



Service Group TR7 Alignment Procedures

Procedure that the Drake service group used to check out the TR-7 at the end of every repair operation.

Repair reported problems. Perform the following checks, some may have been covered in repair.

GENERAL CHECKS

1) Check for 470 or 500 microfarad capacitor (3180260) on chassis under power supply board, on +10 V line from pin 3 (gnd) to pin 10 (+) (count pins from parent board). This is necessary +10 V filtering.

2) Check for surge arrestor (342-3000) from EXT ANT Jack to ground at KEY jack (parallel with 3 PI choke) at back chassis. This prevents diode and double balanced mixer damage from lightning and other surges.

3) Clean Jones connectors as necessary. Check proper value 5 amp fuse.

4) Turn unit on. Check +10 VDC line. Check +10 R (slightly less than 10 volt line in receive, no higher than 0.2 V transmit). Check +10 T (slightly less than 10 volt line in transmit, no higher than 0.2 V receive). Check +5 VDC line. All these on parent board.

5) Check on the chassis plug in unit for power supply board, 2nd pin from parent board +24 VDC line (23.25 to 24.00), and 1st pin from parent board -5 VDC line (-2.5 to -3.5).

6) Check UM9401 pin diodes on the high pass filter assembly, rear.

	RECEIVE	TRANSMIT
ANODE CR1501	MAX 0.9 V	11V TYP
JUNCTION CR1502, CR1503	11 V TYP	MAX 0.9 V

7) Check bias on PA transistors, base lead. On drivers, be careful not to short B to C, this will destroy the transistor.

	RECEIVE	TRANSMIT
DRIVERS	0 V	0.70 V TYP
FINALS	0 V	0.65 V TYP

8) Check band switches, front panel switches, rear panel switch, front panel controls, and plug in boards for any intermittent operation.

9) Check MPN3404/1S2186/1SS135 CR1401, CR1402 calibrator diodes on the high pass filter assembly front. Checks can be done with an ohm meter or by signal check. To do signal check, inject a 0.5 micro volt signal on 7309 KHz and tune in signal noting dB level on an AC voltmeter connected across speaker. Turn on calibrator, AC level should drop 2 to 3 dB.

10) Minor check of all oscillators, 40 MHz, 53.695 MHz, 5.645 MHz.

TRANSMITTER ALIGNMENT

- 11) Predriver pot should be set full counter clockwise on version 2 board, about 12 o'clock on version 1 board. But it is best NOT to re-adjust this pot on version 1 of this board (the one with two SRF2281s) unless necessary. Readjusting can cause this pot to become intermittent.
- 12) Set radio for 10 meters, AM full carrier, into a 50 ohm load.
- 13) Adjust L1013 (right coil on PBT board) to reduce output by 50%. In the following peaking steps, additional detuning may be necessary to keep transmitter out of ALC (green light).
- 14) Peak the following for maximum output. On the PBT board L1014, L1009, L1011, L1012. On 2nd IF/Audio T1101. On the up converter piston capacitor C418 (adjustment could be flaky). On the 2nd mixer L702 (only if need to get last few watts to make specs). Now peak L1013 on the PBT board, if transmitter goes into ALC, reduce carrier control to continue peaking.
- 15) Go to 29.5 to 30.0 MHz segment, AM output should be 40 to 50 watts.
- 16) After 30 minute warmup, set +10 volts (9.97 to 10.00 volts on digital meter), set 40 MHz +/-10 Hz (tweak +10 V by +/- 0.2V if necessary to get set, to avoid changing crystal or capacitor).
- 17) Turn on manual PBT control, and adjust control for center 12 o'clock position. On the PBT board, adjust L1005 for 53.695 MHz +/- 10 Hz, and adjust C1030 for 5.645 MHz +/-10 Hz.
- 18) Turn off manual PBT control. Adjust pots on power supply board for the following (+/- 10 Hz): USE 5643.60 MHz, LSB 5646.40 MHz, CW 5644.20 MHz, RTTY 5647.20 MHz, AM 53.695 MHz.
- 19) Check RIT center. Compare off setting with on setting of control at 12 o'clock. Off setting adjustment is pot on parent board under PTO.
- 20) Wattmeter null. Set radio for 20 meter CW, 100 watts output into 50 ohm load. Connect VTVM to red wire on ALC board and adjust piston capacitor C2005 on Low Pass Filter assembly, rear, for minimum voltage (usually 300 millivolts or less).
- 21) Set forward and reflected power. Forward (FWD) – 100 watts on 20 meters (R2001, right). Reflected: remove load, turn power down till out of ALC, note forward wattmeter reading, switch to reflected (REF) and adjust (R2002, left) for same reading. Reconnect load.
- 22) Set ALC for 120 watts output on 20 meters (front panel green light lights) (R1613, bottom of high pass filter assembly). Typical 10 meter ALC 70 to 90 watts.
- 23) Check two tone all bands, no flat topping on monitor scope and that ALC works. Slight flat topping allowed on 10 meters, typical output 40 to 50 watts (may vary with two tone level and source). If slight flat top on 10 meters, ALC can be readjusted to reduce, apr 110 to 115 watts on 20 meters. If flat topping too much on 10 meters, install 2.7K across R1403, at front switch on high pass filter assembly. See Power output problems, section 3b in trouble shooting guide.
- 24) Check AM carrier output on 10 meters, no mic audio. Minimum 40 watts. If slightly low, readjust predriver pot. Otherwise, check ECNs of parts on the PBT and 2nd IF/Audio boards. See Power output problems, poor AM drive in trouble shooting guide.
- 25) Set to LSB, apply two tone to mic input and adjust mic gain down to bring out of ALC. Note power output and switch to USE and note power. Output power from one side band to the other should be within 3 dB. If not, could be a problem with the crystal filters.

FINAL RECEIVER ALIGNMENT

(Back cover shield (or test shield) installed, check and align steps 26 through 29 only as necessary).

26) Tune radio to a non-calibrator frequency, like 7.309 MHz, on fast AGC, calibrator and PBT off.

27) Set generator to the same frequency, output for about S5 to S7 on the meter. On the 2nd IF/Audio board, peak L1101, L1102, T1102. On the 2nd mixer board, peak L701, L703, C716. Adjust generator to maintain S5 to S7 during alignment.

28) Set generator to 7 microvolts (-90 dBm), tune radio for best signal noting reading on AC voltmeter across speaker. Turn generator down 20 dB (0.7 microvolts, -110 dBm). On the 2nd IF/Audio board, adjust R1136 for only a 2 dB drop on the AC voltmeter from the 7 microvolt (-90 dBm) reference.

29) Adjust R1128 on the 2nd IF/Audio board for an S1 meter reading. Set generator for 50,000 microvolt (-13 dBm) signal. Adjust R1105 for a S9 + 60 meter reading. Switch back and forth from -110 dBm to -13 dBm on the generator and adjust R1128 and R1105 til no more improvement can be made. S9 on the meter will typically be -73 dBm to -77 dBm, but does vary with tracking. Usually favor S1 and S9 readings for pot settings.

30) Check all bands for 10 dB S+N/N (normally will be 12 to 13 dB) for 0.5 microvolts (-113 dBm). Usually can just check one band, because transmit on these bands was OK.

31) On lightning damaged units, or if a problem is reported, be sure to check RV7 functions. Otherwise check is not normally necessary.