Ten-Tec Jupiter (Model 538)
Low-pass Filter Relay & Reverse Polarity Repair

(**Note:** Those undertaking this repair **do so at their own risk**. The procedures outlined located a faulty band-switch relay as well as faulty transistors on the DC Input board. Your circumstances may differ (i.e. the problem may be another component). This procedure has not been approved by Ten-Tec, Inc. or any of its staff.)

Symptoms:

The Jupiter rig belonging to Gary VE7GGJ would not transmit on 15/17 metres. All other bands transmitted and received flawlessly.

Troubleshooting:

A quick search of the schematics drew attention to the low-pass filter board (Figure 4-17). This board contains the relay pairs to switch in the various low-pass filters into the transmit stage of the Jupiter. The relay pair (K7 and K10) switch in the 15 and 17 metre bands.

Unfortunately to test the specific relays requires extensive disassembly of the Jupiter. Bill (W4NJF) provided information on testing the various relays once the low-pass board is exposed.

Removal of the Low-Pass Filter Board:

1. Remove **both** top and bottom covers. When removing the top cover **use caution.** (See item #2)

2. Carefully unplug the speaker from the **Rear Connection Assembly** board. Thread the speaker cable through the grommet and set aside the top cover.

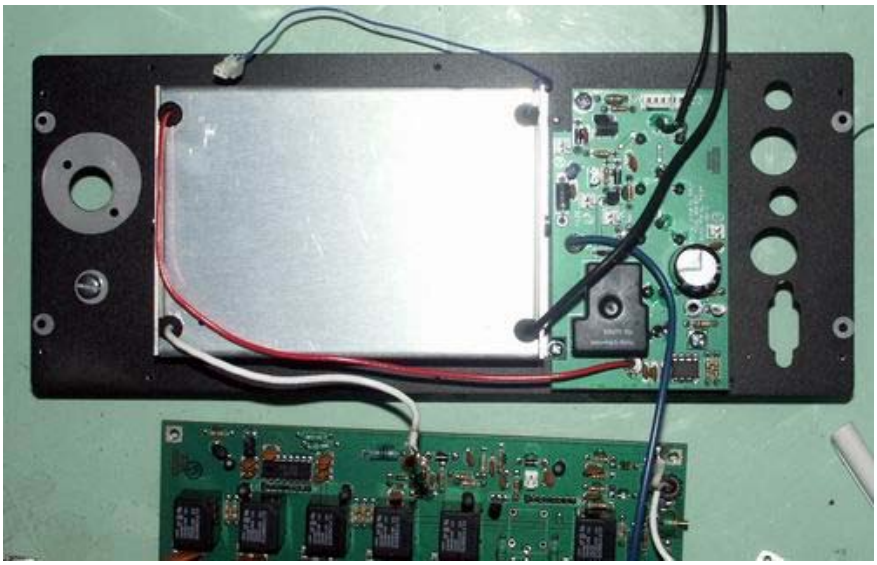
3. Unplug the RF cable connected between the power amplifier and low pass filter board (situated near the edge of the low-pass board between a pair of relays) and all of the white connectors attached to the rear panel boards.

4. In addition, cut the cable tie and unplug the cable from the Power Amplifier to the RF Sub Assembly Board.

5. Removal of the back panel and low-pass filter requires the removal of the rear panel screws and the screws holding the SO-239 antenna connector in place.

VE7TK / VE7ASR trying to keep track of all the screws!

6. With the screws removed from the rear panel it should now be possible to rotate the rear panel with the power amplifier and associated sub-assembly board out of the way.



Rear panel with low-pass filter board attached

7. Remove the screws holding the low-pass filter board in place and **gently** unplug it from the 2 multi-pin connectors and remove it from the rig. (**Note: Use caution as this board is still connected to the power amplifier assembly, DCIN assembly and the Jupiter back panel.**)

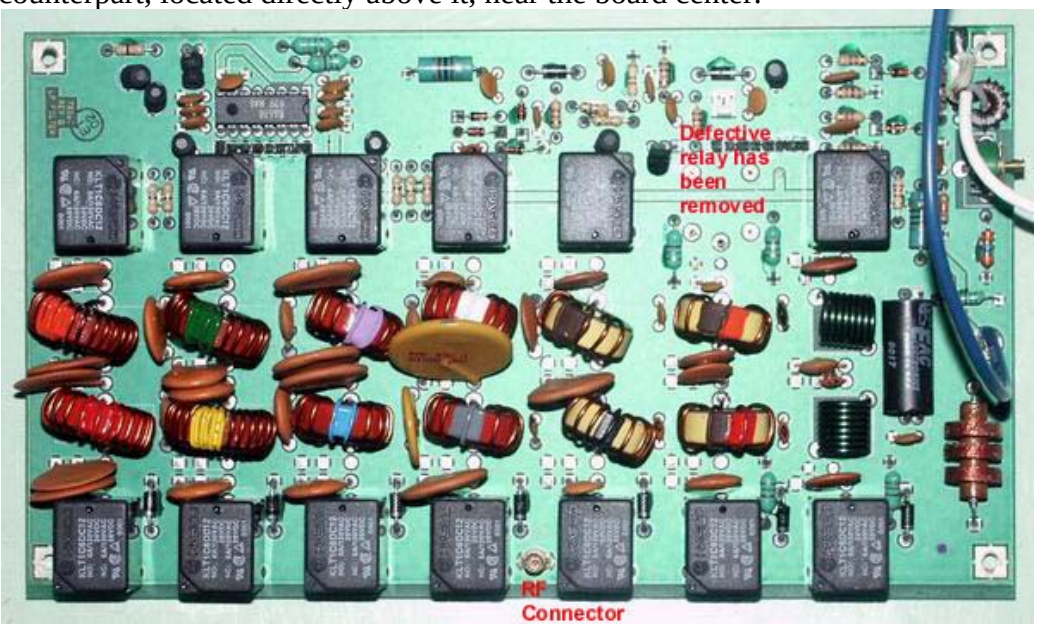
This figure is a rear view of the Jupiter on its left side with the back panel, DCIN board, Power Amplifier and low-pass filter board removed.

Note the two vertical slots with multi-pin connectors to accommodate the low-pass filter board. The **Rear Connectors board**, shown at the bottom of the photo, does not require removal.

Also the cable filled hole above the **Ext Speaker** connector is where the speaker cable from the top cover is routed.

Troubleshooting:

The low-pass filter relays are in two banks. One bank located near the edge of the board and its counterpart, located directly above it, near the board center.



Low-pass filter board with 15 of 16 relays installed (the defective 17/15 metre band relay has been removed)

Each relay has 5 pins and with 3 pins at one end and 2 pins at the other end. As indicated in the figure, the **relay coil** contacts are located on either side of the relay **common** pin.

Relay – Coil and common connection are at the bottom of the figure

Each band combination has a pair of relays and the relay coils are wired in parallel. Measure the resistance across either of the band relay coils. The resistance should be approximately 200 ohms.

If the resistance is approximately 400 ohms this indicates that one of the relay coils is open! (In the unlikely event that BOTH relay coils are open the resistance would approach infinity.)

Carefully unsolder and remove one of the suspect relay pairs and measure the coil resistance. If the coil is open this relay must be replaced.

Measure the coil resistance of the relay remaining on the low-pass board for the band under test. A working relay should have a coil resistance of approximately 400 ohms. A relay with an open coil MUST be removed and replaced.

Contact Ten-Tec Service for the necessary replacement relay(s) (**Ten-Tec Part Number 32103**). Consider ordering a spare so you're ready if this happens again. The old (left) and new (right) relays are shown in the following figure.

Test the new part(s) before installing them to make sure that the coil is operational (for a new relay the coil resistance should be approximately 400 ohms). With the new parts installed check all the relays before reassembly to ensure that the coil resistance for each band is approximately 200 ohms.

Reassembly:

Reassemble the Jupiter in the reverse order of steps 1 through 7 above.

Notes:

(1) Don't forget to attach a cable tie to the cable from the Power Amplifier to the RF Sub Subassembly board.
(2) Finally, **don't panic** – there are no missing cables to attach to connectors 19 and 20 on the DCIN connector assembly (attached to the back panel).

Reverse Polarity Repair:

An unintended repair was needed when, after a 3rd relay failed, a change of ALL switching relays was completed. It was getting late and the power supply leads to the Ten-Tec Jupiter were inadvertently reversed. The result was smoke and a completely dead Jupiter.

After some research the problem was tracked down to the DC Input board (78187). The solution was, fortunately, fairly easy and inexpensive – whew. Transistors Q1 and Q2 were replaced (they are next to connectors 1 and 13) with 2N2222 transistors and the Jupiter was back in business. (**Note:** The RG-174 coax at the lower right of the DC input board has been added to allow the use of an RX-320 as a secondary receiver using N4PY software and may not be present.)

Acknowledgements:

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73,

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