VX-5R Alignment

Introduction

The VX-5R is carefully aligned at the factory for the specified performance across the amateur band. Realignment should therefore not be necessary except in the event of a component failure. Only an authorized Yaesu representative should perform all component replacement and service, or the warranty policy may be void. The following procedures cover the adjustments that are not normally required once the transceiver 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 Yaesu service technicians who are experienced with the circuitry and fully equipped for repair and alignment. If a fault is suspected, contact the dealer from whom the transceiver was purchased for instructions regarding repair. Authorized Yaesu 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, Yaesu 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 familiarity with its 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 500 MHz
? Deviation Meter (linear detector)
? In-line Wattmeter with 5% accuracy at 500 MHz
? 50-Ω, 10-W RF Dummy Load
? 8-Ω AF Dummy Load
? Regulated DC Power Supply adjustable from 3 to 15 VDC, 2A
? Frequency Counter: 0.2-ppm accuracy at 500 MHz
? AF Signal Generator
? AC Voltmeter
? DC Voltmeter: high impedance
? VHF Sampling Coupler
? SINAD Meter

Alignment Preparation & Precautions

A 10-W RF load and in-line wattmeter must be connected to the main antenna jack in all procedures that call for transmission, alignment is not possible with an antenna. After completing one step, read the next step to see if the same test equipment is 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 transceiver and test equipment, and that this temperature be held constant between 20~30°C (68~86°F). When the transceiver is brought into the shop from hot or cold air, it should be allowed some 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 0dBm=0.5 μV.

Test Setup

Set up the test equipment as shown below for transceiver alignment, apply 12 VDC power to the transceiver. Refer to the drawings for Alignment Points.

PLL Reference Frequency

With the wattmeter, dummy load and frequency counter connected to the antenna jack, and while tuned to the center of the band, transmit and adjust **TC2001** on the AF Unit, if necessary, so the counter frequency is within 100 Hz of the displayed frequency on the VX-5R.

UHF band Tx Deviation Adjustment

? With the wattmeter, dummy load and frequency counter connected to the antenna jack, adjust the AF generator attenuator level for 80mV rms @ 1 kHz to the **MIC** jack.
? Transmit and adjust **VR1003** to obtain 4.2-4.5 kHz indicated on the deviation meter (3.7-4.0 kHz for A1, A2A, A2B & A3 versions).

144MHz band Tx Deviation Adjustment
? With the wattmeter, dummy load and frequency counter connected to the antenna jack, adjust the AF generator attenuator level for 80mV rms @ 1 kHz to the **MIC** jack.
? Transmit and adjust **VR1002** to obtain 4.2-4.5 kHz indicated on the deviation meter (3.7-4.0 kHz for A1, A2A, A2B & A3 versions).

50MHz band Tx Deviation Adjustment
? With the wattmeter, dummy load and frequency counter connected to the antenna jack, adjust the AF generator attenuator level for 80mV rms @ 1 kHz to the **MIC** jack.
? Transmit and adjust **VR1001** to obtain 4.2-4.5 kHz indicated on the deviation meter (3.7-4.0 kHz for A1, A2A, A2B & A3 versions).

CTCSS Tx Deviation Adjustment
? Tune to the center of both band, and enable 88.5 Hz CTCSS encode.
? With the wattmeter, dummy load and frequency counter connected to the antenna jack, transmit and adjust **VR1004** to obtain 0.5-0.7 kHz as indicated on the deviation meter.

FM-Wide Alignment
? With the transceiver and RF signal generator both tuned to 76.1 MHz, modulate the RF signal generator with 75-kHz deviation of a 1-kHz tone, and inject +40 dBμ at the antenna jack.
? Adjust **T2001** for optimum SINAD on deviation meter.

Internal System Alignment Routine

This uses a programmed routine in the transceiver which simplifies many previously complex discrete component settings and adjustments with digitally-controlled settings via front panel buttons and LCD indications. Transceiver adjustments include:
? Squelch Hysteresis
? Squelch Threshold & Tight Adjustment
? S-Meter Full Scale & S-1 Adjustment
? Wide-FM S-Meter Full Scale & S-1 Adjustment

? Power Output Adjustment (Hi/L3/L2/L1)

50MHz band Alignment

? To begin, set the transceiver to the center of the 50MHz band, then turn the transceiver off.

? Next, *press and hold* the knob, **BAND**, **TXPO** and **0** button together while powering the radio again. The display shows the first setting.

Note that the first settings are not adjustable and are left as set from the factory.

In the alignment, each adjustment is selected by rotating the knob. Alignment is performed by pressing the knob, then injecting a signal of the required frequency and level.

Pressing knob after a level setting or adjustment is made stores the entry. To exit the alignment routine, press **HOME** button. After performing the system alignment in its entirety, individual settings can be returned to and adjusted should the need arise.

Squelch Hysteresis Adjust (HIS SQL 0)

? Select the squelch hysteresis level by DIAL.

Squelch Preset Threshold (THLD SQL 88)

? Inject a -15dBμ (-13.5dBμ : Version B1, B2A, B2B, C1, C2A, C2B, D1, D2A and D2B) RF signal (3.5kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

Squelch Preset Tight (TIGH SQL 54)

? Adjust the generator level for a -4dBμ (-2.5dBμ : Version B1, B2A, B2B, C1, C2A, C2B, D1, D2A and D2B) signal, then press the **MR** button and rotate it for the next setting.

Low-Scale S-1 Adjustment (S1 LEVEL 12)

? Adjust the generator level to -7dBμ (3.5kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

S-Meter Full-Scale Adjust (S9 LEVEL 106)

? Adjust the generator level to +20dBμ (3.5kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

Wide Low-Scale S-1 Adjustment (S1 LEVEL 13)

? Adjust the generator level to -0dBμ (20kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

Wide S-Meter Full-Scale Adjust (S9 LEVEL 131)

? Adjust the generator level to +20dB μ (20kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

High TX Power Adjust (Hl POWER 112)

? Transmit and adjust the output power level for 5 W by rotating the knob.
? Press the **MR** button to save the entry and rotate it for the next setting.

L3 Tx Power Adjust (L3 POWER 74)

? Transmit and adjust the output power level for 2.5 W using the knob.
? Press the **MR** button to save the entry and rotate it for the next setting.

L2 Tx Power Adjust (L2 POWER 42)

? Transmit and adjust the output power level for 1 W by rotating the knob.
? Press the **MR** button to save the entry and rotate it for the next setting.

L1 Tx Power Adjust (L1 POWER 21)

? Transmit and adjust the output power level for 0.3 W using the knob.
? Press the **MR** button to save the entry.
? This completes the 50MHz-band internal alignment routine, to save all settings and exit, press **BAND** button.

144MHz band Alignment

? To begin, set the transceiver to the center of the 144MHz band, then turn the transceiver off.
? Next, *press and hold* the knob, **BAND**, **TXPO** and **0** button together while powering the radio again. The display shows the first setting.

Note that the first settings are not adjustable and are left as set from the factory.

In the alignment, each adjustment is selected by rotating the knob. Alignment is performed by pressing the knob, then injecting a signal of the required frequency and level.

Pressing knob after a level setting or adjustment is made stores the entry. To exit the alignment routine, press **HOME** button. After performing the system alignment in its entirety, individual settings can be returned to and adjusted should the need arise.

Squelch Hysteresis Adjust (HIS SQL 0)

? Select the squelch hysteresis level by DIAL.

Squelch Preset Threshold (THLD SQL 92)

? Inject a -15dB μ (-13.5dB μ : Version B1, B2A, B2B, C1, C2A, C2B, D1, D2A and D2B) RF signal (3.5kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

Squelch Preset Tight (TIGH SQL 44)

? Adjust the generator level for a -4dB μ (-2.5dB μ : Version B1, B2A, B2B, C1, C2A, C2B, D1, D2A and D2B) signal, then press the **MR** button and rotate it for the next setting.

Low-Scale S-1 Adjustment (S1 LEVEL 24)

? Adjust the generator level to -7dB μ (3.5kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

S-Meter Full-Scale Adjust (S9 LEVEL 120)

? Adjust the generator level to +20dB μ (3.5kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

Wide Low-Scale S-1 Adjustment (S1 LEVEL 51)

? Adjust the generator level to -0dB μ (20kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

Wide S-Meter Full-Scale Adjust (S9 LEVEL 170)

? Adjust the generator level to +20dB μ (20kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

High TX Power Adjust (HI POWER 118)

? Transmit and adjust the output power level for 5 W by rotating the knob.
? Press the **MR** button to save the entry and rotate it for the next setting.

L3 Tx Power Adjust (L3 POWER 76)

? Transmit and adjust the output power level for 2.5 W using the knob.
? Press the **MR** button to save the entry and rotate it for the next setting.

L2 Tx Power Adjust (L2 POWER 44)

? Transmit and adjust the output power level for 1 W by rotating the knob.
? Press the **MR** button to save the entry and rotate it for the next setting.

L1 Tx Power Adjust (L1 POWER 21)

? Transmit and adjust the output power level for 0.3 W using the knob.
? Press the **MR** button to save the entry.
? This completes the 144MHz-band internal alignment routine, to save all settings

and exit, press **BAND** button.

UHF band Alignment

? To begin, set the transceiver to the center of the UHF band, then turn the transceiver off.

? Next, *press and hold* the knob, **BAND**, **TXPO** and **0** button together while powering the radio again. The display shows the first setting.

Note that the first settings are not adjustable and are left as set from the factory.

In the alignment, each adjustment is selected by rotating the knob. Alignment is performed by pressing the knob, then injecting a signal of the required frequency and level.

Pressing knob after a level setting or adjustment is made stores the entry. To exit the alignment routine, press **HOME** button. After performing the system alignment in its entirety, individual settings can be returned to and adjusted should the need arise.

Squelch Hysteresis Adjust (HIS SQL 0)

? Select the squelch hysteresis level by DIAL.

Squelch Preset Threshold (THLD SQL 86)

? Inject a -15dBμ (-13.5dBμ : Version B1, B2A, B2B, C1, C2A, C2B, D1, D2A and D2B) RF signal (3.5kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

Squelch Preset Tight (TIGH SQL 55)

? Adjust the generator level for a -4dBμ (-2.5dBμ : Version B1, B2A, B2B, C1, C2A, C2B, D1, D2A and D2B) signal, then press the **MR** button and rotate it for the next setting.

Low-Scale S-1 Adjustment (S1 LEVEL 7)

? Adjust the generator level to -7dBμ (3.5kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

S-Meter Full-Scale Adjust (S9 LEVEL 96)

? Adjust the generator level to +20dBμ (3.5kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

Wide Low-Scale S-1 Adjustment (S1 LEVEL 13)

? Adjust the generator level to -0dBμ (20kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

Wide S-Meter Full-Scale Adjust (S9 LEVEL 134)

? Adjust the generator level to +20dBμ (20kHz deviation @ 1-kHz), then press the **MR** button and rotate it for the next setting.

High TX Power Adjust (HI POWER 172)

? Transmit and adjust the output power level for 4.5 W by rotating the knob.
? Press the **MR** button to save the entry and rotate it for the next setting.

L3 Tx Power Adjust (L3 POWER 119)

? Transmit and adjust the output power level for 2.5 W using the knob.
??Press the **MR** button to save the entry and rotate it for the next setting.

L2 Tx Power Adjust (L2 POWER 69)

? Transmit and adjust the output power level for 1 W by rotating the knob.
? Press the **MR** button to save the entry and rotate it for the next setting.

L1 Tx Power Adjust (L1 POWER 35)

? Transmit and adjust the output power level for 0.3 W using the knob.
? Press the **MR** button to save the entry.
? This completes the UHF band internal alignment routine, to save all settings and exit, press **HOME** button.

ID: K66VX-5R
ACTIVE COMPONENT LIST

Address	DevIC	Description	Application
[CNTL-UNIT]			
D 1001	Diode	UDZTE-17 5.1B	Static Protect
D 1002	LED	AA1101F-TR	Lamp
D 1003	Diode	1SS400 TE61	SW
D 1004	LED	AA1101F-TR	Lamp
D 1005	Diode	DA221 TL	IDC
D 1006	Diode	RD2.0UM-T2	BATT Charge
D 1007	Diode	RB521S-30 TE6	PWR SW
D 1008	Diode	1SS400 TE61	SW
D 1009	Diode	DA221 TL	Reset
D 1010	Diode	DA221 TL	Reset
D 1011	Diode	1SS400 TE61	Matrix
D 1012	Diode	HN2D01FUTE85R	Matrix
D 1013	Diode	RB521S-30 TE6	3V Reg.
D 1014	Diode	UMP11N TN	Matrix
D 1015	Diode	UMP11N TN	Matrix
D 1016	Diode	RB521S-30 TE6	3V Reg.
D 1017	Diode	RB521S-30 TE6	6.5V DC-DC Convert
D 1018	Diode	1SS400 TE61	SW
D 1019	LED	AA1111C-TR	Lamp
D 1020	LED	AA1111C-TR	Lamp
D 1021	LED	AA1111C-TR	Lamp
D 1022	LED	AA1111C-TR	Lamp
D 1023	LED	AA1111C-TR	Lamp
D 1024	LED	AA1111C-TR	Lamp
Q 1001	Transistor	DTA144EE TL	TX/RX SW
Q 1002	Transistor	2SD1801S-TL	BATT Charge
Q 1003	IC	HD6473877UX(NO PROG.)	CPU
Q 1004	Transistor	2SC5374-TL	Shift SW
Q 1005	Transistor	DTC143ZE TL	PWR SW
Q 1006	Transistor	2SC4617 TL R	Reset
Q 1007	Transistor	DTC144EE TL	IDC
Q 1008	Transistor	DTC124TE TL	TX/RX SW
Q 1009	IC	M24C64-WMN6T	EEPROM
Q 1010	Transistor	UMD2N TR	ROM Reset
Q 1011	IC	S-80730SN-DT-T1	Reset
Q 1012	IC	BA030LBSG-TR	3V Reg.
Q 1013	IC	S-81230SG-QB-T1	3V Reg.
Q 1014	IC	NJM3403AV(TE1)	Mic AMP/IDC/LPF
Q 1015	IC	BA10358FV-E2	Buffer AMP/LPF
Q 1016	IC	RH5RH651A-T1	6.5V DC-DC Convert
Q 1017	IC	S-80730SN-DT-T1	3V Reg.
Q 1018	Transistor	UMW1N TR	TX/RX SW
Q 1019	Transistor	CPH6102-TL	TX/RX SW
[AF-UNIT]			
D 2001	Diode	DAP222-TL	SW
D 2002	Diode	DA221 TL	Noise Detect
D 2003	Diode	DA221 TL	Limitter
D 2004	Diode	1SS372(TE85R)	Signal Detect
D 2005	Diode	1SS400 TE61	Multiplier
D 2006	Diode	RD6.8UMB2-T1B	Audio DC Control
D 2007	Diode	1SV286(TPL3)	DCS Modulation
D 2008	Diode	1SV286(TPL3)	Ref. Osc.
D 2009	Diode	DA221 TL	Limitter
D 2010	Diode	1SS400 TE61	Ref. Osc.
D 2011	LED	BRPG1211C-TR	BUSY/TX LED
D 2012	Diode	DAN222 TL	SW
D 2013	Diode	1SS400 TE61	SW
D 2014	Diode	DA221 TL	Limitter
Q 2001	Transistor	DTC144EE TL	Narrow/Wide SW
Q 2002	Transistor	2SC4400-4-TL	IF AMP
Q 2003	Transistor	UMB3N TN	Narrow/Wide SW
Q 2004	Transistor	2SC5374-TL	IF AMP
Q 2005	IC	TK10930VT1	Narrow IF Subsystem
Q 2006	IC	TA7792F(TP1)	Wide IF Subsystem
Q 2007	Transistor	2SC4400-4-TL	Signal AMP
Q 2008	Transistor	2SC4400-4-TL	Signal AMP
Q 2009	Transistor	UMG1N TR	AM/FM SW
Q 2010	MOSFET	HN1J02FU(TE85L)	Mute SW
Q 2011	Transistor	UMX3N TR	De-emphasis
Q 2012	Transistor	UMD2N TR	Audio DC Control
Q 2013	Transistor	2SC4400-4-TL	Multiplier
Q 2014	Transistor	2SC4617 TL R	Audio DC Control
Q 2015	Transistor	CPH6102-TL	Audio DC Control
Q 2016	Transistor	DTC143ZE TL	DC Charge Mute
Q 2017	Transistor	2SC4617 TL R	OSC AMP
Q 2018	Transistor	2SC4617 TL R	Ref. Osc.
Q 2019	IC	TDA7233D-TR	Audio AMP
Q 2020	FET	2SJ144GR TE85R	AF Mute
Q 2021	Transistor	UMD2N TR	Clone SW
Q 2022	Transistor	UMG2N TR	LED SW
Q 2023	FET	2SK2170-TL	AGC
Q 2024	Transistor	UMH6N TR	AGC
Q 2025	Transistor	FC119-TL	RF AMP
Q 2026	Transistor	2SC4400-4-TL	Mixer
Q 2027	Transistor	UMA2N TR	TX/RX SW
Q 2028	Transistor	DTC144EE TL	TX/RX SW
[RF-UNIT]			
D 3002	Diode	1SS362 TE85R	Limitter
D 3003	Diode	1SS362 TE85R	Limitter

Address	DevIC	Description	Application
D 3006	Diode	U3FWJ44NTE12R	Circuit protect
D 3008	Diode	HVC358B(TAPE)	BPF
D 3009	Diode	HSC277TRF	SW
D 3010	Diode	DAN235E TL	SW
D 3012	Diode	HVC358B(TAPE)	BPF
D 3013	Diode	HVC300A(TAPE)	BPF
D 3014	Diode	HVC350B-TRF	BPF
D 3015	Diode	HVC358B(TAPE)	BPF
D 3016	Diode	HVC300A(TAPE)	BPF
D 3017	Diode	1T412-M20-T8A	BPF
D 3018	Diode	HVC362TRF	BPF
D 3019	Diode	HVC362TRF	BPF
D 3020	Diode	HVC350B-TRF	BPF
D 3021	Diode	1T412-M20-T8A	BPF
D 3022	Diode	HVC362TRF	BPF
D 3023	Diode	HVC362TRF	BPF
D 3024	Diode	HVC358B(TAPE)	BPF
D 3025	Diode	DAN235E TL	SW
D 3026	Diode	1SS400 TE61	SW
D 3027	Diode	1SS400 TE61	SW
D 3028	Diode	DAN222 TL	SW
D 3029	Diode	DAN222 TL	SW
D 3030	Diode	DAN222 TL	SW
D 3031	Diode	DAN222 TL	APC Sens.
D 3032	Diode	HN2D01FUTE85R	SW
D 3033	Diode	1SS355 TE-17	SW
D 3034	Diode	1SV307(TPH3)	ANT SW
D 3035	Diode	1SV307(TPH3)	ANT SW
D 3036	Diode	1SV307(TPH3)	ANT SW
D 3037	Diode	1SS400 TE61	Ripple Filter
D 3038	Diode	1SV307(TPH3)	ANT SW
D 3039	Diode	1SV307(TPH3)	ANT SW
D 3040	Diode	1SV307(TPH3)	ANT SW
D 3041	Diode	1SV271 TPH3	ANT SW
D 3042	Diode	1SV271 TPH3	ANT SW
D 3043	Diode	1SV271 TPH3	ANT SW
D 3044	Diode	1SS321 TE85R	APC Detect
D 3045	Diode	DAN222 TL	ANT SW
D 3046	Diode	DAN222 TL	SW
D 3047	Diode	1SS400 TE61	SW
Q 3007	Transistor	2SC5374-TL	RF AMP
Q 3008	Transistor	UMX3N TR	Level CNTL
Q 3009	Transistor	2SC4400-4-TL	RF AMP
Q 3010	Transistor	2SC5277-D2-TL	RF AMP
Q 3011	Transistor	2SC5374-TL	RF AMP
Q 3013	Transistor	2SC5374-TL	RF AMP
Q 3016	Transistor	2SC5374-TL	Buffer AMP
Q 3017	Transistor	2SC4400-4-TL	Mixer
Q 3018	Transistor	2SC5277-D2-TL	Mixer
Q 3019	Transistor	2SC5374-TL	Mixer
Q 3020	Transistor	2SC5374-TL	PLL Subsystem
Q 3021	IC	FQ7925	Buffer AMP
Q 3022	Transistor	2SC5374-TL	Buffer AMP
Q 3023	Transistor	2SC5374-TL	Buffer AMP
Q 3024	Transistor	2SC5374-TL	APC
Q 3025	Transistor	UMD2N TR	Unlock
Q 3026	Transistor	DTA124EE TL	