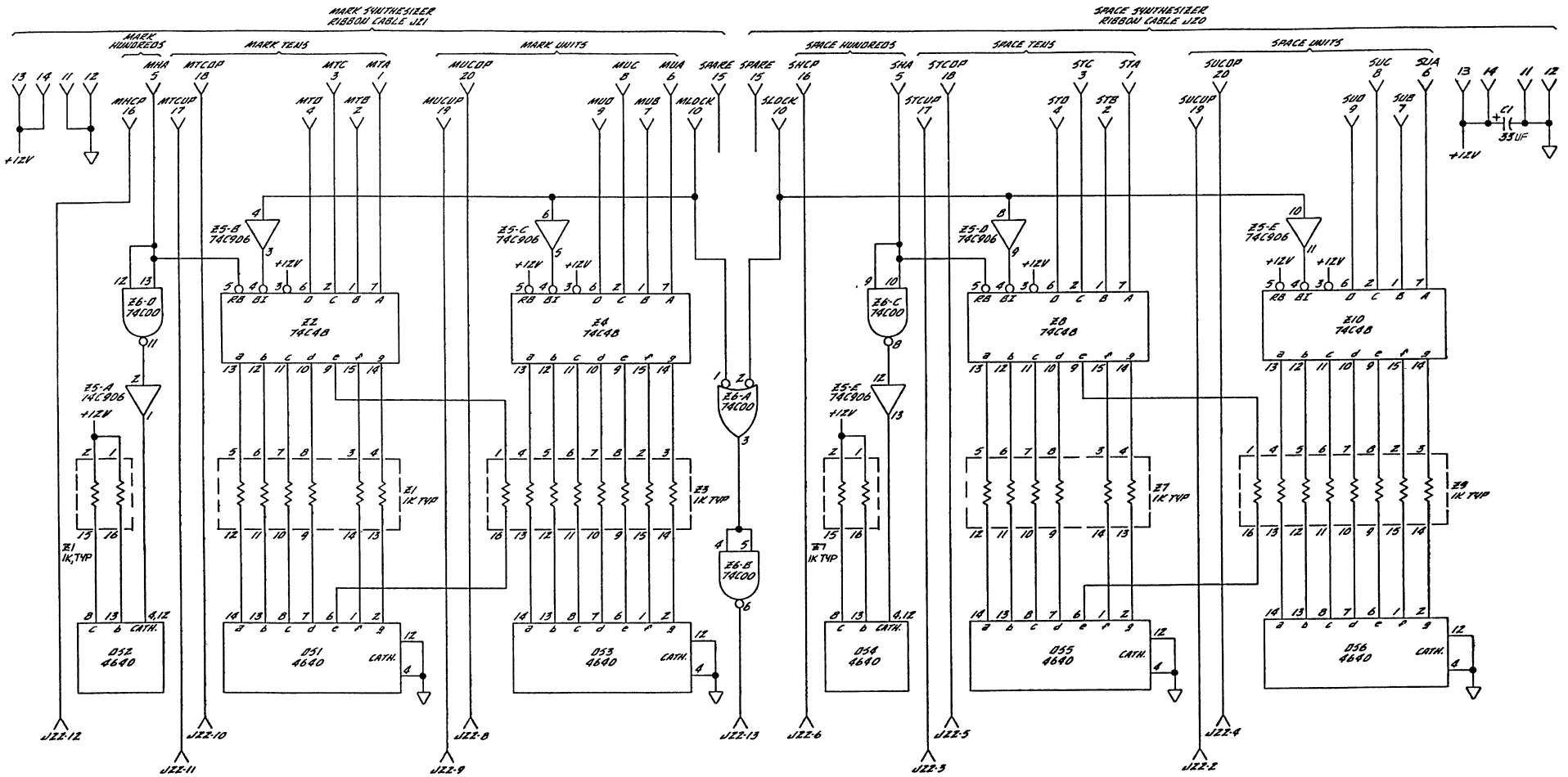
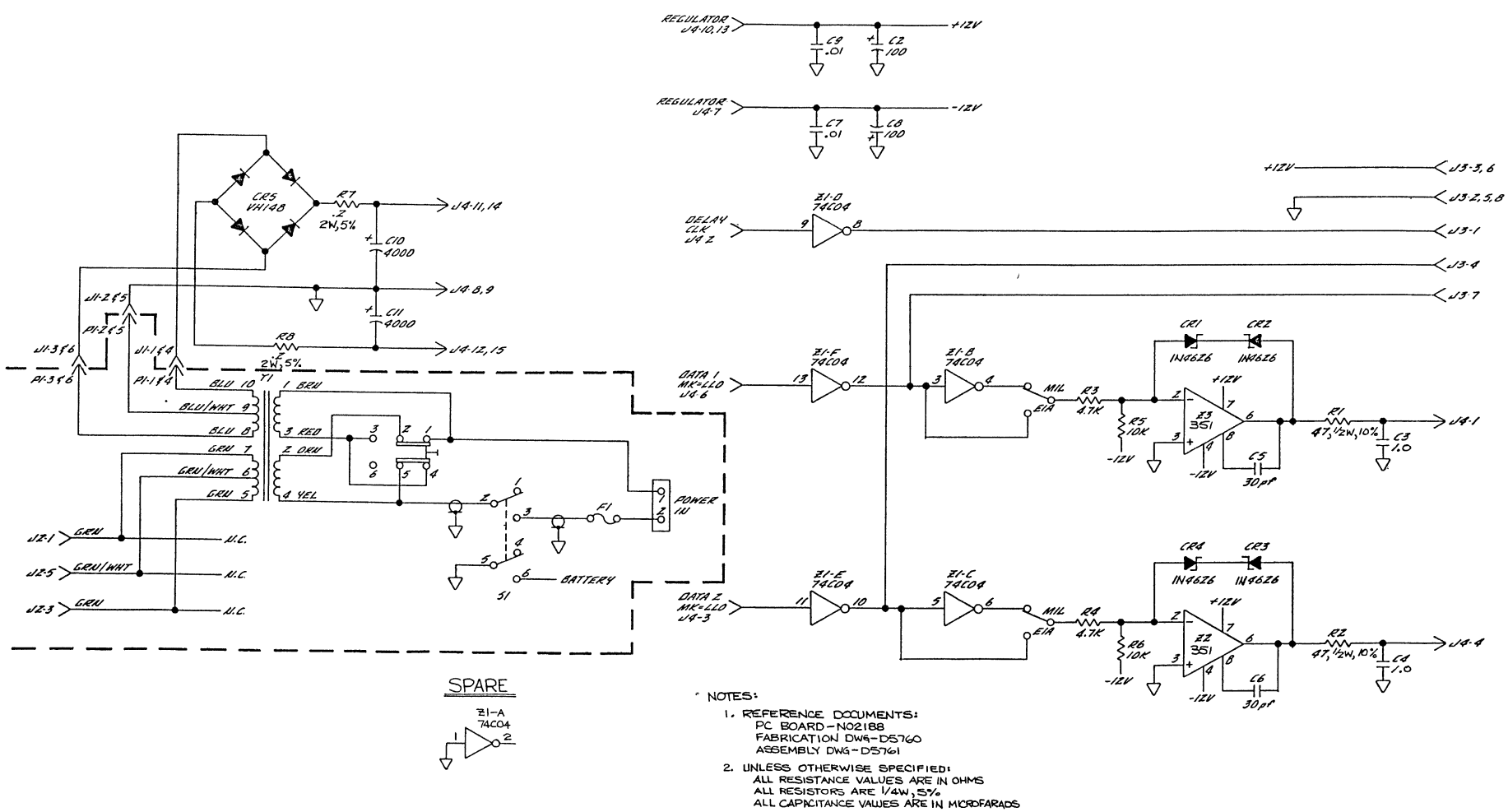


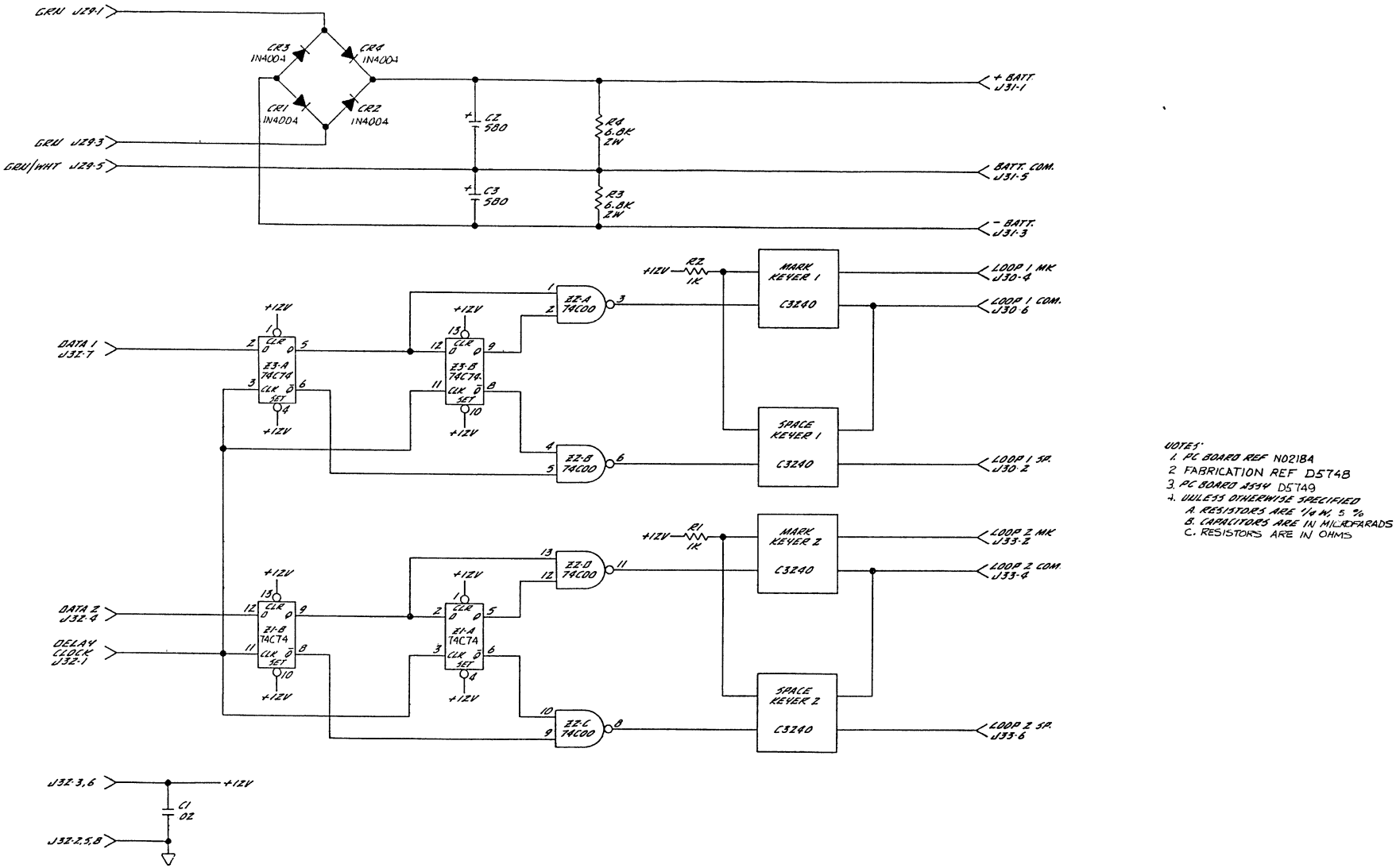
Figure 7-10. Display Board Schematic, Sheet 2 D5756



NOTES:

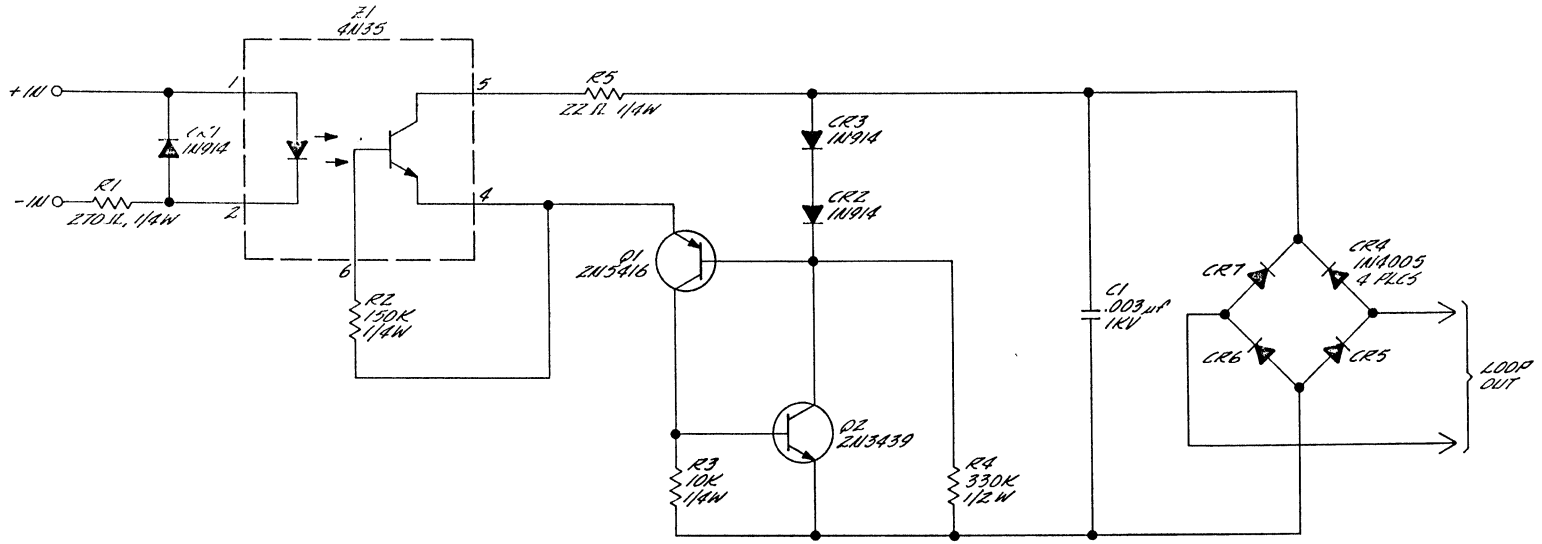
1. REFERENCE DOCUMENTS:
   PC BOARD – N02188
   FABRICATION DWG – D5760
   ASSEMBLY DWG – D5761
2. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL RESISTORS ARE 1/4W, 5%
   ALL CAPACITANCE VALUES ARE IN MICROFARADS

Figure 7-11. Power Supply Schematic D5762



NOTES:
1. PC BOARD REF N021BA
2. FABRICATION REF D5748
3. PC BOARD J334 D5749
4. UNLESS OTHERWISE SPECIFIED
   A. RESISTORS ARE 1/4 W, 5 %
   B. CAPACITORS ARE IN MICROFARADS
   C. RESISTORS ARE IN OHMS

Figure 7-12. Loop Power Supply Schematic D5750.



NOTES:
1. PC BOARD REF 1101452
2. PC BOARD ASSY C3240

Figure 7-13. High Level Neutral Keyer Schematic C3308