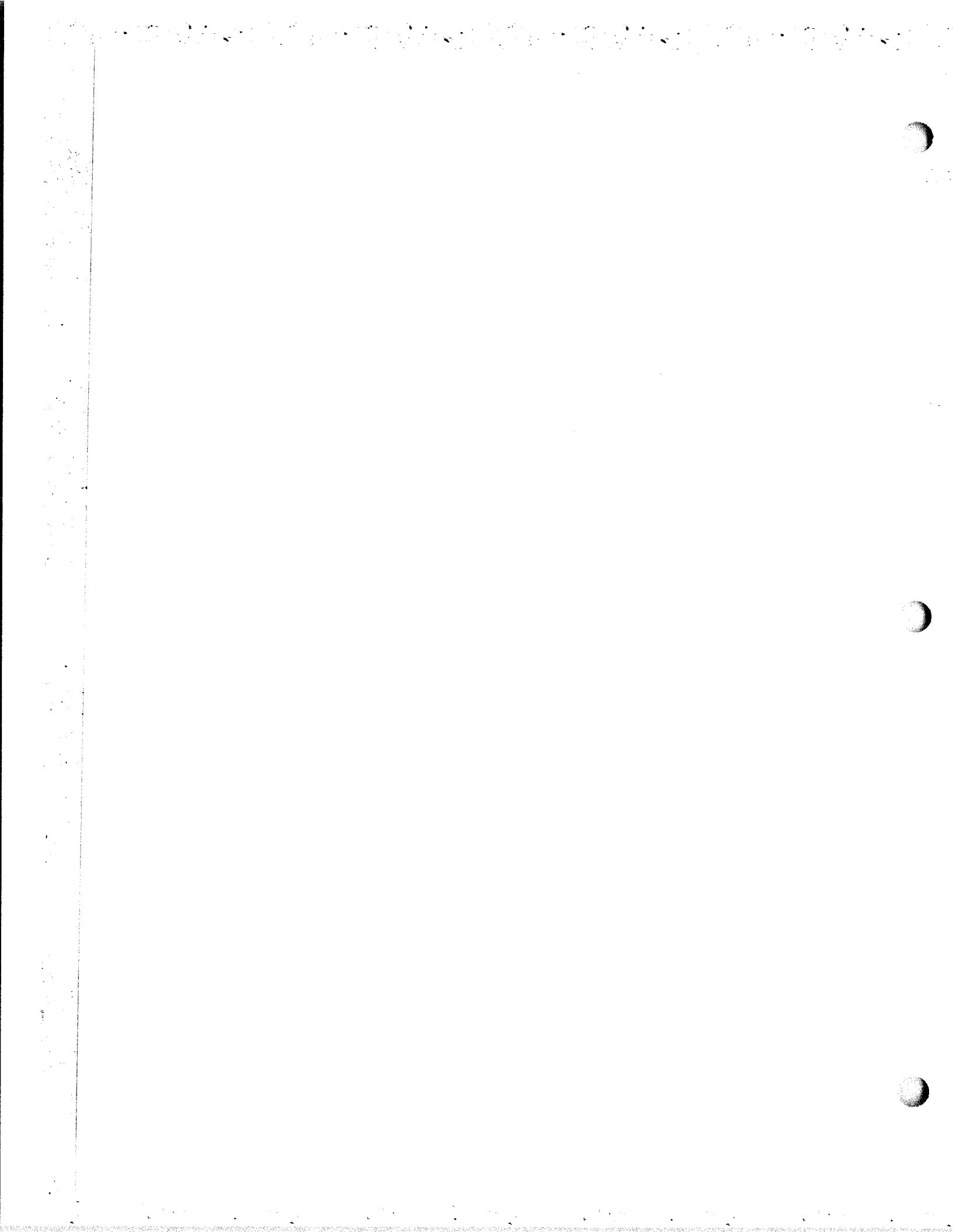


**MK 3 Ships Inertial Navigation — Maintenance
Hint**

The purpose of this article is to alert ship personnel to the possibility of circuit damage through improper -5 volt power supply installation in the Data Output Console (DOC)

Improper mounting of the -5 volt power supply causes a limited clearance problem between the -5 volt adjusting potentiometer (mounted on the door of the Data Output Console (DOC)) and the -5 volt power supply (contained inside the DOC). There have been cases where the potentiometer will contact the -5 volt power supply terminal lugs when the door is secured and the potentiometer is being adjusted. If this trouble should occur in the -5 volt power supply located in the DOC, check clearances between this potentiometer and the power supply transformer. If the clearance is found to be marginal, file the terminal mounting studs, found on the -5 volt power supply transformer, to the level of the connecting lugs. The terminals affected will be terminals A, G and E.

(EIB 939)



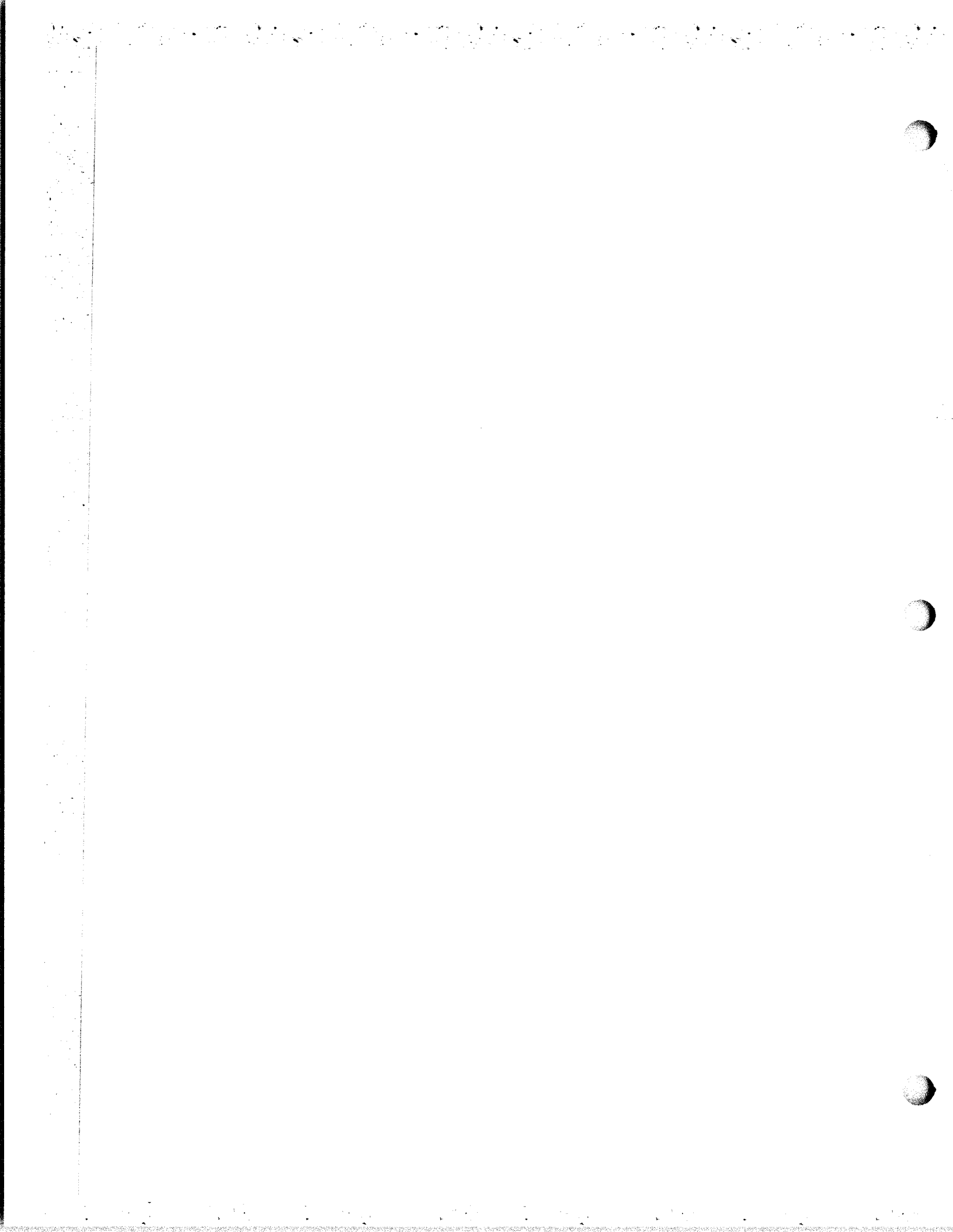
**MK 6 MOD 4 and 4A Dead Reckoning Tracer (DRT)--
Potential Electrical Shock Hazards**

A recent beneficial suggestion submitted to Naval Ship Engineering Center indicated the existence of exposed electrical connections in the vicinity of operator controls within the mechanism assembly of the DRT. The purpose of this article is to advise all holders of this equipment of the existence of this condition and to propose appropriate corrective action that may be taken.

The components having exposed electrical connections and the recommended corrective action are as follows:

- a. Terminal board TBl (upper left side)--make terminal board cover 1-3/4" x 9") of plexiglass (FSN 9G 9330-202-1991) and mount over TBl using existing TBl securing screws.
- b. Terminal board on latitude, longitude, N-S and E-W motor assemblies--make terminal board covers by cutting appropriate size rubber cover from rubber sheet (FSN 9Z 5330-222-2565) and attach (with an appropriate adhesive) over terminal board.
- c. Light rheostat (lower left side)--make and attach rubber cover as indicated in (b) above.

It should be noted that, while other components do have exposed electrical connections, these connections are recessed below the level of the associated operator controls, thereby minimizing the possibility of electrical shock. In all instances each individual should exercise good judgement and prudent concern for safety while in the vicinity of exposed electrical connections. (EIB 864)



MK 9 MOD 0/2 DRAI System Support Data Information

The purpose of this article is to provide a consolidation of all maintenance support data currently available for subject systems.

All concerned are urged to maintain a copy of this article for future use. This article

contains information concerning equipment documentation, maintenance training, field changes, and provides information concerning national stock numbers, field change bulletin ordering numbers etc.

DRAI MK 9 MOD 0/2 System Support Data

1. Equipment and Associated Documentation

National Stock Number (NSN)	2H6605-00-177-9149
Equipment Identification Code (EIC)	MOD 0 - LD0800 MOD 2 - LD0A00
Technical Manual	NAVSHIPS 0924-004-0000 dated January 1973
Overhaul Manual	NAVSHIPS 0924-004-0060
Allowance Parts List (APL)	282130003
Maintenance Index Page (MIP)	IC-011/045-32
Installation Control Drawing (ICD)	RE-B 2698131 RE-E 2698044 RE-E 2697530

2. Maintenance Training

Course Title	MK NC-2 Plotter MOD 2/2A Maintenance
Course Number	A-623-0016
Course Locations	Service School Command, San Diego Fleet Training Center, Norfolk

3. Field Changes

FC Number	DRAI MK 9 MOD	Field Change Description	Stock Number	Field Change Bulletin	EIB
1	0/2	Add Ground Straps to 3A8, 9	NA	NA	756
2	0/2	Change Gears in 3A6, 7	NA	NA	756
3	2	Improve Motor Hanger Assembly on 3A5, 6, 7	NA	NA	756
3/4	0/2	Test Point Panels for 3A5, 6, 7	2S6605-HAD-0364	0924-004-0040	861
4/5	0/2	Amplifier Brackets for 3A3, 4	2S6605-HAD-0365	0924-004-0050	862
5/6	0/2	Motor Controllers for 3A5, 6, 7	2S6605-HAD-0132	0924-004-0070	859 874
6	0	Motor Hanger Assemblies for 3A5, 6, 7	NA	0924-004-0080	
7	0/2	Capacitor 3A5C1 Change	NA	0924-004-0090	
8	0/2	Elimination of Noise Pick-up on Signal Returns	NA	NA	876

(EIB 924/926)

**MK 9 MOD 0 and MOD 2 Dead Reckoning Analyzer-
Indicator Power Supply—Maintenance Hint**

This article provides a check to determine if proper value resistors have been installed in the ± 15 VDC (537-3-030) and +30 VDC (537-3-029) power supplies. The outputs of these power supplies are critical and are dependent upon the proper values of R7 in the ± 15 VDC power supply and R2 in the +30 VDC power supply. Refer to NAVSHIPS 0924-LP-004-0000, dated January 1973, page 60, and accomplish the check as follows:

1. Unsolder one end of the applicable resistor.
2. Connect a AN/ZMU-4() Bridge, or equivalent, meter across the resistor.
3. The resistance of R7 in the ± 15 VDC power supply should read 1.0 ± 0.001 ohm. The resistance of R2 in the +30 VDC power supply should read 0.806 ± 0.001 ohm.
4. Re-solder the resistors to the correct terminals after the measurement.
5. Resistor 3A12R2 in EIB 935 is shown incorrect and technical manual is correct as shown.

(EIB 965)

**MK 9 MOD 4 DRAI—Maintenance Hint for Reducing
Commutator Wear and Prolonging Coupling Spring Life
Cycle of Distance Assemblies A2A3 and A2A4 When
Field Change 5-MK 9 MOD 4 DRAI (Solid State Step
Transmitter) is Installed**

Certain ships, those holding DRAI MK 9 MOD 4 and DRT MK 6 MOD 4B as companion equipments, should by the date of this EIB article have Field Change 5 MK 9 MOD 4 (Solid State Step Transmitter) installed, thus no longer requiring the use of the step transmitters (A2A3B2, A2A4B2 part of distance modules A2A3, A2A4) for inputs to ship's Dead Reckoning equipment.

When this is the case, the brushes of the step transmitters can be removed to accomplish the objectives as stated in subject maintenance hint.

Procedures: Refer to page 83 of NAVSEA 0965-LP-068-4010.

1. Observe safety precautions. Secure 115V DC power to DRAI/DRT.
2. Remove knob (MP50) and cover (MP39) of distance module assembly A2A3.
3. Remove one brush (MP56) and three brushes (MP57).
4. Replace cover and knob.
5. Place all brushes, screws, and washers in small plastic bag. Tag and indicate purpose of brushes. Tie bag to knob shaft (MP21) of distance module assembly.
6. Repeat steps 1 thru 5 for distance module assembly A2A4.

(EIB 904)

**MK 9 MOD 4 DRAI System
Support Data Information**

The purpose of this article is to provide a consolidation of all maintenance support data currently available for subject systems.

All concerned are urged to maintain a copy of this article for future use. This article contains information concerning equipment documentation, maintenance training, field changes, and provides information concerning national stock numbers, field change bulletin ordering numbers etc.

DRAI MK 9 MOD 4-System Support Data

1. Equipment and Associated Documentation

National Stock Number (NSN)	2S6605-00-085-2390	
Equipment Identification Code (EIC)	LD0E000	
Technical Manual	NAVSEA 0965-LP-068-4010	
Technical Manual Supplement (FC 5)	NAVSEA 0965-LP-068-4070	
<u>Interim Manual Changes</u>		
<u>Change No.</u>	<u>Description</u>	<u>NAVSEA No.</u>
T-1	FC 2 Tech. Manual Change	0965-LP-068-4011
T-2	Test/Alignment Procedures for PS 1	0965-LP-068-4012
T-3	FC 3 Tech. Manual Change	0965-LP-068-4013
T-4	FC 4 Tech. Manual Change	0965-LP-068-4014
Allowance Parts List (APL)	282170001 dated 05-24-74	
Maintenance Index Page (MIP)	IC-11/39-B4 dated 11/74	
Installation Control Drawings (ICD)	Outline and Mounting Dimension Dia. RE-E 2697111 Rev B Interconnecting Wiring Diagram RE-E 2697112 Rev C Cable Running Sheets RE-A 2698744 Rev B	

2. Maintenance Training

Course Title	DRAI MK 9 MOD 4 and DRT MK 6 MOD 4B
Course Number	A6230028 (3 weeks duration)
Course Locations	Service School Command, San Diego, and Fleet Training Center, Norfolk

3. Field Changes

FC Number	Field Change Description	Stock Number	Field Change Bulletin	EIB
1	Coupling Assemblies for A2A1, 2, 3, 4 (Superseded by FC 4)	NA	0965-LP-068-4020	784
2	Provision for 400 Hz Synchro Excitation	NA	0965-LP-068-4030	
3	Provision of Forced Air Cooling	2H6605-00- HDU-7122	0965-LP-068-4040	876
4	New Improved Coupling Assemblies for A2A3, A4	2S888-HAQ- 0103	0965-LP-068-4050	847
5	Addition of Solid State Step Transmitter (A2A9)	2S6605-HAD- 0426	0965-LP-068-4060	979 910

(EIB 924/926)

MK 19 Gyrocompass—Information Concerning Replacement of Rotary Power Switch, Part No. 03965-1852645 (S704) in MK 19 Gyrocompass Control Cabinets

This article is directed to all ships and repair facilities concerned with MK 19 gyrocompass systems.

Background: The latest revision of MIL-S-21604/5 (SHIPS) dated 5 September 1975 which controls the "JR" style switches allows manufacturers to provide switches with either of two mounting brackets. One of these brackets was previously used on all of these switches. It has mounting feet .41 inch in thickness and is secured to the control cabinet with three UNC 10-24 x 5/8" screws and one other screw which also serves to anchor a cable clamp. The alternate bracket has mounting feet only .17 inch thick. With the alternate configuration, the three 5/8 inch screws may protrude far enough into the control unit to damage the wiring harness. Should the alternate configuration be received, installing activities should use shorter screws for securing the switch. Parts required, systems affected and procedures follow:

Parts Required:

Qty	Part Number	Description
3	96906-MS51959-61	UNC10-24 X 3/8" Flat Head Screws
A/R	81349-MIL-S-22473	Staking Compound Grade C

Systems Affected:

All MK 19 Mod 3B, 3C, 3D and 3E Gyrocompass Cabinets.

Procedure:

When replacing S704 with switch with alternate configuration. Replace the three UNC-10-24 X 5/8" screws not associated with the cable clamp with UNC 10-24 X 3/8 screws. Secure with staking compound. When the switch is wired, the wire and associated harness should be carefully laced in place to allow the maximum clearance available between the wires and the switch mounting screws.

This article was prepared from information originally promulgated via Sperry Marine Systems Field Engineering Bulletin No. U.S. 166-55/6121-55. This bulletin was distributed to all Naval Shipyards, Ship Repair Facilities, and Tenders.

EIB 943)

SHIPALT SSN 1371 for MK 19 Gyrocompass Vital Heading Output During Loss of Ships Power—Correction to

This article is directed to Navy Repair Facilities concerned with the MK 19 Gyrocompass, and the following submarine hulls: SSNs 637, 638, 646-653 and 660-687.

Background: SHIPALT SSN 1371, involving only MK 19 MOD 3B and MOD 3C Gyrocompass Installations aboard submarines, requires a correction, since the MK 19 Gyrocompass Emergency DC power on submarines is derived from a rectifier bus instead of lead acid storage batteries. The battery discharge indicator alarm has been disconnected from terminals 7LC14 and 7LC17 in the submarine installation of the MK 19 MOD 3B/3C control cabinets.

The following additions should be made to SHIPALT SSN 1371:

a. Install a voltage sensitive relay (HI-G-1350-2A-109) in lower right interior of the Control Cabinet in the vicinity of the Main Terminal Board and wire as follows:
For MK 19 MOD 3B Gyrocompass: Connect relay coil to terminals 1 and 7 of Switch S904. Connect the normally closed relay contacts to 7LC14 (MTB 74) and 7LC17 (MTB 77), respectively.

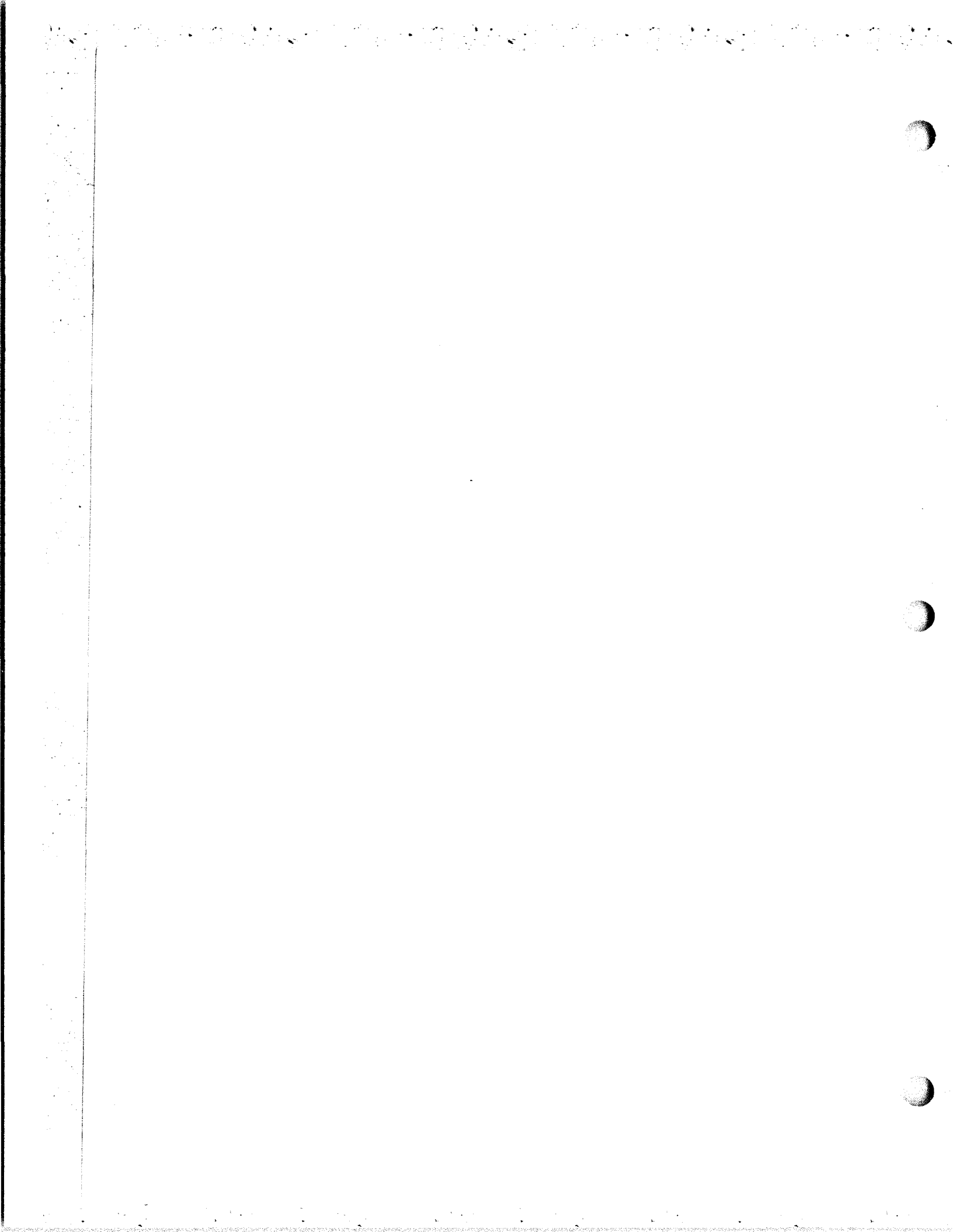
NOTE

The Prime Power Switch (S801) should be operated in "SHIPS" position pending incorporation of the above correction.

For MK 19 MOD 3C Gyrocompass: Connect the relay coil to 7LC21 (MTB 78) and 7LC23 (MTB 80). The normally closed relay contact connections are made identically to those described for the MK 19 MOD 3B above.

More detailed instructions including design information on the relay mounting brackets will be available in Sperry Bulletin No. U.S. 166-55/6121-56. The relay may be ordered from HI-G Incorporated, 580 Spring Street, Windsor Locks, Connecticut, Telephone (203) 623-2481.

(FTB 962)



MK 23 MOD C-3 Gyrocompass—Installation and Maintenance Notes

1. Gyro Power Circuits and Alarm Control Power Circuits (3LC11, 12, 13) shall use separate terminals in the junction box and be connected as shown in figures 3-48 and 4-1 of NAVSHIPS 0924-006-7010 or damage of Static Power Supply may result.

2. Contacts of relay A3K1 in the Static Power Supply Control Unit will burn out if the compass non-vital synchro reference load exceeds 2-1/2 amps. Therefore, the compass non-vital heading synchro reference circuit (12LCC10-R1, R2) shall not be used to supply excitation to the output synchros or bus loads of Synchro Signal Amplifiers.

3. DC Power Supply A1300 Assembly PN C95461 has been superseded with PN C95461-2 which uses an electronic timer instead of a thermal relay. FSN 6605008519713 still applies. This change provides improved reliability of the Compass Cager Circuits and DC Power Supply Assembly A1300.

(EIB 933)

MK 23 MOD C-3 Gyrocompass—Replacement of Cager Thermal Relay (K1301) With an Electronic Timing Circuit, Information Concerning

The purpose of this article is to advise of an improvement to the Cager Control Circuit that eliminates thermal relay K1301.

This article was prepared by the Naval Ship Engineering Center, Norfolk Division, from information originally promulgated via Sperry Marine Systems Field Engineering Bulletin, No. U.S. 167-26, dated 6 January 1978. This bulletin will be distributed to all Naval Shipyards, Ship Repair Facilities and Tenders.

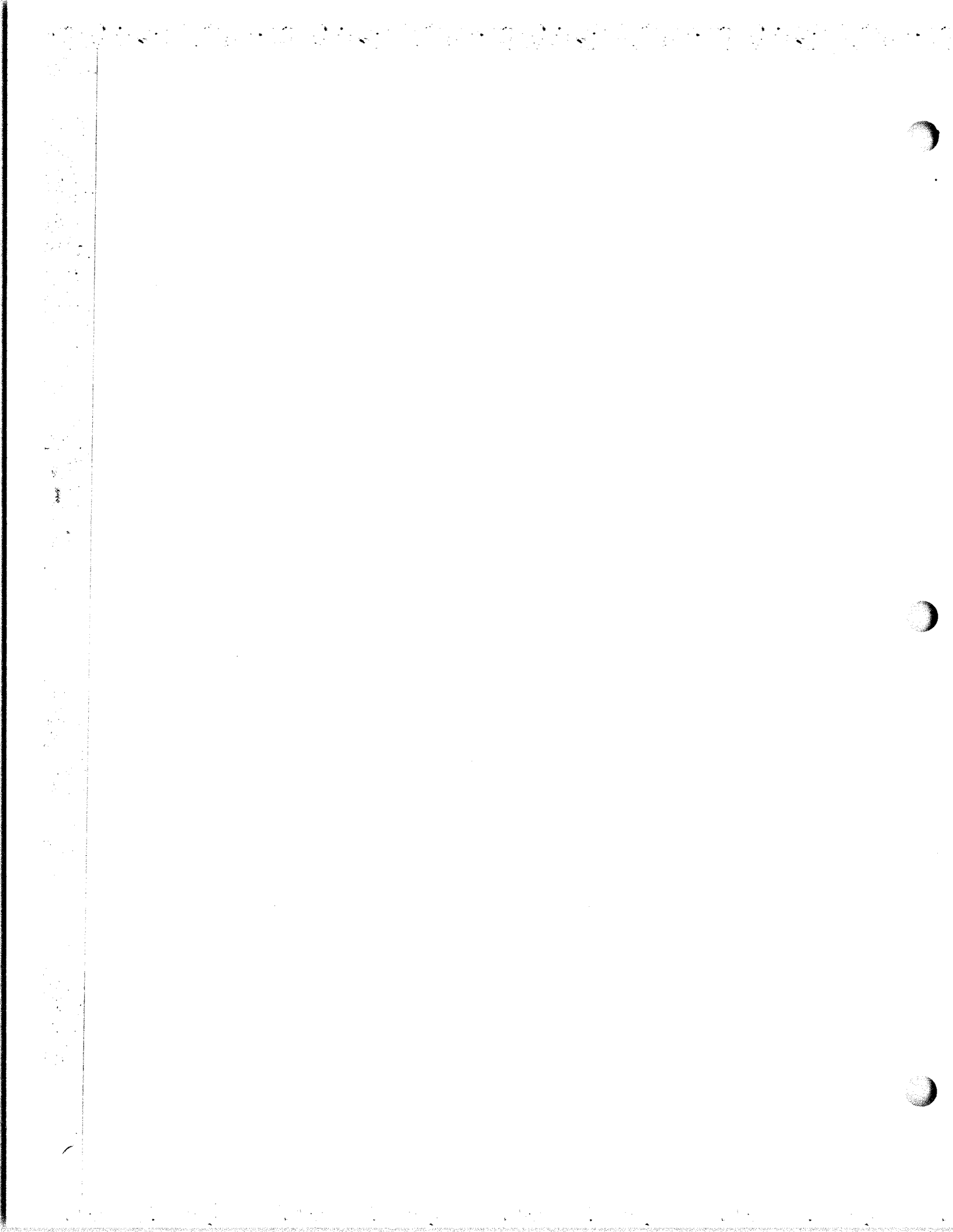
The new electronic timing circuit has been developed to replace the thermal delay relay in the cager pulling coil circuit. The new circuit is mounted on a small printed circuit board and is located in one end of the DC power supply module C95461. The "on" or "pull-in" time is normally 3 seconds and will automatically recycle after any momentary power failures.

DC power supply modules with the new timing circuit are directly interchangeable with the old power supply assembly. New production of MK 23 Compass systems will have the new power supplies, and power supply modules repaired at the factory will have the change incorporated. This change is being made at the manufacturers repair facility, only.

This circuit is currently being used in the MK 23 MOD 4 Gyrocompass. (See page 5-2-41/5-2-42 of NAVSEA 0924-LP-064-4010.)

A change to the MK 23 MOD C-3 Gyrocompass Technical Manual, NAVSEA 0967-LP-006-7010, is planned to show the DC power supply in both configurations.

(EIB 976)



MK 27 Gyrocompass—Change in the Horizontal Contact Pressure of Leaf Assemblies

This article is directed to all Overhaul and Repair Facilities concerned with the Sperry MK 27 Gyrocompass.

This article was prepared from information originally promulgated via Sperry Marine Systems Field Engineering Bulletin No. U.S. SMS-Depot 008, dated 20 September 1976. This bulletin was distributed to all Naval Shipyards, Ship Repair Facilities and Tenders.

Subject:

MK 27 Gyrocompass Contact Leaf Assembly
Part Numbers 1880914 and 1880945

Purpose:

To advise of a change in the horizontal contact pressure specification of these leaf assemblies from 18 grams to 22 ± 2 grams.

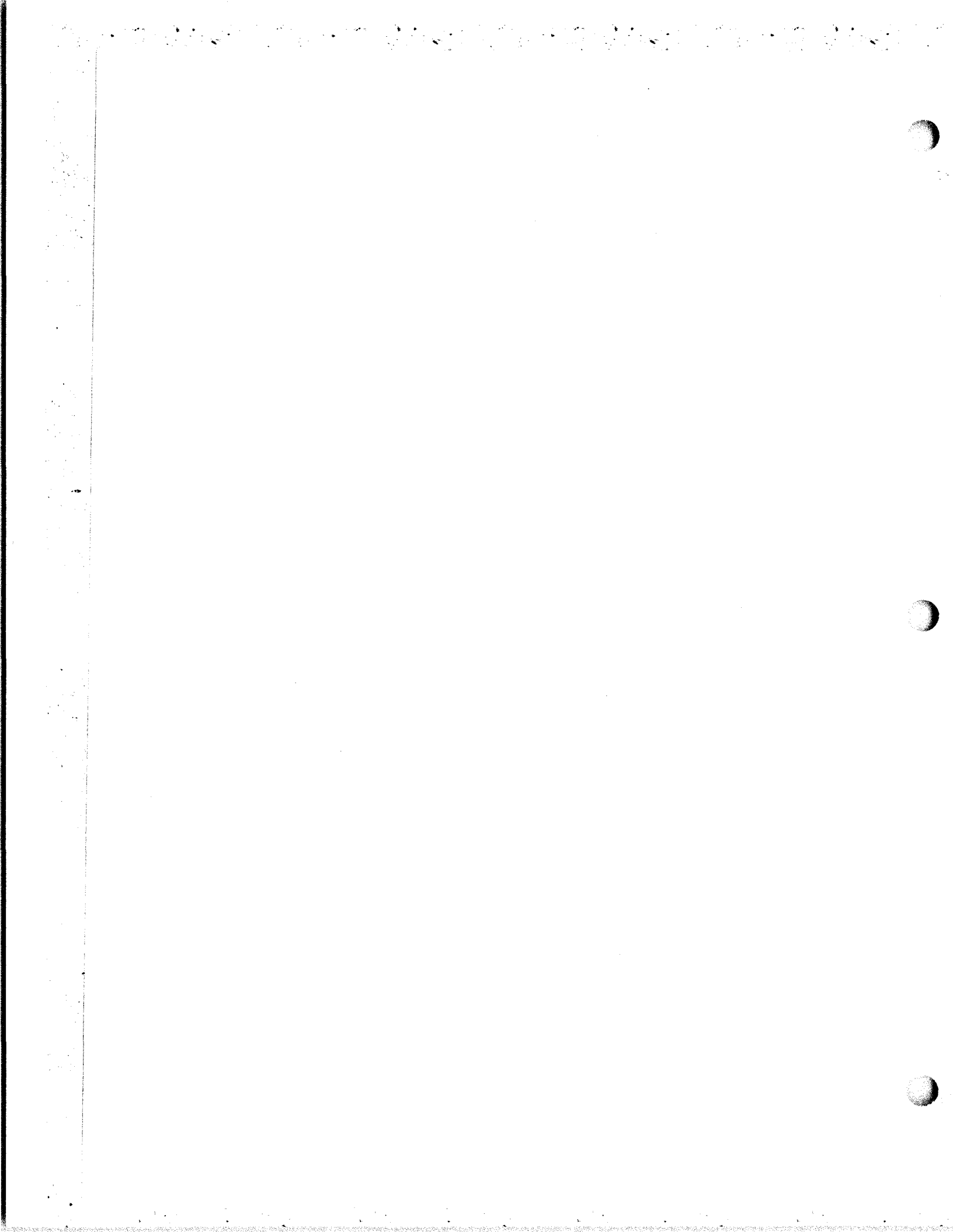
Special Tools Required:

(Sperry Part Numbers)
T-Tool Part Number T-963614 and
Gram Scale Part No. T-959099

Background:

After prolonged periods of operation, light contact pressure and a vibratory environment may allow carbon deposits to accumulate under the leaf contacts. Increasing the contact pressure will substantially reduce this deterioration. T-Tool T963614 should be used in bending these leaf contacts to obtain the 22 ± 2 Gram specification.

(E1B 941)



PRESSURIZING KIT, MK-260/U

Pressurizing Kit ML-260/U is now available for use in maintaining nitrogen pressure in Radio Frequency Tuners TN-197/URT, TN/-229/SRT, TN-230/BRT, TN-248/BRT, and Antenna Coupler CU-372/SRT.

Each kit consists of:

- (a) one 7 cu. ft. cylinder of nitrogen
- (b) one regulator gage
- (c) 25 ft. of hose together with all of the necessary fittings.

This kit will be placed on the shipboard allowance lists for those ships having AN/URT/U, AN/URT-3, AN/URT-4, AN/SRT-14, AN/SRT-15, and AN/SRT-16 equipment installed. Ships having these equipments may requisition these kits (SNSN F 16-P-580001-151) from the nearest electronics supply activity. One kit is required for every four antenna tuners installed.

MK-260/U Pressurizing Kit for Dry-Nitrogen Filled Electronic Units

This article supplies information pertaining to allowance and refilling of MK-260/U pressurizing kit.

NAVELEX Coordinated Shipboard Allowance List (COSAL) for portable electronics equipment, part IBB Group 1, lists the MK-260/U as an allowance item, the quantity determined for each ship is based on its installation configuration. Generally the allowance is one (1) each for Communication, one (1) each for Radar and (1) each for ECM when each or any of the forementioned systems employ dry nitrogen filled units, coaxial cables or wave guides. An additional allowance of one (1) each is established for use in the electrical workshop when required. Previous requisition for kits under 2F or 2Z cognizance were cancelled and should be resubmitted under 4G cognizance (See Article "MK-260/U Pressurizing Kit -- Correction to EIB 710" in this EIB.)

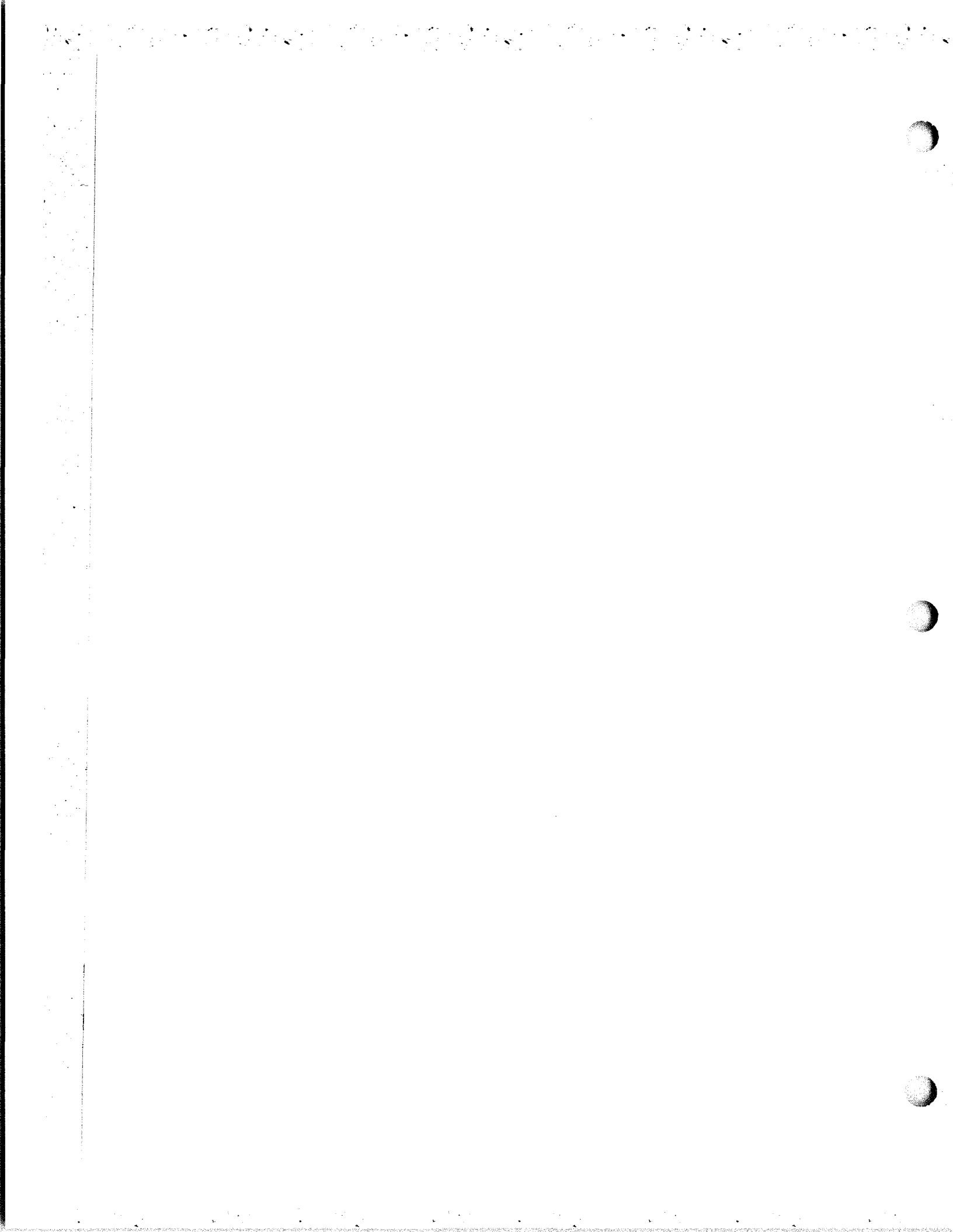
To refill kit nitrogen tanks, activities should submit DD-1149 to supply for direction to the nearest Naval Station or Naval Air Station. Presently a program is being established for refilling the smaller bottles from larger ones by shipboard personnel.

MK-260/U Pressurizing Kit—Correction to EIB 710

Refer to EIB 710 and make pen and ink corrections as follows:

Page 1, paragraph 3, line 2 change
FSN225820-313-7703 to NSN 4G5820-00-313-7703.

(EIB 906)



MK NC-2 MOD 0 Plotting System--Failures of Range Scale Selector Assembly

The Range Scale Selector Assembly, A1A6, located on the Data Converter of the MK NC-2 MOD 0 Plotting System is a high usage item with 12 requisitions per quarter for the switch and solenoid (FSN H6605-509-8644) being processed at Ships Parts Control Center (SPCC).

Investigation of this problem has revealed several likely causes. The following information is provided to aid those concerned with the maintenance of the MK NC-2 MOD 0 Plotting System:

1. The range selector switch should be protected by a two ampere fuse as prescribed by BUSHIPS Notice 9710 Ser 665-1899 of 27 Sep 63. In many instances, maintenance personnel have increased fuse size up to 20 amperes. Under this condition, if the solenoid switch "hangs up" for any reason causing the solenoid to draw excessive current, the solenoid will be damaged before the high amperage fuse opens. AVOID OVER FUSING THIS CIRCUIT.

2. The external switch handle of the range scale assembly must be free to rotate as the switch steps. Investigation revealed that this is sometimes hampered by the stowing of loose articles in the vicinity of the data converter. KEEP THE AREA DIRECTLY IN FRONT OF THE DATA CONVERTER FREE OF ANY OBSTRUCTIONS.

3. As the diodes associated with this circuit are also suspect should the switch fail to operate, be certain before ordering a replacement switch that it is in fact the solenoid and not simply a bad diode. (758)

MK NC-2 MOD 1/1A Plotting System, Integrator Tests--Use of Electronic Stroboscope to Perform

The purpose of this article is to provide additional information concerning the use of a Strobotac^R type 1531-A or 1531-AB, manufactured by General Radio Company, to check the integrator speeds of both the MK NC-2 MOD 1 (NAVSHIPS 0924-038-5010 formerly 324-0617 with Change 1 posted) and MK NC-2 MOD 1A (NAVSHIPS 0924-036-2010) plotting systems.

The afore mentioned stroboscope is available in the Federal Supply System under FSN 226680-799-7616 for type 1531-A and FSN 226680-880-1844 for type 1531-AB; either is recommended for shipboard use to perform subject tests. Tenders and shore activities should continue to use the "Optical Tachometer Method" as outlined in Section 5 (Maintenance) of appropriate equipment manuals to assure maximum accuracy. Strobotac^R has

an accuracy of 1% of dial reading after calibration on middle range and can be successfully used to determine integrator speeds within ± 4 or 5 RPM's of true speed. After setting of integrator speeds using this device it is recommended the "Sample Problem Method" as outlined in appropriate equipment manual, Section 5 (Maintenance) be completed on several scales to assure accuracy after adjustments.

The following information applies only to the Strobotac^R types 1531-A/AB manufactured by General Radio Company (manufacturer's designation symbol: CAG).

NOTE

THE SUCCESSFUL USE OF THE STROBOTAC^R DEPENDS ON: (1) IT BEING CALIBRATED AGAINST THE POWER-LINE FREQUENCY BEING USED AT TIME OF CALIBRATION AND (2) ALLOWING THE INSTRUMENT TO REACH A STABILIZED OPERATING TEMPERATURE BEFORE CALIBRATION. IT IS RECOMMENDED THE INSTRUMENT BE ALLOWED TO WARM UP FOR AT LEAST 30 MINUTES BEFORE CALIBRATION.

Below is the calibration procedure for either type instrument.

NOTE

These procedures assume the standard 120 V 60Hz shipboard power source is being used.

1. Allow the instrument to warm up for at least 30 minutes.
2. Turn the range switch to 670-4170 RPM position.
3. Set the RPM dial to 3600 RPM by rotating the rim of the dial until the mark at 3600 is exactly over the red line on the illuminated window.
4. Adjust the potentiometer marked "HIGH CAL" until the on-off pattern of the neon indicator lamp stops or nearly stops. It makes no difference whether the lamp stays off, stays on, or just barely on - the important thing is that it stays in the same condition. (Do not confuse the characteristic flicker at low ranges with the on-off action referred to here.)
5. Set the RPM dial to 900 and repeat step 4 using the "LOW CAL" potentiometer adjustment.
6. Return the RPM dial to 3600 RPM and repeat step 4 if the calibration indicator lamp varies in intensity. (This step is not necessary unless the LOW CAL adjustment is changed significantly.)

7. Return to the 900 RPM point for additional calibration if required to obtain the most precise calibration available. (842)

MK NC-2 MOD 2A ASW Plotting System, and MK 9 MOD 0/2 Dead Reckoning Analyzer Indicator (DRAI)—Procedure for Selection of Proper Value of R13 in Motor Controller Boards

Motor controller boards (P/N 537-200-064 and 537-200-029), which are used in DRAI integrator modules 3A5(4A5), 3A6(4A6), and 3A7(4A7), have a resistor, R13, which is designated as a "select-on-test" resistor.

While R13 is factory selected to operate in the particular integrator and normally requires no additional testing, the following situations may require changing R13:

1. Replacement of old steer-sense board with the modified type (see EIB 768 of 29 Dec. 1969).
2. Replacement of a motor controller board.
3. Replacement of d-c step motor being driven by a motor controller.

This motor controller "hang-up" is characterized by intermittent operation of d-c step motors in one (or both) directions (while experiencing proper outputs from steer sense board to the step transmitter modules 3A8, 9).

The following procedure can be used to select the proper size of R13:

1. Secure all input power to DRAI.
2. Remove appropriate d-c step motor from integrator gear box by loosening retainer clamps and letting motor hang freely by motor leads (clear of all electronic components).
3. Remove R13 from motor controller circuit (pins 5 and 25) and insert a resistance decade box with 1 watt power capability.
4. Energize DRAI.
5. Introduce a 2 knot speed input at an appropriate cardinal heading.
6. Slowly increase resistance from an initial setting of 10 ohms until intermittent motor operation is observed (Note: A piece of tape can be placed on motor shaft to aid in observing rotation).
7. Reduce resistance in 1 ohm steps until stable motor operation is observed (either cw or ccw rotation).
8. Record this value of resistance.
9. Change cardinal heading by 180° and observe motor rotation in opposite direction. Repeat steps 6 through 8.

10. Using the lower resistance value recorded in steps 8 and 9, select the proper value of R13 by use of the following Table 1:

Table 1

Maximum Resistance (ohms) for Stable Motor Operation	Resistance (ohms, 1w±5%) Value for R13
50 and over	43
45 to 49	39
41 to 44	36
37 to 40	33
33 to 36	27
27 to 32	22

11. Secure all input power to DRAI.
12. Re-install d-c step motor in gear box.
13. Energize DRAI.
14. Insert selected value of R13 in resistance decade box and check for stable motor operation in both directions by observing the appropriate counters (Lat. OSD N-S, Long. OSD E-W, Total Distance).
15. Secure all input power to DRAI.
16. Remove decade box and insert selected resistor (R13) into circuit.

This procedure should be retained for future reference. (782)

**MARK NC-2 Plotting Table Test Overlays No. 1 and
No. 2—Maintenance Hints**

This article provides additional information concerning the use of the MK NC-2 MOD 2 plotting table test overlays which were recently distributed to all equipment holders in an effort to increase the self test capabilities of the plotting table.

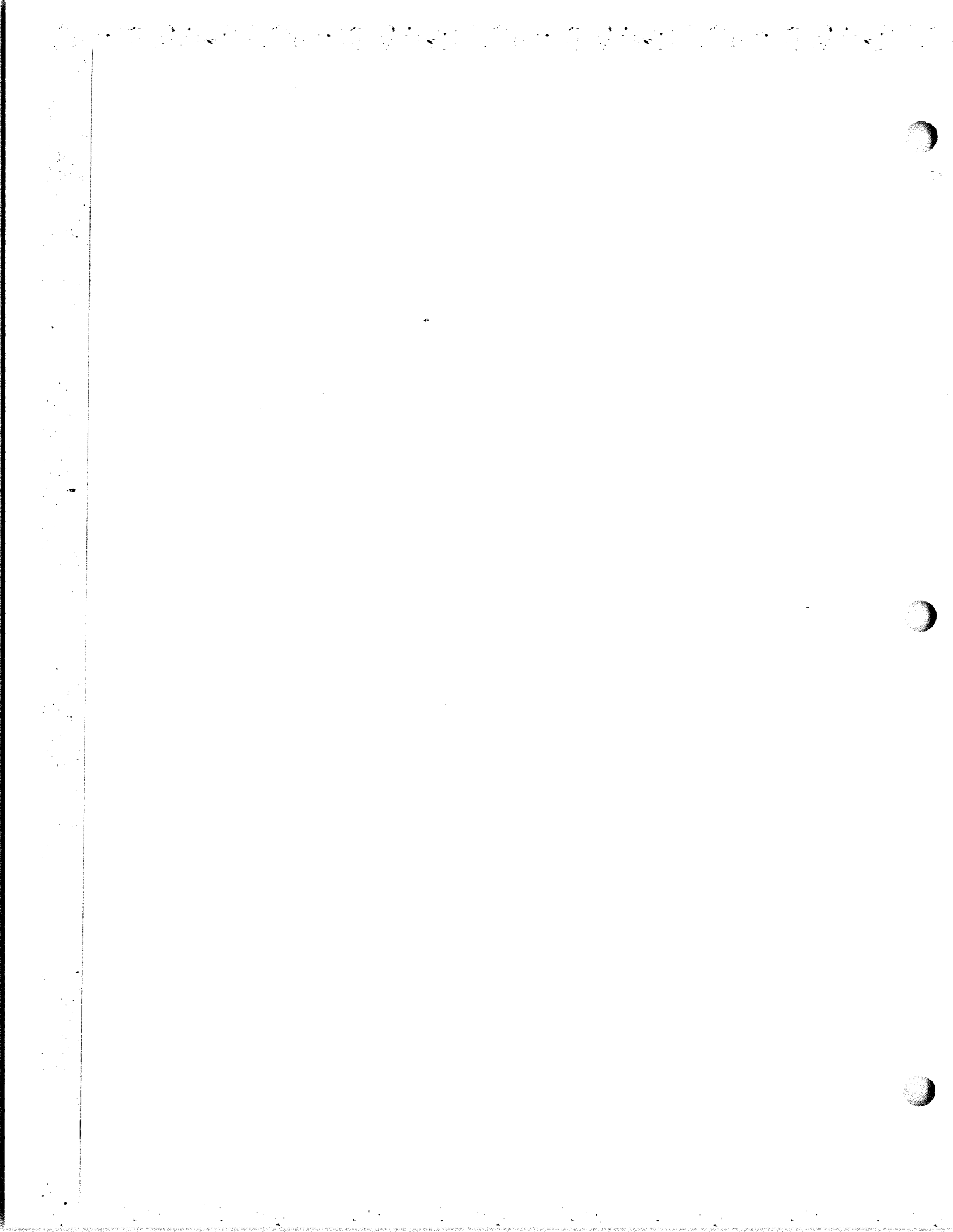
Test Overlay No. 1 (P/N 410-SK2230314) is to be used when conducting the OWN SHIP ACCURACY TEST and the TPA AUTO TRACKING ACCURACY TEST as outlined in Change 1 to NAVSHIPS 0924-002-1000 dated May 1974, page 9. This overlay combines the simulated plots shown in figures 1 and 3 on page 9 of the technical manual.

For best operating results Test Overlay No. 1 should be trimmed on both sides along the existing vertical black lines so that the overlay is 30 in. X 30 in. (note that the overlay has been pre-cut so that the vertical dimension is already 30 in.). This overlay should be attached to the top of the plotting table by aligning the BOTTOM edge of the overlay to the BOTTOM edge of the glass plotting surface while maintaining the NORTH/SOUTH center line of the overlay coincident with the NORTH/SOUTH center line of the OWN SHIP polar plot.

Test Overlay No. 2 (P/N 410-SK2230315) is to be used when conducting the TPA PLOTTING ACCURACY TEST as outlined in Change 1 to NAVSHIPS 0924-002-1000 dated May 1974, page 9. This overlay represents the simulated plot shown in figure 2 on page 9 of the technical manual.

For best operating results Test Overlay No. 2 should be trimmed just as indicated for Test Overlay No. 1. This overlay should be attached to the top of the plotting table by aligning the CENTER of the overlay to the CENTER of the OWN SHIP polar plot as indicated in the technical manual.

(EIB 891)



MN SERIES TROUBLE SHOOTING NOTES

Difficulty Encountered

Audio output of receiver gradually became weaker and weaker. Fidelity perfect. All tubes and voltages checked perfectly.

The set became inoperative.

Receiver blocked and unable to receive signals.

MN.—Receiver inoperative and transmitter radiating r-f carrier normally, but with no modulation.

MN.—Signals intermittent and chopped. 60-cycle hum present with squelch ON or OFF.

MN.—Receiving loudly and clearly but unable to transmit. Transmitter tuning normal. TT-1, TT-2, and TT-3 meter readings normal and peaked OK. TT-4 readings normal and coupling to load increased current. 6.3-volt dial lamp lit when placed in antenna jack.

MN.—Recently the sensitivity of our receiver dropped so low that it was almost impossible to hear a station, unless it was almost alongside.

MN.—Distortion and 60 cycle hum present in receiver output. T-R relay did not operate because of low B plus.

Cause and Remedy

Found both dual electrolytic audio bypass condensers C-28 and C-29 had "opened up." When replaced, good normal audio volume was secured.

It was observed that the power transformer T-1 was heating excessively and that the electrolytic filter condenser C-64 was leaking. The components of this equipment became quite hot when used continually in hot weather. The bottom of this set was perforated to allow more ventilation and capacitor C-64 was replaced. The set operated satisfactorily after making the above modification and replacement.

Found to be due to insulation breakdown between the contacts of relay RL-1.

All voltages in receiver from 5 to 10 percent below specified value. Capacitors C-63 and C-64 found to be open-circuited. Replaced from spares.

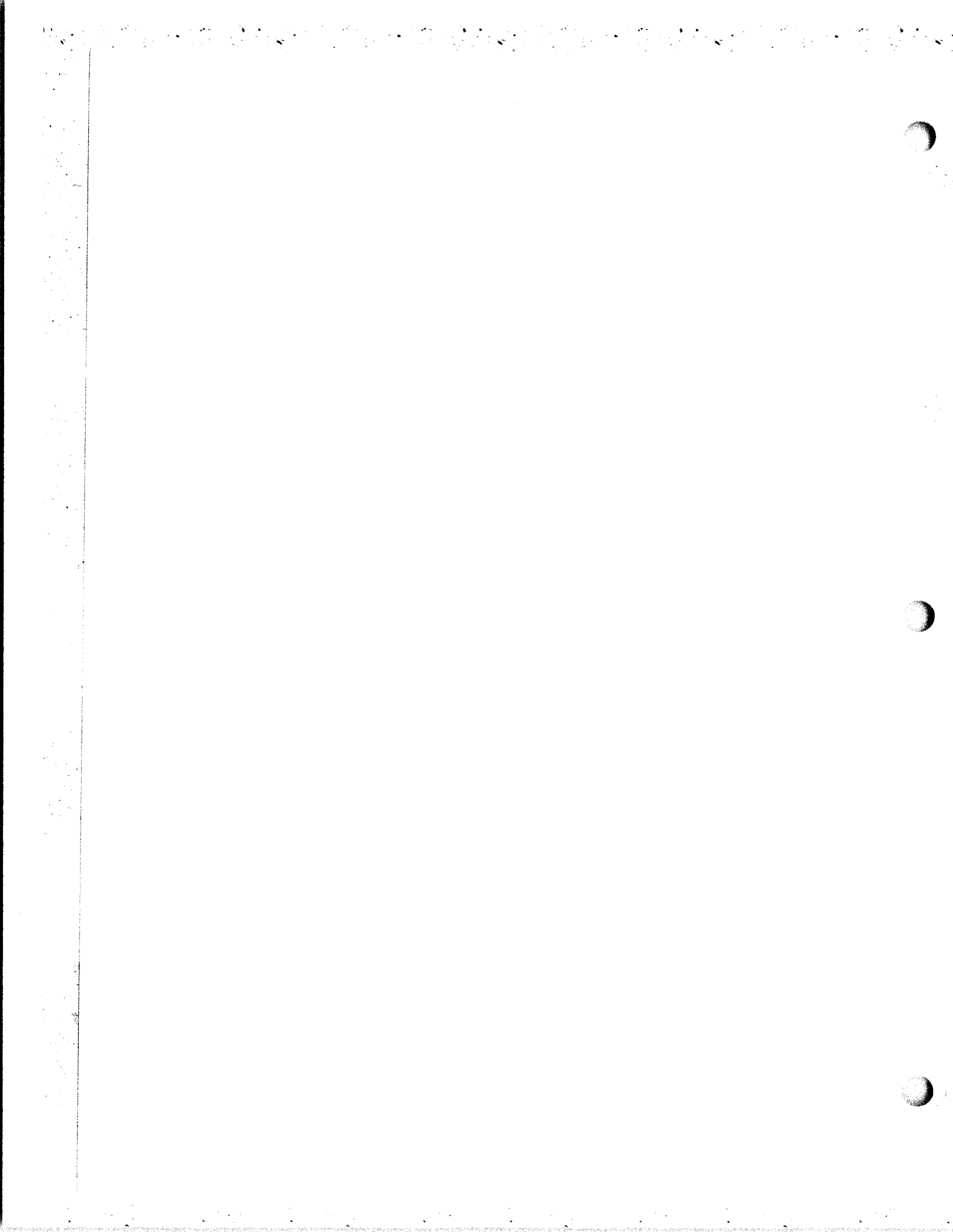
Antenna transfer switch contact corroded and not making good electrical contact. Cleaned all contacts.

With carrier 4.0, the modulator was assumed to be at fault. All socket voltages of oscillator-modulator tube checked OK as did all associated resistors and capacitors. Some parts were replaced, but all to no avail. Finally, as a long shot, C-64 was checked. The C and R bridge told the story. The capacitance had decreased from 8 to 0.015 mfd.

(Editor's note.—Since C-36 (8 mfd) is in parallel with C-64 it appears that C-36 may also be defective.—C-36 and C-64 form the a-c return path to ground for audio signals in the plate circuit of the 6SL7 modulator section. This trouble might have been detected by connecting the vertical plates of a cathode-ray-oscilloscope from B+ to chassis, speaking into the microphone and noting if audio signals (other than slight 120-cycle hum) were present on the B+ supply. If present, C-36 and/or C-64 are defective.)

The trouble was finally traced to C-32, the local oscillator to first mixer coupling capacitor, which had become leaky under load. This capacitor checked good on the model OE-8 capacitor tester, but when replaced, equipment sensitivity became normal.

The dual electrolytic capacitor C-35, C-36 was leaky. Replaced the defective unit and operation returned to normal.



OPERATING PRECAUTIONS FOR THE MO-1/MAK EQUIPMENTS

Due to the high modulation capabilities of the MO-1/MAK equipments, it is essential to assure that the final amplifier is properly loaded at all times when modulation is applied. Otherwise, dangerously high voltages can be generated which may damage the insulation or the connector plugs. To eliminate the possibility of such damage to the equipments, the following precautions should be strictly observed:

- (1) Preliminary tuning should be accomplished with an unmodulated carrier.
- (2) Completely resonate the antenna circuit and adjust coupling so as to load the final amplifier to 95 to 100 ma. plate current.
- (3) Do not apply modulation under any circumstances unless there is a load of at least 95 ma. on the final amplifier.
- (4) With the final amplifier loaded from 95 ma. to 100 ma., 100 percent modulation is easily obtainable. If the plate current is allowed to drop below 95 ma., the transmitter can be easily overmodulated. If the plate current is

more than 110 ma., the plate dissipation of the tube will be exceeded; also, the percentage modulation will be low. Therefore, care should be taken to maintain proper loading on the final amplifier at all times.

(5) When using ICW, it is recommended that the ICW feed-back resistor, R-122, be adjusted so that the percentage of modulation does not exceed 80 percent with the power amplifier loaded to 95 ma.

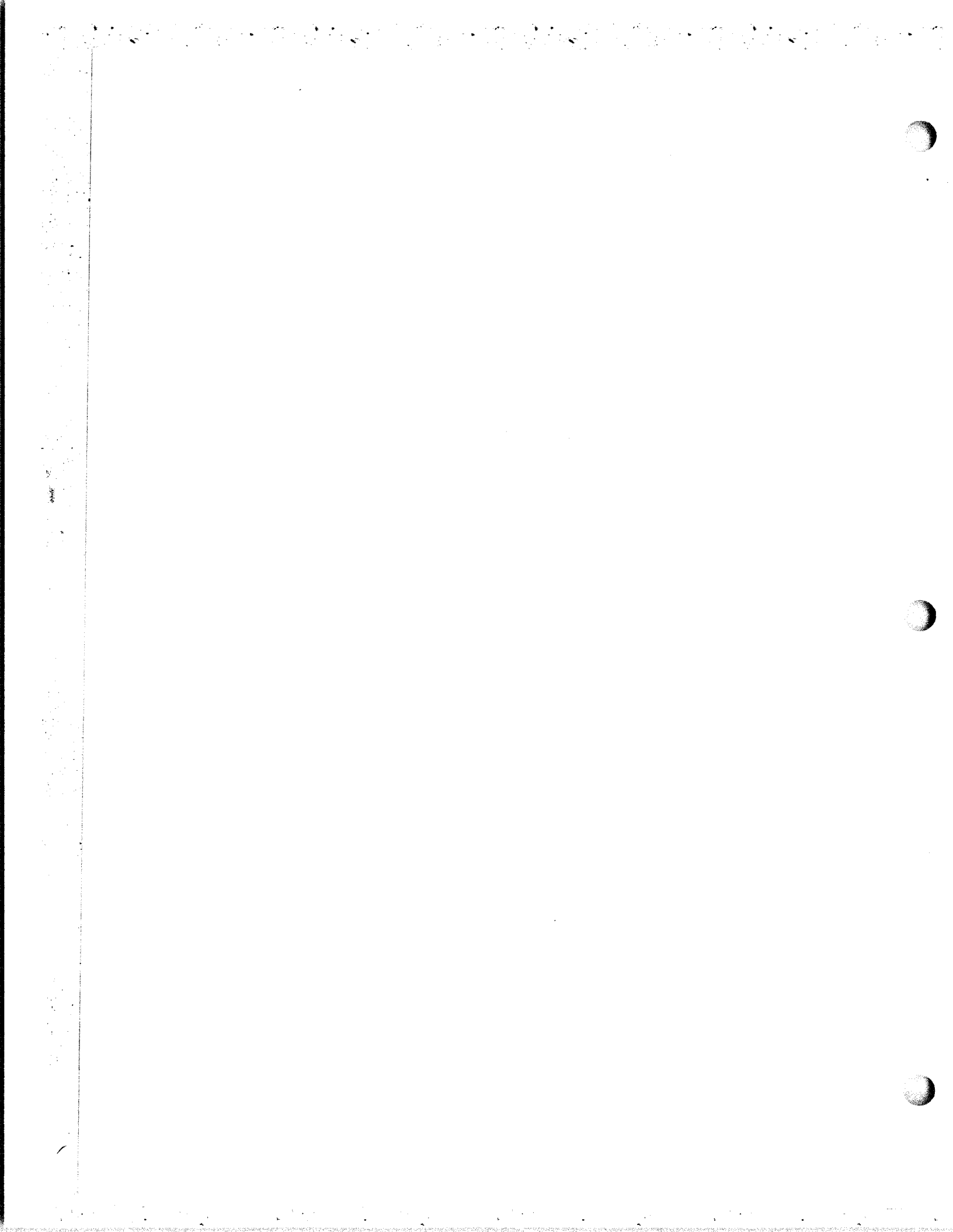
as 9, the separation between turns in L-112 and L-114

(6) Never attempt to shift frequency with the key down, using ICW. Under these circumstances, during switching, the final amplifier is momentarily unloaded and the insulation can be damaged.

Since there have been several failures of connector plugs in these equipments which are directly attributable to improper operation, strictest compliance with the above precautions is recommended. In this connection, it is suggested that a notice be posted near the equipment, reading as follows:

WARNING

With The Final Amplifier Loaded To Less
Than 95 MA. Plate Current



Model 28 Teletypewriter Motor Burn-Out

Motor burn-out in Teletypewriter Model 28 equipped with series-governed motor has been caused by careless installation of the noise suppressor metal cover, thereby shorting out the motor governor resistor. To alleviate this situation, insert a piece of insulating fiber in the cover to prevent a short circuit. (481)

ADJUSTMENT OF PRINT HAMMER ON MODEL 28 PRINTER

The following is reprinted from a Teletype Corporation Information Letter:

"Our attention has been called to the fact that some customers are experiencing undue wear of print hammer and type pallets on the Model 28 Printer.

"Such a situation can develop where the parts involved get out of adjustment and are permitted to operate in that condition for an extended period of time. To guard against this, we recommend that your maintenance procedures be reviewed to provide that each time the typing unit is given routine servicing, the pertinent adjustments be checked and if necessary, remade. These adjustments are as follows (figure and page numbers refer to Teletype Bulletin 217B):

1. Carriage Wire Rope Requirement. Fig. 59.
2. Printing Carriage Position Requirement. Fig. 67.
3. Printing Hammer Bearing Stud Requirement Fig 67.
4. Printing Hammer Stop Bracket Requirement.

Fig. 71.

5. Printing Hammer Operating Bail Spring Bracket Position. See Note: Page 1-71.

"If a routine check of the above adjustments is made whenever the typing unit is lubricated, wear of the print

hammer and type pallets will be negligible. Bulletin 217B is being revised to include this recommendation." (453)

TELETYPE MAINTENANCE FOR 100 WORDS PER MINUTE (WPM) OPERATION

The Teletype Corporation Model 28 series page printers were designed for operation at 60, 75, and 100 words per minute (WPM). Parts wear because of friction, and the increased strain associated with higher speeds has created maintenance problems that were not realized at lower speeds. A machine properly maintained can be expected to give long dependable service. The following remarks and hints on maintenance should be helpful in keeping your equipment on the line.

ADJUSTMENTS

The Model 28 series teletype equipment does not require any unusual adjustment for 100 WPM operation. However, adjustments as outlined in the technical manual must be followed closely. An adjustment requiring a clearance from 0.010 to 0.020 inch should be set at 0.015 inch to expect optimum performance. An exception to the above is the gap between the clutch shoe lever and its stop lug.

This should be adjusted to the high side (0.075 inch) of the required clearance as shown in the technical manual. DO NOT DEPEND UPON YOUR MEMORY WHEN MAKING ADJUSTMENTS - REFER TO THE TECHNICAL MANUAL.

TYPE BOX

Unless the print hammer strikes the type pallets squarely, excessive wear will result. Readjust - REFER TO THE TECHNICAL MANUAL.

COMMON TROUBLES WHEN OPERATING AT 100 WPM

At 100 WPM, the adjustments for the spring tensions on the print hammer operating bail spring and print hammer bail spring become critical. Extreme care must be exercised to assure the correct tension on these springs. Too much tension will cause excessive wear on the type pallets and, in some cases, split the type box. It is recommended that the lower prescribed limit, as outlined in the instruction book, be used, depending upon the satisfactory printing of the characters. Replace ribbon if frayed or if the printing becomes too light. Never increase tension on print hammer spring to darken print. If type smudges, remove type box and clean pallets with a stiff brush.

DASH POT

Adjustment of the dash pot screw will correct a mechanical carriage return bounce that occurs when machine speeds are increased from 60 to 100 WPM. Follow the procedure outlined in the technical manual.

VIBRATION

A check of terminal blocks and all electrical connections should be made a part of maintenance schedules. Vibration at higher speeds will sometimes loosen these connections enough to give intermittent troubles which are difficult to find. Ensure that lock washers are in place.

WORN PARTS

Do not adjust to compensate for worn parts in a mechanism. Model 28 series machines contain case hardened steel parts, and, when worn or maladjusted, may break or damage other components. Worn parts must be replaced and the associated mechanisms readjusted.

CLEANING

Failures often occur immediately after cleaning. It is important that adjustments, moving parts, and springs not be disturbed during the cleaning process. After overhaul of a printer, check the lubrication every 2 days for a period of 8 to 10 days. The cleaning solvent remaining in the felts dilutes the lubricant and relubrication is required.

LUBRICATION

The lubrication interval for Model 28 equipment operating at 100 WPM is a critical area of maintenance. Equipment under continuous operation should be checked weekly for lubrication. A complete lubrication guide is available in the technical manual.

The recommended lubricants for teletype equipment are:

KS-7470 lube oil, FSN 9W9150-261-8297

KS-7471 grease, FSN W9158-205-6843

Proper lubrication can best be accomplished by removing the typing unit from the keyboard unit and lubricating each felt, slide, and other metal-to-metal moving parts. A check

for loose screws and nuts should be made while lubricating the equipment. Over-lubrication can be as bad as under-lubrication. Remove excess oil and grease.

RUNNING UNDER POWER

At the conclusion of any adjustment, cleaning, or lubricating, turn the motor by hand, counter-clockwise at fan end, to assure that there are no parts binding. This is important at lower speeds but becomes even more important at higher speed operation.

CONCLUSION

Proper operation at 100 WPM can be maintained by a preventive maintenance program which gives extra care in adjustments and strict attention to the lubrication intervals. DO NOT DEPEND UPON YOUR MEMORY REFER TO THE TECHNICAL MANUAL. (617-647)

TELETYPE MAINTENANCE HINTS

When servicing or adjusting teletype machines, it is sometimes necessary to clean the contacts on the selector magnet to remove pits, dirt, or corrosion. A strip of clean

bond paper may be used to perform this task; however, standard teletype paper or teletype paper tape should NEVER be used because it is impregnated with oil and may form an insulating film on the selector magnet contacts. (617)

RECOMMENDED TOOLS FOR SERVICING MODEL 28 SERIES TELETYPEWRITERS

The new TE-50 (B) Teletypewriter Tool Kit contains a large number of items not required for servicing Model 28 series machines. It is recommended that activities servicing these teletypewriters draw the following listed tools and tool boxes, in lieu of the TE-50 (B) Kit, from the Naval Supply System. A large percentage of the tools on this list are available in Supply Shopping Marts. Procurement of these tools and boxes will provide servicing activities with an economical and adequate teletypewriter tool kit.

Recommended Tools for Servicing Model 28 Series Teletype Machine

Teletype Corp. No.	Description	Fed. Stock No.	Unit Price
	Tool Box (Note 1)	5140-494-2015	12.00
	Tool Box (Note 2)	5140-584-5558	3.71
152292	Armature Clip	N5815-091-9568	1.01
	Brush	7510-550-8446	.07
	Brush	7510-550-8448	.22
	Case Tuning Fork	5140-356-3891	.36
	Cloth, Cotton	8305-269-1350	.06 yd.
156170	Contact Adjusting Tool	N5815-799-3577	.45
88993	Contact Burnishing	N5120-369-8864	.61
125758	File, Contact	N5815-369-9943	.13
	Forceps, Hemostatic, Curved	6515-334-4300	2.20
	Forceps, Hemostatic, Straight	6515-334-7100	2.02
11 7781	Gauge set with case	N5815-448-3624	35.50
95960	Gauge, Tape	N5815-125-4850	1.60
88975	Greasegun	N4930-356-3924	4.00
	Hammer, hand, machine	9G5120-243-2985	.65
161430	Handwheel	N5815-856-5311	3.00
104457	Hexagon Wrench (.050)	KZ5120-198-5401	.01
110271	Hexagon Wrench	KZ5120-224-2504	.03
124682	Hexagon Wrench (.062)	KZ5120-198-5398	.01
159841	Hexagon Wrench (.093)	KZ5120-242-7410	.02
151383	Keylever remover	N5815-370-1301	.60
73408	Magnifier with case	N5815-412-5989	.90
	Oiler, Hand	4930-204-3737	1.15*
	Oiler (Pres-to)	4930-277-1044	.90*
94646	Orange Stick	N5120-293-2081	.31
	Pliers, Cutting (Diagonal) 4½"	9G5110-240-6209	1.10
	Pliers, Long nose	9G5120-247-5177	1.20
	Pliers, Retaining ring	5120-288-9717	1.15
	Pliers, Slip joint	9G5120-223-7396	.51
159926	Punch Bail Arm Gauge with Pin	N5815-784-0317	.90
99947	Punch Block Cleaner	9G5120-448-2082	.65

ORIGINAL

MOD-28:2

COMMUNICATIONS

NAVSEA 0967-LP-000-0010

SERVICE NOTES

Teletype Corp. No.	Description	Fed. Stock No.	Unit Price
	Rule, Machinist 6"	9G5210-234-5223	.64
152223	Scale, Gram (70 gr)	N6635-599-5461	4.48
94644	Screwdriver (30° offset)	5120-240-5244	1.00
94645	Screwdriver (90° offset)	5120-241-3162	1.00
	Screwdriver (Phillips)	9G5120-234-8913	.23
	Screwdriver 1"	9G5120-222-8866	.17
	Screwdriver (2" Small)	9G5120-227-7377	.11
	Screwdriver 4"	9G5120-278-1282	.24
	Screwdriver 4½"	9G5120-222-8862	.15
	Screwdriver (6" with holder)	9G5120-293-3159	.31
	Screwdriver 8"	9G5120-278-1272	.51
	Screwdriver (10" with holder)	9G5120-293-3178	.38
151384	Screwdriver with blades	N5815-370-1241	1.80
89954	Socket Wrench - "C"	N5120-392-0012	.90
89955	Socket Wrench	N5120-392-0013	.90
162279	Soldering Iron	3432-240-5641	11.48
142554	Spring Hook - Pull	**	.21
142555	Spring Hook - Push	**	.21
100443	Spring Scale (8 oz)	6670-599-5296	3.10
100444	Spring Scale (32 oz)	6670-291-8721	3.10
82711	Spring Scale (64 oz)	N6670-171-3987	2.20
156011	Tape Gauge with pins	N5815-784-0316	6.00
156743	Tape Lid Gauge	N5815-790-3718	1.30
73404	Tommy Wrench		.44
161686	Tool, Universal Function Bar	**	.13
159133	Top Plate Adjusting Gauge	N5815-784-0319	1.50
104986	Tuning Fork - 120 VPS	N5815-412-9066	11.00
151392	Tweezers	N5815-370-1566	.32
129537	Wrench	N5120-293-0809	.70
125765	Wrench, Open End	N5905-174-7929	3.20
125777	Wrench, Open End	N5815-412-5312	.30
113756	Wrench, Set with Case	**	
125779	Wrench, Socket	N5815-370-1270	1.72

Note 1 - Tool Box for Large Ships
 Note 2 - Tool Box for DL, DLG, DD's and below
 * Approximate price
 ** Use teletype Corporation Number when ordering

AN/UGC-13 - CRITICOM EQUIPMENT; PAGE PRINTER SETS, MODEL 28

See article in AN/UGC-13 section under the same title.

MODEL 28KSR TELETYPEWRITERS - DISABLING OF AUTOMATIC MOTORSTOP FEATURE

The purpose of this article is to advise maintenance personnel of the proper procedures for disabling the Automatic Motorstop Feature on Model 28KSR Teletypewriters.

Information obtained during shipboard inspections and from field servicing activities indicates that improper maintenance procedures are being employed to disable the Automatic Motorstop Feature on Model 28KSR Teletypewriter:

The bending or distorting of the motor control mechanism on the Electrical Service Unit (LESU) shall not be used to disable this feature. (642)

Maintenance personnel are advised that the disablement of the Automatic Motorstop Feature shall be accomplished by adjusting the time delay eccentric follower pawl to a point where it does not engage its ratchet wheel. Maintenance personnel shall accomplish this adjustment in accordance with the procedures set forth in one of the following applicable technical manuals.

Equipment	NAVSHIPS No.	Figure No.
TT-47/UG	91393	7-28
TT-47A/UG	91713	7-28
TT-47C/UG	93241	6-71
TT-176/UG	92361	7-25

ORIGINAL

MOD-28:3

**MODEL 28 TELETYPEWRITERS, SELECTOR UNIT -
INFORMATION CONCERNING**

The purpose of this article is to clarify difference in armature and armature springs used on various units.

Armatures with one anti-freeze button, part numbers 152424, 153543, and 160180, should be used with armature spring 151715. Adjustment requirement: (A) 1-1/2 to 2 ounces for 20 MA operation, (B) 2-1/2 to 3 ounces for 60 MA operation.

Armatures with two anti-freeze buttons, part number 195251, should be used with armature spring 104824. Adjustment requirement: (a) approximately 1/2 ounce for 20 MA operation, (b) approximately 3/4 ounces for 60 MA operation.

NOTE: WITH THE SELECTOR MAGNETS ENERGIZED, THE FRONT ANTI-FREEZE BUTTON MUST BE IN CONTACT WITH ITS MAGNET CORE.

The spring tensions given above permit operation of the typing unit prior to measurement of receiving margins. Refine the spring tension for maximum selector performance, with unit connected to specific circuit in which it is to operate.

When a distortion test set is available, refine the selector armature spring adjustment to meet selector receiving margins outlined in the Technical Manual.

The two anti-freeze button armatures are being used on the latest teletypewriter equipment being manufactured. This armature is a quick release armature that helps to overcome the adhesive effect of any oil film that may be present on the armature. (673)

**MOD 28 SERIES TELETYPEWRITERS AND TT-187/UG
SERIES TRANSMITTER DISTRIBUTORS; MAINTENANCE
OF GOLD CONTACTS UTILIZED FOR LOW-LEVEL
KEYING**

The purpose of this article is to provide teletypewriter maintenance personnel with recommended maintenance procedures for the Gold Contacts used in low-level keying.

CAUTION: Care must be taken to ensure that Current and Voltage higher than the 110v d-c at 5 milliamperes not be allowed through the contacts as this will damage them. NEVER PLACE LOW/LEVEL GOLD PLATED CONTACTS ON A 20 or 60 MILLIAMPERES CIRCUIT FOR TEST OR CHECKING OPERATIONS

1. The gold-plated signal contacts may be strobed with a standard distortion test set (DXD) such as the TS-383/UG. Current and voltage shall be limited to 110v dc at 5 milliamperes.

2. After strobing, clean the contacts only with TWILL JEAN CLOTH (KS2423). Burnishers, files or any type of abrasives shall not be used.

3. To clean the contacts, draw the center area of a Twill Jean strip up and down between the closed contacts but do not permit the edge of the strip to be drawn between the contacts. This procedure will prevent small fibers

from the edge of the Twill Jean strip from lodging between the contacts.

4. The above recommended, on these contacts should be conducted at approximately every 1500 hours of operation or sooner if required due to improper operation.

5. After a period of service, loose specks or flakes of gold will collect in the contact box and the contact area may appear to have lost its plating. However, if clean, the contacts will conduct reliably even though the gold may not be seen without the use of a microscope.

6. When it becomes necessary to replace these contacts, order the complete contact assembly by teletype part nr. 179639, rather than individual parts in order to simplify installation.

Operating and maintenance personnel are advised that the operation of more than two teletypewriters from the output of the TSEC/KWR-37 may result in garbling. Under normal operating conditions, reliable operation of no more than two teletypewriters may be obtained from the output of the TSEC/KWR-37.

If operational requirements demand the operation of more than two teletypewriters from the TSEC/KWR-37, it is recommended that a Teletype corporation **selector magnet driver** be installed in each teletypewriter in excess of two in order to ensure reliable operation.

These **selector magnet drivers** are available in Navy stock at an estimated cost of \$36.00 each. Pertinent supply data is as follows:

Nomenclature	Teletype Corp. Part No.	Federal Stock Number
Selector Magnet Driver (660)	177010	1N-5815-065- 9728

**MODEL 28, KSR AND ASR TELETYPEWRITERS -IMPROVED
LONG RANGE LUBRICATION OF THE TYPE-BOX
CLUTCH BEARING**

The purpose of this article is to provide long range lubrication for the type box bearing P/N 150046 by the addition of an oil wick, P/N 74756 (FSN 1N5815-125-8117) on the type box clutch.

Remove drive link 150244 in order to slide the oil wick 74756 over the left end of the bearing 150046. Replace the 150244 drive link and lubricate the oil wick with KS-7470 oil. (689)

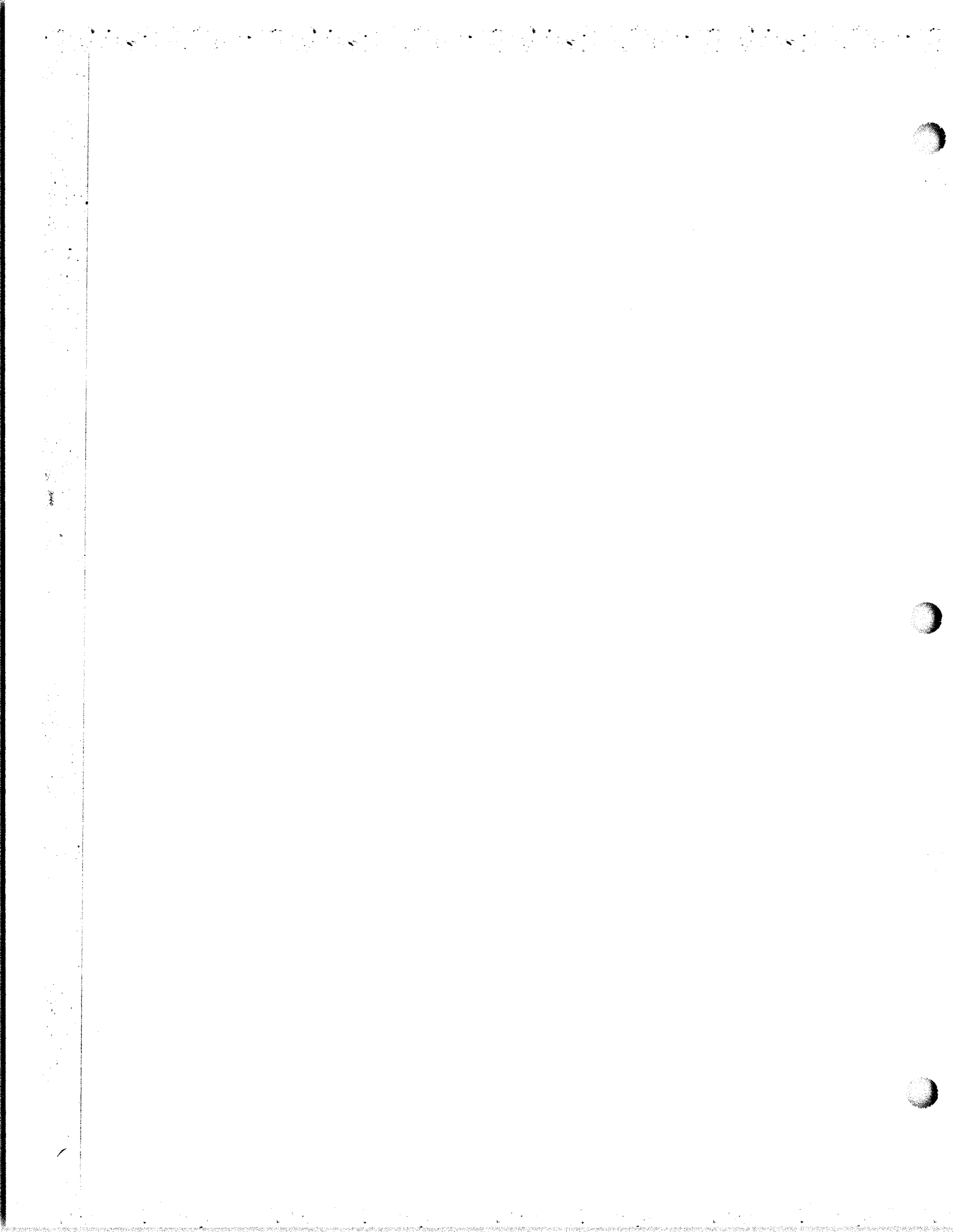
**MODEL 28 SERIES TELETYPEWRITERS -MAINTENANCE
HINT**

Several reports have been received indicating that the spacing shaft helical driving gear mounting screws have loosened, causing a bind in the main shaft of the typing unit. This results in stripped gears in the drive mechanism. Maintenance personnel should check tightness of the 152887 screws during routine maintenance periods by using a 5/32 inch open end wrench (Teletype Part No. 154393) contained in the TK-188/UG tool kit. (EIB 715)

Model 28, ASR Teletypewriters—Shock Hazard

This article provides a warning that Model 28, ASR Teletypewriters, Typing Reperator units with non-interfering Tape Feed-out availability have a possible shock hazard due to exposed terminal connections to Tape Feed-out magnets.

Teletypewriter units manufactured since January 1969 have these terminal connections covered with heat shrinkable tubing. All commands should insure that terminal lugs for the Tape Feed-out magnets be checked and necessary precautions be taken to eliminate the possible shock hazard by installing heat shrinkable tubing, insulating spaghetti or replacement of the present terminal lugs with insulated lugs.



SERVICE NOTES

NAVSEA 0967-LP-000-0010

COMMUNICATIONS

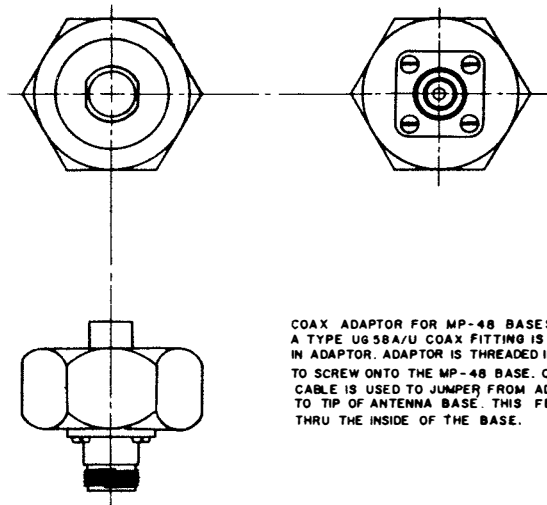
MP-48 MAST BASE

By means of a beneficial suggestion, the Bureau of Ships has been informed that modifying the MP-48 Base by adding a coax adapter to the bottom of the base will reduce the rf cable replacement.

The MP-48 Bases are not usually called for in Navy shipboard installations but when required, the use of an UG-58/U connector is proper.

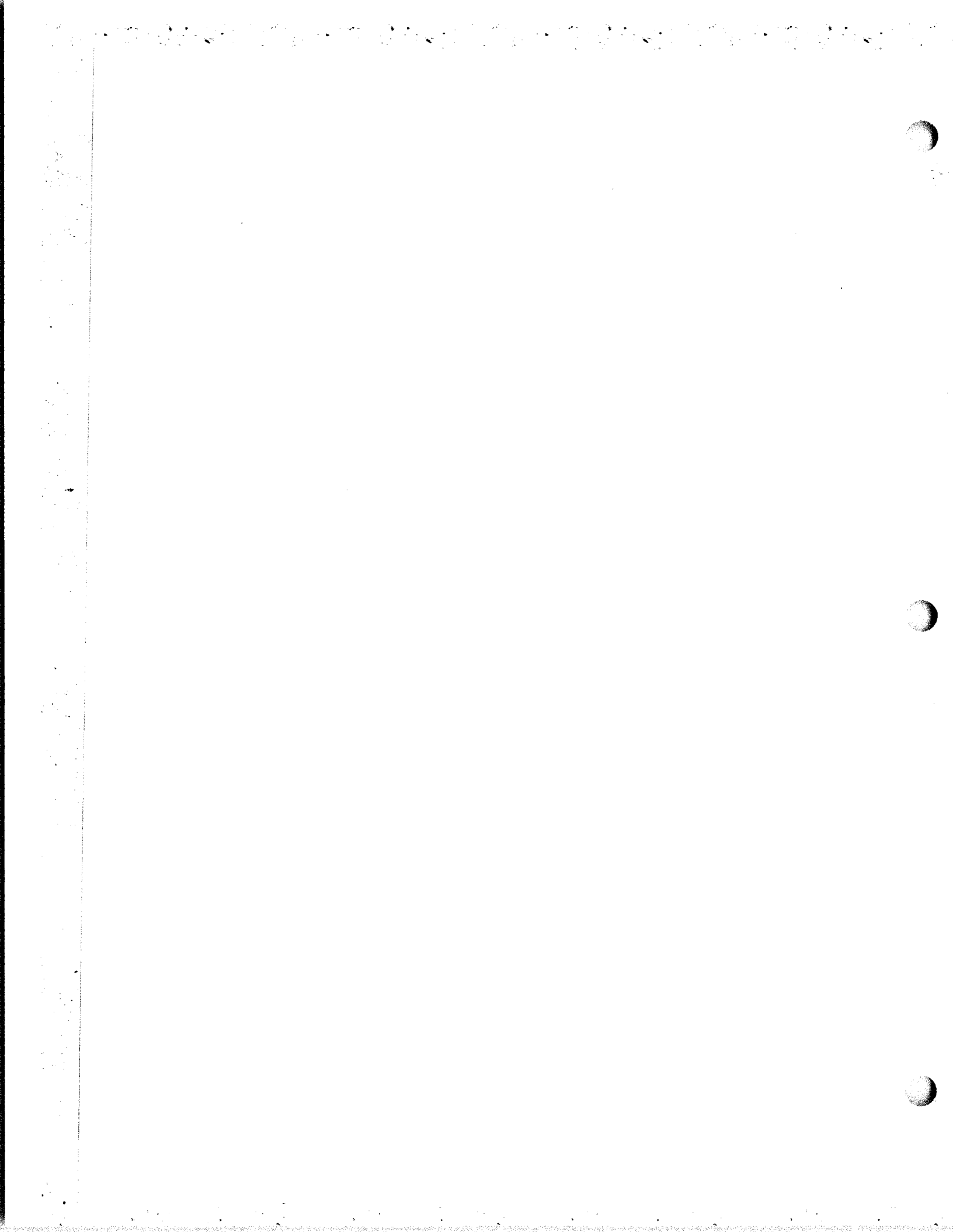
By adding a coax adapter to the bottom of the antenna base, a coax jumper is made up at the base of the antenna and is fed through to the bottom of the antenna and a tip is soldered to the end of the coax cable. See Figure 1.

All cable shall be solidly fastened to the base of the antenna, so that it will not float free.



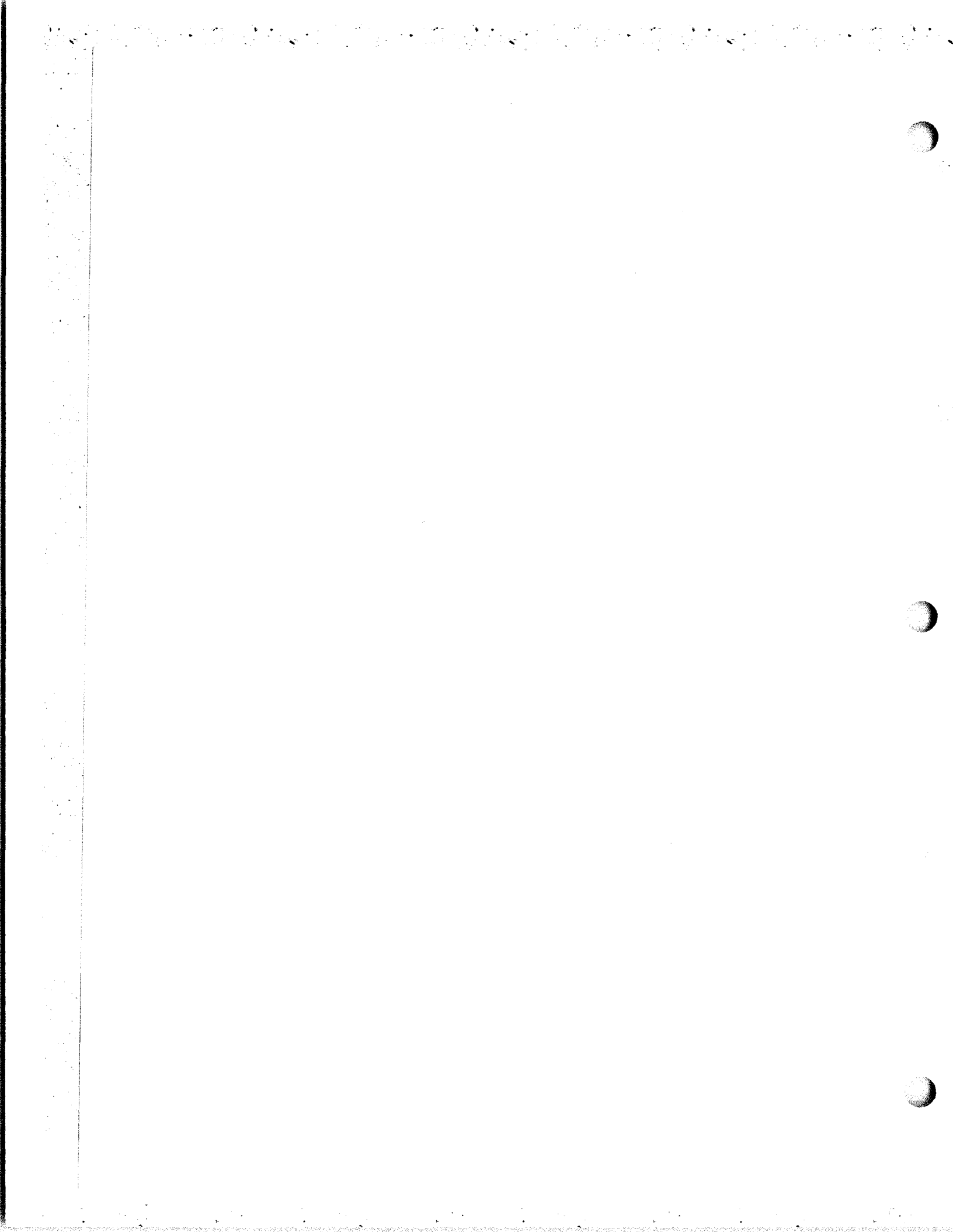
COAX ADAPTOR FOR MP-48 BASES
A TYPE UG 58A/U COAX FITTING IS USED
IN ADAPTOR. ADAPTOR IS THREADED INSIDE
TO SCREW ONTO THE MP-48 BASE. COAX
CABLE IS USED TO JUMPER FROM ADAPTOR
TO TIP OF ANTENNA BASE. THIS FEEDS
THRU THE INSIDE OF THE BASE.

Figure 1



AN/FRA-501, AN/FRA-19(V), AN/FRR-502, AN/FRR-49 (V), CV-591/URR, CV-591A/URR, AND TECHNICAL MATERIAL CORPORATION COMMERCIAL MODEL MSR-5 - USE OF AUTO-TRANSFORMER TO REDUCE EXCESSIVE LINE VOLTAGE

See article in AN/FRA-19 section under the same title.



MT-2751/SYA-4 and MT-3193/SYA-4—Installation and Maintenance Instruction

This instruction is to provide correct "Push-to-Talk" sequencing with the communication footswitch on the Height-Size Video Display Console. On some consoles it has been necessary to depress the footswitch for a "listen" condition.

All MT-2751/SYA-4 and MT-3193/SYA-4 Base Mounts should be checked to insure that when the communication footswitch is depressed, the associated console communications unit is in a "talk" condition and when released it is in the "listen" condition. Should this relationship not prevail, follow the procedure below:

Procedure:

1. Turn off all power to the console. Observe all safety precautions.

2. Remove the front plate from the base-mount.

This is the plate with the footpedal attached.

3. Remove the mounting nut that holds the footswitch (S1) to the frame. This nut is located inside the base behind the switch.

CAUTION: DO NOT ATTEMPT TO LOOSEN THE SWITCH BY GRIPPING THE BODY OF IT IMMEDIATELY BEHIND THE PUSH BUTTON. THIS CAN RESULT IN DAMAGE TO THE SWITCH.

4. When the nut is removed, pull the switch forward through the mounting hole until the contacts and leads are exposed. If there is not enough slack, remove the cable holding these wires to the frame. This clamp is located on the frame immediately behind the switch mounting hole.

5. Remove the leads from contacts 1 & 2 and attach them to contacts 3 & 4 of the switch. See figure 1.

6. Remount the switch (and secure the cable clamp if it has been removed), turn on power to the console and check for proper operation of the switch.

7. Replace the front panel of the base, then check the inter-communication system again to insure that the footpedal is depressing the switch. (691)

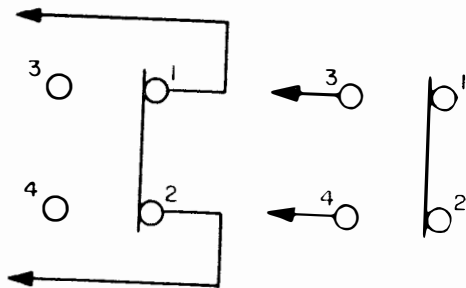
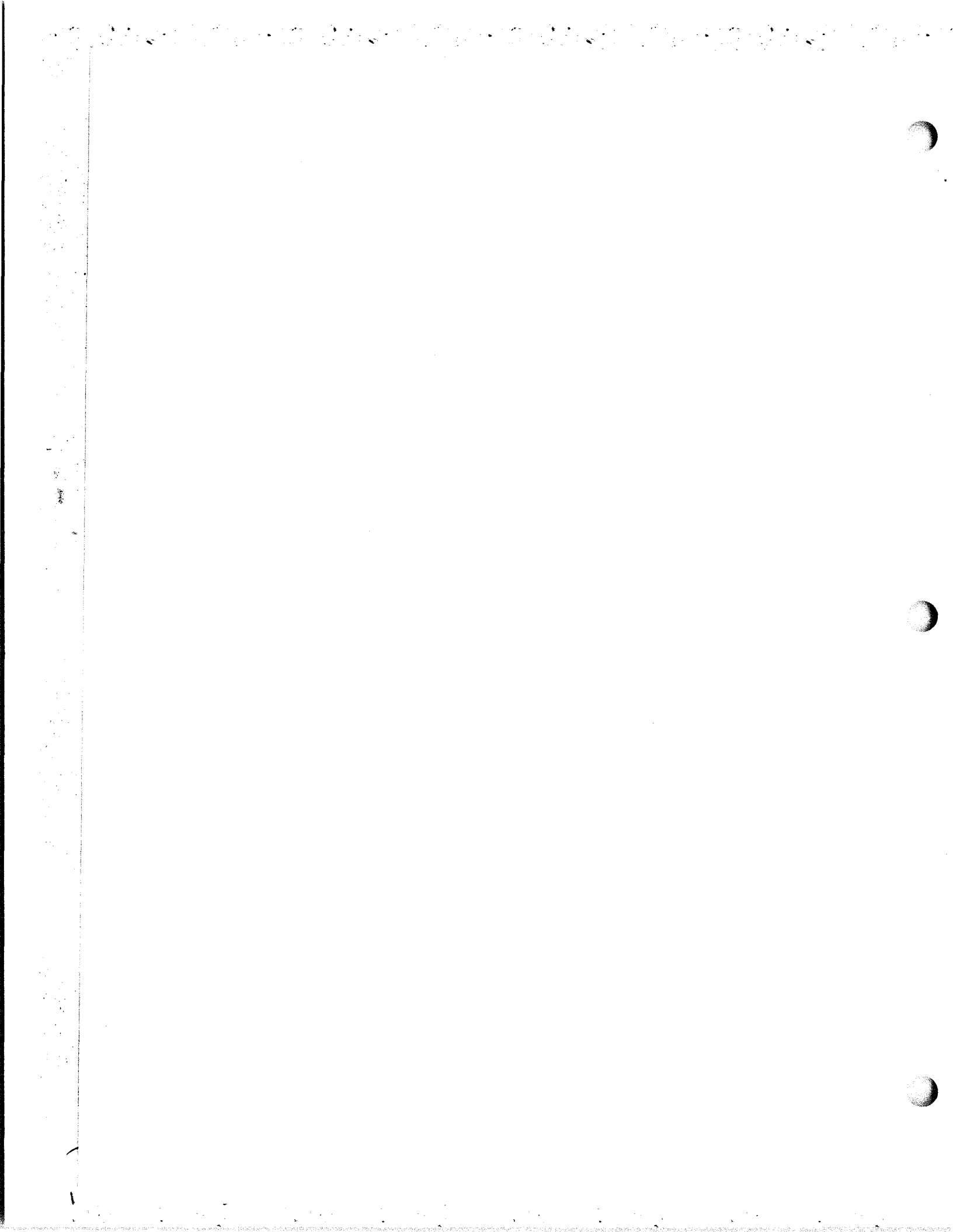
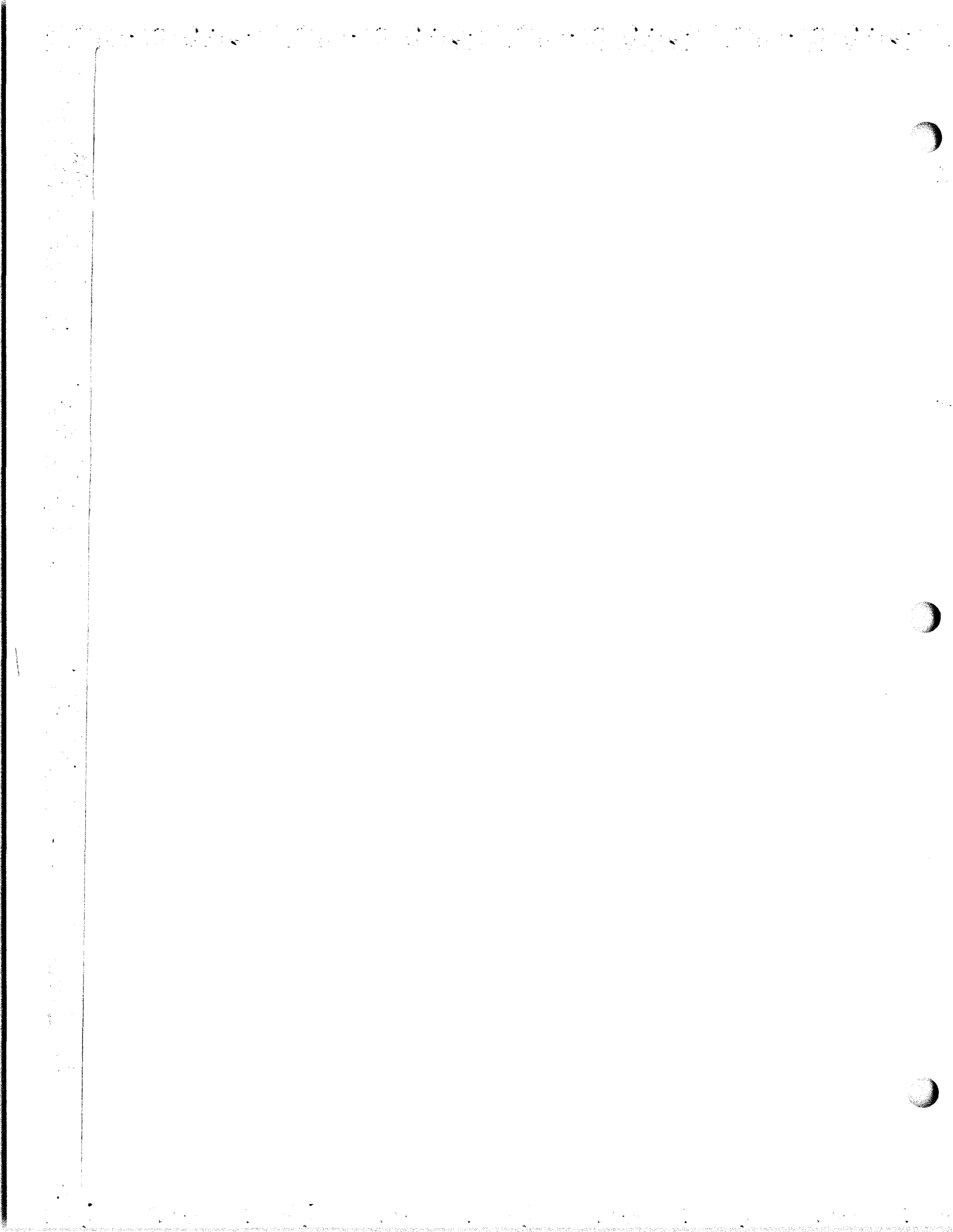


Figure 1. Wiring Connections AN/SYA-4 Foot Pedal Switch



**MT-2751/SYA-4 and MT-3193/SYA-4—Installation and
Maintenance Instruction**

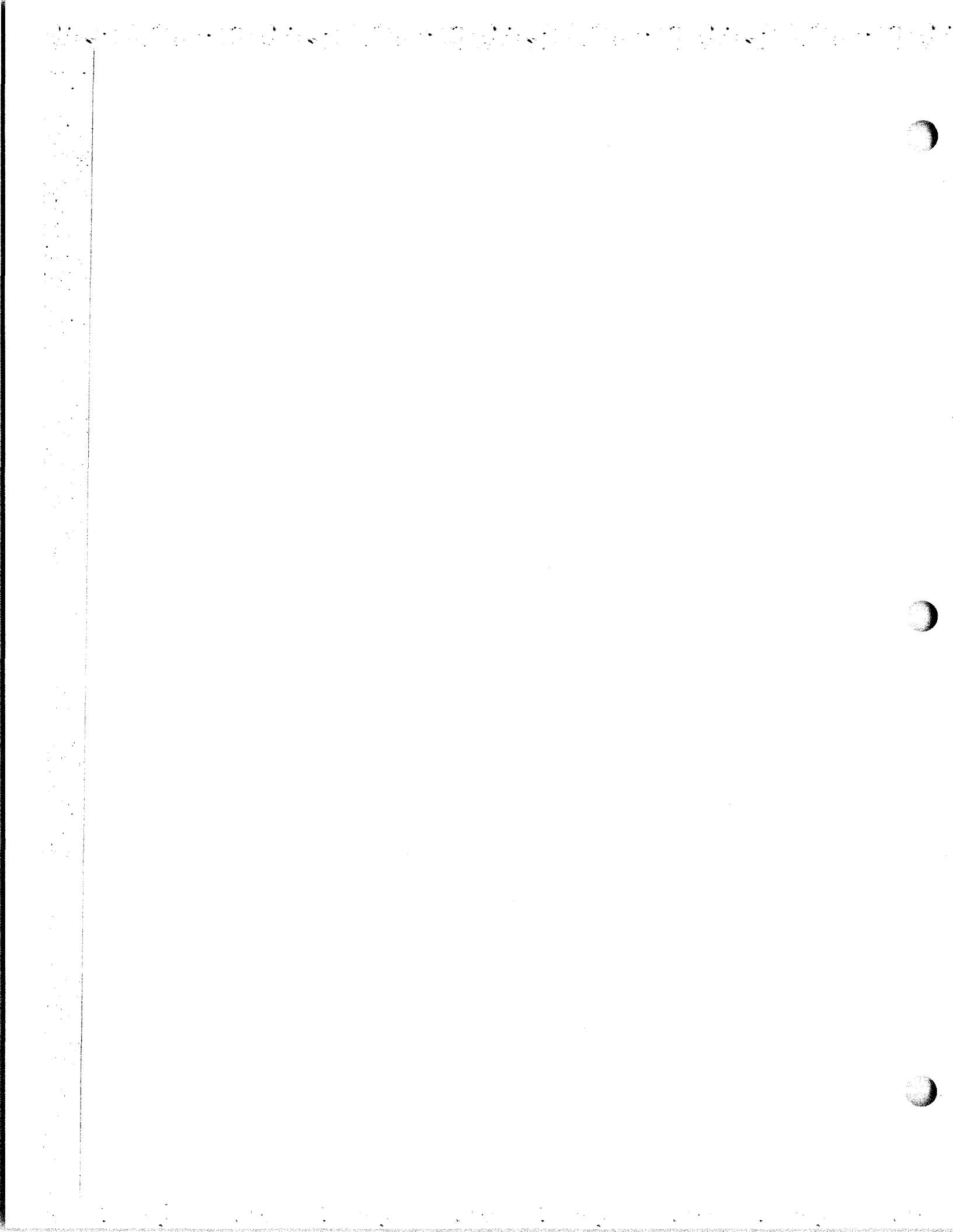
See article in MT-2751/SYA-4 section under the same
title. (691)



MT-3574/USQ-20(V), MT-3574A/USQ-20(V) and
MT-3574B/USQ-20(V) Jumper Cable--Main-
tenance Hint

This article presents an idea to facilitate the removal of tenant converts from subject base to a more accessible work area when troubleshooting is required.

It is suggested that each activity having the subject bases, fabricate one set of cables to extend base cables P1 through P5 for a distance of approximately ten feet. This will allow access to the base and the converters for dynamic troubleshooting. (800)



MU-591/UYK-3(V) Buffer Extended Memory Unit — Maintenance/Training Aid

This article provides a simple, inexpensive method which can reduce troubleshooting time in the majority of Buffer Extended Memory (BEM) hardware.

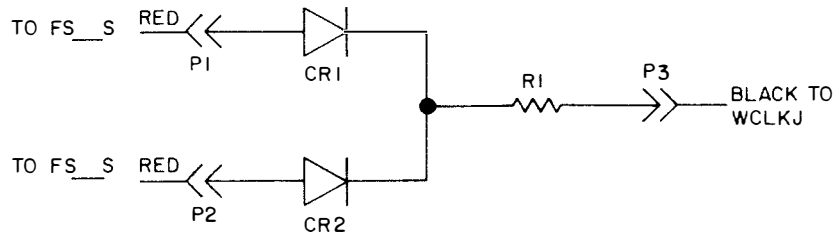
Diagnosing MU-591/UYK-3(V) BEM hardware malfunctions requires that BEM register operations be observed as the state counter progresses through the operational cycles. This function is provided for the CP-771(A)/UYK-3 digital data computer by use of the control panel clock switch placed in the manual mode. The BEM is a unit designed for use with the CP-771(A)/UYK-3(V) and does not have this

capability. This capability can be provided by use of an "OR" gate test device assembled as shown in figure 1. Use of the following procedure will cause the BEM to halt at specific state counter conditions to allow observation of register contents and the proper sequencing of the state counter:

Step 1: Ensuring that the proper instructions to execute the desired BEM operation are programmed, manually load a "looping" program into the CP-771(A)/UYK-3(V) computer memory that is associated with the BEM of interest. The following sample program will cause the BEM to cycle through the "Write Only" sequence of the state counter:

Memory Location	Contents	Symbolic	Comment
00100	75400	SA/IM/C/NO	Store contents of "A"
00101	40000	40000	Register at memory location 40000
00102	20020	BR/DM/F/UN	Return to start
00103	00100	00100	

Start the program and allow to run.



Quantity	Ref Desig	Parts List Description
2	CR1, CR2	1N914
1	R1	3.3K OHM 1/2 Watt Resistor
1	None	Test Lead, Black, 30" Long
2	None	Test Lead, Red, 30" Long
1	P3	Test Probe, Black
1	P1, P2	Test Probe, Red
As Required	None	Shrink tubing

Figure 1 — Wired "OR" Gate Testing Device.

Step 2: Insert P3 of the "OR" gate testing device into test point A101J5 (WCLKJ) at the BEM.

Step 3: Insert P1 into the set output jack of the BEM state counter flip-flop that defines the first state of the BEM operation being tested. This is test point A208J6 (FSWCS). At this point WCLKN will be inhibited, FSWC

will remain set and operations in the BEM and the CP-771(A)/UYK-3(V) will halt. Refer to the MU-591/UYK-3(V) Technical Manual, NAVLEX 0967-438-5010, table 2-3; to determine the condition the BEM state counter will enter next. Note: In the CF processing sequence of the BEM, FSW1 sets one clock pulse after FSWC sets.

Step 4: Insert P2 into the set output jack of the second state counter flip-flop in the BEM operation sequence being tested.

Step 5: Remove P1 from A208J6 and insert it into the set output jack of the third state counter flip-flop in the BEM operation sequence being tested. The first flip-flop should reset and the second should set.

Step 6: Continue to advance the state counter through the sequence being performed using the method described above until the state counter returns to the idle state (FSWC set). The register operations indicated in the Technical Manual, NAVELEX 0967-438-5010, will be enabled during the appropriate state counter conditions provided the BEM hardware is functioning properly. Note: In the CF processing sequence of the BEM state counter FSW2 will set instead of FSWR.

Assemble components as shown in schematic diagram. Cover all exposed connections with shrink tubing.

(EIB 910)

MX-1627/URN-3, MX-2229/GRA-34 TACAN R.F.**Monitor—Shock Hazard**

Users of the subject TACAN monitors are advised of a shock hazard existing when the equipment is line-connected and the power on-off switch, S1201, is in the "off" position.

The present wiring configuration of the equipment is such that 117 VAC is fed directly from the hot side of the safety interlock switch to the following points in the monitor:

Crystal oven Z404, transformer T601 (pin 1), indicating lamps DS 1206 thru DS 1208, terminal board TB 202 (terminals 12-16), pin 6 of relays K101 thru K104, pin 6 of relay K301, and pins 7 and 9 of connector J 302.

The removal of the monitor drawer for servicing requires the technician to release spring-loaded catches which are located in close proximity to TB 202. Inadvertent contact with the exposed terminals of TB 202 is made in many instances.

With the equipment power "on-off" switch in the off position these terminals are hot. Consequently the technician can and often does receive a shock.

With the drawer pulled open (and with the safety interlock also open), it is an understandable presumption on the part of the technician to assume that, with the power switch off, the equipment is deenergized. Consequently, he is prone to exercise a low degree of caution in any subsequent circuit troubleshooting, thereby increasing his chances of exposure to shock.

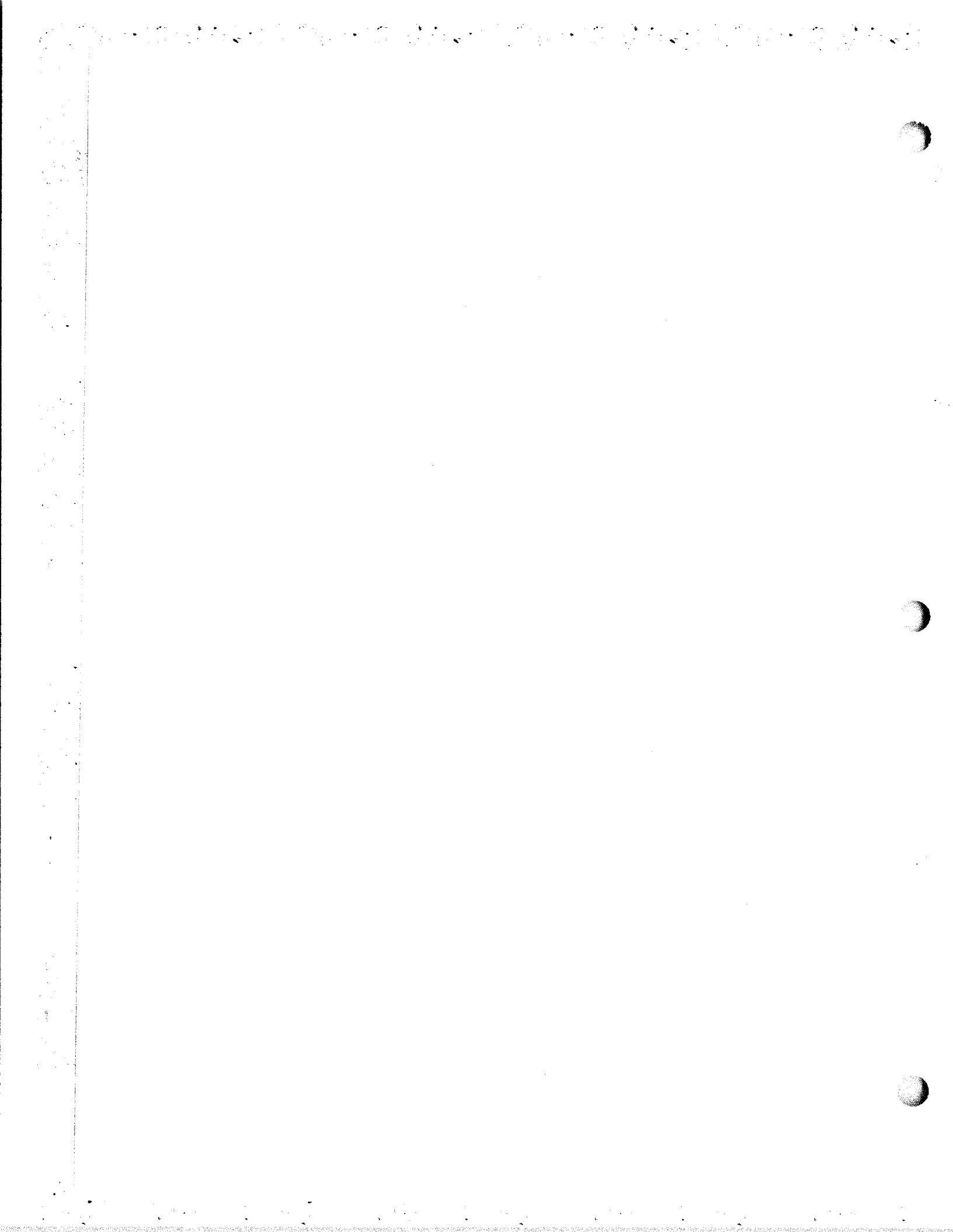
Proposed wiring changes to eliminate this shock hazard are currently in preparation as an engineering change proposal. (EIB 854)

MX-1627(A)/URN-3 TACAN Monitor; Provide Increased Clearance for the Printed Circuit Board (PCB) Installed by Field Change 18-AN/URN-3 (PART II) — Maintenance Hint

Field Change 18-AN/URN-3 (PART II) installed a Printed Circuit Board (PCB) assembly on the MX-1627/URN-3 chassis. When the chassis is taken in and out of its case for maintenance, the "case mounted" blower motor comes in contact with sockets J1 and J3 of the PCB assembly. Solder pins on these sockets become bent and/or broken and sometimes short to ground causing damage to the PCB. The problem can be resolved by cutting off 3/16 of an inch from the mounting spacers of the adjacent blower motor. The lowered blower motor will provide enough clearance to allow free and easy movement of the chassis. (EIB 914)

ORIGINAL

MX-1627/URN-3:1



MX-1743/SRC - ADAPTER CONTROL WIRING ERRORS

The Bureau has been advised by the Portsmouth Naval Shipyard, that an equipment wiring and technical manual error has become apparent in the Adapter Control MX-1743/SRC. The equipments concerned are those manufactured by the John R. Hollingsworth Co. under contract N126S-81281.

During an operational checkout, it was noted that the associated TCS receiver audio output at the local and remote stations was reduced to zero when the MX-1743/SRC local audio-level knob was turned fully counterclockwise.

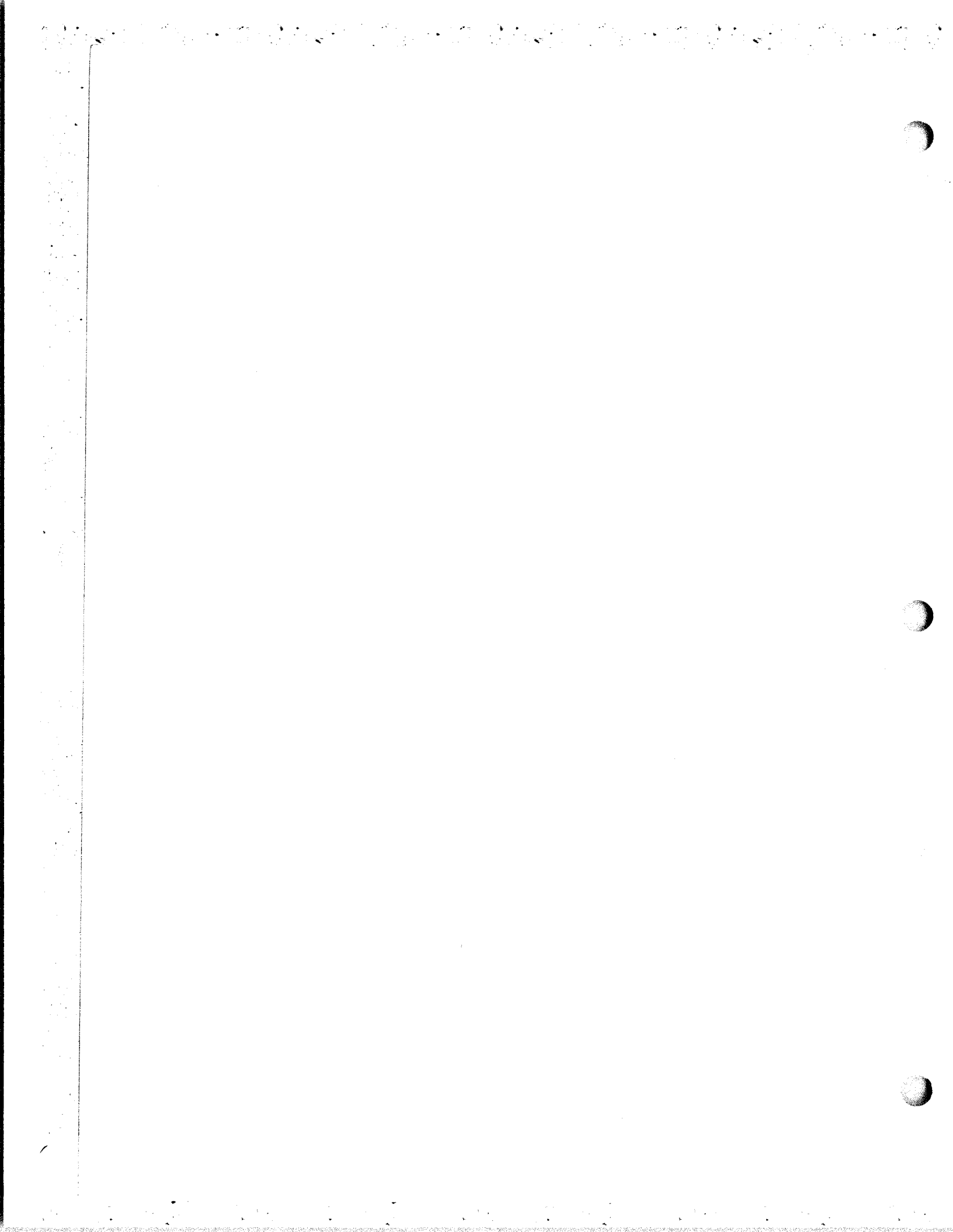
Examination of Figure 4-2 of the MX-1743/SRC Technical Manual, NAVSHIPS 93084, revealed that the wiring to the center and upper portions of R-604 was incorrect. This deficiency is also apparent in the MX-1743/SRC. Reversal of leads to these two points resulted in normal operation.

All ships and activities installing the Adapter Control MX-1743/SRC should check the equipment wiring, modify

if necessary, and correct the equipment schematic in the technical manual.

Paragraph 9.5-6 of the instruction book for the subject equipment indicates that the switch in the power unit disconnects the current-regulator tube and switches the power-transformer primary for operation directly connected to the line filter. The switch in the power unit disconnects the power transformer from the current-regulator circuit but does not disconnect the current-regulator tube from the a-c power line. The equipment therefore continues to require 200 watts. For 60-watt operation it is necessary that the type-876, current-regulator tube be removed from the socket in the power unit and that the switch be thrown to the "out" position.

1 Switch designated as follows: RAK/-1-208 and 209, RAK-2/-3-S-102 and S-103, RAK-4/-5/-6/-7/-8-S-202.

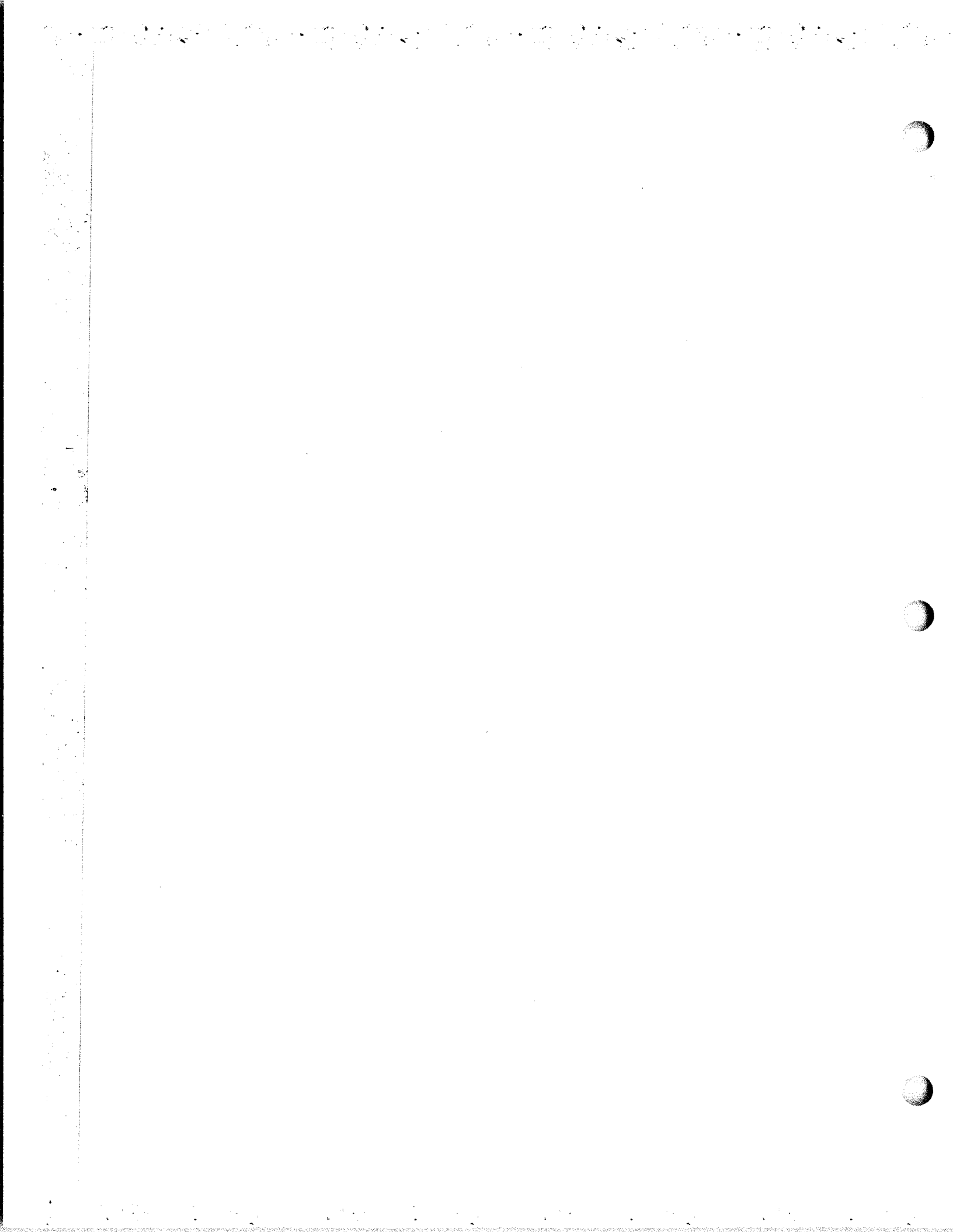


**MX-1986A/SRC, ADAPTER CONTROL -INSTALLATION
AND MAINTENANCE NOTICE**

Installing activities should inspect the orientation of the spade lugs on capacitors C101 and C102, to insure that they are positioned well within the circumference of the chassis cutouts for these capacitors. Lugs deviating in position from the above should be repositioned. The lugs should also be checked during normal maintenance procedures. Correct positioning is important because the capability of the equipment to meet High Impact shock requirements is involved. (680)

**AN/SRC-10Y THROUGH -15Y SERIES AVAILABILITY OF
IMPROVED CONTROL ADAPTER MX-1986A/SRC**

See article under AN/SRC-10Y through -15Y with same title. (EIB 722)



COMMUNICATIONS

NAVSEA 0967-LP-000-0010

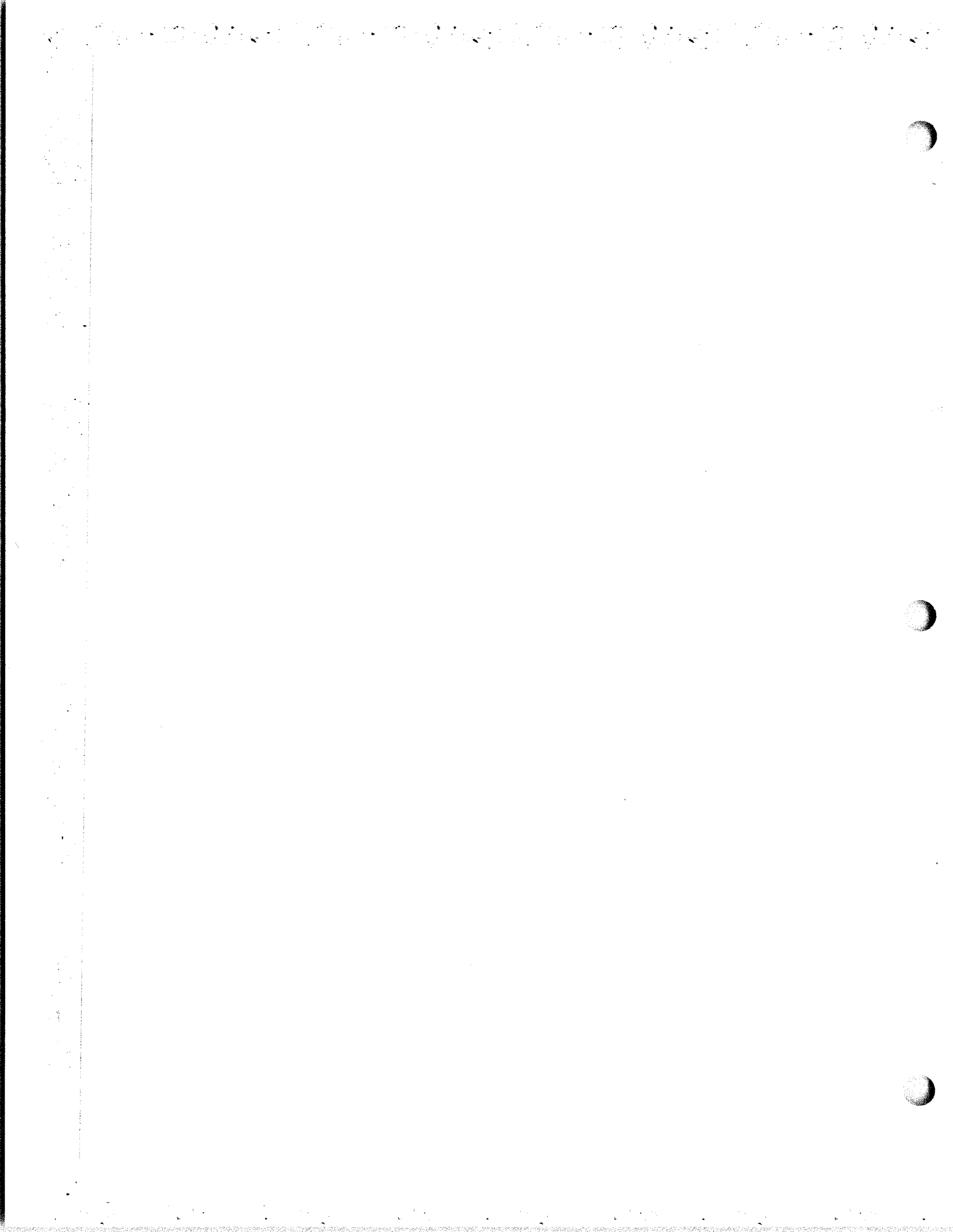
SERVICE NOTES

MX-1627/URN-3, MX-2229/GRA-34
TACAN R.F. Monitor--Shock
Hazard

Refer to article in MX-1627/
URN-3 section under same title.(EIB 854)

ORIGINAL

MX-2229/GRA-34:1



ALIGNMENT AND MAINTENANCE

Many Link (11UF-12UF) FM receivers in the field have been found to be improperly tuned, thus losing many of the advantages of FM reception and greatly reducing the range.

A method of alignment which has proven itself in practice will be outlined in "step by step" progression. No signal source other than an FM transmitter is necessary. The instruments and tools needed are as follows:

- 1--0-1 d-c milliammeter.
- 2--0-100 d-c voltmeter.
- 3--50-0-50 d-c galvanometer or microammeter.
- 4--Non-metallic "screwdriver" (this may be a neutralizing tool).

Two types of instruments incorporating the above meters, mounted in a small portable oak case are available. They are Link Type 1288 and 1617. (They may also be used for the transmitter adjustment and Type 1617 includes a wave-meter.)

The following tuning procedure is recommended:

- 1--Allow a 15-minute "warm up" period.
- 2--Using the 0-100 d-c voltmeter as an indicator, carefully adjust the oscillator trimmer T9 to maximum voltage, by taking a reading between the condenser shaft and ground. This should be about 60-80 volts. No signal is necessary for the adjustment. This completes oscillator tuning.

- 3--Plug the 0-1 milliammeter into jack T5A (J1 in mobile receiver) which is first limiter grid. Use a fairly strong signal of the exact frequency and tune T1 (antenna trimmer), T2 (r-f stage), T3B, T4B and T5A for maximum reading of the 0-1 milliammeter.

- 4--Plug 0-1 milliammeter into jack T6A (J2) which is second limiter grid and tune T6A for maximum reading using fairly strong signal.

- 5--No signal used. Visually set the primary trimmer of T7 (discriminator) so that the factory painted red lines coincide. The primary trimmer is the one nearest the 6AC7 tube. Should the red line be missing, set the trimmer midway in its travel as any misadjustment of the primary may be compensated for by the secondary tuning. This completes the primary tuning of the discriminator.

- 6--Use a fairly strong input signal. Plug the galvanometer into "Balance" jack. Tune the secondary trimmer of T7 so that the galvanometer reads "zero". This may be checked by cutting off the input signal in which case the meter will read several divisions off "zero". The meter should return to "zero" when the same input signal is reapplied. The tuning of the discriminator (T7) is now complete and no further adjustments need be made.

- 7--To obtain the utmost in performance it is necessary to realign T1, T2, T3B, T4B and T5A using a

very weak input signal. Plug the "zero center" galvanometer into T5A (J1) and tune all these carefully maximum deviation.

- 8--Still using a very weak signal plug the 0-1 milliammeter into jack T6A (J2) and tune for maximum deflection. Sometimes the added sensitivity of the galvanometer may be taken advantage of in this jack but unless the signal is very weak it will go "off scale".

- 9--Setting the squelch is the final adjustment. It is plainly marked "squelch" and is located directly below T10. The proper adjustment is slightly beyond the point at which the rushing noise stops, and it must be adjusted without any input signal. The receiver is now properly tuned.

The equipment should be retuned at weekly intervals for a month until it has heat cycled and settled down. Thereafter semimonthly tuning is adequate.

Always have the motor in the vehicle operating at a "fast idle speed when adjusting mobile stations.

Two grounds are advisable in vehicular installations. One should be one-half inch copper braid running from the mobile station ground to the car battery cable ground.

It is advisable to note that T2 and T9 are "calibrated" from one to ten so their approximate frequency can be interpolated from the position of the red line marked on the condenser shaft. This reading (expressed in megacycles) is determined from the second numeral of the frequency. Sample settings are as follows: 36.140 Mc, six; 38.300 Mc, eight; 30.300 Mc, zero; etc.

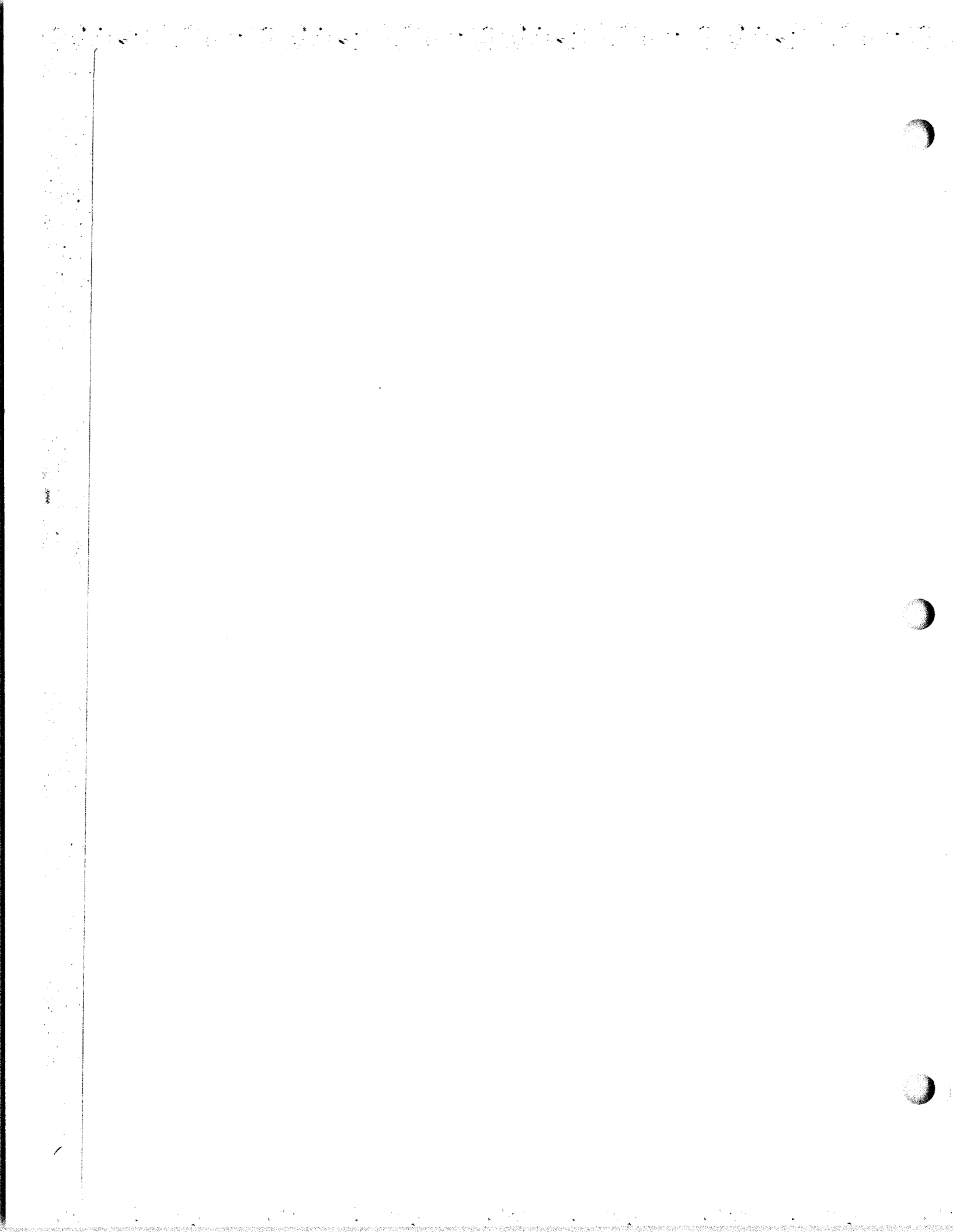
Should a signal generator be used for alignment, let it warm up for an hour and zero beat it frequently against a signal of the known proper frequency.

In addition to the usual test of tubes in a tube checker try them in an equipment which is known to be operating correctly and discard any which prove defective. This is of paramount importance.

Other things being equal, antenna height is the deciding factor in 30-40 Mc communication. Strive for "in the clear" antenna locations in both fixed and mobile stations. It is always well to locate the fixed station antenna in a high electrically quiet location and remote control the station itself.

Remote controls require an a-c source (60 watts at 110 volts) and a telephone pair. They will operate the fixed station at distances up to twelve miles. Any number can be used and they furnish complete operation (transmitting and receiving) and occupy much less space than the fixed station.

Motor (or other) noise should be eliminated exactly as if an AM installation were to be made. A test may be made by using so weak a signal that it will only partially quiet the receiver and then listening with and without the noise. The ideal, of course, is to be able to detect no difference.



TYPE NUMBER 23211 TROUBLESHOOTING
NOTES**Difficulty Encountered**

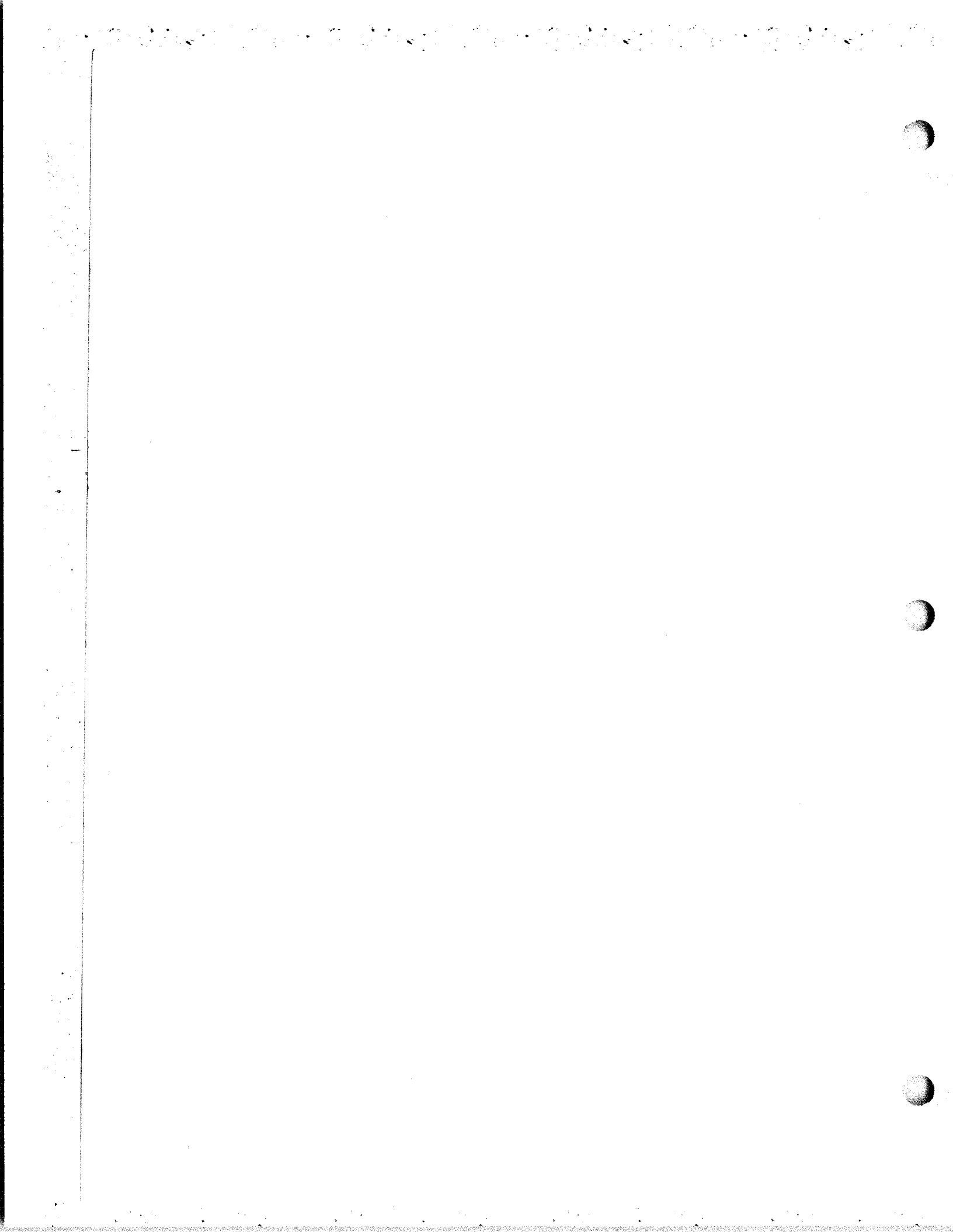
Type 23211-A Equipment.--Remote radiophone unit failed to operate from any transmitter. Relay K-201 vibrated as if actuated by a-c current.

Type 23211 Radiophone Unit.--Mounting screw for relay K-201 vibrated loose due to gun fire.

Cause and Remedy

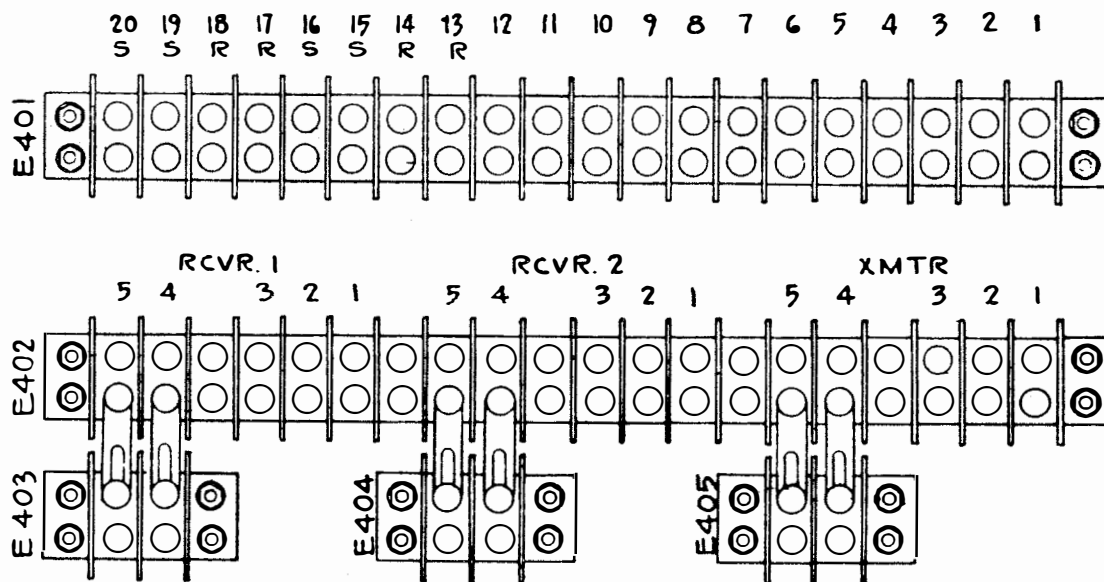
Trouble caused by four wires becoming disconnected from terminal #6 on type RN-23206 radiophone transfer panel, due to poor soldering job. Normal operations restored by resoldering wires to terminal lug.

Removed original screws and replaced with screw 1/8" longer to permit peening the thread on the end above the securing base. Original screws loosened in spite of tight screws and locked washers. By peening the ends, absolutely prevented loosening of the relay.



TERMINAL STRIP MARKINGS

The Bureau has recently received information that several Remote-Control Indicator Units Type-23496 were found to have no identification markings for the terminal strips mounted in the back of the cabinets. For the convenience of those installing activities finding this condition, the accompanying diagram is published. Additional copies are available from the Bureau of Ships.



View of Terminal Strips from Front of Cabinet

FIGURE 1.--Terminal strip markings on type CQC-23496 remote control indicator unit

TYPE-23496 MODIFIED FOR HANDSET EXTENSION

To fulfill the need in some ships for an extension handset for A Remote-Control Indicator Unit Type 23496, a method has been devised to connect a terminal strip in parallel to one of the handset receptacles. Because of difficulty in connecting additional conductors to the receptacle lugs, other solder points were found which

facilitate wiring. The back of these points is indicated in Figure 1 by a circle and designated by a letter which corresponds to the pin designation in the handset jack. The wiring to the new terminal strip is drawn in heavy lines. Inasmuch as there are two handset receptacles in the -23496, the Bureau desires that the flange of receptacle J-401, to which the new terminal strip is set parallel, be painted white.

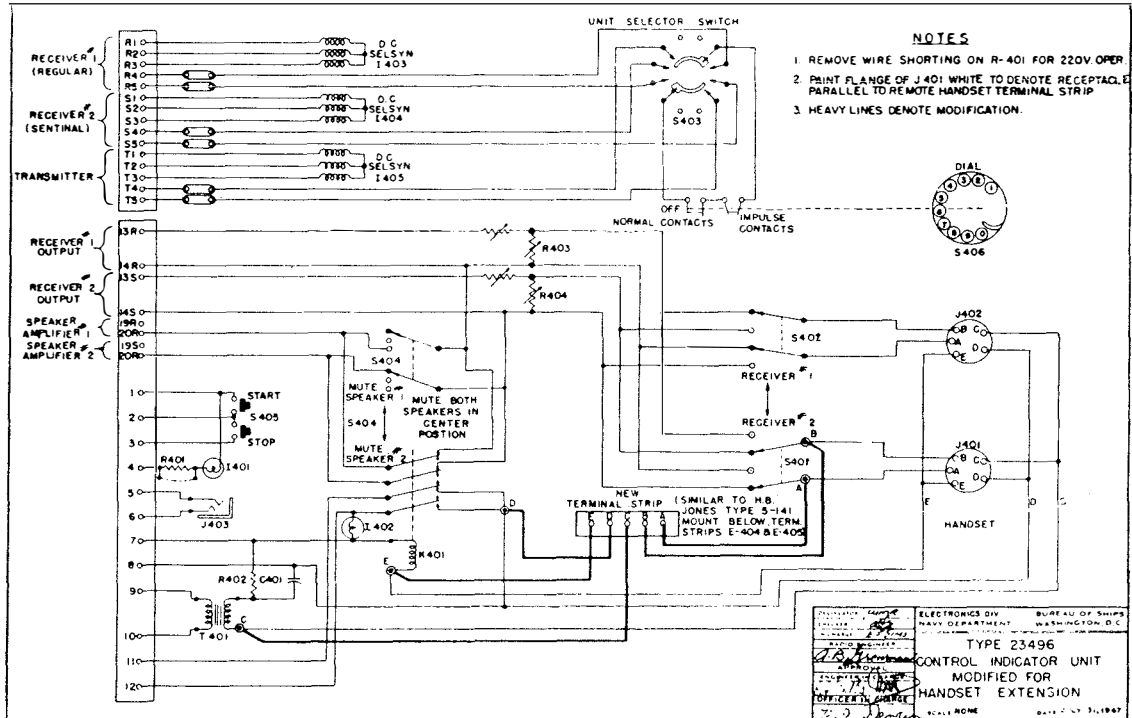
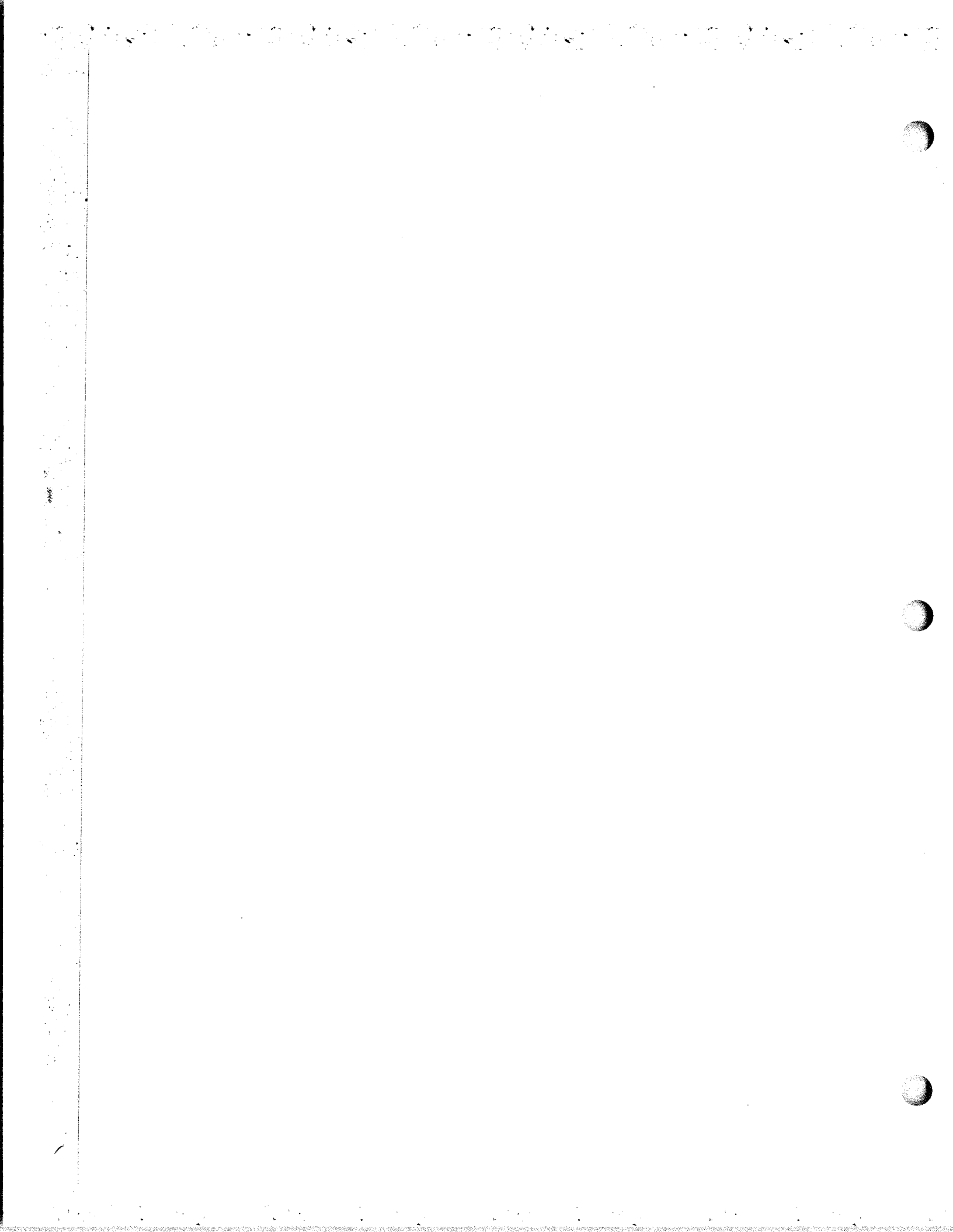


FIGURE 1.-- Type -23496 control indicator unit modified for handset extension

**NT-23497 SELECTOR CONTROL UNIT--
ELIMINATION OF DUMMY PLUG**

The Mare Island Naval Shipyard has suggested eliminating the requirement for a dummy plug in Selector Control Unit NT-23497. The audio output of the receiver in TDZ/RDZ installations is only available at terminals 9 and 11 on terminal strip E-101 of the Selector Control Unit when a dummy plug, jumpered from A to J and L to K, is plugged into J-102. The removal or loss of this plug opens the audio circuit to the terminal strip. The electrical equivalent of the plug can be obtained as follows: Remove the filter-assembly cover in the unit and solder a jumper to the terminal post common to L-101 and C-117 (network is at left end of filter bank, as viewed from front). Solder the other end of this jumper to terminal No. 11 on terminal strip E-101. Connect a second jumper between terminal No. 9 of the terminal strip and the terminal post common to L-102 and C-118. Figure 7-3 in NAVSHIPS 900,777 will aid in locating the points where the above connections are made. If available, cap and chain assembly SNSN N17-G-200911-0524 should be installed on J-102. No field change will be initialed for this modification.



TYPE 49131 SERIES SPEAKER-AMPLIFIER UNITS

The Bureau has received numerous requests from installation and maintenance yards for technical manuals or data sheets covering the type 49131 series speaker-amplifier units. Such information was not obtained with these units and is therefore not available for distribution.

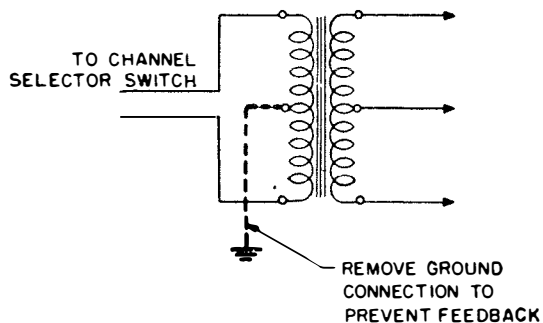


FIGURE 1. --The center-tap lead on the primary of input transformer should be removed

A wiring diagram and parts list is secured inside the cabinet of each speaker-amplifier. However, the examination of this diagram and parts list is usually not very convenient after the unit has been installed and it is believed desirable to reproduce the applicable lists and diagrams herein for ready reference.

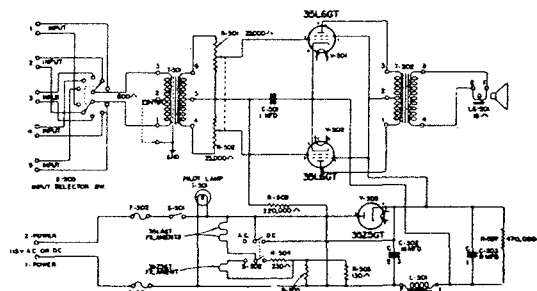


FIGURE 1.--Speaker-amplifier CMX-49131C

Figures 1 and 2 cover the types 49131, 49131A, and 49131B speaker-amplifier units as indicated. Parts lists for the units follow:

Parts List for Type 49131 Speaker-Amplifier Unit

Schematic symbol	Description	Navy type No.	RCA Manufacturing Co., Inc., part No.	Quantities of spare parts furnished
C501	Capacitor, 1-mfd. -3 percent + 10 percent, 400 v.d.c. working.	-48595-A	P-720555-2	
C502	Capacitor--consists of 3 sections, each section 8 mfd. -3 percent +10 percent, 500 v.d.c. working.		K-90549-1	
C503	C502 denotes 2 of the sections connected in parallel totaling 16 mfd.; C503 denotes 1 section, 8 mfd.			
F501	Fuse, 1 ampere, 250-v., cartridge type		K-55544-14	8
F502	Same as F501			
L501	Pilot light assembly socket, candelabra screw base lamp, candelabra screw -- 115-v., 0.1 ampere. Reflector, red jewel, complete with nut.	CS-5/17	K-857431-1 K-866645-1 K-99013-1	1
L501	Reactor, plate filter, impedance 2000 ohms at 60 cycles.	CRV-30764	K-901021-1	1
R501, 502	Potentiometer, dual section, each section 25,000 ohms ± 10 percent, wire-wound.		K-858176-1	1
R503	Resistor, 220,000 ohms ± 10 percent, 1/2-watt, insulated type.		K-850981-90	1
R504	Resistor, 230 ohms, wire-wound, ferrule type, type E		M-420664-36	1
R505	Resistor, 130 ohms ± 5 percent, 1-watt, insulated type.		K845949-34	2
R506	Same as R505			
R507	Resistor, 470,000 ohms ± 10 percent, 1/2-watt, insulated type.		K-850981-94	1
S501	Switch, s.p.s.t., toggle type	CHH-24000	M-420278-1	
S502	Switch, d.p.d.t., toggle type	CHH-24003	M-420278-4	

Parts List for Type 49131 Speaker-Amplifier Unit--Continued

Schematic symbol	Description	Navy type No.	RCA Manufacturing Co., Inc., part No.	Quantities of spare parts furnished
T501	Transformer, audio input, center-tapped primary and secondary. D.-c. resistance of primary (between terminals 1 and 3) 26 ohms; d.-c. resistance of secondary (between terminals 4 and 6) 2000 ohms.	CRV-30765	K-901022-501	
T502	Transformer, audio output, center-tapped primary. D.-c. resistance of primary (between terminals 1 and 3) 104 ohms; d.-c. resistance of secondary (between terminals 4 and 5) 0.57 ohms.	CRV-30766	K-901023-501	
X501	Socket, octal base	CPH-49351	M-421395-506	
X502	Same as X501			
X503	Same as X501			
V501	35L6GT tube			4
V502	Same as V501			
V503	35Z5GT tube		P-712594-504	2
LS501	Loudspeaker cone assembly		P-712678-504	

Parts List for Types 49131A and 49131B Speaker-Amplifier Units

C501	Capacitor, 1-mfd. -3 percent + 10 percent, 400 v. d.-c. working.	-48595-A	P-720555-2	1
C502	Capacitor -- consists of 3 sections, each section 8 mfd. -3 percent + 10 percent, 500 v. d.-c. working.		K-90549-1	1
C503	C502 denotes 2 of the sections connected in parallel totaling 16 mfd.; C503 denotes 1 section 8 mfd.			
F501	Fuse, 1 ampere, 250 v., cartridge type		K-55544-14	8
F502	Same as F501			
I501	Pilot light assembly socket, candelabra screw base lamp, candelabra screw -- 115 v., 0.1 ampere. Reflector, red jewel, complete with nut.	CS-5/17	K-857431-1 K-866645-1 K-99013-1	1
L501	Reactor, plate filter, impedance 2000 ohms at 60 cycles.	CRV-30764	K-901021-1	
R501, 502	Potentiometer, dual section, each section 25,000 ohms ±10 percent, wire-wound.		K-858187-1	1
R503	Resistor, 220,000 ohms ±10 percent, 1/2-watt, insulated type.		K-850981-90	1
R504	Resistor, 230 ohms, wire-wound, ferrule type, stype E		M-420664-36	1
R505	Resistor, 130 ohms ±5 percent, 1-watt, insulated type.		K-845949-34	2
R506	Same as R505			
R507	Resistor, 470,000 ohms ±10 percent, 1/2-watt, insulated type.		K-850981-94	1
S501	Switch, s.p.s.t., toggle type	CHH-24000	M-420278-1	
S502	Switch, d.p.d.t., toggle type	CHH-24003	M-420278-4	
S503	Switch		K-180411	
T501	Transformer, audio input, center-tapped primary and secondary. D.-c. resistance of primary (between terminals 1 and 3) 26 ohms; d.-c. resistance of secondary (between terminals 4 and 6) 2000 ohms.	CRV-30765	K-901022-501	
T502	Transformer, audio output, center-tapped primary. D.-c. resistance of primary (between terminals 1 and 3) 104 ohms; d.-c. resistance of secondary (between terminals 4 and 5) 0.57 ohms.	CRV-30766	K-901023-501	
X501	Socket, octal base	CPH-49351	M-421395-506	

Parts List for Types 49131A and 49 31B Speaker-Amplifier Units--Continued

Schematic symbol	Description	Navy type No.	RCA Manufacturing Co., Inc., part No.	Quantified of spare parts furnished
X502	Same as X501			
X503	Same as X501			
V501	35L6GT tube			4
V502	Same as V501			
V503	35Z5GT tube		P-712594-504	2
LS501	Loudspeaker cone assembly		R-712678-504	

INSTALLATION OF JUMPERS ACROSS INPUT TERMINAL STRIP

The type 49131 series of speaker-amplifier units, except the basic 49131, contain either 3-channel or 5-channel selector switches. These switches are essential when the speaker-amplifier units are used in conjunction with the standard multi-channel broadcast distribution system but are not required, and are objectionable in certain instances, when these units are used on single communication circuits. Several reports reaching the Bureau indicate that unauthorized personnel frequently operate the switch, either thinking that the unit is connected in the broadcast circuit, or just for their amusement. The switch is sometimes left in an open channel and the speaker fails to function when the communication circuit is energized.

To eliminate the possibility of the above condition, it is recommended that all types 49131 units installed on single communication circuits be modified according to Figure 1. Jumpers are installed across the input terminals as indicated, permitting the speaker to operate regardless of the position of the switch.

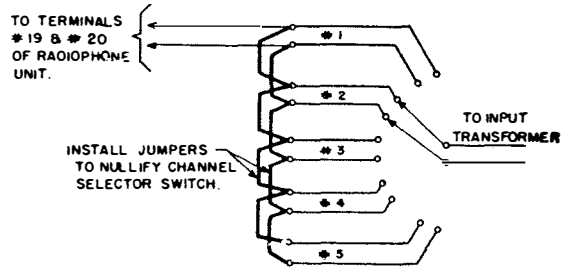


FIGURE 1.--Jumpers installed across input terminals of type 49131 speaker-amplifiers

FEEDBACK ELIMINATION

Occasionally feedback is present between the 49131 series speaker-amplifier unit and a microphone or handset connected to the same circuit or a radiophone unit. The press-to-talk switch in the microphone or handset operates a relay in the associated 23211 or 23423 radiophone unit. The relay is intended to cut out the speaker, but actually only breaks one side of the line, leaving the speaker not entirely inoperative due to a sneak circuit through ground. The center-tap of the speaker-amplifier input winding is grounded. Therefore, when the receiver connected to the particular radiophone unit has a grounded output, the circuit will be completed through ground and one-half of the input winding. The condition can be eliminated by disconnecting the center-tap lead on the input transformer from ground, as indicated in Figure 1.

It should be noted that this method applies only to the type 49131 series units used on communication circuits. Similar units used on standard broadcast reception systems should not be altered in this manner.

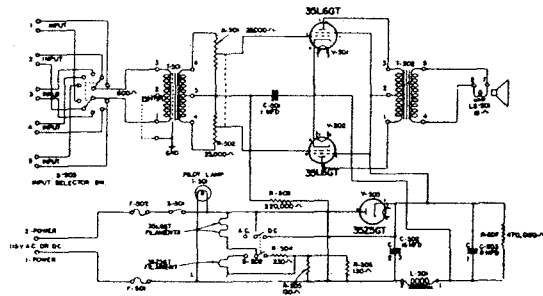


FIGURE 1.--Speaker-amplifier CMX-49131C

POTENTIOMETER FAILURES

Excessive failures of potentiometers R-501 and R-502, have been reported from the field. Investigation discloses that the failures in the large majority of cases are broken stops. This allows the sliding contact to travel farther than it should, causing damages to the winding and also to the coupling link between the sections.

Personnel are cautioned to use these potentiometers with greater care in order that such failures be reduced to a minimum. Every effort should be exerted to inform all hands who have access to the speaker-amplifier that such caution must be practiced. It is suggested that a tag or label be attached to the unit to warn against rough usage.

MODIFICATION OF CHANNEL SELECTOR

When type 49131 speaker-amplifiers for the RBO entertainment system are installed in crew and troop quarters, the channel selector switch takes a terrific amount of abuse due to continual switching in search of programs.

A double-pole double-throw toggle switch in place of the rotary switch has been installed in such units. The toggle switch is entirely satisfactory for a RBO system where only two RBO receivers are used, and the toggle

switch is more sturdy than the rotary switch and better able to stand up under extreme abuse.

This modification is recommended for other ships having two RBO receivers where the channel selector switch has been damaged due to misuse.

The schematic drawing for the Navy type CMX-49131C speaker amplifier unit is pasted inside the case of the equipment. Since this may not be convenient for reference, the drawing and parts list are reproduced herewith as figures 1 and 2.

Schematic symbol	Description	Navy type No.	Magnavoc Co. dwg. and part No.	Quantities of spares furnished
C-501	Capacitor, 1 mfd. \pm 10 percent, 400 v.d.c. working.	C-48595A-10	B-250091	1
C-502	Capacitor, consists of three sections, each section 8 mfd. \pm 20 percent, 500 v.d.c. working	C-481337	B-290008	1
C-503	C-502 denotes two of the sections connected in parallel totalling 16 mfd. C-503 denotes one section 8 mfd.			
F-501	Fuse, 1 ampere, 250 v., cartridge type.		A-180157G6	8
F-502	Same as F-501.			
I-501	Pilot light assembly: Socket, candelabra, screw base. Lamp, candelabra screw, 115 v., 0.1 a. Reflector, red jewel, with nut.	CS-5/17	A-180233 A-180161G2 A-180235G1	1
L-501	Reactor, plate filter, impedance 2000 ohms at 60 cycles.	C-30764	B-350007	
R-501	Potentiometer, dual-section, each section 25,000 ohms \pm 10 percent, wire wound.		A-220040	1
R-502				
R-503	Resistor, 220,000 ohms \pm 10 percent, 1/2 watt insulating type.		B-230063G90	1
R-504	Resistor, 230 ohms, wire wound, ferrule type.		A-240020	1
R-505	Resistor, 130 ohms \pm 10 percent, 1 watt insulated type.		B-230065G257	2
R-506	Same as R-505.			
R-507	Resistor, 470,000 ohms \pm 10 percent, 1/2 watt insulated type.		B-230063G94	1
S-501	Switch, s.p.s.t., toggle type.	C-24000	C-160037G4	
S-502	Switch, d.p.d.t., toggle type.	C-24003	C-160037G5	
S-503	Switch.		A-160064	
T-501	Transformer, audio input, center-tapped primary and secondary, d.c. resistance of primary (between terminals 1 and 3): 26 ohms; d.c. resistance of secondary (between terminals 4 and 6): 2000 ohms.	C-30765	B-320007	
T-502	Transformer, audio output, center-tapped primary, d.c. resistance of primary (between terminals 1 and 3): 104 ohms; d.c. resistance of secondary (between terminal 4 and 5): 0.57 ohms.	C-30766	B-330009	
X-501	Socket, octal base.	C-49351	A-180232	
S-502	Same as X-501.			
X-503	Same as X-501.			
V-501	35L6GT tube.			4
V-502	Same as V-501.			
V-503	35Z5GT tube.			2
L-S501	Loudspeaker. Conehead assembly.		16C10G2 16C11G2	

TYPE NUMBER 49131 TROUBLE SHOOTING NOTES

Difficulty Encountered

- Equipment Type 49131.--Speaker-amplifier unit failed due to exposure to the weather, resulting in the volume control potentiometer becoming disabled.
- Speaker-Amplifier Type 49131.--Damaged channel selector switch on model 49131 series speaker-amplifiers used with RBO systems.
- Speaker-Amplifier Type 49131.--Internal temperature of speaker-amplifier during operation melted solder seal on cap at terminal (lower) end of reactor case, allowing insulating tar to run out, leaving reactor loose in case. In two previous similar instances in other speaker-amplifiers on the ship, the reactor dropped out of the case, breaking the leads and causing failure of the unit.
- Speaker-Amplifier Type 49131.--Intermittent operation or dead.
- Speaker-Amplifier Type 49131-B.--On a-c power, a loud hum is noticed. No noticeable effect when on d-c.
- Speaker-Amplifier Type 49131.--Output very distorted and volume low.
- Speaker-Amplifier Type CMX 49131C.--Extreme 60-cycle hum and distortion noted. Normally this would indicate faulty capacitors.

Cause and Remedy

- To prevent future failure, a sheet metal hood has been installed over the unit and a canvas cover placed over the unit.
- Usually caused by crew members trying to find out what is on the other "censored" channels when the stop is set for 1, 2, or 3 channels as the case may be. After replacing or repairing switch, set the stop so that the knob can be turned to all 5 channels.
- As a temporary modification only, to preclude the possibility of this trouble recurring, the reactor was removed and replaced with a 250-ohm 2-watt composition resistor. No noticeable hum in the output with either a-c or d-c power supply. Equipment now operates satisfactorily.
- Check power and audio leads between terminal board and front panel. These frequently break or ground to shielding at the hinge joint.
- Wiring harness from input transformer to volume control was found to be faulty. At each spot where the individual shielded wires were soldered together, the insulation was damaged by the heat of the soldering iron. Replaced defective wiring.
- Found to be due to volume control R-501 and R-502 being damaged by oil leaking from oil filled components. Repaired by cleaning control with carbon tetrachloride and scraping away defective insulation.
- This trouble was caused by the dual potentiometer having its shaft broken between the two sections. This caused the lower section, R-501, to remain stationary while the upper section, R-502 rotated. The potentiometer was replaced and the equipment operated normally.

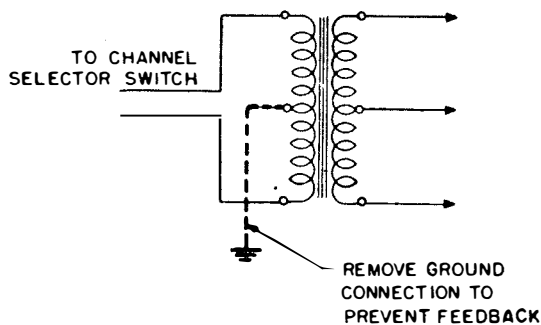
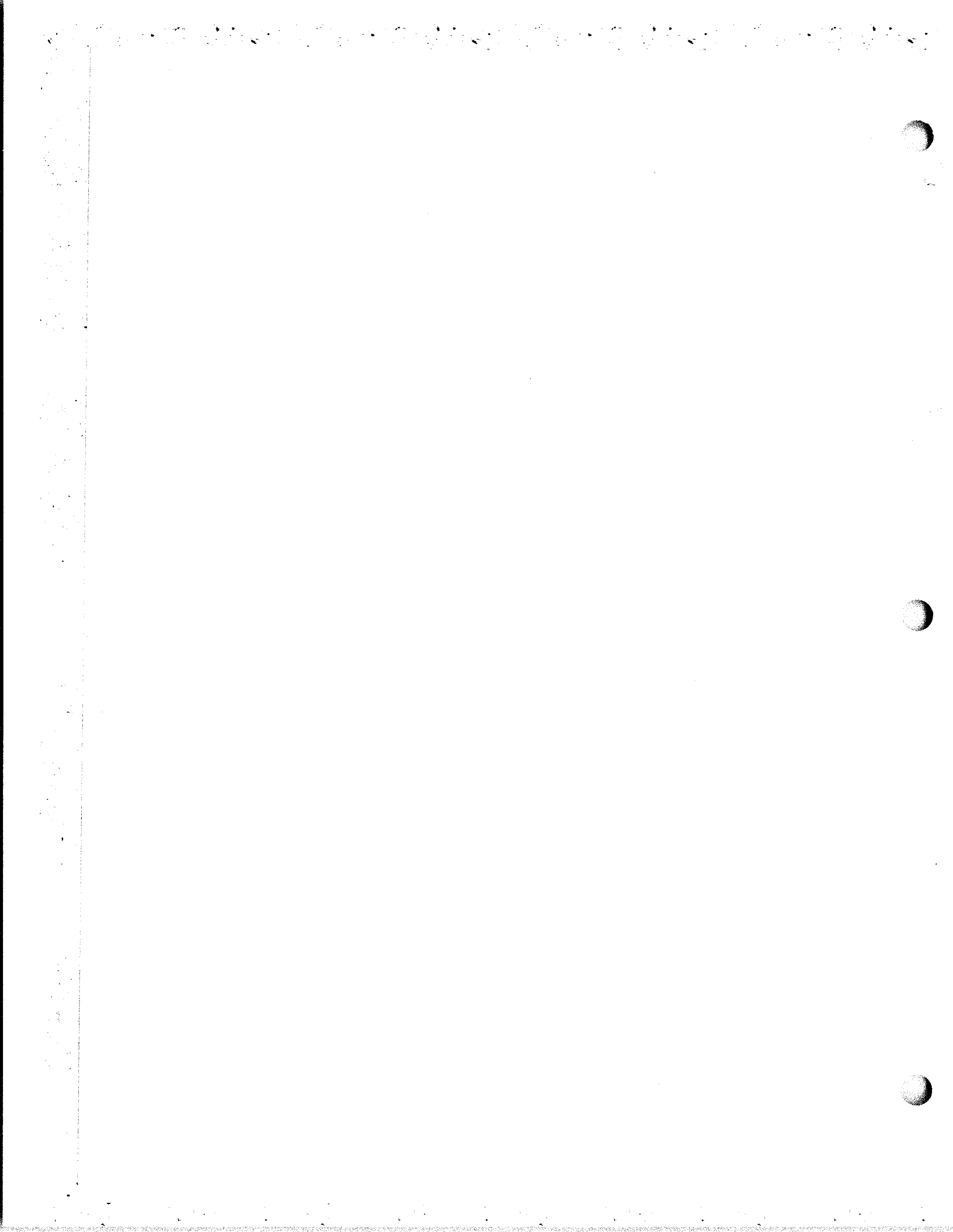


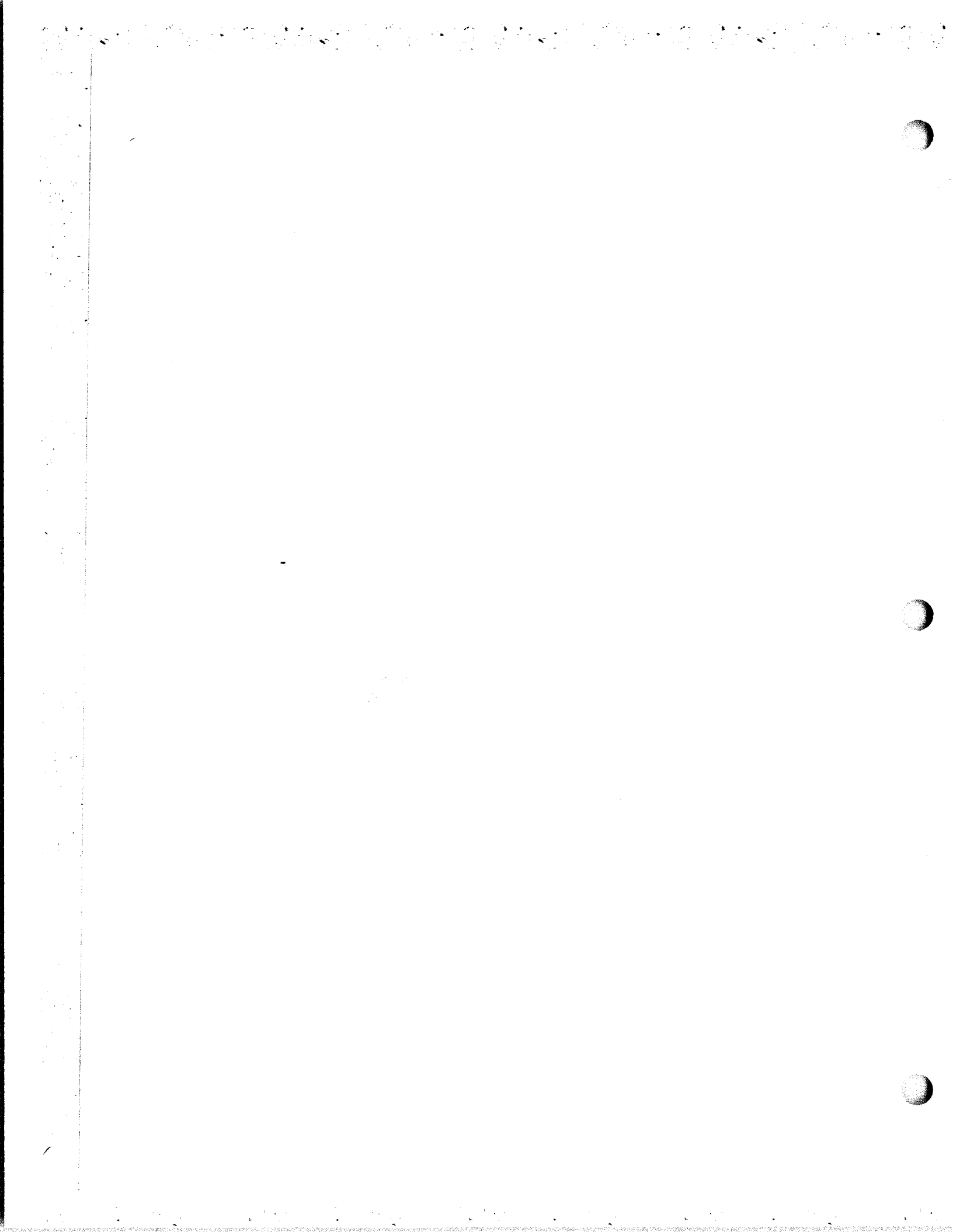
FIGURE 1.--The center-tap lead on the primary of input transformer should be removed



NAVY TYPE 49545 SPEAKER-AMPLIFIER POTENTIOMETER FAILURE

Attention has been directed to a potentiometer failure in the type 49545 (RBO) Speaker-Amplifier. The Bureau of Ships Electronic-Equipment, Failure Tabulation, Summary Report, indicated that potentiometer (R-106) in the type 49545 Speaker-Amplifier becomes defective when exposed to a moist atmosphere. Tests at the Material Laboratory, New York Naval Shipyard, have substantiated the above report. The following repair should be accomplished at the earliest opportunity by maintenance personnel of the activity or vessel to which the affected equipment is assigned.

1. Replace R-106 resistor potentiometer with a similar standard component, N5905-108-9795.
2. Make pen-and-ink correction in the Technical Manual, NAVSHIPS 900,853, Tables 6-1 and 6-3. Delete Navy designation - 634809-20 and insert N5905-108-9795.



SPEAKER-AMPLIFIER TYPE 49620 UNITS

The production of series Speaker-Amplifier Units Type 49131 has ceased and deliveries of this specific unit have been completed. The Speaker-Amplifier Type 49620 units will be furnished for an interim period and shall be used, in lieu of the 49131 series, to fill shipboard allowances.

The design of the Speaker-Amplifier 49131C unit has been slightly modified to accommodate an improved type of speaker unit and will hereafter be identified by the Navy type number 49620. The over-all and mounting dimensions of the 49620 units are identical to those of the 49131C units and they can be installed in any locations or on any existing mounting brackets which have been planned or prepared for the older units. The wiring diagram and parts list are shown in figures 1 and 2.

The Speaker-Amplifier Units Type 49620 do not have blastproof and waterproof speaker cones. These features were waived in this interim unit in favor of improved operation. This fact should be considered when selecting locations for the new units.

The Speaker-Amplifier Type 49620 is considered to be a stop-gap unit and will be discontinued when more suitable units now under development become available. This unit

is intended, primarily, for use on the broadcast entertainment circuit pending availability of the completely new Speaker-Amplifier Unit Type 49545 which will be standard for this circuit; however, due to the unavailability of the new type 50210 amplifier, for use with the type 49546 speaker, it will be necessary also to install the unit on communication circuits in the meantime. Therefore, the 49620 becomes an interim speaker-amplifier for both communication and broadcast entertainment circuits.

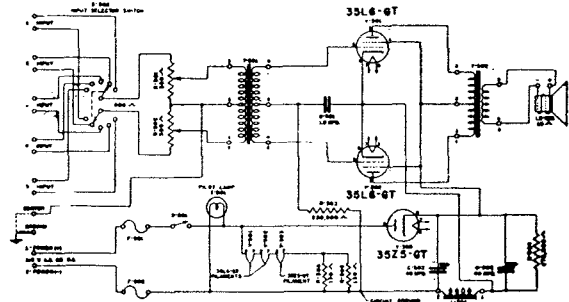


FIGURE 1.--Speaker-amplifier 49620

Schematic symbol	Description	Navy type No.	Magnavox Co. dwg. and part No.	Quantities of spares furnished
C-501	Capacitor, 1.0 mfd. ± 10 percent, 400 v.	C-48595A	16A114-G1	1
C-502	Capacitor, dry electrolytic F.P., 40 mfd., 400 v.d.c.	C-482292	16B10-G1	2
C-503	Same as C-502			
F-501	Fuse, cartridge, 1.0 amp., 250 v.		M-600-G1	40
F-502	Same as F-501			
I-501	Pilot lamp assembly.			
	Socket, candelabra, screw base.		16A83-G1	1
	Lamp, candelabra screw, 115 v., 0.1 a.	CS-5/17	M-603-G1	2
	Reflector, red jewel.		16C45-G1	1
L-501	Reactor, plate filter, 2000 ohms impedance at 60 c.p.s.	C-30764	16A124-G1	1
R-501	Potentiometer, dual-section, each section 300 ohms	CMA632148		
R-502	± 10 percent, wire wound.	CTC632175	16C46-G1	1
		CMC632176		
R-503	Resistor, 220,000 ohms ± 10 percent, 1/2 watt, insulated type.		16A110-G1	1
R-504	Resistor, 470,000 ohms ± 10 percent, 1/2 watt, insulated type.		16A110-G2	1
R-505	Resistor, 130 ohms ± 10 percent, 1 watt, insulated type.		16A126-G1	1
R-506	Same as R-505.			
V-501	Tube, amplifier, Type 35L6-GT.			4
V-502	Same as V-501			
V-503	Tube, rectifier, Type 35Z5-GT.			2
X-501	Socket, octal base tube.	C-49351	16A111-G1	2
X-502	Same as X-501.			
X-503	Same as X-501.			
S-501	Switch, s.p.s.t., toggle type.	C-24000	16C47-G1	1
S-502	Switch, 2 circuit, 5 positions.		16C48-G1	1

Schematic symbol	Description	Navy type No.	Magnavox Co. dwg. and part No.	Quantities of spares furnished
T-501	Transformer, audio input, center-tapped primary and secondary, d.c. resistance of primary (between terminals 1 and 3): 29 ohms; d.c. resistance of secondary (between terminals 4 and 6): 1884 ohms.	C-301307	16A122-G2	1
T-502	Transformer, audio output, center-tapped primary, d.c. resistance of primary (between terminals 1 and 3): 104 ohms; d.c. resistance of secondary (between terminals 4 and 5): 0.57 ohm.	C-301308	16A123-G2	1
LS-501	Loudspeaker.		16B11-G1	1

HANDSET NT-51007A NOISE--CANCELLING ADAPTER

The Electronics Supply Office has procured a quantity of noise-cancelling adapters for the NT-51007A standard shipboard handset. This adapter, complete with instructions for replacement of the existing microphone element, permits speech to be transmitted clearly while neutralizing unwanted noises. The noise-cancelling adapter which is stocked under FSN N5965-567-7442, provides excellent anti-feedback characteristics.

The Bureau of Ships is currently investigating an NT-51007A handset replacement. This new handset will be a noise-cancelling dynamic microphone and receiver type having a built-in transistorized pre-amplifier. It will be interchangeable with existing handsets as used with Radio Remote Control Units C-1138 ()/UR and C-1207/UR. In the near future, all carbon type microphones, handsets and chest-sets will be replaced with dynamic types for the improvement in audio fidelity. A concurrent investigation is being made for a headset-microphone assembly designed to replace existing bulky and heavy chest sets.

NOISE-CANCELING, DYNAMIC HANDSET H-169/U AND FIELD CHANGE KIT FOR NT-51007A HANDSET

The Bureau of Ships is presently procuring the Single-Sideband Transceiver AN/URC-32 and Transmitter AN/WRT-2. These equipments are being provided with a Noise-Canceling, Dynamic-Type Handset H-169/U and cord CX-1846/U mounted on the front panel.

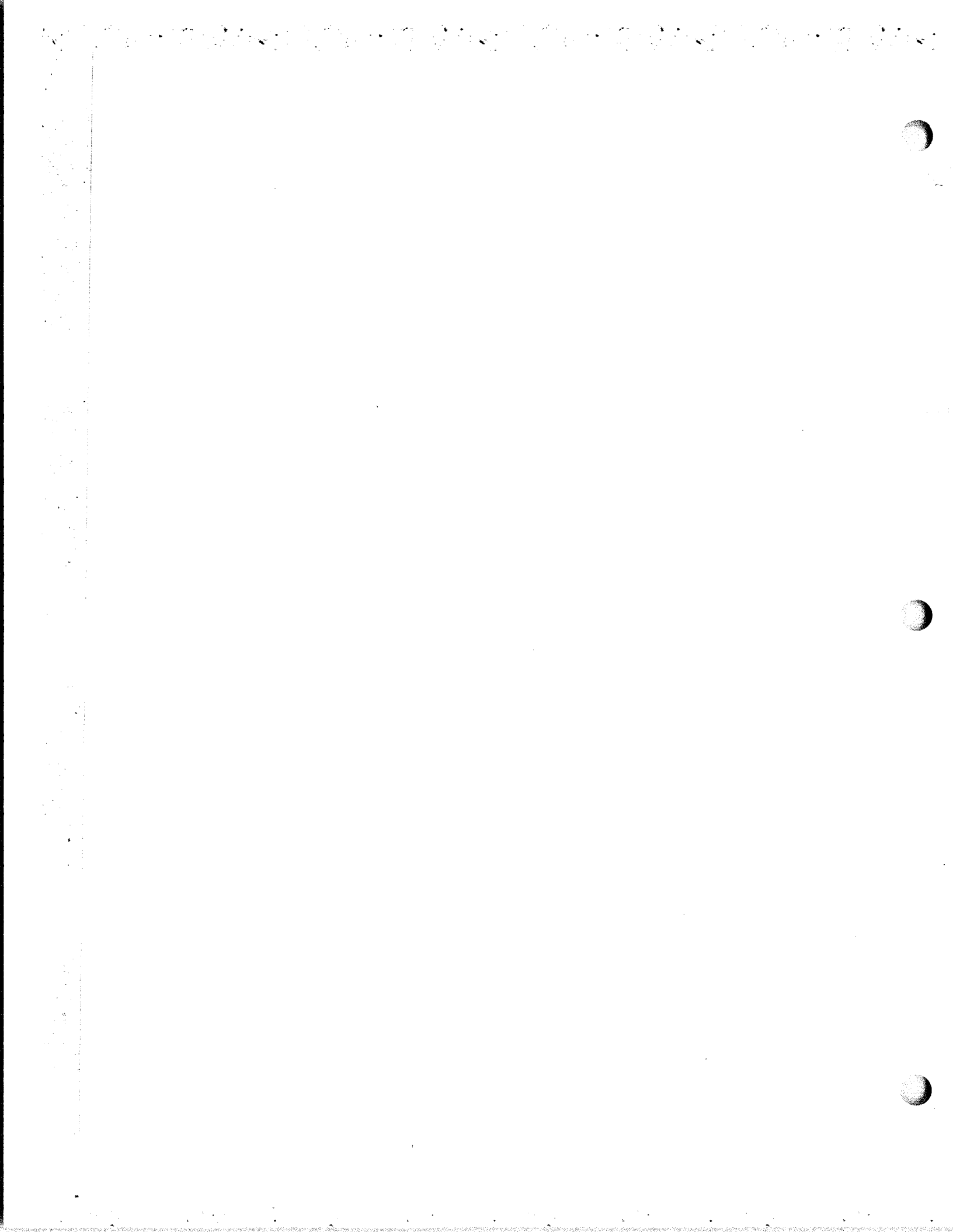
The H-169/U is essentially a NT-51007A type handset with the carbon-microphone element replaced with a dynamic element, a transistorized pre-amplifier, a noise-canceling mouthpiece, and a dynamic-receiver element.

The Bureau is currently procuring a field change kit for the existing NT-51007A handsets to modify them as equivalents to the H-169/U (See EIB 486). These field change kits are not expected to be available until approximately July 1959.

Through the field change to the NT-51007A and the use of the H-169/U dynamic-type hand sets, improved audio fidelity will be achieved with a resultant improvement in communications.

H-169/U and NT-51007A--Modification of Handsets

See article in H-169/U section under the same title. (631)



28 Foot Navy Type C-66046 and 35 Foot Navy Type C-66047 Non-Telescopic Whip Antennas-- Ordering Information

Many discrepancies, found during inspections of 28 foot and 35 foot whip antennas, could be corrected by replacing components of the antenna. In most cases, ships and stations have had to replace the entire antenna due to the extreme difficulty in obtaining component federal stock numbers.

ETCS Dan C. Trusty of Mobile Technical Unit EIGHT has researched the stock numbers and prepared the following pictorial identification sheets.

Note that two parts do not have federal stock numbers. They must be ordered direct from ESO by referencing the BUSHIPS print of the antenna as shown. (791, 854)

NON-TELESCOPIC WHIP ANTENNA

28 FT. NAVY TYPE C-66046
REF BUSHIPS PRINT NO. RE66F499

COMPLETE WHIP ASSEMBLY WITH BASE ADAPTOR
2N5985-369-5530

COMPLETE BASE ADAPTER
9N5985-568-2342

BASE ADAPTER

NOTE 1 ORDER FROM ESO
PART NO. 17 of BUSHIPS
PRINT NO. RE66F499

NOTE 2 ORDER FROM ESO
PART NO. 2 of BUSHIPS
PRINT NO. RE66F499

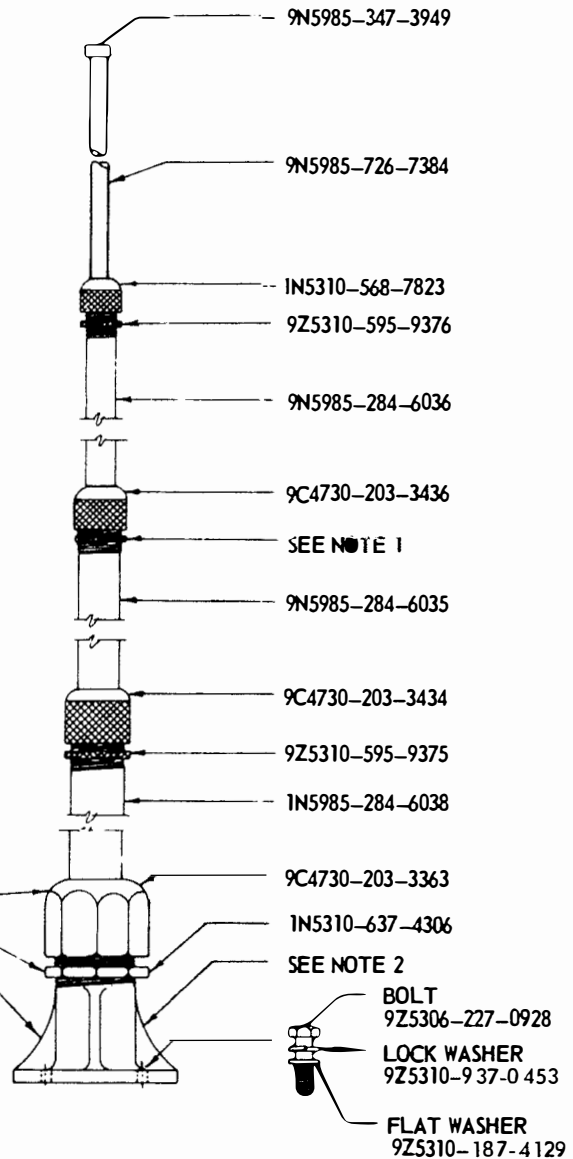


Figure 1. Parts Identification, 28 Ft. Whip Antenna, Navy Type C-66046.

NON-TELESCOPIC WHIP ANTENNA

35 FT. NAVY TYPE C-66047
REF. BUSHIPS PRINT NO. RE 66F499

COMPLETE WHIP ASSEMBLY
WITH BASE ADAPTOR
2N5985-369-5532

COMPLETE BASE ADAPTER
9N5985-636-4835

NOTE 1 - MUST BE ORDERED FROM ESO
PART NO. 17 of BUSHIPS
PRINT NO. RE 66F499

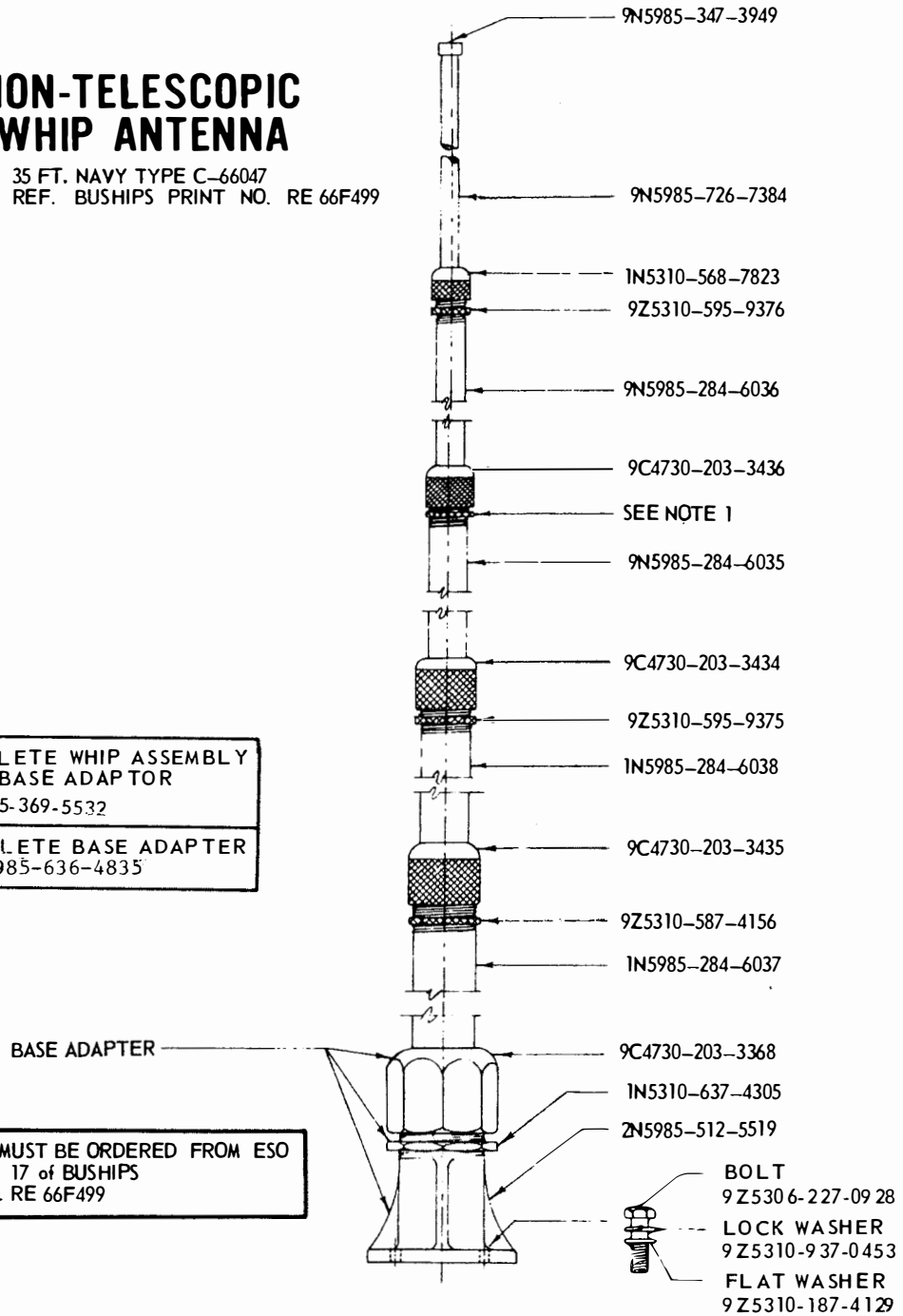
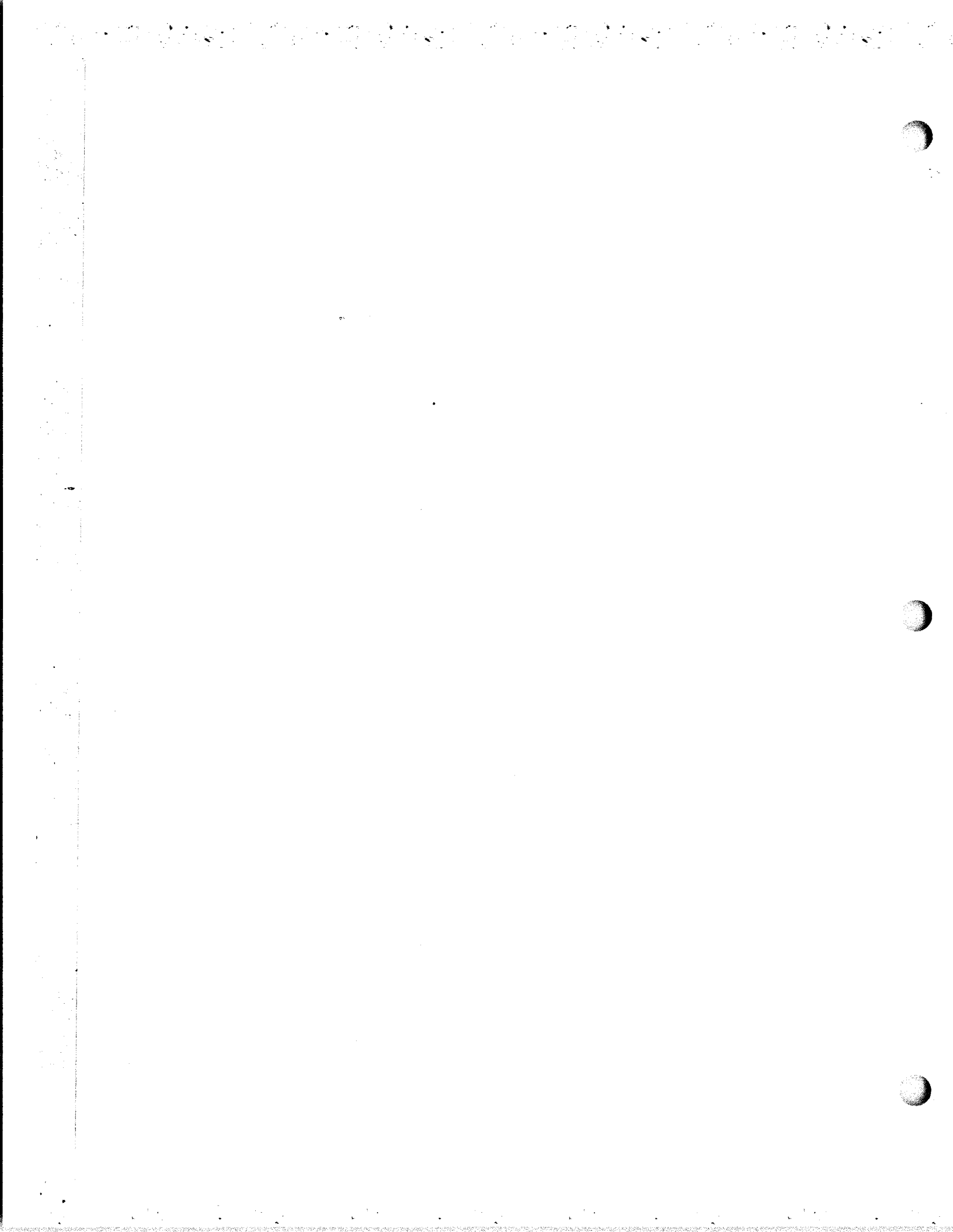


Figure 2. Parts Identification, 35 Ft. Whip Antenna, Navy Type C-66047.

IMPROVEMENT IN THE TYPE COA-66089 ANTENNA SYSTEMS

Failure of the type COA-66089 antenna system (used with model TBY equipment) due to leakage of water into the box at the base of the vertical radiator has been reported. This difficulty may be overcome by the following means:

- (1) Disassemble the antenna rod, Lucite insulator and Lucite washer.
- (2) Cut a rubber gasket one inch in diameter which will fit around the shoulder on the bottom of the lucite antenna insulator (this requires a 3/4" hole in the center).
- (3) Coat the inside and bottom of the Lucite insulator with Glyptol, also the top of the inside lucite washer, and assemble with the rubber gasket, placing a coating of Glyptol between the rubber washer and the metal box.
- (4) Make sure that a flat washer and a lock washer are used under the nut on the end of the antenna, and that the nut is drawn up tight.
- (5) Put a ridge of Glyptol around the junction between the antenna rod and the top of the Lucite insulator, and a ridge of Glyptol around the junction between the metal box and the bottom of the Lucite insulator. This insures a water-tight seal around the two possible entrances for moisture.



ANTENNA REMINDER--Antenna NT-66095

In EIB No. 413, page 3, there is a statement to the effect that broken bellows in type 66095 antenna should be repaired by an exact replacement. The Electronic Supply Office, Great Lakes, Illinois, now has in stock a quantity of 125 replacement bellows for the type 66095. The bellows are stocked under SNSN N16-B-230001-133.

Failure of the bellows (located at the end of the center rod of the matching unit) in NT-66095 Antenna, requires exact replacement. This bellows was originally installed to compensate for expansion of the center conductor. If a rigid piece is substituted for the bellows, there is no compensation for expansion.

The original bellows was made by Fulton Sylphon Division of the Rober Shaw Fulton Controls Company, Knoxville, Tennessee; drawing 107681-8.

