

**MAINTENANCE MANUAL  
POWER AMPLIFIER BOARD  
19C851540G1 (136-153 MHz)  
19C851540G2 (150-174 MHz)  
FOR MVS**

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## DESCRIPTION

The Power Amplifier Board (A4) used in the MVS radio is housed in a cavity running parallel to the side of the radio main casting assembly. Refer to the combination manual for a complete mechanical layout of the radio.

The PA Board amplifies the driver output from the RF Board (approximately 10 watts) to a level of approximately 45 watts, over the frequency range of 136-153 MHz with (G1) and 150-174 MHz with (G2). There are no tuning adjustments on the board.

The board consists of a single stage RF power amplifier. Also included on the board is a diode for reverse power protection, as well as two multi-pin connectors used to distribute non amplifier related signals in the radio. Two small jacks are used to apply drive to, and take RF output from the amplifier. The range of VHF High Band frequencies (136-153 MHz) is covered by a G1 PA Board and (150-174 MHz) is covered by a G2 PA Board.

## CIRCUIT ANALYSIS

The driver output from the RF Board (10 watts, 50 ohms impedance) is matched to the base of Q151 by C151, C152, C153, C154, L151, and L152. Inductor L153 provides a bias return for class "C" operation. A network consisting of L158 and R151 enhances stability.

Once the driver is amplified to approximately 45 watts by Q151, it is matched back up to 50 ohms by C156, C157, C158, L155, and L156. C159 is a DC blocking capacitor, which keeps DC voltage from appearing at the amplifier output.

A+ is supplied to the collector of Q151 through a network consisting of L154, L157, R152, C155, C160, and C162. In addition to enhancing stability, these components also prevent RF from getting onto the A+ line.

The amplifier's output is fed back to the radio's RF Board where it passes through the antenna switch, low pass filter, and directional coupler before being applied to the antenna connector.

Diode D 151 provides reverse polarity protection for the radio. If power 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.

A+ is applied through 6 pin connector J903 by feedthrough capacitor assembly Z903. Other non-amplifier related signals are routed through the PA board for distribution to other boards in the radio. These include A+, switched A+, Relay, and volume/squelch HI. A wiring harness plugs into J151 for this purpose.

**SERVICE NOTES**

This amplifier can be easily checked without removing it from the radio. RF input (at J153) and output (at J152) impedances are 50 ohms.

Remove all power from the radio when servicing the PA Board. The radio's power switch does not remove A+ power from the board.

There are 8 chip mica capacitors on this PA Board. If any are removed, replace them with a new part since they are easily damaged. Apply them in the exact positions shown in the outline diagram. Failure to do this will have an adverse effect on amplifier gain, bandwidth, and efficiency.

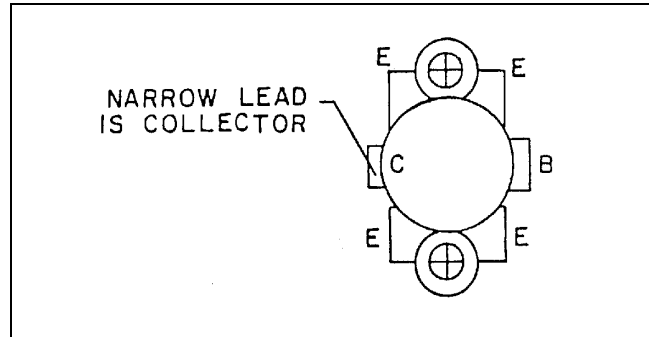
**PA TRANSISTOR REPLACEMENT**

1. Remove the two retaining screws securing PA transistor Q151 to the chassis assembly.
2. Unsolder the six leads of the transistor, and remove it from the printed board. Be careful not to damage the PWB, or capacitors C153 and C154.
3. Remove all excess solder from the board near Q151, and clean the board to allow the new transistor to be positioned properly. Refer to Figure 1 and trim the new transistor leads (if required) to the lead lengths of the removed transistor.
4. Apply silicon grease to back of the replacement transistor and place the transistor in the mounting cut out. Make sure that the base and collector leads are not reversed.

5. Replace the transistor mounting screws using a moderate torque of 0.5 Newton meter (4.5 inch-pounds).
6. Solder the 6 transistor leads to the printed board. Again, be careful not the damage C153 and C154.
7. Remove any flux left on the board.

**NOTE**

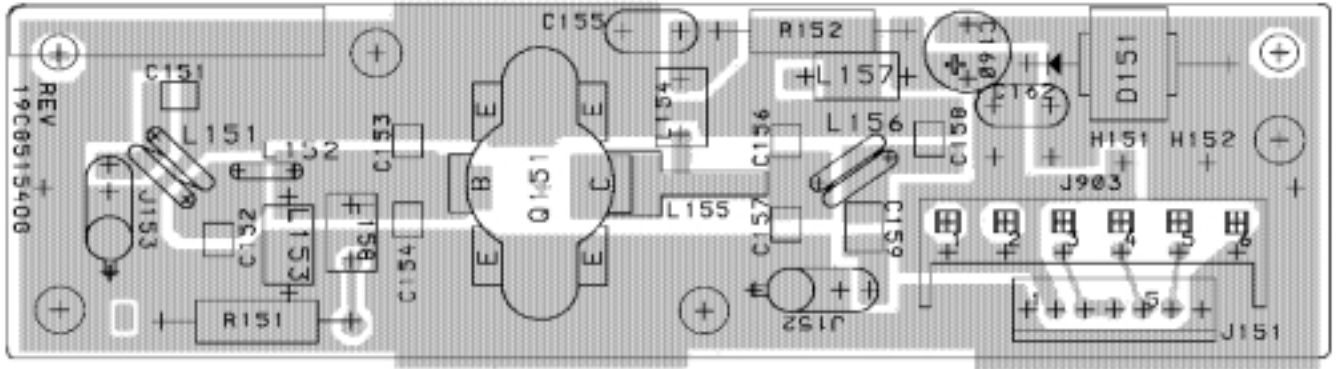
**The PA transistor contains Beryllium Oxide, a TOXIC substance. If the ceramic or other encapsulation is opened, crushed, broken or abraded, the escaping dust may be hazardous if inhaled. Use care when replacing the transistor.**



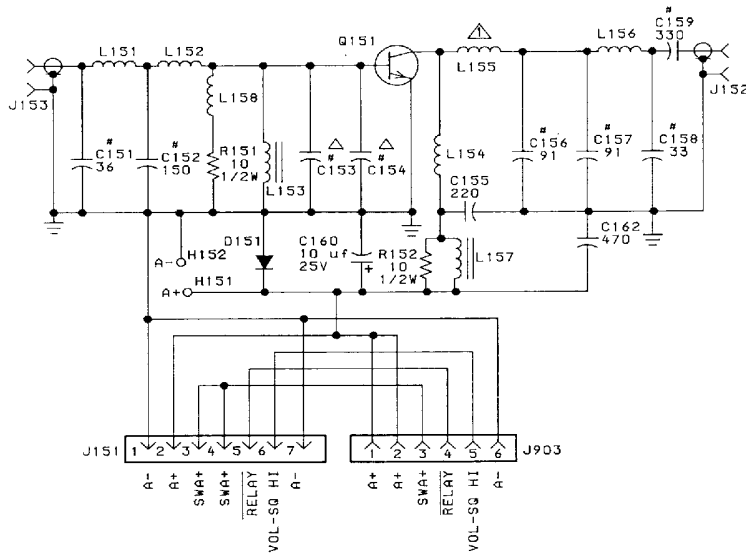
**Figure 1 - PA Transistor Lead Identification**

COMPONENT SIDE

P  
A  
B  
O  
A  
R  
D



(19C851540 Sh. 1 Rev.1)  
(19A705042 Sh. 1 Rev.0)



(19C336841, Rev. 2)

COMPONENT	136-153 MHZ SPLIT (G1)	150-174 MHZ SPLIT (G2)
C153	200	240
C154	200	240

MODEL NO.	REV. LETTER
19C851540G1	
19C851540G2	

NOTES:

1. PART OF PRINTED WIRE BOARD.
2. # INDICATES CHIP COMPONENT LOCATED ON COMPONENT SIDE OF BOARD.

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR M=1,000,000 OHMS. CAPACITOR VALUES IN PICO FARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF-MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH-MILLIHENRYS OR H-HENRYS.

PA BOARD  
19C851540G1&G2

## PARTS LIST

POWER AMPLIFIER BOARD  
 19C851540G1 (136-150 MHz)  
 19C851540G2 (150-174 MHz)  
 ISSUE 3

SYMBOL	PART NO.	DESCRIPTION
		----- CAPACITORS -----
C151	19A705108P26	Capacitor, Mica Chip: 36pF + or - 5%, 500 VDCW, temp coef 0 + 50 PPM.
C152	19A705108P80	Capacitor, Mica Chip: 150pF + or - 5%, 100 VDCW, temp coef 0 + 50 PPM.
C153	19A705108P95	Capacitor, Mica Chip: 200pF + or - 5%, 100 VDCW, temp coef 0 + 50 PPM. (Used in G1).
C153	19A705108P97	Capacitor, Mica Chip: 240pF + or - 5%, 100 VDCW, temp coef 0 + 50 PPM. (Used in G2).
C154	19A705108P95	Capacitor, Mica Chip: 200pF + or - 5%, 100 VDCW, temp coef 0 + 50 PPM. (Used in G1).
C154	19A705108P97	Capacitor, Mica Chip: 240pF + or - 5%, 100 VDCW, temp coef 0 + 50 PPM. (Used in G2).
C155	19A701602P9	Ceramic: 220 pF + or - 20%, 1000 VDCW; sim to Radio Materials Type JF DISCAPS.
C156 and C157	19A705108P36	Capacitor, Mica Chip: 91pF + or - 5%, 500 VDCW, temp coef 0 + 50 PPM.
C158	19A705108P25	Mica: 33 pF + or - 5%, 500 VDCW.
C159	19A705108P101	Capacitor, Mica Chip: 330pF + or - 5%, 100 VDCW, temp coef 0 + 50 PPM.
C160	19A703314P10	Electrolytic: 10 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C162	19A701602P13	Ceramic: 470 pF + or - 20%, 1000 VDCW; sim to Type JF Discap.
		----- DIODES -----
D151	19A700082P1	Rectifier, silicon; sim to MR751.
		----- JACKS -----
J151	19A700072P33	Printed wire: 7 contacts rated @ 2.5 amps; sim to Molex 22-27-2071.
J152 and J153	19B801342P1	Connector, RF.
J903	19A705245P1	Printed wire: 6 contacts, sim to Molex 10-02-1062.
		----- INDUCTORS -----
L151	19A703774P12	Coil.
L152	19A701420P5	Coil.
L153	19A701091G1	Coil.
L154	19B800891P2	Coil, RF Choke: sim to Paul Smith SK-890-1.
L155		Part of printed wire board 19C851538P1.
L156	19A703774P12	Coil.
L157	19A701091G1	Coil.
L158	19B800891P1	Coil, RF Choke: sim to Paul Smith SK-890-1.
		----- RESISTORS -----
R151 and R152	19A700113P15	Composition: 10 ohms + or - 5%, 1/2 w.
		----- TRANSISTORS -----
Q151	19A134340P4	Silicon, NPN, VHF Amplifier: 45 w.

\*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.