



(UNCLASSIFIED)

ELECTRONICS FIELD CHANGE BULLETIN	AN/FRT-39
BUREAU OF SHIPS, NAVY DEPARTMENT	AN/FRT-40
WASHINGTON, D. C.	AN/FRT-62

TYPE (I) CLASS (A)	OPERATIONAL CHANGE (X)
ESTIMATED MANHOURS ( )	NON-OPERATIONAL CHANGE ( )

Prepared by  
(Technical Materiel Corporation)  
(Contract N600 (63133-11-126)63002)

**AUTHORIZATION NOTICE:** Forces afloat or station personnel shall accomplish this field change at the earliest opportunity on ship- or shore-installed equipment affected without reference to the Bureau of Ships.

**EQUIPMENT AFFECTED:** AN/FRT-39; AN/FRT-40; and AN/FRT-62.

**PURPOSE:** This modification provides remote on/off control of the transmitter carrier. In addition, the unit provides an indication of transmitter status by means of signals to a display board located at the transmitter monitor control console or elsewhere at the transmitter site. In order to accomplish this modification, Tone Intelligence Unit Model TIS-3 is physically replaced by Transmitter Keyer Monitor Control Unit, Model KMCU-1. Tone Intelligence Unit TIS-3 will be relocated to the CCL facilities at the transmitter site or to some other remote location.

**PREVIOUS FIELD CHANGES:** No previous field changes need be accomplished prior to the installation of this field change.

**EFFECT ON NOMENCLATURE:** None

JUNE 1965

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IDENTIFICATION OF ACCOMPLISHMENT: The components of this modification are listed in the list of materials required. Figure 1 indicates the physical placement of the KMCU. Figure 2 illustrates the major assembly, the KMCU, in this modification.

LIST OF MATERIAL REQUIRED: Table 1 lists material supplied with the field change kit.

Table 1. Material supplied with the field change kit.

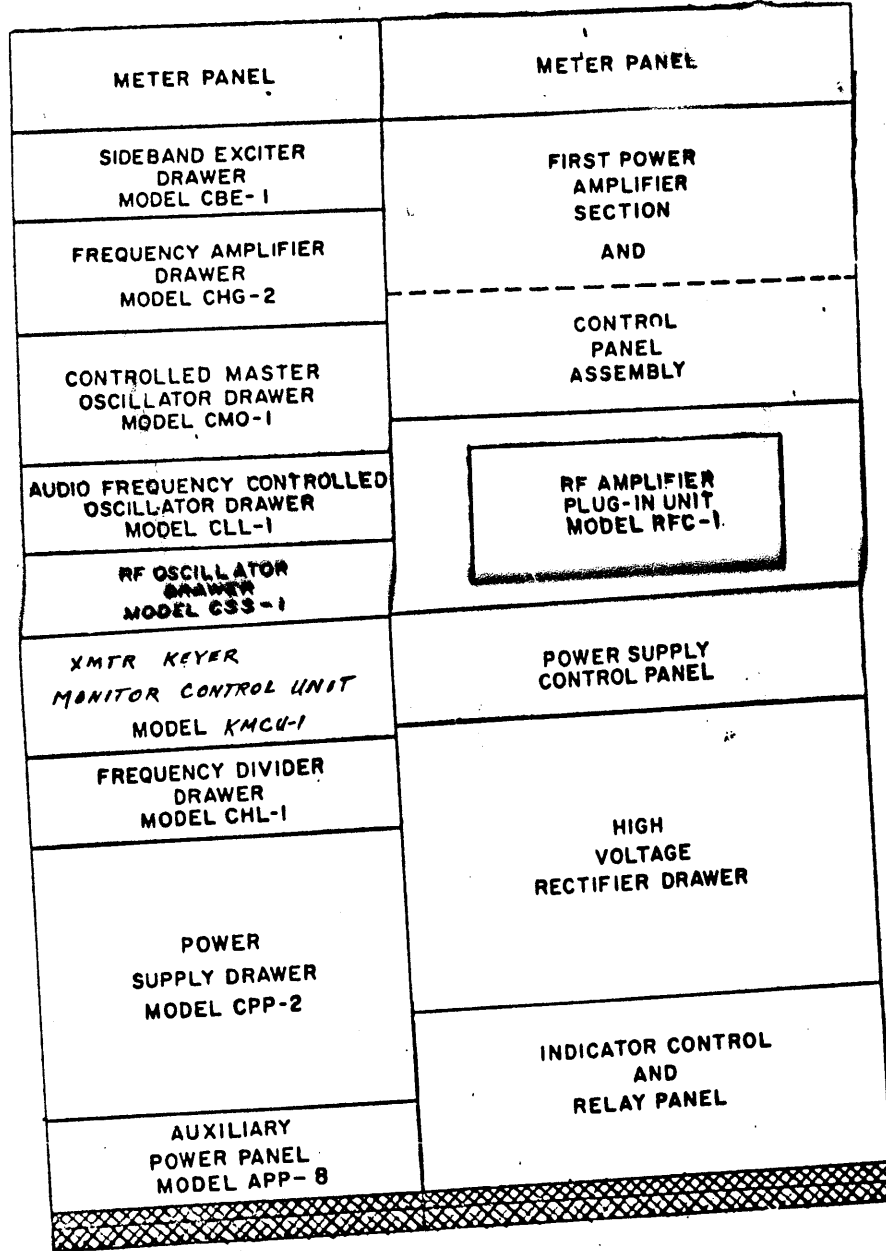
<u>ITEM</u>	<u>QTY.</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>
1	1		DRILL BIT 9/64"
2	1		DRILL BIT 5/16"
3	1		DRILL BIT 3/8"
4	1		DRILL BIT NO. 36
5	1		TAP, 0632 UNC
6	1		PUNCH, CHASSIS, 11/16"
7	1		PUNCH, CHASSIS, 1-5/16"
8	1	TP131-1-J1010	STAMP
9	1	TP131-1-J2708	"
10	1	TP131-1-P3054	"
11	1	TP131-1-E3001	"
12	1	TP131-2-COM	"
13	1	<del>TP131-2-FAIL</del>	"
14	1	TP131-1-ON-AIR	"
15	1	TP131-1-READY	"
16	1	CA1028	WIRING HARNESS, BRANCHED
17	1	CA1029	" " "
18	1	CA1030	" " "
19	1	CA1031	" " "
20	42"	RG174/U	CABLE RF, COAXIAL
21	60"	RG188/U	" "
22	9"	WL100-4	WIRE BUSS, SIZE 16
23	6"	WL100-7	" " " 22
24	18"	PX830-12-1	INSULATION, SLEEVING, SHRINK
25	1	TM100-8	TERMINAL STRIP
26	1	PX337-8	INSULATION
27	2	MS154-1	SADDLE PLATE
28	1	PL169	CONNECTOR, PLUG, COAXIAL
29	1	UG-492/U	ADAPTER, COAXIAL, FEED THRU
30	1	UG-274/U	" " "T"
31	1	LD1745/MS4267	COVER, TERMINAL STRIP
32	2	TE104-1	TERMINAL, LOCKING
33	7	CM20F102G	CAPACITOR, MICA
34	3	SCBPO440 BN5	SCREW, MACHINE
35	4	SCBPO440 BN6	" "
36	4	SCBPO440BN10	" "
37	2	SCBPO632 BN6	" "
38	9	LWEO4MRN	LOCKWASHER, EXTERNAL
39	2	LWEO6MRN	" "
40	11	NTHO440 BN6	NUT, HEX HEAD

Table 1. Material supplied with the field change kit (cont).

<u>ITEMS</u>	<u>QTY.</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>
41	1	KMCU-1	KEYER, MONITOR CONTROL UNIT
42	1	CA581	CABLE, POWER
43	2	NP362-25	NAMEPLATE, MODIFICATION KIT 224
44	1	NP360-5	" " RFG-1A
45	1	NP360-6	" " CHG-2B
46	1	CU161	CLAMP, HOLD DOWN
47	1	CM15C200J	CAPACITOR, MICA, 20 uuf.
48	1	RC32GF471K	RESISTOR, COMP., 470 ohm, 1w.
49	1	RC20GF121K	RESISTOR, COMP., 120 ohm.
50	1	TP131-2-1/2	STAMP
51	1	TP131-2-3/4	"
52	1	TP131-2-5/6	"
53	1	TP131-2-7/8	"
54	1	TP131-1-C3019	"
55	1	TP131-1-C3020	"
56	1	TP131-1-C3021	"
57	1	TP131-1-C3022	"
58	1	TP131-1-C3023	"
59	1	<del>TP131-1-C3024</del>	"
60	1	TP131-1-C3026	"
61	1	TP131-2-GND	"

TOOLS AND TEST EQUIPMENT: Table 2 lists the tools required by the installing activity to perform this modification; no test equipment is required. Since these tools are non-specialized, they are not provided.

1. Screwdrivers, flat blade, assorted sizes.
2. Screwdrivers, Phillips ", assorted sizes.
3. Soldering Iron (100 watt type) 2 feet solder, (rosin core).
4. ELECTRIC DRILL, 3/8" chuck capacity.
5. 6" Pliers, longnose.
6. 6" Pliers, diagonal.

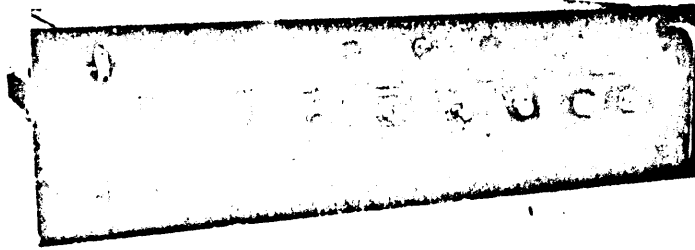


-FIRST FRAME-

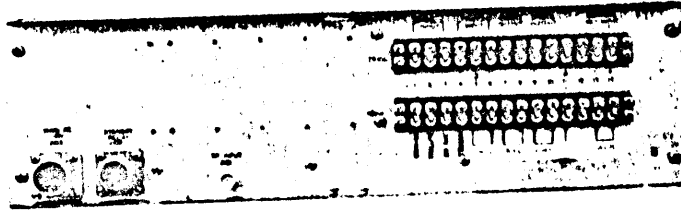
-SECOND FRAME-

-FRONT-

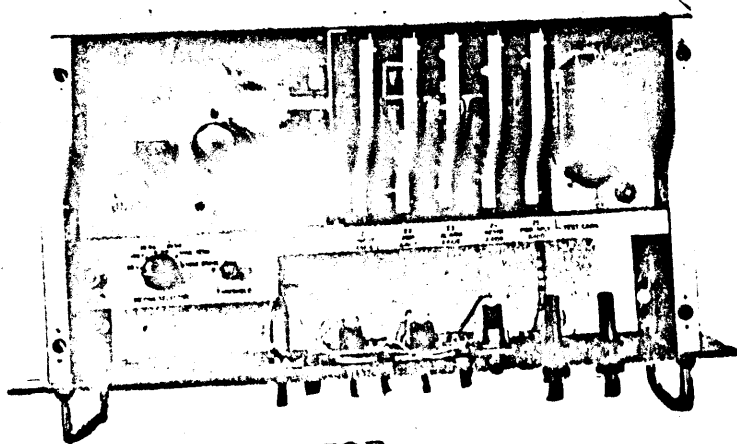
Figure 1



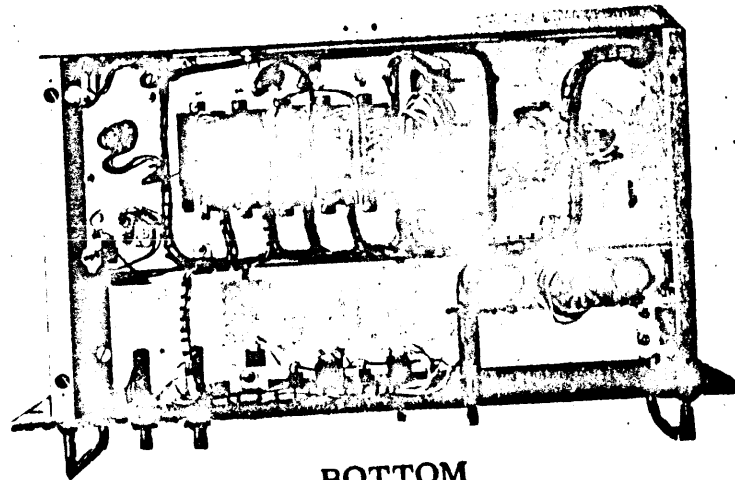
FRONT



REAR



TOP



BOTTOM

Figure 2

(UNCLASSIFIED)

PROCEDURE: The following procedure is for modifying the transmitter. Materials required for this procedure are listed in Table 1. Tools and test equipment required are listed in Table 2. Should further data or illustrative reference be required, refer to the appropriate equipment manual.

1. MODIFICATION OF THE RFC-1.

THIS MODIFICATION CHANGES THE MODEL NUMBER TO RFC-1A

- (a) Remove the RFC-1, IPA, and the AX-104, (IPA Power supply) from the main frame. Remove the RFC-1 from the AX-104. Remove the dust covers from the RFC-1.
- (b) On the underside of the RFC-1, remove the screws securing the component board, A-1607. This is the board on which R-202 is mounted. On the underside of the board, remove the ground lead on R-202 and the jumper between R-202 and C-220. Solder the ground lead to C-220. Using the RG-188/U, strip the cover 3". Cut a 1" piece of No. 12 shrink tubing and slip the tubing over RG-188. Remove the center conductor from the shield at the cover cut. Center the shrink tubing over the break and shrink. Solder the center conductor to R-202 and ground the shield. Dress the RG-188/U to match the breakouts of the main cable. Lace the RG-188 to the main harness connected to P-201. Secure the component board.
- (c) Open P-201. Cut the RG-188/U to the same length as the other wires. Cut the cover back 1". Cut a 1" piece of No. 12 shrink tubing and slip on to the RG-188. Remove the center conductor from the shield. Position the shrink tubing to cover the break and shrink. Cut two 1/2" pieces of No. 12 shrink tubing. Slip these on the center conductor and the shield. Solder the center conductor to Pin "h" and the shield to Pin "j". Slip the shrink tubing over the pins and shrink. Reassemble the plug.
- (d) Replace the covers.

This completes the modification of the RFC-1.

2. MODIFICATION OF 10-kw PA.

- (a) Remove rear shield of 10-kw PA.
- (b) Remove rear shield from V900 chassis.
- (c) Remove cover from r-f monitor board (located on right side wall of V900 chassis).
- (d) Remove resistors R902 and R903 from r-f monitor board.
- (e) Solder item 48 (470 ohm, 1 watt resistor) in circuit to replace old R902.
- (f) Solder item 49 (120 ohm resistor) in circuit to replace R903. New symbol designation is R917.
- (g) Solder item 47 (20 uuf mica capacitor) in parallel with capacitor (C908. Symbol designation of new 20 uuf capacitor is C954.
- (h) Replace cover of r-f monitor board and both rear shields.

3. MODIFICATION OF THE AX-104 IPA POWER SUPPLY.

- (a) Remove the dust covers from the AX-104.
- (b) Cut two 1" pieces and four 1/2" pieces of No. 12 shrink tubing. Slip a 1" piece of shrink tubing over the RG-188. Cut the cover back 1" and remove the center conductor from the shield. Center the shrink tubing over the break and shrink. On the underside of the unit, use two 1/2" pieces of shrink tubing and slip over the center conductor and shield of the trimmed end of the RG-188/U. On J-2001, solder the center conductor to Pin "h" and the shield to Pin "j". Slip the tubing over the pins, and shrink. Lace the RG-188 along th harness to J-2002. Trim the RG-188 to size and follow the above procedure to solder the center conductor to Pin "h" and the shield to Pin "j".
- (c) Replce the dust covers and install the RFC-1A.

This complete the modification of the AX-104.



4. MODIFICATION OF CA-431, JUMPER CABLE BETWEEN THE AX-104 AND THE MAIN FRAME.

- (a) Remove CA-431 from the main frame.
- (b) Cut two 1" pieces and four 1/2" pieces of No. 12 shrink tubing. Open P-1010 and P-1011 of CA-431. Use the procedures above and trim the end of the RG-174/U. Solder the center conductor to Pin "h" of one of the plugs. Lace the RG-174 along the cable and trim to length. Again using the above procedures trim and connect the RG-174/U to the same pin numbers.
- (c) Reassemble the plugs.

This completes the modification of CA-431.

Do not replace the units in the main frame.

5. MODIFICATION OF MS-3679, INTERFRAME SHIELD.

- (a) Mark MS-3679, using Figure 3 for dimensions.
- (b) Using the 9/64" drill bit, 3/8" drill bit and the 1-5/16" chassis punch, modify MS-3679 as shown in Figure 3.
- (c) Using the stamps provided, stamp J-1010 on both sides of the shield and P-3054 on the auxiliary frame side.

This completes the modification of M-3679.

6. INSTALLATION OF CA-1029, MAIN FRAME.

- (a) Starting from the rear of the main frame, near the J-1010 mounting hole in MS-3679, reoute the loose end of CA-1029 along the main cable, through all grommets and clamps, to the breakout for J-1001. Align the RG-174/U breakout of CA-1029 with the breakout for J-1001 on the main harness.

Using two 1/2" pieces of No. 12 shrink tubing over the leads, solder the center conductor to Pin "h" and the shield to Pin "j". Slide the tubing over the pins and shrink. Lace the RG-174 to the main breakout. Route the second breakout of CA-1029 along the main cable to the Tune-Operate switch

## 6. INSTALLATION OF CA-1029, MAIN FRAME (CONT).

on the control panel. Lace the two together. Solder the Violet wire to the Violet wire on the switch. Solder the White/Violet wire to the White/Violet wire on the switch. Lace the two cables together from J-1001 to J-1010. Leave enough slack near J-1010 to allow free positioning into the mounting hole. Using 4-3/8" 4-40 screws, lockwashers and nuts provided, mount J-1010 to MS-3679.

This completes the modification of the main frame.

Reconnect CA-431, and insert and reconnect the RFC-1A and AX-104 drawer.

## 7. MODIFICATION OF MS-2469, CENTER SHIELD.

- (a) Remove all the units from the front of the auxiliary frame.
- (b) Remove jumper wires between terminals 9 and 13 and between terminals 8 and 12, change lead from terminal 13 to 9, and terminal 12 to 8 on the fanning strip going to E-3000, on CA-826 or CA-571, whichever is applicable.
- (c) Mark MS-2469, using Figure 4 for dimensions. Using the 9/64" 5/16" and the No. 36 drill bits and the 0632 UNC Tap, modify MS-2469 as shown in Figure 4. Using the terminal strip, insulation paper, 2 saddle plates, 4-5/8" 4-40 screws, 4 nuts, 2 lock washers and 2 ground lugs, mount the terminal strip, identically as E3000 and E-3002 position on the center shield. Mount the UG-274/U "T" to the feed thru on the equipment side. Cut the removed J-3002, (JJ-172), from the cable. Connect the PL-169 to this cable. Connect this PL-169 to the "T" on the equipment side of the center shield, solder the No. 16 buss wire, to the ground lugs as is done on the other strips. To seven lugs of the strip, running consecutively right to left from No. 14 of E-3000, connect the 1000 MMFD capacitors. Connect the other end of the capacitors to the ground buss as is done on the other strips. To the eighth lug, connect a length of No. 22 buss wire to the ground buss. Position the connections on the terminal strip lugs to leave enough clearance to connect the cable in a following step. Using the stamps provided, stamp the center shield as shown in Figure 5.

This completes the modification of the center shield.

8. INSTALLATION OF CA-1030, AUXILIARY FRAME, REAR

- (a) Connect P-3054 of CA-1030 to J-1010 on the side shield. Route and lace CA-1030 along the main harness to the fanning strip for E-3000. Connect the fanning strip of CA-1030 to E-3001. Using 2 3/8" 0632 screws and lockwashers, secure the fanning strip cover, MS-4258, to the center shield. Remove the jumper across the CMO key line if present.

This completes the modification of the auxiliary frame.

9. INSTALLATION OF CA-1031, AUXILIARY FRAME FRONT.

- (a) Align the center shield breakout of CA-1031 with the center shield breakout of the main cable. Lace the two center shield breakouts together. Connect and solder the leads as shown in Figure 6. Along the main cable, lace the KMCU breakout to the cable as far as the TIS breakout. Do not lace the KMCU and TIS breakouts. Lace the CHG breakout along the main cable and the CHG original breakout. Leave enough slack at the plug to allow free movement during connection.

This completes the modification of the auxiliary frame front.

10. MODIFICATION OF THE CHG-2A.

THIS MODIFICATION CHANGES THE MODEL NUMBER TO CHG-2B

- (a) Remove dust covers from the CHG.
- (b) Mark the main chassis as shown in Figure 7. Using the 9/64, 3/8 drill bits and the 11/16 punch, modify the chassis as shown on Figure 7. Use extreme care during this portion as the internal wiring is in close proximity to the holes. Using the stamp provided, stamp J-2708 on both sides of the chassis.
- (c) Using three 5/16" 4-40 screws, nuts and lockwashers,

10. MODIFICATION OF THE CHG-2A (CONTD).

mount the JJ-119-2 of CA-1028 internally and CU161 externally. Route the cable along the main harness and lace. Connect the orange wire to the orange wire on C-2773. Route and lace the white / orange wire under the tube and along the main harness to the B<sup>+</sup> switch. Connect the white/orange wire to the junction of the switch and the coil, L-2101.

(d) Replace the dust covers.

This completes the modification of all the units.

11. Replace all units in the auxiliary frame with the exception that the KMCU-1 replaces the TIS-3A. The fanning strip of the original cable now goes to TB-101 of the KMCU-1.

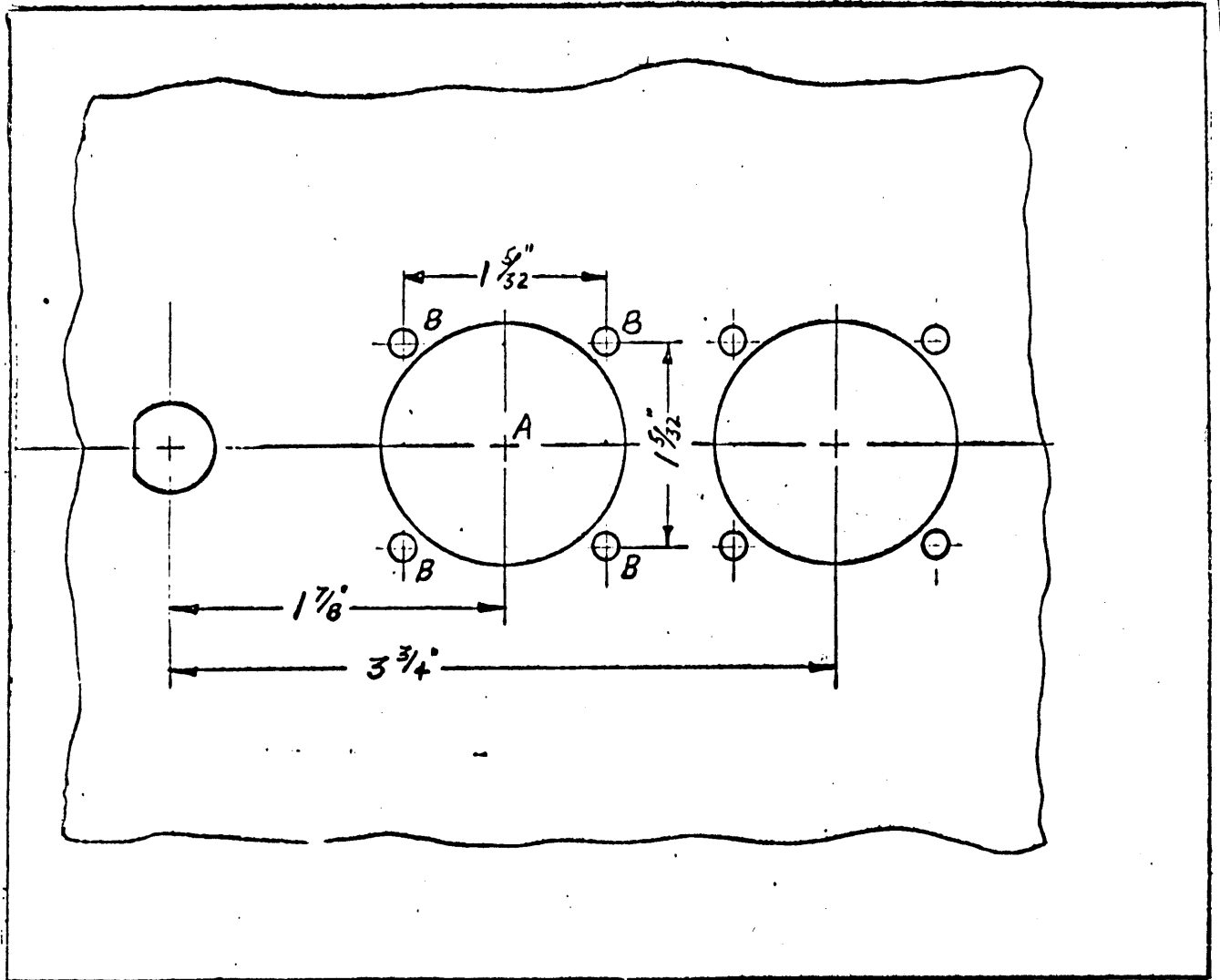
No modification is necessary on this breakout.

12. Apply Kit Modification Name Plate to the AX-104 and the Relay Panel Cover. Apply the RFC-1A and CHG-2B Modification Name Plates to the appropriate equipments.

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AN/FRT-39  
AN/FRT-40  
AN/FRT-62

FIGURE 3



A - 1  $\frac{5}{16}$ " DIA. 1 REQ.

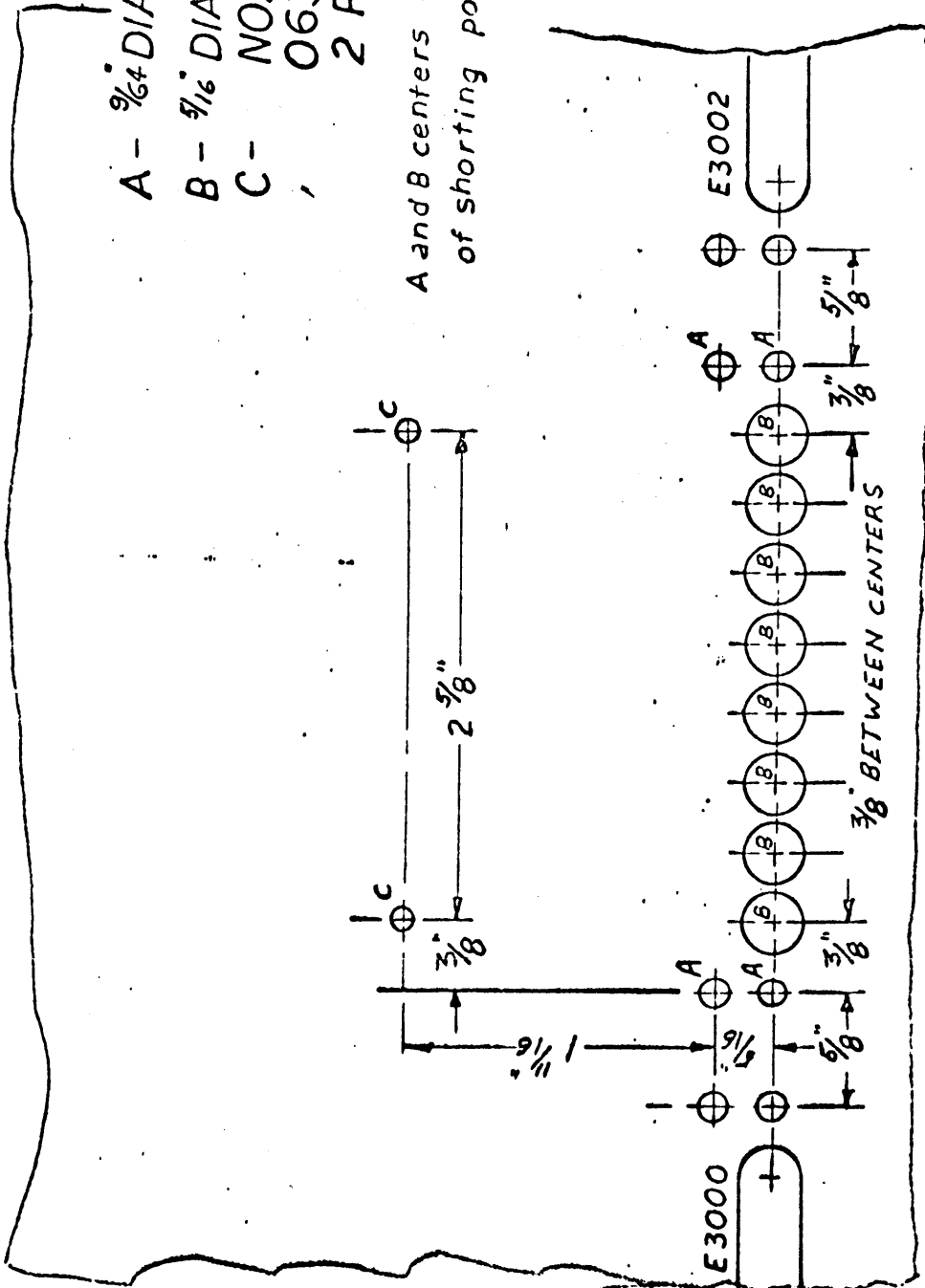
B -  $\frac{9}{64}$ " DIA. 4 REQ.

MODIFICATION OF MS3679

FIGURE 4

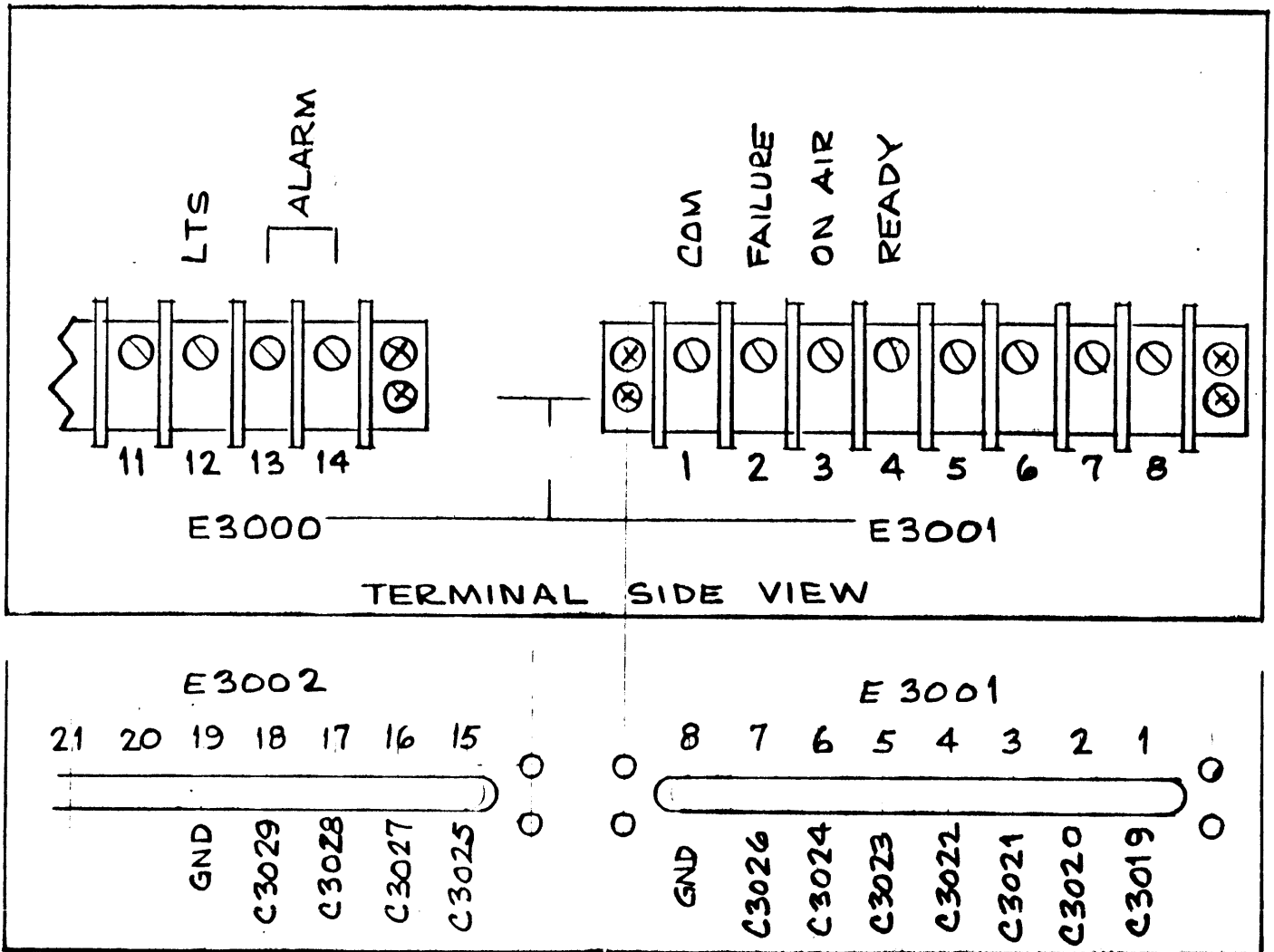
- A -  $\frac{9}{16}$ " DIA. 4 REQ.
- B -  $\frac{5}{16}$ " DIA. 8 REQ.
- C - NO. 36 BIT  
0632 UNC TAP  
2 REQ.

A and B centers critical because of shorting possibility.



MODIFICATION OF MS 2469

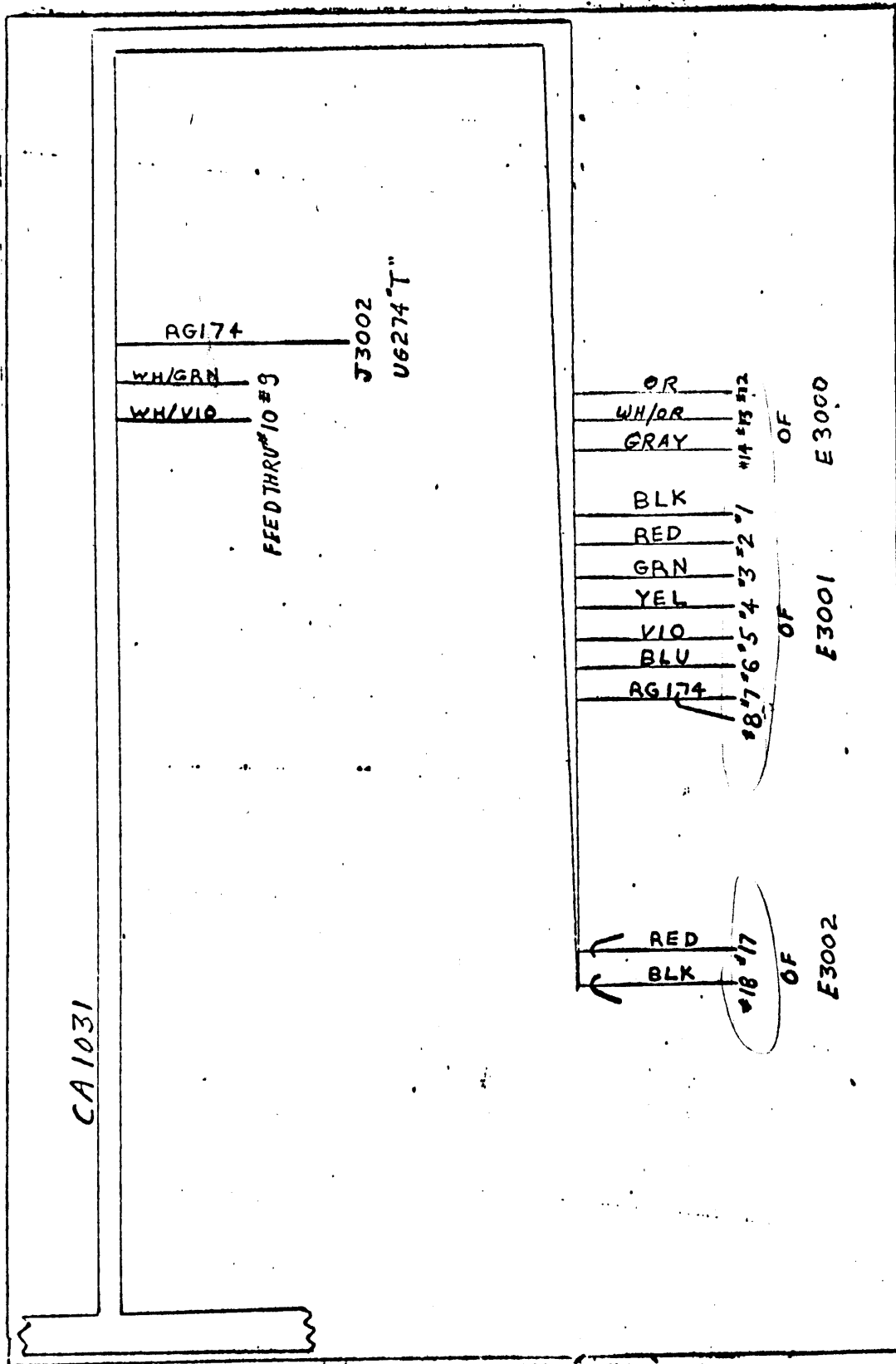
FIGURE 5



EQUIPMENT SIDE VIEW

LETTERING MS 2469

FIGURE 6



CA1031

CA1031 INSTALLATION





TEMPORARY CORRECTION TO TECHNICAL MANUAL FOR RADIO  
TRANSMITTING SETS AN/FRT-39, AN/FRT-40, and  
AN/FRT-62

This temporary correction revises the AN/FRT-39, -40, and -62 manuals to reflect equipment modification as a result of the KMCU-1 field change. The purpose of this field change is to provide remote on/off control of the transmitter carrier. In addition this field change provides an indication of transmitter status by means of signals to a display board located at the CCL facilities or elsewhere at the transmitter site.

When this change is included in the manual, the manual shall cover the equipment as though the KMCU-1 field change had been accomplished on the equipment. This correction does not supersede any other corrections or changes.

Maintenance Support Activities shall make this correction in the technical manual immediately but shall keep the superseded data intact for support of equipments that have not been modified.

Holders of equipment accompanied by technical manuals shall not make this correction in the manual until accomplishment of the field change.

Make the following corrections. Insert these temporary corrections in the technical manual immediately after the front cover and preceding T-3.

Modification of the AN/FRT-39, AN/FRT-40, or AN/FRT-62 transmitters to include Transmitter Keyer-Monitor-Control Unit, Model KMCU-1 necessitates changes and/or additions to the appropriate instruction manuals as indicated in paragraphs 1, 2 and 3 below. In addition to the changes given below, the instruction manual for Tone Intelligence Unit, Model TIS-3 should be removed from Volume 1S (Sideband Generator, Model SBG) and should be replaced by the KMCU-1 instruction manual.

NOTE

The KMCU-1 instruction manual is a preliminary document. The final printed manual will be provided (when it is available) with the KMCU-1 modification kit.

1. OPERATOR'S MANUAL. Section 3 of the operator's manual should be amended in accordance with the following information:

- (a) Start the transmitter as described in the applicable manual.
- (b) Before tuning the exciter on carrier as outlined in paragraph 3-5, set KMCU-1 controls as indicated below:

<u>CONTROL</u>	<u>POSITION</u>
POWER switch	ON
KEYING SELECTOR	To correspond with keying source.
CARRIER	ON (switch is self-locking in this position).

NOTE

In order for the KMCU-1 to perform its intended keying functions, the B<sup>+</sup> switch located on Frequency Amplifier CHG must be left in the OFF position when tuning the exciter and transmitter power amplifiers as indicated in step c below.

- (c) Complete the exciter and transmitter power amplifier tune-up procedures as outlined in Section 3 of the manual.
- (d) Upon completion of step c above, momentarily depress CARRIER switch on KMCU. The switch will automatically assume its off (center) position. It will be noted that the B<sup>+</sup> light on the CHG goes off, and that PA screen grid voltage decreases to 600v. Apply keying signals to the transmitter thru associated traffic control matrix on patch panel. Adjust THRESHOLD control on KMCU for proper keying of transmitter. The B<sup>+</sup> light on the CHG will light, and PA screen voltage will rise during "key-down" periods. Rotate the HOLD IN ADJ control on the KMCU to maintain 1200v PA screen voltage during momentary breaks in keying as will occur between characters and words. Do not rotate THRESHOLD control cw beyond the position where reasonably bias-free keying is obtained.
- (e) The Tone Intelligence Unit, Model TIS-3, removed from the transmitter, may be relocated at a remote transmitter control facility or may be incorporated in the CCL facilities at the transmitter site. For operation of this unit, refer to the appropriate instruction manual.

2. MAINTENANCE MANUAL. - The maintenance manual should be changed as indicated in paragraphs a and b below.

a. PRINCIPLES OF OPERATION. - Refer to Section 6 (Schematic Diagrams) of the applicable transmitter instruction manual and the KMCU instruction manual. The principles of operation given in Section 2 of the maintenance manual should be amended to include the following.

Contacts 5 and 6 of relay KI in the KMCU are connected to the Controlled Master Oscillator CMO key line. Contacts 1 and 2 are connected between the bias voltage divider network for RF amplifiers V201 and V202, and ground. When KI is deenergized (key-up condition), the cathode of V305 (rf power amplifier in the CMO) is opened, and high bias (-150v) is applied to V201 and V202 in the IPA drawer. When the normal keying signal is applied to the transmitter, KI closes, completing the cathode circuit of the i-f power amplifier in the CMO, and normalizing the bias voltages for V201 and V202.

Contacts 2 and 3 of relay K2 in the KMCU are paralleled with B + switch S201 in Frequency Amplifier CHG. Contacts 4 and 5 of K2 in the KMCU are connected in parallel with TUNE/OPERATE switch S1004, on the main frame control panel.

Closure of contacts 4 and 5 (K2 deenergized) energizes TUNE/OPERATE relay K705, and therefore lowers PA screen voltage to 600v. Relay K2 is energized during key down periods, and is held in this condition for a short period after the keying signal is removed. This "hold-in" period is determined by the setting of HOLD IN ADJ control R21 in the KMCU.

The following signals are applied to the KMCU to provide for remote monitoring of transmitter operation.

1. 230vac From terminals 9 and 10 on auxilliary center shield (Warning HV ON light I-300 circuit).
2. PA rf output sample (from S-1 on APP-8)
3. CHI and CH2 audio signals.

The KMCU provides for connection to relay contacts for the following indications:

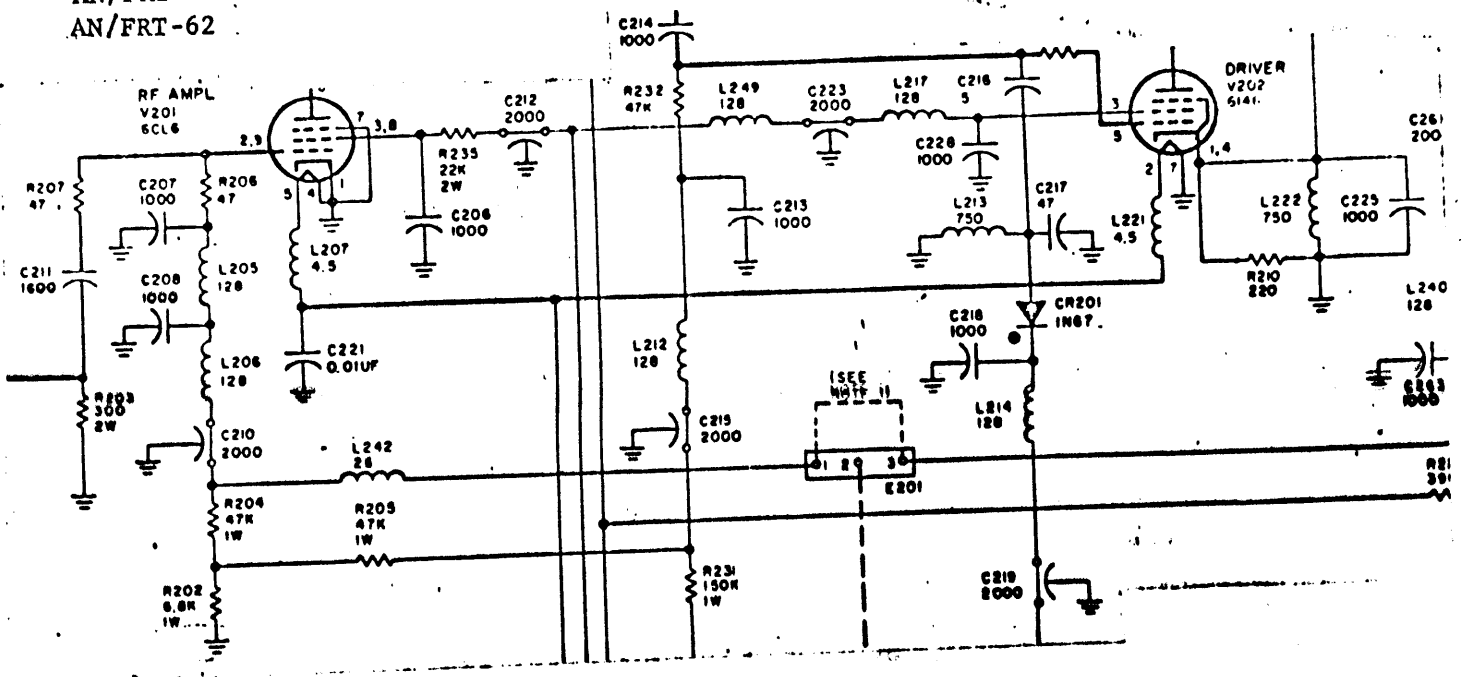
- (a) READY: Plate voltage is on, but transmitter is not radiating.
- (b) ON THE AIR: Transmitter is radiating
- (c) FAILURE: Keying or audio signals are being applied, but the transmitter is not radiating.

b. SCHEMATIC DIAGRAMS (Section 6). - Schematic diagrams given in Section 6 of the maintenance manual should be ammended as shown in figures 1, 2, and 3.

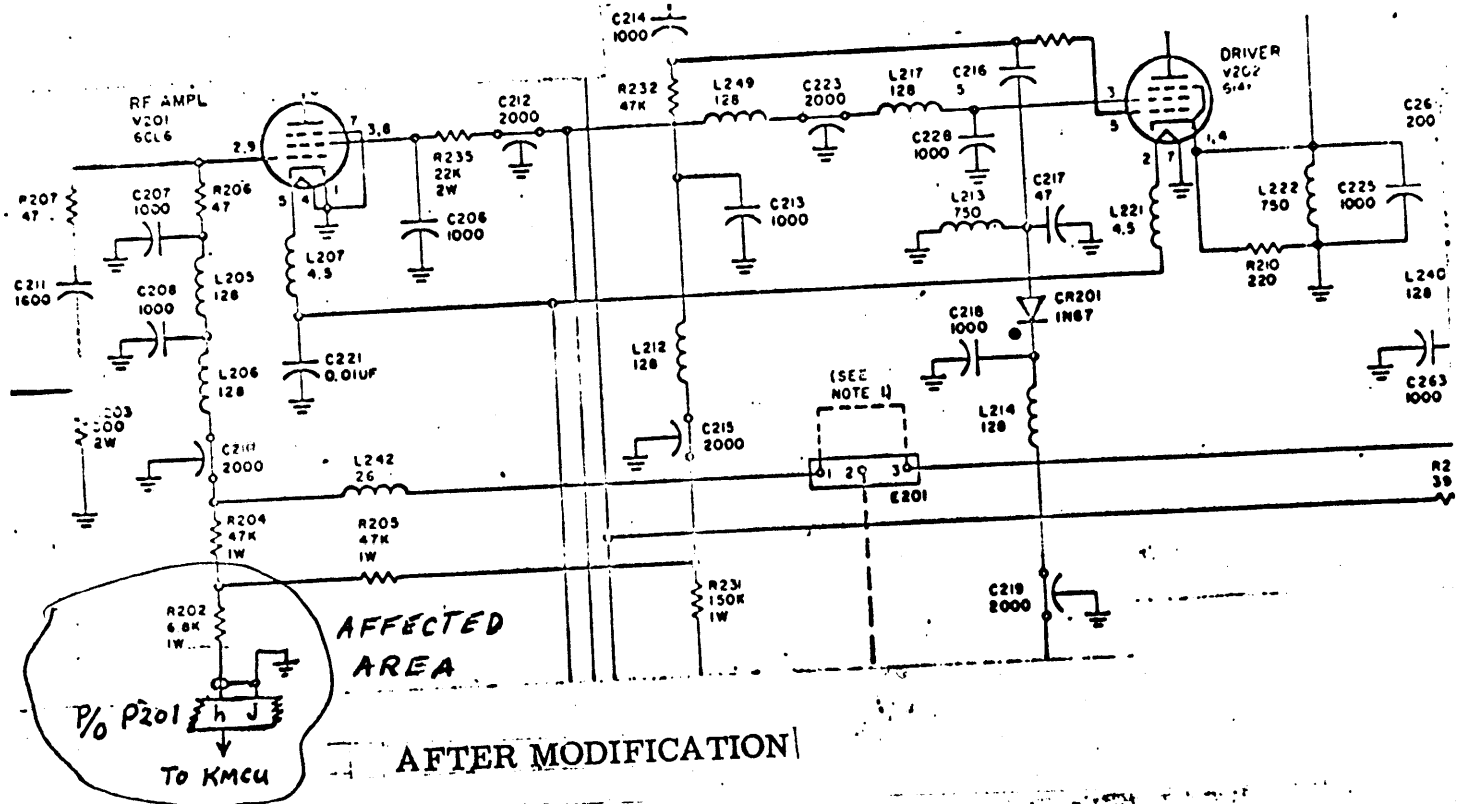
3. VOLUME 1S (Sideband Generator, Model SBG-1/2). - Wiring interconnection diagrams given in Section 2 should be changed in accordance with information contained in figure 4.

NOTE

The wiring interconnection diagram for the KMCU-1 is currently in preparation and will be provided (when available) as part of the KMCU-1 modification kit.



BEFORE MODIFICATION



AFFECTED AREA

AFTER MODIFICATION

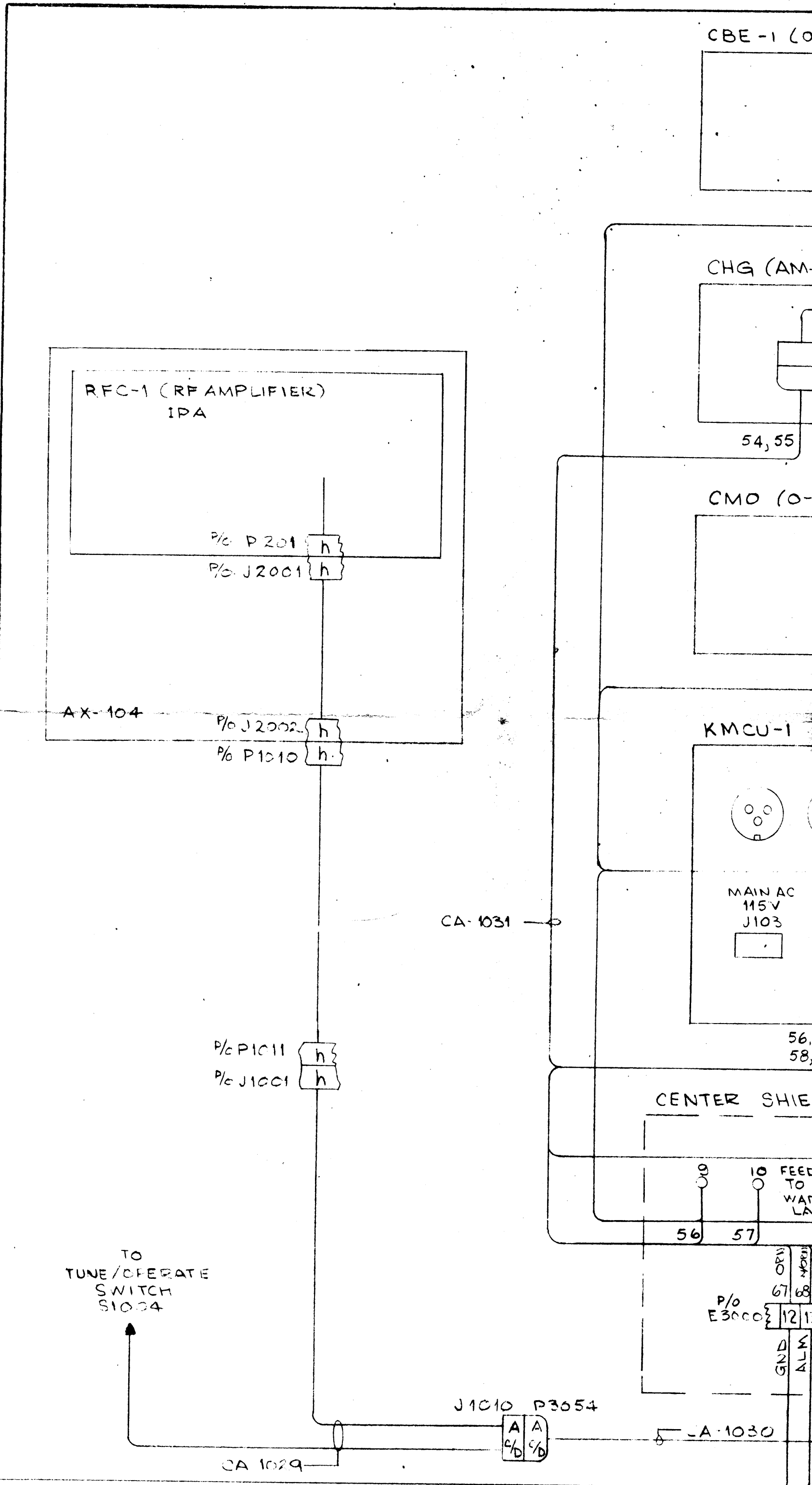
FIGURE 1



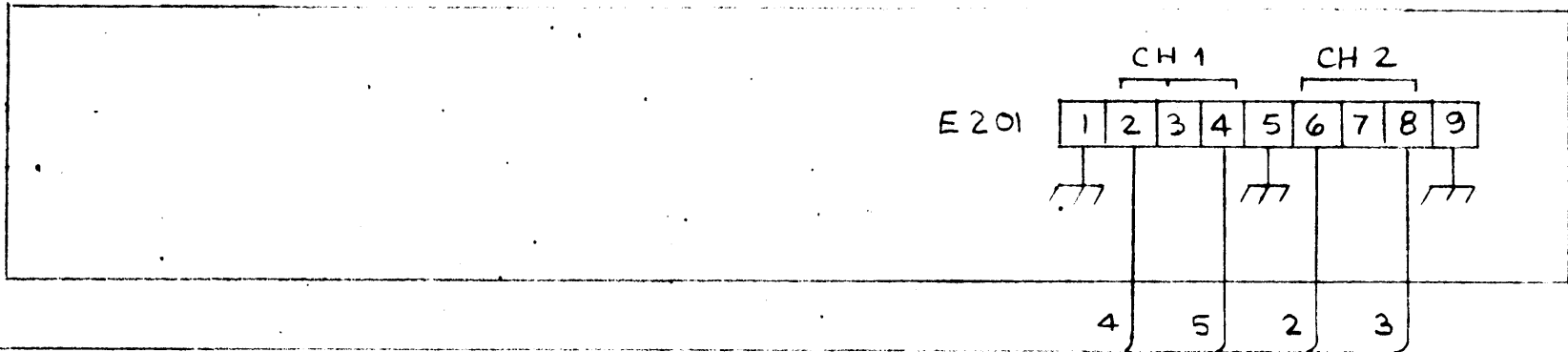
T-4 AN/FRT  
AN/  
AN



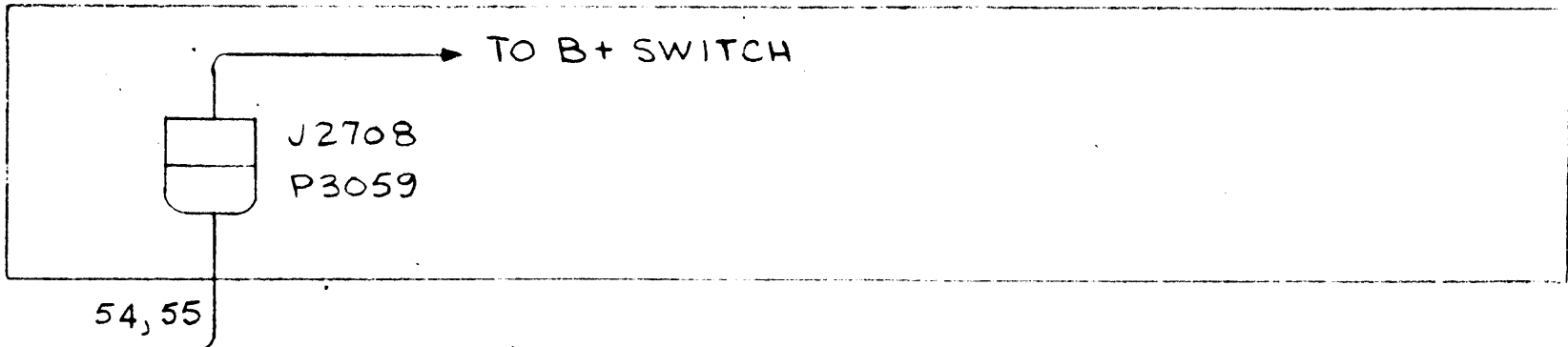
AN/FRT-39-40-62 TRANSMITTER



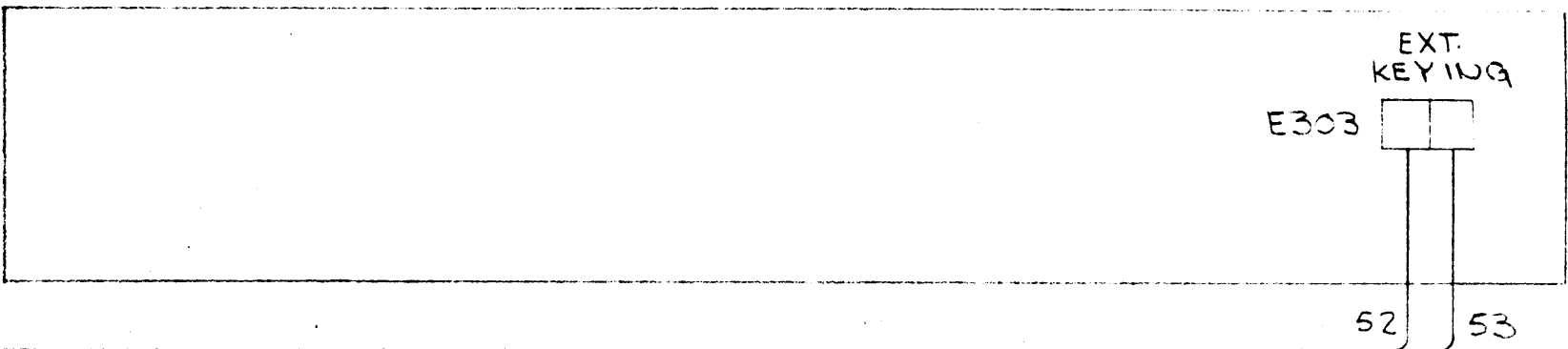
CBE-1 (O-714/UR)



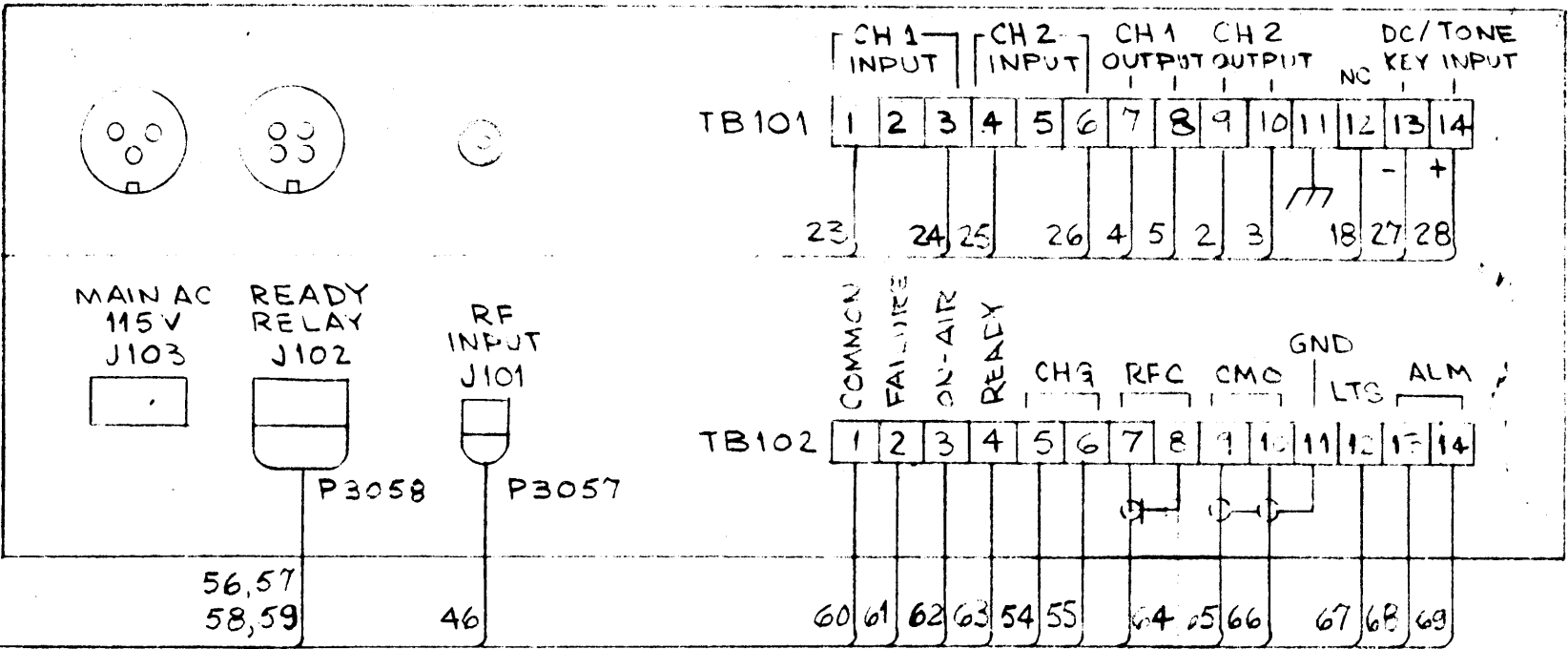
CHG (AM-2505/URA-31)



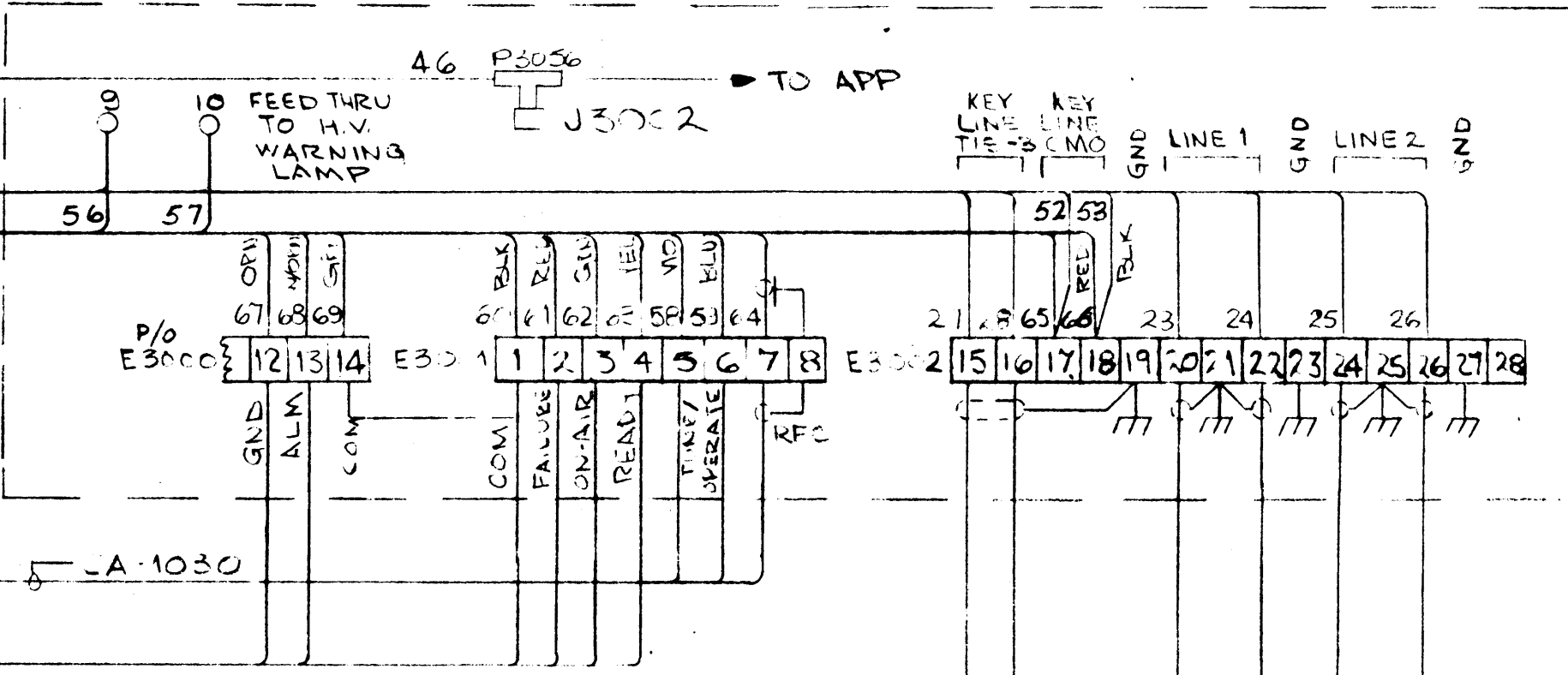
CMO (O-716/URA-31)

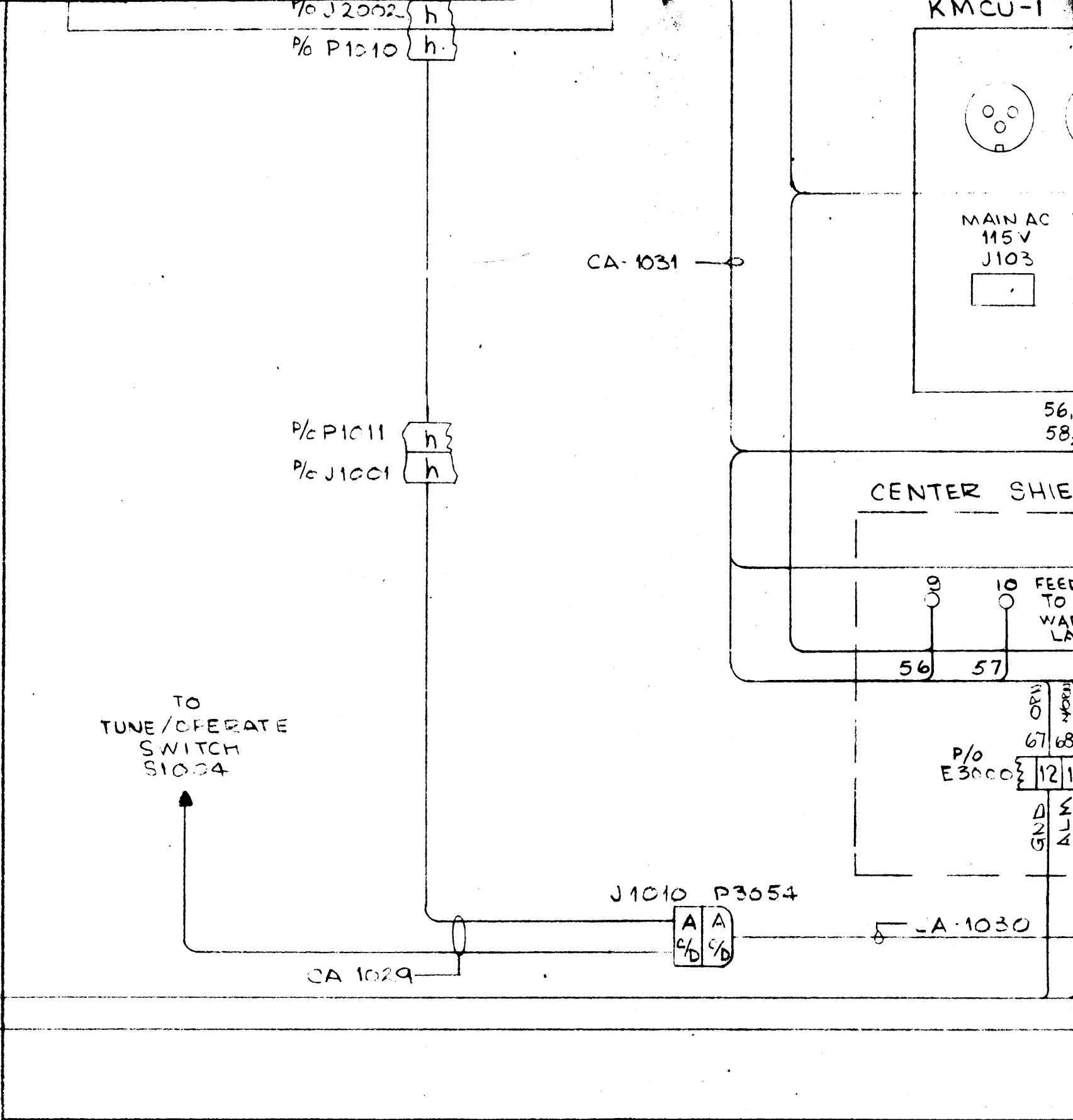


KMCU-1

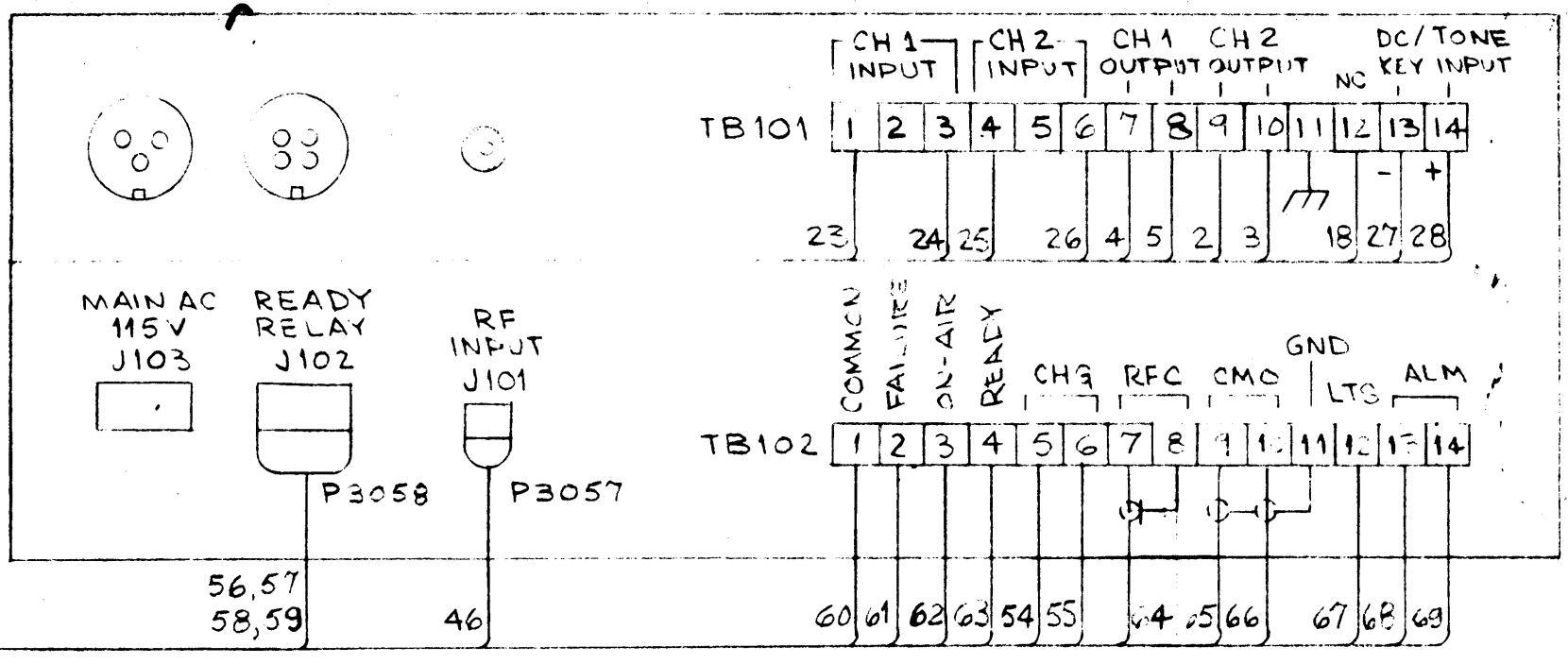


CENTER SHIELD ASS'Y

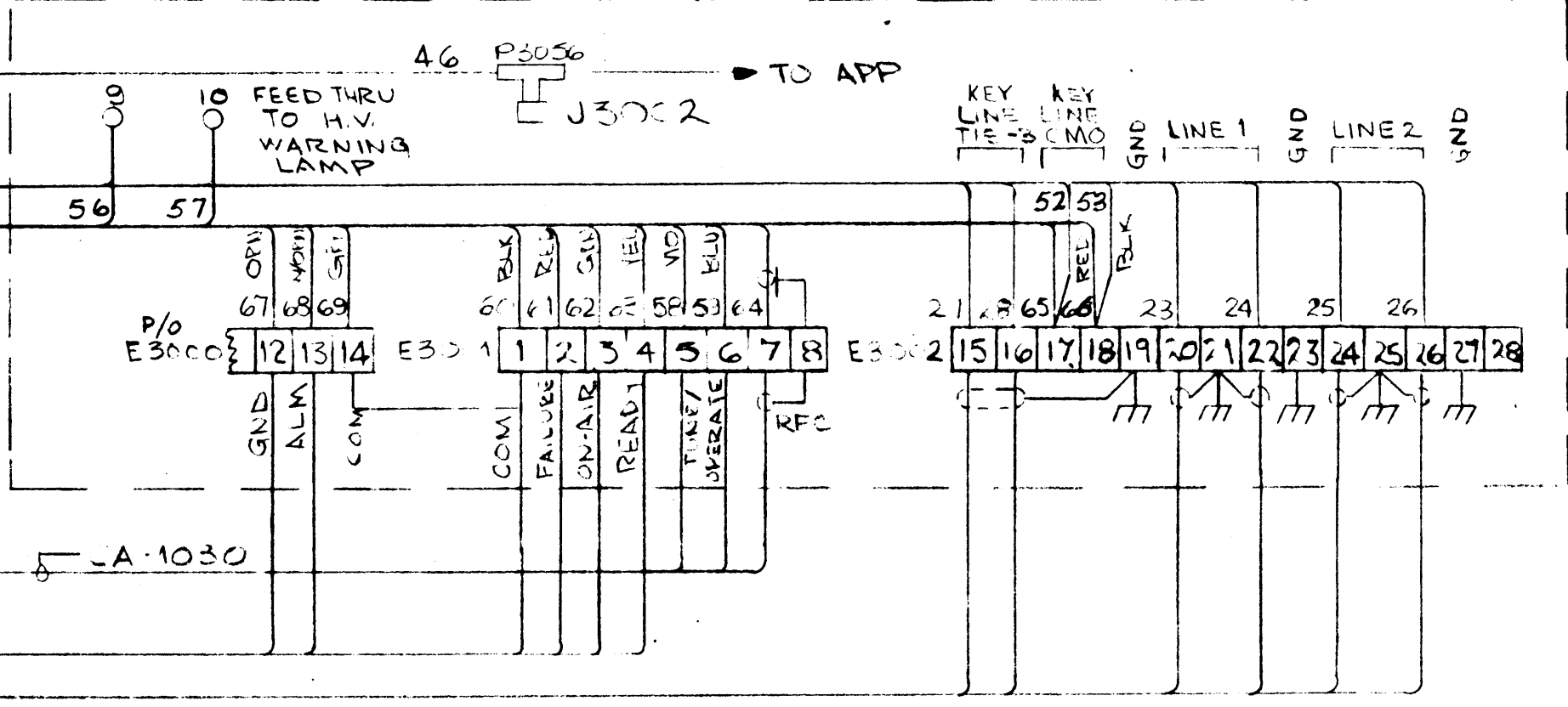




KMCU-1



CENTER SHIELD ASSY



INTERCONNECT WIRING DIAGRAM,  
MODIFICATION FOR KMCU  
INSTALLATION  
FIGURE 4