

## HX300 Alignment

The HX300 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: 0V to 10 VDC, 5A
- 50-ohm Non-reactive Dummy Load: 10 W 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, 1 W
- Oscilloscope
- Spectrum Analyzer
- HX300 Marine Transceiver
- IBM® PC/compatible computer with Microsoft® Windows® 2000, XP, or Vista
- Standard Horizon HX300 Service Flag Controller Program and Alignment Jig.

### 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 68 °F and 86 °F (20 °C and 30 °C). 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 dB $\mu$  = 0.5  $\mu$ V (closed circuit).

### **Before Alignment**

- Install the HX300 Service Flag Controller Program to your computer.
- Set up the test equipment as shown below, and set the DC Power Supply voltage to 4.0 V.
- Execute the HX300 Service Flag Controller Program.
- Select the COM port number which is connected to the HX300 Alignment Jig.
- Press and hold in the [PRESET] key while turning the transceiver on to enter the Alignment Mode.
- Select "Alignment" ON of HX300 Service Flag Controller Program.
- Click the left mouse button on the [SET] button of the HX300 Service Flag Controller Program.

### **Software Alignment/Confirmation Mode**

#### Overview of Software Alignment Mode

The "Software Alignment Mode" has been build in the microprocessor in order to adjust and confirm the performance of transceiver.

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

#### **Starting the alignment mode**

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

#### **Adjustment of PLL frequency**

- Connect the frequency counter to the antenna jack.
- Press the [SCAN/DW] key till "RE" is displayed.
- Press [▲] or [▼] keys while pressing the [PTT] key to set the frequency to 156.80000MHz  $\pm$  100Hz.
- Press [VOL/SQL] 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 "HI" is displayed.
- Press [▲] or [▼] keys while pressing the [PTT] key to set the power to 4.5  $\pm$  0.1W.
- Press [VOL/SQL] key to fix the alignment data.

#### **Adjustment of TX Mid Power**

- Connect the wattmeter and 50-ohm dummy load to the antenna jack.
- Press the [SCAN/DW] key till "MI" is displayed.
- Press [▲] or [▼] keys while pressing the [PTT] key to set the power to  $2.0 \pm 0.1W$ .
- Press [VOL/SQL] 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 "Po" is displayed.
- Press [▲] or [▼] keys while pressing the [PTT] key to set the power to  $0.8 \pm 0.1W$ .
- Press [VOL/SQL] 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 Alignment Jig.
- Set the AF signal output level to 200mVrms at 1kHz
- Press the [SCAN/DW] key till "Md" is displayed.
- Press [▲] or [▼] keys while pressing the [PTT] key to set the deviation to  $4.4 \pm 0.1kHz$ .
- Press [VOL/SQL] key to fix the alignment data.

#### **Adjustment of the Reference modulation**

- Connect the linear detector to the antenna jack and connect the AF signal generator to the Alignment Jig.
- Set the AF signal output level to 1000mVrms at 150Hz
- Press the [SCAN/DW] key till "Mr" is displayed.
- Press [▲] or [▼] keys while pressing the [PTT] key to set the deviation to  $4.4 \pm 0.1kHz$ .
- Press [VOL/SQL] key to fix the alignment data.

#### **Adjustment of the Microphone Sensitivity**

- Connect the linear detector to the antenna jack and connect the AF signal generator to the Alignment Jig.
- Set the AF signal output level to 15mVrms at 1kHz
- Press the [SCAN/DW] key till "MS" is displayed.
- Press [▲] or [▼] keys while pressing the [PTT] key to set the deviation to  $3.0 \pm 0.1kHz$ .
- Press [VOL/SQL] 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 ( $\pm 3.0$ kHz deviation, 1kHz modulation).
- Set the output level to +0dB $\mu$ .
- Press the [SCAN/DW] key till "tI" is displayed.
- Press [PRESET] key to obtain the squelch tight level.
- Press [VOL/SQL] 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 ( $\pm 3.0$ kHz deviation, 1kHz modulation).
- Set the output level to -7dB $\mu$ .
- Press the [SCAN/DW] key till "tH" is displayed.
- Press [[PRESET] key to obtain the squelch threshold level.
- Press [VOL/SQL] key to fix the alignment data.

This completes the Software Alignment Mode. To save all settings and exit, press and hold the [16/9] key for one second. Then turn off the transceiver.

### **After Alignment**

- Execute the HX300 Service Flag Controller Program again.
- Select the COM port number which is connected to the HX300 Alignment Jig.
- Press and hold in the [PRESET] key while turning the transceiver on to enter the Alignment Mode.
- Select "Alignment" OFF of HX300 Service Flag Controller Program.
- Click the left mouse button on the [SET] button of the HX300 Service Flag Controller Program.
- Turn off the transceiver.