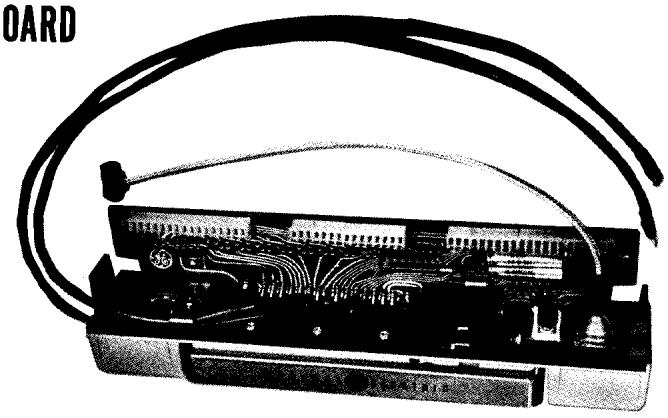
MOBILE RADIO

MASTR II
MAINTENANCE MANUAL
CONTROL UNITS, FRONT PANEL & SYSTEM BOARD



Maintenance Manual LBI-4480B

CONTROL UNITS 19D416781G1,2
FRONT PANEL & SYSTEM BOARD 19D416653G1

SPECIFICATIONS *

CONTROL UNITS

Model Number	
19D416781G1	Single Channel
19D416781G2	Two Channels
Controls	Power-On Volume Squelch Channel Selector Switch
Indicators	Power On Light Transmit Light

FRONT PANEL & SYSTEM BOARD

Model Number	19D416653G1
Input Voltage	12 Volts DC
Output	Regulated 10 Volts DC At 0.1 to 0.5 amperes

*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 radio is supplied by the vehicle battery, high current 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 circuits:

High-level RF energy in the transmitter Power Amplifier assembly can cause RF burns. KEEP AWAY FROM THESE CIRCUITS WHEN THE TRANSMITTER IS ENERGIZED!

CONTROL UNIT

DESCRIPTION

MASTR II Control Units are attractively styled, highly functional units that are enclosed in a two-piece molded Lexan® housing for durability and ease of disassembly. The Control Units are mounted to the vehicle with a Safety Release Lexan® mounting bracket assembly for passenger safety.

The Control Unit uses a printed wiring board to provide a minimum of wiring. The only internal wires used are on the POWER-ON switch and indicator lights.

Cable plugs are secured to the back of the Control Unit by plastic locking clips. The plugs are equipped with indexing tabs to assure connection to the correct jack. The cable is equipped with a strain relief hook that attaches to a steel plate on the bottom rear of the Control Unit.

The microphone plug is secured to a jack on the bottom of the unit by means of a captive locking screw.

All indicator lights are light-emitting diodes (LEDs) for reliability, long life, and low power consumption.

CIRCUIT ANALYSIS

The Control Units are equipped with a VOLUME control, SQUELCH control and a POWER-ON rocker switch. The two-frequency Control Unit is also equipped with a frequency selector switch.

When the POWER-ON switch (S701) is in the OFF position, power is removed from the radio except for the transmitter PA, which is connected to the vehicle battery at all times. Pushing the switch to the ON position applies power to the radio, provides power for the push-to-talk (PTT) circuit and lights the power-on LED in the Power-On/Frequency Indicator window.

Pressing the PTT switch on the microphone energizes the antenna switch, keys the transmitter, mutes the receiver, and lights the transmit indicator LED.

Releasing the PTT switch turns off the transmitter and transmit indicator, de-energizes the antenna switch and un-mutes the receiver. Refer to the Table of Contents for a simplified Transmitter Keying and Power Distribution Diagram.

CR701 and CR708 are protective diodes. CR701 will cause the fuse in the yellow lead to blow if the polarity is reversed. CR708 inhibits the PTT circuit if the polarity of the red lead is reversed.

TWO-FREQUENCY SWITCH (S702)

The frequency select switch is a 12-position switch with a mechanical stop that limits rotation to two positions.

In two-frequency radios, the frequency selector switch selects the desired channel (1 or 2) for both transmitting and receiving. The switch connects A- to the selected transmitter and receiver ICOM so that the radio operates on the selected channel.

IGNITION SWITCH CONNECTIONS

The Control Unit may be connected for three different modes of operation, depending on the way the three ignition switch cables are connected in the vehicle system. The black cable provides the system ground connection. The yellow fused lead provides the receiver hot connections, and the red fused lead provides the transmitter Push-To-Talk hot connection. The three types of operation are:

1. Ignition Switch Standby - For this type of operation, the red fused lead (PTT) is connected to the ACCESSORY or ON terminal of the ignition switch. The yellow fused lead (receiver hot) is connnected to the hot side of the ignition switch, and the black lead connects to vehicle ground.

   With the ignition switch OFF and the POWER-ON switch on, the Power-On indicator light turns on, and the receiver is on, ready to receive messages. Turning the ignition switch to the ON or ACCESSORY position permits the transmitter to be keyed. Turning the POWER-ON switch to OFF removes power from the Two-Way Radio.

2. Ignition Switch Control - For ignition switch control, the yellow and red fused leads are connected to the ACCESSORY or ON terminal of the ignition switch. The transmitter and receiver will operate only when the ignition switch is in the ACCESSORY or ON position. Turning the ignition switch OFF removes all power from the radio.

3. Ignition Switch Bypass - For ignition switch bypass, the yellow and red fused leads connect to the "hot" side of the ignition switch or the vehicle fuse block assembly. Both the transmitter and receiver operate independently of the ignition switch and are turned on and off only by the POWER-ON switch on the Control Unit.

DISASSEMBLY

To gain access to the inside of the Control Unit, simply remove the two screws on the bottom of the front edge of the unit, and lift off the top cover.

To remove the printed wiring board from the control unit housing:

1. Remove the two screws holding the microphone jack.
2. Remove the screw between J701 and J702, and remove the screw between J702 and J703.
3. Remove the screw at each end of the switch and control mounting bracket.
4. Remove the screw holding Power-On switch S701 to the bottom housing. Then swing the printed wiring board up from the front and lift the board out.

RE-INSTALLATION

Standard MASTR II mobile combinations operate in ±12-Volt systems only. If the radio is moved to a different vehicle, always check the battery polarity and voltage of the new system before using the radio.

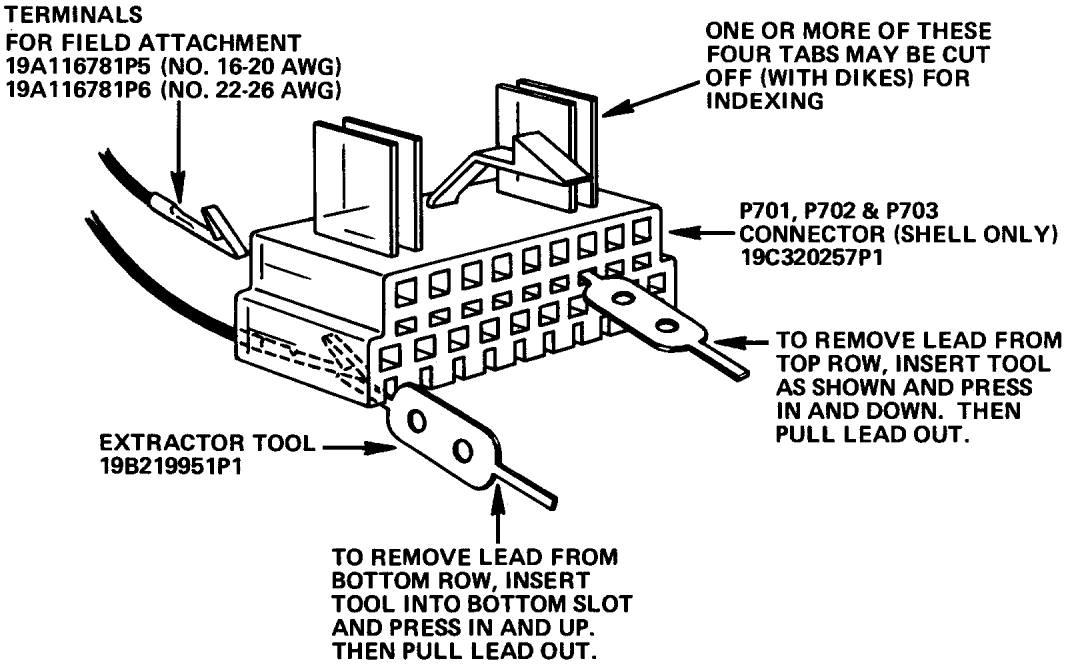


Figure 1 - Using Extraction Tool

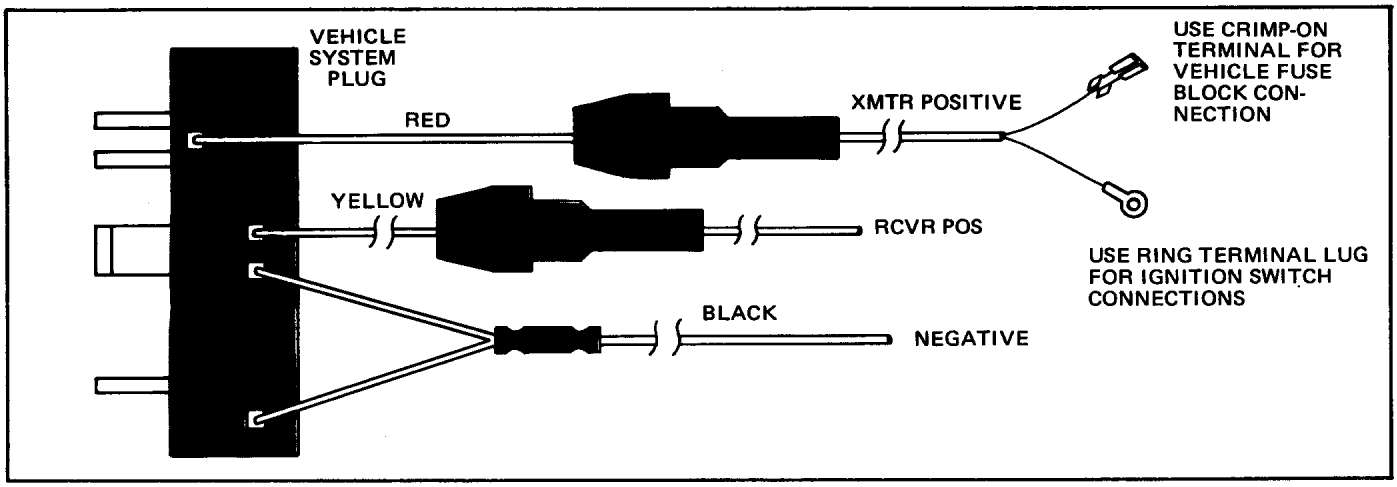


Figure 2 - 12-Volt, Negative Ground Connections

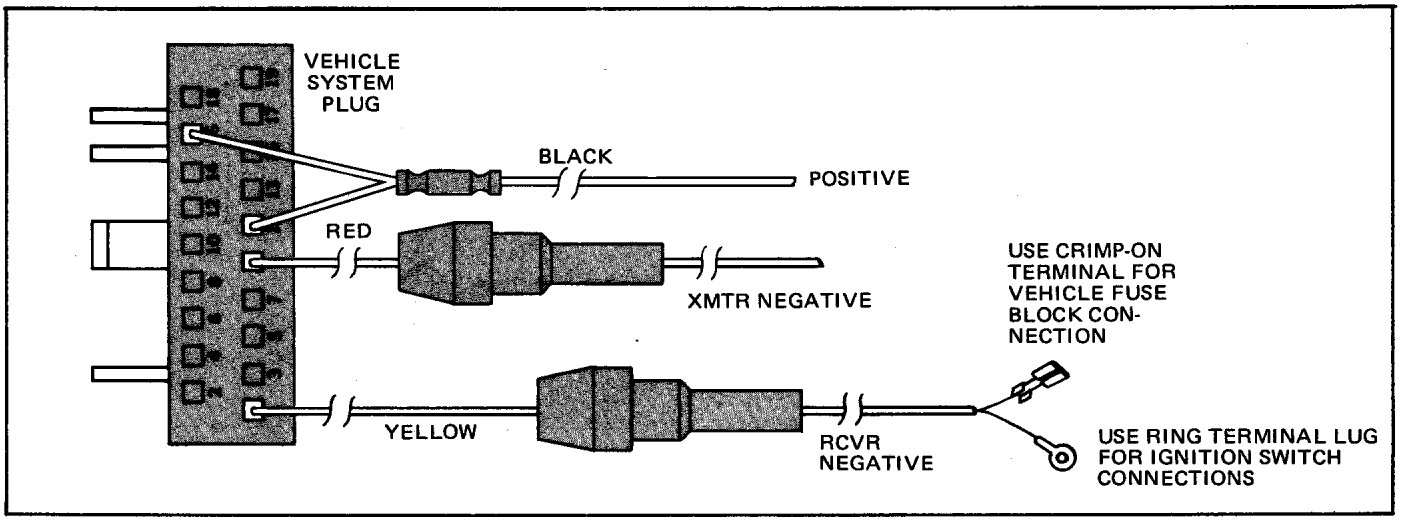


Figure 3 - 12-Volt, Positive Ground Connections

If the radio is moved to a vehicle with different battery polarity, it will be necessary to change the ignition switch leads to the vehicle systems plug. Use the extraction tool as shown in Figure 1, and change the leads as shown in Figures 2 or 3 as required.

FRONT PANEL & SYSTEM BOARD

DESCRIPTION

The System Board mounts to the front casting of the radio, and terminates the power/control cable through jack J901 on the front panel. The System Board provides all power and control functions through printed wiring runs and jacks J902, J903 and J904 to the modules making up the transmitter and receiver functions.

The jack provides 30 control pins that are soldered directly to the System Board, two power pins, and holes for eight optional pins. Power cables from the two power pins run directly from J901 through the left side rail to the bottom of the transmitter PA assembly.

Transmitter exciter and receiver modules plug in from the bottom to jacks on the rear of the System Board.

A hybrid integrated circuit 10-Volt regulator and control module, a centralized metering jack, and pins for plugging in Channel Guard and Carrier Control Timer modules are also mounted on the System Board.

NOTE

In Channel Guard applications, a jumper between H71 and H72 on the System Board is removed.

Centralized metering jack J905 is provided for use with General Electric Test Set 4EX3A11 or Test Kit 4EX8K12. The red metering plug provides continuous access to the regulated 10 Volts, A+, transmitter and receiver audio, and PTT.

The black metering plug on the Test Set is used for metering the transmitter and receiver circuits.

CIRCUIT ANALYSIS

10-VOLT REGULATOR IC

The 10-Volt Regulator IC contains the following circuits:

- 10-Volt Regulator Reference Amplifiers
- Compensation Voltage Divider
- Receiver Muting and Delay
- Transmitter Keying and Delay
- Receiver Oscillator Control
- Transmitter Disable

A typical regulator IC is shown in Figure 4.

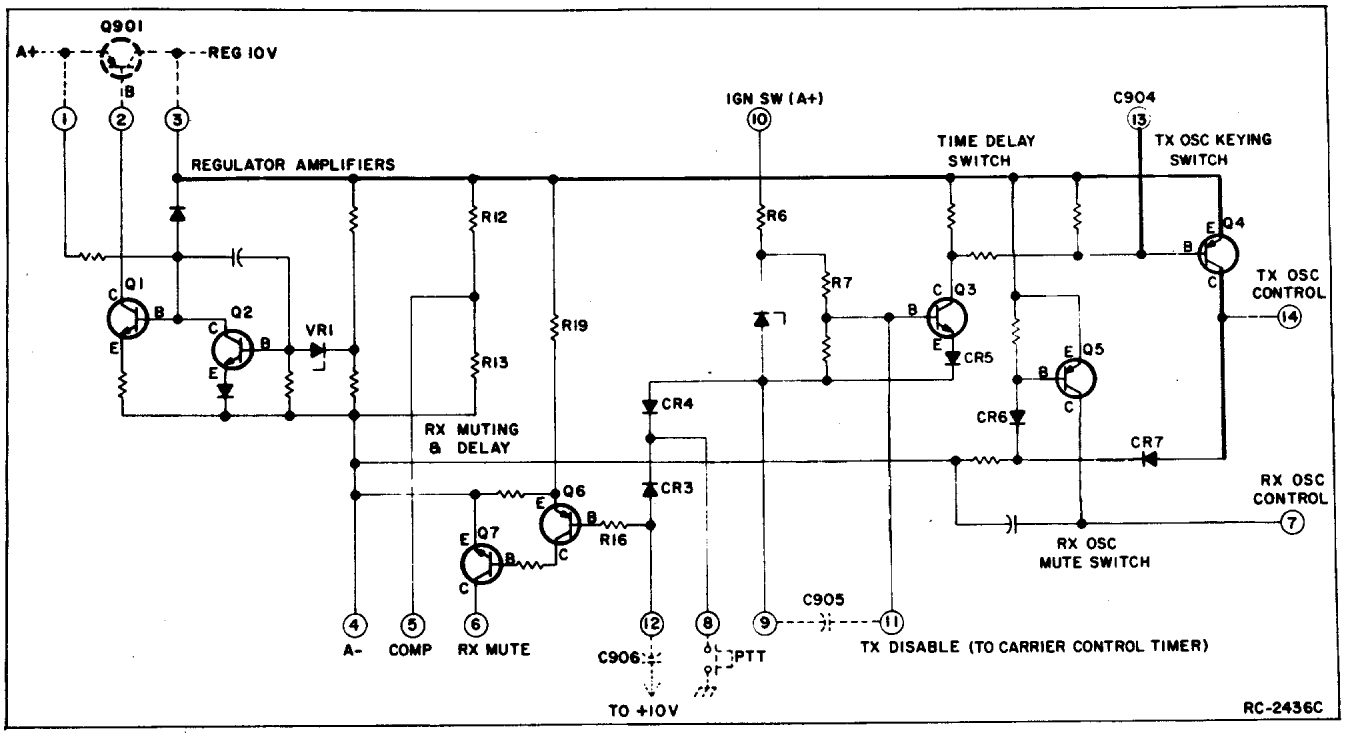


Figure 4 - Typical Regulator IC

10-Volt Regulator

The 10-Volt regulator includes regulator amplifiers Q1 and Q2 (in the IC), and regulator pass transistor Q901. Q901 is mounted on the side of the front casting which acts as a heatsink for the transistor. The regulator circuit provides a closely-controlled supply voltage for the transmitter exciter and receiver (except for the audio PA), and for Channel Guard and Carrier Control Timer options when present. Input voltage (A+) is supplied from the Control Unit on J901-29.

Turning on the radio applies voltage (A+) through input filter L901, C901 and C902 to pin 1 of the regulator and to the base of Q1, causing it to conduct. This turns on PNP regulator pass transistor Q901 and an output voltage appears at the collector. When the output voltage (at pin 3) reaches 10 Volts, zener diode VR1 breaks down, and Q2 starts conducting.

If the output voltage starts to increase, the base current of Q2 also increases, causing it to conduct harder. This causes Q1 to conduct less, decreasing the forward bias on Q901. The voltage drop across Q901 increases and the output remains constant.

When the input voltage starts to drop, the output voltage also tends to drop, causing Q2 to conduct less. This allows Q1 to conduct harder, increasing the forward bias on Q901 and causing it to conduct harder. This reduces the voltage drop across Q901 to keep the output constant.

Service Note: The 10-Volt regulator is protected against short circuits. When supply voltage is present but there is no 10-Volt output, the trouble is probably not in the 10-Volt regulator. Always check for a short (or high drain) on the 10-Volt line before replacing the regulator (see Troubleshooting Procedure).

Compensation Voltage Divider

When the regulator is turned on, the 10-Volt output is applied to a voltage divider network consisting of R12 and R13. This high impedance source provides a stable 5-Volt compensation input (at pin 5) to the transmitter and receiver ICOMs. This source must not be used for any other purpose.

Receiver Muting & Delay

Pressing the PTT switch grounds the base of Q6 in the receiver muting and delay circuit, turning it on. Turning on Q6 turns on Q7, causing its collector to drop to A-. The A- at pin 6 is applied to the receiver squelch and audio ICs, muting the receiver.

With the PTT switch pressed, C906 starts to charge from the +10-Volt line. When the PTT switch is released, C906 keeps Q6 and Q7 on for approximately 50 milliseconds as the capacitor discharges through R19, the emitter-base junction of Q6, and R16. This delays the turn-on of the receiver audio for 50 milliseconds.

Transmitter Keying & Delay

Pressing the PTT switch on the microphone connects pin 8 of the regulator IC to A-. Capacitor C905 starts to charge through R6 and R7. In 15 milliseconds, C905 is charged to a voltage high enough to allow time delay switch Q3 to turn on. This causes transmitter oscillator control switch Q4 to turn on. Turning on Q4 applies voltage to the transmitter ICOM(s), keying the transmitter. Keying the transmitter ICOM is the only keying control function in the transmitter. The collector voltage of Q4 also reverse biases CR6, turning off Q5 and removing the supply voltage from the receiver ICOM(s).

The 15 millisecond time delay in the transmitter oscillator keying circuit allows the antenna switch to energize before RF is applied to the antenna switch. When the PTT is released, diode CR901 delays the antenna switch from de-energizing until the RF is removed from the contacts.

Receiver Oscillator Control

When the radio is in the receive mode (transmitter unkeyed), transmitter oscillator control switch Q4 is off and receiver oscillator control switch Q5 is conducting. The voltage at the collector of Q5 is applied to the receiver ICOM(s).

Transmitter Disable

In radios equipped with a Carrier Control Timer, pin 11 connects to P907-1 (TX DISABLE) on the Carrier Control Timer plug. When the timing cycle on the Carrier Control Timer runs out, A- is applied to pin 11, turning off the transmitter oscillator control voltage which turns off the transmitter.

REPEATING ICOMS

A matrix on the bottom of the System Board permits both the transmitter and

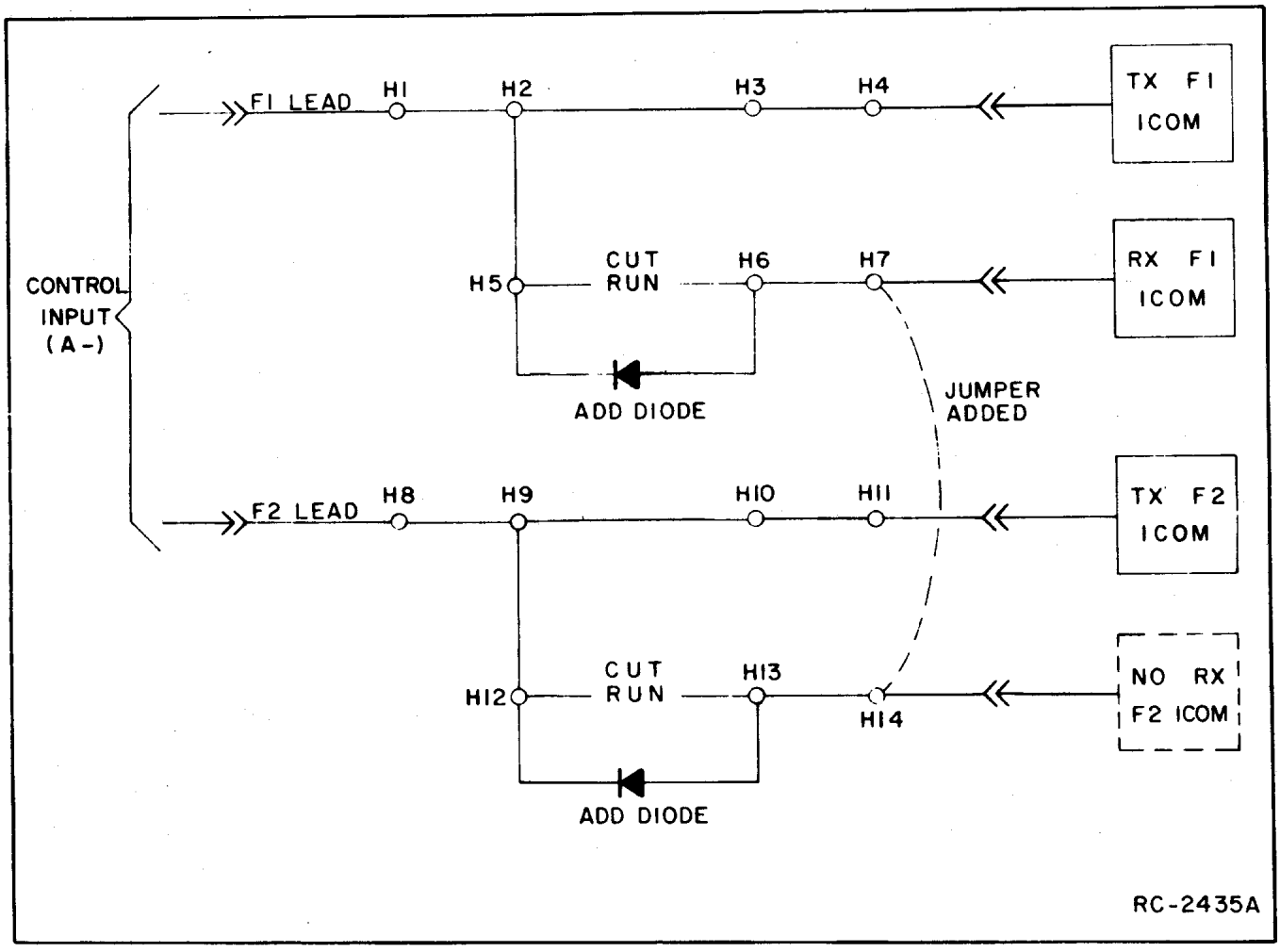


Figure 5 - Repeating ICOMs

receiver to be adapted to repeat the use of the same frequency without the use of additional ICOMs. Isolation diodes and #22 AWG sleeved jumpers are used to connect a single ICOM to more than one frequency control lead.

To repeat the receiver frequencies:

1. Cut the run between H5 and H6, and H12 and H13 (see Figure 5).
2. Add a diode in each of the cut runs as shown.
3. Add a sleeved jumper between H7 and H14.
4. This provides two transmit frequencies and one receive frequency.

To repeat the transmitter frequencies:

1. Cut the run between H2 and H3, and H9 and H10.
2. Add a diode in each of the cut runs with the cathodes towards the control input.
3. Add a jumper between H4 and H11.
4. This provides one transmit frequency and two receive frequencies.

MAINTENANCE

DISASSEMBLY

To service the System Board from the top (see Mechanical Parts Breakdown):

1. Pull the locking handle down, then pry up the top cover at the front notch and lift off the cover.

To service the board from the bottom:

1. Pull the locking handle down and pull the radio out of the mounting frame.
2. Remove the top cover, then loosen the two bottom cover retaining screws and remove the bottom cover.

To remove the System Board from the radio:

1. Remove the top and bottom covers.
2. Disconnect the receiver antenna input plug Ⓐ , and the exciter output plug Ⓑ .
3. Remove the five screws Ⓒ holding the receiver RF assembly to the module mounting frame. Then remove the two screws Ⓓ holding the receiver audio PA heatsink to the right side rail.

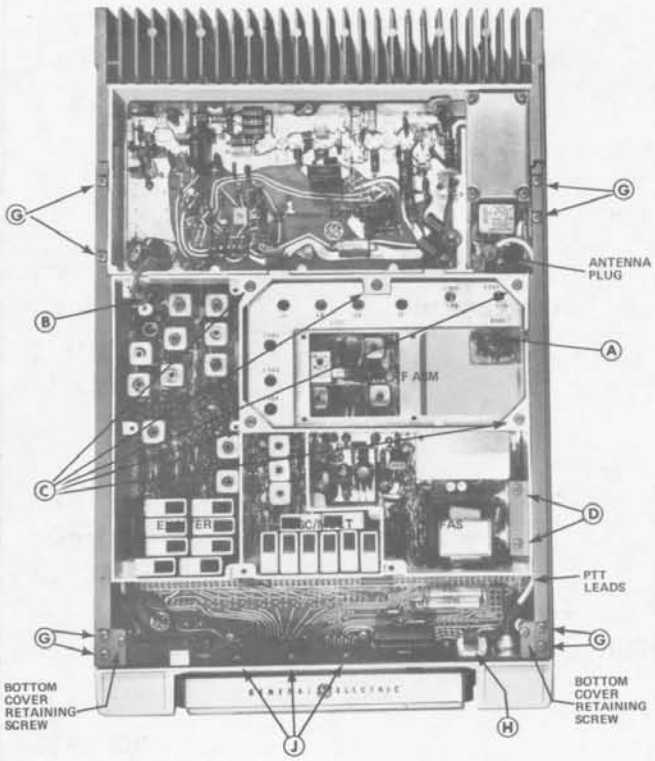


Figure 6 - Disassembly Procedure (Top View)

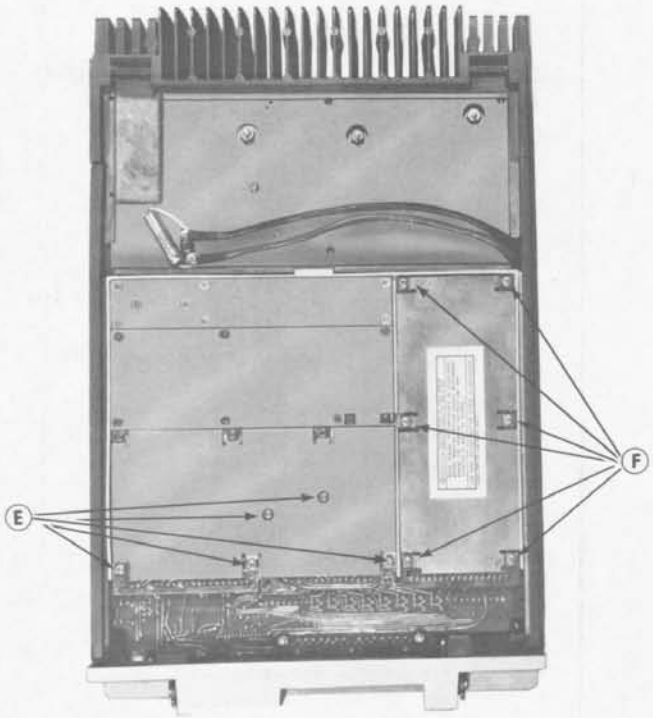


Figure 7 - Disassembly Procedure (Bottom View)

4. Remove the five screws (E) holding the receiver boards to the module mounting frame (see Figure 7).

5. Remove the six screws (F) holding the exciter board and its bottom cover to the module mounting frame.

6. Press straight down on the plug-in Exciter and then the Osc/Mult and IFAS boards to avoid bending the pins when unplugging the boards from the System Board jacks.

7. Remove the four screws (G) in each of the side rails and remove the side rails (see Figure 6). NOTE: Remove the shield on the left side rail to expose the power cables, and if desired, unsolder the cables from the bottom of the PA Assembly.

8. Disconnect the PTT leads from J910 on the System Board, and the antenna plug from the PA assembly.

9. If it is necessary to remove the System Board from the front casting, remove the mounting screw (H) from regulator transistor Q901. Then remove six screws (J) (three along the top and three along the bottom) on System jack J901 and remove the System Board.

TROUBLESHOOTING

10-VOLT REGULATOR U901

SYMPTOM	PROCEDURE
No 10-Volt output	1. Check input voltage (A+) at pin 1 of U901. 2. Remove the Power/Control cable from J901. Check for shorts from Pins 3, 7 and 14 to A-. These readings should be no less than 100 ohms. 3. Check Pass transistor Q901. 4. Replace U901.
Regulator output too high	1. Check Q901. 2. Replace U901.
No switched 10-Volts for transmitter or receiver	1. Check for shorts from Pins 7 and 14 to A-. 2. Check to see that Pin 8 of U901 goes to A- when PTT switch is pressed. 3. Replace U901.

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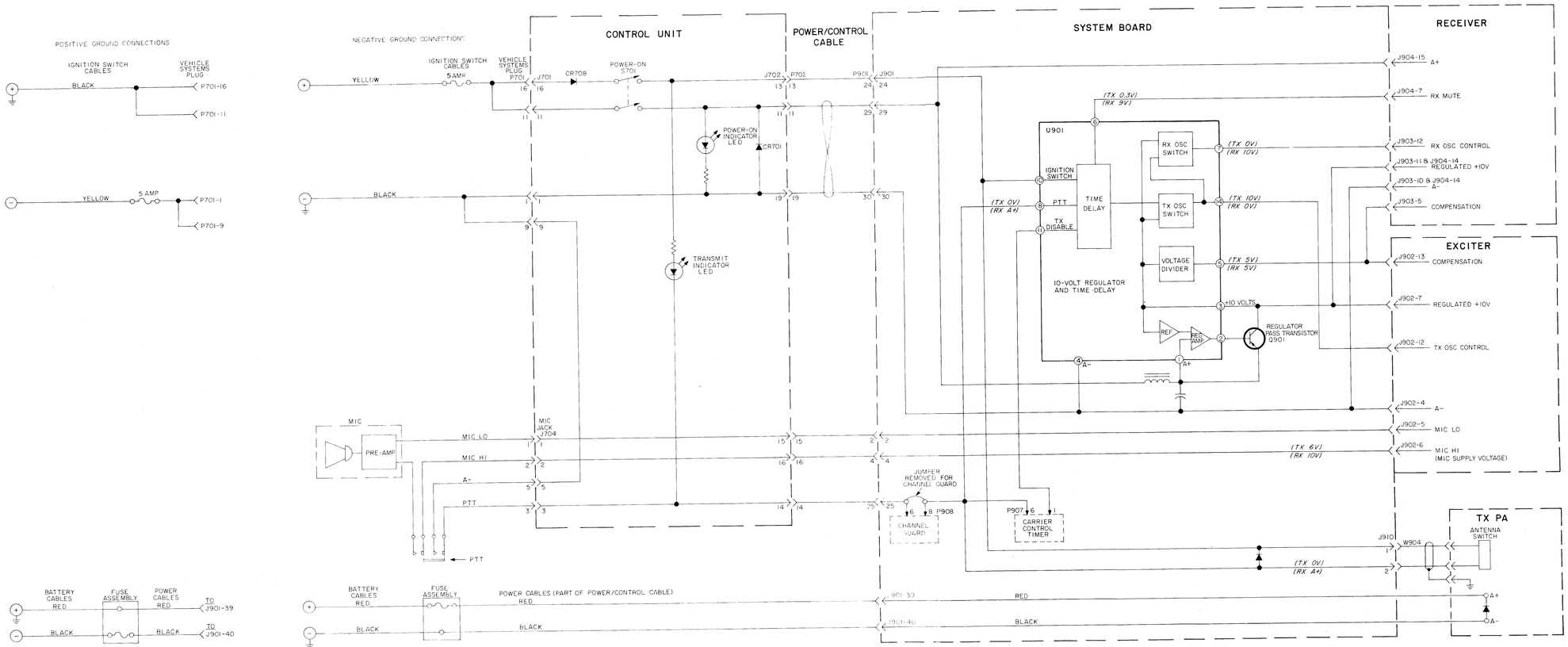
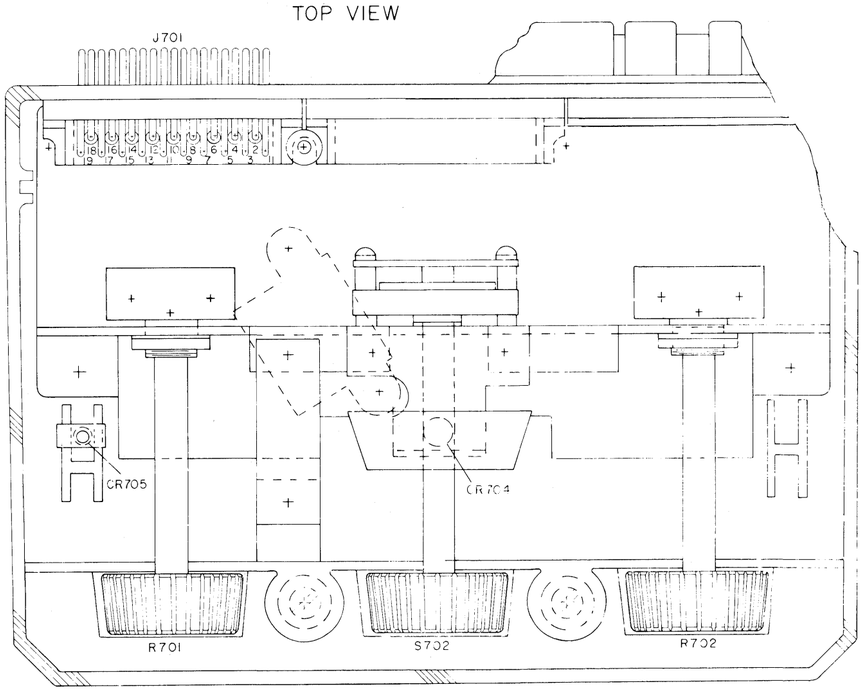
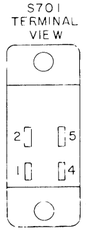


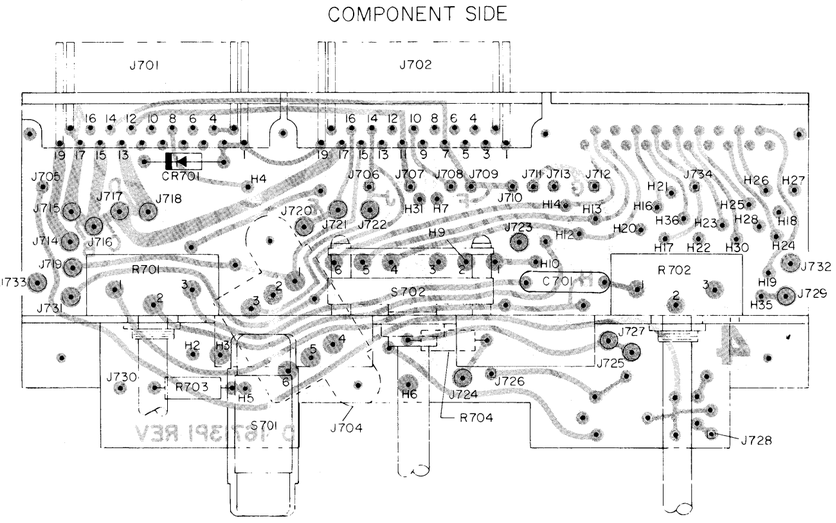
RC-2451B

TRANSMITTER KEYING & POWER DISTRIBUTION DIAGRAM

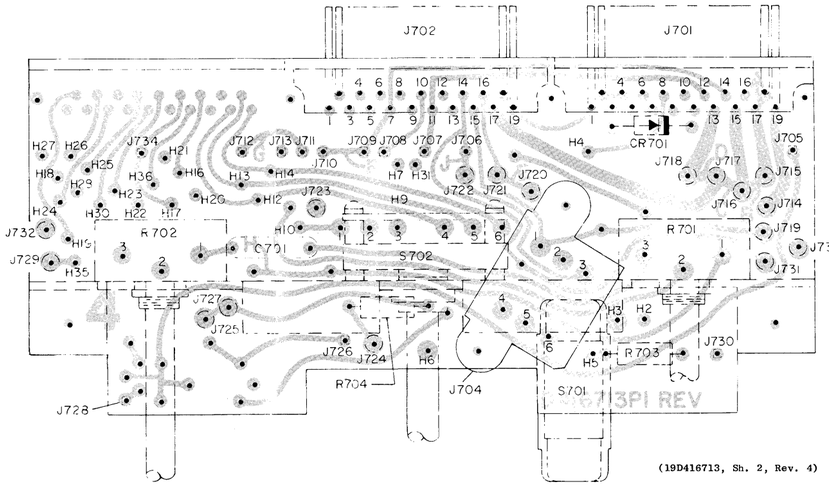
Issue 3





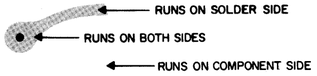


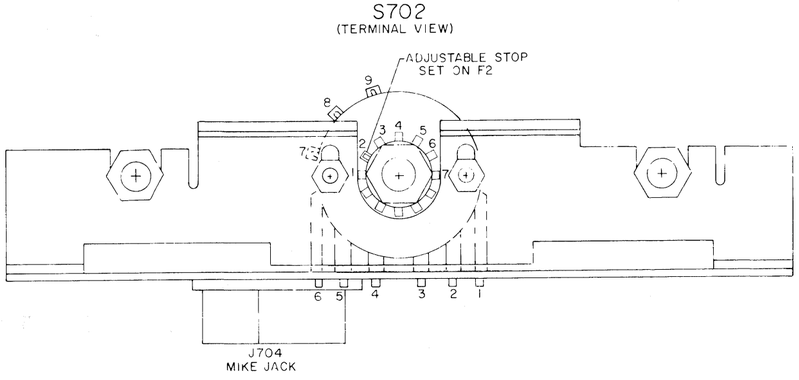
(19D416713, Sh. 2, Rev. 4)
(19D416713, Sh. 3, Rev. 5)

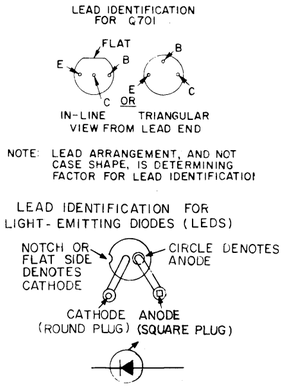


(19D416713, Sh. 2, Rev. 4)

(19D417232, Rev. 4)

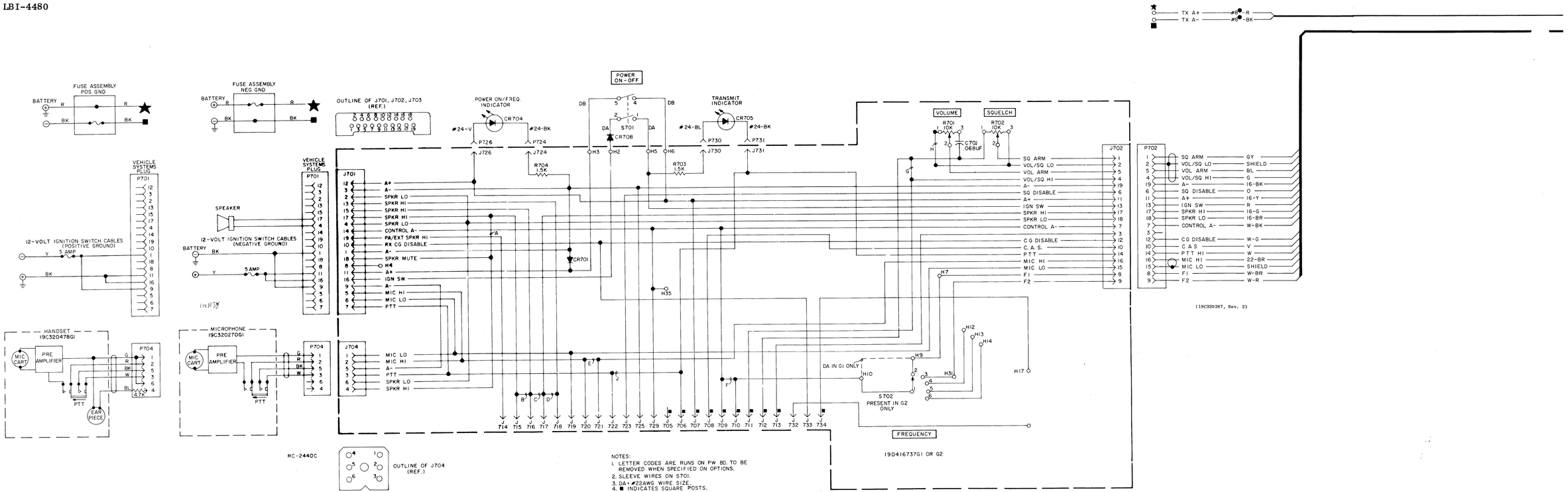






OUTLINE DIAGRAM

CONTROL UNIT
19D416781G1 & G2



NOTES:
1. LETTER CODES ARE RUNS ON PW BD. TO BE REMOVED WHEN SPECIFIED ON OPTIONS.
2. SLEEVE WIRES ON S701.
3. DA = #22AWG WIRE SIZE.
4. ■ INDICATES SQUARE POSTS.

(19D416862, Rev. 7)

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

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

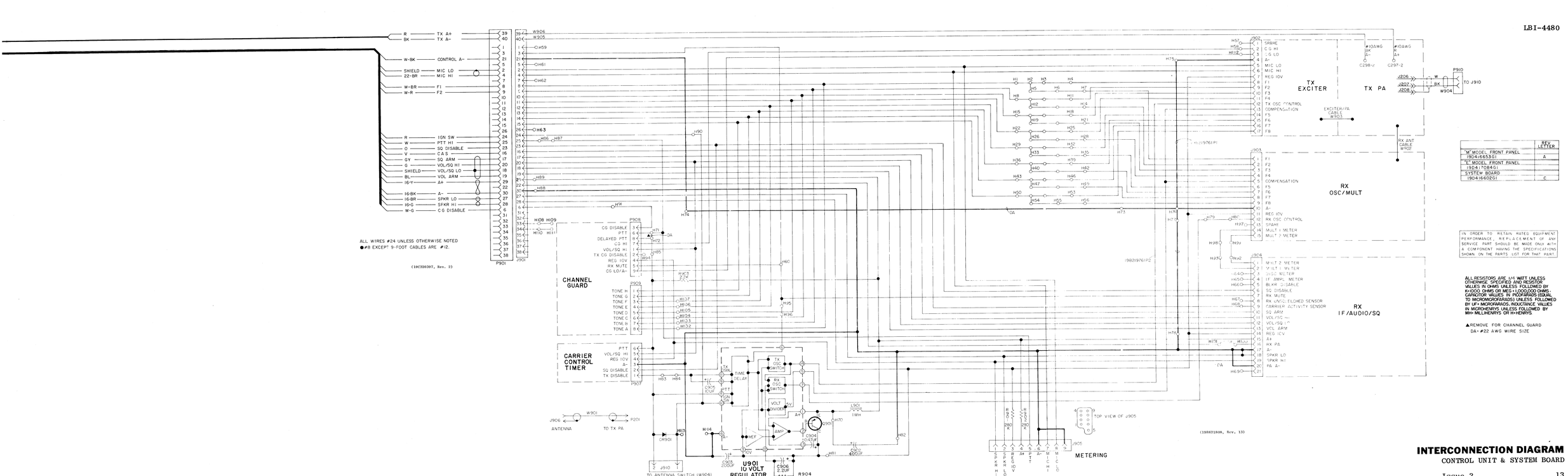
THIS ELEM DIAG APPLIES TO

MODEL NO	REV LETTER
19D416781G1(1-FREQ)	
19D416781G2(2-FREQ)	
19D416737G1	B
19D416737G2	B

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.

INTERCONNECTION DIAGRAM

CONTROL UNIT & SYSTEM BOARD



	REV LETTER
"M" MODEL FRONT PANEL 19D416653G1	A
"C" MODEL FRONT PANEL 19D417084G1	
SYSTEM BOARD 19D416602G1	C

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 1/4 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.

▲REMOVE FOR CHANNEL GUARD DA=#22 AWG WIRE SIZE

INTERCONNECTION DIAGRAM

CONTROL UNIT & SYSTEM BOARD

PARTS LIST

LBI-4439B

CONTROL UNIT 19D416781G1,G2
FRONT PANEL 19D416653G1
SYSTEM BOARD 19D416602G1
AND
ASSOCIATED ASSEMBLIES

SYMBOL	GE PART NO.	DESCRIPTION
		CONTROL UNIT 19D416781G1, G2
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR705	19B209800G1	Diode, light emitting.
		COMPONENT BOARD 19D416737G1, G2
		- - - - - - - - - CAPACITORS - - - - - - - - -
C701*	19A116080P106	Polyester: 0.068 µf ±10%, 50 VDCW. Added by REV A.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR701	4037822P1	Silicon.
CR708	4037822P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J701 and J702	19C320257P2	Pin wafer assembly: 19 contacts.
J704	19B219627G1	Connector: 6 contacts.
J705 thru J713	19A116779P1	Contact, electrical: sim to Molex 08-54-0404.
J714 thru J725	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J726	19A116779P1	Contact, electrical: sim to Molex 08-54-0404.
J727	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J728	19A116779P1	Contact, electrical: sim to Molex 08-54-0404.
J729	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J730	19A116779P1	Contact, electrical: sim to Molex 08-54-0404.
J731 thru J733	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J734	19A116779P1	Contact, electrical: sim to Molex 08-54-0404.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R701	19A116687P2	Variable, carbon film: 10,000 ohms ±20%, 1/4 w; sim to Mallory M304.
R702	19A116687P1	Variable, carbon film: 10,000 ohms ±20%, 1/2 w; sim to Mallory M101.
R703 and R704	3R77P152K	Composition: 1500 ohms ±10%, 1/2 w.
R708*	3R77P471K	Composition: 470 ohms ±10%, 1/2 w. Deleted by REV A.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S701	19A116622P5	Push: DPST, 0.5 amp VDC or 3.0 amps at 125 v; sim to Switchcraft 11K1040.
S702	19A116697P1	Rotary: 1 section, 1 pole, 8 positions (supplied with adj stop), non- shorting contacts, 2 amps at 28 VDC or 1 amp at 110 VRMS; sim to Oak Mfg Type "F".
		FREQUENCY INDICATOR LIGHT ASSEMBLY 19B219686G1, G2
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR704	19A129291P3	Diode, light emitting: red.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - PLUGS - - - - - - - - - -
P724	4029840P2	Contact, electrical: sim to Amp 42827-2.
P726	19A127042P2	Terminal, solderless: sim to Malco 12063-10.
		MECHANICAL PARTS (SEE HC-2447)
1	19A116807P1	Clip, spring tension.
2	19A116773P106	Tap screw: thd size No. 7-19 x 3/8.
3	19B201074P204	Tap screw, Phillips POZIDRIV®: No. 4-40 x 1/4.
4	N402P8C6	Washer: No. 8.
5	19C320389G1	Housing.
6	19B219823G1	Knob.
7	19B219699G1	Frequency indicator.
8	XP270754A	Nameplate. (1-12).
9	XP270754B	Nameplate. (OFF, A-H).
10	4029006P1	Retainer strap: sim to Tinnerman C2386-020-1.
11	N117P9006C13	Tap screw: No. 4-40 x 1/4.
12	7165075P2	Hex nut, brass: No. 3/8-32.
13	7115130P9	Lockwasher: sim to Shakeproof 1220-2.
14	19A134017P1	Adjustable stop.
15	19B219578G1	Safety release disc.
16	19C320022P1	Retaining bracket.
17	N187P16010C6	Screw, hexhead, slotted: No. 10-32 x 5/8. (Quantity 1, used with safely release disc and retaining bracket).
18	N710P16012C6	Screw, hexhead, slotted: No. 10-16 x 3/4. (Quantity 3, used without safely release disc and retaining bracket).
19	19D416594P1	Mounting bracket.
20	19E500988P1	Cover.
21	19A116985P1	Tap screw, assembled washer: No. 13-16 x 3/4 with No. 10 hexhead.
22	XP270753P1	Nameplate. (MASTR II SOLID STATE).
23	19B219626P1	Knob plug. (Frequency switch S702).
24	7140578P4	Nut, push on: sim to Tinnerman C1259-014-27. (Used with item 23).
25	19A130009P1	Diffuser.
26	7160815P4	Washer, spring: sim to Shakeproof 3544-14-00.

SYMBOL	GE PART NO.	DESCRIPTION
		FRONT PANEL AND SYSTEM BOARD 19D416653G1
		- - - - - - - - TRANSISTORS - - - - - - - - -
Q901	19A116375P1	Silicon, PNP.
		- - - - - - - - - CABLES - - - - - - - - - -
W901		ANTENNA CABLE 19A129313G1
J906		Connector. Includes receptacle and adapter:
	4029493P1	Receptacle, coaxial: sim to Amphenol 83-79S.
	4029082P2	Adapter: sim to Amphenol 83-765.
	5491689P84	Cable, RF: approx 13-3/4 inches long, 350 VRMS, 500 VDC operating voltage. (Includes P901).
W905 and W906		POWER LEAD 19A129315G1 (BLACK) 19A129315G2 (RED)
	7491824P9	Terminal, solderless: wire size No. 12-10 AWG; sim to AMP 35470.
	7117269P1	Terminal, solderless: wire size No. 14 AWG. (Used with contact 19B219394P1).
	19B219394P1	Contact.
		SYSTEM BOARD 19D416602G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C901*	19A115680P10	Electrolytic: 200 µf +150% -10%, 18 VDCW. sim to Mallory Type TT. Deleted by REV B.
C902*	19A115680P24	Electrolytic: 400 µf +150% -10%, 18 VDCW. sim to Mallory Type TT.
		In REV A and earlier:
	19A115680P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TT.
C903	19A115680P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TT.
C904	5496267P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C905	19B200240P10	Tantalum: 10 µf ±5%, 15 VDCW.
C906*	5496267P213	Tantalum: 2.2 µf ±10%, 20 VDCW; sim to Sprague Type 150D.
		In REV A:
	19C300075P 150G1J	Polyester: 15,000 pf ±5%, 100 VDCW; sim to GE Type 61F. Added by REV A.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR901	4037822P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J901	19D416398G1	Connector. Includes 30 (19A116669P1) contacts.
J902		Connector. Includes:
	19A116659P3	Printed wiring: 8 contacts; sim to Molex 09-52-3082.
	19A116659P4	Printed wiring: 6 contacts; sim to Molex 09-52-3062.
	19A116659P1	Printed wiring: 3 contacts; sim to Molex 09-52-3032.
J903		Connector. Includes:
	19A116659P3	Printed wiring: 8 contacts; sim to Molex 09-52-3082.
	19A116659P1	Printed wiring: 3 contacts; sim to Molex 09-52-3032.
	19A116659P15	Printed wiring: 4 contacts; sim to Molex 09-52-3042.

SYMBOL	GE PART NO.	DESCRIPTION
J904		Connector. Includes:
	19A116659P4	Printed wiring: 6 contacts; sim to Molex 09-52-3062.
	19A116659P1	Printed wiring: 3 contacts; sim to Molex 09-52-3032.
J905	19B219374G2	Connector. Includes 9 (19A116651P1) contacts.
J910	19A116779P1	Contact, electrical: sim to Molex 08-54-0404. (Quantity 2).
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L901	19A115894P1	Audio freq: 1.0 mh inductance, 0.35 ohms DC res.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P907	19A116779P1	Contact, electrical: sim to Molex 08-54-0404. (Quantity 8).
P908	19A116779P1	Contact, electrical: sim to Molex 08-54-0404. (Quantity 9).
P909	19A116779P1	Contact, electrical: sim to Molex 08-54-0404. (Quantity 8).
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R901 and R902	19C314256P22803	Metal film: 280,000 ohms ±1%, 1/4 w.
R903	3R152P222K	Composition: 2200 ohms ±10%, 1/4 w.
R904*	3R152P133J	Composition: 13,000 ohms ±5%, 1/4 w. Added by REV B.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U901*	19D416564G2	10-Volt Regulator.
		Earlier than REV A:
	19D416564G1	10-Volt Regulator.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A129264G1	Clip. (Used with L901).
	19B219398P1	Support. (Used with J901).
	19B219761P1	Jumper. (Connects J902 and J903).
	19B219761P2	Jumper. (Connects J903 and J904).
	19A116022P1	Insulator, bushing. (Used with Q901).
	19A116023P1	Insulator, plate. (Used with Q901).
	19B201074P206	Tap screw, Phillips POZIDRIV®: NO. . 4-40 x 3/8. (Used with Q901).

SYMBOL	GE PART NO.	DESCRIPTION
		ASSOCIATED ASSEMBLIES
W902	5491689P83	Receiver Antenna Cable: (STANDARD), 4-3/4 inches long; 350 VRMS, 500 VDC operating voltage.
W902	5491689P77	Receiver Antenna Cable: (NOISE BLANKER/PRE-AMP), 6 inches long; 350 VRMS, 500 VDC operating voltage.
W903	5491689P86	Exciter/PA Cable: 3-1/2 inches long; 350 VRMS, 500 VDC operating voltage.
W904		PUSH-TO-TALK-CABLE 19A129314G1
	4036634P1	Contact, electrical: sim to AMP 42428-2. (Used with black and white wire on shielded end).
	4029840P1	Contact, electrical: sim to Amp 41854. (Used with shield).
	19A116781P6	Contact, electrical: sim to Molex 08-50-0108. (Used with black and white wire on connector block end).
	19A116659P16	Connector block. 2 contact; sim to Molex 09-50-4031.
		POWER/CONTROL CABLE 18 CONDUCTOR 19D416716G2
		- - - - - - - - - - PLUGS - - - - - - - - - -
P702		Connector. Includes:
	19B226516P1	Shell.
	19A116781P5	Contact, electrical: wire size No. 16-20 AWG; sim to Molex 08-50-0106. (Quantity 6).
	19A116781P6	Contact, electrical: wire size No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 12).
	19D416352P2	Cable: 18 conductor, 20 feet, includes P901.
	7142878G1	Clip loop (strain relief).
	19A115799P2	Terminal, solderless: sim to AMP 33461. (Quantity 2).
		IGNITION SWITCH CABLE 19B210537G1
		- - - - - - - - - - PLUGS - - - - - - - - - -
P701		Connector. Includes:
	19B226516P3	Shell.
	19A116781P5	Contact, electrical: wire size No. 16-20 AWG; sim to Molex 08-50-0106.
	19A116781P6	Contact, electrical: wire size No. 22-26 AWG; sim to Molex 08-50-0108.
	19A129504G1	Y Cable (BLACK).
		FUSED LEAD 19A129480G1 1 AMP (RED) 19A129480G2 5 AMP (YELLOW)
	1R16P3	Fuse, quick blowing: 1 amp 250 v; sim to Littelfuse 312001 or Bussmann AGC -1.
	1R16P8	Fuse, quick blowing: 5 amps at 250 v; sim to Littelfuse 312005 or Bussmann MTH-5.
	19A115776P2	Fuseholder, phen: sim to Bussmann Type HHJ.
	19A115776P3	Contact, electrical: sim to Littelfuse 904-83. (Located inside fuseholder).
	7491823P7	Ring terminal, solderless: wire size No. 16-14 AWG.
	7491823P8	Ring terminal, solderless: wire size No. 16-14 AWG.
	4029484P2	Terminal, quick connect: wire size 14-18 AWG, fits 1/4 x .032 tab; sim to AMP 41274.
	19A115579P1	Insulated splice.

SYMBOL	GE PART NO.	DESCRIPTION
		BATTERY CABLES
	7147499G7	Battery cable. (BLACK), 3 feet.
	7147499G8	Battery cable. (RED), 3 feet.
		25 - 50 MHz ANTENNA
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7491074P1	Antenna: includes stainless steel rod approx 96-1/2 inches long; ball tip; lockwasher; No. 10-32 hex socket set screw; sim to Antenna Specialists ASPA3BGE.
	7102930P3	Adapter, antenna: approx 2-5/16 inches long. (Used with GE Dwg 7491074P1).
	4033101G1	Antenna package: includes base; adapter spring; cable and plug.
	7472880G5	Antenna base.
	7476632G4	Adapter spring.
	5492239P1	Cable, antenna: includes Type RG-58/U cable approx 15 feet long; PL-259 coaxial plug; mounting clip; ring tongue terminal; sim to Antenna Specialists 13A43.
	2R22P1	Plug, coaxial: mica-filled insert, UHF contact. Signal Corps PL-259; sim to Amphenol 83-1SP. (Used with GE Dwg 5492239P1).
	4K79A1	Coil, loading: 25 to 33 MHz; sim to Antenna Specialists ASPA87.
	19A121577G1	Antenna hook kit.
	7134724P1	Antenna hook.
		132-512 MHz ANTENNA MODEL 4ET12A13 (5490969P13)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Antenna: includes stainless steel whip approx 20 inches long; ball tip; whip socket; No. 6-32 set screw; rubber weather gasket; antenna cable; cable adapter; PL-259 coaxial plug; sim to Antenna Specialists ASPD201GE or Danbury-Knudsen Type PA-25.
	5490969P4	Whip: stainless steel, approx 20 inches long; ball tip.
	5490969P5	Socket, whip: with (2) No. 6-32 set screws.
	5490969P6	Whip and whip socket: stainless steel whip approx 20 inches long with ball tip; whip socket with (2) No. 6-32 set screws.
		Cable, antenna: approx 15 feet long. Type RG-58/U. (Used with GE Dwg 2R22P1 and GE Dwg 7105381P1).
	7105381P1	Adapter, cable: approx 1 x 7/16 inches dia. Type UG-175/U. (Used with GE Dwg 2R22P1 and Type RG-58/U cable).
	2R22P1	Plug, coaxial: mica-filled insert, UHF contact. Signal Corps PL-259; sim to Amphenol 83-1SP. (Used with GE Dwg 7105381P1 and Type RG-58/U cable).
		12 VOLT FUSE ASSEMBLY 19B216021G4 (Fuses must be ordered separately)
		- - - - - - - - - - FUSES - - - - - - - - - -
F1	1R11P4	Quick blowing: 15 amps, 250 v; sim to Bussmann NON15. (Used with low power transmitters, 16-38 w).
F2	1R11P6	Quick blowing: 25 amps, 250 v; sim to Bussmann NON25. (Used with medium power transmitters, 38-66 w).
F3	1R11P7	Quick blowing: 30 amps, 250 v; sim to Bussmann NON30. (Used with high power transmitters, 66-128 w).

PRODUCTION CHANGES

Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - Control Unit Board 19D416737G1, G2, G3
Improve Performance. Delete R708. Add C701.

REV. B - Control Unit Board 19D416737G1, G2
Increases Reliability. Delete J703.

REV. A - Control Unit 19D416781G1, G2
To improve connector retention.
Changed bracket at rear of control head assembly.

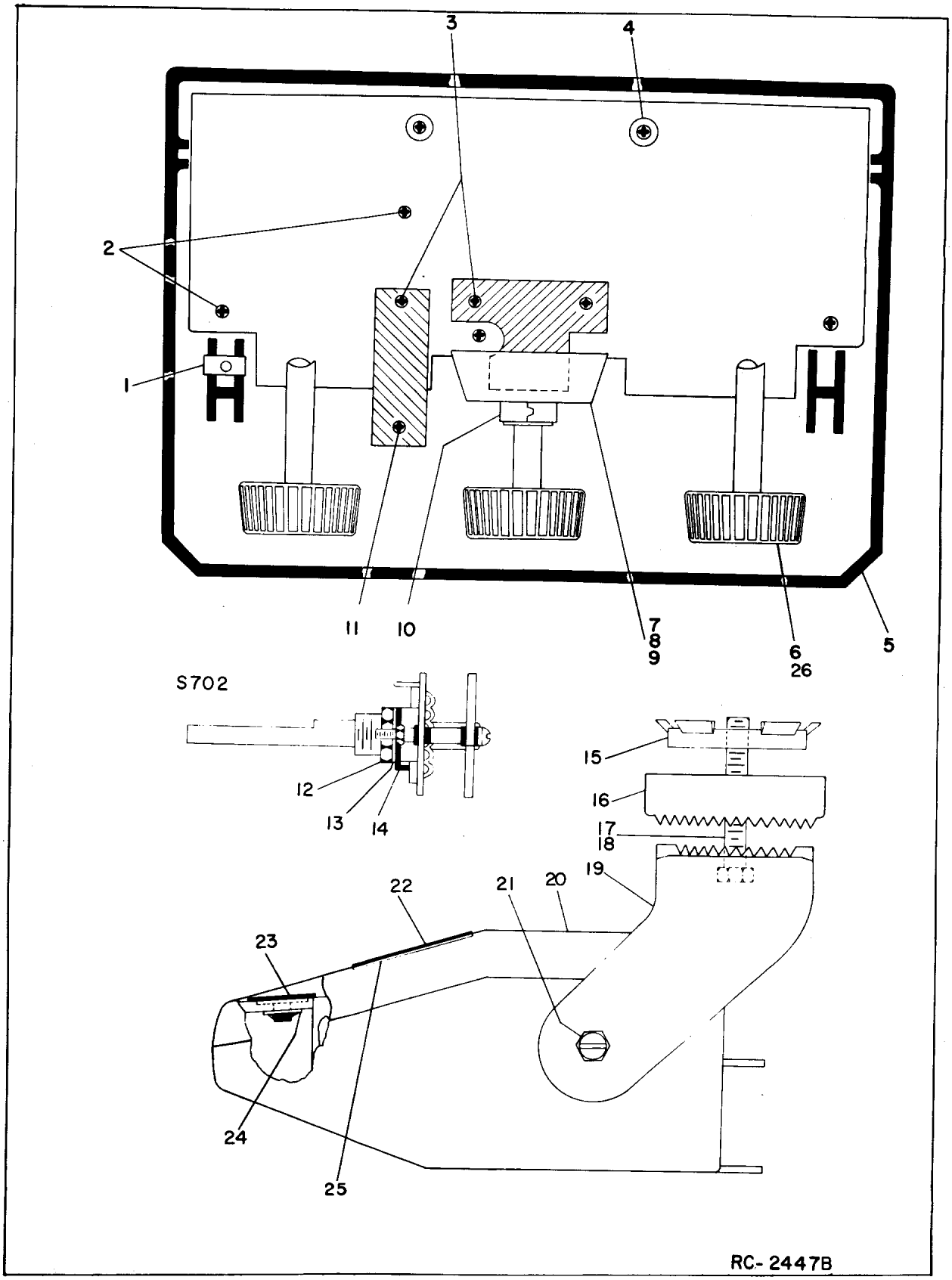
REV. A - Front Panel Assembly 19D416653G1
To improve operation. Changed U901 and added C906.

REV. A - System Board 19D416602G1
To improve operation. Deleted C901 and changed C902.

REV. B - System Board 19D416602G1
To prevent receiver mute caused by ignition noise.
Changed C906 and added R904.

REV. C - System Board 19D416602G1
To improve performance under high RF field by connecting speaker Lo to A-. Added holes H108 thru H112.

 *COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



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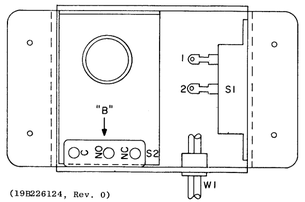
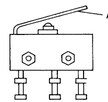
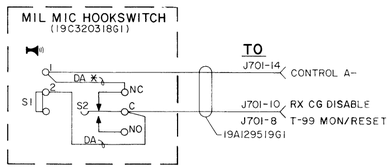
OUTLINE DIAGRAM





(19B226124, Rev. 0)

SCHEMATIC DIAGRAM



* REMOVE DA JUMPER TO DISABLE AUTOMATIC CHANNEL GUARD MONITOR

S2 - SHOWN OFF HOOK

S1 - SHOWN OFF MONITOR

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.	
THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER

(19A129660, Rev. 2)

PARTS LIST

LBI-4483A

MICROPHONE HOOKSWITCH
19C320318G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19B219698G1	Slide: SPST, 3 amp at 125 VAC, 2.2 amp at 14 VAC; sim to Switchcraft 46202LH. (S1 includes switch and housing).
S2	19A116676P1	Sensitive: SPDT, 5 amp at 24 VDC or 5 amp at 250 VRMS; sim to Microswitch 11SM1-T2.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1	19A129414G1	2 conductor cable: approx 5 feet long, includes (2) 19A116781P3 contacts.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A116768P6	Strain relief: sim to Heyco SR-3P-4. (Used with W1).
	N193P1410C	Tap screw, phillips: No. 8 x 5/8.
	N84P5008C6	Screw, phillips: No. 2-56 x 1/2. (Secures S2).
	N210P5C6	Hexnut: No. 2-56. (Secures S2).
	N404P8C6	Lockwasher, internal tooth: No. 2. (Secures S2).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

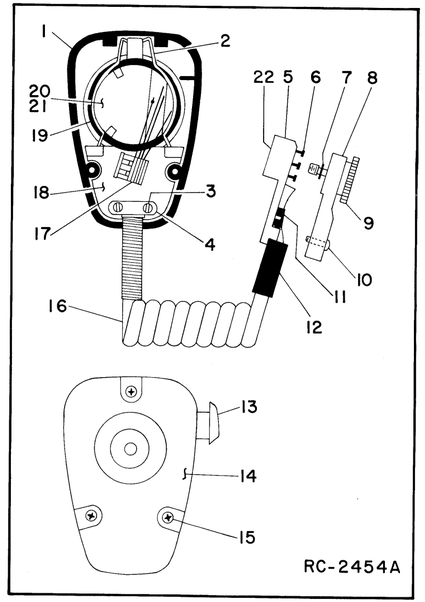
PARTS LIST

LBI-4481A

TRANSISTORIZED DYNAMIC MICROPHONE
19C320270G1
(SEE RC-2454)

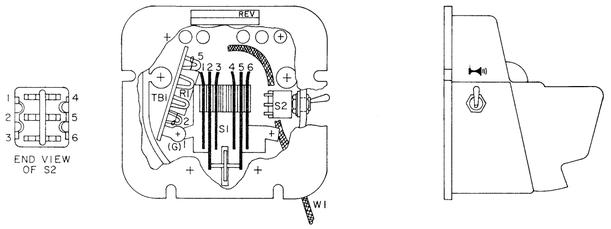
SYMBOL	GE PART NO.	DESCRIPTION
1		Front Case Assembly. RP127. (includes items 14, 15).
2		Retaining spring. (Part of item 18).
3		Tap screw, phillips. (Part of item 16).
4		Retaining bar. (Part of item 16).
5	19D416766P1	Connector base.
6	19A129435P1	Contact.
7	7109043P1	Retaining ring.
8	19D416767P1	Connector cover.
9	19B219723G1	Screw.
10	N136AP905C	Tap screw, phillips: No. 4 x 5/16.
11	19A116937P1	Cable clip.
12	19B219749P1	Strain relief.
13		Switch button kit. RP126.
14		Rear Case Assembly. (Part of item 1).
15		Tap screw, phillips. (Part of item 1).
16	19C321016G1	Cable assembly: Includes items 3-12 and cable RP129.
17		Switch Assembly. RP128.
18		Grille Assembly. RP130. (includes items 2, 10, 21).
19		"O" Ring. (Part of item 18).
20		Transistorized Cartridge. RP117.
21		Washer. (Located under cartridge- part of item 18).
22	19C321016G3	Connector assembly: Includes items 5-12.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



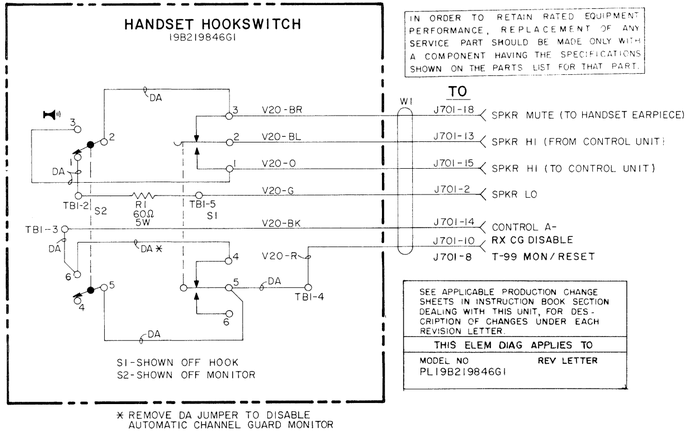
SERVICE SHEET
MICROPHONE & HOOKSWITCH

OUTLINE DIAGRAM



(19B226131, Rev. 0)

SCHEMATIC DIAGRAM



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.

W1	TO	
	J701-18	SPKR MUTE (TO HANDSET EARPIECE)
	J701-13	SPKR HI (FROM CONTROL UNIT)
	J701-15	SPKR HI (TO CONTROL UNIT)
	J701-2	SPKR LO
	J701-14	CONTROL A-
	J701-10	RX CG DISABLE
	J701-8	T-99 MON/RESET

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19B219846G1	

(19B219842, Rev. 2)

SERVICE SHEET

HANDSET & HOOKSWITCH

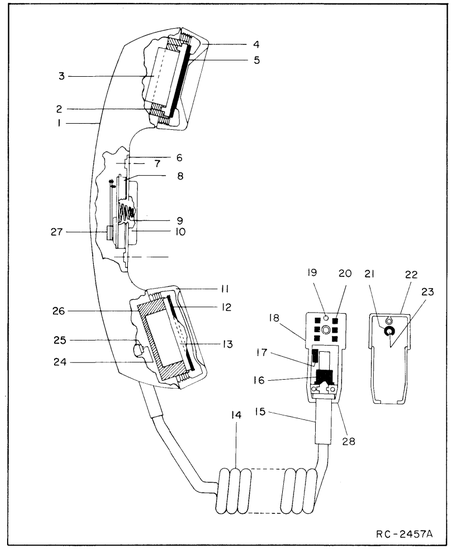
PARTS LIST

LBI-4484

HANDSET HOOKSWITCH
19B219846G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	5493035P12	Wirewound: 60 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19A129585P1	Holder and switch: Thermoplastic case, contact rating 1 amp at 125 v.
S2	19A116877P6	Toggle: DPDT, 1 ma at 6 VDC; sim to C and K Components 7201G. (CHANNEL GUARD DISABLE).
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7775500P203	Phen: 5 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1	19B219841G1	6 conductor, 5 feet long.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	N190AP1312C	Tap screw, phillips pozidriv: No. 6 x 3/4. (Secures housing to base plate).
	N101P1510P	Tap screw, phillips: No. 8 x 5/8. (Used for mounting base plate).
	19B219852P1	Base plate.
	19A129586P1	Bumper, rubber, (2).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



PARTS LIST

LBI-4482A

TRANSISTORIZED DYNAMIC HANDSET
19C320478G1

SYMBOL	GE PART NO.	DESCRIPTION
1		Case Assembly. Includes items 1, 2, 4, 5, 11, 12, 26. Shure Brothers RP142.
2		Adapter. Part of item 1.
3		Receiver Cartridge. Shure Brothers RP140.
4		Receiver Cap. Part of item 1.
5		Washer. Part of item 1.
6		Escutcheon. Part of item 27.
7		Flat head screw, socket cap: No. 4-40 x 1/4. Part of item 27.
8		Actuator. Part of item 27.
9		Spring. Part of item 27.
10		Plunger bar. Part of item 27.
11		Transmitter cap. Part of item 1.
12		Washer. Part of item 1.
13		Transmitter cartridge. Shure Brothers RP139.
14	19C321016G2	Cable assembly: Includes items 14-23 and cable RP141.
15	19B219749P1	Flex relief.
16	19A116937P1	Cable clamp: sim to Malco 21012-3.
17	3R77P472K	Resistor, (R1) Composition, 4700 ohms ±10%, 1/2 w.
18	19D416766P1	Connector case.
19	N136AP905C	Screw.
20	19A129435P1	Pin contact.
21	7109043P1	Retaining ring, 3/16 inch, sim to National Lockwasher WA 510.
22	19D416767P1	Connector Cover.
23	19B219723G1	Screw. (Secures cover, item 22 to case, item 18).
24		Screw. Part of item 14.
25		Cable clamp. Part of item 14.
26		Shield. Part of item 1.
27		Switch Assembly. Includes items 6-10. Shure Brothers RP143.
28	19C321016G3	Connector assembly: Includes items 15, 16, 18-23. Does not include resistor, item 17.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

LBI-4488

SPEAKER
19C320302G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - LOUDSPEAKERS - - - - - - - - - -
LS1	19A116694P1	Permanent magnet, 5 inch: 20 watts, 8 ohms ±10% imp, 100 to 10,000 Hz response; sim to Oaktron T2877.
		- - - - - - - - - - - - CABLES - - - - - - - - - - -
W1	19A129414G1	2 conductor cable: approx 5 feet long, includes (2) 19A116781P3 contacts.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B219692G1	Grille.
	19D416396P1	Housing.
	19C320016P1	Mounting bracket. (Located between housing and retaining bracket).
	19C320022P1	Retaining bracket. (Located between mounting bracket and safety release disc).
	19B219578G1	Safety Release Disc.
	19A116986P108	Tap screw, with lockwasher: No. 7-19 x 1/2. (Secures speaker to housing).
	19A116986P112	Tap screw, with lockwasher: No. 7-19 x 3/4. (Secures grille to housing).
	19A116985P1	Tap screw, with lockwasher: No. 13-16 x 3/4. (Secures mounting bracket to housing).
	N187P16010C6	Screw, hexhead, slotted: No. 10-32 x 5/8. (Quantity 1- used with safety release disc and retaining bracket).
	N710P16012C6	Screw, hexhead, slotted: No. 10-16 x 3/4. (Secures mounting bracket or retaining bracket).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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.

MAINTENANCE MANUAL

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MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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