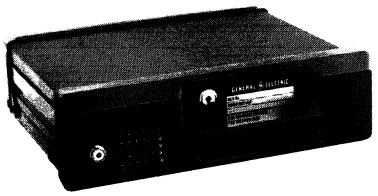
MOBILE RADIO

MASTR® *Executive II*

VEHICULAR REPEATER

MAINTENANCE MANUAL LBI 30830

(DATAFILE FOLDER DF9051)



Mobile Radio

TWO-WAY FM
RADIO

VEHICULAR REPEATER

GENERAL ELECTRIC

TABLE OF CONTENTS

ILLUSTRATIONS

WARNING

Although the highest DC voltage in Vehicular Repeater 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!

COMBINATION NOMENCLATURE

VEHICULAR REPEATER

1st Digit	2nd Digit	3rd Digit	4th Digit	5th Digit	6th Digit	7th Digit
Mechanical Package	System Voltage	Control	Power Output	Channel Spacing	Frequency Range	Options
M Trunk Mount MASTR II Comb.	**V** +12 VDC (Negative Ground Only)	**R** Prioritizing	**1** 0-.9 Watts	**5** 25 kHz	**G** 138-155 MHz	**S** None
E Trunk Mount Executive II Comb.				**6** 30 kHz	**H** 150.8-174 MHz	**N** Noise Blkr.
					K 406-420 MHz	**P** Pre-Amp
					M 450-470 MHz	
					N 470-494 MHz	
					P 494-512 MHz	

MOBILE DETECTOR (OPTIONAL)

1st Digit	2nd Digit	3rd Digit	4th Digit	5th Digit	6th Digit
Product	Product Line	Control	Number of Freq.	Radio Freq Range	DFE Freq. Range
M Mobile Detector	**R** Vehicular RPTR	**1** Mobile Detector	**A** One	**A** 29.7-36 MHz	**A** 29.7-36 MHz
R Personal Receiver	**E** PE	**2** 1-2 Freq. PE	**B** Two	**B** 36-42 MHz	**B** 36-42 MHz
	Y PY	**3** 3-8 Freq. PE	**C** Three	**C** 42-50 MHz	**C** 42-50 MHz
		4 DFE PE	**D** Four	**D** 66-76 MHz	**G** 138-155 MHz
		5 4-Freq. PY	**E** Five	**E** 75-88 MHz	**H** 150.8-174 MHz
			F Six	**G** 138-155 MHz	**K** 406-420 MHz
			G Seven	**H** 150.8-174 MHz	**M** 450-470 MHz
			H Eight	**K** 406-420 MHz	**N** 470-494 MHz
			X Zero	**M** 450-470 MHz	**P** 494-512 MHz
				N 470-494 MHz	**X** No DFE
				P 494-512 MHz	

SYSTEM SPECIFICATIONS*

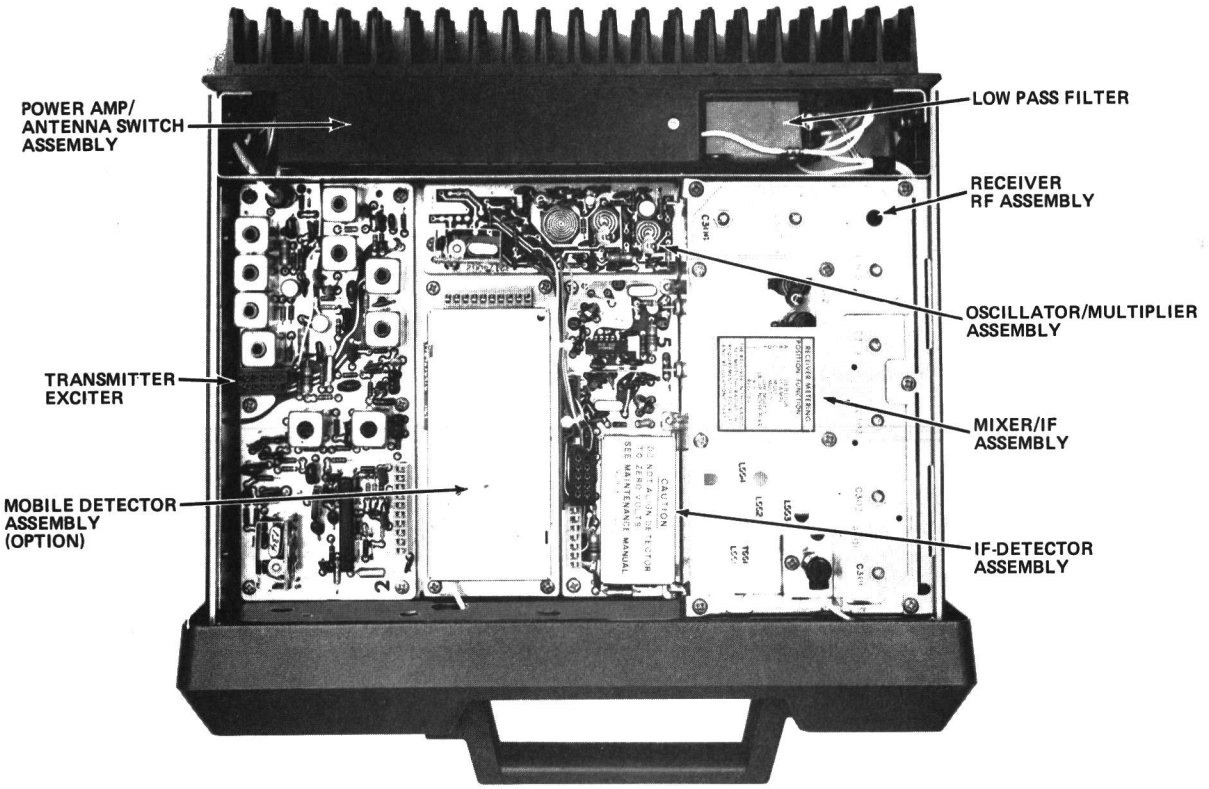
FREQUENCY RANGE	138-174 MHz (KT-169-A) 406-512 MHz (KT-170-A)
INPUT VOLTAGE	13.8 VDC ±20%
BATTERY DRAIN	
Off	0.015 Amperes
Standby	0.450 Amperes
Repeat	0.850 Amperes
DIMENSIONS (H x W x D)	9.9 cm/3.9 in. x 34.3 cm/13.5 in. x 34 cm/13.4 in.
WEIGHT	9 kgs/20 lbs.
TEMPERATURE RANGE	-30°C to +60°C (-22°F to +140°F)
DUTY CYCLE	Continuous

* These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specifications Sheet in the applicable MAINTENANCE MANUAL for specifications of standard units in the Vehicular Repeater System.

FCC FILING NUMBER

TRANSMITTER	POWER OUTPUT	FREQUENCY RANGE
KT-169-A	300 Milliwatts	138-174 MHz
KT-170-A	300 Milliwatts	406-420 MHz 450-512 MHz

TOP VIEW



BOTTOM VIEW

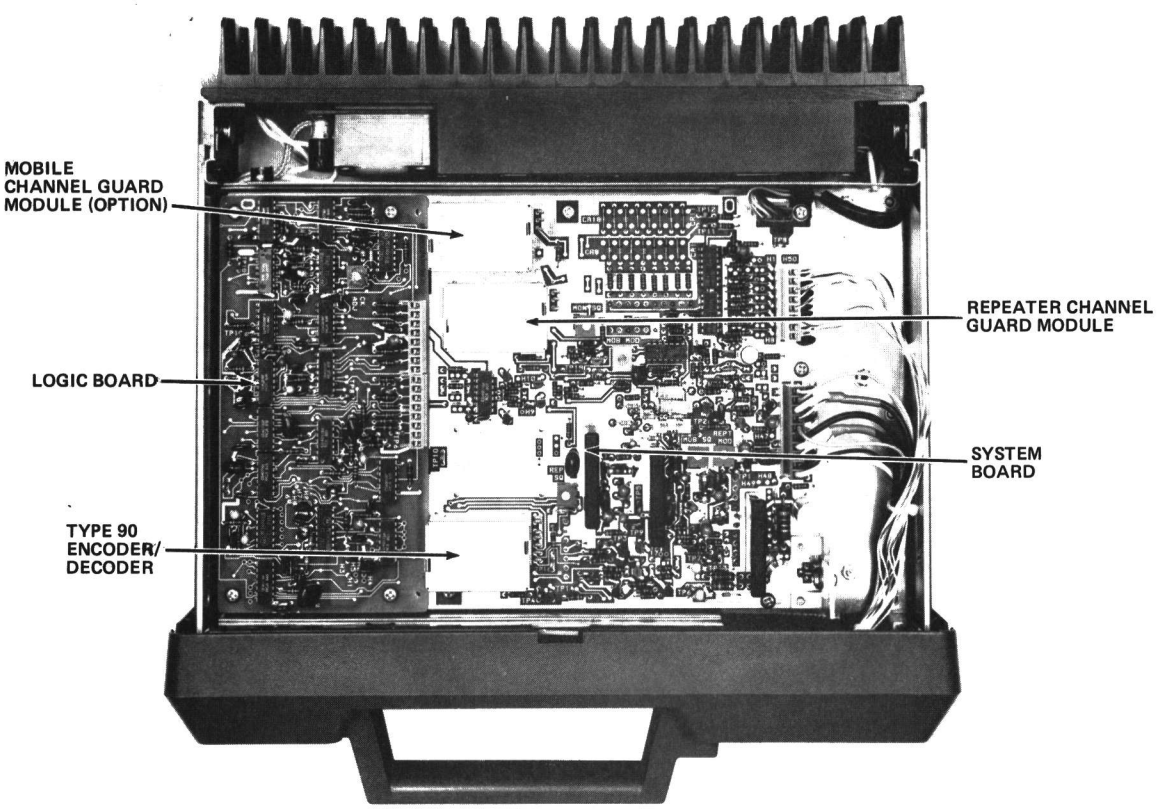


Figure 1 - Vehicular Repeater Radio Unit Module Layout, (Typical)

DESCRIPTION

MASTR® Executive II Vehicular Repeater 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 vehicular repeater radio unit operates in conjunction with a MASTR II or MASTR Executive II radio to repeat base-to-portable and portable-to-base transmissions.

The radios are fully transistorized--utilizing both discrete components and integrated circuits (IC's) for highest reliability. The standard combination is equipped with the following:

- Plug-in oscillator modules for ±0.005% oscillator stability.
- Channel Guard (tone squelch) decode.
- Type 90 tone encode and decode.

The combination is contained in a "slide-rail", tamper resistant mounting frame and is designed for trunk-mount installations. When unlocked, the unit can be easily pulled out of its frame for servicing.

The Vehicular Repeater is of modular construction and the modules may be used interchangeably in vehicular repeater combinations, except for strapping arrangements required for operation in your radio. No modifications are required when transferring the modules from one vehicular repeater to another. All major modules and tuning adjustments except for the System Board, Channel Guard and Type 90 tone modules are easily accessible from the top of the radio (See Figure 1).

Centralized metering jacks for the transmitter and receiver are provided for simplified alignment and troubleshooting. Metering test points are available for the System Board and Logic Board measurements.

TRANSMITTER

The transmitter consists of an exciter board and a power amplifier/antenna switch assembly. The PA/antenna switch assembly mounts on a hinged heat sink casting that swings down for easy access. A low-pass filter mounts on the heat sink next to the PA assembly.

RECEIVER

The receiver consists of an oscillator/multiplier assembly (Osc/Mult), RF assembly, Mixer/IF assembly (MIF) and IF-Detector assembly (IF-Det.). The audio and squelch circuitry for the receiver is located on the system board.

SYSTEM BOARD

The system board contains the 10 Volt regulator, frequency select interface, mobile squelch, repeater squelch, mobile microphone interface, Type 90 interface, repeater CG interface and logic board interface circuit. The board is mounted on the underside of the radio chassis. The system board contains test points to monitor operation of the transmitter, receiver and logic boards.

LOGIC BOARD

The logic board contains the delay state counter circuit, portable interrupt circuit, multiple priority clearing circuit, Type 90 encode timer circuit and a Carrier Control Timer circuit. The board is mounted on the underside of the radio chassis and plugs into the system board.

MOBILE DETECTOR (Optional)

The Mobile Detector is mounted next to the vehicular repeater receiver and monitors the mobile radio transmit frequency to determine if another repeater is repeating portable-to-base transmissions. If there is a portable-to-base transmission in progress, it keeps the delay state counter from counting down and allowing the vehicular repeater to become the priority unit.

VEHICULAR REPEATER SYSTEM DESCRIPTION

The Vehicular Repeater System consists of the MASTR Executive II Vehicular Repeater Radio, a Mobile Radio, Control Unit, a MASTR Personal Series (PE) Portable Radio Unit with its associated Vehicular Charger Unit and associated power/control cables (see Figure 2). The Vehicular Repeater System retransmits (repeats) portable-to-base and base-to-portable transmissions to a vehicule operator, using the PE radio, away from his vehicle. This permits the operator to be in constant contact with other units or networks when it is not feasible to remain with the vehicle. A typical mobile installation is shown in Figure 3.

The vehicular repeater radio contains the control and logic circuits necessary to transform a vehicle into a mobile repeating station. The vehicular repeater is a single frequency radio operating in the 138-174 MHz or 406-512 MHz frequency range with a low-power (300 milliwatts) transmitter. The antenna for the vehicular repeater is

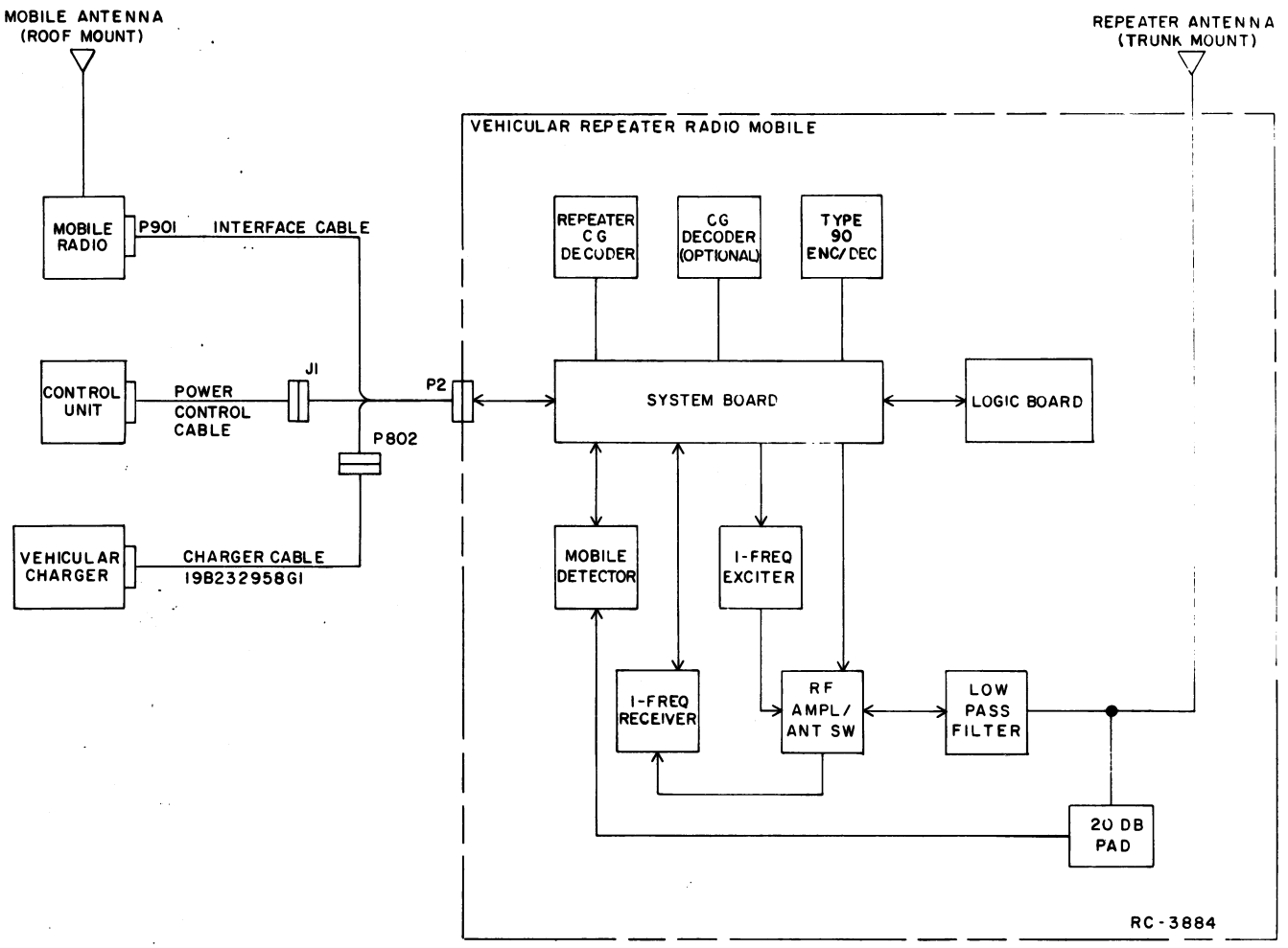


Figure 2 - Vehicular Repeater System Block Diagram

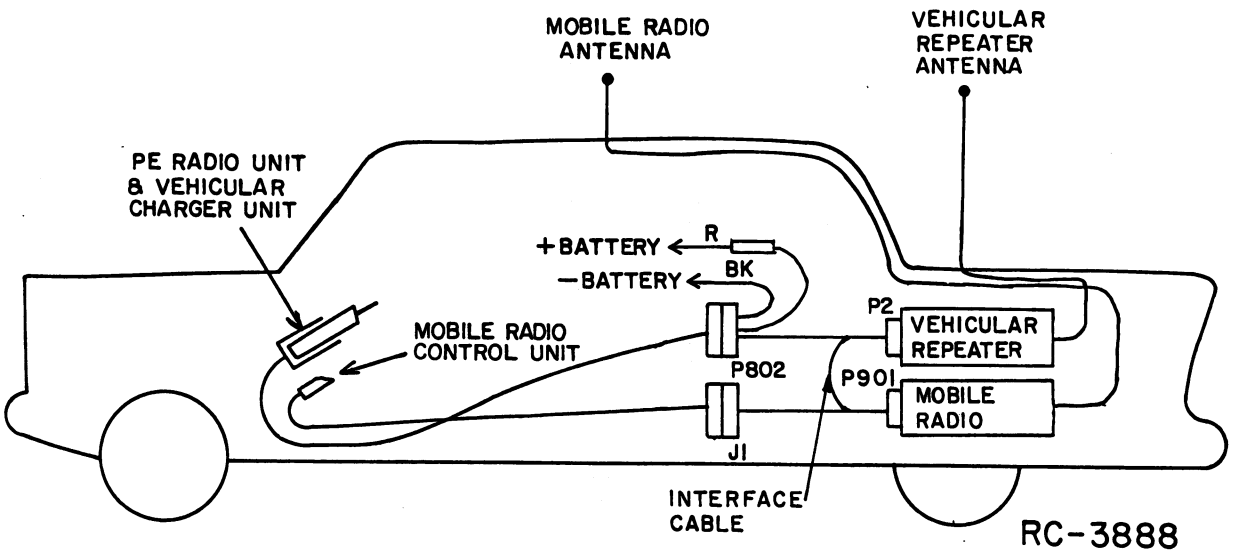


Figure 3 - Typical Installation in Vehicle

normally located on the trunk area of the vehicle.

When the Vehicular Repeater System is enabled, the mobile radio is used to repeat transmissions to and from remote/repeat base stations. This arrangement permits cross-band repeat operation to minimize interference problems and eliminate the requirements for duplexers.

The mobile radio control unit allows the vehicular operator to select the operating channel.

The vehicular charger contains the control circuitry to apply power to the vehicular repeater radio, to enable the Vehicular Repeater System, and to recharge the battery pack of the PE radio. During normal mobile operation the PE radio is inserted into the vehicular charger and the REPEATER pushbutton switch set to the "on" position. This places the Vehicular Repeater System in a ready condition so that removal of the PE radio unit automatically enables the Vehicular Repeater System.

Power is automatically applied for recharging the battery pack when the PE radio is inserted into the charging insert of the vehicular charger. The amber LED indicator labeled CHARGE will glow when positive contact has been made and the green LED indicator labeled READY will glow when the battery pack is fully recharged.

The PE radio operates in the 138-174 MHz or 406-512 MHz frequency range with a medium power transmitter and using a flexible spring antenna. A channel selector switch permits selection of up to 8 channels. Only one frequency/channel is used to communicate via the Vehicular Repeater.

SYSTEM OPERATION

The Vehicular Repeater System extends the communications from a fixed mobile (vehicle) system to a portable communications system permitting the vehicle operator to remain in continuous communication with the dispatch center or other radio system units when away from the vehicle. There are three basic types of operation possible when the operator has left the vehicle with the PE radio. One is portable-to-base operation which uses the Vehicular Repeater System to repeat any transmissions from the PE radio to a remote/repeat base station for communications with a dispatcher or to other mobile radio units via a base station repeater facility.

Another type of operation is the base-to-portable wherein a dispatcher(s) or other mobile radio units using a remote/repeat base station can communicate with the PE radio operator through the repeat function of the Vehicular Repeater System.

The third type of operation involves the PE radios for portable-to-portable communications without activating the repeater.

In portable-to-base operation the Vehicular Repeater System is enabled. When the PE radio user has the channel select switch on the designated repeater channel and keys the unit, the transmitted signal is modulated with a Channel Guard tone. When this CG tone is detected by the CG decoder in the Vehicular Repeater radio, the control and logic circuits key the mobile radio to retransmit the message.

The Vehicular Repeater System is interrupted when the mobile microphone is used. When the mobile PTT switch is operated the repeat function is disabled and the mobile radio is used for communications. When the mobile microphone use is concluded, the Vehicular Repeater System will again be available for the repeat function.

The base-to-portable operation is the reverse of the portable-to-base operation described above.

During these two operations all PE radios in the area will hear each other's transmissions directly and the repeated reply from the base station.

The third type of operation involves only the PE radio units and does not require the repeating functions of the Vehicular Repeater System. A designated channel not provided with the repeater CG tone is used for direct portable-to-portable communications. Since it does not contain a CG tone, it cannot activate the vehicular repeat. However, all PE radios in the area and on the designated channel will hear the transmissions.

Returning the PE radio to the charging insert on the vehicular charger automatically disables the Vehicular Repeater System. Should the PE radio not be inserted into the vehicular charger for some reason (e.g., servicing, wearing of unit, etc.), the REPEATER pushbutton switch must be manually operated to the "on" and "off" positions.

Control logic circuitry is provided by the vehicular repeater radio to insure that only one Vehicular Repeater System is active when more than one unit is in the same general vicinity, thereby preventing multiple transmissions and interference. The priority logic circuits assure that the last Vehicular Repeater System enabled normally becomes the priority unit and will remain until another unit is enabled or the priority unit leaves the area.

A Carrier Control Timer (CCT) prevents system tie-ups and can be strapped to time portable-to-base transmissions, base-to-portable transmissions or both.

Enable of First Vehicular Repeater System

When a vehicle containing the Vehicular Repeater System equipment arrives at a location that requires the operator to be away from the vehicle and yet maintain communication, the Vehicular Repeater System can be enabled. Normally, the PE radio is inserted in the vehicular charger and the REPEATER pushbutton switch is in the "on" position. The operator, removing the PE radio, automatically enables the Vehicular Repeater System. The mobile radio will operate on the channel indicated on the Control Unit. The PE radio channel select switch should be set to the designated repeat channel position.

When the PE radio is removed from the vehicular charger unit, a switch closure in the vehicular charger causes a repeat enable signal to be applied to the logic circuitry in the vehicular repeater radio. This, in turn, causes the vehicular repeater transmitter to send a short burst of Type 90 tone. Since no other Vehicular Repeater Systems have been enabled at this time the Type 90 tone burst has no effect. At the time of the Type 90 tone burst, the delay state counter in the enabled Vehicular Repeater is reset from a priority state "3" to priority state "0", making this vehicular repeater the priority unit at this location.

Enable of Second Vehicular Repeater System

When a second vehicle, equipped with a Vehicular Repeater System, arrives in the general proximity of the first vehicle, nothing will happen until the repeater system in the second vehicle is enabled. Upon removal of the PE radio and the automatic enabling of the Vehicular Repeater System, the second vehicular repeater transmitter sends a short burst of Type 90 tone. This tone is received by the first vehicular repeater receiver and detected by its Type 90 decoder. The decoder output informs the logic and control circuits of the first vehicle that the second Vehicular Repeater System is assuming control and will become the priority vehicular repeater. The delay state counter in the first vehicular repeater will advance to priority state "1" while the delay state counter in the second vehicular repeater advances to priority state "0". Transmissions to and from all PE radios in the area will now be repeated by the second Vehicular Repeater System.

Enable of Additional Vehicular Repeater Systems

The arrival of additional vehicles with Vehicular Repeater Systems in the same general proximity of the last enabled priority vehicular repeater has no effect on the priority Vehicular Repeater System until the newly arrived Vehicular Repeater Systems are enabled. The delay state counter in each vehicular repeater insures that the last Vehicular Repeater System enabled will be the priority unit.

Departure of Vehicular Repeater System Vehicles

The order in which vehicular repeaters leave a location determines whether the priority changes. A vehicle that leaves or disables its Vehicular Repeater System and was not the priority unit has no effect on the remaining Vehicular Repeater Systems. Should the operator re-insert the PE radio into the vehicular charger unit of a priority Vehicular Repeater System (thereby disabling the vehicular repeater) nothing will happen until a condition to repeat occurs. When this condition occurs, the remaining enabled Vehicular Repeater Systems begin to count down from their priority states. The first Vehicular Repeater System to reach priority state "0" becomes the priority unit and repeats, stopping the countdown in the remaining repeaters.

Portable Interrupt

During base-to-portable transmissions, the vehicular repeater transmitter is unkeyed for 6 milliseconds every 2 seconds to check for portable radio transmissions. If there is activity on the portable radio frequency, the vehicular repeater will immediately cease transmitting. If there is a transmission with Channel Guard tone, the vehicular repeater immediately stops repeating base-to-portable and repeats portable-to-base.

Multiple Priority Clearing

If, for any reason, two or more Vehicular repeaters are in priority state "0", the first base-to-portable transmission longer than two seconds will cause all the repeaters in priority state "0", except one, to advance to priority state "1". This action is initiated by the portable interrupt function. On a base-to-portable transmission, each vehicular repeater is interrupted every two seconds to check for any portable transmissions. Since the two second interval is generated by a free-running clock, the intervals in the priority units are random. One of the priority units will interrupt before the others, detect the other repeater(s) and shut down. At the end of the base transmission, the interrupted repeater will advance to priority state "1", clearing the system.

INSTALLATION

The Vehicular Repeater radio is installed in the same manner as the MASTR

Executive II radio. A typical installation is shown in Figure 3. Refer to the MASTR Executive II Installations for details.

POWER CONTROL AND INTERFACE CABLE

The Power/Control cable supplied for the mobile radio unit should be installed as indicated in the Installation Instructions with the following exception:

The interface cable (MASTR II or MASTR Executive II) plug P901 is connected to the Mobile Radio and J1 to the Power Control Cable. The remaining two connectors P2 and P802 are connected to the Vehicular Repeater and Vehicular Charger respectively.

ADJUSTMENTS

INITIAL ADJUSTMENTS

Preliminary adjustments on the mobile radio and the vehicular repeater radio should be completed as indicated in the applicable MAINTENANCE MANUALS. The following adjustment procedures should be performed with the complete Vehicular Repeater System interconnected and power applied.

The options on channels F1 through F8 are chosen to meet the customer's need. If optional mobile detector is present for non-simplex channels, certain diodes corresponding to frequency positions where mobile detector is used are removed from matrix CR1 through CR8. If optional mobile CG decoder is present, diodes are removed from matrix CR11 through CR18 corresponding to frequency position requiring the CG decoder. Refer to Modification Instructions in the Vehicular Repeater Systems Manual.

CAUTION

To prevent possible damage to test equipment when connected directly to the antenna jacks of either the mobile radio or the vehicular repeater radio, directional couplers should be used.

Connect test equipment to the Vehicular Repeater System as shown in Figure 4 and tune modulation deviation meter to repeater transmit frequency.

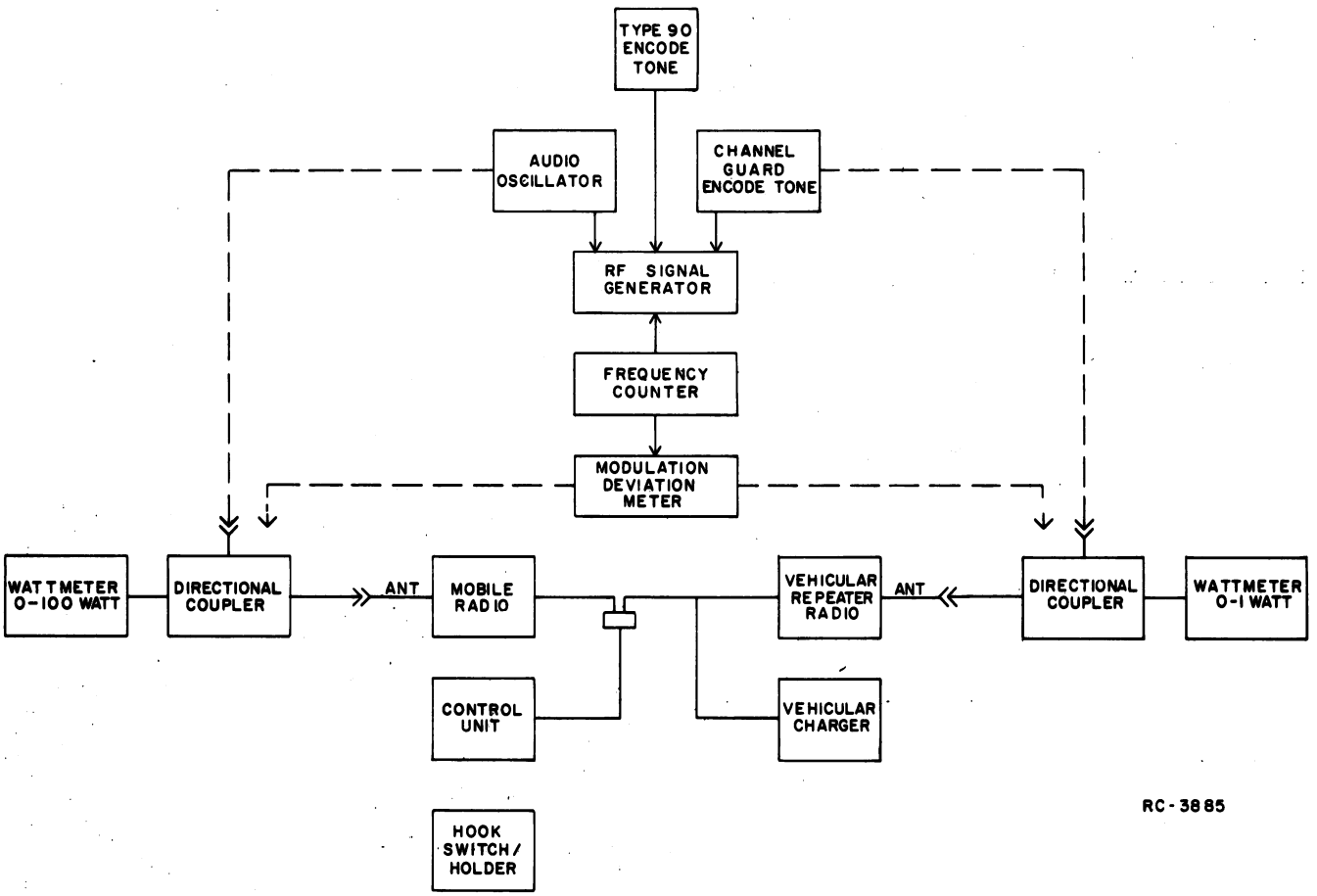


Figure 4 - Test Setup

NOTE

A PE radio unit must be inserted into the vehicular charger unit before performing the following adjustments.

Initial Turn-On

1. Apply power to mobile radio by pressing POWER switch on control unit to "on" position and set Frequency Selector Switch to F1.
2. Apply power to vehicular repeater radio by depressing POWER switch on vehicular charger to the "on" position. The ON indicator should glow.
3. Press the REPEATER pushbutton switch on the vehicular charger to the "on" position. The repeater is keyed for a short period of time.
4. Verify that a short (1/2 second) transmission is observed from the vehicular repeater transmitter as indicated on wattmeter. The ENABLED indicator should glow.

BASE-TO-PORTABLE ADJUSTMENTS

Type 90 Encode Modulation Adjustment

1. On Vehicular Repeater System board connect TP3 to TP6 and TP17 to TP8. Using the deviation meter measure the Type 90 Tone deviation. Adjust R605 on Type 90 Encode/Decode Module as necessary to obtain 3 kHz deviation. Remove jumpers.

Mobile Squelch Adjustment

NOTE

If Mobile Channel Guard option is present on F1 connect a jumper between TP17 and TP8 on Vehicular Repeater Systems board.

1. Apply an on-frequency signal with 20 dB quieting to the mobile radio antenna jack (measured at J902-4) on Vehicular Repeater Systems board.
2. Adjust MOB SQ ADJ control R6 on the vehicular repeater system board so that a voltage at test point TP9 on the vehicular repeater system board switches from less than 1 volt to more than 8 volts.
3. Observe that the vehicular repeater keys with this 20 dB quieting signal.

Mobile Modulation Adjustment

1. Apply an on-frequency 1000 µV signal modulated with 1000 Hz to the vehicular repeater antenna jack.
2. Adjust MOB MOD ADJ control R11 on the vehicular repeater system board for ±3 kHz deviation on mobile radio transmitter output.
3. Remove jumper from TP17 and TP8.
4. If optional Mobile Channel Guard is present, modulate the RF input with the proper Channel Guard tone. Verify that the repeater is keyed as indicated on the wattmeter.

PORTABLE-TO-BASE

Repeater Squelch Adjustment

1. Connect a jumper between TP13 and TP5 on Vehicular Repeater Systems Board.
2. Verify that the mobile radio is keyed.
3. Apply an on-frequency 20 dB quieting signal to the vehicular repeater antenna jack.
4. Adjust RPT SQ ADJ control R25 on the vehicular repeater system board so that the voltage at test point TP10 switches from less than 1 volt to more than 8 volts.

Repeater Modulation Adjustment

1. Apply a 1000 µV on frequency signal modulated with 1000 Hz to the vehicular repeater antenna jack.
2. **Adjust RPT** MOD ADJ control R3 on vehicular repeater system board for ±3 kHz deviation.
3. Remove jumper connected between TP13 and TP5. Verify that mobile radio is unkeyed.
4. Apply an on frequency signal with proper Channel Guard tone to repeater antenna jack. The mobile radio should be keyed.
5. Remove the CG and 1000 µV signal from the RF generator. The mobile should be unkeyed.
6. Apply a Type 90 signal to the RF generator.

7. Disconnect the RF Signal Generator from the repeater antenna jack and then reconnect. The mobile radio should not be keyed.

Mobile Detector Squelch Adjustment

1. If the vehicular repeater is equipped with a Mobile Detector, select a non-simplex channel and apply a 10 dB quieting signal on the RF frequency to the vehicular repeater antenna jack.

2. Adjust MON SQ ADJ control R77 on the vehicular repeater system board so that a voltage at test point TP18 on the vehicular repeater system board switches from less than 1 volt to more than 8 volts.

OPERATION

Complete operating instructions for the Two-Way Radio equipment are provided in the separate OPERATING MANUALS. The basic procedures for receiving and transmitting messages and enabling the vehicular repeater are as follows:

MOBILE RADIO OPERATION

NOTE

A PE radio should be inserted into the vehicular charger or the REPEATER push-button switch be in the "off" position when the operator is in the vehicle.

To Receive A Message

1. Turn on the mobile radio by pressing the POWER switch to the "on" position. The power on indicator will glow.

2. Turn the SQUELCH control (if present) 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 mobile radio is now ready to receive messages from other radios in the communication system.

To Transmit A Message

1. Turn the mobile radio on as directed in the "To Receive A Message" paragraph.

2. Remove the microphone from the hookswitch/holder and press the push-to-talk (PTT) button on the microphone. Speak across the face of the microphone in a normal voice. The red transmit indicator on the control unit will glow each time the microphone PTT button is pressed, indicating that the mobile radio transmitter is operating. Release the microphone PTT button to receive messages.

NOTE

The mobile radio should be used for sending and receiving messages when the operator is in the vehicle.

AUTOMATIC OPERATION OF VEHICULAR REPEATER SYSTEMS

NOTE

A MASTR PE radio must be inserted into the vehicular charger when the Vehicular Repeater System operational mode is not required.

To Turn On Vehicular Repeater System

1. Turn on the mobile radio and select the repeater channel as directed in the "To Receive A Message" section.

2. Apply power to the vehicular repeater radio by pressing the POWER switch on the vehicular charger to ON. The ON indicator will glow.

3. Depress the REPEATER ENABLE push-button switch to the "on" position.

To Enable Vehicular Repeater System

1. Perform all steps as directed in the "To Turn On Vehicular Repeater System" section.

2. Remove the PE radio from the vehicular charger by unlocking the release button, if required, and pressing in on the release button.

3. The ENABLED indicator will glow indicating that the Vehicular Repeater System has been enabled for communications away from the vehicle.

4. Turn on and adjust PE radio as directed in the MASTR PE Series OPERATING MANUAL.

5. The channel select switch on the PE radio should be set to the repeater channel.

The Vehicular Repeater System is now ready to retransmit any communications to and from a vehicle operator using a PE radio away from the vehicle.

To Disable Vehicular Repeater System

1. Turn off the PE radio and reinsert it into the vehicular charger charging insert.
2. The ENABLED indicator will go out and the Vehicular Repeater System is disabled.

To Turn Off Vehicular Repeater System

1. Press the REPEATER pushbutton switch to release to the "off" position.
2. Press the POWER switch on the vehicular charger unit to the "off" position. The ON indicator will go out.

MANUAL OPERATION OF VEHICULAR REPEATER SYSTEM

NOTE

The following operation is NOT recommended, but is given as a guide in the event the conditions indicated exist.

Normally the PE radio is inserted into the vehicular charger unit and the REPEATER pushbutton switch is in the "on" position. However, should the PE radio unit have been removed for some reason (e.g., servicing, wearing of unit, etc.), the REPEATER pushbutton switch must be manually operated to the "on" and "off" positions. With the PE radio removed and Vehicular Repeater System not required, the REPEATER pushbutton switch must be in the "off" position to minimize interference and allow other Vehicular Repeater Systems in the immediate area to operate.

1. Turn on the mobile radio and select the proper channel as directed in the "To Receive A Message" section.
2. Apply power to the Vehicular repeater by pressing the POWER switch on the vehicular charger to the "on" position. The ON indicator will glow.
3. Depress the REPEATER ENABLE pushbutton switch to the "on" position. The ENABLE indicator will glow indicating the Vehicular Repeater System is operational.
4. When the Vehicular Repeater System operation is no longer required, the REPEATER pushbutton switch must be pressed to release to "off" position. The ENABLE indicator will go out.

A vehicle operator returning to the vehicle and not returning the PE unit to the vehicular charger unit must depress the REPEATER pushbutton switch to release to "off" position to disable the Vehicular Repeater System. Failure to do so will cause a delay in another Vehicular Repeater System from assuming the priority state and possibly causing interference with existing or future communications traffic.

NOTE

REMEMBER -- When Vehicular Repeater System operation is no longer required, the PE radio must be inserted into the vehicular charger OR the REPEATER pushbutton switch must be in the "off" position.

MAINTENANCE

REMOVING IC's (and all other soldered-in components) can be easily accomplished by using a de-soldering tool such as a SOLDAPULLT® 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.

CAUTION

The CMOS Integrated Circuit devices used in this equipment can be destroyed by static discharges. Before handling one of these devices, the serviceman should discharge himself by touching the case of a bench test instrument that has a 3-prong power cord connected to an outlet with a known good earth ground. When soldering or de-soldering a CMOS device, the soldering iron should also have a 3-prong power cord connected to an outlet with a known good earth ground or a battery-operated soldering iron should be used.

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.

DISASSEMBLY

To gain access to the unit for servicing:

1. Unlock the radio (see Figure 5).
2. Loosen the two captive screws shown in Figure 5.
3. Pull the radio forward about two inches out of the mounting frame, and lift off top cover.
4. To gain access to the bottom side, pull the radio all the way out of mounting frame.

MECHANICAL PARTS BREAKDOWN

A mechanical parts breakdown diagram of the vehicular repeater is provided in this manual. The diagram shows the placement and GE Part Number of mechanical items (see Table of Contents).

RE-INSTALLATION

If the mobile combination is ever moved to a different vehicle, always check the battery polarity of the new system.

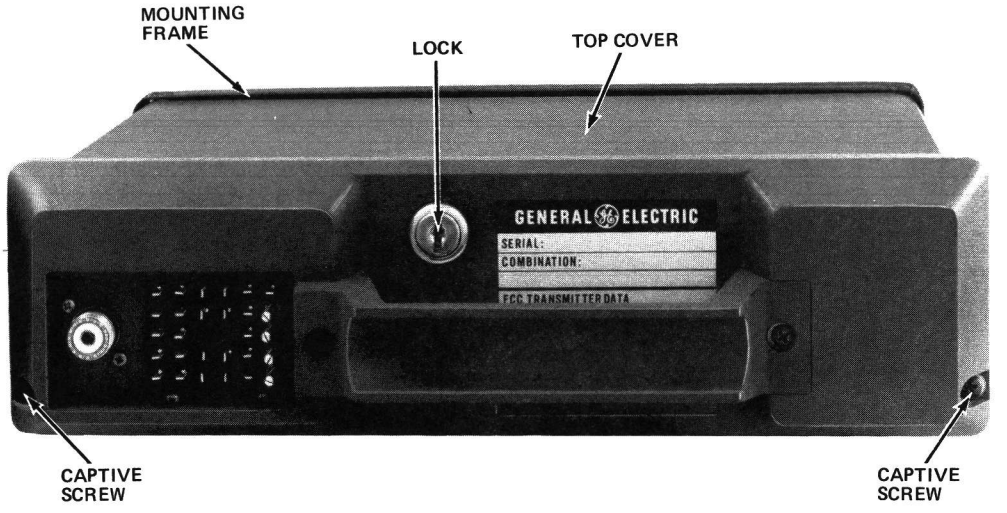


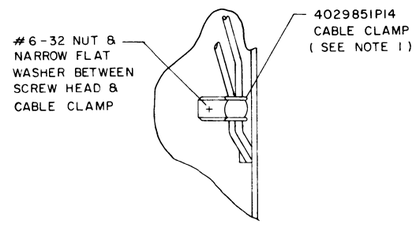
Figure 5 - Disassembly

GENERAL ELECTRIC COMPANY • MOBILE COMMUNICATIONS DIVISION
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

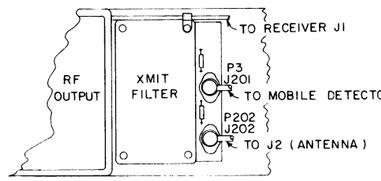
GENERAL ELECTRIC*
U.S.A.

NOTES:
1. PART OF HARDWARE LIST PL19A130750G1 CALLED FOR ON CHASIS ASSEMBLY 19C321683.
2. ROTATE LOCK TAB INTO SLOT AND SECURE IN PLACE.
3. SEE INTERCONNECTION DIAGRAM 19R622371.
4. APPLY SILICONE GREASE PER P6A-EA111 BETWEEN HEATSINK & CHASSIS.
5. DISCARD FOAM RUBBER FILLER WHEN INSTALLING ADDITIONAL CHANNEL GUARD.

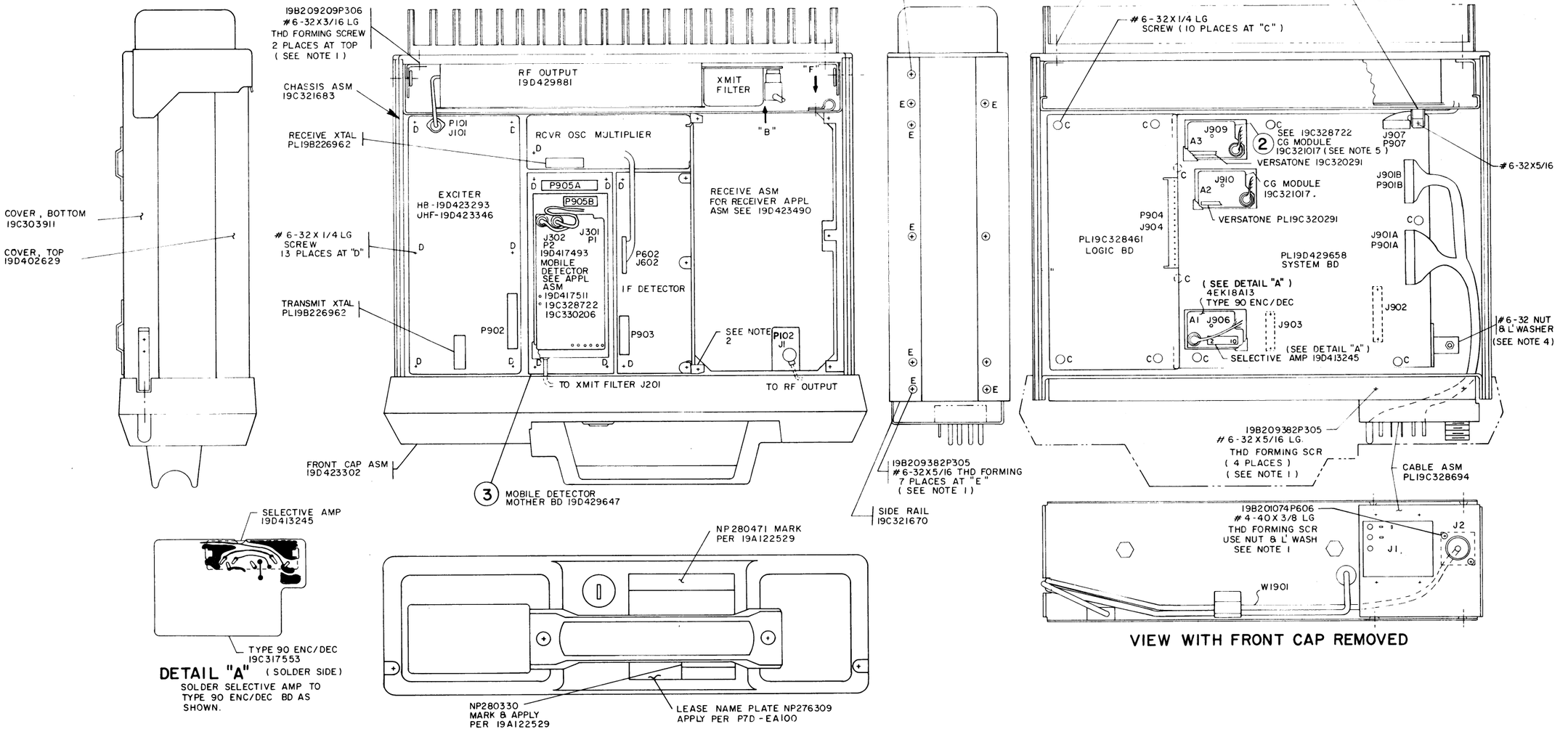
PART NO.	DESCRIPTION
1	BASIC TRUNK MOUNT REPEATER
2	ADDITION OF ADDITONAL CHANNEL GUARD
3	ADDITION OF MOBILE DETECTOR



VIEW "F"

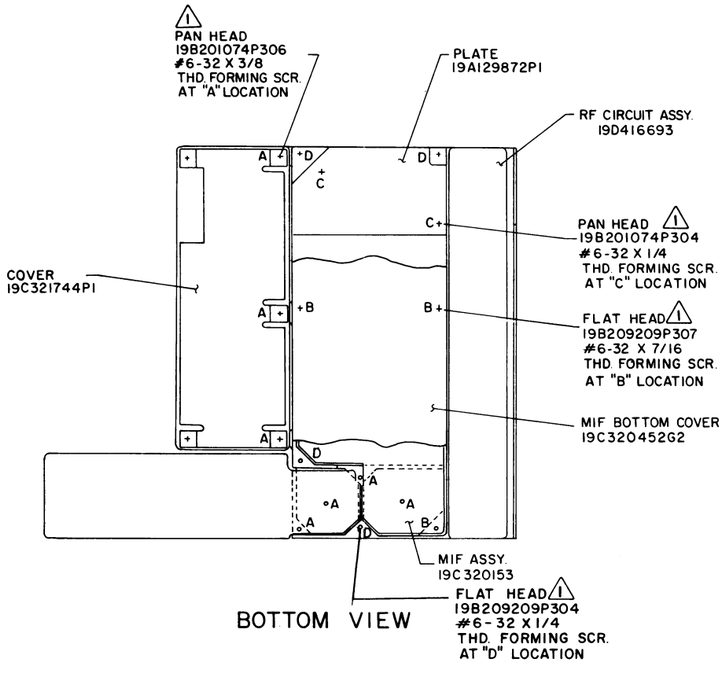


VIEW "B"

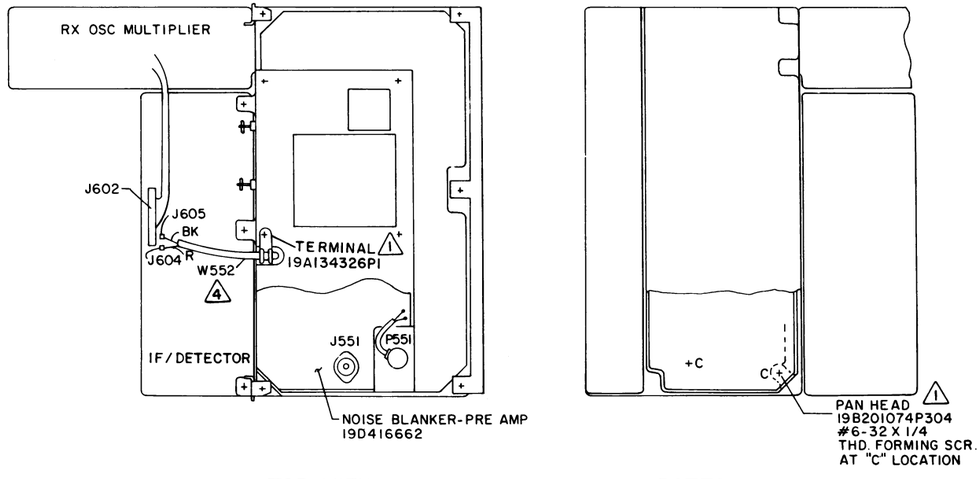


MECHANICAL PARTS BREAKDOWN

MAIN CHASSIS



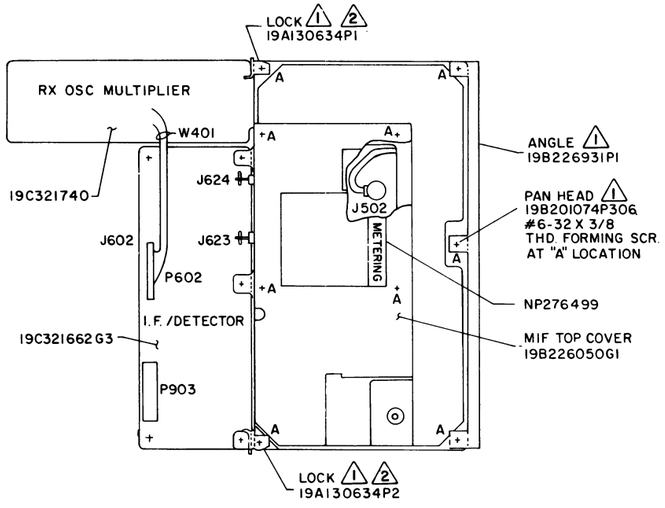
BOTTOM VIEW



TOP VIEW

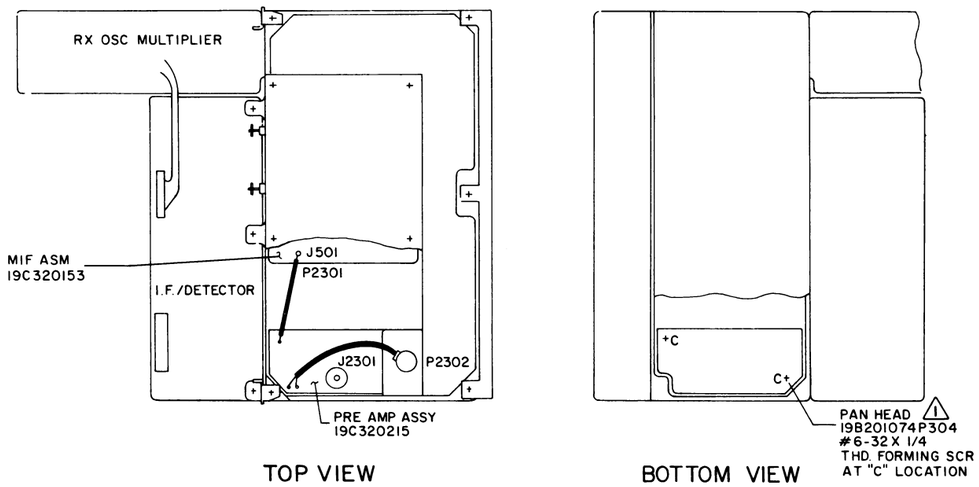
BOTTOM VIEW

NOISE BLANKER-PRE AMP HIGH BAND



RECEIVER HIGH BAND

TOP VIEW

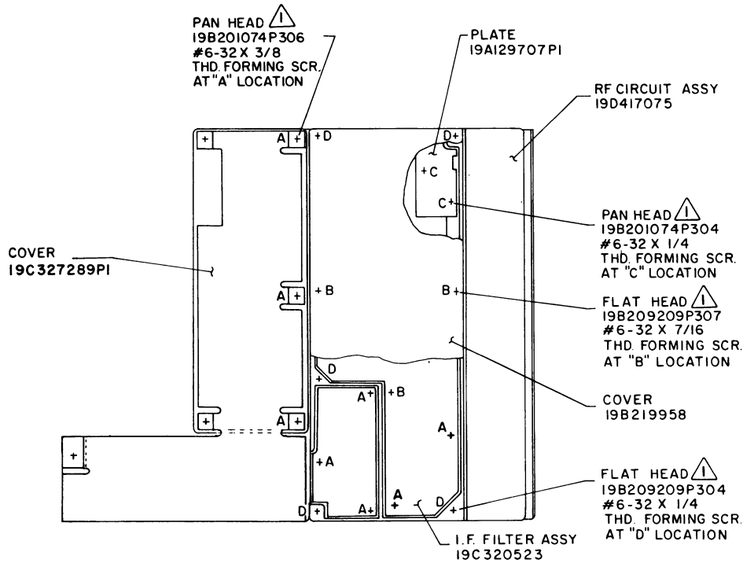


TOP VIEW

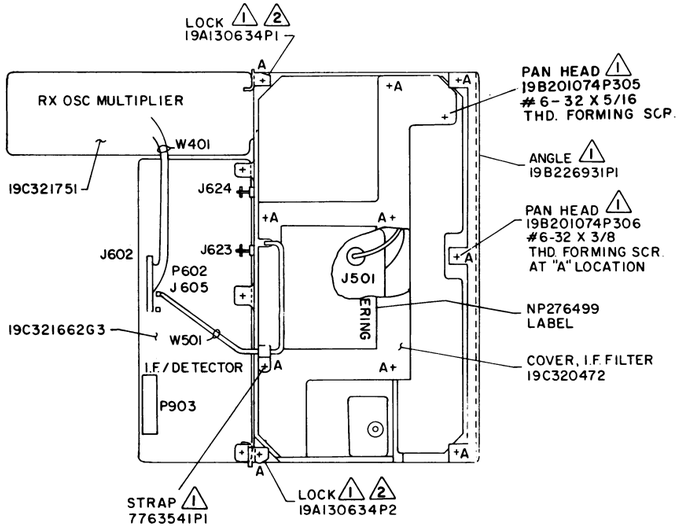
BOTTOM VIEW

PRE-AMP HIGH BAND

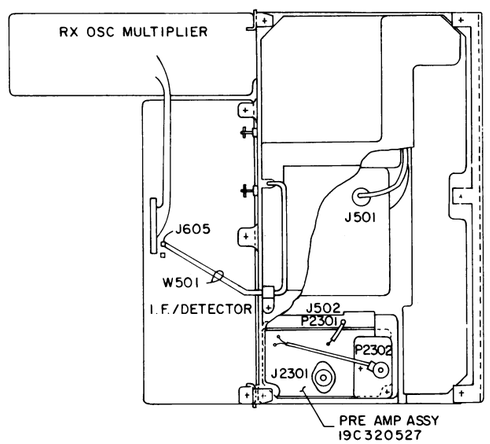
(19D423490, Sh. 2, Rev. 4)



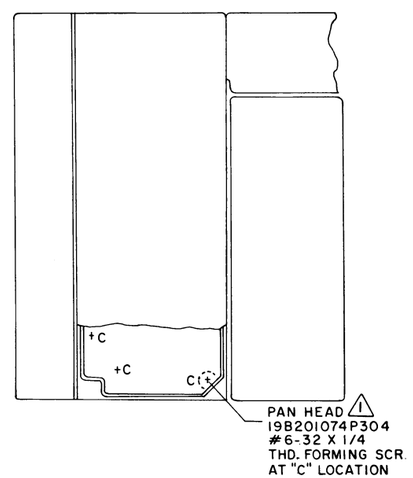
BOTTOM VIEW



RECEIVER UHF
TOP VIEW



TOP VIEW



BOTTOM VIEW

PRE AMP UHF

(19D423490, Sh. 3, Rev. 4)

MECHANICAL PARTS BREAKDOWN

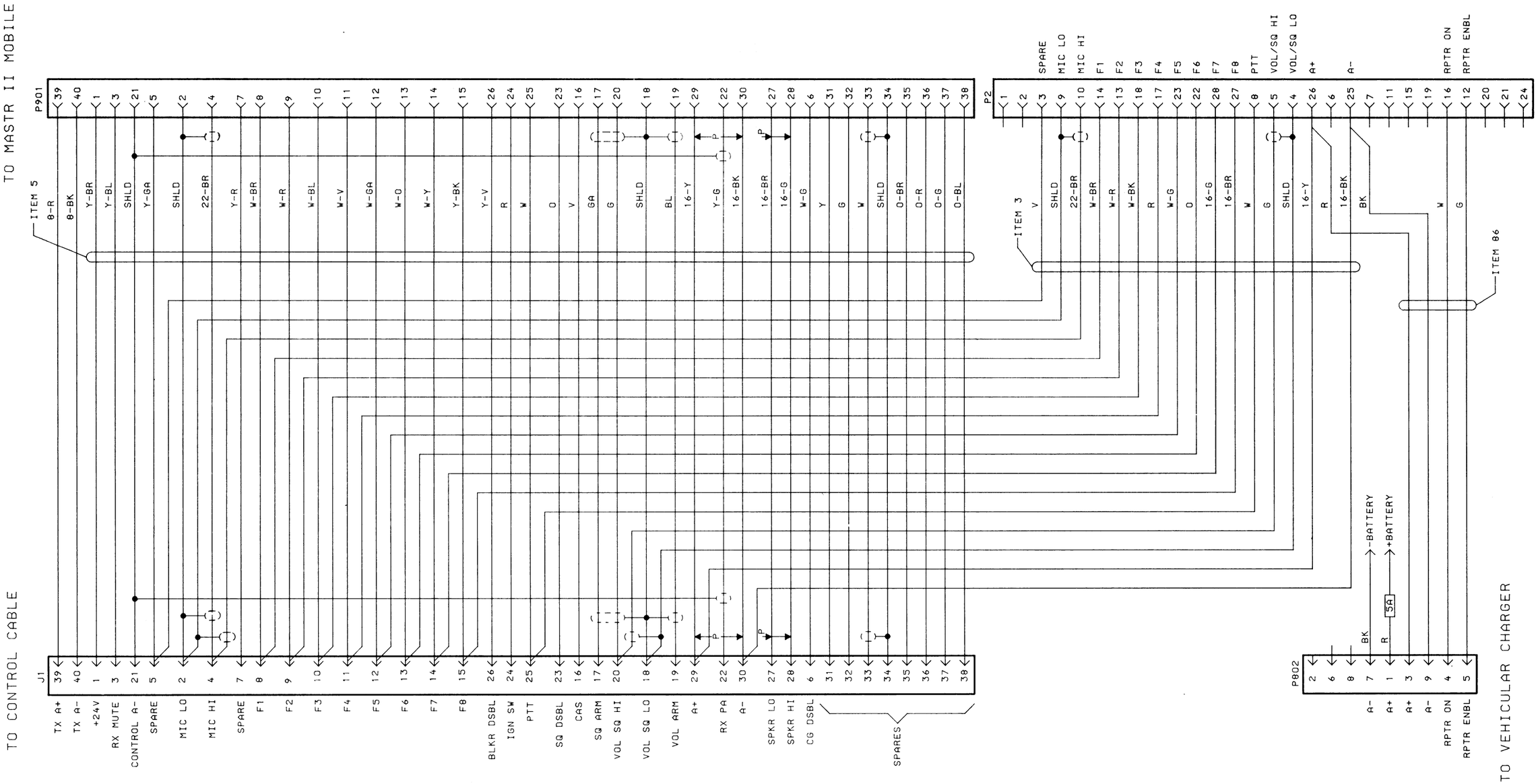
406—512 MHz RECEIVER ASSEMBLY

TO MASTR II MOBILE

TO VEHICULAR REPEATER

TO CONTROL CABLE

TO VEHICULAR CHARGER

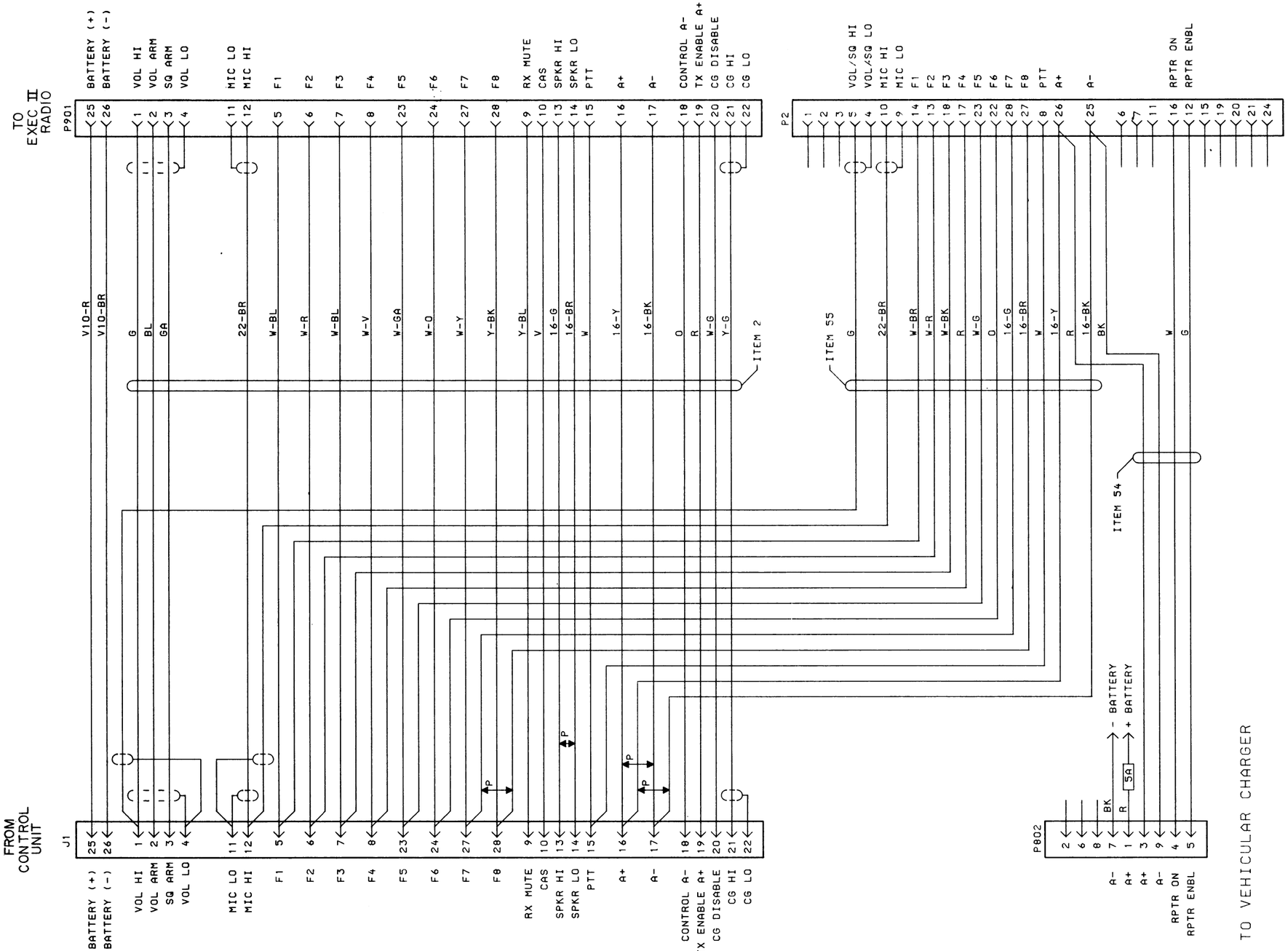


(19D429768, Rev. 1)

SCHEMATIC DIAGRAM

MASTR II INTERFACE CABLE

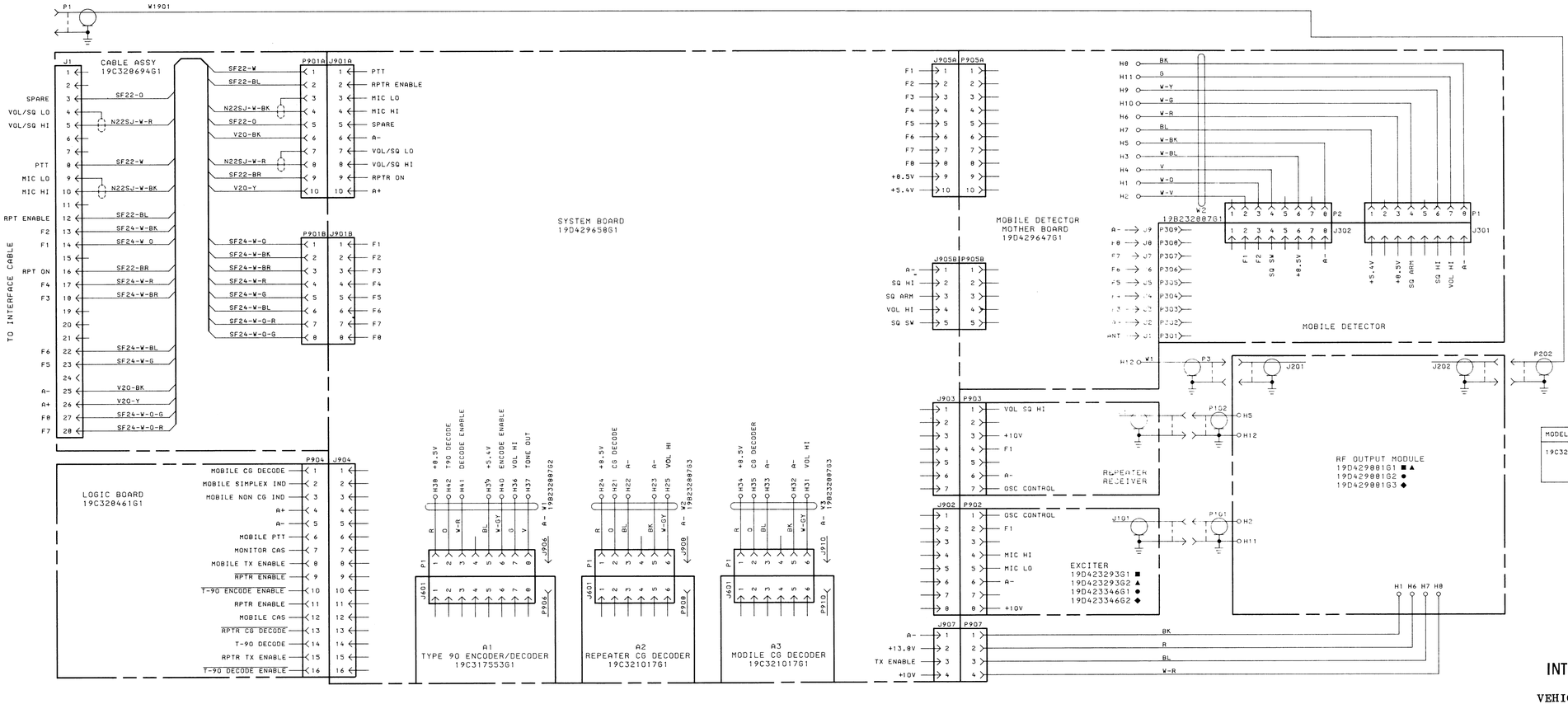
Issue 1



SCHEMATIC DIAGRAM

MASTR EXECUTIVE II INTERFACE CABLE

(19D430458, Rev. 1)



MODEL NO	REV LETTER
19C320694G1	

■ 138-155 MHZ
▲ 150.8-174 MHZ
● 406-420 MHZ
◆ 450-512 MHZ

INTERCONNECTION DIAGRAM

VEHICULAR REPEATER INTERFACE

Issue 1

(19R622371, Rev. 1)

PARTS LIST

FRONT CAP ASSEMBLY
19D423302G1
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
	19D423283P1	Front cap.
	19D423284P1	Handle.
	5491682P21	Rim lock: sim to Yale & Towne Cylinder 9899.
	19A130614G1	Latch. (Used with 5491682P21 rim lock).
	19A134222P1	Washer, spring tension. (Used to secure rim lock)
	19A122242P1	Shoulder screw, black: No. 8-32 x 1. (Secures handle to cap & cap to chassis).
	19A116772P1	Lockwasher, tooth: sim to Shakeproof 4708-06-02. (Secures handle to cap & cap to chassis).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

VEHICULAR REPEATER/MASTR II INTERFACE CABLE
19D423424G25

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1		Connector. Includes:
	19B227771G2	Shell.
	19A116669P1	Contact, electrical: sim to Malco 009-0191-002. (Quantity 38).
	402984OP5	Contact, electrical: sim to Malco 12021-7. (Mates with J1 contacts 19A116669P1).
	19B219394P1	Contact. (Located on the No. 8 red and black wires).
	7117269P1	Solderless terminal. (Mates with 19B219394P1 contact on red & black wires).
	7109043P1	Retaining ring. (Located at J1-39 & J1-40).
	19C328578P1	Cover half. (Side with 19A121175P31 insulator).
	19A1377471	Cover half. (Side without insulator).
	19A121175P31	Insulator. (Located inside of J1 Cover).
	19B232847P1	Cable clip.
	19B201074P304	Tap screw, Phillips POZIDRIV®: No. 6-32 x 1/4. (Secures J1 housing halves at hinge end).
	N136P904C	Tap screw, phillips head: No. 4-24 x 1/4. (Secures covers to J1).
		- - - - - - - - - - PLUGS - - - - - - - - - -
P2		Connector. Includes:
	19C311409P1	Connector, receptacle: 28 female contacts.
	19D413039P1	Cover half. (Nut side).
	19D413039P2	Cover half. (Screw side).
	19C311411G1	Thumbscrew. (Secures P2).
	N36P9020C6	Machine screw: No. 4-40 x 1-1/4. (Secures P2 cover halves).
	N210P9C6	Nut, hex: No. 4-40. (Secures P2 cover halves).
P802		Connector. Includes:
	19B209288P4	Shell.
	19B209288P2	Contact, electrical: sim to Molex 02-09-2101.
P901		Connector, special purpose. Includes:
	19C307162P1	Shell.
	19A134240P1	Contact, electrical: sim to AMP 350657-1. (Quantity 34).
	19A134240P2	Contact, electrical: sim to AMP 350656-1. (Quantity 4).
	19A134240P3	Contact, electrical: sim to AMP 350655-1. (Quantity 2).
	19C328122P1	Connector, guide. (Located over contacts).
	19A134241P1	Jackscrew.
	19B209245P103	Insulated spacer. (Located on jackscrew).
	N193P1208C6	Tap screw, phillips head: No. 6-20 x 1/2. (Secures cover halves).
		- - - - - - - - MISCELLANEOUS - - - - - - - - -
	7139880P13	Cable. Approx 6 feet long. (P2 to J1).
	7139880P16	Cable. Approx 2 feet long. (J1 to P901).
	19A116650P2	Cable. Approx 2 feet long. (J1 to P901).
	19A116650P10	Cable. Approx 2 feet long. (J1 to P901).
	7160478P3	Cable. Approx 21 feet long. (P2 to P802).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

VEHICULAR REPEATER/MASTR EXECUTIVE II
INTERFACE CABLE
19C321890G8
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1		Connector. Includes:
	19C303775P1	Plug: 28 terminals.
	19B227918P2	Cover.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P2		Connector. Includes:
	19C311409P1	Connector, receptacle.
	19B226473G1	Cover.
	19C311411G1	Thumbscrew.
	N210P9C6	Hex nut: No. 4-40. (Secures cover to connector).
	N36P9020C6	Machine screw. (Secures cover to connector).
P802		Connector. Includes:
	19B209288P4	Shell.
	19B209288P2	Contact, electrical: sim to Molex 02-09-2101. (P802-3 thru P802-5, P802-8).
P901		Connector. Includes:
	19C311409P1	Connector, receptacle.
	19B226473G1	Cover.
	19C311411G1	Thumbscrew.
	N210P9C6	Hex nut: No. 4-40. (Secures cover to connector).
	N36P9020C6	Machine screw. (Secures cover to connector).
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7139880P14	Cable. Approx 3 feet. (Located between J1 & P901)
	7160478P3	Cable. Approx 21 feet. (Located between P2 & P802).
	7139880P13	Cable. Approx 7 feet. (Located between J1 & P2).
	19B226198G4	Cable, fused.
	7117269P1	Solderless terminal. (Located at J1-16, J1-17, J1-25, & J1-26).
	19A138442G1	Support. (J1).
	19B201074P304	Tap screw, Phillips POZIDRIV®: No. 6-32 x 1/4. (Secures J1 to support).
	5491480P7	Clip loop. (Secures cable from P901 to J1 at J1).
	5491480P6	Clip loop. (Secures cable from P2 to J1 at J1).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

CHASSIS ASSEMBLY
19C321683G6
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
W1901		CABLE ASSEMBLY 19B227513G1
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1		Connector. Includes:
	4029493P1	Connector, receptacle: sim to Amphenol 83-798.
	4029082P2	Cover.
P202	5491689P121	Connector. (Includes 2 feet cable).
		- - - - - - - - - MISCELLANEOUS - - - - - - - -
	19C321682G5	Frame.
	19C321670G2	Rail.
	19A134313P1	Spacer, threaded.
	4029030P12	Seal, rubber channel.
	19A116552P3	Cable clip: sim to Richco EXC-4.
	N403P16C6	Lockwasher, internal tooth: No. 8. (Located under threaded spacer).
	19B209382P305	Tap screw, Phillips Pozidriv®: No. 6-32 x 5/16. (Secures rail).
	19B209382P304	Tap screw, Phillips Pozidriv®: No. 6-32 x 1/4. (Quantity 2- Located in side rail).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES