TELEX

RADIO DISPATCH PRODUCTS

TDI
Telephone Dispatch Interface
Technical Manual

Proprietary Notice

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Warranty Notice (limited)

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

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Claims

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

Warning

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

Do not open the unit. No user serviceable parts are contained within. Bosch cannot be responsible for damage. If the unit is opened, the warranty can be voided.

FCC Part 68 Compliance

The TDI complies with Part 68 of the **FCC** (Federal Communications Commission) rules and the requirements adopted by the **ACTA** (Administrative Council for Terminal Attachments). On the bottom of the unit is a label that contains, among other information, the product identifier: TLXNI00BTDI

The **USOC** (Universal Services Ordering Code) for the TDI is RJ11C.

A plug and jack used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA. A compliant telephone cord and modular plug is provided with this product. It is designed to be connected to a compatible modular jack that is also compliant. See “Supervisory Indications” on page 4 for details.

The **REN** (Ringer Equivalence Number) is used to determine the number of devices that may be connected to a telephone line. Excessive RENs on a telephone line may result in the device not ringing in response to an incoming call. In most, but not all areas, the sum of RENs should not exceed five (5). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact your local telephone company.

The REN for this product (00B) is part of the product identifier number (TLXNI00BTDI) given on the label located on the bottom of the unit. For REN 00B the *00* indicates no current is drawn and the *B* indicates the type of ringer used.

If the TDI causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn’t practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If you experience trouble with the TDI please contact the Factory Service Center, Customer Service Repair for repair or warranty information. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Repairs to the TDI must be completed by the factory. Contact the Factory Service Center, Customer Service Repair for details.

Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission, or corporation commission for information.

If the installation site has specially wired alarm equipment connected to the telephone line, ensure the installation of a TDI does not disable your alarm equipment. If you have questions about what will disable alarm equipment, consult your telephone company or qualified installer.

To protect against damage to equipment from power surges Telex recommends using a power surge arrestor. Telephone companies report that electrical surges, typically lightning transients, are very destructive to terminal equipment connected to AC power sources.

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CHAPTER 1

Introduction

General

The **TDI** (Telephone Dispatch Interface) is a telephone interface device designed to connect the IP-223 Ethernet Adapter Panel to a standard PSTN phone service. The IP-223 to TDI combination makes the **PSTN** (Phone Switched Telephone Network) phone line a network asset to any Radio Dispatch IP-based console (i.e., C-Soft, C-6200, IP-1616, or IP-2002) allowing telephone calls to be placed or received at the dispatch position. Advanced circuitry and **DSP** (Digital Signaling Processing) software algorithms learn each side of a telephone conversation and react to changing telephone line impedances resulting in minimal adjustments and clear communications.

NOTE: TDI configuration is only available in IP-223 software version 4.100 or higher.

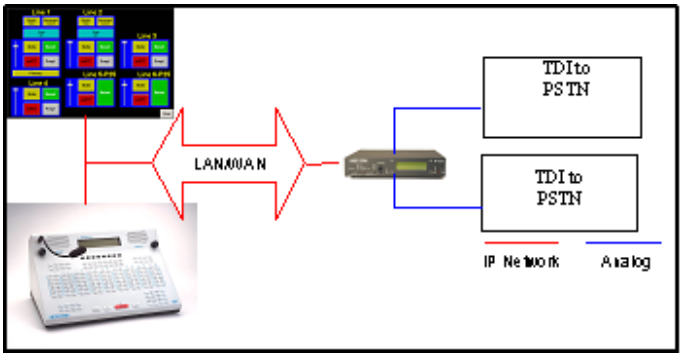


FIGURE 1. TDI System Setup

Indicators and Connectors

Front Panel LEDs

The three (3) LEDs located on the front panel are used to indicate normal telephone line control and supervisory conditions.

FIGURE 2. TDI Front Panel

Operational Indications

POWER-	Green LED indicates power to the TDI.
RING-	Red LED indicates an incoming ring.
OFFHOOK-	Red LED indicates the IP-223 has taken the TDI offhook.

Supervisory Indications

TDI Reset

When the TDI receives a reset command for any reason (i.e., power-up or Watchdog timeout) the RING and OFFHOOK LEDs alternately flash for five (5) seconds. During this time, the DSP circuitry and algorithms are initialized. Telephone line access is disabled during this time.

Telephone Line Monitor

The TDI continuously monitors the telephone line for faults (i.e., line open or short). When a fault on the line is detected, the RING and OFFHOOK LEDs flash together as long as the telephone line fault exists. When the fault is cleared, the LEDs stop flashing.

NOTE: The IP-223 front panel displays LLM when a telephone line fault is detected.

Rear Panel Connections

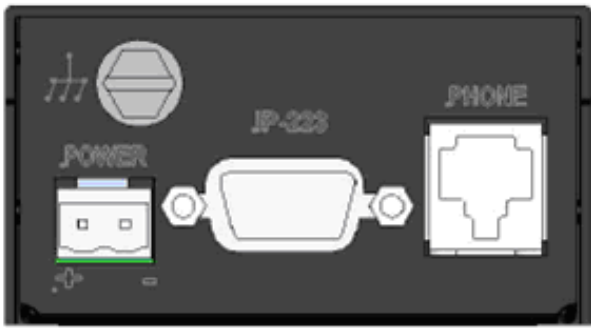
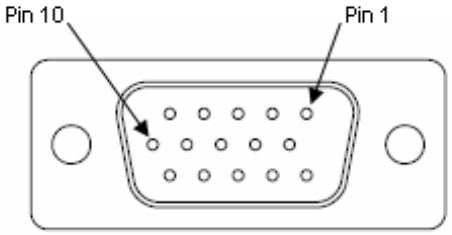


FIGURE 3. TDI Rear Connections

1. *Power*: Nominal 12VDC 1A max filtered power is applied to the TDI to the 2-pin screw lug connector. The input voltage range is 10-16VDC. Pin 1 is the positive terminal. There is an additional ground lug for chassis ground connections.
2. *IP-223*: A Hi-Density DB-15 connector provides all of the required connections between the TDI and the IP-223.

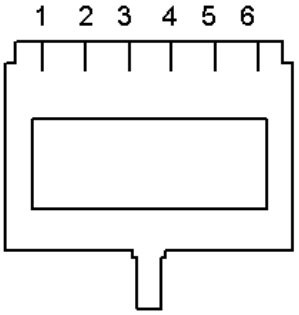
Pin	Description
1	RX+
2	
3	HOOK
4	DTR[a]
5	GND
6	TX+
7	RX-
8	LLM
9	PROGEN[a]
10	TXD
11	TX-
12	GND
13	RING
14	RTS[a]
15	RXD



a. Pins not used at this time.

3. *Phone*: A standard RJ-11 connects the PSTN phone line to the TDI. All telephone signaling and audio is present on the Tip and Ring pair.

Pin	Description
1	
2	
3	RING
4	TIP
5	
6	



Equipment Connection and Setup

TDI Setup

There are no internal jumpers or adjustments in the TDI enclosure.

IP-223 Setup

Jumper Settings

Jumper Position	Jumper Function
"B"	Balanced 600 Ohm
Line 1: J3, J9, J11, J16, J21 Line 2: J25, J28, J29, J19, J20	
"A"	600 Ohm Rx Termination
Line 1: J14 Line 2: J24	
"A"	DIGI I/O Pull Up Resistors (5V)
Line 1: J8 Line 2: J30	
"B"	4-Wire Interface
Line 1: J33, J34 Line 2: J5, J6	
"A"	RS-232 Serial Data
Line 1: J35 Line 2: J26	

IP-223/TDI Connections

IMPORTANT: Always connect the TDI to earth ground.

The TDI package includes the interface cable required for connection of the TDI to the IP-223.

To **connect the interface cable**, do the following:

1. Plug the **Hi-Density male DB-15 connector labeled *To TDI*** into the **female Hi-Density DB-15** on the rear of the TDI enclosure.
2. Plug the **male DB-25 labeled *To IP-223*** into the **Radio 1 or Radio 2 connector** as determined by the installation requirements.
3. Plug the **male DB-9 connector labeled *To IP-223*** into the **SERIAL port on the rear of the IP-223** or into the **serial port splitter** (Bosch P/N F.01U.117.818) as determined by the installation.

   NOTE: Serial splitter cable is required when attaching two serially controlled accessories to one IP-223 or when line 2 has a serial device attached.

IP-223 Web Page Configuration

Multicast Address Setup Page

To operate with the TDI, the IP-223 must be initially set to Phone mode from the Multicast Address Setup page, as shown in Figure 4.

NOTE:

- Phone Mode is only available in IP-223 software version 1.08 or higher.
- TDI configuration is only available in IP-223 software version 4.100 or higher.
- **CLID** (Caller ID Detector) provides the on-hook detection between first and second ring signal. The data transmission and reception is governed by the following BellCore documents:
  - TR-TSY-000030
  - TR-NWT-000030
  - SR-TSV-002476
- User-selected ring cadence and TDI gain options are only available in TDI firmware version 2.000 and IP-223 firmware version 4.300 or later.

Each line has a drop down menu that allows selection of the Phone Mode. The Multicast Address and port numbers are configured just as any other mode. In Phone Mode, the Multicast Address is not required, as the console connects via TCP/IP. Make sure the Rx and Tx port numbers are unique. The ringing signal is broadcast on a unique Multicast Address. The ringing signal address must be common to all listening IP-223s and consoles. For console configuration information, please refer to the specific user manual for the product.

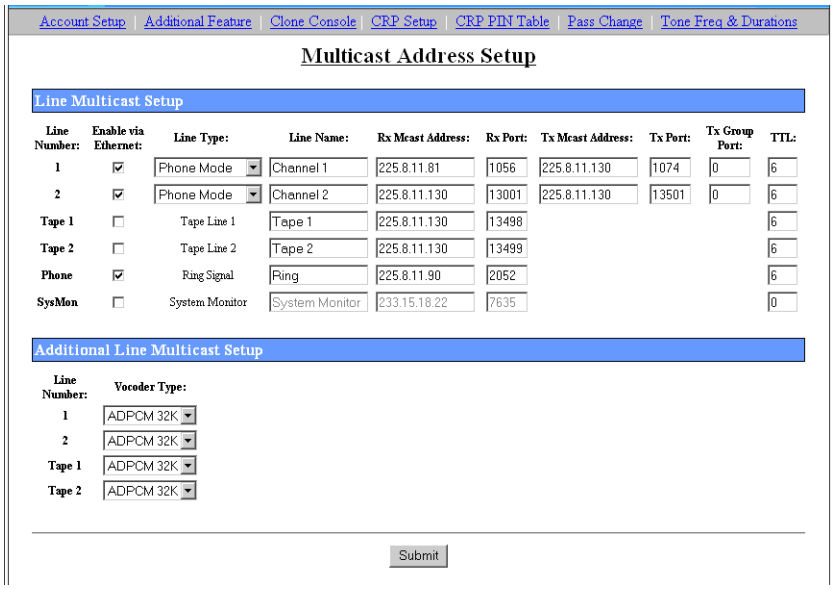


FIGURE 4. Multicast Setup Page—Phone Mode Configuration

NOTE: Once all the lines have been set, click **Submit** to store the options.

Per Line Setup Window Definitions

Once the Phone Mode is selected, the TDI operating parameters may be set up from the Per Line Setup web page. The following figures show the general setup for Phone Mode operation. The Serial Port Mode, relays, timeouts, audio levels and various delays are setup here. Other options apply to special applications. Contact RadioDispatchtechsupport@us.bosch.com. for additional information.

Heading

Figure 5 shows the Per Line Setup window heading. Click Line 1 or Line 2 to select the IP-223 control line.

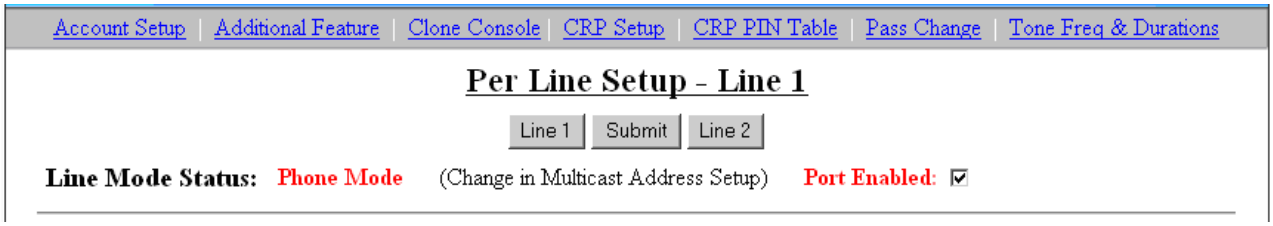


FIGURE 5. Per Line Setup Window—Heading

Ring Setup

The Ring Setup section is used to select the ring cadence for the country of operation or enter custom timings. Once a country is selected from the drop down menu, the default values for the specified country appear in the Ring On and Ring Off fields. For custom timing entries, the on/off times are entered manually in the Ring On and Ring off fields.

The range for the Ring On and Ring Off fields is *100ms to 32000ms*.

FIGURE 6. Per Line Setup—Ring Setup Section

Serial Port Mode

Figure 7 shows the Serial Port Mode section of the Per Line Setup window.

FIGURE 7. Per Line Setup Window— Serial Port Mode Section

The IP-223 detects and displays the current TDI version. See Figure 7.

Serial Port Mode - The TDI operation for the IP-223 may be selected from the drop down menu.

Serial Port Param - The IP-223 is automatically configured for communication with the TDI.

NOTE:

- Press Submit to set and display the available options for the TDI.
- TDI configuration is only available in IP-223 software version 4.100 or higher.

Delay Setup

Figure 8 shows the Delay Setup section of the Per Line Setup window.

FIGURE 8. Per Line Setup—Delay Setup Section

TX Delay - The TX Delay may be set from *0* to *1000 milliseconds*. This feature delays the TX audio for the programmed period.

RX Delay - The RX Delay may be set from *0* to *1000 milliseconds.* This feature records and stores the RX audio for the programmed period before sending the packet to the console.

LAM Setup

Figure 9 shows the LAM Setup section of the Per Line Setup window.

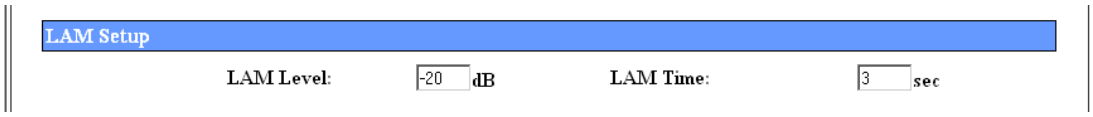


FIGURE 9. Per Line Setup—LAM Setup Section

LAM Level - LAM Level is the signal level the audio must exceed, in dBm, to trigger the RX indication and packet generation to the console.

The default LAM level is -20dB.

LAM Time - LAM Time is the time the RX indication and the packet generation continues after the RX audio falls below the LAM level.

Typical values are *2* to *3 seconds.*

Options

Figure 10 shows the Auto Answer Setup section of the Per Line Setup window.

FIGURE 10. Per Line Setup—Auto Answer Setup Section

Auto Answer - The IP-223 automatically answers the phone after the number of rings entered into this field.

NOTE: If zero (0) is entered, the Auto Answer function is disabled.

Auto Disconnect Time - If the LAM level threshold is not exceeded after the Auto Disconnect time has expired, the IP-223 will automatically place the TDI Onhook to disconnect the call.

NOTE: Once all the options have been set, click **Submit** to store the options.

Audio Level Setup

There are no internal jumpers or adjustments inside the TDI enclosure. Advanced circuitry and DSP software algorithms react to changing telephone line impedances resulting in minimal user setup. Each audio input to the TDI (Telco RX and IP-223 TX) is routed through a complex AGC circuit that provides 44dB of dynamic range control. A nominal 0 dB input level applied to each of the audio inputs results in ±22dB of dynamic input range control by the TDI.

The TDI audio outputs (Telco TX and IP-223 RX) are derived from the processed audio level and DSP echo canceling algorithms to produce nominal 0 dB telco and IP-223 levels. Figure 11 shows the IP-223 General Gain Setup page where the receive and transmit gains for each line are set.

Version 2.000 allows the user to set the system gains. The TDI is initially programmed with the following default parameters:

Ring cadence - Ring on = 2000ms, Ring off = 4000ms (United States)

TDI Rx gain - +9dB

TDI Tx gain - +3dB

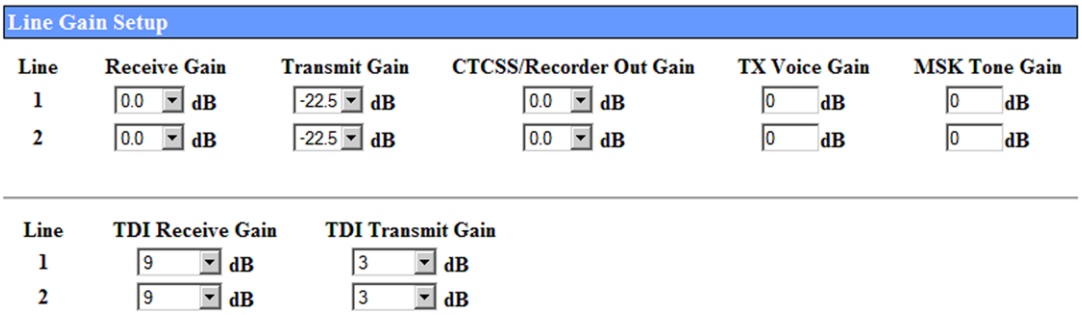


FIGURE 11. General Gain Setup Window—Line Gain Setup Section

Save to EEPROM Page

Figure 12 shows the Save to EEPROM page. Once all the operating parameters have been submitted, click **Save Parameters**.

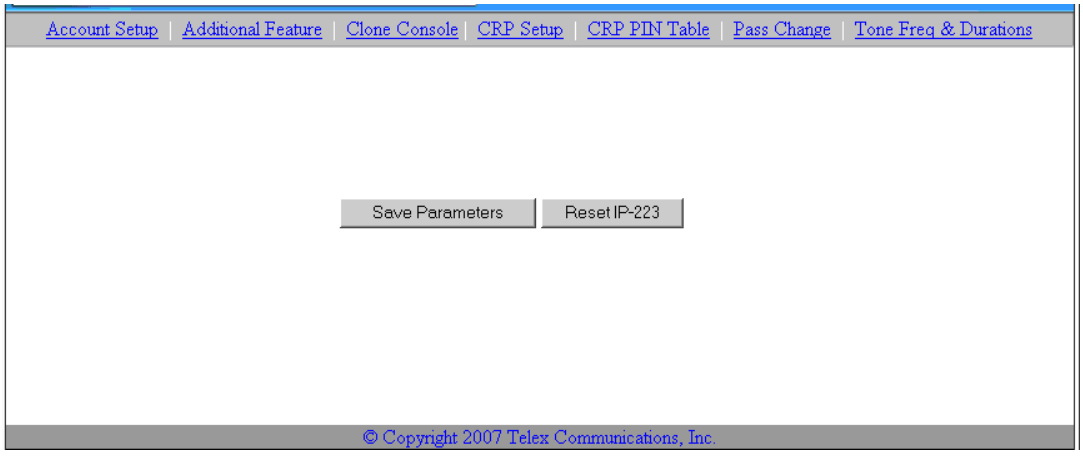


FIGURE 12. Save to EEPROM Page

C-Soft Setup

NOTE: This example shows a basic setup for C-Soft. Please refer to the user manual for other IP-based consoles, if necessary.

Setup IP Multicast List

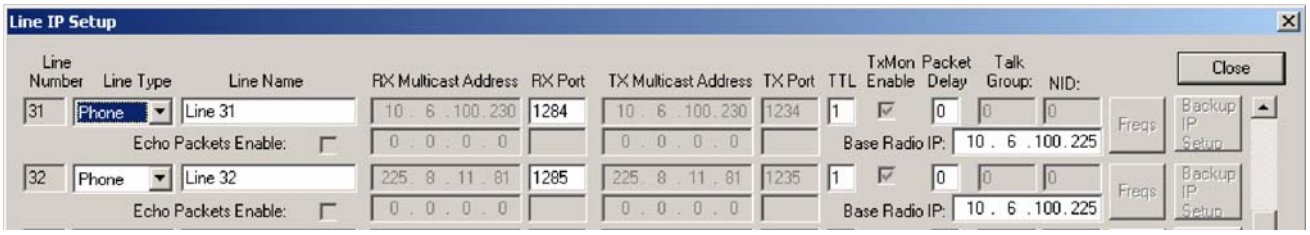


FIGURE 13. Setup IP Multicast List—Phone Mode Configuration

Figure 13 shows an example of setting two (2) lines to Phone Mode. In this example, the Line Type is selected as Phone Mode. The Line Name is user-defined and called Line 31 and Line 32 in the case. The RX port numbers need to be unique. Typically they are just the next number in a standard assignment sequence. The Base Radio IP Address is the IP Address of the IP-223 connected to the TDI.

Set Global Parameters

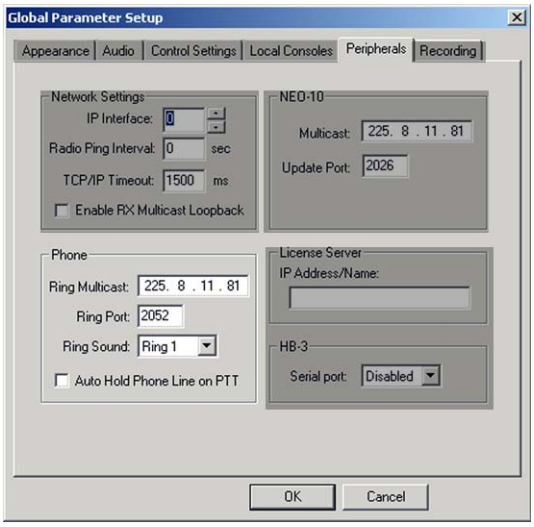


FIGURE 14. Set Global Parameters—Phone Ring Multicast and Port

Figure 14 shows the Phone Ring Multicast and Port number setting. These values must be the same as shown in Figure 4.

C-Soft Phone Control Buttons

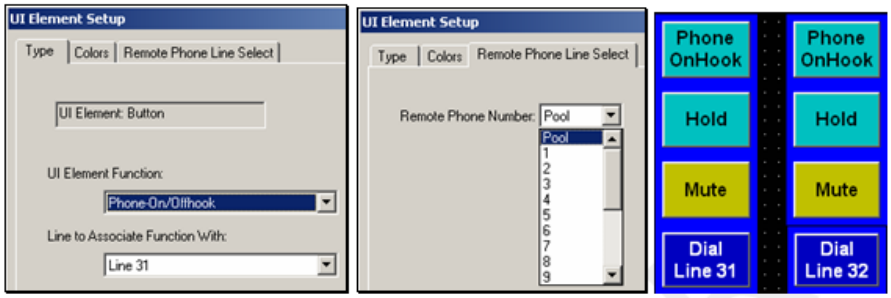


FIGURE 15. C-Soft Phone Control Buttons Setup

Figure 15 shows a few of the basic C-Soft Phone Control buttons used for telephone control. Any button can be configured for a task by right-clicking on the button, then using the UI Element Function drop down menu. In this case, Phone - On/OffHook was selected. The Remote Phone Line Select page shows that no specific line was selected as the Phone asset. Instead, Pool was selected. In the case of the IP-223, Pool mode means if both lines are setup as Phone Mode, the console seizes the first free line available for use from the two (2) line pool. This is the same function as the multi-line telephone. Also shown is an example of a few phone control buttons. Please refer to the C-Soft manual for further details on the button configuration.

Audio Alignment Procedure

IMPORTANT: This section details a typical procedure for audio alignment. Additional adjustments may be required for specific installations.

Audio Alignment is done in two (2) steps. First the Rx path is aligned, then the Tx path. The IP-223 has front panel alignment features for both Rx and Tx. Using the front panel buttons on the IP-223, press and hold the **LINE** button, then press the **IC** button.

While continuing to hold the LINE, repeated presses of the IC button steps through several features, including the alignment features.

LINE/IC first press - IP and Subnet mask addresses.

LINE/IC second press - Tx Alignment tone

LINE/IC third press - Receive audio signal levels are measured at the DSP level.

LINE/IC fourth press -Resets screen to normal mode.

General Gain Setup Window

The **General Gain Setup** window is used to set receive and transmit levels for the line.

Set the audio Rx level to **0db** and the Tx audio level to **-22.5dB** for the line. See Figure 16.

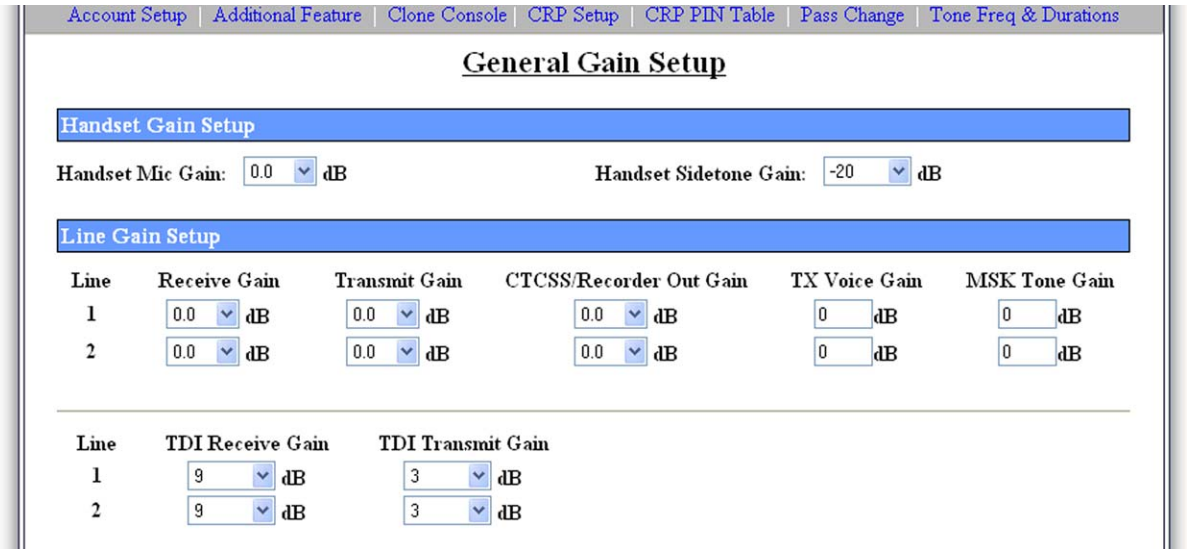


FIGURE 16. General Gain Setup Window

Receive Audio Alignment

Enter the **Receive Audio Alignment** mode on the IP-223 by pressing and holding the **LINE** button, then successively pressing and releasing the **IC** button three (3) times. The TDI must be connected to a live PSTN phone line and then taken offhook. This can be done with C-Soft, or any IP-based Telex Console.

The following steps outline the TDI Rx alignment procedure:

Step 1 From the console, take the telco line offhook. A dial tone should be present.

Step 2 From the front panel Rx control, adjust the dial tone levels to -12dB.

Step 3 Place the telco line back onhook.

Transmit Audio Alignment

Enter the **Transmit Alignment** mode on the IP-223 by pressing and holding the **LINE** button, then successively pressing and releasing the **IC** button two (2) times. This displays the Tx alignment feature of the IP-223. When the telco line is taken offhook, a 1kHz tone is generated by the IP-223.

The following steps outline the TDI Tx alignment procedure.

Step 1 Place an external meter across the Tx+/Tx- front panel terminals.

Step 2 Remove the telco line from the TDI.

Step 3 Enter the Tx alignment mode as indicated above.

Step 4 From the console, place the TDI in the offhook mode be pressing the offhook button.

Step 5 From the front panel Tx control, adjust the 1KHz tone level to -12dB on the external meter (ignore the IP-223 display reading).

Step 6 Place the telco line back onhook.

Step 7 Restore the telco line to the TDI.

TDI Specifications

Operating Temperature Range:

0 to 55°C for full specifications

Power Requirements:

+10 to +16VDC, filtered, 1A Max.

Dimensions:

2.75” W x 4.75” D x 1.75” H

Nominal Input Levels:

IP-223 TX = -22dBm
Telco Line RX = -12dBm

DSP AGC Range:

±22dBm (44dB)

Front Panel Indicators:

Green LED = Power

Red LED = Ring

Red LED = Offhook

Rear Panel Connections:

- 2-pin power
- High Density DB-15
- RJ-11 Phone Line
- Earth Ground

Accessories

- 19” Rack Mount Kit, Bosch P/N F.01U.120.330 (holds up to four (4) TDI boxes)
- IP-223 Serial Port Splitter, Bosch P/N F.01U.117.818

Notes

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