

**CS1000 AND CS1001 ALIGNMENT
REFERENCE MANUAL**

FM HANDHELD TRANCEIVER

**Connect Systems Incorporated
1802 Eastman Ave., Suite 116
Ventura CA 93003**

Version 1.02

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TUNING SELECTION SCREEN

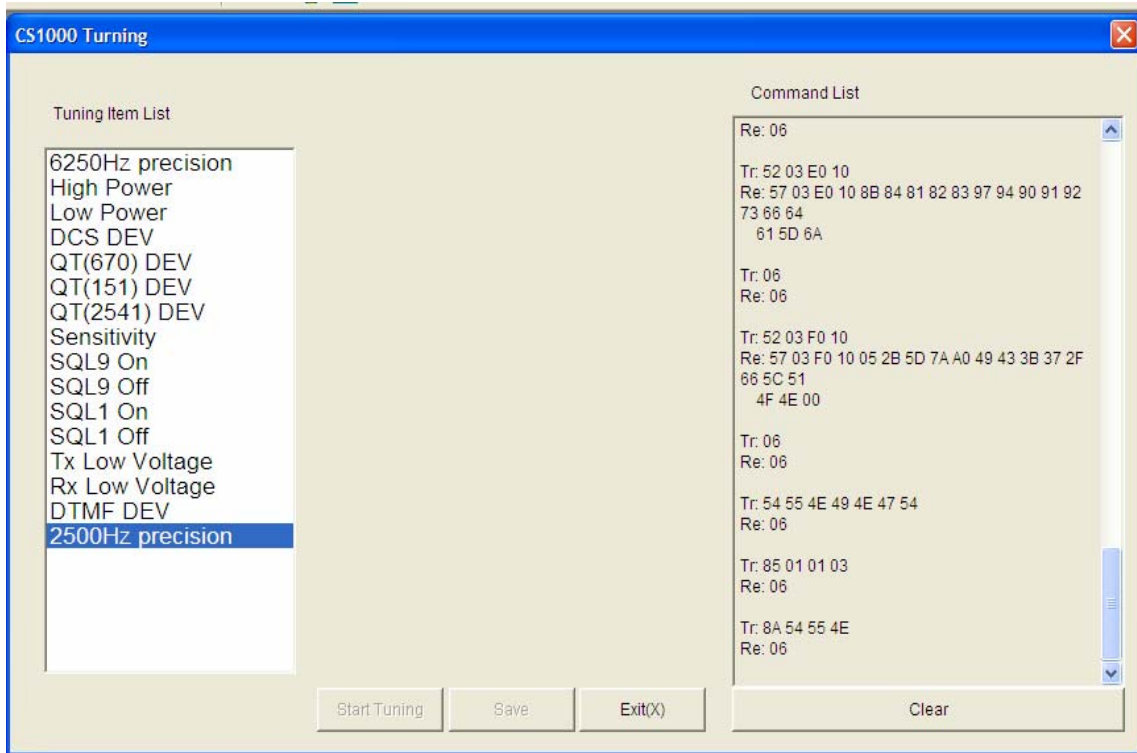
To use the tuning mode, the following null file have to be inserted into the directory running the program:

4208PBG.txt

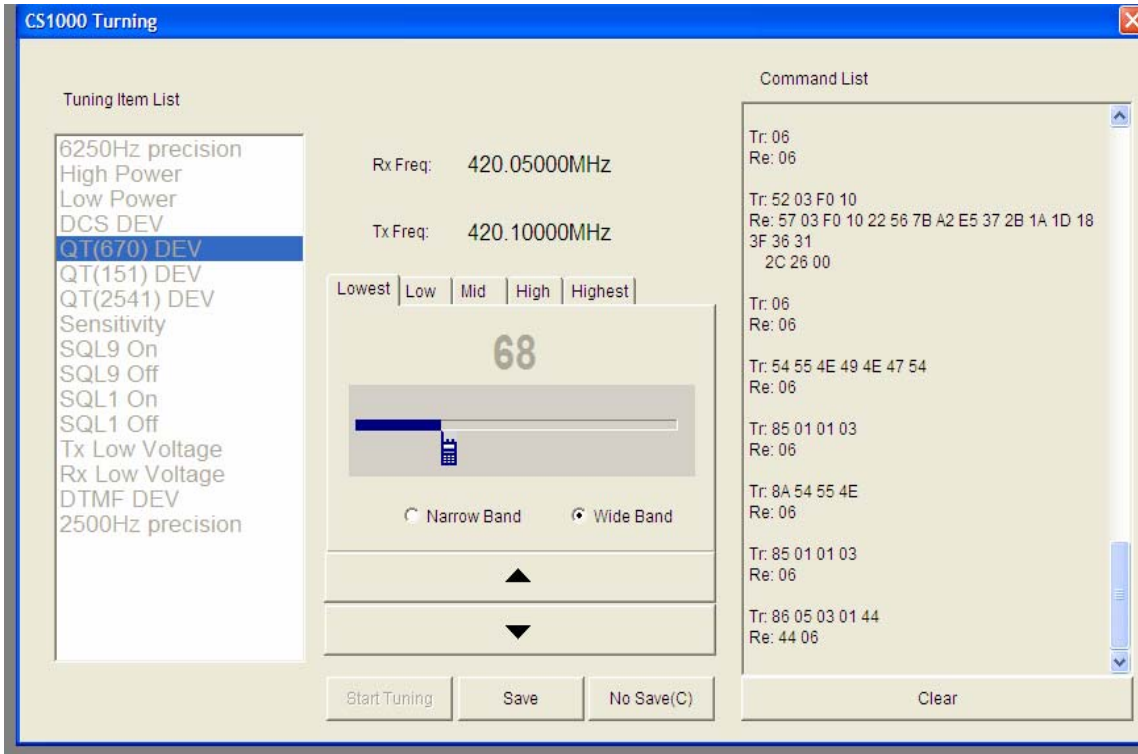
This files can be created with any text editor such as NOTEPAD or WORD.

The fundamental screen necessary to understand the alignment is shown below. The dealer should not normally have to use the alignment screens but if they do we are providing sufficient information on what parameters can be adjusted.

The alignment of a radio requires specialized test equipment and the tuning of these various parameters should not be done without the proper test equipment. Setting the parameters improperly could make the radio non FCC compliant.



TUNING SCREEN



When you double click on an item in the Tuning Item List you will get a screen such as shown above. Notice you have the following choices:

Narrow Band or Wide Band

Select Narrow Band (12.5 KHz) or Wide Band (25 KHz) for the alignment.

Five Different Frequencies

Align the parameters at the frequencies shown above. Note for certain parameters you are adjusting at the Rx Frequency and other parameters you are adjusting at the Tx Frequency. It is up to the dealer to understand if they should be using receive or transmit frequencies.

Save

After you do the tuning and before you get out of this screen, you have the choice of saving the work you completed.

No Save

If you made a mistake and would like to ignore what was done, press the No Save and all your hard work will be lost.

Start Tuning

For certain parameters such as Squelch Level Adjustment, the test equipment sets the level going into the radio. When the proper level is set press the Start Tuning button and the radio determines the proper value. You still have to Save or Not Save the results.

Clear

This clears the Command List. The Command List is the commands sent between the PC program and the program embedded within the radio. This is used mostly as a diagnostic tool for the programmer of the PC program. It can also be used to determine if you actually pressed a button ten minutes ago after you got interrupted by a telephone call in the middle of your alignment procedure.

HELPFUL HINT

When the tuning parameter has multiple frequencies to program do them all. If the frequency in your radio is not within the range of the frequency in the alignment screen you just programmed, it will have no affect. If you program all the frequencies in the alignment screen, then it is guaranteed you will cover whatever is programmed in your radio.

PARAMETERS ALLOWED TO BE ADJUSTED

6250Hz Precision

This parameter is used to adjust the temperature compensated crystal controlled voltage controlled oscillator (TCXVCO). Channel spacing in the standard radio is either 6,250 Hz, 12,500 Hz, and 25,000 Hz. It is no coincidence that the 6250 is a sub-multiple of all the standard frequency spacing. What this parameter actually does is provide a slight DC bias on the TCXVCO to move the frequency slightly to allow the PLL frequency to be exactly on frequency. While the radio should never need adjustment because it is adjusted at the factory, if the oscillator does drift this parameter can be used to compensate for that drift.

2500Hz Precision

This parameter is used exactly like the parameter above except it is used for non standard spacing such as 5 KHz, 10 KHz, and 20 KHz.

High Power

The radio is aligned from the factory to output 5 watts on VHF and 4 watts on UHF in the high power setting. This adjustment can be used to change the default. To prevent interference under certain circumstances or to extend the battery life, it might be desirable to lower the maximum output power to something below what the transmitter is actually capable of. This adjustment is done at the following frequencies:

	VHF	UHF
Lowest	136.10000	420.10000
Low	145.60000	432.60000
Mid	155.10000	445.10000
High	164.60000	457.60000
Highest	173.90000	469.90000

Low Power

The radio is aligned from the factory to output 1 watt on both VHF and UHF in the low power setting. This adjustment can be used to change the default. To prevent interference under certain circumstances or to extend the battery life, it might be desirable to change the output power of the low power setting. This adjustment is done at the following frequencies:

	VHF	UHF
Lowest	136.10000	420.10000
Low	145.60000	432.60000
Mid	155.10000	445.10000
High	164.60000	457.60000
Highest	173.90000	469.90000

DCS Deviation

The radio is aligned from the factory for (800±100 Hz) deviation in wide band (25 KHz) and (400±50 Hz) deviation in narrow band (12.5 KHz). This adjustment allows the dealer to change the default settings. In the narrow band the adjustment is done at 445.10000 for UHF and 155.10000 for VHF but in the wide band there are five choices. The choices correspond to the test frequencies as shown below.

	VHF	UHF
Lowest	136.10000	420.10000
Low	145.60000	432.60000
Mid	155.10000	445.10000
High	164.60000	457.60000
Highest	173.90000	469.90000

CTCSS Deviation

The radio is aligned from the factory for (700±100 Hz) deviation in Wideband (25 KHz) and (350±50 Hz) deviation in Narrowband (12.5 KHz). This adjustment allows the dealer to change the default settings. In the narrow band the adjustment is done at 445.10000 for UHF and 155.10000 for VHF but in the wide band there are five choice. The choices correspond to the test frequencies as shown below. To get more accurate deviation readings over the CTCSS frequency range, the product allows you to align at the CTCSS frequencies of 67.0 Hz, 151.0 Hz, and 254.1 Hz.

	VHF	UHF
Lowest	136.10000	420.10000
Low	145.60000	432.60000
Mid	155.10000	445.10000
High	164.60000	457.60000
Highest	173.90000	469.90000

Sensitivity

The front end of the radio has a bandpass filter that can be electronically adjustable by varying the voltage on the varactors. The adjustment for the sensitivity is used to optimize the center frequency of the bandpass filter for the frequencies specified below.

	VHF	UHF
Lowest	136.05000	420.05000
Low	145.55000	432.55000
Mid	155.05000	445.05000
High	164.55000	457.55000
Highest	173.95000	469.95000

DTMF Deviation

This radio has a separate adjustment for DTMF deviation. This adjustment is done at a single frequency of 445.10000 for both wide band and Narrowband. The factory setting for Wideband (25 KHz) is (3000±200 Hz) and the factory setting for Narrowband (12.5 KHz) is (1500±100 Hz).

Squelch

Squelch Level is an analog reference level number that the transceiver's CPU uses to set the internal squelch threshold. The range is between 0 (open) to 9 (tight). The alignment of the radio allows you to set Squelch level 1 and squelch level 9. The other levels are interpolated. The factory defaults for these two levels are as follows:

SQ1 On -124 dBm (Wideband) -123 dBm (Narrowband)
SQ1 Off -126 dBm (Wideband) -125 dBm (Narrowband)
SQ9 On -118 dBm (Wideband) -117 dBm (Narrowband)
SQ9 Off -120 dBm (Wideband) -119 dBm (Narrowband)

The adjustment is done at the following five frequencies for both wide band and narrow band:

	VHF	UHF
Lowest	136.05000	420.05000
Low	145.55000	432.55000
Mid	155.05000	445.05000
High	164.55000	457.55000
Highest	173.95000	469.95000

Tx Low Voltage

This setting determines the lowest voltage the battery will be in the transmitting mode. If the voltage goes below that point then the system will not transmit. The factory setting for the Tx Low Voltage is 6.7 Volts.

Rx Low Voltage

This setting determines the lowest voltage the battery will be in the receiving mode. If the voltage goes below that point then the system will not receive. The factory setting for the Rx Low Voltage is 6.7 Volts.

TUNING DATA TABLE

	W_Mid									
6250Hz precision	136									
High Power	183	184	184	178	179					
Low Power	101	99	100	95	90					
DCS DEV	47	45	43	43	42	21				
QT(670) DEV	68	66	62	60	60	40				
QT(151) DEV	80	88	92	95	95	52				
QT(2541) DEV	132	139	146	150	153	86				
Sensitivity	34	86	123	162	229					
SQL9 On	55	43	26	29	24	35	33	24	20	18
SQL9 Off	63	54	49	44	38	57	55	41	40	37
SQL1 On	117	107	92	91	89	104	101	99	91	88
SQL1 Off	130	126	117	115	112	122	117	123	113	112
Tx Low Voltage	110									
Rx Low Voltage	108									
DTMF DEV	153	152								
2500Hz precision	140									

The range of man_down level

Man_down 255 ---- 255

Open

This opens the special tuning data file in the PC for this particular radio. The tuning data is in a different file than the normal parameters.

Save

This saves the tuning data to the PC.

Export to EXCEL file

This saves the tuning data to an EXCEL file on the PC.

Read Tuning Data

This reads the tuning data from the radio.

Write Tuning Data

This writes the tuning data to the radio.

Man Down

The man down feature is not currently supported in the CS1000 radio.

It is recommended when you get a radio that you might want to change the tuning data, the following procedure should be followed:

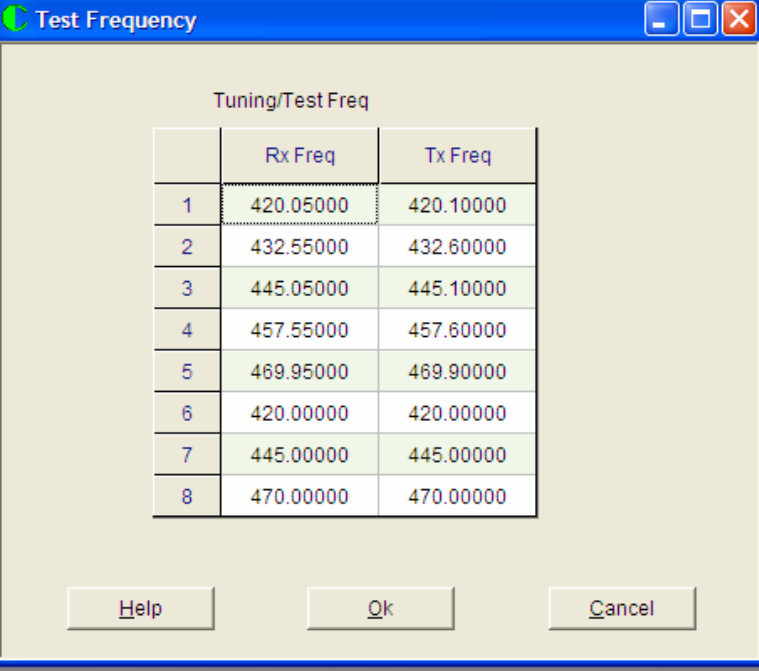
1. Read the Tuning Data from the radio.
2. Save the Tuning Data on a file in the PC.

This is done so if you make gross mistakes in the tuning of the radio, it is easy to recover all the original data. To recover, the following two steps should be followed:

1. Open the data file from the PC that has been saved.
2. Write Tuning Data back to the radio.

The tuning data and the parameters are saved in the Radio and PC separately. Changing and saving the parameters does not affect the tuning data and changing and saving the tuning data does not affect the parameters.

TEST FREQUENCY TABLE



The screenshot shows a window titled "Test Frequency" with a blue title bar and standard Windows window controls (minimize, maximize, close). The main area is a light beige color. At the top center, the text "Tuning/Test Freq" is displayed. Below this is a table with three columns: an index column (1-8), "Rx Freq", and "Tx Freq". The table contains the following data:

	Rx Freq	Tx Freq
1	420.05000	420.10000
2	432.55000	432.60000
3	445.05000	445.10000
4	457.55000	457.60000
5	469.95000	469.90000
6	420.00000	420.00000
7	445.00000	445.00000
8	470.00000	470.00000

At the bottom of the dialog, there are three buttons: "Help", "Ok", and "Cancel".

This screen is only a reference of the frequency the factory uses for final testing of the radio. Changing the parameters has no effect on the operation of alignment of the radio. The changes you make to this screen will not be saved no matter what you do.

CHANGES TO THE MANUAL

Version 1.00

Original Release

Version 1.01

Added Helpful Hint on Page 6.

Version 1.02

Added information on files needed to run tuning program.