

VOLTAGE AND RESISTANCE MEASUREMENTS

The table lists voltages and resistance at all of the tube sockets. These values are measured with a VTVM with all tubes installed in their respective sockets.

All measurements should be made from the socket pins to ground.

Adjust transistor voltage regulator to exactly 9 volts dc with **VR202** on the main printed circuit board. Measure voltage at junction of R294 and R295.

CARRIER OSCILLATOR CRYSTAL ALIGNMENT

1. Using a frequency counter at the crystal, set MODE switch to LSB and adjust **TC203** on main circuit board for 3.1855 MHz. Set switch to USB and adjust **TC204** for 3.1785 MHz.

CRYSTAL CALIBRATOR ALIGNMENT

1. Tune receiver to receive the WWV signal at 10.000 MHz in AM mode. Set crystal calibrator switch to 100 KHz position and zero beat the signals. Adjust **TC301** on the crystal calibrator circuit board if needed to get them to zero beat.
2. Connect VTVM DC probe to center lead of **TR303**. Set crystal calibrator switch to the 25 KHz position. Adjust **VR301** for a .8 volt reading on the VTVM.

SIDE-TONE ADJUSTMENT

CW side tone level may be adjusted by rotating the tone level potentiometer (**VR203**) located on the main circuit board under the top cover. NOTE: Do not disturb settings of adjacent marked potentiometers.

TRANSMITTER ALIGNMENT

1. Disconnect the high voltage (600 volts) by unsoldering the lead at the rectifier board and also the screen voltage by unsoldering the resistors R40 and R41 at the connection of pin 3 of the two tube sockets (V5 and V6). Tape the loose ends of the wire and resistors.
2. Connect VTVM RF probe to pin 5 of V5.
3. Set the MODE switch to USB or LSB, and the VOX GAIN switch to MOX position. Adjust carrier balance potentiometer **VR201** on the main printed circuit board for minimum VTVM indication.
4. Advance MIC GAIN control two positions, and turn the MODE switch to CW/TUNE.
5. Adjust PRESELECT control for maximum VTVM reading.

6. Adjust MIC GAIN control during transmitter alignment to keep VTVM reading at 15 volts dc to avoid saturation of the circuits.
7. Start with upper slug of **T203** nearly out and adjust for peak VTVM reading.
8. Start with both slugs of **T204** nearly out and adjust both slugs for peak VTVM reading.
9. Set BAND switch to the 80 meter band, the main tuning dial to the center (250 KHz), and the PRESELECT control at center position. Adjust the slugs of **L901 & L1001** (they are marked **80**) for a peak reading. Adjust the slugs on all appropriate bands from 40 to 15 meters using the same procedure. Adjust **L908** and **L1008** (underneath the chassis) for the 11 meter band. Set tuning dial to "0" and adjust **L907** for WWV. Set the BAND switch to 10D and the main tuning dial to its upper end and adjust **L905** and **L1005** for peak VTVM readings.
10. Disconnect the VTVM RF probe from pin 5 of V5 and connect it to pin 2 of V202. Set the BAND switch to 10D and adjust the slug of **L3** for a peak VTVM reading. Set the BAND switch to 10C and adjust **TC1101** for a peak VTVM reading. Adjust **TC1102** for a peak reading on 10B, **TC1103** for 10A, **TC1104** for 15, and **TC1105** for 20 meters. Set the BAND switch to 40 and adjust **L4** for peak VTVM reading. Set BAND switch to 80 meters and adjust **TC1106** for peak VTVM reading. Set to WWV, adjust **TC1107**. Set to AUX 1 adjust **TC1108** for 11 meters. Set to AUX 2, adjust **TC1109** if equipped with a crystal for that position.
11. Disconnect VTVM RF probe and connect to pin 1 of V203.
Set main tuning dial to center. Adjust both slugs of **T207** for a peak VTVM reading. Adjust **L18** (under the chassis) for a peak reading. Disconnect VTVM RF probe from pin 1 of V203.
12. It is not recommended to align BPF5 the pass-band and network unless the proper measuring instrument is available. See page for alignment if needed.
13. Turn the POWER switch to the OFF position. Restore unsoldered PA screen grid resistors and high voltage wire.
14. Connect the transceiver output to a 50 or 75 ohm dummy load. Set the main tuning dial to center and tune up the transceiver on the 80 meter band as described in the manual. Adjust the MIC GAIN control setting to keep the PA current to less than 100 ma. Readjust **L1001** for peak watt meter reading. Tune up on each band as described above and readjust **L1002 - L1006**, and **L1008** for the appropriate bands for a peak watt meter reading.
15. Tune transceiver to 14.200 MHz and adjust **T206** for a peak watt meter reading.
16. Place the meter switch to P.O. position and adjust **VR14** (under chassis by antenna socket) to set meter to match external watt meter's output.
17. Tune transceiver to maximum output at 14.350 MHz. To measure spurious radiation use

the S- meter of another receiver and tune it to 14.520 MHz where a spurious signal can be heard. Adjust **TC205** (next to V205) on the main circuit board for a **minimum** S-meter reading without decreasing power output of the transceiver. Adjust **L17** (on top side of chassis) and **L19** (underneath chassis) for **minimum** S-meter readings.

ADJUSTMENT OF AM BOARD

1. Set MODE switch to AM, MIC GAIN control to the "0" position, the meter switch to the I.C. position, VOX switch to MOX position and adjust **VR451** on the AM board to 150 ma.
2. Connect a frequency counter to antenna jack with dummy load. Tune up transceiver on any band. Set MODE switch to AM, VOX switch to MOX position and adjust **TC451** so the frequency on the counter matches the transceivers' transmit frequency.

FINAL AMPLIFIER NEUTRALIZATION

When replacing the final amplifier tubes it may be necessary to reset the bias to 50 ma and check neutralization. Using the procedure outlined below will guarantee maximum output and long tube life.

CAUTION:

HIGH VOLTAGES ARE PRESENT ON UNDERSIDE OF CHASSIS AND IN FINAL TUBE AREA.

USE GREAT CARE WHILE MAKING ADJUSTMENTS WITH WIRING EXPOSED.

1. Locate **TC1** the neutralization variable capacitance shaft on the underside of the chassis near the last band switch wafer, in the final amplifier section.
2. Connect antenna connector to dummy load and set meter switch to I.C. position.
3. Check final amplifier bias in USB or LSB position. If meter indicates other than 50 ma, reset bias.
4. Tune up transmitter in the center of the 15 meter band.
5. After tune up set meter switch in I.C. position. MODE switch in TUNE position and advance MIC GAIN until meter reads 150 ma.
6. Rotate PLATE tuning control and observe dip as indicated on the meter. (Note: If dip is not prominent, reduce LOADING control slightly for better indication). As the PLATE

control is rotated the meter should rise equally and smoothly on either side of the dip indication.

7. Determine which side of the dip rises abruptly. Set PLATE control slightly to this side to this side of the dip keeping the meter reading below 200 ma.
8. Using a non-metallic wand, rotate the neutralization capacitor shaft **TC1** *very slightly* in the direction which reduces the current shown on the meter.
9. Repeat the previous two steps until the meter indicates a smooth equal rise on either side of the maximum dip point.

RECEIVER CIRCUIT ALIGNMENT

When the transmitter circuits are aligned, the only alignments remaining for the receiver circuits are the last IF stage transformer **T205, T351** through **T353** IF transformers in the noise blanker unit, antenna input transformers **L801** to **L805, L807, L808**, trap coils **L806** and **L906, L23, VR4, VR205** and the **S-meter** zero set.

1. Connect signal generator's output to the antenna terminal. Set the BAND switch to 80 meters and receive 3.750 MHz signal from the signal generator. Adjust the PRESELECT control for a peak S-meter reading. Adjust coil **L801** (marked **80**) for a peak S-meter reading. Adjust coils **L802** to **L805, L807, L808** at 7.250 MHz, 14.250 MHz, 21.250 MHz, 29.000 MHz, 10.000 MHz and 27.250 MHz respectively for a peak meter reading. (L807 and L808 are underneath the chassis).
2. Tune the receiver's circuit to 7.100 MHz and leave all controls as is. Apply 5.920 MHz from the signal generator to the antenna terminal. Adjust the **TRAPS L806** and **L906** for a **minimum** S-meter reading. Then tune the receiver to 7.500 MHz with the incoming 5.920 MHz signal from the generator and adjust **L23** (underneath the chassis) for a **minimum** reading on the S-meter.
3. Tune the receiver to an incoming signal on any band or use the signal generator at a low output (less than 1 mV) and adjust the lower slug of **T203**, both slugs of **T205**, and **T351, T352** and **T353** on the noise blanker board all for a peak S-meter reading.

NOISE BLANKER CIRCUIT ALIGNMENT

The blanking level of the noise blanker is determined by the threshold control **VR351** and the noise amplifier stage transformer **T354**.

1. Connect a signal generator output to the antenna terminal and tune the receiver to the signal generator frequency with the AGC switch in the OFF position, (AF GAIN control knob pushed in). Adjust the PRESELECTOR control for highest S-meter reading. Connect

VTVM DC probe between the test point (TP) the cathode of **D352** on the noise blanker circuit board and ground, then adjust **T354** for a peak VTVM reading. Disconnect VTVM.

2. With noise blanker in OFF position, tune to an incoming signal providing an 8 to 9 S-unit signal or use the signal generator to provide an 8 to 9 S-meter reading on any band. Adjust the blanking threshold potentiometer **VR351** until the S-meter reading **decreases** one (1) S- unit when the noise blanker is turned on by pulling the AF GAIN knob out.

S-METER ALIGNMENT

1. Adjust meter to "0" mark on meter according to the instructions on page 6 of the manual. Connect signal generator to antenna jack and set receiver and generator to the same frequency. Set RF GAIN control to full clockwise position. Inject a 50 uV signal into the receiver, adjust PRESELECT control for highest S-meter reading. Adjust **VR205** (underneath the chassis) for an S-9 reading on the meter. If using the 100 KHz calibrator instead of the signal generator, the meter will be adjusted to S9 + 20 db.

CLARIFIER CENTER ALIGNMENT

1. Tune receiver to any frequency using the crystal calibrator or signal generator as a signal source. Verify that the knob of the CLARIFIER control is installed so it is centered with the OFF mark when turned fully counter clockwise to the off position. Turn clarifier on and center it to the "0" position. If the frequency is different from when the clarifier was turned off then adjust **VR4** (underneath the chassis) to make them the same. The clarifier only works on receive.

NOTES

The FT-401B and the Summerkamp FTdx-505 are pretty much identical. These radios came with AM, noise blanker boards and a fan. On the band switch they have WWV. They also have the 11 meter (CB Band) installed in the AUX 1 position. There is also an AUX 2 position but there is no crystal nor coils L909 or L1009 installed from the factory. The noise blankers are different between the two radios according to the schematics in each of their manuals. There are many adjustments that are not listed in Yaesu's procedures and many controls that are not shown. I believe I have listed all of them. There are many ways to align a radio depending on the test equipment being used but I tried to stay with the equipment and procedures that the manual uses. I have tried to better explain some of the procedures and put them in their proper order. I have also added the missing control locations to the top and underside diagrams.

The manual for the FT-401B has some errors. Many of the pages were just copied over from the older FTdx-401 as can be seen on page 1. The manual for the FTdx-505 is more complete, up to date and has a parts list but still has a few errors as well. There are a few errors on both of their schematics.

R256 is shown twice at V208. The 3.3K 1/2 watt connecting from pin 2 to ground is actually R258 according to the parts list.

L808 is also shown twice. It should be L1008 in the PA section.

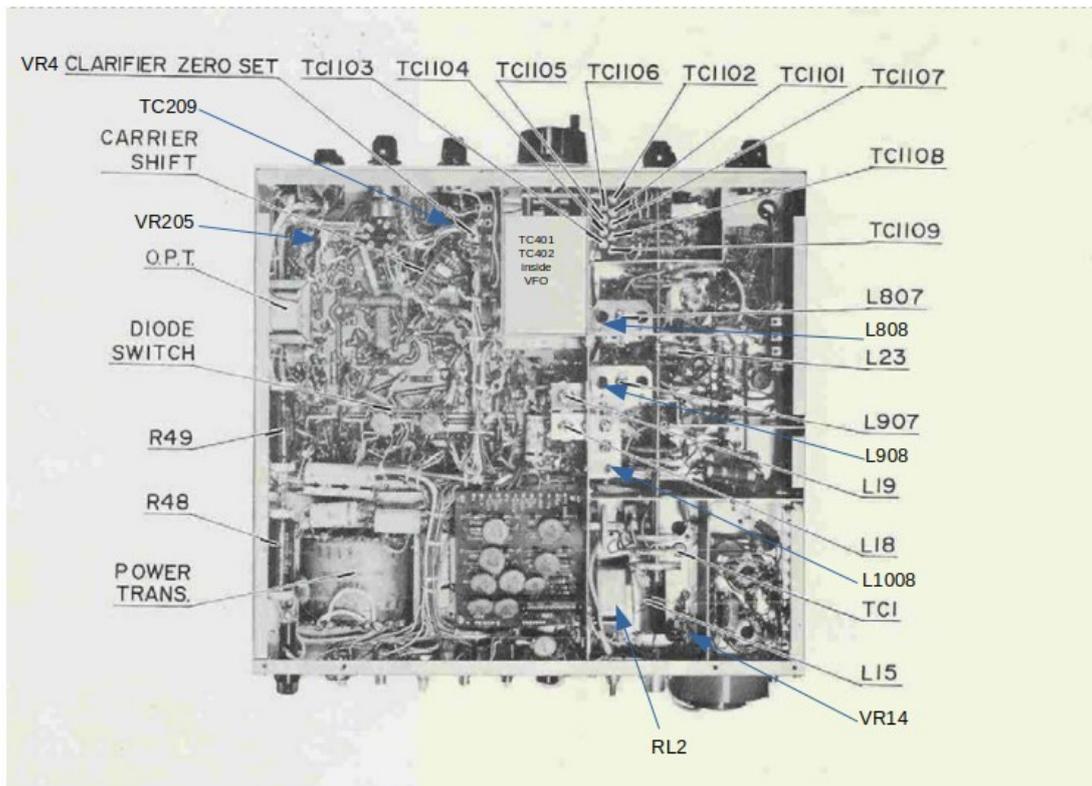
On the tube voltage chart, the voltage at pin 1 of V208 should be 155 volts for receive and transmit. Pin 6 should be 165 volts for receive and transmit.

Pin 1 of V209 should be 80 volts on receive.

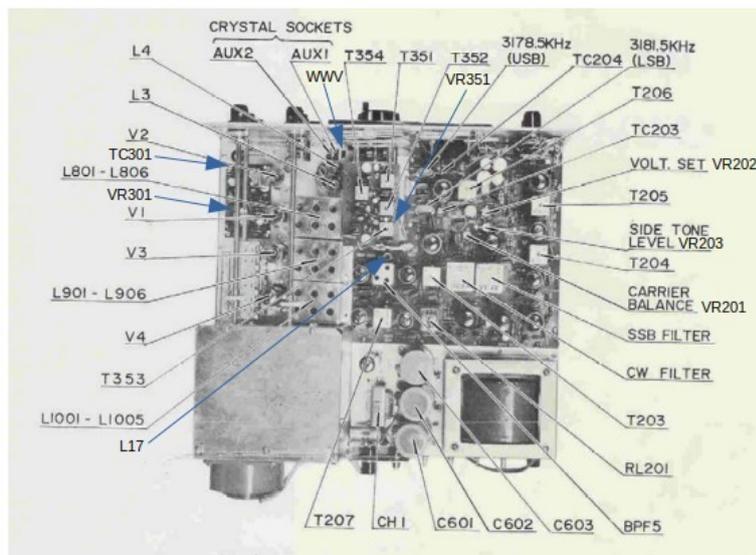
Pin 1 of V212 seems high at 310 volts. Most I have worked on read about 270 volts.

The previous are things I have noticed while working on these radios. There may be more inaccuracies or inconsistencies.

BOTTOM SIDE



TOP SIDE



MODIFICATIONS

This protects R49 if V205 the second IF amplifier (6BA6) tube shorts from its screen to the suppressor grid.

1. Remove orange wire between R49 (4K 20W) and the circuit board.
2. Route a new wire from R49 to pin 5 of V7 (the voltage regulator tube VR105MT).
3. Ground pins 2,4,7 to the center pillar of the tube socket.

Improved receive. I have not tried this myself.

1. Replace the RF amplifier V1 6BZ6 with a 6GMB.
2. A 60 ohm 1/2 w resistor (or two 120 ohm in parallel) has to be connected across the filament pins 3 and 4 to equalize the heater voltages.
3. Best results may be realized with an alignment afterwards.

Neutralizing driver tube

1. Replace C81 with a 5pf trimmer.
2. Adjust until a point is found while adjusting the PRESELCTOR control that transmit and receive signals peak at the same time.

BFM
KC2ESR