

TELEX

RADIO DISPATCH PRODUCTS

C-2000 and C-2000HS *Technical Manual*



C-2000

C-2000HS

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Introduction

Overview

The C-2000 is a full featured single-channel, multi-format, and self-contained desktop radio control console. Its sleek and modern look compliments any surrounding.

The C-2000 is a **DSP** (Digital Signal Processor) based design, allowing easy field programmability using the **DTMF** (Dual Tone Multi-Frequency) keypad on the front of the console. Unlike other manufacturers' equipment, no additional software is required to program the C-2000 console. Modifications and enhancements can generally be made through software changes only. If the user determines they require a special feature enhancement, please contact the Radio Dispatch Sales Department for cost and feasibility.

Initial line level adjustments are made via potentiometers allowing for ease of installation. Should additional adjustments be required, they can be made in the programming mode. **AGC** (Automatic Gain Control) on the receive and microphone audio paths help stabilize line level adjustments.

The C-2000's modular design offers control of one (1) base station, along with selection of 99 frequencies. The line interface offers crossmute capability and squelch control feature eliminating the unwanted noise that is generally associated when monitoring a line.

The C-2000 accommodates a desk microphone along with a handset (or headset) as indicated on the side of the C-2000 console. In addition to the external microphone options, a built in panel microphone is available by pressing the **PTT** (Push-To-Talk) on the front of the panel. When a PTT occurs from any of the three (3) microphones, the others will mute so as not to pick-up unnecessary ambient noise during transmission. When the handset is enabled and taken off hook, the receive audio is transferred to the earpiece.

The console is normally used in conjunction with a matching Radio Dispatch 223 Series (or equivalent) tone-remote panel located at the base station. The console is compatible with Motorola¹, MA/Com Net Ericsson/GE¹, and other tone-remote control systems employing the industry-standard sequential tone-control format.

The console is connected to the mating panels by means of shielded voice-grade or better leased or private lines (including microwave circuits). Metallic or DC continuity is not required.

1. See "Copyright Notice" on page 2.

Features

C-2000HS Features

The C-2000HS is shipped from the factory in the following state:

- 4-wire mode
- Full-duplex
- TX monitor enabled
- F3–F16 disabled
- 600 Ohm TX output impedance
- 600 Ohm RX input impedance

C-2000 Features

The C-2000 is shipped from the factory in the following state:

- 4-wire mode
- Full-duplex
- TX monitor enabled
- F3–F16 Disabled
- 600 Ohm TX output impedance
- 600 Ohm RX input impedance
- Handset disabled
- Desk microphone enabled.

Display Character Description

<i>CC</i> (Clone Complete) -	Cloning is successful.
<i>CL</i> (Clone Mode) -	Clone mode is entered.
<i>CD</i> (Crossmute) -	Another parallel console is active and pull crossmute low.
<i>CP</i> (Correct PIN) -	The PIN number is correctly entered.
<i>EE</i> (Error) -	An error occurred, seen in clone mode if cloning fails.
<i>EP</i> (Enter Pin) -	A PIN number needs to be entered to access setup mode.
<i>FD</i> (Function Duration) -	Function duration programming mode is entered.
<i>FF</i> (Function Frequency) -	Function frequency programming mode is entered.
<i>IP</i> (Incorrect PIN) -	An incorrect PIN number was entered.
<i>OC</i> (Option Changed) -	The option selected is changed.
<i>PC</i> (PIN Changed) -	The PIN was successfully changed.
<i>SS</i> (Settings Saved) -	The current settings are permanently saved.
<i>SU</i> (Supervisor) -	The supervisor pin is activated by a parallel console.

Hardware Overview

The C-2000 is a single-line, multi-mode console designed specifically for small- to medium-level systems. All functions are housed in a single small modern looking console.

C-2000 Console

The **C-2000** console consists of two (2) sub-assemblies; the main processing board and keypad/display board that are enclosed in a single case.

Line Interface

The **Line** interface is an 8-pin RJ-45 connector, using either the standard tone control format compatible with Motorola and M/A ComNet Ericsson/GE or Local Control relay closure. The line interface may be hardware configured for either a 2-wire or 4-wire operation and may be factory modified to accommodate non-industry standard tone control formats, if desired. This is usually a software only change.

Controls and Indicators

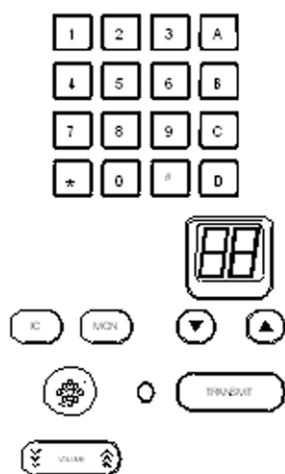


FIGURE 1. Front Panel

Front Panel

The **Front Panel**, shown in Figure 1, contains the user I/O. It features volume and function tone selection, intercom and monitor functions, DTMF keypad, panel PTT and microphone, as well as the dual seven-segment display.

Common Controls and Indicators

Volume Control

The **Volume Control** is used to adjust the receive audio speaker and handset level of the audio present on the receive inputs of the line interface. A minimum volume level can be configured in the setup mode so the console operator can not turn the volume to zero (0). When adjusting the level up or down, the display shows the selected level on a relative scale with zero (0) being off and 25 being full volume.

Panel PTT Push button

The **Panel PTT Push** button when pressed, audio from the panel microphone, or desk microphone if enabled, is sent on the TX line interface.

DTMF Keypad

The **DTMF** keypad is used for transmitting DTMF. The DTMF keypad is also used in the setup mode. It can also be disabled in user mode.

Dual Seven-Segment Display

The **Dual Seven-Segment** display is used to select a frequency and updates with parallel frequency selection, if active.

Function Buttons Up-Down

The **Up** and **Down** arrows are used to select the desired function tone. Pressing the arrows changes the value in the desired direction. Once the desired function tone is selected, the unit pauses, blinks and then sends the function tone shown on the display. The pause and blink rate are programmable in setup mode. Only enabled function tones are displayed and transmitted. No hold tone is associated with the changing of the function tone. A function tone remains selected until the operator changes the setting.

Transmit LED

The **Transmit LED** lights when any PTT source is depressed keying up the console. It also blinks if a hold tone is detected on the TX audio line. This indicates to the operator that another console is currently transmitting on the channel.

Monitor

When the **Monitor** button is pressed a monitor tone burst is sent out. The monitor tone burst consists of a guard tone and function tone of 2050Hz (default value). The MON LED lights for the duration of the tone burst.

Intercom (IC)

When the **Intercom** button is pressed and held down the C-2000 transmits audio without activating the tone generator or local relay. Intercom is considered a PTT operation with the tone generator and local control relay disabled. The selected microphone is based on setup and/or hookswitch status.

Rear Panel Connections

Rear Panel Ports

The **Rear Panel** connections are shown in Figure 2, drawing of the rear panel of the C-2000.

Power Jack

The left most jack on the C-2000 is the **Power Jack**. The power supply included with the unit plugs in to this location. It is a standard 2.5mm center positive plug and requires at least 12V to operate correctly.

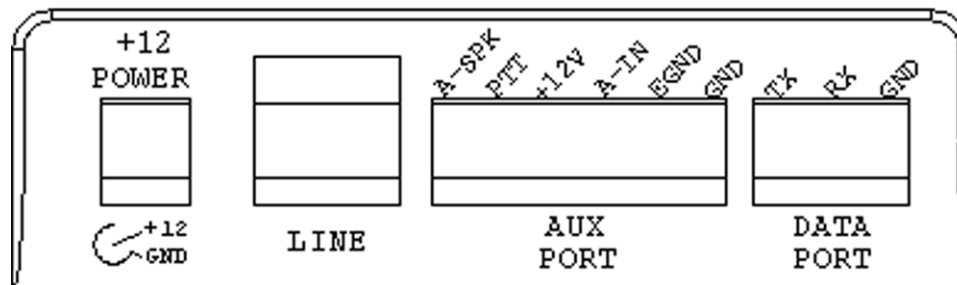


FIGURE 2. Rear Panel

Line Port

The C-2000 is equipped with a single **Line Port**. the connector is a standard 8-pin RJ-45; the pinout is shown in Figure 3. In addition to the standard RX and TX pin pairs, the unit can be supervised and supports crossmute functions. Pins 7 and 8 of the line connector can be used as a form C closure relay for local control. Pins 7 and 8 form the closure during any PTT operation. An internal resistor makes an external connection to ground unnecessary, and can be removed to remove ground from the closure path.

Auxiliary Audio Input

The external 6-pin terminal block provides an audio input (1), PTT (2), and GND (6) line. Pulling PTT to ground activates the audio input line for transmitting audio from an external source. This input is a high impedance capacitance coupled input.

Auxiliary Speaker

Pin 1 of the AUX Port is a capacitance coupled low impedance output used to drive an external speaker amplifier. Output level is controlled by the front panel volume control.

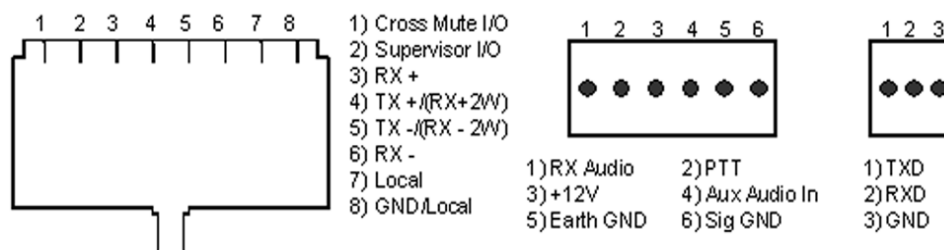


FIGURE 3. Rear Panel Pinouts

Battery Backup

The +12V power input on the AUX Port is used for **Battery Backup** and is a diode-protected input.

Earth Ground

The **Earth Ground** connection on the AUX Port must be connected for proper operation. It provides a path for any external noise to be shunted to.

Data Port

The **Data Port** is a 0 V to 10V asynchronous port used for cloning one (1) C-2000 to another. The cable is not supplied but the connector is. To connect two (2) units, RX on one (1) console should be connected to TX of the other console. Ground is connected straight through. This is a non-standard serial port used only for the C-2000 cloning function.

Specifications

Sequential Tone Line Input and Output Impedance:	2-Wire: 600 or 10K Ohms, jumper selectable, transformer isolated. 4-Wire TX Line: 600 Ohm or 1 Megohm, jumper selectable, transformer isolated. 4-Wire RX Line: 600 or 10K Ohm jumper selectable, transformer isolated. Local Control Keying: Relay rated at 1A at 125VAC, 3A at 40VDC.
Line Input Level:	-40dBm to +10dBm adjustable.
Line Output Level:	-20dBm to +10dBm into a 600 Ohm line, adjustable (high-level guard tone only).
Distortion:	3% maximum at full output.
Hum and Noise:	50dB below operating levels.
Speaker (one):	3in 8 Ohm, heavy-duty.
Amplifier Power:	2W maximum at 3% THD into an 8 Ohm load or equivalent.
Optional Handset Earpiece Level:	Adjustable level independent of speaker volume controls.
Audio Frequency Response:	±1.5dB, 300 to 3000Hz, except at the transmit tone notch frequency.
Tone Frequencies:	PTT/Guard 2175Hz or 2300Hz. The monitor and frequency function tones are programmable from 400Hz to 3000Hz at 50Hz increments. Accuracy ± 1Hz.
Operating Temperature Range:	0°C to +70°C (32°F to +158°F).
Power Requirements:	0.117 VAC, 60Hz, 25W, or 12.0 VDC at 1A maximum.
Microphone Connection:	Handset and headset 4-wire; desk uses 6-wire.

NOTE: Specifications are subject to change with out notice.

Line Setup and Description

Introduction

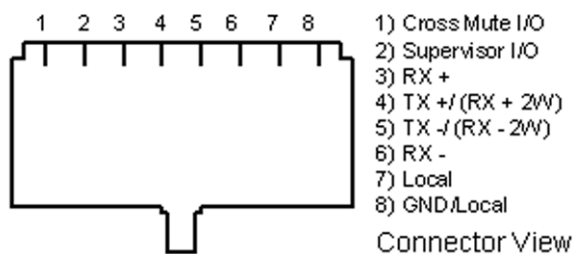


FIGURE 4. Line Connector Pinout

The Line interface for the C-2000 console provides communication with any standard tone remote system. The pinout of the line interface connector is shown in Figure 4, which is on the rear panel.

Feature Description

Crossmute

When a parallel console operator keys a microphone in the same room, the **Crossmute** function mutes the receive audio path of the other parallel consoles. This prevents any unwanted audio loops that could occur, causing a loud squeal on the parallel speakers.

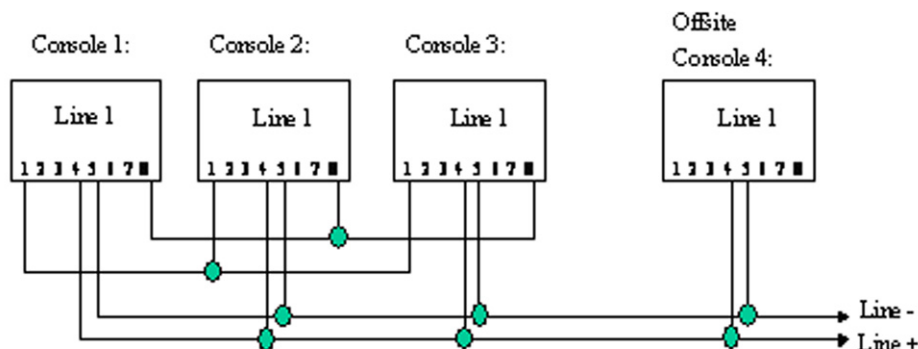


FIGURE 5. Crossmute Function Example

Feedback may be avoided by muting the receive audio of the other consoles which are in parallel with a transmitting console. This can be accomplished by connecting pins 1 and 8 of each of the consoles to be crossmuted, as shown in Figure 5. Pin 8 must be connected to provide a common ground. Figure 5 illustrates the connections between consoles 1 through 3 that are in the same room and when one (1) transmits, the receive audio on the other consoles is muted. Console 4 is off-site with no possibility of feedback, therefore, it is not connected and is not muted.

NOTE: The intercom function does not work between crossmuted consoles.

Supervisor Function

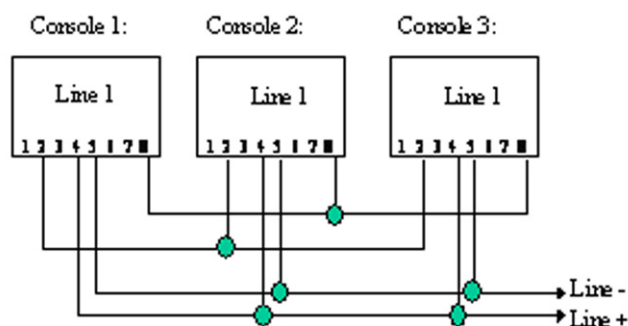


FIGURE 6. Supervisor Function Example

The **Supervisor** function enables a console, such as the C-1616 which has the capability to drive this line, to disable all units on a particular line. This includes both PTT and RX audio. Its connection is similar to the crossmute function. By wiring alone, it is possible to set up only specific consoles with this feature. The connection scheme required to utilize this function is shown in Figure 6. Pin 2 of all consoles are connected together. Pin 8 is a common ground for all consoles and is connected together on all consoles.

Assuming console 1 has supervisory capability, when activated, Line 1 on parallel consoles 2 and 3 would then be inhibited from both transmit and receive. In addition, the C-2000 displays *SU* on the seven (7) segment display if a master console, such as the C-1616, activates the supervisor function.

Relay Contact Closure For Local Control

The relay is normally open and provides a dry contact closure during PTT functions between pins 7 and 8 of the line jack. The relay contacts are rated at 500mA at 12VDC or 250mA at 115VAC. When using the intercom function, the relay is not activated. If this **Relay Closure** is used for local control (or any other case where tone bursts are not used for signaling), disabling the tone generation is recommended by entering the setup mode.

2-Wire/4-Wire Mode

The C-2000 comes standard with a jumper selectable 2- or 4-wire option.

NOTE: The C-2000 is shipped in the 4-wire mode.

The **2-Wire Mode** is setup by the following jumper positions:

TABLE 1. 2-Wire Mode Jumper Settings

Jumper	Position
JP10	A
JP11	A

The **4-Wire Mode** is setup by the following jumper positions:

TABLE 2. 4-Wire Mode Jumper Settings

Jumper	Position
JP10	B
JP11	B

The RX pair is now on pins 3 and 6 on the connector and the TX pair is on pins 4 and 5. Once the transmit and receive paths are separated the impedance of each side must be set.

RX Side Settings

In 4-wire mode, the **RX Side** is jumper selectable for a 600 Ohm impedance, or 10k Ohm impedance. If only one (1) console is on the line (no parallel consoles), then place J8 in the A position for a 600 Ohm line impedance. If more than one (1) console is on one (1) line, then place J8 on one (1) console in the A position and all other consoles in the B position. Each console added to the system results in line loss.

The following chart gives an indication as to how much loss can be expected. The first console in the system is set for an impedance of 600 Ohms out (approximately). Each console added to the system thereafter is set for an impedance of 10k Ohms. The more consoles bridged on the line, the lower the line impedance and the greater the loss in audio level.

NOTE: In 2-wire mode, all consoles should have J8 in the B position.

Console #	J8 Position	Impedance	Impedance	Loss (dB)
1	A	604	604	0.0
2	B	10k	569	-0.5
3	B	10k	539	-1.0
4	B	10k	511	-1.5
5	B	10k	486	-1.9
6	B	10k	464	-2.3

Level adjustment can be made to the receive audio by entering the setup mode or adjusting the RX level potentiometer inside the C-2000.

TX Side Settings

The C-2000 TX output circuitry has a **DPDT** (Double Pole Double Throw) relay that is used to connect and disconnect the TX output transformer from the TX line based on PTT status. This allows a very large number of consoles to be attached to the line in parallel, because only the transmitting unit is directly connected to the line. When not transmitting, the DPDT relay is connected to 600 Ohms or open circuit depending on the number of consoles connected in parallel to the line.

If only one (1) console is attached, this unit should have J12 in the A position. This makes it the effective master and terminates the line with 600 Ohms. If multiple consoles are connected in parallel, one (1) console should be designated as the master by placing J12 in the A position. The remaining consoles should be designated as slaves and should have J12 placed in the B position. In this manner, the impedance looking back into the parallel configuration of consoles is still 600 Ohms. Figure 7 shows the basic configuration.

NOTE:

- The C-1616 could also be the master in this configuration.
- If any of the consoles connected in parallel are not C-2000's, then all the C-2000's should be configured as slaves. Additionally, J14 should be used as a TX line impedance correction if there are consoles other than the C-2000 connected in parallel. J14 position B adds another 600 Ohms to the output TX line. J14 Position A is straight through.

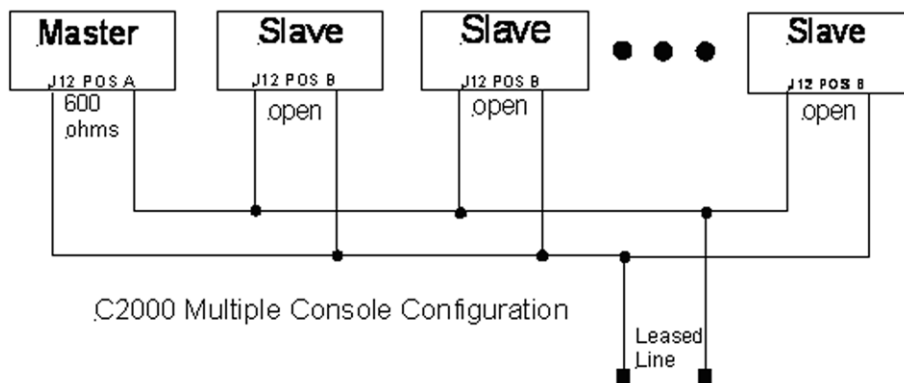


FIGURE 7. Master and Slave Console Configuration

Transmit Monitor

In a 4-wire system with parallel consoles, the transmit line may be monitored. The **Transmit Monitor** is not needed in 2-wire mode because transmit audio is already on the receive circuit. The transmit monitor, in 4-wire mode, is used to detect transmit activity for the TX Detect LED. For more information, see “Transmit Monitor Setup” on page 15.

Level Adjustments

Transmit Side Adjustments

The transmit audio consists of multiple audio sources, microphone audio, AUX input, Function Tones, and **DTMF** (Dual Tone Multiple Frequencies) tones. Each audio source is summed or generated in the **DSP** (Digital Signal Processing) with the analog signal being generated on a single DAC. The following is a list of the potentiometers that affect the transmit path.

Reference Description

<i>R171</i>	TX Output Level Adjustment
<i>R105</i>	Desk Microphone Adjustment
<i>R115</i>	Handset Microphone Adjustment

Mic Input level Adjustment

CAUTION: Care should be taken to avoid over-driving the input TX circuitry, as this distorts the audio. Verify you enable the desired microphone connection in setup mode. Saying and holding the word *four* is a good audio level test vocalization. Use a strong tone of voice.

To **adjust the handset audio input level**, do the following:

1. Connect an **oscilloscope** to test point TP3.
2. Adjust **R115**.
3. Speak into the **handset**.
4. Adjust the **audio** to approximately 3.5Vp-p.

A portion of the handset audio will be routed to the handset earpiece, this level is adjustable in setup mode. For the Desk Microphone input, repeat the sequence only monitor test point TP2 and adjust R105. Make sure that the Desk Microphone is at the normal distance from the operator when setting the level.

TX Output Level Adjust

The transmit level potentiometer is used to adjust the **Output Level** of the transmit audio so it is calibrated with the tone levels set in setup mode. Calibration of the TX line varies depending on system variables as well as the number of consoles found in parallel on the line. An easy way to align the console for the correct level is to press and hold the PTT key. While the console is keyed up, the unit by default, generates a Hold tone at -20dBm. A meter reading dBm is used and R171 adjusted to read the correct value. Also an alignment tone state 50 is provided (REV.2.3 and higher operating software).

Transmit Monitor Setup

The **Transmit Monitor** provides a portion of the transmit audio of a 4-wire circuit to the receive path. This allows the console operator to listen to the transmissions of parallel console operators.

To **set this level have a parallel console operator**, do the following:

1. Press the **intercom** button.
2. Adjust **R104** until the level is comfortable in the handset/headset earpiece or the speaker.

NOTE:

Make sure this feature is enabled or no audio will be passed. See "Setup Mode" on page 17.

RX Level Adjustment

The **RX Level** should be adjusted so the maximum level coming into the console use the entire range of the **ADC** (Analog to Digital Converter), which is 0-4V. A test tone of +3dBm to -5dBm coming into the line interface is a good value to use. Adjust R89 so the signal seen on an oscilloscope at test point TP4 is approximately 3.8Vp-p.

Setup Mode

Entering Setup Mode

Entry into the C-2000 **Setup Mode** is accomplished by pressing and holding the **IC** and **MON** keys, then pressing the **2** key. The IC and MON buttons stay lit when in setup mode.

If a PIN number is required, an EP (Enter PIN) appears in the display requesting the 4-digit number be entered. If the number is entered incorrectly, the C-2000 displays “IP” (Incorrect PIN) and returns to user mode. No PIN number is required if the system defaults are set. Default values can be restored to the unit by pressing and holding the function up and function down keys when power is applied to the unit. If a PIN number has been set, it is requested before resetting to default values. If the PIN is entered incorrectly, the C-2000 does not reset its values to default and will enter the user mode.

PIN numbers can be enabled, disabled, or changed in Setup Mode, see Setup State 1 PIN Number Change on page 21. If the PIN number is lost or forgotten, a system override is available that sets all parameters back to default.

To **reset the system parameters**, do the following:

3. Power down the **unit**.
4. Open the **case**.
5. Disconnect the **speaker**.
6. Place **test jumper J17** in the A position.
7. Power up the **unit**.
This mode resets defaults and does a system test. The C-2000 has now stored system defaults, which includes no PIN number.
8. Power down the **unit**.
9. Place **J17** in the B position.
10. Connect the **speaker**.
11. Close the **case**.
12. Power up the **unit**.

Exiting Setup Mode

Exiting Setup Mode is done in the same manner as entering setup mode.

1. Press and hold the **IC** and **MON** keys.
2. Press the **2** key.
The user returns to normal operation mode.

NOTE: Settings are saved on exit.

To **save settings before exiting setup mode**, do the following:

1. Press and hold the **IC** and **MON** keys.
2. Press the **D** key.

Maneuvering Through Setup Mode

Setup Mode Control Keys

The main control keys are:

<i>Volume Up and Down</i> -	Selects the setup state by scrolling up and down through the allowed states.
<i>Function Up and Down</i> -	Selects the setup option for the current setup state by scrolling through the allowed options for that state.
<i>DTMF Found Key (#)</i> -	Used as the Enter key. Pressing this key enters the current option for the current state. It also takes you into a more complicated mode if more than a simple enable or disable is required.
<i>DTMF Star Key (*)</i> -	Used as the Escape key. Pressing this key exits without saving from certain setup states that require it.
	NOTE: Only a few states use this key.
<i>DTMF A and B Keys</i> -	These keys are used to program Function Tone frequencies main and sub-tone. It is also used to select clone mode master or slave.
<i>IC and D Key</i> -	Pressing and holding IC, then pressing D saves the changes made to setup mode.
<i>IC and MON Keys</i> -	Pressing these keys together while in the PIN change state disables the PIN.
	NOTE: This key sequence is not used in any other state.
<i>Transmit Key</i> -	This key is used to display the current setup state, once the display has changed to the setup option.

Setup Mode Philosophy

Once **Setup Mode** is entered, the operator uses the volume up and down keys to select the setup state. The setup state is the system function that the operator wishes to change or enable. The display shows the setup state number and both decimal points for one (1) second and then change to the Setup State option number, with no decimal point, that is currently programmed.

If you want to review the setup state while the set up option is being displayed, simply press the TRANSMIT key on the front panel and the current setup state displays as long as the key is held. Once you have scrolled to your desired setup state and the display has changed to that states currently programmed setup option, the operator can use the function up and function down keys to scroll to the appropriate setup option.

The display shows the setup option number and no decimal points. The selection scrolls to those option values available to that setup state, i.e., an enable/disable setup state has option 1 and 2, with 1=enable and 2=disable and no other. Now, pressing the Enter (#) key programs the selected option for the current state. Once programming completes, the display shows *OC (Option Changed)*, then display the current setup state.

Saving the changes made to a setup state is done by pressing and holding IC and pressing D. The display shows SS (Settings Saved) and then returns to the current Setup State. Exiting setup mode automatically saves the settings. If the settings are not saved and power is lost, the changes will be discarded.

There are certain setup states with more complex user interface features. For more information about status states, see Setup Mode on page 17.

TABLE 3. Setup States and Setup State Options

Setup State Number	Setup State	Description
0	<i>PIN Number Entry/Idle</i>	Automatically entered when Setup Mode is accessed.
1	<i>PIN Number Change</i>	Used to change the Setup Mode PIN number.
2	<i>Guard/Hold Tone Frequency</i>	Selects between 2175Hz and 2300Hz.
3	<i>Guard Tone Level</i>	Sets the level of the Guard tone.
4	<i>Guard Tone Duration</i>	Sets the Guard tone duration
5	<i>Hold Tone Level</i>	Sets the Hold tone level
6	<i>Hold Tone Hang Time</i>	Sets the time PTT and the hold tone is held after the Key release.
7	<i>Function Tone Level</i>	Sets the level of the Function Tone.
8	<i>Function Tone Duration</i>	Sets the duration of the Function Tone.
9	<i>Single/Dual Function Tone Mode</i>	
10	<i>Function Tone Frequency Select Mode</i>	Single mode F-Tone frequency.
11	<i>MON Frequency Selection</i>	Set Frequency of the monitor tone. 2050Hz default.
12	<i>DTMF Keypad Enable/Disable</i>	
13	<i>DTMF Tone Level</i>	Set the level of the DTMF tone generator.
14	<i>DTMF Hang Timer</i>	Time between DTMF tones that the Guard/Hold tone will wait.
15	<i>MIC AGC</i>	
16	<i>RX AGC</i>	
17	<i>Main Speaker with Handset Enable/Disable</i>	
18	<i>Single Frequency Telephone Mode^a</i>	
19	<i>Auxiliary Speaker Enable/Disable</i>	
20	<i>Function Tone Enable/Disable</i>	Select any F-tone from 1–99 to enable or disable, either mode.
21	<i>Crossmute Enable/Disable</i>	
22	<i>Minimum Speaker Audio Level Enable/Disable</i>	Min Speaker audio level Enable/Disable:
23	<i>Handset Mic Gain Setting</i>	Set the gain used for input audio on the handset microphone.
24	<i>Desk Mic Gain Setting</i>	Set the gain used for input audio on the desk microphone.
25	<i>AUX Port Gain Setting</i>	Set the gain used for input audio on the auxiliary port.
26	<i>Panel Mic Gain Setting</i>	
27	<i>RX Gain Setting</i>	Set the gain for the input RX audio.
28	<i>TX Gain Setting</i>	Set the gain for the output TX audio.
29	<i>Clone Mode Entry</i>	Enter the Clone mode. Press enter key, then select RX or TX.
30	<i>Duplex Mode Enable/Disable</i>	

TABLE 3. Setup States and Setup State Options

Setup State Number	Setup State	Description
31	<i>Handset Enable/Disable</i>	
32	<i>Monitor Mode Enable/Disable</i>	
33	<i>Tone/Local Mode Enable/Disable</i>	
34	<i>Squelch Threshold Level</i>	Set the threshold the squelch breaks at.
35	<i>Squelch Enable/Disable</i>	
36	<i>Squelch Hang Timer</i>	Set the time the squelch stays on after the threshold is broken.
37	<i>TX Monitor Enable/Disable</i>	
38	<i>Tone Detector Threshold</i>	Set the threshold level of the tone detector.
39	<i>Headset Hook Switch Enable/Disable</i>	
40	<i>TX Delay Period</i>	Set the amount of time TX output audio is delayed. 500ms max.
41	<i>Desk Microphone Enable/Disable</i>	
42	<i>Ring Type Select^a</i>	Select the type of annunciation on incoming call.
43	<i>EMSTEL Enable/Disable^a</i>	Enable EMS Telephone mode.
44	<i>DTMF Sequence Entry^a</i>	Program the DTMF strings or sequences.
45	<i>Ring Duration Entry^a</i>	Program the number of rings that will occur before no answer.
46	<i>DTMF Sequence Enable/Disable</i>	DTMF Sequence Enable/Disable:
47	<i>Function Tone Delay</i>	Program the amount of delay between F-up, F-down and F-tone launch.
48	<i>Parallel Update Enable/Disable</i>	
49	<i>Alert Tone Enable/Disable</i>	
50	<i>Alignment Tone On/Off</i>	Turns a test tone on and off.

a. Special Software Option

Setup Mode Navigation Overview

<i>IC, MON and 2 -</i>	<i>Used to access and exit Setup Mode.</i>
<i>Volume Up/Down -</i>	<i>Set the current Setup State. Number displayed with both decimal points lit.</i>
<i>Function Up (▲ ▲)/Down (▼ ▼)</i>	<i>Set the Setup State option. Number displayed with no decimal points lit.</i>
<i>ENTER (#) -</i>	<i>Key used to enter a value or mode. OC (Option Changed) or mode indication displayed after press.</i>
<i>IC and D -</i>	<i>Used to save any change made in Setup Mode. SS (Saved Settings) is displayed momentarily.</i>

NOTE:

- Any other keystroke of importance is detailed in the Setup State section where it is used.
- If no PIN is required, then upon entering the Setup Mode key sequence (IC-MON-2) the user goes directly to setup state 1.
- Descriptions of each setup variable appear in the following sections. In all option menus, the default option is denoted with an * (asterisk).

Setup State 0 PIN Number Entry/Idle

The **PIN Number Entry/Idle** setup state is automatically entered when the setup mode key sequence is entered (i.e. IC-MON-2). If a PIN number is required, EP (Enter PIN) is displayed. At this point, the user has to enter a 4-digit PIN number. The display sequences through 1,2,3,4 as the PIN is entered. If the PIN is correct, setup mode automatically goes to setup state 1, PIN Number Change. The user is now free to scroll through the Setup States.

If the PIN is entered incorrectly, an IP displays and the C-2000 returns to the normal operation mode.

If no PIN is required, then upon entering the setup mode key sequence (IC-MON-2) the user goes directly to setup state 1.

Setup State 1 PIN Number Change

The **PIN Number Change** setup state is used to change the PIN number. Enter Setup State 1 using the Volume Up/Down keys. Then press the Enter (#) key. The display shows EP (Enter PIN) expecting a new PIN number to be entered. The display sequences through 1,2,3,4 as the new PIN is entered. Once 4 digits have been entered, the display shows EP (Enter PIN) requesting the PIN again as a confirmation.

If the PINs match, the display shows PC (PIN Changed).

If the PIN's do not match, the display shows IP (Incorrect PIN) and you are forced back to normal operation mode.

To **remove a PIN**, do the following:

1. Press the **Enter (#)** key.
Display shows EP (Enter PIN) as if you were changing the PIN.
2. Press and hold the **IC** key.
3. Press the **MON** key.
Display shows PD (PIN Disabled).

NOTE: The changes are automatically saved.

Setup State 2 Guard/Hold Tone Frequency

The **Guard/Hold Tone Frequency** setup state, see Table 4, is used to set the frequency of the guard and hold tones. Two (2) values are valid for setup frequencies.

To **set the guard/hold tone frequency**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 4. Guard/Hold Tone Frequency

Option	Frequency
1 (default)	2175Hz
2	2300Hz

Setup State 3 Guard Tone Level

The **Guard Tone Level** setup state is used to set the level of the guard tone. The guard tone has a 40dB range. The values in between those shown in Table 5 are valid as well. For example 25 would result in an output level of -6dB for the guard tone.

To **set the guard tone level**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 5. Guard Tone Level

Option	Level
1	-30dB
11	-20dB
21	-10dB
25	-6dB
31	0 dB
41 (default)	+10dB

Setup State 4 Guard Tone Duration

The **Guard Tone Duration** setup state can vary from 0 to 500ms and is configurable to the nearest 10ms. The setup option is offset by one (1) and multiplied by 10. Any value between those in Table 6 is valid.

To **set the tone duration**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 6. Guard Tone Duration

Option	Duration
1	0 ms
14 (default)	130ms
51	500ms

Setup State 5 Hold Tone Level

The **Hold Tone Level** setup state is used to set the level of the hold tone. The Hold tone has a 40dB range. The values in between those shown in Table 7 are valid as well, for example 25 would result in an output level of -6dB for the hold tone.

To **set the hold tone level**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 7. Hold Tone Level

Option	Level
1	-30dB
11 (default)	-20dB
21	-10dB
25	-6dB
31	0 dB
41	+10dB

Setup State 6 Hold Tone PTT Hang Time

The **PTT Hang Time Duration** can vary from 0 to 500ms and is configurable to the nearest 10ms. The setup option is offset by one (1) and multiplied by 10. The purpose of this setting is to allow some programmable amount of time for the hold tone to continue after the PTT is released. This allows for the PTT to be released and pressed again without re-sending the guard-function sequence.

To **set the PTT hang time duration**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 8. Hold Tone PTT Hang Time

Option	Duration
1	0 ms
21 (default)	200ms
51	500ms

Setup State 7 Function Tone Level

The **Function Tone Level** is used to set the level of the Function Tone, which has a 40dB range. The values in between those shown in the Table 9 are valid as well, for example 25 would result in an output level of -6dB for the Function Tone.

To **set the function tone level**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 9. Function Tone Level

Option	Level
1	-30dB
25	-6dB
31 (default)	0 dB
41	+10dB

Setup State 8 Function Tone Duration

The **Function Tone Durations** can vary from 0 to 500ms and is configurable to the nearest 10ms.

GLOBAL DURATIONS: Use the function control keys to **adjust the duration option (1–51)**, do the following:

1. Press **A** for the Function Tone duration to be globally changed. This includes the main and sub-tones.
Display shows OC (Option Changed).

NOTE: Do not press # for global changes.

INDIVIDUAL DURATIONS: To **modify FT Function Tone durations**, do the following:

1. Press **Enter (#)**.
Display shows FD (Function Duration).

NOTE: Function Tone one (1) duration mode has been entered.

Use the instructions for Setup State 10 Function Tone Frequency setup, only applied to the duration Table 10 for Setup State 8.

TABLE 10. Function Tone Duration

Option	Duration
1	0ms
5 (default)	40ms
51	500ms

Setup State 9 Single/Dual Function Tone Mode

Single/Dual Function Tone Mode is used to set whether the C-2000 generates single or dual function tones. In the single Function Tone mode, Function Tones F1–F16 are valid and is sent per the programmed values of frequency, duration, and level. In the dual tone mode, two (2) function tones are sent out in which the first function tone is the tens digit and the second function tone is the ones digit. F10 is used as zero (0). In the dual mode it is important to remember the settings for F1–F10 are used for the digits. Remember, the frequencies programmed for F1–F10 will be transmitted to the tone remote. If the user modifies the frequencies of F1–F10, the tone remote at the radio must be capable of Dual Function Tone mode and the frequencies must be modified to match the C-2000.

To **set the single/dual function tone mode**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 11. Single Dual Function Tone Mode

Option	Setting
1 (default)	Single Tone
2	Dual Tone

Setup State 10 Function Tone Frequency

Function Tone Frequency is used to set the frequency of a particular function tone, it is a more complex setup state. Each Function Tone has a main tone and one (1) sub-tone. Once the user maneuvers to Setup State 10 using the VOLUME UP/DOWN keys, they must enter the Function Tone Frequency setup mode. Prior to entry, the FUNCTION UP/DOWN keys have no effect on the setup option. Function Tone Frequency setup mode has yet to be started.

To **start Function Tone Frequency setup mode**, do the following:

1. Press the **ENTER (#)** key with Setup State 10 as the current state.
Notice that the display changes to FF, the system is now in Function Tone Frequency setup mode.

In this mode, the FUNCTION UP/DOWN (▲ ▲ ▼ ▼) keys are used to select the Function Tone the user wishes to modify. The allowable values are 1–99. Pressing FUP (▲ ▲) or FDWN (▼ ▼) causes the display to scroll through these values, with no decimal point displayed. Once scrolling has stopped, the display changes to setup option 1, with both decimal points displayed.

Once the user has selected the function tone to be modified, use the VOLUME UP/DOWN keys to select the frequency for the current function tone, based on. The display scrolls through the setup option numbers with both decimal points displayed. With the display showing the frequency setup option, the user can momentarily change the display to the current function tone selected by pressing and holding the TRANSMIT key. The current function tone displays with no decimal points until the key is released, after which the display returns to the setup option.

Once the user has selected the function tone and the frequency, programming can begin. Remember each function tone has a main and a sub-tone. These are programmed by pressing DTMF A for the main tone or DTMF B for the sub-tone. Once the main or sub-tone has been selected, the display shows OC (Option Changed), then return to the current function tone number.

Exiting and saving the changes to the Function Tone Frequency setup mode can be achieved in the following manner: First, exit the function tone frequency setup mode by pressing the Escape key (*). This takes you to the entry point for setup state 10. From here the user navigates to any other setup state.

To **save the changes**, do the following:

1. Simply press and hold the **IC** key.
2. Press **DTMF D**.
Display will show SS (Saved Settings).

TABLE 12. Available Function and Monitor frequencies.

Option	Frequency	Option	Frequency	Option	Frequency
1	400Hz	19	1300Hz	37	2200Hz
2-F16	450Hz	20-F7	1350Hz	38	2250Hz
3	500Hz	21	1400Hz	39	2300Hz
4-F15	550Hz	22-F6	1450Hz	40	2350Hz
5	600Hz	23	1500Hz	41	2400Hz
6-F14	650Hz	24-F5	1550Hz	42	2450Hz
7	700Hz	25	1600Hz	43	2500Hz
8-F13	750Hz	26-F4	1650Hz	44	2550Hz
9	800Hz	27	1700Hz	45	2600Hz
10-F12	850Hz	28-F3	1750Hz	46	2650Hz
11	900Hz	29	1800Hz	47	2700Hz
12-F11	950Hz	30-F2	1850Hz	48	2750Hz
13	1000Hz	31	1900Hz	49	2800Hz
14-F10	1050Hz	32-F1	1950Hz	50	2850Hz
15	1100Hz	33	2000Hz	51	2900Hz
16-F9	1150Hz	34-MON	2050Hz	52	2950Hz
17	1200Hz	35	2100Hz	53	3000Hz
18-F8	1250Hz	36	2150Hz		

NOTE: In the options with a Function Number (F1-F16) and MON in the cell, indicate the default frequencies for that Function Tone.

Function Tone setup mode overview:

FUNCTION UP (▲ ▲) and *DOWN* (▼ ▼): Set the current Function Tone to be modified.

VOLUME UP/DOWN: Set the current Function Tone Frequency.

DTMF A and B: Select the main or sub Function Tone to be programmed.

TRANSMIT key: Show the current Function Tone once the display changes to the setup option.

*DTMF **: Escape out of Function Tone Frequency setup mode.

IC and D: Method used to save the changes made in Setup Mode.

Setup State 11 Monitor Frequency Select

The **Monitor Frequency Select** setup state is used to set the frequency of the monitor function tone.

To see the available options and the default monitor function tone frequency, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 12 DTMF Keypad Enable/Disable/Enable (without PTT)

The **DTMF Keypad Enable/Disable/Enable** setup state is used to enable/disable the keypad in normal operation mode.

Setup State option:

1=Enable*

2=Disable

3=Enable without PTT tone being sent

To **enable/disable the DTMF keypad**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 13 DTMF Tone Level

The **DTMF Tone Level Setup** state has a 40dB range. The values in between those shown in the Table 13 are valid as well, for example, 25 results in an output level of -6dB for the DTMF Tone.

To **configure DTMF tone level**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 13. DTMF Tone Level

Option	Level
1	-30dB
11	-20dB
21 (default)	-10dB
31	0 dB
41	+10dB

Setup State 14 DTMF Hang Timer

The **DTMF Hang Timer** setup state is used to allow the user a programmable amount of time to release one (1) DTMF key and press another without the hold tone being stopped and requiring the unit to resend the guard. Function tones can vary from 0 to 980ms and is configurable to the nearest 10ms. This timer has no effect if PTT or IC is already pressed.

TABLE 14. DTMF Hang Time

Option	Duration
1	0 ms
5	40ms
51 (default)	500ms
99	980ms

Setup State 15 MIC AGC Enable/Disable

The **MIC AGC Enable/Disable** is used to enable/disable AGC on all MIC inputs.

Setup State option:

1=Enable*

2=Disable

To **enable/disable AGC on all MIC inputs**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 16 RX AGC Enable/Disable

The **RX AGC Enable/Disable** is used to enable/disable AGC on the receive audio.

Setup State option:

1=Enable*

2=Disable

To **enable/disable AGC on the receive audio**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 17 Main Speaker with Handset Enable/Disable

The **Main Speaker with Handset Enable/Disable** allows receive handset audio to be played on the main speaker, as well as the handset earpiece.

Setup State option:

1=Enable*

2=Disable

To **enable/disable the main speaker and handset**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 18 SF Mode Enable/Disable (Special Software Option)²

The **SF (Single-Frequency) Mode Enable/Disable** setup state is used to enable/disable mode of operation. This mode requires the device operate in a telephone station configuration with 4-wire analog supervision SF signaling.

Setup State option:

1=Enable

2=Disable*

To **enable/disable SF mode**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

NOTE: If SF Mode is enabled, EMSTEL Mode is disabled.

Setup State 19 Aux Speaker Enable/Disable

The **Aux Speaker Enable/Disable** setup state is used to enable/disable the auxiliary speaker capability.

Setup State option:

1=Enable

2=Disable*

To **enable/disable the auxiliary speaker capability**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

2. This mode is not available unless activated at the factory. Once activated it will become a standard setup state.

Setup State 20 Function Tone Enable/Disable

The **Function Tone Enable/Disable** setup state is used to enable/disable a specific function tone. Allowed setup options are 1–99 or all the possible function tones.

To **modify the status of a function tone**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. To enable the Function Tone, press **DTMF A**.
3. To disable the Function Tone, press **DTMF B**.
Display shows OC (Option Changed).

NOTE: To **determine the status of the Function Tone**, observe the display as the option scrolls:

- Right decimal point is displayed the Function Tone is enabled.
- No decimal point is displayed the Function Tone is disabled.

Setup State 21 Crossmute Output Enable/Disable

The **Crossmute Output Enable/Disable** setup state is used to set whether the C-2000 pulls the crossmute pin on the line connector low during a PTT/IC sequence.

Setup State option:

1=Enable

2=Disable*

To **enable/disable crossmute output**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 22 Min Speaker Level Enable/Disable

The **Min Speaker Level Enable/Disable** is used to set whether the C-2000 enforces a minimum speaker level. Enabling this guarantees the operator cannot turn the volume completely off. The volume control range is 0–25, with zero (0) being muted audio and 25 being full volume. The possible setup options are 1–25 or the full volume control range, except zero (0) or muted.

To **enable/disable min speaker level**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

To **clear the minimum speaker value**, do the following:

1. Press the **Escape (*)** key.
Display shows OC (Option Changed).

NOTE: The default value for this feature is zero (0), or no minimum level.

Setup State 23 Handset Mic Level

The **Handset Mic Level** setup state is used to set the level of the handset microphone jack input. The allowable range is –10dB to +10dB. The values in between those shown in Table 15 are valid as well, for example 12 would result in an output level of +1dB for the level setting.

To **set the level of the handset microphone jack input**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 15. Handset Mic Level

Option	Level
1	-10dB
11 (default)	0 dB
12	+1dB
21	+10dB

Setup State 24 Deskmic Level

The **Deskmic Level** setup state is used to set the level of the deskmic jack input. The allowable range is –10dB to +10dB. The values in between those shown in Table 16 are valid as well, for example 12 would result in an output level of +1dB for the level setting.

To **set the level of the deskmic jack input**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 16. Deskmic Level

Option	Level
1	-10dB
11 (default)	0 dB
12	+1dB
21	+10dB

Setup State 25 Aux Input Port Level

The **Aux Input Port Level** setup state is used to set the level of the Aux input port. The allowable range is –10dB to +10dB. The values in between those shown in Table 17 are valid as well, for example 12 would result in an output level of +1dB for the level setting.

To **set the level of the aux input port**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 17. Aux Input Port Level

Option	Level
1	-10dB
11 (default)	0 dB
12	+1dB
21	+10dB

Setup State 26 Panel Microphone Input Level

The **Panel Microphone Input Level** setup state is used to set the level of the panel microphone input level. The allowable range is –10dB to +10dB. The values in between those shown in Table 18 are valid as well, for example 12 would result in an output level of +1dB for the level setting.

To **set the level of the panel microphone input level**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 18. Panel Microphone Input Level

Option	Level
1	-10dB
11 (default)	0 dB
12	+1dB
21	+10dB

Setup State 27 RX Line Jack Level

The **RX Line Jack Level** setup state is used to set the level of the RX line jack. The allowable range is –10dB to +10dB. The values in between those shown in Table 19 are valid as well, for example 12 would result in an output level of +1dB for the level setting.

To **set the level of the RX line jack**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 19. RX Line Jack Level

Option	Level
1	-10dB
11 (default)	0 dB
12	+1dB
21	+10dB

Setup State 28 TX Line Jack Level

The **TX Line Jack Level** setup state is used to set the level of the TX Line Jack. The allowable range is –10dB to +10dB. The values in between those shown in Table 20 are valid as well, for example 12 would result in an output level of +1dB for the level setting.

TABLE 20. TX Line Jack Level

Option	Level
1	-10dB
11 (default)	0 dB
12	+1dB
21	+10dB

Setup State 29 Clone Mode

The **Clone Mode** setup state is used to copy the non-volatile memory of a properly configured unit to a generic unit, thereby cloning one (1) unit to another.

NOTE: The software version numbers must be the same.

This setup state is the gateway to a more complex mode, so there are no setup options at first.

To **setup clone mode**, do the following:

1. Setup the slave to receive data and the master to transmit data. Make sure the two (2) units are properly connected.
2. The data port on the back of the C-2000 is a 3-pin port with TX, RX and GND.
3. Using a 3-wire serial cable constructed as shown in Figure 8, connect the two (2) units together.
4. Keep the cable length reasonably short.
5. Each unit is shipped with the connector plugged into the back.

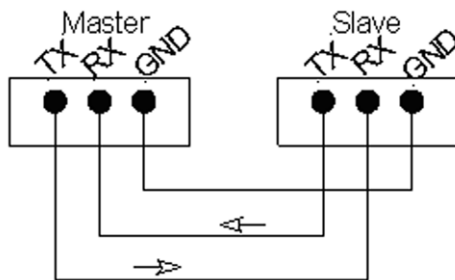


FIGURE 8. Serial Cable Diagrams

To **enter clone mode**, do the following:

1. Press the **Enter (#)** key.
The display shows CL (Clone Mode). The C-2000 is waiting to be told whether it is the master (TX) or the slave (RX).

To **operate in clone mode operation**, do the following:

1. Press **DTMF B** to place the slave unit in receive mode.
There is no indication that the unit is in receive mode. The slave will wait indefinitely for the master to begin sending data. The slave unit is ready to receive, the user begins transmitting with the master.
2. Press **DTMF A** on the master will start the transmission.
The slave unit will receive the last packet, after approximately five (5) seconds.
3. Calculate the **checksum**.
Display CC (Clone Complete) or EE (Error) if checksum fails. This concludes the cloning process.

To **exit clone mode**, do the following:

1. Press the **ESCAPE(*)** key.
Display shows CC (Clone Complete).

NOTE: The C-2000 is back in normal setup mode and waiting for the next setup state.

Clone Mode Overview

<i>ENTER(#)</i> key:	<i>Used to enter Clone Mode.</i>
<i>ESCAPE(*)</i> key:	<i>Used to exit Clone Mode.</i>
<i>DTMF B:</i>	<i>Sets up the slave/receive mode. Must be done prior to receiving data.</i>
<i>DTMF A:</i>	<i>Starts data transmission from the master. Slave will indicate Clone Complete.</i>

Setup State 30 Full Duplex Mode Enable/Disable

The **Full-Duplex Mode Enable/Disable** is used to set whether the C-2000 has the full-duplex mode of operation enabled or disabled. Full-Duplex allows the operator to listen to incoming traffic during a PTT sequence.

Setup State option:

1=Enable*

2=Disable

To **enable/disable full duplex mode**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 31 Handset Enable/Disable

The **Handset Enable/Disable** is used to set whether the C-2000 has the handset enabled or disabled. This is used to determine the routing of receive audio.

Setup State option:

1=Enable*

2=Disable

To **enable/disable the handset**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 32 Auto-Monitor Enable/Disable

The **Auto-Monitor Enable/Disable** is used to set whether the C-2000 has the monitor set to automatic or manual. In the case of automatic, if the handset is installed the MON burst is sent when an off-hook is sensed. In the manual mode, the MON key must be pressed to send the MON burst to the tone remote.

Setup State option:

1=Enable

2=Disable*

To **enable/disable auto-monitor**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 33 Tone/Local Mode

The **Tone/Local mode** is used to determine whether the C-2000 should send the Guard-Func-Hold sequence for PTT. If the unit is set to local mode, a PTT closes the relay attached to the line jack.

Setup State option:

1=Tone*

2=Local

To, **set the tone/local mode**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 34 Squelch Level

The **Squelch Level** is used to set the level at which the squelch, if enabled, opens up the receive audio. This function can be used with an incoming tone to determine the set point. If an incoming tone is present, as soon as the value is entered from Table 21, the speaker either opens up or mutes. The values in between those shown in Table 21 are valid as well.

To **set the squelch level**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

TABLE 21. Squelch Level

Option	Level
1	-30dB
21*	-10dB
31	0 dB

Setup State 35 Squelch Enable/Disable

The **Squelch Enable/ Disable** enables or disables the squelch function. If disabled, all audio, no matter the incoming level, is played through to the speaker.

Setup State option:

1=Enable

2=Disable*

To **enable/disable the squelch**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 36 Squelch Hang Time

The **Squelch Hang Time** duration can vary from 1 to 60s and is configurable to the nearest second. The squelch hang time determines the amount of time the squelch stays open after a valid signal is removed. The Setup State option number is the value, in seconds, to be programmed. The default value is 10 seconds.

To **configure squelch hang time**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 37 TX Monitor Enable/Disable

The **TX Monitor Enable/Disable** enables or disables the TX monitor function. In 4-wire mode, if TX monitor is enabled, parallel TX audio is routed to the speaker. Also, the tone detector algorithm blinks the TRANSMIT LED when threshold surpassing hold tone is detected on the TX line. In 2-wire mode, this feature is not applicable.

Setup State option:

1=Enable*

2=Disable

To **enable/disable TX monitor function**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 38 Tone Detector Threshold

The **Tone Detector** is used to set the threshold for the tone detectors, there are two (2) thresholds that may be adjusted. Threshold A is for a TX Hold Tone. If the Hold tone causes the threshold to be surpassed, the TRANSMIT LED starts blinking. This indicates a parallel transmission. Possible values range from 100–9900 the default is 4500.

To set the threshold A tone detector, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **DMTF A**.
Display shows OC (Option Changed).

Threshold B is for the parallel update function tone. If parallel update is enabled and a parallel console transmits the Guard/Function tone sequence, which causes this tone detector threshold to be surpassed, the unit switches the current function tone value to that decoded and update the display.

To **set the threshold B tone detector**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **DMTF B**.
Display shows OC (Option Changed).

TABLE 22. Tone Detector Threshold

Option	Threshold A	Threshold B
1	100	10000
25	2500	250000
45	4500 (default)	450000 (default)
75	7500	750000
99	9900	990000

NOTE: When this Setup State option number is first displayed it will show the default or the value last programmed, whether threshold A or B.

Setup State 39 Headset Enable/Disable

The **Headset Enable/Disable** is used to enable/disable headset control of the hook switch. If enabled, a headset can cause the system to be taken off hook.

Setup State option:

1=Enable

2=Disable*

To **enable/disable headset control of the hook switch**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 40 TX Delay Period

The **TX Delay Period** is the amount of time the C-2000 spools audio before transmitting. The maximum delay period is 500ms.

To **set the TX delay period**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Option	Period
1	0
2	100ms
3	200ms
4	300ms
5	400ms
6	500ms

Setup State 41 Desk Microphone Enable/Disable

The **Desk Microphone Enable/Disable** is used to enable/disable the desk microphone.

Setup State option:

1=Enable

2=Disable*

To **enable/disable the desk microphone**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup State 42 Ring Type Select (Special Software Option)

The **Ring Type Select** is used to select the type of annunciation the C-2000 uses in SF or EMSTEL modes of operation. There are eight (8) different rings to select from, all cadences are one (1) second annunciation, four (4) second ring period. Possible notes are, from lowest to highest: A=440Hz, B=494Hz, C=523Hz, D=587Hz, E=659Hz, F=698Hz, G=784Hz, 2A=880Hz.

To **set the ring type select**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

Setup Option	Note One	Note Two	Note Three	Note Four
1	E	A	E	A
2	A	E	C	G
3	F	G	A	C
4	G	D	A	D
5	A	C	E	G
6	G	E	C	A
7	G	G	C	C
8	G	2A	G	2A

Setup State 43 EMSTEL Enable/Disable (Special Software Option)

The **EMSTEL Enable/Disable** is used to enable/disable the EMSTEL mode of operation. This mode is to operate in multi-party, 4-wire private network. It uses two (2) digit DTMF signaling.

Setup State option:

1=Enable

2=Disable*

To **enable/disable EMSTEL**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **Enter (#)**.
Display shows OC (Option Changed).

NOTE: If SF Mode is enabled, EMSTEL Mode is disabled. Disable SF Mode before exiting setup mode.

Setup Option	Assignment
1	D00
2	D01
3	D02
4	D03
5	D04
6	D05
7	D06
8	D07
9	D08
10	D09
11	D10
12	D11
13	D12
14	D13
15	D14
16	Receive/D15

Setup State 44 DTMF Sequence Entry

The **DTMCF Sequence Entry** is used to program the DTMF sequences which cause annunciation if received or is transmitted when the D key is pressed and the sequence assignment number follows directly, providing the mode is enable (see DTMF Sequence Enable/Disable and DTMF Keypad Enable/Disable).

NOTE: When this feature is enabled, the D key is unavailable for normal DTMF use.

To **enter a DTMF sequence**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **ENTER (#)**.
3. Enter the **DTMF sequence**.
Which is to be received or transmitted.
4. Press the **A** key.
Terminates the sequence. Display will show OC (Option Changed).

To **program the sequence to decode on receive for EMSTEL mode**, do the following:

1. Scroll to **setup option 16**.
2. Program the desired **sequence** in the slot used for that function.

For example: to program 1234567890 to be transmitted when the D10 sequence number is entered, do the following:

1. Scroll to **setup option 11**.
2. Press **ENTER (#)**.
3. Enter **1,2,3,4,5,6,7,8,9,0**.
4. Enter **A**.

NOTE: The setup option is used to select which Dxx address the sequence is intended for. The A is only a secondary enter key, allowing the # key to be a part of any sequence.

To **disable a previously programmed sequence**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **ENTER (#)**.
3. Press the **B** key.
Display shows OC (Option Changed).

NOTE: Allowed keys are (1234567890*#). The maximum sequence length is 16 digits.

Delays are added to the sequence by pressing the D key during the sequence entry period. For example, the number 111 - - 555 - - 1234 can be entered as follows: 1 1 1 D D 5 5 5 D D 1 2 3 4, which takes up 14 of the 16 total digits. When entering a sequence, the display will show the sequence count of the current DTMF string.

Dial String Entered	1	1	1	D	D	5	5	5	D	D	1	2	3	4
Display Count	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Setup State 45 Ring Duration (Special Software Option)

The **Ring Duration** is used to program the number of rings that occur if the unit is instructed to ring and is not taken offhook. Ringing stops after the programmed number of rings. The setup options are 1–10 corresponding to the number of desired rings. The default value is four (4) rings. This feature is used in SF and EMSTEL modes.

To **program the ring duration**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **ENTER (#)**.
Display shows OC (Option Changed).

Setup State 46 DTMF Sequence Enable/Disable

The **DTMF Sequence Enable/Disable** is used to enable/disable DTMF Sequence transmissions, when the D key is pressed followed by the assigned sequence number (D00, D01,...D15).

Setup State option:

1=Enable

2=Disable*

To **enable/disable DTMF sequence**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **ENTER (#)**.
Display shows OC (Option Changed).

NOTE: When this feature is enabled, the D key is unavailable for normal DTMF use.

Setup State 47 Function Tone Launch Delay

The **Function Tone Launch Delay** is used to control the amount of time/delay that occurs between the function tone key press event and the actual function tone being transmitted. Shows the available delays.

To **set the function tone launch delay**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **ENTER (#)**.
Display shows OC (Option Changed)

Setup Options	Delay
1	500ms
2	600ms
3	700ms
4	800ms
5	900ms
6	1 second

Setup State 48 Parallel Update Enable/Disable

The **Parallel Update Enable/Disable** is used to enable/disable parallel update capability, this feature is used to control parallel consoles. If a secondary console is connected in parallel and transmits a Function Tone, the primary unit decodes the Function Tone and switch its current Function Tone to decoded.

Setup State option:

1=Enable

2=Disable*

To **enable/disable parallel update**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **ENTER (#)**.
Display shows OC (Option Changed).

Setup State 49 Alert Tone Enable/Disable

The **Alert Tone Enable/Disable** is used to enable/disable alert tone capability, this feature allows an alert tone to be transmitted as long as the A key is pressed and held. The tone is a high/low warble tone at 0 dBm.

Setup State option:

1=Enable

2=Disable*

To **enable/disable alert tone capability**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **ENTER (#)**.
Display shows OC (Option Changed).

NOTE: If this feature is enabled, the A key is not available for normal DTMF use.

Setup State 50 Alignment Tone On/Off

The **Alignment Tone On/Off** is used to turn an alignment tone on and off, this feature is used to assist the system setup. The tone frequency is 1050Hz at 0 dBm. All the control is done in this setup mode.

Setup mode option:

1=On

2=Off*

To **turn an alignment tone on and off**, do the following:

1. Select the **setup option** using FUP/FDWN keys.
2. Press **ENTER (#)**.
Display shows OC (Option Changed).

C-6200 Worksheet

Record your C-2000 programmed personality on the worksheet shown in Table 23.

TABLE 23. C-2000 C-200 Programming Worksheet

State	State Setting	State	State Setting	State	State Setting
1		18		35	
2		19		36	
3		20		37	
4		21		38	
5		22		39	
6		23		40	
7		24		41	
8		25		42	
9		26		43	
10	Non-Default, see Table 24	27		44	
11		28		45	
12		29		46	
13		30		47	
14		31		48	
15		32		49	
16		33		50	
17		34			

Record the C-2000 Function Tone frequencies and enable/disable in Table 24.

TABLE 24. C-200 Function Tone Frequencies Worksheet

F#	Frequency	E/D	F#	Frequency	E/D	F#	Frequency	E/D	F#	Frequency	E/D
F1			F5			F9			F13		
F2			F6			F10			F14		
F3			F7			F11			F15		
F4			F8			F12			F16		

Notes:

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