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ICOM 211/245(S)/251/451/701

The most common problem is bad solder connections in the PLL unit and Display driver unit.

BRIEF History: The 211/701 came out in 1976 (give or take a few months), Japan was trying a new type of PCB, with plated thru holes, it didn't work very well so the plated thru holes were replaced with pins, these pins were coated to bond with copper and solder, and it almost worked, these pins are breaking down now, and can cause anything from open connections to low resistive connections. What we are calling updates, are to remove these pins and replace them with copper wire bent over on top and bottom, then resolder the connection. It is important to remove all the old solder. The better method is to add jumper wires on the bottom side of the board (this is what we do, more reliable), I will try to post some pictures of where the wires go, it will take a while though. The 701 only has a few pins, and most of the boards stayed with the plated thru holes. The 211 had 4 generations of PLL's and 3 generations of Display drivers. The 245 uses the same PLL, and had 2 generations of Display drivers.

211 PLL Alignment: The PLL alignment is straight forward, does require a accurate frequency counter and patience. If the frequency is off by more than 4Khz, there are other problems and the alignment sheets won't help. Most common causes of problems are bad solder joints, dried out caps (electrolytics) and the -9v regulator's (DC/DC converter) associated parts. (it is very rare for the -9v reg. (DP1) to fail!). Align A, Align B

701 Alignment Is covered in the rear of the owners manual.

PLL Updates This is a picture of updating (wiring) a mid production version PLL (400Kb) 211 PLL, and this is the older version (200Kb) 211 PLL Older Version, and this is the newer version normally called the black board (200Kb) 211 PLL Newer version, there is one version newer than this, but it was a version that came out after the production stopped, it was a service upgrade, there are very few of these versions out there and once installed, I am not aware of any problems. I will try to find a picture of it and post it.

The RM-2 Is a Computer controller for the 701/211/245. IT allows direct frequency entry (not bad for 1978), DTMF pad, 4 Memory channels, and control for scanning (some radio's need a mod for scan stop), offset and Dup functions. Fairly reliable unit. MOST IMPORTANT; turn the RM2 on LAST and off FIRST, just turning off radio power can damage the RM2 when power is turned back on. Most common symptom is 0 _ _ 0 or 0 in the display, most common cause IC2 and IC11.

211 / 251 PL encoder We are asked alot about putting in a PL into the 211 or 251A. Yes it can be done. Communications Specialists (800-854-0547) have a internal encoder unit and a external encoder unit. The int. unit runs about \$30 and the external about \$50. The internal is programed by a dip switch and will fit neatly under the top hatch cover. Good choice if one or two tones is all that is needed. If you use more tones, I recommend the external unit, it has a rotary selector that gives you quick access to all the sub tones used. This is a sheet showing where to connect the tone wires. PL Install (200Kb)

701 Finals HF finals are usually very reliable, barring Mother Nature. If you measure the voltage on the base, radio off, power applied, it should be 0 (0.05 max, works for the drivers too, but the radio needs to be on) The 701 had three different finals, 2SC2097 (80W device), 2SC2097H (100W device) and the main stay 2SC2097HH (140W device). I have tried to find another source for the HH version, but ICOM is it, and those days are probably numbered. You can use the "H" version, but I recommend (strongly) setting the ALC to 80W. Each version has a different bias, output capacitance configuration. DO NOT USE A 701PS! it is unregulated, the regulator is in the 701 via the power connector and is capable of 28v!

251 The 251 is basically a more advanced version of the 211. The Main unit is almost the same. The PLL and Logic are very different. The biggest issue with the 251 is the CMOS logic. It "glitches" and is very static sensitive. The CPU and Expander are no longer available new. Generally it is very reliable, and needs very little maintenance.

451 The 451 came in 2 different versions 430-439.99 or 440 to 449.99. Not possible to make a 20mhz radio of it. (that is why the 471 was so popular). No real issues. same CMOS logic as the 251, but for some reason, never really had any problems with it. Alignment is rarely needed, and you need a good accurate counter.

R-18

⊖

9.9 Adjustment 145

147 adj 5Kz

C-35 ⊖

C-34 ⊖

L3

⊖

145Mhz Adj.
(VCO freq 134.2985 USB)

147 Adj 0khz (136.300 VCO)

loop
filter
adjustment
(not usually required)



NOTES PLL COVER MUST BE REMOVED

FOR ACCESS TO C-34 & R-35.

FRONT

EARLY STYLE PLL

COVER (L-3 & R-18 ACCESSIBLE

W/O COVER REMOVAL)

Pot that is
here is for
145 loop
filter

Lock-up Adj for
144-146 RANGE

⊖

⊖

Lock-up Adj for
146-148 RANGE

⊖ = C-35

L-3 → ⊖ ⊖ C-34

R-18 → ⊖

FRONT

CURRENT STYLE PLL COVER.
(ALL Adj ACCESSIBLE THRU COVER)

Complete frequency alignment of the synthesizer of the 211/245 requires removal of the synthesizer cover. This is accomplished by removing the retaining screws from the cover and carefully lifting the cover off. In most cases, the seals will be broken voiding warranty. Alignment should be accomplished by ICOM during the warranty period and by knowledgeable persons after that. Care must be exercised to insure minimum contact with the large scale integrated (LSI) chip. It is a CMOS device costing about \$50 and static electricity discharges can destroy it.

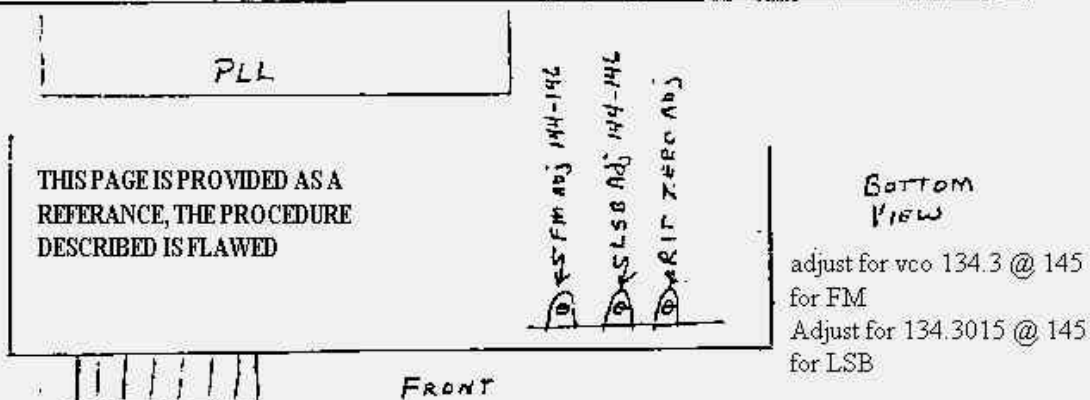
After removing the cover, carefully reconnect the radio to 13.8VDC and a good 10 watt minimum dummy load. Allow the radio to warm up to operating temperature. Select FM mode and any frequency in the 146 - 148 MHz range. Adjust C-35 (see fig. #1) for on frequency operation of a 5KHz frequency ie 147.015. Next adjust C-34 for on frequency operation of an even KHz frequency, ie 147.010. Recheck for interaction.

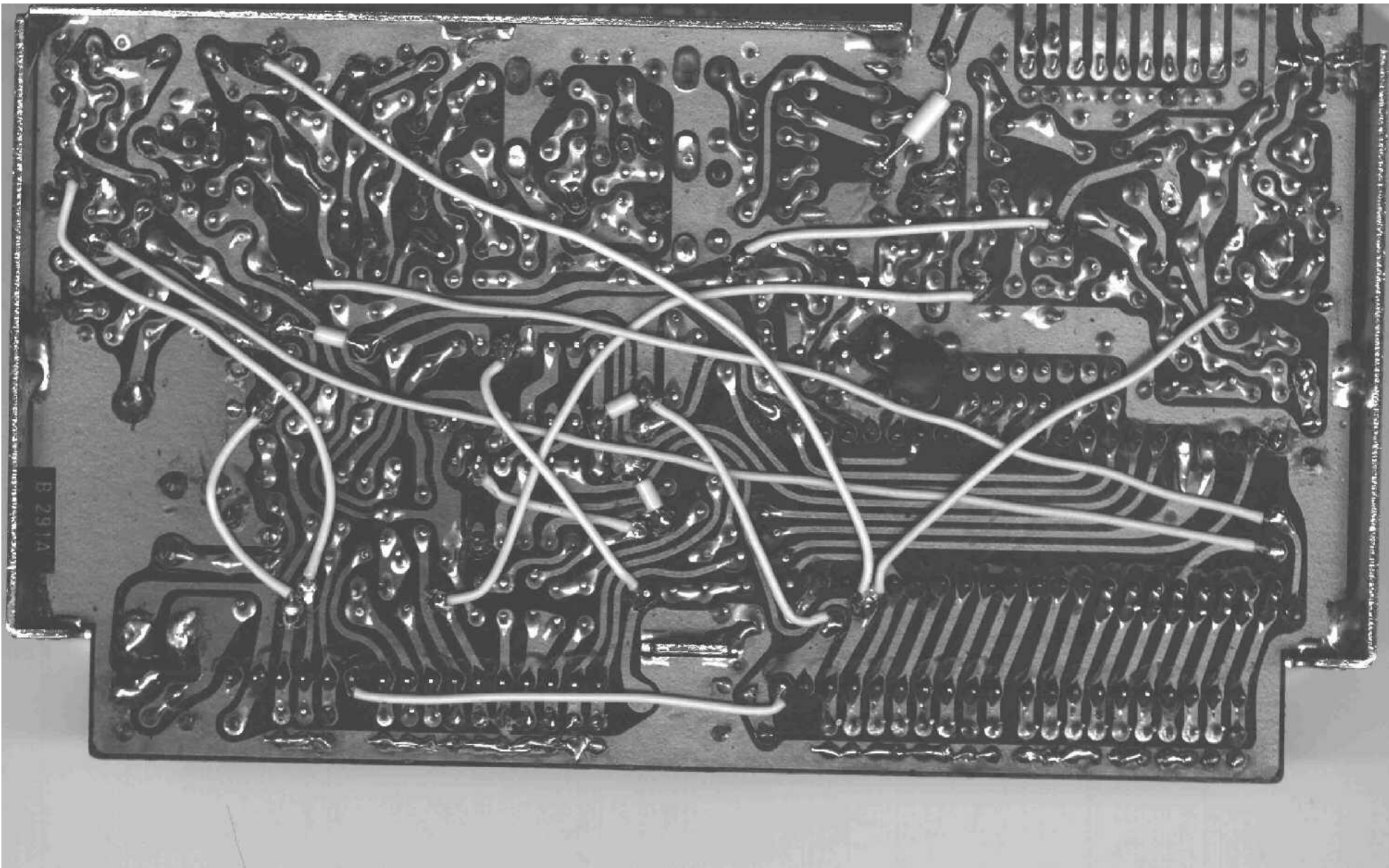
Select USB receive mode and a frequency in the 144 - 146MHz range ending in 0.0. Adjust L-3 for a zero beat with a known input signal of 100uv strength and the AGC switch in the fast position. Then select a frequency ending in 9.9 and adjust R-18 for a zero beat using the same procedure. Recheck at 0.0 for adjustment interaction and correct as necessary until no change occurs.

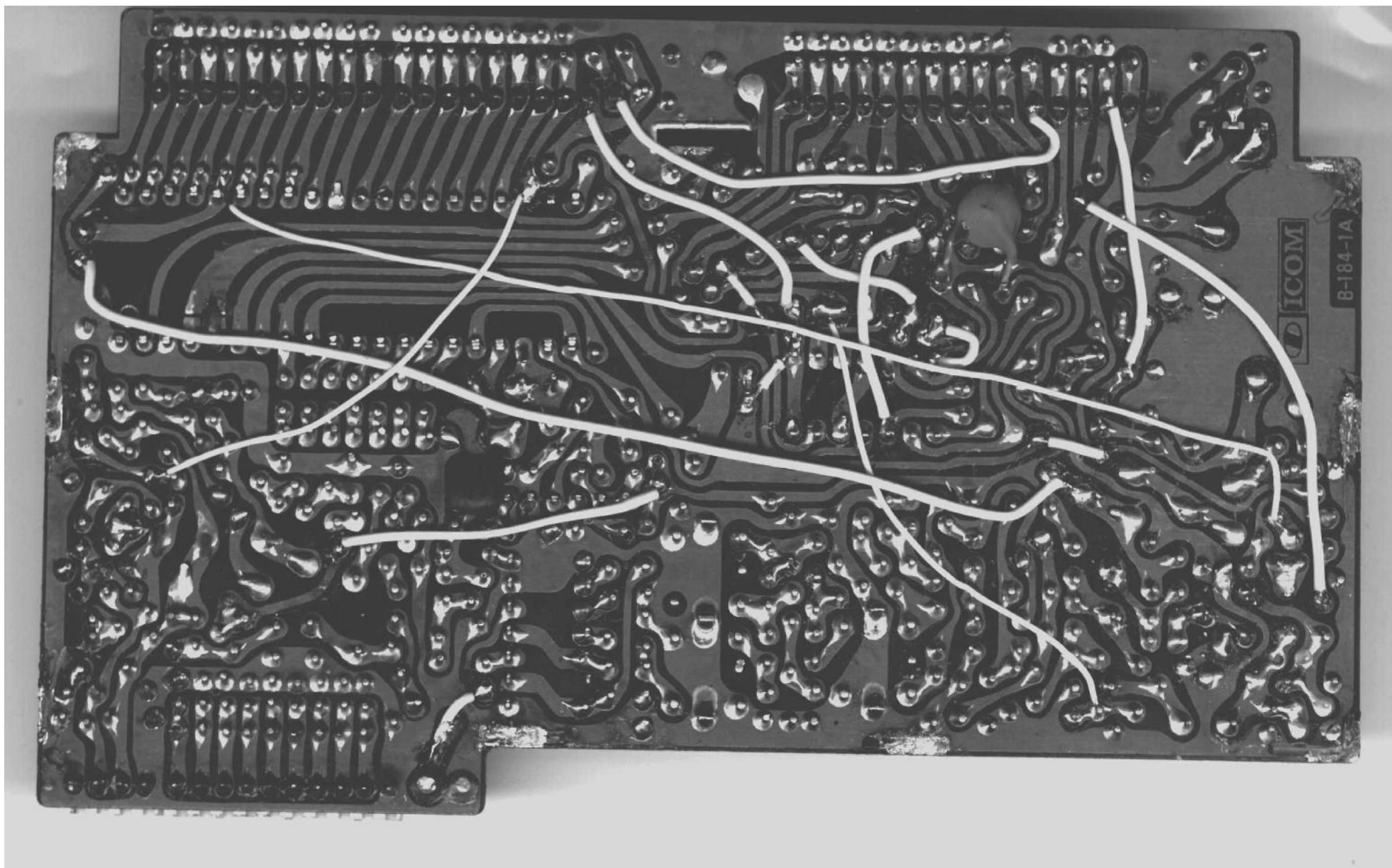
Select FM mode in the 144 - 146 range and adjust to frequency using transmit or receive mode. The FM adjustment is located behind the front panel. See diagram below. Select LSB and zero beat using the LSB adjust resistor next to the FM adjust resistor and the zero beat method used for USB. If the RIT causes a frequency shift when turned on in the center position, you may wish to adjust its zero position. Use the RIT zero adjust resistor shown in the drawing. You can adjust in FM using the discriminator meter or in SSB using the zero beat technique. This completes the PLL alignment. The radio should be reassembled.

The lockup pots control the transit time between VFO A & B in the duplex mode. A CW adjustment shortens the transit time. Too much CW rotation will cause an oscillation to occur. This control should be adjusted only when necessary and then just to the point where the transition is smooth and no "ripping" sound is heard.

NOTE: ICOM ASSUMES NO LIABILITY FOR DAMAGE CAUSED BY CONSUMER ALIGNMENT OF PRODUCTS.







ICOM

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