

HX850S Alignment

The **HX850S** has been carefully aligned at the factory for the specified performance across the marine band.

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 Standard Horizon representative, or the warranty policy may be voided.

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 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 Standard Horizon 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 Standard Horizon 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, Standard Horizon, a division of VERTEX STANDARD, must reserve 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 the need for 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 200 MHz
- ☐ Deviation Meter (linear detector)
- ☐ AF Millivoltmeter
- ☐ SINAD Meter
- ☐ Inline Wattmeter with 5% accuracy at 200 MHz
- ☐ Regulated DC Power Supply: 3 to 15 VDC, 2A
- ☐ 50-ohm Non-reactive Dummy Load: 10W at 200 MHz
- ☐ Frequency Counter: >0.1 ppm accuracy at 200 MHz
- ☐ AF Signal Generator
- ☐ DC Voltmeter: high impedance
- ☐ VHF Sampling Coupler
- ☐ AF Dummy Load: 8 Ohms, 3 W
- ☐ Oscilloscope
- ☐ Spectrum Analyzer

Alignment Preparation & Precautions

A dummy load and inline wattmeter must be connected to the main antenna jack in all procedures that call for transmission. 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 transceiver and test equipment, and that this temperature be held constant between 20°C and 30°C (68°F and 86°F). When the transceiver is brought into the shop from hot or cold air it should be allowed some time for thermal equalization with the environment before alignment. If 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 this procedure are based on $0 \text{ dB}\mu = 0.5 \text{ }\mu\text{V}$ (closed circuit).

Overview of the Test Mode

The test mode has been build in the microprocessor in order to confirm the performance of transceiver.

The purpose is to adjust transceiver simply and to confirm the performance of transceiver smoothly.

(A) Expansion channels “EXP01 - EXP06” will be set as follows:

DISPLAY	RX Frequency	TX Frequency
EXP01	156.050 MHz	156.050 MHz
EXP02	---	157.425 MHz
EXP03	163.275 MHz	---
EXP04	155.050 MHz	155.050 MHz
EXP05	162.025 MHz	162.025 MHz
EXP06	163.575 MHz	158.975 MHz

(B) In CH70, every time you are in transmit mode, (every time you press PTT), the following test tone can be outputted:

1st transmission: Synthetic tone of 1300 Hz and 2100 Hz

2nd transmission: 1300 Hz

3rd transmission: 2100 Hz

4th transmission: No modulation

5th transmission: Return to 1st transmission

(C) Scan the channels between WX10 and EXP04 in the SCAN mode.

(D) In the test mode, a transmit time-out timer function (TOT) becomes off.

(E) A user's MMSI is set to “0123456789” for DSC tests tempor

Starting the Test Mode

Press the [PWR] switch while pressing and holding the [DISTRESS] and [WX] keys to turn on.

Confirmation of VCO

- ☐ Connect the DC voltmeter to the test point (LOCK TP).
- ☐ Set the channel to **EXP06**, confirm that the voltage on the **TP1013** is more than 0.25V during receiving.
- ☐ Set the channel to **EXP04**, confirm that the voltage on the **TP1013** is less than 3.8V during transmitting.

Overview of the Alignment Mode

The alignment mode has been built in the microprocessor in order to adjust the performance of transceiver.

Starting the alignment mode

Set the channel to **CH16** and then press the **[PWR]** switch while press and holding the **[DISTRESS]** and **[CALL]** keys.

Adjustment of PLL frequency

- ☐ Connect the frequency counter to the antenna jack.
- ☐ Press the **[SCAN/DW]** key till "**00:M REF**" is displayed.
- ☐ Press **[▲]** or **[▼]** keys while pressing the **[PTT]** key to set the frequency to $156.80000\text{MHz} \pm 100\text{Hz}$.
- ☐ Press **[CALL/ENT]** key to fix the alignment data.

Adjustment of TX High Power

- ☐ Connect the wattmeter and 50-ohm dummy load to the antenna jack.
- ☐ Press the **[SCAN/DW]** key till "**02:Hi Po**" is displayed.
- ☐ Press **[▲]** or **[▼]** keys while pressing the **[PTT]** key to set the power to $6.0 \pm 0.1\text{W}$.
- ☐ Press **[CALL/ENT]** key to fix the alignment data.

Adjustment of TX Mid2 Power

- ☐ Connect the wattmeter and 50-ohm dummy load to the antenna jack.
- ☐ Press the **[SCAN/DW]** key till "**03:Mid2 Po**" is displayed.
- ☐ Press **[▲]** or **[▼]** keys while pressing the **[PTT]** key to set the power to $5.0 \pm 0.1\text{W}$.
- ☐ Press **[CALL/ENT]** key to fix the alignment data.

Adjustment of TX Mid1 Power

- ☐ Connect the wattmeter and 50-ohm dummy load to the antenna jack.
- ☐ Press the **[SCAN/DW]** key till "**04:Hi Po**" is displayed.
- ☐ Press **[▲]** or **[▼]** keys while pressing the **[PTT]** key to set the power to $2.5 \pm 0.1\text{W}$.
- ☐ Press **[CALL/ENT]** key to fix the alignment data.

Adjustment of TX Low Power

- ☐ Connect the wattmeter and 50-ohm dummy load to the antenna jack.
- ☐ Press the **[SCAN/DW]** key till "**05:Lo Po**" is displayed.
- ☐ Press **[▲]** or **[▼]** keys while pressing the **[PTT]** key to set the power to $0.8 \pm 0.1\text{W}$.
- ☐ Press **[CALL/ENT]** key to fix the alignment data.

Adjustment of the Maximum Deviation

- ☐ Connect the linear detector to the antenna jack and connect the AF signal generator to the microphone jack.
- ☐ Set the AF signal output level to 200mVrms at 1kHz
- ☐ Press the [SCAN/DW] key till "06:Devi" is displayed.
- ☐ Press [▲] or [▼] keys while pressing the [PTT] key to set the deviation to 4.2 ± 0.1 kHz.
- ☐ Press [CALL/ENT] key to fix the alignment data.

Adjustment of the Squelch Threshold

- ☐ Connect the RF signal generator to the antenna jack.
- ☐ Set the output frequency at 156.8000MHz with standard modulation (± 3.0 kHz deviation, 1kHz modulation).
- ☐ Set the output level to -9dB μ .
- ☐ Press the [SCAN/DW] key till "07:THRESH" is displayed.
- ☐ Press [WX] key to obtain the squelch threshold level.
- ☐ Press [CALL/ENT] key to fix the alignment data.

Adjustment of the Squelch Tight

- ☐ Connect the RF signal generator to the antenna jack.
- ☐ Set the output frequency at 156.8000MHz with standard modulation (± 3.0 kHz deviation, 1kHz modulation).
- ☐ Set the output level to +3dB μ .
- ☐ Press the [SCAN/DW] key till "08:TIGHT" is displayed.
- ☐ Press [WX] key to obtain the squelch tight level.
- ☐ Press [CALL/ENT] key to fix the alignment data.

Adjustment of DSC Squelch threshold

- ☐ Connect the RF signal generator to the antenna jack.
- ☐ Set the output frequency at 156.5250MHz with standard modulation (± 3.0 kHz deviation, 1kHz modulation).
- ☐ Set the output level to -4dB μ .
- ☐ Press the [SCAN/DW] key till "09:CH70 SQL" is displayed.
- ☐ Press [WX] key to obtain the DSC squelch threshold level.
- ☐ Press [CALL/ENT] key to fix the alignment data.

Adjustment of DC VOLT

- ☐ Set the DC power supply to 7.4VDC.
- ☐ Press the [SCAN/DW] key till "10:VOLT" is displayed.
- ☐ Press [WX] key to obtain the DC voltage.

- Press [**CALL/ENT**] key to fix the alignment data.

Closing the Alignment Mode

Press and hold the [**DISTRESS**] for 2 seconds to memorize all alignment data.

Then press and hold the [**PWR**] key to turn the radio off.