

## HELP! I Just Got a TS-450/690



### Preventive Maintenance

Take care when removing components. Component holes seem to be unusually small plus the solder used does not seem to flow very well. It is very easy to damage the PC board. Leaky battery and capacitors don't help any either.

- I. Replace the battery on the CPU UNIT.
- II. Replace C104 on the IF UNIT. This capacitor often leaks.
- III. C99 and C101, both adjacent to the heatsink for IC5, may also need to be replaced.



- IV. Replace C20 on the AT UNIT. This capacitor is sandwiched between the two motor drive ICs, IC4 and IC5. When replacing C20, lay new capacitor over away from motor drive ICs.



- V. Check, resolder, improve connection from filter board to SO-239 on real panel.
  - VI. Check to see if any mods and Service Bulletins have been applied.
  - VII. Carefully apply contact cleaner/lubricant to all switches and pots.
  - VIII. Check and clean fans.
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### Repair

- I. See troubleshooting chart in Service Manual.

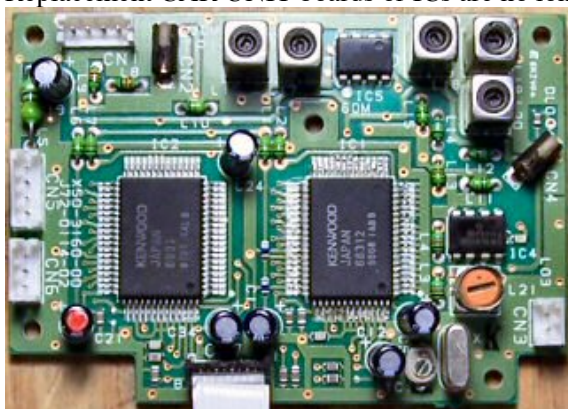
- II. PLL UNLOCK.

1. If you are *lucky*, the cause of PLL unlock could be loss of HET Oscillator VCO2. Although I haven't seen this problem myself, John, WB4LNM, discovered this problem in the TS-450 at K4RY. In this case, TC1 in the VCO2 sub-unit of the PLL UNIT had broken causing the 64.22MHz VCO to lose lock. Clif, KA5IPF, says that a broken TC1 is common.

(Photo by WB4LNM)



2. If you are *unlucky*, the cause of PLL unlock may be one or more bad DDS ICs, IC1 and IC2, on the CAR UNIT. Replacement CAR UNIT boards or ICs are no longer available.

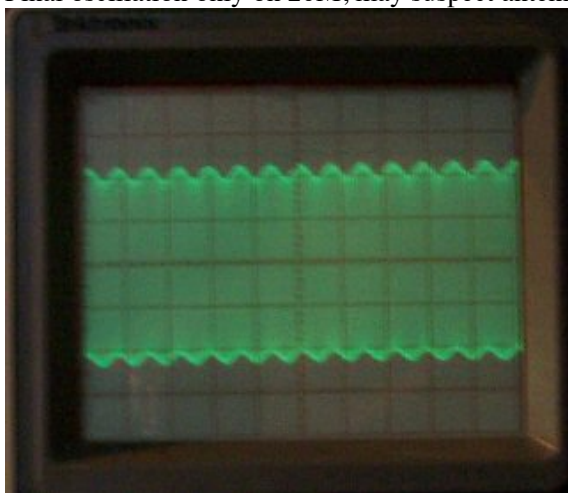


### III. Signal leakage around 455kHz filters.

Usually caused by residue from a leaking C104 on the IF UNIT. Remove filters and clean/check PC board carefully.

### IV. Final Oscillation.

1. Final oscillation only on 20M, may suspect antenna tuner. Problem is really in final.



Scope timebase 1us/div. Oscillating about 1.5MHz(!) into dummy load on 20M, without tuner. Much worse with tuner.

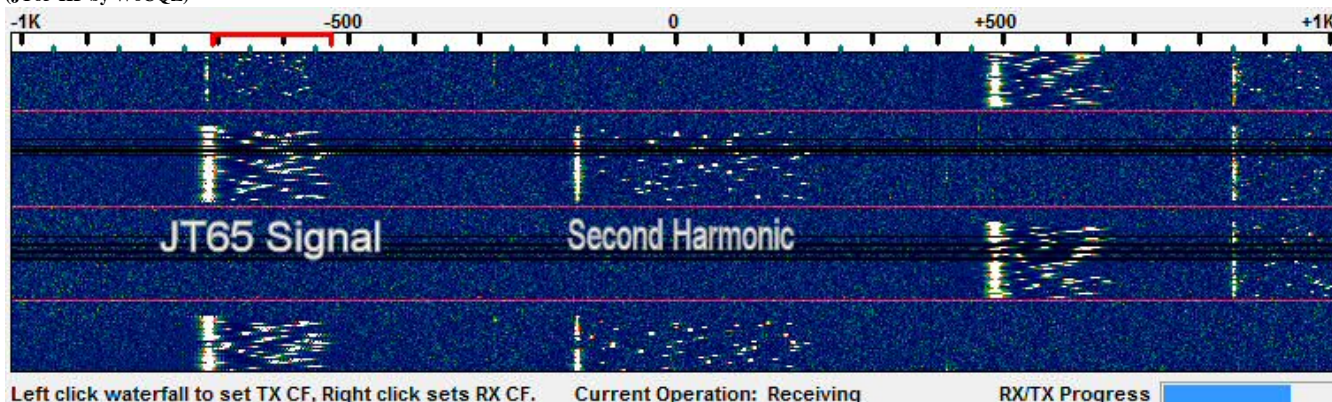
2. Improve bypassing. Add 0.1uf bypass cap from L14, at center tap of output transformer L13, to ground. Scrape away resist near L14 for ground connection. New bypass cap should use short leads.
3. Lower resonant frequency of output circuit. Add 220pf caps across collector and emitter of final transistors as shown in Service Bulletin [ASB-1036/APU-0017](#).



## V. Packet Output Audio Distortion.

1. Packet receive output, J2, has unusually high level of distortion making output generally unusable for modern digital modes.

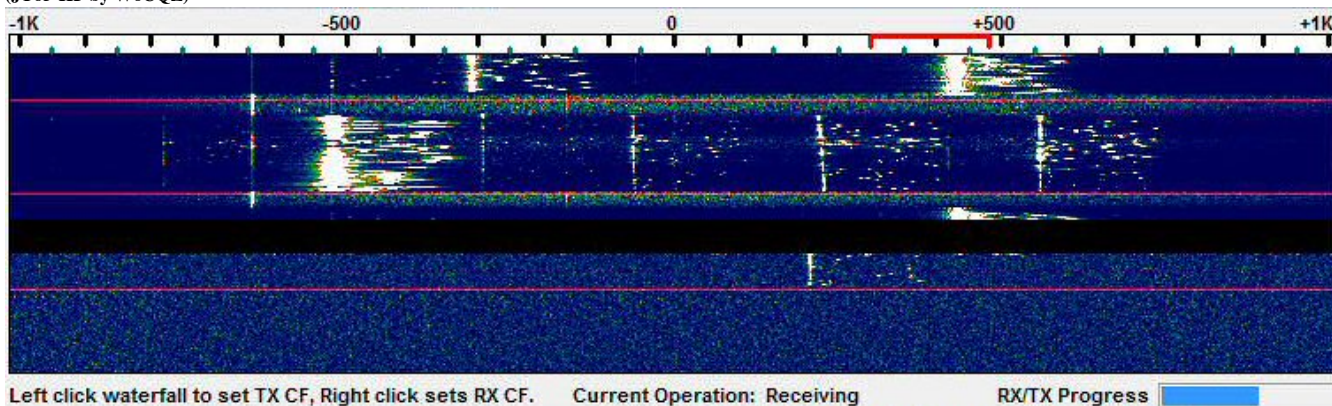
(JT65-HF by W6CQZ)



*These second order harmonics are generated in the receiver audio and are not a problem at the transmitting station.*

2. Packet out amplifier, Q38, has no feedback. Add negative feedback and adjust input level to compensate for decreased gain.

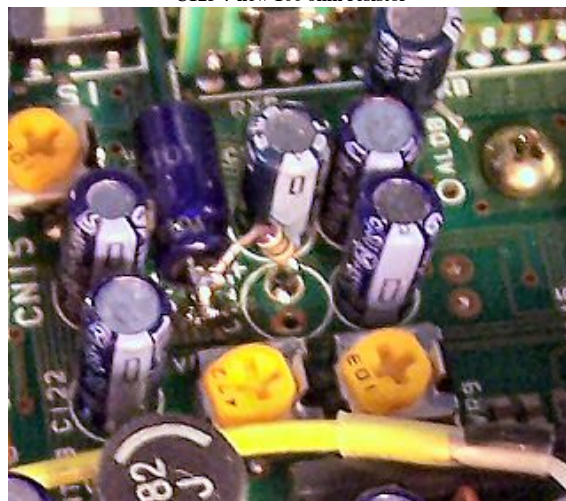
(JT65-HF by W6CQZ)



C123

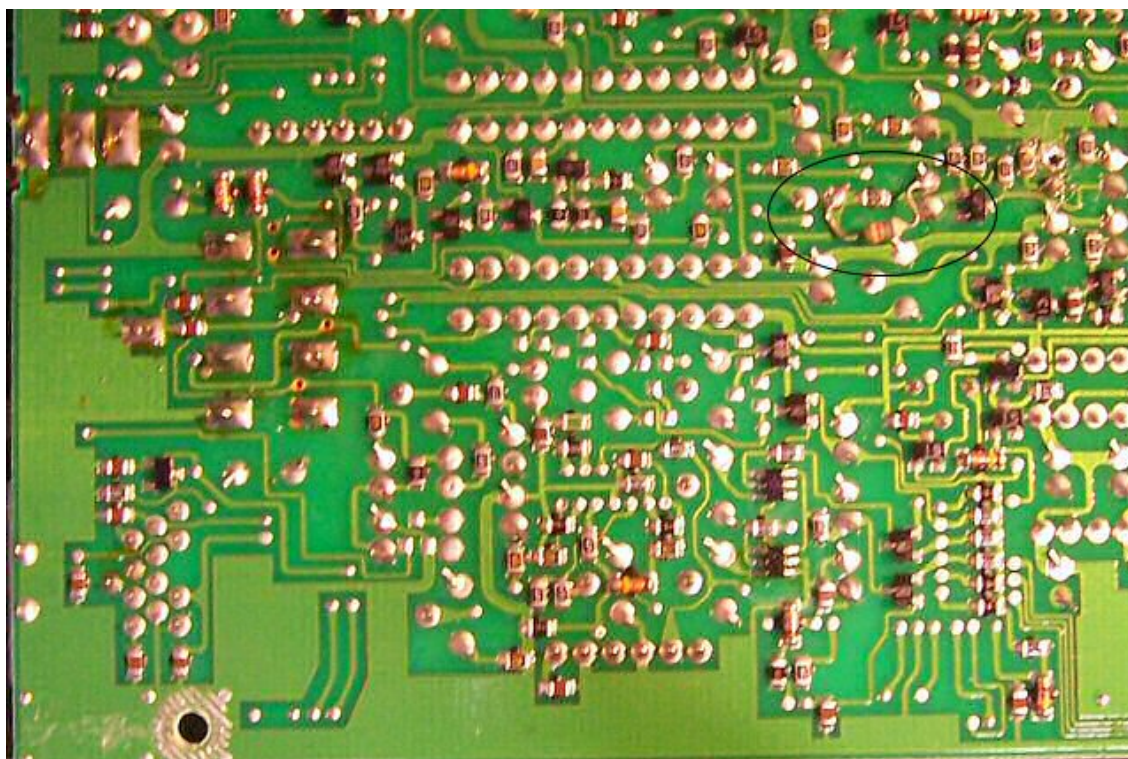


C123 + new 100 ohm resistor

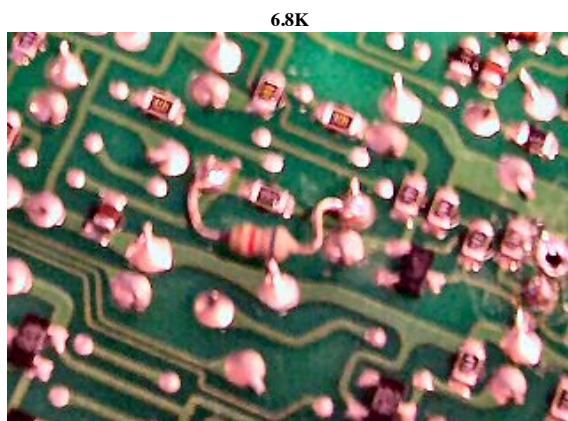


new 6.8K ohm resistor across R148

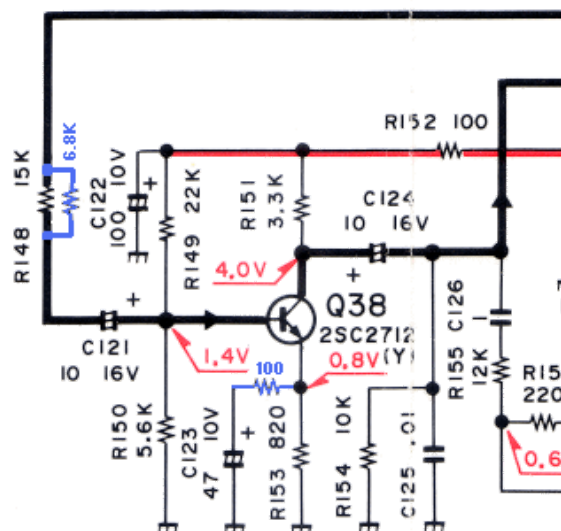




Schematic



Optical illusion, the resistor lead clears that adjacent pad.

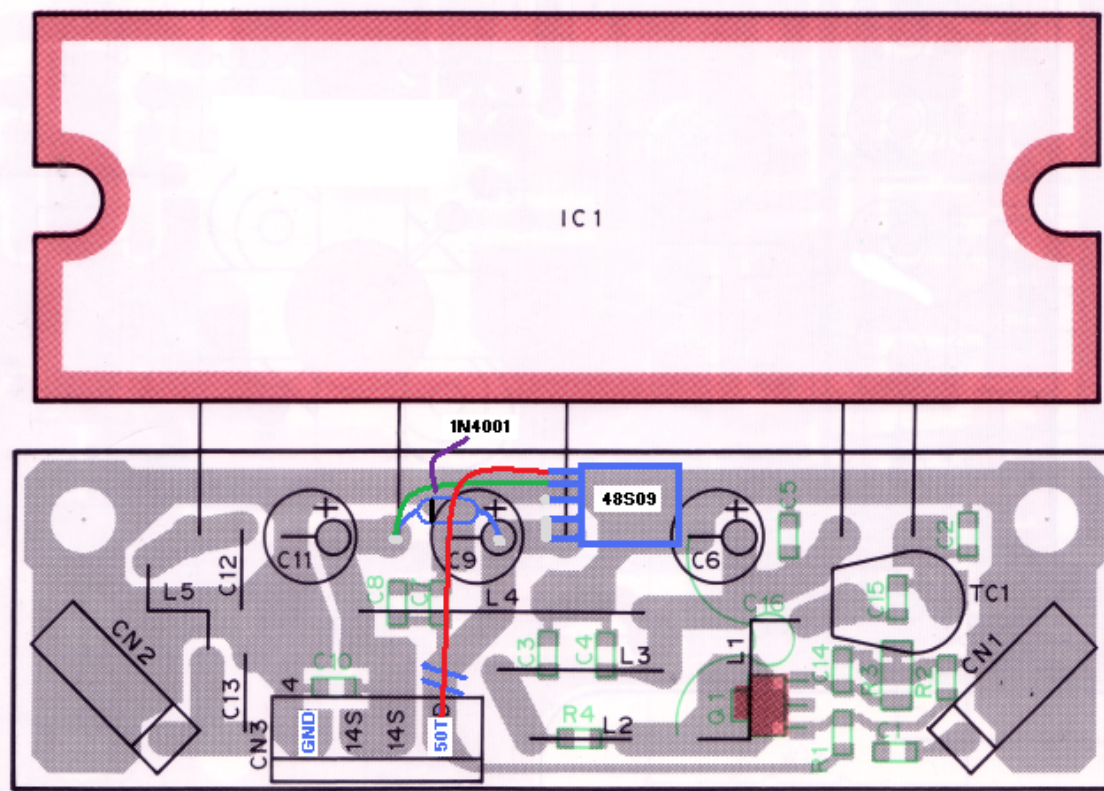


#### VI. (TS-690S only) - Low drive, distorted TX audio only on 6 meters

1. Erratic ALC after warm up, low drive on SSB caused by loss of gain in 6M driver, M57735.
2. Bias is 7V, should be 9V. When brick heats up, low bias voltage is insufficient to keep brick linear.
3. Circuit suggested in «[Hints and Kinks - Better Linearity During 50-MHz SSB Transmit with the Kenwood TS-690S Transceiver, June 1994 - QST - page 75](#)» not ideal - bias does not go to 0 Volts on receive or when rig is on other bands.
4. Use a Toshiba TA48S09AF SMD 9V regulator with ON/OFF and mount on foil side ground of driver board somewhere.
  - a. Cut 50T signal near CN3. Note corrected CN3 signals.
  - b. Scrape away resist of ground foil and tin area between C6 and C9. The new regulator will be mounted there.
  - c. Scrape resist from ground near C9 and between C9 and bias pad. Tin these areas.
  - d. Solder pin 3 to ground foil. Solder pins 4 and 5 to bias pad near C9. Solder IC flange to foil near ground lead of C6.
  - e. Add a wire from pin 1 to 50T at connector CN3. Note corrected signals names at CN3.
  - f. Add a wire from pin 2 to 14S - use pad near C11.
  - g. A 1N4001 is added across the regulator for transient protection.

## 50MHz 10W FINAL UNIT (X45-3420-00)

Foil side view : TS-690S



## Adjustments and Alignment

### I. See ADJUSTMENTS in Service Manual

1. Carrier point adjustments can be made easier by using Spectrogram or another FFT display.
2. S-Meter can be adjusted with AIP off to match standards (S9 == 50 $\mu$ v and 6db/S unit) from about S3 through 40 over S9.

uv	0.2	0.4	0.8	1.6	3.3	6.3	12.6	25.1	50	160	500	1600	5000	15000	50000
S	1	2	3	4	5	6	7	8	9	10	over 20	over 30	over 40	over 50	over 60

## Mods and Improvements

### I. DJB mods:

1. [Increased IF gain for 12 - 6 meters.](#)
2. Custom TCXO



### II. [Adjustable sidetone pitch \(not tested\)](#)

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