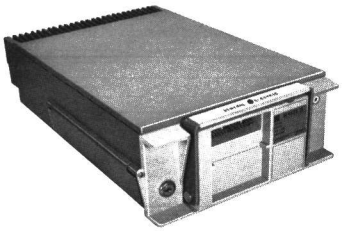
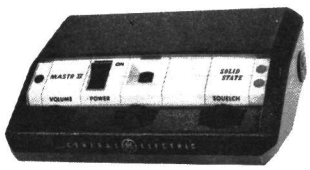
MOBILE RADIO

MASTR II

MAINTENANCE MANUAL



MOBILE RADIO



CONTROL UNIT

"E" MODEL

1 - THRU 12 - FREQUENCY

TWO-WAY FM MOBILE COMBINATIONS

LBI - 4698

SPEAKER

GENERAL ELECTRIC

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WARNING

Although the highest DC voltage in MASTR II Mobile 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 circuits! High-level RF energy in the transmitter Power Amplifier assembly can cause RF burns upon contact. Keep away from these circuits when the transmitter is energized!

EQUIPMENT INDEX

Equipment	Model or Part Number
Transmitter and Receiver	Refer to the Applicable Maintenance Manual
Transmitter Multi-Frequency Board	19C320613G1
Receiver Multi-Frequency Board	19D417156G1
Multi-Frequency Cable Harness Assembly	19B219989G1
Exciter/PA Cable	5491689P93
Receiver Antenna Cable	
Standard	5491689P83
Noise Blanker or Pre-Amp	5491689P77
Control Unit (Requires Multi-Freq Kit 19A129578G2)	19A129576G1
Microphone	19C320270G1
Speaker	19C320302G1
Antennas	Refer to Control Unit Maintenance Manual
Power/Control Cable	
20-Foot, 38 Conductor	19D416716G11
12-Volt Fuse Assembly	
Low Power (up to 35 Watts)	19B216021G1
Medium Power (35 to 65 Watts)	19B216021G6
High Power (65 to 110 Watts)	19B216021G3
Battery Cables	
Black	7147499G7
Red	7147499G8
Ignition Switch Cable Assembly	
12-Volt	19B219537G4
DC Converter	19B219537G3
DC Converter	19D417134G1
Microphone Bracket	7141414G4
Channel Guard Microphone Hookswitch	19C320318G1
Extractor Tool	19B219951P1
Mounting Hardware	19A129474G1
Key (BF10A)	5491682P8
Alignment Tools	19B219676G1 19B219678P1

OPTIONS

Equipment	Part or Option Number
Power/Control Cables	
9-Foot, 38-Conductor	19D416716G10
27-Foot, 38-Conductor	19D416716G12
Handset	19C320478G1
Hookswitch	19B219846G1
12-Volt, 3-Wire Ignition Switch Cable Assembly	19B219537G1

SYSTEM SPECIFICATIONS *

FREQUENCY RANGE	42-50 MHz (Low Band) 138-174 MHz (High Band) 406-512 MHz (UHF)
BATTERY DRAIN (less options)	
Receiver Squelched	0.25 amperes at 13.8 VDC
Receiver Unsquelched	2.4 amperes at 13.8 VDC
Transmitter	
50-Watt Low Band	11 amperes at 13.6 VDC
100-Watt Low Band	25 amperes at 13.4 VDC
35-Watt High Band	9 amperes at 13.6 VDC
65-Watt High Band	15 amperes at 13.6 VDC
110-Watt High Band	28 amperes at 13.4 VDC
40-Watt UHF	10.5 amperes at 13.6 VDC
DIMENSIONS (HxWxD)	5" x 12-1/16" x 18-3/4"
WEIGHT (less mounting plate)	
Standard Radio	29-1/2 pounds
With DC Comverter	36-1/2 pounds
TEMPERATURE RANGE	-40°C to +70°C (-40°F to +158°F)
DUTY CYCLE	
Intermittent	20% Transmit, 100% Receive (EIA)
Continuous	100% Transmit (see applicable Specification Sheet)

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

COMBINATION NOMENCLATURE

1st Digit	2nd Digit	3rd Digit	4th Digit	5th Digit	6th Digit	7th Digit	8th & 9th Digits	10th Digit
Mechanical Package	System Voltage	Power Output	Channel Spacing	Frequency Capability	Number of Freq.	Options	Frequency Range	Oscillator Stability
E Model	**C** ±12-Volts DC	**5** 16-38 Watts	**4** 20 KHz	**P** 12-Freq.	**A** 1-Freq.Tx&Rx	**S** Standard	**33** 42-50 MHz	**A** ±5 PPM (0.0005%)
	J DC Converter ± Ground	**6** 38-66 Watts	**5** 25 KHz		**B** 2-Freq. XMIT 1-Freq. Rec.	**U** Channel Guard	**56** 138-155 MHz	**B** ±2 PPM (0.0002%)
		7 66-110 Watts	**6** 30 KHz		**C** 2-Freq.Tx&Rx	**N** Noise Blanker	**66** 150.8-174 MHz	
					D 1-Freq. XMIT 2-Freq. Rec.	**W** Channel Guard & Noise Blanker	**77** 406-420 MHz	
					E 3-Freq.Tx&Rx	**P** UHS Receiver	**88** 450-470 MHz	
					F 4-Freq.Tx&Rx	**Q** UHS Receiver & Channel Guard	**89** 470-494 MHz	
					G 5-Freq.Tx&Rx		**91** 494-572 MHz	
					H 6-Freq.Tx&Rx			
					J 7-Freq.Tx&Rx			
					K 8-Freq.Tx&Rx			
					L 9-Freq.Tx&Rx			
					M 10-Freq.Tx&Rx			
					N 11-Freq.Tx&Rx			
					P 12-Freq.Tx&Rx			

TRANSMITTER TYPE NUMBERS

STANDARD TRANSMITTER	FREQ. RANGE (MHz)	NUMBERQ OF FREQS.	FREQ. STABILITY	POWER OUTPUT (Watts)
KT-80-A	42-50	1 thru 12	±0.0005%	50
KT-80-C	42-50	1 thru 12	±0.0002%	50
KT-81-A	42-50	"	±0.0005%	100
KT-81-C	42-50	"	±0.0002%	100
KT-82-A	138-174	"	±0.0005%	35
KT-82-C	138-174	"	±0.0002%	35
KT-83-A	138-174	"	±0.0005%	65
KT-83-C	138-174	"	±0.0002%	65
KT-84-A	138-174	"	±0.0005%	110
KT-84-C	138-174	"	±0.0002%	110
KT-86-A	450-512	"	±0.0005%	40 (450-470 MHz) 38 (470-494 MHz) 35 (494-512 MHz)
KT-86-C	450-512	"	±0.0002%	40 (450-470 MHz) 38 (470-494 MHz) 35 (494-512 MHz)

TRANSMITTER WITH DC CONVERTER	FREQ. RANGE (MHz)	NUMBER OF FREQS.	FREQ. STABILITY	POWER OUTPUT (Watts)
KT-80-E	42-50	1 thru 12	±0.0005%	50
KT-80-G	42-50	1 thru 12	±0.0002%	50
KT-82-E	138-174	"	±0.0005%	35
KT-82-G	138-174	"	±0.0002%	35
KT-83-E	138-174	"	±0.0005%	65
KT-83-G	138-174	"	±0.0002%	65
KT-86-E	450-512	"	±0.0005%	40
KT-86-G	450-512	"	±0.0002%	40 (450-470 MHz) 38 (470-494 MHz) 35 (494-512 MHz)

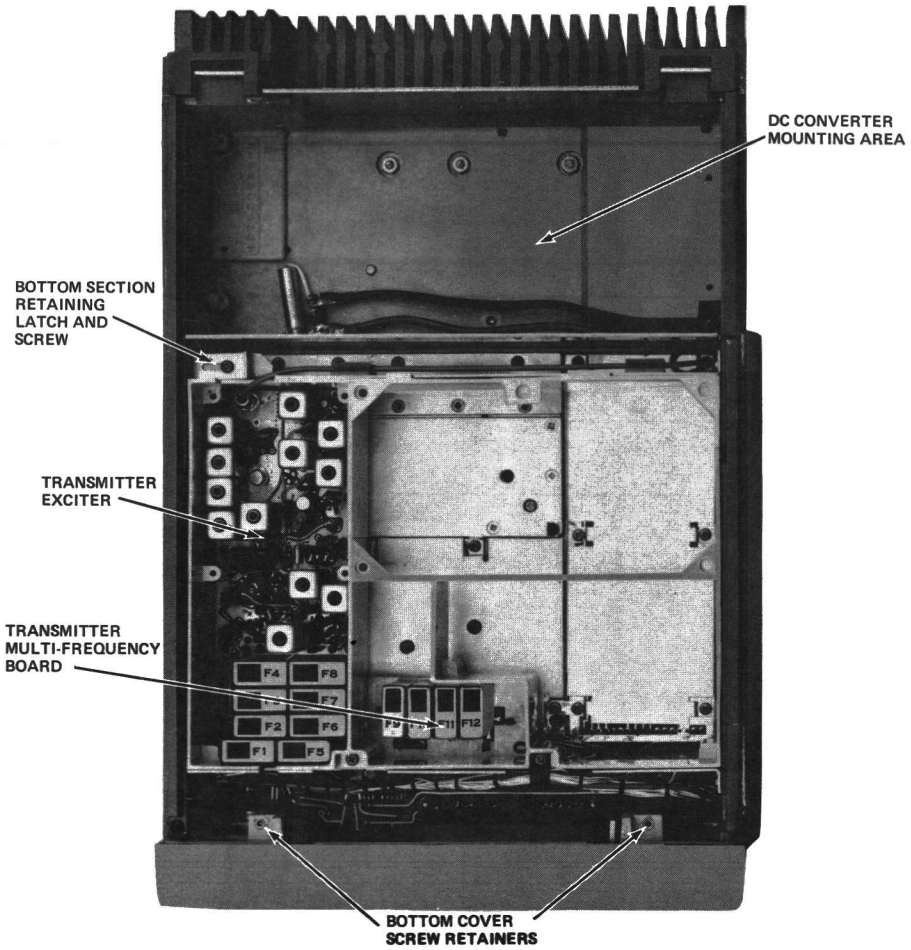


Figure 1 - Typical Bottom Section Module Layout

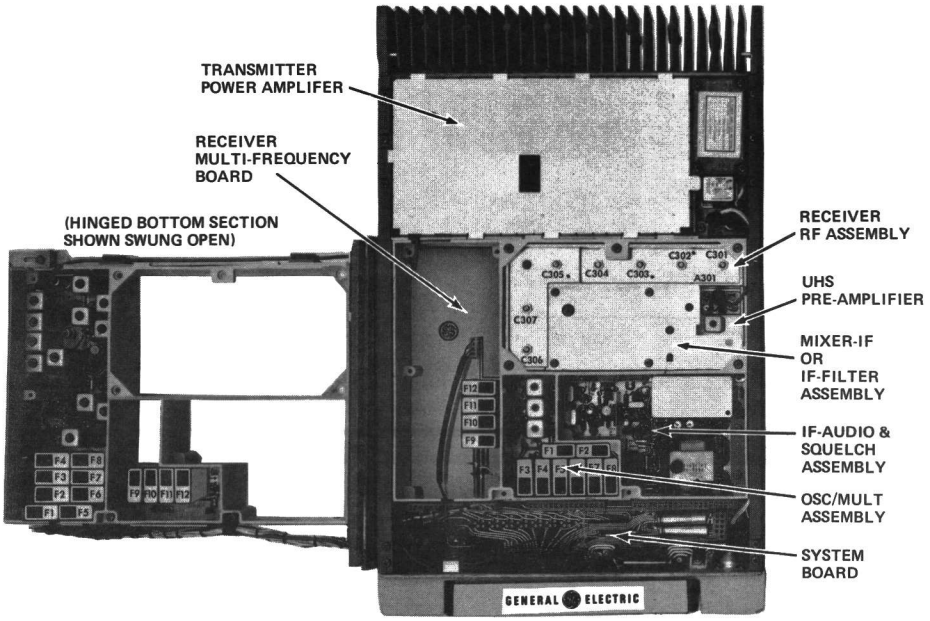


Figure 2 - Typical Top Section Module Layout
(Bottom Section Swung Open)

DESCRIPTION

MASTR II mobile radio combinations are compact, highly reliable and ruggedly-constructed units that are designed to meet the most stringent requirements in the two-way radio field..

The radios are fully transistorized-utilizing both discrete components and Integrated Circuits (IC's) for highest reliability. Since no tubes are used, the radio is ready to use the instant it is turned on. The standard combination may be equipped with the following:

- One through twelve frequencies.
- Plug-in oscillators for ±0.0002% or ±0.0005% oscillator stability.
- Channel Guard (tone squelch)
- Noise Blanker (42-50 and 138-174 MHz)
- Ultra High Sensitivity (UHS) pre-amplifier (138-174 and 450-512 MHz)
- DC Converter

The radio set is housed in a drip-proof case only five inches high. The radio mounts to the vehicle by a bottom mounting plate, and is tamper-proof when locked into the mounting plate. When unlocked, the handle can be pulled down and the radio pulled out of the mounting plate or the top cover removed for servicing. When the handle is pulled down 90 degrees, the radio can be locked to hold the handle in the carrying position.

The top section of the radio contains the receiver modules, receiver multi-frequency board, and the transmitter PA board. A hinged bottom section provides space for mounting the exciter board, transmitter multi-frequency board, or other modules.

To gain access to the modules in the bottom section, remove the radio from its mounting frame and turn the radio over. Then loosen the two captive screws securing the bottom cover and remove the cover (see Figure 1).

The bottom section swings open so that all major modules and tuning adjustments in the radio are easily accessible for servicing. To swing the bottom section open, first remove the bottom cover. Next, loosen the screw in the retaining latch and slide the latch open. The bottom section will now swing open as shown in Figure 2.

No power supply is required since the highest supply voltage used in the radio is derived from the vehicle battery.

Centralized metering jacks for the transmitter, receiver and system board are provided for simplified alignment and troubleshooting.

The transmitter, receiver and option modules are electrically isolated from the radio chassis to permit operating in positive or negative ground vehicles without the use of a polarity converter. The transmitter exciter and receiver modules are mounted in a Lexan® frame for isolation. In 12-Volt systems, simply changing four connections to the control unit and reversing the power leads at the fuse block allows the radio to be used in negative or positive ground vehicles. No changes are required in the radio.

TRANSMITTER

The transmitter consists of an exciter board and a transmitter multi-frequency board which are located in the hinged assembly mounting frame, and a power amplifier assembly. The PA assembly is comprised of a PA board mounted on a PA casting at the rear of the radio. Refer to Table of Contents for transmitter multi-frequency boards. A hermetically sealed antenna switch is also mounted on the PA assembly.

RECEIVER

The receiver consists of an oscillator/multiplier assembly (osc/mult), RF assembly, mixer/IF assembly (MIF), IF-audio and squelch assembly (IFAS), and a receiver multi-frequency board. In receivers with Noise Blankers, a MIF/noise blanker board (MIF/NB) replaces the standard MIF board. In UHS receivers, the pre-amplifier mounts in the area near the antenna input board. Refer to Table of Contents for receiver multi-frequency boards.

DC CONVERTER

For systems that operate between a minimum of 16 Volts DC and a maximum of 60 Volts DC (i.e., nominal 24-Volt, 36-Volt or 48-Volt systems), a DC converter mounts at the rear of the radio under the transmitter PA assembly. The converter supplies all power to the radio, and no changes are required in the power leads on the radio for positive or negative ground operation.

CONTROL UNIT

The control unit contains the power on-off rocker switch, volume and squelch controls, channel selector switch in multi-frequency models, a red transmit indicator

light and a power on/frequency indicator light. Space is provided for an optional rocker switch, and two optional indicator lights.

The control unit is enclosed in a two piece molded Lexan® housing, and is supplied with a Lexan® mounting bracket and Safety Release assembly. The Safety Release assembly breaks away under impact for passenger safety. This mounting assembly also permits the control unit to be swiveled as desired for the convenience of the operator.

Three connectors are located on the rear of the control unit. Two of the connectors are for the control cable(s), and one (Vehicle Systems Jack J701) is for power, accessories and external options.

MICROPHONE AND HANDSET

MASTR II mobile combinations use a dynamic microphone with a built-in transistorized microphone pre-amplifier. The microphone is housed in a sturdy Lexan® case, and the extendable coiled cord plugs into the microphone jack on the bottom of the control unit. The plug is secured to the jack by a retaining screw.

An optional telephone-type handset is available for use with the radio. The handset uses a dynamic microphone with a built-in microphone pre-amplifier. The extendable coiled cord plugs into the microphone jack on the bottom of the control unit, and is secured to the jack by a retaining screw.

HOOKSWITCHES

In Channel Guard applications, a microphone or handset hookswitch is supplied with the radio. The hookswitches are equipped with a Channel Guard disable switch.

Placing the switch in the "up" position (towards the small speaker symbol) disables the receive Channel Guard. With the switch in the "down" position, the Channel Guard is disabled only when the microphone or handset is removed from the hookswitch.

SPEAKER

A five-inch speaker contained in a Lexan® housing provides an audio output of 12 watts. The speaker impedance is eight ohms. The speaker leads are terminated in Vehicle Systems Plug P701 which connects to J701 on the rear of the control unit.

The speaker is supplied with a Lexan® mounting bracket and Safety Release assembly. The Safety Release assembly breaks away under impact for passenger safety, and permits the speaker to be swiveled as desired to direct sound to the operator.

MULTI - FREQUENCY BOARDS

Interconnections of supply voltages and control functions for the multi-frequency option are provided by cable harness 19B219989G1. Refer to Cable Harness Routing and Interconnection Diagram (see Table of Contents).

The receiver multi-frequency board mounts in the space normally occupied by the transmitter exciter board. Connector P2311 on the receiver multi-frequency board connects through J902 on the System board providing the connections required by the receiver multi-frequency board. J1811 of the cable harness plugs onto P2311 of the receiver multi-frequency board, providing all of the required interconnections from the System board to the transmitter exciter board. These connections are made through J1813 of the cable harness to P902 of the exciter board.

The receiver multi-frequency board contains ICOMs for frequencies F9 through F12. The RF output from the ICOMs is connected from J2311 on the receiver multi-frequency board to hole H3 on the standard receiver oscillator/multiplier board. Hole H3 is the parallel connection point of the RF output for all ICOMs on the osc/mult board. Refer to applicable Maintenance Manual for ICOM adjustment procedure.

Frequency selection lead connections for F9 through F12 are made from J901, through J1812 of the cable harness to P2312 on the receiver multi-frequency board.

The transmitter multi-frequency board contains ICOMs for frequencies F9 through F12. The RF output from the ICOMs is connected from J2101 of the transmitter multi-frequency board to hole H5 on the transmitter exciter board. Hole H5 is the parallel connection for the RF output of all ICOMs on the exciter board. Refer to applicable Transmitter Maintenance Manual for ICOM adjustment procedures.

Mid-temperature range backup compensation voltage for transmitter ICOMs is provided by voltage divider resistors R2101 and R2102 on the transmitter multi-frequency board.

RF drive from J101 of the exciter board is connected to J201 on the Power Amplifier assembly through RF cable assembly 5491689P93 (50-ohm RF cable).

Frequency selection lead connections for F9 through F12 are made from J901 through J1814 of the cable harness to P2101 on the transmitter multi-frequency board.

All other connections to standard modules are made through the System Board connectors as in standard radios. Refer to the System Board Maintenance manual for details.

PRE-INSTALLATION CHECK

MASTR II radios are shipped from the factory completely connected to permit the serviceman to perform system checks on the transmitter and receiver without removing the radio from its shipping container. Simply removing the lid on the internal packing case provides access to the battery cables, ignition switch cables, microphone, control unit and radio antenna jack. The radio is shipped connected for 12-Volt, negative ground operation except when equipped with DC converter.

CAUTION

Before bench testing the MASTR II Mobile Radio, be sure of the output voltage characteristic of your bench power supply.

To protect the transmitter power output transistors from possible instant destruction, the following input voltages must not be exceeded:

Transmitter unkeyed: 20 Volts
Transmitter keyed
(50 ohm resistive load): 18 Volts
Transmitter keyed
(no load or non-resistive load):

15.5 V (42-50 MHz)
14.5 V (138-174 MHz)
15.5 V (406-512 MHz)

These voltages are specified at the normal vehicle battery terminals of the radio and take the voltage drop of standard cables into account. The voltage limit shown for a non-optimum load is for "worst case" conditions. For antenna mismatches likely to be encountered in practice, the actual limit will approach the 18 Volt figure.

Routine transmitter tests should be performed at EIA Standard Test Voltages (13.6 VDC for loads of 6 to 16 amperes; 13.4 VDC for loads of 16 to 36 amperes). Input voltages must not exceed the limits shown, even for transient peaks of short duration.

Many commonly used bench power supplies cannot meet these requirements for load regulation and transient voltage suppression. Bench supplies which employ "brute force" regulation and filtering (such as Lapp Model 73) may be usable when operated in parallel with a 12-Volt automotive storage battery.

INITIAL ADJUSTMENT

After the MASTR II Radio has been installed (as described in the Installation Manual), the following adjustments should be made by an electronics technician who holds a 1st or 2nd Class FCC Radio-telephone license.

Make sure that a RADIO TRANSMITTER IDENTIFICATION form (FCC Form 452-C or General Electric Form NP270303) has been filled out and attached to the transmitter.

TRANSMITTER ADJUSTMENT

The adjustment for the transmitter includes measuring the Forward and Reflected Power and adjusting the antenna length for optimum ratio, then setting the transmitter to rated power output (or to the specific output or input which may be required by the FCC station authorization). Next, measuring the frequency and modulation and entering these measurements on the FCC-required Station records. For the complete transmitter adjustment, refer to the ALIGNMENT PROCEDURE in the MAINTENANCE MANUAL for the transmitter.

RECEIVER ADJUSTMENT

The initial adjustment for the receiver includes tuning the input circuit to match the antenna. For the Receiver Initial Adjustment Procedure, refer to the FRONT END ALIGNMENT PROCEDURES in the MAINTENANCE MANUAL for the receiver.

OPERATION

Complete operating instructions for the Two-Way Radio are provided in the separate OPERATOR'S MANUAL. The basic procedures for receiving and transmitting messages follows:

TO RECEIVE A MESSAGE

1. Turn the radio on by pressing the POWER-ON rocker switch to the ON position.
2. Turn the SQUELCH control clockwise (to the right) as far as possible.
3. Adjust the VOLUME control until the noise is easily heard, but is not annoyingly loud.

4. Now, slowly turn the SQUELCH control counterclockwise (to the left) until the noise just fades out.

The radio is now ready to receive messages from other radios in the system.

TO TRANSMIT A MESSAGE

1. Turn the radio on as directed in the "To Receive a Message" section.

2. Press the push-to-talk button on the microphone and speak across the face of the microphone in a normal voice. Release the button as soon as the message has been given. The red indicator light on the control unit will glow each time the microphone button is pressed, indicating that the transmitter is on the air. The receiver is muted whenever the transmitter is keyed.

MAINTENANCE

REMOVING IC's

Removing IC's (and all other soldered-in components) can be easily accomplished by using a de-soldering tool such as a SOLDA-PULLT® or equivalent. To remove an IC, heat each lead separately on the solder side and remove the old solder with the de-soldering tool.

An alternate method is to use a special soldering tip that heats all of the pins simultaneously.

PREVENTIVE MAINTENANCE

To insure high operating efficiency and to prevent mechanical and electrical failures from interrupting system operations, routine checks should be made of all mechanical and electrical parts at regular intervals. This preventive maintenance should include the checks as listed in the table of Maintenance Checks.

TEST AND TROUBLESHOOTING PROCEDURES

The individual Maintenance Manual for the transmitter and receiver describe standard test procedures which the serviceman can use to compare the actual performance of the transmitter or receiver against the specifications of the unit when shipped from the factory. In addition, specific troubleshooting procedures are available to assist the serviceman in troubleshooting the transmitter and receiver.

NOTE

In positive ground operation only, A- is "hot" with respect to vehicle ground. Shorting the receiver front end casting or any printed wiring board ground patterns to the radio case may cause one of the in-line fuses to blow.

MECHANICAL PARTS BREAKDOWN

Mechanical parts breakdown diagrams of the two-way radio are provided in this manual. The diagrams show the placement and GE Part Number of mechanical items on the Two-Way radio set (see Table of Contents).

RE-INSTALLATION

If the radio is ever moved to a different vehicle, always check the battery polarity and voltage of the new system before using the radio.

NOISE SUPPRESSION

After completing the initial adjustment of the transmitter and receiver, the serviceman should determine whether additional noise suppression is required. The following information should assist the serviceman in identifying and eliminating undesirable noise interference.

Ignition Noise

Ignition noise sounds like a "popping" sound in the speaker, whose frequency varies with engine speed while a weak signal is being received. This type of interference is generated by the spark plugs, distributor and any poor connections in the high-voltage system which might cause arcing. Ignition noise may be identified by noting that the noise disappears as soon as the ignition switch is turned off.

1. If the vehicle does not have a resistance lead from the coil to the center of the distributor cap, disconnect the lead at the distributor and cut the lead so that a Cable-Type Suppressor may be inserted in it close to the distributor. Screw the cut ends of the lead into the suppressor.

NOTE

A resistance lead operates as a very effective noise suppressor as long as there are no breaks anywhere along its length. Never cut a resistance lead to insert a suppressor. A loose knot is often tied in the lead to prevent excess flexing, which might break the conductor.

MAINTENANCE CHECKS	INTERVAL	
	6 Months	As Required
CONNECTIONS - Ground connections and connections to the voltage source should be periodically checked for tightness. Loose or poor connections to the power source will cause excessive voltage drops and faulty operation.	X	
ELECTRICAL SYSTEM - Check the voltage regulator and alternator or generator periodically to keep the electrical system within safe and economical operating limits. Over-voltage is indicated when the battery loses water rapidly. Usage of 1 or 2 ounces of water per cell per week is acceptable for batteries in continuous operation.		X
MECHANICAL INSPECTION - Since mobile units are subject to constant shock and vibration, check for loose plugs, nuts, screws and parts to make sure that nothing is working loose.	X	
ANTENNA - The antenna, antenna base and all contacts should be kept clean and free from dirt or corrosion. If the antenna or its base should become coated or poorly grounded, loss of radiation and a weak signal will result.	X	
ALIGNMENT - The transmitter and receiver meter readings should be checked periodically, and the alignment "touched up" when necessary. Refer to the applicable ALIGNMENT PROCEDURE and troubleshooting sheet for typical voltage readings.		X
FREQUENCY CHECK - Check transmitter frequency and deviation as required by FCC. Normally, these checks are made when the unit is first put into operation, after the first six months, and once a year thereafter.		X

2. Check to see that:

   -- the distributor points and condenser are in good condition.

   -- the high-voltage leads from the distributor are not broken and are making good contact at each end.

   -- the spark plugs have clean, dry insulators and their electrodes are clean and properly adjusted.

   -- the timing has been properly adjusted.

3. Use a 0.5-mFd by-pass capacitor to by-pass the battery lead to the ignition coil. Mount the capacitor under a screw which will provide a good ground, and connect the capacitor lead to the terminal of the coil which is connected to the ignition.

4. Remove the ignition coil and its mounting bracket. Clean paint from coil (where the bracket mounts), from the bracket and from the engine block. Remount the coil so as to obtain a good ground for the coil case.

5. If the vehicle has been driven 30,000 or 40,000 miles or more, the cap and rotor of the distributor will probably need replacing. This will not only reduce ignition noise, but also improve the overall performance of the engine.

6. High-voltage ignition wires can become capacitively coupled to the low-voltage systems, causing ignition noise to appear in the low-voltage system. This coupling can be minimized by separating the high-and low-voltage leads, or if necessary, separately shielding the leads.

7. If one of the ignition leads happens to have the critical length for radiating at the receiver's frequency, the noise can be reduced by changing the length of the lead. A noise source of this type is not common and can only be found by using a noise meter or by trial and error.

8. If the preceding steps fail to reduce ignition noise to a satisfactory level, it may be necessary to install resistance-type spark plugs, individual suppressors on each spark plug, or a shielded ignition wire harness.

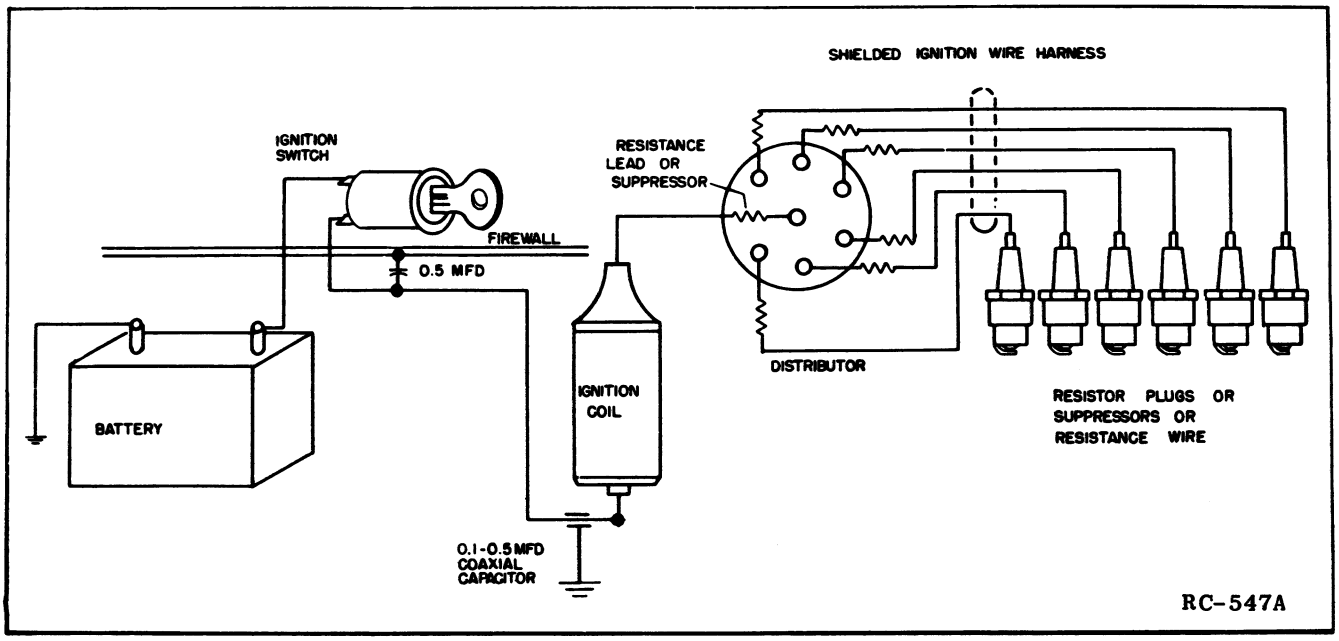


Figure 3 - Ignition Circuit with Noise Suppression Components

Alternator Noise

Alternator noise shows up as a high-pitched "whine", whose pitch varies with engine speed. To check for this type of noise, run the engine at a moderate speed and then shut off the engine, while listening to the noise on the receiver. Alternator noise will continue as long as the engine turns, lowering in pitch as the engine slows down.

It may be necessary to install a coaxial type, 0.5 mFd filter capacitor from the ungrounded alternator terminal to ground.

CAUTION

Do not install this capacitor on alternators that are equipped with a factory-supplied capacitor for protecting the rectifiers and suppressing noise.

Generator Noise

Generator noise shows up as a high-pitched "whine", whose pitch varies with engine speed. To check for this type of noise, run the engine at a moderate speed and then shut off the engine, while listening to the noise on the receiver. Generator noise will continue as long as the engine turns, lowering in pitch as the engine slows down.

By-pass the armature terminal on the generator to ground with a 0.5 mFd, 40 or 50-amp coaxial capacitor. Be sure to scrape the area where the capacitor is to be mounted, so that its case will be well grounded.

CAUTION

Do not by-pass the field terminal (F), as this will damage the voltage regulator contacts.

Generator Regulator Noise

Generator regulator noise shows up as a "raspy" sound which is generated by the contacts in the regulator and radiated by the leads coming out to the regulator. If suppression of the regulator noise is necessary, connect a 5-ohm resistor in series with a .002-mFd capacitor from the field, terminal (F) of the regulator to ground. If possible, these components should be mounted inside regulator case. The battery terminal (BAT) and armature terminal (ARM) can be by-passed to ground with 0.5-mFd capacitors.

CAUTION

If the regulator is opened to install the capacitor or resistor, remember that one wrong connection or shorted wire can damage the regulator or generator.

Gauge noise produces a "hissing" or "crackling" sound. Tapping the face of each gauge while the engine is running usually shows up which gauge is at fault. By-pass the gauge lead to ground with a 0.5-mFd capacitor, connected close to the sensing element.

Static and Arching Noise

The following suggestions may help to

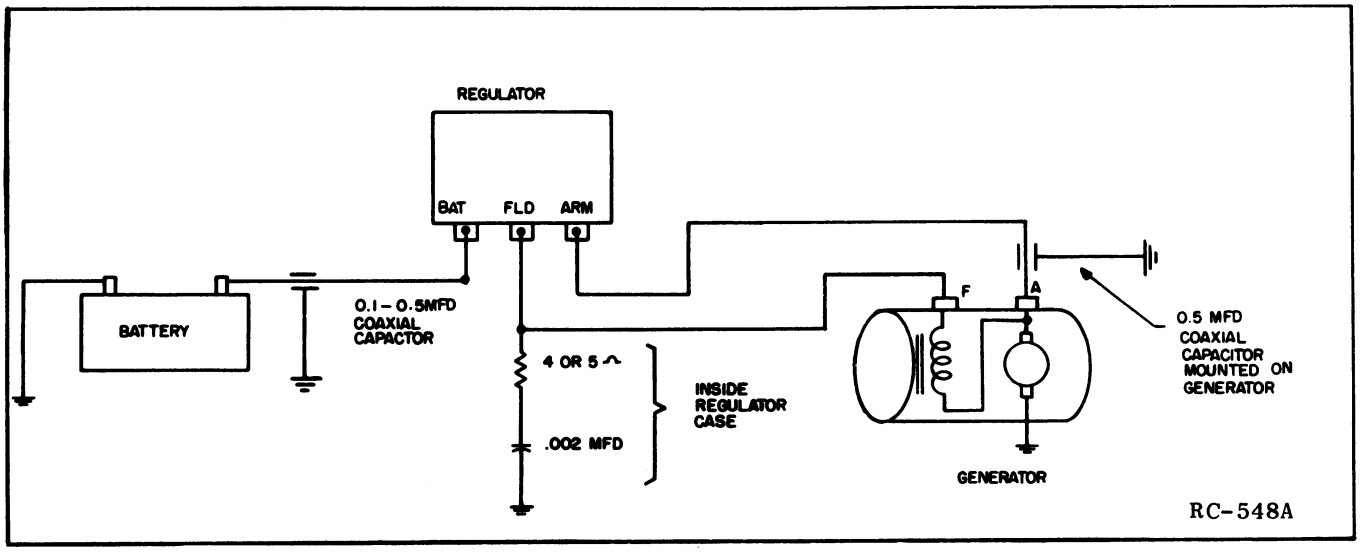


Figure 4 - Generator Circuit with Noise Suppression Components

cure other unusual type of interference:

1. Use bonding braid to electrically bond the hood and each corner of the engine block to the vehicle's frame. Scrape paint and dirt from bonding points to obtain a good ground.
2. Treat noisy tires with anti-static powder.
3. Use front-wheel static collectors for irregulator "popping" noise which disappears when the brakes are applied.
4. Use heavily graphited penetrating oil on the exhaust pipe and muffler supports if they are producing noise.

PARTS LIST

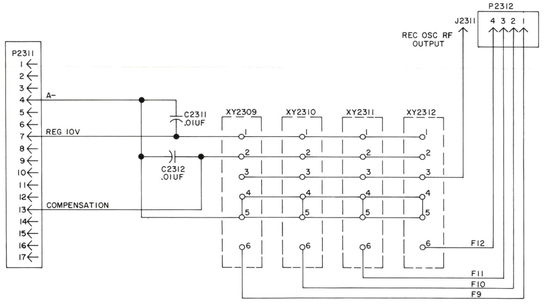
LBI-4839

RECEIVER MULTI-FREQUENCY BOARD
19D417156G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - CAPACITORS - - - - - - - - -
C2311 and C2312	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J2311	19A116779P1	Contact, electrical: sim to Molex 08-54-0404.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P2311		Connector. Includes:
	19B219594P3	Contact strip.
	19B219594P2	Contact strip.
P2312	19A116779P1	Contact, electrical: sim to Molex 08-54-0404.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY2309 thru XY2312	19A116779P1	Contact, electrical: sim to Molex 08-54-0404. (Quantity 6 for each socket).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

RECEIVER MULTI-FREQUENCY BOARD



(19C320867, Rev. 1)

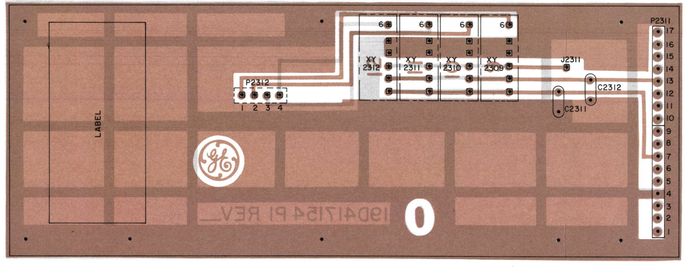
SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO

MODEL NO	REV LETTER

CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS.

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.



(19C321546, Rev. 0)
(19D417154, Sh. 2, Rev. 0)
(19D417154, Sh. 3, Rev. 0)

RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

PARTS LIST

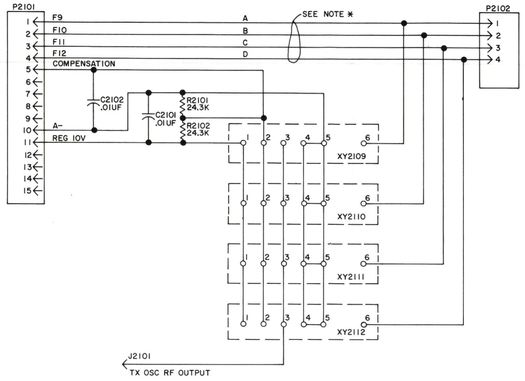
LBI-4838

TRANSMITTER MULTI-FREQUENCY BOARD
19C320613G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2101 and C2102	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J2101	19A116779P1	Contact, electrical: sim to Molex 08-54-0404.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P2101		Includes:
	19B219594P1	Contact, electrical: 7 pins.
	19B219594P2	Contact, electrical: 8 pins.
P2102	19A116779P1	Contact, electrical: sim to Molex 08-54-0404.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2101 and R2102	19C314256P22432	Metal film: 24,300 ohms ±1%, 1/4 w.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY2109 thru XY2112	19A116779P1	Contact, electrical: sim to Molex 08-54-0404.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

TRANSMITTER MULTI-FREQUENCY BOARD



(19C320866, Rev. 3)

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

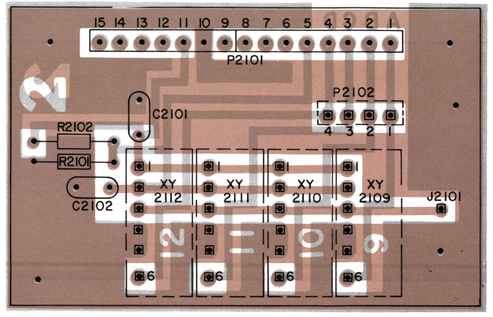
THIS ELEM DIAG APPLIES TO

MODEL NO	REV LETTER

* FOR SPECIAL APPLICATIONS CUT RUNS A, B, C & D TO ISOLATE FREQUENCY SELECT LEADS FROM P2101.

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.

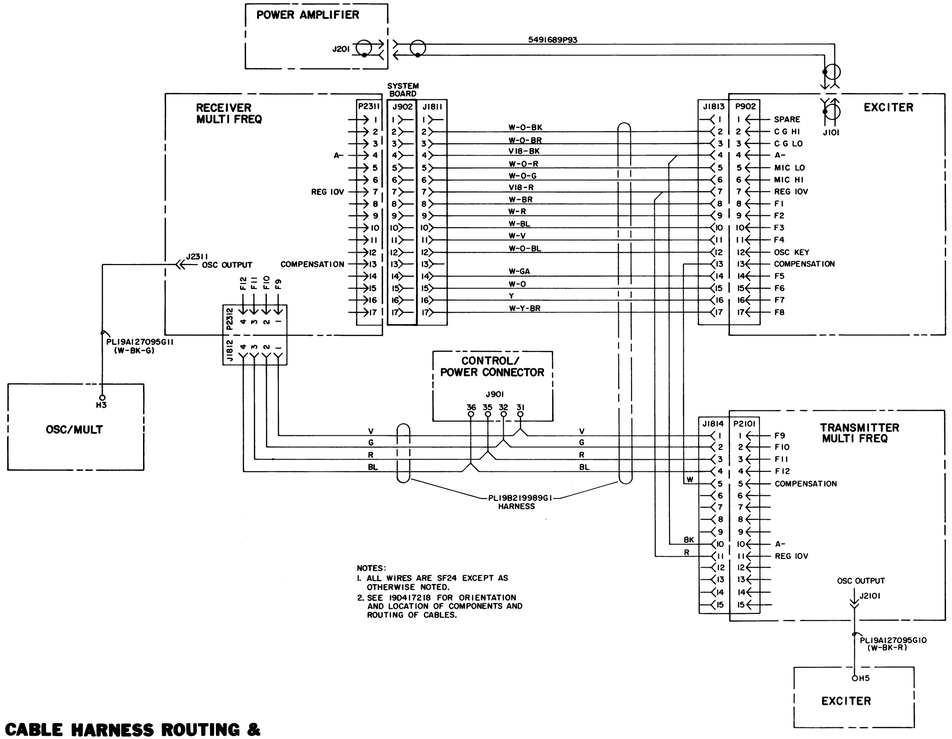
IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.



(19C321547, Rev. 0)
(19C320612, Sh. 2, Rev. 2)
(19C320612, Sh. 3, Rev. 2)

SCHEMATIC & OUTLINE DIAGRAM

RECEIVER MULTI-FREQUENCY BOARD
TRANSMITTER MULTI-FREQUENCY BOARD

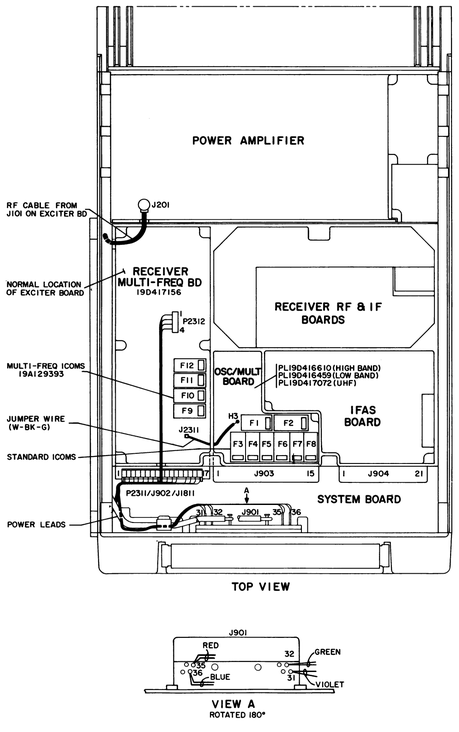


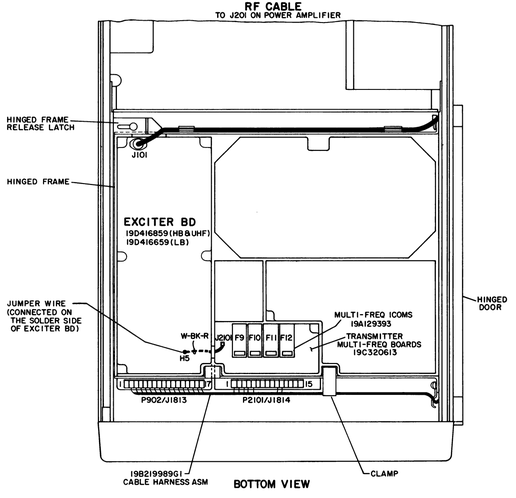
NOTES:
1. ALL WIRES ARE SF24 EXCEPT AS OTHERWISE NOTED.
2. SEE 19D417218 FOR ORIENTATION AND LOCATION OF COMPONENTS AND ROUTING OF CABLES.

(19D417221, Rev. 1)

CABLE HARNESS ROUTING & INTERCONNECTION DIAGRAM

1-THRU 12 FREQUENCY MASTR II COMBINATION





RC-2696

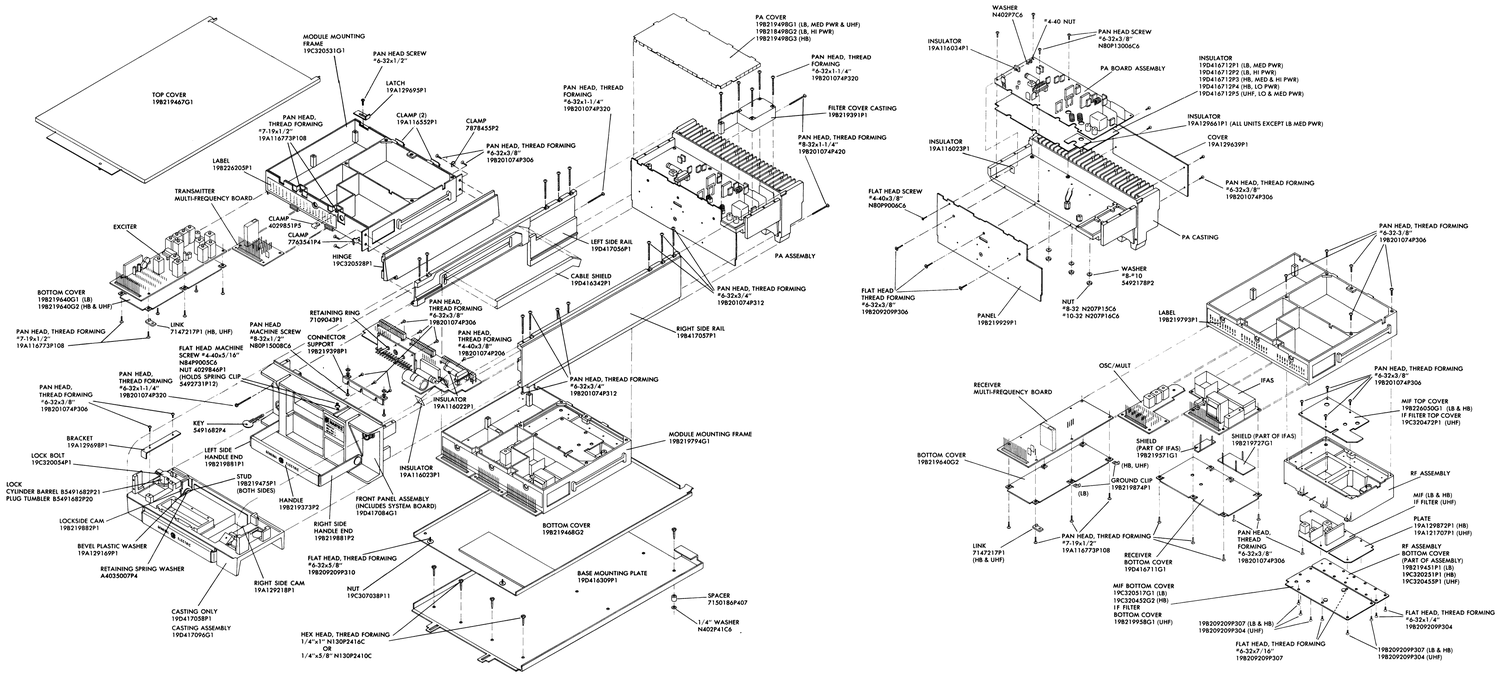
PARTS LIST

LBI-4850

INTERCONNECTION CABLE HARNESS
19B219989G1

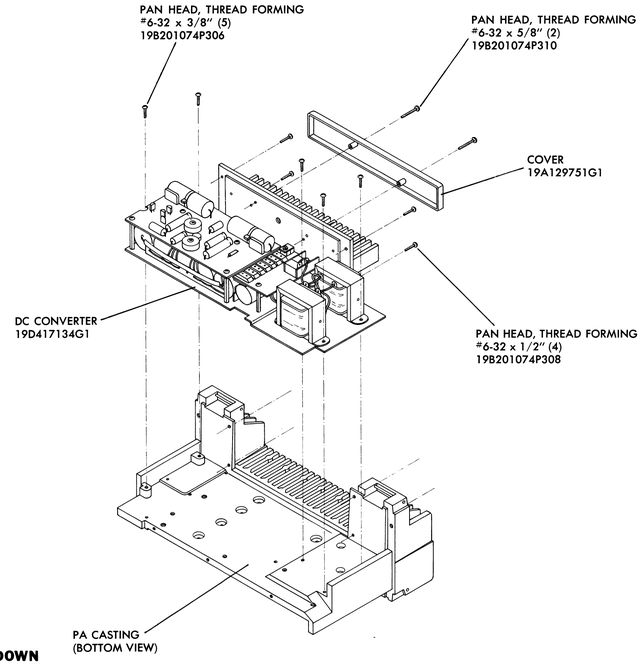
SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1811		Connector. Includes:
	19A129854P1	Shell.
	19A116781P5	Contact, electrical: wire range No. 16-20 AWG; sim to Molex 08-50-0106. (Quantity 2).
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 13).
J1812		Connector. Includes:
	19A116659P17	Shell.
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 4).
J1813		Connector. Includes:
	19A129854P1	Shell.
	19A116781P5	Contact, electrical: wire range No. 16-20 AWG; sim to Molex 08-50-0106. (Quantity 2).
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 14).
J1814		Connector. Includes:
	19A116659P22	Shell.
	19A116781P6	Contact, electrical: wire range No. 22-26 AWG; sim to Molex 08-50-0108. (Quantity 7).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



MECHANICAL PARTS BREAKDOWN

1-THRU 12 FREQUENCY RADIO



MECHANICAL PARTS BREAKDOWN

DC CONVERTER

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 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

LBI-4698

DF-9031

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY ● LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC

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