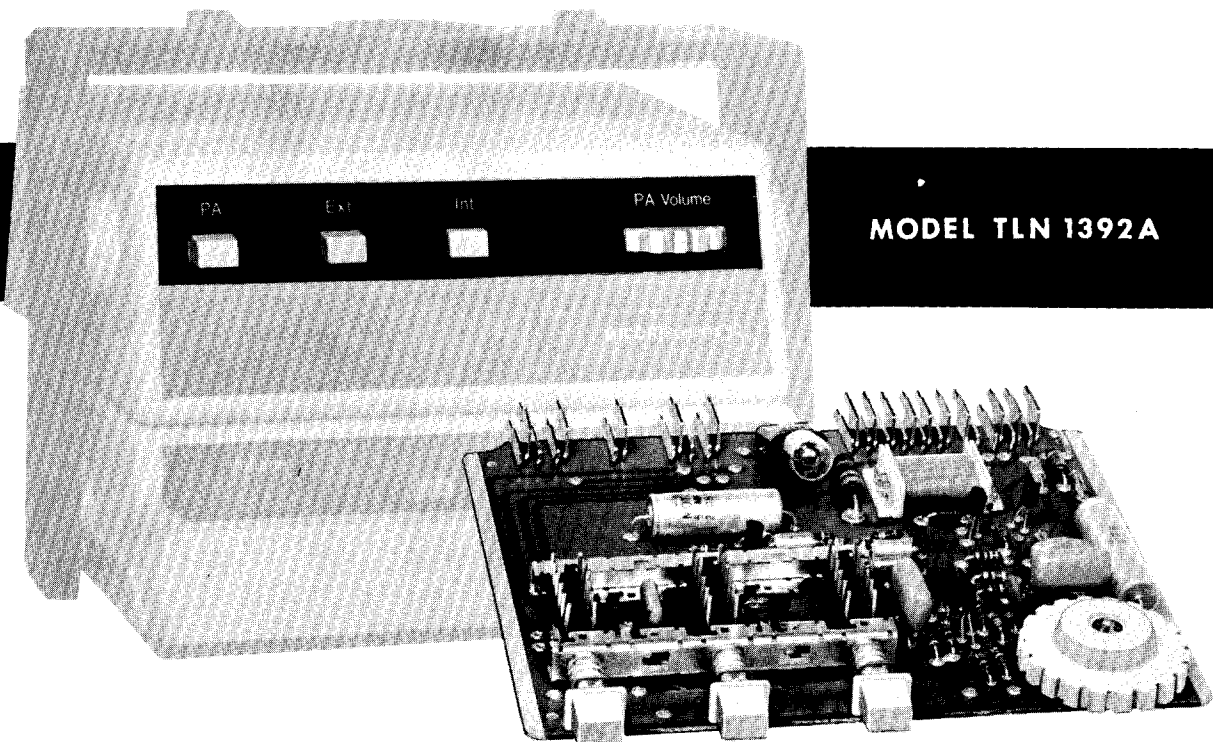


MICOR[®] | Systems 90

MOBILE PUBLIC ADDRESS



MODEL TLN 1392A



MOTOROLA INC.

ENGINEERING PUBLICATIONS

1301 E. ALGONQUIN ROAD

Communications Division

SCHAUMBURG, ILLINOIS 60172

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THIS MANUAL HAS BEEN
DISCONTINUED

68P81102E29
Issue - A

1. DESCRIPTION

The "Micor" Mobile Public Address option adapts the "Micor" radio for three-way usage as follows:

- The radio's microphone can be used for public address announcements over an external speaker.

- The radio's received audio can be routed to the external speaker.

- The radio can be operated in the normal manner.

A separate volume control is used to set the volume of the external speaker. The option card slides into a "Systems 90" accessory housing.

2. INSTALLATION

a. Field Installed Option

The public address circuit card is installed in the accessory housing, either alone or in conjunction with other radio accessories. The installation instructions provided here are for the public address used as the only accessory. For instructions pertaining to multiple installations refer to the Installation Instructions supplied with the housing assembly.

To add mobile public address in a negative ground system, refer to Figure 1 and proceed as follows:

(1) Slide the circuit card completely into the housing assembly.

(2) Install the rear housing cover and secure with two captive screws.

(3) Disconnect the black connector (P1101) from the control head.

(4) Use the contact removal tool to remove eight wires, with pins attached, from P1101 as follows:

- Yellow wire from position 1.
- Black-violet wire from position 9.
- Green wire from position 6.
- Orange wire from position 3.

- Black-green wire from position 20.
- Center conductor of red shielded cable from position 17.
- Shield of red cable from position 10.
- Black-brown wire from position 16.

NOTE

Steps (5) and (6) are not applicable when the wires extend at least five inches beyond the sleeving on the multiconductor cable.

(5) Remove the "S" clamp from the end of the multiconductor cable and move the strain relief back about five inches.

(6) Cut approximately five inches of sleeving off the cable. Avoid cutting the insulation of any wires.

(7) Insert the pins and wires which were removed from P1101 into the orange connector (P3) as follows:

- Yellow wire into position 12.
- Black-violet wire into position 15.
- Green wire into position 22.
- Orange wire into position 20.
- Black-green wire into position 19.
- Center conductor of red shielded cable into position 13.
- Shield of red cable into position 14.
- Black-brown wire into position 18.

(8) Insert the pins and wires connected from P3 into P1101 as follows:

- Yellow wire into position 1.
- Black-violet wire into position 9.
- Green wire into position 6.
- Orange-brown wire into position 3.
- Green-black wire into position 20.

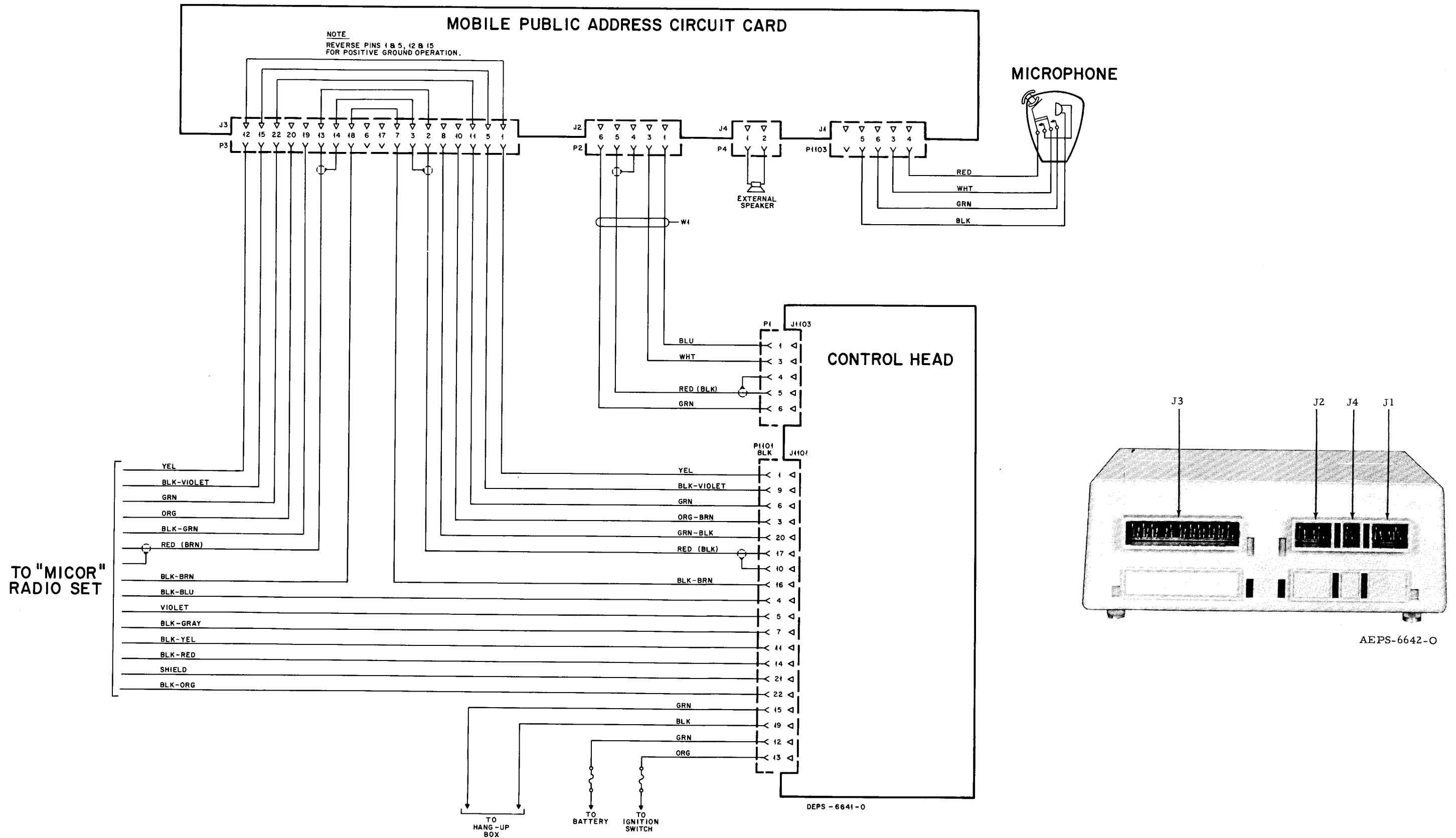


Figure 1.
Installation

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● Center conductor of red shielded cable into position 17.

● Shield of red cable into position 10.

● Black-brown wire into position 16.

(9) Reconnect P1101 to the control head and connect P3 to the 22 pin receptacle (J3) on the rear of the public address circuit card.

(10) Connect the short cable (W1), terminated in six-pin black connectors, between public address jack (J2) and control head microphone jack (J1103).

(11) Select the location for the external speaker (see Figure 2) and connect the speaker leads to the two-pin connector (P4). The external speaker is not supplied but the mating connector (P4) is provided. Connect P4 to receptacle J4 on the public address circuit card.

NOTE

The speaker selected for external use must be capable of handling 10 to 15 watts of audio power, and have an impedance of 8 ohms.

(12) Insert the microphone plug (P1103) into the public address microphone jack (J1).

(13) Remove the escutcheon backing and attach escutcheon to the housing assembly front panel.

To install mobile public address in a positive ground system, use the same procedure as for a negative ground system with the following exceptions:

Remove jumper JU1 on the public address circuit card.

Reverse pins 1 and 5 in the orange connector (P3). (Yellow to pin 5, black-violet to pin 1.)

Reverse pins 12 and 15 in the orange connector (P3). (Yellow to pin 15, black-violet to pin 12.)

b. Factory Wired Option

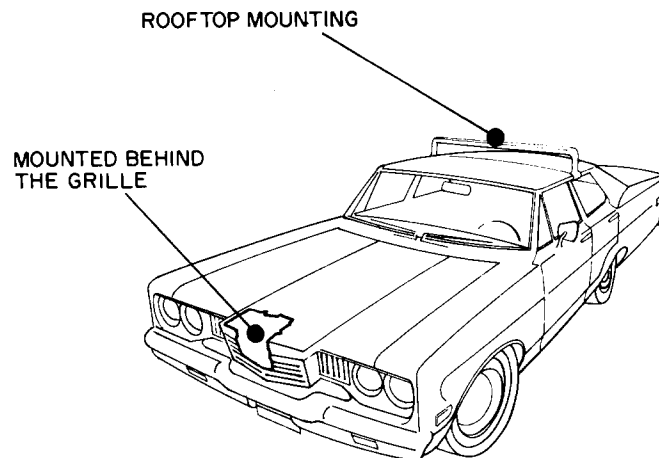
When the public address option is purchased as part of a radio system the wiring changes will have been completed. The individual system components are shipped with all interconnecting cables attached, to permit a thorough system check out before unpacking. To install the radio system proceed as follows:

(1) Install the radio and cabling as directed in the radio installation instructions.

(2) Install the trunion bracket and housing assembly as instructed.

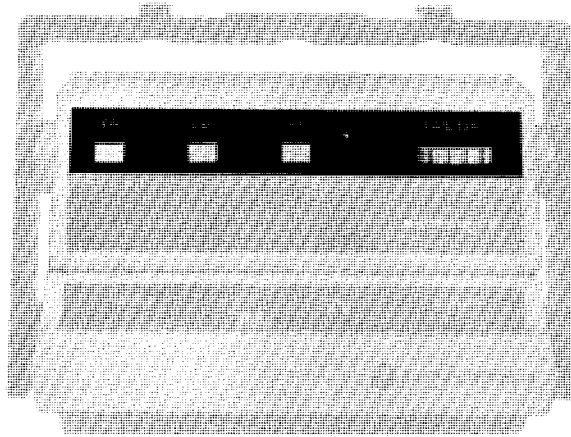
(3) Connect the black (and blue, if used) connectors to the control head.

(4) Connect the orange connector (P3) to public address jack (J3).



AEPS-6657-0

Figure 2.
External Speaker Locations



AEPS-6643-O

Figure 3.
Operator's Controls

(5) Connect the short cable (W1), terminated in six-pin black connectors between public address jack (J2) and control head microphone jack (J1103).

(6) Select the location for the external speaker (see Figure 2) and connect the speaker to the two-pin connector (P4). The external speaker is not supplied but the mating connector (P4) is provided. Connect P3 to receptacle J4 on the public address circuit card.

NOTE

The speaker selected for external use must be capable of handling 10 to 15 watts of audio power and have an impedance of 8 ohms.

(7) Insert the microphone plug (P1103) into the public address microphone jack (J1).

3. OPERATION

a. Operator's Controls

The operator controls on the mobile public address panel consist of three "push-on" switches and a volume control as shown in Figure 3.

The switches are mechanically interlocked so that only one mode can be selected at a time. These switches operate as follows:

Radio Internal (INT) - Radio performs normal receive and transmit operation.

Radio External (EXT) - Receiver audio routed to an external speaker. Volume is controlled by option card.

Public Address (PA) - Normal receive operation, with transmit inhibited. Microphone audio is amplified by receiver audio circuitry, then fed to external speaker. Volume is controlled by option card.

The volume control (PA VOLUME) affords the operator continuous control of the audio level to the external speaker. This control is effective in PA and EXT modes only.

b. PA Mode

To operate the unit as a public address system proceed as follows:

- (1) Depress the PA button.
- (2) Set the PA VOLUME control for loudness required.
- (3) Close the microphone push-to-talk (P-T-T) switch and clearly state the desired message.
- (4) When the push-to-talk button is released, receiver audio continues to be heard on the internal speaker. If a reply must be made, just press the INT button to return to normal transmitter operation.

NOTE

In the PA mode, the sensitivity of the microphone is slightly reduced to minimize acoustical feedback. To compensate for this sensitivity reduction it is necessary for the operator to hold the microphone slightly closer to the mouth for the rated output.

c. EXT Mode

When it becomes necessary for the operator to leave the vehicle, any incoming calls can be heard by using the external speaker. This is accomplished as follows:

(1) Depress the EXT button.

(2) Set the PA VOLUME control to give the required level at the external speaker.

d. INT Mode

Normal radio operation is achieved as follows:

(1) Depress the INT button.

(2) Use the control head VOLUME and SQUELCH controls to establish radio operating conditions.

4. FUNCTIONAL CIRCUIT DESCRIPTION

The operation of mobile public address can best be described by analyzing only one mode at a time. Functional diagrams showing the various signal paths in each mode are provided as an aid to understanding circuit operation.

a. Radio Internal (INT)

When the INT switch (S1C) is depressed, a mechanical interlock causes the PA switch (S1A) or the EXT switch (S1B) to "pop out".

NOTE

Selector switches must be depressed until a click is heard, indicating that the switch is locked in position.

This selector switch arrangement establishes conditions as follows:

● Microphone audio and P-T-T function routed directly to control head.

● Receiver audio is applied to the internal speaker and prevented from reaching the external speaker.

The audio and control signal paths are shown in Figure 4.

b. Radio External (EXT)

The overall result of selecting the EXT mode is that the radio transmit function operates normally. However, the receiver audio portion is different in that an additional stage of amplification is provided and an external speaker is used in lieu of the internal speaker.

When the EXT switch (S1B) is depressed, the following conditions are established:

● Microphone audio and P-T-T function routed directly to control head.

● Receiver discriminator output is switched to input of audio preamplifier Q6.

● Inverter Q2 base switched to ground, causing Q2 "turn off". The resultant collector voltage rise initiates the following events.

--Preamplifier enable Q3 is switched "on", allowing preamplifier Q6 to begin operating.

--Squelch disable Q1 is turned on, however the output is not used in the EXT mode.

--Reed switch drivers Q4 and Q7 are turned on causing the reed switch K1 to actuate, thus selecting the external speaker.

--Audio mute Q5 is momentarily activated.

NOTE

Audio muting occurs momentarily whenever K1 is actuated to prevent accidental damage to reed contacts during switching.

The preceding conditions are depicted in Figure 5.

c. Public Address (PA)

In the PA mode, the transmitter is entirely disabled. The receiver portion will operate with the audio output delivered to the internal speaker unless the P-T-T switch is depressed, in which case the receiver audio is interrupted.

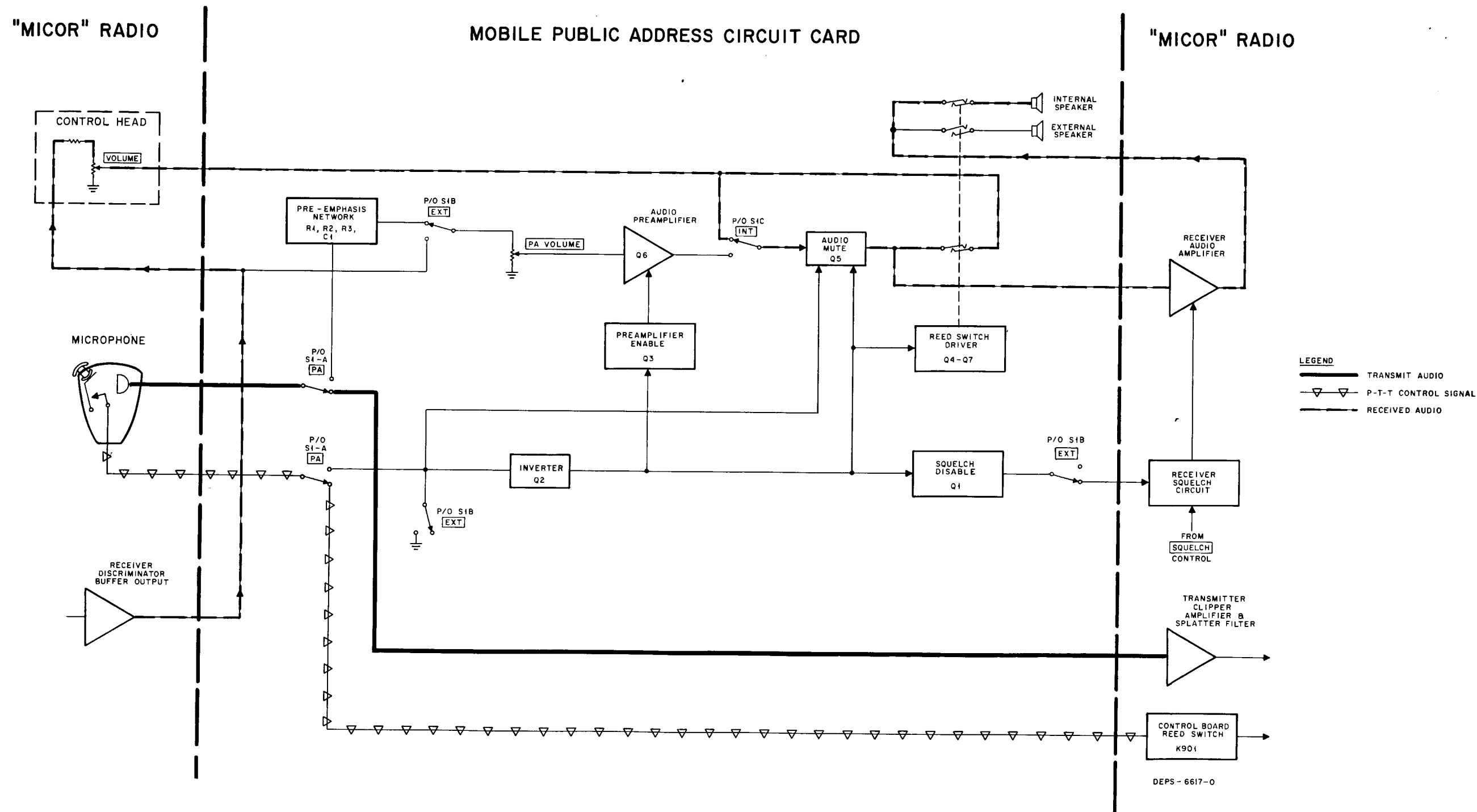


Figure 4.
INT Mode Functional Operation

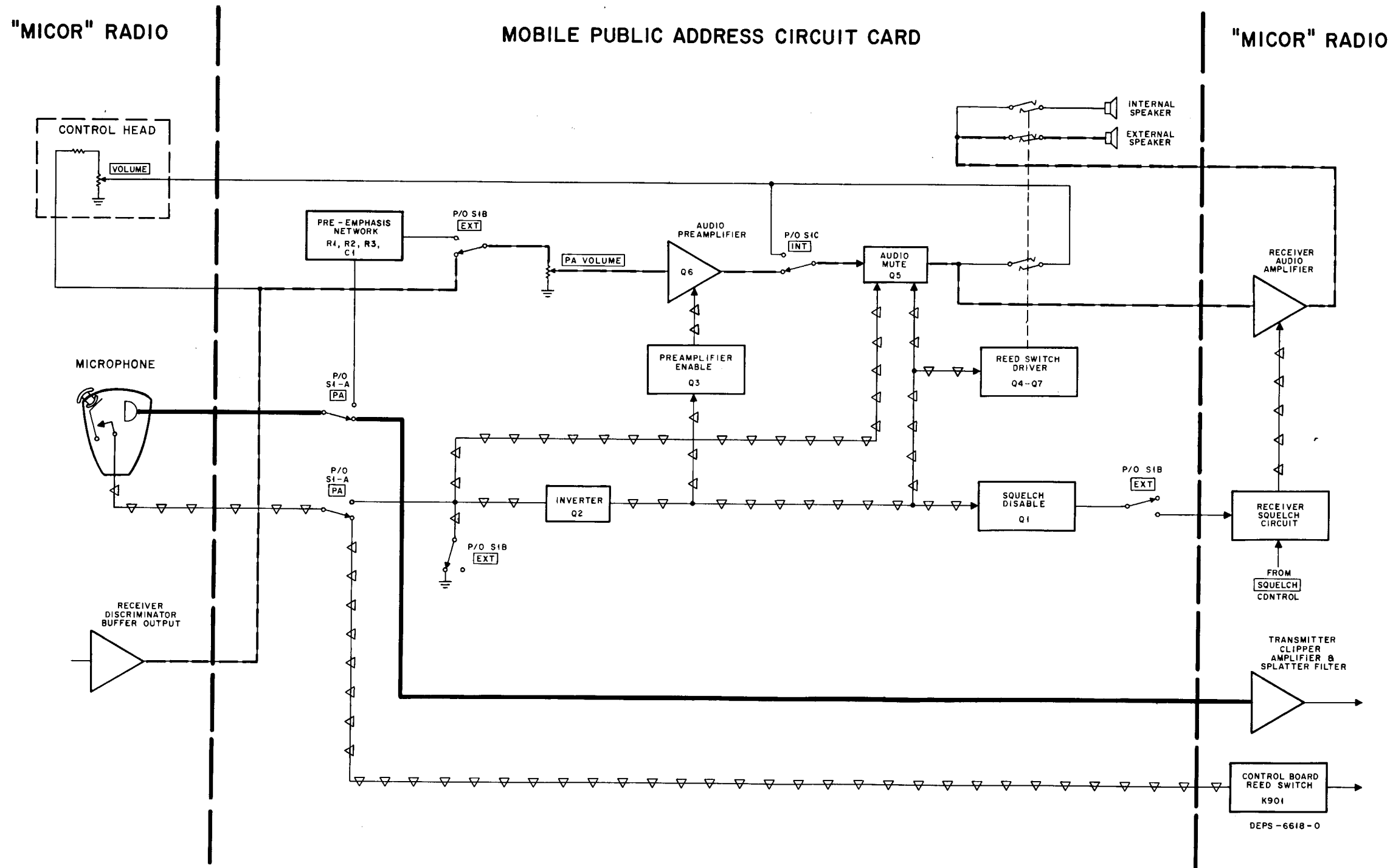


Figure 5.
EXT Mode Functional Operation

Depressing the PA switch (S1A) prevents the P-T-T function from keying the transmitter and also prevents microphone audio from reaching the transmitter. When the P-T-T switch is actuated, the following takes place.

● Inverter Q2 base switched to ground, causing Q2 "turn off". The resultant collector voltage rise initiates the following events.

--Preamplifier enable Q3 is switched "on", allowing preamplifier Q6 to begin operating.

--Squelch disable Q1 is turned "on" and the output is used to keep the receiver audio amplifier "on".

--Reed switch drivers Q4 and Q7 are turned on causing the reed switch K1 to actuate, thus selecting the external speaker and disrupting the receiver audio path.

--Audio mute Q5 is momentarily activated.

Microphone audio is applied to preamplifier Q6, through pre-emphasis network R1, R2, R3, and C1. The output of Q6 is then applied to the receiver audio amplifier.

The various signal paths and switch configurations are shown in Figure 6.

5. MAINTENANCE

Mobile public address maintenance can be broken down into two categories; testing and troubleshooting. Testing is actually an extension of troubleshooting and is limited to comparing voltage measurements to those indicated on the schematic diagram.

a. In-System Testing

Making circuit voltage checks necessitates removing the circuit card from the housing assembly and is accomplished as follows:

(1) Disconnect the four connectors attached to the circuit card.

(2) Loosen the two captive screws securing the rear housing cover and remove the cover.

(3) Slide the circuit card out of the housing assembly and place the card atop the housing with the solder side up.

(4) Reconnect the four connectors (removed previously) to the proper location on the circuit card.

CAUTION

Do not allow the circuit card to come into contact with any metallic object which may cause damage from an accidental short circuit.

(5) Apply power to the system and proceed to take the necessary voltage measurements.

b. Bench Testing

A check out of mobile public address can also be performed on a test bench. The following equipment is required for a thorough circuit check-out.

● DC Power supply.

● Audio signal generator.

● Service bench VTVM.

● Short jumper wire terminated in alligator clips.

To perform a bench check proceed as follows:

(1) Remove four connectors from rear of the circuit card.

(2) Loosen two captive screws securing the rear housing cover and remove the rear cover.

(3) Remove the circuit card from the housing.

(4) Set up the public address circuit card as shown in Figure 7.

(5) Depress the INT button.

(6) Use the VTVM to make the following checks.

NOTE

Refer to the circuit board detail for connector and pin locations.

● Audio signal between pins 4 (GND) and 5 (AUDIO HI) of J2 has amplitude equal to signal between pins 4 (GND) and 5 (AUDIO HI) of J1.

● No signal present between pins 1 and 2 of J4.

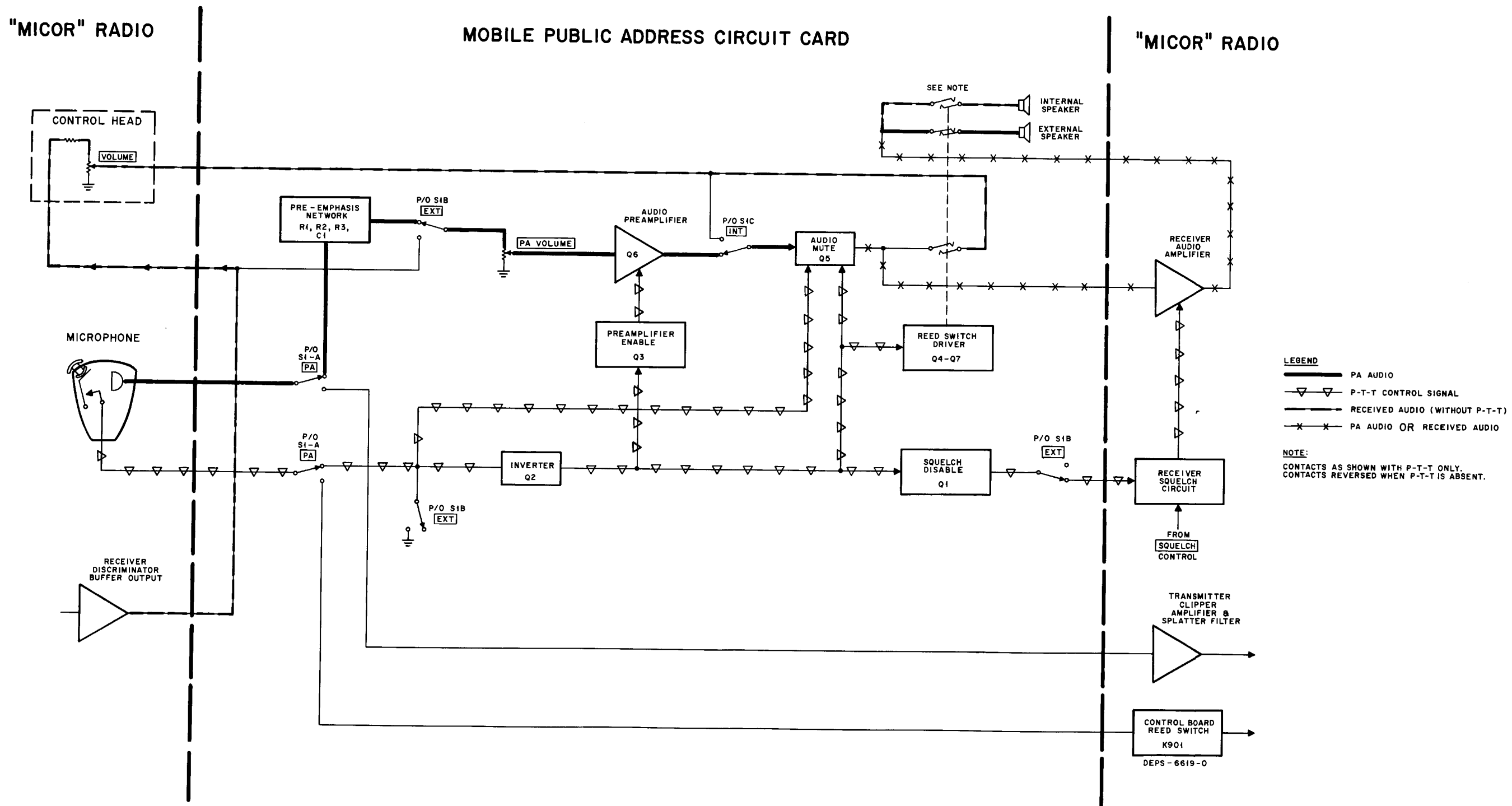


Figure 6.
PA Mode Functional Operation

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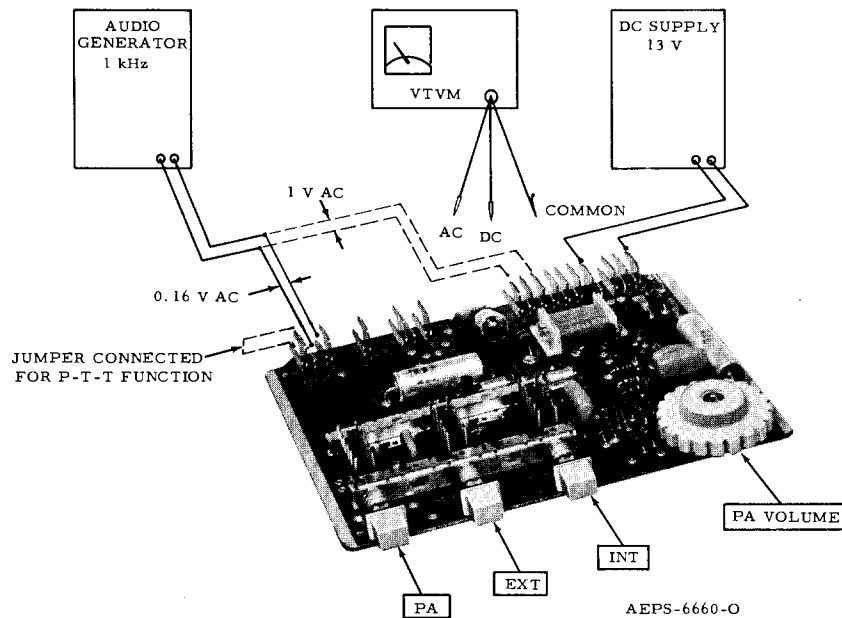


Figure 7.
Bench Testing

- Resistance indication between pins 3 and 6 of J2 is shorted with jumper connected as shown in Figure 7 and open with jumper removed.

- Move audio generator leads to J3 and increase amplitude as shown. Verify equal signal amplitude between pins 10 and 11 of J3.

(7) Depress the EXT button and use the VTVM to make the following checks.

- Audio signal being monitored drops to zero.

- Audio signal amplitude between pins 1 and 2 of J4 is equal to the applied signal.

(8) Apply the audio signal generator output to pins 7 and 5 of J3.

(9) Set the generator output to 0.3 V ac and check the amplitude between pins 19 and 5 of J3.

(10) Vary the PA VOLUME control and verify that indicated voltage smoothly follows volume control variations.

(11) Depress the PA switch and connect the generator output to pins 4 and 5 of J1.

(12) Connect the jumper as shown in the set-up diagram.

(13) With the meter connected as in step 9, note that the signal is present with the jumper connected and drops to zero when the jumper is removed.

(14) Check the dc voltage at Q1 collector and verify the following:

- 0 V with the jumper removed.

- Slight positive voltage (0.2 V) with jumper connected.

(15) Proper switch operation can be verified by performing the checks indicated in the following chart.

CONNECT OHMMETER BETWEEN PINS		MODE SELECTED			
+	-	INT	EXT	PA	PA*
1 (J1)	1 (J2)	S	S	S	S
3 (J1)	3 (J2)	S	S	O	O
4 (J1)	4 (J2)	S	S	O	O
5 (J1)	5 (J2)	S	S	O	O
6 (J1)	6 (J2)	S	S	O	O
22, 11 (J3)	1 (J4)	S	S	S	S
21, 10 (J3)	20, 9 (J3)	S	O	S	O
20, 9 (J3)	2 (J4)	O	S	O	S
19 (J3)	8 (J3)	S	O	S	O
17 (J3)	5 (J3)	O	S	S	S

KEY:

* - JUMPER BETWEEN PINS 3 AND 6 (J1)

O - OPEN

S - SHORTED

c. Troubleshooting

A troubleshooting chart is provided as an aid in isolating the cause of any malfunction attributed to the public address circuits. This chart presents a logical sequence of steps which result in isolating a faulty component or circuit. Refer to this chart when attacking any problem caused by this unit.

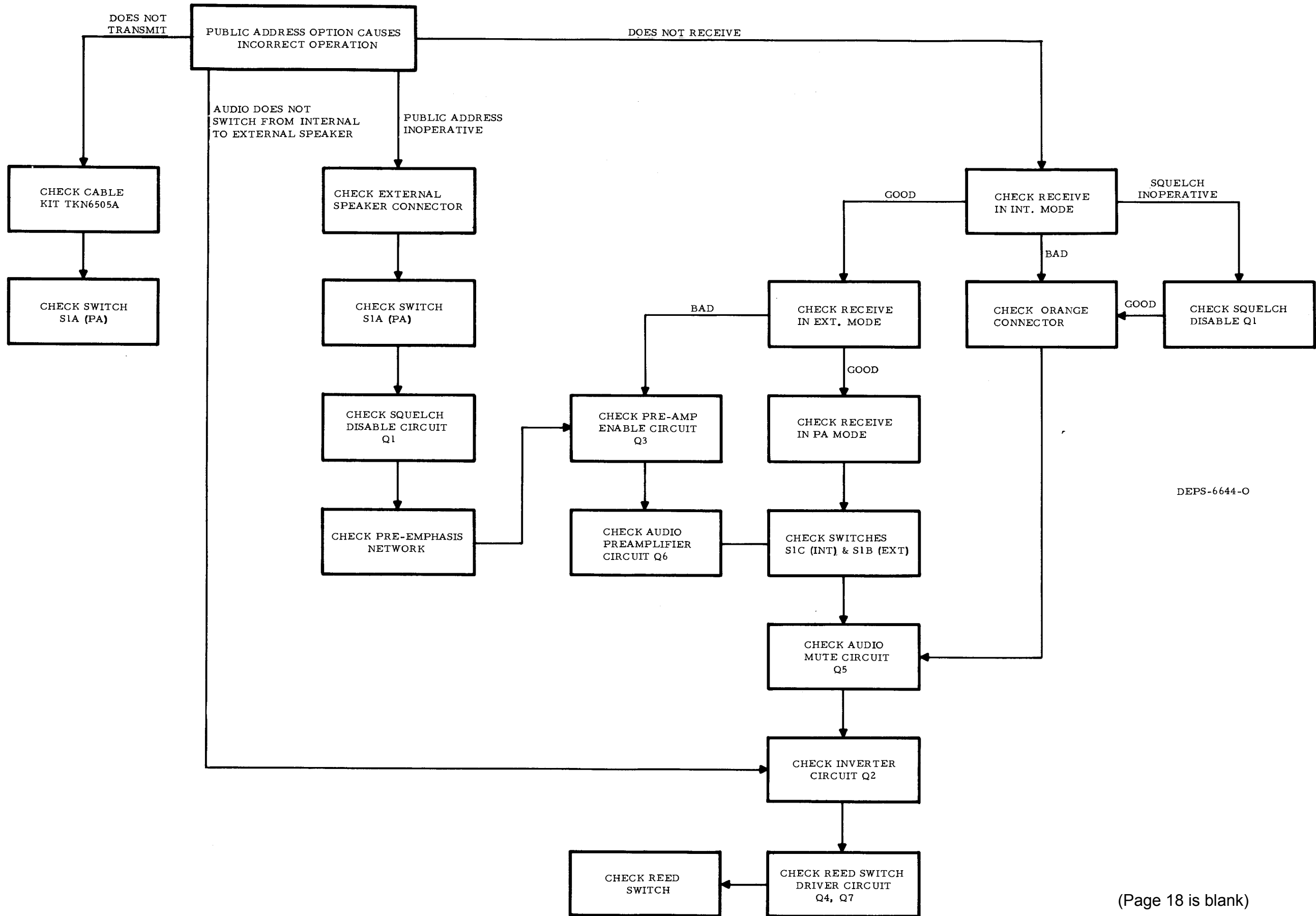
d. Repair

Any component on the circuit card can be replaced by following accepted repair procedures.

Refer to the "Micor" radio instruction manual for information pertaining to ordering replacement parts. Upon completion of repairs, the circuit card is reinstalled as follows:

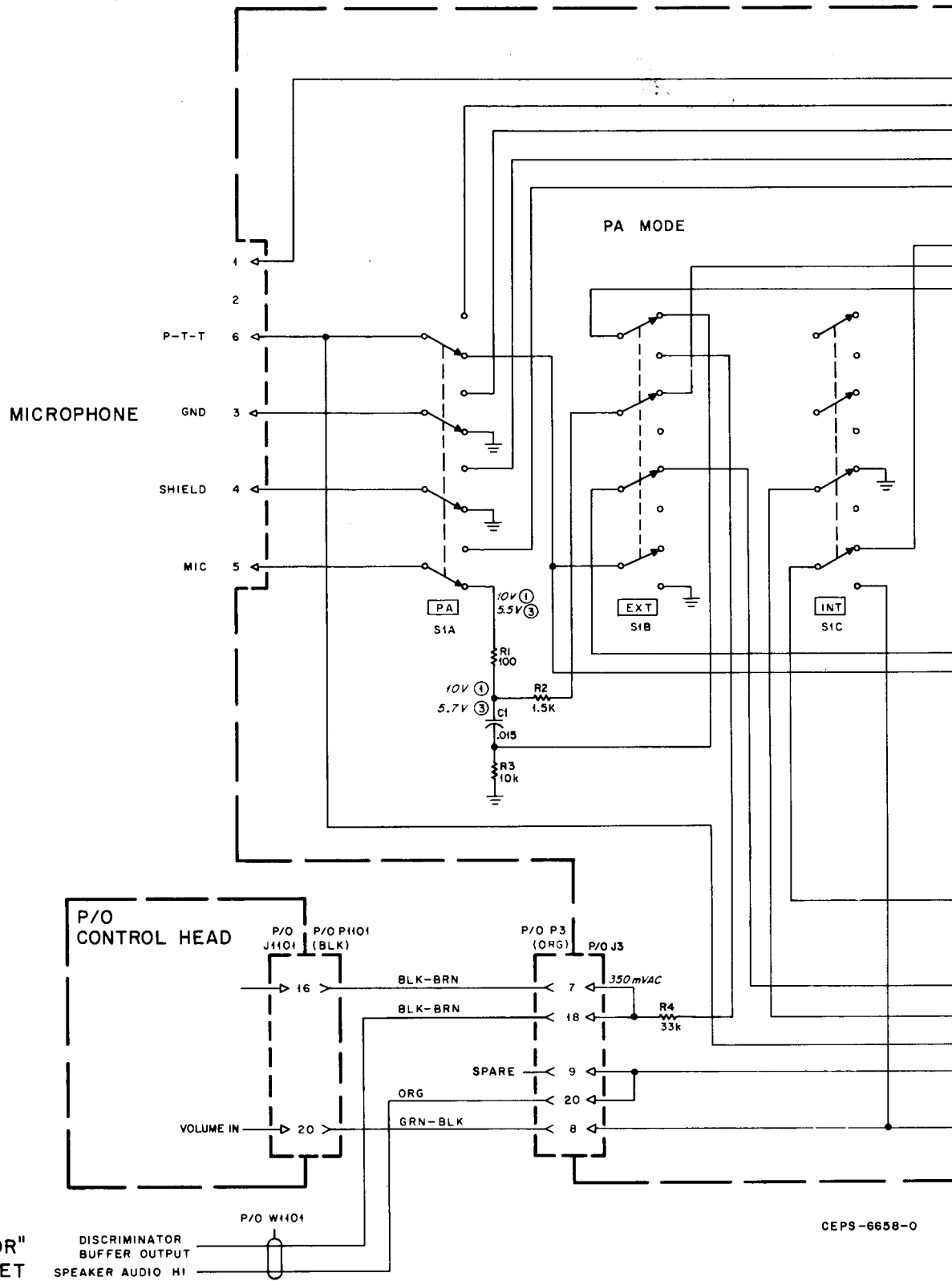
- (1) Disconnect the four connectors from the circuit card.
- (2) Slide the card completely into the housing.
- (3) Install the rear housing cover and secure with two captive screws.
- (4) Reconnect the four connectors to the proper locations.

MOBILE PUBLIC ADDRESS TROUBLESHOOTING CHART

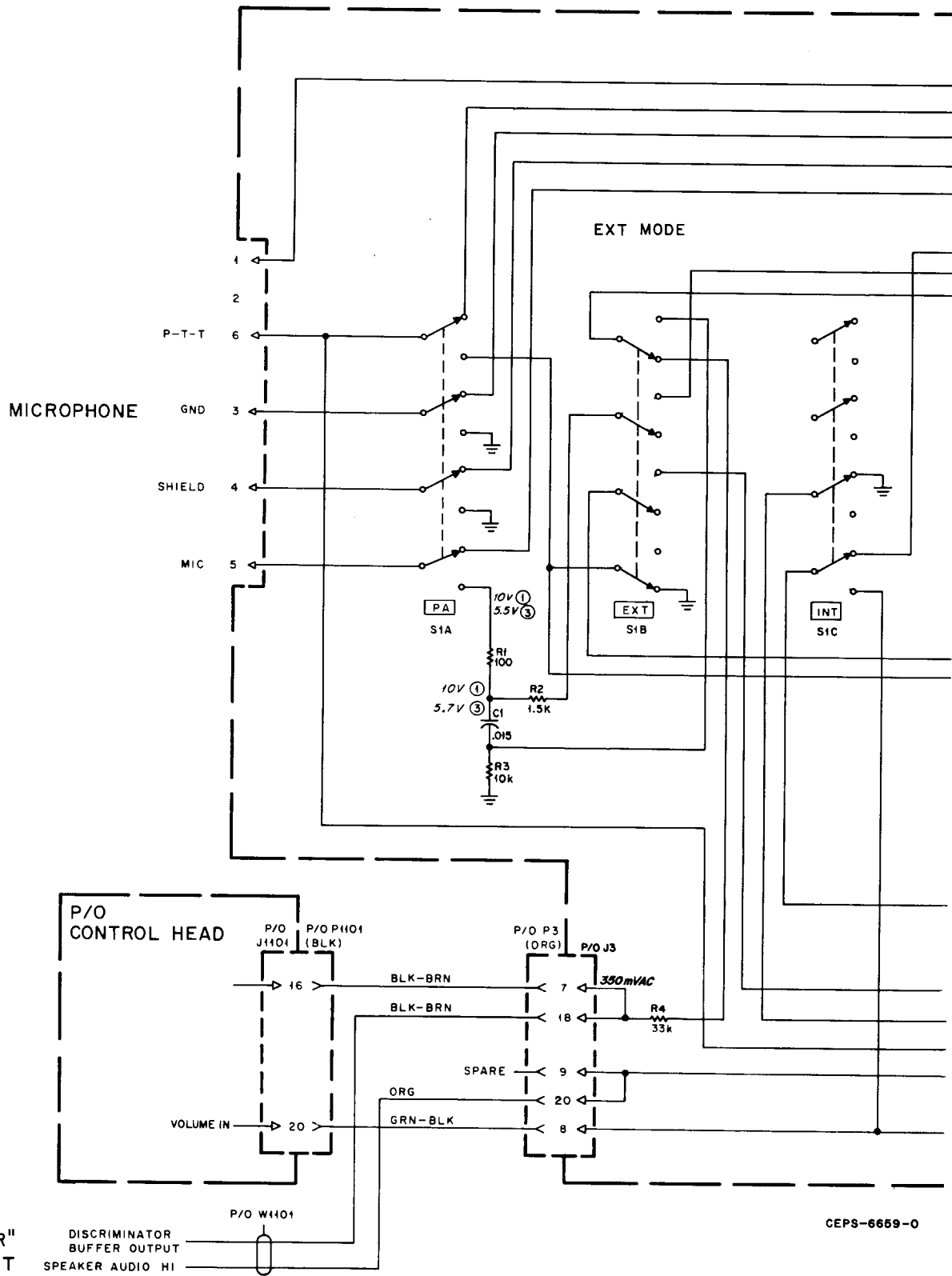


DEPS-6644-O

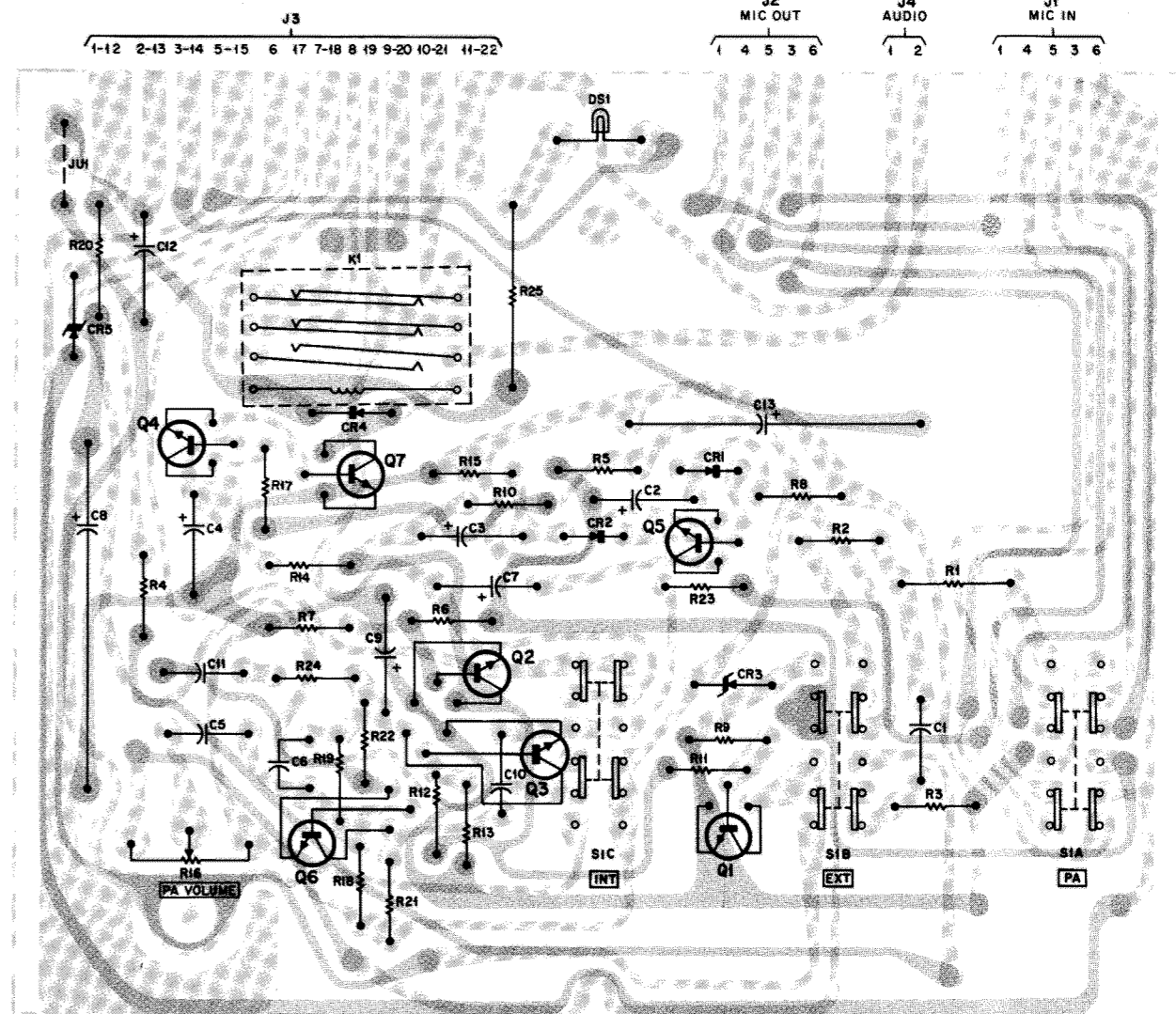
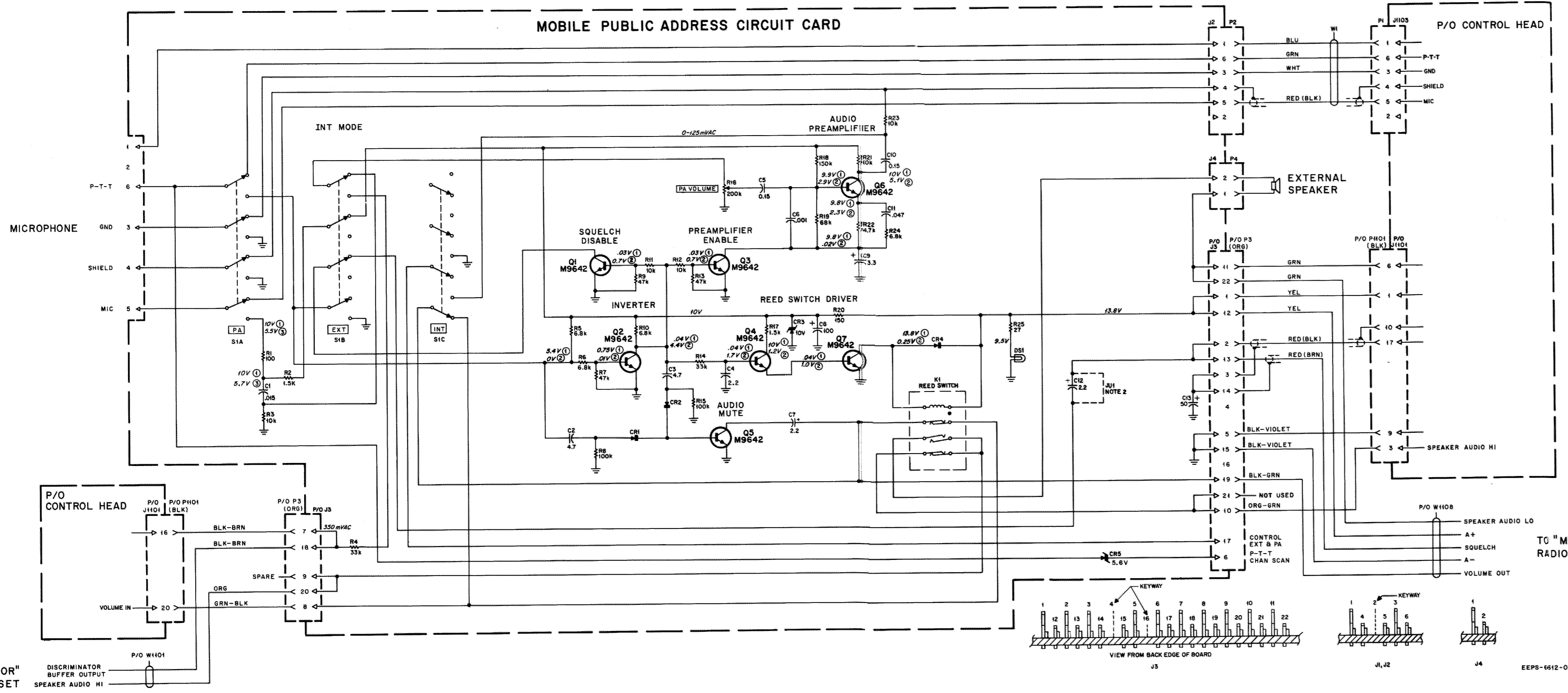
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TO "MICOR"
RADIO SET



MOBILE PUBLIC ADDRESS CIRCUIT CARD



MODEL CHART FOR TLN1392A

ITEM	SUFFIX	DESCRIPTION
TLN4524A		PUBLIC ADDRESS CIRCUIT BOARD
TKN6504A		CABLE AND CONNECTOR (ORANGE)
TKN6505A		CABLE (W/1)
TLN4511A		ESCUTCHEON AND HARDWARE ITEMS

- NOTES:
- ALL CAPACITOR VALUES ARE IN μF .
 - JU1 USED IN NEGATIVE GROUND SYSTEMS ONLY.
 - ALL VOLTAGES ARE DC UNLESS SPECIFIED OTHERWISE.
 - ENCIRCLED NUMBERS INDICATE CIRCUIT CONDITIONS AS FOLLOWS:
 ① - INT OR PA (NO P-T-T)
 ② - EXT OR PA (WITH P-T-T)
 ③ - PA (WITH P-T-T)
 - VOLTAGE MEASUREMENTS ARE TAKEN WITH REFERENCE TO PUBLIC ADDRESS CIRCUIT CARD GROUND.
 - CENTER CONDUCTOR COLOR IS INDICATED BY ().

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM
 Mobile Public Address
 Schematic Diagram and
 Circuit Board Detail
 Motorola No. 63P81102E30-O
 2/12/71-NPC

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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PARTS LIST

TLN1392A Public Address System

PL-1218-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C1	8D82905G10	<u>CAPACITOR, fixed: uF: ±10%;</u> 50 V; unl. stated .015 4.7; 25 V 4.7; 25 V 2.2; 15 V 0.15 .001; 100 V 2.2; 15 V 100 ±150-10%; 25 V 3.3 ±20%; 15 V 0.15 .047 2.2; 15 V 50 <u>SEMICONDUCTOR DEVICE,</u> <u>diode: (SEE NOTE)</u> silicon silicon silicon; Zener type; 10 V silicon silicon; Zener type; 5.6 V <u>LAMP, incandescent:</u> 12 V; 0.19 A; wedge base; 1 ep.; type No. 161 <u>CONNECTOR, receptacle:</u> consists of contact terminals mounted on circuit board; see following information: 28C84269C01 CONTACT, electrical; male (short) 28C84269C02 CONTACT, electrical; male (long) (for reference only) (for reference only) <u>SWITCH, magnetic reed:</u> 12 V dc; 1 form "A"; 2 form "B"; coil res. 240 ohms ±10% <u>LOUDSPEAKER, magnetic:</u> (for reference only) <u>CONNECTOR, plug:</u> includes: 14C84590B01 BODY, connector; (black); 5-contact type: 9C84151B01 TERMINAL, contact; female includes: 14C84556B05 BODY, connector (orange); 20-contact type: 9C84151B01 TERMINAL, contact; female includes: 14C84566B01 BODY, connector: 2-contact type; 9C84151B01 TERMINAL, con- tact; female <u>TRANSISTOR; (SEE NOTE)</u> N-P-N; type M9642 <u>RESISTOR, fixed: ±5%; 1/4 W;</u> unl. stated 100; 1/2 W 1.5k 10k 33k 6.8k 6.8k 47k 100k 47k 6.8k 10k 10k 47k 33k 100k variable: 200 k 1.5k 150k
C2	23D82783B25	
C3	23D82783B25	
C4	23D82783B16	
C5	8D82905G05	
C6	21D82187B20	
C7	23D82783B16	
C8	23D82601A09	
C9	23D83214C17	
C10	8D82905G05	
C11	8D82905G03	
C12	23D82783B16	
C13	23D83550B02	
CR1	48C83654H01	
CR2	48C83654H01	
CR3	48D82256C11	
CR4	48C82466H13	
CR5	48D82256C12	
DS1	65B83554G01	
J1, 2, 3, 4		
J1101		
J1103		
K1	80D84157B03	
LS1		
P1, 2		
P3		
P4		
Q1 thru 7	48R869642	
R1	6S6408	
R2	6S129681	
R3	6S129668	
R4	6S129526	
R5	6S129237	
R6	6S129237	
R7	6S131527	
R8	6S124A97	
R9	6S131527	
R10	6S129237	
R11	6S129668	
R12	6S129668	
R13	6S131527	
R14	6S129526	
R15	6S124A97	
R16	18K855155	
R17	6S129681	
R18	6S128683	

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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R19	6S129299	68k
R20	6S5645	150; 1/2 W
R21	6S129668	10k
R22	6S129669	4.7k
R23	6S129668	10k
R24	6S129237	6.8k
R25	17C82036G04	27; 2 W
S1	40D84324C08	<u>SWITCH ASSEMBLY, push;</u> <u>interlocking action; lockout</u> <u>type:</u> 3-section, each section 4 form "C"; does not include 14C84360C01 INSULATOR, switch terminal: 6 required
XDS1	9C84285C01	<u>LIGHT, indicator;</u> 2-contact; white opaque screen for wedge-base lamps; does not include lamp <u>CABLE ASSEMBLY, special</u> <u>purpose:</u> includes miscellaneous leads and reference parts P1, P2 (for reference only)
W1	TKN6505A	
W1108		
NON-REFERENCED ITEMS		
	13D84319C07	ESCUTCHEON
	38C84321C01	PUSHBUTTON
	36C84327C01	THUMBWHEEL (volume)
	42S10113A21	RETAINER (for thumbwheel)
	66C84699B01	CONTACT REMOVAL TOOL

NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.