TELEXT RADIO DISPATCH PRODUCTS

IP-224 Technical Manual

up to and including version 1.300





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chapter 1 Introduction

Overview

The IP-224 Ethernet Adapter Panel provides a reliable means of remotely controlling two (2) audio devices. The IP-224 can be configured to operate in modes that allow it to connect to digital consoles, and perform a variety of other tasks related to using radios on a digital network. The IP-224 is interconnected to a distant remote control console by means of an available **WAN** (Wide Area Network) or **LAN** (Local Area Network) connection.

Installation and service is easy. The IP-224 can be rack mounted or placed directly on the desktop. The main board is hot-swappable, allowing future hardware updates without having to disconnect power from the unit. Hardware and software parameters are set from the web browser configuration windows.

An LCD display provides user feedback when programming. The network settings, alignment tones, gains, and display contrast can be set from the IP-224 front panel. IP-224 unit information, input VU (Volume Unit) meters, and the ability to reboot the IP-224 can be accessed through the main menu. A handset connection is provided for convenient monitoring of either line. Test point connections are easily accessed on the front panel.

The IP-224 is compatible with Telex's C6200, IP-1616, IP-2002, and C-Soft. It also supports multiple data communication protocols including RS-232, RS-485, TTL, CAN, and USB. The IP-224 is the communication gateway for a Telex Radio Dispatch system.

Browser Requirements

- Microsoft Internet Explorer¹ version 6.0 or later.
- Mozilla¹ Firefox version 4.00 or later.

Network Requirements

- 10Mbps or 100Mbps, full-duplex TCP/IP connection.
- Static IP Address or DHCP option.

^{1.} See "Copyright Notice" on page 2.

Features

NOTE: For more information on all available features, contact your sales representative.

- IP addressable network device
- Simultaneously interface two (2) audio devices (radio, repeater, etc.)
- Configure the device easily using web page interface or Telex System Manager tool
- Provide basic parameter setup directly from the front of the unit including gains and network setup
- Software based hardware setup eliminates need for jumpers
- Software gain control without adjusting hardware potentiometer
- Support serial over IP for data exchange
- Analog recorder output
- IP recorder output
- Monitor audio levels via status web page interface
- Support multiple serial protocols including RS-485, RS-232, TTL, CAN, USB 2.0

- Support tone mode
 - 1000 programmable dual function tone frequencies
 - Single or dual function tone generation
 - Ten (10) selectable PTT frequencies
 - Adjustable Guard, Function and Hold Tone duration and magnitude
- Supports local radio control
 - Eight (8) digital outputs for channel selection
 - Programmable per function tone (up to 1000)
 - Hardware PTT relay
- **CTCSS** (Continuous Tone Coded Squelch System) generation (up to 64 frequencies)

SAP #	CTN	Items
F01U164302	IP224	IP224-Standard Series (no options)
F01U165537	IP224 wOps @PI	IP224-with options factory installed (@PI)
F01U165538	IP224 MB Dual	IP224-Mounting Brackets (dual)
F01U165539	IP224 MB Single	IP224-Mounting Brackets (single)
F01U165554	MTRBi for IP224	IP224-MTRBi Radio Interface includes cables
F01U165540	DB37 KenTKX150	IP224-TK-x150/x180/5x10/NEXEDGE interface cable
F01U165541	DB37 KenTKX90	IP224-Kenwood TK-x90 interface cable
F01U165543	DB37 650370	IP224-650370 IP223 to Viper cable adaptor
F01U165544	DB37 Cabtone	IP224-Cabtone cable assembly
F01U165545	DB37 CDM1250	IP224-Motorola CDM1250 interface cable
F01U165548	EFJ5300_Cabl	IP224-EFJ5300 Radio interface cable (sold per line)
F01U165549	iDEN_Cable	IP224-iDEN Radio interface cable (sold per line)
F01U165550	Fltsy D 224@PI	IP224-FleetSync Decode Software factory installed (@PI)
F01U165551	Fltsy DE 224@PI	IP224-FleetSync Decode & Encode Software factory installed (@PI)
F01U165552	MDC DC 224@PI	IP224-MDC1200 Decode Software factory installed (@PI)
F01U165553	MDC D&E 224@PI	IP224-MDC1200 Decode & Encode Software factory installed (@PI)
F01U165556	IP25300 224@PI	IP224-EFJ5300 Software & Cable factory installed (@PI)
F01U165557	NI223+ IP224@PI	IP224-iDEN Software & Cable factory installed (@PI)
F01U296145	MOTOTRBO@PI	IP-224 MOTOTRBO Interface w/cable factory installed (@PI) (sold per
		line)
F01U296148	SDC@PI	IP-224 Sprint Direct Connect factory installed (@PI) (sold per line)
F01U217158	FltsyD224 Field	IP224-FleetSync Decode Software field upgrade
F01U217159	FltsDE224 Field	IP224-Fleetsync Decode & Encode Software field upgrade
F01U217160	MDC DC224 Field	IP224-MDC1200 Decode Software field upgrade
F01U217161	MDC D&E224 Field	IP224-MDC1200 Decode & Encode Software field upgrade
F01U217162	IP25300 SW FLD	IP224-EFJ5300 Software & Cable field upgrade (sold per line)

Options

Options

F01U217163	NI223+SW Field	IP224-iDEN Software & Cable field upgrade (sold per line)
F01U296144	MOTOTRBO@Field	IP-224 MOTOTRBO Interface w/cable field upgrade (sold per line)
F01U296147	SDC@Field	IP-224 Sprint Direct Connect field upgrade (sold per line)

Supported Serial Control Radios

- Kenwood Radios
 - x80 Series
 - x90 Series
 - x150 Series
 - x180 Series
 - 5x10 Series
 - NEXEDGE Series

- EF Johnson 5300
- iDEN Falcon Series
- Motorola MOTOTRBO
 - XPR4500
 - XPR5550
- Sprint Direct Connect
 - AdvanceBridge by AdvanceTec

Supported Signaling

MDC-1200

- Radio Disable
- Radio Enable
- Status Messaging
- Text Messaging
- Select Call
- Radio Check

- Remote Monitor
- ANI
- Emergency Receive
- Emergency Acknowledgement
- Call Alert

FleetSync

- Radio Disable
- Radio Enable
- Status Messaging
- Select Call

- Text Messaging
- ANI
- Emergency Receive

Operating Modes

The IP-224 is capable of operating each audio port in the following modes:

Local Mode - Allows the radio to connect directly to the IP-224 allowing local control of the radio.

Tone Mode - Allows the IP-224, based on Ethernet traffic, to generate 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

Specifications

TABLE 1. IP-224 Specifications

Power Requirements	+11VDC to +16VDC, 600mA nominal		
Ethernet Speed	10 BASE-T or 100 BASE-TX		
Flash Memory	128MB		
SDRAM Memory	256MB		
Electro Static Discharge Immunity	8kV on all exposed operator control areas. At 8kV no operation is disturbed. At 8kV no permanent damage		
Lease Line	2-Wire and 4-Wire supported		
Radio Interface	±45VDC withstand rating		
Hum and Noise	60dB below rated output for each line		
Non-Relay Outputs	Open collector, active low, 200mA maximum, 40VDC collector to emitter voltage		
Radio Input Level	10mVp-p to 10Vp-p, adjustable		
Line Output Level	10mVp-p to 10Vp-p adjustable (Single-Ended) 20mVp-p to 40Vp-p adjustable (Balanced)		
Tone Frequencies	Single or dual function tone generation Function tone range 0 Hz–3200Hz adjustable in 1Hz increments Total tone duration 0 ms–999ms Tone magnitude -60dB to +12dB		
Vocoder	Telex 32K (50 kbits/sec simplex), G.726 16K (34 kbits/sec simplex), G.726 32K (50 kbits/sec simplex), G.711 (82 kbits/sic simplex)		
Relay Contact Ratings	1A at 63V AC/DC		
Digital I/O Ratings	Pull up/pull down/float 3.3VDC/5VDC/12VDC 10K Ohm pull up/pull down		
Transmit Output Impedance	600 Ohms for balanced mode, 200 Ohms for single-ended mode		
Receive Input Impedance	10/600/10K Ohms (User-selectable)		
Audio Distortion	2% THD maximum		
Audio Frequency Response	300Hz to 3000Hz + 1, -3dB less than 3% distortion		
LAM Sensitivity	-50dB to +10dB		
COR Sensitivity	User selectable rising or falling edge from radio		
DTMF Detection Bandwidth	±25Hz around center of frequency		
Monitor timer	10ms to 9999ms, adjustable		
Control Type	32-bit Digital Media Processor		
Line Protection	Fast-acting solid state surge protection		
Memory Protection	Settings preserved in non-volatile memory		
Level Controls	Menu driven front panel controls for TX, RX, spare audio and CTCSS		
Operating Temperature Range	0°C to 50°C (32°F το 122°F) for full specifications		
Storage Temperature Range	e -30°C to 65°C (-22°F το 149°F) for full specifications		
Dimensions	1.625in. H, 11.5in D x 8.5in W (41.3mm H x 292.1mm D 215.9mm W)		
Actual Weight	ht 4.125lbs (1.9kg)		
Shipping Weight and Dimensions	7 lbs (15"D x 16"W x 5"H) 3.2kg (381mm D x 406mm W x 127mm H)		
NOTE: Specifications are subject to change without notice			

Front Panel Controls and Indicators



FIGURE 2. IP-224 Front Panel

1. **Display** - Provides the user with status information relating to the current task.

Status Indications include the following:

- Radio Line Name Indication
- IP-224 Firmware and Hardware Versions
- IP-224 IP Address, Subnet, and Gateway Information
- Transmit and Receive Indications and Frequencies
- Line Disable Status
- VU Meter

.

• Ethernet Intercom Active Indicator

Status Information provided when decode/encode option enabled, include the following:

- ANI (Automatic Number Identification) in Serial Mode, FleetSync, and MDC signaling.
- 2. MENU Softkey Provides access to front panel menus.
- 3. IC Softkey Provides a means to go back in the menu structure and provides handset microphone TX Ethernet audio to the network when pressed.
- 4. Arrow Up Softkey Moves the selection up the menu list and allows the selection of the line to be monitored or controlled with the handset.
- 5. Arrow Down Softkey Moves the selection down the menu list and allows the selection of the line to be monitored or controlled with the handset.
- 6. RADIO 1 Jack Provides an RJ-12 connection to measure line 1 audio levels. See Table 2, "RJ-12 Pinouts," on page 30.
- RADIO 2 Jack Provides an RJ-12 connection to measure line 2 audio levels. For more information, see Table 2, "RJ-12 Pinouts," on page 30.
- 8. HANDSET Jack Provides the ability to monitor and talk on either line with an optional handset.
- 9. USB Port For future use.
- **10. TX LED** Provides a visual indication the IP-224 is generating IP packets. When lit, packets are being transmitted to the network.
- **11.** LINK LED Provides a visual indication of the Ethernet connection. When lit, a valid network connection is established.

Back Panel



FIGURE 3. IP-224 Back Panel

- 1. **3-Pin Terminal Power Connection** Provides power (+11VDC to +16VDC) to the unit.
- 2. PRIM ETHERNET Connection Provides a primary 10/100 Base-T network connection.
- 3. SECOND ETHERNET Connection Provides a secondary 10/100 Base-T network connection.
- 4. ACCESSORY DB-9 Port Provides a connection used for recorder outputs. For more information, see "Accessory DB-9 Pin Out" on page 32.
- 5. **DB-37 RADIO 1 DB-37 Port -** Provides a connection to a radio interface for Line 1. For more information, see "DB-37 Port" on page 33.
- 6. DB-37 RADIO 2 DB-37 Port Provides a connection to a radio interface for Line 2. For more information, see "DB-37 Port" on page 33.

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CHAPTER 2 Communications System Design

Designing a system requires an understanding of the radio network and how the various radios and other communication equipment is connected.

Before you begin to design the system, create a road map of the radio, console, and any other communication equipment locations.

This road map 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 or radio on the network.
- The number of channels each radio may operate on.

Communications Control

Tone Remote Control

Telex Radio Dispatch 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

VoIP (Voice over Internet Protocol) is referred to generically throughout this document to mean **RoIP** (Radio over Internet Protocol). VoIP is a method of breaking analog audio up into packets to be transferred over a computer data network. Because 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, decompressed, 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

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 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 resource may be required. These resources 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 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 Telex 32K VoIP channel requires 50 kbits/sec of bandwidth while active. Full-duplex conversation requires 100 kbits/sec of bandwidth. For more information, see "Vocoder Type Drop Down Menu" on page 49.

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.

Multicast

In general, Telex Radio Dispatch systems require Multicast to function. The network must be able to create a static Multicast Address, that is accessible at all times.

Internet Group Management Protocol

IGMP can be used to control where Multicast is allowed to propagate. This should be limited to Subnets utilizing the C-Soft program as the dispatch console and only when used on an intermittent basis (when the C-Soft program is used for a period of time and then shut down). When a console on the Subnet is expected to be continually operational, Multicast must be active for the Subnet at all times.

Once an **IGMP** (Internet Group Management Protocol) join message is sent out, networks typically enable Multicast and then prune branches after a period of time. Due to intermittent usage patterns of 2-way radios, such 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 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

Network Performance

Networks should perform well under any loading conditions. The default audio delay is 200ms, plus any delay added by the network. While delay alone does not cause issues, variable delay (*also known as jitter*) does. Jitter in a network cannot exceed the maximum packet buffer of any individual product buffer. Refer to the individual product manuals for these specifications. For example: the IP-224 can handle a maximum of 600ms of network jitter.

NOTE: Losing more than 5% of the total packets transmitted compromises audio quality and system performance. Optimal 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 that 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 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 monitoring console, 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 Radio Dispatch products utilize Multicast for audio communications. Second, consider if the network infrastructure supports Multicast. Multicast packets are defined to be all packets with a destination address of between 224.0.0.0 and 239.255.255.255. Some of these addresses are commonly used for broadcast audio and are not necessarily available. When a computer opens a UDP/IP port within this address range, it also joins the group. By joining the group, a packet is sent out to all addresses saying it is interested in seeing the traffic on this Multicast Address. Routers that receive this broadcast message to join a particular Multicast Address then pass packets through because the router is now aware a listener is interested in certain Multicast Address traffic is IGMP. Telex Radio Dispatch products support IGMPv1and v2, as defined in RFC 1112.

In addition to the joining of Multicast broadcast groups, clients on the network can also specify a packet **TTL** (Time-To-Live). The TTL is the number of routers the packet goes through before being stopped. As an example, the TTL for a particular broadcasting node on the network is set to three (3). This means when a packet is transmitted, it arrives at the first router in the network. This router examines the TTL value in the packet and determines if it should pass it through since it is not zero (0). When it passes the packet, the router decrements the TTL value by one (1) to a value of two (2). The next router encountered

26 Communications System Design

by packets does the same, reducing the value of TTL to one (1). The next router does the same and the TTL is reduced to zero (0). The next router the packet reaches examines the TTL value, sees it is zero (0), and the packet is not to be retransmitted. Setting a large TTL value may allow for packets to get from one (1) host to another on a large network, but also adds additional bandwidth requirements due to the larger number of packets being transferred.

Telex Port-Centric Method

As mentioned earlier, Telex utilizes Multicast for all audio communications. Typically only one (1) Multicast is used for all traffic. In addition to a valid Multicast Address, a port number is required. The port is an additional two (2) bytes of information ranging between 1054 and 65535 that further specifies how the data traffic should be handled. For example, assume the base Multicast Address chosen is 225.8.11.81. Port 1054 is used to distinguish channel 1's RX traffic. Port 1072 is used to specify channel 1's TX traffic. Channel 2 might use 1055 for RX and 1073 for TX traffic. By making each channel's TX and RX ports different and unique, full-duplex¹audio can be supported and many channels of traffic can be supported using only one (1) Multicast Address. It is through this method a single console can pick and choose the particular radio resources available on the network without concern for what the console right next to it is utilizing.

^{1.} Full-duplex data transmission means that data can be transmitted in both directions on a signal carrier at the same time.

chapter 3 Installation

IP-224 Installation

CAUTION: All cables must not exceed three (3) meters in length.

The general installation process for connecting an IP-224 and configuring for use are outlined below.

To install, setup, and configure IP-224, do the following:

- Step 1 Mount the IP-224. See "IP-224 Rack Mounting" on page 28.
- **Step 2** Connect the IP-224 to the Ethernet through the primary port.
- Step 3 Connect up to two (2) radios to the back of the IP-224 using a DB-37 connector. For more information, see "DB-37 Port" on page 33.
- **REFERENCE:** For more information, see the appropriate radio application note.
 - Step 4 Connect the power supply to the back of the unit. For more information, see "Back Panel Connections" on page 31.
 - Step 5 Configure IP-224 network settings from the display menu. For more information, see "Network Settings Menu" on page 91.
 - **Step 6** Configure a web browser to connect to the IP-224. For more information, see "Accessing IP-224 Web Browser Configuration Windows" on page 36.
 - Step 7 Configure IP-224 parameters specific to the install. For more information, see "Web Setup Windows Standards" on page 37.

CAUTION: Transient protection is provided near all audio inputs and outputs. The IP-224 line transformers are not designed to operate on lines carrying **DC** (Direct Current). If a voltage is on the line, isolate it with external capacitors. If the line termination must conduct DC, install a 600:600 Ohm transformer designed for the current involved.

Maintenance

Maintenance of the IP-224 is discussed in "Update Firmware" on page 109 and "Service" on page 119.

The IP-224 can be rack mounted one of two ways: one unit (single) or two units (dual). Single or dual mounting brackets are available for purchase.

• The mounting brackets ship with (14) 6-32 x 1/4" flathead screws and four (4) 10-32 x 3/4" rack screws.

To assemble one (1) IP-224 unit, do the following:

- 1. Using four (4) screws, attach the **side bracket** to the right side of the unit.
- 2. Using four (4) screws, attach the side bracket to the left side of the unit.



To mount the assembled unit to the rack, do the following:

- 1. Place the **assembly** in the rack and align the **side brackets holes** with the rail's holes.
- 2. Using four (4) screws, attach the assembly's side brackets to the rail.



To assemble two (2) IP-224 units, do the following:

- 1. Using four (4) screws, attach the middle bracket (C) to the left side of the unit #2 (B).
- 2. Using four (4) screws, attach the side bracket (D) to the right side of the unit #2 (B).
- 3. Using two (2) screws, attach the middle bracket (C) to the bottom of the unit #1 (A).

4. Using four (4) screws, attach the **side bracket** (D) to the left side of the unit #1 (A).



Front Panel Connections

For more information, see "IP-224 Front Panel" on page 20.

- For an electrically safe installation, the external power supply must be UL listed and CSA approved.
- All cables must not exceed three (3) meters in length.

RADIO 1 and RADIO 2 Jack

The front panel **RADIO 1** and **RADIO 2** jacks are used to measure receive and transmit audio levels of the specified line. Fluke Banjo P/N 10220-100 or a similar device can be used to take measurements.

To connect a voltmeter to the IP-224, do the following:

> On the front of the IP-224 unit, insert the **RJ-12 plug** into the LINE jack.

TABLE 2. RJ-12 Pinouts

Pin Number	Description	Banjo Pin
1	CTCSS/Spare Audio Input	1
2	RX Audio	BK
3	TX- Audio	R
4	TX+ Audio	G
5	Ground	Y
6	CTCSS/Spare Audio Output	6

Handset Jack

The **Handset** Jack is used to connect an optional handset, (AHS-1) allowing the user to monitor and talk on either line. When the handset **PTT** (Push-To-Talk) is pressed, the selected radio connected to the IP-224 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.

TABLE 3. Handset Jack Pinouts

Pin Number	Description	
1	Microphone Audio Input	
2	Ground	
3	PTT Input	
4	Speaker Audio Output	

Back Panel Connections

For more information, see "IP-224 Back Panel" on page 21.

Power Terminal

The **Power Terminal** is used to connect power (+11VDC to +16VDC) to the unit using a 3-pin terminal.

To connect power to the IP-224, do the following:

> Using the 3-Pole Terminal Strip Connector, connect Pin 1 to +12VDC, Pin 2 to ground, and Pin 3 to earth ground.

TABLE 4. Power Terminal Pinouts

Pin Number	Description
1	+12V
2	GND
3	EGND

PRIM Port

The **PRIM** port is used to connect the IP-224 to the Radio Dispatch primary network.

To connect to the network, do the following:

> Insert one (1) end of the **Ethernet cable into the PRIM Port** and the **other end in the network router**. *The IP-224 LINK LED illuminates*.

Second Port

The **SECOND** port is an optional Ethernet connection. It can be used to connect to a backup network router. If the primary Ethernet connection fails, the IP-224 automatically switches over to the secondary connection.

NOTE: The **SECOND Port** is supported in version 1.300 or newer software releases.

To connect to a backup network, do the following:

> Insert one (1) end of the Ethernet cable into the SECOND Port and the other end into the backup network router.

ACCESSORY Port

The **ACCESSORY** port connector is used for recorder outputs. The user has the option to route analog signals out of the IP-224 to interface to a third party recorder. For more information, see Table 5.

 TABLE 5. Accessory DB-9 Pin Out

Pin Number	Pin Name	Description
1	Recorder Line 1 Output+	20mVpp to 8Vpp Adjustable (Balanced)
2	N/C	
3	N/C	
4	N/C	
5	Ground	
6	Recorder Line 1 Output-	20mVpp to 8Vpp Adjustable (Balanced)
7	N/C	
8	Recorder Line 2 Output+	20mVpp to 8Vpp Adjustable (Balanced)
9	Recorder Line 2 Output-	20mVpp to 8Vpp Adjustable (Balanced)

DB-37 Port

The **DB-37** port is used to connect a radio interface cable enabling the associated radio to communicate with the IP-224. Each port connects one (1) radio to one (1) line.

Pin Number	Pin Name	Desription
1	TX+ Audio	20mVpp to 40Vpp Adjustable (Balanced)
2	TX- Audio	20mVpp to 40Vpp Adjustable (Balanced)
3	CTCSS/Spare Audio Output	10mVpp to 10Vpp Adjustable
4	RSSI Input	User selectable 5/10VDC Maximum
5	PTT Relay Common Contact	1 Amp @ 63V AC/DC
6	MON Relay N.C. Contact	1 Amp @ 63V AC/DC
7	MON Relay N.O. Contact	1 Amp @ 63V AC/DC
8	Function #1 Relay Common Contact	1 Amp @ 63V AC/DC
9	Function #2 Relay N.C Contact	1 Amp @ 63V AC/DC
10	Function #2 Relay N.O. Contact	1 Amp @ 63V AC/DC
11	Digital I/O #0	±36VDC Withstand Rating
12	Digital I/O #2	±36VDC Withstand Rating
13	Digital I/O #4	±36VDC Withstand Rating
14	Digital I/O #6	±36VDC Withstand Rating
15	COR Input	±36VDC Withstand Rating
16	RS-485/CAN D+	+5VDC Maximum
17	RS-232/TTL TXD	RS-232—Voltage Range: ±25VDC Maximum TTL—Voltage Range: 0 to +5VDC Maximum
18	USB VBus/+5VDC Output	+5VDC, 1 Amp output (Maximum)
19	USB D+	+5VDC Maximum
20	RX+ Audio	10mVpp to 10Vpp Adjustable (Balanced)
21	RX- Audio	10mVpp to 10Vpp Adjustable (Balanced)
22	CTCSS/Spare Audio Input ^a	10mVpp to 10Vpp Adjustable
23	PTT Relay N.C. Contact	1 Amp @ 63V AC/DC
24	PTT Relay N.O. Contact	1 Amp @ 63V AC/DC
25	MON Relay Common Contact	1 Amp @ 63V AC/DC
26	Function #1 Relay N.C. Contact	1 Amp @ 63V AC/DC
27	Function #1 Relay N.O. Contact	1 Amp @ 63V AC/DC
28	Function #2 Relay Common Contact	1 Amp @ 63V AC/DC
29	Ground	
30	Digital I/O #1	±36VDC Withstand Rating
31	Digital I/O #3	±36VDC Withstand Rating
32	Digital I/O #5	±36VDC Withstand Rating
33	Digital I/O #7	±36VDC Withstand Rating
34	RS-485 Busy	+5VDC Maximum
35	RS-485/CAN D-	+5VDC Maximum
36	RS-232/TTL RXD	RS-232—Voltage Range: ±25VDC Maximum
27		11L—Voltage Range: 0 to +5 VDC Maximum
51	USB D-	+5VDC Maximum

TABLE	6.	DB-37	Port
IADEE	ν.	DD JI	1 010

a. CTCSS/Spare Audio Input is not supported in version 1.300 software release.

IP-224

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chapter 4 Browser Setup

The IP-224 configuration windows are accessed by using a web browser such as Microsoft Internet Explorer¹ version 6.0 or later and Mozilla¹ Firefox version 4.00 or later. Access to the IP-224 configuration pages is password protected. This chapter includes information on setting the IP Address, accessing the IP-224 web interface pages, the IP-224 web page setup standards, and an explanation of the IP-224 web page configuration parameters.

This section provides the user with the required information to set up a basic radio installation. Some modes of operation and adjunct connected equipment trigger various configuration pages to display additional information. Refer to the specific technical manuals and application notes for supplementary information.

NOTE: Alternatively, TSM (Telex System Manager) can be used to set some IP-224 parameters.

Setting the IP Address Information

The IP Addresses of the IP-224 and the PC must be on the same Subnet in order for the IP-224 to interface successfully with the LAN or WAN. IP Addresses consist of four (4) numbers (i.e. quads) separated by periods. For example, 10.2.99.101.

An example of IP Addresses residing in the same Subnet:

PC IP Address -	10.2.99.250
IP-224 Address -	10.2.99.251
PC and IP-224 Subnet Mask -	255.255.255.0

NOTE:

- Contact your Network Administrator to obtain the network IP Address and Subnet Mask.
- For operation on different Subnets, a default gateway address must be configured. For more information, see "Default Gateway Field" on page 43.

^{1. &}quot;Copyright Notice" on page 2.

Accessing IP-224 Web Browser Configuration Windows

Before connecting the IP-224 to the web browser, an IP Address and Subnet Mask, compatible with an existing network, must be set on the IP-224. For more information, see "Network Settings Menu" on page 91.

The configured IP Address is the web browser address (http://[IP Address]) used to access the IP-224 configuration windows.

To access the IP-224 configuration 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-224. *The IP-224 configuration Login window appears.*

Windows Security	
The server 172.	19.230.151 at IP-224 requires a username and password.
	User name Password Remember my credentials
	OK Cancel

- **3.** In the User name field, enter **admin**.
- 4. In the Password field, enter the appropriate password.

NOTE: If this is the first time the IP-224 has been started and/or a password has not been assigned to the unit, enter **admin**.

 Click the OK button. *The Home window appears.*
Web Setup Windows Standards

Links

The left navigation pane contains links used to access the various IP-224 configuration windows.

TABLE 7.	IP-224	Links
----------	--------	-------

Link	Description
• Home	Displays the Home Window
Ethernet Setup	Displays the Ethernet Setup Window
Multicast Setup	Displays the Multicast Setup Window
Hardware Setup	Displays the Hardware Setup Window
▶ Gain Setup	Displays the Gain Setup Window
Per Line Setup	Displays the Per Line Setup Window
Account Management	Displays the Account Management Window
Additional Features	Displays the Additional Features Window and Access Key Entry Field
Save Parameters	Displays the Save Parameters or Reset IP-224
 System Status 	Displays the System Status Window

To access a setup window, do the following:

> Click the appropriate **link**.

The IP-224 Browser Banner, shown in Figure 4, appears on all windows in the web configuration. The upper left corner displays the IP-224 unit's information label.



FIGURE 4. IP-224 Information Label

This label contains the following information:

Name	The IP-224 Name
MAC	The IP-224 MAC Address
HW	The IP-224 Hardware Version
FW	The IP-224 Firmware Version
SN	The IP-224 Serial Number
Checksum	A value calculated from the firmware programmed in the unit.

Home Window

The Home window, shown in Figure 5, provides the user contact information.



FIGURE 5. IP-224 Home Window

Device Name Field

The **Device Name** field is used to enter a user-defined descriptive name (40 characters max) for the unit. This name is displayed in the upper left corner of each IP-224 configuration page in the Browser Banner.

Submit Button

The Submit button is used to temporarily save changes to the IP-224.

To permanently save changes, do the following:

- Click the Submit button. The changes are sent to the IP-224 to temporary storage.
- 2. From the left navigation, select **Save Parameters**. *The Save Parameters window appears*.
- **3.** Click the **Save Parameters**. button. *Changes are now permanently saved to the IP-224 console.*

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chapter 5 *Ethernet Setup*

Ethernet Setup Window

The **Ethernet Setup** window, shown in Figure 6, is used to enable Auto Failover, view the Current Active Port, set an active port, configure a network connection for the Primary Port or Secondary Port by configuring the host protocol, the IP-224's IP Address, Subnet Mask, Gateway Address, Packet Delay Before Playback, QOS settings, and Telex System Manager (TSM) settings. TSM is used to set parameters and update firmware for the IP-224.

Use the navigation pane on the left to open the following windows:

- Ethernet Port Setup
- Packet Setup
- TSM Setup

ELEX IP-224	ETUEPNET DOPT SETIID	
Home		
Ethernet Setup	Auto Failover Enabled: 🗌	
Ethernet Port Setup Packet Setup	Current Active Port: Primary Set Active Port: © Primary C Secondary	
TSM Setup	Drimow Dort	
	DHCP Enabled:	
Multicast Setup	Unit IP Address: 192 168 1 150	
Hardware Setup	Subnet Mask: 255 255 0.0 255 255 0.0	
Gain Setup	Default Gateway: 255 255 255 192 168 1 1	
Per Line Setup	The former and the fo	
Account Management	PACKET SETUP	
Additional Features	Packet Delay Before Playback: 10 QOS Precedence Bits: 0	
Save Parameters	QOS D, T, and R Bits: 0	
System Status		
	TELEX SYSTEM MANAGER SETUP	
	Enable: Mcast Address: Incoming Outgoing Port: Port: TIL:	
	System Manager 🔽 233.15.18.22 7635 7636 6	
	Submit	
	CODINA	

FIGURE 6. Ethernet Setup Window

ETHERNET PORT SETUP

Auto Failover Enabled Check Box

The **Auto Failover Enabled** check box if selected, enables the IP-224 to monitor the link status on the Primary Ethernet port. The IP-224 verifies the link status once per second. If the Primary Ethernet port link is lost, the IP-224 switches to the Secondary Ethernet port.

The IP-224 continues to use the Secondary Port until the link on the port is lost, the port selection is changed or the IP-224 is rebooted. The Auto Failover can also be changed via the IP-224 front panel display. For more information, see "Auto Failover Check Box" on page 91.

NOTE: When Auto Failover is enabled the IP-224 selects the Primary Port at power up.

Current Active Port Field

The Current Active Port field is used to view the IP-224's current active Ethernet port.

This field is automatically populated and cannot be modified.

NOTE: The Current Active Port field is also found on the System Status window of the IP-224 web application. For more information, see "System Status" on page 85.

Set Active Port Radio Button

The **Set Active Port** radio button is used to manually select the active Ethernet port on the IP-224. The active port can be changed regardless of the Auto Failover Enabled setting (for debug/setup purposes). The active Ethernet port can also be changed via the front panel of the IP-224. For more information, see "Set Active Port Menu" on page 96.

Available selections are:

- *Primary* Select Primary to set the PRIM Ethernet port on the IP-224 as the active port (Default).
- Secondary Select Secondary to set the SECOND Ethernet port on the IP-224 as the active port.

Primary Port Section

The Primary Port section is used to enable DHCP, set the unit's IP Address, Subnet Mask, or Gateway for the PRIM Ethernet port on the IP-224.

Secondary Port Section

The **Secondary Port** section is used to enable DHCP, set the unit's IP Address, Subnet Mask, or Gateway for the SECOND Ethernet port on the IP-224.

DHCP Enabled Check Box

The **DHCP** (Dynamic Host Configuration Protocol) **Enabled** check box, if selected, allows the IP-224 to acquire IP Addresses and other network configuration settings automatically when connected to a network.

NOTE: The network must allow DHCP service before the IP-224 can get the network parameters. Radio Dispatch 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.

Unit IP Address Field

The **Unit IP Address** field is used to display or set the unit's IP Address. The web browser configuration uses the IP Address to identify the IP-224 for such operations as set up, software upgrades, and communication on the network.

Subnet Mask Field

The **Subnet Mask** field is used to display or set the unit's 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.

Default Gateway Field

The **Default Gateway** field is used to display or set the unit's gateway address. The gateway address is used to connect to another network.

PACKET SETUP

Packet Delay Before Playback Field

The **Packet Delay before Playback** field is used to enter a delay period for the audio packets before they are played. The IP-224 uses a 20ms **UDP/IP** 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 *10*, which translates to a delay of 200ms 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 voice traffic.

For more information, see "Precedence Field and D, T, R, Binary Reference" on page 44.

QOS D, T, and R Bits Field

The **QOS: D, T, and R Bits** field is used for advanced programming purposed. 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 that high capacity lines 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.

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

TABLE 8. Precedence Field and D, T, R, Binary Reference

TELEX SYSTEM MANAGER SETUP

Enable Check Box

The **Enable** check box is used to enable communication with TSM (Telex System Manager). If cleared, TSM cannot detect the IP-224.

By default, the check box is selected.

For more information, see "Update Firmware" on page 109.

REFERENCE: For more information, see the Telex System Manager Technical Manual (F.01U.196.144).

Multicast Address Field

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

This field is automatically populated and cannot be modified.

Incoming Port Field

The **Incoming Port** field displays the port used to communicate with TSM. TSM requests data from the IP-224 through this port.

This field is automatically populated and cannot be modified.

Outgoing Port Field

The **Outgoing Port** field displays the port used to communicate with TSM. The IP-224 sends data through this port to TSM. This field is automatically populated and cannot be modified.

IP-224

TTL Field

The TTL field is used to enter the number of routers the multicast audio packets pass through before being discarded.

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

Submit Button

The **Submit** button is used to temporarily save changes to the IP-224.

To permanently save changes, do the following:

- Click the Submit button. The changes are sent to the IP-224 in temporary storage.
- 2. From the left navigation, select **Save Parameters**. *The Save Parameters window appears*.
- **3.** Click the **Save Parameters** button. *Changes are now permanently saved to the IP-224 console.*

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CHAPTER 6 Multicast Setup

Multicast Setup Window

The **Multicast Setup** window, shown in Figure 7, identifies the mode of operation (line type), serial protocol (serial type), vocoder type, in addition, which Multicast Address and ports are used for the IP-224 to communicate various line and IP recorder information.

Use the navigation pane on the left to open the following windows:

- Line Setup
- IP Recorder Setup

TELEX IP-224				S	ubmit		Au	to Configu	ration: 🔽
▶ Home									
Ethernet Setup	LINE SET	TUP							
 Multicast Setup 	Line:	Line Enable:	Line Name:		Line Type:	Serial Ty	pe:	Voco	ler Type:
Line Setup	1	R	Line 1		Local Mode 💌	Off		▼ TELE	X 32K 👻
IP Recorder Setup	2	~	Line 2	Í	Local Mode 💌	Off			X 32K 👻
Hardware Setup	Line:	Mcast Enable:	RX Mcast:	RX Port:	TX Mcast:	TX Port:	TX Grou Port A	p TX Grou : Port B:	р п.:
Gain Setup	1		225.8.11.81	1054	225.8.11.81	1072	0	0	6
Per Line Setup	2	•	225.8.11.81	1055	225.8.11.81	1073	0	0	6
Account Management	IP RECO	RDER SETI	IP						
Additional Features									
Save Parameters	Line:	Mcast Enable:	Line Name:		Vocoder Type:	Mcast Addr	ess: (Outgoing Port:	π.:
System Status	1		Recorder 1		TELEX 32K 💌	225.8.11.81	:	2250	6
	2		Recorder 2		TELEX 32K 💌	225.8.11.81		2251	6
				S	ubmit				

FIGURE 7. Multicast Setup Window

Auto Configuration

The **Auto Configuration** check box, if selected, the IP-224 automatically configures the necessary changes to the Hardware, Gain, and Per Line Setup parameters when a Line Type or Serial Type is selected.

48 Multicast Setup

LINE SETUP

Line Enable Check Box

The Line Enable check box, if selected, indicates DB-37 and Ethernet connectivity for the specified line is active. Otherwise, the DB-37 and Ethernet traffic for the specified line of the IP-224 is ignored.

Line Name Field

The **Line Name** field is used to enter a descriptive name for the specified line. This name is displayed on the front panel LCD. This field can contain *up to 9 characters*.

Line Type Drop Down Menu

The **Line Type** drop down menu is used to select the operating mode for line 1 and 2. Selecting a Line Type enables the fields necessary to enter the setup information for the selected line. The selected Line Type determines which serial mode may be enabled.

Available selections are:

Local Mode - Connects the radio directly to the IP-224 providing full control of the radio.

- Serial Types -•EF Johnson 5300
- •iDEN
- •Kenwood 5x10
- Kenwood NEXEDGE
- •Kenwood x150
- •Kenwood x180
- •Kenwood x80
- •Kenwood x90
- MOTOTRBO Interface
- •MTRBi
- Serial Over IP
- Sprint Direct Connect Interface
- NOTE: All radio types are not always shown. Available selectable radio types are based on enabled options.
 - *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.

Serial Types -•Serial Over IP

Serial Type Drop Down Menu

The **Serial Type** drop down menu is used to select the serial communication type (for example, serial protocol, baud rate, etc.) for Line 1 and 2. For more information, see "Line Type Drop Down Menu" on page 48 for a list of available serial options.

Vocoder Type Drop Down Menu

The **Vocoder Type** drop down menu is used to select the vocoder used to convert audio into a digital format. This feature is used to configure communication between the IP-224 and C-Soft.

Available selections are shown. Bit rates are based on Simplex mode.

- •TELEX 32K (50 kbits/sec with overhead)
- •G.726 16K (34 kbits/sec with overhead)
- •G.726 32K (50 kbits/sec with overhead)
- •G.711 64K (82 kbits/sec with overhead)
- **NOTE:** Design considerations must take into account that although 16K uses less bandwidth the audio quality may not perform as desired.

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

Mcast Enable Check Box

The **Mcast Enable** check box, if selected, indicates Ethernet connectivity for the specified line is active. Otherwise, audio received from the analog connection of the IP-224 is not echoed to the Ethernet, and Ethernet traffic is not mixed into the IP-224 audio.

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 wanting to listen to the audio traffic received must have the same Multicast Address.

The range for this field is 224.0.0.0 to 239.255.255.255.

NOTE:

- IP-224 units can also operate Unicast (point-to-point). These fields can support class A, B, and C addresses.
- Ensure the RX and TX port numbers are unique.

RX Port Field

The RX Port field is used to enter the RX port number for each line. The RX port number must be unique.

The range for this field is 1054 to 65535.

The **TX Mcast** field is used to enter the Broadcast Address for all audio traffic transmitted on a specific line. All consoles wanting to transmit audio traffic must have the same Multicast Address.

The range for this field is 224.0.0.0 to 239.255.255.255.

NOTE:

- IP-224 units can also operate Unicast (point-to-point). These fields can support class A, B, and C addresses.
- Ensure the RX and TX port numbers are unique.

TX Port Field

The **TX Port** field is used to enter the TX port number for each line. The TX port number must be unique.

The range for this field is 1054 to 65535.

TX Group Port A Field

The TX Group Port A field is used to transmit to multiple IP-224 units based on a unique port number.

The range for this field is 1054 to 65535.

TX Group Port B Field

The TX Group Port B field is used to transmit to multiple IP-224 units based on a unique port number.

The range for this field is 1054 to 65535.

TTL Field

The **TTL** field is used to enter 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.

IP RECORDER SETUP

Mcast Enable Check Box

The Mcast Enable check box is used to activate the IP recorder multicast output for the specified line.

Line Name Field

The Line Name field is used to assign a unique label to the IP recorder line.

This field can contain up to 15 alphanumeric characters.

Vocoder Type Drop Down Menu

The **Vocoder Type** drop down menu is used to select the bit rate at which audio is converted into digital format. This feature is used to configure communication between the IP-224 and Network Recorder.

Available selections are:

TELEX 32K (50 kbits/sec with overhead)
G.726 16K (34 kbits/sec with overhead)
G.726 32K (50 kbits/sec with overhead)

•G.711 64K (82 kbits/sec with overhead)

IMPORTANT: Vocoder configurations must be the same across devices and the Network Recorder.

Mcast Address Field

The Mcast Address field is used to enter the Multicast Address that generates multicast audio for the IP recorder output.

The range for this field is 224.0.0.2 to 239.255.255.255.

Outgoing Port Field

The Outgoing Port field is used to enter the Multicast Audio port number for the IP recorder output.

The range for this field is 1054 to 65535.

TTL Field

The **TTL** field is used to enter the number of routers the multicast audio packets go through before being discarded. Network design dictates this value.

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

Submit Button

The Submit button is used to temporarily save changes to the IP-224.

To permanently save changes, do the following:

- 1. Click the **Submit** button. *The changes are sent to the IP-224 to temporary storage.*
- 2. From the left navigation, select **Save Parameters**. *The Save Parameters window appears*.
- **3.** Click the **Save Parameters** button. *Changes are now permanently saved to the IP-224 console.*

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CHAPTER 7 Hardware Setup

Hardware Setup Window

NOTE: If the Auto Configuration check box from the Multicast Setup window is checked, the IP-224 automatically configures the hardware when a Line Type or Serial Type is selected.

The Hardware Setup window, shown in Figure 8, is used to view the line information and settings. The user may also manually set the hardware parameters for special requirements determined by the installation.

Use the navigation pane on the left to open the following windows:

- Line Info
- Audio/Analog Setup
- Digital I/O Setup
- Serial Protocol Setup



FIGURE 8. Hardware Setup Window

The **Line Info** field displays the Line Name, Line Type, and Serial Type for each line. This information is pulled from the Multicast Setup window.

IMPORTANT: No fields can be modified in this section.

AUDIO/ANALOG SETUP

2-Wire/4-Wire Audio Drop Down Menu

The **2-Wire/4-Wire Audio** drop down menu is used to select the audio interface between the IP-224 and the radio for each line.

NOTE: The TX and RX paths are separate in 4-wire mode and combined in 2-wire mode.

Available selections for this field are 4-wire and 2-wire.

RX Audio Single-Ended/Balanced Drop Down Menu

The RX Audio Single-Ended/Balanced drop down menu is used to select the RX audio input connection for each line.

Available selections for this field are Single-Ended and Balanced.

RX Audio Impedance Drop Down Menu

The **RX** Audio Impedance drop down menu is used to select the RX impedance for each line.

Available selections for this field are 10K Ohms, 10 Ohms, and 600 Ohms.

TX Audio Single-Ended/Balanced Drop Down Menu

The TX Audio Single-Ended/Balanced drop down menu is used to select the TX audio output connection for each line.

Available selections for this field are Single-Ended and Balanced.

TX Audio Impedance Drop Down Menu

The **TX** Audio Impedance drop down menu is used to select the TX impedance for each line.

Available selections for this field when TX Audio Single-Ended is selected are 800 Ohms, and 200 Ohms.

Available selections for this field when TX Audio Balanced is selected are 2.4K Ohms, 1.8K Ohms, 1.2K Ohms, and 600 Ohms.

DIGITAL I/O SETUP

I/O Pullup/Pulldown/Float Drop Down Menu

The **I/O Pullup/Pulldown/Float** drop down menu is used to select the idle status on the digital I/O lines. The I/O lines can be configured with a pull-up resistor to the selected I/O voltage, a pull-down resistor to ground, or left floating.

Available selections for this field are Float, Pull-up and Pull-down.

I/O Voltage Drop Down Menu

The I/O Voltage drop down menu is used to select the I/O pull-up voltage level on the digital I/O lines.

Available selections for this field are 12VDC I/O, 5VDC I/O and 3.3VDC I/O.

SERIAL PROTOCOL SETUP

Serial Type Drop Down Menu

The Serial Type drop down menu is used to select the IP-224 serial port protocol and voltage levels.

Available selections for this field are TTL, RS-232, RS-485, and CAN.

Baud Rate Drop Down Menu

The Baud Rate drop down menu is used to select the serial communication baud rate.

Available selections 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

RS485 Address Drop Down Menu

The **RS-485** Address drop down menu is used to select the address of the attached device on the RS-485 bus the IP-224 communicates with. This is only used if RS-485 is selected as the serial communication protocol.

Available selections are 2 - 7. The default is 2.

Submit Button

The Submit button is used to temporarily save changes to the IP-224.

To permanently save changes, do the following:

- Click the Submit button. The changes are sent to the IP-224 to temporary storage.
- 2. From the left navigation, select **Save Parameters**. *The Save Parameters window appears*.
- **3.** Click the **Save Parameters button**. *Changes are now permanently saved to the IP-224 console.*

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снартег 8 Gain Setup

Gain Setup Window

The **Gain Setup** window, shown in Figure 9, is used to adjust gain levels for Analog Recorder Gains, CTCSS Gains, Handset Gains, RX AGC Gains, and RX/TX Gains.

Use the navigation pane on the left to open the following windows:

- Line Info
- Analog Recorder Gains
- CTCSS Gains
- Handset Gains
- RX AGC Gains
- RX/TX Gains

ELEX IP-224		Submit	Auto Configuration:
Home			
Ethernet Setup	LINE INFO		
Multicast Setup	Info	Line 1	Line 2
Hardware Setup	Line Name:	Line 1	Line 2
Gain Setup	Serial Type:	Off	Off
ine Info			
Analog Recorder Gains	ANALOG RECORDER GAINS		
landset Gains	Coin Name	Line 1	Line 2
RX AGC Gains	Appleg Recorder Output	Lille I	
X/TX Gains	Analog Recorder Output:	Udb	UdB
Per Line Setup	CTCSS GAINS		
Account Management	Gain Name	Line 1	Line 2
Additional Features	CTCSS Input:	0 dB	0 dB
Save Parameters	CTCSS Output:	0 dB	0 dB
System Status			
	HANDSET GAINS		
	Gain Name		
	Handset Mic Input:	0 dB	
	Handset Sidetone:	0 dB	
	Gain Name	Line 1	Line 2
	Handset Output:	0 dB	0 dB
	RX AGC GAINS		
	Gain Name	Line 1	Line 2
	RX AGC Enabled:		
	RX AGC Target Level:	0 dB	0 dB
	RX AGC Min Level:	-20 dB	-20 dB
	RX AGC Max Gain:	10 dB	10 dB
	RX/TX GAINS		
	Gain Name	Line 1	Line 2
	RX Input:	0 dB	0 dB
	TX IP Input:	0 dB	0 dB
	TX Monitor Input:	0 dB	0 dB
	TX Output:	-12.5 dB	-12.5 dl
			12.00
		Submit	

FIGURE 9. Gain Setup Window

LINE INFO

The **Line Info** field displays the Line Name, Line Type, and Serial Type for each line. This information is pulled from the Multicast Setup window.

These fields are automatically populated and cannot be modified.

ANALOG RECORDER GAINS

Analog Recorder Output Gain Slider

The Analog Recorder Output Gain slider is used to set the analog recorder output gain level for the specified line.

The range for this field is -30dB to 15dB.

CTCSS GAINS

CTCSS Input Gain Slider

The CTCSS Input Gain slider is used to set the CTCSS/Spare Input level for the specified line.

The range for this field is -15dB to 45dB.

CTCSS Output Gain Slider

The CTCSS Output Gain slider is used to set the CTCSS/Spare Output level for the specified line.

The range for this field is -40dB to 15dB.

HANDSET GAINS

Handset Mic Input Gain Slider

The Handset Mic Input Gain slider is used to set the gain level for the handset's microphone.

The range for this field is -8dB to 20dB.

Handset Sidetone Gain Slider

The **Handset Sidetone Gain** slider is used to set the level of sidetone heard in the handset. Sidetone is sound diverted from a microphone to the speaker so a speaker hears their own voice.

The range for this field is -10dB to 8dB.

Handset Output Gain Slider

The Handset Output Gain slider is used to set the handset's receive gain level for the specified line.

The range for this field is -12dB to 10dB.

RX AGC GAINS

RX AGC Enabled Check Box

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

RX AGC Target Level Slider

The **RX AGC Target Level** slider is used to control the level at which the AGC attempts to hold RX audio. The AGC increases the level of RX audio below the Target Level, and decreases the level of RX audio above the Target Level.

The range for this field is -12dB to 2dB.

RX AGC Min Level Slider

The **RX AGC Min Level** slider is used to control the noise threshold for the RX AGC. RX audio levels below the Min Level setting are considered noise by the system, and cannot have any level adjustment applied. This prevents the AGC from attempting to boost background noise up to the AGC Target Level.

The range for this field is -50dB to -20dB.

RX AGC Max Gain Slider

The **RX AGC Max Gain** slider is used to control the maximum amount of gain boost AGC applies to RX audio below the Target Level.

The range for this field is *0dB* to *30dB*.

RX/TX GAINS

RX Input Gain Slider

The RX Input Gain slider is used to set the receive audio gain level for the specified line.

The range for this field when RX Audio Single-ended is selected is -15dB to 45dB. The range for this field when RX Audio Balanced is selected is -17dB to 43dB.

TX IP Input Gain Slider

The TX IP Input Gain slider is used to set the inbound transmit multicast gain level for the specified line.

The range for this field is -30dB to 10dB.

TX Monitor Input Gain Slider

The TX Monitor Input Gain slider is used to set the transmit monitor audio gain level for the specified line.

The range for this field is -30dB to 38dB.

TX Output Gain Slider

The TX Output Gain slider is used to set the transmit audio gain level for the specified line.

The range for this field when TX Audio Single-ended is selected is *-40dB* to *20dB*. The range for this field when TX Audio Balanced is selected is *-35dB* to *30dB*.

Submit Button

The **Submit** button is used to temporarily save changes to the IP-224.

To permanently save changes, do the following:

- Click the Submit button. The changes are sent to the IP-224 for temporary storage.
- 2. From the left navigation, select **Save Parameters**. *The Save Parameters window appears*.
- **3.** Click the **Save Parameters**. button. *Changes are now permanently saved to the IP-224 console.*

chapter 9 Per Line Setup

Per Line Setup Window

The **Per Line Setup** window, shown Figure 10, is used to view and set the parameters for the selected line. The details on the window apply to Line 1 or 2.

NOTE: If the field is grayed out or missing, it is not applicable to the mode selected for the line.

Use the navigation pane on the left to open the following windows:

- Line Info
- CTCSS Setup
- Delay/Timeout Setup
- Function Tone Setup
- LAM/COR Setup
- Options Setup
- Relay Setup
- Signaling Setup
- Tone Setup

TELEX IP-224	Line Select: 1 2	Submit		Auto Configuration: 🕅
▶ Home				
Ethernet Setup	LINE INFO			
Multicast Setup	Line Name: Line 1	Line Type: Lo	cal Mode	Serial Type: Off
Hardware Setup				
Gain Setup	CTCSS SETUP			
✓ Per Line Setup	C Always On	⊂ On w	vith PTT 💿 Off	F
Line Info CTCSS Setup Delay/Timeout Setup	DELAY/TIMEOUT SETUP			
 Function Tone Setup LAM/COR Setup 	RX Delay:	80 ms	TX Delay:	0 ms
 Options Setup 	PTT Timeout:	0 sec	PTT Delay:	20 ms
Relay Setup Signaling Setup Tone Setup	Squelch Tail Delay:	0 ms	Selcall Min. PTT:	3500 ms

FIGURE 10. Per Line Setup Window

LINE INFO

The **Line Info** field displays the Line Name, Line Type, and Serial Type for each line. This information is pulled from the Multicast Setup window.

These fields are automatically populated and cannot be modified.

CTCSS SETUP

Always On Radio Button

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

On With PTT Radio Button

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

Off Radio Button

The Off radio button, if selected, indicates CTCSS is off at all times.

Default selection is Off.

DELAY/TIMEOUT SETUP

RX Delay Field

The **RX Delay** field is used to enter the amount of time, in milliseconds, the RX audio is recorded and stored. RX audio is constantly recorded by the IP-224 and when a COR or LAM triggered detect occurs, the IP-224 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 5000ms.

IP-224

TX Delay Field

The **TX Delay** field is used to enter the delay 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 5000ms.

PTT Timeout Field

The **PTT Timeout** field is used to indicate how long to allow PTT to be active. If a time is entered in the field, PTT times out after the designated amount of time has lapsed. This feature is useful in cases where the line goes off hook for an indefinite period of time due to a stuck PTT key.

The range for this field is 0 to 1800 sec.

The default is θ .

Squelch Tail Delay Field

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

The range for this field is 0 to 5000ms.

Selcall Min. PTT Field

The **Selcall Min. PTT** field is used to enter the minimum amount of time serially controlled radios will PTT after receiving a Selcall, Individual Call, or Group Call from IP dispatch consoles.

The range for this field is 1000 to 10,000ms.

NOTE: The Selcall Min. PTT field is displayed only if Local Mode is selected in the Line Type drop down menu and a compatible serially controlled radio is selected in the Serial Type drop down menu in the Multicast Setup window.

FUNCTION TONE SETUP

TELEX IP-224	Line Se	elect: 1	2		Submit			A	uto Configu	ration: 🖂
▶ Home										
Ethernet Setup	FUNCT	ION TONE	SETUP							
Multicast Setup	Jump t	o Entry:	<< < 1 to 1	10 🔻	> >>					
Hardware Setup			,							
▶ Gain Setup	Boot I	n Froquor								
▼ Per Line Setup	boot	priequei								
Line Info	Entry	Enable	Relay	Relay Group	Relay Time (ms)	Digital Output	CTCSS Freq	CTCSS Default	System	Chan
<u>CTCSS Setup</u> <u>Delay/Timeout Setup</u>	1		-	1-	0	0	0		1	1
Function Tone Setup LAM/COR Setup	2	~	-	1 -	0	0	0		1	2
Options Setup Relay Setup	3	~	-	1 -	0	0	0		1	3
 <u>Signaling Setup</u> 	4	~	•	1 -	0	0	0		1	4
Ione Setup	5	V	-	1 -	0	0	0		1	5
Account Management	6	~	-	1 -	0	0	0		1	6
Additional Features	7	~	-	1 -	0	0	0		1	7
Save Damaster	8	~	-	1 -	0	0	0		1	8
Save Parameters	9		-	1 -	0	0	0		1	9
System Status	10	~	-	1 -	0	0	0		1	10
	Line Se	elect: 1	2		Submit					

FIGURE 11. Function Tone Setup Window - System and Chan

NOTE: 1000 functions tones (extended talk groups) apply to C-Soft version 6.000 and above. The IP-2002 console supports 100 function tones. The IP-1616 and the C-6200 consoles support the first 16 channels.

Jump To Entry Drop Down Menu

The Jump To Entry drop down menu is used to select up to 1000 function tones (in groups of 10) to view and modify.

To select a group of 10 function tones, do the following:

> From the Jump To Entry drop down menu, select the **group of 10 function tones** you want to view. *The selected function tone group appears.*

Boot Up Frequency Drop Down Menu

The Boot Up Frequency drop down menu is used to set the function tone frequency of the IP-224 upon boot up.

The range for this field is *I* to *1000*. The default is *I*.

Enable Check Box

The Enable check box, if selected, indicates the function tone is active.

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

Relay Drop Down Menu

The Relay drop down menu is used to select the relay, if any, that closes immediately upon receipt of the function tone.

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

Relay Group Drop Down Menu

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

Available selections are *1* and *2*.

Relay Time (ms) Field

The **Relay Time (ms)** field is used to enter the time the selected relay is activated when the function tone is received. If the Relay Time field is set to 0 the selected relay is activated without a timeout.

The range for this field is 0 to 32000ms.

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

> In the Relay Time field, enter **0**.

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

> In the Relay Time field, enter the **amount of time** in milliseconds.

Digital Output Field

The **Digital Output** field is used to enter the digital output value for the function tone.

The range for this field is 0 to 256.

To configure the desired output, do the following:

> In the Digital Output field, enter the numeric value for the desired DIG0–DIG7 output.

NOTE: See the Value column in "Digital Output Values" on page 123. *H* is high (on), *L* is low (off).

CTCSS Freq Field

The **CTCSS Freq** field is used to enter the CTCSS tone frequency set for the function tone.

The range for this field is 0 to 64. If 0 is entered, there is no CTCSS tone frequency set for the function tone.

To configure the desired tone frequency do the following:

> In the CTCSS Freq field, enter the desired **tone number** for the frequency.

NOTE: For more information, see Table 10, "CTCSS Tone Frequencies," on page 121.

CTCSS Default Check Box

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

System Field

The **System** field is used to control radios serially connected to the IP-224. When the function tone is changed by the console operator, along with the Chan field setting, the IP-224 changes the radio to the desired system and channel.

The range for this field is 0 to 999.

NOTE: The System field is displayed only if Local Mode is selected in the Line Type drop down menu, and a serially controlled radio is selected in the Serial Type drop down menu in the Multicast Setup Window.

Chan Field

The **Chan** field is used to control radios serially connected to the IP-224. When the function tone is changed by the console operator, along with the System field setting, the IP-224 changes the radio to the desired system and channel.

The range for this field is 0 to 999.

NOTE: The Chan field is displayed only if Local Mode is selected in the Line Type drop down menu, and a serially controlled radio is selected in the Serial Type drop down menu in the Multicast Setup Window.

TELEX IP-224	Line S	elect: 1	2		Submit			Auto Co	onfiguration: 🗵		
▶ Home	-										
Ethernet Setup	FUNCT	ION TONE	SETUP								
Multicast Setup	Jump t	Jump to Entry: << < 1 to 10 • >>									
Hardware Setup											
Gain Setup	Boot U	lo Frequer	icv: 1 -								
 Per Line Setup 											
Line Info CTCSS Setup	Entry	Enable	Relay	Relay Group	Relay Time (ms)	CTCSS Freq	CTCSS Default	Tone Freq 1 (Hz)	Tone Freq 2 (Hz)		
 Delay/Timeout Setup 	1	~	-	1 -	0	0		1950	0		
Function Tone Setup LAM/COR Setup	2	v	-	1-	0	0		1850	0		
Options Setup	3	~	-	1 -	0	0		1750	0		
<u>Relay Setup</u> <u>Signaling Setup</u>	4	~	-	1 -	0	0		1650	0		
 <u>Tone Setup</u> 	5	v	-	1 -	0	0		1550	0		
Account Management	6	~	-	1 -	0	0		1450	0		
	7	~	-	1 -	0	0		1350	0		
Additional Features	8	~	-	1 -	0	0		1250	0		
Save Parameters	9	~	-	1-	0	0		1150	0		
System Status	10	~	-	1 -	0	0		1050	0		
				_							
	Line Se	elect: 1	2		Submit						

FIGURE 12. Function Tone Setup Window - Tone Freq 1 and Tone Freq 2

Tone Freq 1(Hz) and Tone Freq 2(Hz) Fields

The **Tone Freq 1(Hz) and Tone Freq 2(Hz)** fields are used to enter the value associated with each function tone burst. The standard function tones and their frequencies are shown in Table 9 on page 67.

The range for this field is 0 to 3200Hz.

If the second value is set at zero (0), the second function is not generated.

NOTE: The **Tone Freq 1(Hz)** and **Tone Freq 2 (Hz)** fields are displayed only if Tone Mode is selected in the Line Type drop down menu in the Multicast Setup Window.

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

TABLE 9. Standard Function Tone Frequencies

LAM/COR SETUP

The LAM/COR Setup section is used to enable LAM or COR for audio processing. LAM and COR settings can be selected at the same time, creating an AND function required to generate RX packets to the network.

TELEX IP-224	Line Select: 1 2	Submit	Auto Configuration: 💟
▶ Home]		
Ethernet Setup	LAM/COR SETUP		
Multicast Setup	LAM Enable: 🗸	COR Enable:	COR Active High:
Hardware Setup	LAM Level: -20 dB		-
Gain Setup	LAM Time: 3 sec		
▼ Per Line Setup			
Line Info			
CTCSS Setup	Line Select: 1 2	Submit	
Delay/Timeout Setup			
Function Tone Setup			
LAM/COR Setup			
Options Setup			
- Anton Comm			

FIGURE 13. LAM/COR Setup Window

LAM Enable Check Box

The LAM Enable check box, if selected, indicates LAM is used to indicate receive audio.

LAM Level Field

The LAM Level field is used to enter the threshold at which the radio/line un-mutes and generates RX packets to the network.

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

LAM Time Field

The **LAM Time** field is used to enter the amount of time the LAM level can drop below the threshold without action from the IP-224. It allows small gaps in the audio sequence.

The range for this field is 0 to 60 sec.

COR Enable Check Box

The **COR Enable** check box, indicates the **COR** (Carrier Operated Relay) is enabled. If selected, the IP-224 monitors the COR for line activity in order to generate RX packets to the network.

COR Active High Check Box

The **COR** Active High check box, if selected, indicates the COR active signal polarity is high. The I/O connection is located on pin 15 of the DB-37 connector.

OPTIONS SETUP

If an **Options** field is graved out or missing, the particular option is not available for the line mode configured.

TELEX IP-224	Line Select: 1 2	Submit	Auto Configuration: 🗵
► Home			
Ethernet Setup	OPTIONS SETUP		
Multicast Setup	Freq Update w/ PTT	Pre-Em	phasize TX
Hardware Setup	Full Duplex Hi-Pass RX	PTT Not Scan Lis	tch Filter st
Gain Setup	Monitor Enable		
 Per Line Setup 			
Line Info CTCSS Setup Delay/Timeout Setup Function Tone Setup LAM/COR Setup Options Setup Relay Setup Signating Setup Tone Setup	Line Select: 2	Submit	
Account Management			
Additional Features			
Save Parameters			
System Status			

FIGURE 14. Options Setup Window (Local Mode)

NOTE: This Options Setup window only appears when Local Mode is selected in the Line Type drop down menu, and a Kenwood radio is selected in the Serial Type drop down menu in the Multicast Setup Window.

F1 Last Call Check Box

The F1 Last Call check box, if selected, stores the last received or transmitted iDEN number into the IP-224 Function Tone 1 settings.

NOTE: The F1 Last Call check box is displayed only if Local Mode is selected in the Line Type drop down menu, and iDEN is selected in the Serial Type drop down menu in the Multicast Setup window.

Freq Update w/PTT Check Box

The **Freq Update w/PTT** check box indicates a channel change is forced with each PTT. If cleared, channel changes occur only when the incoming channel is different than the previous channel.

Full Duplex Check Box

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

NOTE: COR settings can affect Full-Duplex operation. Trunked radio systems with go-ahead beeps typically require COR to be turned off.

Hi-Pass RX Check Box

The Hi-Pass RX check box is used to enable a 300Hz Hi-Pass filter for the RX audio.

Monitor Enable Check Box

The Monitor Enable check box indicates serial monitor commands can be sent to the radio.

Pre-Emphasize TX Check Box

The Pre-Emphasize TX check box is used to enable a 6dB octave pre-emphasis filter for the TX audio.

PTT Notch Filter Check Box

The **PTT Notch Filter** check box indicates the PTT notch filter is enabled. When selected, the PTT frequency is filtered from the RX audio.

Scan List Check Box

The Scan List check box, if selected, indicates C-Soft's scan list is synchronized with the radio's scan list.

TELEX IP-224 Home	Line Select: 1 2	Submit	Auto Configuration: 🗵
Ethernet Setup	OPTIONS SETUP		
Multicast Setup	Cross Mute	Monitor	Enable
Hardware Setup	 Freq Update w/ PTT Full Duplex 	☐ Parallel ☑ PTT Note	Tone Console ch Filter
Gain Setup	Hi-Pass RX	Supervis	or
▼ Per Line Setup			
Line Info CTCSS Setup Delay/Timeout Setup Function Tone Setup LAW/COR Setup Options Setup Relay Setup Signaling Setup Tone Setup	Line Select: 2	Submit	
Account Management			
Additional Features			
Save Parameters			
System Status			

FIGURE 15. Options Setup Window - (Tone Mode)

NOTE: This Options Setup window only appears when Tone Mode is selected in the Line Type drop down menu in the Multicast Setup Window.

Cross Mute Check Box

The **Cross Mute** check box indicates the cross mute I/O pin (DIGO, pin 11 of the DB-37 connector) is enabled. If selected, parallel console cross mute control is enabled. Cross mute is used to mute parallel consoles during transmission.

Freq Update w/PTT Check Box

The **Freq Update w/PTT** check box indicates a channel change is forced with each PTT. If cleared, channel changes occur only when the incoming channel is different than the previous channel.

Full Duplex Check Box

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

Hi-Pass RX Check Box

The Hi-Pass RX check box is used to enable a 300Hz Hi-Pass filter for the RX audio.

Monitor Enable Check Box

The Monitor Enable check box indicates monitor function tone generation is allowed.

Parallel Tone Console Check Box

The **Parallel Tone Console** check box, if selected, indicates a parallel console is being used. This allows audio from a parallel console to be sent to the network as TX packets.

PTT Notch Filter Check Box

The **PTT Notch Filter** check box indicates the PTT notch filter is enabled. When selected, the PTT frequency is filtered from RX audio.

Supervisor Check Box

The **Supervisor** check box indicates the Supervisory I/O pin (DIG1, pin 30 of the DB-37 connector) is enabled. If selected, parallel console supervisory control is enabled and control of the radio can be seized from other consoles.

RELAY SETUP

TELEX IP-224	Line Select: 1 2	Submit		Auto Configuration: 🗵
▶ Home				
Ethernet Setup	RELAY SETUP			
Multicast Setup	Common To Ground:			
Hardware Setup	Monitor	🗹 РТТ	□ R1	□ R2
▶ Gain Setup	Monitor Relay:			
▼ Per Line Setup	Reset with PTT	On except PTT	○ Timed 0 ms	
Line Info	PTT Relay:			
<u>CTCSS Setup</u>	PTT relay only	O PTT + R1	O PTT + R2	O PTT + BOTH
 Delay/Timeout Setup Function Tone Setup 				
 LAM/COR Setup 				
 Options Setup 				
<u>Relay Setup</u>	(
 <u>Signating Setup</u> <u>Tone Setup</u> 	Line Select: 1 2	Submit		

FIGURE 16. Relay Setup Window

Common to Ground Check Boxes

The **Common to Ground** check boxes, if selected, indicate the common connection of the Form C relay contact is connected to ground.

Controlled relays:

- Monitor
- **PTT**
- R1
- R2

Monitor Relay Radio Buttons

The Monitor Relay radio buttons identify the relay operation under specified IP-224 operating conditions.

Available selections for this field are:

Reset with PTT -	The monitor relay is activated from the time the monitor command 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 command is received or not.
Timed -	The monitor relay is activated when the monitor command is received for the amount of time entered in the Timed ms field.

The range for this field is 0 to 32,000ms.

PTT Relay Radio Buttons

The PTT Relay radio buttons identify which relays are active with PTT.

Available selections for this field are:

PTT relay only -	Only the PTT relay is closed
PTT+R1 -	The PTT relay and relay R1 is closed
<i>PTT</i> + <i>R2</i> -	The PTT relay and relay R2 is closed
PTT + BOTH -	The PTT relay and both relays R1 and R2 are closed
SIGNALING SETUP

TELEX IP-224	Line Select: 1 2	Submit		Auto Configuration: 🛛
Home Ethernet Setup	SIGNALING SETUP			
 Multicast Setup Hardware Setup Gain Setup Per Line Setup Line Info 	Fleetsync Decode: Fleetsync Encode: SK Tone Delay: 1000 ms Emerg. Status 1:	MDC Decode: MDC Encode: MSK Tone Gain: Emerg. Status 2:	0 dB	ANI Suffix:
 CTCSS Setup Delay/Timeout Setup Function Tone Setup LAM/COR Setup Options Setup Relay Setup Signaling Setup Tone Setup 	Line Select: 1 2	Submit		
 Account Management Additional Features Save Parameters System Status 				

FIGURE 17. Signaling Setup Window

IMPORTANT: The FleetSync and MDC-1200 features in this section are optional IP-224 accessories. The Access code must be entered on "Additional Features" on page 81 to enable the features.

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-224 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-224 instead of the radio.

MDC Decode Check Box

The **MDC Decode** check box is used to enable MDC-1200 Over-the-Air decode. All inbound MDC-1200 messages are decoded by the IP-224 instead of the radio.

MDC Encode Check Box

The **MDC Encode** check box is used to enable MDC-1200 Over-the-Air encode. All outbound MDC-1200 messages are generated by the IP-224 instead of the radio. Motorola encode features supported by the IP-224 include PTT ID, call alert, select call, radio check, remote monitor, and radio disable/enable.

signaling

MSK Tone Delay Field

The MSK Tone Delay field is used to enter the delay of MDC-1200 or FleetSync MSK signals. When Ethernet MSK

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 10,000ms. Default is 1000ms.

MSK Tone Gain Field

The MSK Tone Gain field is used to enter the gain of MDC-1200 or FleetSync MSK signals.

The range for this field is -60 to +10dB. The default is 0 dB.

Emerg. Status 1 Field

The Emerg. Status 1 field is used to enter a status number to trigger an emergency call in IP dispatch consoles.

Emerg. Status 2 Field

The Emerg. Status 2 field is used to enter a status number to trigger an emergency call in IP dispatch consoles.

TONE SETUP

The **Tone Setup** section identifies standard tone parameters. The IP-224 is capable of generating the standard tone sequences required to control a radio with a tone termination panel.

TELEX IP-224	Line Select: 1 2	Submit	Auto Configuration: 🗵
Home Ethernet Setup	TONE SETUP		
Multicast Setup	PTT/Notch Freq:	2175 H z	Monitor Frequency: 2050 Hz
Hardware Setup	Guard Tone Duration:	130 ms	Guard Tone Magnitude 10 dB
Gain Setup	FTone Duration:	40 ms	FTone Magnitude: 0 dB
▼ Per Line Setup	Hold Tone Hangtime:	200 ms	Hold Tone Magnitude: -20 dB
Line Info CTCSS Setup Delay/Timeout Setup Function Tone Setup LAM/COR Setup Options Setup Relay Setup Signaling Setup Tone Setup	Line Select: 1 2	Submit	
Account Management			

FIGURE 18. Tone Setup Window

PTT/Notch Freq Drop Down Menu

The **PTT/Notch Freq** drop down menu is used to select the frequency the IP-224 generates for guard/hold tones, detects for guard/hold tones, and the center frequency for the notch filter.

Available selections for this field are 2100, 2175, 2300, 2325, 2400, 2600, 2800, 2850, 2970 and 3200Hz. The default is 2175Hz.

Monitor Frequency Field

The **Monitor Frequency** field is used to enter the value of the function tone generated when the MON button on the console is pressed.

The range for this field is 0 to 3200Hz. The default is 2050Hz.

NOTE: This selection appears in Tone Mode.

Guard Tone Duration Field

The **Guard Tone Duration** field is used to enter the amount of time the IP-224 generates the guard tone and detects for the guard tone.

The range for this field is 0 to 999ms. The default is 130ms.

NOTE: This selection appears in Tone Mode.

Guard Tone Magnitude Field

The Guard Tone Magnitude field is used to enter the level the IP-224 generates the guard tone.

The range for this field is -60 to 12dB. The default is 0db.

NOTE: This selection appears in Tone Mode.

FTone Duration Field

The **FTone Duration** field is used to enter the duration the IP-224 generates the function tone and detects for 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. The default is 40ms.

NOTE: This selection appears in Tone Mode.

FTone Magnitude Field

The FTone Magnitude field is used to enter the level the IP-224 generates the function tone.

The range for this field is -60 to 12dB. The default is 0 dB.

NOTE: This selection appears in Tone Mode.

Hold Tone Hang Time Field

The **Hold Tone Hang Time** field is used to enter the amount of time the IP-224 hold tone continues after the release of the PTT button. Pressing the PTT button again during this hang time continues the transmission without sending the guard and function tones again.

The range for this field is 0 to 999ms. The default is 200ms.

NOTE: This selection appears in Tone Mode.

Hold Tone Magnitude Field

The Hold Tone Magnitude field is used to enter the level the IP-224 generates the hold tone.

The range for this field is -60 to 12dB. The default is -20dB.

NOTE: This selection appears in Tone Mode.

Submit Button

The Submit button is used to temporarily save changes to the IP-224.

To permanently save changes, do the following:

- Click the Submit button. The changes are sent to the IP-224 for temporary storage.
- 2. From the left navigation, select **Save Parameters**. *The Save Parameters window appears*.
- **3.** Click the **Save Parameters** button. *Changes are now permanently saved to the IP-224 console.*

CHAPTER 10 Account Management

Account Management Window

The Account Management window, shown in Figure 19, is used to change the Administrator's password. The IP-224 system parameters may also be reset to factory default settings from this page.

Use the navigation pane on the left to open the following windows:

- Change Password
- System Parameters

Change Password

Access to the IP-224 web setup browser is protected either by a default password or user-defined password. The user defined password may be set or changed at any time. Changing the password requires the user to identically enter a password (4-16 characters) in the New Password and Confirm Password fields. If the two (2) passwords entered are the same, the password is saved to memory.

TELEX IP-224	
Home Ethernet Setup Multicast Setup	CHANGE PASSWORD Username: admin Password:
Hardware Setup Gain Setup	New Password: Confirm Password: Submit
Per Line Setup Account Management <u>Change Password</u> System Parameters	SYSTEM PARAMETERS Restore Factory Defaults Confirmation Code: t4zrw3k
Additional Features Save Parameters System Status	Enter Restore Code: Restore

FIGURE 19. IP-224 Account Management Window

IMPORTANT: Make note of the new password before adding or changing a password.

- **1.** From the left navigation, select **Account Management**. *The Account Management window appears.*
- 2. In the Password field, enter the **current password**.
- 3. In the New Password field, enter a **password** (4-16 characters).
- 4. In the Confirm Password field, enter the same password assigned in the previous step.
- Click the Submit button. The entries currently displayed on the window are sent to the IP-224 for storage.
- **6.** From the left navigation, select **Save Parameters**. *The Save Parameters window appears*.
- 7. Click the **Save Parameters** button. *Changes are now permanently saved to the IP-224 console.*

System Parameters

If required, all of the IP-224 system parameters may be reset to factory defaults. A restore code must be entered to reset the parameters. The restore code is displayed in red in the System Parameters section as shown in Figure 19.

To reset the system parameters, do the following:

- 1. In the Enter Restore Code field, From the left navigation, select enter the **Restore Factory Defaults Confirmation Code**.
- 2. Click Restore.
 - If an error occurred in the Restore Code entry, the error message shown in Figure 20 appears.
 - If the Restore code was entered correctly, the SUCCESS message shown in Figure 21 appears.
- **3.** From the left navigation, select **Save Parameters**. *The Save Parameters window appears*.
- 4. Click Save Parameters.

CAUTION: All user data (for example, IP Address, password, etc.) is reset back to the factory default except the additional features (MDC1200, FleetSync, EF Johnson, iDEN, etc.)

TELEX IP-224	A ERROR: There was an error while tyring to reset system parameters.
• Home	CHANGE PASSWORD
Ethernet Setup	
Multicast Setup	Daceword
Hardware Setup	
Gain Setup	Confirm Password:
Per Line Setup	Submit
▼ Account Management	
Change Password	SYSTEM PARAMETERS
System Parameters	Restore Factory Defaults Confirmation Code: t4zrw3k
Additional Features	
Save Parameters	Enter Restore Code: Restore
System Status	

FIGURE 20. Account Management Window - Restore Code Error

TELEX IP-224			
• Home	BUCCESS: System parameters have been su	ccessfully reset.	
Ethernet Setup	CHANGE PASSWORD		
Multicast Setup	Username:	admin	
Hardware Setup	Password:		
Gato Setup	New Password:		
Per Line Setup	Confirm Password:		
* Account Management		Sut	omit
Change Password			
System Parameters	SYSTEM PARAMETERS		
Additional Features	Restore Factory Defaults Confirmation Code: t4zn	v3k	
Save Parameters	Enter Restore (ode:	Restore
System Status			

FIGURE 21. Account Management Window - Restore Code Success

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CHAPTER 11 Additional Features

Additional Features Window

The **Additional Features** window, shown in Figure 22, displays the special operational software enabled in the IP-224. Each additional feature is enabled by entering a separately purchased option code. Refer to the respective technical manuals for set up information.

TELEX IP-224			
• Home	ACCESS ADDI	IIONAL FEATURES	
Ethernet Setup	Access Kev:		Submit
Multicast Setup	·		
Hardware Setup		<u>Feature Name</u>	Number Of Lines Allowed
Gain Setup		EFJohnson Radio	2
		FleetSync Decode	2
Per Line Setup		FleetSync Encode	2
Account Management		iDEN Radio	0
		MDC1200 Decode	2
 Additional Features 		MDC1200 Encode	2
Envo Davametera		MOTOTRBO Interface	1
Save Farameters		NXDN Interface	0
System Status		P25 Interface	0
		Sprint Direct Connect	2
		TETRA Interface	0

FIGURE 22. Additional Features Window

These fields are automatically populated and cannot be modified.

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CHAPTER 12 Save Parameters

Save Parameters

The Save Parameters window is used to save the current configuration to the IP-224. It is also used to reset the IP-224 device.



FIGURE 23. Save Parameters Window

Save Parameters Button

The Save Parameters button is used to save any changes submitted to the IP-224 for storage into permanent memory.

To save changes to permanent memory, do the following:

- 1. From the left navigation, select **Save Parameters**. *The Save Parameters window appears*.
- 2. Click the Save Parameters button. Changes are now permanently saved to the IP-224 console.
 - **NOTE:** Clicking Submit saves changes in temporary memory only. The configuration values do not take affect until Save Parameters is clicked.

Reset IP-224 Button

The Reset IP-224 button is used to perform a full reset of the IP-224. This is the software equivalent of a power down reset.

To reset the IP-224, do the following:

- 1. From the left navigation, select **Save Parameters**. *The Save Parameters window appears*.
- 2. Click Reset IP-224.

The IP-224 web page displays the count down clock until the unit fully reboots. The web page home screen appears after the completion of reset.

chapter 13 System Status

System Status Window

The **System Status** window, shown in Figure 24, is used to view the IP-224's current active Ethernet port and audio levels in real time, such as Handset Input, CTCSS Input, RX Input, TX IP Input, and TX Monitor Input.

TELEX IP-224				
• Home	ETHERNET PORT STATU	S		
Ethernet Setup	Current Active Port:	Primary		
Multicast Setup				
Hardware Setup				
Gain Setup	<u>Level Name</u> Handset Input:	-50 dB		
Per Line Setup				
	Level Name	Line 1	Line 2	
 Account Management 	CTCSS Input:	-50 dB	-50 dB	
Additional Features	RX Input:	-50 dB	-50 dB	
	TX IP Input:	-50 dB	-50 dB	
Save Parameters	TX Monitor Input:	-50 dB	-50 dB	
▼ System Status				

FIGURE 24. System Status Window

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IP-224 Front Panel

The IP-224 front panel uses an **LCD** (Liquid Crystal Display) display to provide the user with basic IP-224 information and menu options. The front panel softkeys are used to navigate through the menus and make quick changes to a few basic parameters. Front panel LEDs indicate when the IP-224 is generating IP Packets (TX) and if a network connection is established (LINK).

Front Panel Display

NOTE: Take care not to damage the display:

- Clean with soft cloth using ethyl alcohol or isopropyl alcohol. Do not use solvents such as ketone, or aromatics.
- Do not operate or store in direct exposure to sunlight.

Front Panel Softkeys

The Front Panel softkeys are used to access and navigate through the programming menus.

MENU Softkey

The **MENU** softkey is used to access the MAIN menu. The MENU softkey is also used to navigate through the lower level menus and used to select menu options. Once the softkey is pressed, the Main menu appears. For more information, see "MAIN Menu" on page 88.

IC Softkey

The IC softkey is used to return to previous menu level.

Arrow Up Softkey

The Arrow Up softkey is used to navigate the IP-224 menus by moving the selection up the menu.

Arrow Down Softkey

The **Arrow Down** softkey is used to navigate the IP-224 menus by moving the selection down the menu.

Positioning the arrow next to the desired selection allows the user to proceed to the next menu level by pressing the MENU softkey again.

MAIN Menu

The **MAIN** menu, shown in Figure 25, is used select various system levels to control or monitor, gains to set, view or set network parameters, and switch on/off tones for system alignment.

Available selections for the Main Menu include:

- Systems Utilities
- Network Settings
- Input VU Meters
- Gain Adjustments



FIGURE 25. Main Menu Screen

Main Menu Structure

MAIN MENU

SYSTEM UTILITIES View Unit Info **Display Contrast** Reboot IP-224 NETWORK SETTINGS Auto Failover **Primary Port** Secondary Port Set Active Port **INPUT VU METERS RX** Inputs **CTCSS** Inputs TX IP Inputs **TX Monitor Inputs** Handset Mic GAIN ADJUSTMENTS TX Outputs **RX** Inputs TX IP Inputs **TX Monitor Inputs CTCSS** Inputs **CTCSS** Outputs Recorder Outputs Handset

System Utilities Menu

The System Utilities menu is used to view unit info, display contrast, and reboot the IP-224.

View Unit Info Menu

The **View Unit Info** menu, shown in Figure 26, is used to display the unit's information, including network parameters, serial number, hardware version, and software version.



FIGURE 26. View Unit Info Menu Screen

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select System Utilities.
- **3.** Press the **MENU** softkey. *The System Utilities menu appears.*
- 4. Using the arrow softkey, select View Unit Info.
- **5.** Press **MENU** softkey. *The View Unit Information appears in the display.*

Display Contrast Menu

The Display Contrast menu, shown in Figure 27, is used to set up the contrast level of the main display in front of the unit.



FIGURE 27. Display Contrast Menu Screen

To adjust the Contrast Level, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select System Utilities.
- **3.** Press the **MENU** softkey. *The System Utilities menu appears.*
- 4. Using the arrow softkeys, select **Display Contrast**.
- 5. Press the MENU softkey. *The Display Contrast menu appears.*
- 6. Using the arrow softkeys, select the desired **contrast level**.
- 7. Press the **MENU** softkey to save the new contrast level.
- 8. Press the IC softkey to return to the previous menu.

Reboot IP-224 Menu

The Reboot IP-224 menu, shown in Figure 28, is used to reset the unit.

Θ	REBOOT IP-224:	
	Reboot the IP-224?	

FIGURE 28. Reboot IP-224 Menu Screen

To reset the unit, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select System Utilities.
- **3.** Press the **MENU** softkey. *The System Utilities menu appears.*
- 4. Using the arrow softkeys, select **Reboot IP-224**.
- 5. Press the MENU softkey. *The Reboot IP-224 menu appears.*
- 6. Press the MENU softkey. *The unit begins rebooting.*

Network Settings Menu

The Network Settings menu is used to view and set the IP-224's network parameters.

Available Selections include:

- Auto Failover
- Primary Port
- Secondary Port
- Set Active Port

Auto Failover Check Box

The **Auto Failover Enabled** check box if selected, enables the IP-224 to monitor the link status on the Primary Ethernet port. The IP-224 verifies the link status once per second. If the Primary Ethernet port link is lost, the IP-224 switches to the Secondary Ethernet port.

The IP-224 continues to use the Secondary Port until the link on the port is lost, the port selection is changed or the IP-224 is rebooted. The Auto Failover can also be changed via the IP-224 front panel display. For more information, see "Auto Failover Enabled Check Box" on page 42.

NOTE: When Auto Failover is enabled the IP-224 selects the Primary Port at power up.

Ю.	NETWORK SETTINGS:
<u> </u>	Auto Fạilover: □+
\otimes	_F Primary Port

FIGURE 29. Auto Failover Menu Screen

To enable Auto Failover for the unit, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Network Settings.
- **3.** Press the **MENU** softkey. *The Network Settings menu appears.*
- **4.** Press the **MENU** softkey and select **Auto Failover** option check box. *The updating message appears and the display returns to the Network Settings menu.*

The **Primary Port** menu, shown in Figure 30, is used to enable DHCP, display or set the unit's IP Address, Subnet Mask, or Gateway for the PRIM Ethernet port on the IP-224.

\square	IETWORK SE	TTINGS:
Ϋ́Τ	Primary	Port+
⊗⊾	Secondarý	Port

FIGURE 30. Primary Port Menu Screen

Secondary Port Menu

The **Secondary Port** menu, shown in Figure 31, is used to enable DHCP, display or set the unit's IP Address, Subnet Mask, or Gateway for the SECOND Ethernet port on the IP-224.

	NETWORK SET	TINGS:
∽↑	Primary	Port
×⊻	Secondarý	Port+

FIGURE 31. Secondary Port Menu Screen

DHCP Check Box

The **DHCP** (Dynamic Host Configuration Protocol) menu, shown in Figure 32, allows the IP-224 to acquire IP Addresses and other network configuration settings automatically when connected to a network.

By default DHCP check box is not selected.

NOTE: The network must allow DHCP service before the IP-224 can get the network parameters. Radio Dispatch 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.



FIGURE 32. DHCP Menu Screen

To enable DHCP for the unit, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Network Settings.
- **3.** Press the **MENU** softkey. *The Network Settings menu appears.*

4. Using the arrow softkeys, select **Primary Port**. OR

Using the arrow softkeys, select Secondary Port.

- 5. Press the **MENU** softkey.
- 6. Press the MENU softkey and select DHCP option check box. The updating message appears and the display returns to the Primary Port or Secondary Port menu.
- 7. Press the IC softkey to return to the previous menu.

To validate the new network setting, do the following:

- 1. Using the arrow softkeys, select **IP Address**.
- 2. Press the MENU softkey. *The IP address of the unit appears.*
- 3. Press the IC softkey to return to the previous menu.

Set IP Address Menu

The Set IP Address menu, shown in Figure 33, is used to display or set the unit's IP Address.



FIGURE 33. Set IP Address Menu Screen

To set the IP Address, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select **Network Settings**.
- **3.** Press the **MENU** softkey. *The Network Settings menu appears.*
- Using the arrow softkeys, select Primary Port. OR Using the arrow softkeys, select Secondary Port.
- Press the MENU softkey. The Primary Port menu appears. OR The Secondary Port menu appears.

NOTE: Verify the DHCP check box is not selected.

- 6. Using the arrow softkeys, select **IP** Address.
- 7. Press the **MENU** softkey. *The Set IP Address menu appears. The first IP Address quad is active.*
- 8. Press the MENU softkey to move the quad selection, as needed.
- **9.** Press and hold the **arrow** softkeys to increment the quad number at a rapid rate. OR

Press the arrow softkeys to increment the quad number, up or down, by a value of one (1).

- 10. Repeat steps 8 and 9 until the IP Address is complete.
- **11.** Press the **IC** softkey to return to the previous menu.

Set Subnet Mask Menu

The **Subnet Mask** menu, shown in Figure 34, is used to display or set the unit's 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.



FIGURE 34. Set Subnet Mask Menu Screen

To set the Subnet Mask, do the following:

- 1. From the home state, press the MENU softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Network Settings.
- **3.** Press the **MENU** softkey. *The Network Settings menu appears.*
- Using the arrow softkeys, select Primary Port. OR Using the arrow softkeys, select Secondary Port.
- 5. Press the MENU softkey. *The Primary Port menu appears. OR The Secondary Port menu appears.*

NOTE: Verify the DHCP check box is not selected.

- 6. Using the arrow softkeys, select **Subnet Mask**.
- 7. Press the MENU softkey. The Set Subnet Mask menu appears. The first Subnet Mask quad is active.
- 8. Press the MENU softkey to move the quad selection, as needed.
- **9.** Press and hold the **arrow** softkeys to increment the quad number at a rapid rate. OR

Press the arrow softkeys to increment the quad number, up or down, by a value of one (1).

- 10. Repeat steps 5 and 6 until the Subnet mask settings are complete.
- **11.** Press the **IC** softkey to return to the previous menu.

Set Gateway Address Menu

The **Gateway Address** menu, shown in Figure 35, is used to display or set the unit's gateway address. The gateway address is used to connect to another network.



FIGURE 35. Set Gateway Menu Screen

To set the Gateway Address, do the following:

- 1. From the home state, press the MENU softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Network Settings.
- **3.** Press the **MENU** softkey. *The Network Settings menu appears.*
- Using the arrow softkeys, select Primary Port. OR Using the arrow softkeys, select Secondary Port.
- 5. Press the MENU softkey. *The Primary Port menu appears. OR The Secondary Port menu appears.*

NOTE: Verify the DHCP check box is not selected.

- 6. Using the arrow softkeys, select Gateway.
- Press the MENU softkey. The Set Gateway menu appears. The first gateway quad is active.
- 8. Press the MENU softkey to move the quad selection, as needed.
- **9.** Press and hold the **arrow** softkeys to increment the quad number at a rapid rate. OR

Press the arrow softkeys to increment the quad number, up or down, by a value of one (1).

- **10.** Repeat **steps 5** and **6** until the gateway settings are complete.
- **11**. Press the **IC** softkey to return to the previous menu.

Set Active Port Menu

The **Set Active Port** menu, shown in Figure 35, is used to manually select the active Ethernet port on the IP-224. The active port can be changed regardless of the Auto Failover Enabled setting (for debug/setup purposes). The active Ethernet port can also be changed via the IP-224 web application. For more information, see "Set Active Port Radio Button" on page 42.

Available selections are:

- *Primary* Select Primary to set the PRIM Ethernet port on the IP-224 as the active port (Default).
- Secondary Select Secondary to set the SECOND Ethernet port on the IP-224 as the active port.



FIGURE 36. Set Active Port Menu Screen

To change the Active Port, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Network Settings.
- **3.** Press the **MENU** softkey. *The Network Settings menu appears.*
- **4.** Using the arrow softkeys, select **Set Active Port**. *The Active Port menu appears.*
- 5. Using the arrow softkeys, select the **Secondary** check box.

NOTE: By default the Primary check box is selected.

- **6.** Press the **MENU** softkey. *The updating message appears and the display returns to the Active Port menu.*
- 7. Press the IC softkey to return to the previous menu. *The Active Port menu appears.*
- 8. Press the IC softkey to return to the previous menu.

Input VU Meters Menu

The **Input VU Meters** menu is used to display and monitor various input audio levels. When the VU meter appears on the display and audio is being received, the total volume is represented graphically and the value is given in dB.

Available selections include:

- RX Inputs
- CTCSS Inputs
- TX IP Inputs
- TX Monitor Inputs
- Handset Mic

RX Input Levels Menu

The **RX Input Levels** menu, shown in Figure 37, is used to monitor the IP-224's received audio level.



FIGURE 37. RX Input Levels Menu Screen

To monitor the RX Inputs Levels, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select **Input VU Meters**. Press the **MENU** softkey.
- 3. Using the arrow softkeys, select **RX Inputs**.
- **4.** Press the **MENU** softkey. *The RX Input Levels menu appears. The VU meters for Line 1 and Line 2 appear.*
- 5. Press the IC softkey to return to the previous menu. *The Input VU Meters menu appears.*
- 6. Press the IC softkey to return to the previous menu.

CTCSS Input Levels Menu

The CTCSS Input Levels menu, shown in Figure 38, is used to monitor the CTCSS audio level.



FIGURE 38. CTCSS Input Levels Menu Screen

To monitor the CTCSS Input Levels, do the following:

- 1. From the home state, press the MENU softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Input VU Meters.
- **3.** Press the **MENU** softkey. *The Input VU Meters menu appears.*
- 4. Using the arrow softkeys, select **CTCSS Inputs**.
- 5. Press the MENU softkey. *The CTCSS Input Levels menu appears. The VU meters for Line 1 and Line 2 appear.*
- 6. Press the IC softkey to return to the previous menu. *The Input VU Meters menu appears.*
- 7. Press the IC softkey to return to the previous menu.

TX IP Input Levels Menu

The TX IP Input Levels menu, shown in Figure 39, is used to monitor the TX Multicast audio level from IP dispatch consoles.



FIGURE 39. TX IP Input Levels Menu Screen

To monitor the TX IP Input Levels, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears.*
- 2. Using the arrow softkeys, select Input VU Meters.
- **3.** Press the **MENU** softkey. *The Input VU Meters menu appears.*
- 4. Using the arrow softkeys, select **TX IP Inputs**.
- **5.** Press the **MENU** softkey. *The TX IP Inputs Levels menu appears. The VU meters for Line 1 and Line 2 appear.*
- 6. Press the IC softkey to return to the previous menu. *The Input VU Meters menu appears*.
- 7. Press the IC softkey to return to the previous menu.

TX Monitor Input Levels Menu

The TX Monitor Input Levels menu, shown in Figure 40, is used to monitor the TX Monitor audio level.



FIGURE 40. TX Mon Input Levels Menu Screen

To monitor the TX Monitor Input Levels, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select **Input VU Meters**.
- **3.** Press the **MENU** softkey. *The Input VU Meters menu appears.*
- 4. Using the arrow softkeys, select **TX Monitor Inputs**.
- Press the MENU softkey. The TX Mon Input Levels menu appears. The VU meters indicate the current TX monitor levels on both lines.
- 6. Press the IC softkey to return to the previous menu. *The Input VU Meters menu appears.*
- 7. Press the IC softkey to return to the previous menu.

Handset Mic Input Level Menu

The **Handset Mic Input Level** menu, shown in Figure 41, is used to monitor the current microphone input level from the handset.



FIGURE 41. Handset Mic Level Menu Screen

To monitor the Handset Mic Input Level, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears.*
- 2. Using the arrow softkeys, select Input VU Meters.
- **3.** Press the **MENU** softkey. *The Input VU Meters menu appears.*
- 4. Using the arrow softkeys, select Handset Mic.
- Press the MENU softkey.
 The Handset Mic Level menu appears. The VU meters indicate the current microphone input from the handset.
- 6. Press the IC softkey to return to the previous menu. *The Input VU Meters menu appears.*
- 7. Press the IC softkey to return to the previous menu.

Gain Adjustment Menu

The Gain Adjustment menu is used to view and set the IP-224's gain settings.

Available selections include:

- TX Outputs
- RX Inputs
- TX IP Inputs
- TX Monitor Inputs
- CTCSS Inputs
- CTCSS Outputs
- *Recorder Outputs*
- Handset

TX Outputs Gain Menu

The **TX Outputs menu**, shown in Figure 42, is used to display or set the unit's TX Output gain settings.



FIGURE 42. TX Output Gains Menu Screen

To set the TX Output Gains, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Gain Adjustments.
- **3.** Press the **MENU** softkey. *The Gain Adjustments menu appears.*
- 4. Using the arrow softkeys, select **TX Output**.
- 5. Press the MENU softkey. *The TX Output Gains menu appears.*
- 6. Using the arrow softkeys, scroll to the **Output Gain** you want to modify. The available selections for this menu are:
 - Level [Line #1/2(dB)] Adjusting the numeric value adjusts the TX Output gain for the selected line. To adjust the gain setting, do the following:
 - a. Using the arrow softkeys, position the **findicator** next to the value to be adjusted.
 - **b.** Press the **MENU** softkey to enter gain adjustment mode. *A rectangular box appears around the gain value.*
 - c. Using the arrow softkeys, adjust the **gain settings** to the desired value. *Changes in gain value take effect immediately.*
 - **d.** Press the **MENU** softkey to save changes and exit the gain adjustment mode. OR
 - e. Press the IC softkey to discard changes and exit the gain adjustment mode.
 - **Tone** When the box is selected, the IP-224 generates an alignment tone at the TX+/- output pins. To **select/clear the Tone Enable box,** do the following:
 - a. Using the arrow softkeys, position the **findicator** next to the desired option.
 - **b.** Press the **MENU** softkey to select or clear the check box.
 - **PTT** When the box is selected, the IP-224 energizes the **PTT** relay for the selected line. Alternatively, a **handset** plugged into the HANDSET port on the front of the unit can be used to assert PTT. To **select/clear the PTT Enable box**, do the following:
 - a. Using the arrow softkeys, position the **indicator** next to the desired option.
 - **b.** Press the **MENU** softkey to select or clear the check box.
- 7. When the gain adjustment is complete, press the IC softkey to return to the previous menu.

RX Inputs Gains Menu

The **RX Input Gains** menu, shown in Figure 43, is used to display or set the unit's RX Input gain settings.



FIGURE 43. RX Input Gains Menu Screen

NOTE: It is recommended to DISABLE the RX AGC (via the unit's webpage settings) while adjusting the RX Input gain.

To set the RX Input Gain, do the following:

- 1. From the home state, press the MENU softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Gain Adjustments.
- **3.** Press the **MENU** softkey. *The Gain Adjustments menu appears.*
- 4. Using the arrow softkeys, select **RX Inputs**.
- Press the MENU softkey. The RX Input Gains menu appears.
- 6. Using the arrow softkeys, scroll to the Input Gain you want to modify. *An on-screen VU Meter displays the RX audio level for the selected line.*
 - Level [Line #1/2(dB)] Adjusting the numeric value adjusts the RX Input gain for the selected line. To adjust the gain setting, do the following:
 - a. Using the arrow softkeys, position the **indicator** next to the value to be adjusted.
 - **b.** Press the **MENU** softkey to enter gain adjustment mode. *A rectangular box appears around the gain value.*
 - c. Using the arrow softkeys, adjust the **gain settings** to the desired value. *Changes in gain value take effect immediately.*
 - **d.** Press the **MENU** softkey to save changes and exit the gain adjustment mode. OR

Press the IC softkey to discard changes and exit the gain adjustment mode.

7. When the gain adjustment is complete, press the IC softkey to return to the previous menu.

The **TX IP Input Gains** menu, shown in Figure 44, is used to display or set the unit's TX IP Input Gains settings.



FIGURE 44. TX IP Input Gains Menu Screen

To set the TX IP Input Gains, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Gain Adjustments.
- **3.** Press the **MENU** softkey. *The Gain Adjustment menu appears.*
- 4. Using the arrow softkeys, select **TX IP Inputs**.
- 5. Press the MENU softkey. *The TX IP Input Gains menu appears.*
- 6. Using the arrow softkeys, scroll to the **Input Gain** you want to modify. *An on-screen VU Meter displays the TX IP audio level for the selected line.* The available selections for this menu are:
 - Level [Line #1/2(dB)] Adjusting the numeric value adjusts the TX IP Input gain for the selected line. To adjust the gain setting, do the following:
 - a. Using the arrow softkeys, position the **findicator** next to the value to be adjusted.
 - **b.** Press the **MENU** softkey to enter gain adjustment mode. *A rectangular box appears around the gain value.*
 - c. Using the arrow softkeys, adjust the **gain settings** to the desired value *Changes in gain value take effect immediately.*
 - **d.** Press the **MENU** softkey to save changes and exit the gain adjustment mode. OR

Press the IC softkey to discard changes and exit the gain adjustment mode.

7. When the gain adjustment is complete, press the IC softkey to return to the previous menu.

TX Monitor Input Gains Menu

The TX Monitor Inputs menu, shown in Figure 45, is used to display or set the unit's TX Monitor Input Gains settings.



FIGURE 45. TX Monitor Input Gains Menu Screen

NOTE: It is recommended to DISABLE the RX AGC (via the unit's webpage settings) while adjusting the TX Monitor Input Gains.

To set the TX Monitor Input Gains, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Gain Adjustments.
- **3.** Press the **MENU** softkey. *The Gain Adjustment menu appears.*
- 4. Using the arrow softkeys, select **TX Monitor Inputs**.
- **5.** Press the **MENU** softkey. *The TX Monitor Input Gains menu appears.*
- 6. Using the arrow softkeys, scroll to the **Input Gain** you want to modify. *An on-screen VU Meter displays the TX audio level for the selected line.*
 - Level [Line #1/2(dB)] Adjusting the numeric value adjusts the TX Monitor Input gain for the selected line. To adjust the gain setting, do the following:
 - a. Using the arrow softkeys, position the **findicator** next to the value to be adjusted.
 - **b.** Press the **MENU** softkey to enter gain adjustment mode. *A rectangular box appears around the gain value.*
 - c. Using the arrow softkeys, adjust the **gain settings** to the desired value. *Changes in gain value take effect immediately.*
 - **d.** Press the **MENU** softkey to save changes and exit the gain adjustment mode. OR

Press the IC softkey to discard changes and exit the gain adjustment mode.

7. When the gain adjustment is complete, press the IC softkey to return to the previous menu

The CTCSS Input Gains menu, shown in Figure 46, is used to display or set the unit's CTCSS Input Gains settings.



FIGURE 46. CTCSS Input Gains Menu Screen

To set the CTCSS Input Gains, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Gain Adjustments.
- **3.** Press the **MENU** softkey. *The Gain Adjustments menu appears.*
- 4. Using the arrow softkeys, select CTCSS Inputs.
- 5. Press the MENU softkey. *The CTCSS Input Gains menu appears.*
- 6. Using the arrow softkeys, scroll to the CTCSS Gain you want to modify. An on-screen VU Meter displays the CTCSS audio level for the selected line.
 - Level [Line #1/2(dB)] Adjusting the numeric value adjusts the CTCSS Input gain for the selected line. To adjust the gain setting, do the following:
 - a. Using the arrow softkeys, position the 🖆 indicator next to the value to be adjusted.
 - **b.** Press the **MENU** softkey to enter gain adjustment mode. *A rectangular box appears around the gain value.*
 - **c.** Using the arrow softkeys, adjust the **gain settings** to the desired value. *Changes in gain value take effect immediately.*
 - d. Press the MENU softkey to save changes and exit the gain adjustment mode. OR

Press the IC softkey to discard changes and exit the gain adjustment mode.

7. When the gain adjustment is complete, press the IC softkey to return to the previous menu.

CTCSS Output Gains Menu

The CTCSS Output Gains menu, shown in Figure 47, is used to display or set the unit's CTCSS Output Gains settings.



FIGURE 47. CTCSS Output Gains Menu Screen

To set the CTCSS Output Gains, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears*.
- 2. Using the arrow softkeys, select Gain Adjustments.
- **3.** Press the **MENU** softkey. *The Gain Adjustments menu appears.*
- 4. Using the arrow softkeys, select CTCSS Outputs
- Press the MENU softkey. The CTCSS Output Gains menu appears.
- 6. Using the arrow softkeys, scroll to the CTCSS Gain you want to modify. The available selections for this menu are:
 - Level [Line #1/2(dB)] Adjusting the numeric value adjusts the CTCSS Output gain for the selected line. To adjust the gain setting, do the following:
 - a. Using the arrow softkeys, position the 🖬 indicator next to the value to be adjusted.
 - **b.** Press the **MENU** softkey to enter gain adjustment mode. *A rectangular box appears around the gain value.*
 - c. Using the arrow softkeys, adjust the **gain settings** to the desired value. *Changes in gain value take effect immediately.*
 - **d.** Press the **MENU** softkey to save changes and exit the gain adjustment mode. OR

Press the IC softkey to discard changes and exit the gain adjustment mode.

- Enable Tone When the box is selected, the IP-224 generates an alignment tone at the CTCSS output pin. To select/clear the Tone Enable box, do the following:
 - a. Using the arrow softkeys, position the **findicator** next to the desired option.
 - **b.** Press the **MENU** softkey to select or clear the check box.
- 7. When the gain adjustment is complete, press the IC softkey to return to the previous menu.

The Recorder Output Gains menu, shown in Figure 48, is used to display or set the unit's Recorder Output Gains settings.



FIGURE 48. Recorder Output Gains Menu Screen

To set the Recorder Output Gains, do the following:

- 1. From the home state, press the **MENU softkey**. *The Main menu appears*.
- 2. Using the arrow softkeys, select Gain Adjustments.
- **3.** Press the **MENU** softkey. *The Gain Adjustments menu appears.*
- 4. Using the arrow soft keys, select **Recorder Outputs**.
- **5.** Press the **MENU softkey**. *The Recorder Output Gains menu appears.*
- 6. Using the arrow softkeys, scroll to the **Recorder Gain** you want to modify. The available selections for this menu are:
 - Level [Line #1/2(dB)] Adjusting the numeric value adjusts the Recorder Output gain for the selected line. To adjust the gain setting, do the following:
 - **a.** Using the arrow softkeys, position the **indicator** next to the value to be adjusted.
 - **b.** Press the **MENU softkey** to enter gain adjustment mode. *A rectangular box appears around the gain value.*
 - c. Using the arrow softkeys, adjust the **gain settings** to the desired value. *Changes in gain value take effect immediately.*
 - **d.** Press the **MENU softkey** to save changes and exit the gain adjustment mode. OR

Press the IC softkey to discard changes and exit the gain adjustment mode.

• Enable Tone - When the box is selected, the IP-224 generates an alignment tone at the RECORDER +/- output pins.

To select/clear the Tone Enable box, do the following:

- a. Using the arrow softkeys, position the **finite indicator** next to the desired option.
- **b.** Press the **MENU softkey** to select or clear the check box.
- 7. When the gain adjustment is complete, press the IC softkey to return to the previous menu.

IP-224

Handset Menu

The Handset menu, shown in Figure 49, is used to configure the unit's Handset Gains settings.



FIGURE 49. Handset Gains Menu Screen

To set the Handset Gains, do the following:

- 1. From the home state, press the **MENU** softkey. *The Main menu appears.*
- 2. Using the arrow softkeys, select Gain Adjustments.
- **3.** Press the **MENU** softkey. *The Gain Adjustments menu appears.*
- 4. Using the arrow softkeys, select Handset.
- **5.** Press the **MENU** softkey. *The Handset Gains menu appears.*
- 6. Using the arrow softkeys, scroll to the **Handset Gains menu option** desired. The available selections for this menu are:
 - Mic Gain (dB) Adjusting the numeric value adjusts the Handset Mic gain. *An on-screen VU meter displays the Handset Mic input audio level.* To adjust the gain setting, do the following:
 - a. Using the arrow softkeys, position the **findicator** next to the value to be adjusted.
 - **b.** Press the **MENU** softkey to enter gain adjustment mode. *A rectangular box appears around the gain value.*
 - c. Using the arrow softkeys, adjust the **gain settings** to the desired value. *Changes in gain value takes effect immediately.*
 - **d.** Press the **MENU** softkey to save changes and exit the gain adjustment mode. OR

Press the IC softkey to discard changes and exit the gain adjustment mode.

• **Output Level [Line #1/2(dB)]** - Adjusting the numeric value adjusts the Handset Output audio level for the selected line.

To adjust the gain setting, do the following:

- a. Using the arrow softkeys, position the **findicator** next to the value to be adjusted.
- **b.** Press the **MENU** softkey to enter gain adjustment mode. *A rectangular box appears around the gain value.*
- c. Using the arrow softkeys, adjust the **gain settings** to the desired value. *Changes in gain value take effect immediately.*
- **d.** Press the **MENU** softkey to save changes and exit the gain adjustment mode. OR

Press the IC softkey to discard changes and exit the gain adjustment mode.

- Sidetone Gain- Adjusting the numeric value adjusts the Handset Sidetone audio level for the selected line. To adjust the gain setting, do the following:
 - a. Using the arrow softkeys, position the 📫 indicator next to the value to be adjusted.
 - **b.** Press the **MENU** softkey to enter gain adjustment mode. *A rectangular box appears around the gain value.*
 - c. Using the arrow softkeys, adjust the **gain settings** to the desired value. *Changes in gain value take effect immediately.*
 - **d.** Press the **MENU** softkey to save changes and exit the gain adjustment mode. OR

Press the IC softkey to discard changes and exit the gain adjustment mode.

7. When the gain adjustment is complete, press the IC softkey to return to the previous menu.
CHAPTER 15 Update Firmware

Update Firmware

Updating the firmware of VoIP hardware requires using **TSM** (Telex System Manager). The latest version of TSM is available for download from http://www.telex.com/us/dispatch/downloads.

NOTE:

- VoIP hardware includes the following Radio Dispatch devices: ADHB-4, IP-224, 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 and remove earlier versions of TSM from the computer, if needed.
- 2. Download the latest TSM from www.telex.com.

NOTE: For more information, see "Download Telex Firmware" on page 111.

- **3.** Unzip and double-click **setup.exe**. *The Telex System Manager Welcome window appears.*
- **4.** Click the **Next** button. *The Select Installation Folder window appears.*

🛃 Telex System Manager	
Select Installation Folder	
The installer will install Telex System Manager to the followin To install in this folder, click "Next". To install to a different fo Folder:	g folder. older, enter it below or click "Browse".
C:\Program Files\T elex Communications\T elex System M	fanager\ Bjowse Disk Cost
Install Telex System Manager for yourself, or for anyone w	ho uses this computer:
Cancel	< <u>₿</u> ack Next≻

 To specify an installation path for TSM, click the Browse button. 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\

6. Select the Everyone check box to allow any user access to TSM. OR

Select the **Just Me** check box to allow the current user access to TSM.

7. Click the **Next** button.

The Confirm Installation window appears.

🛃 Telex System Manager	
Confirm Installation	
The installer is ready to install Telex System Manager on your computer. Click "Next" to start the installation.	
Cancel < Back	Next >

8. Click the Next button.

The Installing Telex System Manager appears and a Please Wait message appears. Once TSM is installed, a success message appears on the Confirm Installation window.

9. Click the Close button.

Download Telex Firmware

When new firmware becomes available it is posted to our website. It can be downloaded at http://www.telex.com/us/dispatch/ downloads. Check the website periodically for updated firmware.



FIGURE 50. Telex Website Firmware—Download Link

To download TSM, do the following:

- 1. From the navigation pane, select **Download**. *The Downloads window appears*.
- 2. From the right navigation pane, select **TSM**. *The Telex System Manager Download window appears.*
- **3.** Click the **Download File** icon. *The Opening TSM_Vxxx .zip window appears.*
- 4. Select the Save File radio button.
- 5. Select the **Do this automatically for files like this from now on check box** for future downloads (optional).
- 6. Click the OK button. *The Enter Name of the File to Save to window appears. The filename field is populated with the TSM file name.*
- 7. Locate a destination folder.
- Click the Save button. The TSM .zip file is saved to the destination folder.

NOTE: Downloading firmware is a similar procedure.

The **Update Firmware Tool** window, shown in Figure 51, is used to upload the newest version of firmware to the device selected in the Destination field.

Firmware Update Tool			×
File: C:\Program Files\Telex	Communications	IP-224\IP224 v0.027.t/b	-
Firmware File Info			
Device Type: IP-22	4	Version: 0.027	
Date: 3/8/20	11	Checksum: FF74CBAA	ן
Destination			
192.168.1.17		Login Username: admin Password:	
Manual Entry 192 . 168 . 1 . 17	• 3	Write Firmware	Close

FIGURE 51. Firmware Tool Window

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.

Date Field

The **Date** field displays the currently selected file's firmware creation date.

Firmware Version Field

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

Checksum Field

The Checksum field displays the currently selected file's firmware checksum

Destination Group Box

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 file. 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 add the VoIP hardware's IP Address 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: The admin profile 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.

The range for this field is 4 to 16 characters.

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.

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:

- 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**. *ⁱ The Open window appears*. *ⁱ*
- 4. Select the.**tfb file** you want to upload. *The file is highlighted*.
- Click the Open button. 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, select the **device's IP Address**. *The Write Firmware button is activated.*
- 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.

• Once the firmware is uploaded, the device resets.

Firmware Update Tool		\mathbf{x}	
File: \\Deliserver\vega\Vega_Software\IP	24_Development\v0.033\IP2	24_v 🕶 📄	
Firmware File Info			
Device Type: IP-224	Version: 0.03	3	
Date: 8/26/2011	Checksum: 3650.08	866	
Destination			
172 19 60 120 - James Dev (P-224 172 19 90 107 - Telex (P-224 172 19 110 150 - Mich & Oen Test I 172 19 110 160 - Mich & Oen Test I 172 19 153 183 - Telex (P224 172 19 210 140 - Telex (P-224	Login Username: admin Password: *****		
0.0.0.0	Lucia Commun	Claus	
	Firmware Update In Progre	255	
	Do not po	wer down or restart the de	vice while firmware update in progress
	Device	Progress	Status
	172.19.135.138 - Telex IP224		Confirming System Kernel transmission
			Close

- Click the Close button. The Firmware Update in Progress window closes.
- **9.** Click the **Close** button. *The Firmware Update Tool window closes.*

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

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

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CHAPTER 16 Factory Mode

Factory Mode

Factory Mode is used to reset the webpage password and to reset all of the unit's parameters to factory defaults.

Factory Mode Screen

The Factory Mode screen is used to select Reset Password or Factory Defaults.



FIGURE 52. Factory Mode Screen

NOTE: Once the menu is accessed, a left arrow appears in the display next to the currently selected menu option.

Reset Password Check Box

The **Reset Password** check box enables the operator to reset the webpage password on the IP-224. Once selected, the default password of the unit is reset to admin and the username is admin.

To reset the webpage password, do the following:

- 1. Turn the **unit** on.
- 2. From the home state, press the MENU softkey. *The Main menu appears.*
- 3. Using the arrow softkeys, scroll to System Utilities.
- Press the Menu softkey. The System Utilities Menu appears.
- 5. Using the arrow softkeys, scroll to View Unit Info.
- 6. Press the Menu softkey. *The View Unit Info screen appears.*
- While the View Unit Info screen appears, use the Arrow Up and Arrow Down buttons to perform the following sequence: up, up, down, and down.
 The Factory Mode screen appears.

- 8. Using the arrow softkeys, select **Reset Password**.
- **9.** Press the **Menu** softkey. *The Password is Reset.*

Factory Defaults Check Box

The Factory Defaults check box enables the operator to reset all the unit's parameters to default.

To reset the IP-224 back to the factory defaults, do the following:

- 1. Turn the **unit** on.
- 2. From the home state, press the MENU softkey. *The Main menu appears.*
- 3. Using the arrow softkeys, scroll to System Utilities.
- 4. Press the Menu softkey. *The System Utilities Menu appears.*
- 5. Using the arrow softkeys, scroll to View Unit Info.
- 6. Press the Menu softkey. *The View Unit Info screen appears.*
- While the View Unit Info screen appears, use the Arrow Up and Arrow Down softkeys to perform the following sequence: up, up, down, and down. The Factory Mode screen appears.
- 8. Using the arrow softkeys, select Factory Defaults.
- **9.** Press the **Menu** softkey. *Parameters are Reset and Rebooting.*

IP-224 Mainboard

The IP-224 mainboard can be replaced while the unit remains connected to radios, Ethernet, and power.

To replace the IP-224's mainboard, do the following:

- 1. Remove the two (2) screws (A) on the front of the unit.
- 2. Thread the supplied thumbscrews into front panel.
- **3.** Pull the **board display assembly** (B) completely out of the unit. *The board unplugs and the display is blank.*



- 4. Using the six (6) board guides (C) inside the IP-224, carefully slide the **replacement board** into the unit, ensuring the board is located inside the board guides (C).
- 5. Push the **board** completely into the unit (B) until it is seated in the connector (not shown) at the back of the unit. *The board is connected and the display is active.*



NOTE: Thumbscrews are not used to install the PCB into chassis.

APPENDIX A CTCSS Tone Frequency Table

CTCSS Tone Frequency Table

TABLE 10.	CTCSS Tor	ne Frequencies
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Tone Number	Freq. (Hz)
1	33.0
2	35.4
3	36.6
4	37.9
5	39.6
6	44.4
7	47.5
8	49.2
9	51.2
10	53.0
11	54.9
12	56.8
13	58.8
14	63.0
15	67.0
16	69.4

Tone Number	Freq. (Hz)
17	71.9
18	74.4
19	77.0
20	79.7
21	82.5
22	85.4
23	88.5
24	91.5
25	94.8
26	97.4
27	100.0
28	103.5
29	107.2
30	110.9
31	114.8
32	118.8

Tone Number	Freq. (Hz)
33	123.0
34	127.3
35	131.8
36	136.5
37	141.3
38	146.2
39	151.4
40	156.7
41	159.8
42	162.2
43	165.5
44	167.9
45	171.3
46	173.8
47	177.3
48	179.9

Tone	Freq.
Number	(Hz)
49	183.5
50	186.2
51	189.9
52	192.8
53	196.6
54	199.5
55	203.5
56	206.5
57	210.7
58	218.1
59	225.7
60	229.1
61	233.6
62	241.8
63	250.3
64	254.1

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APPENDIX A Digital Output Table

Digital Output Table

TABLE 11. Digital Output Values

Value	DIG7	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
0	L	L	L	L	L	L	L	L
1	L	L	L	L	L	L	L	Н
2	L	L	L	L	L	L	Н	L
3	L	L	L	L	L	L	Н	Н
4	L	L	L	L	L	Н	L	L
5	L	L	L	L	L	Н	L	Н
6	L	L	L	L	L	Н	Н	L
7	L	L	L	L	L	Н	Н	Н
8	L	L	L	L	Н	L	L	L
9	L	L	L	L	Н	L	L	Н
10	L	L	L	L	Н	L	Н	L
11	L	L	L	L	Н	L	Н	Н
12	L	L	L	L	Н	Н	L	L
13	L	L	L	L	Н	Н	L	Н
14	L	L	L	L	Н	Н	Н	L
15	L	L	L	L	Н	Н	Н	Н
16	L	L	L	Н	L	L	L	L
17	L	L	L	Н	L	L	L	Н
18	L	L	L	Н	L	L	Н	L
19	L	L	L	Н	L	L	Н	Н
20	L	L	L	Н	L	Н	L	L
21	L	L	L	Н	L	Н	L	Н
22	L	L	L	Н	L	Н	Н	L
23	L	L	L	Н	L	Н	Н	Н
24	L	L	L	Н	Η	L	L	L
25	L	L	L	Н	Н	L	L	Н

Value	DIG7	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
26	L	L	L	Н	Н	L	Н	L
27	L	L	L	Н	Н	L	Н	Н
28	L	L	L	Н	Н	Н	L	L
29	L	L	L	Н	Н	Н	L	Н
30	L	L	L	Н	Н	Н	Н	L
31	L	L	L	Н	Н	Н	Н	Н
32	L	L	Н	L	L	L	L	L
33	L	L	Н	L	L	L	L	Н
34	L	L	Н	L	L	L	Н	L
35	L	L	Н	L	L	L	Н	Н
36	L	L	Н	L	L	Н	L	L
37	L	L	Н	L	L	Н	L	Н
38	L	L	Н	L	L	Н	Н	L
39	L	L	Η	L	L	Н	Н	Н
40	L	L	Η	L	Н	L	L	L
41	L	L	Η	L	Н	L	L	Н
42	L	L	Η	L	Н	L	Н	L
43	L	L	Η	L	Η	L	Н	Н
44	L	L	Η	L	Н	Н	L	L
45	L	L	Н	L	Н	Н	L	Н
46	L	L	Η	L	Η	Η	Н	L
47	L	L	Н	L	Н	Н	Н	Н
48	L	L	Н	Н	L	L	L	L
49	L	L	Н	Н	L	L	L	Н
50	L	L	Н	Н	L	L	Н	L
51	L	L	Н	Н	L	L	Н	Н
52	L	L	Н	Н	L	Н	L	L
53	L	L	Н	Н	L	Н	L	Н
54	L	L	Н	Н	L	Н	Н	L

TABI F	11 Digital	Output	Values
IABLE	11. Digital	Output	values

Value	DIG7	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
55	L	L	Н	Н	L	Н	Н	Н
56	L	L	Н	Н	Н	L	L	L
57	L	L	Н	Н	Н	L	L	Н
58	L	L	Н	Н	Н	L	Н	L
59	L	L	Н	Н	Н	L	Н	Н
60	L	L	Н	Н	Н	Н	L	L
61	L	L	Н	Н	Н	Н	L	Н
62	L	L	Н	Н	Н	Н	Н	L
63	L	L	Н	Н	Н	Н	Н	Н
64	L	Н	L	L	L	L	L	L
65	L	Н	L	L	L	L	L	Н
66	L	Н	L	L	L	L	Н	L
67	L	Н	L	L	L	L	Н	Н
68	L	Н	L	L	L	Н	L	L
69	L	Н	L	L	L	Н	L	Н
70	L	Н	L	L	L	Н	Н	L
71	L	Н	L	L	L	Н	Н	Н
72	L	Н	L	L	Н	L	L	L
73	L	Н	L	L	Н	L	L	Н
74	L	Н	L	L	Н	L	Н	L
75	L	Н	L	L	Н	L	Н	Н
76	L	Н	L	L	Н	Н	L	L
77	L	Н	L	L	Н	Н	L	Н
78	L	Н	L	L	Н	Н	Н	L
79	L	Н	L	L	Н	Н	Н	Н
80	L	Н	L	Н	L	L	L	L
81	L	Н	L	Н	L	L	L	Н
82	L	Н	L	Н	L	L	Н	L
83	L	Н	L	Н	L	L	Н	Н
84	L	Н	L	Н	L	Н	L	L
85	L	Н	L	Н	L	Н	L	Н
86	L	Н	L	Н	L	Н	Н	L
87	L	Н	L	Н	L	Н	Н	Н
88	L	Н	L	Н	Н	L	L	L
89	L	Н	L	Н	Н	L	L	Н
90	L	Н	L	Н	Н	L	Н	L
91	L	Н	L	Н	Н	L	Н	Н
92	L	Н	L	Н	Н	Н	L	L
93	L	Н	L	Н	Н	Н	L	Н
94	L	Н	L	Н	Н	Н	Н	L
95	L	Н	L	Н	Н	Н	Н	Н
96	L	Н	Н	L	L	L	L	L
97	L	Н	Н	L	L	L	L	Н
98	L	Н	Н	L	L	L	Н	L

Value	DIG	DIG	DIGS	DIG4	DIG3	DIG2	DIG	DIG
99	L	Н	Н	L	L	L	Н	Н
100	L	Н	Н	L	L	Н	L	L
101	L	Н	Н	L	L	Н	L	Н
102	L	Н	Н	L	L	Н	Н	L
103	L	Н	Н	L	L	Н	Н	Н
104	L	Н	Н	L	Н	L	L	L
105	L	Н	Н	L	Н	L	L	Н
106	L	Н	Н	L	Н	L	Н	L
107	L	Н	Н	L	Н	L	Н	Н
108	L	Н	Н	L	Н	Н	L	L
109	L	Н	Н	L	Н	Н	L	Н
110	L	Н	Н	L	Н	Н	Н	L
111	L	Н	Н	L	Н	Н	Н	Н
112	L	Н	Н	Н	L	L	L	L
113	L	Н	Н	Н	L	L	L	Н
114	L	Н	Н	Н	L	L	Н	L
115	L	Н	Н	Н	L	L	Н	Н
116	L	Н	Н	Н	L	Н	L	L
117	L	Н	Н	Н	L	Н	L	Н
118	L	Н	Н	Н	L	Н	Н	L
119	L	Н	Н	Н	L	Н	Н	Н
120	L	Н	Н	Н	Н	L	L	L
121	L	Н	Н	Н	Н	L	L	Н
122	L	Н	Н	Н	Н	L	Н	L
123	L	Н	Н	Н	Н	L	Н	Н
124	L	Н	Н	Н	Н	Н	L	L
125	L	Н	Н	Н	Н	Н	L	Н
126	L	Н	Н	Н	Н	Н	Н	L
127	L	Н	Н	Н	Н	Н	Н	Н
128	Н	L	L		L	L		L
129	Н	L	L	L	L	L	L	Н
130	Н	L	L	L	L	L	H	L
131	Н	L	L	L	L	L	H	H
132	Н	L	L	L	L	H	L	L
133	Н	L	L	L	L	H		H
134	Н	L	L	L	L	H	H	L
135	н	L	L	L	L	H	H	L
136	Н	L	L	L	H	L	 	L
137	Н	L	L	L	H	L	L 	H
138	H	L	L	L 	H	L	H 	
139	H	L	L	L	H		H	H
140	H	L 	L 	L 	H	H	L 	L 11
141	H	L -	L -	L	H	H	L 	Н
142	Н	L	L	L	Н	Н	Н	L

Value	DIG7	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0	Value	DIG7
143	Н	L	L	L	Н	Н	Н	Н	187	Н
144	Н	L	L	Н	L	L	L	L	188	Н
145	Η	L	L	Н	L	L	L	Н	189	Н
146	Н	L	L	Н	L	L	Н	L	190	Н
147	Н	L	L	Н	L	L	Н	Н	191	Н
148	Н	L	L	Н	L	Н	L	L	192	Н
149	Н	L	L	Н	L	Н	L	Н	193	Н
150	Н	L	L	Н	L	Н	Н	L	194	Η
151	Н	L	L	Н	L	Н	Н	Н	195	Н
152	Н	L	L	Н	Н	L	L	L	196	Η
153	Н	L	L	Н	Н	L	L	Н	197	Н
154	Н	L	L	Н	Н	L	Н	L	198	Н
155	Н	L	L	Н	Н	L	Н	Н	199	Н
156	Н	L	L	Н	Н	Н	L	L	200	Н
157	Н	L	L	Н	Н	Н	L	Н	201	Н
158	Н	L	L	Н	Н	Н	Н	L	202	Н
159	Н	L	L	Н	Н	Н	Н	Н	203	Н
160	Н	L	Н	L	L	L	L	L	204	Н
161	Н	L	Н	L	L	L	L	Н	205	Η
162	Н	L	Н	L	L	L	Н	L	206	Η
163	Н	L	Н	L	L	L	Н	Н	207	Н
164	Н	L	Н	L	L	Н	L	L	208	Н
165	Н	L	Н	L	L	Н	L	Н	209	Н
166	Н	L	Н	L	L	Н	Н	L	210	Н
167	Н	L	Н	L	L	Н	Н	Н	211	Н
168	Н	L	Н	L	Н	L	L	L	212	Η
169	Н	L	Н	L	Н	L	L	Н	213	Н
170	Н	L	Н	L	Н	L	Н	L	214	Н
171	Н	L	Н	L	Н	L	Н	Н	215	Н
172	Н	L	Н	L	Н	Η	L	L	216	Н
173	Н	L	Н	L	Н	Н	L	Н	217	Η
174	Н	L	Н	L	Н	Н	Н	L	218	Н
175	Н	L	Н	L	Н	Н	Н	Н	219	Η
176	Н	L	Н	Н	L	L	L	L	220	Н
177	Н	L	Н	Н	L	L	L	Н	221	Н
178	H	L	Н	Н	L	L	Н	L	222	Н
179	H	L	Н	Н	L	L	Н	Н	223	Н
180	Н	L	Н	Н	L	Н	L	L	224	Н
181	H	L	Н	Н	L	Н	L	Н	225	Н
182	Н	L	Н	Н	L	Н	Н	L	226	Н
183	Н	L	Н	Н	L	Н	Н	Н	227	Н
184	Н	L	Н	Н	Н	L	L	L	228	Н
185	Н	L	Н	Н	Н	L	L	Н	229	Η
186	Н	L	Н	Н	Н	L	Н	L	230	Н

Value	DIG7	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0
187	Н	L	Н	Н	Н	L	Н	Н
188	Н	L	Н	Н	Н	Н	L	L
189	Н	L	Н	Н	Н	Н	L	Н
190	Н	L	Н	Н	Н	Н	Н	L
191	Н	L	Н	Η	Н	Н	Н	Η
192	Η	Η	L	L	L	L	L	L
193	Н	Η	L	L	L	L	L	Н
194	Н	Η	L	L	L	L	Н	L
195	Н	Η	L	L	L	L	Н	Η
196	Н	Η	L	L	L	Н	L	L
197	Н	Η	L	L	L	Н	L	Η
198	Η	Η	L	L	L	Η	Н	L
199	Н	Η	L	L	L	Η	Н	Н
200	Η	Η	L	L	Н	L	L	L
201	Н	Η	L	L	Н	L	L	Η
202	Н	Η	L	L	Н	L	Н	L
203	Η	Η	L	L	Н	L	Н	Н
204	Η	Η	L	L	Н	Η	L	L
205	Н	Η	L	L	Н	Н	L	Η
206	Н	Η	L	L	Н	Н	Н	L
207	Η	Η	L	L	Н	Η	Н	Н
208	Н	Η	L	Η	L	L	L	L
209	Н	Η	L	Η	L	L	L	Η
210	Η	Η	L	Η	L	L	Н	L
211	Н	Η	L	Η	L	L	Н	Η
212	Н	Η	L	Η	L	Η	L	L
213	Н	Н	L	Н	L	Н	L	Н
214	Н	Н	L	Н	L	Н	Н	L
215	Н	Н	L	Н	L	Н	Н	Н
216	Н	Н	L	Н	Н	L	L	L
217	Н	Н	L	Н	Н	L	L	Н
218	Н	Н	L	Н	Н	L	Н	L
219	Н	Η	L	Η	Н	L	Н	H
220	Н	Н	L	Н	Н	Н	L	L
221	Н	Н	L	Н	Н	Н	L	Η
222	Н	Η	L	Η	Н	Н	Н	L
223	Н	Н	L	Н	Н	Н	Н	Н
224	Н	Н	Н	L	L	L	L	L
225	Н	Н	Н	L	L	L	L	Н
226	Н	Н	Н	L	L	L	Н	L
227	Н	Η	Н	L	L	L	Н	Η
228	Н	Н	Н	L	L	Н	L	L
229	Н	Н	Н	L	L	Н	L	Н
230	Н	Н	Н	L	L	Н	Н	L

Value	DIG7	DIG6	DIG5	DIG4	DIG3	DIG2	DIG1	DIG0			
231	Н	Н	Н	L	L	Н	Н	Н			
232	Н	Н	Н	L	Н	L	L	L			
233	Н	Н	Н	L	Н	L	L	Н			
234	Н	Н	Н	L	Н	L	Н	L			
235	Н	Η	Н	L	Н	L	Н	Η			
236	Н	Н	Н	L	Н	Н	L	L			
237	Н	Н	Н	L	Н	Н	L	Н			
238	Н	Н	Н	L	Н	Н	Н	L			
239	Н	Н	Н	L	Н	Н	Н	Н			
240	Н	Н	Н	Н	L	L	L	L			
241	Н	Н	Н	Н	L	L	L	Н			
242	Н	Н	Н	Н	L	L	Н	L			
243	Н	Η	Н	Н	L	L	Н	Η			
244	Н	Н	Н	Н	L	Н	L	L			
245	Н	Н	Н	Н	L	Н	L	Η			
246	Н	Η	Н	Н	L	Н	Н	L			
247	Н	Н	Н	Н	L	Н	Н	Η			
248	Н	Н	Н	Н	Н	L	L	L			
249	Н	Η	Н	Н	Н	L	L	Η			
250	Н	Н	Н	Н	Н	L	Н	L			
251	Н	Н	Н	Н	Н	L	Н	Н			
252	Н	Н	Н	Н	Н	Н	L	L			
253	Н	Н	Н	Н	Н	Н	L	Н			
254	Н	Н	Н	Н	Н	Н	Н	L			
255	Н	Н	Н	Н	Н	Н	Н	Н			
256	Previous Digital Output Values are used										

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