



GLOBAL SIGNALING DIVISION

COE Communications Engineering Document

Author: **Keith Gilbertson**

Rev: **A**

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Title: **12RII Radio Alignment Radio Alignment Procedure**

12R 99
SERIES A large, bold, black '12R' is positioned above the word 'SERIES' in a stylized, blocky font. To the right of 'SERIES' are two large, thin, light-gray '99's. The first '99' is oriented vertically, and the second is oriented horizontally, creating a sense of depth and motion.



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12RII Radio Alignment Radio Alignment Procedure

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GE TRANSPORTATION SYSTEMS

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1. Revision History

2. Equipment List

Personal Computer
12RII SETUP UTILITY Software
Radio Test Fixture & Radio Interface Cable
Power Supply
Marconi 2955B Radio Test Set or Equivalent

3. Procedure

3.1. *Setup*

- ? Set the power supply for the proper input voltage of the radio (74 or 37 volts DC).
- ? Connect the Interface cable to the radio under test
- ? Connect the antenna port of the radio to the Marconi.
- ? Connect the audio inputs and outputs of the Marconi to the Radio TF.
- ? Launch 12RIIUPS (Utility Programming Software) on PC.
- ? Upload 12RTEST.CNF file to the radio.
- ? Open dynamic tune window in 12RII Utility Software. Select proper parameter when necessary in the alignment procedure to tune the digital adjustments in the radio.

3.2. *Transmitter Adjustments*

3.2.1. Max Power Limit & Set levels

- ? Select Test Channel 1 (161.100 Mhz.)
- ? Select the RF Power Setting on the 12RII Setup Utility of the Radio Tune window.
- ? Tune the Hi Power Scroll bar to Max (256) in the software control. Hit the Radio PTT button on the screen. The radio should activate the transmitter.



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- ? Adjust VR1 on the RFPA module for a maximum power setting of 50 Watts.
- ? Adjust the scroll bar control on the PC screen down until the radio power is at 45 watts. Unkey the radio by clicking the mouse on the PTT button a second time.
- ? Next select the Lo Power scroll bar. Key the radio and adjust the scroll bar until the radio output power is at 10 Watts.
- ? Un-key the radio and exit this setup window.

3.2.2. Max Deviation & Modulation Balance

- ? Select the Max. Deviation/Balance Window in the Setup Software
- ? Inject a 300 Hz. sine wave at 2 VRMS into the Handset Audio Input of the Radio.
- ? Set the Marconi filtering to 15KHz low pass and enable the scope display.
- ? Key the Radio with the Handset PTT input on the Test Fixture. Monitor the deviation on the Marconi screen.
- ? Adjust the Leading Edge and Trailing Edge scroll bars until the leading and trailing edges of the waveform are both at 4.4 KHz deviation. (The Marconi should also read 4.4 KHz deviation.) The waveform should resemble a square wave with a horizontal top and bottom, but with slightly rounded corners almost vertical sides.
- ? Change the frequency of the 300 Hz. Sine wave to 1000 Hz. Input level is 2 VRMS. Adjust the Max Deviation Control for a 4.4 KHz reading on the Marconi. *< If above goes as planned, this step should not be necessary. GF>*
- ? Un-key the radio and exit the Max. Deviation/Balance Screen.

3.2.3. Frequency Setting

- ? Select the Frequency Tune tab in the Setup Software.
- ? Key the Radio with the PTT button on the screen
- ? Adjust the Frequency tune scroll bar in the software window until the radio transmit frequency is at 161.100000 MHz +/- 100 Hz.
- ? Un-key the radio and exit the Frequency Tune Screen

3.3. QT Level

- ? Select the QT Level tab in the Setup Software.
- ? Set the Marconi filtering to 300Hz Low Pass.
- ? Key the Radio with the PTT button on the screen
- ? Adjust the QT Level scroll bar until the Marconi reads 0.75 KHz deviation.
- ? Un-key the radio and exit the QT Level Screen

3.3.1. Microphone Modulation Sensitivity & Distortion

- ? Select the Microphone Level tab in the Setup Software.
- ? Inject a 1000 Hz. sine wave at 250 mVRMS into the Handset Audio Input of the Radio.
- ? Set the Marconi filtering to 300-3400 Hz band Pass.
- ? Key the Radio with the PTT button on the screen



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- ? Adjust the Microphone Modulation Level scrollbar until the Marconi reads 3.0 +/- 0.1 KHz deviation.
- ? Un-key the radio and exit the Microphone Level Screen

3.3.2. DTMF Modulation Level

- ? Select the DTMF Level tab in the Setup Software.
- ? Set the Marconi filtering to 300-3400 Hz band Pass.
- ? Key the Radio with the PTT button on the screen.
- ? Adjust the DTMF Modulation Level scrollbar until the Marconi reads 3.0 +/- 0.1 KHz deviation.
- ? Un-key the radio and exit the DTMF Level Screen

3.3.3. MSK Modulation Level.

- ? Select the MSK Level tab in the Setup Software.
- ? Set the Marconi filtering to 300-3400 Hz band Pass.
- ? Key the Radio with the PTT button on the screen.
- ? Adjust the MSK Modulation Level scrollbar until the Marconi reads 3.0 +/- 0.1 KHz deviation.
- ? Un-key the radio and exit the MSK Level Screen

3.4. Receiver Alignment

3.4.1. Front End pre-selector

No Tuning is necessary. Tuned at Kenwood Factory.

3.4.2. First IF Alignment

No tuning is necessary. Tuned at Kenwood Factory.

3.4.3. Handset Audio Output & Distortion

- ? Inject a receive signal at 161.100 Mhz. Modulated with 1000 Hz. at 3KHz. Deviation level into the radio. Set the level of the signal to -60dBm.
- ? Measure the Radio Handset Audio Output level with volume at maximum. Level should be 150mV RMS +/- 2 dB at a distortion of 5% or less.

3.4.4. Speaker Output & Distortion

- ? With the same signal as above, Measure the output from the speaker going into the load in the test fixture. Level should be Make sure the load is set for the proper impedance of 4 ohms for clean cab radios or 8 ohms for remote radios. The level should be 10 Watts min. with volume control at Max.

3.4.5. Squelch Setting

- ? Select the Squelch tab in the Setup Software.



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- ? Inject a receive signal at 161.100 Mhz. modulated with 1000 Hz. at 3 KHz. deviation level into the radio. Set the level of the signal to -115 dBm.
- ? Press the button labeled "Set" in the setup program.

3.4.6. Sensitivity Check

- ? Inject a receive signal at 161.100 Mhz. Modulated with 1000 Hz. at 3KHz. Deviation level into the radio. Set the level of the signal to -119 dBm.
- ? Measure the SINAD of the received signal at the Radio Handset output.
- ? The SINAD should be greater than or equal to 12 dB.

3.5.