MOBILE RADIO

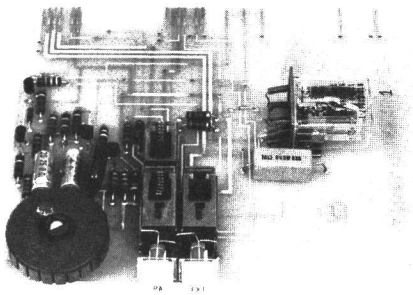
MASTR® II MAINTENANCE MANUAL

PUBLIC ADDRESS OPTION
(Used with C-800 & C-900 Series Control Units)

Maintenance Manual LBI-30355
DATAFILE FOLDER - DF-8389

PUBLIC ADDRESS OPTION 19D423229G1

LOUDSPEAKER – 19B209425P2
SPEAKER CABLE – 19B219826G1



CONTROL UNIT

SPECIFICATIONS *

PUBLIC ADDRESS MODULE	
Power Requirement	0.100 Amperes @13.8 VDC (Additional Current Required by Control Unit)
Frequency Response	200 to 5000 Hz (PA Pre-amplifier only)
Preamplifier Output	160 Millivolts (Minimum output with 60 mV input)
Preamplifier Gain	8 dB (minimum)
Preamplifier Distortion	Less than 1% at 1 kHz
Input Voltage Regulated Voltage	13.8 VDC 9.4 ±0.6 VDC @ approximately 0.012 Amperes
LOUDSPEAKER	
Impedance	8 ohms ±10%
Power (max.)	25 Watts
Voice Coil Resistance	6.75 ohms ±15%

These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

GENERAL ELECTRIC

TABLE OF CONTENTS

WARNING

Although the highest DC voltage in the Mobile Radio Equipment is supplied by the vehicle battery, high currents may be drawn under short circuit conditions. These currents can possibly heat metal objects such as tools, rings, watchbands, etc., enough to cause burns. Be careful when working near energized 12-Volt circuits!

DESCRIPTION

The General Electric Public Address (PA) option provided for C-800 and C-900 Series Control Unit applications consists of an external speaker, a speaker cable and the PA option board. A noise cancelling microphone may be desirable for use in areas with a high volume of background noise. The Public Address option is used only with MASTR II combinations.

Two pushbutton switches (PA and EXT) control the operation of the PA module. The pushbutton switches are backlighted at a low level with LEDs. When the PA or EXT pushbutton is pressed in, the associated LED glows at maximum brightness.

OPERATION

The Public Address option allows the operator to select any one of four operational modes best suited to his needs at any given time. The audio level may be adjusted to a maximum level of 12 watts audio power using the PA VOLUME control on the PA option module. Operational modes are selected using the PA (public address) and EXT (external) pushbutton switches.

SWITCH POSITION	OPERATING MODE
PA out. EXT out	- Normal radio operation, no PA function.
PA in . EXT out	- PA function selected; receiver audio heard on internal speaker only; no transmit capability.
PA out. EXT in	- No PA function; receiver audio split - 30% internal speaker, 70% external speaker; the audio level is controlled by the VOLUME control on control module (lower deck); transmit capablilty present.
PA in . EXT in	- PA function selected; receiver audio split - 30% internal speaker, 70% external speaker; no transmit capability.

CIRCUIT ANALYSIS

References to symbol numbers mentioned in the following text are found on the Schematic Diagram, Outline Diagram and Parts List. Figure 1 serves as a flow diagram showing the MIC HI signal flow from the microphone to the speaker.

The Public Address Module contains the PA and EXT (speaker selector) pushbutton light indicator switches, a squelch disable circuit, a DC switch, audio amplifier and PA VOLUME control, and a 9.4 V voltage regulator.

PA SELECTION

The PA pushbutton switch is a two section DPDT push-push switch that controls the operation of the PTT, squelch disable, microphone, and PA indicator circuits. When the PA option is not selected (switch out), the PTT circuit is completed through P1705A-6, S1701 pins 3 and 1 and P1705B-9. The Mic Hi circuit is completed through P1705A-9, S1701 pins 4 and 2, and P1705B-11. The PA indicator LED is backlighted at a low level and the radio is in a normal operational mode with both transmit and receive capability.

Pressing the PA switch in disables the transmit function and connects the Mic Hi input to the audio amplifier. R1718 is shorted by switch contacts 10 and 12 causing the PA indicator to glow at maximum brightness.

Pressing the microphone PTT switch in applies A- to the receiver squelch circuit through P1705A-6, S1701 contacts 3 and 5 and diode CR1704 to P1705C-1. A- from the PTT circuit disables the receiver squelch circuit, and thereby enables the receiver audio circuits.

The Mic Hi input from P1705A-9 is applied through S1701 contacts 4 and 6 to the PA VOLUME control and audio amplifier. The Mic Lo circuit is completed through P1705B-3 and S1701 contacts 11 and 9 to P1705A-8.

Additionally, control A- is applied through S1701 contacts 3 and 5 and diode CR1703 to energize audio switching relay K1701. With relay K1701 energized, the internal speaker is disconnected from the PA/EXT SPKR Hi lead due to open contacts 8 and 9 of K1701. Receiver audio however, is connected directly to the internal speaker through P701-17 on the control module, J901-17 on the backplane board and vehicle system plug P701-17.

PA audio from the receiver is applied to the external speaker through P1705B-2, relay contacts K1701-7 and 6, P1705A-13, J901-19 on the backplane board and vehicle system plug P701-19.

SPEAKER SELECTION (EXT)

The position of EXT (external) switch S1702 determines how the receiver audio/PA output is split. With the EXT and PA switches in the out position the SPKR Hi input from the IFAS or IF DET board is applied only to the internal speaker. The SPKR Hi input appears at P1705B-2.

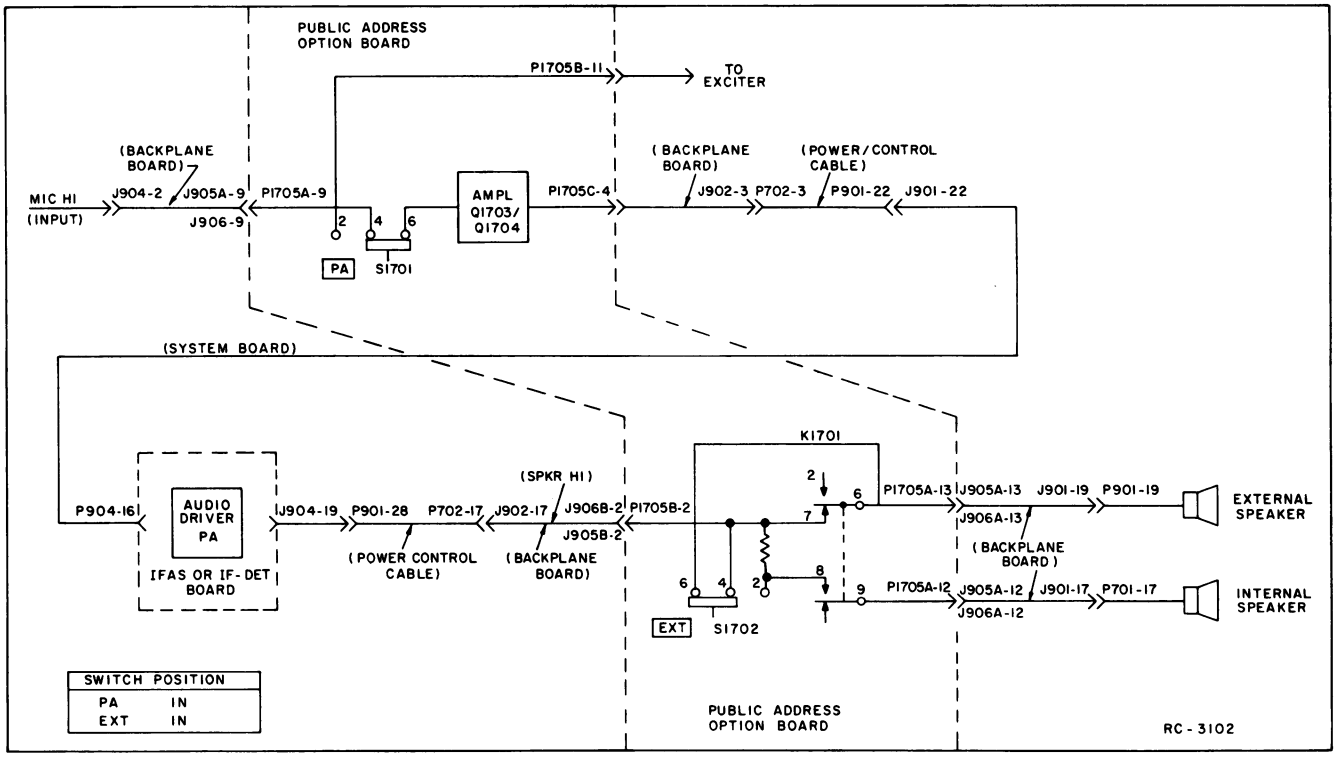


Figure 1 - PA Audio Flow Diagram

The circuit to the internal speaker is completed through S1702 contacts 2 and 4 and relay contacts K1701-8 and 9. In this mode of operation audio is heard only over the internal speaker.

With the EXT switch in and the PA switch out, the SPKR HI output is divided 70% to the external speaker and 30% to the internal speaker. In this mode of operation the audio path from P1705B-2 to the internal speaker is completed through R1702, closed relay contacts K1701-8 and 9 and P1705A-12.

DC Switch and Regulator

In the receiver mode of operation, DC switch Q1701 and regulator Q1702 are normally turned off. When the microphone PTT switch is pressed (PA mode), A- is applied to the base of DC switch Q1701, turning Q1701 on. With Q1701 on, the base of Q1702 is clamped at approximately 10 V by zener diode CR1701. Regulator Q1702 is turned on by the positive voltage on its base. Regulation is accomplished by the constant 10 V applied to the base of Q1702, producing approximately 9.4 V on the emitter of Q1702.

Audio Amplifier and Emitter Follower

The microphone output signal (MIC HI) is coupled through contacts 4 and 6 of S1701 to the high side of PA level control R1708. The amount of signal level applied to the base of audio amplifier Q1703 is determined by the setting of R1708. The signal is then coupled from the arm of R1708 through C1701 and R1710 to the base of audio amplifier Q1703.

The amplified output from the collector of Q1703 is direct coupled to the base of emitter follower Q1704. The emitter of Q1704 is connected to P1705C-4 of the component board. The DC path (RX PA input) for the emitter of Q1704 is through J902-3 on the control unit, and the Power/Control P901-22 on the Cable. Connection is completed through P901-22 of the Power/Control Cable to J901-22 of the System Board. From J901-22, the connection is made through the DA jumper between H101 and H100 to J904 on the System Board. The DA jumper is present only when the Public Address option is utilized.

The emitter load resistor (4.7K ohms) for Q1704 is located within receiver audio IC U604 and is connected from pin 6 of U604 to A-. The DC voltage on the emitter of Q1704 (approximately 5 VDC) is used to back bias an amplifier within U604, preventing receiver noise from being amplified along with the microphone signal which is coupled through C635 to U604-pin 7.

INSTALLATION

Control units equipped with a factory installed Public Address option are supplied

with an external speaker (19B209425P2) and a Speaker Cable Assembly (19B219826G1).

EXTERNAL SPEAKER MOUNTING

Mount the external speaker in the desired location (on vehicle roof, under hood, etc.). Using the cable assembly, make the speaker electrical connections to the Vehicle System Plug (P701) as indicated below.

1. Using the backing plate as a template, mark and drill two 13/64-inch holes for the backing plate retaining screws, and four 9/32-inch holes for the speaker mounting screws. Next, drill a 5/8-inch hole for the speaker cable and insert rubber grommet in the hole.
2. Attach the backing plate behind the mounting surface with two #8-32 thread-forming screws and lockwashers.
3. Route cable from the control unit through backing plate (under mounting surface), grommet, and gasket, to the speaker (see Figure 2).
4. Connect the speaker cable leads and the speaker leads using the two splice connectors furnished.

CAUTION

Do not ground either side of the External Speaker.

5. Mount the speaker using four 1/4" x 7/8" screws, and lockwashers supplied.

ELECTRICAL CONNECTION TO VEHICLE SYSTEM PLUG

1. Insert one lead of speaker cable assembly (19B219826G1) into P701-2 (Speaker Lo of the Vehicle System Plug).
2. Insert the other lead of the Speaker Cable assembly into P701-19 (External Speaker Hi of the Vehicle System Plug).
3. Strain relieve the speaker cable to the control unit using a standard cable clamp (not supplied) in order to prevent damage to P701-2 and P701-19.
4. Connect P701 (Vehicle System Plug) to J701 on the control unit.

CONTROL BOARD AND SYSTEM BOARD MODIFICATIONS

Control units that have not been equipped with a factory installed Public Address option must have the control module within the control unit and the Systems Board in the radio modified. Refer to the Front Panel and System Board Maintenance Manual for System Board Modifications.

The following instructions install the Public Address Module in the C-800 and C-900 Series Control Units. Refer to the

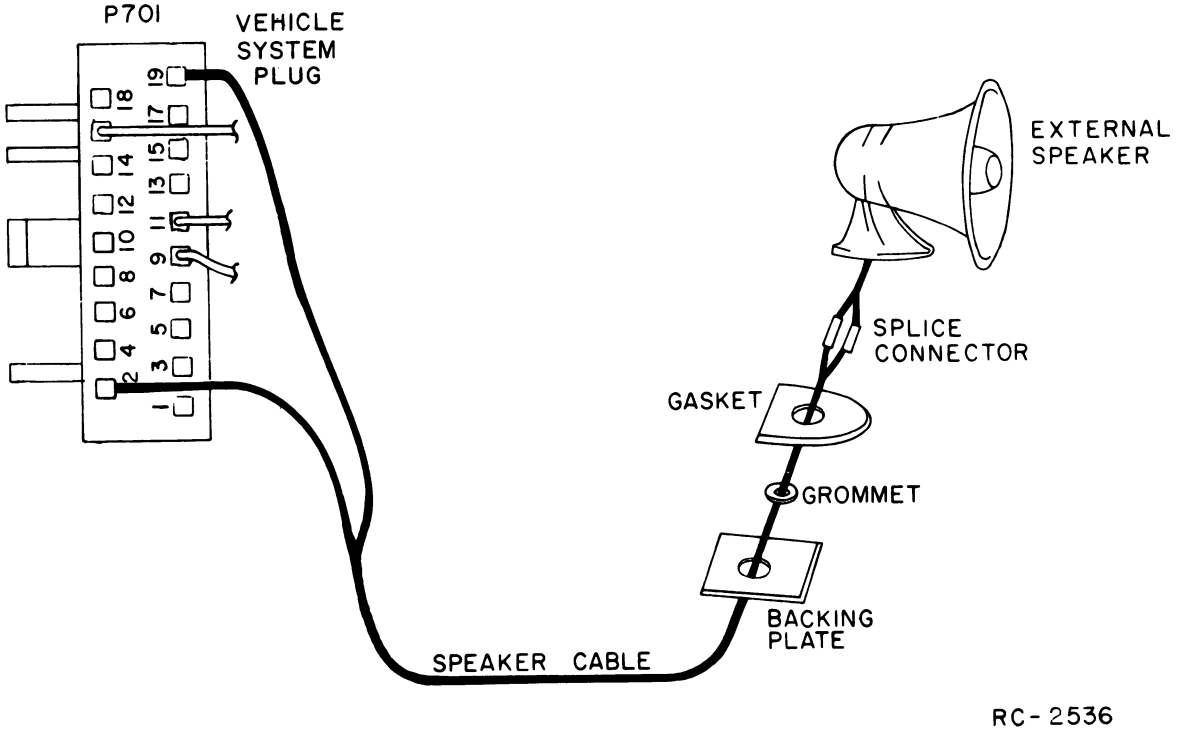


Figure 2 - External Speaker Connections

Control Unit Maintenance Manual for removal and replacement procedures for the control module and to locate jumpers "C", "E", "D", and "J".

Control Module

1. Remove front panel of control unit.

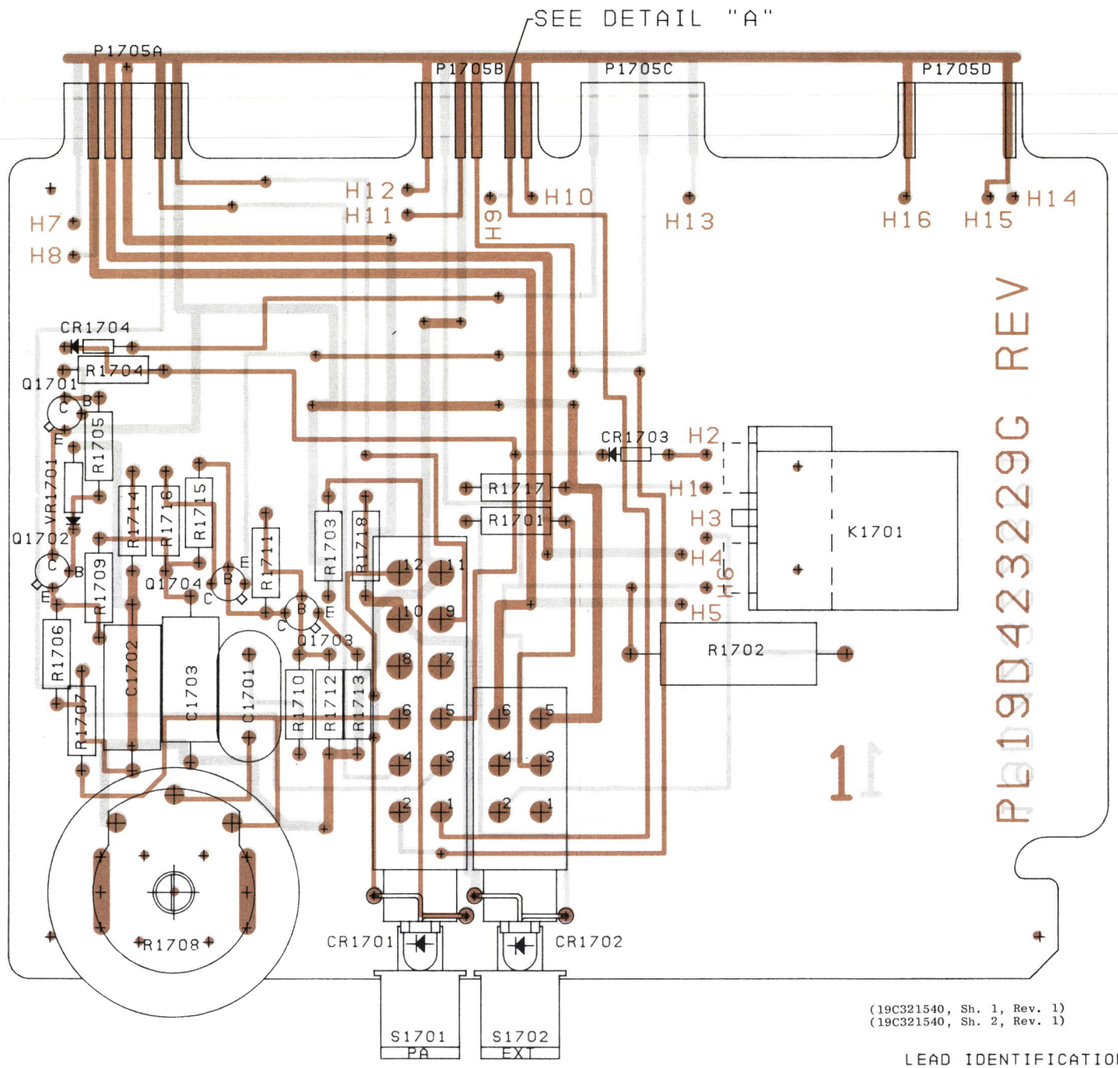
2. Remove control module (refer to Control Unit Maintenance Manual for removal and replacement procedures).

3. Cut or remove lettered jumpers "C", "E", and "J".

NOTE

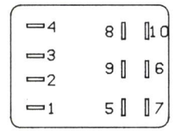
If universal tone connector (option 9405) or if a handset and hookswitch (compatible with Channel Guard) is used, cut or remove lettered jumper "D" also.

4. Reinstall control modules.

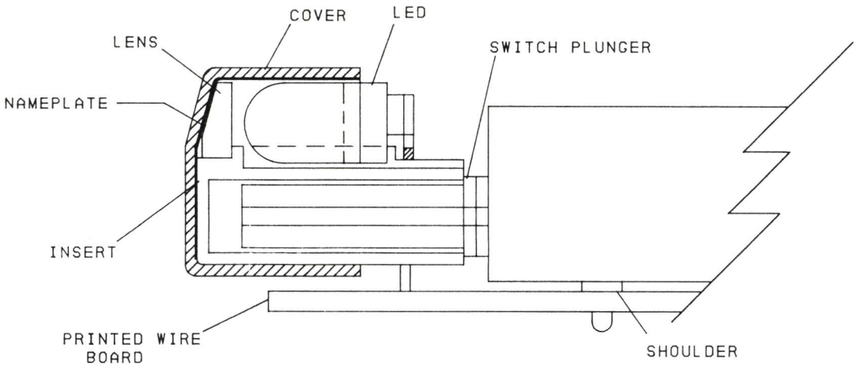


(19C321540, Sh. 1, Rev. 1)
(19C321540, Sh. 2, Rev. 1)

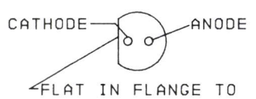
CONNECTION CHART	
SOLDER DA WIRE AS FOLLOWS: SEE WIRING DIAG. 19R622189	
FROM	TO
K1701-1	H1
K1701-4	H2
K1701-6	H5
K1701-7	H6
K1701-8	H3
K1701-9	H4



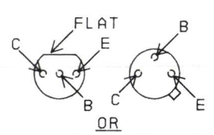
TERMINAL VIEW OF K1701



LEAD IDENTIFICATION FOR CR1701, CR1702

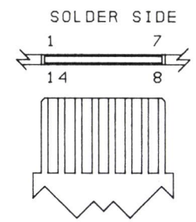


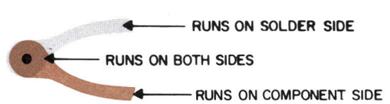
LEAD IDENTIFICATION FOR Q1701-Q1704



NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

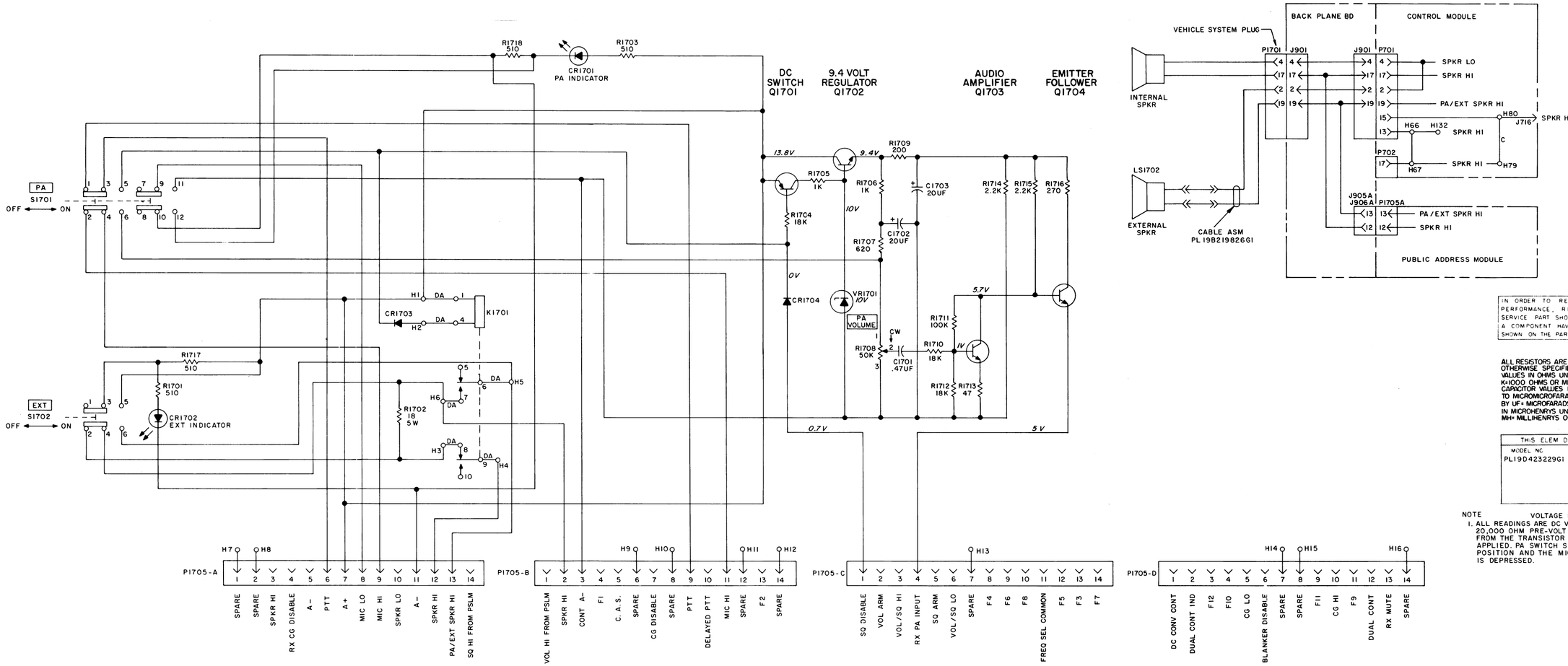
(19D424604, Rev. 1)





OUTLINE DIAGRAM

PUBLIC ADDRESS MODULE



(19R622189, Rev. 2)

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

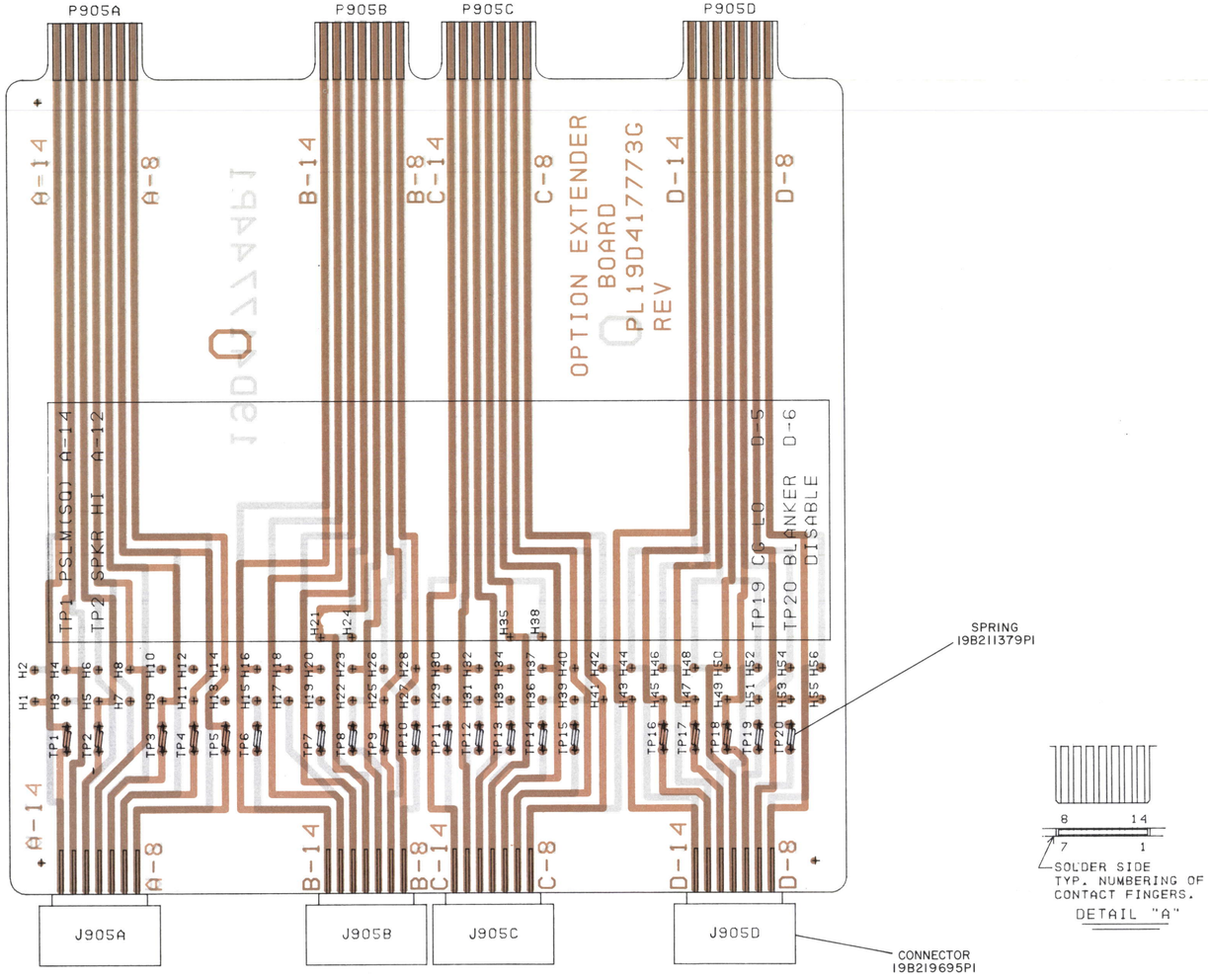
THIS ELEM DIAG APPLIES TO	
MODEL NO.	REV LETTER
PLI9D423229G1	

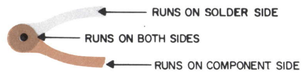
NOTE VOLTAGE READINGS

1. ALL READINGS ARE DC VOLTAGES TAKEN WITH A 20,000 OHM PRE-VOLT METER, AND MEASURED FROM THE TRANSISTOR PIN TO A- WITH NO SIGNAL APPLIED. PA SWITCH S1701 IS IN THE ON POSITION AND THE MICROPHONE P.T.T. SWITCH IS DEPRESSED.

SCHEMATIC DIAGRAM

PUBLIC ADDRESS MODULE





OUTLINE DIAGRAM & PARTS LIST

OPTION MODULE EXTENDER BOARD

(19D424211, Rev. 0)
(19B226451, Sh. 1, Rev. 0)
(19B226451, Sh. 2, Rev. 0)

8 Issue 1

PARTS LIST

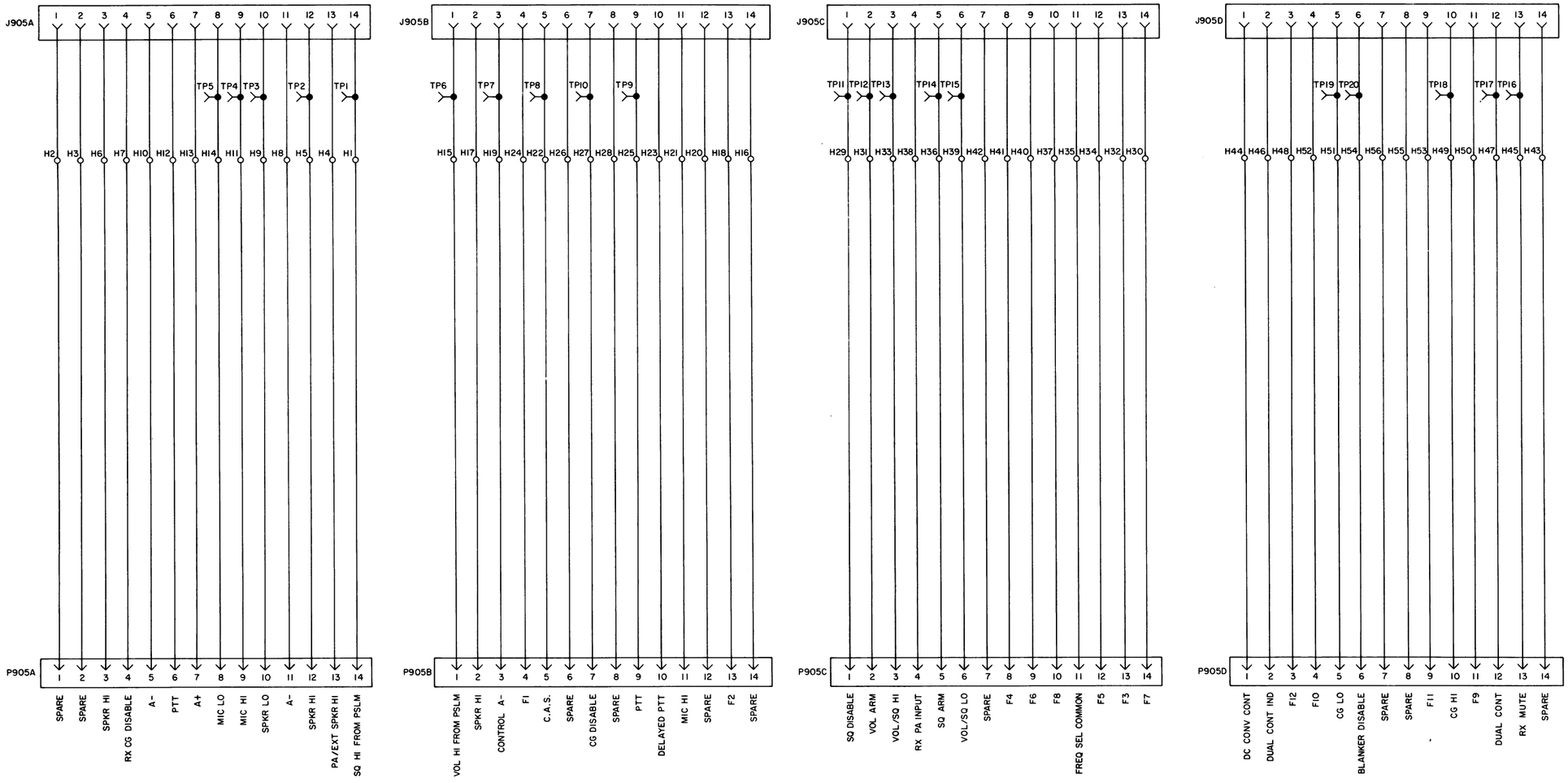
LBI-30356

PUBLIC ADDRESS OPTION
19D423229G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1701	19A116080P11	Polyester: 0.47 µf ±20%, 50 VDCW.
C1702 and C1703	19A115680P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1701 and CR1702	19A134407P7	Diode, optoelectronic: yellow; sim to Monsanto MV5353.
CR1704 and CR1705	19A115250P1	Silicon.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1701	5491595P12	Armature: 1.5 w operating, 520 ohms ±15% coil res, 2 form C contacts; sim to Allied Control T154-X-186.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1701	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q1702 thru Q1704	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1701	3R77P511J	Composition: 510 ohms ±5%, 1/2 w.
R1702	5493035P53	Wirewound: 18 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R1703	3R77P511J	Composition: 510 ohms ±5%, 1/2 w.
R1704	3R77P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R1705 and R1706	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
R1707	3R77P621J	Composition: 620 ohms ±5%, 1/2 w.
R1708	19B209535P3	Variable, carbon film: 50,000 ohms ±20%, 0.25 w; sim to Mallory LCN-TM4.
R1709	3R77P201J	Composition: 200 ohms ±5%, 1/2 w.
R1710	3R77P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R1711	3R77P104K	Composition: 100,000 ohms ±10%, 1/2 w.
R1712	3R77P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R1713	3R77P470J	Composition: 47 ohms ±5%, 1/2 w.
R1714 and R1715	3R77P222K	Composition: 2200 ohms ±10%, 1/2 w.
R1716	3R77P271K	Composition: 270 ohms ±10%, 1/2 w.
R1717 and R1718	3R77P511J	Composition: 510 ohms ±5%, 1/2 w.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1701	19B209563P1	Push: 4PDT, 1 station, alternate action; sim to Switchcraft Series 70,000.
S1702	19B209563P2	Push: 2PDT, 1 station, alternate action; sim to Switchcraft Series 70,000.
		- - - - - - - - - - VOLTAGE REGULATORS - - - - - -
VR1701	4036887P11	Silicon, Zener.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19B226334P1	Pushbutton. (Used with S1701, S1702).
	19B226331P1	Actuator. (Used with S1701, S1702).
	19C321004P1	Lens. (Used with S1701, S1702).
	NP276459P27	Nameplate, plastic. (PA) (Used with S1701).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
	19A115010P3	Contact, electrical: sim to Malco 13A009-11. (Located in printed board- Used with S1701, S1702)
	19B226571G1	Knob. (Used with R1708).
	19B200525P103	Rivet. (Secures K1701 support).
	4038946P3	Support. (K1701).
	N210P7C13	Hex nut: No. 3-48 x 1/4. (Secures K1701).
	N404P9C13	Lockwasher, internal. (Secures K1701).
	NP276459P28	Nameplate, plastic. (EXT). (Used with S1702).



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PLI9D417773	

(19R622088, Rev. 1)

SCHEMATIC DIAGRAM

OPTION MODULE EXTENDER BOARD

Issue 1

ORDERING SERVICE PARTS

Each component appearing on the schematic diagram is identified by a symbol number to simplify locating it in the parts list. Each component is listed by symbol number, followed by its description and GE Part Number.

Service parts may be obtained from Authorized GE Communication Equipment Service Stations or through any GE Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. GE Part Number for component
2. Description of part
3. Model number of equipment
4. Revision letter stamped on unit

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired, or should particular problems arise which are not covered sufficiently for the purchaser's purposes, contact the nearest Radio Communication Equipment Sales Office of the General Electric Company.

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC

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