

VX-2500V Alignment

Introduction

The VX-2500V is carefully aligned at the factory for the specified performance across the frequency range specified for each version. Realignment should therefore not be necessary except in the event of a component failure, or altering version type. 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 transceiver has left the factory. However, if damage occurs and some parts subsequently are placed, 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 transceiver 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 transceiver 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 1000MHz
- ☐ Deviation Meter (linear detector)
- ☐ In-line Wattmeter with 5% accuracy at 1000MHz
- ☐ 50- Ω RF Dummy Load with power rating 100W at 1000MHz
- ☐ 4- Ω AF Dummy Load
- ☐ Regulated DC Power Supply (standard 13.8V DC, 15A)

- ☐ Frequency Counter with 0.1ppm accuracy at 1000MHz
- ☐ AC Voltmeter
- ☐ DC Voltmeter
- ☐ VHF Sampling Coupler
- ☐ IBM PC / compatible Computer
- ☐ Oscilloscope
- ☐ Vertex Standard VPL-1 Connection Cable & Alignment program

Alignment Preparation & Precautions

A 50-Ω RF Dummy Load and in-line wattmeter must be connected to the main antenna 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, in connected) before proceeding.

Correct alignment requires that the ambient temperature be the same as that of the transceiver and test equipment, and that this temperature be held constant between 20 and 30°C (68 ~ 86 °F). When the transceiver 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
0dBμ EMF = 0.5μV.

Setup the test equipment as shown for transceiver alignment, apply 13.8V DC power to the transceiver. Refer to the drawings above for Alignment Points.

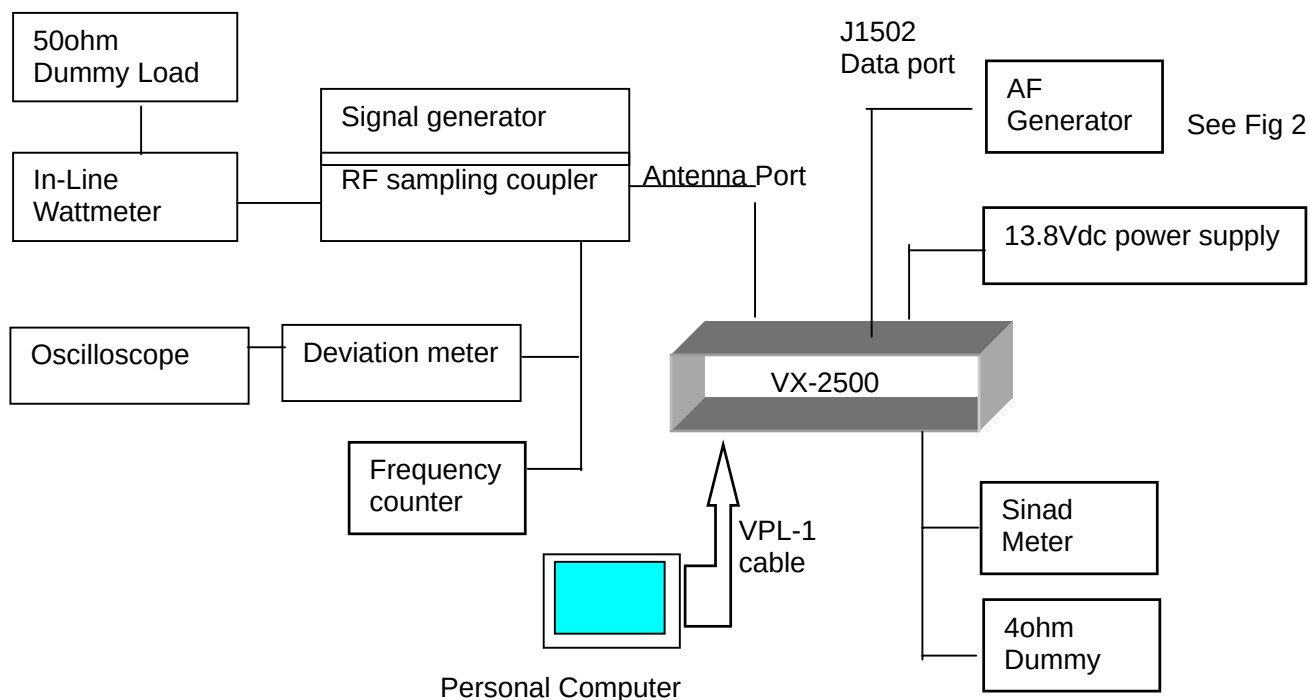
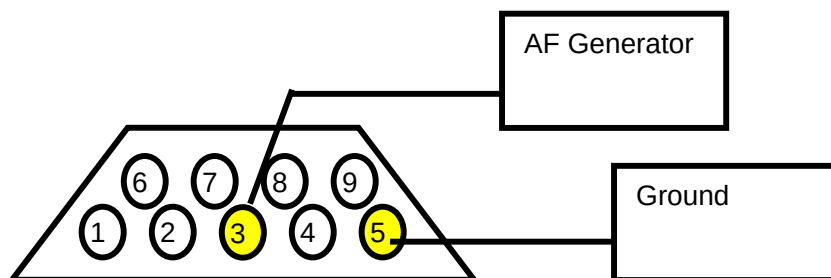


Fig.1 Alignment Setup



(Fig 2: J1502 connection for the modulation adjustment)

The transceiver must be programmed for use in the intended system before alignment is attempted. The RF parameters are loaded from the file during the alignment process.

[Important]

In order to facilitate alignment over the complete switching range of the equipment it is recommended that the channel data in the transceiver is preset as the chart below.

Table.1 RF Ch. List

RF Ch. list	Ch. Space	Frequency(Simplex)	
		Ver. C	
Ch #1	Wide	161.100	MID Frequency(Wide) [use in the SVC47]
Ch #2	Narrow	161.100	MID Frequency(Narrow) [use in the SVC47]
Ch #3	Wide	148.100	LOW Frequency [for PLL VCV adjustment]
Ch #4	Wide	173.900	HIGH Frequency [for PLL VCV adjustment]

The alignment mode is accessed by “Alignment mode” command from the computer whilst switching on. And it is operated by the alignment tool automatically.

During the alignment mode, normal operation is suspended. Use the alignment tool program running on PC.

• PLL VCV

- ☐ Connect the positive lead of the DC voltmeter to the test point TP1007 (VCV) on the RF-Unit, as indicated in the figure, and the negative lead to chassis ground.
- ☐ Set the transceiver to the high band edge frequency channel, then adjust coil L1017 on the Unit for 4.25V on the voltmeter.
- ☐ Key the transmitter, and adjust coil L1020 on the Unit for 4.25V on the voltmeter.
- ☐ Next select to the low edge frequency channel and confirm above 0.80V to 1.50V on the voltmeter.
- ☐ Key the transmitter, and confirm above 1.00V to 1.50V on the voltmeter.

• PLL Reference Frequency

With the wattmeter, dummy load and frequency counter connected to the antenna jack, and select band center frequency channel, key the transmitter and adjust VR1001 on the RF-Unit, if necessary, so the counter frequency is within 100 Hz of the channel center frequency for the transceiver version.

The alignment tool outline

Installation the tool

This alignment tool consists,MS-DOS based, only one execute file " svc47.exe ". You make a
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directly as you think fit, and copy this file. That is all of the installation process.

Boot the tool

Change directly and input in command line, " svc47 [enter] ", and boot the alignment tool.

Preparation

Setup the test equipment as "Alignment Preparation & Precautions".
Set the RF Ch. List to Table1 on the CE47 Clone editor software.

Enter to the alignment mode

To enter the alignment mode, and press "[0] Alignment Mode" on the personal computer Key board. You turn off the power of the transceiver, and turn on the transceiver. If entry succeed,the alignment tool display as follows.

[0]Common TX

[1]Common RX

Action of the switches

When the transceiver is in alignment mode, the action of [PTT], [MON],[UP],[DOWN] is ignored. All of the action is remote controlled by PC.

Menu of the tool

[0]Common TX

- [0] Tx Power High

This parameter is used to align TX High power (25W).

Press [Enter] on "[0] Tx Power High" to align TX High power.

Select the Channel 1 in alignment range.

Press the [Space] key on the keyboard to activate the transmitter.

Press the [UP]/[DWN] key, as need, to set the power output to the following specification, as indicated on the external wattmeter.

Tx Power High:25[W](± 0.5 W)

When the 25Watt level is attained, press [Enter] to lock in the new data.

- [1] Tx Power Low

This parameter is used to align TX Low power (5W).

Press [Enter] on "[1] Tx Power Low" to align TX Low power.

Select the Channel 1 in alignment range.

Press the [Space] key on the keyboard to activate the transmitter.

Press the [UP]/[DWN] key, as need, to set the power output to the following specification, as indicated on the external wattmeter.

Tx Power Low:5[W](± 0.1 [W])

When the 5Watt level is attained, press [Enter] to lock in the new data.

- [2] VCO Deviation

This parameter is used to align the VCO Deviation.

Press [Enter] on "[2] VCO Deviation" to align VCO Deviation.

Select the Channel 1 in alignment range.

Adjust the AF generator output level to 388mVrms(-6dBm) at 1 kHz to the pin3 of the J1502 (-sub 9pin).

Press the [Space] key on the keyboard to activate the transmitter.

Press the [UP]/[DWN] key, as need, to set the VCO Deviation (Wide) to the following

specification, as indicated on the deviation meter.

When the desired deviation level is attained, press [Enter] to lock in the new data.

Select the Channel 2, and set the VCO Deviation (Narrow), same as Channel 1.

VCO Deviation(Wide) :4.0[kHz](±0.1[kHz])

VCO Deviation(Narrow):2.0[kHz](±0.1[kHz])

- [3] REF Deviation

This parameter is used to align the REF Deviation.

Press [Enter] on "[3] REF Deviation" to align REF Deviation.

Select the Channel 1 in alignment range.

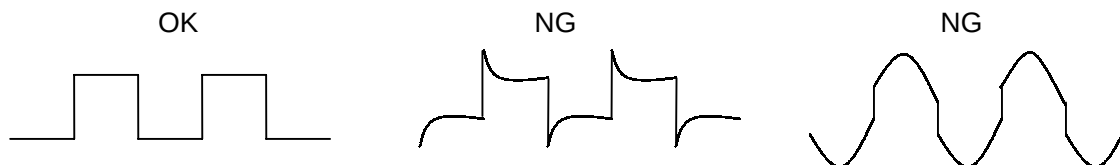
Adjust the AF generator output level to 388mVrms(-6dBm) at 100Hz to the pin3 of the J1502.

Press the [Space] key on the keyboard to activate the transmitter.

Press the [UP]/[DWN] key, as need, to set the modulation wave as follows.

Press [Enter] to lock in the new data.

Select the Channel 2, and set the modulation wave, same as Channel 1.



- [4] CTCSS Deviation

This parameter is used to align the CTCSS deviation.

Press [Enter] on "[4] CTCSS Deviation" to align CTCSS Deviation.

Select the Channel 1 in alignment range.

Press the [Space] on the keyboard to activate the transmitter, and injects a CTCSS test tone.

Press the [UP]/[DWN] key, as need, to set the CTCSS Deviation (Wide) to the following specification.

Press [Enter] to lock in the new data.

Select the Channel 2, and set the CTCSS Deviation (Narrow), same as Channel 1.

CTCSS Deviation(Wide) :0.70[kHz](±0.1[kHz])

CTCSS Deviation(Narrow):0.35[kHz](±0.1[kHz])

- [5] DCS Deviation

This parameter is used to align the DCS deviation.

Press [Enter] on "[5] DCS Deviation" to align DCS Deviation.

Select the Channel 1 in alignment range.

Press the [Space] key on the keyboard to activate the transmitter, and injects a DCS test tone.

Press the [UP]/[DWN] key, as need, to set the DCS deviation (Wide) to the following specification.

Press [Enter] to lock in the new data.

Select the Channel 2, and set the DCS deviation (Narrow), same as Channel 1.

DCS Deviation(Wide) :0.60[kHz](±0.1[kHz])

DCS Deviation(Narrow):0.30[kHz](±0.1[kHz])

The actual DCS deviation will increase around 20% based on the above alignment as follows,

Actual DCS Deviation(Wide) :0.70[kHz]

Actual DCS Deviation(Narrow):0.35[kHz]

- [6] LTR Deviation

This parameter is used to align the LTR deviation.

Press [Enter] on "[6] LTR Deviation " to align LTR Deviation.

Select the Channel 1 in alignment range.

Press the [Space] key on the keyboard to activate the transmitter, and injects a LTR test tone.

Press the [UP]/[DWN] key, as need, to set the LTR Deviation (Wide) to the following specification.

Press [Enter] to lock in the new data.

Select the Channel 2, and set the LTR deviation (Narrow), same as Channel 1.

LTR Deviation(Wide) :0.80[kHz](± 0.1 [kHz])

LTR Deviation(Narrow) :0.60[kHz](± 0.1 [kHz])

The actual LTR deviation will increase around 20% based on the above alignment as follows,

Actual LTR Deviation(Wide) :1.00[kHz]

Actual LTR Deviation(Narrow):0.70[kHz]

[1]Common RX

- [0] Tight NSQL

This parameter is used to align the noise level in squelch Tight.

It adjusts this alignment RX Tuning after ending.

Select the MID frequency channel in alignment range.

Set the SG output level to -2.5dB μ V, and obey the message.

- [1] Threshold NSQL

This parameter is used to align the noise level in squelch Threshold.

It adjusts this alignment RX Tuning after ending.

Select the MID frequency channel in alignment range.

Set the SG output level to -8.5dB μ V, and obey the message.

- [2] RX Tune

This parameter is used to align RX Tune.

Select the MID frequency channel in alignment range.

Set the SG output level to -8.0dB μ V.

Pressing the [DWN] key, reduce the RX Tune Level and set the SINAD above 12dB.