

Alignment Procedure

This radio is adjusted to meet all condition in production except special case.
Readjustment is not requirement.

5-1) The preparation before adjustment.

- 1) Set the power supply voltage to 7.4V and then connect to the radio.
- 2) Connect the connector to radio Antenna terminal.
- 3) Connect the radio to test equipment.

5-2) PLL Synthesizer

- 1) Measure the voltage of TP1 with high impedance voltage meter.
- 2) Adjust L304 at RX channel 0.7 to be 1.0V.
Confirm if it is below 2.3V at RX high channel.
- 3) Adjust L307 at TX channel 0.7 to be 1.0V.
Confirm if is below 3.2 at TX high channel.
- 3) Confirm if channel 1 is in 0.7+/-0.2 in RX

5-3) Adjustment of transmitter [Up+Down+Power on]

- 1) Adjust to tune the set frequency.[D/A]
- 2) Adjust to tune the set power.[D/A]
- 3) Set audio generator to be 1 \square 80mVrms and connect to radio external jack.
- 4) Adjust RV301 to tune desired modulation.
- 5) If a channel is set with Sub-tone the modulation of Sub-tone varies based on the size of the modulation.

5-4) Adjustment of receiver

- 1) Set SSG RF level to -47dBm @ 1 \square 60% Dev.
- 2) Adjust SSG RF level and confirm if 12dB SINAD is below -119dBm.
- 3) Adjust D/A to open audio at 12dB SINAD.
- 4) Set tone frequency to SSG when there is channel set with Sub-tone and then set deviation to 10% peak Dev. Then check if GREEN LED is on.
- 5) Repeat the above in other channels.

HL-10V2L / HL-10U2 Alignment

The HL-10V2, HL-10U1 has been carefully aligned at the factory for the specified performance across the frequency range specified for each version. Re-alignment should therefore not be necessary except in the event of component failure, or altering version type. All component replacement and service should only be performed by an authorized HEADLINE I&C Ltd representative, or the warranty policy may be void.

Required Test Equipment

- RF signal generator with calibrated output level at 1dB (or RADIO COMMUNICATION TEST SET)
- Deviation Meter (Liner Detector)
- AC Voltmeter
- SINAD Meter
- In-Line Wattmeter with 5% accuracy at 500mW
- Regulated DC Power Supply adjustable from 4 to 10V, 3A
- 50Ω Non-reactive Dummy Load: 10W at 500mW
- Frequency Counter: ±0.2ppm accuracy at 500mW
- AF Signal Generator
- DC Voltmeter: High impedance

HL-10V2L

Low Band Edge (channel 1): 136.000MHz

Band Center (channel 2): 155.000MHz

High Band Edge (channel 3): 174.000MHz

HL-10U2

Low Band Edge (channel 1): 440.000MHz

Band Center (channel 2): 470.000MHz

High Band Edge (channel 3): 490.000MHz

PLL & Transmitter

Set up the test equipment as shown for transmitter alignment. Adjust the supply voltage to 7.4V for all steps where not specified otherwise.

PLL VCV (Varactor Control Voltage)-HL10V2

- Connect the DC voltmeter between TP1 on the main unit and ground.
- Set the transceiver to CH1 (low band edge), and adjust L304 on the main unit for 0.7V ±0.1V on the DC voltmeter, while receiving.
- Set the transceiver to CH1 (low band edge), and adjust L307 on the main unit for 0.7V ±0.1V on the DC voltmeter, while transmitting.
- Set the transceiver to CH3 (high band edge), and confirm the high-end VCV is lower than 2.3V while receiving, and low than 3.2V while transmitting.

PLL Reference

- Set the transceiver to CH1 (low band edge), and adjust trimmer of the VCTCXO on the main unit for band center frequency ±100Hz.

Transmitter Output Power

- Set the transceiver to CH1 (low band edge), and adjust D/A1 on the main unit for that the power meter reading is 5W. Confirm that the current consumption is 2.0A or below.
- Set the transceiver to CH1 (low band edge), and adjust D/A1 on the main unit for that the power meter reading is 1W. Confirm that the current consumption is 1.0A or below.

Modulation Level

Max Deviation: (VCO Modulation)

- Set the transceiver to CH2 (band center).
- Inject a 1Hz tone at 100mVrms to the MIC jack.
- Adjust RV301 on the main unit for the deviation meter reading is $\pm 4.0\text{Hz}$ (for 25 steps) or $\pm 2.0\text{Hz}$ (for 12.5 steps) deviation.

MIC Sensitivity

- Set the transceiver to CH2 (band center).
- Inject a 1Hz tone at 100mVrms to the MIC jack.
- Adjust tone level so that deviation meter reading is $\pm 3.0\text{Hz}$ (for 25 steps) or $\pm 1.5\text{Hz}$ (for 12.5 steps) deviation.

CTCSS Deviation

- Set the transceiver to CH2 (band center).
- Check the deviation meter reading is $\pm 0.6\text{Hz}$ (for 25 steps) or $\pm 0.35\text{Hz}$ (for 12.5 steps) deviation.

CDCSS Deviation

- Check the deviation meter reading is $\pm 0.75\text{Hz}$ (for 25 steps) or $\pm 0.4\text{Hz}$ (for 12.5 steps) deviation.

Receiver

Set up the test equipment as shown for receiver alignment.

Sensitivity

- Set the transceiver to CH3 (high band edge).
- Turn the RF signal generator to the same frequency of the transceiver, than set the generator output level to -40dBm with $\pm 3\text{Hz}$ deviation @ 1Hz tone modulation.
 - 1) Adjust SSG RF Level and confirm if 12dB SINAD is below -119dBm.
 - 2) Adjust D/A open Audio at 12dB SINAD.
 - 3) Set tone frequency to SSG when there is channel set with Subtone and then set deviation to 10% peak Dev. Then check if GREEN LED is on.
 - 4) Repeat the above in other channels.