MAINTENANCE MANUAL
POWER AMPLIFIER / DUPLEXER ASSEMBLY
19D902017G5
FOR TMX-8712

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DESCRIPTION

A 20 watt power amplifier and duplexer are housed in the Power Amplifier / Duplexer Assembly for the TMX-8712. The assembly is mounted on the bottom of the radio assembly. Refer to the Combination Manual for a mechanical layout and interconnection diagram.

The PA Board amplifies the 200 milliwatt output from the RF Board to a level of approximately 20 watts over the frequency ranges of 806-825 MHz and 851-870 MHz. There are no tuning adjustments on the board. The amplifier is housed in a cavity in the Amplifier / Duplexer Assembly.

The duplexer is used to separate the receiver and transmitter signal paths when connected to a common antenna. The antenna cable has a female TNC connector which is part of the duplexer assembly.

CIRCUIT ANALYSIS

POWER AMPLIFIER

PA Board 19C851739 consists of a 20 watt PA module. Also included on the board is a diode for reverse power protection and a directional coupler circuit for power control. J153 is used to apply the 200 milliwatt drive to the board and the DC power control voltage to the PA module's first stage. J152 is the 20 watt output from the amplifier. J154 jack is used to connect the directional coupler output to the power control input on the RF Board.

A+ power is supplied by feedthrough capacitor Z901 which connects to H151 on the PA Board. Diode D152 provides reverse polarity protection. If the A+ power polarity is accidentally reversed, this diode will conduct, causing the power cable's A+ fuse to blow, thereby removing power from the radio and preventing serious damage.

The power control circuit on the RF Board controls the supply voltage to the PA module's first stage. The voltage is sent to the module via the RF input cable. L152 provides the necessary isolation of the DC voltage from the 200mW RF drive.

The amplifier's output passes through a directional coupler consisting of printed lines W152 and W153 and associated components. The coupler provides a sample of transmitter power to D151 which produces a positive DC voltage proportional to the RF output power level. This DC voltage feeds the power control circuit on the RF Board through J154. The power control circuit adjusts the supply voltage to the PA module's first stage. See the RF Board Maintenance Manual for a description of the power control circuit.

DUPLEXER

The duplexer provides the needed isolation between the receiver RF input and the transmitter output to allow sharing a common antenna. The TX filter section minimizes transmitter noise at the receiver frequency. The RX section filters out the transmit signal to prevent receiver desensitization.

The frequency spacing between the receiver and transmitter is fixed at 45 MHz. The receive port passband is 850 to 870 MHz and the transmit port passband is 805 to 825 MHz. The minimum isolation from the RX to TX port is 52 dB, as well as from the TX to RX port. Maximum insertion loss from either the TX or RX port to the antenna port is 2.3 dB, but is typically 1.8 dB, with a maximum ripple of 0.8 dB across the 20 MHz passbands. Because of the insertion loss, the Power Amplifier power level will be typically 20 watts to produce 12 watts at the antenna port output. Exceeding these power levels will cause destructive internal heating of the duplexer and PA module.

SERVICE NOTES

To check the PA Board separately from the RF Board, RF drive must be AC coupled to the input jack (J153) with 12 Vdc fed to pin 2 of the module.

Pin 2 of PA module U151 should have an adjustable voltage of 0 to 12 volts. At maximum power, with Power Set adjustment R111 on the RF Board fully clockwise, pin 2 should be at 12 volts.

Check for 13.6 volts on pins 3 and 4 of the PA module. Ensure a good electrical ground exists between the module, board, and casting.

PA MODULE REPLACEMENT

To Remove PA Module U151

1. Remove the PA Board by first unplugging the coax cables from J152, J153, and J154. Remove the grounding clip from output jack J152.
2. Remove the retaining screw for feedthrough capacitor Z901. Unsolder and remove the capacitor from hole H151.
3. Unsolder and loosen the five leads on the PA module using either solder removal braid or a mechanical desoldering tool. These leads are fragile and can be bent very easily.
4. Remove the screws securing the board and module. The PA Board can now be removed.
5. Unsolder and remove the module grounding clips from the board. There are two pins in each clip holding the module in place.

To Install PA Module U151

1. Trim the new module leads to the same length as the old module.
2. Attach the grounding clips to the replacement module using two pins in each clip.
3. Apply some thermal grease to the metal side of the module.
4. Replace the board in the casting, installing all screws in the board and module. Only snugly assemble both module screws at first and then tighten to 5 in-lbs.
5. Solder the five module leads and the grounding clips.
6. Replace the mounting screw for feedthrough capacitor Z901 and solder to H151.
7. Plug the three coax cables into J152, J153, and J154. Install the grounding clip on output jack J152. Ensure that the clip slides down on the casting wall beside the PC Board and makes good contact with the jack.
8. Replace the PA cover shield.

GE Mobile Communications

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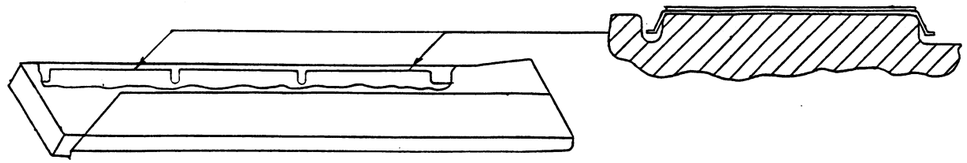
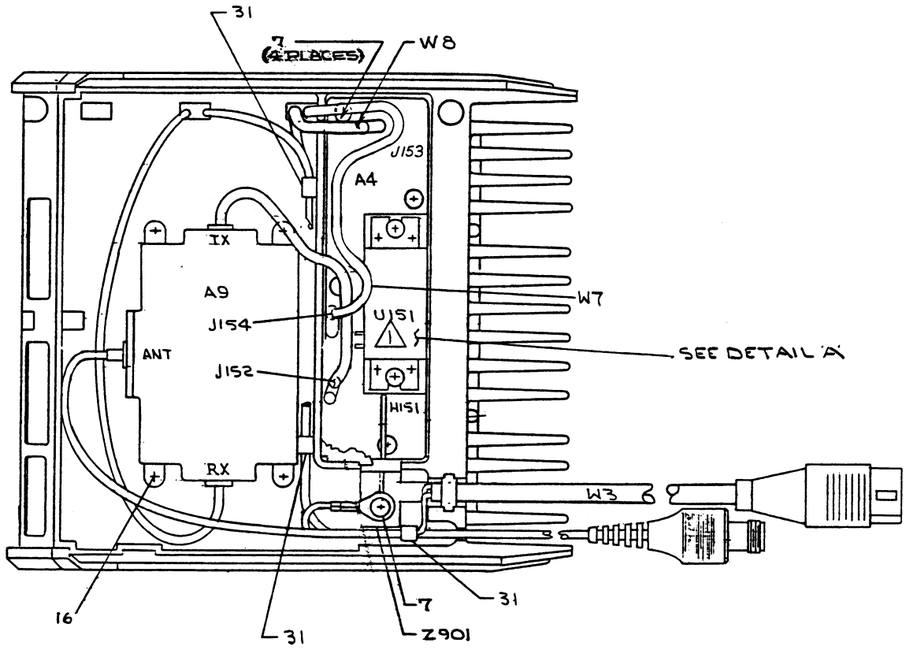
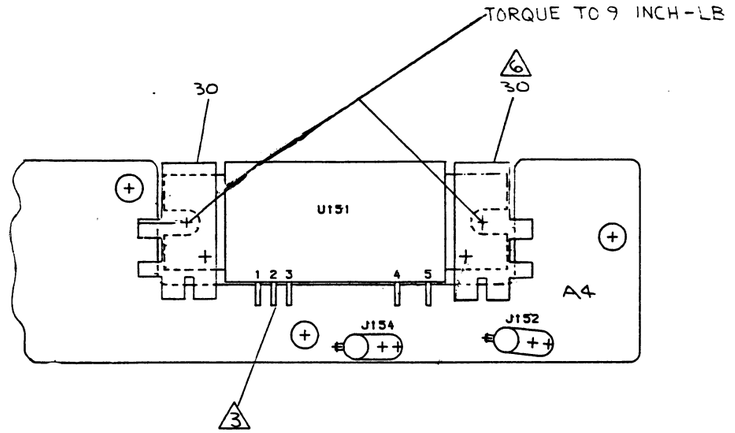






DETAIL A

(23)

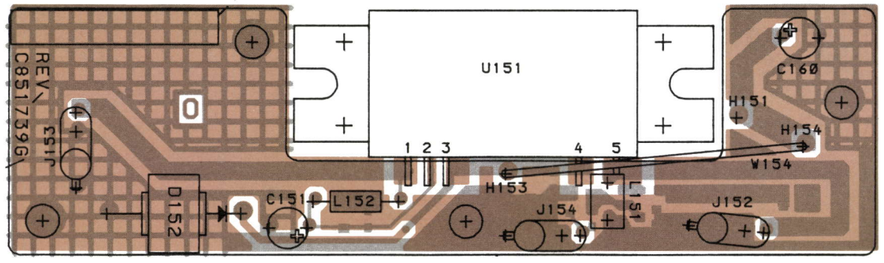
NOTES:

1. APPLY SILICON GREASE PER 19A701431 TO U151 ON PA BD. (A4). TO PREVENT EARLY LIFE FAILURE DUE TO EXCESSIVE HEAT, IT IS IMPORTANT THAT THE METAL PLATE OF U151 BE FIRMLY MOUNTED TO THE CASTING WITH NO BURRS OR OTHER DEFECT PREVENTING FIRM CONTACT.
2. DIP ENDS OF SCREW (ITEM 7 & 16) INTO GREASE BEFORE INSTALLING INTO CASTING. TORQUE TO 15 INCH-LB
3. SOLDER LEADS OF U151 TO A4 AFTER ASSEMBLY.
4. SOLDER ONE END OF Z901 TO A4 H151 AND OTHER END TO W3-ORANGE WIRE.
6. SOLDER ITEM 30 TO A4 AFTER ASSEMBLY. SOLDER SHALL BE AROUND PERIPHERY OF ITEM 30 WHERE IT COMES IN CONTACT WITH A4.
7. SPOT TIE ITEM 31 AT RANDOM LOCATIONS FOR BETTER WIRE DRESS.

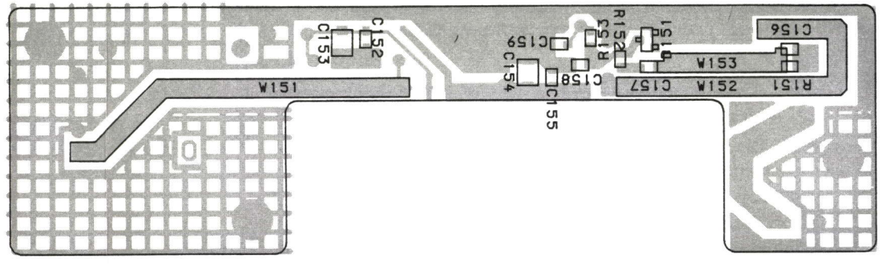
(19D902017, Sh. 2, Rev. 5)

RC-7150

COMPONENT SIDE

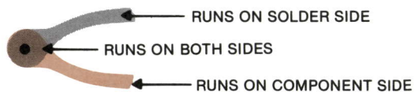


SOLDER SIDE



(19C851739, Rev. 0)
(19C851740, Sh. 1, Rev. 0)
(19C851740, Sh. 2, Rev. 0)

RC-7151



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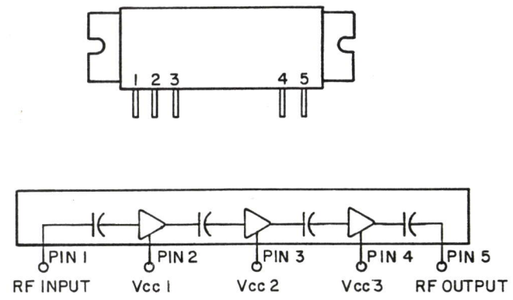
(19C851740, Sh. 2, Rev. 0)

RF AMPLIFIER

19A143904P2



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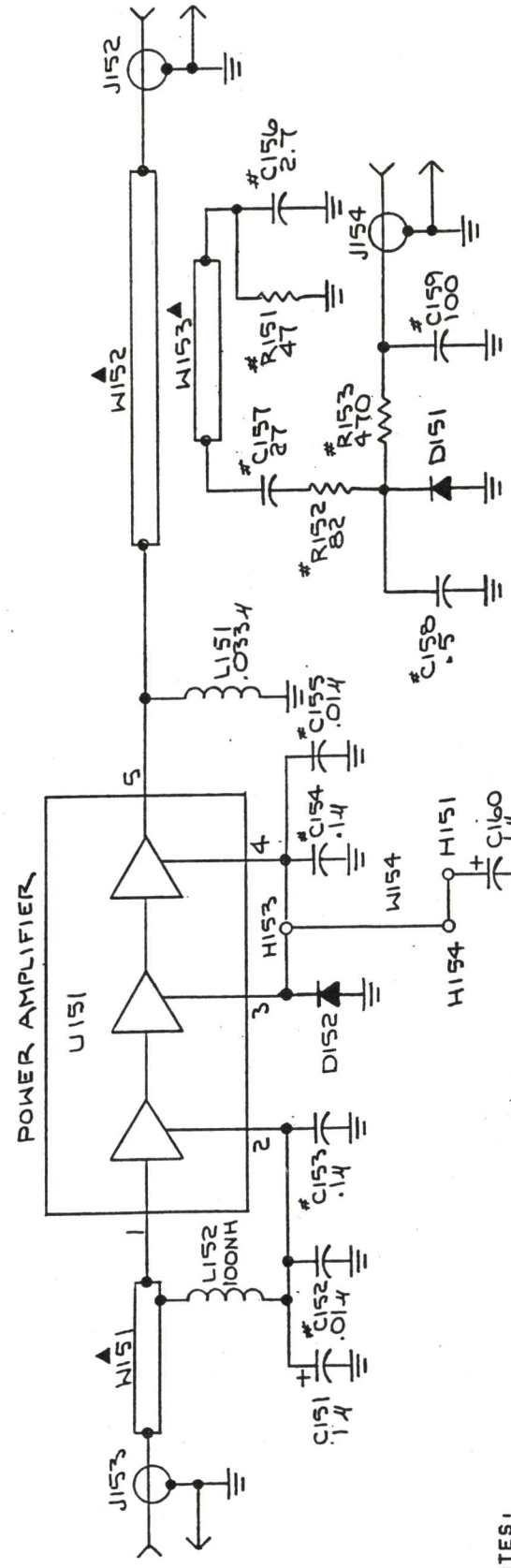

NOTES:
1. # INDICATES CHIP COMPONENT LOCATED ON SOLDER SIDE OF P.W.B.
2. Δ PART OF P.W.B.
3. ALL RESISTORS ARE .1 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K-1000 OHMS OR M-1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY u-MICROFARADS.INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH-MILLIHENRYS, NH-NANOHENRYS OR H-HENRYS.

MODEL NO.	REV LETTER
19C851739G1	

(19B801597, Rev. 0)

POWER AMPLIFIER BOARD

PA/DUPLEXER