

ALIGNMENT PROCEDURE

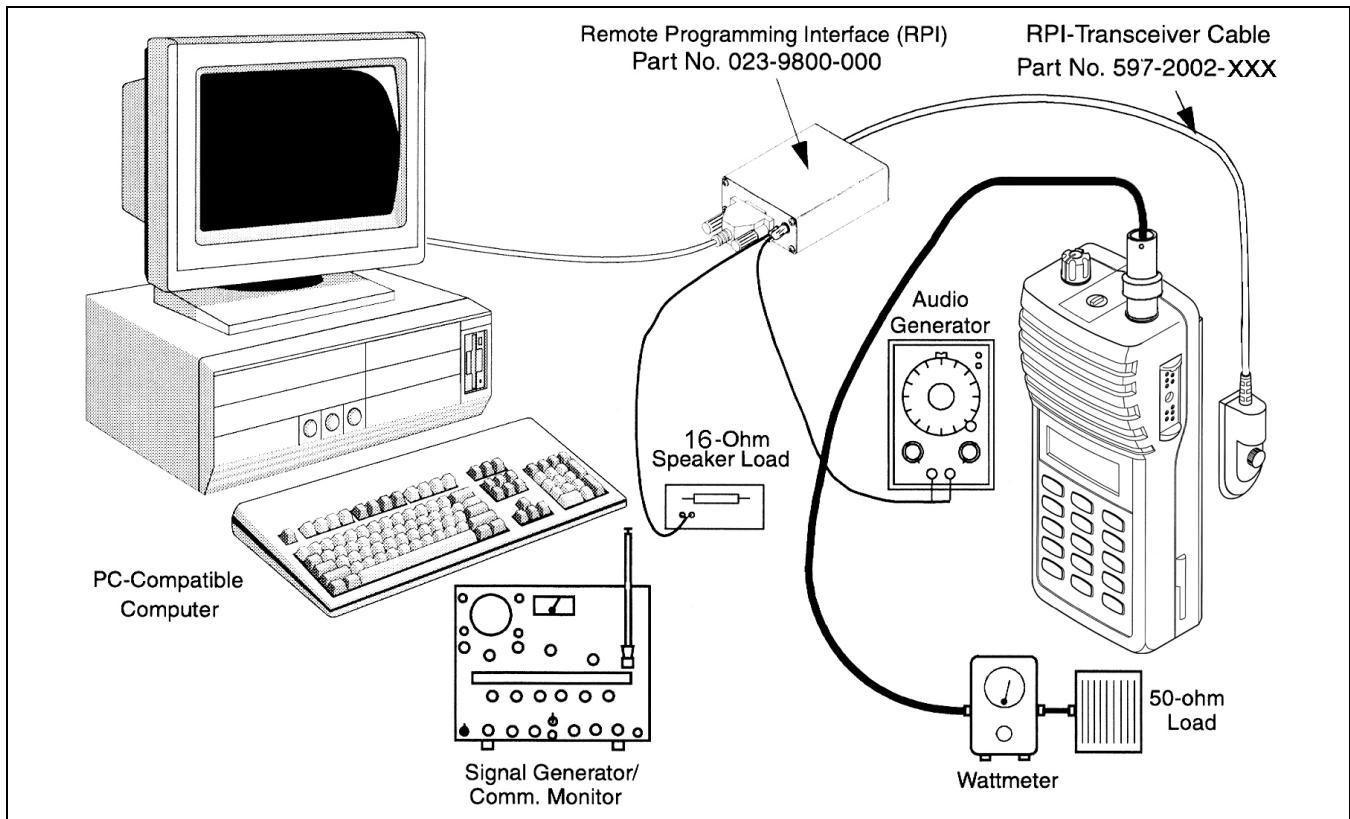


Figure 2 Alignment Setup Diagram

GENERAL

INTRODUCTION

The alignment procedure described in this section should be performed if repairs are made that could affect the factory alignment.

To perform this alignment, special tune software and the same basic computer setup used for programming is required. This equipment is shown above and also described in the "Test Setup" description which follows. Only Remote Programming Interface (RPI), Part No. 023-9800-000, can be used because it's the only RPI that has microphone and speaker audio jacks that are required for alignment.

Only two adjustments are made manually and the others are made digitally using the PCTune software. The two manual adjustments are squelch sensitivity and TCXO frequency. If these adjustments do not need to be changed, transceiver can be tuned without removing the cover.

This transceiver does not have a special test mode that is selected. Instead, the tuning software automatically selects the frequencies and other test conditions that are required to perform the alignment. If the transceiver must be controlled manually to perform such things as testing or troubleshooting, program temporary conventional channels.

TEST SETUP

Connect the test setup shown in Figure 2. Additional information follows on equipment in this setup.

Antenna Jack Adapter - The transceiver antenna jack is an SMA female type. Therefore, some sort of adapter may be required to connect test equipment to this jack. An SMA female to BNC female adapter is available by ordering Part No. 515-3102-060.

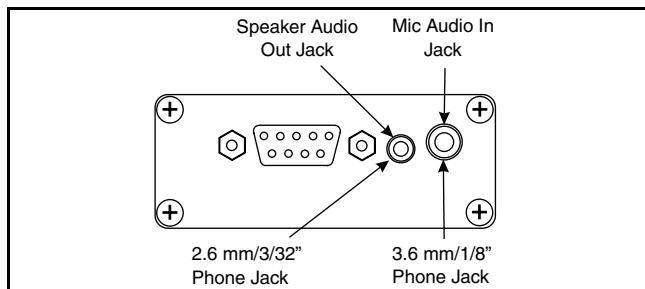
RF Signal Generator - When connecting the generator to the antenna jack, use at least a 6 dB pad between the generator and transceiver. This protects the generator if the transmitter is accidentally keyed and also ensures that a 50-ohm load exists. The input levels listed in the tuning screens are at the antenna jack, so increase the generator output accordingly.

Power Source - If a battery is used to provide transceiver power during alignment, make sure it is in good condition and fully charged. Power output levels are with 7.5 volts applied to the transceiver. Typical current when transmitting at high power is 1.8 A.

Wattmeter/Load - The wattmeter and dummy load must measure and dissipate up to approximately 4 watts. For accurate power output measurement at 450 MHz, use a minimum number of connectors with a Teflon or better dielectric. If coaxial cable is used, it should be a minimum length of a low-loss type.

Audio Generator - The audio generator is connected to the larger (1/8") mono phone jack of the RPI shown below.

Speaker Load - The speaker load is connected to the smaller (3/32") mono phone jack of the RPI as shown above. This is a low level audio output that requires a load of approximately 16 ohms.



RPI Microphone and Speaker Jacks

Computer and RPI - Note that RPI, Part No. 023-9800-000 must be used. Other RPI's do not have the jacks required to inject microphone audio and monitor speaker audio with a computer connected to the accessory jack.

PCTUNE SOFTWARE

General

The PCTune software is a Windows®-based program. Minimum software and hardware requirements are as follows:

- Windows® 95/98
- 486DX2-66 or faster microprocessor
- 4 megabytes of RAM
- 3 megabytes free space available on hard drive
- An available serial port

Software Installation

Proceed as follows to install this software:

1. Close all applications that are currently running (other than Windows)
2. Insert the disk containing the PCTune software in drive A: (or B:)
3. From the Windows 95/98 taskbar, choose RUN and select SETUP.EXE on drive A: (or B). Alternatively, use File Explorer and double click SETUP.EXE.
4. Follow the instructions on the screen. The program is automatically loaded on the hard drive and start-up shortcuts or groups created.

Starting the Tune Program

Select Start in the taskbar, then Programs > PCTune > PCTune.

Exiting the Tune Program

Click the PCTune logo on the left end of the title bar and select “Close” or click the “X” button on the right end of the title bar.

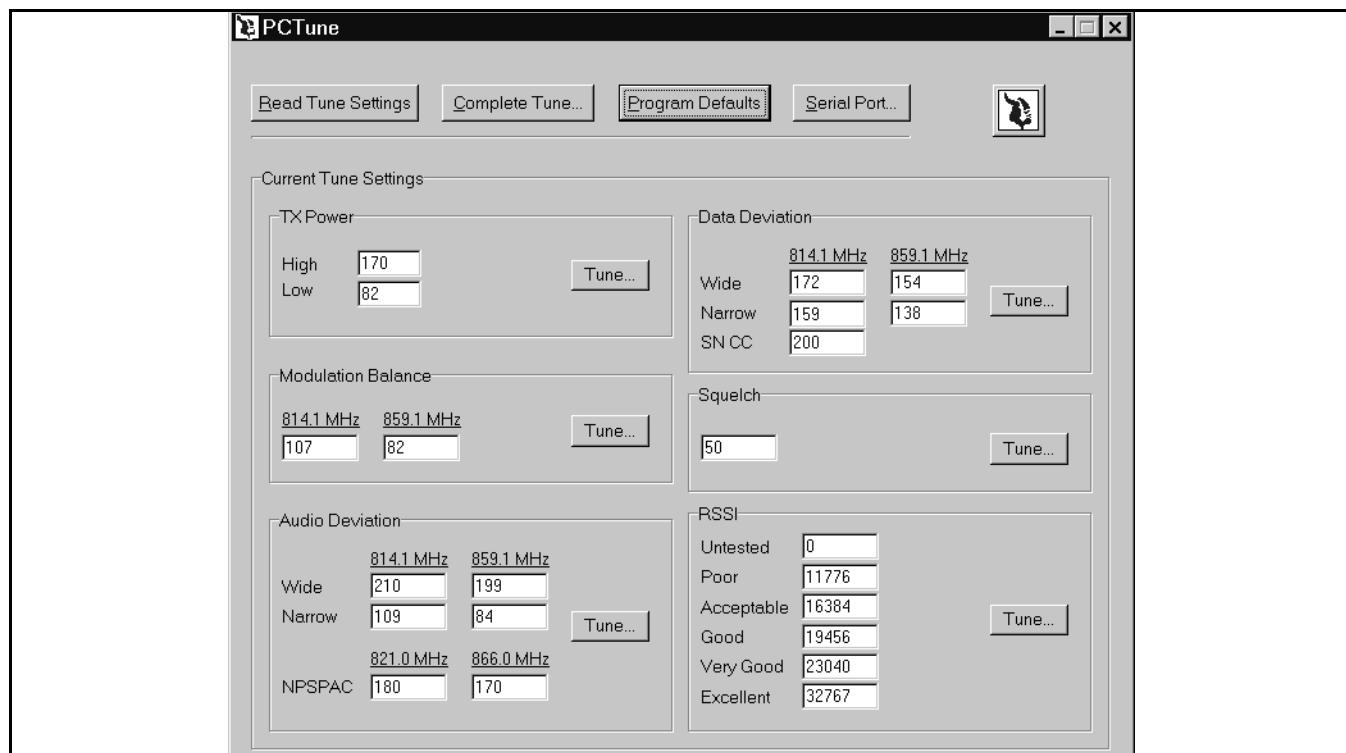


Figure 3 PCTune Main Screen

PRELIMINARY SETUP

1. With transceiver power turned off, connect the RPI to an unused serial port of the computer. Then connect the RPI to the accessory jack of the transceiver using the cable indicated in Figure 2.
2. Start the PCTune program as described in the preceding section and click the “Serial Port” button near the top to display the selected serial port. Change to the port being used if necessary.
3. Turn transceiver power on and the green indicator on the RPI should light. Move the slide switch to the other position if this indicator is amber.

MAIN PCTUNE SCREEN

The main PCTune screen is shown in Figure 3. The various adjustments that are performed are show in the six boxes in the lower part of this screen.

To perform just one adjustment or perform the adjustments individually, click the “Tune” button in the applicable box. To perform a complete alignment and have the program automatically step through all adjustments, click the “Complete Tune” button on the top. The functions of the various buttons in this screen are as follows:

Read Tune Settings Button - Reads and displays the various tune settings currently stored in the radio.

Complete Tune Button - Initiates the complete tuning procedure as just described.

Program Defaults Button - Programs the transceiver with the default settings for the various adjustment. This can be used to quickly restore a radio to typical settings.

Serial Port Button - Selects the serial port that is used to connect the RPI to the computer. This setting only needs to be made the first time the program is run or if a different serial port is used.

Tune Buttons - These buttons are used to perform individual adjustments without having to go through the complete alignment procedure (see paragraph at the beginning of this section).

EF Johnson Logo Button - Clicking this button displays the PCTune version number.

REMOVING TRANSCEIVER COVER

NOTE: The transceiver cover needs to be removed only if the frequency and squelch adjustments described in Sections and need to be reset.

The frequency and squelch noise level adjustments are made by manually resetting controls on the RF board. To access these controls, proceed as follows:

1. Remove the battery, belt clip, and back cover.
2. An external power supply must then be connected to the transceiver.

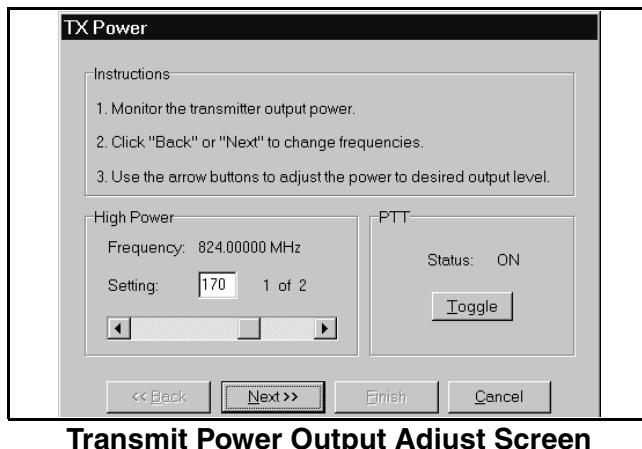
TRANSMIT FREQUENCY AND POWER

FREQUENCY ADJUSTMENT

Frequency adjustment should be performed with the ambient temperature near the TCXO calibration reference of 77°F (25°F). This ensures that the frequency will be within tolerance at the temperature extremes. Proceed as follows:

NOTE: The transmitter immediately keys when the following function is selected. To turn the transmitter on and off, click the “Toggle” button (see screen which follows).

1. Connect a wattmeter and dummy load to the antenna jack as shown in Figure 2.
2. Click the “Complete Tune” button to automatically go from one adjustment to the next or click the “Tune” button in the “Tx Power” box to perform only this adjustment.
3. Monitor the transmit frequency with a communications monitor set to the frequency displayed on the screen.
4. At room temperature, this frequency should be within ± 200 Hz. If readjustment is required, remove the transceiver cover and connect power as described in the “Removing Transceiver Cover” description. Then adjust the capacitor in U201 for the correct frequency. This also adjusts the receive frequency.



Transmit Power Output Adjust Screen

POWER OUTPUT ADJUSTMENT

Set the high and low power output by clicking the arrows or moving the button in the scroll bar. The relative power level is indicated by the number in the box. Set the high and low power levels as follows:

High Power Level = 4.0 watts

Low Power Level = 1.0 watt

MODULATION BALANCE

1. If manually selecting each test, click the “Tune” button in the “Modulation Balance” box. Otherwise, this function is selected automatically when the “Complete Tune” button is clicked.

2. View the transmit modulation waveform on the CRT of a communication monitor. If applicable, set the monitor for de-emphasis off, high-pass filter off, low-pass filter 3 kHz, and FM peak detection active.
3. Follow the instructions on the screen and adjust for the best demodulated square wave with minimum tilt and overshoot.

AUDIO DEVIATION

1. If manually selecting each test, click the “Tune” button in the “Audio Deviation” box. Otherwise, this function is selected automatically when the “Complete Tune” button is clicked.
2. Inject a 1 kHz signal at the level indicated on the screen into the Mic Audio jack of the RPI (see “Test Setup” description).
3. Monitor the transmit modulation signal with a communication monitor and follow the instructions on the screen to adjust the wide and narrow band deviation.

DATA DEVIATION

1. If manually selecting each test, click the “Tune” button in the “Data Deviation” box. Otherwise, this function is selected automatically when the “Complete Tune” button is clicked.
2. Monitor the transmit modulation signal with a communication monitor and follow the instructions on the screen to adjust the wideband, narrow band, and SMARTNET/SmartZone control channel data deviation.

SQUELCH ADJUST

The squelch threshold level is set manually by VR401 on the RF board. The factory setting of VR401 need to be changed. If field readjustment is required, proceed as follows:

1. If manually selecting each test, click the “Tune” button in the “Squelch” box. Otherwise, this function is selected automatically when the “Complete Tune” button is clicked.
2. Remove the cover and connect power as described in the “Removing Transceiver Cover” description. Connect an RF signal generator to the antenna jack using a 6 dB or greater pad. Set the generator for the channel frequency and modulation indicated on the screen.
3. Adjust VR401 so that the squelch just opens (audio is heard) at 8-9 dB SINAD.

RSSI ADJUST

NOTE: Improperly setting the RSSI levels can result in degraded roaming operation. Therefore, do not change the default settings unless you are familiar with how roaming will be affected.

The function which adjusts the RSSI levels is available only by clicking the “Tune” button in the “RSSI” box. It is not displayed in the Complete Tune mode for the reason just described. The default values that are programmed by clicking the “Program Defaults” button (see “Main PCTune Screen” description) should not be changed unless you are familiar with how these levels control site switching in an LTR-Net system.