



Model C-SOFT
User Configurable Version
USB and Parallel Key Versions
Radio Control Console
Includes P25 Control Options
Version 2.8x

Technical Manual

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1 Introduction

The original version of the C-Soft console from Telex-Vega provided a user interface much like the user interfaces standard and Vega's standalone desktop console. With the release of Version 2.0, the radio technician is now able to completely define the look and operational characteristics of the radio operators interface. With an infrastructure of Vega VoIP products, C-Soft represents another method for controlling a radio network utilizing standard computing equipment.

The C-Soft software console is protected from copying by the use of a security dongle attached to either the parallel printer port, or to a USB port. Software updates are freely available within the same version family by simply downloading them from our website at www.vega-signaling.com.

2 Computer System Requirements

Operating System:	Windows 2000 or XP required.
Sound System:	Full Duplex windows compatible sound system. Sound Blaster or HW compatible recommended.
Network Connection:	10 Mbps or 100Mbps TCP/IP connection. Constant IP address preferred.
Processor Speed:	Celeron 500 or greater especially if controlling P25 radios or large numbers of radios.
Memory:	Minimum of 256Mbytes recommended

3 Software Installation

There are several steps to installing the C-Soft package on a computer. The first is to copy the manual and program onto the computer and setup shortcuts to them.

3.1 Program Installation

Step 1: Open Windows Explorer and create a new subdirectory under the root directory called C-Soft. This can be accomplished by selecting a local hard disk drive (typically drive C:) in the left pane of Windows explorer. In the right pane, right click on an open spot and select New->Folder. The folder will appear and allow the user to enter a name for the new folder. Use C-Soft. See Figure 1 for creation of the directory.

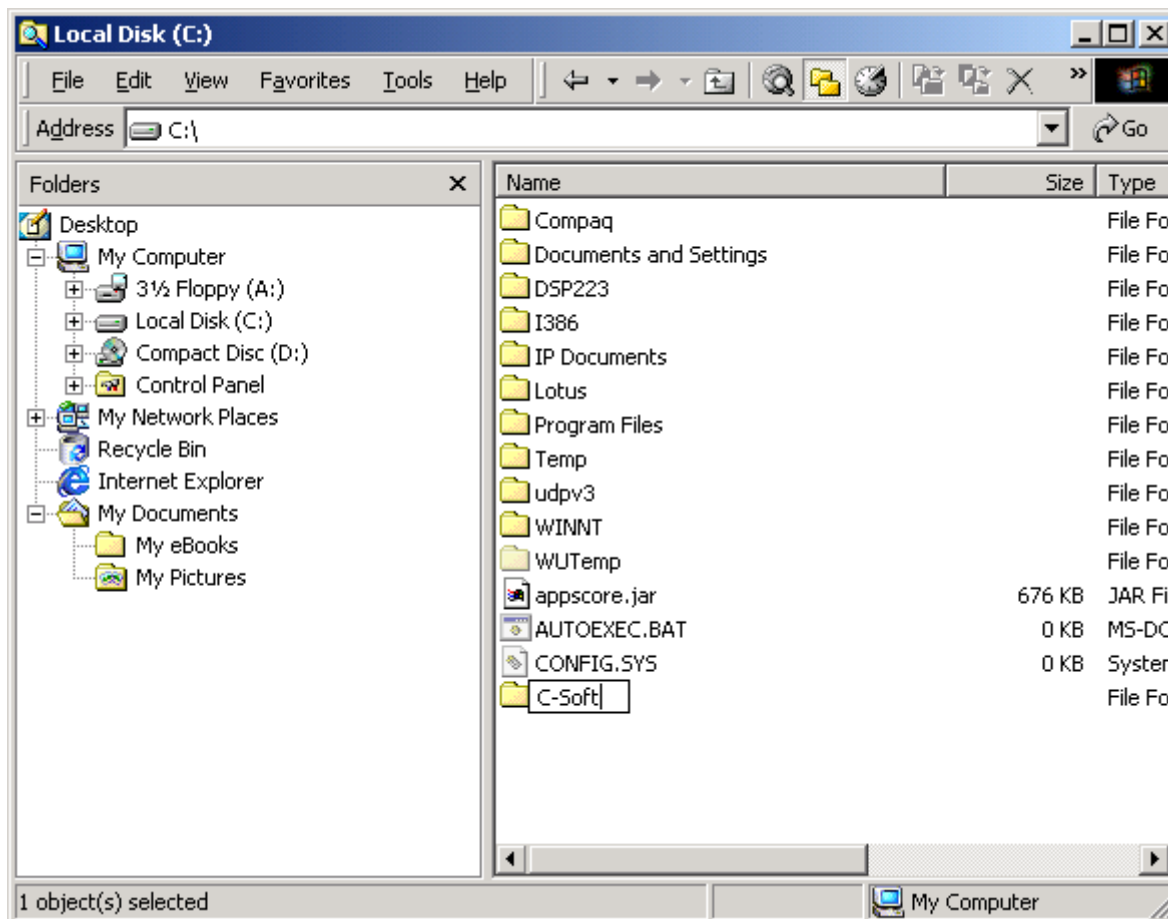


Figure 1 – Adding a Directory for C-Soft

Step 2: Copy the files CSoftRuntime.exe, CSoftDesigner.exe and C-Soft Manual 25.pdf from the included CD into the newly created directory. Also copy C6200F_Default.veg into the new directory.

Step 3: Create a shortcut on the desktop to open the CSoftRuntime.exe, CsoftDesigner.exe, and the Adobe .PDF formatted document file. Telex-Vega suggests that the user print out a copy of the manual for reference purposes. A copy of the Adobe Acrobat reader is included on the CD if it doesn't already exist on the users computer.

3.2 Driver Installation

Before the CSoftRuntime.exe file can be executed from the desktop Icon created in Section 3.1, a driver to allow the

program to access the security Dongle must be loaded. **Make certain that no USB dongle is connected during the installation of the driver.** Execute file SPNComboInst1.0.5.exe included on the CD. Follow the directions of the setup wizard as it executes. A standard installation is the normal install and only a qualified IT professional should attempt to use the manual install. The user will have to restart their computer after the installation of the Dongle driver is completed. Additional information on the driver installation can be found at http://www.rainbow.com/support/eu_support.htm. The CSoftDesigner.exe program does not require the dongle to be installed. This allows the person responsible for the dispatcher's console interfaces to do screen design without the need for a licensed copy of the software. The output of the designer software is a file that is loaded by the runtime program when it is started.

3.3 Initial Program Launch

After the successful installation of the program files, documentation, and dongle drivers, check the installation by executing CSoftRuntime and CSoftDesigner. Each should load and run. A predefined screen will be executed by the runtime software.

3.4 CSoftruntime.exe Default Load File

By default the C6200F_Default.veg file is searched for in the same directory as the CSoftruntime.exe program. If the file does not exist in the directory, no screen design is loaded and the console does not function. It is recommended that the screen designer save designs under descriptive names and only save out the default load filename when a design is ready to test.

Starting in version 2.52 the CSoftruntime.exe file will recognize a command line filename to load instead of the default name of C6200F_Default.veg. A short cut can be created to run a different screen design from the desktop or the file type of .veg can be associated with CSoftunrime.exe so that the .veg files can be double-clicked from anywhere and cause the design to execute.

3.5 Initial Volume Control Settings

The volume control, normally resident in the tray, is used to control audio output and input. The settings of these controls is crucial to the operation of the software console. There are two sets of settings, one is the playback volumes, and the other is the recording volumes. The playback volumes are brought up by double clicking on the speaker in the tray. Generally the main and wave volumes are set to max as C-Soft will be used to control the actual speaker levels. The other important playback setting is to mute the microphone. Not muting the microphone will cause the microphone audio to feedback from the speakers. The settings for playback should look like Figure 2.

The recording settings are accessed by going to the options menu, selecting properties, changing the radio control to recording, and then pressing OK. The microphone input is used by C-Soft. The HB-3 alignment procedure is used with the microphone input. The microphone should be the Selected input and the volume settings should be around the second tick. Figure 3 shows the general playback settings.

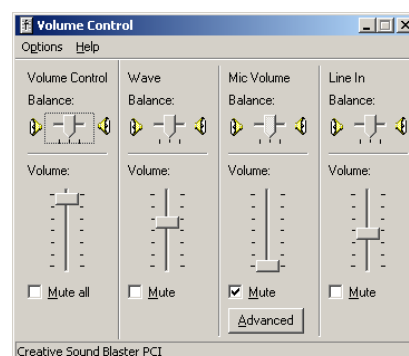


Figure 2 – Playback volume settings

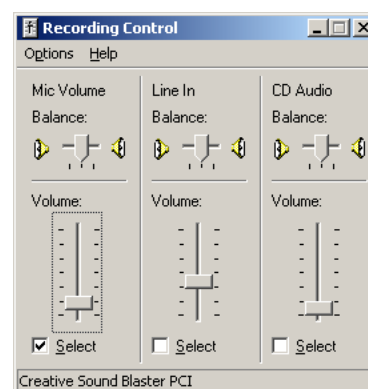


Figure 3 – Record volume settings

4 Communications System Design

Setup of the C-Soft console involves understanding your radio network and how the various radios and console are setup within it. It is very important that a complete roadmap of the locations of the radios and consoles be determined before configuration begins. This includes the multicast address involved as well as the port number for each channels TX and RX communications. It is also necessary to know the base IP addresses assigned to each console or radio on the network for administration purposes. An excerpt from the Vega IP White paper is included here to help the user understand how the network portion of the system works.

4.1 White Paper Excerpt

4.1.1 Tone Remote Control

Telex Vega sells a full line of tone control consoles and radio adaptors. This technology requires an analog connection between each console and each radio. Each console that needs to control an individual radio is wired in parallel to allow multiple operator positions to monitor and control the same radio. For a large system with multiple console positions and multiple radio channels, an entire rack might be devoted to bridging audio to all interested parties. In addition, due to loading of multiple consoles on a particular circuit, additional bridging hardware might be required, increasing wiring and tuning of the system for acceptable performance. The Ethernet based IP network solves many of these issues and provides for a number of other services that were not possible before.

4.1.2 VoIP Radio Control

Radio over IP, being a subset of Voice over IP will be referred to as VoIP generically throughout this document. VoIP is a method for breaking analog audio up into packets that can be transferred over a computer data network. Because of the packetized nature of Ethernet, the audio is generally broken up into 10-40ms chunks of audio, compressed, and placed onto the Ethernet. The nodes of the network are then free to utilize or ignore any combination of packets. If a particular audio stream is of interest, the stream of audio packets are captured, uncompressed, converted back to analog, and played on available speakers.

Given the popularity of the Ethernet based network, many companies and agencies already have an existing network or Local Area Network (LAN). Beyond that, a large number of companies exist to provide Wide Area Network (WAN) connections between sites with significant distances between them. The WAN connections can be used to connect offices across the street from one another, around the world, or anywhere in between. Possibly the best thing about these connections is that they may already exist. In many cases WAN links are less expensive than a comparable leased analog line, and they can carry more conversations simultaneously.

The most compelling reason to consider basing the next radio control system upgrade on VoIP technology is the simplification in wiring requirements. Instead of needing to bring a pair or more of wires, per channel, to each console, only a single connection to the Ethernet is required. Since the Ethernet can easily handle dozens of simultaneous connections it becomes the only pipeline required for all communications requirements.

4.1.3 IP Operation Overview

The network options today have essentially converged on Ethernet. A local Best Buy, Office Depot, or Radio Shack will sell many of the components for both a wired or wireless network solution. For more advanced network applications, an in house or external network hardware source may be required. These sources of information will be able to help with the design of the network as well as provide sources for advanced networking equipment such as routers and hubs from Cisco and other network vendors. This section is an overview of the protocol that operates on the top of the Ethernet network.

4.1.4 Ethernet as Physical Layer

Ethernet is itself a network. It has a low level method for transferring data from one location to another. Source and destinations are based on the MAC address which is embedded in the Ethernet interface. The MAC address is unique for all devices in the world and cannot be changed. The IEEE controls the allocation of the MAC addresses. The definition for Ethernet includes requirements for interoperation at speeds of 10 and 100 Mbps. Higher speeds are available but generally have not filtered down into end user equipment. It is upon this base that higher level protocols such as IP are based.

4.1.5 TCP/IP and UDP/IP

TCP/IP is the best-known protocol for use in computer communications. It is the basis for communications on the Internet and World Wide Web. It is a guaranteed method of transferring data between two computers. Being guaranteed means that for every packet of information transferred from one computer to another an acknowledgement packet is returned. Additional handshaking is utilized from the outset of the data communications to guarantee both ends of the connection. Because of this guaranteed communications and its implementation utilizing handshaking (no other method is available), TCP/IP adds a great deal of overhead to data communications that is not desirable for audio traffic over a network. This is where UDP/IP finds its acceptance.

UDP/IP has existed just as long as TCP/IP as an unreliable method of data communications. The term unreliable should not be thought of as a problem for audio communications over a network connection. UDP allows for a computer to send a packet of data to another computer without the handshaking sequence required within TCP/IP. Because of this, the computer that sends the packet has no confirmation that the packet arrived at its destination. While the loss of packets can be a problem, it generally is accounted for when the UDP application is developed. In the case of VoIP, the loss of a packet which only contains 10-40ms of audio is not a problem as the human ear generally will ignore the loss of that small chunk of audio. In addition, programmers play tricks to make this loss of information difficult to detect to the human ear. The largest single factor in the loss of UDP/IP packets is network design and loading. As long as a network is well designed with capacity for all of its chartered requirements, packet loss will not be an issue. Because of its lower overhead and its ability to Multicast, UDP/IP is the protocol of choice for VoIP development.

4.1.6 Multicast UDP/IP

Multicast is an extension to UDP/IP. It enabled one computer to broadcast data packets that has multiple recipients. This is an ideal model for radio communications when multiple people need to monitor the audio. A single VoIP connected radio is setup to broadcast multicast VoIP packets when receiving audio. Since the multicast packets can be received by any interested party, all consoles that are monitoring the audio can receive and decode the packets for playback. In addition to simplifying monitoring of audio traffic by multiple listeners, multicast also greatly cuts the bandwidth requirement on the network. Instead of having to regenerate the received audio into a UDP/IP data stream to each individual monitor, which would use the bandwidth times the number of monitoring consoles, a single data stream is generated and monitored by all.

Implementation of Multicast protocol requires a few things for seamless use on a network. First the clients must all support the protocol. This is accepted as given since all Vega products utilize multicast for audio communications. The next issue to consider is if the network infrastructure supports multicast.

Multicast packets are defined to be all packets with a destination address of between 224.0.0.0 and 239.255.255.255. Some are commonly used for broadcast audio and are not necessarily available. When a computer opens a UDP/IP port within this address range, it will also join the group. By joining the group a packet is sent out to all addresses saying that it is interested in seeing the traffic on this particular multicast address. Routers that receive this broadcast message to join a particular multicast address will then pass packets through because the router is now aware that a listener is interested in this traffic. The routers utilized in the network must support this. The protocol used to alert routers to parties who are interested in certain multicast address traffic is IGMP or Internet Group Management Protocol. The Vega products support IGMPv1 as defined in RFC 1112.

In addition to the joining of multicast broadcast groups, clients on the network can also specify a packet time to live. The time to live (TTL) is the number of routers that the packet will go through before being stopped. As an example, the time to live for a particular broadcasting node on the network is set to 3. This means that when a packet is transmitted, it will arrive at the first router in the network. This router will examine the TTL value in the packet and determine if it should pass it through since it is not zero. When it passes the packet, the router will decrement the TTL value by one to a value of 2. The next router encountered by packet will do the same reducing the value of TTL to 1. The next router does the same and the TTL is now 0. The next router the packet reaches will examine the TTL value, see it is zero, and the packet will not be retransmitted. Setting a large TTL value may allow for packets to get from one host to another on a large network, but will also add additional bandwidth requirements due to the larger number of packets being transferred.

4.1.7 Vega Port Centric Method

As mentioned earlier, Telex Vega utilizes Multicast for all audio communications. In addition, typically only one Multicast is used for all traffic. In addition to a valid Multicast address, a port number is required. The port is an additional two bytes of information ranging between 1025 and 65535 that further specifies how the data traffic should be handled. Assume for a moment that the base multicast address chosen is 225.8.11.81. Port 1054 is used to distinguish channel 1's RX traffic. Port 1072 is used to specify channel 1's TX traffic. Channel 2 might use 1055 for RX and 1073 for TX traffic. By making each channel's TX and RX ports different and unique, full duplex audio can be supported and many channels of traffic can be supported using only one multicast address. It is also through this method that a single console can pick and choose the particular radio resources available on the network without concern for what the console right next to it is utilizing.

4.1.8 P25 and Initial Radio Standards

TIA is the organization within which the P25 radio standards have been developed. Most major radio manufacturers participate in this standards organization. The interface of choice for connecting infrastructure radios has become Ethernet. This is the first standards body to address Radio control over IP. The standard is evolving and as of the writing of the manual appears to be the only widely accepted standard for IP based radio control.

4.2 Network Requirements

4.2.1 Bandwidth

Each VoIP channel requires 50kbit of bandwidth when active. A transmission from a console to a radio will require 50kbit of bandwidth during the transmission. When the transmission ends, the bandwidth will no longer be required. If the conversation is a full duplex conversation, audio in each direction, then 100kbit of bandwidth will be required. 50kbit for each direction. Some radio systems will give go-ahead beeps when it is clear to talk, if the dispatcher is going to hear them, it must be a full duplex conversation. The full duplex bandwidth may only be required for the first few seconds of the conversation due to the brief nature of the go-ahead beeps at the beginning of the transmission. When utilizing a PIB223 or C-6200 for a telephone connection, a full 100kbit is required since it is a full time full duplex conversation.

4.2.2 Multicast

In general, the Telex-Vega system requires multicast to function. The network must be able to create a static "nailed-up" multicast address. The multicast must be accessible at all times. It is very common for networks to enable multicast for a period of time after an IGMP join message is sent out, and then "prune" off branches after a period of time. Because of the nature of two-way radio and its intermittent usage patterns, this can create a significant problem where the system appears to work flawlessly for a period of time and then no longer works. In the Cisco world, ip pim dense-mode is generally recommended, sparse-dense-mode can also generally be implemented effectively. It is also generally a good idea to explicitly join the multicast group with a ip igmp static-join X.X.X.X command.

4.2.3 IGMP

IGMP can be used to control where multicast is allowed to propagate to. This should generally be limited to subnets utilizing C-Soft as the dispatch console, and only when used on an intermittent basis. That is, when C-Soft is used for a while and then shut down. If a console is expected to be operational at all times on a subnet, then that subnet should have multicast nailed up and active at all times.

4.2.4 Network Performance

The network should perform well under all loading conditions. The default delay of the audio is 120ms, plus any delay added by the network. Delay does not cause issues, but variable delay (jitter) does. Jitter in a network cannot exceed the maximum packet buffer of the individual products buffers. See each product manual for this specification. As an example, the IP-223 can handle about 600ms of network jitter. For good audio quality, no more than 5% of all packets transmitted should be lost. This is an absolute maximum, exceeding this value will cause poor audio quality and system performance and in general practice packet loss should be much less than 1%.

5 Communications Screen Design Reference

5.1 Overview

The program, CSoftDesigner, is used for the creation of the dispatcher screens. Various combinations of buttons, sliders, text, and popup windows are dynamically placed onto the screen. These elements are then configured to operate on particular lines. The user of the design software can place the elements in any location desired and can include or omit functions based on the requirements of the system and the end operator of the console.

The first step in the process of creating a user interface is to define its interactions with your IP network. This includes knowing the RX and TX port of each radio, the multicast group(s) utilized, the number of radios to control and the frequencies that they might be using.

5.2 Notes on Window Sizes, Locations, and Shutdown

By default, designer and runtime expand to fill the entire screen. While this is fine in a single monitor dedicated system, it may not be acceptable if only a small window is to be presented for radio control on a single monitor system, or if the dispatcher is to run the screen design on a multi-monitor computer. Because of this some steps can be taken to ease the design and execution of the software in these special cases. A general procedure follows, some experimentation may still be required.

- 1) When CSoftDesigner is executed, it will expand to fill the entire screen. The first step is to change the size of the designer window to match that of the window that should be presented to the dispatcher for the end design. By doing this, all of the buttons will scale to the designed size when CSoftRuntime is later executed with the design.
- 2) If the design is new, create the design. If an existing design is being edited, step 1 should be completed before loading the design to edit. For initial designs, it is recommended that the resize, minimize, maximize, and close buttons be left enabled.
- 3) Once the design looks as it should on screen in the designer application, save the file into the location from which CSoftRuntime will execute it.
- 4) When CSoftRuntime is executed it looks for a file called cposi.txt. This file is written when CSoftRuntime is shutdown. It stores the size and position of the CSoftRuntime window when it is closed. The first time the program is run in a new directory, the cposi.txt file will not exist. CSoftRuntime will expand to fill the whole screen. Assuming that the controls to resize and position the window are still active, position the CSoftRuntime window to the location where it should always run from. The buttons will not rescale to this window and some may be hidden from view by this process. This is not a problem as the size and position of the window is what is being created. Once the size and position is approximately correct, close the CSoftRuntime program, the cposi.txt file will be updated.
- 5) Run the CSoftRuntime program again. The window should return to its last location and size with the buttons, sliders, VU Meter, and clock in correct locations.
- 6) Variations on this process can be attempted to get desired results. Once a size and location is determined, the cposi.txt file can be made read only by adjusting its properties. The user may still be able to resize the window, but each time CSoftRuntime is executed, it will return to its original location.

When C-Soft is shutdown, in addition to the size and location of the window being stored in cposi.txt, the current console state is stored. This includes selected status, mute status, channel frequency, and the call list (no audio stored, only the entries).

5.3 IP Parameters Setup

Line Number	Line Type	Line Name	RX Multicast Address	RX Port	TX Multicast Address	TX Port	TTL	TxMon	Packet	Delay	Talk	Group	NID	Scanable	Buttons
1	Vega	FIRE	225.8.11.81	1054	225.8.11.81	1072	2	☒	10	1	1			☒	Freqs Backup IP Setup
2	Vega	2	225.8.11.81	1055	225.8.11.81	1073	2	☒	10	1	1			☒	Freqs Backup IP Setup
3	Vega	3	225.8.11.81	1056	225.8.11.81	1074	2	☒	10	1	1			☒	Freqs Backup IP Setup
4	Vega	4	225.8.11.81	1057	225.8.11.81	1075	2	☒	10	1	1			☒	Freqs Backup IP Setup
5	Vega	5	225.8.11.81	1058	225.8.11.81	1076	2	☒	10	1	1			☐	Freqs Backup IP Setup
6	Vega	6	225.8.11.81	1059	225.8.11.81	1077	2	☒	10	1	1			☐	Freqs Backup IP Setup
7	Vega	7	225.8.11.81	1060	225.8.11.81	1078	2	☒	10	1	1			☐	Freqs Backup IP Setup
8	Vega	8	225.8.11.81	1061	225.8.11.81	1079	2	☒	10	1	1			☐	Freqs Backup IP Setup
9	Vega	9	225.8.11.81	1062	225.8.11.81	1080	2	☒	10	1	1			☐	Freqs Backup IP Setup
10	Vega	10	225.8.11.81	1063	225.8.11.81	1081	2	☒	10	1	1			☐	Freqs Backup IP Setup

Figure 4 – IP Parameters Setup Screen

The first option under the Edit menu is the “Setup IP Multicast List” option. Selecting this option will open the dialog box shown in Figure 4, and is generally the first step in creating a new screen design.

The dialog box contains some data. If no file has been loaded to edit and no changes have been made, the default state has Line 1 as the only line enabled with only one Frequency enabled (F1). The designer should go through and enabled all lines that this console position will have access to as well as the frequencies allowed for each line. Many of the dialog boxes associated with the setup of the user interface elements depend on this setup. If a line that is later required is not enabled from this dialog box, it will not appear as an option for setup. The same is true for frequencies associated with the line. The designer can return to this dialog box at any time to make changes which would then allow or disallow their selection in subsequent operations. Each of the columns are defined in the following sections.

5.3.1 Packet Delay

This setting is used to compensate for network delays, jitter, and lost packets. The more packets that are buffered before playback, the more the console software can do to compensate for lost and delayed packets. The greater this value, the more delay is introduced before playback of the audio begins. A typical initial value is 6. This translates into a delay of 120ms before playback. (Each packets is 20ms of audio.) The speed of the PC, its sound card type, and the operating system it is running all affect the delay before playback and is beyond the control of this parameter.

5.3.2 Line Type

Three types of lines are currently available for control. One of them is None, in other words, no line is enabled. The second option in the drop down dialog box is for a line type of Vega. The Vega setting is used to be compatible with Telex-Vega’s Radio control over IP products such as the C-6200 or the IP-223. The third option is the P25 option. This option is compatible with the EF Johnson 2600 Series repeater. The forth option is Phone. The Phone option allows the console to access a telephone line from across the network. From this option, other options are selectively enabled or disabled.

5.3.3 Line Number

The Line Number is the logical number of the line in the system. In most cases, design of the console screen is dependent on the names given in the later fields, but a couple of items do refer to this logical number. No editing is possible for this entry.

5.3.4 RX and TX Multicast Addresses

The RX and TX Multicast Addresses are used as the broadcast address for all audio traffic. This dotted quad number must be between 224.0.0.2 and 239.255.255.255. All devices that are to interoperate on this channel must have the same respective Multicast Address for RX and TX channels. Generally, when dealing with Vega VoIP enabled equipment, one multicast address is used for all channels with the port number defining the TX and RX channels.

Conversely, on some P25 types of equipment, it is common to use different Multicast addresses and sometimes the same address for each several different lines. In this case, differentiation between the two lines traffic is completed by reviewing the NAC value.

5.3.5 RX and TX Ports

These numbers must be unique, per channel, and be greater than 1024. As an example, consider Line 1 above in Figure 4. The RX Port is 1054 and the TX Port is 1104. All consoles that wish to monitor receive audio for channel 1 must have their Base Multicast address set the same as well as the same RX Port number. The same goes for TX audio. Any console on the network that wishes to transmit must set its port number to 1104 to cause the radio to keyup.

For the EFJ P25 option, the port number should be set to 10110 at all times for both TX and RX Ports.

5.3.6 TTL-Time To Live

The Time to Live value represents the number of routers the multicast audio packets will go through before being stopped. Network design will dictate this value. If audio is not reaching a particular node on the network, increasing this value is one option that might be tried.

5.3.7 TxMon Enable

The TX Monitor enable allows the user to monitor other TX traffic being sent from other console operators.

5.3.8 Talk Group

The Talk Group option is only available for entry when the line type is EFJ P25. This is the Talk Group value that will be embedded into this lines transmission.

5.3.9 NAC

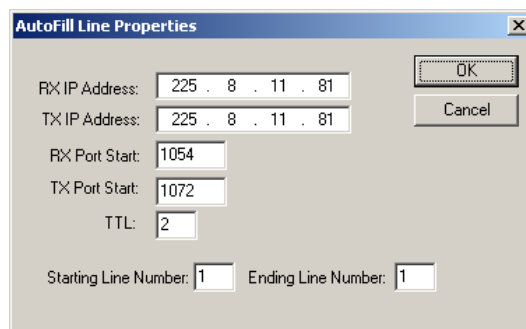
The NAC is the Network Access Code and is only available when the line type is EFJ P25. This will be the value of the NAC that is sent when traffic is generated on this line. In addition, the NAC is used to route receive audio to a unique channel based on the NAC value received from the repeater.

5.3.10 Scanable Column

The Scanable column is used to allow a dispatcher to control the scan list of a particular radio. As of publication of this manual, only the Kenwood x150 and x80 series support this functionality. If this box is checked, not only does the scan button function, but the frequency buttons for this line can be “right clicked” and the channel be added or deleted from the scan list. See the frequency change button description for more information on this feature.

5.3.11 Autofill

The Autofill button allows the console designer to quickly fill blocks of lines with information. This button can be used to eliminate repetitious data entry by hand. The function will automatically increment the RX and TX port numbers as it fills in the lines selected. Figure 5 shows the dialog box used for Autofill.



The image shows a dialog box titled "AutoFill Line Properties". It contains several input fields for configuring the autofill function. The fields are: "RX IP Address:" with the value "225 . 8 . 11 . 81", "TX IP Address:" with the value "225 . 8 . 11 . 81", "RX Port Start:" with the value "1054", "TX Port Start:" with the value "1072", "TTL:" with the value "2", "Starting Line Number:" with the value "1", and "Ending Line Number:" with the value "1". There are "OK" and "Cancel" buttons in the top right corner.

Field	Value
RX IP Address:	225 . 8 . 11 . 81
TX IP Address:	225 . 8 . 11 . 81
RX Port Start:	1054
TX Port Start:	1072
TTL:	2
Starting Line Number:	1
Ending Line Number:	1

Figure 5 – Autofill dialog box

5.3.12 Echo Packets Enable

The Echo Packet function allows the system to operate on networks that do not support multicast. It requires that the C-Soft application be running at all times to translate and transfer packets from one IP address to another. A

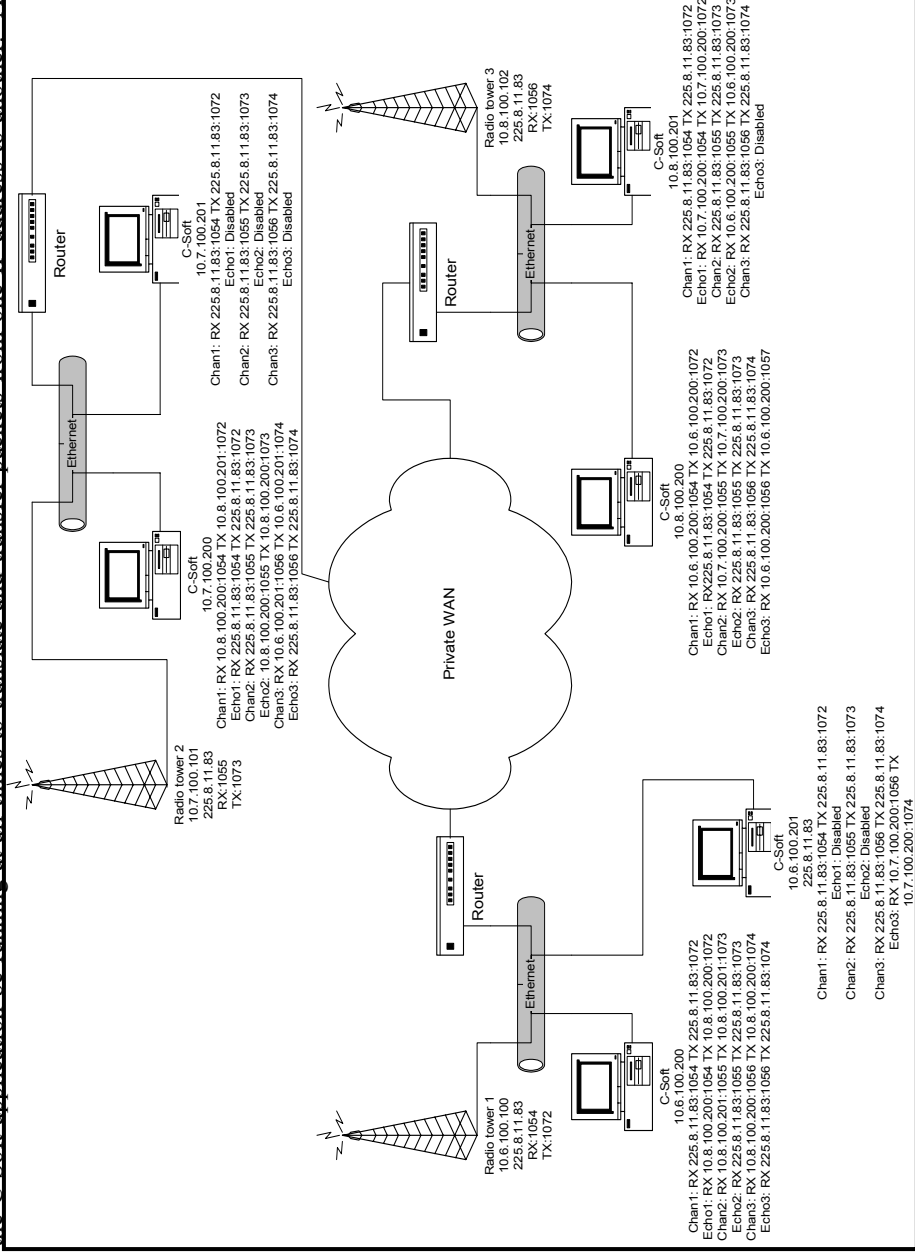


Figure 6—Echo Packet Example Diagram

typically application might be a number of radios spread throughout a network. Since multicast is not supported, the radio adaptors (IP-223s or C-6200s) are programmed to send packets to a specific static IP address; the IP address of the PC running C-Soft with Echo Packet enabled.

The general functionality of Echo packets is as follows. All traffic received on the address of the RX packet, which was typically multicast, but under this scenario is the unicast address of the radio remote, is copied and output to the RX Echo Packet address. In this scenario, the Echo Packet RX address would typically be the multicast address. This enables the C-Soft to function as a gateway for other consoles on the same local network segment. The local consoles transmit and receive the multicast address only and the C-Soft application translates and sends the packets to the radio directly. The TX side works in a similar fashion except that packets received on either address are echoed to the other address and when the C-Soft transmits, it sends to both ports simultaneously. Figure 6 shows an example Echo Packet system. The example shows three different radios connected through a WAN. The WAN is assumed to not pass multicast. In each of the subnets, a single copy of C-Soft is used to do the communications to the radio within its subnet. A second console is used to echo the audio traffic to other copies of C-Soft on different subnets. C-Soft will also echo all traffic to a multicast address within its subnet so that additional consoles can be added to the system by specifying the multicast address only.

5.3.13 Freqs Button per Line

Pressing the Freqs button on a particular line will open the dialog box for the settings for that particular line. The dialog is shown in Figure 7. The first column in the dialog box is the Enable checkbox. Checking and unchecking this box will turn on and off the options for this frequency within the rest of the designer software as well as options

within the dialog box. The Frequency Name is a descriptive name that is used through the rest of the program for referencing the frequency of the line. It can also be placed on a button dynamically by referencing it as a variable.

5.3.14 Per Line Pair Mode

There are four available wildcard groups per line. Function tones 1 and 2 are not allowed in a wildcard group and a function tone may not be part of more than one group. One function tone from each group can be active at a time, plus either F1 or F2. This allows for function tones to have control functions, but that are not used for actual frequency control of the radio. The dialog box will control what is allowed and not allowed.

5.3.15 RX Block Lines

The RX block function is used to mute certain channels when the current channel is placed into a transmit condition. This allows the dispatcher to transmit on a radio that has overlapping coverage with other radios, without getting feedback from the radios that are receiving the transmitted signal. The setup of the function is completed by highlighting the lines that should be muted during a transmit operation. This function also operates when a parallel console is detected transmitting on the line.

5.3.16 Backup IP Setup

The Backup IP Setup button at the far right of the dialog box is used to allow for a backup network resource to be used to access a radio line in the event of a failure of the primary radio interface.

Error! Reference source not found. shows the dialog box for this function. A complete second set of RX and TX addresses are included as well as separate port numbers for them. A base IP address is also included.

5.3.17 Base Radio IP

The Base Radio IP address is used by C-Soft as the destination address of an internal Ping command. The base radio IP address is periodically pinged to determine if a network connection still exists to the particular radio. If no response is received from the ping, the backup IP radio addresses are used. There is also a backup button that can be used to force a switch or to monitor the actual channel being used; backup or primary.

5.3.18 Setup JEM Boxes

The JEM (Johnson Encryption Machine) is a device which does all encryption for a P25 system externally in a FIPS certifiable manner. It is a standalone network device which C-Soft uses for the encrypt/decrypt process. The setup for a JEM device in C-Soft is completed by selecting "Setup JEM Boxes" from the Edit menu in designer. The dialog box shown in Figure 9 will open. Type in the IP addresses of the JEM devices on the network. The JEM device can be located on the same network as the radio resources, or they can be located on a separate network that might be local to only the computer running C-Soft. If this is the case, the JEM Ethernet Interface should be changed to logical number of the network interface on which the JEM devices are located.

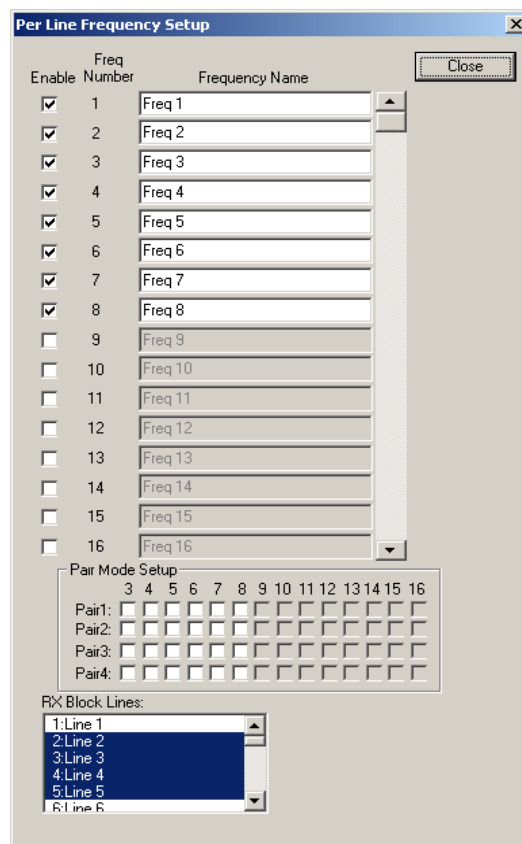


Figure 7 - Per Line Frequency Setup Dialog Box

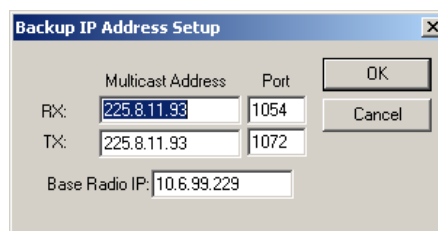


Figure 8 - Backup IP Setup

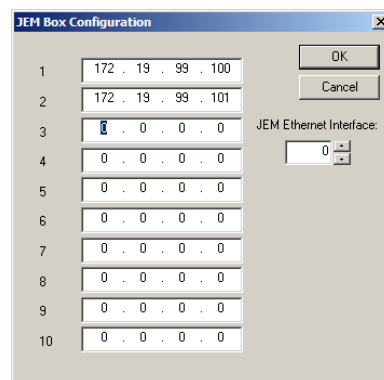


Figure 9 - JEM Box Setup

5.4 Paging Encoder Setup

Upon selecting the Paging Setup menu, the dialog box shown in Figure 10 will be displayed. This box is typically the first location for setup of the paging system of the C-Soft console. The C-Soft will allow setup of up to 10 simultaneous paging encoder types. The three currently supported paging encoders are: Quickcall II 100 and 1000 group, as well as DTMF. To setup each of the 10 encoders, use the pull down box in the second column to select the type of encoder. Once an encoder has been selected, clicking on the setup button on the same row will open the associated setup screen for the encoder. The setup screens for each appear next:

5.4.1 2 Tone 100 Setup:

The setup screen in Figure 11 is for 2 Tone 100. This is the setup dialog that appears when the Setup button is pressed from the Paging setup dialog and 2 Tone 100 is selected in the pull down menu. This format requires only a two digit code to generate a paging sequence. Going from top to bottom, the parameters are as follows:

Name for Paging Setup:

This is a character string which associates a name with the particular setup for this encoder. The name will be displayed as an option in the Paging Directory dialog box.

Delay before first Tone:

This option is the amount of time allowed from PTT until the first tone is played

Tone #1 and #2 Group Numbers:

The Tone Group numbers are selected from the top row of Table 1 and Table 2. These are the standard tables for Two-Tone Signaling.

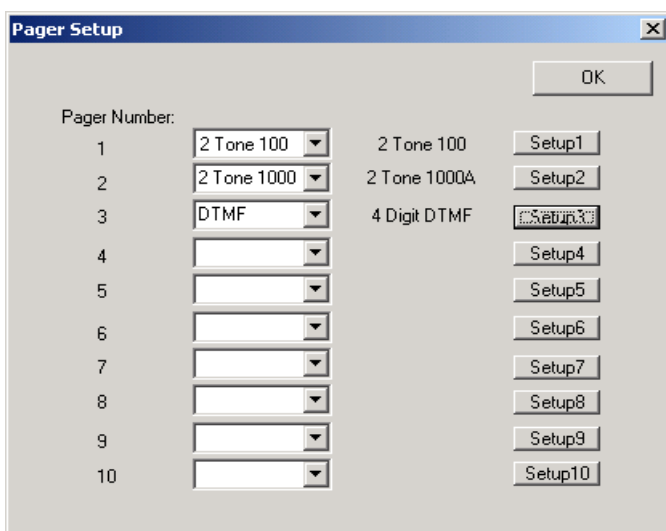


Figure 10 - Paging Encoder Setup

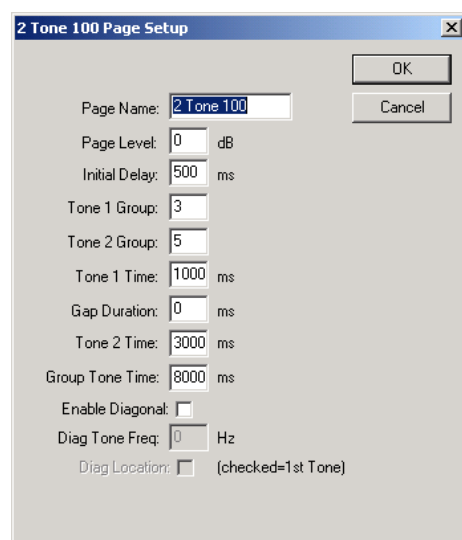


Figure 11 - 2-Tone 100 paging setup screen

Vega Group No.	1	2	3	4	5	6	7
Tone Groups	Mot 1	Mot 2	Mot 3	Mot 4	Mot 5	Mot 6	Mot A
0	330.5	569.1	1092.4	321.7	553.9	122.5	358.9
1	349.0	600.9	288.5	339.6	584.8	1153.4	398.1
2	368.5	634.5	296.5	358.6	617.4	1185.2	441.6
3	389.0	669.9	304.7	378.6	651.9	1217.8	489.8
4	410.8	707.3	313.0	399.8	688.3	1251.4	543.3
5	433.7	746.8	953.7	422.1	726.8	1285.8	602.6
6	457.9	788.5	979.9	445.7	767.4	1321.2	668.3
7	483.5	832.5	1006.9	470.5	810.2	1357.6	741.3
8	510.5	879.0	1034.7	496.8	855.5	1395.0	822.2
9	539.0	928.1	1063.2	524.6	903.2	1433.4	912.0
Diagonal	569.1	979.9	569.1	569.1	979.9	979.9	979.9

Table 1

Vega Group No.	8	9	10	11	12	13	14	15
Tone Groups	Mot B	Mot Z	GE A'	GE B'	GE C'	Mot 10	Mot 11	Custom
0	371.5	346.7	682.5	652.5	667.5	1472.9	1930.2	1034.9
1	412.1	384.6	592.5	607.5	712.5	1513.5	1989.0	953.9
2	457.1	426.6	757.5	787.5	772.5	1555.2	2043.8	0
3	507.0	473.2	802.5	832.5	817.5	1598.0	2094.5	0
4	562.3	524.8	847.5	877.5	862.5	1642.0	2155.6	0
5	623.7	582.1	892.5	922.5	907.5	1687.2	2212.2	0
6	691.8	645.7	937.5	967.5	952.5	1733.7	2271.7	0
7	767.4	716.1	547.5	517.5	532.5	1781.5	2334.6	0
8	851.1	794.3	727.5	562.5	577.5	1830.5	2401.0	0
9	944.1	881.0	637.5	697.5	622.5	1881.0	2468.2	0
Diagonal	979.9	979.9	742.5	742.5	742.5	None	None	None

Table 2

Entering a number from 1 to 14 in each of these fields will then select, based on the two digit pager code, which two

frequencies will be played in succession.

Tone #1 Duration:

Gap Duration:

Tone #2 Duration:

Group Tone Duration: Each of these durations are set in milliseconds and generally conform to the standard paging plans listed in Table 3:

Tone #1 (ms)	Gap (ms)	Tone #2 (ms)	Group Call (ms)	Type
1000	-	3000	8000	GE std, Mot std Tone and Voice
400	0	800	8000	Mot. Tone Only
1000	0	3000	6000	NEC-B
1000	300	3000	6000	NEC-A
1000	0	1000	4000	NEC-C
400	0	800	4000	NEC-M
500	0	500	3000	NEC-L
400	0	400	3000	NEC-D

Table 3

Enable Diagonal Tone: This checkbox determines if the diagonal tone of a group is used or not. When the diagonal tone is disabled, the next two entries are ignored and the second tone is played for the diagonal tone duration period. When the diagonal is enabled, the diagonal tone (**Diagonal Tone Frequency**) is used in place of either the first or second tone depending on the final check box (**Diagonal Tone Location**). Anytime both the first and second tones come from the same tone group and are the same number, group call paging is generated.

5.4.2 2 Tone 1000 Setup:

The 1000 group paging mode is similar to the 100 group paging group except that it adds an additional number making it a three digit code. The new first digit is used for an additional table lookup, which then points to two of the columns in Table 1 and Table 2, listed previously in the 100 group setup. Figure 12 shows the entries required for setting up one of the 1000 encoders.

Name for Paging Setup: A 10 digit name associated with this particular paging setup.

Delay before first Tone: This option is the amount of time allowed from PTT until the first tone is played

Tone Plan Number: The tone plan number is selected from the list of tone plans in Table 4, Table 5, and Table 6. If the pager to be reached is N349, the Tone Plan Number would be set to 12 which corresponds to group N. All pagers using the N group would then reference this encoder setup in the listing of all persons. The 3 corresponds to which line in group N to select the tone groups from. In this case, 3 says to take both the first and second tone from group number 3

Figure 12 - 2-Tone 1000 paging setup dialog

Vega Codeplan #	1	2	3	4	5	6	7	8	9
Pager Capcodes	Mot B	Mot C	Mot D	Mot E	Mot F	Mot G	Mot H	Mot J	Mot K
0xx	2+4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1xx	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
2xx	2+2	2+2	2+2	2+2	1+3	1+3	1+3	1+4	1+4
3xx	3+3	1+2	1+2	1+2	3+3	3+3	3+3	4+1	4+1
4xx	1+2	4+4	1+5	2+1	4+4	3+1	3+1	4+4	4+4
5xx	1+3	1+4	5+5	1+6	3+1	5+5	1+6	5+5	1+6
6xx	2+1	2+1	2+1	6+6	1+4	1+5	6+6	1+5	6+6
7xx	3+1	4+1	5+1	6+1	4+1	5+1	6+1	4+5	6+1
8xx	2+3	2+4	2+5	2+6	3+4	3+5	3+6	5+4	4+6
9xx	3+2	4+2	5+2	6+2	4+3	5+3	6+3	5+1	6+4

Table 4

(3+3). So, for N349, the first tone sent would be 313.0 for 1 second, followed by 1063.2 for 3 seconds.

Tone #1 Duration: **Gap Duration:** **Tone #2 Duration:** **Group Tone Duration:**

Enable Diagonal Tone: **Diagonal Tone Frequency:** **Diagonal Tone Location:**

These are the same entries as the previous section in Table 3.

Vega Codeplan # Pager Capcodes	10 Mot L	11 Mot M	12 Mot N	13 Mot P	14 Mot Q	15 Mot R	16 Mot S	17 Mot T
0xx	N/A	4+2	4+2	4+2	4+2	4+2	4+2	4+2
1xx	1+1	2+3	2+3	2+3	2+4	2+4	2+5	3+4
2xx	1+5	2+2	2+2	2+2	2+2	2+2	2+2	4+3
3xx	5+1	3+3	3+3	3+3	4+2	4+2	5+2	3+3
4xx	1+6	4+4	3+2	3+2	4+4	4+4	2+6	4+4
5xx	5+5	3+2	5+5	2+6	5+5	2+6	5+5	5+5
6xx	6+6	2+4	2+5	6+6	2+5	6+6	6+6	3+5
7xx	6+1	4+2	5+2	6+2	4+5	6+2	6+2	4+5
8xx	5+6	3+4	3+5	3+6	5+4	4+6	5+6	5+4
9xx	6+5	4+3	5+3	6+3	5+2	6+4	6+5	5+3

Table 5

Vega Codeplan # Pager Capcodes	18 Mot U	19 Mot V	20 Mot W	21 Mot Y	22 Mot MT	23 GE X	24 GE Y	25 GE Z*
0xx	4+2	4+2	4+2	N/A	4+2	10+10	11+11	10+10
1xx	3+4	3+5	4+6	7+7	1+1	11+10	12+11	12+10
2xx	4+3	5+3	6+4	8+8	2+2	11+11	12+12	12+12
3xx	3+3	3+3	5+6	9+9	1+2	10+11	11+12	10+12
4xx	4+4	3+6	4+4	7+8	4+4	12+12	N/A	N/A
5xx	3+6	5+5	5+5	7+9	5+5	12+10	N/A	N/A
6xx	6+6	6+6	6+6	8+7	2+1	12+11	N/A	N/A
7xx	6+3	6+3	4+5	9+7	4+5	10+12	N/A	N/A
8xx	4+6	5+6	5+4	8+9	5+4	11+12	N/A	N/A
9xx	6+4	6+5	6+5	9+8	2+4	N/A	N/A	N/A

Table 6

5.4.3 DTMF Paging:

DTMF paging is also supported in the C-Soft console. The standard DTMF digits are allowed in any length. Figure 13 shows the web setup required for enabling DTMF paging. The entries are similar to those before.

Name for Paging Setup: A 10 digit name associated with this particular paging setup.

Delay before first Tone: This option is the amount of time allowed from PTT until the first tone is played

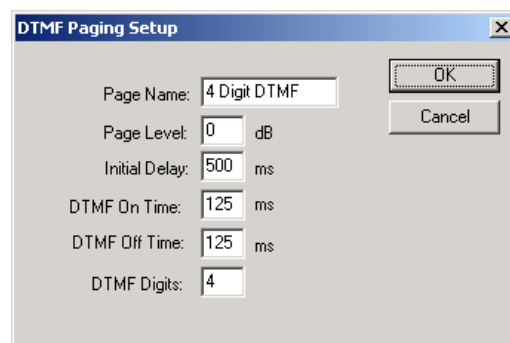
Digit On Time:

Digit Off Time: The amount of time for the DTMF digit to played and the spacing between digits.

Total Page Digits: The number of digits in a standard page. All pages that utilize this option will expect this number of digits.

5.4.4 Manual Paging Entry

There is also a manual page button that allows setup of up to 5 tones of programmable frequency and duration. See the user interface elements listing for the Manual Page button.



The image shows a 'DTMF Paging Setup' dialog box with the following fields and values:

Field	Value	Unit
Page Name:	4 Digit DTMF	
Page Level:	0	dB
Initial Delay:	500	ms
DTMF On Time:	125	ms
DTMF Off Time:	125	ms
DTMF Digits:	4	

Buttons: OK, Cancel

Figure 13 - DTMF Paging dialog

5.5 Global Setup

The Set Global Parameters dialog box is selected from the Edit menu and is shown in Figure 14. The parameters are discussed in the following sections.

5.5.1 DTMF Setup

Two options are available for setup that affect the operation of the DTMF keypad keys should the designer place them on the screen. The first parameter is the Flywheel. This is the amount of time the user has to go from one key to another key without the console keying down the radio. The console will automatically keyup to transmit if a DTMF key is pressed. The second option is the relative level to be transmitted. The actual level transmitted by the radio will vary depending on the system between the console and the actual radio. This could include the TX pot setting of the radio, settings within the radio, etc. This value exists to allow the designer to turn up or down the relative level that gets transmitted once the remainder of the system is aligned and operational.

5.5.2 Supervisor Timeout

By programming this value to something other than zero, if the console sees no activity on both TX and RX of the supervised lines for the programmed amount of time, the lines will be released from supervision. In addition, this value is used when the Supervisor key is pressed such that if the console operator forgot to release the supervisor function, after the programmed period of no activity at the console, the supervisor release command would be sent out. A value of 0, disables the timer.

5.5.3 Local Console IP Address / Ethernet Crossmute

Up to 10 addresses can be entered for the Local IP addresses. These addresses should correspond to the base IP address of the other C-6200 and C-Soft consoles within the same room. This list is used for the Ethernet crossmute function. The C-Soft examines the source of the audio and flags it if the source was from a console in this list. If the source of the TX audio is from a console with an IP address within this list, the audio will then be muted. The only exception to this muting rule is if the HB3 is connected and the headset is turned on. If the received audio is to be routed to the headset earpiece, it will be played, ignoring the crossmute condition.

A second method exists starting in version 2.62 to create crossmutes. If CSoftruntime.exe finds a file called csoft_crossmutes.txt in the directory it is executed from, it will load up to 10 IP addresses, one per line, from this file and replace the settings in the global settings dialog. This allows for a position to have its own crossmute settings without requiring a different design file.

5.5.4 IP Interface

Computers can contain more than one Ethernet interface. For this reason, the software console can be configured to utilize either any of the first four interfaces. Because the runtime software is not necessarily executed on the same PC as the software to design the user interface, some experimentation may be required. If no traffic is seen on the desired Ethernet interface, changing this option, saving the file, and restarting the console may correct the problem.

5.5.5 HB3 Serial Port

Beginning in version 2.1 of the C-Soft package, an external audio interface is supported. This unit, called the HB-3, allows connection of standard dispatcher accessories including a deskmic, 2 headsets, and footswitches. It also has a connection to the serial port of the PC. It is through this serial port that messages are sent and received from C-Soft to detect the PTT events. This functionality allows the C-Soft application to respond to PTT's from a footswitch without requiring the dispatcher to move a mouse cursor to the C-Soft application. It also functions even if the C-Soft application does not have the focus. Use this pulldown option to select the serial port that the HB-3 is

Figure 14-Global Properties Setup

connected to on the PC or disable it.

5.5.6 License Server

In addition to supporting a local key attached to the PC, a remote key sever can also be used for license management. A single PC is loaded with the key management driver. Up to 10 individual keys can be connected to this server PC. 5 of each key type are supported by the dongle driver software. This means that 5 USB and 5 Parallel port keys can be connected to the server. Once the server is setup, each client computer (with the Dongle Driver installed) has the License Server field filled in with either the direct IP address or the network name of the server. The server will then allow up to its key count number of concurrent users of C-Soft. This method has the advantage of making the C-Soft software more portable across a network. Contact the factory for license server options in which more than 10 concurrent licenses are required. An options, which is new in 2.62, allows for an entry of “dual mode” to be put in as the license server (no quotes). This option tells the console to first look for a key on the local machine. If no key is found, send a broadcast looking for license servers on the network. This allows for multiple license servers reside on a network for greater redundancy and fault tolerance. It is a slightly slower bootup however.

5.5.7 Windows Controls

Several of the standard windows control buttons can be selectively added or removed from the upper right corner of the window. It is important to note that if the Close button is removed, the only way to shutdown the application is to use the Windows Task Manager. The open on activity will automatically open a popup window if line activity indications are occurring within it.

5.5.8 Bitmap Logo Setup

A customer supplied bitmap logo can be included with the screen design. It will not show up in the designer program, but only in the runtime version. The file must be a bitmap and be located in the directory that runtime is executed from. The filename is a maximum of 20 characters. Once the filename is entered, select the screen placement of the bitmap with the pulldown menu.

5.5.9 Background Color

The background color for the console and its popup windows can be set by pressing this button and selecting a color. Black is the default.

5.5.10 Audio Routing and Muting

Three checkboxes are displayed to allow control of audio routing. Set these per dispatcher preference.

5.5.11 Enable Sticky ANI

When checked, the ANI displayed on the Select button will be left on the Select button until the next call is received.

5.5.12 Kill Lines on Crosspatch (2.7)

Checking the Kill Lines on Crosspatch option will disable the dispatchers ability to transmit on a line that has been put into a crosspatch by a parallel dispatcher. Leaving the option un-checked, allows the dispatcher to use the lines even though another dispatcher has them in a crosspatch.

5.5.13 Radio Ping Interval

The Radio Ping interval is the time in seconds between Ping attempts on the Base Radio Address. A value of zero (0) will disable the function as will not filling an IP address in the IP Setup Dialog. A typical value would be 300 seconds or five minutes. See section 5.3.17 for more information about the Base Radio IP setup.

5.5.14 RX Block Delay

The RX Block Delay setting is used to delay the release of the RX Blocked lines (setup in the frequency settings dialog boxes). The purpose of this is to allow IP and system delayed audio to end before releasing the mutes.

5.5.15 MIC AGC Enable and Settings

Starting in Version 2.58, C-Soft supports a Software based microphone AGC. This function helps to level speech level variations caused by use of different microphones, different speaking distances to the microphone, and different volumes of speech from different users. The Enable checkbox is the left most option and must be checked to enable this function. The Target level is the audio level that the packets are adjusted to. If the measured audio

level is above the target level, the audio is reduced in gain. If the incoming level is below the target, up to 15dB of gain is applied to bring the level up. The last option is the Minimum Active Level setting. This setting is used to tell the AGC software when to quit trying to adjust the audio level. If audio below this level is detected, the AGC will attempt to make no adjustments to the audio. This prevents open mics from amplifying background noise onto the transmit channel.

5.5.16 Phone Ringer Multicast and Port

Enter the IP address and port number that the ring signal will be broadcast to. This should correspond to the values set in the C-6200 that has the actual phone card physical interface.

5.5.17 NEO Multicast and Port Numbers

The NEO-10 Network I/O device sends out a UDP packet anytime one of its inputs or outputs changes state. C-Soft monitors this traffic allow all users of the equipment to see changes in the status of inputs or outputs. Enter the desired multicast and port number in these fields. They should match the values entered into the NEO-10 Multicast setup screen. This is not the base IP address as is used for the individual buttons.

5.5.18 Positional Recording Settings

The positional recording options allow for audio from a console position to be sent directly to a recorder. Each speaker and the microphone can be independently sent to the Vega Network Recording device. Enable only the audio sources that need to be recorded. The microphone is only recorded during activity such as PTT or a telephone call. The typical IP address entered for each of these options is the static IP address of the Vega Network Recorder. The network recorder is then set to look for packets from this position. The ports must be unique on the system. This option will require, if multiple consoles are in use, a separate configuration for each console be created.

5.6 P25 Setup Menu

P25 requires some specific setup parameters be entered for correct function of the console. These parameters were located in the Global Settings dialog box prior to version 2.56 but have been relocated and augmented. Figure 15 shows the dialog box displayed when the P25 setup option is selected from the Edit menu.

5.6.1 Console Unit ID

The Console ID is entered to allow unique identification of the console during a transmission and for User ID calls.

5.6.2 Console RSI

The Console RSI is used for over the network re-keying operations.

The only currently supported KMF is the one made by EF Johnson. Contact EF Johnson for more information.

5.6.3 KMF Reply NID

When using a KMF to manage encryption keys, a specific NID or NAC must be used for response messages. Enter the NAC code being used by the KMF in this location. A common value is 659.

5.6.4 P25 Late Entry

Checking this box will cause the console application to resend the Header packet(s) at the beginning of each superframe for the purpose of late entry.

5.6.5 P25 Private ID Call Listen

This function, when enabled, allows the dispatcher to listen to Private Calls. With this option unchecked, private ID calls are indicated on the dispatchers screen with an icon on the Select button, but the audio is not played.

5.7 User ID List

The User ID list is used with the ANI features of certain radios. As of the writing of this manual, Fleetsync and P25 user ID are supported. MDC1200 is expected to follow in the near future. Figure 16 shows the dialog box for this data entry. The Name is the string that will be placed on the Select button of the line where the ANI is received. The User ID value is the actual number the radio transmits as its identifier. The Sticky ANI feature in the Global Setup dialog can be used to have the alias placed on the Select button until the next call comes.

Some radio ANI systems function with hexadecimal numbers. A hexadecimal value can be entered for the User ID by typing a “0x” in front of the number. The “View as Hex” checkbox will switch the display of the User IDs in the table between decimal and hexadecimal display.

In addition to allowing manual entry, a comma delimited file can be loaded from disk allowing for a central list to be maintained in a spreadsheet or other file format and then imported into the console design. The file must take the form of Name,ID. One name and ID per line.

Console Unit ID:	125	OK
Console RSI:	0	Cancel
KMF Reply NID:	0	
☒ P25 Delayed Entry ☐ P25 Prvt. ID Cal Listen		

Figure 15 – P25 setup parameters

	Name:	User ID:
1	Portable1	2131006
2	Ehlers	2131005
3	Squad 51	1001
4	Radio 2	1000
5	5100B	502
6	5100A	501
7		0
8		0
9		0
10		0
11		0
12		0

☐ View as Hex

Hexadecimal Values must be entered with a '0x' as the first two characters of the value.

Load From File Close

Figure 16 – User ID List

5.8 Crypto Key Entry (P25 Only)

The forth option under the Edit menu is the Crypto Key entry dialog box. Up to sixteen crypto keys can be entered. Each of these keys is referenced by a 16 bit index value as well as a 64 bit key. The digits 0-9 and A-F are supported for the keys. Selection of this menu item will open the dialog box shown in Figure 17. Once the keys have been entered, pressing the OK button will close the dialog box and save the entered values.

5.9 Radio ID Dialog Box

Selecting the Edit User ID option from the Edit menu will open the dialog box shown in Figure 18. This dialog box is used to associate a name with a particular radio ID number.

When the radio with a User ID number listed in this table is transmitting, the Name associated with that User ID is displayed in the Select button of the line on which the user is transmitting. Note that User ID List is sorted in descending order by User ID number when the dialog box is closed. The program uses this ordering to speed the search for the incoming User ID.

5.10 Interface Item Manipulation

A number of possible manipulations of the user interface items are possible. Not all options are supported on all items. A number of the standard windows shortcuts are also supported. Figure 19 shows the main screen of the designer application.

5.10.1 Edit Menu Options

Most of the edit menu commands can also be accessed by toolbar buttons and also by right clicking on the element itself and selecting from the popup menu that appears. Each of the buttons on the toolbar are shown with a line to the menu command that will perform the same operation. Beginning in Version 2.5, standard clipboard options exist. A group of objects can be

selected by clicking on an open space and dragging a rectangle over the items to be included in the selection. When the left button is released all items completely contained within the rectangle will be added to the selection

group. This group can then be Cut, Copied, or moved. By right clicking on an object within the selected group, the groups Line Number association or its Font can be changed. ***Note that it is not currently possible to move a group of objects with the mouse.***

5.10.2 Delete Items (Cut)

Three other options exist in the Edit menu that have not been previously mentioned. The Cut function is used to delete an element. The CTRL-X shortcut key is also active. When selected from the menu, the interface object with the target drawn on it will be deleted. In the case of the a popup window with multiple object within it, all items are deleted from the window as well as the base popup button.

Index	Key Value
1:	0001 0123456789ABCDEF
2:	0000 0000000000000000
3:	0000 0000000000000000
4:	0000 0000000000000000
5:	0000 0000000000000000
6:	0000 0000000000000000
7:	0000 0000000000000000
8:	0000 0000000000000000
9:	0000 0000000000000000
10:	0000 0000000000000000
11:	0000 0000000000000000
12:	0000 0000000000000000
13:	0000 0000000000000000
14:	0000 0000000000000000
15:	0000 0000000000000000
16:	0000 0000000000000000

Figure 17 – Encryption Key Dialog Box

	Name	User ID
1	Radio 2	502
2	Radio 1	501
3		0
4		0
5		0
6		0
7		0
8		0
9		0
10		0
11		0
12		0

Figure 18 – User ID Entry Dialog

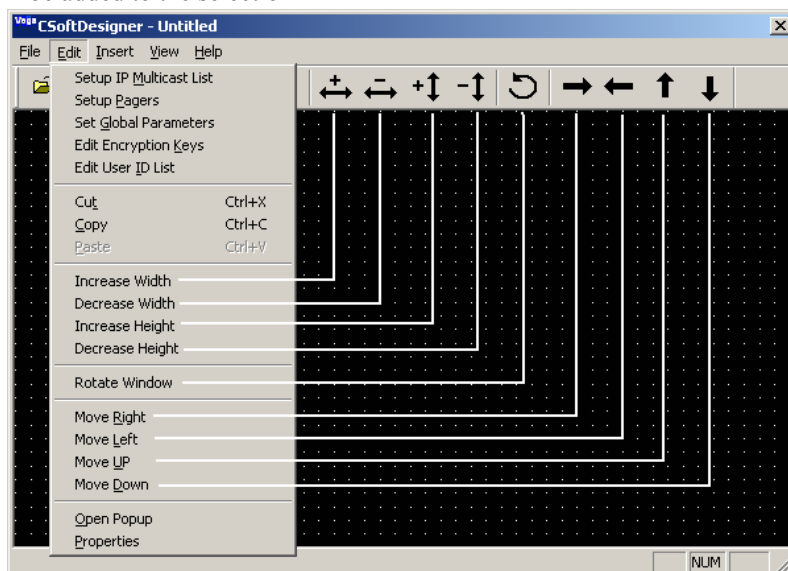


Figure 19 – Interface Element Edit Options

Cut objects are not saved to the clipboard!

5.10.3 Copy Items

This function operates in the standard windows way. An object or objects that are selected can be copied. Once a valid group of objects has been copied, the Paste function will become active.

5.10.4 Paste Items

When a group of objects has been copied, the Paste function becomes available. The Paste function will look at the currently active view for its placement. To copy from one Popup to another requires that the objects be selected and copied in the first window, and that the destination Popup window be selected before the Paste function is selected.

5.10.5 Open Popup

If the button is a popup menu button, having the target active on it and selecting the Open Popup option from the Edit menu or by right clicking on the button, will open the button within the designer so the elements within it can be edited.

5.10.6 Properties

The Properties selection, available from the edit menu or by right clicking on the item of interest, opens a paged dialog box with the properties pertinent to the function of the element. The function of the element can be changed as well.

5.10.7 Drop, Drag, and Copy

Individual objects can be moved by clicking on them and dragging them to a new location. In addition, a button/slider/popup copy function is supported by holding down the CTRL key while moving the object with the mouse. This will copy the item exactly with all parameters in tact. This is very useful for copying elements where only a couple minor changes are required to use the button. It is also much faster than moving to a menu for each operation.

5.11 User Interface Element Reference

The insert menu has options for inserting a button, a slider, and a popup window. The buttons make up the most used element of the user interface.

By selecting “Add UI Button” from the Insert menu, a generic button will be placed into the upper left corner of the screen. The text on it will read none. The button is selected by clicking on it. Once a button is selected, it will have a “target” drawn on it signifying that operations selected from the menus or button bar will occur to this particular element. Figure 20 shows the popup

menu that results after right clicking on the button. Selecting Properties brings up the standard front screen for

all user interface elements. Figure 21 shows this dialog. In the base case, two tabs exist. The default first tab is the Type tab. This tab contains information pertaining to the function of the button. The first pull down, UI Element Function, is a list of all supported functions that the button can have. Each of these functions, as well as their specific settings will be discussed in the following sections. The second pull down is only active when button functions that require specification of the associated line are selected.

The second tab, Colors, is used for setting the text and colors of the button. Selecting a function will place default values for text and

color on the button. Figure 22 shows the dialog. This example shows a button with defaults set if the button is to function as a Select button. Colors for the button and text can be changed for both the up and down positions. Text can be specified for each position. Multiple lines of text can be placed on to the button by pressing CTRL-Enter to move to the next line. Some functions automatically place additional lines of text onto the Select button, so leaving additional space on the button for text generally is a good idea. The border color can also be specified. The border is half of the grid size. This allows buttons to be grouped with the same color border. This helps to create visual separation

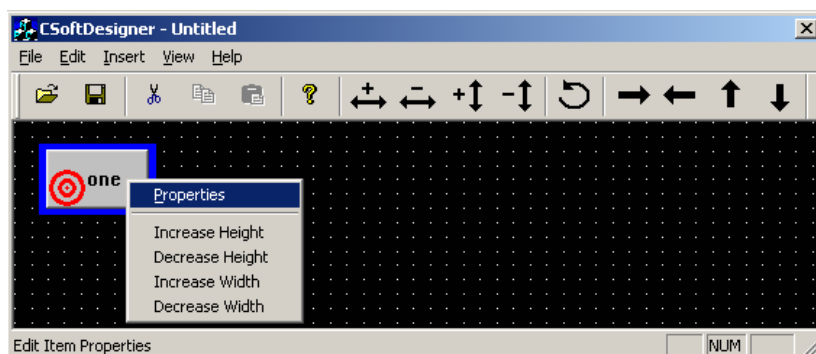


Figure 20 – Button Properties

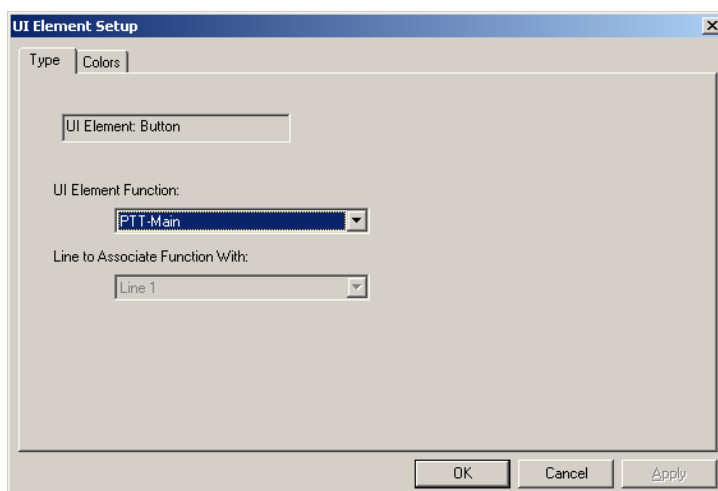


Figure 21 – Main Properties screen

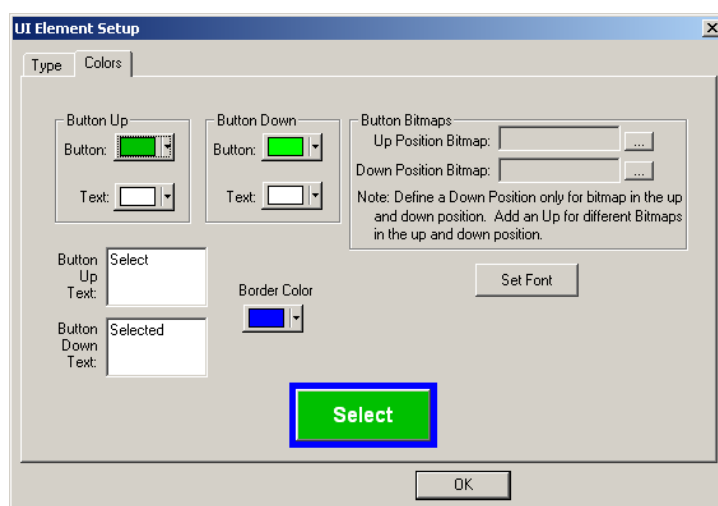


Figure 22 – Color Setup

between groups. The font can be adjusted by pressing the Set Font button. A bitmap can also be added to the button by selecting the desired bitmap files. The Bitmap files must be resident in the CSoftruntime directory for them to be used by the program. If the bitmaps are not found by runtime, they simply will not be displayed.

5.11.1 Button Function List

5.11.1.1 PTT-Main

The main PTT button is the most recognized button on the console. Generally all consoles will have one. When pressed, audio present on the sound cards mic input, will be encoded and sent to all Selected channels. The PTT-Main selection has no additional setup parameters and does not require a line to be associated with it.

5.11.1.2 PTT-Per Line

The Per Line PTT, or Instant PTT, function is used to immediately key up one particular line on the current frequency. The PTT-Per Line function, when selected for a button adds a third tab to the dialog box that allows a PTT-Per Line button to move to a specific frequency. The default is option 0 which is to use the currently selected frequency. Opening the drop-down box lists frequencies that are available on the line selected in the Type tab. Figure 23 shows the dialog box when the Per Line PTT Setup tab is chosen.

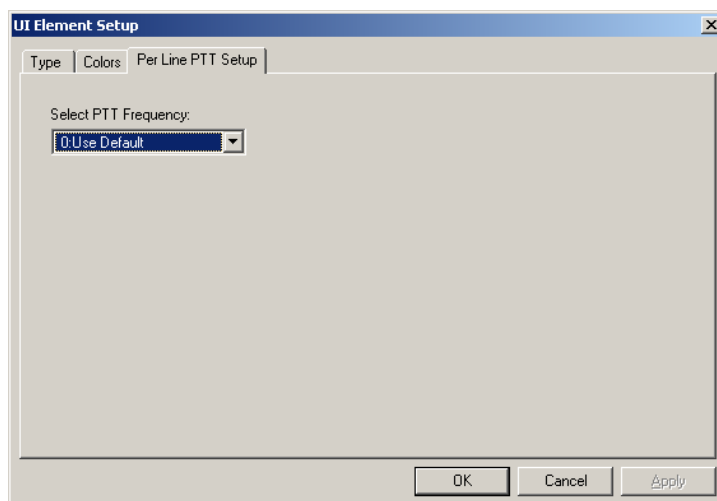


Figure 23 – PTT-Per Line dialog tab

5.11.1.3 PTT-Talkback

The PTT Talkback button keeps track of the last line that audio was received from. When pressed, it will transmit to that line.

5.11.1.4 Mute Main

The Mute Main selection is the option for a global mute key. When the user presses this button, all lines that are not currently selected will be muted. If the line is currently selected, it will be unaffected. No line selection is required and there are no additional setup parameters.

5.11.1.5 Mute Per Line

The Mute Per Line button is used to mute a particular line. It is a latched button that is active when pressed and inactive when released. A line for the mute to affect must be chosen from the Type tab. Figure 24 shows the dialog box that appears when the Mute Per Line option is set. Three options allow customization of the function of the button. The first is a mute timer. Entry of a value in this box will force the mute to deactivate itself automatically after the entered number of seconds. A value of zero disables the feature. The second option is for setting a minimum level while muted. A value of 0 entered will cause the mute to turn off the unselect audio completely. The remaining options of -20 to -1 apply a cut in the audio level to merely reduce the unselect audio played at the speaker. This has the effect of making sure that the dispatcher position is unable to turn off

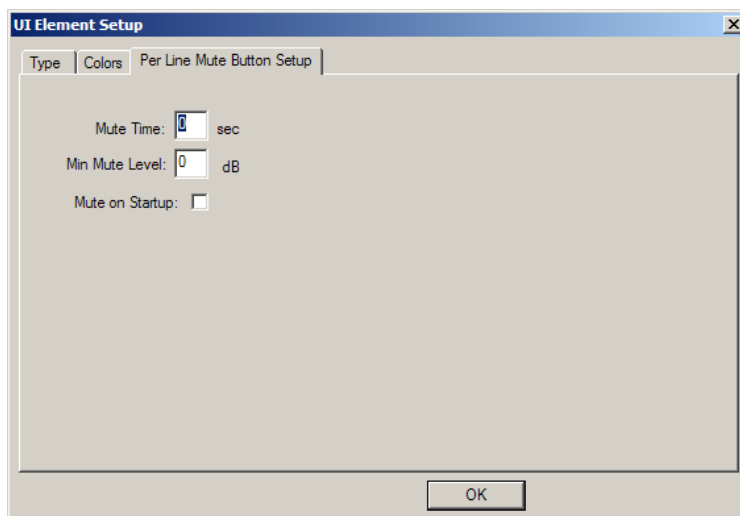


Figure 24 – Mute Per Line dialog tab

audio completely that should be monitored. When the Mute button for a particular line is active, the lines volume control is also disabled. The last option is a checkbox to have C-Soft automatically enable the mute when the program is started. When upgrading from older designs, this check box may have to be checked and unchecked to get it to take effect.

5.11.1.6 Mute Group

The Mute Group option allows for a preprogrammed number of lines to be muted by pressing this button. The Mute Group button has a third tab that allows for selection of the lines to be muted when this button is pressed. Clicking once on a line in the list will include it, clicking on it a second time will remove it from the list of lines to Mute. No line selection is required for this button.

5.11.1.7 Select

The Select button is a common staple on most console screen designs. It is a toggle on/off

button that is used for determining which channels will be transmitted on when a master or accessory PTT button is pressed. DTMF and Alert tones are also transmitted to all selected lines. The select button is also used to indicate activity on a line. Indications such as audio receive, transmit, crossmute, intercom, encrypted, collision, and supervisor are all indicated on this button by the console.

It is possible to customize the actual icons used for Tx, Rx, Intercom, and Crossmute. By default these are small circular “LEDs” with a letter or two in them. To replace each of these default icons with one of the users choosing, place a file named txled.bmp, rxled.bmp, icled.bmp, and/or xtxled.bmp into the directory with CSoftRuntime.exe. If found, these user bitmaps

will replace the default bitmaps. The background color of RGB(192,192,192) is transparent when placed onto the button. (BMP must be 24bit)

The third tab of the Select button is used for Select Call. The C-6200 and IP-223 have built in DTMF decoders and embed this decode information into the IP packet stream. The stream can then be decoded and used to notify a dispatcher of an outside call. Enter the digits required to activate the select call feature. Multiple options are supported for annunciation of the select call sequence being detected. The Select button can be set to blink. Audible alarms can be activated and the Mute button, if active, can be opened for a programmed period of time.

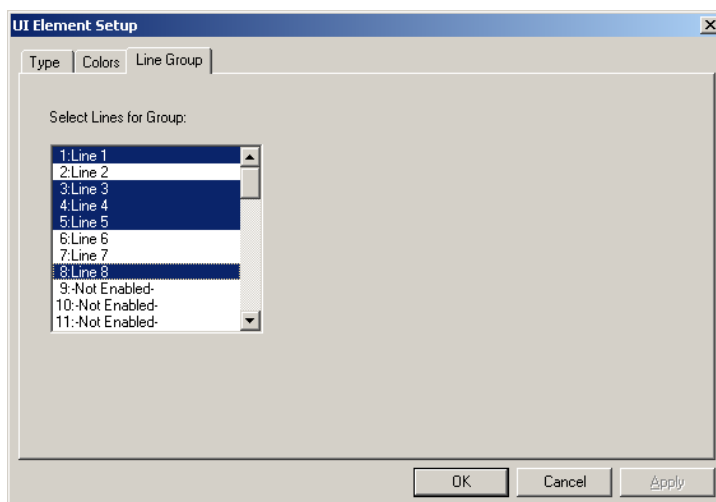


Figure 25 – Line Group Selection

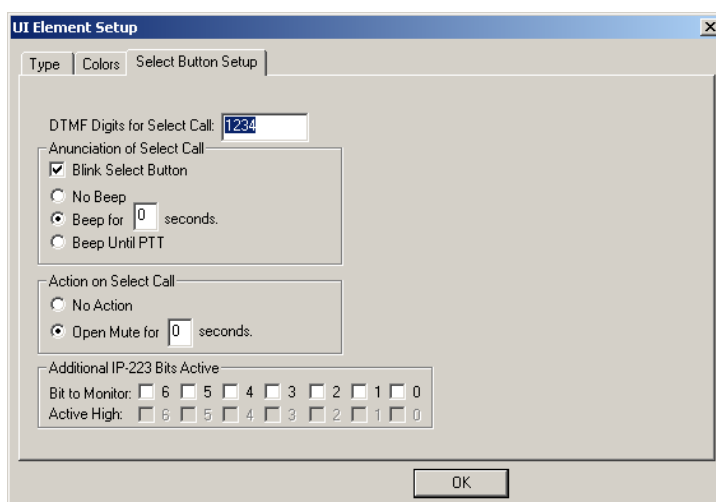


Figure 26 – Select Call Setup Tab

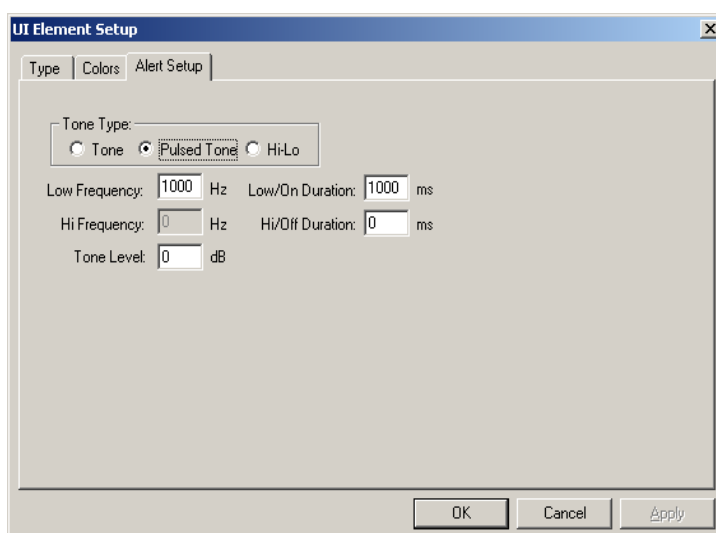


Figure 27 – Alert Tone Setup Parameters

In addition, the digital inputs of the IP-223 can be used to place further criteria on the Select call. The DIGIO 0-6 pins of the IP-223 can be used to sense events in the field. The bits are available in both active high and active low configurations. If multiple bits are chosen, they must all be true for the Select Call function to operate.

5.11.1.8 Alert

The Alert button is added to the user interface when the dispatcher requires a method to send some sort of tone. The Alert tones are played to all selected lines when pressed. If PTT is not active when an Alert button is pressed, the PTT button is automatically activated to key up the remote radios before the tones are generated. A number of options exist in the third tab for setting up this sound. Figure 27 shows the Alert Setup dialog tab. Three general types of tones are available. A single steady tone, a pulsed tone, and a Hi-Lo warble. Each tone type has parameters that allow customization of the tone sent. The dialog box will grey out the entries that are not required for a particular tone type. The Tone Level input is available for all tone types and allows a relative change in the level of the tone generated.

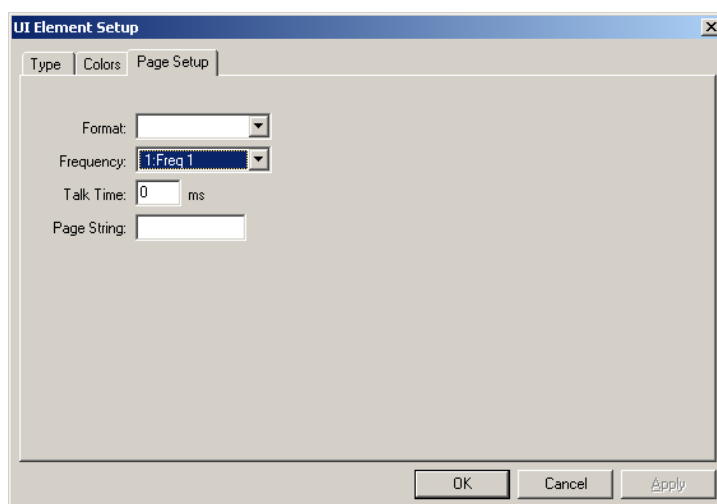


Figure 28 – Page Setup Dialog Tab

The Page button is used to send a single page to a particular line and on a particular frequency. The setup options, shown in Figure 28, require that the paging encoders be setup prior to setting up the specific page associated with this button. The Talk Time is amount of time after the page is sent for the dispatcher to add a voice message after the page. The Page String is specific to encoder selected.

5.11.1.10 Page Stack

The Page Stack key has no line or addition setup options. It is toggled on an off to allow a number of pages to be selected and sent in succession. Normally, with this button not pressed, or absent from the console interface, a page is sent the moment the Page button is pressed. When pressed, all Page keys that are pressed will latch on giving the console operator an indication of which pages are selected. The group of pages are then sent when the Page Send button is pressed.

5.11.1.11 Page Send

As mentioned in the Page Stack section, the Page Send button is added to the interface to send a group of selected pages. The console operator is notified when the last stacked page is sent so that a voice message can be sent to the page recipients. No line or addition setup parameters are required for this button.

5.11.1.12 Frequency Change

The Frequency Change button is another staple of a multi-frequency remote radio dispatch operation. This button, when pressed, will sent a burst of packets onto the Ethernet requesting that the remote radio change to the new frequency. In addition, all other consoles on the network will also change their displays to show the new frequency of the radio on that particular line. A line must be chosen for this function, and based on that line selection, a third tab in the dialog box allows the buttons frequency to be set. The frequency selection is identical to that of the Per Line PTT in section 5.11.1.2. In addition, if the “Scanable” option was set in the Line IP Setup screen, then right clicking on this button will bring up a floating menu that allows the user to add or remove this channel from the scan list. When a frequency is in the scan list, a “SCAN” icon appears on the frequency change button. Parallel consoles are also alerted to update their display if a frequency is added or removed from the scan list.

5.11.1.13 Frequency Variable

Given that the frequency can be changed, and conceivably placing a button for every frequency on every line would probably overwhelm the dispatcher, it is common to place the frequency selection buttons into a Popup window. The dispatcher opens this popup window to change frequencies and closes it after they are done. However, with the window closed, it become impossible to see exactly what frequency is currently selected for that line. By placing a variable, \$FREQx\$ into a buttons text. The actual text for “x” lines frequency will automatically be updated on the button when it changes. See the example design for more information on actually doing this. This can be placed into any button, but is typically used on the Popup button used for setting the particular lines frequency, or the Select button for that line.

5.11.1.14 Group Select

The Group Select button, when pressed on, is used to allow multiple lines to be selected simultaneously. It is also sometimes referred to as simul-select. No line or other setup information is required.

5.11.1.15 Group Programmed

The Group Programmed button works similarly to the Mute Group button discussed in section 5.11.1.6. The difference is that when this button is pressed, the lines that are configured in the third tab, are placed into a select condition. This allows for a dispatcher to create a predefined broadcast group that can quickly be selected for broadcast.

5.11.1.16 TX All

The TX all button requires no setup. It will place all lines into a selected mode. A subsequent PTT would then transmit on all lines.

5.11.1.17 RX All

The RX all cancels mutes on all unselected lines. It does not change the select status of a line. No setup is required for this button.

5.11.1.18 DTMF Digit

Selecting DTMF Digit adds one digit of the DTMF keypad. All 16 pairs are supported. The DTMF digit is played to all selected lines either during a PTT operation or it will generate PTT if pressed on its own. Figure 29 shows the DTMF Digit selection tab. Creation of a 12 or 16 digit pad is best accomplished by creating one single digit and then copying the digit

with the CTRL key and the mouse. Last of all, all key's properties are edited to set them to the correct digit and text.

5.11.1.19 Monitor

The Monitor button is used to send a packet burst, similar to a frequency change, to tell the remote radio to open squelch or ignore CTCSS tones. No setup is required for this button.

5.11.1.20 Intercom

The Intercom button is used to allow communications between consoles without keying the remote radios. The Intercom button works exactly like the Main PTT button except that additional information is included that tells the tone termination panel not to

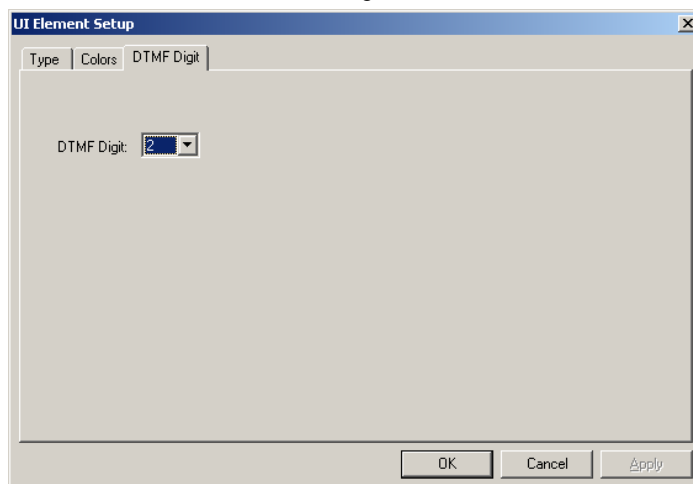


Figure 29 – DTMF Digit dialog tab

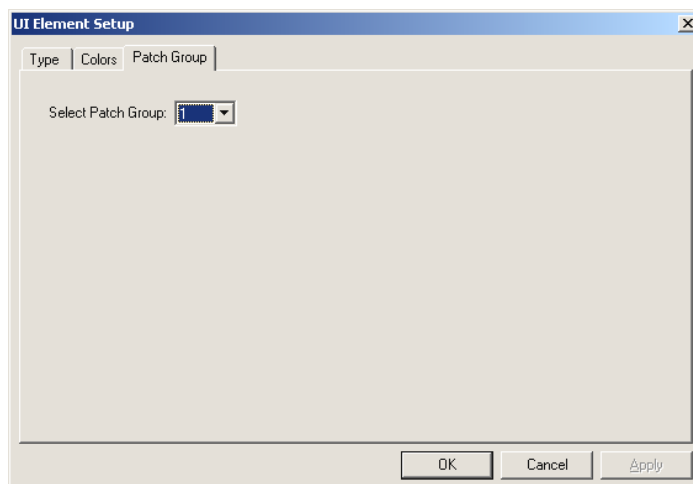


Figure 30 – Crosspatch Group Selection Tab

generate PTT and key the radio. Not setup is required for this key.

5.11.1.21 Intercom-Instant

The Instant Intercom button is used to talk between dispatchers without keying the radio connected to the line. The difference between this button and the standard Intercom button is that it works on a predetermined line and does not transmit on the selected lines.

5.11.1.22 Crosspatch

The Crosspatch button allows the dispatcher to connect two or more radios/phone lines together so that persons communicating through different lines can talk to each other. Figure 30 shows the crosspatch group selection tab. Up to 10 patches are supported by the software console. Once a crosspatch button is placed on the console screen, lines are added into and out of the patch by first pressing the Crosspatch button and then pressing Select buttons. The Select buttons will change color and text to indicate they are now part of a crosspatch. Receive traffic on one line of a crosspatch will be transmitted to all other lines of the crosspatch. The patch can be dropped by pressing each select button in the patch again, or by including a Crosspatch Clear button.

5.11.1.23 Crosspatch Clear

The Crosspatch clear button requires the same setup as the Crosspatch button. Based on the programmed patch group in the third tab, all lines selected into the patch will be release from it. It is generally a good idea to have a Crosspatch Clear button as a quick way to end a patch.

5.11.1.24 Crosspatch Block

The Crosspatch Block function is used to block a particular line from transmitting. For example, if a particular line is stuck in receive due to noise, that line can be blocked which releases its control of the crosspatch. After the line has been through one transmit cycle, it is then again eligible to control the patch.

5.11.1.25 Crosspatch Programmed

A programmed crosspatch allows the dispatcher to quickly create a crosspatch between any number of pre-determined lines. One the third tab of this button, select the lines that should be included in the crosspatch when this button is pressed. It is suggested that a unique color be used for this button as its color will be given to all the lines in the crosspatch when it is pressed. In addition, just like in the previous crosspatch button setups, a crosspatch group number must be chosen and it must be unique. The Autostart Crosspatch checkbox can be utilized to have the crosspatch automatically be created when the program is started.

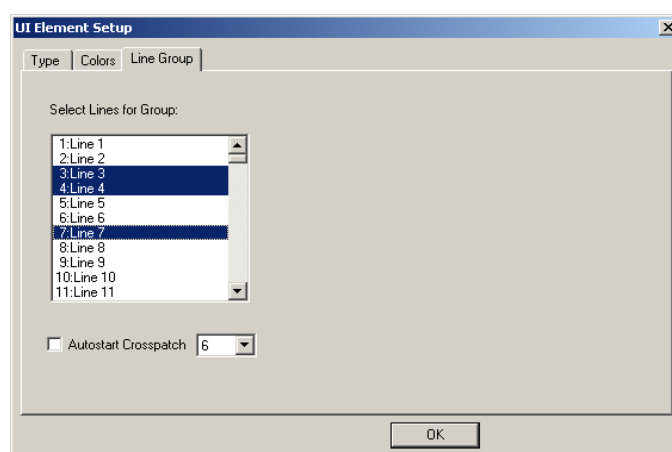


Figure 31 – Programmed Crosspatch Setup

5.11.1.26 Supervisor

The Supervisor button is used to allow a single dispatch location to grab complete control of a line or group of lines. When the Supervisor button is pressed, a 4 digit code must be entered. This code is entered in tab three of the Supervisor button setup tab shown in Figure 32, allows the designer of the console interface to set this 4 digit code. After entry of the code has been completed, a supervisor packet burst is sent out to all selected lines. The consoles that receive that packet burst then have those lines removed from their local control. The operator of those lines can neither hear receive traffic or create transmit traffic. A period of inactivity can automatically turn off the supervisor function. See section 5.5.2 on setting the supervisor timer.

5.11.1.27 Page – Manual Entry (2.7)

The Manual Page button is similar in use to the Page button referenced in section 5.11.1.9. However, this button allows a designer to incorporate up to 5 single tones in sequence. Frequency and duration are all programmable. The frequency values will accept a decimal point. Figure 33 Other functions such as lead in delay, talk time, frequency to send the page on, and whether the page goes to the line defined in the first tab of the buttons properties or it goes to the selected channel are all settable. Once created, the button can be stacked using the Page Stack and Page Send buttons.

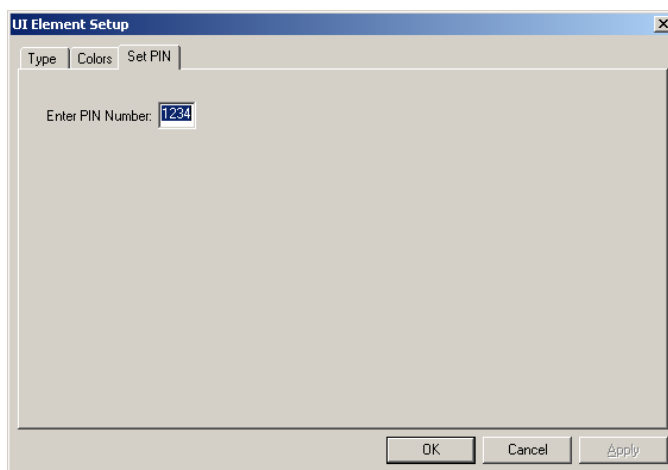


Figure 32 – Set PIN tab for Supervisor button

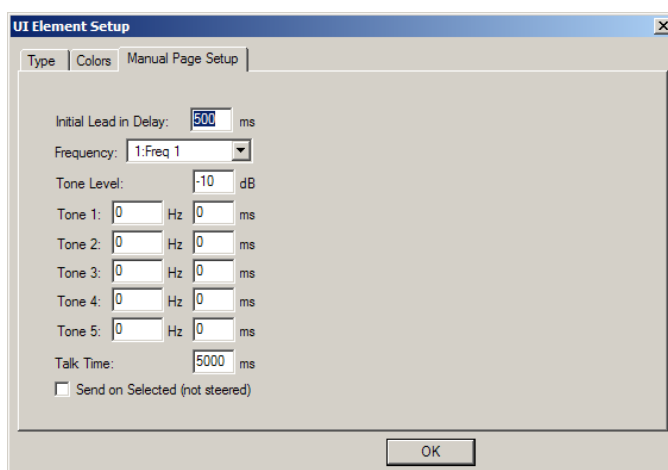


Figure 33 - Manual Page Setup

5.11.1.28 Instant Recall

The Instant recall button allows for a console operator to play back a pre-determined amount of audio. The software console constantly maintains a record of the last 1800 seconds of both parallel transmit and receive audio traffic. Figure 34 shows the setup for the button. Multiple buttons can be placed on the screen. Each button can be set to play back up a certain period of audio, either select or unselect. New in version 2.52 allows the IRR to only record audio when a call is active. This, along with the longer IRR time allows for a long conversation to be replayed without worry of loss of audio.

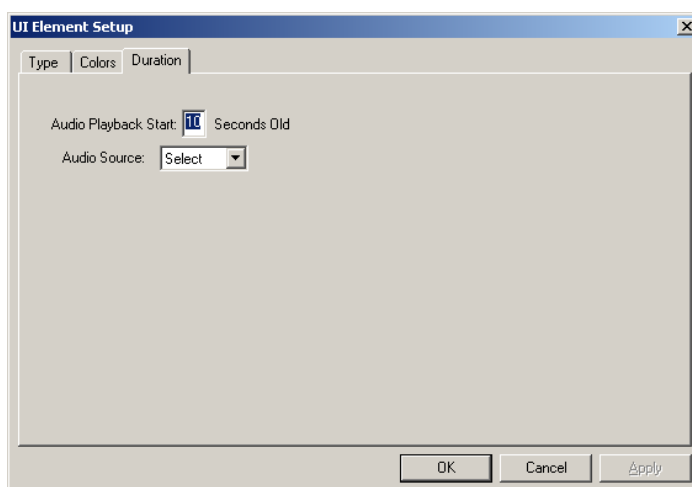


Figure 34 – Instant Recall Recorder Setup Tab

5.11.1.29 P25-Select

The EFJ-Select option functions identically to that of the normal Select button except it must be used when a console is controlling a P25 basestation radio. See section 5.11.1.7 for further discussion on the Select button.

5.11.1.30 P25-Per Line PTT

The EFJ-Per Line PTT option functions to that of the standard Per Line PTT. It is required to be used for a P25 channel. See section 5.11.1.2 for further discussion of the Instant PTT function.

5.11.1.31 P25-Encryption

This button is placed to allow the dispatcher to selectively turn on and off encryption on a particular P25 channel. The channel number is set for this button and on the third tab which encryption key should be activated.

5.11.1.32 P25-User ID Call

The User ID call button, when added to a screen design, will open a dialog box asking the dispatcher to select a specific user to call. Figure 35 shows the dialog box that is opened within the CSoftruntime Program. Any defined Users (see section 5.9 for information on adding unique radio IDs) will be listed in this dialog box. Once a User ID is selected, the button will display the selected ID and all subsequent transmissions will go out in the User ID call format.

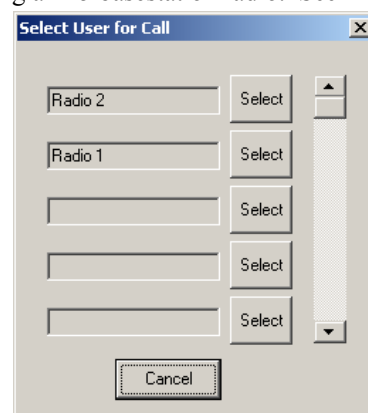


Figure 35 -User ID Call Select

5.11.1.33 Emergency Cancel

The P25, Fleetsync, and MDC1200 radio formats support an emergency function. When received, the console will be playing an emergency hi-lo tone to the select speaker to notify the dispatcher of the emergency event. In addition, on the line that received the emergency call, the Select button will blink between its predefined color and red. Pressing the emergency cancel button will stop the hi-lo tone as well as the blinking of the Select Button. This button is typically pressed by the dispatcher once the emergency situation has been resolved. Starting in version 2.7, the Emergency Cancel button also sends a parallel update to other consoles which ends the emergency indication on their consoles as well.

5.11.1.34 Emergency Acknowledge

The Emergency Acknowledge button is similar to that of the Emergency cancel button except that it only stops the hi-lo tone from being played on the select speaker. This button will set the timer value set within the Global Setup Dialog box. As long as that time has not expired subsequent emergency notifications from the field radios will not restart the alarm sounding.

5.11.1.35 Input Indication

The Input Indication button is used to monitor the two inputs of the HB-3 or 10 inputs of the NEO-10. Figure 36 shows the screen used for setup. An audible annunciation is available as well as selecting which input to use. The input can also be set to be active high or low. When the input is determined to be active, the button is placed into the pressed state. Use the color tab to change the button color, text, or bitmap to reflect this to the user. In the case of the NEO being used to monitor external inputs, the Base IP address and input number must be specified.

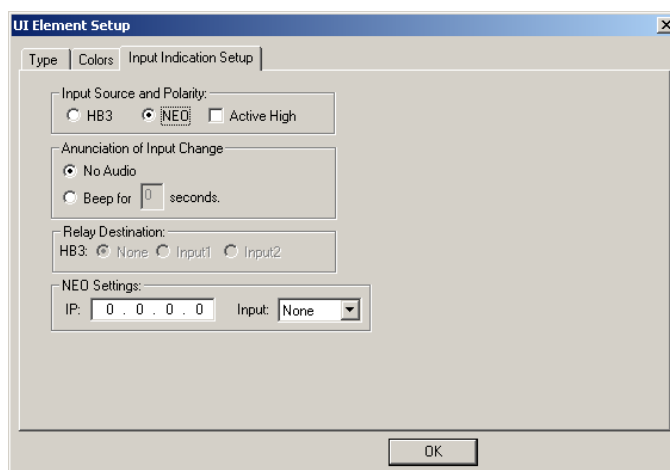


Figure 36 – Input Indication Setup Screen

5.11.1.36 Relay Control Button

The Relay Control button is used to control the relays available within the HB-3 or a networked NEO-10. The Relay Control button can be set to operate in three modes: Latched, Momentary, or Timed. The exact relay to control must also be selected. Figure 37 shows the setup screen. In the case of the NEO-10 controls, the Base IP address of the NEO device must be specified as well as the relay number.

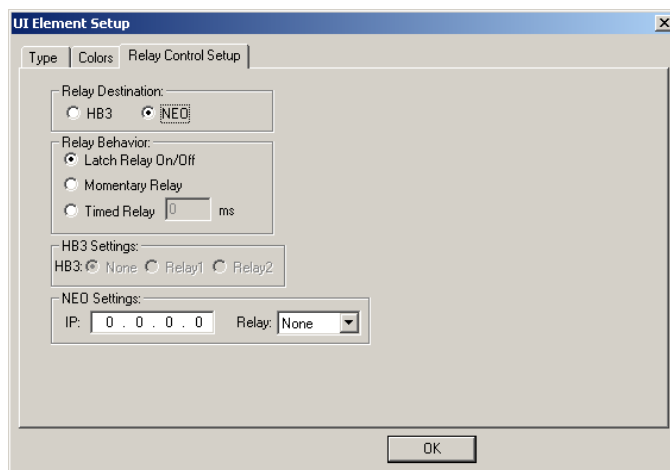


Figure 37 – Relay Control Configuration Dialog

5.11.1.37 Marker Tone

The Marker Tone option allows for a periodic automatic keyup of a radio channel and a tone burst to be played. The tone played is setup the same way as the Alert Tones. Two additional parameters are entered to control the spacing between keyups and the duration of the tone played.

5.11.1.38 Phone-On/Offhook

A phone On/Offhook button is added to a screen design when one of the lines is setup as a phone line. A phone, like a radio circuit, can be utilized as a network device. A C-6200 with a phone card can offer its phone lines for use by anybody on the network. A phone line can be used for direct phone communications by the dispatcher or to add a crosspatch to telephone capability for the radio users. Add the button and set the Line to the correct line number for the phone resource. When pressed by the user, the line will go offhook and dialtone will be heard from the select speaker. All radio traffic is moved to the unselect speaker. Full duplex audio will be present from the microphone while the line is offhook and not on hold. Placing the line on hold will mute the transmit audio and place the receive audio on the unselect speaker. When an incoming call is received by the hard-wired phone card, a ring signal is sent out. C-Soft will generate a ringing sound and place a RING icon on the On/Offhook button. To answer the call, the line is taken offhook. The first console to answer the call will take control of the line. All others will be denied. The On/Offhook button also has a third tab which can be used to force the use of a particular phone line on the console. To use any line, select the Pool option, otherwise select the exact line to be used. C-Soft will only ring if that particular chosen line is ringing. A regular Mute-Per Line button can also be associated with a phone line to mute both the mic and speaker of the line.

5.11.1.39 Phone-Hold

The Hold button can be added if the need to place the phone line on hold is required. While a line is on hold, no transmit audio is sent to the line and receive audio is sent to the unselect speaker.

5.11.1.40 Phone-Flashhook

The Flashhook button generally becomes part of the DTMF dialing keypad allowing the console operator perform a flashhook operation on the phone line.

5.11.1.41 Phone-Autodial

The autodial button can be added to allow the dispatcher to quickly dial a specific number that is used repeatedly. When this button type is selected, a third tab will appear allowing the designer to enter the number to dial. Only the digits 0-9 are currently supported.

5.11.1.42 Backup Line

The Backup Line button is used to force the line to route packets to and from either the primary or secondary radio interface as setup in the Line IP parameters. If the Ping routine fails to receive a reply from the Base Radio IP, it will automatically switch to the backup radio settings. This button will automatically change state to show this condition. If both the primary and backups fail, a LINK FAIL message will be placed on the Select button. The third tab of the setup for this button contains a checkbox to allow the dispatcher to manually switch between the primary and secondary radios. If this is not checked, the button can be used as an indicator, but the dispatcher will not be able to control the radio in use. The software will also not automatically reset from the backup radio to the primary radio without a restart.

5.11.2 Volume Control Objects

Selecting “Add UI Volume Control” from the insert menu will insert a slider control of default size and orientation. The Volume control can be

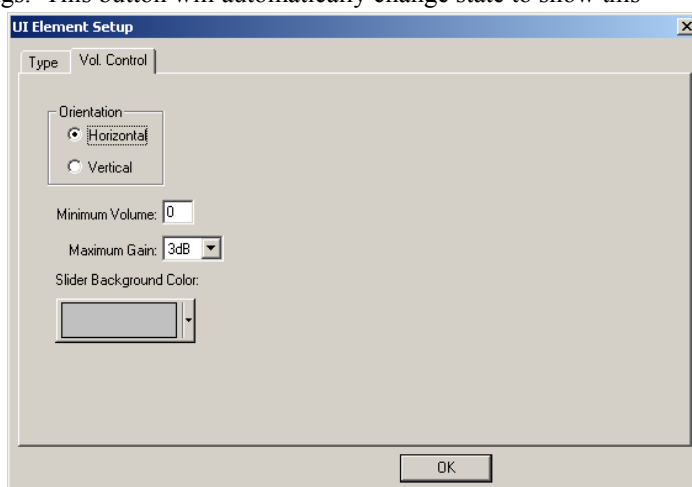


Figure 38 – Volume Control Setup Tab

resized, moved, and copied in the same way as the button controls. Access to its setup parameters is accomplished by selecting it. The same target icon is used to show selection. Selecting Properties from the edit menu or right clicking on the slider and selecting Properties from the popup menu will bring up the standard dialog box. The “Type” tab of the dialog box allows selection of the affect of the slider. The “Vol Control” tab is used to control the look of the slider.

The first option on the slider control is the orientation of the slider itself. As placed from the insert menu, the orientation is vertical. If a horizontal orientation is desired, change the selected option. The slider will be rotated upon exit of the dialog box. The Minimum Volume entry is used to make sure that the console operator cannot turn the audio completely down. A value in the range from –20 to 0 is allowed. –20 signifies that the most the operator can turn down the audio is by –20dB. A value of zero allows complete turnoff of the audio. The next option is for the maximum gain of the slider control. A setting of zero dB allows the operator to only listen to the audio at the maximum level of the incoming audio. Up to 12dB of gain can be applied which may allow the dispatcher to monitor level volume level traffic. The last option is the background color of the slider itself. Typically it would match the color of the borders of the buttons that are functioning on the same line or grouping. Pressing the button pops up a dialog box that allows selection of a different color.

5.11.2.1 Volume-Per Line

One of the Vol control types is the Volume-Per Line selection in the Type tab of the Properties dialog box. Selecting this option, along with an associated line setting, will allow the console operator the ability to control the relative level of the particular line with respect to other lines. This control is disabled when the line is represents is muted.

5.11.2.2 Volume-Master Select

The Master Select volume option allows for a single control that manipulates the volume of all select audio.

5.11.2.3 Volume-Master Unselect

The Master Unselect volume option allows for creation of a control to change the unselect volume for all lines.

5.11.3 Popup Windows

One of the most versatile user interface options is the popup window. A popup can be used to group similar line functions together, pages, alerts, or any combination of button and slider controls. Popups can exist within other popups allowing for nested controls. Once a popup is created with its interface options inside, it can be copied by moving it with the mouse while holding the CTRL key. This allows for large sections of user interface to be designed, copied, and then modified slightly to speed user interface development.

Inserting a popup windows is accomplished by selecting it from the insert menu. It will initially appear as a button labeled “Popup” and the associated window will be closed. To open the popup, right click on it and select “Open Popup” from the menu that appears. Alternately, with the button selected, as denoted by the target, select “Open Popup” from the Edit menu. This is the only way to open a popup from within the designer. In the runtime, the user opens the popup by simply clicking on the button. To close the popup, click the “Done” button within the window.

Resizing the popup button is done with the window closed and the button selected. The Increase/Decrease Width/Height options function on the button. To change the dimensions and locations of the popup window, open the popup window making sure that the button remains selected. Now the sizing options work on the window. In addition, the relative location of the window can be changed with the direction arrows and the rotate button. Note that with the window open, the only way to change location or size of a popup window is with the menu commands or toolbar buttons. There is no mechanism to do this with the mouse.

To Insert buttons, volume controls, and popups into an existing popup, the popup must be open and the popups button must be selected (shows the target symbol). Now, selecting items from the insert menu will be placed inside the popup window. It is not possible to move or copy a user interface item from one window to another. Once an item is part of a popup window structure, it will always be part of a popup window structure. Editing the elements within a popup is identical to doing so when they are located within the main window.

5.11.3.1 Web Pages within Popups

One of the newest features available in C-Soft is the ability to embed a Web Page within a popup window. To accomplish this, create a popup as described in the previous section. The window can be sized and located as in 5.11.3. When editing the properties of the popup, change the UI Element Function from being Popup Window Control to that of Popup Web Page. Once this function is selected, a third tab will appear allowing entry of the web page URL. Enter the URL such as <http://www.weather.com>. The second entry of the third tab governs how often a web page is reloaded. A value of 0 will load the webpage only when C-Soft starts running. Any other value will cause the PC to reload the web page on the state interval. This function is useful for displaying a weather map on the dispatchers screen and having the radar image update every five minutes. The last option, if checked, forces the webpage to refresh whenever its popup button is pressed. There is a maximum of three web pages allowed on any screen design

5.11.3.2 Popup Call History

Another function that can be embedded into a popup windows is call list.

The call list consists of up to 500 lines of text that includes the date, time, and channel information for every incoming radio call. If user ANI information is available, it is displayed as well. This provides the dispatcher with a historical view of all the activity on the connected radio channels. To add this function, create a popup as described in 5.11.3. The window can be sized and located as described previously. When editing the properties of the popup, change the UI Element Function from being Popup Window Control to that of Popup Call History. When the CSoftRuntime.exe program is run, the inside of the window will contain lines of text and a scroll bar allowing review of up to 500 lines of radio calls. Starting in version 2.7, a third tab with setup options will appear when the Call History is selected as the popup type. The first two options help to control how many calls get placed into the call history list, muted calls and NEO events can be included or excluded from the call history. The third entry allows for fewer lines to be saved in the call history. Enter the maximum number of lines to be kept in the call history. The final option allows control of the font size of the text in the Call History window. The default is 8. Enter a larger number for larger text.

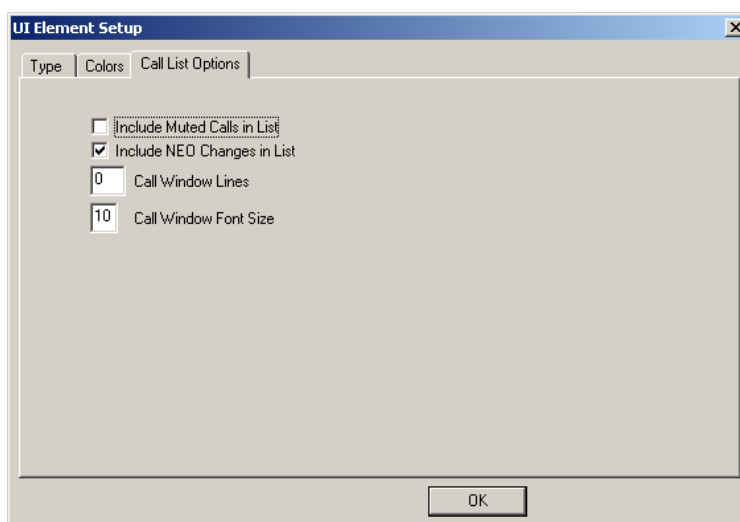


Figure 39 – Call History Setup

5.11.3.2.1 Call History IRR Playback

In addition to displaying a call history, the call window can also be used for playback of the audio from recent calls. The IRR function has previously been discussed, but an alternate way to play back a call is to double click on the date stamped entry of the call in the call history window. If the audio was played to either the select or unselect speaker, it will be stored and accessible. The recorder will also continue to record other calls that come in, but are not played because the a previous call is being played. Three minutes of audio, is still the normal stored audio. Silence between calls is not stored.

5.11.4 Adding Descriptive Text

Text can be added to the main screen or a popup window. Selecting “Add Text” from the Insert menu opens the dialog box shown in Figure 40. This is pretty much the standard Windows text definition dialog box with a couple items added. Generally it is a good idea to select generic fonts like Arial and Times Roman for screen layouts. Otherwise, the designer must make sure that the font exists on the computer that will be used for the dispatcher.

After the dialog box opens, select the standard options of Font, Font Style, Size, and Color. Changes to these options will be displayed in the Sample box giving the designer an opportunity to view the text before actually placing it.

The next two options are specific to the designer software package. The Horizontal checkbox is the default. If checked the text will be placed onto the screen with a normal left to right reading direction. Unchecking it will place the text in a vertical orientation.

The actual text string to be placed on the screen is entered into the bottom text entry box. A text string can be up to 50 characters.

The text string will be placed onto the screen in the upper left corner. It can be moved with the mouse or the menu/toolbar options. Text shows it is selected by placing a box around the string. Clicking within that box will allow it to be dragged to a new location. Copy also works while moving the text by holding down the CTRL key. While selected it can also have its size increased and decreased and be rotated. Upside down text is not supported. The increase/decrease commands have the same function whether selected for width or height. Each just enlarges or decreases the point size of the text string. Text can be edited after it is placed onto the screen by Right-Clicking on it.

Version 2.7 increased the maximum number of text strings in a design from 200 to 2000.

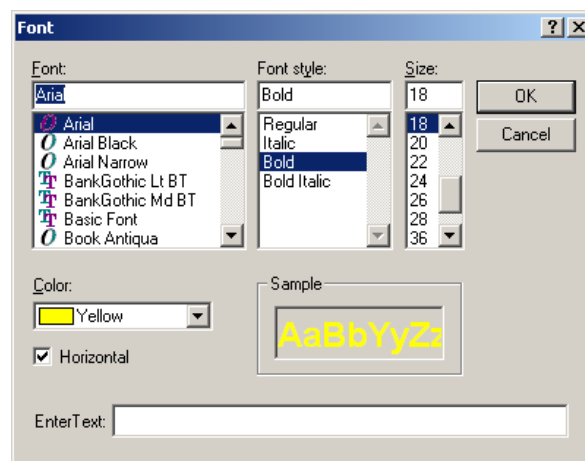


Figure 40 – The Add Text dialog box

6 Basic Screen Design Tutorial

This chapter is a brief tutorial that will guide the user through the creation of a 6 line console design along with a few of the other user interface elements. From this design, other more complicated designs can be completed. It is a good idea to periodically save the design. The final design is loaded on the CD that this software was delivered on and is called “Tutorial 1.veg”. In the final step, the design will be saved with the default name of “C6200F_Default.veg” which is the filename that CSoftruntime.exe loads when it starts running.

6.1 First Step – Setup Basic IP Parameters

In most console designs, prior knowledge of the system architecture must exist. In this case, the console is going to be designed for a six radio system. Each radio will have four active frequencies. Start by enabling lines 2-6 in the Multicast IP Setup dialog under the edit menu. The RX Port addresses are fine as defaults for this exercise. The TX Ports should be changed to start from 1072 and increase up from there. For each of lines 1-6, click on the frequency button at the right of each line and enable Lines 1-4. Feel free to modify frequency and line names to something more meaningful. Leave the Echo Packet entries turned off.

Line Number	Line Type	Line Name	RX Multicast Address	RX Port	TX Multicast Address	TX Port	TTL	TxMon Enable	Talk Group	NAC	Frequency
1	Vega	Line 1	225. 8 . 11 . 81	1054	225. 8 . 11 . 81	1072	1	☒	0	0	Freqs
2	Vega	Line 2	225. 8 . 11 . 81	1055	225. 8 . 11 . 81	1073	1	☒	0	0	Freqs
3	Vega	Line 3	225. 8 . 11 . 81	1056	225. 8 . 11 . 81	1074	1	☒	0	0	Freqs
4	Vega	Line 4	225. 8 . 11 . 81	1057	225. 8 . 11 . 81	1075	1	☒	0	0	Freqs
5	Vega	Line 5	225. 8 . 11 . 81	1058	225. 8 . 11 . 81	1076	1	☒	0	0	Freqs
6	Vega	Line 6	225. 8 . 11 . 81	1059	225. 8 . 11 . 81	1077	1	☒	0	0	Freqs
7	Disabled	Line 7	225. 8 . 11 . 81	1060	225. 8 . 11 . 81	1110	1	☒	0	0	Freqs
8	Disabled	Line 8	225. 8 . 11 . 81	1061	225. 8 . 11 . 81	1111	1	☒	0	0	Freqs
9	Disabled	Line 9	225. 8 . 11 . 81	1062	225. 8 . 11 . 81	1112	1	☒	0	0	Freqs
10	Disabled	Line 10	225. 8 . 11 . 81	1063	225. 8 . 11 . 81	1113	1	☒	0	0	Freqs

Packets to Buffer before Playback: 6

Figure 41 – Tutorial Line IP Setup dialog

6.2 Second Step – Monitor, PTT-Main, and Intercom

Start by adding a button and moving it to the bottom center of the screen. Enlarge the button width by about three times. Add two other regular buttons on either side of it. By selecting each button and editing the properties, make the left button Monitor, the large middle button PTT-Main, and the right button Intercom. When you are done it should look something like Figure 42.

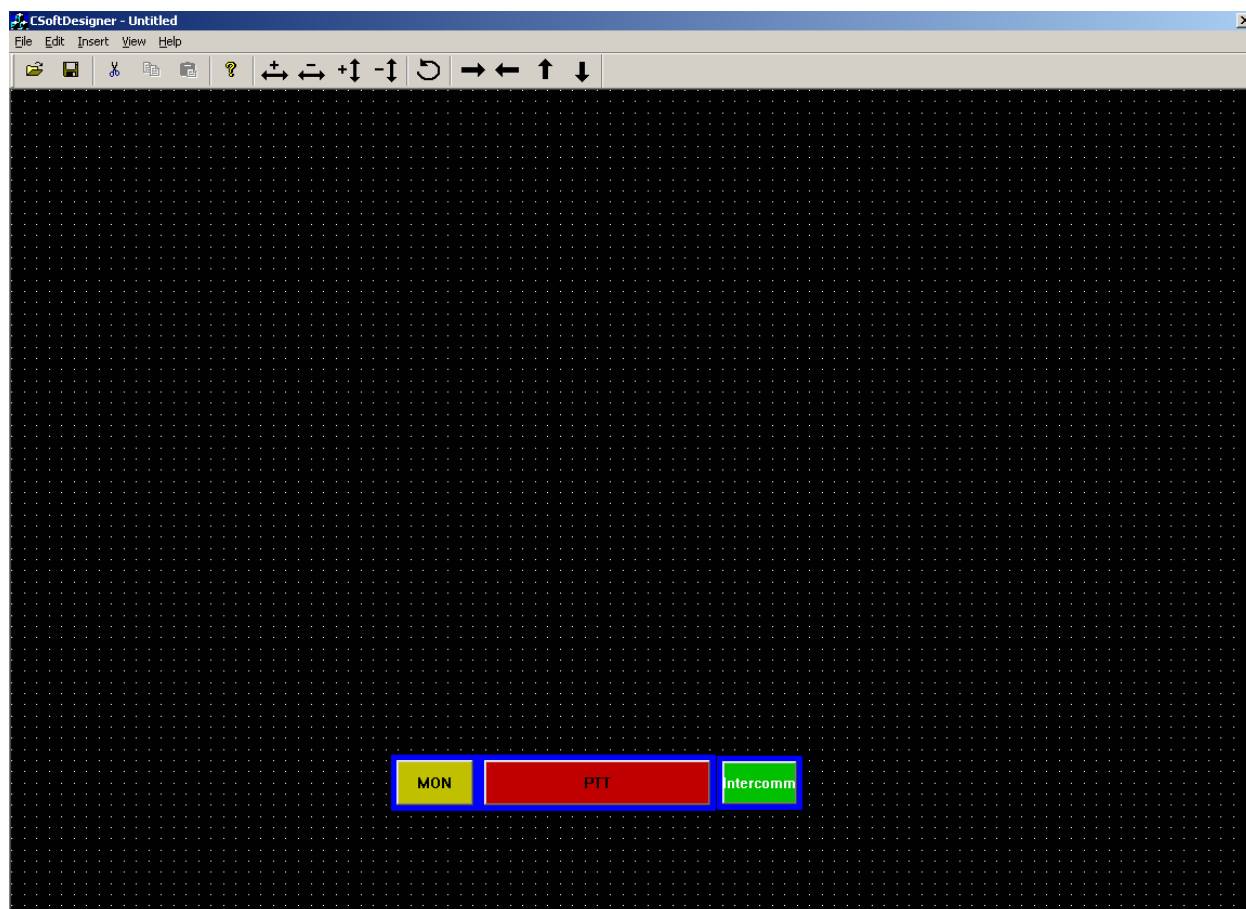


Figure 42 –First Step in Tutorial. Monitor, PTT-Main, and Intercom

6.3 Step Three – Create First Column of Controls

- 1) In step three add to the left and above the Monitor button, a button. Set its type to PTT-Per Line. Leave its line set as Line 1. The third tab will be left as selection 0:Default Frequency. Frequency control will be added later.
- 2) Directly above the InPTT button, add a volume control. Set it as Per Line Volume control, set for line 1, and leave the options in the third tab at default, except to change the background color to the same color of blue as the InPTT buttons border.
- 3) Above the Volume control, add another button. Set its function to Mute-Per Line. Select Line 1 for it. The third tab parameters should be left as default. Increase the width of the volume control to match that of the buttons above and below it.
- 4) Above the Mute button, place another button. Set its function to Select. Set it to Line 1.
- 5) Above the Select button, add a Popup button. In the color tab, sets its text for both the up and down positions to be \$FREQ1\$. The popup button should have its width and height decreased by one.
- 6) Open the popup window and insert four buttons. Each of these buttons should be Frequency Change buttons. Set them all for Line 1 and set each to one of the four frequencies. Change the up and down text to the F1-F4 or some other useful name. Adjust the size of the window to minimize the amount of space it occupies on the screen.

After steps 1-6 have been completed, the screen display should look like Figure 43.

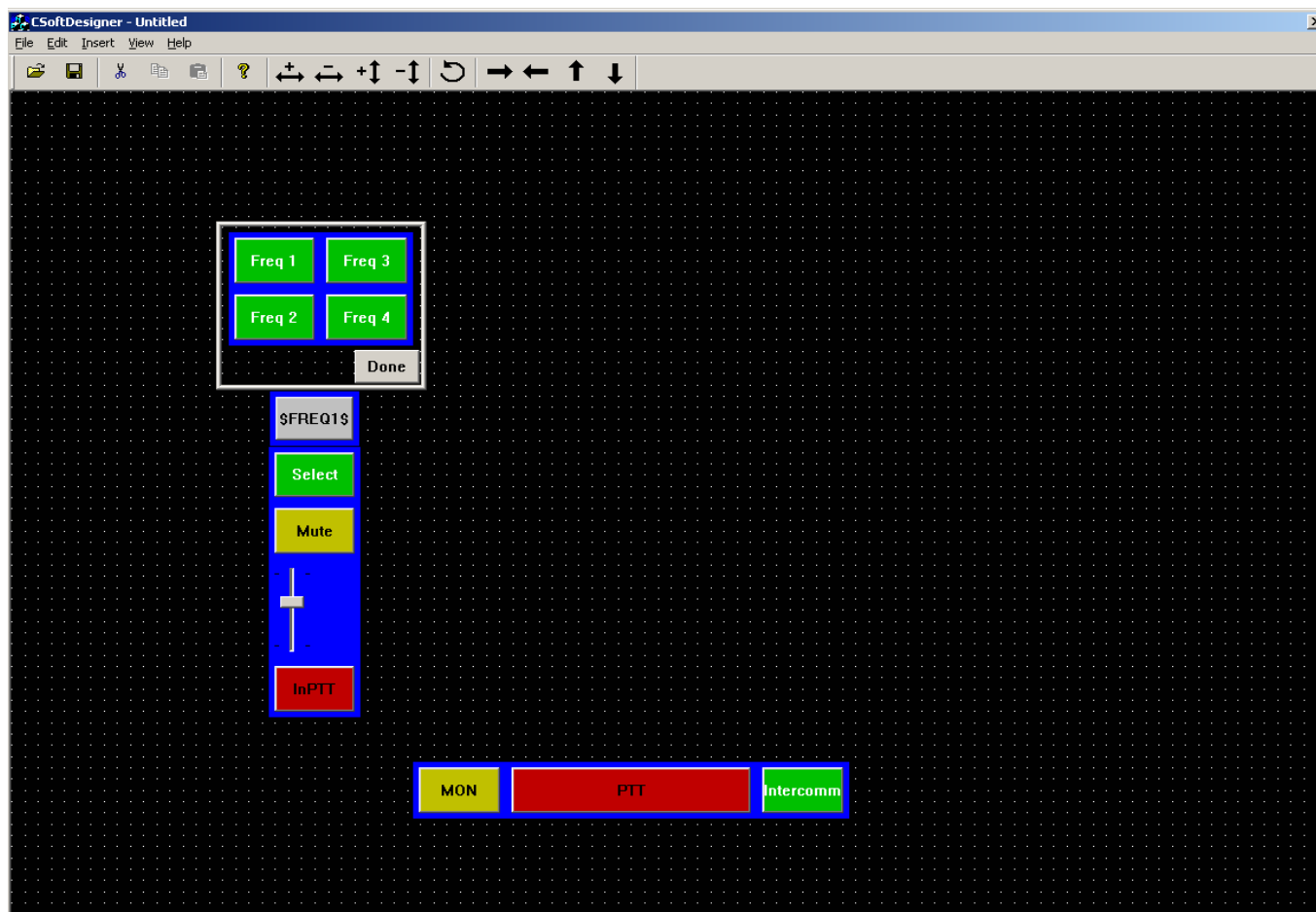


Figure 43 – Third Step Tutorial Screen Layout

6.4 Step Four – Create Other Five Control Columns

In this step, the first column created will be copied across the screen to create five more channels of controls. The quickest way to do this is to use the mouse to select the entire column worth of controls. Move the mouse above and to the left of the Frequency popup. While holding down the left mouse button, draw a rectangle around the column of controls. When at the lower right of the control column, release the button. All controls within the rectangle will now be selected. Select copy from the Edit menu followed by Paste. Copies of the selected elements will be displayed below and to the right of the old controls. They will all be selected. Use the arrow keys on the toolbar to move them to the new location. While the group is selected, right click on one of the controls in the group. The Properties option will appear as a shortcut menu. Selecting properties will allow changing all of the buttons line

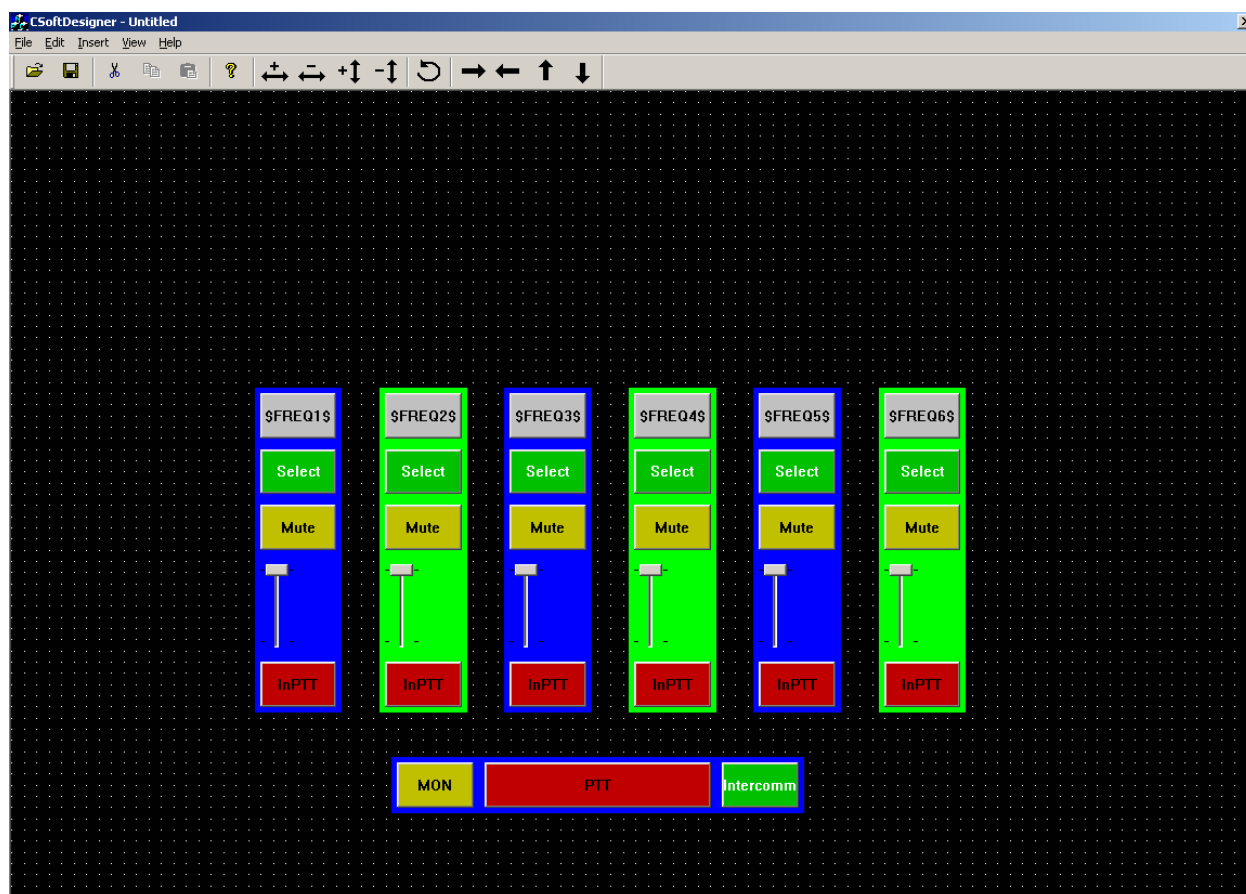


Figure 44 – Step Four tutorial screen. All six line controls are present

association with one selection. The Freq popup will still need to be opened and have all of its frequency selection buttons changed. This can be done again by selecting all the buttons in the window and right clicking. In addition change the variable name on the popup button itself to that of the new line. That way, the correct frequency for the line will always be displayed within the Popup button. The border/background colors can also be changed to help differentiate the radio channels. Repeat these steps for each column. When this is completed the display should look something like Figure 44.

6.5 Step Five – Other Standard Controls

In this step, several other common controls will be added.

- 1) In a grouping to the left of the columns of line controls, add buttons for the following. Mute Main, TX All, RX All, and Group Select. None of these four buttons requires any setup other than to select the function from the Type tab of the properties dialog box. Under the group of four button just added, insert two Alert keys. Set one of them to be a pulsed tone and the other to be a Hi-Lo Warble. Fill in frequencies and durations for all boxes that are not grayed out.2)
- 2) On the right side of the design, a 12 key DTMF keypad will be added. Start by inserting one new button, setting it to DTMF, and then copy it with CTRL-mouse drag method to make the rest of the keypad. Then go back and change the DTMF digit for each key, default text will automatically be placed on the button.
- 3) Finally, add two more volume controls. Make these volume controls horizontally oriented and assign the left one as Volume Master Select and the right one as Volume Master Unselect. Add text above or below each slider to label its function.

After completing these three steps, the screen layout should look similar to Figure 45.

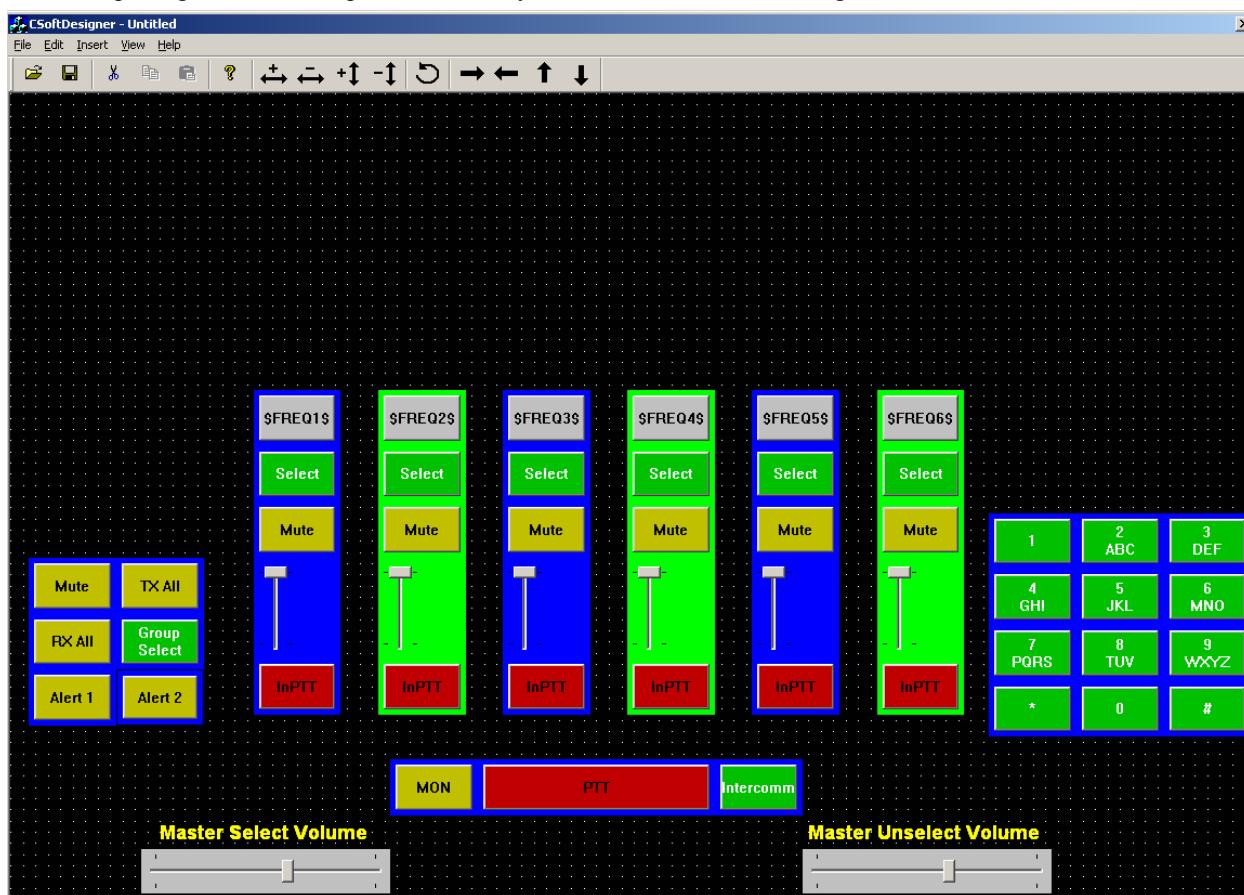


Figure 45 –Tutorial Step 5. General controls, DTMF keypad, and Master Volumes.

6.6 Step 6 – Testing the Design

Having completed steps 1-5, the design is now ready to test. Save out the design into the same directory as CSoftRuntime.exe. Use the default filename of C6200F_Default.veg. This file will then be automatically loaded by the runtime software and activated. If the runtime program finds the file and runs correctly, the screen will look like Figure 46.

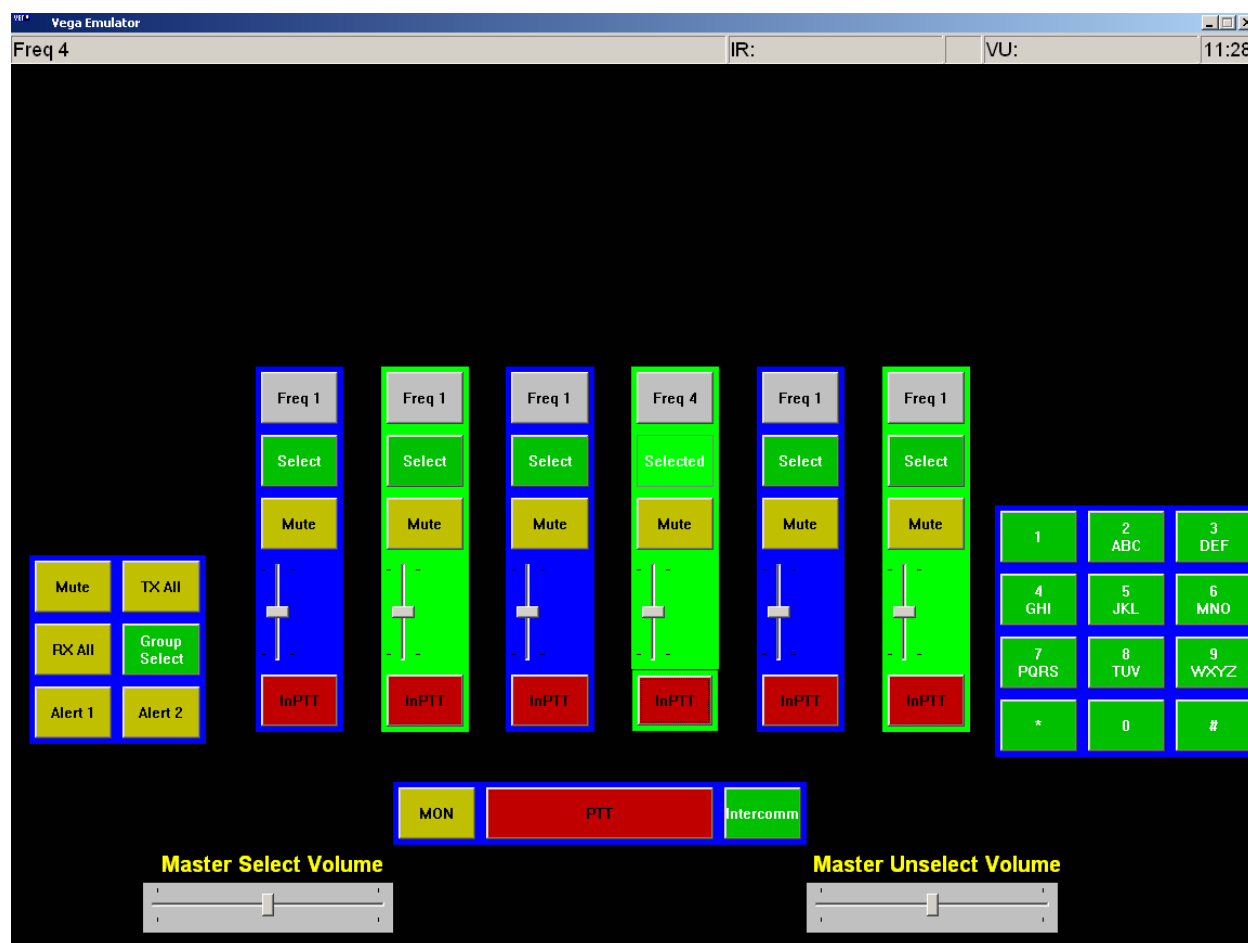


Figure 46 – Runtime display of tutorial design.

A number of items should be pointed out for the runtime software.

- 1) The top of the window has a status bar that is used to display information to the console operator. Close observation will reveal 5 separate areas, called panes, each displaying different specific information. From left to right, these panes display: text messages, IRR playback position, PTT status, VU Meter, and the computer's time.
- 2) The select button is used for a number of status functions. When transmit packets are present from another console on the network, a small red LED with a "T" is placed on the select button to indicate to the operator that transmit activity is active on that line and therefore the operator cannot transmit on it. When receive activity is present, a small red LED with an "R" is placed on the Select button. Two other indications that appear on the Select button include a "XT" indication stating that transmit activity is present on the line, but it is crossmuted, and a "SUP" indication to show that the line/button is supervised. The SUP indication also shows up on the Mute and InPTT buttons for a particular line since they are also directly affected by the supervisor function.

- 3) Although it is not setup to be demonstrated in this example, it is also possible to place the line controls within a Popup window. Had a popup been created initially in the tutorial, and all the Select, Mute, InPtt, Volume Controls, and Frequency Popup windows been placed into it, it would have allowed a grouping of lines that could have been hidden from view by closing the window. This would allow for a much larger number of lines to be controlled from the single screen user interface. It is of course likely that line activity could occur on a line while its window is closed. The dispatcher would receive an indication of this on the Popup button that the line is stored within. An “Active” LED indication will be placed onto any Popup button that has indications occurring within it. If the dispatcher has not muted the lines within the hidden window, audio would still be heard and the activity indication on the popup control would indicate where the traffic was coming from.
- 4) Notice that the \$FREQx\$ text that was placed onto the Popup windows for frequency control, now display the frequency of the line. If another parallel console changes the frequency of the radio on the line, it will be automatically updated to display the new frequency name.
- 5) Once a design has been completed, as in the tutorial example, all buttons should be checked for correct function.

7 Warranty, Service, Repair, and Comments

Important! Be sure the exact return address and a description of the problem or work to be done are enclosed with your equipment.

Warranty (Limited)

All Telex Manufactured Vega signaling products are guaranteed against malfunction due to defects in materials and workmanship for three years, beginning at the date of original purchase. If such a malfunction occurs, the product will be repaired or replaced (at our option) without charge during the three-year period, if delivered to the Telex factory. Warranty does not extend to damage due to improper repairs, finish or appearance items, or malfunction due to abuse or operation under other than the specified conditions, nor does it extend to incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. This warranty gives the customer specific legal rights, and there may be other rights which vary from state to state.

Factory Service Center

TELEX Communications, Inc.

Vega Signaling Products

8601 East Cornhusker Highway, Lincoln, Nebraska, 68507

Phone: (800) 752-7560-Sales, (800) 898-6723-Tech Support, Fax: (402) 467-3279

E-mail: vega@telex.com, Web: www.vega-signaling.com

Claims

No liability will be accepted for damages directly or indirectly arising from the use of our materials or from any other causes. Our liability shall be expressly limited to replacement or repair of defective materials.

Suggestions or Comments

We'd appreciate your input. Please send us your suggestions or comments concerning this manual, by fax or e-mail them to: vega@us.telex.com

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