

Parts required for conversion to 6 Meters for the Transmitter PA PCB:

Parts for Midland 70-066

Capacitors.

		Jaycar
4.7pF	- 1 of	RC-5308
22 pF	- 2 of	RC-5316
27 pF	- 2 of	RC-5217
33 pF	- 1 of	RC-5218
39 pF	- 2 of	RC-5219
100 pF	- 1 of	RC-5324
1000 pF	- 1 of	RC-5336

Note: All capacitors are 50V Ceramic

Wire.

Approximately 200 mm of 0.63mm [22bs] enameled coated wire [Jaycar WW4018].

NOTES:

- 1: Use the proper power meter to measure the output power. For example, if you use a 140 to 525Mhz power/SWR meter – you will get false readings. Such as 6 watts instead of 25 watts.
- 2: The voltage applied to the PA stage will determine your output power. Eg

25 Watts with 12.0 Volts

38 Watts with 13.8 Volts

- 3: It has been noticed that some converters have accidentally removed a, or some Surface Mounted Components while de-soldering coils etc from Printed Circuit Boards.

This has resulted in circuits not tuning correctly or, especially the PA board self oscillating on another frequency other than the 6 meter band.

Especially look at the Surface Mounted capacitor across CV502. You will have to check with the Midland Service Manual.

Also remember to have capacitor legs as short as possible. When bending the capacitors over, make sure that the legs have not shorted onto the board.

- 4: At this point in time, it looks like the following amendment will be necessary for the capacitor across CV502:-

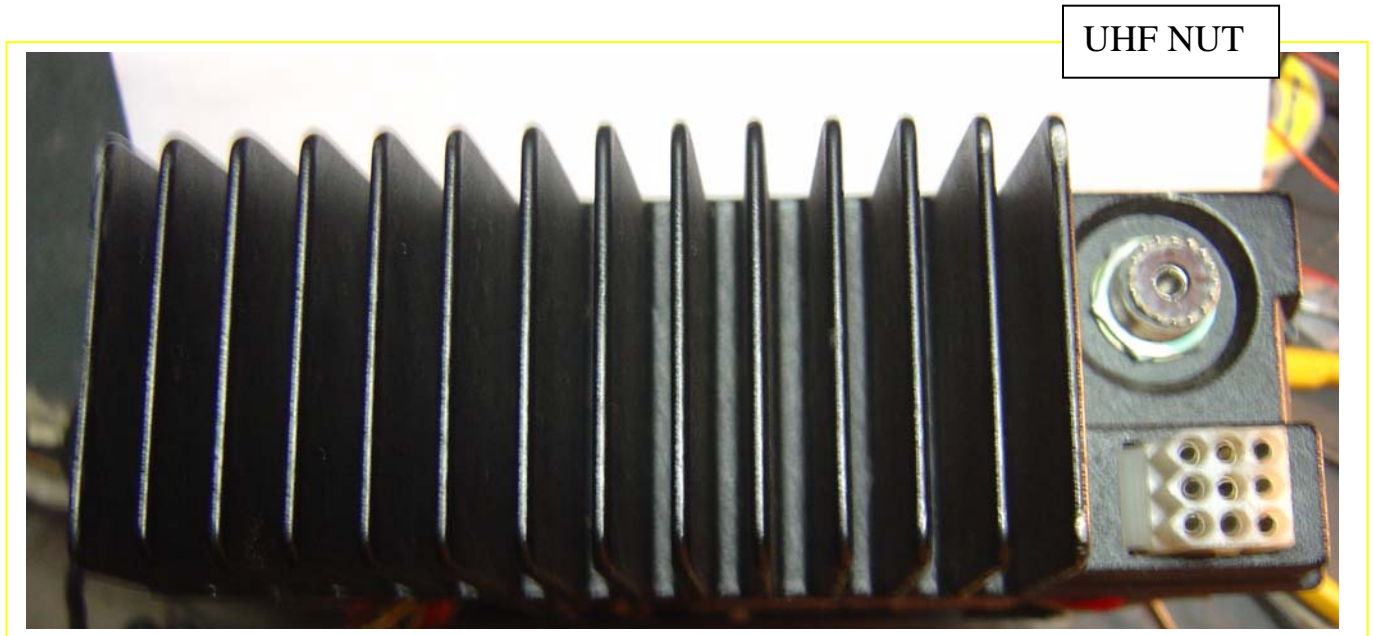
22pF for Midland 70-066A

33pF for Midland 70-066B

The Midland 70-066 Transmitter PA Board:

Before you remove the PA PCB board, unscrew the nut from the UHF RF socket at the rear of the Midland 70-066 transceiver.

REMOVE UHF NUT:



Midland 70-066 PA module above:

The Midland 70-066 Transmitter PA stage swings down by unscrewing the two screws on the side of the PA stage. Then remove the top PA cover, by unscrewing the two screws at the bottom of the cover.

The RT85 Transmitter PA PCB [**P**rinted **C**ircuit **B**oard] is fixed to the chassis; Remove the top cover from the PA PCB.

Unscrew the three screws from transistors Q503 & Q502. [Remember when placing PA PCB back into housing to use **temperature transfer compound** on bottom of transistors.]

Remove the 6 screws from the side of the PA PCB.

Remove the PA PCB from its enclosure.

Unsolder the 3 wires from the PCB → **T8V**, **+B** & **G**.

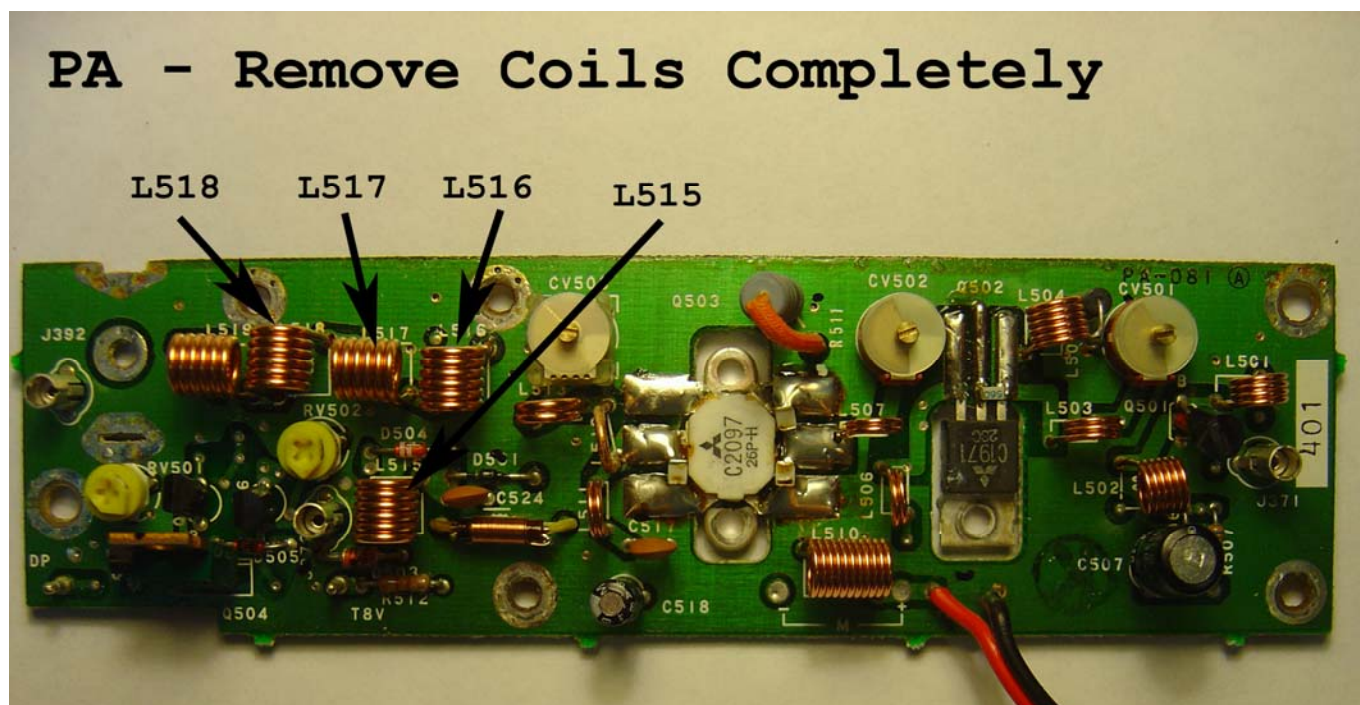
Mark the PCB with your call-sign by using your felt pen. Your PA PCB can now be freely un-soldered. Don't forget to unsolder the holes where the three wires were connected.

PA Coils – Midland 70-066B – Overview:

<u>Coil</u>	<u>Original</u>	<u>Action</u>	<u>New Replacement</u>	<u>Notes</u>
L114	4.5T	Remove	7.5T	0.5mm Enamel Wire Synthesizer Board
L501	3.5T	Remove	4.5T old L114	
L502	5.5T	Leave in		
L503	2.5T	Remove	3.5T old L501	
L504	5.5T	Leave in		
L506	1.5T	Leave in		
L507	1.5T	Remove	2.5T old L503	
L510	10.5T	Leave in		
L511	1.5T	Leave in		
L512	0.5T	Remove	1.5T old L513	
L513	1.5T	Remove	2.5T old L519 cut	1.25mm Enamel Wire
L515	5.5T	Remove	6.5T	0.63mm Enamel Wire
L516	5.5T	Remove	6.5T	0.63mm Enamel Wire
L517	5.5T	Remove	6.5T	0.63mm Enamel Wire
L518	5.5T	Remove	6.5T	0.63mm Enamel Wire
L519	5.5T	Remove	6.5T	0.63mm Enamel Wire

Note: T = Turns

You may de-solder all coils to be removed in one sitting [eg using a de-soldering station]. You may wind all new coils or use the old removed coils. If you intend to insert old coils, then, on de-soldering the coils, mark each old coil with marking pen and label [masking tape tag] attached to the old coil.



Remove **L515, L516, L517** and **L518**.

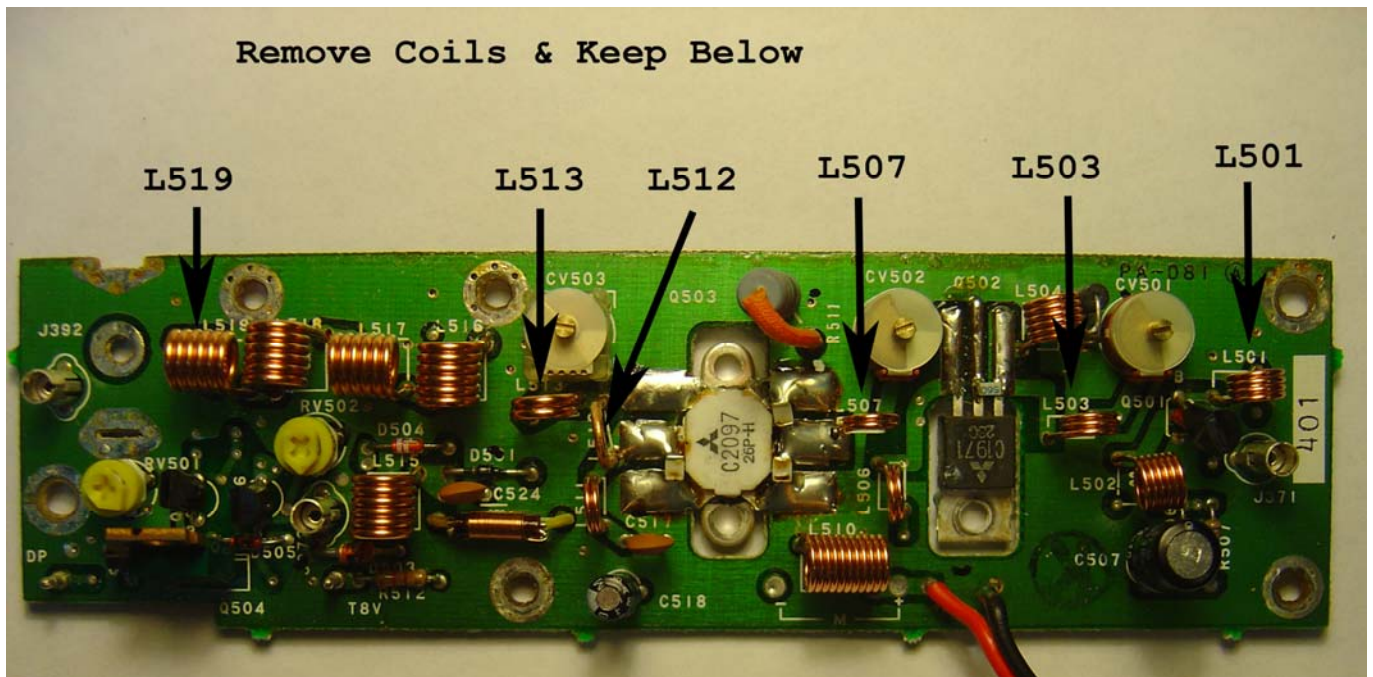
Since these coils will not be reused, use side-cutters to cut them in half and then remove the pieces by heating the joint from the underside and carefully removing the part coil from the top.

Remove **L519** and hold with tag. [To be used later on to replace L513.]

Cut 5 of pieces of 0.63mm [22bs] of enameled coated wire, 143mm long. Scrape off enamel at each end of wire for approximately 5mm. [NOTE: The new Jaycar wire, the enamel can be removed by heat. So instead of scraping wire, tin ends of wire with a soldering iron.] Wind onto a 5mm drill bit [the drill bit

should have the same size diameter of the coil retracted from L515 – 5mm]. Each piece of wire should wind for 6.5 turns [with long ends.]

Solder in five of new wound coils into **L515, L516, L517, L518** and **L519**.



Transmitter PA Modifications to 6 Meters:

Remove **L501** and keep; replace with original **L114** from the synthesizer board. [**4.5 Turns**]

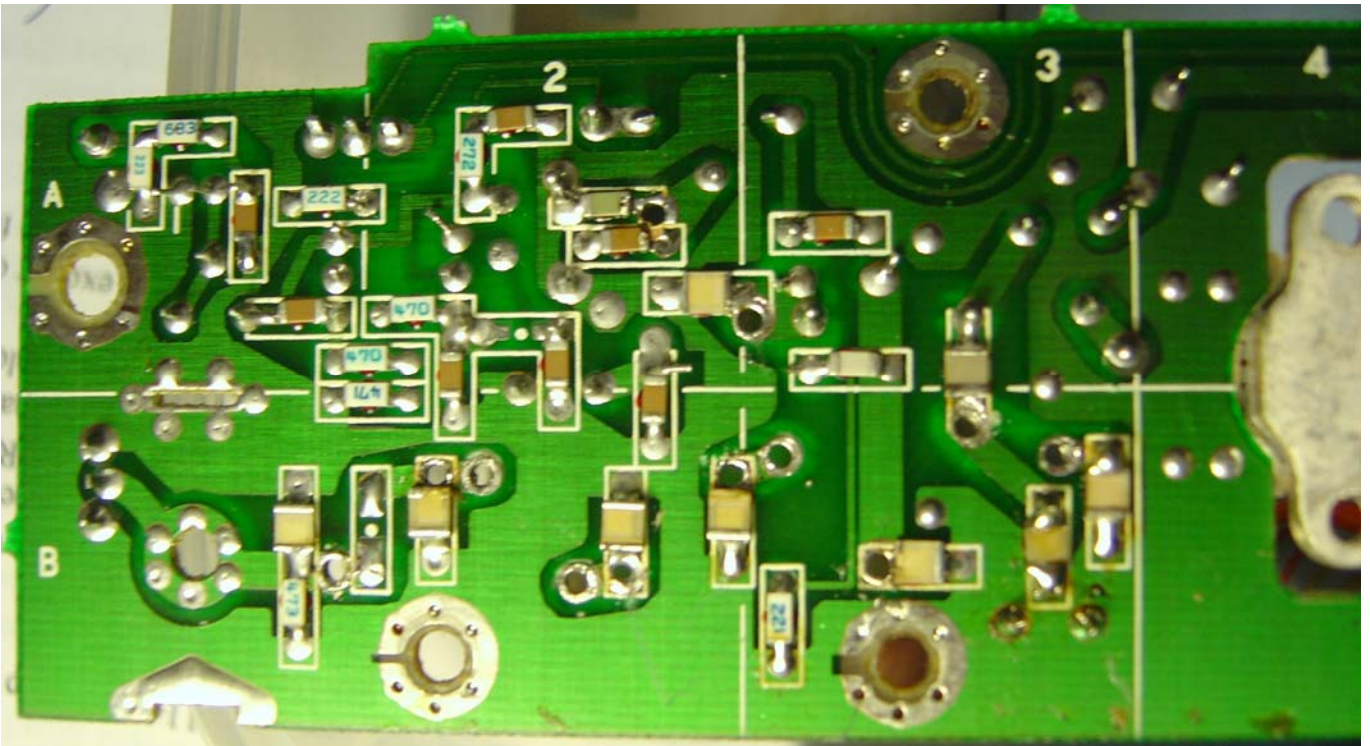
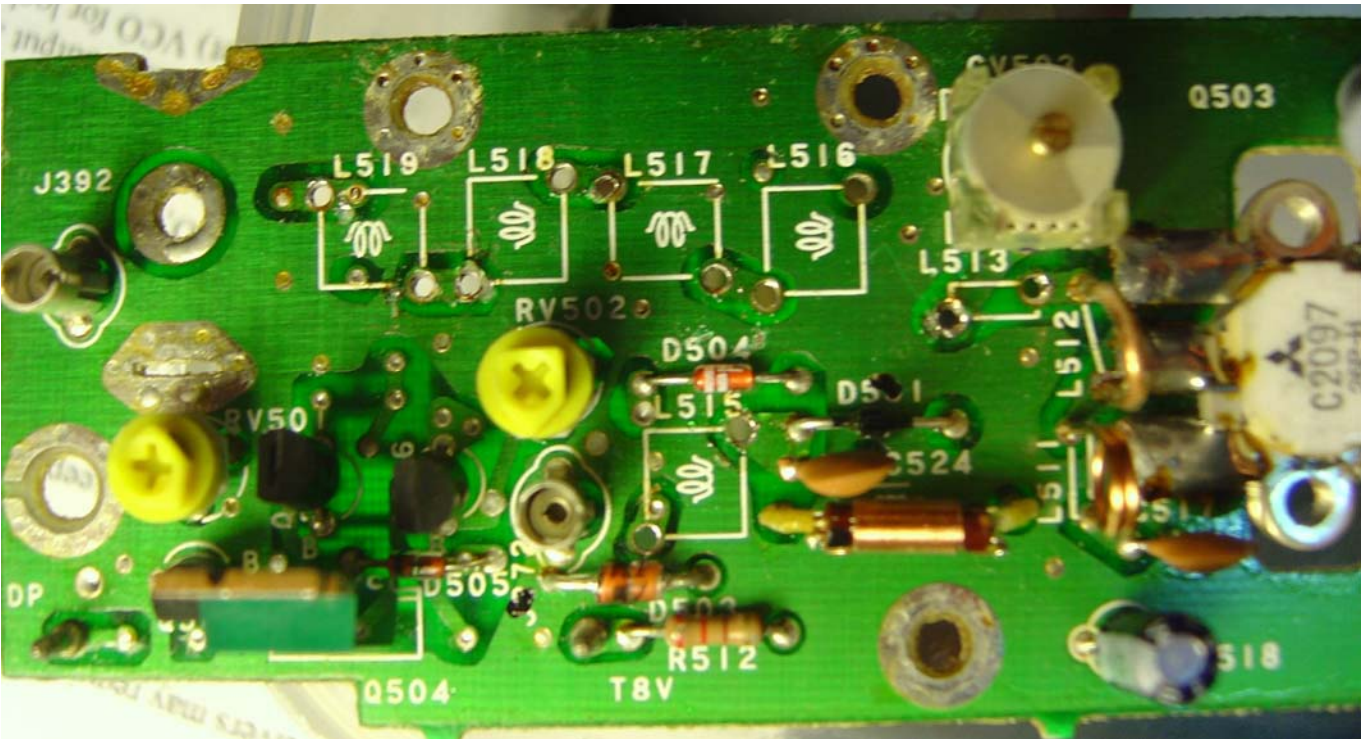
Remove **L503** and keep; replace with original **L501**. [**3.5 Turns**]

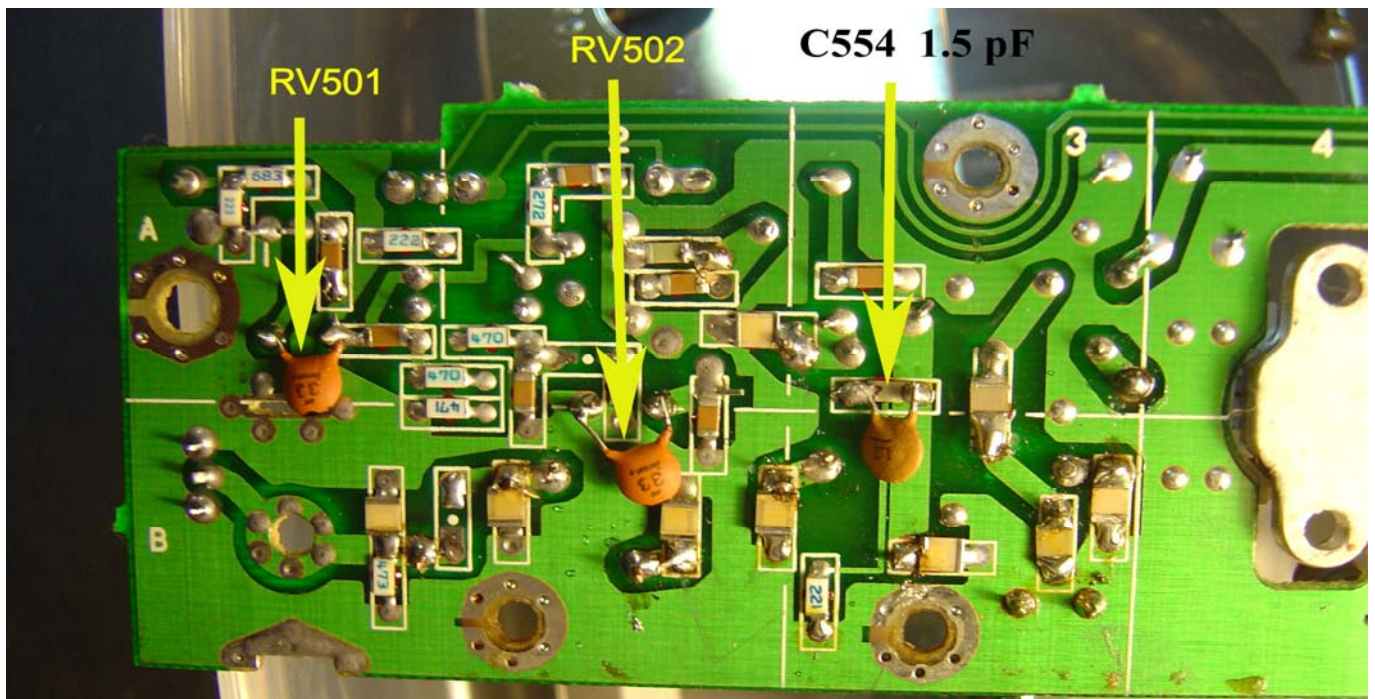
Remove **L507** then replace with original **L503**. [do not keep coil **L507** just removed] [**2.5 Turns**]

Remove **L519**. Cut back to 2.5 turns and keep coil to replace coil **L513**.

Remove **L513** and keep; replace with old cut back 2.5 turns of coil **L519**. [**2.5 Turns**]

Remove original **L512**; replace with original **L513**. [**1.5 Turns**]





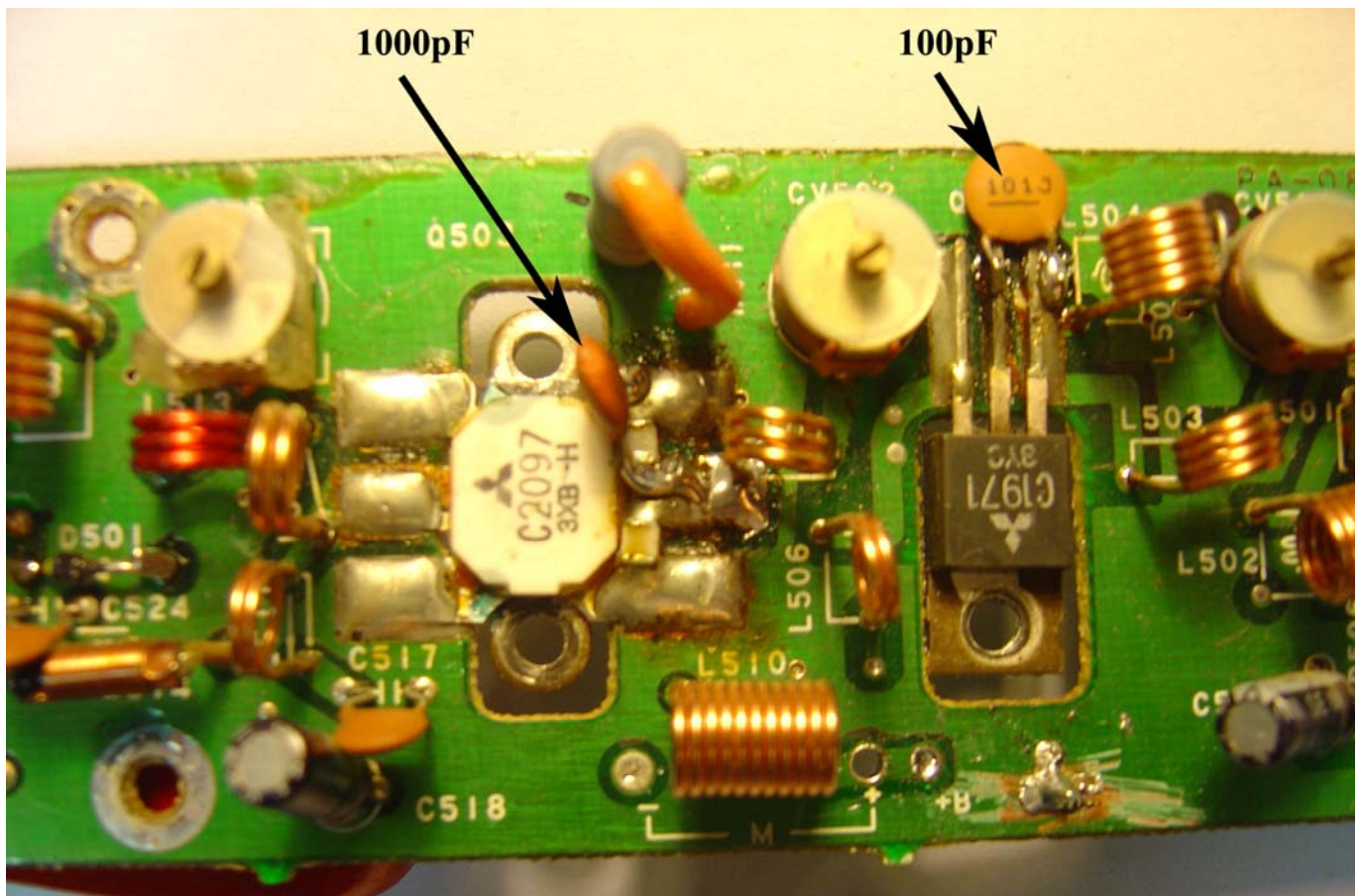
RT85 above:

Add **33pF** to bottom of **RV501** and **RV502** on the underside of the board for an **AWA RT85** As photo above.

Add **33pF** to bottom of **RV502** on the underside of the board for a Midland 70-066.

Add **1.5pF** to the RF sensor circuit (**C554**) on the underside of the board as per the photo. On the RT85 this capacitor is already fitted.

Midland 70-066 PA Modifications:



Large Caps – Midland 70-066 above:

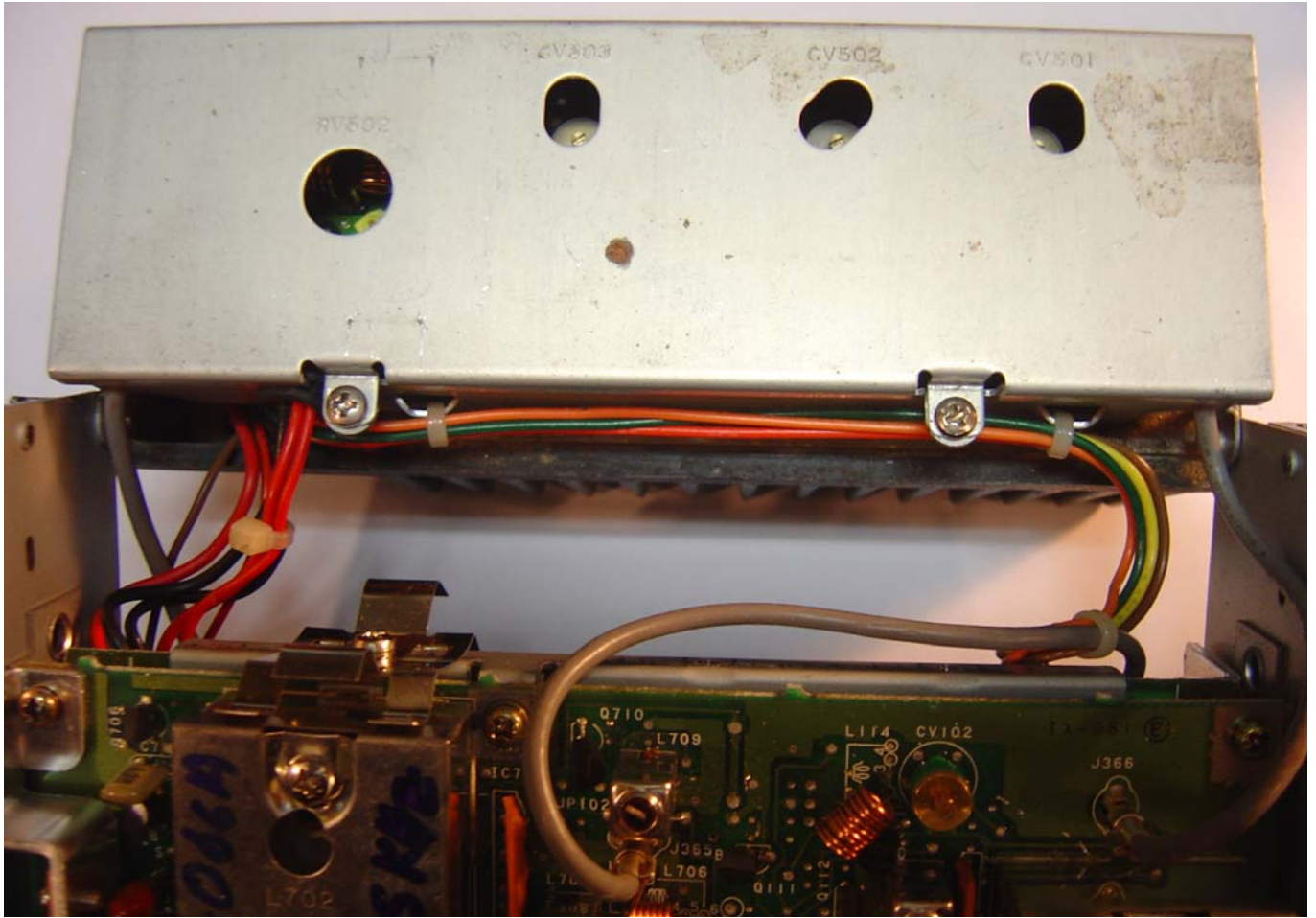
Add 100pF between B and E of Q502 on the component side of the board as per the photo.

Add 1000pF between B and E of Q503 on the component side of the board as per the photo.

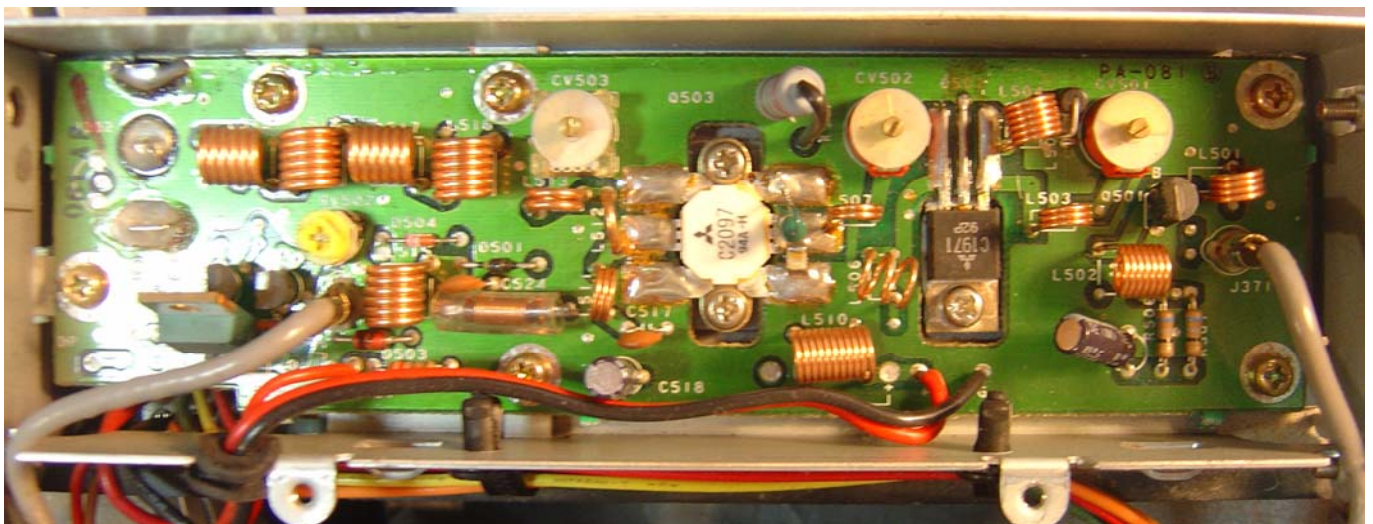
Adding the capacitors B-E on the driver and PA transistor is required to stabilize the amplifier. It is necessary to replace the coils in the LPF to get the second harmonic output of the transmitter down to an acceptable level.

Having made the modifications, reassemble the PA and apply power. Terminate the output in a good dummy load with a power meter – **not an antenna!** Set RV502 fully clockwise for maximum power out. Key the transmitter and adjust for maximum power starting from the output end and working back towards the synthesizer. Don't forget CV102 on the synthesizer board. After modification and tuning it is normally possible to get 50W out of the transmitter with no sign of instability, do not run it at this power for long – there is not enough heat sink on the PA. When you have maximum power out adjust RV502 for no more than 30 Watts out. If you wish to run 50 watts, then attach a 12 Volt fan to the rear heat sink. Allow the fan to blow across the rear fins.

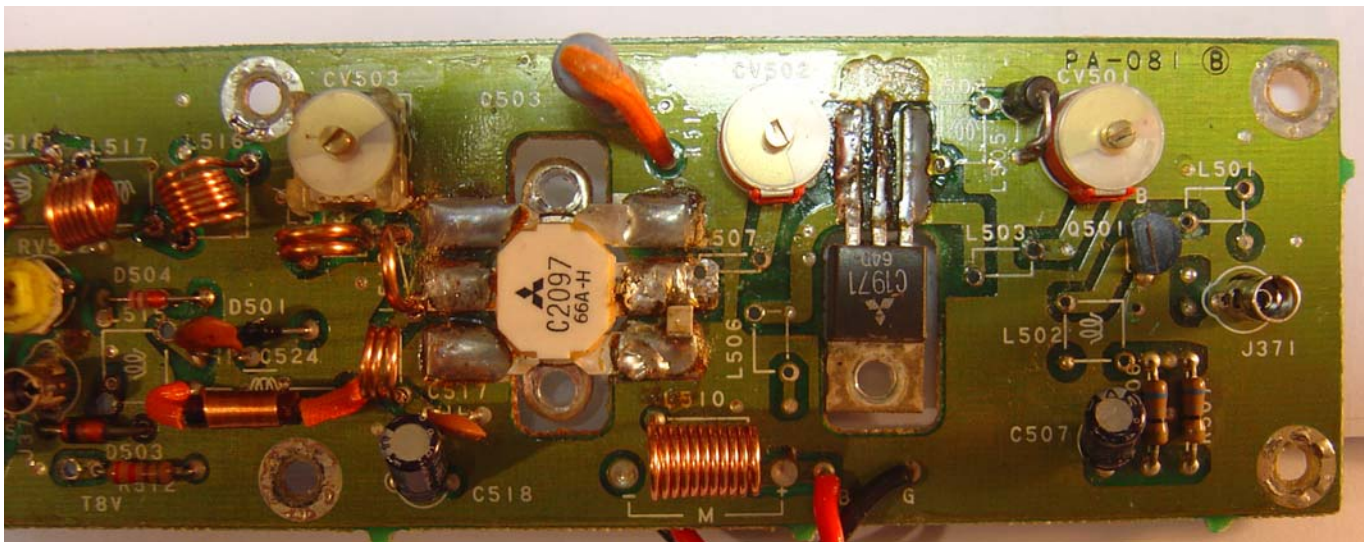
PA Modifications for Midland 70-066 Transceiver to 6 Meters:



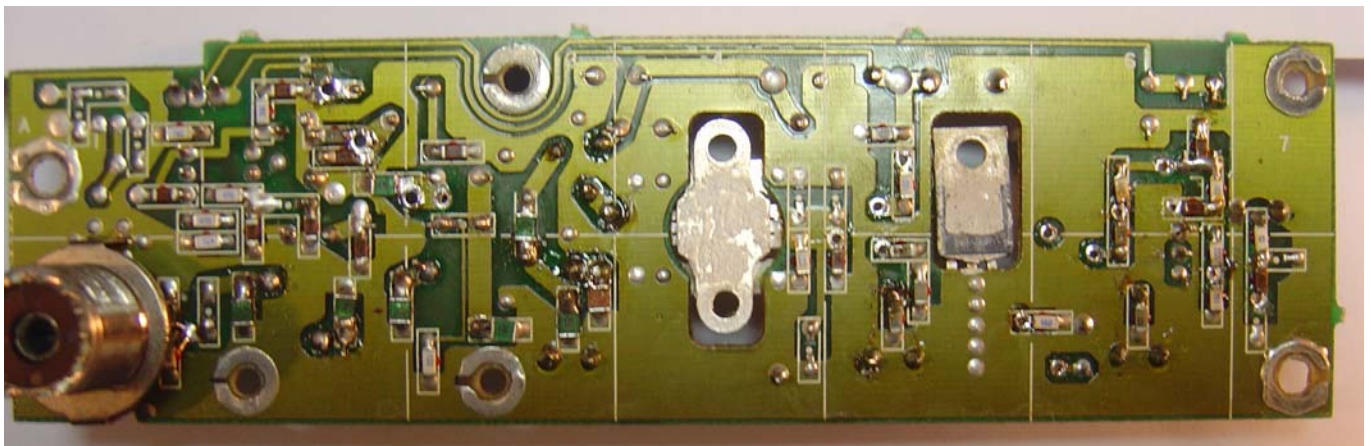
PA Swung Back. Midland 70-066A Top cover still on – Above:



PA Top View – Midland 70-066A Original Setup – Cover Removed - Above:



PA Top View – Midland 70-066A Driver Coils Removed – Above:



PA Bottom View – Midland 70-066A Coils Removed – Above:

Remove **L501** and keep; replace with original **L114** from the synthesizer board.

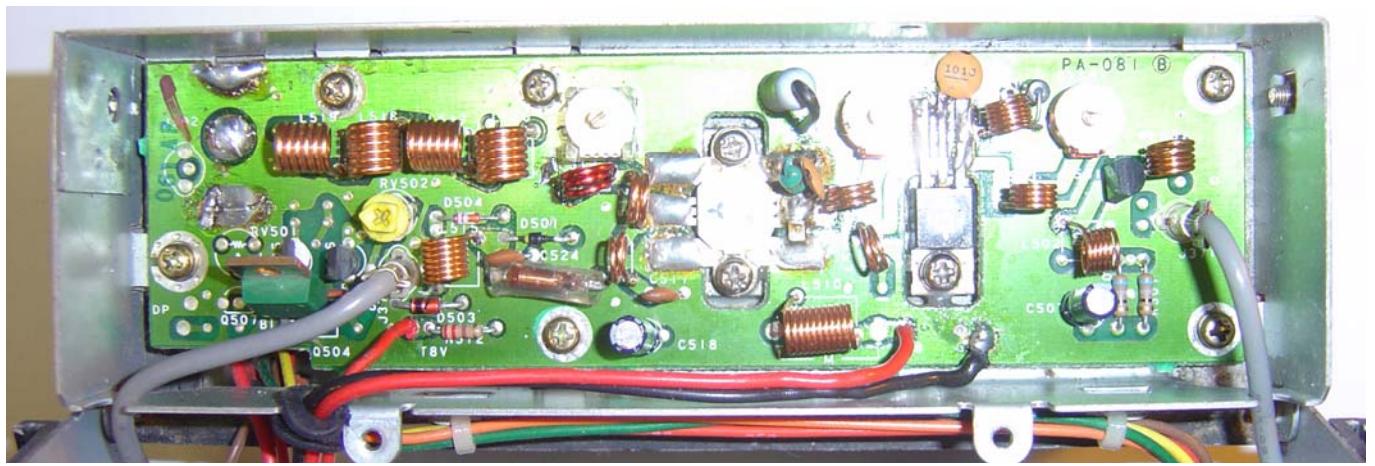
Remove **L503** and keep; replace with original **L501**.

Remove **L507**; replace with original **L503**. [do not keep coil **L507** just removed]

Remove **L519**. Cut back to 2.5 turns and keep coil to replace coil **L513**.

Remove **L513** and keep; replace with old cut back 2.5 turns of coil **L519**.

Remove original **L512**; replace with original **L513**.



PA Midland 70-066 New coils inserted:

Place 4.7pF across C511

Place 27 pF across C519

Place 22 pF across C522

Place 27 pF across C525

Place 33 pF across C526

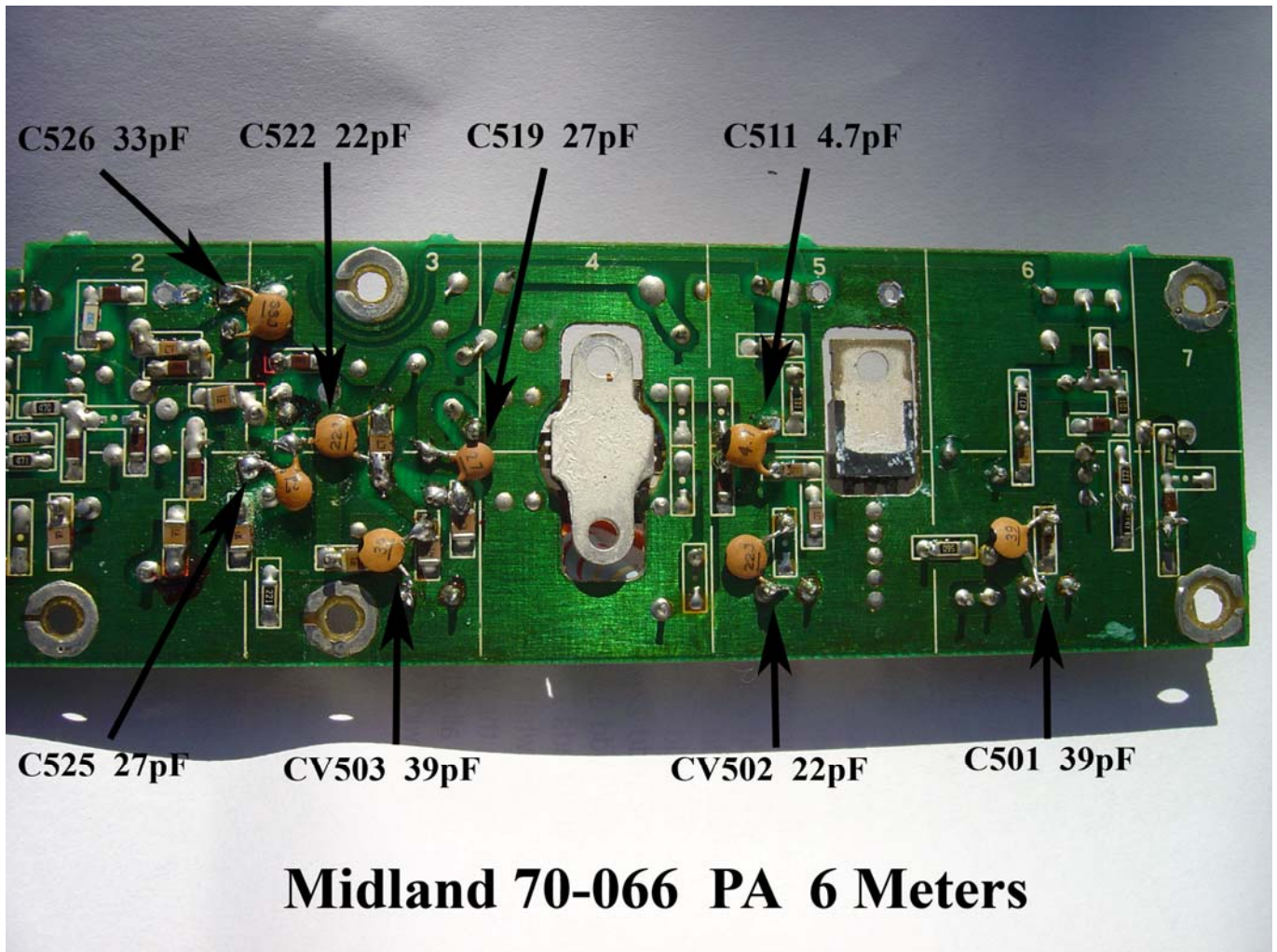
Place 100 pF across base & ground of Q502 [2SC1971]

Place 1000 pF across base & ground of Q503 [2SC2097]

Place 39 pF across CV501

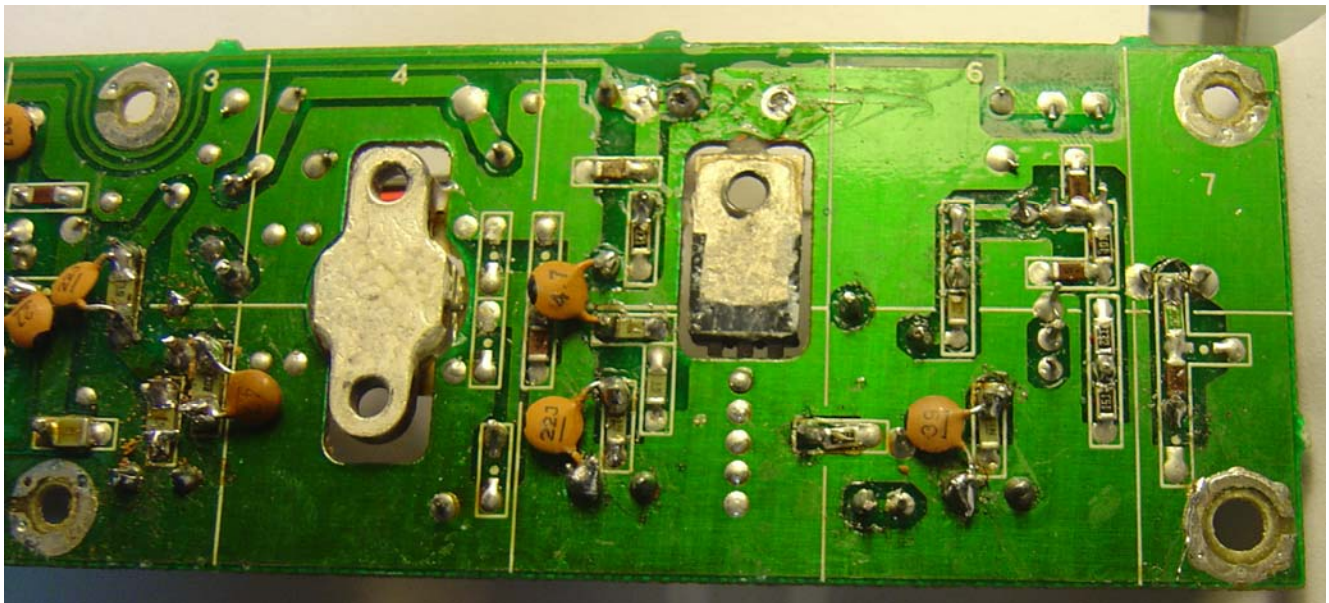
Place 22 pF across CV502

Place 39 pF across CV503

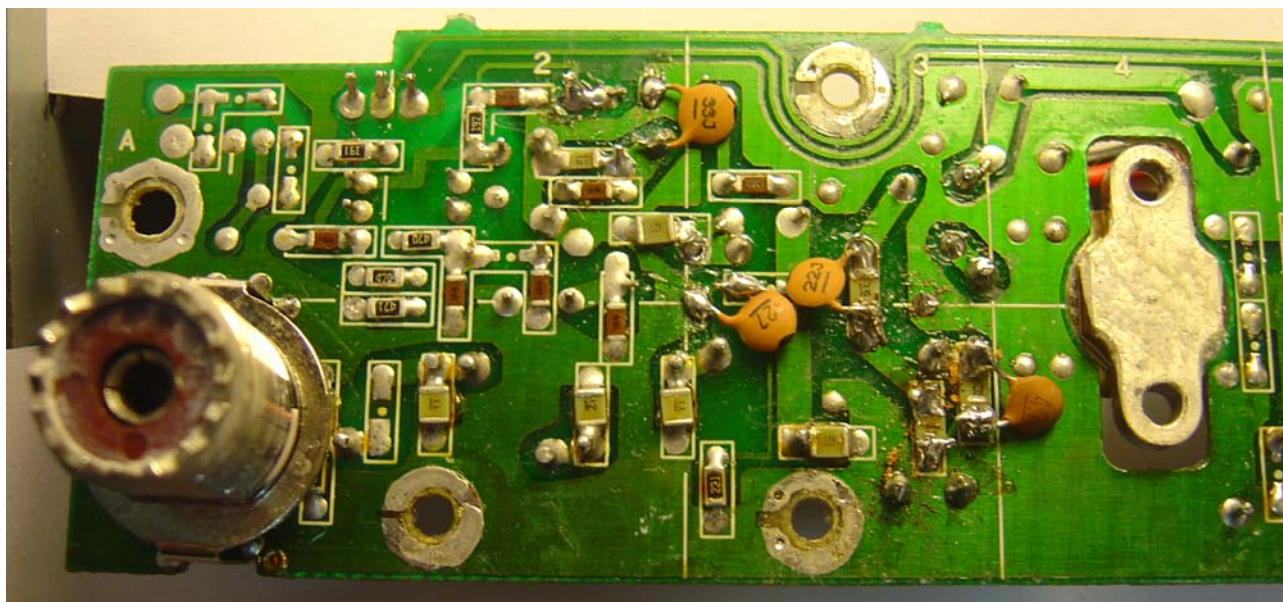


PA Bottom View – New Capacitors for Midland 70-066 - Above:

Top of C526 [33pf] - scrape green off copper layer.

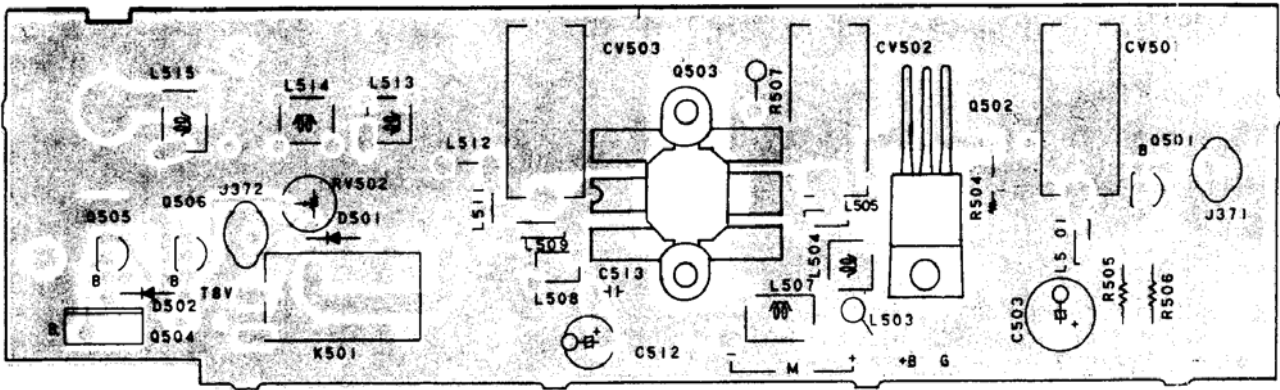


PA Bottom View – New Capacitors for Midland 70-066 - Above:

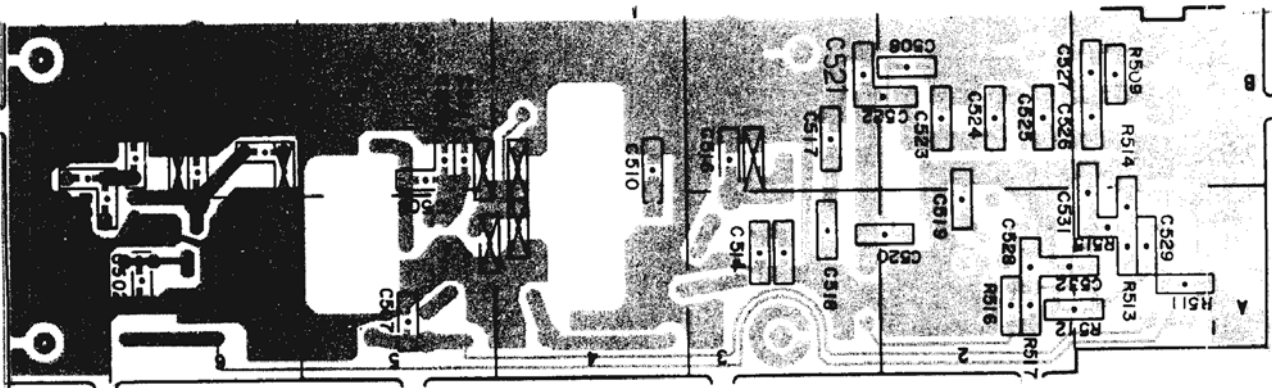


PA Bottom View – New Capacitors for Midland 70-066 - Above:

Top of C526 [33pf] - scrape green off copper layer.

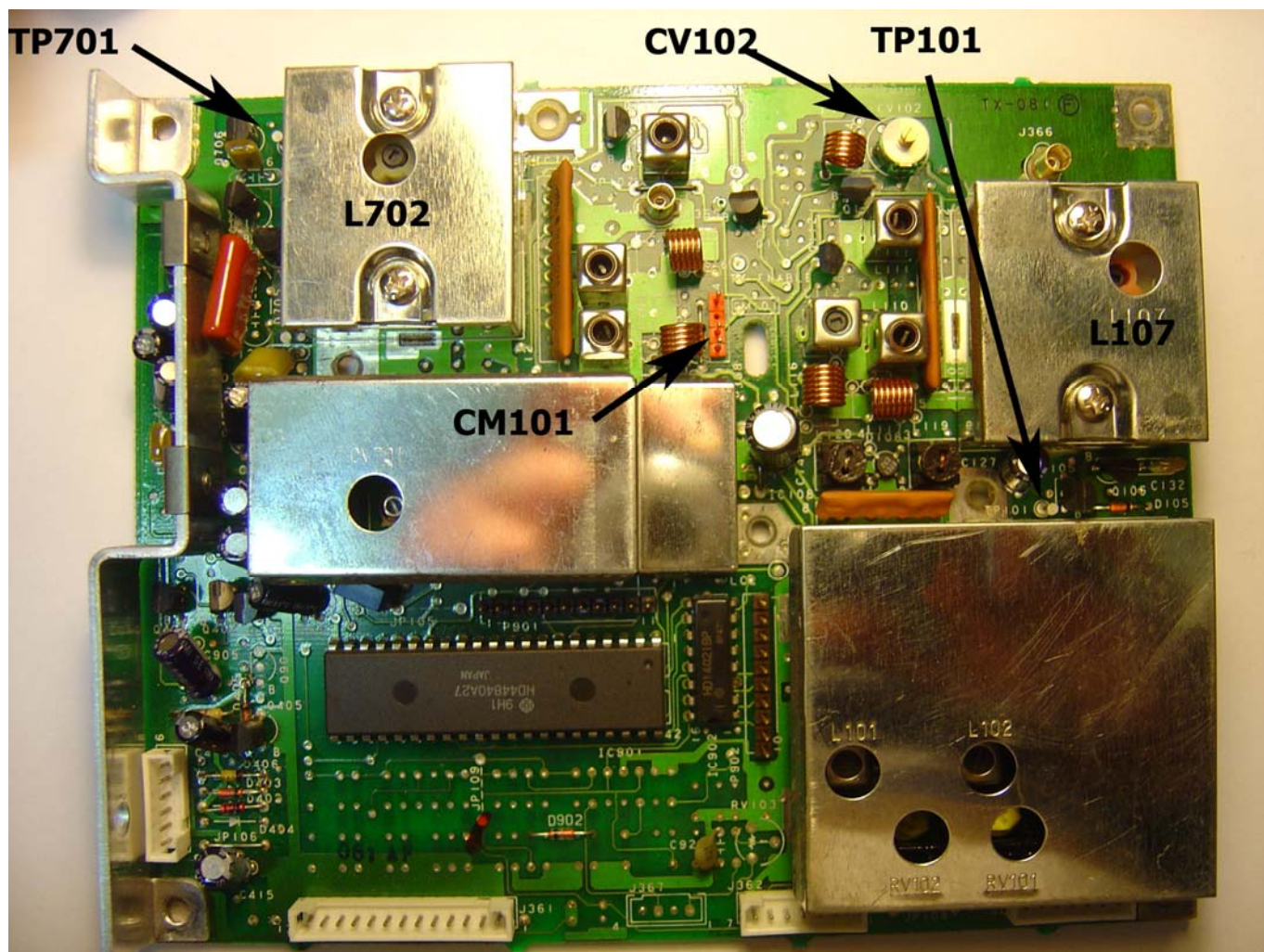


PA PC Board – Top View – Above:

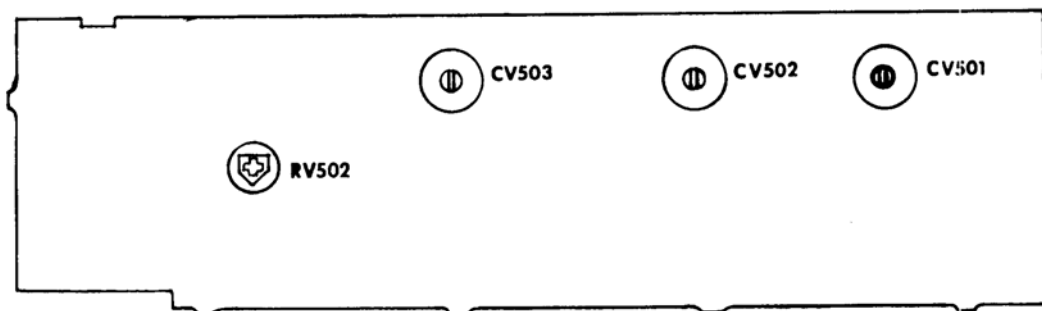


PA PC Board – Top View – Above:

TRANSMITTER ALIGNMENT



The Synthesizer Board – Above



Midland 70-066 Transmitter PA Alignment Points above:

1. Connect a lower power 50 ohm power meter to J366 [exciter output]. Go to channel 48 for center frequency. Connect a multimeter to TP101, [refer to the diagram above – The Synthesizer Board] and operate the microphone PTT button.

2. Adjust L107 [refer to the diagram above – The Synthesizer Board] such that the multimeter reading is centered on 3.5 Volts for all programmed channels.
3. Adjust CV102 for maximum output into the power meter. output should be 20mW to 40mW (for VHF). Release the PTT button.
4. Connect J366 to P366. Connect a 50Mhz power meter to the antenna output. Set RV502 on the Power Amplifier PCB fully clockwise. Set the power supply to 13.8 Vdc.
5. Operate the PTT and adjust CV501, then CV502, and finally CV503 for maximum power output. Repeat the adjustment of CV501, then CV502 and CV503 for maximum power.
6. Adjust RV502 to obtain $P_o = 25W$ (High Power position). Note that the power rises slightly as the unit heats up, so adjust for 23 - 24W when cold.
7. If "low power" output is required, short P302 to P303 on the control unit and adjust RV501 for required output.
- 8: Also check at the lowest & highest frequencies – channel 19 [52.500Mhz] an channel 38 [53.975Mhz].

Transmitter Audio Adjustments:

1. Adjust audio oscillator for a 600 ohm output level of 30mV rms.
2. Switch on the PTT and measure the deviation. Vary the frequency from 500Hz to 3KHz and find the maximum deviation. Adjust RV101 for +- 5KHz maximum, testing for positive and negative deviation. Slight adjustment may be made to L101 and L102 (for VHF) to obtain optimum symmetry and distortion.
3. Reduce the audio oscillator to 3mV rms at 1KHz.
4. Adjust RV102 for +-3KHz deviation. If necessary, repeat steps 1 and 2 above.