TELEX

RADIO DISPATCH PRODUCTS

IP-223
Remote Adapter Panel
Technical Manual

up to and including version 4.500

Proprietary Notice

The product information and design disclosed herein were originated by and are the property of Bosch Security Systems, Inc. Bosch reserves all patent, proprietary design, manufacturing, reproduction, use and sales rights thereto, and to any article disclosed therein, except to the extent rights are expressly granted to others.

Copyright Notice

*All other trademarks are property of their respective owners.

**MOTOROLA and the Stylized M logo are registered in the U.S. Patent and Trademark Office.

Warranty Notice (limited)

For warranty and service information, refer to www.telex.com/warranty.

Factory Service Center

Factory Service Center
Bosch Security Systems, Inc.
Radio Dispatch Products
8601 East Cornhusker Highway
Lincoln, Nebraska, 68507

Phone Numbers

Sales:

Phone .....(800) 752-7560

Fax.....(402) 467-3279

E-mail..... TelexDispatch@us.bosch.com

Customer Service Repair: .....(800) 553-5992

Technical Support:

Phone .....(800) 898-6723

E-mail ..... TelexDispatchtechsupport@us.bosch.com

Web .....www.telexradiodispatch.com

Claims

No liability 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.

Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Table of Contents

List of Figures

List of Tables

CHAPTER 1

Overview

The IP-223 Remote Adapter Panel provides a reliable means of controlling two (2) audio devices remotely. The adapter has multiple modes allowing it to connect to both digital and analog consoles, and performs a variety of other tasks related to using radios on a digital network.

The IP-223 is interconnected to distant remote control console(s) by means of any available **WAN** (Wide Area Network) or **LAN** (Local Area Network) connection.

Features

NOTE: The features listed below for the IP-223 do not comprise the full feature set. For more information on all the features available, contact your sales representative.

- Ethernet TX and LINK LEDs
- PTT, Monitor, F1 and F2 relays (programmable to any function tone or revert to F1)
- Four (4) PTT modes and three (3) monitor modes
- Nine (9) selectable PTT frequencies
- Seven (7) digital outputs for channel selection, completely programmable per function tone
- **CTCSS** (Continuous Tone Coded Squelch System) generation (64 frequencies)
- Hardware and software gain control
- Local handset port for monitoring activity and transmission back to base or to radio
- RS-232C port on rear for initial configuration and direct radio control
- Single function tone recognition (16 function tones)
- **RX** (Receive) audio squelch
- Crosspatch capability
- **ANI** (Automatic Number Identification) over-the-air-protocol—decode and display
- Provides iDEN interface
- Supports Sepura SRM2000, TETRA radio
- E.F. Johnson RS5300 P25 radio interface
- Remote Crosspatch capabilities
- POTS line fail-over
- Phone line interface
- MDC and Fleetsync Encode/Decode
- 5/6 Tone signalling Encode/Decode
- Kenwood radios interface
- **SOIP** (Serial Over Internet Protocol)

NOTE: Transient protection is provided near all audio inputs and outputs. The IP-223 line transformers are not designed to operate on lines carrying **DC** (direct current). If a voltage is on the line, isolate with external capacitors. If the line termination must conduct direct current, install a 600:600 Ohm transformer designed for the current involved.

Operating Modes

The IP-223 is capable of operating each audio port in different modes:

Local Mode - Allows the radio to connect directly to the IP-223 allowing for simple migration and local control of the radio.

Tone Mode - Allows the IP-223, based on Ethernet traffic, to generate required key tones required to control industry standard tone-equipped radio circuits. This allows an existing tone decoder and radio to be connected. This mode also supports a parallel analog console.

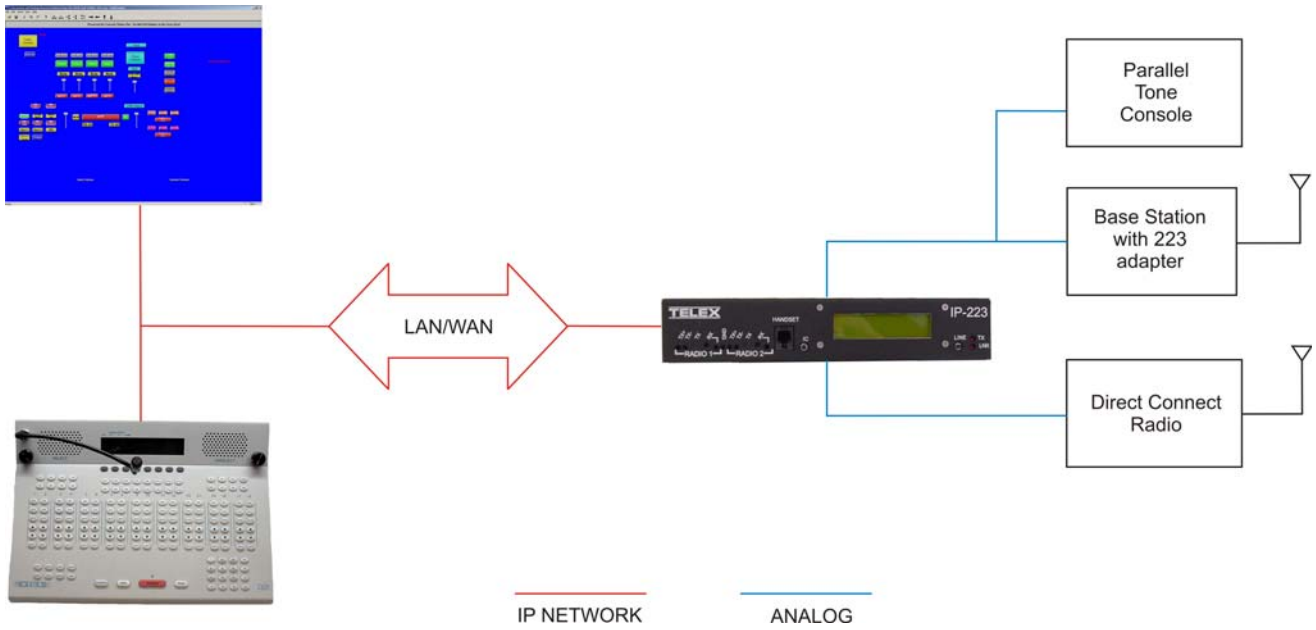


FIGURE 1. Local and Tone Mode Connections

Console Mode - Allows the use of existing tone-based consoles. The IP-223 decodes industry standard tones, converts it to Ethernet traffic to another IP-223 that can be in tone or local mode.

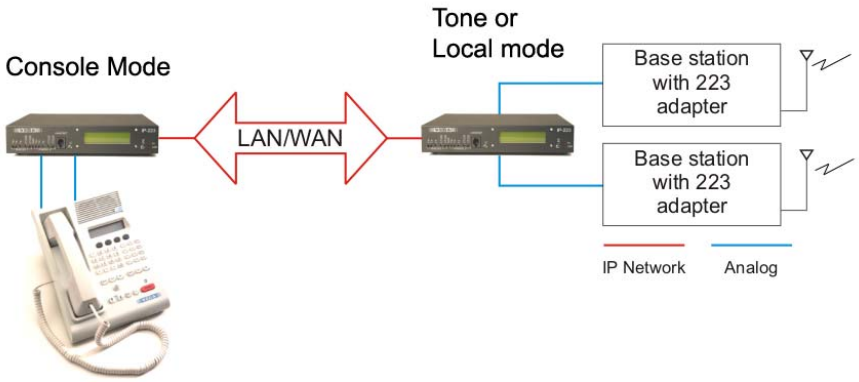


FIGURE 2. Console Mode Connection

Phone Mode - Using a **PIB** (Phone Interface Box) or **TDI** (Telephone Dispatch Interface), a line on the IP-223 is used to connect to an analog phone line.

iDEN Radio Mode - Using the NI-223, allows interface with a Falcon Class **PTT** (Push-To-Talk) mobile phone system.

TETRA Radio Mode - Used to interface to a TETRA digital trunked system using the IP-223 and the Sepura SRM2000 mobile radio. The IP-223 interfaces the radio through the **PEI** (Peripheral Equipment Interface) allowing dispatch access to TETRA radio assets.

IP-223 Accessories

There are several optional **accessories** available for the IP-223:

Part Number	Description
223RACK	1 unit high rack shelf to hold up to two (2) IP-223 units
2490248	Alignment Handset
730153	Power Supply
301611000	Fleetsync Over the Air Decode
301611004	FleetSync Encode/Decode
301611001	MDC Over the Air Decode
301611005	MDC 1200 Encode/Decode
301912000	NI-223
PRD000003000	IP223 to EFJohnson 5300 Mobile Radio Advanced Control Interface Box
301953000	IP223DB-9Splitter - Serial Port splitter cable DB-9
301956000	IP223CAB150/180 - IP223-Kenwood TK-150/180 cable
301957000	IP223CAB90 - IP223-Kenwood TK-90 cable
301969000	IP223CABCDM1250 - IP-223-Motorola**[a] CDM and GM cable
301961000	IP223CAB2000 - IP-223-Sepura SRM2000 cable
879794	IP223CAB Tone - IP-223-Dual DB-25 Tone cable 24ft.
F.01U.162.606	MTRBi Radio Interface

a. For copyright information, see “Copyright Notice” on page 2

IP-223 Specifications

The specifications for the IP-223 are listed in Table 1. The specifications are subject to change without notice.

CAUTION: This device is not **PoE** (Power Over Ethernet) compatible.

TABLE 1. IP-223 Specifications

Operating Temperature Range	0 to 70°C for full specifications
Power Requirements	+12 to +16Vdc, semi-regulated, ~700mA
Ethernet Speed	10 BaseT or 100 BaseTX
Lease Lines	2W and 4W supported
Radio Interface	±45VDC withstand rating
Relay Contact Ratings	1A at 125Vac
Non-Relay Outputs	Open collector, active low, 200mA maximum, 40V collector to emitter voltage
Radio Input Level	10mVp-p to 10Vp-p, adjustable
Radio Output Level	10mVp-p to 10Vp-p for mic level or -40 to +10dBm into 600Ω load, adjustable
Radio Output Impedance	600Ω for balanced mode, 200Ω for single ended mode
Frequency Response	±1.5dB, 300 to 3000Hz
Audio Distortion	2% THD maximum
DTMF Detection Bandwidth	± 25 Hz around center of frequency
MON timer	10ms to 9999ms, adjustable
Dimensions	8 ½” (215.9mm) Wide, 9 3/4” (247.65mm) Deep, by 1 5/8” (41.275mm) High
Actual Weight	3.75lb (1.701kg)
Shipping Weight and Dimensions	5lbs (2.267kg) ~ 12”(304.8mm) x 10”(254mm) x3”(76.2mm)

Front Panel

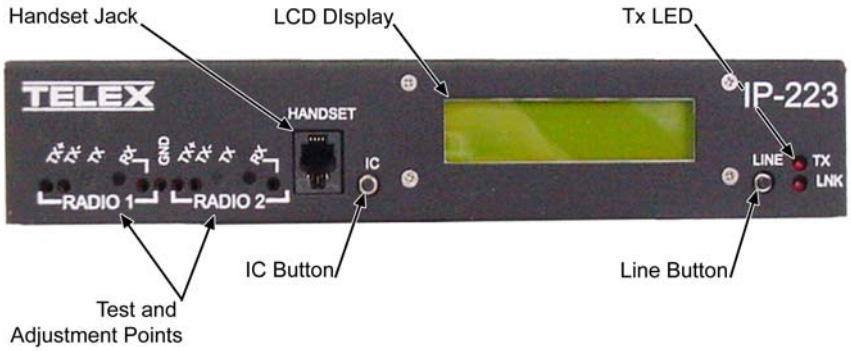


FIGURE 3. IP-223 Front Panel

Test and Adjustment Points

Test and adjustment points for **Radio 1** and **Radio 2** are provided on the front panel. Newer versions of the IP-223 provide access to additional test and adjustment points on the case top, as shown in Figure 4.

NOTE: Radio 1 and radio 2 are also referred to as line 1 and line 2 in this manual.

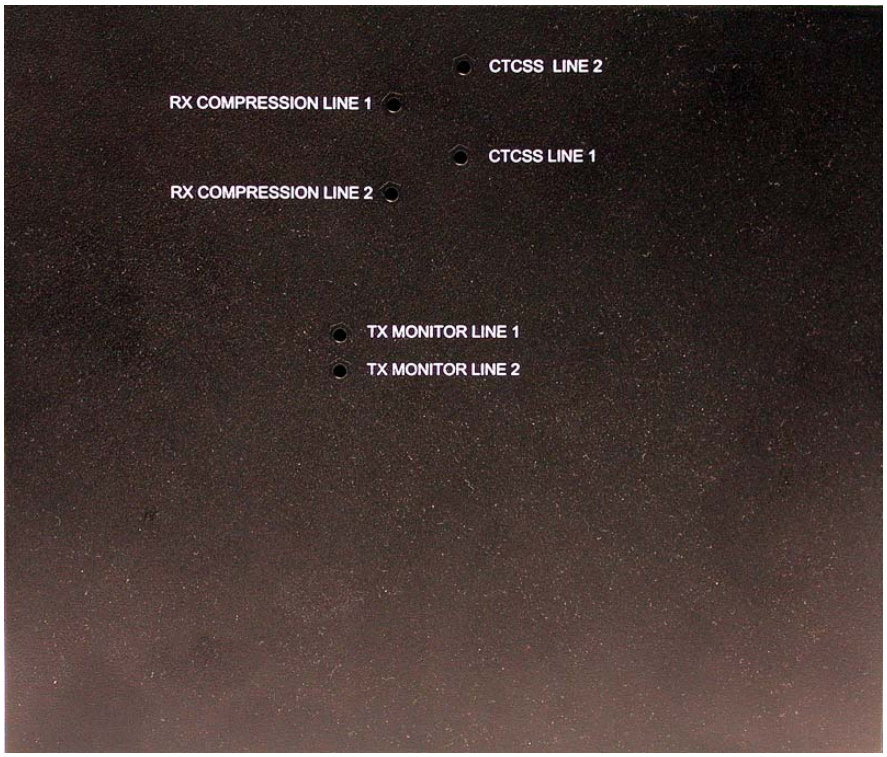


FIGURE 4. IP-223 Case Top Test Points

Handset Jack

An optional handset is available for the IP-223. When the optional handset is plugged into the handset jack, the ability to monitor and talk on either line is available. The handset jack is located on the front of the unit. When the handset **PTT** (Push to Talk) switch is pressed, the selected radio connected to the IP-223 is keyed up on the existing frequency and the handset microphone audio is transmitted.

Ethernet audio is also generated on the TX multicast and port for the selected line. This functionality can be used to test both the Ethernet network and the analog connection.

IC Button

The **IC** button, when pressed, sends audio from the handset microphone back through the IP Network on the selected TX multicast and port. It also sends audio to the transmit lines of the IP-223 without keying up the radio. This means no PTT relay in local mode and no **EIA** (Electronic Industries Association) tones in tone mode.

NOTE: A handset is required to use the IC button.

LCD Display

The **LCD** display provides panel status information, such as the IP and Subnet Addresses, line status, and handset line selection.

- TX F# (# is the selected function tone) indicates a PTT is active.
- RX F# (# is the selected function tone) indicates the RX radio is active.
- ID # displays when a Fleetsync or **MDC** (Mobile Daughter Card) ANI ID is decoded. This does not include serial decoding.
- When connected to a serially controlled radio, iDEN, Sepura, Kenwood or Johnson displays.
- INTCOM displays when the front panel IC button is pressed.
- EnetIC displays when the console generated intercom is received.
- CTX F# displays when the console mode IP-223 decodes tones from a tone console in Console mode.
- CRX F# displays when the IP-223 transmits wire-line audio to a legacy tone console in Console mode.
- PTX F# displays when the IP-223 decodes tones from a legacy tone console attached in parallel in Tone mode.
- CPT F# displays when the IP-223 transmits to a line if the line-to-line crosspatch is enabled.
- Ring displays when there is an incoming phone call in Phone mode.
- Offhook displays when the line is in use during a phone call.
- LLM displays when no phone line is connected to the PIB or TDI in Phone mode.
- NO LINE ENABLED displays after power-up if neither line is enabled.
- Scan List.... displays during power up while the IP-223 is communicating with serial controlled radios that support the Scan List feature.

To **toggle the LCD display**, do the following:

1. Press and hold the **line button** and then momentarily press the **IC button**.
   Three (3) different displays are available with each press of the IC button:
   - While pressing the **line button**, press the IC button once.
     The IP Address and Mask Address of the unit displays.
   - Continue to hold the **line button**, then press the IC button a second time.
     The TX alignment tones are turned ON.
   - Continue to hold the line button, then press the **IC button** a third time.
     The RX VU meter displays.
2. Press the **IC button** a fourth time to clear the display.
   The LCD display returns to the normal.
3. Release the **line button**.

Line Button

The **Line** button is used to select which radio, or line, the handset audio is routed to and which line is being monitored. The handset line selection is displayed as an asterisk (*) in the right most column of the LCD display. An asterisk (*) on the top line of the display indicates a connection to line 1, and an asterisk (*) on the bottom line of the display indicates a connection to line 2.

TX LED

The **TX LED** provides a visual indication the IP-223 is generating IP packets. When the LED is illuminated, packets are being transmitted to the network.

LNK LED

The **LNK LED** provides a visual indication of the Ethernet connection. When the LED is illuminated, a valid network connection is established.

Back Panel

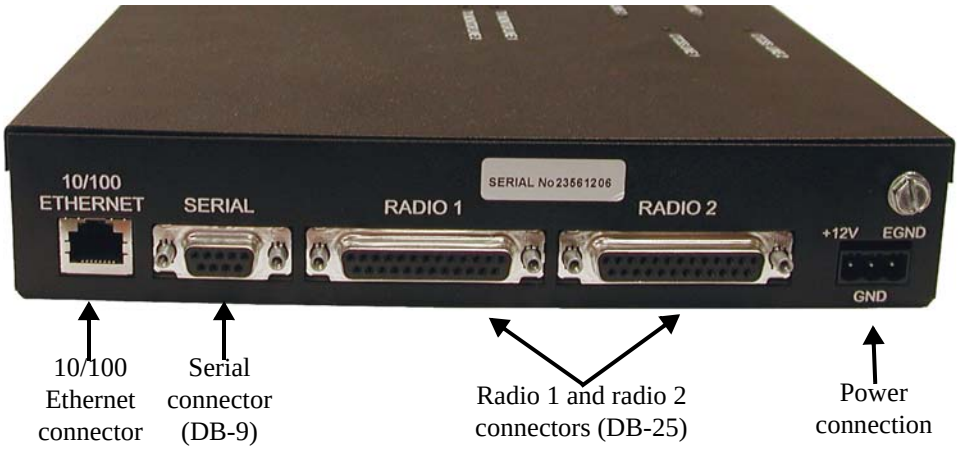


FIGURE 5. IP-223 Back Panel

10/100 Ethernet Connector

The **10/100 Ethernet** connector provides the LAN or WAN connection for the IP-223.

Serial Connector

The **Serial** connector (DB-9) is used for either of the following:

- Programming an initial IP Address into the IP-223 unit, if the IP Address cannot be programmed through the Ethernet port on the installed system.

NOTE: The jumper setting must be RS-232, to communicate with HyperTerminal.

- Providing serial communication to various radios. Both radio 1 and radio 2 are supported on this connector, with the appropriate splitter cable.

NOTE: You must adjust the position of the jumper, on J35 when using line 1, or on J26 when using line 2, according to the serial connection type for the radio interface shown below. For more information, see “Jumper Positions” on page 31.

TABLE 2. Jumper Position

Jumper position	Connection type
A	RS-232
B	TTL

TABLE 3. DB-9 Pinout

SERIAL DB-9 PINOUT			
Pin #	**Line #**	**Signal**	**Description**
1	1	RX TTL	Serial data input, TTL level. Input voltage range: +5 to 0V max.
2	1	TX 232	Serial data output, RS-232C level.
3	1	RX 232	Serial data input, RS-232C level. Input voltage range: ±25V max.
4	2	TX TTL	Serial data output. TTL level.
5	Both	GND	Ground.
6	2	RX TTL	Serial data input, TTL level. Input voltage range: +5 to 0V max.
7	2	RX 232	Serial data input, RS-232C level. Input voltage range: ±25V max.
8	2	TX 232	Serial data output, RS-232C level.
9	1	TX TTL	Serial data output, TTL level.

Radio 1 and Radio 2 Connectors

Two (2) **DB-25** connectors are provided for connection to various audio devices. The pinouts shown in Table 4 are used when custom cables need to be fabricated.

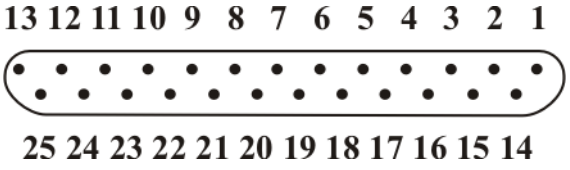
Power Connection

The IP-223 requires +12 to +16VDC, ~700mA of clean power. A 3-pin screw terminal receptacle is provided on the right rear of the unit. Pin 1 is the positive terminal, pin 2 is the ground terminal, and pin 3 is the earth ground terminal.

As with all communication equipment, earth ground should be used. Earth ground is a low impedance path to the earth for the purpose of discharging lightening, static, and radiated energy.

TABLE 4. DB-25 Connector Pinout Connections

Pin #	Name	Description
1	PTT N.C.	Relay contact closure, rated at 1A at 125Vac.
2	PTT Common	Relay contact closure, rated at 1A at 125Vac.
3	MON N.O.	Relay contact closure, rated at 1A at 125Vac.
4	R1 N.C.	Relay contact closure, rated at 1A at 125Vac.
5	R1 Common	Relay contact closure, rated at 1A at 125Vac.
6	R2 N.O.	Relay contact closure, rated at 1A at 125Vac.
7	GND	Ground.
8	DIG0	Software configurable input/output. Output mode: open collector, active low, 200mA maximum, 40V collector to emitter voltage. Input mode: 10K Ohm pull-up to +5V to +12V, jumper selectable.
9	DIG2	Same as Pin 8.
10	DIG4	Same as Pin 8.
11	CTCSS	29mVp-p to 10Vp-p adjustable audio output, AC coupled
12	RX-	10mVp-p to 10Vp-p, adjustable.
13	TX-	10mVp-p to 10Vp-p for microphone level or -40 to +10dBm into 600 Ohm load, adjustable. 600 Ohms for balanced mode, 200 Ohms for single ended mode.
14	PTT N.O.	Relay contact closure, rated at 1A at 125Vac.
15	MON N.C.	Relay contact closure, rated at 1A at 125Vac.
16	MON Common	Relay contact closure, rated at 1A at 125Vac.
17	R1 N.O.	Relay contact closure, rated at 1A at 125Vac.
18	R2 N.C.	Relay contact closure, rated at 1A at 125Vac.
19	R2 Common	Relay contact closure, rated at 1A at 125Vac.
20	DIG6	Same as Pin 8.
21	DIG1	Same as Pin 8.
22	DIG3	Same as Pin 8.
23	DIG5	Same as Pin 8.
24	RX+	10mVp-p to 10Vp-p, adjustable. Input impedance is jumper selectable to 10K Ohms, 600 Ohms or 8 Ohms.
25	TX+	10mVp-p to 10Vp-p for mic level or -40 to +10dBm into 600 Ohm load, adjustable. 600 Ohm output impedance for balanced mode, 200 Ohm output impedance for single ended mode.
Shield	GND	Ground.



CHAPTER 2

Communications System Design

Designing an IP-223 system requires an understanding of the radio network and how the various radios and communication equipment are connected.

Design an IP-223 system by creating a roadmap of the radio, console, and any other communication equipment locations. This roadmap must include the following:

- Multicast addresses for each channel of **TX** (transmit) and **RX** (receive) communication.
- Port numbers for each channel of TX and RX communication.
- Base IP Addresses assigned to each console and IP-223 on the network.

Communications Control

Tone Remote Control

Telex sells a full line of tone control consoles and radio adaptors. This technology requires an analog connection between console and radio. Each console needing 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 not previously possible.

VoIP Radio Control

RoIP (Radio Over Internet Protocol) being a subset of VoIP is referred to as VoIP generically throughout this document. VoIP is a method of breaking analog audio up into packets that can be transferred over a computer data network. Because of the Ethernet delivers information packets, audio is generally broken into 10-40ms chunks of audio, compressed, and placed on 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, encompassed, converted back to analog, and played on available speakers.

Given the popularity of the Ethernet-based networks, many companies and agencies already have an existing network or **LAN** (Local Area Network). Beyond that, a large number of companies exist to provide **WAN** (Wide Area Network) 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 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 Ethernet can easily handle dozens of simultaneous connections, it becomes the only pipeline required for all communications.

Network Requirements

IP Operation Overview

The network options today have essentially converged on Ethernet. A local electronics store may 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 can also 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 protocols operating on the top of the Ethernet network.

Ethernet as Physical Layer

Ethernet is a network and has a low level method for transferring data from one (1) location to another. Source and destinations are based on the **MAC** (Media Access Control) which is embedded in the Ethernet interface. The MAC Address is unique for all devices in the world and cannot be changed. The **IEEE** (Institute of Electrical and Electronics Engineers) controls the allocation of the MAC Addresses. The definition for Ethernet includes requirements for inter-operation at speeds of 10 and 100 Mbps. Higher speeds are available, but generally have not filtered down into end-user equipment.

Bandwidth

Each **VoIP** (Voice Over Internet Protocol) channel requires 50kBit of bandwidth while active. Full-duplex conversation (audio in each direction) requires 100kBit of bandwidth.

NOTE: Most radio voice communications are half-duplex (audio in only one direction at any one time), thus requiring 50kbits.

Some radio systems transmit *go-ahead* beeps when it is clear to talk. In order for the console operator to hear the beeps, the system must support full-duplex communication. Full-duplex bandwidth may only be required for the first few seconds of a conversation, due to the brief nature of the *go-ahead* beeps at the beginning of the transmission.

When using a PIB, TDI, C-6200, or the NI-223 for a telephone connection, 100kBit is required since it is a constant, full-duplex conversation.

Multicast

In general, Telex systems require **Multicast** to function. The network must be able to support the multicast traffic generated by the system.

It is common for networks to enable Multicast after an **IGMP** (Internet Group Management Protocol) join message is sent out, and then prune off branches after a period of time. Due to the intermittent usage patterns of two-way radios, a system can appear to work flawlessly for a period of time and then no longer work.

NOTE: When using Cisco technology, IP PIM dense mode is generally recommended. Generally speaking, sparse-dense-mode can also be implemented effectively. We recommend explicitly joining the multicast group with an *IP IGMP static-join X.X.X.X* command. For more information on Cisco and IGMP, visit www.cisco.com.

Internet Group Management Protocol

IGMP (Internet Group Management Protocol) can be used to control where multicast is allowed to propagate. When a console on the subnet is expected to be continually operational, multicast must be active for that subnet at all times.

Network Performance

Networks should perform well under any loading conditions. The default audio delay is 120ms, plus any delay added by the network. While delay alone does not cause issues, **variable delay (jitter)** does. Jitter in a network cannot exceed the maximum packet buffer of any individual product buffer. For example, the IP-223 can handle approximately 600ms of network jitter.

REFERENCE: Refer to the individual product manuals for these specifications.

NOTE: Losing more than 5% of the total packets transmitted compromises audio quality and system performance. Optimally, packet loss should be less than 1%.

TCP/IP and UDP/IP

TCP/IP (Transmission Control Protocol/Internet Protocol) 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 (2) computers. Being guaranteed means for every packet of information transferred from one (1)computer to another an acknowledgement packet is returned. Additional *handshaking* is utilized from the outset of the data communications to ensure 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 is not desirable for audio traffic over a network. This is where UDP/IP finds its acceptance.

UDP/IP (Universal Datagram Protocol/Internet Protocol) has its existed 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 sending the packet has no confirmation 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 ignores the small chunk of lost audio. The largest single factor in the loss of UDP/IP packets is network design and loading. UDP applications use algorithms which makes the loss of information the largest single factor in UDP/IP network design and loading. As long as a network is well designed with capacity for all of its chartered requirements, packet loss can be a non-issue. Because of its lower overhead and its ability to Multicast, UDP/IP is the protocol of choice for VoIP development.

Multicast UDP/IP

Multicast is an extension to UDP/IP. It enables one (1) computer to broadcast data packets to 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 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 reduces 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 uses the bandwidth times the number of monitoring consoles, a single data stream is generated and monitored by all.

Implementation of a Multicast protocol requires a few things for seamless use on a network. First, clients must all support the protocol. This is accepted as given since all Telex products utilize Multicast for audio communications. Second, consider if the network infrastructure supports Multicast.

CHAPTER 3

Installation and Level Settings

Local Radio Connections

NOTE: Connections to radios differ from connections for remote operation; therefore connections are discussed separately.

Jumper Positions

An example of the **jumper positions** are shown in Figure 6. In the figure, jumper 14 (J14) is shown in position A, jumper 3 (J3) is shown in position B, and jumper 23 (J23) has been placed on the center pin indicating the jumper is in the NULL position.

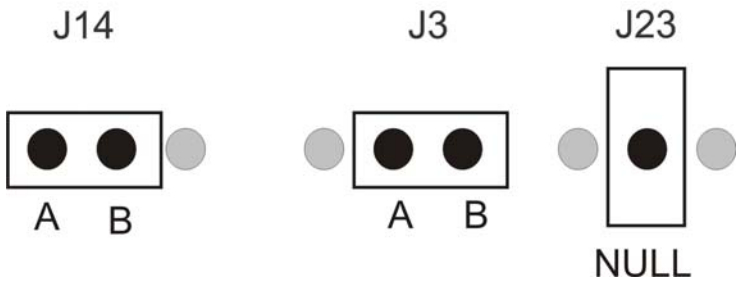


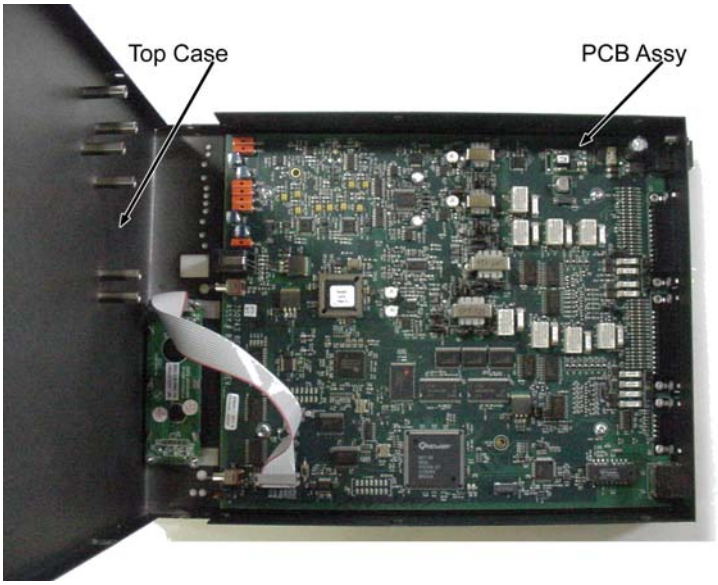
FIGURE 6. Jumper Positions

To **adjust the position of a jumper**, do the following:

1. Remove **power** from the IP-223 unit.

CAUTION: Failure to remove power may cause damage to the unit.

2. Remove the **six (6) screws** from the case top.
3. Carefully slide the **case top** forward past the IC and LINE buttons, and then **lift up** to gain access to the **PCB** (Printed Circuit Board).



4. Locate the **desired jumper** on the PCB assembly.
5. Using needle nose pliers, adjust the **jumper**, if necessary.
6. Carefully lift up the **case top** and place it into position on the chassis bottom.
7. Secure the **case top** into position using the six (6) screws.
8. Connect **power** to the IP-223 unit.
   The IP-223 is ready to configure for Local mode.

TX Audio Connection

Different jumper settings are required for different revisions of the PCB installed in the IP-223 unit. Set the jumper position for the line according to the connection type.

- If the radio transmit audio output is balanced, connect to pins 13 and 25 of the DB-25 connector.
- If the transmit audio is single ended, use pin 25 of the DB-25 connector.

NOTE: Shielded cable is recommended.

PCB 750743 or PCB 750630 Revision C and Higher

Line 1 jumpers: J3, J9, and J11

Line 2 jumpers: J25, J28, and J29

TABLE 5. PCB 750743 or PCB 750630 Revision C and Higher Jumper Positions

Jumper Position	Connection Type
A	Single Ended Low-Impedence
B	Balanced 600 Ohm

RX Audio Connection

Different jumper settings are required for different revisions of the PCB installed in the IP-223 unit, to connect the radio receiver audio to the IP-223. Set the jumper position for the line according to the connection type.

- If the radio receiver audio output is balanced, connect to pins 12 and 24 of the DB-25 connector.
- If the receiver audio is single ended, use pin 24 of the DB-25 connector. The audio source must follow the squelch circuit to prevent sending continuous noise to the remote console.
- If a high-impedance point in the receiver is used, a shielded cable is recommended.

PCB 750743 or PCB 750630 Revision C and Higher

Line 1 jumpers: J16 and J21

Line 2 jumpers: J19 and J20

TABLE 6. PCB 750743 or PCB 750630 Revision C and Higher Jumper Positions

Jumper Position	Connection Type
A	Single Ended Low-Impedence
B	Balanced 600 Ohm

TABLE 7. RX Impedance Jumper Positions - 2-Wire

	Jumper Position	
	Line 1	Line 2
Receive Input Impedance:	**J14**	**J24**
8 Ohms (for a speaker input)	B	B
600 Ohm	A	A
10k Ohm	NULL	NULL

NOTE: When the speaker output is used, the radio volume control affects the audio levels of the IP-223.

TABLE 8. RX Impedance Jumper Positions - 4-Wire

	Jumper Position			
	Line 1		Line 2	
Receive Input Impedance:	**J14**	**J23**	**J17**	**J24**
8 Ohms (for a speaker input)	B	A	A	B
600 Ohm	A	B	B	A
10k Ohm	B	B	B	B

COR I/O

The **COR** (Carrier Operated Relay) **I/O** (Input/Output) connection indicates audio is being received from the radio. The COR I/O connection is provided at DIG6, pin 20 of the DB-25 connector.

PTT Connection

Connect the radio **PTT** circuit to the PTT relay contact terminals on the DB-25 connector. Usually the common of the relay contact switch is grounded and the normally open contact connects to the PTT input. An alternative method to ground the common of the relay internal to the unit is to jumper R377 (line 1) and R381 (line 2) with a piece of wire soldered closed.

Monitor Connection

Connect the radio **MON** circuit to the MON relay contact terminals on the DB-25 connector. Usually the common of each relay contact switch is grounded and the normally open contact connects to the MON input. An alternative method to ground the common of the relay internal to the unit is to jumper R376 (line 1) and R380 (line 2) with a piece of wire soldered closed.

R1 and R2 Relays

The IP-223 provides two (2) **relay closures** for controlling the frequency of the radio, or switching a remote ancillary device. The F1 and F2 contacts can be connected through the DB-25 connector. Usually the common of each relay contact switch is grounded and the normally open contact connects to the radio frequency control terminals. Information on programming the R1 and R2 relays is provided in the “Setup Information” chapter of this manual starting on page 45.

An alternative method to ground the common of the internal relay R1 is to jumper R375 (line 1) and R379 (line 2), and for relay R2 jumper R374 (line 1) and R378 (line 2) with a piece of wire soldered closed.

Digital I/O

In addition to the two (2) standard relay closures, seven (7) lines of digital I/O are also included. These lines are open-collector transistor outputs. They can be programmed on a per line basis to generate any of 128 combinations. They pull down to ground and can be jumper selected to pull up to either +5V or the power supply voltage (minimum +12V).

Jumpers J8 (line 1) and J30 (line 2) are used to select the pull up voltage. Jumper position A pulls up to +5V and jumper position B pulls to the power supply value.

NOTE: Some radios provide a pull-up voltage. When this occurs, place the jumper into the null position. Information on programming the digital I/O lines is provided in the “Setup Information” chapter of this manual starting on page 45.

CTCSS Connection

The IP-223 connection can be used for a recorder output or as a **CTCSS** (Continuos Tone Coded Squelch System) output:

Recorder output - The analog audio is generated at the connection.

CTCSS output - Each function tone can be assigned a CTCSS number which corresponds to a CTCSS frequency. See “CTCSS Tone Frequency Table” on page 151.

Tone and Console Operation

Tone and Console operation require jumpers set to specific locations. For more information, see “Jumper Positions” on page 31.

2-/4-Wire Jumper Settings

TABLE 9. 2- and 4-Wire Jumper Settings

2-Wire / 4-Wire Selection:	Line 1	Line 2
2-Wire A position	J33 and J34	J5 and J6
4-Wire B position	J33 and J34	J5 and J6

The RX termination J14 (line 1) and J24 (line 2) should be placed in jumper position A on 4-wire systems for a single unit at the end of a line. If multiple units are connected in parallel, only one (1) unit should have the RX termination jumper in the A position. The RX termination jumper should be in the null position on the rest of the units.

For 2-wire operation:

- **PCB 750743 or PCB 750630 revision C and higher** - Set J14 or J24 to the NULL position.

TX Side Settings

PCB 750743 or PCB 750630 revision C and higher

Two (2) jumpers on the transmit pair allow a degree of control over the output impedance. The jumper positions for each line, depending on how many consoles are placed in parallel.

NOTE: PCB 750630 revision A does not have these jumpers.

TABLE 10. PCB 750743 or PCB 750630 Revision C and Higher

Jumper Position					
	Line 1		Line 2		
Consoles in Parallel:	**J17**	**J22**	**J10**	**J15**	**Output Impedance**
1	B	B	B	B	600 ohms
2	A	B	A	B	1200 ohms
3	B	A	B	A	1800 ohms
4	A	A	A	A	2400 ohms

Local PTT I/O

The **Local PTT I/O** is used to generate TX Ethernet traffic on a system in local mode as opposed to the 2175Hz detection on a system in tone mode. The input is at DIG5; pin 23 of the DB-25 connector. The TX condition is caused by an active low.

Cross Mute I/O

Cross Mute I/O information to local consoles is provided at DIG0, pin 8 of the DB-25 connector.

Supervisory I/O

Supervisory I/O information to and from consoles is provided at DIG1, pin 21 of the DB-25 connector. The supervisory I/O is both an input and an output.

Supervisory input and output in console, tone or local mode behaves as follows:

Console Mode - Input - An Ethernet packet supervisor is sent on detection.
Output - When an Ethernet packet is received, the line level is set.
While under supervisory control, TX traffic from the Ethernet to the console is muted. The console's audio to the Ethernet is muted. The handset PTT and the IC button are disabled.

Tone Mode - Input - An Ethernet packet supervisor is sent on detection.
Output - When an Ethernet packet is received, the line level is set.

Local Mode - Input- No affect on I/O.
Output - No affect, when Ethernet packet is received.
While under control, manual PTT and the IC button are disabled.

NOTE: For information on programming the supervisory I/O, see "Setup Information" on page 45.

Level Adjustments

Once the IP-223 unit is connected to the system, the level potentiometers can be set. Access to test and adjustment points on newer versions of the IP-223 are provided through labeled openings on the case top and on the front panel of the unit. On older versions of the IP-223, access to some of the test and adjustment points is provided through labeled openings on the front panel; however, the case top needs to be opened to access the other test and adjustment points.

General Alignment

The IP-223 has a TX alignment tone and an RX alignment VU, meter accessible from the front panel of the unit.

- Press and hold the **line button** and then momentarily press the **IC button** two (2) times to generate the 1kHz 0dB TX alignment tone on both lines.
- Press and hold the **line button** and then momentarily press the **IC button** three (3) times to display the RX VU meters.

Radio TX

The **Radio TX** test points (TP2 and TP6) and the **Radio 2 TX** test points (TP8 and TP9) are located on the front panel of the IP-223. These points provide a point to measure the actual signal being placed into the radio or balanced TX line. The front panel accessible adjustment Radio 1 TX potentiometer (R47) and Radio 2 RX potentiometer (R61) are used to adjust these levels.

NOTE: If the unit is placed into single-ended mode, the Radio TX+ should be measured with respect to ground.

It is also possible to place jumper J9 (line 1) or J27 (line 2) into the *A* position to decrease the output of the TX line by a factor of 10. The final adjustment should allow for undistorted audio to be transmitted for the full range of transmission levels at the desired deviation. This can be accomplished by turning on the TX alignment tone and adjusting the TX output to 0dB, as measured into a 600 ohm load.

Radio RX

Standard Alignment Procedure for a 2- or 4-wire System:

- Inject a 0dBm test tone on the RX pair (4-wire pins 12 and 24: 2-wire pins 13 and 25).
- Measure the RX level on test point TP13 for line 1 or TP1 for line 2.
- Adjust potentiometer R175 for line 1 or potentiometer R110 for line 2 until 0dBm is measured between the test point and GND. (*0dBM = 2VPP = .707VRMS*).
- Detune slightly 1-2dBm to provide overhead for large transients.
- **AGC** (Automatic Gain Control) compression potentiometers RV5 for line 1 and RV1 for line 2 control the aggressiveness of the AGC circuitry, if enabled. The AGC can be used to enhance the gain capabilities of the RX circuitry. Set RV5/RV1 fully clockwise and, if required, back off 10 to 15 degrees maximum.
- Use the RX alignment tool (VU meter) accessed through the LCD display to verify the dBm level. See “General Alignment” on page 36. The reading should be 0dBm with the AGC turned off. If the AGC is ON, it is likely the RX alignment software always displays 0dBm, the targeted level for the AGC circuitry.

Line TX Monitor Level - Tone and Console Mode

PCB 750743 or PCB 750630 revision C and higher

The **Line TX Monitor Level** adjustment is used when the IP-223 is connected to consoles set in 4-wire mode. This allows for local TX audio to be sent back on the network and played at other consoles so both sides of the radio traffic can be heard. The alignment for TX monitor is similar to 4-wire RX alignment.

To **adjust the TX monitor**, do the following:

1. In the options section of the Per Line Setup window, select the **TX Monitor**.

   NOTE: If this feature is not necessary, or the line is in 2-wire mode, the TX Monitor field in the Options section on the Per Line Setup window should be cleared.

2. Verify the **RX alignment is completed first**.

To **perform a standard alignment for a 4-wire system**, do the following:

1. Transmit a **0dBm** t**est tone** on the TX audio pairs pins 13 and 25.
2. Measure the **RX level** on test point TP13 for line 1 or TP1 for line 2.
3. Adjust **potentiometer R390 for line 1** or **potentiometer R391 for line 2** until 0dBm is measured between the test point and GND (*0dBM = 2VPP = .707VRMS*).

NOTE: Do not adjust the RX potentiometers.

4. Use the **RX alignment tool (VU meter)** accessed through the LCD display to verify the dBm level.

CTCSS Level

The **CTCSS level** is measured by connecting an oscilloscope or RMS meter to ground and Radio 1 CTCSS test point (TP7) or Radio 2 CTCSS test point (TP10). With the radio connected to the CTCSS output, have the remote console open to receive audio so CTCSS is present. Adjust the Radio 1 CTCSS potentiometer (R50) or Radio 2 CTCSS potentiometer (R53) until the desired level is achieved.

Frequency Decoding

The IP-223 is factory tuned to the frequencies shown in Table 11. The detection frequencies cannot be changed as they are coded into the software. However, any actual function or output can be made to work with any existing programmed frequency. Please consult the factory for special requirements for frequency selections.

Guard tone/PTT Tone: 2175 Hz

MON Function Tone: 2050 Hz

Frequency Select Function Tones (where used)

TABLE 11. Factory Set Frequencies

F1: 1950 Hz	**F5**: 1550 Hz	**F9**: 1150 Hz	**F13**: 750 Hz
F2: 1850 Hz	**F6**: 1450 Hz	**F10**: 1050 Hz	**F14**: 650 Hz
F3: 1750 Hz	**F7**: 1350 Hz	**F11**: 950 Hz	**F15**: 550 Hz
F4: 1650 Hz	**F8**: 1250 Hz	**F12**: 850 Hz	**F16**: 450 Hz

CHAPTER 4

Update Firmware

Update Firmware

Telex VoIP Hardware firmware can be updated using **TSM** (Telex System Manager). A copy of TSM is available on the CD included in the shipment with the VoIP hardware.

NOTE:

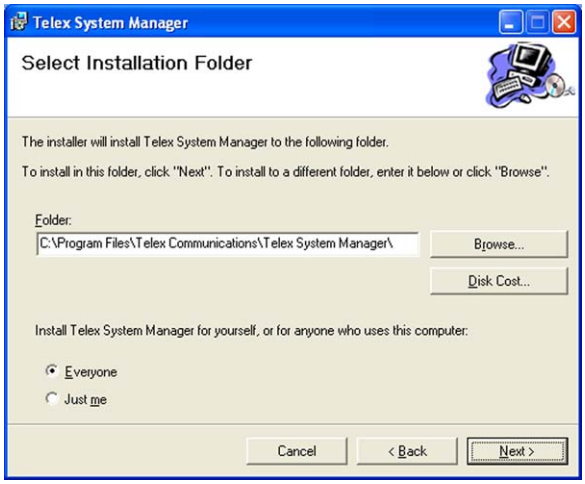
- VoIP hardware includes the following Telex devices: IP-223, IP-2002, IP-1616, C-6200 and NEO-10.
- TSM uses .tfb (Telex Firmware Binary) files to update VoIP firmware.

Install TSM

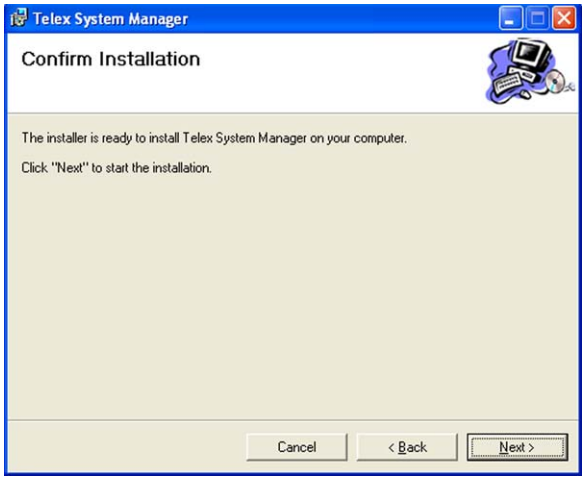
To **install TSM**, do the following:

1. Locate the **setup.exe file** on the Telex CD.
   OR
   Download **TSM** from www.telexradiodispatch.com.

   NOTE: For more information, see “Download Telex Firmware” on page 41.
2. Double-click **setup.exe**.
   The Telex System Manager install window appears.
3. Click **Next**.
   The Select Installation Folder window appears.



4. To specify an installation path for TSM, click **Browse**.
   OR
   To accept the default folder location, leave the **path** entered in the Folder field
   By default, TSM is installed at **C:\Program Files\Telex Communications\Telex System Manager**.
5. To allow any user to access TSM, select **Everyone**.
   OR
   To allow only one user to access TSM, select **Just Me**.
6. Click **Next**.
   The Confirm Installation window appears.
7. Click **Next**.
   A Please Wait message appears. Once TSM is installed, a success message appears on the Confirm Installation window.
8. Click **Close**.



Download Telex Firmware

When new firmware becomes available it is posted to our website. It can be downloaded at www.telexradiodispatch.com. Check the website periodically for updated firmware.

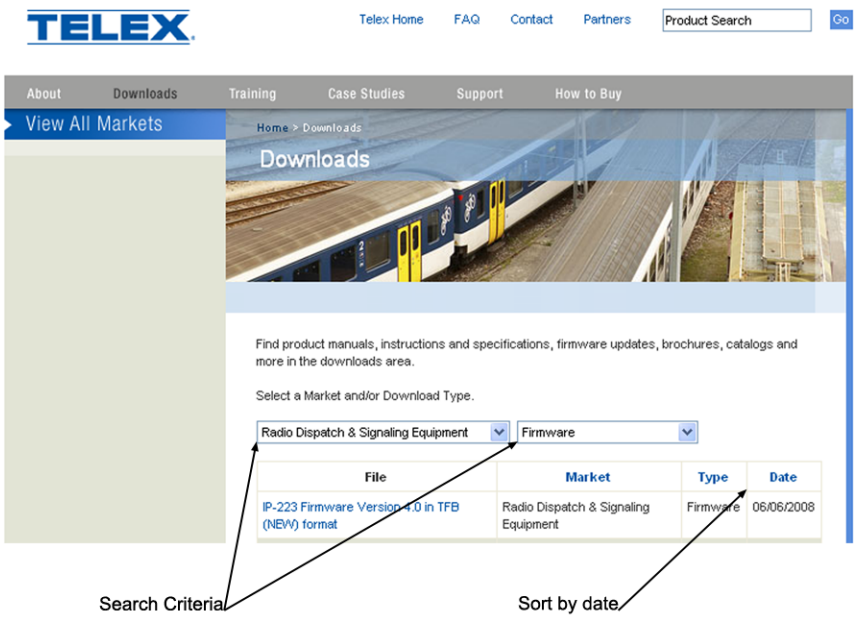


FIGURE 7. Telex Website Firmware Downloads.

To **download updated firmware**, do the following:

1. Set the search criteria to **Radio Dispatch & Signaling Equipment** and **Firmware,** see Figure 7.
2. To sort the files by date, click the **Date column heading**.
3. Locate the **updated firmware file** for your device.
4. Click the **filename**.
   The File Download window opens.
5. Save the **file** to your computer.

Update Firmware Tool Window

The **Update Firmware Too**l window, shown in Figure 8, is used to upload the newest version of firmware to the device selected in the Destination field.

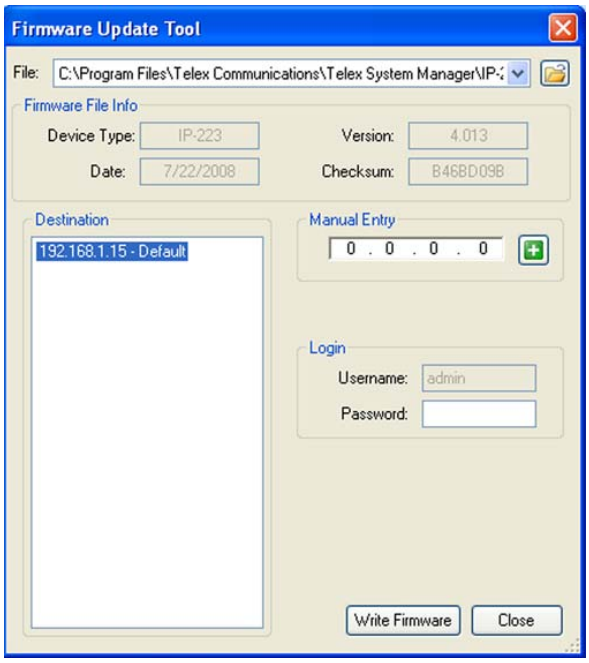


FIGURE 8. Firmware Update Tool

File Field

The **File** field is used to select a firmware file to upload to the VoIP hardware.

Firmware File Info Group Box

Device Type Field

The **Device Type** field displays the type of device supported by the currently selected file in the File field.

Firmware Version Field

The **Firmware Version** field displays the currently selected file's firmware version.

Left Navigation Pane

The **Left Navigation Pane** displays all detected devices from the main dialog's Device list with device types that match the currently selected firmware files. Manually entered IP Addresses also appear in the navigation pane. Once the device is added, it appears in the left navigation pane and is available for selection.

NOTE: If the device you are updating does not automatically appear in the navigation pane, manually enter the IP Address in the Manual Entry field.

Manual Entry Field

The **Manual Entry** field is used to enter the VoIP hardware's IP Address to add to the left navigation pane.

Login Group Box

Username Field

The **Username** field is used to enter the administrator's username.

This field can contain up to *16 lowercase characters*.

NOTE: When updating firmware, *admin* is the only user who can update the firmware.

Password Field

The **Password** field is used to enter the administrator's password, if one is required.

Write Firmware Button

The **Write Firmware** button is used to begin the upload process. Once the button is selected, the file specified in the File field is uploaded to the VoIP hardware.

Close Button

The **Close** button is used to close the window.

Upload VoIP Hardware Firmware

Once TSM is installed and your new .tfb file is downloaded, you are ready to upload the VoIP hardware's firmware.

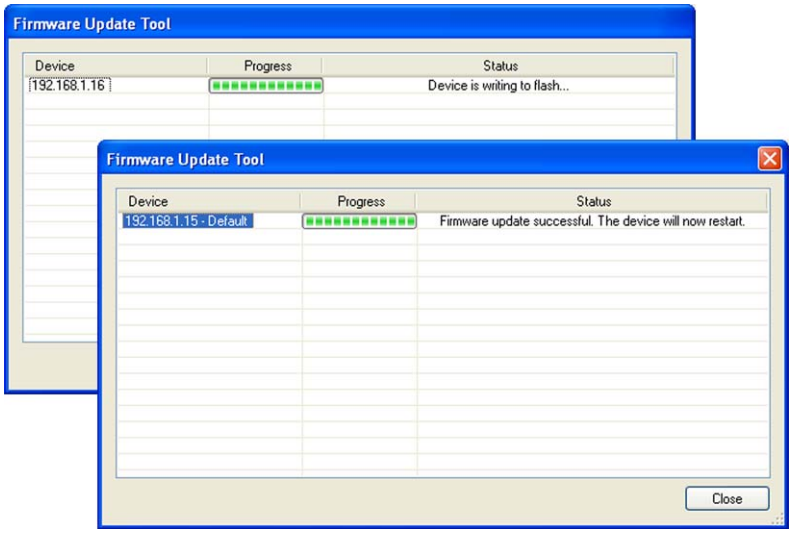
To **upload the VoIP hardware's firmware**, do the following:

1. Click the **TSM shortcut** on your desktop.
   OR
   From your taskbar, click **Start|Programs|Telex Communications|Telex System Manager**.
   The Telex System Manager window opens.
2. Click **Tools|Firmware Update**
   The Firmware Update Tool opens.
3. To locate the .tfb file for upload, click the **folder icon**  .
   The Open window appears.
4. Select the.**tfb file** you want to upload.
   The file is highlighted.
5. Click **Open**.
   The selected file appears in the File field.

   NOTE: If the device does not appear in the list, enter the **VoIP hardware's IP Address** in the Manual Entry field and click the **Add** button.  *The IP Address appears in the left navigation pane.*
6. In the left navigation pane, select the device's **IP Address**.
   The Write Firmware button is active.
7. Click the **Write Firmware** button.
   Firmware update messages are shown in the Status column which provides feedback on the firmware update progress. Once the progress reaches 100%, the firmware is updated.

   NOTE: If an error occurs, the Progress column is reset and an error message appears in the Status column.

NOTE: Once the firmware is uploaded, the device resets.



8. Click **Close**.
   The dialog window closes.
9. Click **Close**.

To **access the webpage directly from the Firmware Update Tool window**, do the following:

1. Right-click the device's **entry**.
   The Flyout menu appears.
2. From the context menu, click **Webpage**.
   The Connect To window opens.
3. In the User Name field, enter a **user name**.
4. In the Password field, enter a **password**.
5. Click **OK**.
   The Web Browser's Configuration Welcome window opens.

CHAPTER 5

Setup Information

The setup information for the IP-223 is accessed by using a web browser configuration window, such as Microsoft[1] Internet Explorer. This chapter includes information on setting the IP Address, accessing the IP-223 web setup windows, the setup window standards, and an explanation of the fields on each window used to configure the IP-223.

Setting the IP Address Information

Before entering the setup information for the IP-223, the **IP Address** and **Subnet Mask** must be assigned to the IP-223 by the use of a web browser or Windows HyperTerminal if the assigned IP Address is not accessible on your network. Contact your network administrator to obtain the network IP Address, Subnet, and Mask.

For the IP-223 to interface successfully with the LAN or WAN, the IP Addresses of the IP-223 and your PC must be on the same subnet. IP Addresses consist of four (4) numbers separated by periods. For example, 10.2.99.101. For more information on IP Addresses and subnets, consult your network administrator.

In order for the PC and the IP-223 unit to communicate via IP, both devices need to be in the same subnet.

NOTE: For operation on different subnets, a gateway address must be configured.

An example of IP Addresses residing in the same subnet:

PC IP Address - 10.2.99.250

IP-223 IP Address - 10.2.99.251

IP-223 Network Mask - 255.255.255.0

1. *See “Copyright Notice” on page 2.*

To **display the IP Address and Network Mask assigned to the IP-223**, do the following:

1. Connect **power** to the IP-223.
   The IP Address and subnet mask are displayed on the LCD momentarily upon power up.
2. Press and hold the **line button** on the front panel of the IP-223, and then momentarily press the **IC button**, to check the IP Address and subnet mask at any other time,.
   The IP Address is displayed on the top line of the LCD, and the Network Mask is displayed on the bottom line of the LCD.

NOTE: Compare and verify the IP Address and Network Mask obtained from your network administrator to the addresses configured on the IP-223.

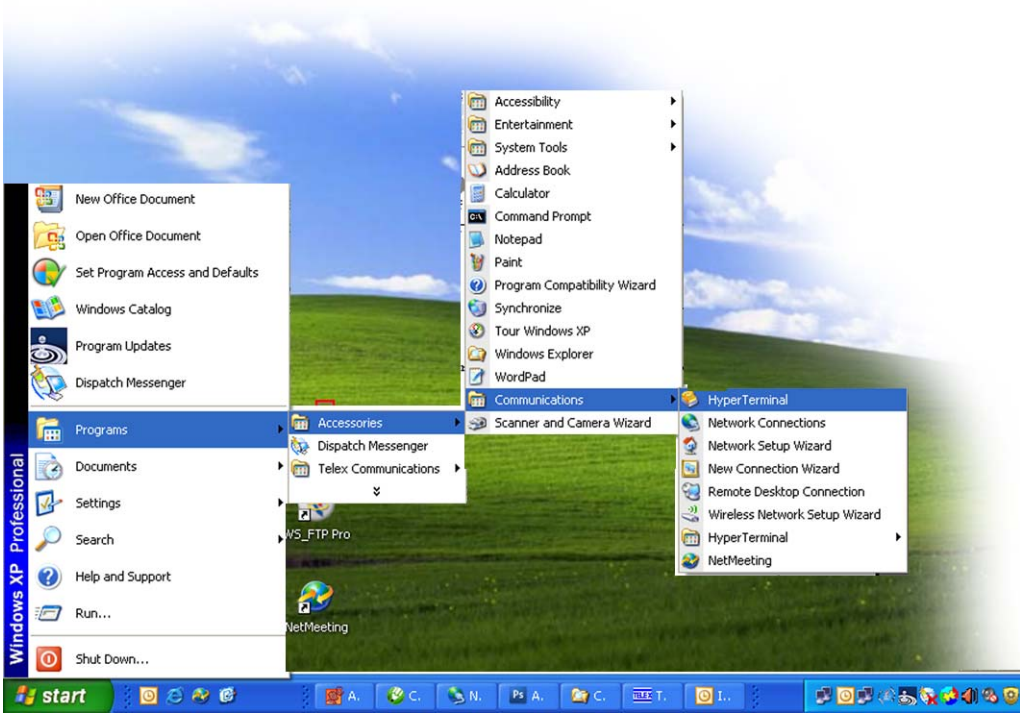
Using HyperTerminal

HyperTerminal is an alternate method to set the IP Address and Subnet Mask.

NOTE: J35 must be in the A position.

To **assign the IP Address and Network Mask using HyperTerminal**, do the following:

1. Using a DB-9 serial cable, connect the **IP-223** to your PC.
2. From the Start menu, select **Programs**.
   The Programs flyout menu appears.
3. Select **Accessories**.
   The Accessories flyout menu appears.
4. Select **Communications**.
   The Communications flyout menu appears.
5. Select **HyperTerminal**.
   The HyperTerminal and Connection Description windows open.
   OR
   If the HyperTerminal window opens, a connection to HyperTerminal is already configured.

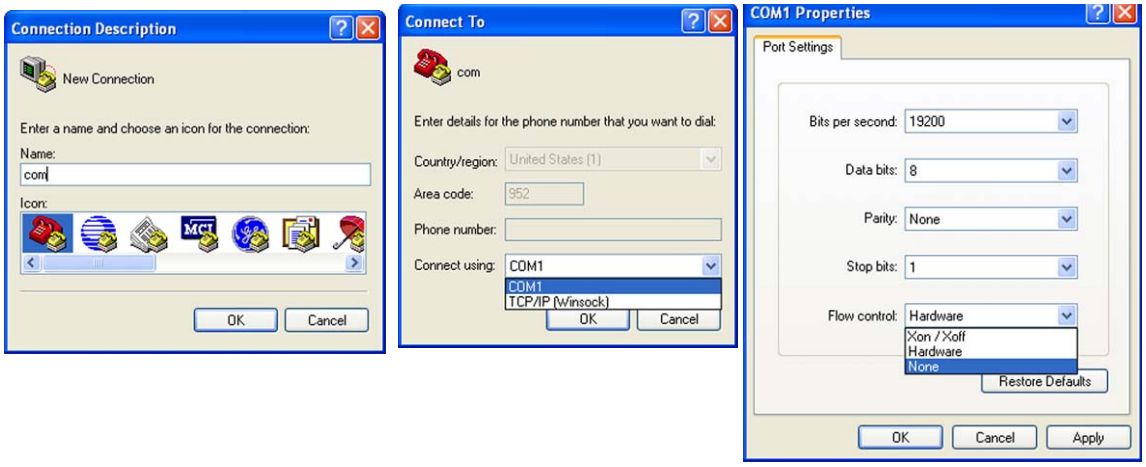


6. From the Connection window, enter **com** in the Name field.
   OR
   If the HyperTerminal window opens, proceed to **step 13**.
7. Click **OK**.
   The Connect To window appears.
8. From the Connect Using drop down menu, select **COM1**.
9. Click **OK**.
   The Com1 Properties window appears.
10. From the Bits per second drop down menu, select **19200**.
11. From the Flow Control drop down menu, select **None**

NOTE: These parameters may be different than the defaults depending on the selected Serial Port Parameters, see “Serial Port Parameters Drop Down Menu” on page 97.

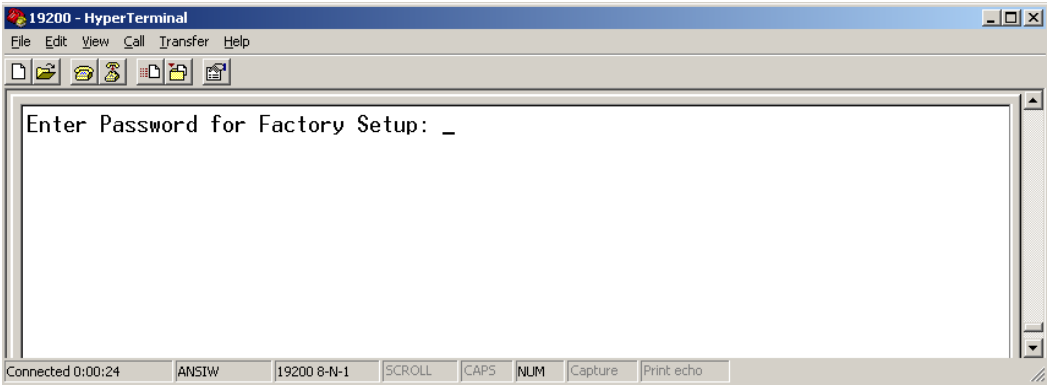
Drop down menu	Default Setting
Bits per second field:	19200
Data bits field:	8
Parity field:	None
Stop bits field:	1
Flow control field:	None

12. Click **OK**.
    The Main HyperTerminal window appears.



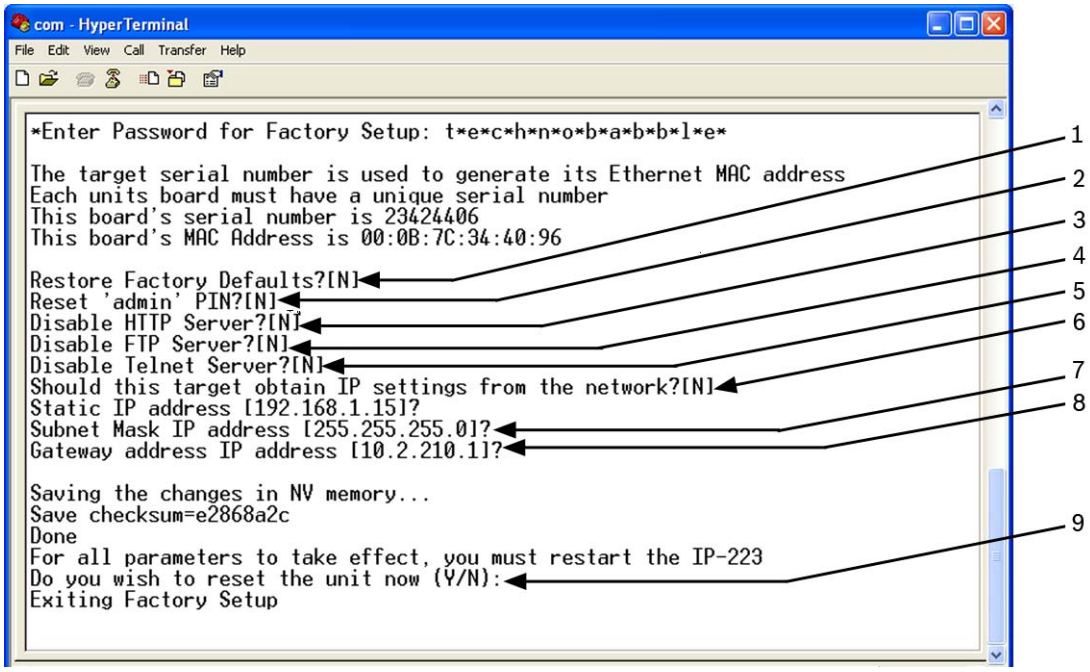
13. In the main **HyperTerminal window**, enter an uppercase **S.**

14. Press **enter**.
Enter Password for Factory Setup appears.



15. Enter **technobabble** for the factory setup password.

16. Press **enter**.
The serial port access window appears.



NOTE: The serial number is fixed and should match the case label. The **MAC** (Media Access Control) address is generated based on the serial number.

The following is a brief explanation of the factory setup options:

1 - Provides the ability to reset the unit's parameters back to the factory defaults.

2 - Allows the admin PIN to be reset.

3 - Prevents the unit from starting the HTTP server[1].

4 - Prevents the unit from starting the FTP server[2].

5 - Prevents the unit from starting the Telnet server[3].

6 - Allows the unit to get an IP Address via DHCP, or to manually set the IP Address.

7 - Allows the Subnet Mask to be manually entered or changed.

8 - Allows the Gateway Address to be manually entered or changed.

9 - Provides the ability to reset the unit back to the default.

17. When *Restore Factory Defaults* appears, enter **Y** to reset the board parameters, otherwise enter **N**.
18. Press **Enter**.
19. When *Reset 'admin' PIN* appears, enter **Y** to reset the board's password number to none, otherwise, enter **N**.
20. Press **Enter**.
21. When *Disable HTTP Server* appears, enter **Y** to disable the HTTP server, otherwise, type **N**.
22. Press **Enter**.
23. When *Disable FTP Server* appears, enter **Y** to disable the FTP server, otherwise, enter **N**.
24. Press **Enter**.
25. When *Disable Telnet Server* appears, enter **Y** to disable the Telnet server, otherwise enter **N**.
26. Press **Enter**.
27. When *Should this target obtain IP settings from the network* appears, enter **Y** to obtain the IP settings from the network, otherwise, enter **N**.
28. Press **Enter**.
29. When *Static IP address* appears, enter the **IP Address** of the IP-223, if necessary.
30. Press **Enter**.
31. When *Subnet Mask IP address* appears, enter the **Subnet Mask IP Address**, if necessary.
32. Press **Enter**.
33. When *Gateway address IP address* appears, enter the **Gateway IP Address**, if necessary.
34. Press **Enter**.
35. When *Do you wish to reset the unit now* appears, enter **Y** if changes were made on the window, otherwise enter **N**.
36. If changes were made on the window, press **enter** to reset the IP-223, otherwise proceed to the next step.
    The changes made are saved to memory.
37. Close the **HyperTerminal program**.

1. *The IP-223 web configuration windows can not be accessed if the HTTP server is disabled.*
2. *The IP-223 firmware can not be upgraded if the FTP server is disabled.*
3. *The IP-223 can not be debugged if the Telnet server is disabled.*

Accessing IP-223 Web Browser Configuration Windows

Before connecting the IP-223 to the web browser, an IP Address compatible with an existing network must be set. Details on setting the IP Address and Network Mask are described earlier in “Setting the IP Address Information” on page 45.

The configured IP Address is the web browser address (http://[IP Address]) used to access the IP-223 Web Setup windows.

To **access the IP-223 web setup windows**, do the following:

1. Open a **web browser** on the PC.
2. In the web address bar, enter the **IP Address** of the IP-223.
   The Connect to [IP Address] window appears.

3. From the User Name drop down menu, type ***admin*** or the **Username**.
4. In the Password field, enter the appropriate **Username password**.

   NOTE: If this is the first time the IP-223 has been started and a password has not been assigned to the unit, no entry is required.

5. Click **OK**.
   The Welcome window appears.

IP-223 Web Setup Windows Standards

Links

Across the top of each setup window are **links** used to access the various IP-223 configuration pages. On the left side of the links header, the name assigned to the unit, the MAC address, and the version number of the firmware are displayed.

FIGURE 9. IP-223 Links

TABLE 12. IP-2002 Links

Link	Description
	Displays the “Welcome Window” on page 53.
	Displays the “Basic Ethernet Setup Window” on page 55.
	Displays the “General Gain Setup Window” on page 59.
	Displays the “Multicast Address Setup Window” on page 65.
	Displays the “Per Line Setup Window” on page 76.
	Displays the “Save to EEPROM Window” on page 117.

TABLE 12. IP-2002 Links

Account Setup	Displays the “Account Setup Window” on page 119.
Additional Feature	Displays the “Additional Feature Setup Window” on page 133.
Clone Console	Displays the “Clone Console Window” on page 135.
CRP Setup	Displays the “Crosspatch Setup Window” on page 136.
CRP PIN Table	Displays the “CRP PIN Table Window” on page 143.
Pass Change	Displays the “Pass Change Window” on page 146.
Tone Freq & Durations	Displays the “Tone Frequency & Durations Window” on page 147.

To **access a setup window**, do the following:

> Click the desired **link**.
The window for the selected link appears.

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

1. Click **Submit**. 

The changes are sent to the IP-223 in temporary storage.

2. Click **Save to EEPROM**. 

The Save to EEPROM window opens.

3. Click **Save Parameters**. 

Changes are now permanently saved to the IP-223 console.

Welcome Window

The **Welcome** window provides a basic description of the IP-223 operating modes and a field to enter a descriptive name for the unit. This name displays at the top of each IP-223 web setup window.

To **open the Welcome window**, do the following:

> Click the **IP-223 photo** in the upper-left corner of the window.

Console Name Field

The **Console Name** field is used to identify the currently active IP-223 system.

This field can contain up to *12 characters*.

To **name the IP-223 unit**, do the following:

1. In the Console Name field, enter the **desired name**.
2. Click **Submit**.
   The name appears at the top of the setup window.
3. Click **Save to EEPROM**.
   The Save Setup Parameters window appears.
4. Click **Save Parameters**.
   The changes made are saved to permanent memory.

Firmware Version Field

The **Firmware Version** field displays the version for the currently loaded firmware.

This field cannot be modified.

Checksum Field

The **Checksum** field is calculated from the firmware programmed in the unit.

This field cannot be modified.

Submit Button

The **Submit** button is used to temporarily save changes to the IP-223.

NOTE: Click **Submit** to save changes in temporary memory only.

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

1. Click **Submit**. 

The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

The Save to EEPROM window opens.
3. Click **Save Parameters**. 

Changes are now permanently saved to the IP-223 console.

Basic Ethernet Setup Window

The **Basic Ethernet Setup** window, shown in Figure 10, is used to configure a network connection by setting the host protocol, the IP-223 IP Address, Subnet Mask, Gateway Address, as well as setting the network time protocol and packet delay.

Serial Number Field

The **Serial Number** field displays the serial number of your IP-223. The serial number label is located on the back of the adapter box and should match the number in this field.

MAC Address

The **MAC Address** field displays the MAC Address of the IP-223.

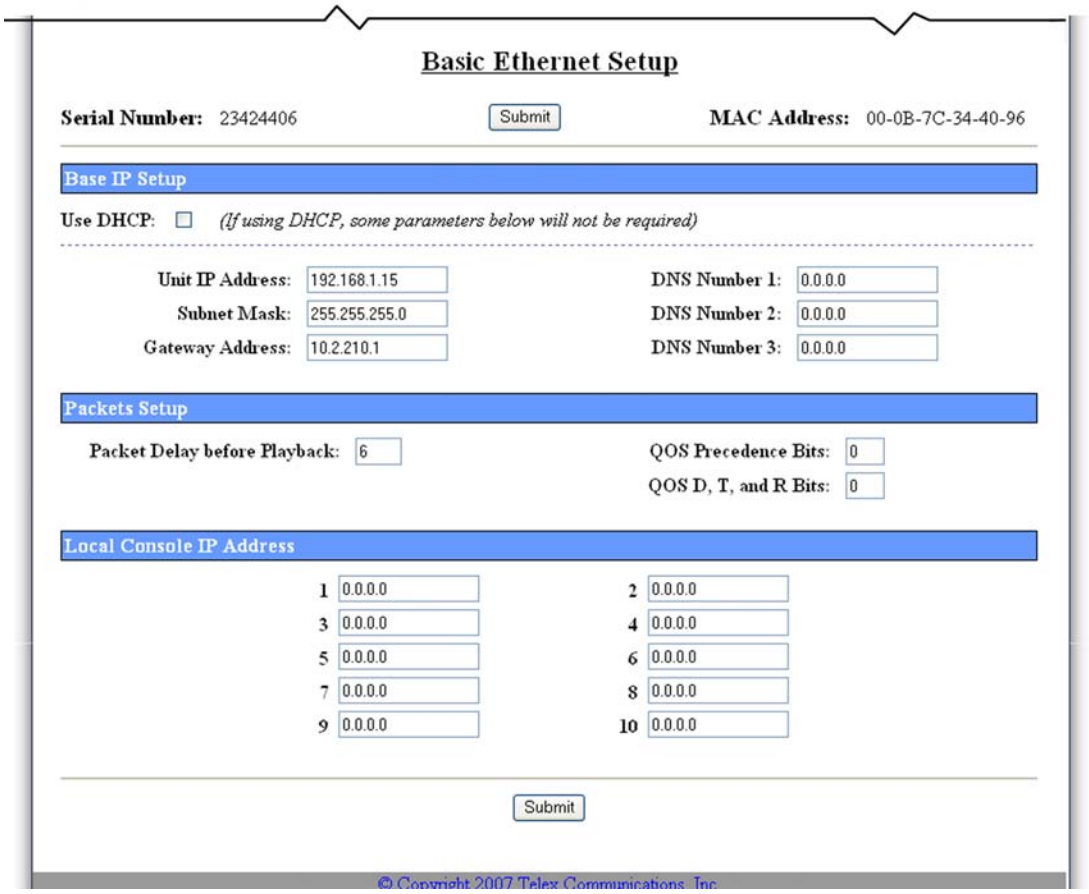


FIGURE 10. Basic Ethernet Setup Window

Base IP Setup

Use DHCP Server Check Box

The **Use DHCP Server** check box, if selected, indicates **DHCP** (Dynamic Host Configuration Protocol) is used. If selected, DHCP allows the IP-223 to acquire all of the information from the network bypassing any manual entry.

NOTE: Bosch does not recommend operating with DHCP enabled. Operating with DHCP enabled may cause the base IP Address to change unexpectedly making changes to the software setup more difficult. If employing 5/6-tone selective calling and messaging, DHCP must not be used.

Unit IP Address Field

The **Unit IP Address** field is used to enter a unique base IP Address for the IP-223. The web browser configuration uses the IP Address to identify the IP-223 for such operations as set up, software upgrades, and communications in some operating modes.

Subnet Mask Field

The **Subnet Mask** field is used to enter the Subnet Mask Address. The Subnet Mask is used to distinguish local addresses from addresses requiring the use of a gateway to reach other networks. Contact your network administrator to obtain the proper value for this field.

Gateway Address Field

The **Gateway Address** field is used to enter the Gateway Address. The Gateway Address is the IP Address for the node used to reach other networks. Contact your network administrator to obtain the proper value for this field.

DNS Number 1–3 Fields

The **DNS** (Domain Name Server) **Number 1–3** fields are currently not supported by the IP-223.

Packet Setup

Packet Delay before Playback Field

The **Packet Delay before Playback** field is used to enter a delay of audio packets before they are played. The IP-223 utilizes a 20ms **UDP/IP** (User Datagram Protocol/Internet Protocol) packet to encode audio. Some buffering of these packets must occur before playback to help absorb network delays, jitter, and lost packets.

The range for this field is *4* to *29*.

The typical entry for this field is 6, which translates to a delay of 120ms before playback (each packet is 20ms of audio). Larger values may be required for complicated networks, and smaller values for less complicated networks.

QOS: Precedence Bits Field

The **QOS:** (Quality of Services) **Precedence Bits** field is used to set the priority level of network traffic.

The range for this field is *0* to *7*.
Typically this value is set to *0* for normal traffic and *5* for voice traffic.

QOS: D, T, and R Bits Field

The **QOS: D, T and R** (Delay, Throughput, and Reliability) **Bits** field is used for advanced programming purposes. Contact your network administrator to obtain the appropriate value for this field.

Delay (D) - an active delay bit directs the router to choose a high speed to minimize delay

Throughput (T) - an active throughput bit specifies high capacity links should be used.

Routing (R) - an active routing bit directs routing protocols and network management applications to select fault-tolerant paths.

The range for this field is *0* to *7*.
Typically this value is set to *0*.

For more information on the binary equivalent for delay, throughput, and reliability, see Table 13 on page 57.

TABLE 13. D, T, R Binary Reference

Precedence Field					**D, T, and R bits**				
Binary				**Traffic Type**	**Binary**				
0	0	0	(0)	Best Effort	D	T	R		
0	0	1	(1)	Background	0	0	0	(0)	Normal (Best Effort), minimal cost
0	1	0	(2)	Standard	0	0	1	(1)	Maximize Reliability
0	1	1	(3)	Excellent Load	0	1	0	(2)	Maximize Throughput
1	0	0	(4)	Controlled Load	1	0	0	(4)	Minimize Delay
1	0	1	(5)	Video					
1	1	0	(6)	Voice					
1	1	1	(7)	Network Control					

Local Console IP Address

Local Computer IP Address Fields

The **Local Computer IP Address** fields identify the base IP Address of up to 10 IP-223 units within the same room. These fields are generally used when the selected line mode is console. The entries are used for the Ethernet crossmute function. The IP-223 examines the source of the audio and flags it if the source from one (1) of the IP-223 units listed in these fields.

To **configure the IP-223 for use**, do the following:

1. Click **Basic Ethernet Setup**.
   The Basic Ethernet Setup window appears.
2. In the Unit IP Address field, enter the **IP Address**.
3. In the Subnet Mask field, enter the **Subnet Mask Address**.
4. In the Gateway Address field, enter the **Gateway Address**, if required.
5. In the Unit Name field, enter a **descriptive name**.
6. In the Packet Delay before Playback field, enter the **number of packets** of delay for playback.

   NOTE: Each packet is 20ms of audio.
7. In the QOS: Precendence Bits field, enter the **number of bits**, if required.
8. In the QOS: D, T, and R Bits field, enter the **number of bits**, if required.
9. In the Local Computer IP Address fields, enter the **IP Addresses** of the IP-223 units located in the same room.
10. Click **Submit**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
11. Click **Save to EEPROM**.
    The Save Setup Parameters window appears.
12. Click **Save Parameters**.
    The entries are saved to permanent memory.

Submit Button

The **Submit** button, located at the bottom of each configuration window, is used to upload changes to the IP-223.

NOTE: Clicking **Submit** saves changes in temporary memory only.

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

1. Click **Submit**. 

   The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

   The Save to EEPROM window opens.
3. Click **Save Parameters**. 

   Changes are now permanently saved to the IP-223 console.

General Gain Setup Window

The **General Gain Setup** window, shown in Figure 11, is used to adjust gain levels, as required. Except for handset sidetone gain, the gains are set to 0dB, by default, and can be adjusted up or down. The IP-223 is based largely on software controlled resistors with a resolution of 1.5dB per step.

EXAMPLE: If it is determined the output level for a transmission line is 3.0dB too high, an entry of -3.0dB should be entered in the corresponding Transmit Gain field for the line.

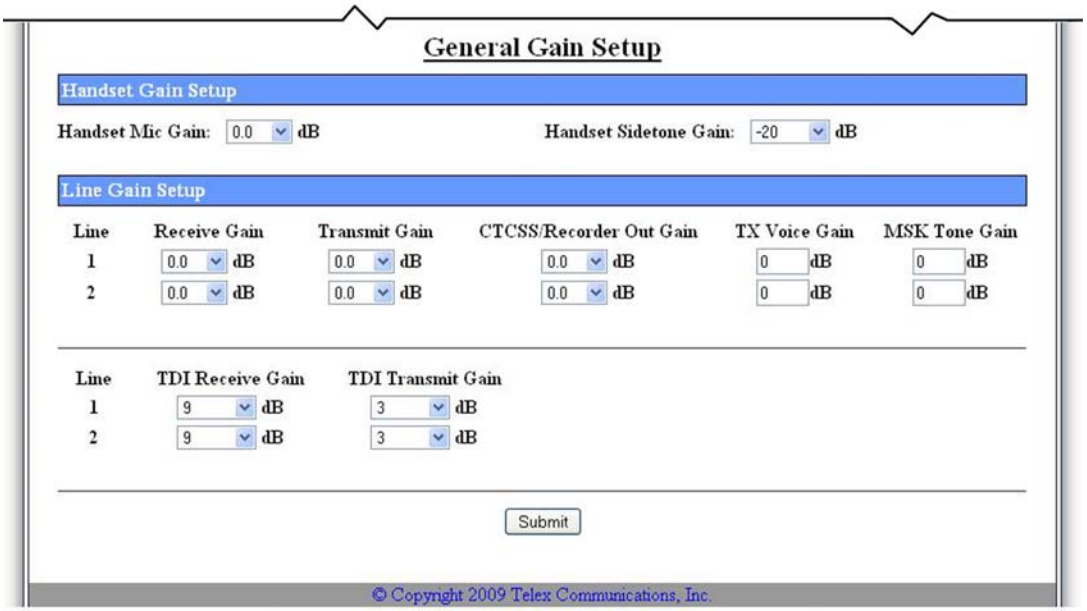


FIGURE 11. General Gain Setup Window

Handset Gain Setup

Handset Mic Gain Drop Down Menu

The **Handset Mic Gain** drop down menu is used to set the level, in dB, of gain for the handset mic.

Available selections are: *12.0, 10.5, 9.0, 7.5, 6.0, 4.5, 3.0, 1.5, 0, -1.5, -3.0, -4.5, -10.5, -16.5, -22.5, -28.5,* and *-34.5*.

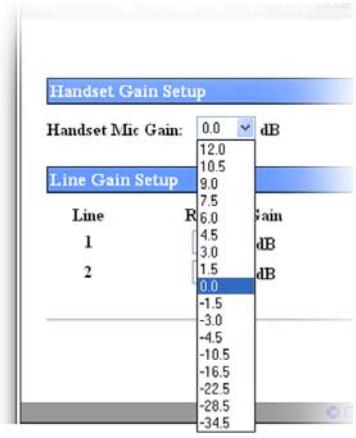


FIGURE 12. Handset Gain Setup Drop Down Menu

Handset Sidetone Gain Drop Down Menu

The **Handset Sidetone Gain** drop down menu is used to set the volume, in dB, of sidetone you hear in the handset. Sidetone is an adjustable amount of your voice signal sent back through the handset so you can hear yourself talk.

The values for this field are, *-12, -14, -16, -18, -20, -22, -24,* and *MUTE*.

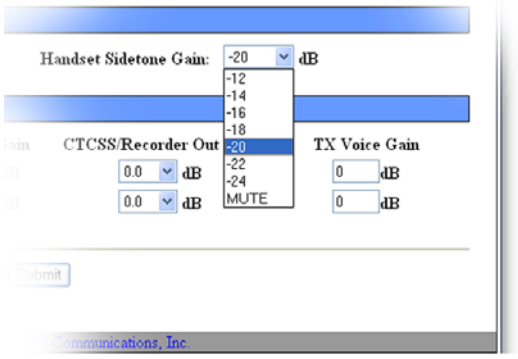


FIGURE 13. Handset Sidetone Gain Drop Down Menu

Line Gain Setup

Receive Gain Drop Down Menu

The **Receive Gain** drop down menu is used to set the gain level, in dB, for receive audio on either line 1 or line 2.

Available selections are *12.0, 10.5, 9.0, 7.5, 6.0, 4.5, 3.0, 1.5, 0, -1.5, -3.0, -4.5, -10.5, -16.5, -22.5, -28.5,* and *-34.5*.

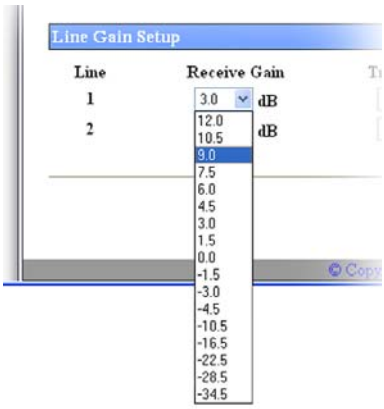


FIGURE 14. Receive Gain Drop Down Menu

Transmit Gain Drop Down Menu

The **Transmit Gain** drop down menu is used to set the gain level, in dB, for transmit audio on either line 1 or line 2

Available selections are *12.0, 10.5, 9.0, 7.5, 6.0, 4.5, 3.0, 1.5, 0, -1.5, -3.0, -4.5, -10.5, -16.5, -22.5, -28.5,* and *-34.5*.

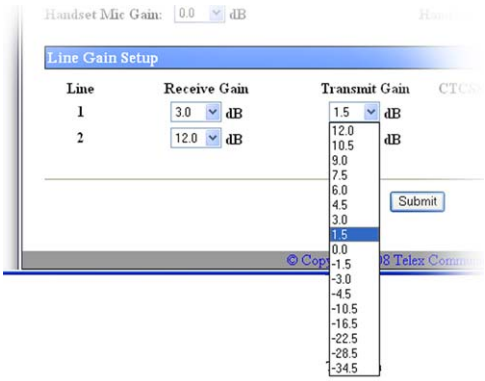


FIGURE 15. Transmit Gain Drop Down Menu

CTCSS/Recorder Out Gain Drop Down Menu

The **CTCSS/Recorder Out Gain** drop down menu is used to set the CTCSS/recorder gain, in dB, for either line 1 or line 2.

Available selections are *12.0, 10.5, 9.0, 7.5, 6.0, 4.5, 3.0, 1.5, 0, -1.5, -3.0, -4.5, -10.5, -16.5, -22.5, -28.5,* and *-34.5.*

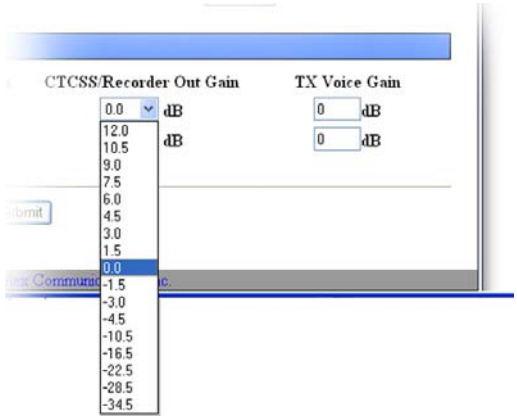


FIGURE 16. CTCSS/Recorder Out Gain Drop Down Menu

TX Voice Gain Field

The **TX Voice Gain** field indicates the transmit voice gain, in dB, for either line 1 or line 2.

The range for this field is *10dB* to *-60dB.*

MSK Tone Gain Field

The **MSK Tone Gain** field is used to set the MDC-1200 and FleetSync **MSK** (Minimal-Shift Keying) signal gain, in dB, for Line 1 or Line 2.

This field can range from *10dB* to *-60dB.*
Default is *0dB.*

TDI Receive Gain Drop Down Menus

The **TDI Receive Gain** drop down menus are used to set the TDI receive gain, in dB, for a TDI connected to Line 1 or Line 2. This gain affects receive audio just before entering the IP-223 receive audio path.

NOTE: This field is only available with upgraded TDI firmware.

Available selections are *21, 18, 15, 12, 9, 6, 3, 0, -3, -6, -9, -12* and *MUTE*.
Default is *9dB*.

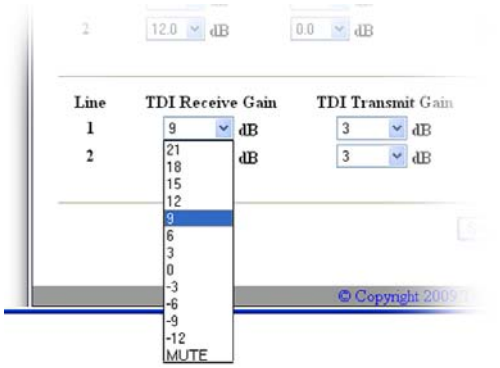


FIGURE 17. TDI Receive Gain Drop Down Menu

TDI Transmit Gain Drop Down Menus

The **TDI Transmit Gain** drop down menus are used to set the TDI transmit gain, in dB, for a TDI connected to Line 1 or Line 2. This gain affects transmit audio just before entering the POTS line.

NOTE: This field is only available with upgraded TDI firmware.

Available selections are *21, 18, 15, 12, 9, 6, 3, 0, -3, -6, -9, -12* and *MUTE*.
Default is *3dB*.

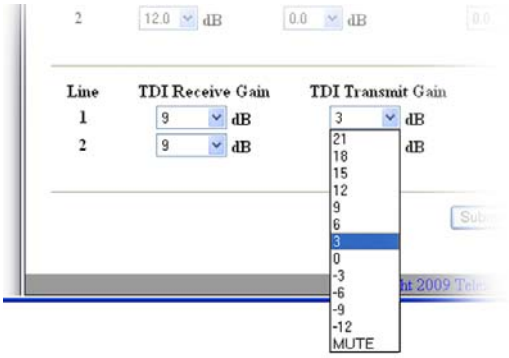


FIGURE 18. TDI Transmit Gain Drop Down Menu

To **adjust a signal level**, do the following:

1. Click **General Gain Setup**.
   The General Gain Setup window appears.
2. From the Handset Mic Gain drop down menu, select the **desired gain** for the handset mic.
3. From the Headset Sidetone drop down menu, select the **desired gain** for the headset sidetone.
4. From the Receive Gain drop down menu, select the **desired receive gain** for the appropriate line.
5. From the Transmit Gain drop down menu, select the **desired transmit gain** for the appropriate line.
6. From the CTCSS Gain drop down menu, select the **desired CTCSS gain** for the appropriate line.
7. In the TX Voice Gain field, enter the **desired gain** for the appropriate line.
8. In the MSK Tone Gain field, enter the **desired gain** for the appropriate line.
9. From the TDI Receive Gain drop down menu, select the **desired TDI Receive gain** for the appropriate line.
10. From the TDI Transmit Gain drop down menu, select the **desired TDI Transmit gain** for the appropriate line.
11. Click **Submit**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
12. Click **Save to EEPROM**.
    The Save Setup Parameters window appears.
13. Click **Save Parameters**.
    The entries are saved to permanent memory.

Submit Button

The **Submit** button, located at the bottom of each configuration window, is used to upload changes to the IP-223.

NOTE: Clicking **Submit** saves changes in temporary memory only.

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

1. Click **Submit**. 

   The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

   The Save to EEPROM window opens.
3. Click **Save Parameters**. 

   Changes are now permanently saved to the IP-223 console.

Multicast Address Setup Window

The **Multicast Address Setup** window, shown in Figure 19, identifies the mode of operation or line type, as well as which port the IP-223 uses to communicate various line information on.

FIGURE 19. Multicast Address Setup Window—View 1

Line Multicast Setup

Line Number Field

The **Line Number** field displays the appropriate line number for the specified parameters.

Enable via Ethernet Check Box

The **Enable via Ethernet** check box, if selected, indicates Ethernet connectivity is active. Otherwise, audio received from the analog connections of the IP-223 are not echoed to the Ethernet, and Ethernet traffic is not mixed into the audio of the IP-223.

Line Type Drop Down Menu

The **Line Type** drop down menu identifies the operating mode for Line 1 and 2. The line type for all other operating modes is displayed on the window. Selecting a line type enables the fields necessary to enter the setup information for the selected line type.

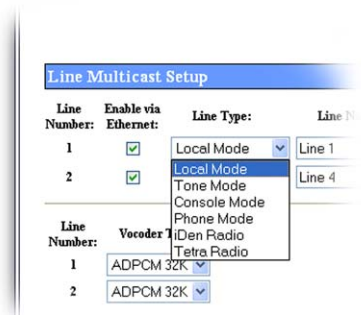


FIGURE 20. Line Type Drop Down Menu

Available selections are:

Local Mode - Connects the radio directly to the IP-223 allowing for simple migration and full, local control of the radio. Required for SOIP enabled lines.

Tone Mode - Generates the key tones required to control standard, tone-equipped radio circuits. This allows an existing tone decoder and radio to be connected. This mode also supports a parallel analog console for local control.

Console Mode - Allows the use of existing tone-based consoles on the VoIP network. The IP-223 decodes standard tones, converts them into Ethernet traffic for another IP-223 and optional parallel IP consoles.

Phone Mode - Uses a PIB or TDI to connect an IP-223 line to an analog phone line

iDEN Radio - Uses an NI-223 to interface with a Falcon Class PTT mobile phone system.

TETRA Radio Mode - Interfaces to a TETRA digital trunk system using the IP-223 and the Sepura SRM2000 mobile radio. The IP-223 interfaces the radio through the PEI, allowing dispatch access to TETRA radio assets.

Line Name Field

The **Line Name** field is used to enter a descriptive name for the line.

This field can contain up to *12 characters*.

RX Mcast Address Field

The **RX Mcast Address** field is used to enter the broadcast address for all audio traffic received on a specific line. All consoles must have the same Multicast Address. The entry in the first Multicast Address field applies to the port number entered in the RX Port field.

NOTE:

- The option to use a different Multicast Address for the RX port is available. This provides flexibility and acts as a filter.
- Phone operation requires unique RX and TX ports.
- If you want all consoles to monitor RX and TX audio on a specific line, you must have their base Multicast Address, RX and TX ports set the same.

The range for this field is *224.0.0.0* to *239.255.255.255*.

RX Port Field

The **RX Port** field identifies the RX port number for each line. The RX port number must be unique.

The range for this field is *1054* to *65535*.

EXAMPLE: Based on the entries shown in Figure 19, any console attempting to transmit to line 1 must have a Multicast Address of 225.8.11.81 and an RX port number of 2054 to monitor RX audio and a TX port number of 4072 to monitor TX audio.

TX Mcast Address Field

TX Mcast Address field identifies the broadcast address for all audio traffic transmitted on a specific line. All consoles must have the same Multicast Address. The entry in the second Multicast Address field applies to the port number entered in the TX Port field.

The range for this field is *224.0.0.0* to *239.255.255.255*.

NOTE:

- IP-223s can also operate Unicast (point-to-point). These fields can support class A, B, and C addresses.
- Make sure the RX and TX port numbers are unique.

TX Port Field

The **TX Port** field identifies the TX port number for each line. The TX port number must be unique.

The range for this field is *1054* to *65535*.

EXAMPLE: Based on the entries shown in Figure 19, any console attempting to transmit to line 1 must have a Multicast Address of 225.8.11.81 and an RX port number of 1054 to monitor RX audio and a TX port number of 1072 to monitor TX audio.

TX Group Port Field

The **TX Group Port** field is used to transmit to multiple IP-223s based on a unique port number.

TTL Field

The **TTL** (Time-To-Live) field identifies the number of routers the multicast audio packets go through before being discarded. Network design dictates this value.

NOTE: If audio is not reaching a particular node on the network, increasing this value may correct the problem.

The range for this field is *1* to *128*.
The default is *6*.

To **define the parameters for a line number**, do the following:

NOTE: The following procedure outlines the entries required for each field on the Multicast Port Number Setup window. Depending on the line type selected, all entries listed may not be required or available for the line type.

1. Click **Multicast Address Setup**.
   The Multicast Address Setup window appears.
2. Select the **Enable via Ethernet** check box, if Ethernet connectivity is used.
3. From the Line Type drop down menu, select the **operating mode**.
4. In the Line Name field, enter a **descriptive name** for the line.
5. In the first Multicast Address field, enter the **Multicast Address**.
6. In the RX Port field, enter a unique **RX port number**.
7. In the second Multicast Address field, enter the **Multicast Address**.
8. In the TX Port field, enter a unique **TX port number**.
9. In the TX Group Port field, enter the **TX group port number**, if applicable.
10. In the TTL field, enter the **number of routers** the multicast audio packets can go through before being stopped.
11. Click **Submit**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
12. Click **Save to EEPROM**.
    The Save Setup Parameters window appears.
13. Click **Save Parameters**.
    The entries are saved to permanent memory.

Vocoder Type Drop Down Menu

The **Vocoder Type** drop down menu, shown in Figure 21, indicates the bit rate at which audio is converted into digital format. This feature is used to configure communication between the IP-223 and C-Soft.

Available selections are: ***ADPCM*** *(Adaptive Differential Pulse Code Modulation) 16K* and *ADPCM 32K*.

NOTE: Design considerations must take into account that although 16K uses less bandwidth, the audio quality might not perform as desired.

IMPORTANT: Vocoder configurations must be the same across devices and C-Soft.

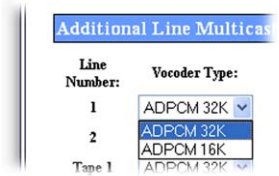


FIGURE 21. Vocoder Type Drop Down Menu

Phone Setup

Enable Check Box

The **Enable** check box is used to set up a phone ring tone when phone calls are received. The entry for a ring signal must be a unique Multicast Address and different from the other lines.

Line Name Field

The **Line Name** field is used to enter an alphanumeric label for the phone ring setup.

This field can contain up to *12 characters*.

Multicast Address Field

The **Multicast Address** field is used to enter the Multicast Address for the ring. The console must be set up with the same Multicast Address in order to hear the phone ring.

The range for this field is *224.0.0.0* to *239.255.255.255*.

NOTE: The ring Multicast Address must match the console's ring multicast setting to receive the ring tone.

Outgoing Port Field

The **Outgoing Port** field identifies the port number where the ring packet is generated.

The range for this field is *1054* to *65535.*

NOTE: The Outgoing Port number must match the console's ring port number to receive the ring tone.

TTL Field

The **TTL** field identifies the number of routers the multicast audio packets must pass through before being discarded. Network design dictates this value. See your network administrator for further information.

NOTE: If audio is not reaching a particular node on the network, increasing this value may correct the problem.

The range for this field is *0* to *128*.
The default is *6*.

Serial Over IP

The **Serial Over IP** section is used to configure the IP-223 to receive serial data through the serial port and send the data to the IP network. SOIP can also take data from an IP Network and send it to the serial port.

NOTE:

- On power up, SOIP appears on the IP-223 display panel to indicate the mode.
- Consult your network administrator for port type and port numbers to use.

Enable Check Box

The **Enable** check box, if selected, indicates the line is enabled for SOIP.

SOIP Type Drop Down Menu

The **SOIP Type** drop down menu is used to set up the network protocol SOIP operates in.

Available selections for this field are, **UDP** (User Datagram Protocol) and **TCP** (Transmission Control Protocol).

Line Name Field (UDP Setting)

The **Line Name** field is used to name the SOIP line with a user-recognizable label.

RX Mcast Address Field (UDP Setting)

The **RX Mcast Address** field indicates the Multicast Address used to receive SOIP packets.

The range for this field is *224.0.0.0* to *239.255.255.255*.

RX Port Field (UDP Setting)

The **RX Port** field indicates the port used to receive SOIP packets.

The range for this field is *1054* to *65535*.

TX Mcast Address Field (UDP Setting)

The **TX Mcast Address** field indicates the Multicast Address used to send SOIP packets.

The range for this field is *224.0.0.0* to *239.255.255.255*.

TX Port Field (UDP Setting)

The **TX Port** field indicates the port used to send SOIP packets.

The range for this field is *1054* to *65535*.

TTL Field (UDP Setting)

The **TTL** field identifies the number of routers the SOIP data packets go through before being discarded. Network design dictates this value.

The range for this field is *1* to *128*.
The default is *6*.

To **configure Multicast for an SOIP line**, do the following:

1. Click **Multicast Address Setup**.
   The Multicast Address setup window appears.
2. Select the **Enable via Ethernet** check box for the line to be enabled for SOIP.
3. Select **Local Mode** from the Line Type drop down menu for the line.
   The line is enable for local control.

To **configure the Serial Over IP section for SOIP using UDP**, do the following:

1. Select the **Enable** check box for the line to be enabled for SOIP.
2. From the SOIP Type drop down menu, select **UDP**.
3. In the Line Name field, enter a **name** for the SOIP line.
4. In the RX Mcast Address field, enter the **Multicast Address**.
5. In the RX Port field, enter the **port number**.
6. In the TX Mcast Address field, enter the **Multicast Address**.
7. In the TX Port field, enter the **port number**.
8. In the TTL Field, enter a **number equal to or greater than the number of routers** the packets are to go through before reaching their destination.

To **permanently save the SOIP settings**, do the following:

1. Click **Submit**.
   Parameters are temporarily saved.

   NOTE:

   - By default, when SOIP is first enabled, the baud rate is set to *9600, N, 8, 2*.
   - To change the baud rate, see “Serial Port Parameters Drop Down Menu” on page 97.
2. Click **Save to EEPROM**.
3. Click **Save Parameters**.
   Parameters are permanently saved to the IP-223.

Line Name Field (TCP Setting)

The **Line Name** field is used to name the SOIP line with a user-recognizable label.

Client IP Field (TCP Setting)

The **Client IP** field is used to enter the Client IP Address the IP-223 connects to for TCP SOIP.

Host IP Field (TCP Setting)

The **Host IP** field indicates the IP Address of this IP-223.

This field cannot be modified.

Inbound Port Field (TCP Setting)

The **Inbound Port** field indicates the port number used to receive SOIP packets.

The range for this field is *1054* to *65535*.

Outbound Port Field (TCP Setting)

The **Outbound Port** field indicates the port number used to send SOIP packets.

The range for this field is *1054* to *65535*.

To **configure Multicast for an SOIP line**, do the following:

1. Click **Multicast Address Setup**.
   The Multicast Address Setup window appears
2. Select the **Enable via Ethernet** check box for the line to be enabled for SOIP.
3. From the Line Type drop down menu for the SOIP line, select **Local Mode**.
   The line is enabled for local control.

To **configure the Serial Over IP section for SOIP using TCP**, do the following:

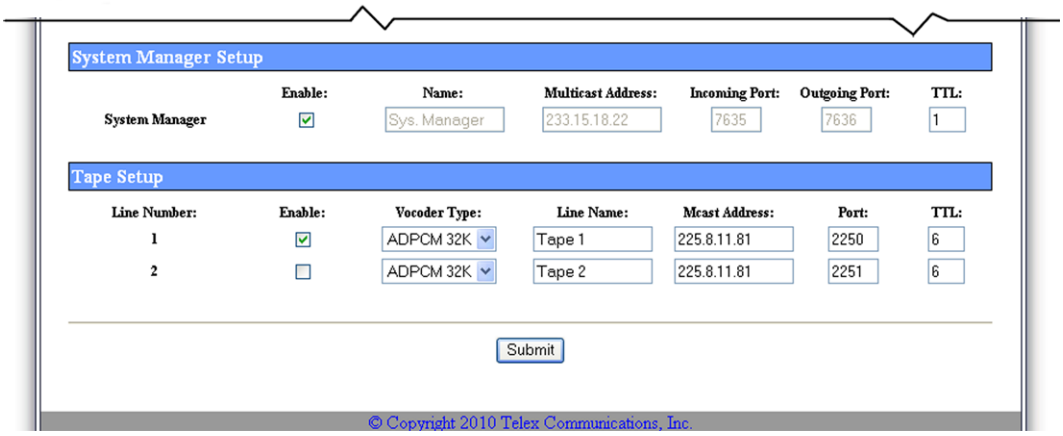
1. Select the **Enable** check box for the line to be enabled for SOIP.
2. From the SOIP Type drop down menu select **TCP**.
3. In the Line Name field, enter a **name** for the SOIP line.
4. In the Inbound Port field, enter the **port number** used to receive SOIP data.
5. In the Outbound Port field, enter the **port number** used to transmit SOIP data.

To **permanently save the settings**, do the following:

1. Click **Submit**.
   Parameters are temporarily saved.

   NOTE:

   - By default, when SOIP is first enabled, the baud rate is set to *9600, N, 8, 2*.
   - To change the baud rate, see “Serial Port Parameters Drop Down Menu” on page 97
2. Click **Save to EEPROM**.
3. Click **Save Parameters**.
   Parameters are permanently saved to the IP-223.



System Manager Setup

Enable Check Box

The **Enable** check box is used to enable communication with **TSM** (Telex System Manager). If cleared, TSM can not detect the IP-223. By default, the check box is selected. TSM is used to update IP-223 firmware.

To learn how to update IP-223 firmware, see “Update Firmware” on page 39.

REFERENCE: For more information, see the Telex System Manager Technical Manual (LIT000259000).

Name Field

The **Name** field displays Sys Manager and cannot be modified.

Multicast Address Field

The **Multicast Address** field displays the default Multicast Address used by TSM to detect connected VoIP hardware.

This field cannot be modified.

Incoming Port Field

The **Incoming Port** field identifies the port used to communicate with TSM. TSM requests data from the IP-223 through this port. This field is automatically populated and cannot be modified.

Outgoing Port Field

The **Outgoing Port** field identifies the port used to communicate with TSM. The IP-223 sends data through this port to TSM.

This field is automatically populated and cannot be modified.

TTL Field

The **TTL** (Time To Live) field identifies the number of routers the multicast audio packets pass through before being discarded. The value in this field is entered by default and used by TSM to communicate with VoIP hardware.

The range for this field is *1* to *128.*
Default is *6*.

Tape Setup

Enable Check Box

The **Enable** check box is used to activate a tape recorder for the specified line.

Vocoder Type Drop Down Menu

The **Vocoder Type** drop down menu, shown in Figure 22, indicates the bit rate at which audio is converted into digital format. This feature is used to configure communication between the IP-223 and C-Soft.

Available selections for this field are *ADPCM 16K* and *ADPCM 32K*.

NOTE: Design considerations must take into account that although 16K requires less bandwidth, the audio quality might not perform as desired.

IMPORTANT: Vocoder configurations must be the same across devices and C-Soft.

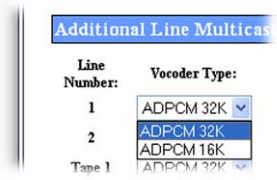


FIGURE 22. Vocoder Type Drop Down Menu

NOTE: When Tape 1 is enabled, a separate stream is created with both RX and TX audio for that line. When Tape 2 is enabled, a separate Ethernet stream is created with both RX and TX audio for that line. This stream can then be recorded by a Telex Network Recorder.

Line Name Field

The **Line Name** field is used to assign a unique label to the tape line.

This field can contain up to *12 alpha-numeric characters*.

Mcast Address Field

The **Mcast Address** field is used to configure the Multicast Address used to generate multicast audio for the recorder.

The range for this field is *224.0.0.2* to *239.255.255.255*.

Port Field

The **Port** field is used to configure the port used to generate multicast audio for the recorder.

The range for this field is *1054* to *65535*.

TTL Field

The **TTL** field identifies the number of routers the multicast audio packets pass through before being discarded.

The range for this field is *1* to *128.*

Submit Button

The **Submit** button, located at the bottom of each configuration window, is used to upload changes to the IP-223.

NOTE: Clicking **Submit** saves changes in temporary memory only.

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

1. Click **Submit**. 

The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

The Save to EEPROM window opens.
3. Click **Save Parameters**. 

Changes are now permanently saved to the IP-223 console.

Per Line Setup Window

The **Per Line Setup** window, shown in Figure 23, is used to view and set the parameters for the line type selected on the Multicast Setup window. The details on the window apply to the line number displayed at the top of the window. The selected line type enables the appropriate fields necessary to set up the line.

Per Line Setup Window—Local, Tone, and Console Mode

The **Per Line Setup** window for **Local, Tone, or Console Mode** configuration, shown in Figure 23, appears when Local, Tone or Console is selected from the Line Type drop down menu on the Multicast Address Setup window.

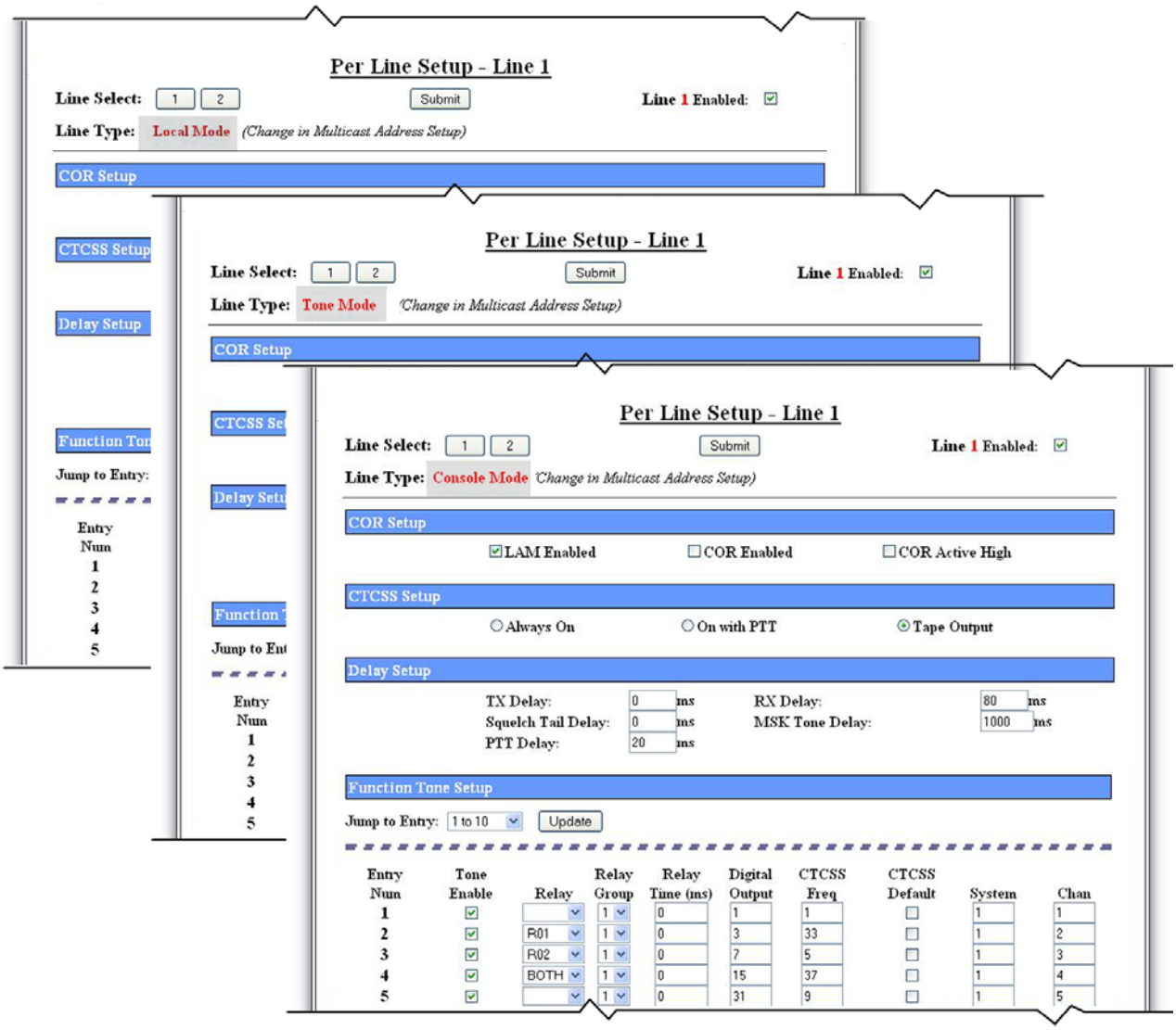


FIGURE 23. Per Line Setup—Local, Tone, and Console Modes, View 1

Line Select 1 Button

The **Line Select 1** button is used to navigate to the Per Line Setup window for Line 1 configuration.

Line Select 2 Button

The **Line Select 2** button is used to navigate to the Per Line Setup window for Line 2 configuration.

Submit Button

To **permanently save changes,** do the following.

1. Click **Submit**. 

The console name appears at the top of the Welcome window.
2. Click **Save to EEPROM**. 

The Save to EEPROM window opens.
3. Click **Save Parameters**. 

Changes are now permanently saved to the IP-223 console.

Line Type Field

The **Line Type** field displays the line type assigned to the line in the “Multicast Address Setup Window” on page 65.

Line Enabled Check Box

The **Line Enabled** check box, if selected, indicates the line’s port is enabled to transmit and receive audio.

COR Setup

The **COR Setup** section is used to enable LAM or COR for monitoring purposes.

NOTE:

- LAM and COR can both be selected at the same time.
- LAM and COR are used to check audio signal for processing.

LAM Enabled Check Box - Local and Tone Modes

The **LAM Enabled** check box is used to monitor the line for the signal level configured in the LAM Level field. see “LAM Level Field - Local, Tone, and Console Modes” on page 82.

COR Enabled Check Box - Local and Tone Modes

The **COR Enabled** check box, if selected, indicates the COR I/O pins (DIG6, pin 20 of the DB-25 connector) are enabled. If selected, the IP-223 monitors the COR for line activity.

COR Active High Check Box - Local and Tone Modes

The **COR** (Carrier Operated Relay) **Active High** check box, if selected, indicates the COR active signal polarity is high.

CTCSS Setup

Always On Radio Button - Local, Tone, and Console Modes

The **Always On** radio button, if selected, indicates CTCSS is on at all times.

On With PTT Radio Button - Local, Tone, and Console Modes

The **On With PTT** radio button, if selected, indicates CTCSS is generated only when PTT is activated.

Tape Output Radio Button - Local, Tone, and Console Modes

The **Tape Output** radio button, if selected, indicates CTCSS is generated. If selected, no CTCSS is generated. This audio output is used as an analog sum of RX and TX audio for the line. The output port is single-ended capacitor coupled.

Delay Setup

TX Delay Field - Local, Tone, and Console, Modes

The **TX Delay** field identifies the delay, in ms, of TX audio. When TX Ethernet packets arrive, the PTT relay is closed and TX audio is delayed for the specified time. This provides the ability to overcome timing issues involving repeater attack time or trunking (clear to talk) delays.

The range for this field is *0* to *2000ms*.

RX Delay Field - Local, Tone, and Console Modes

The **RX Delay** field identifies the amount of time, in ms, RX audio is recorded and stored. RX audio is constantly recorded by the IP-223 and when a COR or LAM triggered detect occurs, the IP-223 goes back the specified time of delay to start generating Ethernet packets. This provides the ability to prevent lost first syllables.

The range for this field is *0* to *1000ms*.

Squelch Tail Delay Field - Local, Tone, and Console Modes

The **Squelch Tail Delay** field identifies the amount of time, in ms, the RX audio is muted after PTT occurs. This provides the ability to overcome squelch tail ping-pong in crosspatch modes by muting the radio RX input after PTT occurs.

The range for this field is *0* to *5000ms*.

MSK Tone Delay Field - Local and Tone Modes

The **MSK Tone Delay** field identifies the delay, in ms, of MDC-1200 or FleetSync MSK signals. When Ethernet MSK signaling packets arrive, the PTT relay is closed and the MSK signal is delayed for the specified time. This provides the ability to overcome timing issues involving repeater attack times or other system delays.

The range for this field is *0* to *10000ms*.
Default is *1000ms*.

PTT Delay Field - Local Mode

The **PTT Delay** field identifies the delay, in ms, before closing the PTT relay. When TX Ethernet packets arrive, the PTT relay closure is delayed for the specified time. This delay provides the ability to allow for digital output channel changes before keying the radio.

The range for this field is *20* to *2000ms*.
Default is *20ms*.

Jump To Entry Drop Down Menu

The **Jump To Entry** drop down menu allows you to select function tones (in groups of 10) to view and modify.

1. From the Jump To drop down menu, select the **group of 10 function tones** you want to view.
2. Click **Update**.
   The function tones you select appear.

Go Button

The **Go** button is used to navigate to the page in the Jump to Entry drop down menu.

Update Button

The **Update** button, when selected, searches and displays the selection you chose from the Jump To drop down menu.

Tone Enable Check Box

The **Tone Enable** check box, if selected, indicates the function tone is active. The standard function tones and their frequencies are the default entries. These entries are shown in Table 14 on page 149.

The frequency for the tone is set on the Tone Frequency and Durations window described on page 147.

NOTE: At least one (1) function tone must be selected.

Relay Drop Down Menu - Local, Tone, and Console Modes

The **Relay** drop down menu, shown in Figure 24, identifies the relay(s), if any, closed immediately upon receipt of the function tone.

Available selections are *no selection, R01, R02,* or *BOTH*.

FIGURE 24. Relay Drop Down Menu—Per Line Setup

Relay Group Drop Down Menu - Local, Tone, and Console Modes

The **Relay Group** drop down menu identifies if a relay is grouped into separate functions. This allows more than one (1) relay to be activated at any particular time by being in separate groups.

EXAMPLE: When F1 has R1 selected as its relay, and F2 has R2 selected as its relay, setting the two (2) Relay Group numbers to the same value allows multiple relays with different functions. In this scenario, the relays for F1 and F2 are interlocked.

When the Relay Group assigned to F1 and F2 are different, R2 does not activate when F1 is received. Furthermore, when there is no relay selected for a function tone, but the assigned relay group is used by another relay group, when the function tone is received, all relays in the group are activated. This allows relay R1 and R2 to be assigned to different groups and use other function tones within the same relay group to activate them.

Available selections are *1* and *2*.

Relay Time (ms) Field - Local, Tone, and Console Modes

The **Relay Time (ms)** field identifies the selected relay(s) activate on when the function tone is received, or the selected relay(s) is activated for a specified period of time when the function tone is received.

To **program the relay(s) to activate on when the function tone is received**, do the following:

> Enter a **0** in the field.

To **set the duration the relay(s) is activated**, do the following:

> Enter the desired **amount of time**, in ms.

The range for this field is *0 to 32000ms*.

Digital Output Field - Local Mode

The **Digital Output** field identifies the DIG0-DIG6 output for the function tone.

The range for this field is *0* to *128*. *H* is high (on), *L* is low (off).
The DIG6 for COR input limits the field range from *0* to *63*.

NOTE: A digital output value equal to 128 does not change the current state of the digital outputs.

To **configure the desired output**, do the following:

> Enter the **numeric value** for the desired DIG0-DIG6 output.

NOTE: Reference the Value column in Table 16 “Digital Output Values” on page 153.

CTCSS Freq Field - Local Mode

The **CTCSS Freq** field identifies the CTCSS tone frequency set for the function tone.

The range for this field is *0* to *64*.

To **configure the desired tone frequency**, do the following:

> Enter the desired **tone number** for the frequency.

NOTE:

- Reference Table 15 in “CTCSS Tone Frequencies” on page 151.
- If 0 is entered, there is no CTCSS tone frequency set for the function tone

CTCSS Default Check Box - Local Mode

The **CTCSS Default** check box, if selected, indicates the entry in the CTCSS Freq field is ignored and the last selected value is generated during PTT.

EXAMPLE: F1 is used for all transmissions and CTCSS Default is selected for F1.
F2-F8 have different CTCSS values programmed and the CTCSS Default check box is cleared.

Selecting F2 and then keying up on F1 sets the CTCSS tone to the F2 value.
Selecting F4 sets the CTCSS tone to the F4 value.
When PTT is pressed, F1 is the default frequency and the F4 CTCSS tone is sent.

System Field - Local Mode

The **System** field is used to control radios serially connected to the IP-223. Once configured, the IP-223 directs audio to the system entered in the field.

When the function tone is changed by the console operator, this setting, along with the Chan field setting, directs the radio to the system and frequency configured in the field. This field works in conjunction with the Chan field.

This field can contain up to *3 digits*.

Chan Field - Local Mode

The **Chan** field is used to control radios serially connected to the IP-223. Once configured, the IP-223 directs audio to the frequency entered in the field.

When the function tone is changed by the console operator, this setting, along with the System field setting, directs the radio to the system and frequency configured in the field. This field works in conjunction with the System field.

The range for this field is *0* to *999*.

Per Line Setup—Local, Tone, and Console Mode, View 2

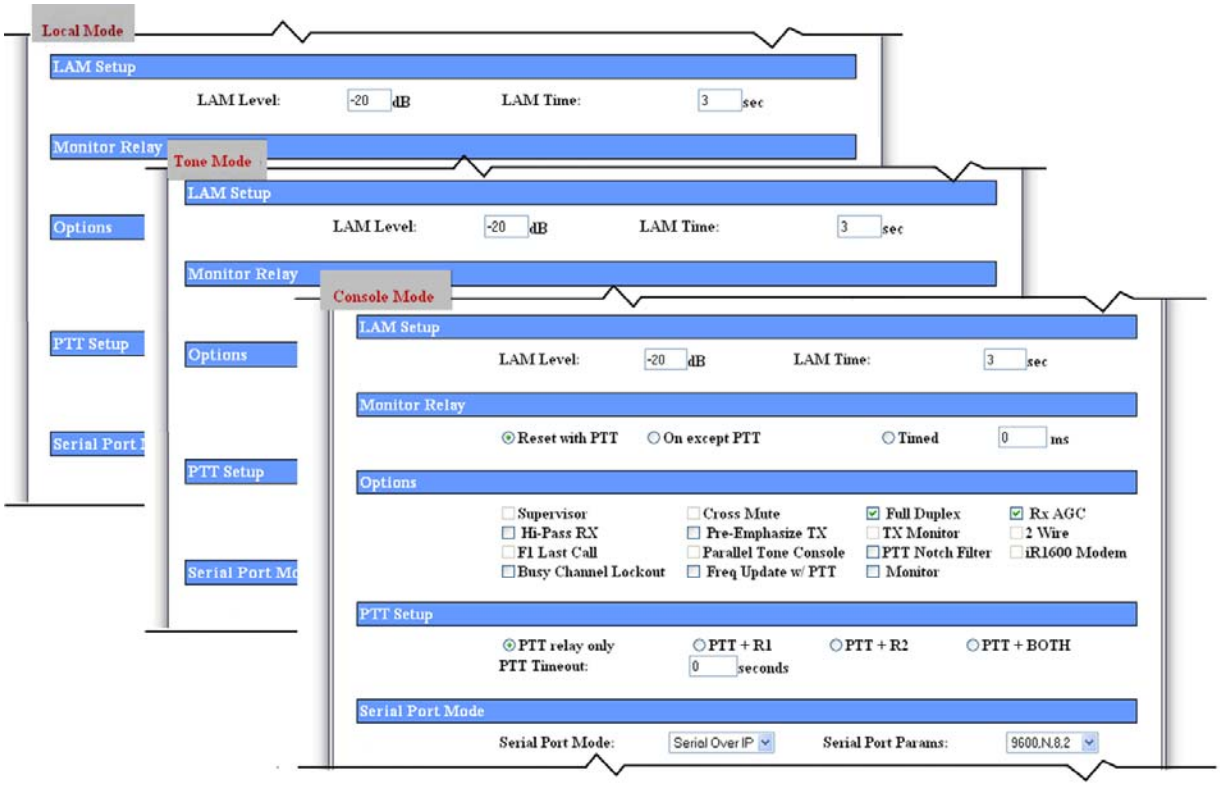


FIGURE 25. Per Line Setup—Local, Tone, and Console Modes, View 2

LAM Setup

LAM Level Field - Local, Tone, and Console Modes

The **LAM Level** field identifies the threshold, in dB, at which the radio/line unmutes and sends RX packets to the Ethernet.

The range for this field is *-50 to +10dB.*

LAM Time Field - Local, Tone, and Console Modes

The **LAM Time** field identifies the amount of time, in seconds, the LAM level can drop below the threshold without action from the IP-223. It allows small gaps in the audio sequence.

The range for this field is *0 to 60 sec*.

Monitor Relay

The **Monitor Relay** field provides the IP-223 the ability to decode a valid Ethernet packet and provide a relay-contact output to turn off the sub-audible-tone-decoder circuit in the radio receiver. This allows the console operator to monitor the line for other users before transmission (required by FCC regulations on stations equipped with CTCSS).

Available selections for this field are:

Reset with PTT - The monitor relay is activated from the time the monitor tone sequence is received until the next PTT operation.

On except PTT - The monitor relay is activated at all times except when PTT is active, whether the monitor function tone is received or not.

Timed - The monitor relay is activated for the amount of time, in ms, entered.

Options

If an **Options** field cannot be selected, the particular option is not available for the line being configured.

Supervisor Check Box - Tone and Console Modes

The **Supervisor** check box indicates the Supervisory I/O pin (DIG1, pin 21 of the DB-25 connector) is enabled. If selected, parallel console supervisory control is enabled and control of the radio can be seized from other consoles.

Cross Mute Check Box - Tone and Console Modes

The **Cross Mute** check box indicates the crossmute I/O pin (DIG0, pin 8 of the DB-25 connector) is enabled. If selected, parallel console crossmute control is enabled. Crossmute is used to mute the parallel consoles during a parallel transmission.

Full Duplex Check Box - Local, Tone, and Console Modes

The **Full Duplex** check box indicates full-duplex audio is supported. If selected, full-duplex (TX and RX transmission) audio is allowed.

RxAGC Check Box - Local, Tone, and Console Modes

The **RxAGC** (Receive Automatic Gain Control) check box indicates radio RX audio includes an AGC. If selected, an AGC step is added to the radio RX audio. This results in a more consistent radio RX audio transmission by increasing the level of low audio and decreasing the level of loud audio.

Hi-Pass RX Check Box - Local, Tone, and Console Modes

The **Hi-Pass RX** check box, if selected, indicates RX audio below 300Hz is blocked.

Pre-Emphasize TX Check Box - Local Mode

The **Pre-Emphasize TX** check box, if selected, indicates TX audio includes a standard 6dB octave pre-emphasis.

TX Monitor Check Box - Tone Mode

The **TX Monitor** check box, if selected, indicates audio from parallel consoles in 4-wire mode are sent to the Ethernet as a transmit packet.

2-Wire Check Box - Tone Mode

The **2-Wire** check box, if selected, indicates the line number being configured is 2-wire. If not selected, the line is 4-wire.

F1 Last Call Check Box - Local, Tone, and Console Modes

The **F1 Last Call** check box is selectable only in iDEN mode.

Parallel Tone Console Check Box - Tone and Console Modes

The **Parallel Tone Console** check box, if selected, indicates a parallel console is being used (for example, a legacy tone console, only available in console and tone mode).

NOTE:

- Must be enabled when console is configured for **EIA** (Electronics Industries Alliance).
- Must be enabled when configuring for console mode.

PTT Notch Filter Check Box - Local, Tone, and Console Modes

The **PTT Notch Filter** check box indicates the 2175Hz notch filter is enabled. When selected, 2175Hz ±180Hz frequency range is filtered during PTT. Use this option when 2175Hz is blocking desirable audio.

iR1600 Modem Check Box

The **iR1600 Modem** check box is selectable only in iDEN mode.

Busy Channel Lockout Check Box - Local and Tone Modes

The **Busy Channel Lockout** check box, if selected, indicates outgoing messages are placed in queue until the radio is idle. Messages can be lost when sent on half-duplex radios. Selecting this check box avoids lost messages. This feature is available on lines configured for FleetSync or MDC-1200.

Freq Update w/PTT Check Box

The **Freq Update w/PTT** check box indicates that a channel change is forced with each PTT. If not selected, channel changes occur only when the incoming channel is different than the previous channel.

Monitor Check Box

The **Monitor** check box indicates monitor function tone generation is allowed or allows serial monitor commands to be sent to the radio.

PTT Setup

The **PTT Setup** section allows a secondary external function to be controlled with a separate relay closure at the same time as the PTT relay.

PTT relay only Radio Button - Local, Tone, and Console Modes

The **PTT relay only** radio button, if selected, indicates only the PTT relay is closed.

This is the default PTT setting.

PTT + R1 Radio Button - Local, Tone, and Console Modes

The **PTT + R1** radio button, if selected, indicates both the PTT relay and the R1 relay close at the same time.

PTT + R2 Radio Button - Local, Tone, and Console Modes

The **PTT + R2** radio button, if selected, indicates the PTT relay and the R2 relay close at the same time.

PTT + BOTH Radio Button - Local, Tone, and Console Modes

The **PTT + BOTH** radio button, if selected, indicates the PTT relay, the R1 relay and the R2 relay close at the same time.

PTT Timeout Field - Local, Tone, and Console Modes

The **PTT Timeout** field is used to indicate how long, in seconds, to allow PTT to be active when no audio is transmitted. If a time is entered in the field, PTT activity times out after the designated amount of time has lapsed. This feature is useful in cases where the line goes offhook for an indefinite period of time due to a stuck PTT key.

The range for this field is *0* to *1800 sec*.
Disabled is *0*.

Serial Port Mode Drop Down Menu - Local, Tone, and Console Modes

The **Serial Port Mode** drop down menu, shown in Figure 26, is used to identify the specific radio interface for the serial port configuration. Selecting an item with a Scan List suffix enables a frequency scan list update function. The freq scan list function synchronizes the console scan list with the radio's scan list.

By default, the serial port in Tone or Console mode is *Normal*.
By default, when the line is enabled for SOIP, This field cannot be modified.

NOTE: Once this mode is changed and parameters saved, the system automatically resets.

Available selections for this field are:

Normal
Kenwood Series 80
Kenwood Series 80 - Scan List
Kenwood Series 90
Kenwood x150
Kenwood x150 - Scan List
Kenwood Series x180
Kenwood Series x180 - Scan List
Kenwood 5710/5810
Kenwood NEXEDGE
EF Johnson 5300

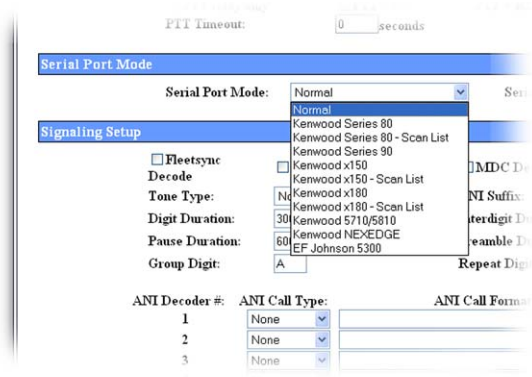


FIGURE 26. Serial Port Mode Drop Down Menu - Local Mode

Serial Port Params Drop Down Menu - Local, Tone, and Console Modes

The **Serial Port Params** (Parameters) drop down menu identifies the configuration of the serial port data speed and format. Serial port parameters refer to bit rate, parity, data bits, and stop bits.

The serial port parameters in Tone or Console mode is, by default, *19200.N.8.1*.

Available selections for this field are:

300,N,8,1,	*4800,N,8,1*
300,N,8,2	*4800,N,8,2*
300,E,7,1	*4800,E,7,1*
1200,N,8,1	*9600,N,8,1*
1200,N,8,2	*9600,N,8,2*
1200,E,7,1	*9600,E,7,1*
2400,N,8,1	*19200,N,8,1*
2400,N,8,2	*19200.N.8.1*
2400,E,7,1	*19200,E,7,1*

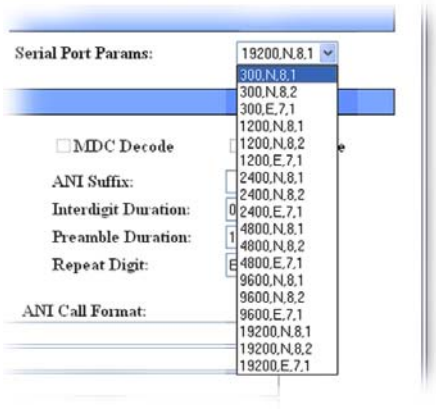


FIGURE 27. Serial Port Params Drop Down Menu - Normal Mode

Per Line Setup—Local, Tone, and Console Mode, View 3

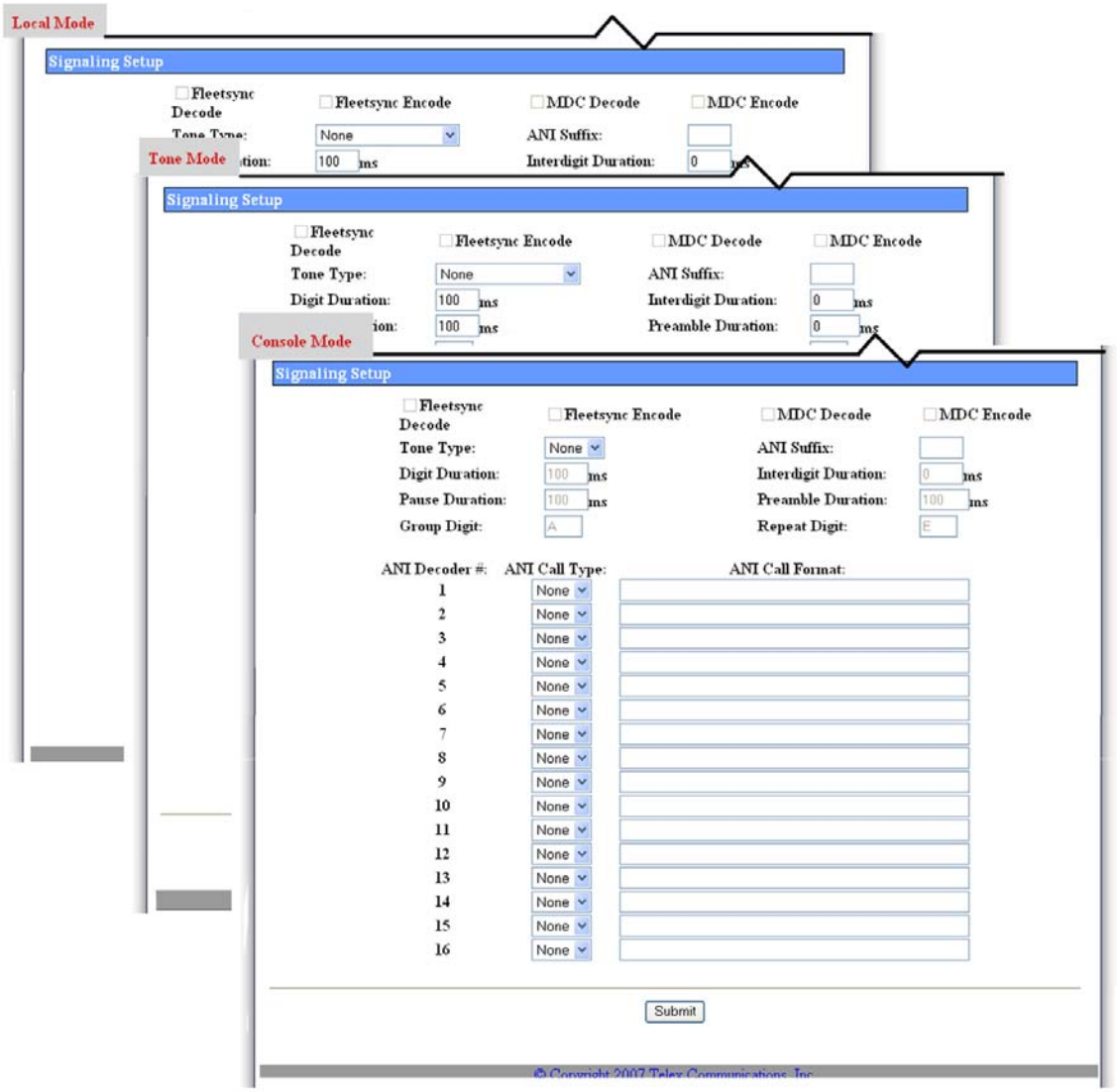


FIGURE 28. Per Line Setup—Local, Tone, and Console Mode, View 3

Signaling Setup

The **Signaling Setup** section is used to set up encode, decode, tone type, digits pause and duration.

IMPORTANT: The FleetSync and MDC-1200 features in this section are optional IP-223 accessories. The “Additional Feature Setup Window” on page 133, must be also configured.

FleetSync Decode Check Box - Local and Tone Modes

The **FleetSync Decode** check box is used to enable FleetSync Over-the-Air decode. All inbound FleetSync messages are decoded by the IP-223 instead of the radio.

FleetSync Encode Check Box - Local and Tone Modes

The **FleetSync Encode** check box is used to enable FleetSync Over-the-Air encode. All outbound FleetSync messages are generated by the IP-223 instead of the radio.

MDC Decode Check Box - Local and Tone Modes

The **MDC Decode** check box is used to enable **OTA** (Over-the-Air) MDC-1200 decode. All inbound MDC-1200 messages are decoded by the IP-223 instead of the radio.

MDC Encode Check Box - Local and Tone Modes

The **MDC Encode** check box is used to enable OTA encode. All outbound MDC-1200 messages are generated by the IP-223 instead of the radio. Motorola encode features supported by the IP-223 include PTT ID, call alert, select call, radio check, remote monitor and radio disable/enable.

Tone Type Drop Down Menu

The **Tone Type** drop down menu, shown in Figure 29, identifies the signaling type used when receiving a call.

Available selections for this field are:

None	*KENWOOD 5TONE*
CCIR1	*MODAT*
CCIR2	*NATEL*
DTMF	*PCCIR*
DZVEI	*PDZVEI*
EEA	*PZVEI*
EIA	*ZVEI1*
EURO	*ZVE12*

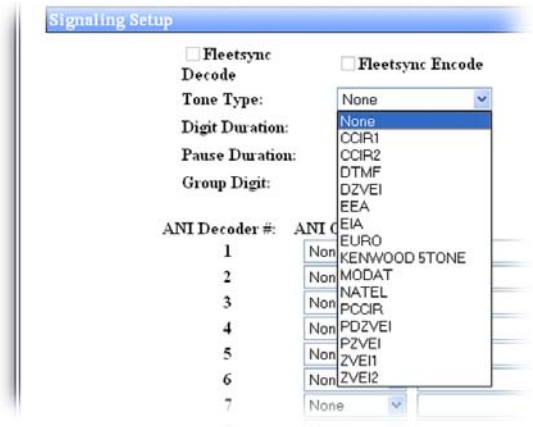


FIGURE 29. Tone Type Drop Down Menu

ANI Suffix Drop Down Menu - Local, Tone, and Console Modes

The **ANI Suffix** drop down menu, shown in Figure 30, identifies a 0- to 3-digit suffix is appended to the end of the ANI received.

Available selections for this field are *None, Emergency, Group, Individual,* and *Status*.

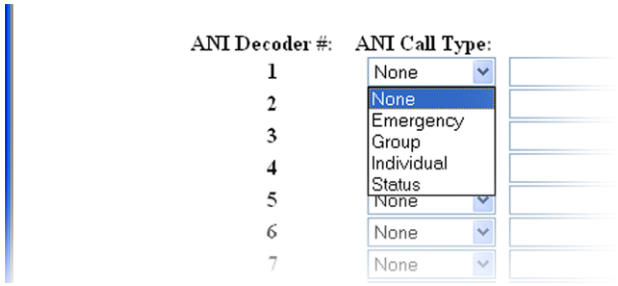


FIGURE 30. ANI Type Drop Down Menu

EXAMPLE: If you have a suffix 123 and the ANI 9876 is received, the IP-223 sends 9876123 to the consoles. This is useful if two (2) different lines have duplicate ANI IDs.

Digit Duration Field - Local and Tone Modes

The **Digit Duration** field identifies the length of time, in ms, the digit tone is decoded when it is active for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Interdigit Duration Field - Local and Tone Modes

The **Interdigit Duration** field identifies the length of time, in ms, between the digit tones for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

NOTE: Some radio systems require an extended first tone, to allow time to activate the receivers.

Pause Duration Field - Local and Tone Modes

The **Pause Duration** field identifies the length of time, in ms, allowed between received groups for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Preamble Duration Field - Local and Tone Modes

The **Preamble Duration** field identifies the length of time, in ms, the first tone is sent for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Group Digit Field - Local and Tone Modes

The **Group Digit** field identifies the group digit. The group digit is a wild card that can represent any digit. Placing a group digit within a filter allows any digit appearing at that location in the tone string to pass through the filter.

The range for this field is *0–9, A–D, *, #* (DTMF tone types)
The range for this field is *0–9, A–F* (all other tone types)
The default for this field is *A*.

Repeat Digit Field - Local and Tone Modes

The **Repeat Digit** field identifies the digit that separates two (2) digits sent back to back. On occasion, radio system messages require two (2) of the same digits to be entered back to back. Use of repeat digits delimits tone duration ensuing continuous transitions.

The range for this field is *A–F*.
The default for this field is *E*.

ANI Decoder # Field

The **ANI Decoder #** field lists, in sequential order, the available ANI Decoders.

ANI Call Type Drop Down Menu - Local, Tone, and Console Modes

The **ANI Call Type** drop down menu, shown in Figure 31, identifies the type of call for the ANI Decoder #.

Available selections for this field are: *Emergency, Group, Individual*, or *Status*.

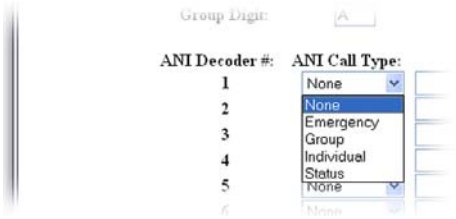


FIGURE 31. ANI Call Type Drop Down Menu—Per Line Setup

ANI Call Format Field - Local, Tone, and Console Modes

The **ANI Call Format** field identifies the call string format for the ANI Decoder #.

This field can contain *up to 16 digits.*

NOTE: Use *0–9, A–D, *,* and # for DTMF tone types or *0–9, A–F,* for all other tone types as well as the following characters:

I (Caller ID) - Placed into the ID field of the ANI packet or the ANI field of the caller portion of the telegram. The ID is stored as a 32-digit string in the packet.

G (Group Digits) - Stored in the Group section of the ANI packet. The group value is converted to a decimal number and is stored as an 8-digit string in the packet.

S (Status) - Digits represented by S are interpreted as status information. These values are converted to decimal numbers and stored as an 8-digit status string in the ANI packet. The console has a corresponding list of the status numbers and descriptions that are displayed upon receipt of the packet.

P (Pause) - When inserted into the string, a pause is expected in this location. The pause duration is set in the Pause Duration field (see “Pause Duration Field - Local and Tone Modes” on page 89).

R (Calling ID) - Used to delineate the location of the digits being used for a selective call. These digits represent the address or ID of the person being called. They are stored in the ANI packet as an 8-digit string.

Per Line Setup Window—Phone Mode, View 1

The **Per Line Setup** window for Phone Mode configuration**,** shown in Figure 32, appears when Phone is selected from the Line Type drop down menu on the Multicast Address Setup window.

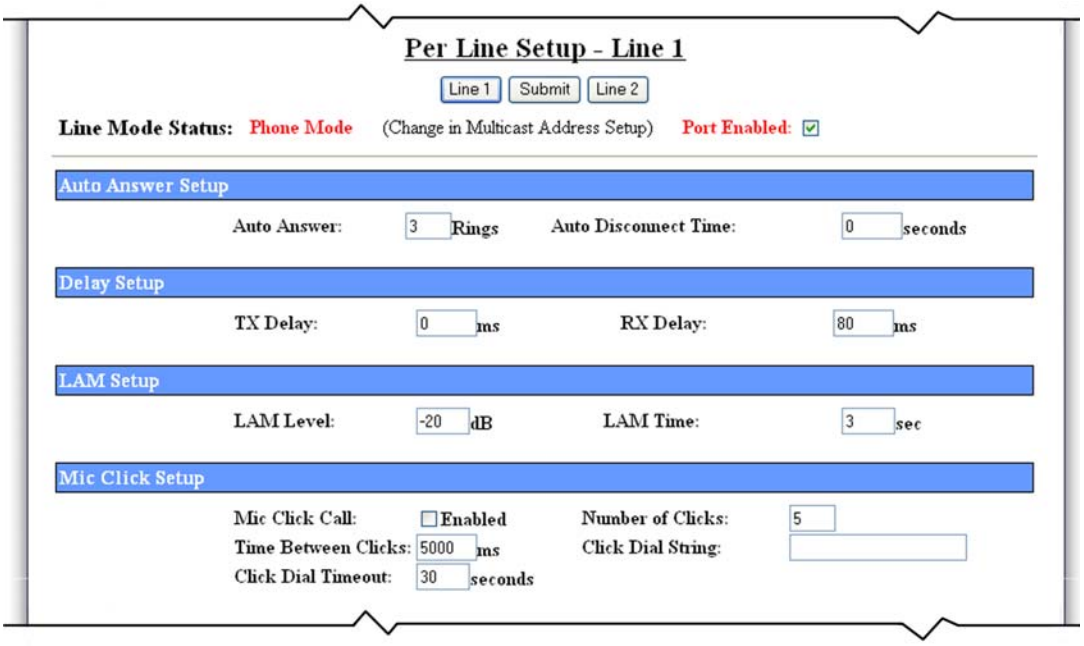


FIGURE 32. Per Line Setup—Phone Mode, View 1

Auto Answer Setup

Auto Answer Field

The **Auto Answer** field identifies the number of times the phone rings before the line goes offhook. This field is used to remotely enable a IP-223 to PIB or TDI connection.

The range for this field is *0* to *999* rings.

Auto Disconnect Time Field

The **Auto Disconnect Time** field identifies the amount of time, in seconds, before the IP-223 automatically places the PIB or TDI adapter onhook or disconnects if the threshold entered in the LAM Level field is not reached.

The range for this field is *0* to *9999 seconds.*

Delay Setup

TX Delay Field

The **TX Delay** field identifies the delay, in ms, of TX audio. When TX Ethernet packets arrive, the PTT relay is closed and TX audio is delayed for the specified time. This provides the ability to overcome timing issues involving repeater attack time or trunking (clear to talk) delays.

The range for this field is *0 to 2000ms*.

RX Delay Field

The **RX Delay** field identifies the amount of time, in ms, RX audio is recorded and stored. RX audio is constantly recorded by the IP-223 and when a COR or LAM triggered detect occurs, the IP-223 goes back the specified time of delay to start generating Ethernet packets. This provides the ability to prevent lost first syllables using COR.

The range for this field is *0 to 1000ms*.

LAM Setup

LAM Level Field

The **LAM Level** field identifies the threshold, in dB, at which the radio/line unmutes and sends RX packets to the Ethernet.

The range for this field is *-50 to +10dB.*

LAM Time Field

The **LAM Time** field identifies the amount of time, in seconds, the console continues to play audio when receiving audio above the LAM threshold specified in the LAM Level field. This entry is also used by the Ethernet to determine how long to send audio.

The range for this field is *0 to 60 sec.*

Mic Click Setup

Mic Click Call Enabled Check Box

The **Mic Click Call Enabled** check box indicates a remote radio user can click the radio PTT the stated number of times within a specified period of time to dial a programmed number. Upon receipt of this sequence, the IP-223 takes the PIB or TDI offhook and automatically dials the number in the Click Dial String field.

Number of Clicks Field

The **Number of Clicks** field identifies the number of times the radio PTT must be pressed to automatically dial the number in the Click Dial String field.

The range for this field is *1* to *5*.

Time Between Clicks Field

The **Time Between Clicks** field identifies the amount of time, in ms, allowed between mic clicks.

The range for this field is *0* to *9999ms*.

Click Dial String Field

The **Click Dial String** field identifies the number automatically dialed when the radio PTT is pressed the number of times specified in the Number of Clicks field.

The range for this field is *DTMF digits 0–9, A–D, **, or *#*.

Click Dial Timeout Field

The **Click Dial Timeout** field identifies the amount of time, in seconds, the phone rings before hanging up.

The range for this field is *10* to *60 sec*.

Per Line Setup—Phone Mode, View 2

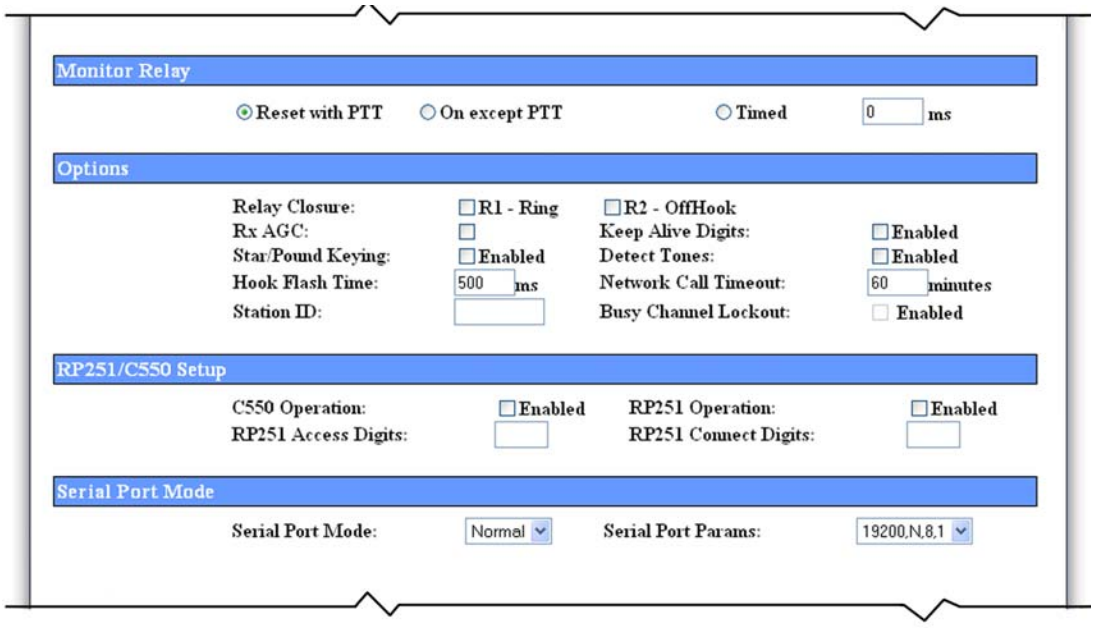


FIGURE 33. Per Line Setup—Phone Mode, View 2

Monitor Relay

The **Monitor Relay** field provides the IP-223 the ability to decode a valid Ethernet packet and provide a relay-contact output to turn off the sub-audible-tone-decoder circuit in the radio receiver. This allows the console operator to monitor the line for other users before transmission (required by FCC regulations on stations equipped with CTCSS).

Available selections for this field are:

Reset with PTT - The monitor relay is activated from the time the monitor tone sequence is received until the next PTT operation.

On except PTT - The monitor relay is activated at all times except when PTT is active, whether the monitor function tone is received or not.

Timed - The monitor relay is activated for the amount of time, in ms, entered.

Options

Relay Closure

R1 - Ring Check Box

The **R1 - Ring** check box indicates the R1 relay opens and closes in step with the ring cadence. If selected, the R1 relay opens and closes in step with the ring cadence.

R2 - OffHook Check Box

The **R2 - OffHook** check box indicates the R2 relay opens when the phone is taken offhook. If selected, the R2 relay opens when the phone is taken offhook.

Rx AGC Enabled Check Box

The **RxAGC Enabled** check box indicates the phone audio includes an AGC. If selected, an AGC step is added to the phone RX audio. This results in a more consistent phone RX audio by increasing the level of low audio and decreasing the level of loud audio.

NOTE: This is a software driven AGC. The per line hardware AGC is not used.

Keep Alive Digits Enabled Check Box

The **Keep Alive Digits Enabled** check box indicates keep alive digits are generated at the remote site or responded to at a local site. Keep Alive Digits are responsible for verifying the phone connection status - active or inactive.

Star/Pound Keying Enabled Check Box

The **Star/Pound Keying Enabled** check box indicates an inbound caller on the phone line has the capability to control the radio connected to the opposite line of the IP-223. Used in conjunction with Auto Answer and Auto Disconnect Time, this function allows the user to key-up and key-down the radio. If selected, the inbound caller can key-up and key-down the radio connected to the opposite line of the IP-223. The star key (*) keys up the radio, the pound key (#) keys down the radio. Pushing double # hangs up the remote phone line.

Detect Tones Enabled Check Box

The **Detect Tones Enabled** check box indicates key-up tones detected on the phone line automatically keys up the radio on the opposite line of the IP-223. This parameter is used in Radio Phone Mode.

Hook Flash Time Field

The **Hook Flash Time** field identifies the amount of time, in ms, an offhook line is temporarily placed during a hook flash.

The range for this field is *0* to *9999ms*.

Network Call Timeout Field

The **Network Call Timeout** field identifies the amount of time, in minutes, before a network call is automatically placed onhook.

The range for this field is *0* to *60min.*

Station ID Field

The **Station ID** field is used to enter a unique ID number to identify the line. This ID is sent after an auto-answer event.

This field can contain up to *12 digits*.

Busy Channel Lockout Check Box

The **Busy Channel Lockout** check box is not available in Phone mode.

RP251/550 Setup

The **RP251/550 Setup** section is used to configure legacy PSTN radio control systems.

C550 Operation Enabled Check Box

The **C550 Operation Enabled** check box indicates operation of the C-550 console is enabled. If selected, operation of the C-550 console is enabled.

RP251 Operation Enabled Check Box

The **RP251 Operation Enabled** check box indicates operation of the RP-251 panel is enabled. If selected, operation of the RP-251 dial-up remote station panel is enabled.

RP251 Access Digits Field

The **RP251 Access Digits** field identifies the 1- to 3-digit access code assigned to the RP-251 panel.

The range for this field is *DTMF digits 0–9, A–D. ** or *#.*

RP251 Connect Digits Field

The **RP251 Connect Digits** field identifies the 1- to 3-digit connect code sent to the console at the time of connection.

The range for this field is *DTMF digits 0–9, A–D, ** or *#.*

Serial Port Mode

Serial Port Mode Drop Down Menu

The **Serial Port Mode** drop down menu is used to identify the specific radio interface for the serial port configuration. Selecting an item with a Scan List suffix enables a frequency scan list update function. The freq scan list function synchronizes the console scan list with the radio's scan list.

Available selections are *Normal* and *TDI*.
Default is *Normal*.

NOTE: Once this mode is changed and parameters saved, the system automatically resets.

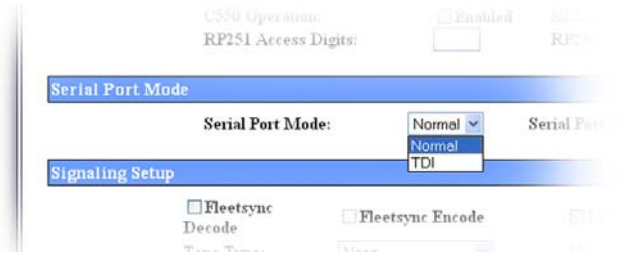


FIGURE 34. Serial Port Drop Down Menu—Phone Mode

Serial Port Parameters Drop Down Menu

The **Serial Port Params** drop down menu identifies the configuration of the serial port data speed and format. Serial port parameters refer to bit rate, parity, data bits, and stop bits. The Baud rate is used in phone mode. If phone mode is enabled on line 1, this is the rate used to connect to the IP-223 via the HyperTerminal.

The default setting for the field, *19200.N.8.1*.

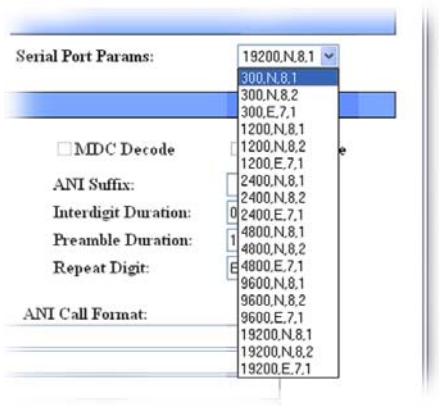


FIGURE 35. Serial Port Params Drop Down Menu—Phone Mode

Signaling Setup

The **Signaling Setup** section is used to set up encode, decode, tone type, digits pause and duration.

IMPORTANT: The FleetSync and MDC-1200 features in this section are optional IP-223 accessories. The “Additional Feature Setup Window” on page 133, must be also configured.

FleetSync Decode Check Box

The **FleetSync Decode** check box is used to enable FleetSync Over-the-Air decode. All inbound FleetSync messages are decoded by the IP-223 instead of the radio.

FleetSync Encode Check Box

The **FleetSync Encode** check box is used to enable FleetSync Over-the-Air encode. All outbound FleetSync messages are generated by the IP-223 instead of the radio.

MDC Decode Check Box

The **MDC Decode** check box is used to enable **OTA** (Over-the-Air) MDC-1200 decode. All inbound MDC-1200 messages are decoded by the IP-223 instead of the radio.

MDC Encode Check Box

The **MDC Encode** check box is used to enable OTA encode. All outbound MDC-1200 messages are generated by the IP-223 instead of the radio. Motorola encode features supported by the IP-223 include PTT ID, call alert, select call, radio check, remote monitor and radio disable/enable.

Tone Type Drop Down Menu

The **Tone Type** drop down menu, shown in Figure 29, identifies the signaling type used when receiving a call.

Available selections for this field are:

None
CCIR1
CCIR2
DTMF
DZVEI
EEA
EIA
EURO
KENWOOD 5TONE
MODAT
NATEL
PCCIR
PDZVEI
PZVEI
ZVEI1
ZVE12

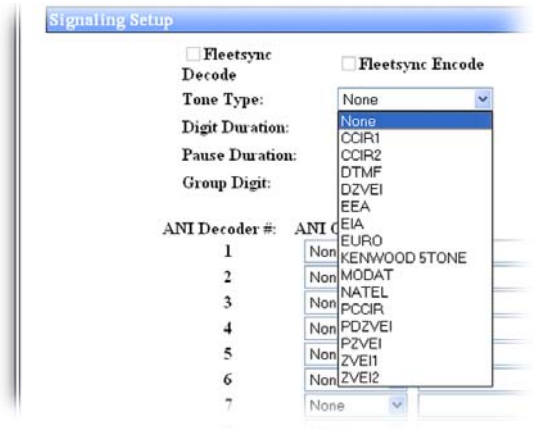


FIGURE 36. Tone Type Drop Down Menu

ANI Suffix Drop Down Menu

The **ANI Suffix** drop down menu, shown in Figure 30, identifies a 0- to 3-digit suffix is appended to the end of the ANI received.

Available selections for this field are *None, Emergency, Group, Individual,* and *Status*.

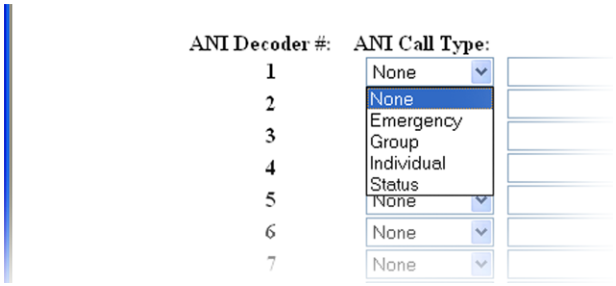


FIGURE 37. ANI Type Drop Down Menu

EXAMPLE: If you have a suffix 123 and the ANI 9876 is received, the IP-223 sends 9876123 to the consoles. This is useful if two (2) different lines have duplicate ANI IDs.

Digit Duration Field

The **Digit Duration** field identifies the length of time, in ms, the digit tone is decoded when it is active for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Interdigit Duration Field

The **Interdigit Duration** field identifies the length of time, in ms, between the digit tones for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

NOTE: Some radio systems require an extended first tone, to allow time to activate the receivers.

Pause Duration Field

The **Pause Duration** field identifies the length of time, in ms, allowed between received groups for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Preamble Duration Field

The **Preamble Duration** field identifies the length of time, in ms, the first tone is sent for the signaling type selected in the Tone Type drop down menu.

The range for this field is *0* to *100ms.*

Group Digit Field

The **Group Digit** field identifies the group digit. The group digit is a wild card that can represent any digit. Placing a group digit within a filter allows any digit appearing at that location in the tone string to pass through the filter.

The range for this field is *0–9, A–D, *,* or *# (DTMF tone types).*
The range for this field is *0–9, A–F, *,* or *# (all other tone types).*
The default for this field is *A.*

Repeat Digit Field

The **Repeat Digit** field identifies the digit that separates two (2) digits sent back to back. On occasion, radio system messages require two (2) of the same digits to be entered back to back. Use of repeat digits delimits tone duration ensuing continuous transitions.

The range for this field is *A–F.*
The default for this field is *E.*

ANI Decoder # Field

The **ANI Decoder #** field lists, in sequential order, the available ANI Decoders.

ANI Call Type Drop Down Menu

The **ANI Call Type** drop down menu, shown in Figure 31, identifies the type of call for the ANI Decoder #.

Available selections for this field are: *Emergency, Group, Individual*, or *Status*.

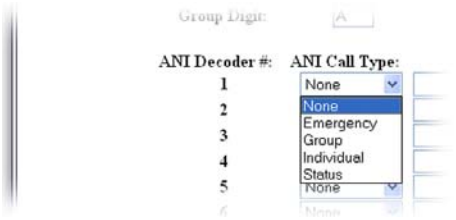


FIGURE 38. ANI Call Type Drop Down Menu—Per Line Setup

ANI Call Format Field

The **ANI Call Format** field identifies the call string format for the ANI Decoder #.

This field can contain up to *16 digits*.

NOTE: Use *0–9, A–D, **, and # for DTMF tone types or *0–9, A–F*, for all other tone types as well as the following characters:

I (Caller ID) - Placed into the ID field of the ANI packet or the ANI field of the caller portion of the telegram. The ID is stored as a 32-digit string in the packet.

G (Group Digits) - Stored in the Group section of the ANI packet. The group value is converted to a decimal number and is stored as an 8-digit string in the packet.

S (Status) - Digits represented by S are interpreted as status information. These values are converted to decimal numbers and stored as an 8-digit status string in the ANI packet. The console has a corresponding list of the status numbers and descriptions that are displayed upon receipt of the packet.

P (Pause) - When inserted into the string, a pause is expected in this location. The pause duration is set in the Pause Duration field (see “Pause Duration Field - Local and Tone Modes” on page 89).

R (Calling ID) - Used to delineate the location of the digits being used for a selective call. These digits represent the address or ID of the person being called. They are stored in the ANI packet as an 8-digit string.

Per Line Setup—iDEN Mode

The **Per Line Setup** window for iDEN Radio configuration, shown in Figure 39, appears when iDEN is selected from the Line Type drop down menu on the Multicast Address Setup window.

FIGURE 39. Per Line Setup—iDEN Radio Mode, View 1

Delay Setup

TX Delay Field

The **TX Delay** field identifies the delay, in ms, of TX audio. When TX Ethernet packets arrive, the PTT relay is closed and TX audio is delayed for the specified time. This provides the ability to overcome timing issues involving repeater attack time or trunking (clear to talk) delays.

The range for this field is *0* to *2000ms*.

RX Delay Field

The **RX Delay** field identifies the amount of time, in ms, RX audio is recorded and stored. RX audio is constantly recorded by the IP-223 and when a LAM or COR, triggered detect occurs, the IP-223 goes back the specified time of delay to start generating Ethernet packets. This provides the ability to prevent lost first syllables using LAM or COR.

The range for this field is *0* to *1000ms*.

Squelch Tail Delay Field

The **Squelch Tail Delay** field identifies the amount of time, in ms, the RX audio is muted after PTT occurs. This provides the ability to overcome squelch tail ping-pong in crosspatch modes by muting the radio RX input after PTT occurs.

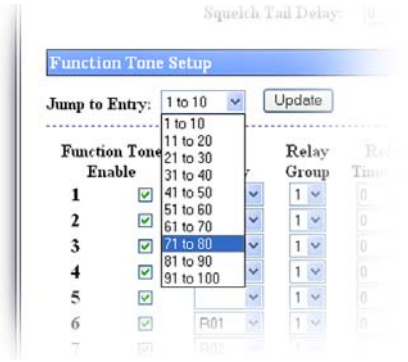
The range for this field is *0* to *5000ms*.

Function Tone Setup

Jump To Entry Drop Down Menu

The **Jump To Entry** drop down menu allows you to select function tones (in groups of 10) to view and modify.

1. From the Jump To drop down menu, select the **group of 10 function tones** you want to view.
2. Click **Update**.
   The function tones you select appear.



Go Button

The **Go** button is used to navigate to the page in the Jump to Entry Drop Down Menu.

Update Button

The **Update** button searches and displays the selection you choose from the Jump To drop down menu.

Function Tone Enable Check Box

The **Function Tone Enable** check box, if selected, indicates the function tone is active. The standard function tones and their frequencies are the default entries. See Table 14 on page 149. The frequency for the tone is set on the Tone Frequency and Durations window described on page 147.

NOTE: At least one (1) function tone must be selected.

Relay Drop Down Menu

The **Relay** drop down menu, shown in Figure 40, identifies the relay(s), if any, closed immediately upon receipt of the function tone.

Available selections for this field are *no selection*, *R01*, *R02*, or *BOTH*.

FIGURE 40. Relay Drop Down Menu—Per Line Setup

Relay Group Drop Down Menu

The **Relay Group** drop down menu identifies if a relay is grouped into separate functions. This allows more than one (1) relay to be activated at any particular time by being in separate groups.

EXAMPLE: When F1 has R1 selected as its relay, and F2 has R2 selected as its relay, setting the two (2) Relay Group numbers to the same value allows multiple relays with different functions. In this scenario, the relays for F1 and F2 are interlocked. When the Relay Group assigned to F1 and F2 are different, R2 does not activate when F1 is received. Furthermore, when there is no relay selected for a function tone, but the assigned relay group is used by another relay group, when the function tone is received, all relays in the group are activated. This allows relay R1 and R2 to be assigned to different groups and use other function tones within the same relay group to activate them.

Available selections are: *1*or *2*.

Relay Time (ms) Field

The **Relay Time (ms)** field identifies the selected relay(s) activated when the function tone is received, or the selected relay(s) is activated for a specified period of time when the function tone is received.

To **program the relay(s) to activate on when the function tone is received**, do the following:

> Enter a **0** in the field.

To **set the duration the relay(s) is activated**, do the following:

> Enter the desired **amount of time**, in ms, in the field.

The range for this field is *0 to 32000ms.*
H is high (on), *L* is low (off).

Call Type Drop Down Menu

The **Call Type** drop down menu, shown in Figure 41, identifies the iDEN radio call type.

Available selections for this field are *Direct Connect, Group Call, Call Alert,* and *Emergency Group Call.*

FIGURE 41. Call Type Drop Down Menu—iDEN Mode

iDEN Number Field

The **iDEN Number** field is used to enter the iDEN ID number for the function tone setup. Consult the manufacturer's technical data for ID formatting guidelines.

This field can contain up to *17 characters*.

Per Line Setup—iDEN, View 2

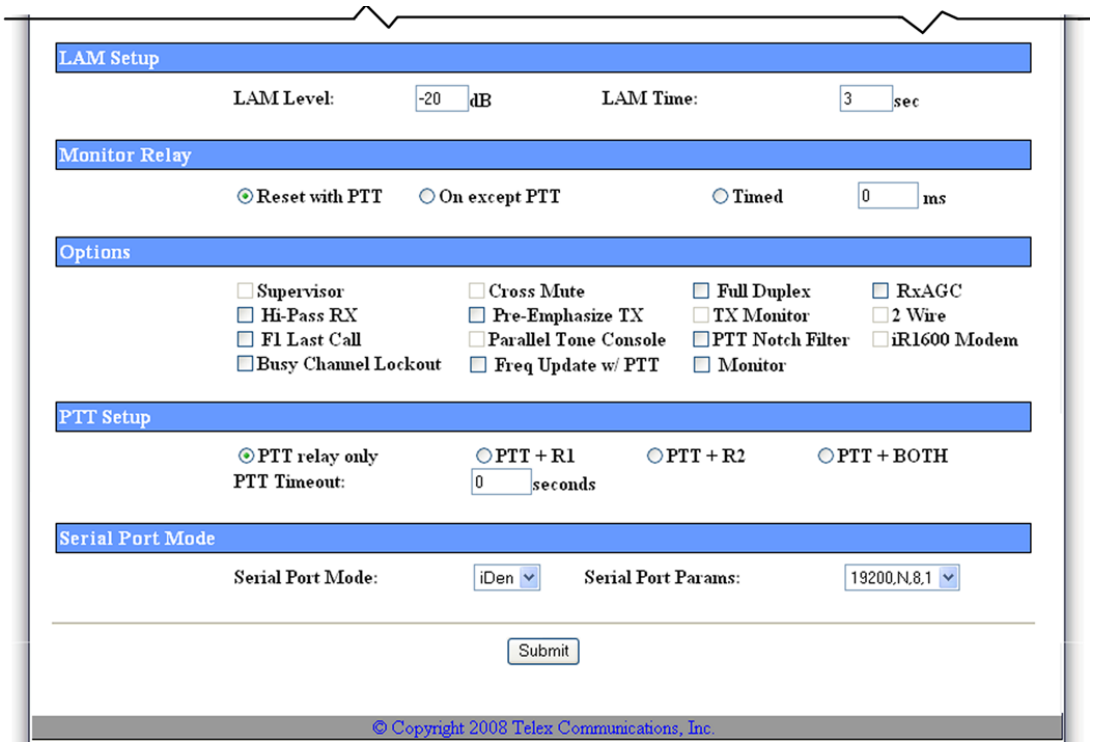


FIGURE 42. Per Line Setup—iDEN Mode, View 2

LAM Setup

LAM Level Field

The **LAM Level** field identifies the threshold, in dB, at which the radio/line unmutes and sends RX packets to the Ethernet.

The range for this field is *-50* to *+10dB.*

LAM Time Field

The **LAM Time** field identifies the amount of time, in seconds, the console continues to play audio when receiving audio above the LAM threshold specified in the LAM Level field. This entry is also used by the Ethernet to determine how long to send audio.

The range for this field is *0* to *60 sec*.

Monitor Relay

The **Monitor Relay** field provides the IP-223 the ability to decode a valid Ethernet packet and provide a relay-contact output to turn off the sub-audible-tone-decoder circuit in the radio receiver. This allows the console operator to monitor the line for other users before transmission (required by FCC regulations on stations equipped with CTCSS).

Available selections for this field are:

Reset with PTT - The monitor relay is activated from the time the monitor tone sequence is received until the next PTT operation.

On except PTT - The monitor relay is activated at all times except when PTT is active, whether the monitor function tone is received or not.

Timed - The monitor relay is activated for the amount of time, in ms, entered.

Options

If an **Options** field cannot be selected, the particular option is not available for the line number to which the details on the window apply.

Supervisor Check Box

The **Supervisor** check box is selectable only in tone and console modes. For more information, see “Supervisor Check Box - Tone and Console Modes” on page 83.

Crossmute Check Box

The **Crossmute** check box is selectable only in tone and console modes. For more information, see “Cross Mute Check Box - Tone and Console Modes” on page 83.

Full Duplex Check Box

The **Full Duplex** check box indicates full-duplex Ethernet is supported. If selected, full-duplex (TX and RX transmission) audio packets are allowed.

RxAGC Check Box

The **RxAGC** (Automatic Gain Control) check box indicates the radio RX audio includes an AGC. If selected, an AGC step is added to the radio RX audio. This results in the transmission of a more consistent radio RX audio by increasing the level of low audio and decreasing the level of loud audio.

Hi-Pass RX Check Box

The **Hi-Pass RX** check box indicates RX audio below 300Hz is blocked.

Pre-Emphasize TX Check Box

The **Pre-Emphasize TX** check box indicates TX audio includes a standard *6dB* octave pre-emphasis.

TX Monitor Check Box

The **TX Monitor** check box is selectable only in tone mode. For more information, see “TX Monitor Check Box - Tone Mode” on page 84.

2-Wire Check Box

The **2-Wire** check box is selectable only in local and console modes. From more information, see “2-Wire Check Box - Tone Mode” on page 84.

F1 Last Call Check Box

The **F1 Last Call** check box, if selected, indicates a call can be placed to the last transmitted or received iDEN Direct Connect number by pressing F1 on your keyboard.

Parallel Tone Console Check Box

The **Parallel Tone Console** check box is selectable only in Tone and Console modes. For more information, see “Parallel Tone Console Check Box - Tone and Console Modes” on page 84.

PTT Notch Filter Check Box

The **PTT Notch Filter** check box indicates the 2175Hz notch filter is bypassed. When selected, 2175Hz ±180Hz frequency range is ignored during PTT. Use this option when 2175Hz is blocking desirable audio.

iR1600 Modem Check Box

The **iR1600 Modem** check box, if selected, indicates the IP-223 can control an iR1600. An access key code (*also known as a hash code)* is required for this feature to be enabled. For more information. see “Enter Access Key Field” on page 133.

Busy Channel Lockout Check Box

The **Busy Channel Lockout** check box, if selected, indicates outgoing messages are placed in queue until the radio is idle. Messages can be lost when sent on half-duplex radios. Selecting this check box avoids lost messages. This feature is available on lines configured for FleetSync or MDC-1200.

Freq Update w/PTT Check Box

The **Freq Update w/PTT** check box indicates that a channel change is forced with each PTT. If not selected, channel changes occur only when the incoming channel is different than the previous channel.

Monitor Check Box

The **Monitor** check box indicates monitor function tone generation is allowed or allows serial monitor commands to be sent to the radio.

PTT Setup

The **PTT Setup** section allows a secondary external function to be controlled with a separate relay closure at the same time as the PTT relay. Select one of the following:

PTT relay only - When selected, only the PTT relay is closed. (Default Setting)

PTT + R1 - When selected, both the PTT relay and the R1 relay close at the same time.

PTT + R2 - When selected, both the PTT relay and the R2 relay close at the same time.

PTT + BOTH - When selected, the PTT relay, the R1 relay, and the R2 relay close at the same time.

PTT Timeout Field

The **PTT Timeout** field is used to configure the length of time, in seconds, the IP-223 allows the radio to key up. This function is used to prevent an extensive occupation of the interfaced radio.

The range for this field is *0* to *1800sec*.
Disable is *0*.

Serial Port Mode

Serial Port Mode Drop Down Menu

The **Serial Port Mode** drop down menu is used to identify the specific radio interface for the serial port configuration. Selecting an item with a Scan List suffix enables a frequency scan list update function. The Freq Scan List function synchronizes the console scan list with the radio's can list.

Available selection for this field is only *iDEN*.

NOTE: Once this mode is changed and parameters saved, the system automatically resets.

Serial Port Params Drop Down Menu

The **Serial Port Params** drop down menu identifies the configuration of the serial port data speed and format. Serial port parameters refer to bit rate, parity, data bits, and stop bits.

The default setting for this field, *19200.N.8.1*, is not configurable.

Per Line Setup—Tetra Mode

The **Per Line Setup** window for Tetra Radio configuration, shown in Figure 43, appears when Tetra is selected from the Line Type drop down menu on the Multicast Address Setup window.

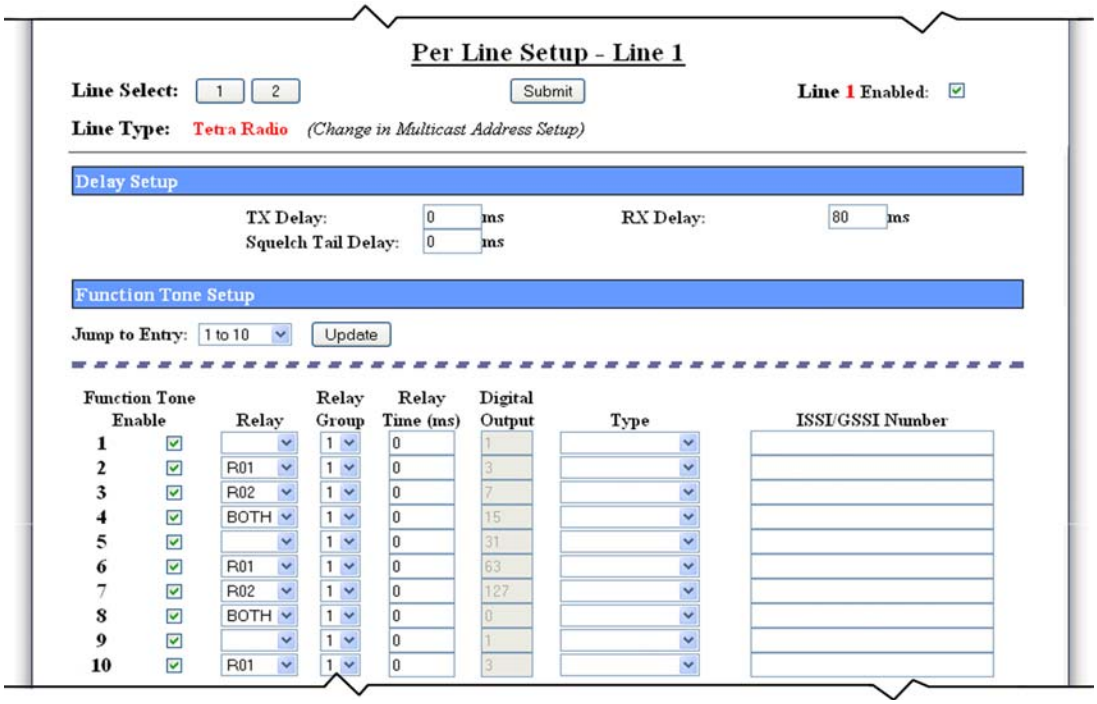


FIGURE 43. Per Line Setup—Tetra Mode, View 1

Delay Setup

TX Delay Field

The **TX Delay** field identifies the delay, in ms, of TX audio. When TX Ethernet packets arrive, the PTT relay is closed and TX audio is delayed for the specified time. This provides the ability to overcome timing issues involving repeater attack time or trunking (clear to talk) delays.

The range for this field is *0* to *2000ms*.

RX Delay Field

The **RX Delay** field identifies the amount of time, in ms, RX audio is recorded and stored. RX audio is constantly recorded by the IP-223 and when a LAM or COR triggered detect occurs, the IP-223 goes back the specified time of delay to start generating Ethernet packets. This provides the ability to prevent lost first syllables using LAM or COR.

The range for this field is *0* to *1000ms*.

Squelch Tail Delay

The **Squelch Tail Delay** field identifies the amount of time, in ms, the RX audio is muted after PTT occurs. This provides the ability to overcome squelch tail ping-pong in crosspatch modes by muting the radio RX input after PTT occurs.

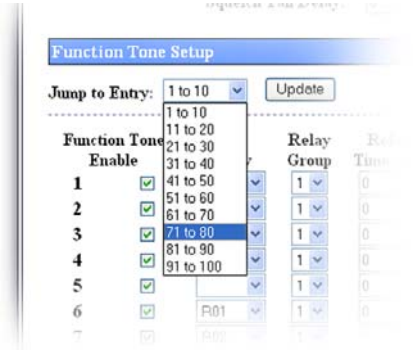
The range for this field is *0* to *5000ms*.

Function Tone Setup

Jump To Entry Drop Down Menu

The **Jump To Entry** drop down menu allows you to select function tones (in groups of 10) to view and modify.

1. From the Jump To drop down menu, select the **group of 10 function tones** you want to view.
2. Click **Update**.
   The function tones you select appears.



Update Button

The **Update** button searches and displays the selection you choose from the Jump To drop down list.

Tone Enable Check Box

The **Tone Enable** check box, if selected, indicates the function tone is active. The frequency for the tone is set on the Tone Frequency and Durations window described on page 147. The standard function tones and their frequencies are the default entries. These entries are shown in Table 14 on page 149.

NOTE: At least one (1) function tone must be selected.

Relay Drop Down Menu

The **Relay** drop down menu identifies the relay(s), if any, closed immediately upon receipt of the function tone.

Available selections for this field are *no selection*, *R01*, *R02*, or *BOTH*.

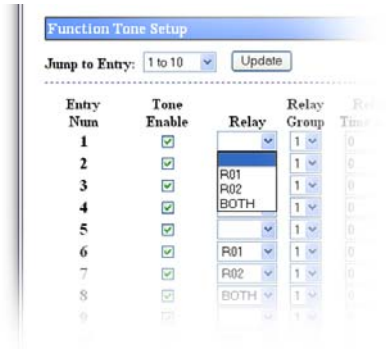


FIGURE 44. Relay Drop Down Menu

Relay Group Drop Down Menu

The **Relay Group** drop down menu identifies if a relay is grouped into separate functions. This allows more than one (1) relay to be activated at any particular time by being in separate groups.

EXAMPLE: When F1 has R1 selected as its relay, and F2 has R2 selected as its relay, setting the two (2) Relay Group numbers to the same value allows multiple relays with different functions.
In this scenario, the relays for F1 and F2 are interlocked. When the Relay Group assigned to F1 and F2 are different, R2 does not activate when F1 is received. Furthermore, when there is no relay selected for a function tone, but the assigned relay group is used by another relay group, when the function tone is received, all relays in the group are activated. This allows relay R1 and R2 to be assigned to different groups and use other function tones within the same relay group to activate them.

Available selections are: *1* or *2*.

Relay Time (ms) Field

The **Relay Time (ms)** field indicates the selected relay(s) activate when the function tone is received, or if the selected relay(s) is activated for a specified period of time when the function tone is received.

The range for this field is *0* to *32000*ms.

To **program the relay(s) to activate on when the function tone is received**, do the following:

> Enter a **0** in the field.

To **set the duration the relay(s) is activated**, do the following:

> Enter the desired **amount of time**, in ms, in the field.

Type Drop Down Menu

The **Type** drop down menu, shown in Figure 45 identifies the type of call for Sepura radio configuration.

Available options for this field are:

Trunked GC (Group Call) - A half duplex point-to-multi-point call where immediate communication takes place between the calling and the called users.

Trunked HDPC (Half Duplex Private Call) - A half duplex point-to-point call between caller and called units. Each unit asks permission to transmit before each transaction.

Trunked UDSL (User Defined Scan List) - A scan of specific groups predefined in the radio and in the IP-223. A UDSL is a collection of pre-defined talk group (or function tone) settings. The UDSL string entered in the ISSI/GSSI Number field is separated by the semicolon. It can accept up to 10 trunked groups.

Direct GC - Communication with other TETRA radios without the use of the network. This is called **DMO** (Direct Mode Operation).

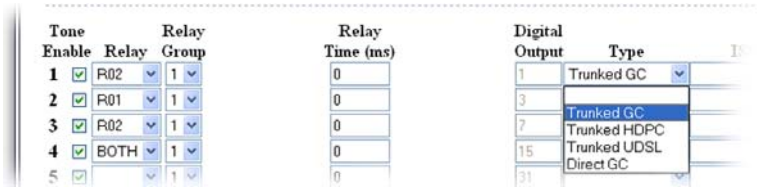


FIGURE 45. Type Drop Down Menu—Tetra Mode

ISSI/GSSI Number Field

The **ISSI/GSSI Number** field identifies the group number or unit number for the selected Sepura radio type.

Per Line Setup—Tetra Mode, View 2

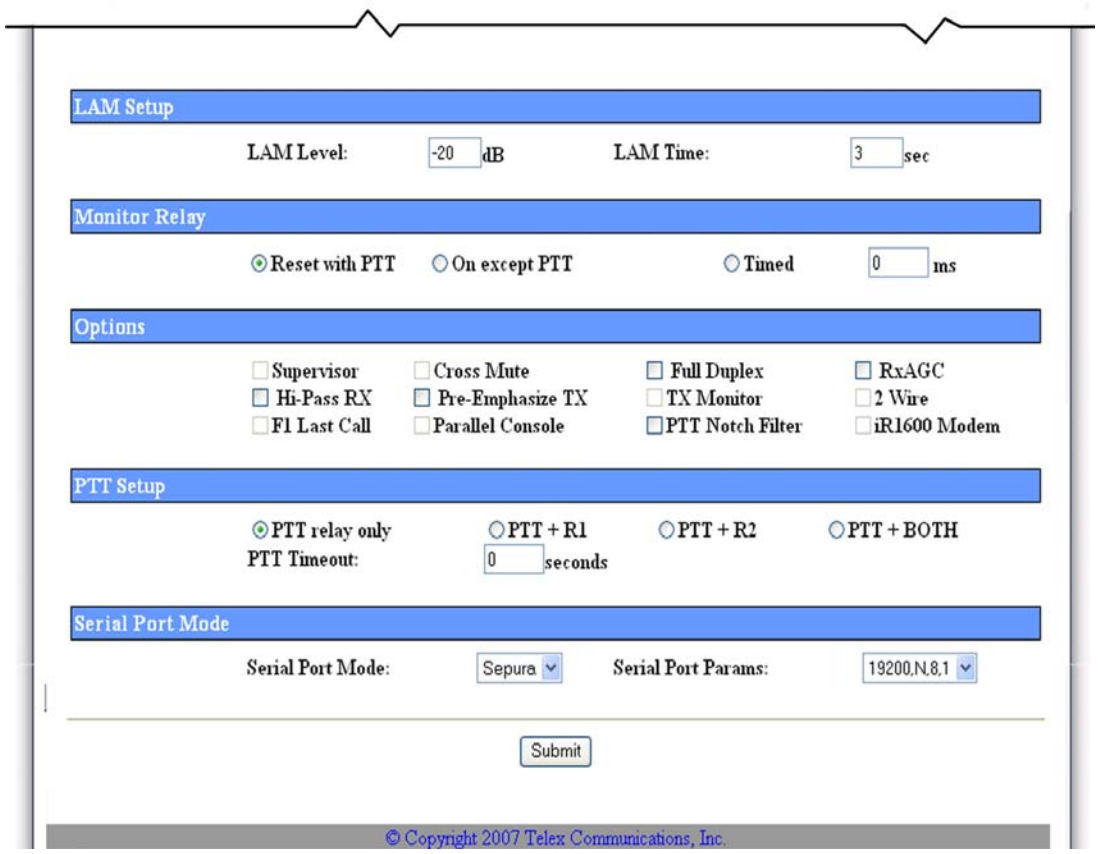


FIGURE 46. Per Line Setup—Tetra Mode, View 2

LAM Setup

LAM Level Field

The **LAM Level** field identifies the threshold, in dB, at which the radio/line unmutes and sends RX packets to the Ethernet.

The range for this field is *-50* to *+10dB.*

LAM Time Field

The **LAM Time** field identifies the amount of time, in seconds, the console continues to play audio when receiving audio above the LAM threshold specified in the LAM Level field. This entry is also used by the Ethernet to determine how long to send audio.

The range for this field is *0* to *60 sec*.

Monitor Relay

The **Monitor Relay** field provides the IP-223 the ability to decode a valid Ethernet packet and provide a relay contact output to turn off the sub-audible-tone-decoder circuit in the radio receiver. This allows the console operator to monitor the line for other users before transmission. This is required by FCC regulations on stations equipped with CTCSS.

Available selections for this field are:

Reset with PTT - The monitor relay is activated from the time the monitor tone sequence is received until the next PTT operation.

On except PTT - The monitor relay is activated at all times except when PTT is active, whether the monitor function tone is received or not.

Timed - The monitor relay is activated for the amount of time, in ms, entered.

Options

If an **Options** field cannot be selected, the particular option is not available for the line number the details apply to.

Supervisor Check Box

The **Supervisor** check box is selectable only in tone and console modes. For more information, see Figure “Supervisor Check Box - Tone and Console Modes” on page 83.

Cross Mute Check Box

The **Cross Mute** check box is selectable only in tone and console modes. For more information, see “Cross Mute Check Box - Tone and Console Modes” on page 83.

Full Duplex Check Box

The **Full Duplex** check box indicates full-duplex Ethernet is supported. If selected, full-duplex (TX and RX transmission) audio packets are allowed.

RxAGC Check Box

The **RxAGC** check box indicates whether or not the radio RX audio includes an AGC. If selected, an AGC step is added to the radio RX audio. This results in the transmission of a more consistent radio RX audio by increasing the level of low audio and decreasing the level of loud audio.

Hi-Pass RX Check Box

The **Hi-Pass RX** check box indicates RX audio below 300Hz is blocked. If selected, RX audio below 300Hz is blocked.

Pre-Emphasize TX Check Box

The **Pre-Emphasize TX** check box indicates whether or not TX audio includes a standard 6dB octave pre-emphasis. If selected, a standard 6dB octave pre-emphasis is included in the TX audio.

TX Monitor Check Box

The **TX Monitor** check box is selectable only in tone mode. For more information, see “TX Monitor Check Box - Tone Mode” on page 84.

2-Wire Check Box

The **2-Wire** check box is selectable only in local and console modes. For more information, see “2-Wire Check Box - Tone Mode” on page 84.

F1 Last Call Check Box

The **F1 Last Call** check box is selectable only in iDEN mode. For more information, see “F1 Last Call Check Box - Local, Tone, and Console Modes” on page 84.

Parallel Console Check Box

The **Parallel Console** check box is selectable only in tone and console modes. For more information, see “Parallel Tone Console Check Box - Tone and Console Modes” on page 84.

PTT Notch Filter Check Box

The **PTT Notch Filter** check box indicates the 2175Hz notch filter is bypassed. When selected, 2175Hz ±180Hz frequency range is ignored during PTT. Use this option when 2175Hz is blocking desirable audio.

iR1600 Check Box

The **iR1600** check box is selectable only in iDEN mode. Fro more information, see “iR1600 Modem Check Box” on page 108.

Freq Update w/PTT Check Box

The **Freq Update w/PTT** check box indicates that a channel change is forced with each PTT. If not selected, channel changes occur only when the incoming channel is different than the previous channel.

Monitor Check Box

The **Monitor** check box indicates monitor function tone generation is allowed or allows serial monitor commands to be sent to the radio.

PTT Setup

The **PTT Setup** box allows a secondary external function to be controlled with a separate relay closure at the same time as the PTT relay. Select one (1) of the following:

PTT relay only - When selected, only the PTT relay is closed. (Default Setting)

PTT + R1 - When selected, both the PTT relay and the R1 relay close at the same time.

PTT + R2 - When selected, both the PTT relay and the R2 relay close at the same time.

PTT + BOTH - When selected, the PTT relay, the R1 relay, and the R2 relay close at the same time.

PTT Timeout Field

The **PTT Timeout** field is used to indicate how long, in seconds, to allow PTT to be active when no audio is transmitted. If a time is entered in the field, PTT activity times out when no audio is transmitted for the designated amount of time. This feature is useful in cases where the line goes offhook for an indefinite period of time due to a stuck PTT key.

The range for this field is *0* to *1800 sec*.
Disabled is *0*.

Serial Port Mode

Serial Port Mode Drop Down Menu

The **Serial Port Mode** drop down menu is used to identify the specific radio interface for the serial port configuration. Selecting an item with a Scan List suffix enables a frequency scan list update function. The Freq Scan List function synchronizes the console scan list with the radio's scan list.

By default, the serial port in Tetra mode is only *Sepura*.

NOTE: Once this mode is changed and parameters saved, the system automatically resets.

Serial Port Params Drop Down Menu

The **Serial Port Params** drop down menu identifies the configuration of the serial port data speed and format. Serial port parameters refer to bit rate, parity, data bits, and stop bits.

The default setting for this field, *19200.N.8.1*, is not configurable.

Save to EEPROM Window

The **Save to EEPROM** window, shown in Figure 47, is used to save the current configuration to the IP-223 or to reset the parameters on the configuration web page to the last configuration saved to the IP-223.

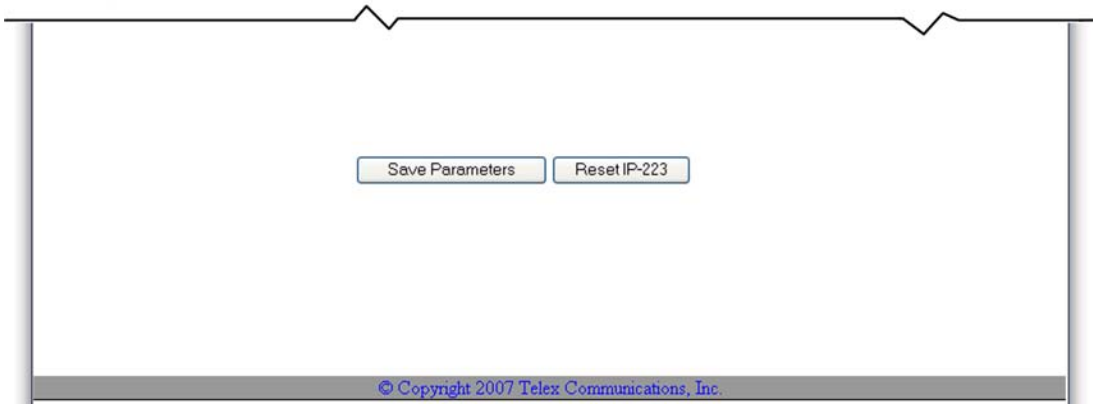


FIGURE 47. Save to EEPROM

Save Parameters Button

The **Save Parameters** button is used to save any changes submitted to the IP-223 for storage into permanent memory.

Reset IP-223 Button

The **Reset IP-223** button is used to perform a full reset of the IP-223. This is the software equivalent of a power down reset.

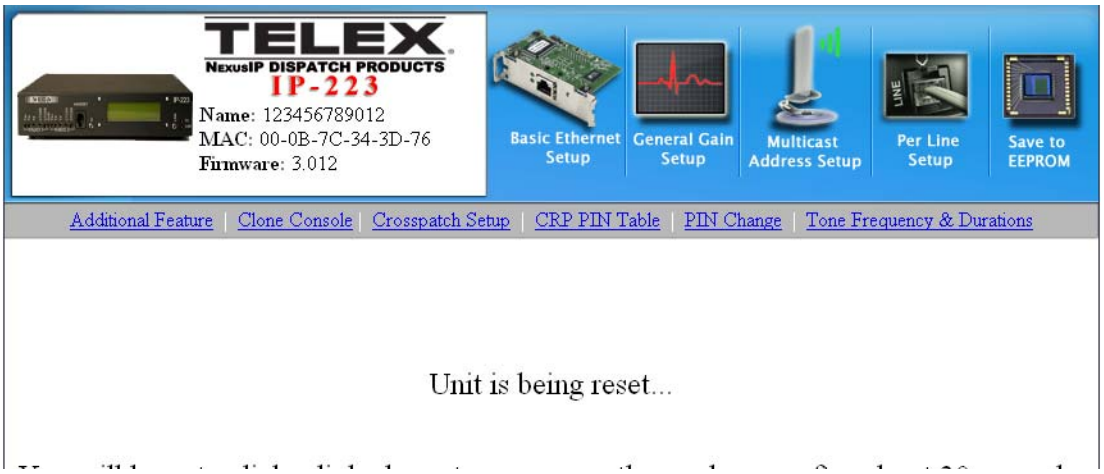
To **save changes to permanent memory**, do the following:

1. Click **Save to EEPROM**.
   The Save Setup Parameters window appears.
2. Click **Save Parameters**.
   The parameters are saved to permanent memory.

NOTE: Clicking **Submit** saves changes in temporary memory only.

To **reset the IP-223**, do the following:

1. Click **Save to EEPROM**.
   The Save Setup Parameters window appears.
2. Click **Reset IP-223.**
   A momentary loss of connectivity occurs. The connection is restored after several seconds.
3. Click a **link** to access a setup window, otherwise close the web browser.



Account Setup Window

The **Account Setup** window, shown in Figure 48, allows you to manage system and user accounts.

System Accounts

By default, the IP-223 comes with two (2) **system accounts** created: *admin* and *user.* Upon first use, there are no passwords set for either account. You can change the passwords for both of the accounts, if desired. These are the only system accounts allowed.

Admin System Account

The **Admin System** account has privileges to change, modify or delete anything within the IP-223 software configuration. The account rights are not configurable, except for the password.

User System Account

The **User System** account is used to manage the system user account password. The system user account is in edit mode when the username field is highlighted yellow.

Created Accounts

Created Accounts are user-defined accounts that may have different defined permissions to selected areas of the IP-223 configuration software.

Up to *five (5) accounts* can be created.

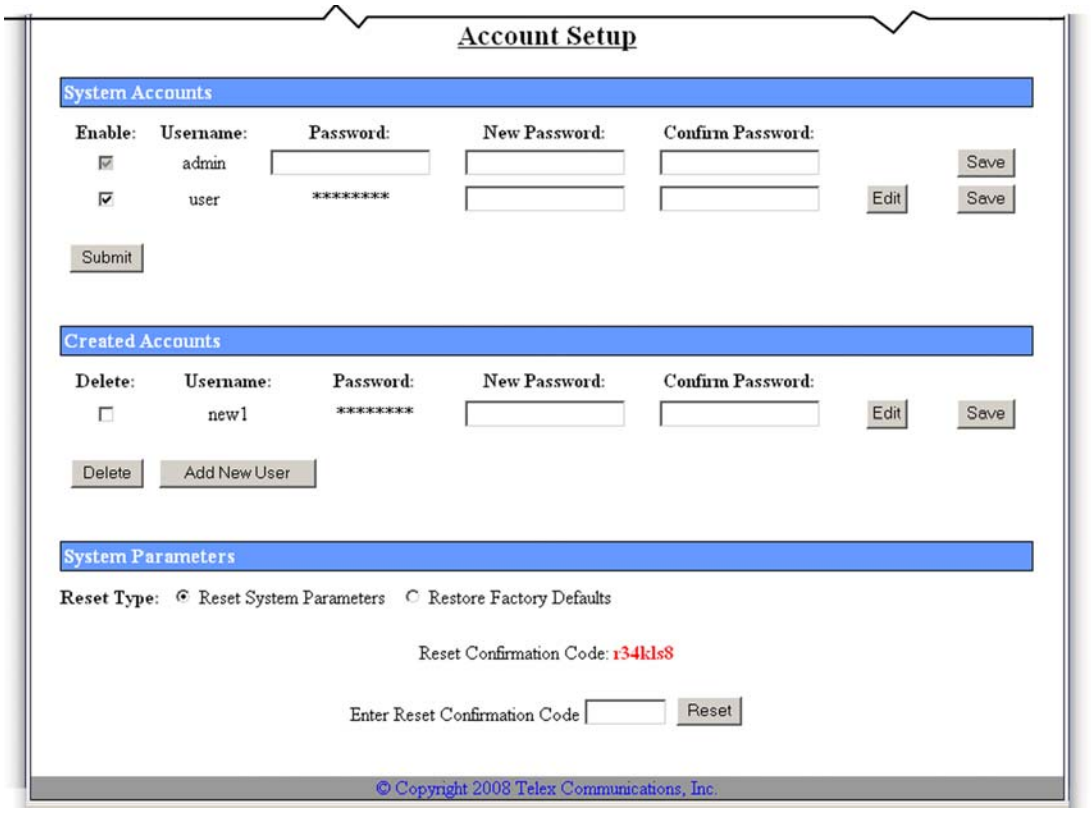


FIGURE 48. Account Setup

System Accounts

Enable Check Box

The **Enable** check box indicates whether the username is active. When selected, the username is active.

NOTE: The admin system account is always enabled.

Username Column

The **Username** column displays the username of the system account. This field is not configurable.

Password Field

The **Password** field displays the password for the system account. The password is shown in asterisks (******) for security purposes.

NOTE: The admin password field is always blank, whether or not an admin password is assigned.

The range for this field is a *4–16 character* alphanumeric password.

New Password Field

The **New Password** field is used to enter a new password for the system account.

The range for this field is a *4–16 alphanumeric character*s.

To **set a new password**, do the following:

1. In the password field, enter the **current password**.
   Asterisks representing the characters appear in the field.

   NOTE: If no password is required, leave this field blank.
2. In the New Password field, enter the **new password.**
   Asterisks representing the characters appear in the field.
3. In the Confirm Password field, re-enter the **new password**.
4. Click **Save**.
   The success message appears.

5. Click **Submit**.
   The changes are sent to the IP-223 console.
6. Click **Save to EEPROM**.
   The Save to EEPROM window opens.
7. Click **Save Parameters**.
   Changes are now permanently save to the IP-223.

Confirm Password Field

The **Confirm Password** field is used to confirm the password you entered in the New Password field.

This password must match the password entered in the New Password field.

Edit Button

The **Edit** button is used to make changes to the User system account password. The edit button is inactive until the user account is enabled.

NOTE: The admin account can not be modified.

To **enable the user account**, do the following:

1. Select the **Enable** check box next to the account,
2. Click **Submit**.
   The edit button becomes active.

   NOTE: The only configurable fields are the New Password field and the Confirm Password field. Also, when the Edit window is open, a Set No Password check box appears. For more information, see “Edit User Accounts Window” on page 125.

Save Button

The **Save** button is used to temporarily save changes to the system account.

NOTE: Click **Submit** to save the change to the console.

Submit Button

The **Submit** button, located at the bottom of each configuration window, is used to upload changes to the IP-223. Clicking Submit saves changes in temporary memory only.

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

1. Click **Submit**. 

   The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

   The Save to EEPROM window opens.
3. Click **Save Parameters**. 

   Changes are now permanently saved to the IP-223 console

Created Accounts

Delete, Username, Password, New Password, Confirm Password Display Columns

The **Delete**, **Username**, **Password**, **New Password**, **Confirm Password** columns display the existing user accounts you have created.

To **delete an account**, do the following:

1. Select the **Delete** check box for the account you want to delete.
2. Click **Delete**.
3. Click **Submit**. 

4. Click **Save to EEPROM**. 

The Save to EEPROM window opens.
5. Click **Save Parameters**. 

Changes are now permanently save to the IP-223.

To **change a created account password**, do the following:

1. In the New Password field, enter a **password**.
2. In the Confirm Password field, enter the **same password used in step 1**.
3. Click **Save**.
4. Click **EEPROM**.
5. Click **Save Parameters**.
Changes are now permanently saved to the IP-223 console.

Delete Button

The **Delete** button is used to delete the selected user account(s). User accounts are marked for deletion by selecting the Delete check box.

Add New User Button

The **Add New User** button opens the Create New User window. From this window, you can create a user profile with selectable permissions. For more information, see “Add New User Window” on page 128.

System Parameters

Reset System Parameters Button

The **Reset System Parameters** button resets all parameters, except multicast and port numbers, in the IP-223 to the factory defaults.

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

1. Select the **Reset System Parameters** radio button.
2. In the reset confirmation code number field, enter the **reset confirmation code number**.
3. Click **Reset**.
4. Click **Save to EEPROM**.
5. Click **Save Parameters**.
   System settings on both the console and browser configuration windows are reset.
   OR
   Click **Reset IP-223**, to undo and restore system parameters to the last saved configuration.
   System settings on both the console and the browser configuration windows are set to the previously saved version.

Restore Factory Defaults Radio Button

The **Restore Factory Defaults** radio button is used to restore the configuration webpages to the factory default settings. All previously entered settings are deleted from all browser configuration windows.

The console settings are not restored until the Reset button is clicked and the changes are saved to EEPROM.

NOTE: The parameters can be restored if the settings have not been saved to the console with the Save Parameters button. An undo is accomplished by clicking **Reset**.

To **restore the factory defaults**, do the following:

1. Select the **Restore Factory Defaults** radio button.
2. In the reset confirmation code number, enter the **reset confirmation code number**.
3. Click **Reset**.
   Parameters are reset or factory defaults restored, depending on selection.
4. Click **Save to EEPROM**.
5. Click **Save Parameters**.
   Factory default settings are restored to the browser configuration windows.
   OR
   Click **Reset IP-223**, to undo and restore system parameters to the last saved.
   System settings on both the console and the browser configuration windows are set to the previously saved version.

Reset Confirmation Code Number

The **Reset Confirmation Code Number** indicates permission to reset system parameters is granted.

Enter Reset Confirmation Code Field

The **Enter Reset Confirmation Code** field is used to enter the reset confirmation code number. Once the code is entered, the software recognizes the user is authorized to make the change.

The Reset Confirmation Code Number is generated by the firmware and appears in the window.

Reset Button

The **Reset** button is used to send changes to the browser configuration windows.

To **permanently save the change**, do the following:

1. Select the **Reset System Parameters** radio button.
   OR
   Select the **Restore Factory Defaults** radio button.
2. In the reset confirmation code number, enter the **reset confirmation code number**.
3. Click **Reset**.
4. Click **Save to EEPROM.**
   The EEPROM window opens.
5. Click **Save Parameters.**
   Factory default settings are restored to the browser configuration windows.
   OR
   Click **Reset IP-223**, to undo and restore system parameters to the last saved configuration.
   System settings on both the console and the browser configuration windows are set to the previously saved version.

Edit User Accounts Window

The **Edit User Account** window, shown in Figure 49, is used to edit the user system account. You can only change the password or set no password from this window.

By default, the System User Account has access to only the default admin pages Tone Freqs and General Gain Setup, ID Directory, and Save to EEPROM.

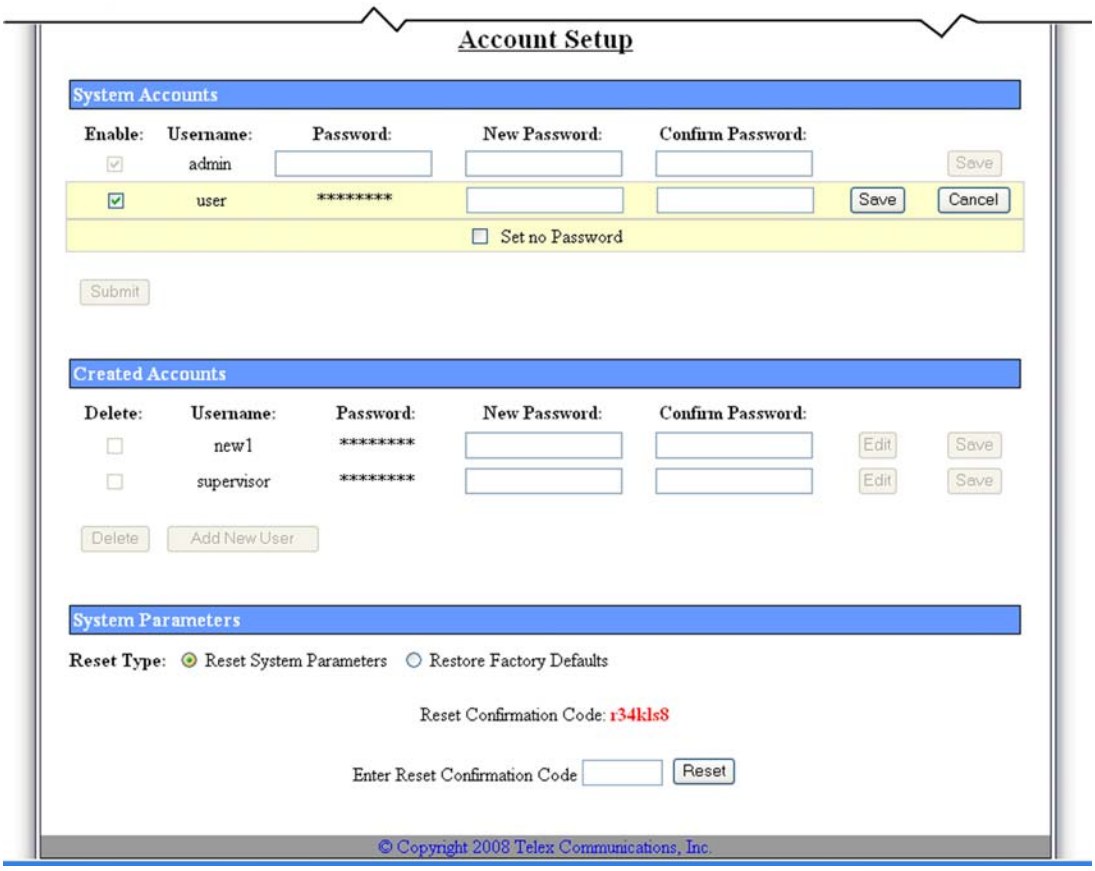


FIGURE 49. Edit User Account

Once you have made change to the user system account, the following message appears at the top of the Account Setup window.

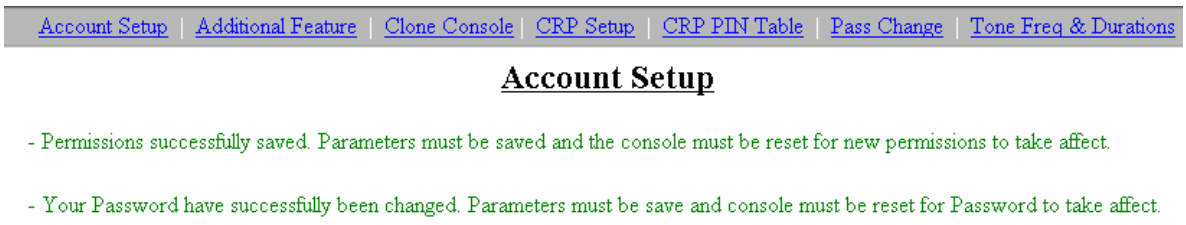


FIGURE 50. Success Message

NOTE: The information is not stored in permanent memory until it is saved. For more information, see “Save Parameters Button” on page 117.

To **change the admin System Account Password**, do the following:

1. In the Current Password field, enter the **current password**.
   OR
   Leave **blank** if no password is required.
2. In the New Password field, enter a **new password**.
   Asterisks appear for each character.
3. In the Confirm Password field, enter the **password** again.
   Asterisks appear for each character.
4. Click **Save**.
5. Click **Save to EEPROM**.
   The Save to EEPROM window appears.
6. Click **Save Parameters** to save the changes to the IP-223.

To **change the system account password from an actual password to no password**, do the following:

1. Leave the N**ew Password** and **Confirm password fields** blank.
2. Click **Save**.
3. Click **Save to EEPROM**.
   The Save to EEPROM window appears.
4. Click **Save Parameters** to save the changes to the IP-223

To **change the user system account password or edit the account**, do the following:

1. Select the **Enable** check box next to the *user* username.
2. Click **Submit**.
   Once enabled, the New Password, Confirm Password fields, Edit and Save buttons become active.
3. In the New Password field, enter a **new password**.
   The password can be 4-16 alpha-numeric characters in length.
4. In the Confirm Password field, enter the **password** again.
5. Click **Save**.
6. Click **Save to EEPROM**.
   The Save to EEPROM window appears.
7. Click **Save Parameters** to save the changes to the IP-223.

Set No Password Check Box

The **Set No Password** check box is used to indicate the account does not require a password.

To **set no password for the system user account**, do the following:

1. Under the New Password column, select the **Set No Password** check box.
2. Click **Save**, to save changes and return to the Account Setup window.
   OR
   Click **Cancel**, to discard changes and return to the Account Setup window.
   Once you have made the changes to the system user account and your changes have been accepted, a message appears at the top of the Account Setup window.

Save Button

The **Save** button is used to temporarily save changes.

Cancel Button

The **Cancel** button discards the user account settings you have made and reopens the Account Setup window.

To **permanently save the new password**, do the following:

1. Click **Submit**. 

2. Click **Save to EEPROM**. 

The Save to EEPROM window opens.

3. Click **Save Parameters**. 

Changes are now permanently save to the IP-223.

Add New User Window

The **Add New User** window, shown in Figure 51, is used to create a new user account. From this window, you can assign permissions to certain users.

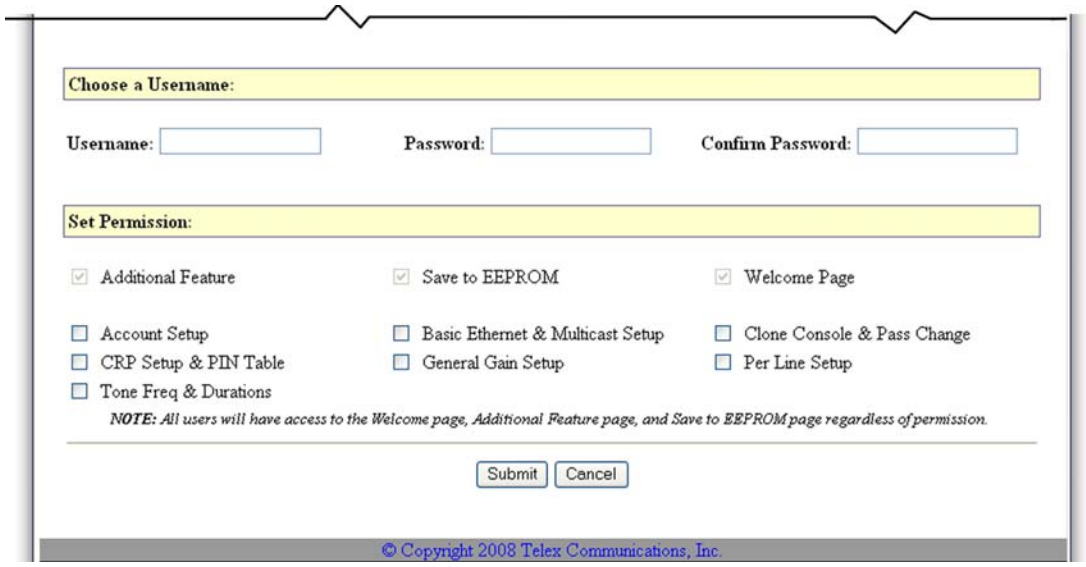


FIGURE 51. Add New User—Account Setup

Choose a Username

Username Field

The **Username** field identifies the username of the account you are creating.

This field can contain up to *16 alphanumeric characters*.

Password Field

The **Password** field identifies the password required to log on to this user account.

The range for this field is a *4–16 alphanumeric* password.

Confirm Password Field

The **Confirm Password** field is used to confirm the password you entered into the Password field. This password must match exactly with the Password field entry.

Set Permissions

Additional Feature Check Box

The **Additional Feature** check box indicates access is granted to make changes to the Additional Feature page. This permission is automatically granted to every user and is not configurable.

Save To EEPROM Check Box

The **Save to EEPROM** check box indicates permission is granted to use the Save to EEPROM window. By default, permission to change configurations in this window is granted on every created account. For more information, see “Save to EEPROM Window” on page 117.

Welcome Page Check Box

The **Welcome Page** check box indicates permission is granted to change the name of the console’s Welcome window. By default, permission to change the name of this window is granted on every created account. For more information, see “Welcome Window” on page 53.

Account Setup Check Box

The **Account Setup** check box indicates access is granted to the Account Setup window.

Basic Ethernet & Multicast Setup Check Box

The **Basic Ethernet Setup** check box indicates permission is granted to the Basic Ethernet Setup and Multicast Address Setup windows where changes can be made by the user. For more information, see “Basic Ethernet Setup Window” on page 55, and “Multicast Address Setup Window” on page 65.

Clone Console & Pass Change Check Box

The **Clone Console & Pass Change** check box indicates permission is granted to the Clone Console and Pass Change windows where changes can be made by the user. For more information, see “Clone Console Window” on page 135, and “Pass Change Window” on page 146.

CRP Setup & PIN Table Check Box

The **CRP Setup & PIN Table** check box indicates access is granted to make changes to the CRP Setup and PIN Table pages. Users are able to make changes to these pages.

General Gain Check Box

The **General Gain** check box indicates access is granted to make changes to the General Gain page. This permission is automatically granted to every user and is not configurable.

Per Line Setup Check Box

The **Per Line Setup** check box indicates access is granted to make changes to the Per Line Setup page. When enabled, users are able to make changes to the page.

Tone Freq & Durations Check Box

The **Tone Freq & Durations** check box indicates access is granted to make changes to the Tone Freq & Durations page. When enabled, users are able to make changes to the page.

Cancel Button

The **Cancel** button discards the user account settings you have made and reopens the Account Setup window.

Submit Button

The **Submit** button is used to upload changes to the IP-223.

NOTE: Clicking **Submit** saves changes in temporary memory only.

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

1. Click **Submit**. 

The changes are sent to the IP-223 in temporary storage.

2. Click **Save to EEPROM**. 

The Save to EEPROM window opens.

3. Click **Save Parameters**. 

Changes are now permanently saved to the IP-223 console.

Back to Account Setup Button

The **Back to Account Setup** button, shown in Figure 52, appears when Submit is clicked from the Add New User window. Use the Back to Account Setup button to navigate back to the Account Setup window.

FIGURE 52. Create New User Success Message

Add Another User Button

The **Add Another User** button is used to navigate back to the Add New User window.

Edit Created Accounts Window

The **Edit Created Account** window, shown in Figure 53, is used to edit permissions granted to a user account.

NOTE: The Edit button is not active until an account has been created.

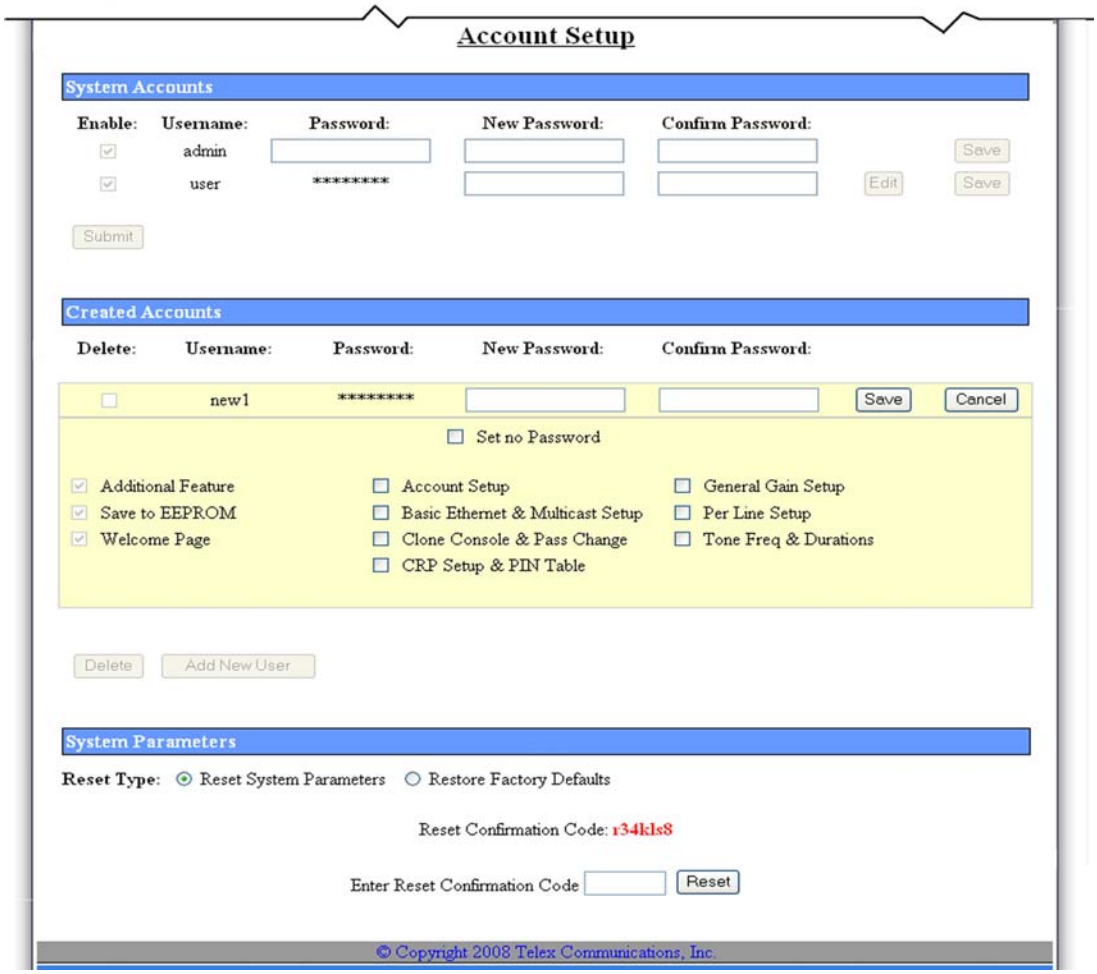


FIGURE 53. Edit Created Account

Created Accounts

To **edit a created account**, do the following:

1. From the Edit Create Accounts window, select or clear **check boxes** to grant or remove permissions.
   Permissions change based on selections.

   NOTE: For check box descriptions see “Set Permissions” on page 128.

2. Click **Save**.
   A message appears.
   OR
   Click **Cancel** to discard changes.

New Password Field

The **New Password** field is used to enter a new password for the account you are creating.

The range for this field is a *4–16 character* alphanumeric password.

Confirm Password Field

The **Confirm Password** field is used to confirm the password you entered in the password field. This password must match the password entered in the New password field.

To **change the password for the created account**, do the following:

1. In the New Password field, enter a **new password**.
2. In the Confirm password field, enter the **same password used in step 1**,
3. Click **Save**.
   The Account Setup window opens.
4. Click **Save to EEPROM**.
   The Save to EEPROM window opens.
5. Click **Save Parameters**.
   Changes are now permanently saved to the IP-223 console.

Save Button

The **Save** button is used to save the changes to temporary memory.

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

1. Click **Save**.
2. Click **Save to EEPROM**.
   The Save to EEPROM window opens.
3. Click **Save Parameters**.
   Changes are now permanently saved to the C-6200 console.

Additional Feature Setup Window

The **Additional Feature Setup** window, shown in Figure 54, activates special features enabled by purchasing an option string from Telex. Examples of special features are Kenwood's Fleetsync and Motorola's MDC1200 Over-the-Air ANI decoder. For more information, contact Telex Sales. Have the unit serial number available when purchasing this option.

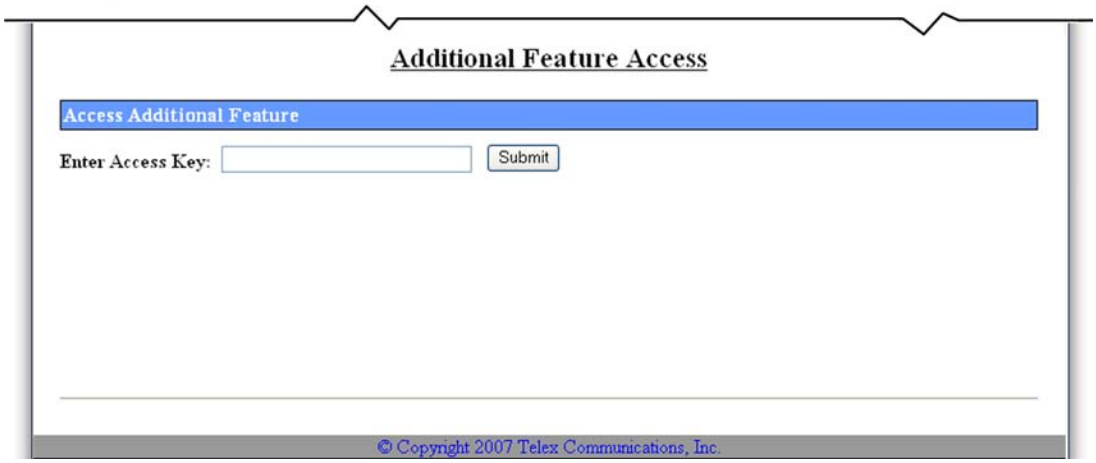


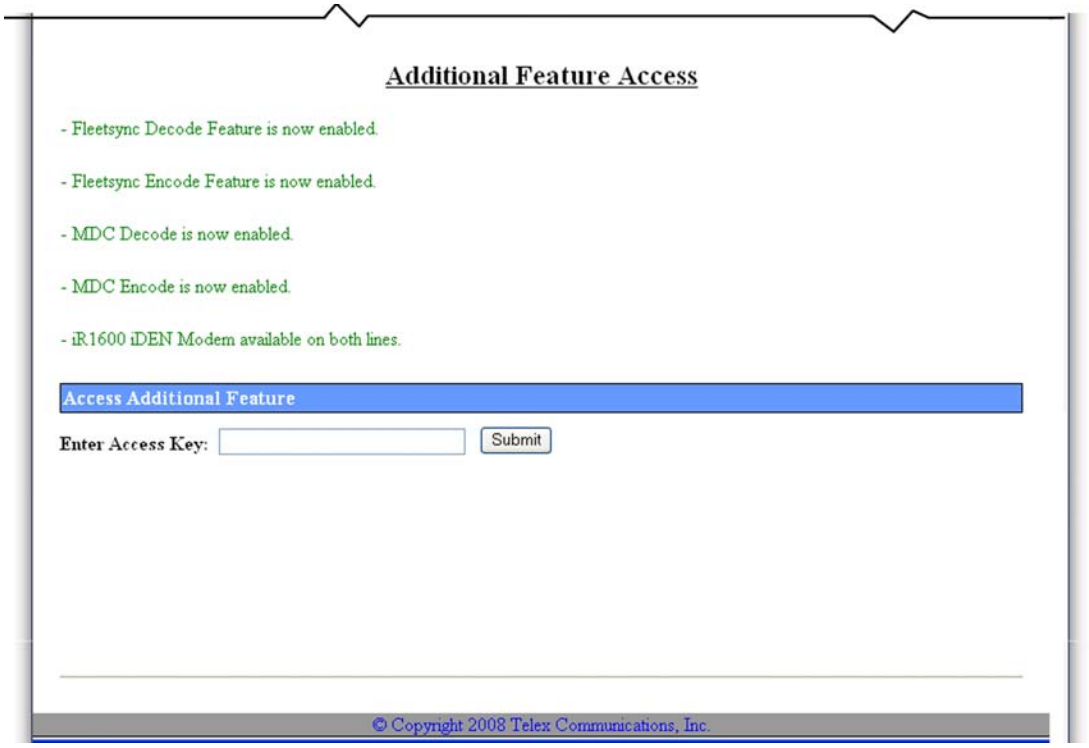
FIGURE 54. Additional Feature Access

Enter Access Key Field

The **Enter Access Key** field is used to enter an access key code (*also known as a hash code*) to enable purchased options.

To **activate a special feature**, do the following:

1. Click **Additional Feature**.
   The Additional Feature Setup window appears.
2. In the enter Access Key field, enter the **16-digit Access Key code**.
   The window displays a list of additional features enabled on your IP-223.
3. Click **Submit**.
   The entries currently displayed on the window are sent to the IP-223 for storage.
4. Click **Save to EEPROM**.
   The Save Setup Parameters window appears.
5. Click **Save Parameters**.
   The entries are saved to permanent memory.


Additional Feature Access
- Fleetsync Decode Feature is now enabled.
- Fleetsync Encode Feature is now enabled.
- MDC Decode is now enabled.
- MDC Encode is now enabled.
- iR1600 iDEN Modem available on both lines.
Access Additional Feature
Enter Access Key:
Submit
© Copyright 2008 Telex Communications, Inc.

Clone Console Window

The **Clone System Parameters** window, shown in Figure 55, provides the ability to copy the setup information, other than the serial number, base IP Address Subnet Mask from one IP-223 unit to another IP-223 unit.

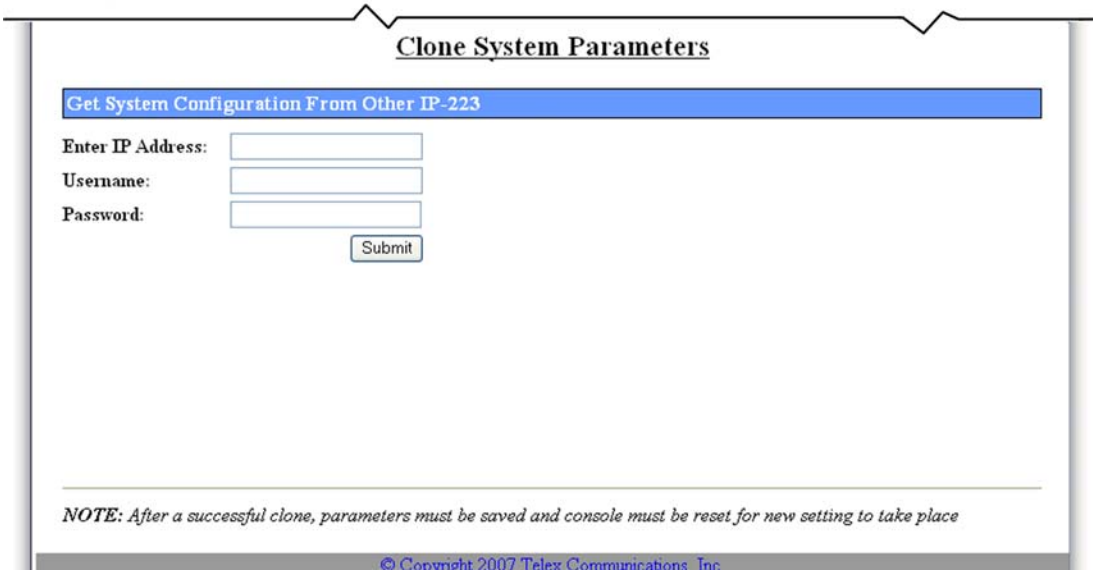


FIGURE 55. Clone System Parameters

To **copy configuration data from one IP-223 unit to another IP-223 unit**, do the following:

1. Click **Clone Console**.
   The Retrieve Configuration Data from Remote IP-223 window appears.
2. In the Enter IP Address field, enter the **IP Address** of the remote IP-223 the configuration data is to be copied from.
3. Enter the **username and password** of the remote IP-223.
4. Click **Submit**.
   The setup information, other than the serial number, base IP Address, and mask address is sent to the IP-223 for storage.
5. Click **Save to EEPROM**.
   The Save Setup Parameters window appears.
6. Click **Save Parameters**.
   The entries are saved to permanent memory.

Crosspatch Setup Window

The **Crosspatch Setup** window, shown in Figure 56, provides the necessary parameters to configure crosspatch.

This window can contain up to *100 entries*.

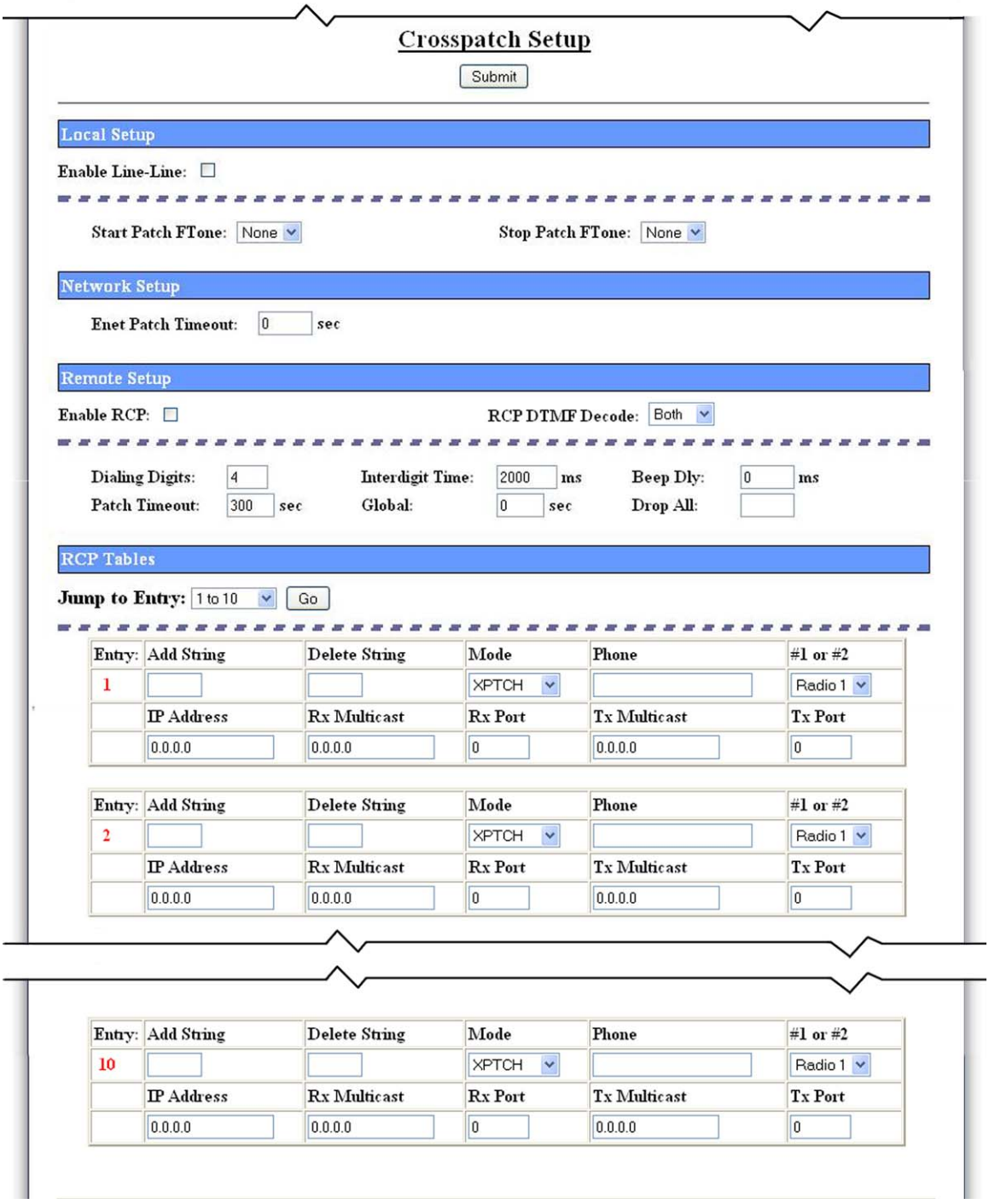


FIGURE 56. Crosspatch Setup

Local Setup

Enable Line-Line Check Box

The **Enable Line-Line** check box indicates audio can be crosspatched from one line to another line. TX traffic from the console overrides the crosspatch to allow the console operator to take control of the line.

Start Patch FTone Drop Down Menu

NOTE: When using the Start and Stop FTone, the Line-Line check box must NOT be selected.

The **Start Patch FTone** drop down menu identifies the Ethernet function tone selection that starts a crosspatch between line 1 and line 2.

Stop Patch FTone Drop Down Menu

The **Stop Patch FTone** drop down menu identifies Ethernet function tone selection that stops a crosspatch between line 1 and line 2.

Network Setup

Enet Patch Timeout Field

The **Enet Patch Timeout** field is used to switch a full-duplex IP-223 line to a half-duplex line because an Ethernet crosspatch is active. When the Enet Patch Timeout expires, the IP-223 line switches back to full-duplex regardless the Ethernet crosspatch state.

The range for this field is *0* to *3600 secs*.
Default is *0* (disabled).

Remote Setup

Enable RCP Check Box

The **Enable RCP** check box indicates **RCP** (Remote Crosspatch) is enabled. If selected, RCP is enabled.

RCP DTMF Decode Drop Down Menu

The **RCP DTMF Decode** drop down menu is used to select which line(s) can decode DTMF digits for RCP.

Available selections for this field are *Both*, *Line 1*, and *Line 2*.
The default is *Both*.

Dialing Digits Field

The **Dialing Digits** field identifies the number of **DTMF** (Dual Tone Multi-Frequency) digits allowed in the Drop All, Add String, and Delete String fields on the window.

The range for this field is *2* to *4*.

Interdigit Time Field

The **Interdigit Time** field identifies the amount of time, in ms, allowed between DTMF digits before a reset occurs. If a reset occurs, the DTMF sequence must be started again.

This range for this field is *0* to *32000ms*

Beep Dly Field

The **Beep Dly** (Delay) field identifies the amount of time, in ms, between the digit string detection and status beeps echoed back to the hand-held radio.

The range for this field is *0* to *5000ms*.

Patch Timeout Field

The **Patch Timeout** field identifies the amount of time, in seconds, allowed for inactivity on an active patch. If a patch is inactive for the specified period of time, the patch is dropped.

The range for this field is *0* to *999 seconds*.

NOTE: Patch Timeout must be greater than Global Timeout.

Global Field

The **Global** field identifies the amount of time, in seconds, allowed for any patch.

The range for this field is *0* to *32000 seconds*.

Drop All Field

The **Drop All** field identifies the DTMF digit sequence used to drop all current patches. The number entered must be the number of digits specified in the Dialing Digits field.

The field can contain *up to 4 digits*.

RCP Tables

The required fields depend on the mode selected:

XPATCH - Requires #1 or #2, IP Address, Add String and Delete String.

DIAL - Requires Phone, Add String and Delete String.

DLVOIP - Requires Rx Multicast/Port, TX Multicast/Port, Add String and Delete String.

PHONEP - Requires Add String and Delete String.

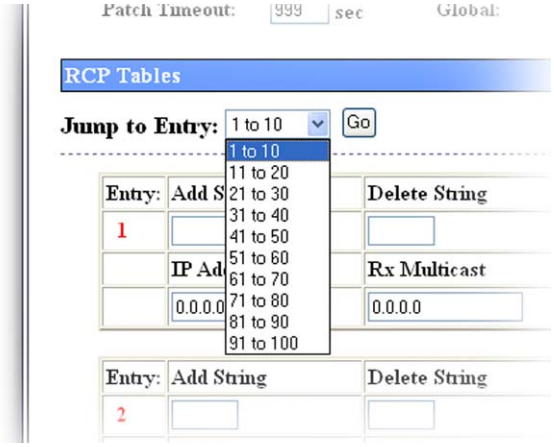
LPTCH - Requires Add String and Delete String.

RCP Tables

Jump To Entry Drop Down Menu

The **Jump To Entry** drop down menu allows you to select function tones (in groups of 10) to view and modify.

1. From the Jump To drop down menu, select the **entries** you want to view.
2. Click **GO**.
   The function tones you select appears.



Go Button

The **Go** button is used to navigate to the page in the Jump to Entry Drop Down Menu.

Entry Field

The **Entry** field labels the row for the crosspatch entry.

Add String Field

The **Add String** field identifies the DTMF digit sequence to add this crosspatch entry. The number entered must be the number of digits specified in the Dialing Digits field.

This field can contain up to *4 digits*.

Delete String Field

The **Delete String** field identifies the DTMF digit sequence to delete this crosspatch entry. The number entered must be the number of digits specified in the Dialing Digits field.

This field can contain up to *4 digits*.

Mode Drop Down Menu

The **Mode** drop down menu identifies the crosspatch mode used for the crosspatch entry number.

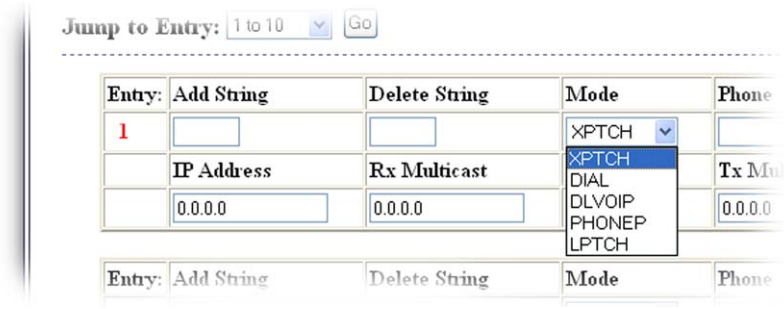


FIGURE 57. Crosspatch Setup—Mode Drop Down Menu

Available selections for this field are:

XPTCH - Crosspatch to a remote IP-223. The IP Address and line number is required.

DIAL - A remote user with a portable radio can key a DTMF string, causing the IP-223 to take the PIB or TDI offhook, dial a pre-programmed phone number and establish a patch between the devices.

DLVOIP - A remote user with a portable radio can key a DTMF string, causing the IP-223 to join different multicast groups and ports, which can cause mapping the IP to a different line.

PHONEP - A remote user with a portable radio can key a DTMF string, causing the IP-223 to take the PIB or TDI offhook. Once the PIB or TDI is offhook, the user can manually dial a phone number.

LPTCH - Line-to-line crosspatch. Enable and disable using DTMF strings.

Phone Field (DIAL option only)

The **Phone** field identifies the phone number to be dialed for this crosspatch entry.

This field can contain up to *21 digits.*

#1 or #2 Drop Down Menu (XPATCH option only)

The ***#1 or #2*** drop down menu identifies which DB-25 connector port on the remote IP-223 is used in this crosspatch entry.

Available selections for this field are: *Radio1* or *Radio 2*.

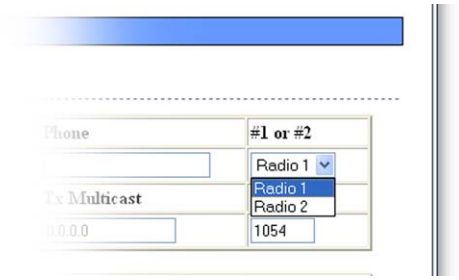


FIGURE 58. #1 or #2 Drop Down Menu—Crosspatch Setup

IP Address Field (XPATCH option only)

The **IP Address** field identifies the IP Address of the remote IP-223 with a radio used in this crosspatch entry.

Rx Multicast Field (DLVOIP option only)

The **Rx Multicast** field identifies the broadcast address for the RX audio traffic used in this crosspatch entry. To inter-operate, all consoles must have the same base Multicast Address.

The range for this field is *224.0.0.0* to *239.255.255.255*.

Rx Port Field (DLVOIP option only)

The **Rx Port** field identifies the RX port number for this crosspatch entry. This RX port number must be unique.

The range for this field is 1054 to 65535.

TX Multicast Field (DLVOIP option only)

The **TX Multicast** field identifies the broadcast address for the TX audio traffic used in this crosspatch entry. To inter-operate, all consoles must have the same base Multicast Address.

The range for this field is *224.0.0.0* to *239.255.255.255*.

TX Port Field (DLVOIP option only)

The **TX Port** field identifies the TX port number for this crosspatch entry. The TX port number must be unique.

The range for this field is 1054 to 65535.

Command Buttons

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

> Click **Submit**.

Prev 10 Button

The **Prev 10** button is used to traverse the window between crosspatch entries 1 and 100.

Next 10 Button

The **Next 10** button is used to traverse the window between crosspatch entries 1 and 100.

To **define the crosspatch parameters**, do the following:

1. Click **Crosspatch Setup**.
   The Crosspatch Setup window appears.
2. Select the **Line-Line Enable** check box to route audio from one line to another line.
3. From the Start Patch FTone drop down menu, select the **function tone** that starts a crosspatch between two radios.
4. From the Stop Patch FTone drop down menu, select the **function tone** that stops a crosspatch between two radios.
5. Select the **RCP Enable** check box to enable RCP.
6. In the Dialing Digits field, enter the **number of DTMF digits** allowed in the Drop All, Add String, and Delete Strings fields on the window.
7. In the Interdigit Time field, enter the **amount of time** (in ms) allowed between DTMF digits before a reset occurs.
8. In the Beep Dly field, enter the **amount of time** (in ms) between digit string detection and status beeps echoed back.
9. In the Patch Timeout field, enter the **amount of time** (in seconds) allowed for inactivity on an active patch before the patch is dropped.
10. In the Global field, enter the **amount of time** (in seconds) allowed for inactivity on all patches before all patches are dropped.
11. In the Drop All field, enter the **DTMF digit sequence** to drop all current patches.

    NOTE: The DTMF digit sequence must be the number of digits specified in the Dialing Digits field in step 6.
12. Complete **Entry 1** in the RCP Tables, if applicable:
13. In the Add String field, enter the **DTMF digit sequence** to add this crosspatch entry.

    NOTE: The DTMF digit sequence must be the number of digits specified in the Dialing Digits field in step 6.
14. In the Delete String field, enter the **DTMF digit sequence** to delete this crosspatch entry.

    NOTE: The DTMF digit sequence must be the number of digits specified in the Dialing Digits field in step 6.
15. From the Mode drop down menu, select the desired **crosspatch mode**.
16. In the Phone field, enter the **phone number** of the phone to be dialed.
17. From the #1 or #2 drop down menu, select the applicable **DB-25 connector port** used on the remote IP-223.
18. In the IP Address field, enter the **IP Address** of the remote IP-223 with the radio used in this crosspatch entry.
19. In the Rx Multicast field, enter the **Multicast Address** for the RX audio traffic.
20. In the Rx Port field, enter a unique **RX port number**.
21. In the TX Multicast field, enter the **Multicast Address** for the TX audio traffic.
22. In the TX Port field, enter a unique **TX port number**.
23. When all entries in the RCP Table are complete for entry 1, repeat **steps 13 through 22 above** to complete the required remote crosspatch entries on this window.

24. If all of the remote crosspatch entries are complete on the window and more crosspatches need to be defined, click **Submit**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
    OR
    If all of the remote crosspatch entries are complete on the window and no more crosspatches need to be defined, click **Submit.**
    AND
    proceed to **step 28**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
25. Click **Next 10** to toggle to the next Crosspatch Setup window.
26. Complete **steps 13 through 22** for all desired crosspatch entries on the window.
27. After all crosspatches have been entered, click **Submit**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
28. Click **Save to EEPROM**.
    The Save Setup Parameters window appears.
29. Click **Save Parameters**.
    The entries are saved to permanent memory.

CRP PIN Table Window

The **Remote CrossPatch Pin Setup** window, shown in Figure 59, allows up 300 PIN numbers to be set for operation of the IP-223's crosspatch feature.

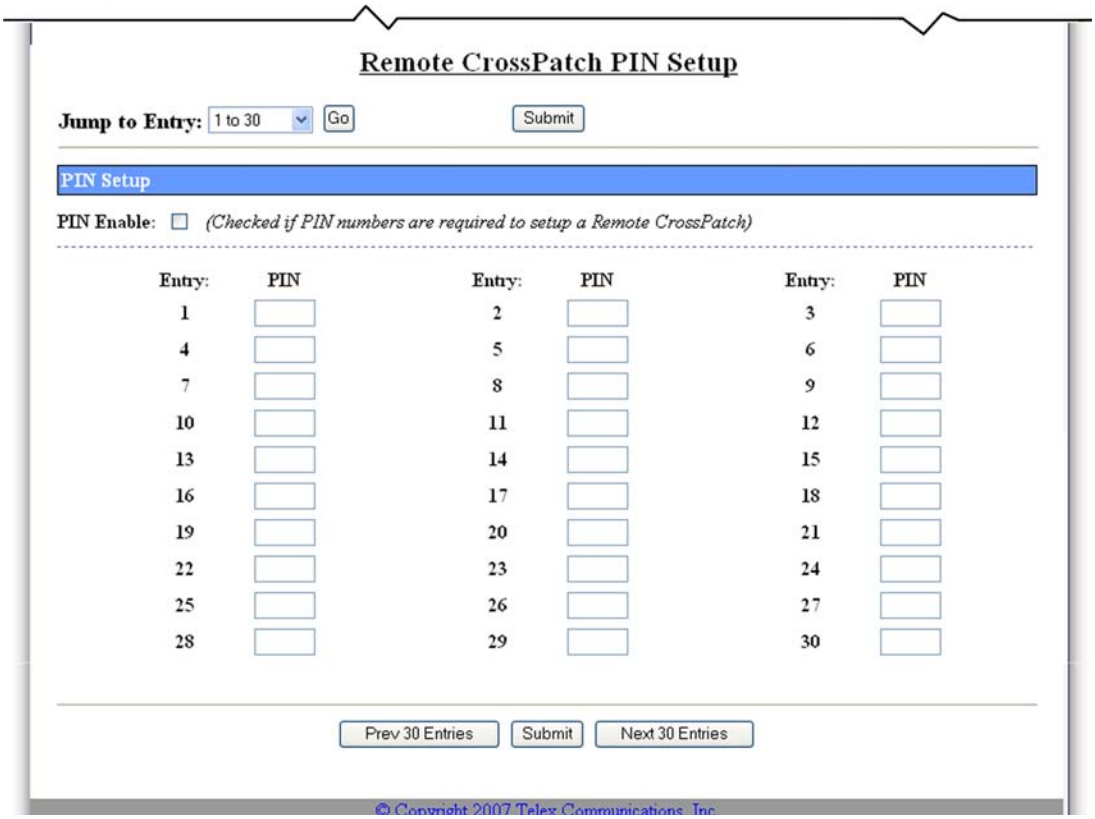


FIGURE 59. Remote Crosspatch Pin

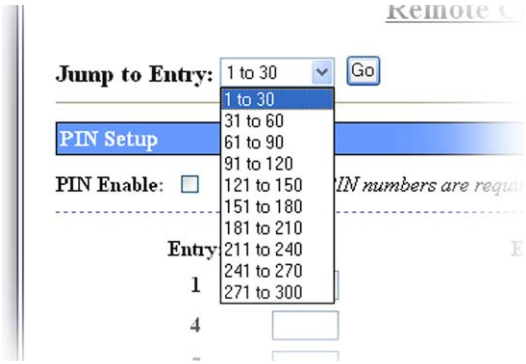
When PIN numbers are entered correctly, a Go-Ahead Beep sequence to indicate success or failure is played back on the console indicating RCP setup is ready.

NOTE: The Interdigit Time field entry on the Crosspatch Setup window also applies to PIN entry.

Jump To Entry Drop Down Menu

The **Jump To Entry** drop down menu allows you to select function tones (in groups of 30) to view and modify.

1. From the Jump To drop down menu, select the **entries** you want to view.
2. Click **GO**.
   The function tones you select appears.



Go Button

The **Go** button is used to navigate to the page in the Jump to Entry Drop Down Menu.

Submit Button

The **Submit** button is used to upload changes to the IP-223.

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

1. Click **Submit**. 

   The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

   The Save to EEPROM window opens.
3. Click **Save Parameters**. 

   Changes are now permanently saved to the IP-223 console.

PIN Setup

PIN Enable Check Box

The **PIN Enable** check box indicates a PIN number is required to create a crosspatch.

Entry Field

The **Entry** field indicates the crosspatch number for the PIN.

PIN Field

The **PIN** field is used to enter a PIN number for the displayed crosspatch entry number.

This field can contain up to *4 digits*.

Submit Button

The **Submit** button, located at the bottom of each configuration window, is used to upload changes to the IP-223.

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

1. Click **Submit**. 

The changes are sent to the IP-223 in temporary storage.
2. Click **Save to EEPROM**. 

The Save to EEPROM window opens.
3. Click **Save Parameters**. 

Changes are now permanently saved to the IP-223 console.

Prev 30 Entries Button

The **Prev 30 Entries** button is used to traverse the window between crosspatch PIN entries 1 and 300.

Next 30 Entries Button

The **Next 30 Entries** button is used to traverse the window between crosspatch PIN entries 1 and 300.

To **define crosspatch PIN numbers**, do the following:

1. Click **CRP PIN Table**.
The Remote CrossPatch Pin Setup window appears.
2. Select the **PIN Enable** check box if a PIN number is required to create a crosspatch.
3. In the PIN field, enter a **PIN number** for the crosspatch number.
4. Continue entering a **4-digit PIN number** for the crosspatch numbers until all required PIN entries are complete on the window.
5. If all of the PIN entries are complete on the window and more PINs need to be defined, click **Submit**.
The entries currently displayed on the window are sent to the IP-223 for storage.
OR
If all required Crosspatch PIN entries are complete on the window and no more PINs need to be defined, click **Submit** and proceed to **step 9**.
The entries currently displayed on the window are sent to the IP-223 for storage.
6. Click **Next 30**, to move to the next Remote CrossPatch Pin Setup window.
7. Repeat the **steps 3 through 5 above** to continue entering the Crosspatch PIN entries until all of the required PIN entries have been completed.
8. After all PINs have been entered, click **Submit**.
The entries currently displayed on the window are sent to the IP-223 for storage.
9. Click **Save to EEPROM**.
The Save Setup Parameters window appears.
10. Click **Save Parameters**.
The entries are saved to permanent memory.

Pass Change Window

The **Account Password Change** window, shown in Figure 60, is used to assign a password. If the two (2) passwords entered are the same, the password number is entered into memory. The password is required to be entered in the Password field on the Connect to [IP Address] window to access the web setup windows for the IP-223.

FIGURE 60. Account Password Change

NOTE: The password entered does not take effect until the IP-223 has been reset.

To **create a password for the administrator's user name**, do the following:

IMPORTANT: Make note of the new password before adding or changing a password number.

1. Click **Pass Change**.
   The administrator's Account Password Change window appears.
2. In the New Password field, enter a *16-character* **password**.
3. In the Confirm Password field, enter the same *16-character* **password** assigned in the previous step.
4. Click **Submit**.
   The entries currently displayed on the window are sent to the IP-223 for storage.
5. Click **Save to EEPROM**.
   The Save Setup Parameters window appears.
6. Click **Save Parameters**.
   The entries are saved to permanent memory and the IP-223 is reset.

Tone Frequency & Durations Window

The **Tone Frequency and Durations** window, shown in Figure 61, identifies frequencies and function tones. The IP-223 is capable of generating the standard tone packages required to control a radio with a tone termination panel.

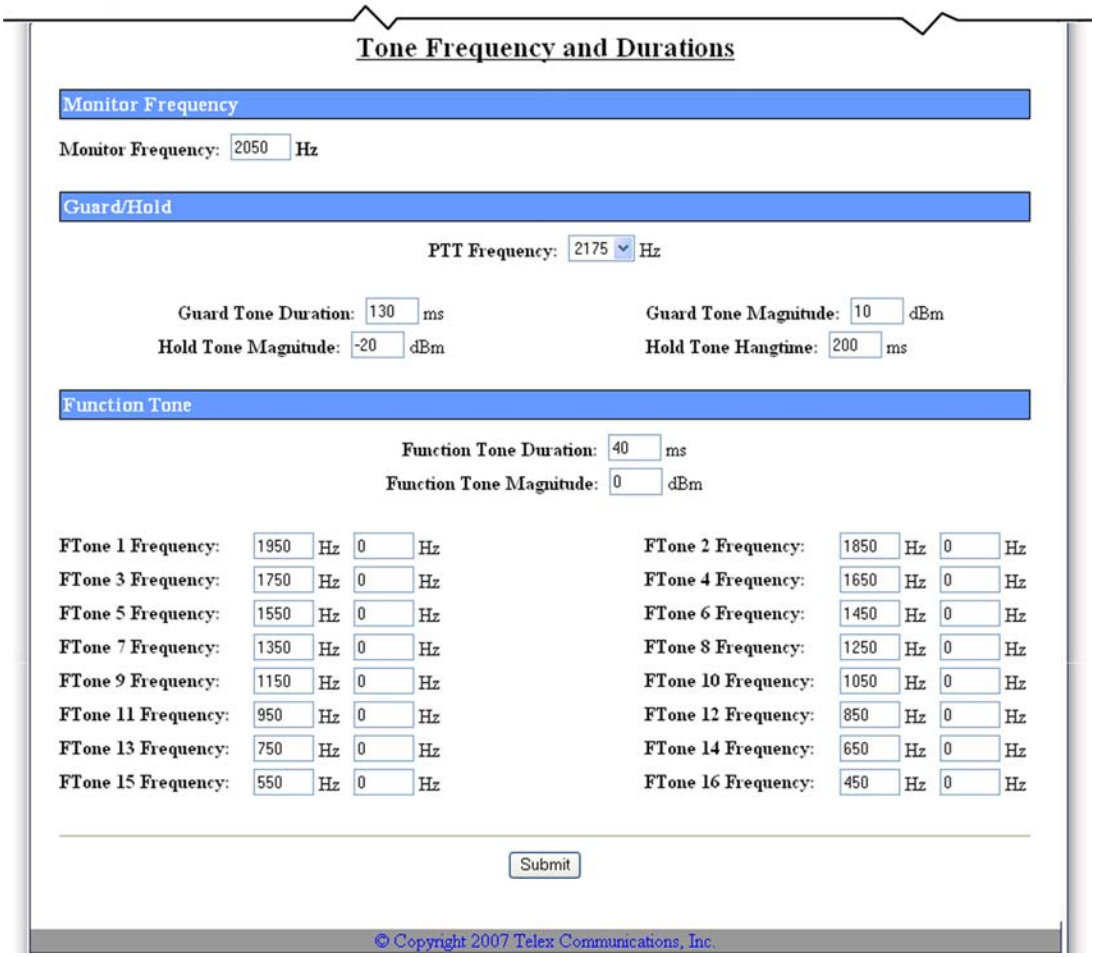


FIGURE 61. Tone Frequency and Durations

Monitor Frequency

Monitor Frequency Field

The **Monitor Frequency** field identifies the value, in Hz, of the function tone sent when the MON button on the console is pressed. In most cases, this value is set at 2050Hz.

The range for this field is *0* to *3200 Hz*.

Guard Hold

PTT Frequency Drop Down Menu

The **PTT Frequency** drop down menu, shown in Figure 62, identifies the PTT frequency, in Hz, the console uses.

Available selections for this field are *2100, 2175, 2300, 2325, 2400, 2600, 2800, 2850* and *2970Hz*.

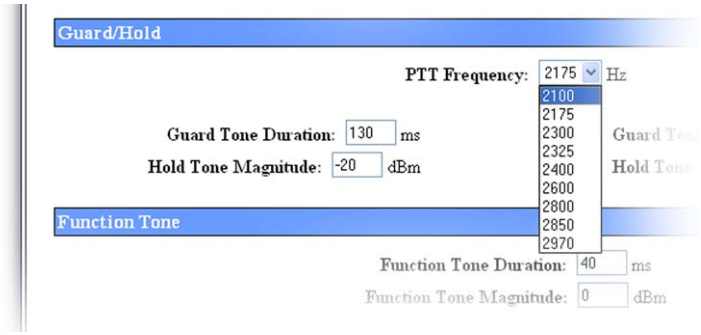


FIGURE 62. PTT Frequency Drop Down Menu

Guard Tone Duration Field

The **Guard Tone Duration** field identifies the amount of time, in ms, the guard tone plays before the function tone.

The range for this field is *0* to *999ms*.

Guard Tone Magnitude Field

The **Guard Tone Magnitude** field identifies the level, in dBm, of the guard tone.

The range for this field is *-60* to *12dB*.

Hold Tone Magnitude Field

The **Hold Tone Magnitude** field identifies the level, in dBm, of the hold tone summed with TX audio to keep the radio in a transmit state.

The range for this field is *-60* to *12dB*.

Hold Tone Hangtime Field

The **Hold Tone Hangtime** field identifies the amount of time, in ms, the hold tone continues after the release of the PTT button. Pressing the PTT button again during this hangtime continues the transmission without resending the guard and function tones.

The range for this field is *0* to *999ms*.

Function Tone

Function Tone Duration Field

The **Function Tone Duration** field identifies the duration, in ms, of the function tone. When dual function tones are set, both tones are set to this duration.

The range for this field is *0* to *999ms*.
In most cases, this value is set to *40ms*.

Function Tone Magnitude Field

The **Function Tone Magnitude** field identifies the level, in dBm, of the function tone.

The range for this field is *-60* to *12dB*.

FTone 1-16 Frequency Fields

The **FTone 1-16 Frequency** fields identify the value, in Hz, associated with each function tone burst. The standard function tones and their frequencies are shown in Table 14.

NOTE: If the second value is set at 0, no second function tone is sent.

The range for this field is *0* to *3200 Hz*.

TABLE 14. Standard Function Tone Frequencies

Function Tone Number	Frequency (Hz)	Function Tone Number	Frequency (Hz)
F1	1950	F9	1150
F2	1850	F10	1050
F3	1750	F11	950
F4	1650	F12	850
F5	1550	F13	750
F6	1450	F14	650
F7	1350	F15	550
F8	1250	F16	450

To **define the frequencies and function tones**, do the following:

1. Click **Tone Frequency & Durations**.
   The Tone Frequency and Durations window appears.
2. From the PTT Frequency drop down menu, select the **PTT frequency** (in Hz).
3. In the Guard Tone Duration field, enter the **amount of time** (in ms) the guard tone plays before the function tone.
4. In the Guard Tone Magnitude field, enter the **level** (in dBM) of the guard tone.
5. In the Hold Tone Magnitude field, enter the **level** (in dBM) of the hold tone summed with TX audio to keep the radio in a transmit state.
6. In the Hold Tone Hangtime field, enter the **amount of time** (in ms) the hold tone continues after the release of the PTT button.
7. In the Function Tone Duration field, enter the **duration** (in ms) of the function tone.
8. In the Function Tone Magnitude field, enter the **level** (in dBM) of the function tone.
9. In the Monitor Frequency field, enter the **frequency** (in Hz) of the function tone sent when the MON button on the console is pressed.

   NOTE: In the FTone 1-16 Frequency fields, the standard frequencies associated with each function tone are provided in the first field for the function tone. To change the frequency for a function tone, enter the desired **frequency** (in Hz) in the field provided.

10. In the frequency field, enter the **desired frequency (in Hz)**.
11. Enter the desired **frequency** (in Hz) for the second function tone. An entry of 0 indicates no second function tone is sent.
12. Click **Submit**.
    The entries currently displayed on the window are sent to the IP-223 for storage.
13. Click **Save to EEPROM**.
    The Save Setup Parameters window appears.
14. Click **Save Parameters**.
    The entries are saved to permanent memory.

APPENDIX A

CTCSS Tone Frequency Table

CTCSS Tone Frequency Table

TABLE 15. CTCSS Tone Frequencies

Tone Number	Freq. (Hz)	Tone Number	Freq. (Hz)	Tone Number	Freq. (Hz)	Tone Number	Freq. (Hz)
1	33.0	17	71.9	33	123.0	49	183.5
2	35.4	18	74.4	34	127.3	50	186.2
3	36.6	19	77.0	35	131.8	51	189.9
4	37.9	20	79.7	36	136.5	52	192.8
5	39.6	21	82.5	37	141.3	53	196.6
6	44.4	22	85.4	38	146.2	54	199.5
7	47.5	23	88.5	39	151.4	55	203.5
8	49.2	24	91.5	40	156.7	56	206.5
9	51.2	25	94.8	41	159.8	57	210.7
10	53.0	26	97.4	42	162.2	58	218.1
11	54.9	27	100.0	43	165.5	59	225.7
12	56.8	28	103.5	44	167.9	60	229.1
13	58.8	29	107.2	45	171.3	61	233.6
14	63.0	30	110.9	46	173.8	62	241.8
15	67.0	31	114.8	47	177.3	63	250.3
16	69.4	32	118.8	48	179.9	64	254.1

Digital Output Table

Digital Output Table

TABLE 16. Digital Output Values

Value	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
0	L	L	L	L	L	L	L
1	L	L	L	L	L	L	H
2	L	L	L	L	L	H	L
3	L	L	L	L	L	H	H
4	L	L	L	L	H	L	L
5	L	L	L	L	H	L	H
6	L	L	L	L	H	H	L
7	L	L	L	L	H	H	H
8	L	L	L	H	L	L	L
9	L	L	L	H	L	L	H
10	L	L	L	H	L	H	L
11	L	L	L	H	L	H	H
12	L	L	L	H	H	L	L
13	L	L	L	H	H	L	H
14	L	L	L	H	H	H	L
15	L	L	L	H	H	H	H
16	L	L	H	L	L	L	L
17	L	L	H	L	L	L	H
18	L	L	H	L	L	H	L
19	L	L	H	L	L	H	H
20	L	L	H	L	H	L	L
21	L	L	H	L	H	L	H
22	L	L	H	L	H	H	L
23	L	L	H	L	H	H	H
24	L	L	H	H	L	L	L
25	L	L	H	H	L	L	H

TABLE 16. Digital Output Values

Value	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
26	L	L	H	H	L	H	L
27	L	L	H	H	L	H	H
28	L	L	H	H	H	L	L
29	L	L	H	H	H	L	H
30	L	L	H	H	H	H	L
31	L	L	H	H	H	H	H
32	L	H	L	L	L	L	L
33	L	H	L	L	L	L	H
34	L	H	L	L	L	H	L
35	L	H	L	L	L	H	H
36	L	H	L	L	H	L	L
37	L	H	L	L	H	L	H
38	L	H	L	L	H	H	L
39	L	H	L	L	H	H	H
40	L	H	L	H	L	L	L
41	L	H	L	H	L	L	H
42	L	H	L	H	L	H	L
43	L	H	L	H	L	H	H
44	L	H	L	H	H	L	L
45	L	H	L	H	H	L	H
46	L	H	L	H	H	H	L
47	L	H	L	H	H	H	H
48	L	H	H	L	L	L	L
49	L	H	H	L	L	L	H
50	L	H	H	L	L	H	L
51	L	H	H	L	L	H	H
52	L	H	H	L	H	L	L
53	L	H	H	L	H	L	H
54	L	H	H	L	H	H	L

TABLE 16. Digital Output Values

Value	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
55	L	H	H	L	H	H	H
56	L	H	H	H	L	L	L
57	L	H	H	H	L	L	H
58	L	H	H	H	L	H	L
59	L	H	H	H	L	H	H
60	L	H	H	H	H	L	L
61	L	H	H	H	H	L	H
62	L	H	H	H	H	H	L
63	L	H	H	H	H	H	H
64	H	L	L	L	L	L	L
65	H	L	L	L	L	L	H
66	H	L	L	L	L	H	L
67	H	L	L	L	L	H	H
68	H	L	L	L	H	L	L
69	H	L	L	L	H	L	H
70	H	L	L	L	H	H	L
71	H	L	L	L	H	H	H
72	H	L	L	H	L	L	L
73	H	L	L	H	L	L	H
74	H	L	L	H	L	H	L
75	H	L	L	H	L	H	H
76	H	L	L	H	H	L	L
77	H	L	L	H	H	L	H
78	H	L	L	H	H	H	L
79	H	L	L	H	H	H	H
80	H	L	H	L	L	L	L
81	H	L	H	L	L	L	H
82	H	L	H	L	L	H	L
83	H	L	H	L	L	H	H
84	H	L	H	L	H	L	L
85	H	L	H	L	H	L	H
86	H	L	H	L	H	H	L
87	H	L	H	L	H	H	H
88	H	L	H	H	L	L	L
89	H	L	H	H	L	L	H
90	H	L	H	H	L	H	L
91	H	L	H	H	L	H	H
92	H	L	H	H	H	L	L
93	H	L	H	H	H	L	H
94	H	L	H	H	H	H	L
95	H	L	H	H	H	H	H
96	H	H	L	L	L	L	L
97	H	H	L	L	L	L	H
98	H	H	L	L	L	H	L

TABLE 16. Digital Output Values

Value	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
99	H	H	L	L	L	H	H
100	H	H	L	L	H	L	L
101	H	H	L	L	H	L	H
102	H	H	L	L	H	H	L
103	H	H	L	L	H	H	H
104	H	H	L	H	L	L	L
105	H	H	L	H	L	L	H
106	H	H	L	H	L	H	L
107	H	H	L	H	L	H	H
108	H	H	L	H	H	L	L
109	H	H	L	H	H	L	H
110	H	H	L	H	H	H	L
111	H	H	L	H	H	H	H
112	H	H	H	L	L	L	L
113	H	H	H	L	L	L	H
114	H	H	H	L	L	H	L
115	H	H	H	L	L	H	H
116	H	H	H	L	H	L	L
117	H	H	H	L	H	L	H
118	H	H	H	L	H	H	L
119	H	H	H	L	H	H	H
120	H	H	H	H	L	L	L
121	H	H	H	H	L	L	H
122	H	H	H	H	L	H	L
123	H	H	H	H	L	H	H
124	H	H	H	H	H	L	L
125	H	H	H	H	H	L	H
126	H	H	H	H	H	H	L
127	H	H	H	H	H	H	H
128	Previous digital output values are used.						

APPENDIX C

Tone Frequency Table

Tone Frequency Table

TABLE 17. Supported Radio Dispatch Tone Frequencies

Tone Number	Code Digit	European Tone Frequencies in Hz												Motorola	
		ZVEI1	ZVEI2	KEN	PZVE I	DZVEI	PDZVEI	CCIR1	CCIR2	PCCIR	EEA	EURO SIGNAL	NATE L	EIA	MODAT
TONE 0	0	2400	2400	815	2400	2200	2200	1981	1981	1981	1981	979.8	1633	600	637.5
TONE 1	1	1060	1060	882	1060	970	970	1124	1124	1124	1124	903.1	631	741	787.5
TONE 2	2	1160	1160	954	1160	1060	1060	1197	1197	1197	1197	832.5	697	882	937.5
TONE 3	3	1270	1270	1032	1270	1160	1160	1275	1275	1275	1275	767.4	770	1023	1087.5
TONE 4	4	1400	1400	1117	1400	1270	1270	1358	1358	1358	1358	707.4	852	1164	1237.5
TONE 5	5	1530	1530	1209	1530	1400	1400	1446	1446	1446	1446	652.0	941	1305	1387.5
TONE 6	6	1670	1670	1308	1670	1530	1530	1540	1540	1540	1540	601.0	1040	1446	1537.5
TONE 7	7	1830	1830	1415	1830	1670	1670	1640	1640	1640	1640	554.0	1209	1587	1687.5
TONE 8	8	2000	2000	1531	2000	1830	1830	1747	1747	1747	1747	510.7	1336	1728	1837.5
TONE 9	9	2200	2200	1657	2200	2000	2000	1860	1860	1860	1860	470.8	1477	1869	1987.5
GROUP TONE	A	2800	885	1939	970	825	825	2400		1050	1055			2433	
	B	810	810	2270	810	740	886	930		930	930			2292	
RESET TONE	C	970	740	2098	2800	2600	2600	2247		2400	2247			2010	
	D	885	680	2457	885	885	856	991	2110	991	991			2292	
REPEAT TONE	E	2600	970	1792	2600	2400	2400	2110	2400	2110	2110	1062.9	1805	459	487.5
	F	680	2600		680	680		1055			2400		1995	1091	

APPENDIX D

IP-223 Settings - Quick Reference

I/O Connectors

Connector	Description
J1	Power IN
J18	Serial port
J2	Radio/Line 1
J31	Radio/Line 2
J4	Display Header
J66	Handset Jack
J7	Ethernet port

Adjustments

Signal	Line 1	Test point	Line 2	Test point
RX Pre-amp	R175	TP13	R110	TP1
RX Compressor	RV5	TP12	RV1	TP3
TX Audio out	R47	TP15	R61	TP5
TX Monitor IN (Not available in 750630 Rev A)	R390	TP13	R391	TP1
CTCSS out	R50	TP7	R53	TP10

Jumper Settings

PCB 750743 or PCB 750630 revision F

Line 1	Jumper Setting	Line 2
J35	A = RS232 serial data, B = TTL	J26

PCB 750743 or PCB 750630 revision C, D, E, and F

Line 1	Jumper Setting	Line 2
J33, J34	2 or 4 Wire, A = 2-wire, B = 4-wire	J5, J6
J16, J21	RX Input, A = Single ended, B = Balanced	J19, J20
J14	RX Input Impedance, “A” = 600, B = 8 and Center = 10Kohm	J24
J3, J9, J11	TX Output, A = Single ended, “B” = Balanced	J25, J28, J29
J13	TX Output Level, “A” = Low, B = High	J27
J8	Digital I/O Pull-up Voltage, A = +5, “B” = +12	J30
J17, J22	TX Output Impedances: “B” = 600 ohms	J10, J15
(J17), J22	(A) and B = 1.2K ohms	(J10), J15
J17, (J22)	A and (B) = 1.8K ohms	J10, (J15)
J17, J22	A = 2.4K ohms	J10, J15

PCB 750630 revision A

Line 1	Jumper Setting	Line 2
J33, J34	2 or 4 Wire, A = 2-wire, B = 4-wire	J5, J6
J15, J16, J21	RX Input, A = Single ended, B = Balanced	J19, J20, J22
J14, J23	RX Input Impedances: B = 10K ohms	J24, J17
(J14), J23	(A) and B = 600 ohms	(J24), J17
(J23), J14	(A) and B = 8 ohm speaker	(J17), J24
J3, J9, J10, J11	TX Output, A =Single ended, B = Balanced	J25, J26, J28, J29
J13	TX Output Level, A = Low, B High	J27
J8	Digital I/O Pull-up Voltage, A = +5, B = +12	J30

Jumper Locations

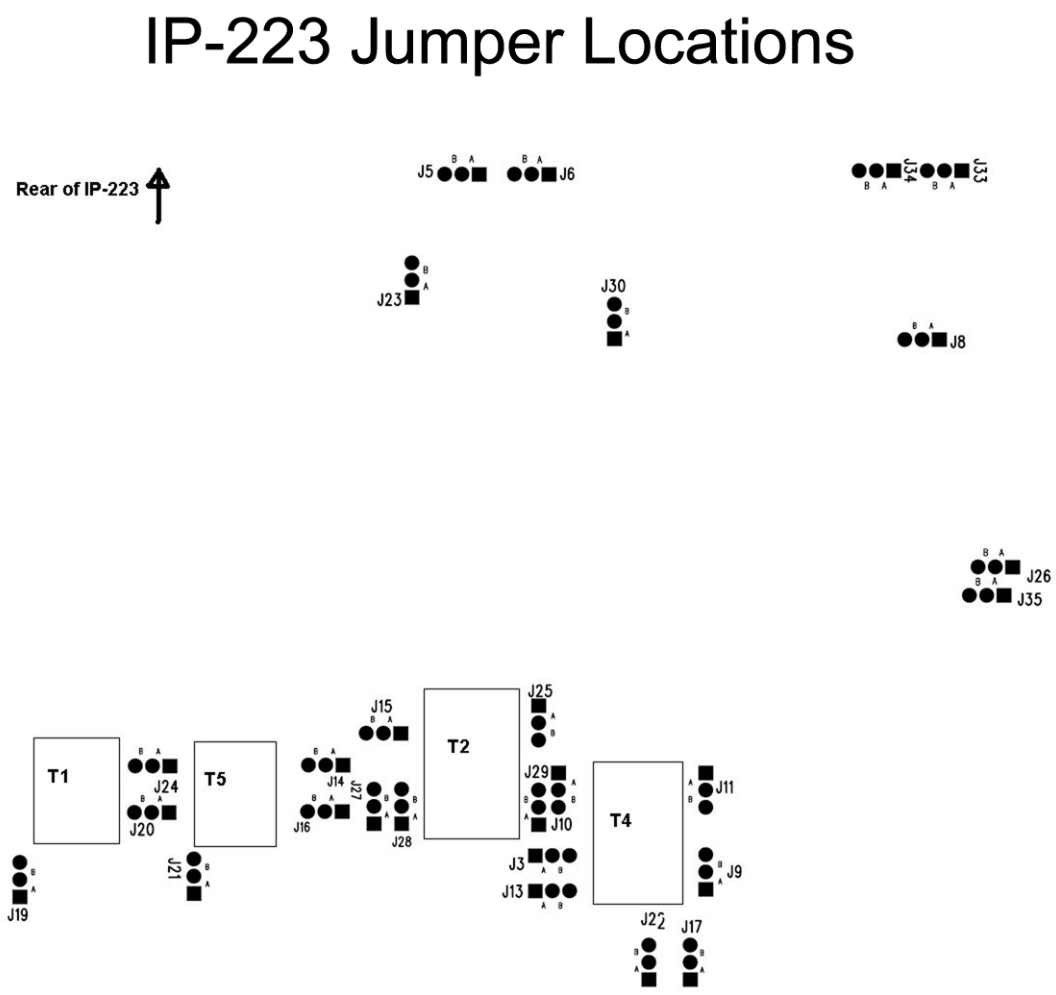


FIGURE 63. Jumper Locations

APPENDIX E

DB-25 Connector Wire Colors

DB-25 Connector Wire Color Worksheet

The DB-25 Connector wire color table can be used as a worksheet. Blank cells are provided for notes. SeeTable 18 on page 162.

TABLE 18. DB-25 Wire Colors

Pin #	Name	Wire Color	Your Radio Pinout Here
1	PTT N.C.	Brown	
2	PTT Common	Red	
3	MON N.O.	Orange	
4	R1 N.C.	Pink	
5	R1 Common	Yellow	
6	R2 N.O.	Green	
7	GND	Lt. Green	
8	DIG0	Blue	
9	DIG2	Violet	
10	DIG4	Gray	
11	CTCSS	White	
12	RX-	Black	
13	TX-	Brown/White	
14	PTT N.O.	Red/White	
15	MON N.C.	Red/Black	
16	MON Common	Orange/White	
17	R1 N.O.	Orange/Black	
18	R2 N.C.	Pink/Black	
19	R2 Common	Yellow/Black	
20	DIG6	Green/White	
21	DIG1	Green/Black	
22	DIG3	Blue/White	
23	DIG5	Violet/White	
24	RX+	Gray/Black	
25	TX+	Black/White	
Shield	Ground		

Notes

Bosch Security Systems, Inc.
12000 Portland Avenue South
Burnsville, MN 55337 U.S.A.
www.boschcommunications.com