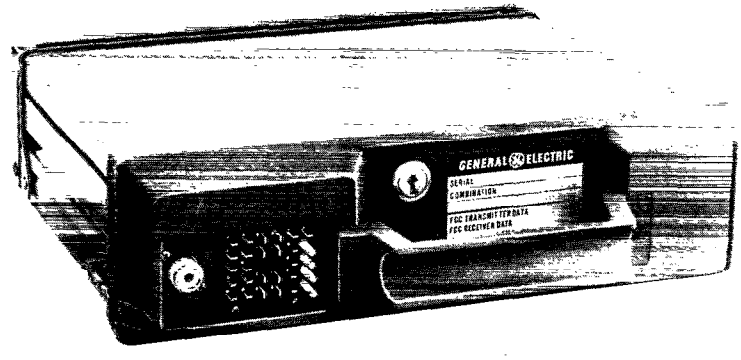
LBI-31154D

Mobile Communications



MASTR® *Executive II* VEHICULAR REPEATER

Maintenance Manual

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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 objects such as tools, rings, watchbands, etc., enough to cause burns. Be careful when working near energized circuits!

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COMBINATION NOMENCLATURE

VEHICULAR REPEATER

Digit 1	Digit 2	Digit 3	Digit 4	Digit 5	Digit 6	Digit 7
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.
D Used With Delta-S,SX and RANGR					**K** 406-420 MHz	**P** Pre-Amp
					M 450-470 MHz	
					N 470-494 MHz	
					P 494-512 MHz	

MOBILE DETECTOR (OPTIONAL)

Digit 1	Digit 2	Digit 3	Digit 4	Digit 5
Product	Product Line	Control	Number of Freq.	Radio Freq. Range
M Mobile Detector	**R** Vehicular RPTR	**1** Mobile Detector	**A** One	**A** 29.7-36 MHz
			B Two	**B** 36-42 MHz
			C Three	**C** 42-50 MHz
			D Four	**D** 66-76 MHz
			E Five	**E** 75-88 MHz
			F Six	**G** 138-155 MHz
			G Seven	**H** 150.8-174 MHz
			H Eight	**K** 406-420 MHz
			X Zero	**M** 450-470 MHz
				N 470-494 MHz
				P 494-512 MHz

SYSTEMS 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

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 portable-to-base and base-to-portable transmissions to an operator, using the PE radio, away from his vehicle.

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, MASTR Executive II, DELTA S/SX or RANGR mobile radio.

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 ±0.0005% 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. Test points are available on the system board.

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 a microcomputer which establishes repeater priority and controls all radio transmissions between the portables and the base station. It also provides the carrier control timer function, courtesy beep, and multiple priority clearing. The board is mounted on the underside of the radio chassis and plugs into the system board.

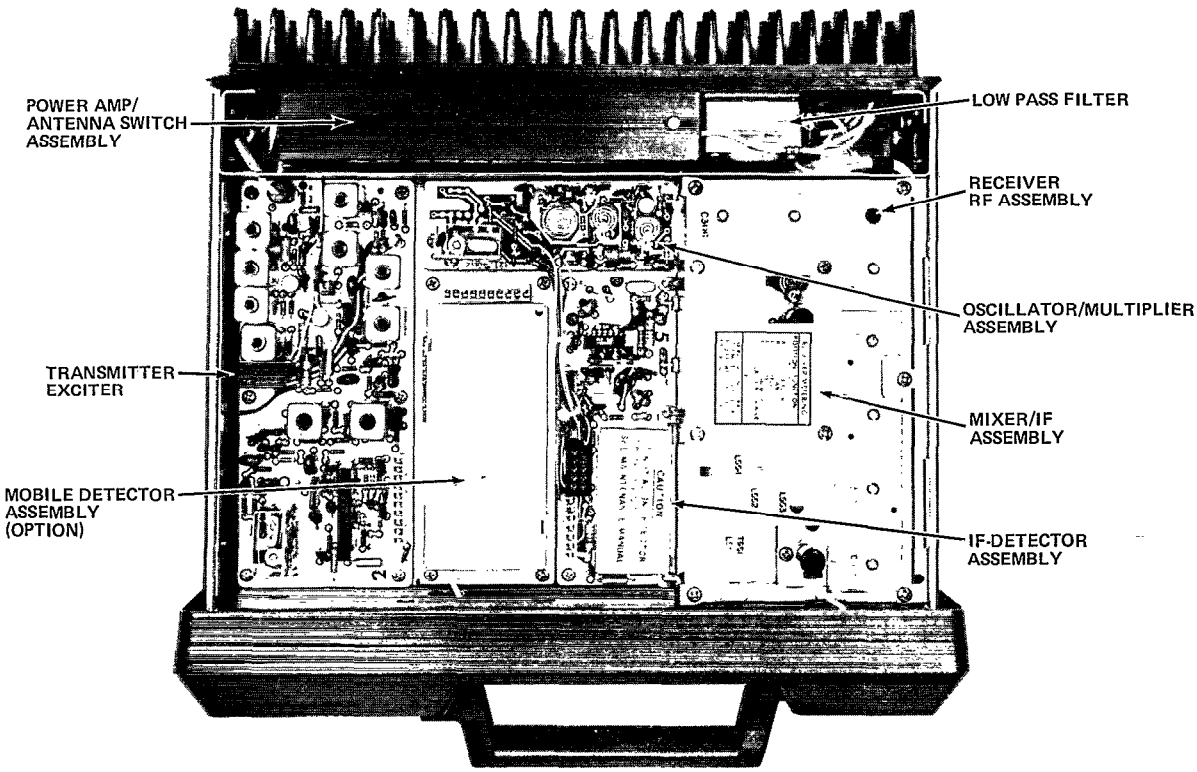
MOBILE DETECTOR (Optional)

The Mobile Detector is used in duplex radio systems and is mounted next to the vehicular repeater receiver. It 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 causes the logic board to maintain a non-priority status.

VEHICULAR REPEATER SYSTEM DESCRIPTION

The vehicular repeater radio contains the control and logic circuits necessary to transform a vehicle into a mobile repeating station. A typical mobile installation is shown in Figure 3. 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 flexible spring antenna for the vehicular repeater is normally located on the trunk area of the vehicle.

TOP VIEW



BOTTOM VIEW

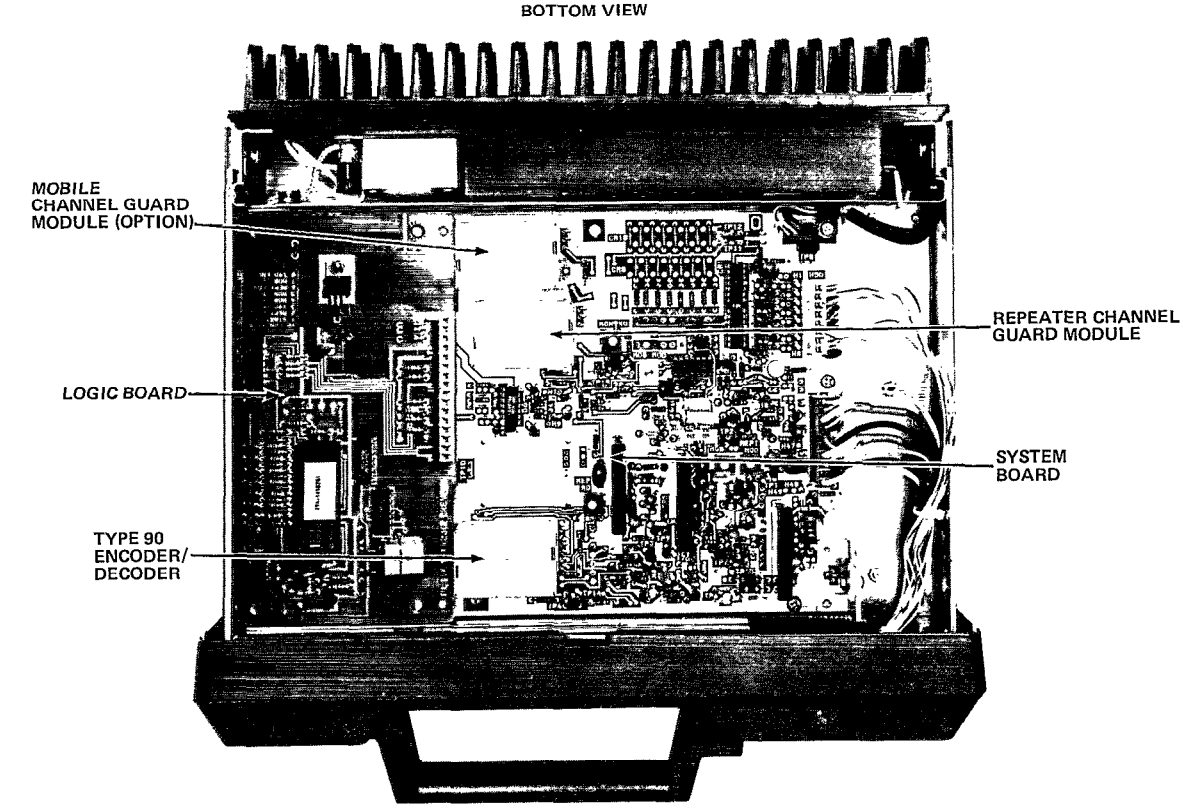


Figure 1 - Vehicular Repeater Radio Unit Module Layout, (Typical)

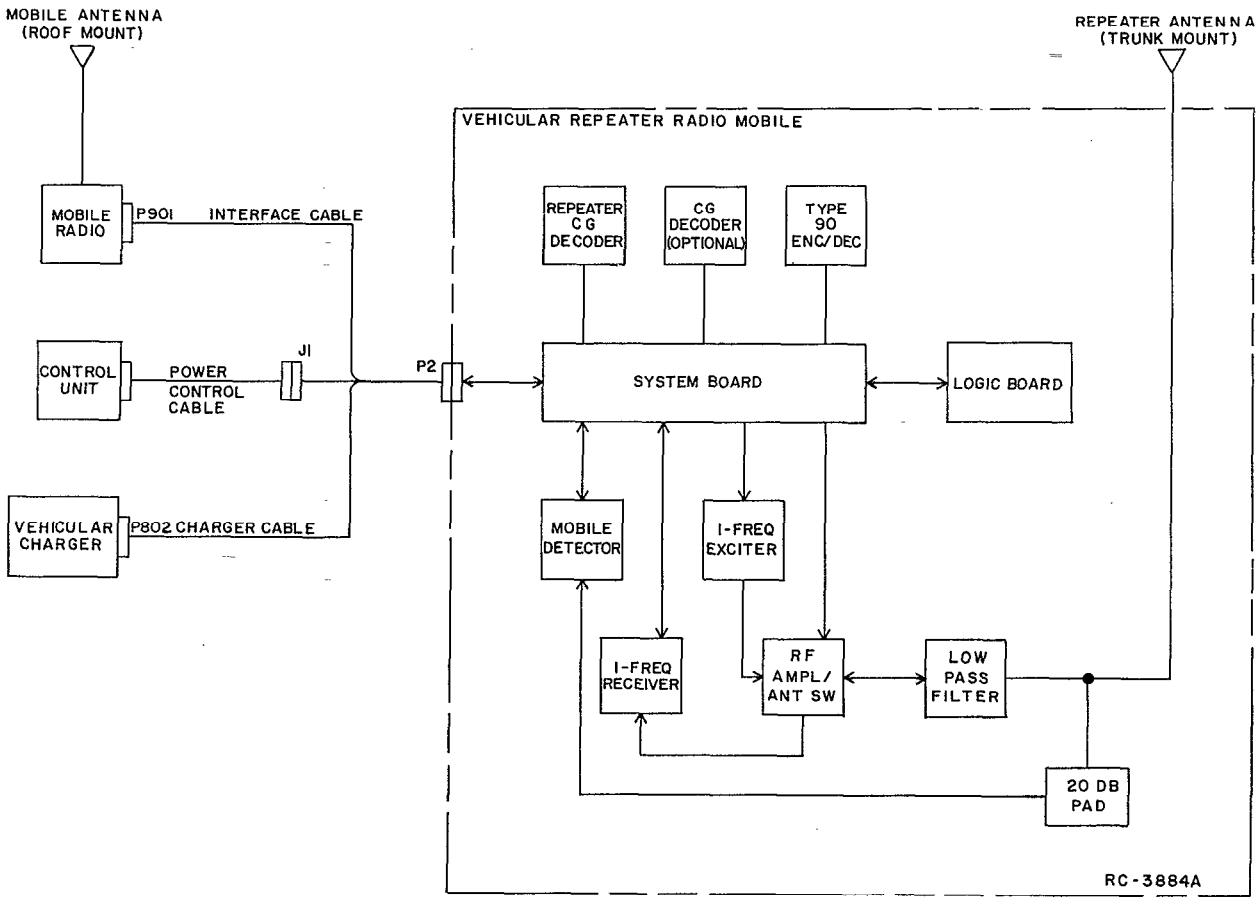


Figure 2 - Vehicular Repeater System Block Diagram

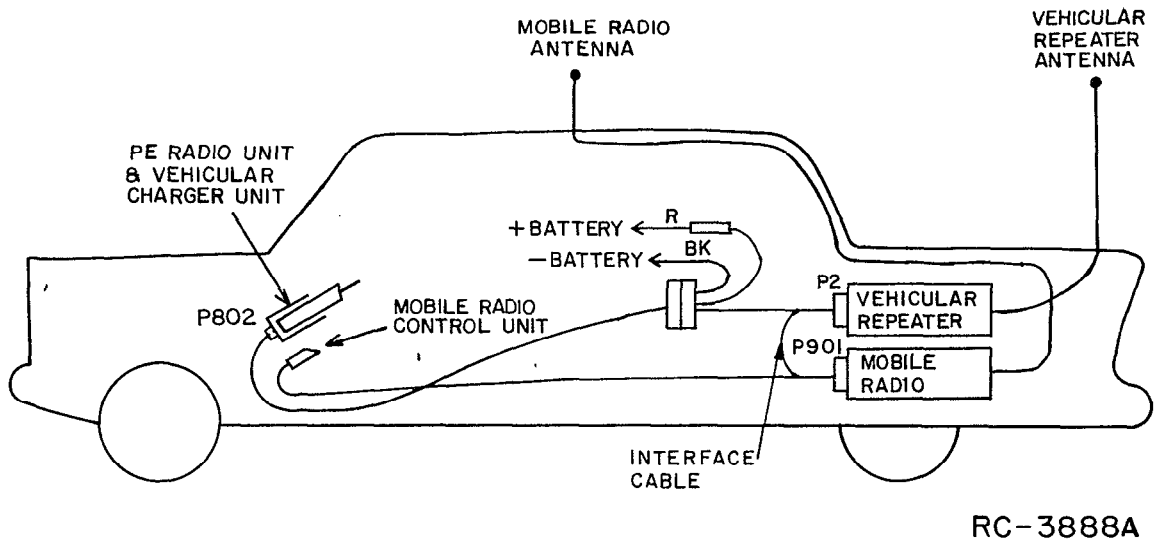


Figure 3 - Typical Installation in Vehicle

NOTE

The vehicular repeater should not be used with gain antennas. Also, for improved operation, the distance between the mobile and repeater antennas should be maximized.

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 operator to select one of up to eight operating channels for mobile-to-base communications.

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 to recharge the battery pack when the PE radio is inserted into the 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 microcomputer on the logic board keys the mobile radio transmitter.

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. However, since repeater priority is random as established by software control, an alternate repeater system may assume priority status.

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 repeater. 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.

The microcomputer in each vehicular repeater utilizes a random counter to establish priority. The counter is started each time a condition to repeat is detected. If no repeater begins to repeat before the counter counts down the repeater will begin to repeat and will assume the priority state. All other repeaters will remain quiet. The counter consists of a fixed 400 millisecond delay and a random count of 1.1 seconds. Since the value of the count is initialized when the repeater is tuned on, each individual repeater will have a different delay which will change each time the repeater is powered up.

A Carrier Control Timer (CCT) which resides in microcomputer software, prevents system tie-ups by timing base-to-portable transmissions. A DA jumper wire H1-H2 may be connected to disable the CCT if desired.

Courtesy Beep

The Type 90 encoder is enabled for approximately 30 milliseconds at the end of each portable-to-base repeat transmission. This tone burst or courtesy beep lets the portable operator know that his radio is working and his message has been transmitted to base. It may be desirable to eliminate the courtesy beep in systems using both the 19C331423 logic board and the 19C328461 logic board. Because of the different method used to establish repeater priority in vehicular repeaters using logic board 19C328461 its possible that the courtesy beep could cause all repeaters so equipped to count down simultaneously the eight levels of priority. This would allow all repeaters equipped with the 19C328461 logic board to temporality assume priority status. For this reason a DA jumper wire may be connected between H5-H6 on the 19C331423 logic board to disable the courtesy beep.

Vehicular Repeater System Enable

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, when removing the PE radio, automatically enables the Vehicular Repeater System. The mobile radio will operate on the channel indicated by 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 to transmit a 700 millisecond 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 microcomputer established the repeater as the priority repeater.

REPEATER PRIORITIZING AND OPERATION

The vehicular repeater contains a prioritizing system to prevent more than one radio from transmitting at once. When a repeater is enabled, it will transmit a 700 millisecond Type 90 tone on the portable frequency and goes into the "priority state". In priority, the repeater will repeat as soon as a request to repeat is heard. A vehicular repeater always listens for the Type 90 tone on the portable frequency. If it hears the tone, the repeater assumes that another repeater has just been enabled and is therefore the priority repeater. All repeaters who hear the tone will immediately jump to the "non-priority state".

A repeater in non-priority will not repeat immediately. It will listen for another repeater to come up. If no other repeater begins to repeat within a specified time period, the non-priority repeater will assume that there is no priority repeater present to repeat. The non-priority repeater will begin to repeat and jump into the priority mode to become the new priority repeater. The specified time period is random and will vary from repeater to repeater. The random delay is between 400 ms and 1.1 seconds long. (The random clock is loaded with a different setting each time a request to repeat is heard.) In a system that is functioning correctly, there can be any number of non-priority repeaters, but only one repeater will be in priority, and it will be the one doing all of the repeating.

If the priority repeater leaves the scene, when the next request to repeat comes along a short random time delay will occur before one of the remaining repeaters will step up to the priority state and start to repeat. All of the other repeaters will remain silent, and stay in non-priority.

The microcomputer will recognize the following conditions as repeat requirements.

NOTE

Some condition requirements can be duplicated by other simultaneous transmissions. For example, an active mobile transmitter and, a portable-to-portable transmission. The prioritizing system will nullify these to eliminate undue interference.

Base-to-Portable:

Mobile CAS

Mobile CAS and CG Option and Mobile CG (with CG Option on Mobile)

Portable-to-Base:

Repeater CAS and Repeater CG

Another Repeater Repeating Base-to-Portable

Mobile CAS and Repeater CAS

Mobile CAS and CG Option and Mobile CG and Repeater CAS (with CG Option on Mobile)

Another Repeater Repeating Portable-to-Base

Mobile CAS and Repeater CAS and Repeater CG

Monitor Option and Monitor CAS and Repeater CAS and Repeater CG (Duplex Mobile)

Portable Interrupt

During base-to-portable transmissions, the vehicular repeater transmitter is unkeyed for 6 milliseconds every second 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

VEHICULAR REPEATER ADAPTER CABLE

DESCRIPTION

The DELTA-S/SX and RANGR Vehicular Repeater Adapter Cable allows the DELTA-S/SX and RANGR radios to be used with the Executive II Vehicular Repeater. The cable contains an interface board to convert the mobile's control leads into a configuration that is compatible with the control system of the vehicular repeater. The DELTA channel select lines are coded in 5-line binary while the vehicular repeater channel select inputs are 1 of 8 with the selected channel input at ground potential. The DELTA radio is capable of 32 channel operation, 16 in mode A and 16 in mode B.

The interface box (part of the cable) detects all mode B channels, channels 9 thru 16 of mode A, and disables the repeater for those channels.

The repeater enable line is held high only for channels 1 thru 8 of mode A.

CIRCUIT ANALYSIS

The interface and detection circuit consists of a hex buffer/inverter A1, binary-to-decimal converter U2, magnitude comparator U3, and buffer transistors Q1 thru Q8. Q9 and Q10 control the repeater enable line at P2-12.

All binary inputs applied to J1-1 thru J1-4 are buffered by buffer/inverters U1A-D and converted to decimal 1 thru 8 by the binary-to-decimal converter U2. The decimal decoder causes one output, 01-08, to go high for each set of binary inputs, turning the appropriate transistor (Q1-Q8) on. This will ground the selected channel select line F1-F8 and allow the channel to become active. The truth table shown below in Table 1 identifies the valid binary inputs and associated channel selected.

J1- 4 3 2 1	U2 INPUT D C B A	U2 OUTPUT HIGH	CHANNEL SELECTED
1 1 1 0	0 0 0 1	01	F1
1 1 0 1	0 0 1 0	02	F2
1 1 0 0	0 0 1 1	03	F3
1 0 1 1	0 1 0 0	04	F4
1 0 1 0	0 1 0 1	05	F5
1 0 0 1	0 1 1 0	06	F6
1 0 0 0	0 1 1 1	07	F7
10 1 1 1	1 0 0 0	08	F8

TABLE 1 - TRUTH TABLE

The magnitude comparator compares the incoming bit configuration of A0-A3 against a fixed binary number, B0-B3. B3 is held high by the 5-volt regulator U4. B0-B2 are strapped to ground for a binary 8(1000). If the binary number present on A0-A3 exceeds 8 (1000) U3-13 goes high, turning Q9 on and inhibiting RPT ENBL. This prevents the repeater from turning on.

All mode B channels are identified by FB5. When FB5 is present, inverter U1F goes high, turning Q10 on. Q10 disables the repeater.

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 Installation Instructions 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 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.

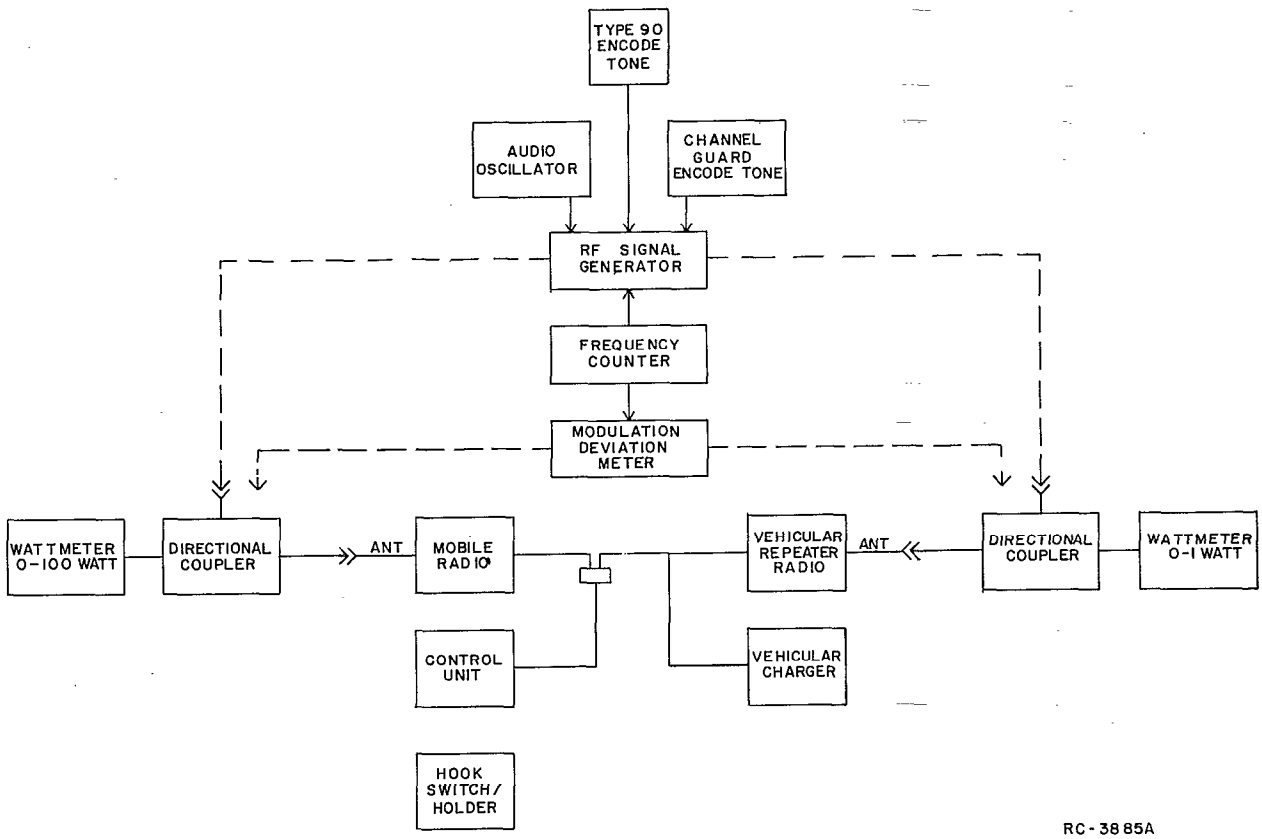


Figure 4 - Test Setup

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 the Mobile Channel Guard option is present on F1 connect a jumper between TP17 and TP8 on the 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 uV 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 uV 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 uV 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 apply the Channel Guard tone. The mobile radio should key up after a short delay (1/4 to 2 second).

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 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 pushbutton 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.

2. Remove the microphone from the hookswitch 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 is not operating.

To Turn On Vehicular Repeater System

1. Turn on the mobile radio and select the repeater channel.

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 pushbutton switch to the "on" position.

To Enable Vehicular Repeater System

1. Turn on the Vehicular Repeater System.

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 operational and will retransmit between the base station and portable radio.

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 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 these 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 assigned channel.

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 Vehicular Repeater System operation is no longer required, the REPEATER pushbutton switch must be in the "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 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 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.

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. 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.

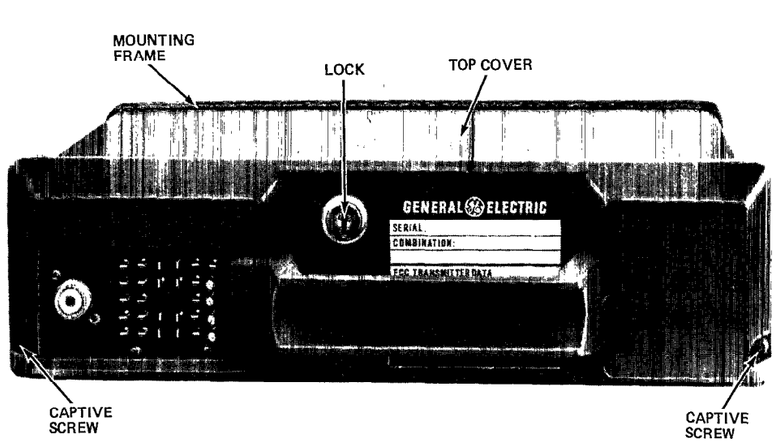


Figure 5 - Disassembly

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.

ERICSSON

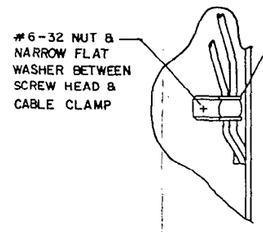
Ericsson GE Mobile Communications Inc.
Mountain View Road • Lynchburg, Virginia 24502

Printed in U.S.A.

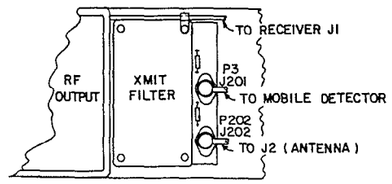
LBI31154

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 P5A-EA111 BETWEEN HEATSINK & CHASSIS.
5. DISCARD FOAM RUBBER FILLER WHEN INSTALLING ADDITIONAL CHANNEL GUARD.

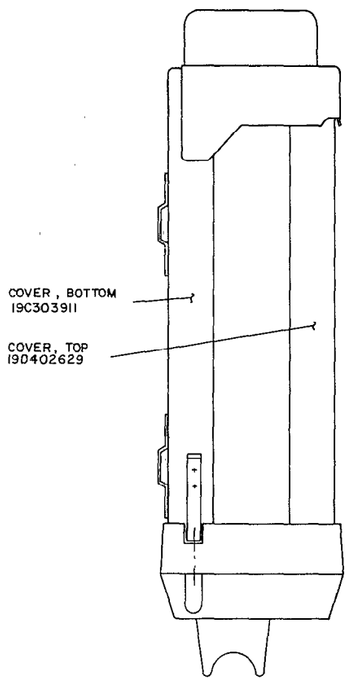


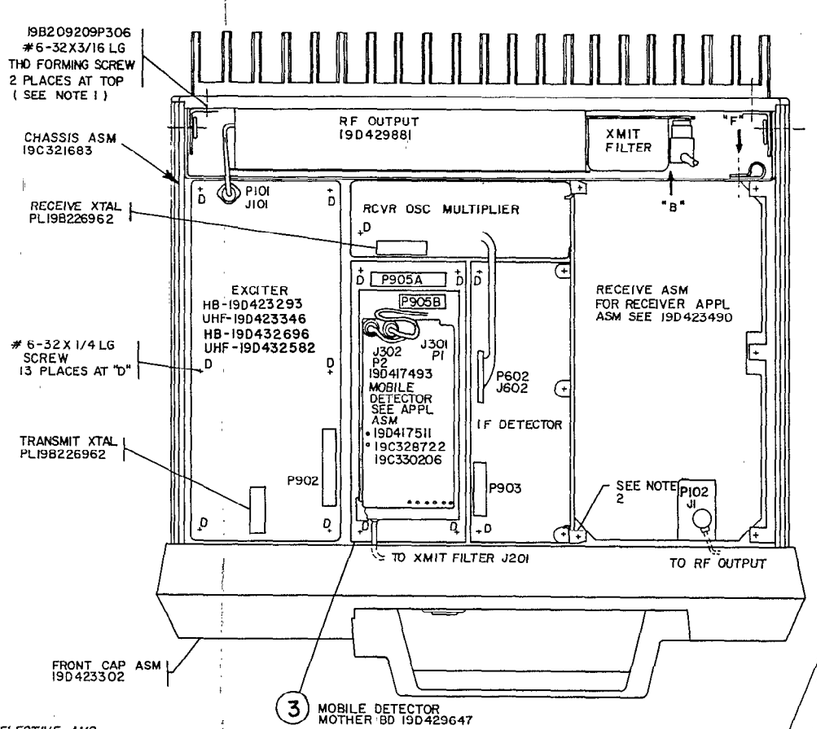
VIEW "F"

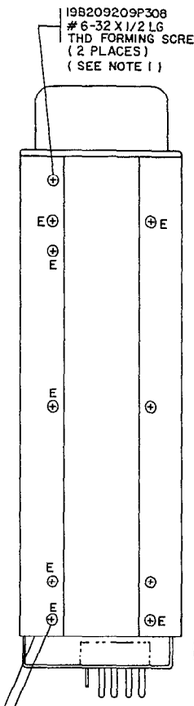


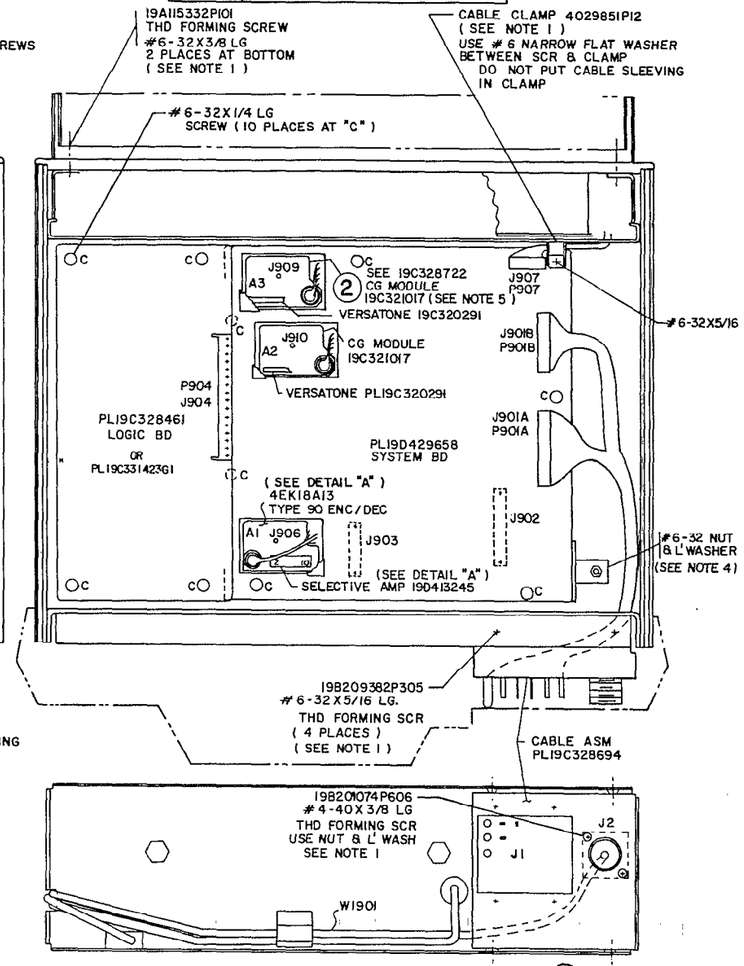
VIEW "B"

PART NO.	DESCRIPTION
1	BASIC TRUNK MOUNT REPEATER
2	ADDITION OF ADDITONAL CHANNEL GUARD
3	ADDITION OF MOBILE DETECTOR
4	NO CCT ON BASE TO PORTABLE
5	INHIBIT T-90 PRIORITY BURST
6	NO CURTESY BEEP



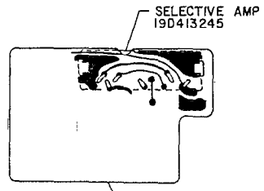






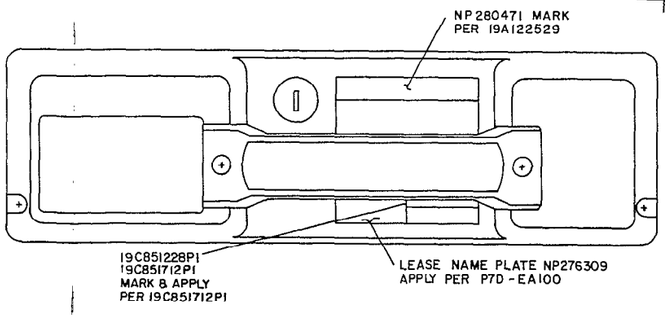
VIEW WITH FRONT CAP REMOVED

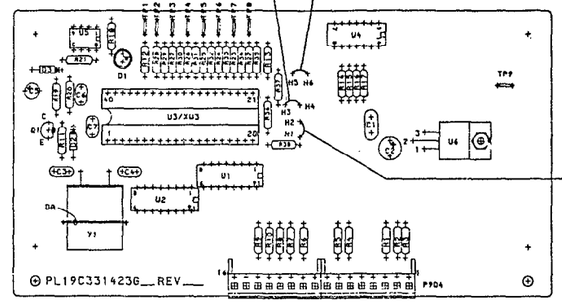
(1)



DETAIL "A" (SOLDER SIDE)

SOLDER SELECTIVE AMP TO TYPE 90 ENC/DEC BD AS SHOWN.



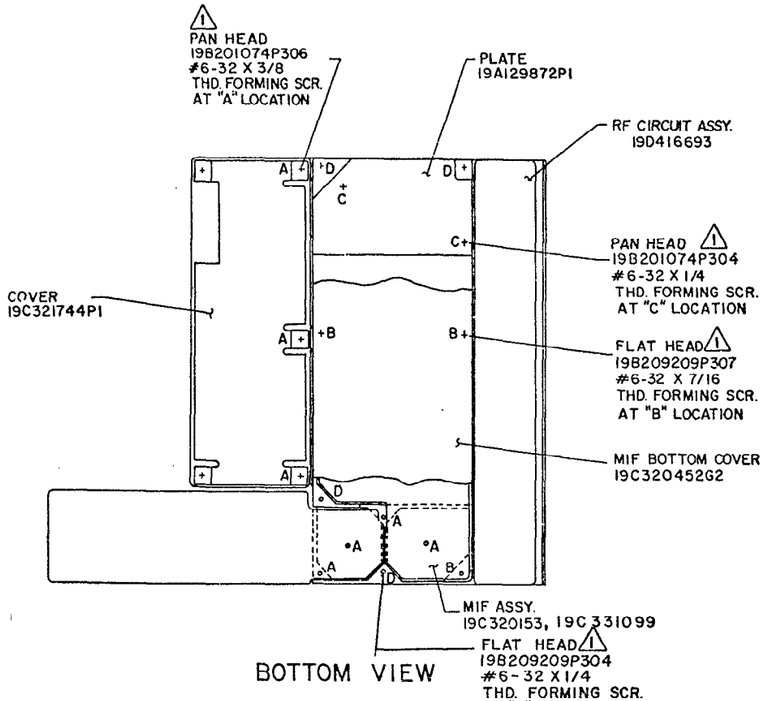


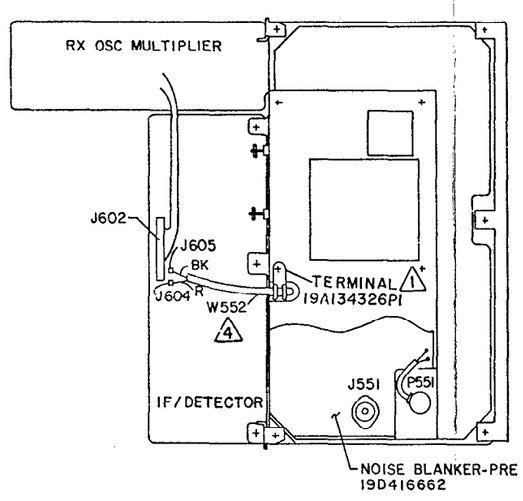
(19D429922, Sh. 2, Rev. 0)

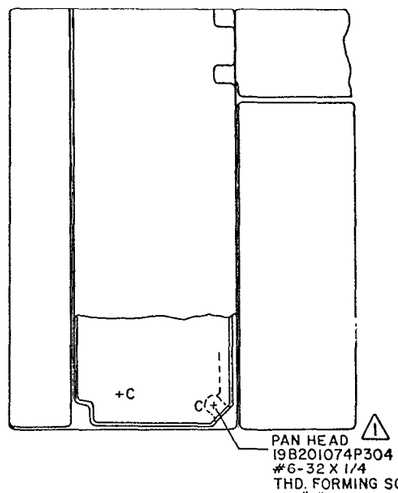
(19D429922, Sh. 1, Rev. 5)

MECHANICAL PARTS BREAKDOWN

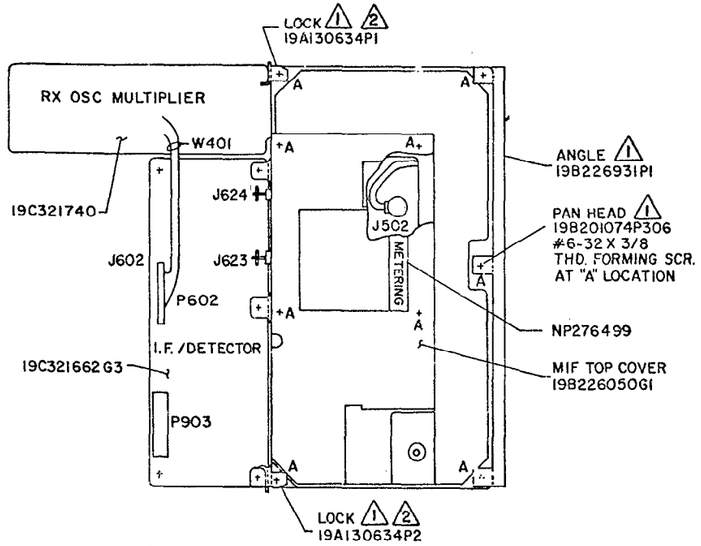
MAIN CHASSIS





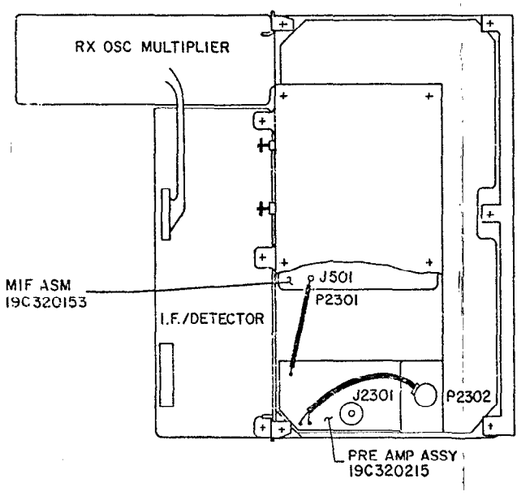


NOISE BLANKER-PRE AMP HIGH BAND

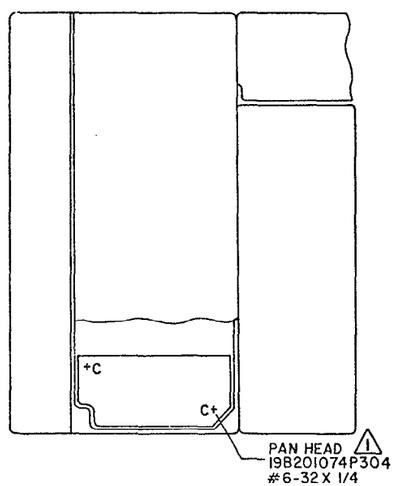


RECEIVER HIGH BAND

TOP VIEW

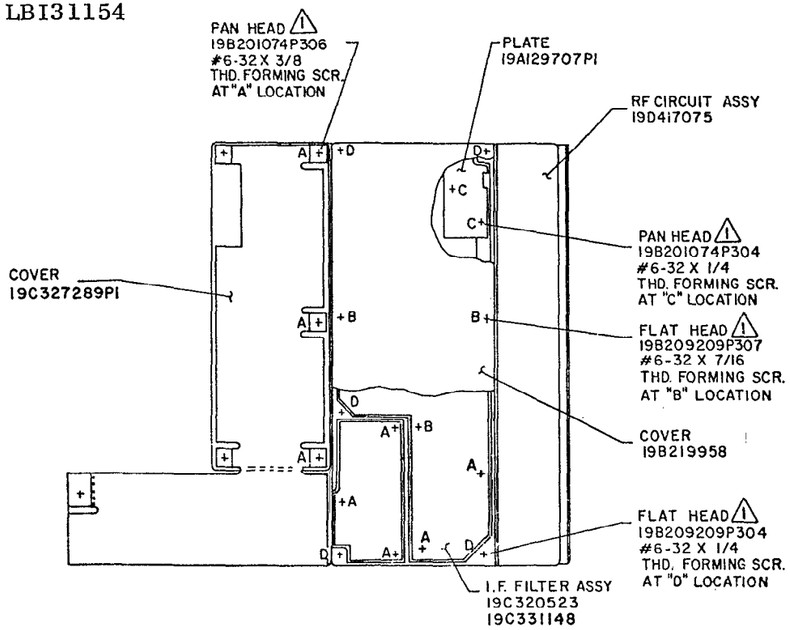


TOP VIEW

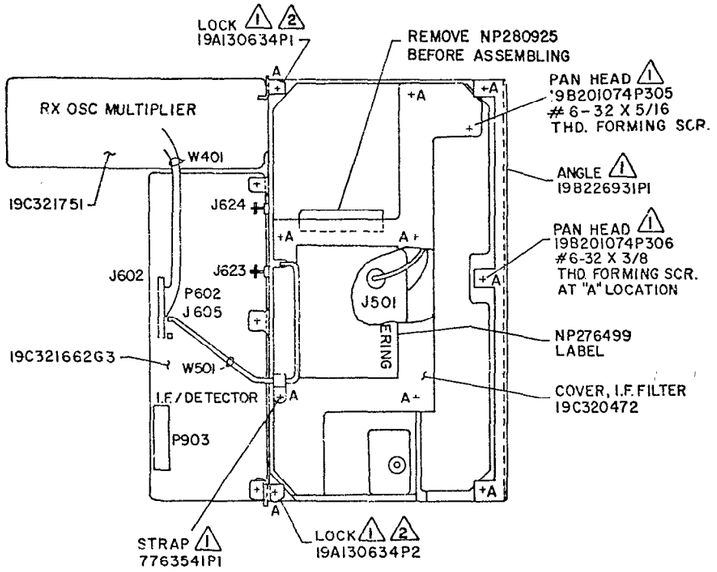


BOTTOM VIEW

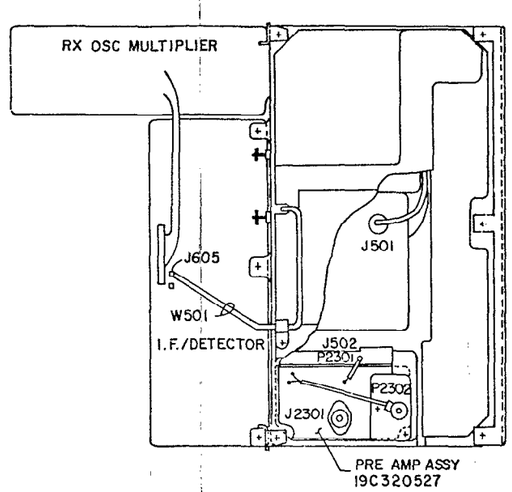
PRE-AMP HIGH BAND



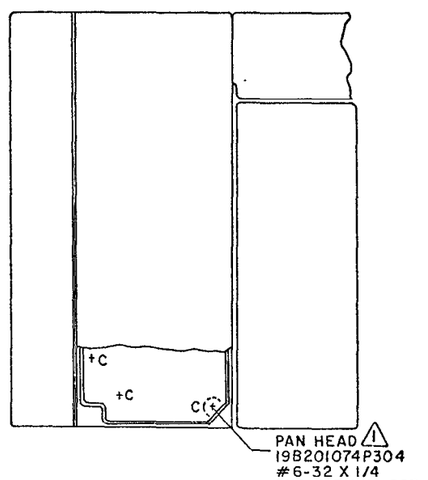
BOTTOM VIEW



RECEIVER UHF
TOP VIEW



TOP VIEW



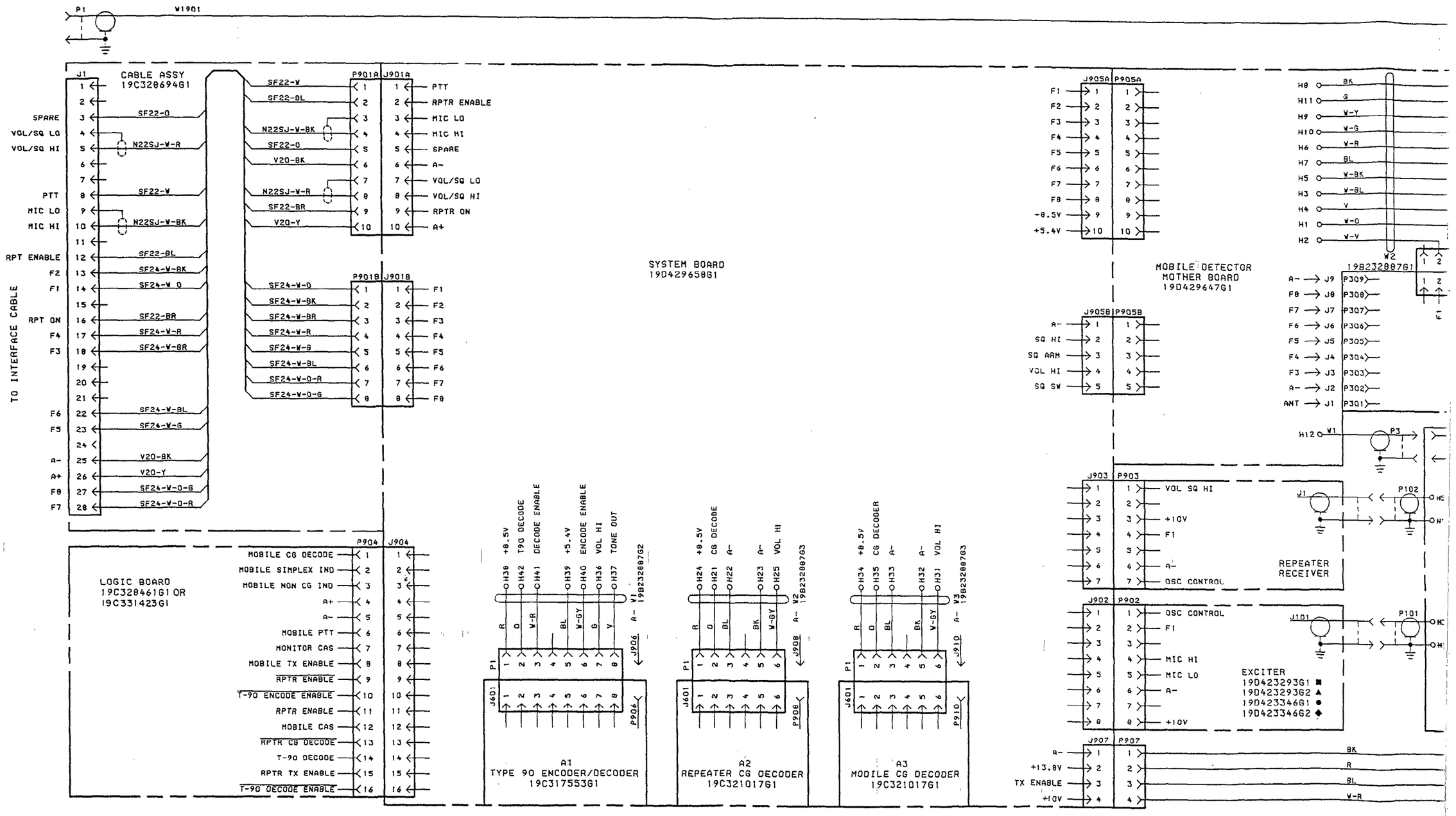
BOTTOM VIEW

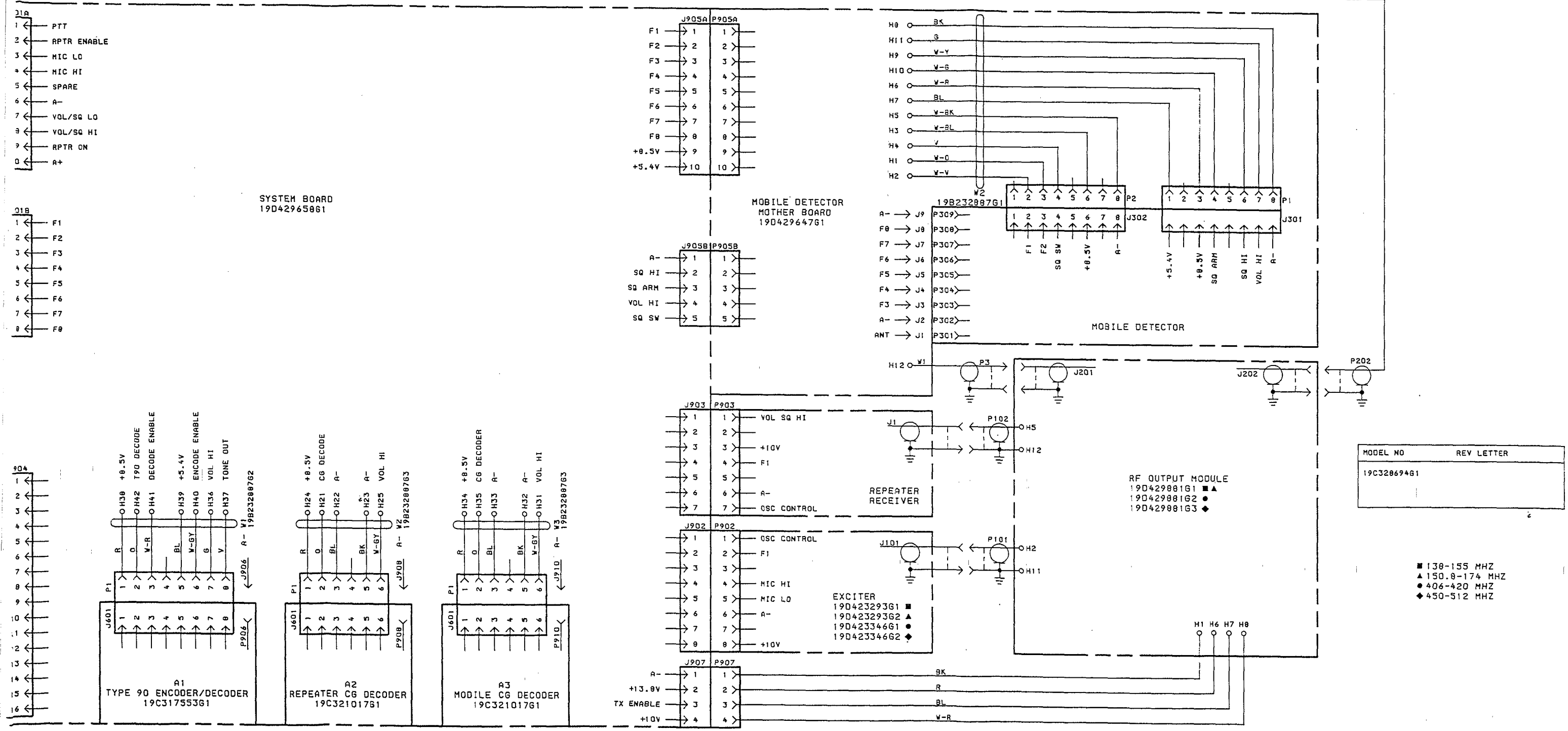
PRE AMP UHF

(19D423490, Sh. 3, Rev. 6)

MECHANICAL PARTS BREAKDOWN

406—512 MHz RECEIVER ASSEMBLY


P1
W1901
J1
CABLE ASSY
19C32869G1
SPARE
VOL/SQ LO
VOL/SQ HI
PTT
MIC LO
MIC HI
RPT ENABLE
F2
F1
RPT ON
F4
F3
F6
F5
A-
A+
F8
F7
SF22-O
N22SJ-W-R
SF22-W
N22SJ-W-BK
SF22-BL
SF24-W-BK
SF24-W-O
SF22-BR
SF24-W-R
SF24-W-BR
SF24-W-BL
SF24-W-G
V20-BK
V20-Y
SF24-W-O-G
SF24-W-O-R
TO INTERFACE CABLE
P901A J901A
SF22-W
SF22-BL
N22SJ-W-BK
SF22-O
V20-BK
N22SJ-W-R
SF22-BR
V20-Y
PTT
RPTR ENABLE
MIC LO
MIC HI
SPARE
A-
VOL/SQ LO
VOL/SQ HI
RPTR ON
A+
P901B J901B
SF24-W-O
SF24-W-BK
SF24-W-BR
SF24-W-R
SF24-W-G
SF24-W-BL
SF24-W-O-R
SF24-W-O-G
F1
F2
F3
F4
F5
F6
F7
F8
SYSTEM BOARD
19D429658G1
J905A P905A
F1
F2
F3
F4
F5
F6
F7
F8
-8.5V
+5.4V
J905B P905B
A-
SQ HI
SQ ARM
VOL HI
SQ SW
MOBILE DETECTOR
MOTHER BOARD
19D429647G1
H8
H11
H9
H10
H6
H7
H5
H3
H4
H1
H2
8K
G
W-Y
W-G
W-R
BL
W-8K
W-BL
Y
W-O
W-V
W2
19B232887G1
F1
A- J9 P309
F8 J8 P308
F7 J7 P307
F6 J6 P306
F5 J5 P305
F4 J4 P304
F3 J3 P303
A- J2 P302
ANT J1 P301
H12
W1
P3
LOGIC BOARD
19C328461G1 OR
19C331423G1
P904 J904
MOBILE CG DECODE
MOBILE SIMPLEX IND
MOBILE NON CG IND
A+
A-
MOBILE PTT
MONITOR CAS
MOBILE TX ENABLE
RPTR ENABLE
T-90 ENCODE ENABLE
RPTR ENABLE
MOBILE CAS
RPTR CG DECODE
T-90 DECODE
RPTR TX ENABLE
T-90 DECODE ENABLE
A1
TYPE 90 ENCODER/DECODER
19C31755G1
+8.5V
T90 DECODE
DECODE ENABLE
+5.4V
ENCODE ENABLE
VOL HI
TONE OUT
A-
W1
19B232887G2
J906
P906
J601
A2
REPEATER CG DECODER
19C32101G1
+8.5V
CG DECODE
A-
A-
VOL HI
A-
W2
19B232887G3
J908
P908
J601
A3
MODILE CG DECODER
19C32101G1
+8.5V
CG DECODER
A-
A-
VOL HI
A-
W3
19B232887G3
J910
P910
J601
J903 P903
VOL SQ HI
+10V
F1
A-
OSC CONTROL
J1
P102
REPEATER
RECEIVER
J902 P902
OSC CONTROL
F1
MIC HI
MIC LO
A-
+10V
J101
P101
EXCITER
19D423293G1 ■
19D423293G2 ▲
19D423346G1 ●
19D423346G2 ◆
J907 P907
A-
+13.8V
TX ENABLE
+10V
BK
R
BL
W-R



(19R622371, Rev. 2)

INTERCONNECTION DIAGRAM

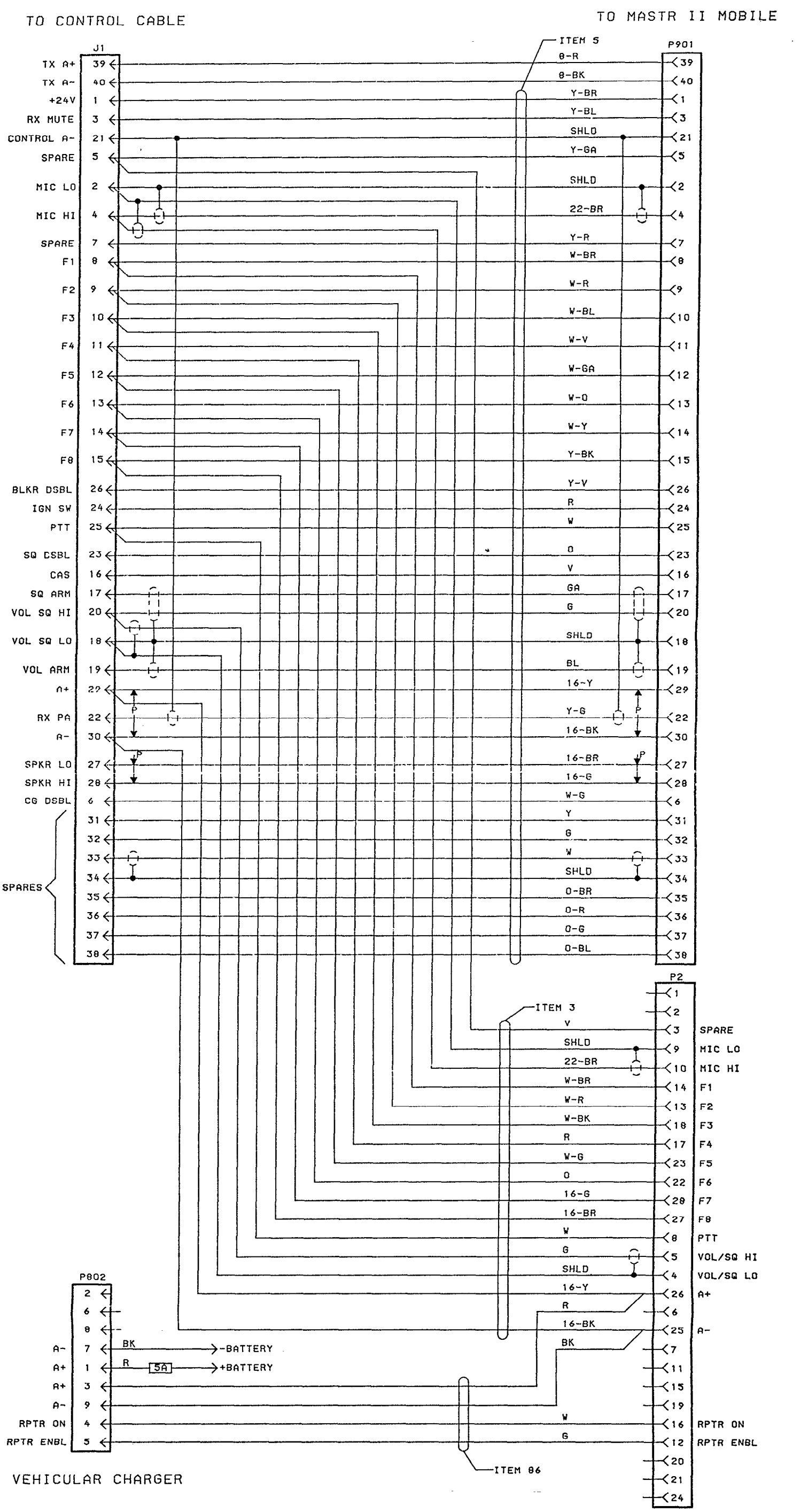
VEHICULAR REPEATER INTERFACE

SCHEMATIC DIAGRAM

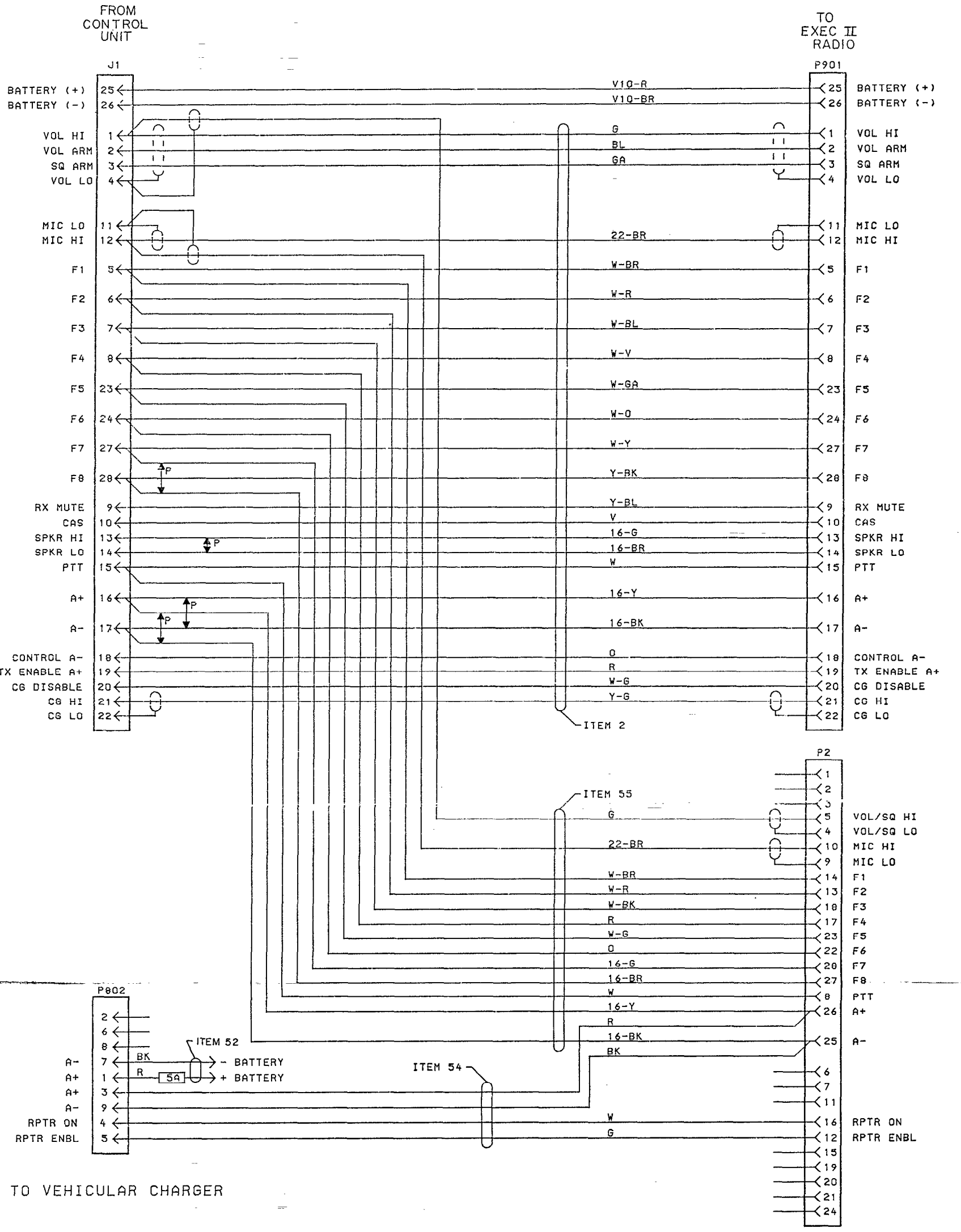
MASTR II INTERFACE CABLE

16

Issue 1



(19D429768, Rev. 1)

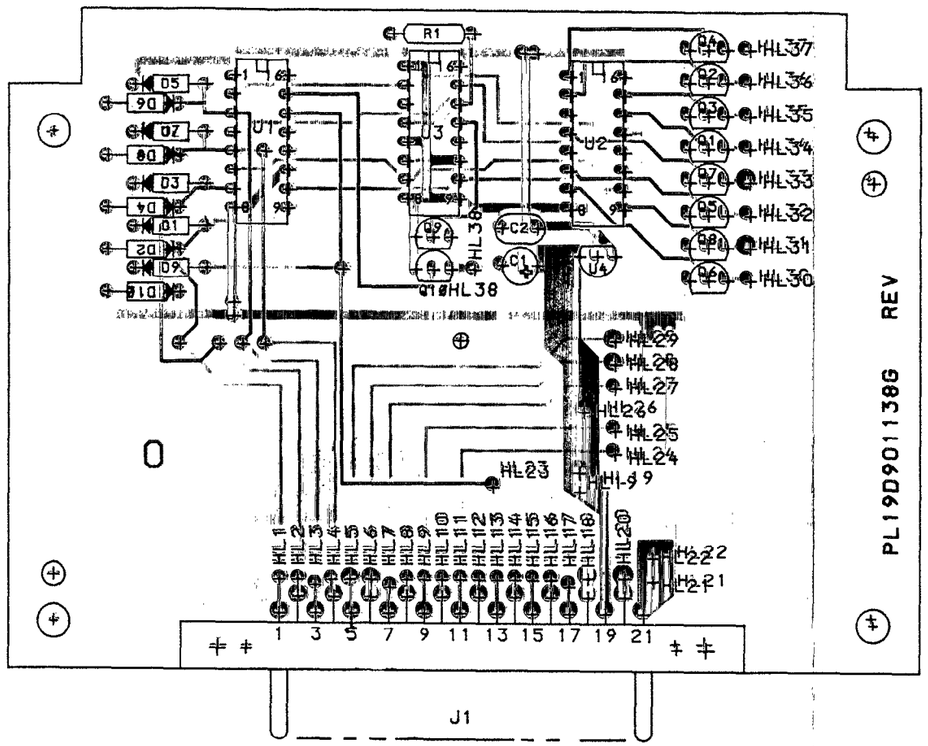


NOTES:
1. ALL WIRES ARE #24 UNLESS OTHERWISE NOTED.
2. IF FIXED SQUELCH OPTION IS PRESENT, SQ ARM IS USED FOR SQ MONITORING.

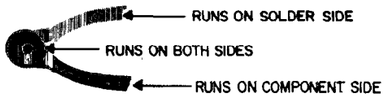
(19D430458, Rev. 2)

SCHEMATIC DIAGRAM

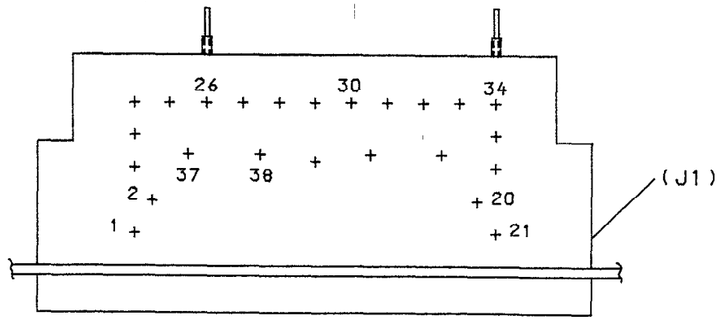
MASTR EXECUTIVE II INTERFACE CABLE



CAUTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC SENSITIVE DEVICES

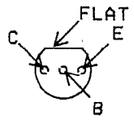


(19D901140, Rev. 1)
(19A703577, Sh. 1, Rev. 0)
(19A703577, Sh. 2, Rev. 0)



VIEW "A"

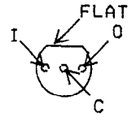
LEAD IDENTIFICATION
FOR Q1 THRU Q10



IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

LEAD IDENTIFICATION
FOR U4



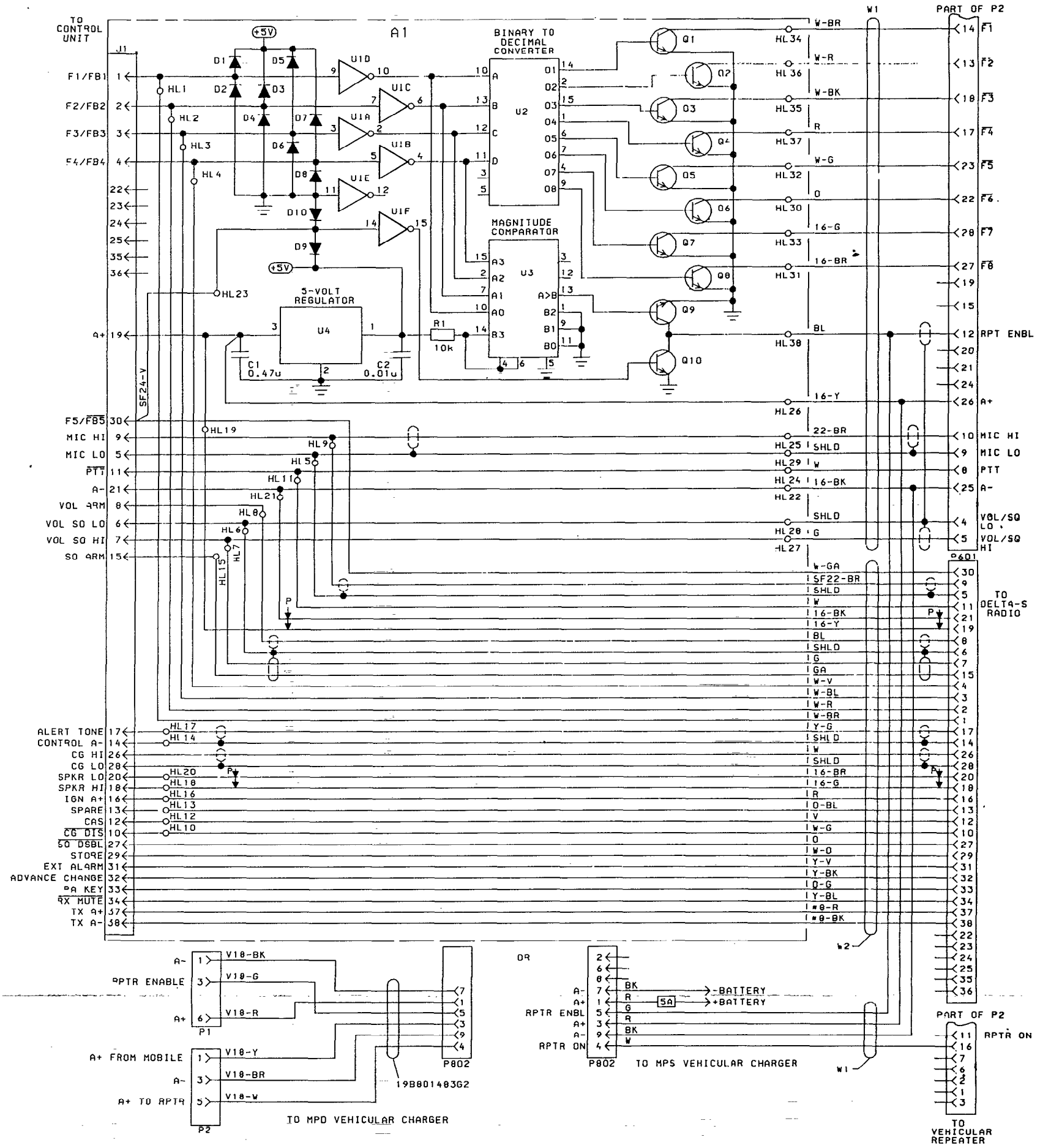
IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

OUTLINE DIAGRAM
DELTA-S/SX and RANGR
INTERFACE ADAPTER CABLE

SCHEMATIC DIAGRAM

DELTA-S/SX and RANGR
INTERFACE ADAPTER CABLE



POWER & GND CONNECTIONS

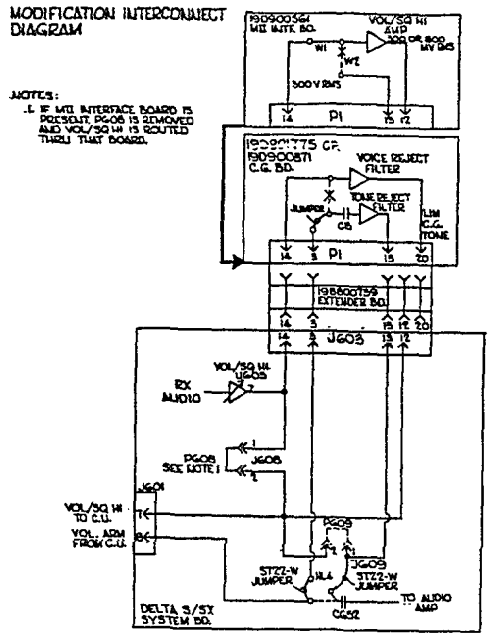
DEVICE	VDD +5V PIN NO.	GND PIN NO.
U1	1	8
U2	16	8
U3	16	8

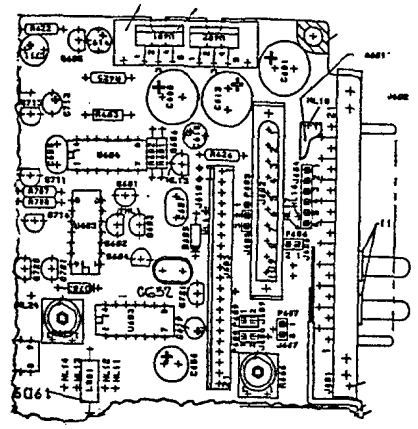
ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED.
RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER k OR M.
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER µ,n OR p.
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR µ.

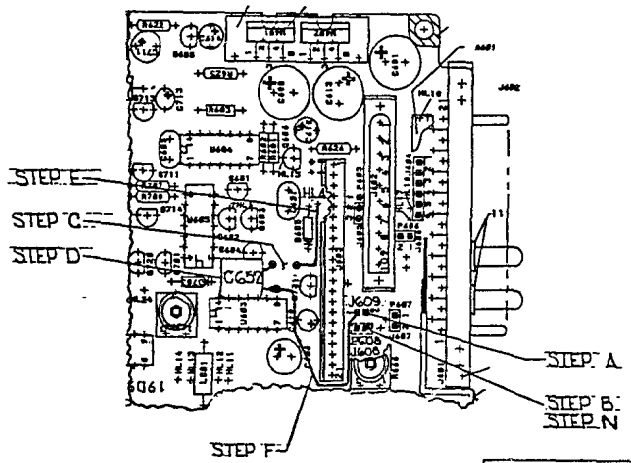
MODEL NO.	REV. LETTER
19C851179	

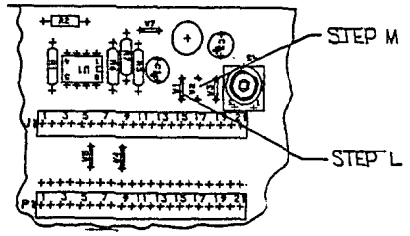
LBI31154

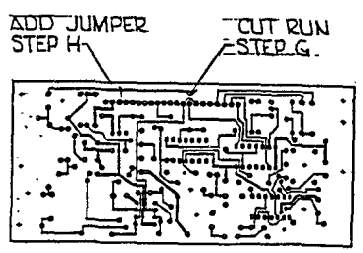
(19D901611, Sh. 1, Rev. 2)

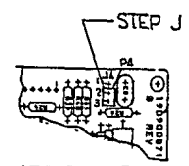


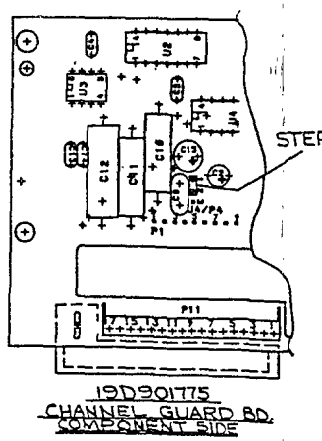












(19D901611, Sh. 1, Rev. 2)

DELTA S/SX MOBILE

1

MODIFICATION INSTRUCTION

DESCRIPTION

THIS MODIFICATION INSTRUCTION IS FOR THE DELTA S/SX RADIO WITH CHANNEL GUARD (19D900871 BD. OR 19D901775 BD) WHEN USED WITH THE VEHICULAR REPEATER HAVING CHANNEL GUARD DECODER OPTION 2703. THIS MODIFICATION MOVES THE CHANNEL GUARD TONE REJECT FILTER NORMALLY IN VOL/SQ HI TO VOL ADM TO PROVIDE PROPER TONE INPUT LEVEL TO OPTION 2703.

MODIFICATION - USING MOD KIT 19A705786T

REMOVE RADIO TOP AND BOTTOM COVERS.
REMOVE CHANNEL GUARD BOARD (AND MII INTERFACE BOARD IF PRESENT).
REASSEMBLE AFTER MODIFICATION COMPLETE.

ON RADIO SYSTEM BOARD:

A. CHECK THAT P609 IS REMOVED
B. CHECK THAT P608 IS IN PLACE (SEE MII INTERFACE BOARD MOD BELOW)
C. REMOVE C652
D. REPLACE C652 WITH 19A702250P113 (SUPPLIED IN MOD KIT) (SOLDERING ONLY ONE LEAD TO BOARD) AS SHOWN
E. ADD JUMPER FROM HOLE WHERE C652 WAS TO HL4
F. ADD JUMPER FROM C652 HANGING LEAD TO J609-1

ON CHANNEL GUARD BOARD 19D900871:

REVISION "A" OR EARLIER BOARDS (PRE APRIL/1985)

G. CUT PATTERN BETWEEN P1-14 AND C8
H. ADD JUMPER BETWEEN P1-3 AND C8

REVISION "B" OR LATER BOARDS WITH JA/P4

J. MOVE P4 FROM JA-1 & 2 TO JA-2 & 3

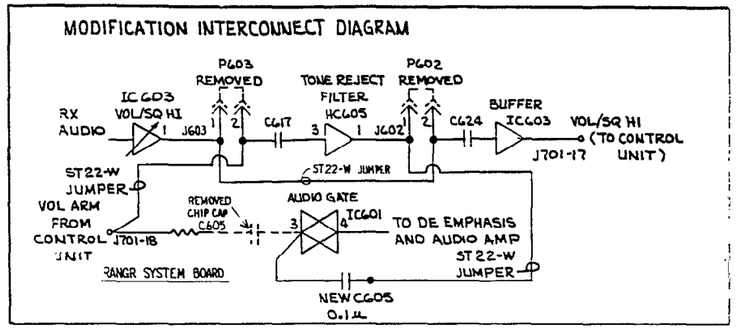
ON CHANNEL GUARD BOARD 19D901775:

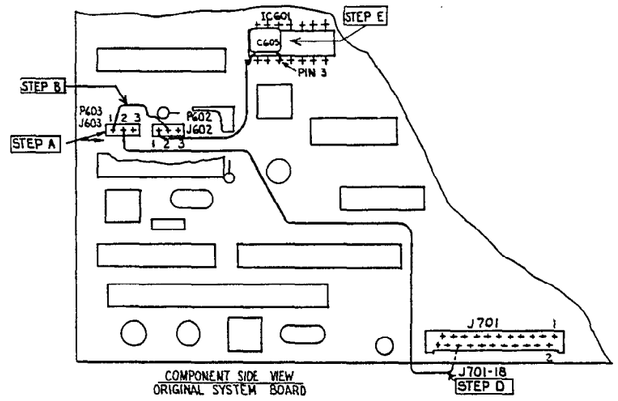
K. MOVE P4 FROM JA-1 & 2 TO JA-2 & 3

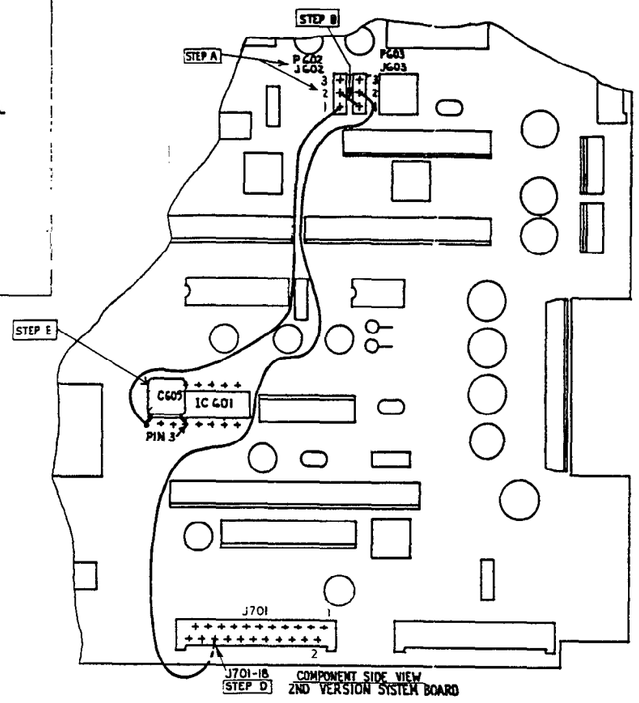
IF MII INTERFACE BOARD 19D900561 IS PRESENT:

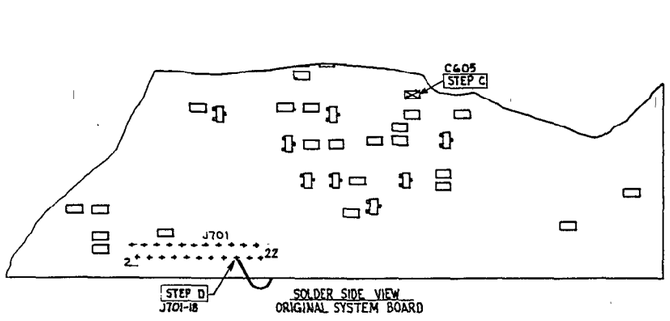
L. CHECK THAT W1 IS PRESENT
M. CHECK THAT W2 IS REMOVED
N. REMOVE P608 ON SYSTEM BOARD

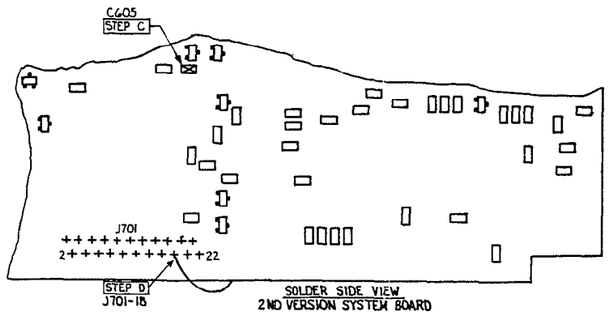
SEE SHEET 2 OF THIS DRAWING FOR RANGE MODIFICATION.











(19D901611, Sh. 2, Rev. 0)

(2) **RANGR MOBILE**

MODELS COVERED:
19C852050
19C852150
19C852450
19C852800

MODIFICATION INSTRUCTION

DESCRIPTION

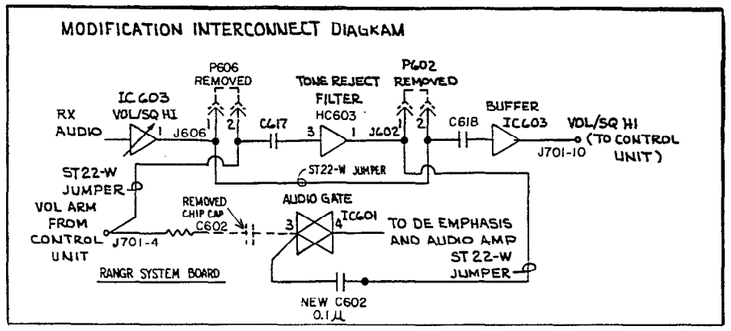
THIS MODIFICATION INSTRUCTION IS FOR RANGR RADIO WITH CHANNEL GUARD WHEN USED WITH THE VEHICULAR REPEATER HAVING CHANNEL GUARD DECODER OPTION 2703.

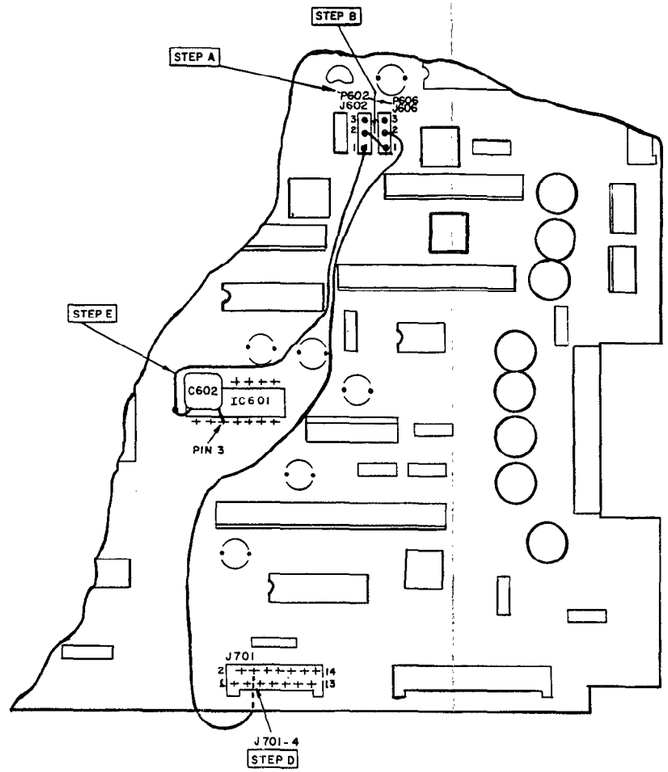
MODIFICATION - USING MOD KIT 19A70457861

REMOVE RADIO TOP COVER.
REMOVE RADIO SYSTEM BOARD.
REASSEMBLE AFTER MODIFICATION IS COMPLETE.

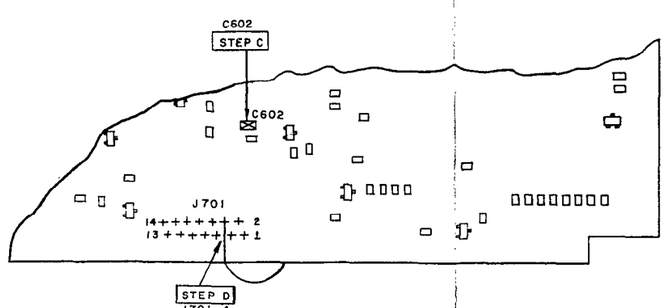
ON RADIO SYSTEM BOARD:

A. REMOVE P602 AND P603.
B. ADD JUMPER FROM J602-2 TO J603-1.
C. REMOVE CHIP CAPACITOR C605.
D. ADD JUMPER FROM J701-18 TO J603-2.
E. SOLDER ONE SIDE OF C605 (19A702250P113 SUPPLIED IN KIT) TO IC601-PIN 3. ADD JUMPER FROM J602-1 TO OTHER SIDE OF C605. STAKE C605 BODY TO IC601.





COMPONENT SIDE VIEW



SOLDER SIDE VIEW

(19D901611, Sh. 3, Rev. 0)

③

RANGR MOBILE - 89

MODELS COVERED:
19C852051
19C852151
19C852451
19C852801

MODIFICATION INSTRUCTION

DESCRIPTION

THIS MODIFICATION INSTRUCTION IS FOR RANGR RADIO WITH CHANNEL GUARD WHEN USED WITH THE VEHICULAR REPEATER HAVING CHANNEL GUARD DECODER OPTION 2703.

MODIFICATION - USING MOD KIT 19A704578G1

REMOVE RADIO TOP COVER.
REMOVE RADIO SYSTEM BOARD.
REASSEMBLE AFTER MODIFICATION IS COMPLETE.

ON RADIO SYSTEM BOARD:

A. REMOVE P602 AND P606.
B. ADD JUMPER FROM J602-2 TO J606-1.
C. REMOVE CHIP CAPACITOR C602.
D. ADD JUMPER FROM J701-4 TO J606-2.
E. SOLDER ONE SIDE OF C602 (19A702250P113 SUPPLIED IN KIT) TO IC601-PIN 3. ADD JUMPER FROM J602-1 TO OTHER SIDE OF C602. STAKE C602 BODY TO IC601.

PARTS LIST

FRONT CAP ASSEMBLY
19D423302G1
ISSUE 3

SYMBOL	GE PART NO.	DESCRIPTION
	19D423283P1	Front cap.
	19D423284P1	Handle.
	5491682P21	Lock barrel: sim to Yale & Towne Cylinder 9899.
	19A130614G1	Latch. (Used with 5491682P21 lock cylinder).
	19A134222P1	Washer, spring tension. (Used with secures lock cylinder).
	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).
	5491682P20	Rim lock, plug: sim to Yale & Towne plug 9899.

PARTS LIST

VEHICULAR REPEATER/MASTR II INTERFACE CABLE
19D423424G25
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1		Connector. Includes:
	19B227771G2	Shell.
	19A701254P1	Contact, electrical: sim to Malco 009-0191-002. (Quantity 38).
	4029840P5	Contact, electrical: sim to Malco 12021-7. (Mates with J1 contacts 19A116669P1).
	19B800557P1	Contact. (Located on the No. 8 red and black wires).
	19A701658P1	Solderless terminal. (Mates with 19B800557P1 contacts on red & black wires).
	19A701289P1	Retaining ring: 3/16 inches; sim to National Lockwasher WA 510. (Located at J1-39 & J1-40).
	19C328578P1	Cover half. (Side with 19A121175P31 insulator).
	19A137747G1	Cover half. (Side without insulator).
	19A121175P31	Insulator. (Located inside of J1 Cover).
	19B232847P1	Cable clip.
	19B201074P304	Tap screw, Phillips POZIDRIVE: 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. (Secures side).
	19C311411G1	Thumbscrew. (Secures P2).
	N36P9020C6	Machine screw, slotted head: No. 4-40 x 1-1/4. (Secures P2 cover halves).
	N210P9C6	Hex nut, steel: 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.
	19A701376P1	Contact, electrical rated @ 4 amps; sim to AMP 350657-1. (Quantity 34).
	19A701376P2	Contact, electrical rated @ 4 amps; sim to AMP 350656-1. (Quantity 4).
	19A701376P3	Contact, electrical rated @ 35 amps; 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).
	7139880P15	Cable: approx 2 feet long. (J1 to P901).
	19A701460P2	Cable: approx 2 feet long. (J1 to P901).
	19A701460P10	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 EXECTUIVE II
INTERFACE CABLE
19C321890G8
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1		Connector. Includes:
	19C303775P1	Plug: 28 terminals.
	19B227818P2	Cover.
		- - - - - - - - - - - - PLUGS - - - - - - - - - - - -
P2		Connector. Includes:
	19C311409P1	Receptacle: 28 contacts.
	19B226473G1	Cover.
	19C311411G1	Thumbscrew.
	N210P9C6	Hex nut, steel: No. 4-40. (Secures cover to connector).
	N36P9020C6	Machine screw, slotted head: No. 4-40 x 1-1/4. (Secures cover to connector).
P802		Connector. Includes:
	19B209288P4	Shell.
	19B209288P2	Contact, electrical: sim to Molex 02-09-2101. (P802-3 thru P802-5, P802-9).
P901		Connector. Includes:
	19C311409P1	Connector, receptacle: 28 contacts.
	19B226473G1	Cover.
	19C311411G1	Thumbscrew.
	N210P9C6	Hex nut, steel: No. 4-40. (Secures cover to connector).
	N36P9020C6	Machine screw, slotted head: No. 4-40 x 1-1/4. (Secures cover to connector).
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7139880P14	Cable: approx 3 feet. (Located betwen J1 & P901).
	7160478P3	Cable: approx 21 feet. (Located between P2 & P802).
	7139880P13	Cable: approx 7 feet. (Located J1 & P2).
	19B226198G4	Cable, fused.
	19A701658P1	Solderless terminal. (Located at J1-16, J1-17, J1-25, & J1-26).
	19A138442G1	Support. (J1).
	19B201074P304	Tap screw, Phillips POZIDRIVE: 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 P1 to J1 at J1).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

CHASSIS ASSEMBLY
19C321683G6
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
W1901		CABLE ASSEMBLY 19B227513G1
		- - - - - - - - - - - - PLUGS - - - - - - - - - - - -
P1		Connector. Includes:
	19A700067P1	Receptacle, coax; 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 KKC-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

PARTS LIST

VEHICULAR REPEATER ADAPTER CABLE
(DELTA 5)
19C851179G1
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
A1		VEHICULAR REPEATER ADAPTER 19D901138G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A701534P3	Tantalum: 0.47 uF ±20%, 35 VDCW.
C2	T644ACP310K	Polyester: .010 uF ±10%, 50 VDCW.
		- - - - - - - - - - - DIODES - - - - - - - - - -
D1 thru D10	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
		- - - - - - - - - - - JACKS - - - - - - - - - -
J1	19C850591G3	Connector, system: 30 contacts.
		- - - - - - - - - - *TRANSISTORS* - - - - - - - - -
Q1 thru Q10	19A700023P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	H212CRP310C	Deposited carbon: 10K ohms ±5%, 1/4 w.
		- - - - - - - - *INTEGRATED CIRCUITS* - - - - - - -
U1	19A700176P1	Digital: HEX BUFFER/CONVERTER (INVERTING).
U2	19A700029P21	Digital: BCD-TO-DECIMAL DECODER.
U3	19A700029P230	Digital: BIT MAGNITUDE COMPARATOR.
U4	19J706031P1	Linear: POSITIVE VOLTAGE REGULATOR.
		- - - - - - - - - - - CABLES - - - - - - - - - -
W1		CONTROL CABLE 19C851172G1
P2		Connector. Includes:
	19C311409P1	Receptacle, phenolic: 28 contacts.
	19D413039P1	Cover. (Nut side).
	19D413039P2	Cover. (Screw side).
	19C311411G1	Thumbscrew.
	N36P902086	Machine screw, slotted head: No 4-40 x 1-1/4. (Secures covers).
	N210P986	Hexnut. (Secures covers)
P802		Connector. Includes:
	19B209288P4	Shell.
	19B209288P2	Contact, electrical: sim to Molex 02-09-2101. (Quantity of 4)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7139880P13	Cable: 18 conductor.
	7160478P3	Cable: approx 21 feet long.
	19B226198G4	Power Cable. (Includes fuse assembly).
W2		CABLE ASSEMBLY 19D901151G1
P601		Connector. Includes:
	19D900037P1	Shell.
	19D900015P1	Housing.
	19A701375P1	Contact, electricnl rated @ 4 amps; sim to AMP 350657-1. (P601-1 thru 17, 22 thru 36).
	19A701376P2	Contact, electrical rated @ 4 amps; sim to AMP 350656-1. (P601-18 thru 21).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
	19A701376P3	Contact, electrical rated @ 35 amps; sim to AMP 350655-1. (P601-37, 38).
	19B800513P1	Gasket.
	19C850508P1	Cover.
	7139880P16	Cable, special purpose: 34 conductors.
	19A701460P2	Cable, red; sim to GE SI-57528.
	19A701460P10	Cable, black.
	19B800557P1	Contact. (Hung in wiring - Quantity of 2).
	19A701658P1	Solderless terminal.
	19A701077P1	Clip.
	19A705055P1	Thumbscrew.
	19A701488P4	Retaining ring. (Located on thumbscrew).
	19A701312P6	Flatwasher: 1.7 - 1.85 ID.
	19A700034P4	Nut, hex: No. M3 x 0.5MM. (Secures cable clip).
	19A700031P425	Machine screw, No. M3-0.5 x 25. (Secures cable clip).
	19A700032P5	Lockwasher, internal tooth: No. 3MM. (Secures cable clip)
	19A701507P606	Screw, thd forming: M3.5-1.27 x 9.60. (Secures cover to shell).
	19A701507P608	Screw, thd. forming: No. 3.5-1.27 x 12.7. (Secures connector to shell).
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A703584G1	Can.
	19C851169P1	Cover.
	5490407P11	Rubber grommet: neoprene. (Used with W1).
	5490407P17	Rubber grommet: neoprene. (Used with W2).
	19J706152P1	Retaining strap. (Used with W1 and W2).
	19A701289P1	Retaining ring: 3/16 inches; sim to National Lockwasher WA 510. (Located on terminals of J1 - Quantity of 2).
	N193P120486	Tap screw, phillips head: 6-20 x 1/4. (Secures cover).
	19A702364P308	Machine screw, TORX Drive: No. M3-0.5 x 8.
	19C850706P1	Spacer. (Located between A1 and can).