

VX-1700 Alignment

The VX-1700 is carefully aligned at the factory for the specified performance across the entire operating frequency range. Realignment should therefore not be necessary except in the event of a component failure. All component replacement and service should be performed only by an authorized Vertex Standard representative, or the warranty policy may be void.

The following procedures cover the sometimes critical and tedious adjustments that are not normally required once the product has left the factory. However, if damage occurs and some parts subsequently are replaced, realignment may be required. If a sudden problem occurs during normal operation, it is likely due to component failure; realignment should not be done until after the faulty component has been replaced.

We recommend that servicing be performed only by authorized Vertex Standard service technicians who are experienced with the circuitry and fully equipped for repair and alignment. Therefore, if a fault is suspected, contact the dealer from whom the product was purchased for instructions regarding repair. Authorized Vertex Standard service technicians realign all circuits and make complete performance checks to ensure compliance with factory specifications after replacing any faulty components.

Those who do undertake any of the following alignments are cautioned to proceed at their own risk. Problems caused by unauthorized attempts at realignment are not covered by the warranty policy. Also, Vertex Standard reserves the right to change circuits and alignment procedures in the interest of improved performance, without notifying owners.

Under no circumstances should any alignment be attempted unless the normal function and operation of the product are clearly understood, the cause of the malfunction has been clearly pinpointed and any faulty components replaced, and realignment determined to be absolutely necessary.

The following test equipment (and thorough familiarity with its correct use) is necessary for complete realignment. Correction of problems caused by misalignment resulting from use of improper test equipment is not covered under the warranty policy. While most steps do not require all of the equipment listed, the interactions of some adjustments may require that more complex adjustments be performed afterwards. Do not attempt to perform only a single step unless it is clearly isolated electrically from all other steps. Have all test equipment ready before beginning, and follow all of the steps in a section in the order presented.

Required Test Equipment

- RF Signal Generator with calibrated output level at 30 MHz
- In-line Wattmeter with 5% accuracy at 30 MHz
- 50 Ohm RF Dummy Load with power rating of 200 W at 30 MHz
- 16 Ohm RF Dummy Load with power rating of 200 W at 30 MHz
- Frequency Counter with 0.02 ppm accuracy at 40 MHz
- AF Signal Generator
- AC Voltmeter
- DC Voltmeter: High input impedance
- DC Ammeter
- HF Sampling Coupler
- IBM PC / compatible Computer with MS-DOS or later operating system
- Vertex Standard CT-62 Programming Cable & CE77 Programming/Alignment Software

Alignment Preparation & Precautions

A 50-Ohm RF Dummy Load and in-line wattmeter must be connected to the ANT jack in all procedures that call for transmission, except where specified otherwise. Correct alignment is not possible with an antenna.

After completing one step, read the following step to determine whether the same test equipment will be required. If not, remove the test equipment (except dummy load and wattmeter, if connected) before proceeding.

Correct alignment requires that the ambient temperature be the same as that of the radio and test equipment, and that this temperature be held constant between 20° and 30 °C (68° ~ 86 °F). When the radio is brought into the shop from hot or cold air, it should be allowed time to come to room temperature before alignment.

Whenever possible, alignments should be made with oscillator shields and circuit boards firmly affixed in place. Also, the test equipment must be thoroughly warmed up before beginning.

Note: Signal levels in dB referred to in the alignment procedure are based on 0dB μ = 0.5 μ V.

Set up the test equipment as shown below, and apply 13.8V DC power to the transceiver.

The VX-1700 must be programmed for use in the intended system before alignment is attempted.

The frequency and other parameters are loaded from the file during the alignment process.

In order to facilitate alignment over the complete operating range of the equipment, it is recommended that the channel data first be uploaded and then stored to disk. Alignment Channel data should then be downloaded. The original data can be replaced at the end of the alignment process.

Reference & Local Alignment

PLL Reference Frequency Alignment

- Connect the Frequency Counter to pin 4 of Q1062 on the MAIN Unit.
- Adjust X1003 on the MAIN Unit for 22.625 MHz \pm 10 Hz on the frequency Counter.

2nd Local Output Level

- Connect the RF millivoltmeter to TP1043 on the MAIN Unit.
- Adjust T1013 on the MAIN Unit for 160 mVrms (\pm 50 mVrms) on the RF millivoltmeter.
- Confirm that the output level is 0 dBm (\pm 2 dB) on the RF millivoltmeter.

PLL Alignment

VCO VCV Alignment

Connect the DC voltmeter to TP1048 on the MAIN Unit, and referring to the Table below, switch the transceiver to each channel listed. Then adjust the listed component for the required voltage or confirm that the correct voltage is present.

Tune to	Adjust or Confirm	For
13.499 MHz	Adjust T1066	5.2 V \pm 0.1 V
0.100 MHz	Confirm	More than 0.6 V
29.999 MHz	Adjust T1067	5.3 V \pm 0.1 V
13.5000 MHz	Confirm	More than 0.5 V

PLL Output Level

- Connect the RF millivoltmeter to TP1039 on the MAIN Unit, then tune the radio to 7.500 MHz.
- Confirm that the output level is more than 10 dBm.

Transmitter Alignment

TX IF Coils Alignment

- Connect the 50 Ohm Dummy Load to the ANT jack.
- Remove the coaxial plug from J1002 on the MAIN Unit, then connect the RF millivoltmeter and 50 Ohm resistor to J1002.
- Connect the AF Generator to pin 5 of the MIC jack.
- Tune the radio to 7.500 MHz, USB mode.
- Inject a 1500 Hz audio signal from the AF Generator.
- Key the transmitter (connect pin 6 of the MIC jack to GND), then adjust the AF Generator output level so that the RF millivoltmeter reading is approximately 0 dBm.
- Adjust T1008, T1009, T1010, and T1011 on the MAIN Unit in succession several times for maximum indication on the RF millivoltmeter while transmitting.

Receiver Alignment

RX IF Coils Alignment

- Connect the RF Signal Generator to the ANT jack, and connect the AF millivoltmeter to the EXT SP jack.
- Tune the radio to 19.900 MHz, CW mode.
- Inject a 19.900 MHz signal from the RF Signal Generator, then adjust the RF Signal Generator output level to 0 dB.
- Adjust T1012 on the MAIN Unit for minimum indication on the AF millivoltmeter.

PA Unit Alignment

Pre-Driver Section Idling Current Alignment

- Connect the 50 Ohm Dummy Load to the ANT jack.
- Remove the shorting-plug from J2003 on the PA Unit, then connect the DC Ammeter to J2003 (pin 1: “-” lead, pin 2: “+” lead).
- Set VR2001 on the PA Unit fully counter-clockwise.
- Tune the radio to 7.500 MHz, USB mode.
- Key the transmitter (connect pin 5 of the MIC jack to GND) with no microphone input, and adjust VR2001 for 300 mA (± 30 mA) on the DC Ammeter.
- Disconnect the DC Ammeter, and replace the shorting-plug into J2002.

Driver Section Idling Current Alignment

- Connect the 50 Ohm Dummy Load to the ANT jack.
- Remove the shorting-plug from J2003 on the PA Unit, then connect the DC Ammeter to J2004 (pin 1: “-” lead, pin 2: “+” lead).
- Set VR2002 on the PA Unit fully counter-clockwise.
- Tune the radio to 7.500 MHz, USB mode.
- Key the transmitter (connect pin 5 of the MIC jack to GND) with no microphone input, and adjust VR2001 for 300 mA (± 30 mA) on the DC Ammeter.
- Disconnect the DC Ammeter, and replace the shorting-plug into J2004.

Final Section Idling Current Alignment

- Connect the 50 Ohm Dummy Load to the ANT jack.
- Remove the solder jumper which is connected between TP2020 and TP2021 on the PA Unit, then connect the “+” lead of the DC Ammeter to TP2020 and the “-” lead to TP2021.
- Set VR2003 on the PA Unit fully counter-clockwise.
- Tune the radio to 7.500 MHz, USB mode.

- Key the transmitter (connect pin 5 of the MIC jack to GND) with no microphone input, and adjust VR2003 for 300 mA (\pm 30 mA) on the DC Ammeter.
- Disconnect the DC Ammeter, and re-connect the solder jumper between TP2020 and TP2021.

CM Coupler Balance

- Connect the 50 Ohm Dummy Load and Inline Wattmeter to the ANT jack, and connect the CW keyer to the KEY jack.
- Connect the DC voltmeter to TP2018 (“+” lead, “-” lead: GND) on the PA Unit.
- Tune the radio to 29.000 MHz, A1A mode.
- Key the transmitter (close the CW key).
- Now adjust TC2001 on the PA Unit for minimum indication on the DC voltmeter.

Software Menu Alignment

The ANT jack should be connected to a Dummy Load (in the case of transmission) or RF Signal Generator (in the case of reception). General alignment conditions are as follows, unless otherwise noted.

VOL Knob: Center (12 o'clock position).

SQL Knob: Fully counter-clockwise.

TX Output Power: HIGH

VOX: Off

The channel data in the radio is preset per the chart below.

Channel	Frequency
1-001	1.7000 MHz
1-002	3.5000 MHz
1-003	5.5000 MHz
1-004	7.5000 MHz
1-005	12.0000 MHz
1-006	19.8000 MHz
1-007	29.0000 MHz

Press and hold in the keypad's [1(MODE)], [4(STEP)], [7(V/M)], and [F] keys simultaneously, and turn on the radio while holding them in; the alignment menu will then be activated.

In the alignment procedures, each alignment parameter is selected by pressing the [ALARM]/[2128] key. Each alignment item is selected by rotating the CH Knob. To **store** the alignment parameters when you are satisfied with the adjustment, press the [F] key for *longer* than a half second.

Note that a few alignment parameters are not adjustable, and are to be left as set at the factory.

TX Output Power Alignment

- Connect the 50 Ohm Dummy Load and Inline Wattmeter to the ANT jack.
- Referring to the Table below, press the [ALARM]/[2128] key to recall each parameter listed, then key the transmitter and rotate the CH knob for the required output.

Parameter	Output Power
1PO-VH	125 W (± 5 W)
1PO-H	100 W (± 5 W)
1PO-MH	50 W (± 5 W)
1PO-ML	25 W (± 1 W)
1PO-L	10 W (± 1 W)
2PO-VH	125 W (± 5 W)
2PO-H	100 W (± 5 W)
2PO-MH	50 W (± 5 W)
2PO-ML	25 W (± 1 W)
2PO-L	10 W (± 1 W)
3PO-VH	125 W (± 5 W)
3PO-H	100 W (± 5 W)
3PO-MH	50 W (± 5 W)
3PO-ML	25 W (± 1 W)
3PO-L	10 W (± 1 W)
4PO-VH	125 W (± 5 W)
4PO-H	100 W (± 5 W)
4PO-MH	50 W (± 5 W)
4PO-ML	25 W (± 1 W)
4PO-L	10 W (± 1 W)
5PO-VH	125 W (± 5 W)
5PO-H	100 W (± 5 W)
5PO-MH	50 W (± 5 W)
5PO-ML	25 W (± 1 W)
5PO-L	10 W (± 1 W)
6PO-VH	125 W (± 5 W)
6PO-H	100 W (± 5 W)
6PO-MH	50 W (± 5 W)
6PO-ML	25 W (± 1 W)
6PO-L	10 W (± 1 W)
7PO-VH	125 W (± 5 W)
7PO-H	100 W (± 5 W)
7PO-MH	50 W (± 5 W)
7PO-ML	25 W (± 1 W)
7PO-L	10 W (± 1 W)

TX Gain Alignment

- Connect the 50 Ohm Dummy Load and Inline Wattmeter to the ANT jack.
- Connect the AF Generator to pin 5 of the MIC jack, and adjust the AF Generator output level to 0.5 mV @1 kHz.
- Referring to the Table below, press the [ALARM]/[2128] key to recall each parameter listed, then key the transmitter and rotate the CH knob for the required output.

Parameter	Output Power
1TX-G-H	50 W (\pm 10 W)
2TX-G-H	63 W (\pm 10 W)
3TX-G-H	50W (\pm 10 W)
4TX-G-H	50W (\pm 10 W)
5TX-G-H	50W (\pm 10 W)
6TX-G-H	50W (\pm 10 W)
7TX-G-H	50W (\pm 10 W)
1TX-G-L	5 W (\pm 1 W)
2TX-G-L	5 W (\pm 1 W)
3TX-G-L	5W (\pm 1 W)
4TX-G-L	5W (\pm 1 W)
5TX-G-L	5W (\pm 1 W)
6TX-G-L	5W (\pm 1 W)
7TX-G-L	5W (\pm 1 W)

REV ALC Alignment

- Connect the 16 Ohm Dummy Load (or three 50 Ohm Dummy Loads in parallel) to the ANT jack.
- Referring to the Table below, press the [ALARM]/[2128] key to recall each parameter listed, then key the transmitter and rotate the CH knob just to the point when the S-meter reading is changed from S-7 to S-8.

Parameter	S-meter reading
1R-ALC	S-7 to S-8 threshold.
2R-ALC	S-7 to S-8 threshold.
3R-ALC	S-7 to S-8 threshold.

SWR Alignment

- Connect the 16 Ohm Dummy Load (or three 50 ohm Dummy Loads in parallel) to the ANT jack.
- Press the [ALARM]/[2128] key to recall the parameter "1_SWR3," then press the [ENT] key.
- Press the [2128] key momentarily to recall the parameter "2_SWR3," then press the [ENT] key.
- Press the [2128] key momentarily to recall the parameter "3_SWR3," then press the [ENT] key.

This completes the internal alignment routine.

To save all settings and exit, press and hold in the [ENT] key for at least one second.