XAP TH2 Telephone Interface

Installation & Operation Manual

ClearOne®

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XAP TH2 Installation and
Operation Manual
ClearOne Part No. 800-151-301
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XAP TH2 Installation and Operation Manual

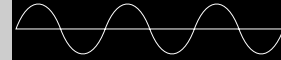## Table of Contents

Congratulations on purchasing the XAP TH2 Telephone Interface. The XAP TH2 is a single-line digital hybrid which uses digital signal processing (DSP) to separate the transmit and receive audio, eliminating distortion, weak signals, and feedback. It continually filters low and high frequency noise to provide pure sound.

The XAP TH2 is designed to function as a stand-alone telephone hybrid or as an accessory to the XAP 800 (echo cancelling, audio processing, microphone mixing matrix), enabling you to add remote callers to your audio conferences.

Features

- 100% digital signal processing (DSP) technology ensures crystal-clear audio with the deepest, most reliable hybrid null.

- Balanced line-level input and output.

- Touch-tone dialing capability (40 character dial string).

- Full-time telco echo cancellation with 31 millisecond tail time.

- Conference up to 16 callers (with 16 XAP TH2s) within a XAP 800 system.

- Adjustable audible connect and disconnect tones.

- Selectable caller automatic level control (ALC).

- Adjustable dial tone, DTMF attenuation.

- Simultaneous two-wire/four-wire operation.

- Continual adaptation to telephone line conditions.

- Digital anti-alias filter to minimize hum and Central Office switching noise.

- Compatible with analog telephone lines.

- Program and operate with a connected PC or any other type of serial remote control device via expansion bus or RS-232 port.

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Professional Services Group

If you need any additional information on how to install, set up, or operate your system, please contact us at one of the locations listed below. We welcome and encourage your comments so we can continue to improve our products and serve your needs.

ClearOne Communications ~ 1825 Research Way ~ Salt Lake City, UT 84119

Technical Support

Telephone: 1.800.283.5936 (USA) or 1.801.974.3760
Fax: 1.801.977.0087
E-mail: tech.support@clearone.com
Web site: www.clearone.com

Sales and Customer Service

Telephone: 1.800.945.7730 (USA) or 1.801.975.7200
Fax: 1.800.933.5107 (USA) or 1.801.977.0087
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E-mail: global@clearone.com

Product registration

Please register your XAP TH2 online by visiting ClearOne Technical Support at **www.clearone.com**. When your product is properly registered, ClearOne Communications is better able to serve you should you require technical assistance. Registration information is also used to notify you of upgrades and new product information.

Product returns

All product returns require a return authorization (RA) number. Please contact ClearOne Technical Support before attempting to return your XAP TH2 unit.

Unpacking

Ensure that the following items were received with your shipment:

XAP TH2

Push-on Blocks (2)
PART 673-016-003

8' Power Cord
PART 699-150-006

12' Telephone Cable
PART 830-000-012

XAP TH2 Manual
PART 800-151-301

18" Expansion Bus Jumper (1)
PART 830-150-004

Expansion Bus Terminator (1)
PART 830-150-003

Audio Video Product CD
PART 800-000-001
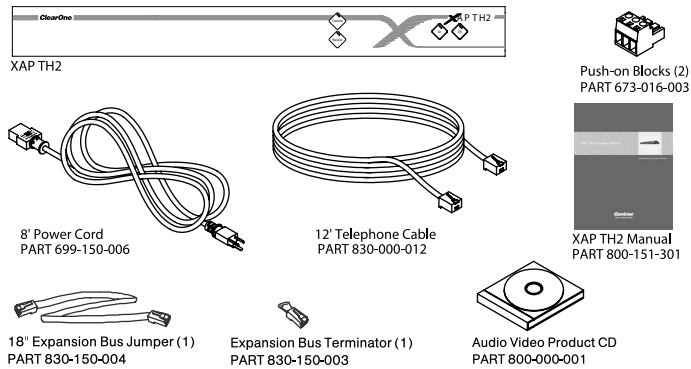
Figure 1.1. XAP TH2 shipment

! ClearOne is not responsible for product damage incurred during shipment. You must make claims directly with the carrier. Inspect your shipment carefully for obvious signs of damage. If the shipment appears to be damaged, retain the original boxes and packing material for inspection by the carrier. Contact your carrier immediately.

Controls and Connections
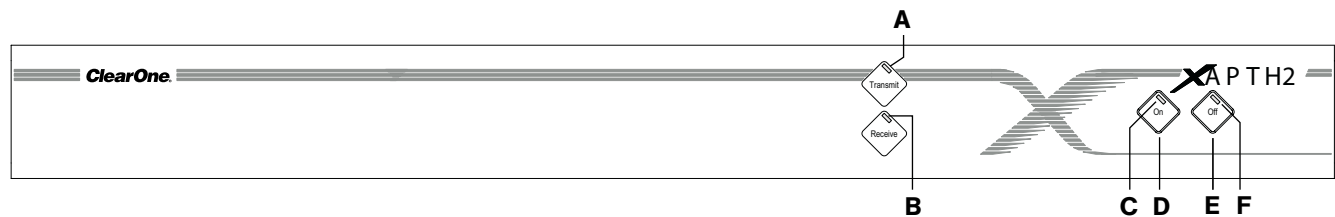
Figure 1.2. XAP TH2 front-panel controls

Front panel

A. **Transmit LED.** This bicolor LED indicates the audio levels being transmitted from the room to the telephone line.

B. **Receive LED.** This bicolor LED indicates the audio level the room is receiving from the telephone line.

C. **On LED.** This bicolor LED indicates the hybrid's ON state. The LED will illuminate green when the hybrid is in the ON state.

D. **On.** The On button connects the XAP TH2 to the telephone line and automatically adapts the hybrid to the line.

E. **Off.** The Off button disconnects the hybrid from the telephone line and mutes all audio.

F. **Off LED.** This bicolor LED indicates the hybrid's OFF state. The LED will illuminate red when the hybrid is in the OFF state.

☞ Pressing and holding the On button for more than a half-second while the hybrid is active will readapt it. When the hybrid is activated from the Off to On state, the XAP TH2 will send the updated status via the expansion bus.
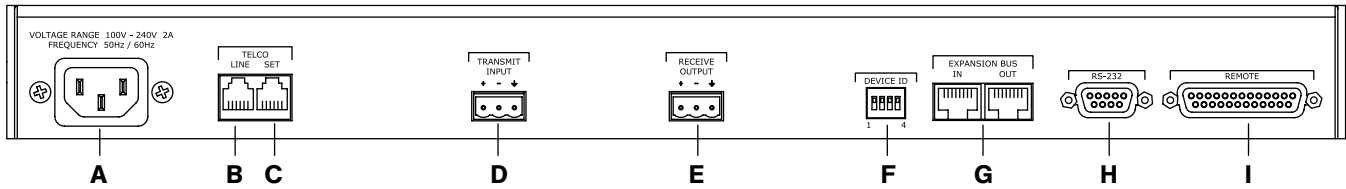
Rear panel

The XAP TH2 rear-panel connectors perform the following functions:

A. **Power.** The AC power cord input is a IEC type connector allowing 100–240VAC, 50/60Hz.

B. **Telco Line.** This RJ-11 connector provides connection of a standard analog telephone line to the hybrid.

C. **Telco Set.** This RJ-11 connector allows connection to a standard telephone set. Tip and ring from the phone line are present at this connector when the hybrid is in its off state. Tip and ring from the phone line are not present at this point when the hybrid is in its on state.

D. **Transmit Input.** This Phoenix connection provides a non-gated electronically balanced line level input. The nominal input level is 0dBu. This line input is mutable. The default setting is off (not muted).

E. **Receive Output.** This Phoenix connection provides a balanced line level output. The nominal output level is 0dBu. The output adjusts for line imbalances and maintains a constant output level. This line output is mutable. The default setting is off (not muted).

F. **Device ID.** This four-position DIP switch is used to assign a device ID number to the XAP TH2. See page 8 for more details.

G. **Expansion Bus In, Out.** This RJ-45 connector is used to connect the XAP TH2 to the XAP 800 for control. G-Ware is capable of accessing and controlling an expansion bus local area network (LAN) of up to eight XAP 800/PSR1212 units and 16 XAP TH2 units, where the total number of microphone inputs does not exceed 64. The expansion bus supports a distance of up to 80 feet between each connected XAP 800 or PSR1212.

H. **RS-232.** This female DB-9 serial port is for interconnection between the XAP TH2 and a PC, modem, or other custom remote controller. For serial protocol, see page 28.

I. **Remote.** This DB-25 connector provides control and status of the XAP TH2 and unbalanced audio. See Appendix B for pinouts.

Before You Install

Power requirements

The XAP TH2 automatically accommodates voltage requirements of 100–240VAC, 50/60Hz, 15W.

Telephone line requirements

The XAP TH2 model operates on a standard analog telephone line and connects to the telephone system with a standard RJ-11C modular jack. If you do not have an RJ-11C jack where you want to install your XAP TH2, call your telephone company for installation.

The XAP TH2 can be configured to meet compliance requirements of different countries via the G-Ware software. See page 12.

! Warning: The country code must be set correctly in G-Ware to ensure that the unit operates properly when connected to the telco network and complies with the country's telco requirements. Changing this code to a country other than the intended country of operation might cause the XAP TH2 to be non-compliant.

Equipment placement

The XAP TH2 models are designed for installation in a standard 19-inch equipment rack. You can also purchase side panels for desktop placement.

Network requirements

The expansion bus (RS-485) lets you connect up to eight XAP 800/400s and 16 XAP TH2 units, where the total number of microphone inputs does not exceed 64. The maximum distance between interconnected XAP 800/400 or PSR1212 units is 80 feet (24 meters). Insertion of a XAP TH2 must not increase the cable length between two PSR1212s, XAP 800s and/or XAP 400s beyond 80 feet. ClearOne recommends that category five twisted-pair (10BaseT LAN) cable be used.

Environmental requirements

The XAP TH2 can be safely operated in a room with varying temperatures between 32 °F (0 °C) and 110 °F (43 °C).
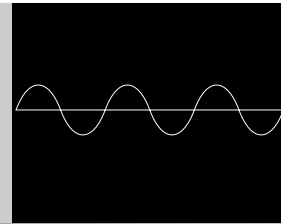
Hardware Setup

The XAP TH2 is designed for easy installation and setup. All connections are made through rear-panel connectors. This section provides instructions on installing the units in the rack and making initial connections, assigning device ID numbers, and creating an expansion bus (E-bus) network.

The diagram below illustrates the typical connections that are made when adding a XAP TH2 to a XAP 800.
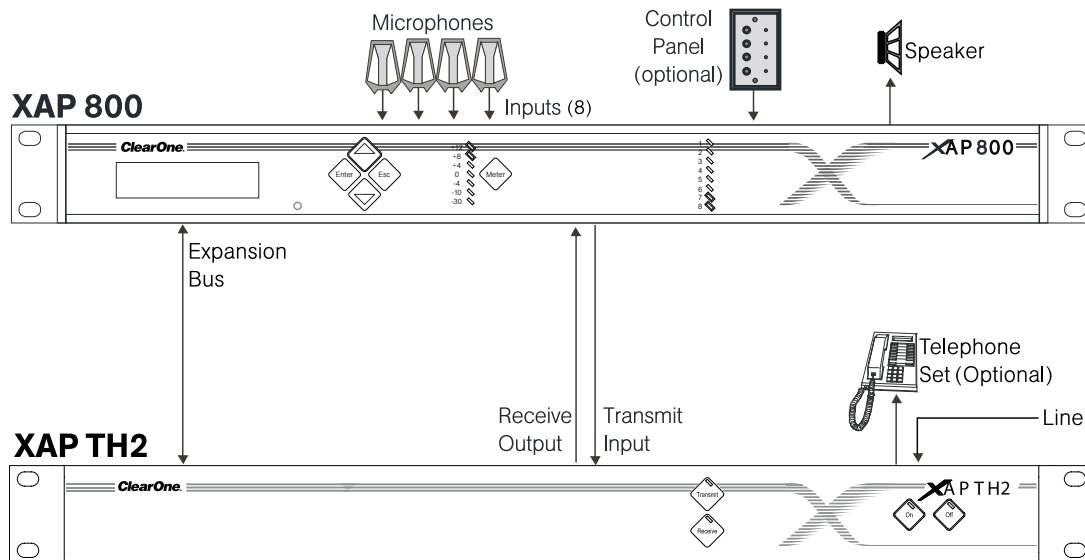
Figure 2.1. System diagram

Connecting the unit

Refer to XAP TH2 rear-panel drawing on the following page. Each connector is numbered for easy identification.

1. Place the unit in the rack and attach it securely. XAP TH2 models are designed for installation in a standard 19-inch equipment rack.

2. Connect your telephone line from the wall jack to the RJ-11C Line jack [B].
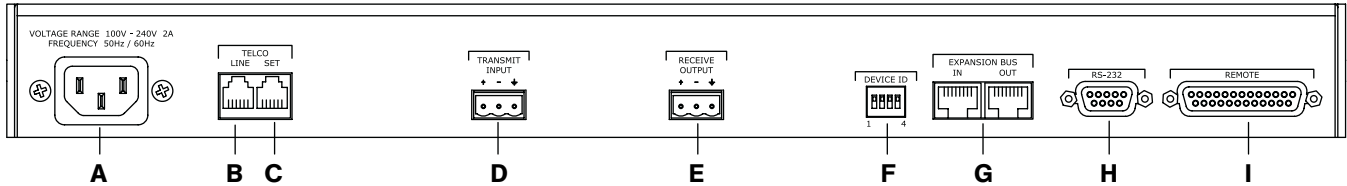
Figure 2.2. XAP TH2 back-panel connectors

The three terminals in the Phoenix connector correspond with the back-panel audio contacts (from left to right): +(positive), −(negative), and ↓(ground).
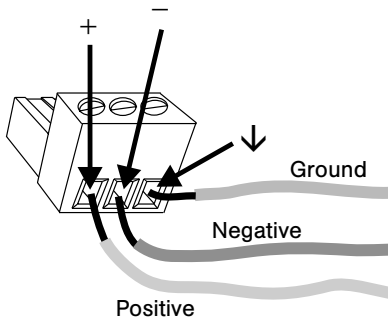
Figure 2.3. Phoenix push-on connector

If more than one XAP TH2 is assigned the same device ID number, the Transmit and Receive LEDs will flash red and green on the affected units until the error is corrected.

You will need to power cycle the unit to have it recognize changes made to the device ID.

3. Plug your telephone set into the RJ-11C Set jack [C].

4. If you are using a custom controller for control and hybrid status, plug it into the DB-25 Remote connector [I].

   If you are using an external RS-232 controller, connect it to the RS-232 port [H].

5. Wire the XAP TH2 to the XAP 800 using the provided three-terminal Phoenix push-on connectors. These connectors are designed for easy wiring; simply insert the desired wire into the appropriate connector opening and tighten down the top screw.

   • **Transmit Input** Audio connected to the Transmit Input [D] will be sent down the telephone line.

   • **Receive Output** Audio from the telephone participant is passed to Receive Output [E].

Assigning device ID numbers

Before creating an expansion bus network, you need to set up unique expansion bus Device ID numbers for each XAP TH2 on the network. There are 16 expansion bus network device locations that can be selected (0-F). As shipped from the factory, all XAP TH2 units default as binary address 0.

Set Device ID numbers for each XAP TH2 unit at your site by manipulating rear-panel DIP switches 1–4 [F], selecting/deselecting each switch to set up address 0–15 in binary code. The table on the following page illustrates DIP switch settings. DIP switch changes are read only when the unit is powered up, so you will need to power cycle the unit to have the changes recognized.

Device ID DIP switch settings

Binary Address	DIP Switch 1 Position	DIP Switch 2 Position	DIP Switch 3 Position	DIP Switch 4 Position
0 (default)	0 (UP)	0 (UP)	0 (UP)	0 (UP)
1	0 (UP)	0 (UP)	0 (UP)	1 (DOWN)
2	0 (UP)	0 (UP)	1 (DOWN)	0 (UP)
3	0 (UP)	0 (UP)	1 (DOWN)	1 (DOWN)
4	0 (UP)	1 (DOWN)	0 (UP)	0 (UP)
5	0 (UP)	1 (DOWN)	0 (UP)	1 (DOWN)
6	0 (UP)	1 (DOWN)	1 (DOWN)	0 (UP)
7	0 (UP)	1 (DOWN)	1 (DOWN)	1 (DOWN)
8	1 (DOWN)	0 (UP)	0 (UP)	0 (UP)
9	1 (DOWN)	0 (UP)	0 (UP)	1 (DOWN)
10 (A)	1 (DOWN	0 (UP)	1 (DOWN)	0 (UP)
11 (B)	1 (DOWN)	0 (UP)	1 (DOWN)	1 (DOWN)
12 (C)	1 (DOWN)	1 (DOWN)	0 (UP)	0 (UP)
13 (D)	1 (DOWN)	1 (DOWN)	0 (UP)	1 (DOWN)
14 (E)	1 (DOWN)	1 (DOWN)	1 (DOWN)	0 (UP)
15 (F)	1 (DOWN)	1 (DOWN)	1 (DOWN)	1 (DOWN)

Creating an expansion bus network

1. Place the XAP TH2 unit in the rack. The back-panel Expansion Bus In and Expansion Bus Out connectors are designed for setting up your expansion bus network. Connections between units are made in daisy-chain fashion using category five twisted-pair cable.

2. The first XAP unit in the chain must have the Expansion Bus In connector terminated with an Expansion Bus terminator (provided).

XAP 800

XAP TH2

Expansion Bus Terminator

XAP TH2

Expansion Bus Terminator
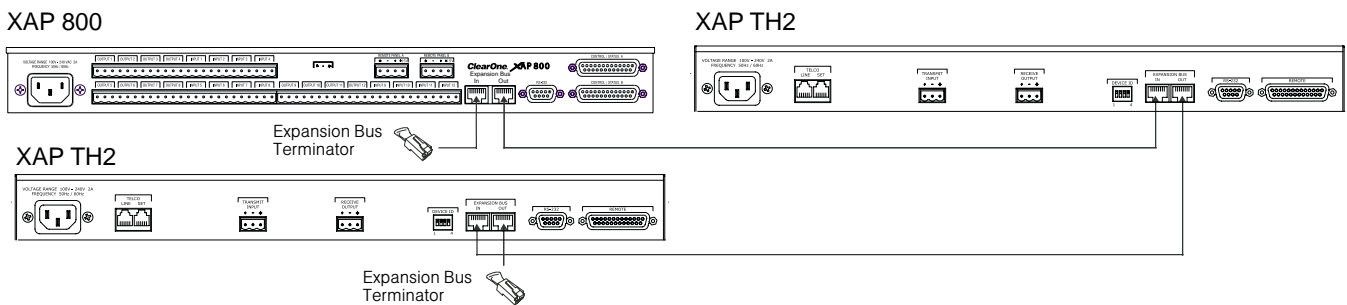
Figure 2.4. E-bus connection diagram

☞ If networked XAP 800s and TH2s are stacked vertically, connect them using the short RJ-45 jumper. When networking between long distances, use category five twisted-pair (10BaseT LAN) cable. The maximum cable run between XAP 800/400 and PSR1212 units is 80 feet (24 meters).

3. The first XAP unit's Expansion Bus Out connector is then attached to the Expansion Bus In connector on the next unit in the chain. At the end of the network, the final unit must have the Expansion Bus Out connector terminated with an Expansion Bus terminator as well.

An expansion bus network will allow interconnection of up to 16 XAP TH2s and any combination of XAP 800s/400s and PSR1212s where the number of microphone inputs does not exceed 64.

Connecting power

The power input [A] will operate at any level between 100–240VAC, 50–60Hz, 15W (typical). Plug in the XAP TH2 to complete the hardware installation.
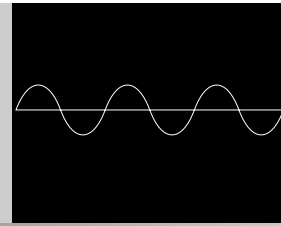
G-Ware

ClearOne's G-Ware software provides an easy interface for configuring and controlling your XAP TH2. This chapter assumes you have already installed G-Ware and have created a site. If you need help installing G-Ware, creating a new site, or would like to see system requirements, consult the XAP 800 manual or help file.

To add a XAP TH2 to a site file

You can add XAP TH2(s) to your site file by connecting to your networked site and letting G-Ware automatically create icons for the detected units. Or you can work offline and manually add the unit(s) to the site file and connect to the site at a later time.

1. Open G-Ware software from the **Start** menu, or by double-clicking the desktop icon, and select the site to which you will be adding the XAP TH2.

2. Click the **Connect** button on the G-Ware toolbar or select **Connect** from the Connect Menu. Choose **Sync to Unit(s)**. G-Ware will automatically create icons for any new units it detects on the network and place them in the Site pane. Right-click the unit icon and select **Unit Properties**.

    If you are working offline, click the **Add** button on the G-Ware toolbar and select **XAP TH2**. The XAP TH2 Unit Properties window opens.
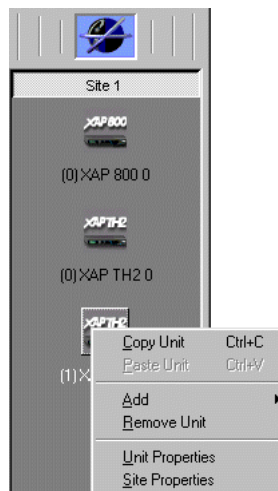
Figure 3.1. Unit icons in Site Pane with Unit menu displayed

When connecting to your site, you can choose to sync to Unit(s) or Document. If you sync to the Unit(s), you will update your G-Ware site file with the current state of the unit(s). If you sync to the Document, you will update your units with the settings you have saved in the site file.

To configure Unit Properties

1. Type a descriptive **Unit Name** in the space provided. The **Unit Identification** and **Firmware Version** will be supplied by the unit when a connection is made.

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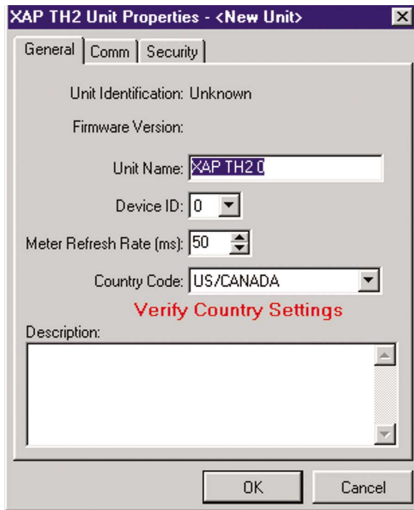
Figure 3.2. Unit Properties General tab
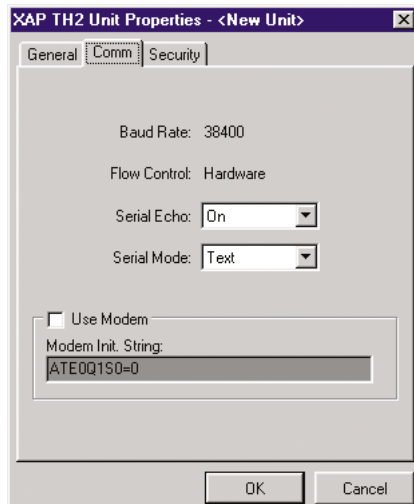
Figure 3.3. Unit Properties Comm tab
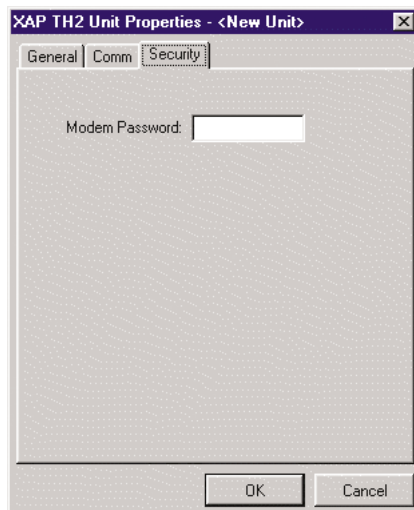
Figure 3.4. Unit Properties Security tab

2. If you have already established a connection with the site, the **Device ID** will be assigned. If you are working offline, select the Device ID that matches the ID you assigned the unit via the back-panel DIP switches. Device IDs ensure the software will sync up with the proper unit when there are multiple TH2s on a network.

3. Adjust the **Meter Refresh** rate as necessary. The default rate is 50ms.

4. Select the country where this product is being used from the **Country Code** list.

Warning: The country code must be set correctly to ensure that the unit operates properly when connected to the telco network and complies with the country's telco requirements. Changing this code to a country other than the intended country of operation might cause the XAP TH2 to be non-compliant.

5. Click the **Comm** tab. The Baud Rate and Flow Control settings are changed using the Site Properties window. Select the **Serial Echo** and **Serial Mode** you want to use.

   Serial Echo enables the unit to echo back the commands you send over the E-bus network. Serial Mode determines the format (binary or text) in which the commands return over the E-bus network. The default setting when G-Ware is connected to a unit is binary. When the unit is disconnected, the default is text.

6. Select **Use Modem** if a modem will be used with the unit.

7. Click the **Security** tab to enter a **Modem Password**. This password will be required for all connections made to the RS-232 port whether it be modem, direct connection to PC, or AMX touch panel.

8. Click **OK** to save settings and close the **Unit Properties** window.

You will need to repeat this process for all XAP TH2 units on your network.

Telco Configuration

XAP TH2 Flow Screen

The XAP TH2 Flow Screen shows a detailed block diagram of the audio path in relation to the TH2. There are four buttons on the Flow Screen: Dial, Telco Config, Telco Meters, and GPIO builder. The Flow Screen is displayed for the selected unit in the site panel on the left of the G-Ware screen.

To configure the XAP TH2

1. Click the **Telco Config** button on the XAP TH2 Flow Screen.

2. The **Telco Config** window opens. Refer to the table on the following page for a description of configurable settings.

3. Click **Close** when you have finished making changes to save the settings and close the window.

Figure 3.5. Telco Configuration window for XAP TH2

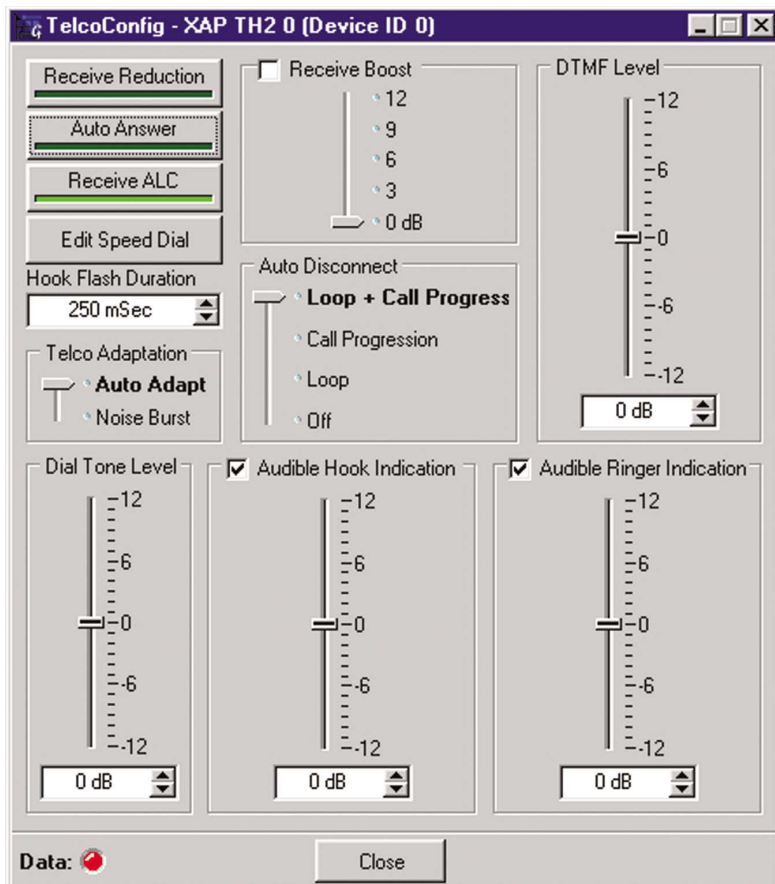| Feature	Description
Receive Reduction	This feature lowers receive audio coming in through the telephone line when transmit audio is present. This feature is typically used in applications where the transmit party needs control of the conversation. When activated, the receive audio is ducked by 6dB. Receive Reduction can be turned on or off. The default is off.
Auto Answer	The XAP TH2 can be programmed to answer after one complete valid ring has been detected. The unit connects to the line automatically in the same manner it would connect if you issued a connect command. Auto Answer can be turned on or off. The default is off.
Receive ALC	Automatic Level Control (ALC) may be selected on the telco input. This feature is designed to keep soft and loud telephone participants at a consistent level. The parameters of ALC are not user adjustable. ALC can be turned on or off. The default setting is on.
Edit Speed Dial	The XAP TH2 supports 10 speed dial numbers. Each number can be 40 digits long and can have a 20 character label associated with it. These numbers and labels are stored in non-volatile memory and the number can be called by a single command. Any valid touch-tone digit and the pause character (comma) may be stored. All speed dial numbers are empty except for number 9, which is programmed with ClearOne's technical support number, and number 10, which is programmed with the conference calling services number.
Hook Flash Duration	Hook Flash is supported by a single command. When the command is received, the unit will execute a flash for the duration programmed. Variable length Hook Flash is programmable on the unit. The on/off time is programmable from 50msec to 2 seconds in 10msec steps. The default is 250msec.
Telco Adaptation	In some applications, it may be desirable to adapt the hybrid with a white-noise burst rather than allowing the hybrid to adapt automatically to line conditions. This feature allows you to choose between Noise Burst and Auto Adapt. The default is Auto Adapt.
Receive Boost	The Receive Boost adds 6dB of gain to the receive signal delivered from the phone line. This is typically used for low-level telephone lines, allowing the signal to be boosted into a range where the hybrid can perform at an adequate level of acceptance. The Receive Boost can be turned on or off. The default is off. This feature is set up during the initial configuration and is not used to adjust level from call to call.
Auto Disconnect	The XAP TH2 supports automatic disconnection of calls either from loop drop or from call progress tone detection. Auto Disconnect can be turned on (Loop + Call Progression, Call Progression, Loop) or off. The default is Loop, which is on.
Loop Drop + Call Progression	If either a call progress tone or loop drop/reversal is detected, the unit will perform a normal disconnect.
Call Progression	If a call progress tone is detected, the unit will perform a normal disconnect.
Loop	When a valid loop drop or reversal is detected, the unit will perform a normal disconnect. This is the default state.
DTMF Level	This feature allows you to adjust the DTMF tone level in relationship to the participant audio level in the room. The level can be adjusted in 1dB steps from a nominal level 0 (default) to plus or minus 12dB.
Dial Tone Level	This feature allows you to adjust the Dial Tone level in relationship to the participant audio level in the room. The level can be adjusted in 1dB steps from a nominal level 0 (default) to plus or minus 12dB.
Audible Hook Indication	When the unit goes off hook (connects) a beep is injected into the receive channel and transmit channel of the unit. When the unit goes on hook (disconnects), a series of 2 beeps is injected into the receive channel to indicate that the call has been dropped. This indicator can be turned on and off by selecting and deselecting the checkbox. The default is on. The level adjustment allows you to customize the level in relationship to the participant audio level in the room. The level can be adjusted in 1dB steps from a nominal level 0 (default) to plus or minus 12dB.
Audible Ring	In the On mode, when a valid ring is detected the front panel LED flashes, a serial command is transmitted , and an audible ring is heard from the receive channel. In the Off mode, the front panel LED flashes and a serial command is transmitted, however, no ring tone is generated. This indicator can be turned on and off by selecting and deselecting the checkbox. The default is on. The level adjustment allows you to customize the level in relationship to the participant audio level in the room. The level can be adjusted in 1dB steps from a nominal level 0 (default) to plus or minus 12dB.

Creating Custom Control

To use GPIO Builder

GPIO, or general purpose input/output, allows you to establish pin assignments for the XAP TH2's Control/Status port. These pins provide control via contact closure and status via open collector functions in the unit.

1. Open the GPIO Builder by clicking the **GPIO Builder** button on the Flow Screen.
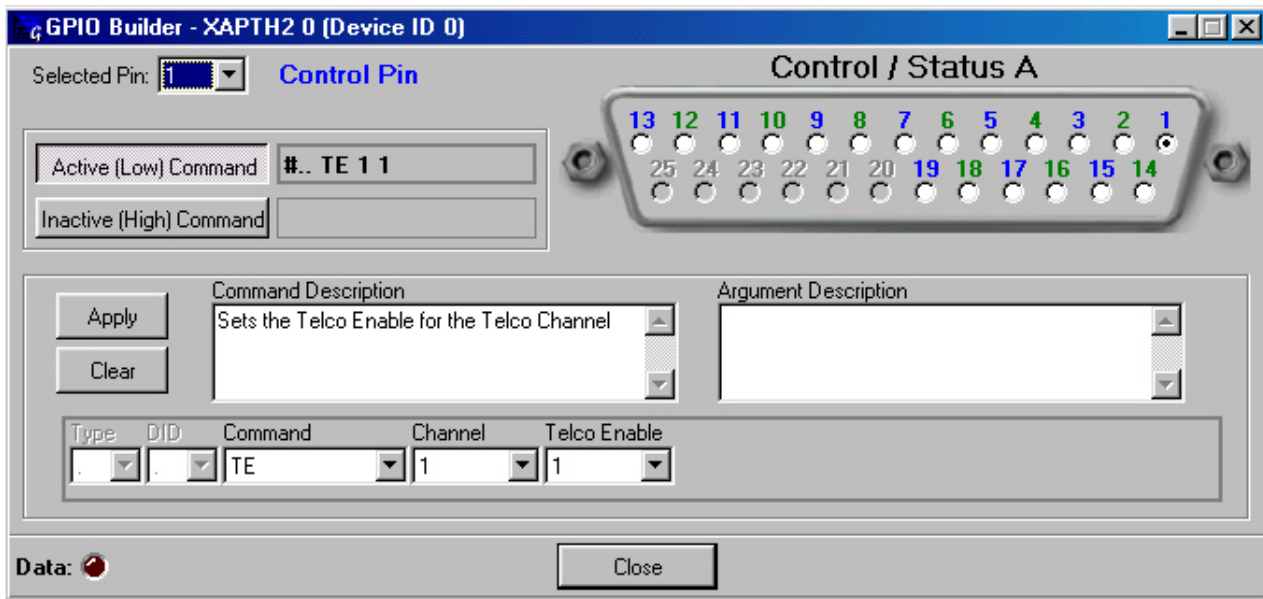
Figure 3.6. GPIO Builder in G-Ware

2. Select the **Control/Status pin** you want to program.

3. Select the command state to change—**Active** (Low)/**Inactive** (High).

4. To make changes to the command string, select the desired parameters from the drop-down menus along the bottom of the window. For a list of commands and their descriptions, see the G-Ware help file.

   When you select a different command in the Command menu, the other drop-down menus change to reflect available parameters.

   The Command Description and Argument Description panes reflect command and argument information. You can modify this information as desired.

5. Click **Apply** to save changes or **Clear** to return to the default settings. To exit the window, click **Close**.

Odd-numbered pins (blue) are control pins, and even-numbered pins (green) are status pins. Pins 20-25 are not user-definable.

The Active Command pane reflects the default command string for the selected pin.

If you have created your site file offline, or have made changes to your site file, you will need to connect to your site and sync the units to the site file.

To sync site file to the XAP TH2

If you sync to the Unit(s), you will update your G-Ware site file with the state of the unit. If you sync to the Document, you will update your units with the configurations you have saved in the site file.

1. Connect to your site or unit using one of the following methods:

    ~   Establish a direct serial connection from the RS-232 port on the XAP TH2 to the COM port on your PC

    ~   Establish a direct serial connection from you PC to the XAP 800 which is linked to the XAP TH2(s) via the E-bus

2. Click the **Connect** button on the G-Ware toolbar or select **Connect** from the Connect menu. Choose to sync to **Document**. This will update your units with the configurations you have made in the site file.
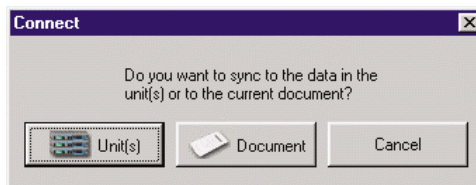
Figure 3.7. Connection choices
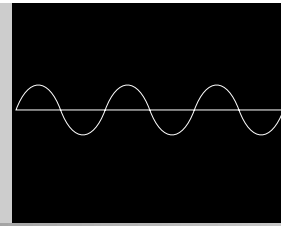
The XAP TH2 has four basic functions: make a call, answer a call, disconnect a call, and mute. This chapter explains how to perform these functions with the TH2 unit and a telephone handset (optional) and with the Dial interface in G-Ware. You can also use touch panels and custom control devices.

Using the XAP TH2
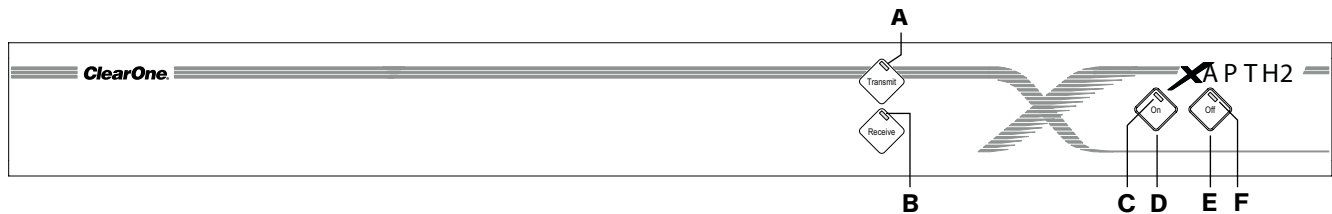
Figure 4.1. XAP TH2 front-panel controls

To answer a call

Depending on how you have configured your XAP TH2, an incoming call can ring on the telephone set connected to the XAP TH2, the receive output, and pass a serial ring to the control device. An incoming call will also cause the front panel On LED [C] to flash. You can answer the call in one of two ways:

- Press the **On** button [D] on either the front panel or on your remote control. This will route the call through the XAP TH2 to the XAP 800. The green On LED [C] will light. The red Off LED [F] will extinguish. Upon connection, the XAP TH2 automatically adjusts to the line conditions.

- Answer the call by picking up the telephone handset and talking to your party over the telephone.

If you have turned on Audible Ring Indication (see page 14), you will hear a ringing sound from the receive channel when a call comes in.

To make and disconnect a call

1. Call the party using your handset.

2. After the other party has answered, route the call through the XAP TH2 by pressing the **On** button [D]. The On LED [C] will light and the XAP TH2 will take control of the call, disabling the telephone set. You may now safely hang up the handset without disconnecting your call.

   If using an external controller, it is not necessary to press the On button [D]. The DIAL serial port command automatically engages the XAP TH2. See Serial Commands, page 28.

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If you have enabled auto-answer, the XAP TH2 will connect to the call after one ring.

3. When the conversation is complete, press the **Off** button [E] to disconnect the call. You can also disconnect using an external controller. If the handset is off hook, audio will be routed to the telephone.

If your call is through the handset only (the red Off LED [F] will be lit), hang up when the conversation is complete.

Using the Dial Interface

To make and disconnect a call

1. Open the Dial Interface by clicking the **Dial** button on the Flow Screen.

2. Activate the telephone interface by clicking **Connect**.

3. When the green light above the Connect button illuminates, enter the number to be dialed, including any dial-out prefixes.

4. Click **Dial**.

5. When you are finished with the call, click **Disconnect** to end the call. If there is noise on the phone line during a call, you might need to click the **Re-Null** button to force the interface to readapt to the line. After the unit sends a noise burst down the line for adaptation, it automatically switches to auto adapt mode. The receive signal is muted during a noise burst.

To dial multiple numbers

Numbers can be dialed one at a time or a string can be dialed at one time (In-Block). When dialing multiple numbers, the maximum length of the string is 40 characters. A comma is interpreted as a two second pause. If a command to dial is issued while the unit is on hook, the unit will go off hook and dial the number.

To mute

Click **Mute Transmit** to mute the transmit audio (audio being sent to the telephone line). Click **Mute Receive** to mute the receive audio (audio being received from the telephone line).

Connect LED. This green LED illuminates when the dialing interface is active.

Connect. Click Connect to activate the dialing interface.

Keypad Display. Numbers dialed on the Dial keypad are displayed here.

Disconnect LED. This red LED illuminates when the dialing interface is inactive.

Disconnect. Click Disconnect to terminate a call.

Dial - XAP TH2 0 (Device ID 0)

Connect   Disconnect

	ABC	DEF
1	2	3
GHI	JKL	MNO
4	5	6
PQRS	TUV	WXYZ
7	8	9
*	0	#

Dial Keypad. This functions as a typical telephone keypad and displays the digits being dialed in the space above as you click on the numbers.

In-Block Dialing. Numbers typed on your computer keyboard are displayed here. You can dial one phone number at a time or a block of numbers.

In-Block Dialing

Dial   View Last #

Dial. Dial activates when a number is entered in the In-Block Dialing field. Click it to Dial the number.

View Last #. Displays the last number called.

Speed Dial

Dial   Edit

Speed Dial. 10 numbers can be stored in Speed Dial. Limit 20 characters per label.

Dial. Dials the selected Speed Dial number.

Edit. Allows you to add/modify Speed Dial numbers.

Re-Null   Hook Flash

Mute Transmit   Mute Receive

Re-Null. Sends a short noise burst down the telephone line and forces the XAP TH2 to adapt to the telephone line for maximum telephone echo cancellation.

Hook Flash. Sends a momentary interruption in the line seizure, allowing options such as 3-way calling, call waiting, and call hold. This feature is dependent on the services offered by your telephone company.

Mute Transmit LED. Illuminates red when signal is muted.

Data: Close

Data LED. Illuminates Green when connected to the unit.

Close. Exits the Dial Interface.

Mute Receive LED. Illuminates red when signal is muted.

Mute Transmit. Mutes the Transmit Input.

Mute Receive. Mutes the Receive Output.

Controllers

Custom control (DB-25) option

A customer-supplied remote control or contact-closure switch can be programmed to perform functions such as: mute on/off, system on, and system off. For pinouts, see Remote connector pinout, page 26.

External control system

The XAP products are designed to function with external control systems. The controller is connected to the XAP 800 RS-232 port. Via the E-bus network, all networked XAP products can be accessed and controlled from that single point. The controller can also be connected directly to the XAP TH2 RS-232 port.

Using an external controller, the XAP TH2 can be turned on or off; transmit and receive audio can be muted; DTMF tones can be generated (see Serial Commands, page 28); the XAP TH2's binary address can be queried; telephone interface can be renulled; input and output can be metered and muted; and ERL and ERLE can be read. These commands are also available in the G-Ware software which can communicates with the XAP TH2 via the RS-232 serial port, the E-bus network, or directly.

Touch-tone dialing

Through the expansion bus (and serial commands), the XAP TH2's touch-tone (DTMF) dialing capability can be accessed. This allows outbound calls to be initiated by the XAP TH2 without requiring an external dialer or telephone set. This feature continues to function after connection, enabling the user to issue tones for voice mail/pager interaction. See Serial Commands on page 28.
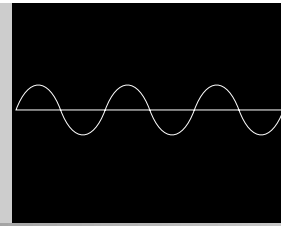
Adjusting Levels

In order to optimize the audio levels, you will need to place a call on the XAP TH2. This will enable you to evaluate the levels for caller audio, audio being sent to the telephone, dial tone, DTMF tone, audible hook indication, and audible ring indication.

Adjusting receive audio

To increase or decrease the caller audio level that is being sent to all sources (power amplifier, video codec, recording device, etc.), adjust the gain on the XAP 800 input channel that is connected to the XAP TH2 Receive Output. This will affect only the incoming caller audio. See the XAP 800 manual or G-Ware help file for detailed instructions.

Receive Boost

If incoming caller audio is consistently low, activate the Receive Boost in the XAP TH2 Telco Config window. Using Receive Boost, you can increase the signal from the phone line in 3dB steps from 0 to 12dB. This setting is not used to correct variances in call audio from one call to the next.

Receive ALC

If incoming caller audio has a mix of soft and loud talkers, activate Receive ALC in the Telco Config window. This feature helps keep telephone participants at a consistent level.

Receive Reduction

If local audio needs to take priority over caller audio, activate Receive Reduction. This feature reduces audio from the caller by 6dB when local audio is present.

When making adjustments to the receive and transmit audio level, refer to the TH2 Telco Meters window in G-Ware for a meter view of levels. See page 23 for more information.

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Adjusting transmit audio

To increase or decrease audio being sent to the telephone line, adjust the output gain on the XAP 800 output channel that is connected to the XAP TH2 Transmit Input. This will affect only the audio being sent to the telephone on that channel. See the XAP 800 manual or G-Ware help file for detailed instructions.

Adjusting DTMF level

If the DTMF tones are too loud or too soft in relation to the caller audio, adjust DTMF Level in the Telco Config window. The level can be adjusted in 1dB steps from a nominal level 0 (default) to plus or minus 12dB.

Adjusting dial tone level

If the dial tone is too loud or too soft in relation to the caller audio, adjust Dial Tone Level in the Telco Config window. The level can be adjusted in 1dB steps from a nominal level 0 (default) to plus or minus 12dB.

Audible Hook Indication

When the unit goes off hook (connects), a beep is placed on the receive channel and the transmit channel of the unit. When the unit goes on hook (disconnects), a series of 2 beeps is placed on the receive channel to indicate that the call has been dropped. This indicator can be turned on and off by selecting and deselecting the checkbox. The default is on. The level adjustment allows you to customize the level of the beeps in relationship to the caller audio level in the room. The level can be adjusted in 1dB steps from a nominal level 0 (default) to plus or minus 12dB.

Audible Ring Indication

If you have the Audible Ring Indication turned on, a valid call will cause the front panel On LED to flash, a serial ring command to transmit, and an audible ring to be heard from the receive channel. In the Off mode, the front panel On LED flashes and a serial command is transmitted. However, no ring tone is generated. This indicator can be turned on and off by selecting and deselecting the checkbox. The default is on. The level adjustment allows you to customize the level of the ring in relationship to the caller audio level in the room. The level can be adjusted in 1dB steps from a nominal level 0 (default) to plus or minus 12dB.

Telco Meters

Using meters

Open the XAP TH2 Telco Meters window by clicking the Telco Meters button on the XAP TH2 Flow Screen. The Telco Meters window is a diagnostic tool which allows you to observe the performance of various aspects of XAP TH2 operation. Refer to the Transmit and Receive meters when making level adjustments.
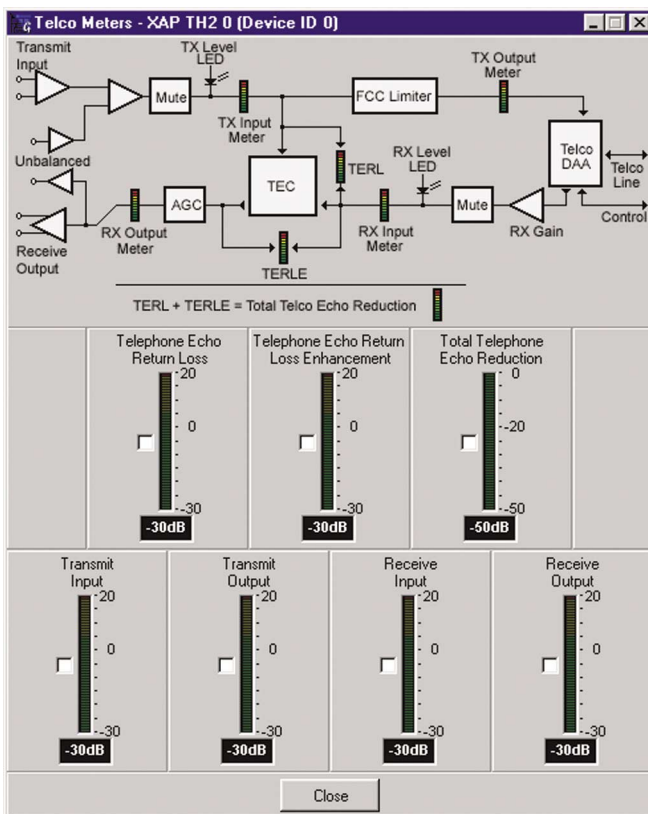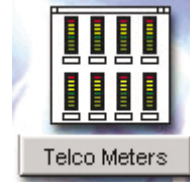
Figure 5.1. XAP TH2 Telco Meters window

Telco Echo Return Loss (TERL)

The Telco Echo Return Loss meter shows the coupling between the transmit signal and the input to the telephone echo canceller. It is the ratio of the two levels. The range of the meter is -30 to +20dB. It is a peak meter and updates only when transmit signal is present.

Telco Echo Return Loss Enhancement (TERLE)

The Telco Echo Return Loss Enhancement meter shows the loss through the telephone echo cancellation and non-linear processing chain. It is the ratio of the

two levels. The range of the meter is -30 to +20dB. It is a peak meter and updates only when a signal is present.

Total Telco Echo Reduction

The Total Telco Echo Reduction meter is the sum of the TERL and TERLE meters. It indicates the total echo return loss in the system. The range of the meter is -50 to 0dB. It is a peak meter and only updates when signal is present.

Transmit Input

This meter shows the audio level input to the XAP TH2 for transmission to the telephone line. The range of the meter is -30 to +20dB.

Transmit Output

This meter shows the transmit audio level output from the XAP TH2 to the Telco DAA. The range of the meter is -30 to +20dB.

Receive Input

This meter shows the audio level input to the XAP TH2 as it is received from the Telco DAA. The range of the meter is -30 to +20dB.

Receive Output

This meter shows the receive audio level output from the XAP TH2 to the XAP 800. The range of the meter is -30 to +20dB.

Appendix A: Specifications

Dimensions (LxDxH)
17.25" x 10.25" x 1.75"
43.8 x 26 x 4.5 cm

Weight
7 lb/3.18 kg dry
12 lb/5.4 kg shipping

Operating Temperature
32–100° F/0–38° C

Humidity
15% to 80%, non-condensing

Power Input Range
Auto-adjusting
100–240VAC; 50/60Hz

Power Consumption
15W typical

Device ID
4-position DIP switch

Expansion Bus In/Out
Proprietary Network
RJ-45 (2), 115.2kbps,
   110kΩ Impedance
Category five twisted-pair cable
80' (24 meters) maximum cable
   length between any two
   PSR1212s, XAP 800s, or
   XAP 400s

RS-232
DB-9 female
9,600/19,200/38,400
   (default)/57,600 baud rate; 8 bits,
   1 stop, no parity
Hardware flow control
   on (default)/off

Control/Status
DB-25 female
Inputs: active low (pull to ground)
Outputs: open collector, 40VDC max,
   40mA each
+5VDC (300mA over-
   current protected)

Telco Line
RJ-11
POTS (plain old telephone service) or
   analog extension from a PBX
A-lead supervision provided

Telco Set
RJ-11
Connect analog telephone set
A-lead supervision provided

Transmit Input
Push-on terminal block, balanced,
   bridging
Impedance: >10kΩ
Nominal Level: 0dBu
Maximum Level: 15dBu

Receive Output
Push-on terminal block, balanced
Impedance: <50Ω
Nominal Level: 0dBu
Maximum Level: 19dBu

Audio Performance
Conditions: Unless otherwise
specified, all measurements are
performed with a 22Hz to 22kHz
BW limit (no weighting). Transmit
limiter and Receive ALC disabled
Frequency Response: 250Hz to
   3.3kHz ±1dB
THD+N: <0.2% re max level
SNR: >62dB re max level

Telco Echo Cancellation
Tail time: 31ms
Null: 55dB nominal

Approvals
FCC, CSA, IC, CE, NOM, ACA,
SABS, JATE

Set-up Software
G-Ware

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Appendix B: Pinouts

Remote connector pinout

Pin	Definable	Type	Default Description
1	Yes	Control (Input)	Telco On
2	Yes	Status (Output)	Telco On Indicator
3	Yes	Control (Input)	Telco Off
4	Yes	Status (Output)	Telco Off Indicator
5	Yes	Control (Input)	
6	Yes	Status (Output)	
7	Yes	Control (Input)	
8	Yes	Status (Output)	
9	Yes	Control (Input)	Transmit Mute
10	Yes	Status (Output)	Transmit Mute Indicator
11	Yes	Control (Input)	Receive Mute
12	Yes	Status (Output)	Receive Mute Indicator
13	Yes	Control (Input)	
14	Yes	Status (Output)	
15	Yes	Control (Input)	
16	Yes	Status (Output)	
17	Yes	Control (Input)	
18	Yes	Status (Output)	
19	Yes	Control (Input)	
20	No	Analog	Unbalanced Transmit
21	No	Analog	Analog Ground
22	No	Analog	Unbalanced Receive
23	No	Analog	Analog Ground
24	N/A	N/A	+5V 300 mA
25	N/A	N/A	Ground

Inputs: Remote control provided via contact closure to Switch/Indicator Common

Outputs: Remote indicators provided via open collector outputs to Indicator
Common (<40V, <40mA)

RS-232 COM port pinout

Pin	Description	Pin	Description
1	DCD	6	DSR
2	TXD	7	CTS
3	RXD	8	RTS
4	DTR	9	Not used
5	Ground		

Set connector pinout

Pin	Description	Pin	Description
1	To pin 6 of SET RJ-11C	4	Tip
2	To pin 5 of SET	5	To pin 2 of LINE
3	Ring	6	To pin 1 of LINE RJ-11C

Line connector pinout

Pin	Description	Pin	Description
1	To pin 6 of LINE RJ-11C	4	Ring
2	To pin 5 of LINE	5	To pin 2 of SET
3	Tip	6	To pin 1 of SET RJ-11C

Appendix C: Serial Commands

The XAP TH2 accepts serial commands through the serial port or the expansion bus. The commands in this manual pertain only to the XAP TH2. RS-232 serial port protocol is 9,600, 19,200, 38,400 (default), or 57,600 baud; 8 bits, 1 stop bit, no parity. The Flow Control setting for the RS-232 port is on by default.

Conventions

The following typographic conventions are used in this document to describe the different serial commands. use the Command structure section and the examples as a guide when creating your serial commands.

Convention	Description
<X>	Parameters enclosed in < > indicate a mandatory parameter.
[X]	Parameters enclosed in [ ] indicate an optional parameter.
1-8	Parameters separated by a - indicate a range between the values.
4,7,9	Parameters separated by a , indicate a list of available values.
MREF	Words in uppercase bold indicate command text.
DEVICE	Indicates the device type and device number on the expansion bus network. It is composed of a device type character and a device number. The device type for the XAP TH2 is always 6 and the device ID will always be 0–15, or * (to select all TH2 units).

Command structure

Commands can be either UPPER CASE or lower case. Also, extra spaces or tabs between arguments in text commands is allowed. Return values are always in upper case. In order for a command to be recognized by the serial port, the command must be terminated by a carriage return.

The structure of serial commands is as follows: #DEVICE COMMAND[X][X]

#	indicates the start of a command line
DEVICE	represents the device type and device number
COMMAND	is the command text
[X] [X]	represents any additional options in the order that they appear in the command descriptions that follow

Example

A command to enable auto-answer on the XAP TH2 device "0" would have the command line:
#60 AA 1 1. In this command line, 6=XAP TH2, 0=unit 0, AA=command, 1=Telco channel 1, 1=on state. If a command calls for a "null" value, leave a blank in the command line. For example, **#60 AA** would return the current auto-answer state on device 60.

Command responses will have a carriage return line feed. Example: #60 AA 1 1 CR (carriage return line feed).

Groups and channels

If a channel has an alpha value of "*", the command will be applied to all channels For example, a group value of M and a channel value of * means that the command will be applied to all channels of group M (mic inputs). The following table shows the alpha representations for the different groups and the channels that are available for each product.

	Group	XAP 800/PSR1212 Channel Range	XAP TH2 Channel Range	XAP 400 Channel Range
Inputs	I	1–12		1–8
Outputs	O	1–12		1–9 (9 is power amp)
Mic Input	M	1–8		1–4
Gating Group	G	1–4, A–D		1–4, A-D
Processing	P	A–H		A–D
Ambient	A	1–8		1–4
Line Inputs	L	9–12		5–8
Expansion Bus	E	O–Z		O–Z
Unit	U	0	0	0
GPIO	Y	0	0	0
Matrix	X	0		0
Wall plates	W	0–11		0–11
Presets	S	1–32		1–32
Macros	C	1–255		1–255
Unknown	N			
Transmit	T		1	1
Receive	R		1	1
Virtual Reference	B	1–4		1–4

Type and device IDs

Type ID	Unit type	Device ID range
4	PSR1212	0–7
5	XAP 800	0–7
6	XAP TH2	0–F
7	XAP 400	0–7

Meter type definitions

Alpha	Level position for Mics	Level position for Line Inputs	Level position for Outputs and Telco Transmits	Level Position for Processors	Level Position for Telco Receives
I	Input level	Input level	Input level	Level into processor	Input Level
A	Level after gain adjustment, but before filter	Level after gain adjustment	Level after gain adjustment	Amount of compression	Level after gain adjustment
N	Level after filter but before gate (non-gated level)	N/A	N/A	Level after compressor and filters	N/A
G	Level after gate (gated level)	N/A	N/A	N/A	N/A
R	Echo Return Loss	N/A	N/A	N/A	Telco Echo Return Loss
E	Echo Return Loss Enhancement	N/A	N/A	N/A	Telco Echo Return Loss Enhancement
T	ERL + ERLE	N/A	N/A	N/A	TERL + TERLE
D	Impulse Duration (Tail Time)	N/A	N/A	N/A	N/A
C	AGC	AGC	N/A	N/A	AGC
Y	Pre AGC RMS meter	Pre AGC RMS meter	N/A	N/A	Pre AGC RMS meter
Z	Post AGC RMS meter	Post AGC RMS meter	N/A	N/A	Post AGC RMS meter

Serial command error codes

Error number	Text message	Explanation/Solution
1	Memory error	The box is out of internal memory. Power cycle the box.
2	No command found	A command was not found in the string.
3	Unknown command response	A command was executed on a different device type that this box cannot display. The command dictionary needs to be updated.
4	Not implemented	The command is not implemented.
5	Argument error	The command had an argument that was out of range.
6	Unknown command	The command is unknown to this unit.
7	Bad checksum	The binary command's checksum is wrong.
8	Preset of macro invalid	A preset or macro failed to program because it is too large or because its command list contained an invalid command.
10	Queue error	The internal command queue is full. Enable flow control and use all five pins on the serial port.
11	Command too big	The binary command is too large.
12	Unit is locked	Unlock the unit with the proper password.

XAP TH2 Serial commands

Command	Function	Command	Function
AA	Sets auto-answer for a telco channel	PRGSTRING	Sets/reports a programmed string
ACONN	Sets the audible connect signal to on/off	REDIAL	Redials the last number
ACONNLVL	Sets the level of the audible connect signal	RING	Indicates a ringing line (reportable only)
AD	Sets auto-disconnect for a telco channel	RINGER	Sets the audible ringer for a telco channel
ALC	Sets the ALC for the telco receive	RINGERLVL	Sets the audible ring indication level
BAUD	Selects/reports the baud rate of the serial port	RXBOOST	Sets the receive boost at 0, 3, 6, 9, or 12dB
COUNTRY	Sets/reports the country for compliance	RXBSTEN	Enables/disables receive boost
DIAL	Dials a DTMF sequence or reports last sequence dialed	RXRD	Sets the RX reduction for the telco channel
		SERECHO	Selects/reports the serial echo of the RS-232
DID	Selects/reports device ID	SERMODE	Selects/reports the serial mode of the RS-232
DTMFLVL	Sets the DTMF tone level in the room	SPEEDDIAL	Dials one of ten numbers on the telco channel
DTONELVL	Selects/reports the audible dial tone level	STOREDIAL	Saves a number in speed dial or reports the current value
FLOW	Selects/reports the flow control of the serial port		
		STRING	Executes a string for the RS-232 port
HOOK	Sends a hook flash to the telephone line	TAMODE	Sets the telco adapt mode for the telco channel
HOOKD	Sets hook flash duration		
LABEL	Selects/reports label of specified channel	TE	Sets the telco enable for the telco channel
LVL	Reports in, out, or processor level	TERL	Reports the telco echo return loss (read only)
LVLREPORT	Selects/reports level status	TERLE	Reports the telco echo return loss enhancement (read only)
LVLRRATE	Sets the level report rate for the unit		
MDMODE	Enables/disables the modem mode for the unit	TOUT	Selects/reports the title screen inactivity time out
MINIT	Sets/reports modem initialization string of serial port		
		UID	Reports unit ID (read only)
MUTE	Sets/reports mute status	VER	Reports unit version (read only)
NULL	Renulls the XAP TH2 to the telephone line		

AA - Auto-Answer Enable/ Disable

This command selects/reports the setting of auto-answer.

Command form: DEVICE **AA** <Channel> [Value]

Argument details

Name	Description
Channel	See Groups and Channels on page 29
Value	0 = Off, 1 = On, 2 = Toggle

Example: #61 AA 1 1 On XAP TH2 unit 1 (**#61**), auto-answer (**AA**) for telco

channel (**1**) is set on (**1**).

ACONN - Audible Connect / Disconnect Indication

This command selects/reports the status of the audible connect/disconnect indication.

Command form: DEVICE **ACONN** <Channel> [Value]

Argument details

Name	Description
Channel	See Groups and Channels on page 29
Value	0 = Off, 1 = On, 2 = Toggle, (Null to query in text)

Example: #60 ACONN 1 1 On XAP TH2 unit 0 (**#60**), audible

connect/disconnect (**ACONN**) for telco channel 1 (**1**) is set on (**1**).

ACONNLVL - Audible Connect/Disconnect Level

This command selects/reports the audible connect/disconnect indicator's level.

Command form: DEVICE **ACONNLVL** <Channel> [Value]

Argument details

Name	Description	Units
Channel	See Groups and Channels on page 29	
Value	-12.00–12.00	dB
	(Null to query in text)	

Example: #64 ACONNLVL 1 -6 On XAP TH2 unit 4 (**#64**), audible

connect/disconnect level (**ACCONLVL**) on channel 1 (**1**) is set to -6dB (**-6**).

AD - Auto-Disconnect Enable/Disable

This command selects/reports the setting of auto-disconnect.

Command form: DEVICE **AD** <Channel> [Value]

Argument details

Name	Description
Channel	See Groups and Channels on page 29
Value	0 = Off, 1 = Loop Drop, 2 = Call Progress
	3 = Loop Drop + Call Progress
	(Null to query in text)

Example: #62 AD 1 3 On XAP TH2 unit 2 (**#62**), auto-disconnect (**AD**) on

channel 1 (**1**) is set to Loop Drop + Call Progress (**3**).

ALC - Automatic Level Control

This command selects/reports the state of the automatic level control.

Command form: DEVICE **ALC** <Channel> <Group> [Value]

Argument details

Name	Description
Channel	See Groups and Channels, page 29
Group	17 (R)
Value	0 = Off, 1 = On, 2 = Toggle
	(Null to query in text)

Example #62 ALC 1 1 On XAP TH2 unit 2 (**#62**), the automatic level control

(**ALC**) for the hybrid (**1**) is on (**1**).

BAUD - Baud Rate

This command selects/reports the baud rate of the serial port.

Command form: DEVICE **BAUD** [Value]

Argument details

Name	Description
Value	9600, 19200, 38400, 57600
	(Null to query in text)

Example: #66 BAUD 38400 On XAP TH2 unit 6 (**#76**), the baud rate (**BAUD**)

for the RS-232 port is set to 38,400 (**38400**).

COUNTRY – Country Selection

This command sets/reports the country for compliance.

Command form: DEVICE **COUNTRY** [Value]

Argument details

Name	Description
Value	1 = US / Canada
	2 = Europe (CTR21)
	3 = Mexico
	4 = Australia
	5 = South Africa
	6 = Japan
	7 = Brazil
	(Null to query in text)

Example: #60 COUNTRY 1 On the XAP TH2 unit 0 (**#60**), the country selection (**COUNTRY**) is set to US/Canada (**1**).

DIAL – DTMF Dialing

This command dials a DTMF sequence or reports back the last sequence dialed.

Command form: DEVICE **DIAL** <Channel> [Number]

Argument details

Name	Description
Channel	1
Number	1 – 40 Chars of '0' – '9', 'A' – 'D', '*', '#', ','
	(Null to query last number dialed in text)

Example: #62 DIAL 1 1,8002835936 XAP TH2 unit 2 (**#62**) dials (**DIAL**) on channel 1 (**1**) the number **18002835936**.

DID - Device ID

This command selects/reports the device ID.

Command form: DEVICE **DID** [Value]

Argument details

Name	Description
Value	See Type and Device IDs, page 29
	(Null to query in text)

Example: #63 DID 0 On XAP TH2 unit 3 (**#63**), the device ID (**DID**) is set to **0**.

DTMFLVL - DTMF Tone Level

This command selects/reports the DTMF tone's level.

Command form: DEVICE **DTMFLVL** <Channel> [Value]

Argument details

Name	Description	Units
Channel	See Groups and Channels, page 29	
Value	-12.00 – 12.00	dB
	(Null to query in text)	

Example: #62 DTMFLVL 1 6 On XAP TH2 unit 2 (**#62**), the DTMF tone level
(**DTMFLVL**) is set to **6**dB.

DTONELVL - Dial Tone Level

This command selects/reports the audible dial tone's level.

Command form: DEVICE **DTONELVL** <Channel> [Value]

Argument details

Name	Description	Units
Channel	See Groups and Channels, page 29	
Value	-12.00 – 12.00	dB
	(Null to query in text)	

Example: #60 DTONELVL 1 3 On XAP TH2 unit 0 (**#60**), the dial tone level
(**DTONELVL**) is set to -3dB (**3**).

FLOW - Flow Control

This command selects/reports the flow control of the serial port on the unit.
Hardware flow control is implemented using DTR and DSR.

Command form: DEVICE **FLOW** [Value]

Argument details

Name	Description
Value	0 = Off, 1 = On, 2 = Toggle
	(Null to query in text)

Example: #63 FLOW 1 On XAP TH2 unit 3 (**#63**), the flow control (**FLOW**) to
the RS-232 port is enabled (**1**).

HOOK - Hook Flash

This command sends a hook flash. There is no query for this command.
Command form: DEVICE **HOOK** <Channel>

Argument details

Name	Description
Channel	See Groups and Channels, page 29

Example: #65 HOOK 1 On XAP TH2 unit 5 (**#65**), send a **HOOK** flash to the hybrid (1).

HOOKD - Hook Flash Duration

This command selects/reports the hook flash duration.
Command form: DEVICE **HOOKD** <Channel> [Value]

Argument details

Name	Description	Units
Channel	See Groups and Channels, page 29	
Value	50 – 2000	ms
	(Null to query in text)	

Example: #66 HOOKD 1 500 On XAP TH2 unit 6 (**#66**), the hook flash duration (**HOOKD**) for the hybrid (**1**) is set to 500ms (**500**).

LABEL - Label

This selects/reports the label of the specific channel or the unit.
Command form: DEVICE **LABEL** <Channel> <Group> [In/Out] [Value]

Argument details

Name	Values
Channel	See Groups and Channels, page 29
Group	I, O, M, G, P, L, E, U, W, S, C, Z, T, R
Input/Output	0 = output
	1 = input
Label	1 – 20 characters
	CLEAR = clear the label
	(Null to query in text)

Example: If the label of the Transmit is "Audio to Telco," the command returns DEVICE 1 T 0 AUDIO TO TELCO.

LVL - Level

This command reports the level of a channel. This command is read only.

Command form: DEVICE **LVL** <Channel> <Group> <Position> [Value]

Argument details

Name	Description	Units
Channel	See Groups and Channels, page 29	
Group	1, 2, 3, 5, 6, 7, 16, 17 (I, O, M, P, A, L, T, R)	
Position	See Meter Type Definitions, page 30	
Value	-99.99 – 99.99	dB
	(Sent with Null in text, Value returned)	

Example: #61 LVL 1 T I This will return the level of the telco input on XAP TH2 unit 1.

LVLREPORT - Level Report

This command selects/reports the status of level reporting for the specified channel.

Command form: DEVICE **LVLREPORT** <Channel> <Group> <Position> [Value]

Argument details

Name	Description
Channel	See Groups and Channels, page 29
Group	1, 2, 3, 5, 6, 7, 16, 17 (I, O, M, P, A, L, T, R)
Position	See Meter Type Definitions, page 30
Value	0 = Off (Delete from list being reported)
	1 = On (Add to list being reported)
	2 = Toggle
	(Null to query in text)

Note: The level report rate (LVLRRATE) must also be set for levels to be reported.

Example: If you request the level of the transmit input to be reported, the command returns DEVICE **LVLREPORT** 1 T I.

LVLRRATE - Level Report Rate

Sets the level report rate for the unit.

Command form: DEVICE **LVLRRATE** [Value]

Argument details

Name	Description	Units
Value	0 = Turn off reporting but leave current list	
	1 = Turn off reporting and clear the list	
	50 – 1000 = Set Rate (1 meter every x ms)	ms
	(Null to query in text)	

Example: #63 LVLRRATE 100 On XAP TH2 unit 3 (**#63**), the level report rate (**LVLRRATE**) is set to **100**ms.

MDMODE - Modem Mode

This command enables or disables the modem mode for the unit. When the modem mode is enabled, the modem initialization string is sent out the serial port and the serial port now requires a password before a command is processed. After five minutes of serial inactivity the password will be requested to continue serial activity.
Command form: DEVICE **MDMODE** [Value]

Argument details

Name	Description
Value	0 = Off, 1 = On, 2 = Toggle
	(Null to query in text)

Example: #67 MDMODE 1 On XAP TH2 unit 7 (**#67**), the modem mode (**MDMODE**) is on (**1**).

MINIT - Modem Initialization String

This command sets/reports the modem initialization string of the serial port when in modem mode.
Command form: DEVICE **MINIT** [Value]

Argument details

Name	Description
Value	CLEAR = Clear current value
	1 – 80 Characters
	(Null to query in text)

Example: #61 MINIT ATZ On XAP TH2 unit 1 (**#61**), the modem initialization string (**MINIT**) is **ATZ**.

MUTE - Mute

This command selects/reports the setting of mute on a channel.
Command form: DEVICE **MUTE** <Channel> <Group> [Value]

Argument

Name	Description
Channel	1
Group	T, R
Value	0 = Off, 1 = On, 2 = Toggle
	(Null to query in text)

Example: If the Receive mute is enabled, the command returns DEVICE **MUTE** 1 R 1.

NULL - Null the line

This command nulls the line. There is no query for this command.

Command form: DEVICE **NULL** <Channel>

Argument details

Name	Description
Channel	See Groups and Channels, page 29

Example: If the phone is nulled, the command returns DEVICE **NULL** 1.

PRGSTRING - Program String

This command sets/reports a programmed string.

Command form: DEVICE **PRGSTRING** <ID> [Value]

Argument details

Name	Description
Device	0–7 or * to select all units
PRGSTRING	Command
ID	0 – 7 (string location)
Value	1–80 Characters
	CLEAR = Clear current value
	Null = Current value

Example: #63 PRGSTRING 2 MUTE On XAP TH2 unit 3 (**#63**), string location **2** is programmed (**PRGSTRING**) with **MUTE**.

Supported special characters

\a = alert

\b = backspace

\f = formfeed

\n = new line

\r = carriage return

\t = horizontal tab

\v = vertical tab

\\ = backslash

REDIAL – Dial the last number again

This command redials the last number. There is no query for this command.
Command form: DEVICE **REDIAL** <Channel>

Argument details

Name	Description
Channel	See Groups and Channels, page 29
Group	17 (R)

Example: #60 REDIAL 1 On XAP TH2 unit 0 (#60), the hybrid (1) will redial
the last number dialed.

RING - Ring Indication

This command indicates a ringing line. This command is reportable only. It cannot
be queried or set.
Command form: DEVICE **RING** <Channel>

Argument details

Name	Description
Channel	See Groups and Channels, page 29
Group	17 (R)

Example: If the TH2 detects an incoming ring signal, the command returns
DEVICE **RING** 1.

RINGER - Audible Ring Selection

This command sends/reports the use of an audible ring.
Command form: DEVICE **RINGER** <Channel> [Value]

Argument details

Name	Description
Channel	See Groups and Channels, page 29
Group	17 (R)
Value	0 = Off, 1 = On, 2 = Toggle, (Null to query in text)

Example: If the audible ring indication is enabled, the command returns DEVICE
RINGER 1 1.

RINGERLVL - Audible Ring Level

This command selects/reports the audible ring level.

Command form: DEVICE **RINGERLVL** <Channel> [Value]

Argument details

Name	Description	Units
Channel	See Groups and Channels, page 29	
Group	17 (R)	
Value	-12.00 – 12.00	dB
	(Null to query in text)	

Example: If the audible ring indication is set to 3dB, the command returns DEVICE **RINGERLVL** 1 3.

RXBOOST - Receive Boost

This command selects/reports the level of receive boost.

Command form: DEVICE **RXBOOST** <Channel> [Value]

Argument details

Name	Description	Units
Channel	See Groups and Channels, page 29	
Group	17 (R)	
Value	0, 3, 6, 9, 12	dB
	(Null to query in text)	

Example: If the receive boost is set to 6dB, the command returns DEVICE **RXBOOST** 1 6.

RXBSTEN - Receive Boost Enable

This command enables/disables receive boost or reports the status.

Command form: DEVICE **RXBSTEN** <Channel> [Value]

Argument details

Name	Description
Channel	See Groups and Channels, page 29
Group	R
Value	0 = Off, 1 = On, 2 = Toggle
	(Null to query in text)

Example: #64 RXBOOST 1 6 On XAP TH2 unit 4 (**#64**), the receive boost (**RXBOOST**) of the hybrid (**1**) is set to **6**dB.

RXRD - Telco Receive Reduction

This command selects/reports the status of the Telco receive reduction.

Command form: DEVICE **RXRD** <Channel> [Value]

Argument details

Name	Description
Channel	See Groups and Channels, page 29
Group	17 (R)
Value	0 = Off, 1 = On, 2 = Toggle, (Null to query in text)

Example: #65 RXRD 1 0 On XAP TH2 unit 5 (**#65**), the receive reduction (**RXRD**) for the hybrid (**1**) is off (**0**).

SERECHO - Serial Echo

This command selects/reports the serial echo of the RS-232 port.

Command form: DEVICE **SERECHO** [Value]

Argument details

Name	Description
Value	0 = Off, 1 = On, 2 = Toggle
	(Null to query in text)

Example: #64 SERECHO 1 On XAP TH2 unit 4 (**#64**), the serial echo (**SERECHO**) of the RS-232 port is set to on (**1**).

SERMODE - Serial Mode

This command selects/reports the serial mode of the RS-232 port.

Command form: DEVICE **SERMODE** [Value]

Argument details

Name	Description
Value	1 = Text, 2 = Binary, (Null to query in text)

Example: #65 SERMODE 1 On XAP TH2 unit 5 (**#65**), the RS-232 port serial mode (**SERMODE**) is set to text (**1**).

SPEEDDIAL - Speed Dialing

This command dials a speed dial number.

Command form: DEVICE **SPEEDDIAL** <Channel> [Value]

Argument details

Name	Description
Channel	See Groups and Channels, page 29
Group	R
Value	1 – 10
	(Null to query in text)

Example: #61 SPEEDDIAL 1 5 On XAP TH2 unit 1 (**#61**), **SPEEDDIAL** the hybrid (**1**) with the number stored in location **5**.

STOREDIAL – Store a number as a Speed Dial

This command saves a number in a speed dial or reports the current value.

Command form: DEVICE **STOREDIAL** <ID> [Number Label]

Argument details

Name	Description
ID	1 – 10
Number	1 – 40 chars '0' – '9', 'A' – 'D', '*', '#'
	(Null to query in text)
Label	1 – 20 chars

Example: #62 STOREDIAL 5 1,8004478556 Express Conference On XAP TH2 unit 2 (**#62**), store (**STOREDIAL**) the number **1,8004478556** and the name of **Express Conference** into speed dial location **5**.

STRING - String Execution

This command sends the specified string out the serial port

Command form: DEVICE **STRING** [ID]

Argument details

Name	Description
ID	0 – 7
	(Null to query last string in text)

The serial command to create a string is PRGSTRING (Program String). See page 39.

Example: #61 STRING 3 On XAP TH2 unit 1 (**#61**), the **STRING** programmed into location **3** will be sent out the RS-232 port.

TAMODE - Telco Adapt Mode

This command selects/reports the Telco adapt mode.

COMMAND FORM: DEVICE **TAMODE** <Channel> [Value]

Argument details

Name	Description
Channel	See Groups and Channels, page 29
Group	17 (R)
Value	0 = Auto, 1 = Burst, (Null to query in text)

Example: #62 TAMODE 10 On XAP TH2 unit 2 (**#62**), set the telco adapt mode (**TAMODE**) for the hybrid (**1**) to Auto (**0**).

TE - Telco Enable

This command selects/reports the hook status.

Command form: DEVICE **TE** <Channel> [Value]

Argument details

Name	Description
Channel	See Groups and Channels, page 29
Group	17 (R)
Value	0 = Off, 1 = On, 2 = Toggle
	(Null to query in text)

Example: #63TE 1 1 On XAP TH2 unit 3 (**#63**), set the telco enable (**TE**) of the hybrid (**1**) on (**1**), off hook.

TERL - Telco Echo Return Loss

This command reports the Telco echo return loss. This command is read only.

Command form: DEVICE **TERL** <Channel> [Value]

Argument details

Name	Description	Units
Channel	See Groups and Channels, page 29	
Group	17 (R)	
Value	(Sent with a Null in text)	dB

Example: #63 TERL 1 -12 On XAP TH2 unit 3 (**#63**), the telco echo return loss (**TERL**) for the hybrid (**1**) is **-12**dB.

TERLE - Telco Echo Return Loss Enhancement

This command reports the Telco echo return loss enhancement.

This command is read only.

Command form: DEVICE **TERLE** <Channel> [Value]

Argument details

Name	Description	Units
Channel	See Groups and Channels, page 29	
Group	17 (R)	
Value	(Sent with a Null in text)	dB

Example: #74 TERLE 1 -24 On XAP 400 unit 4 (**#74**), the telco echo return

loss enhancement (**TERLE**) for the hybrid (**1**) is **-24**dB.

UID - Unit ID

This command reports the unit ID. This command is read only.

Command form: DEVICE **UID** [Value]

Argument details

Name	Description	Units
Device	0–F or * to select all units	
UID	Command	
Value	Null to return value	Hexadecimal

Example: #63 UID B465F991 The unit ID number (**UID**) received from XAP

TH2 unit 3 (**#63**), is **B456F991**.

VER - Version

This command reports the firmware version of the unit. This command is read only.

Command form: DEVICE **VER** [Value]

Argument details

Name	Description
Device	0–F or * to select all units
VER	Command
Value	Null to return value

Example: #64 VER 1.0.0 The version of the firmware (**VER**) programmed into

XAP TH2 unit 4 (**#64**), is **1.0.0**.

Appendix D: Warranty

ClearOne Communications (Manufacturer) warrants that this product is free of defects in both materials and workmanship. Should any part of this product be defective, the Manufacturer agrees, at its option, to:

A. Repair or replace any defective part free of charge (except transportation charges) for a period of one year from the date of installation for the end-user, provided the owner returns the product to the Manufacturer at the address set forth below. No charge will be made for parts or labor during this period;

B. Furnish replacement for any defective parts in the product for a period of one year from the date of original purchase. Replacement parts shall be furnished without charge, except labor and transportation.

This Warranty excludes assembled products not manufactured by the Manufacturer whether or not they are incorporated in a Manufacturer product or sold under a Manufacturer part or model number.

THIS WARRANTY IS VOID IF:

A. The product has been damaged by negligence, accident, act of God, or mishandling, or has not been operated in accordance with the procedures described in the operating and technical instructions; or,

B. The product has been altered or repaired by other than the Manufacturer or an authorized service representative of the Manufacturer; or,

C. Adaptations or accessories other than those manufactured or provided by the Manufacturer have been made or attached to the product which, in the determination of the Manufacturer, shall have affected the performance, safety or reliability of the product; or,

D. The product's original serial number has been modified or removed.

NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE, APPLIES TO THE PRODUCT. MANUFACTURER'S MAXIMUM LIABILITY HEREUNDER SHALL BE THE AMOUNT PAID BY THE END-USER FOR THE PRODUCT. No person or entity authorized to assume any obligation or other liability in connection with the products. No action, regardless of form, arising out of or relating to the product or this Warranty, may be brought by end-user more than one (1) year after the cause of action has accrued.

Manufacturer shall not be liable for punitive, consequential, or incidental damages, expenses, or loss of revenue or property, inconvenience, or interruption in operation experienced by the end user due to a malfunction in the purchased product. No warranty service performed on any product shall extend the applicable warranty period.

In case of unsatisfactory operation, the end-user shall promptly notify the Manufacturer at the address set forth below in writing, giving full particulars as to the defects or unsatisfactory operation. Upon receipt of such notice, the Manufacturer will give instructions respecting the shipment of the product, or such other matters as it elects to honor this warranty as above provided. This warranty does not cover damage to the product during shipping and the Manufacturer assumes no responsibility for such damage. All shipping costs shall be paid by the customer.

This warranty extends only to the original end user and is not assignable or transferable. This Warranty is governed by the laws of the State of Utah, without regard to the conflicts of interests provisions thereof.

ClearOne Communications
1825 Research Way
Salt Lake City, Utah 84119

Appendix E: Compliance

Warning: The country code settings must be set for the desired country of operation in order to ensure proper operation of the XAP TH2 and to ensure that the XAP TH2 complies with the country's Telco requirements. Changing these settings to a country other than the intended country of operation might cause the XAP TH2 to be non-compliant.

FCC Part 15 Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

Changes or modifications not expressly approved by ClearOne Communications could void the user's authority to operate the equipment.

FCC Part 68 Compliance

FCC Registration Number: US:FBIBR00BXAPTH2 Ringer Equivalence Number (REN): 0.0B(ac)

A label containing, among other information, the FCC registration number and Ringer Equivalence Number (REN) for this equipment is prominently posted on the top plate, near the rear of the equipment. If requested, this information must be provided to your telephone company. USOC Jacks: This device uses RJ-11C and RJ21X terminal jacks.

The REN is used to determine the quantity of devices, which may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed five (5). To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the telephone company to obtain the maximum RENs for the calling area.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice is not 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 for you to make the necessary modifications in order to maintain uninterrupted service.

If you experience problems with this equipment, contact ClearOne Communications, 1825 Research Way, Salt Lake City, Utah 84119, or by phone at (801) 975-7200 for repair and warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.

No user serviceable parts are contained in this product. If damage or malfunction occurs, contact ClearOne Communications for instructions on its repair or return.

This equipment cannot be used on telephone company provided coin service. Connection to Party Line Service is subject to state tariffs.

IC Compliance

IC Certification Number: 1970 11802
Ringer Equivalence Number (REN): 0.0B(ac)

NOTICE: The Industry of Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by ClearOne Communications. Any repairs or

alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Safety Information

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electrical inspection authority, or electrician, as appropriate.

European Compliance

This equipment has been approved in accordance with Council Directive 1999/5/EC "Radio Equipment and Telecommunications Equipment"

$\mathsf{C}\mathsf{E}$ Conformity of the equipment with the guidelines below is attested by the CE mark.

EC Declaration of Conformity

Application of Council Directive(s):	1999/5/EC Radio equipment and Telecommunications Terminal Equipment (R&TTE) Directive
Manufacturer's Name:	ClearOne Communications
Manufacturer's Address:	1825 West Research Way
	Salt Lake City, Utah 84119 U.S.A.
Model No.:	XAP TH2

Standard(s) to which Conformity is declared:

89/336/EEC "Electromagnetic Compatibility (EMC) Directive":

EN 55022: 1998 (Emissions)	Specification for limits and methods of measurement of radio interference characteristics of information technology equipment.

| EN 61000-3-2:1995/A1/A2:1998 | Part 3: Limits – Section 2: Limits for harmonic current emissions. |
EN 61000-3-3:1995	Section 3: Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current up to and including 16 A.
EN 55024: 1998 (Immunity)	Information technology equipment – Immunity characteristics – Limits and methods of measurement.
EN 61000-4-2: 1995/A1:1998	Electrostatic Discharge
EN 61000-4-3: 1996/A1:1998	Radiated RF Immunity
EN 61000-4-4: 1995	Electrical Fast Transients
EN 61000-4-5: 1995	Lighting Surge
EN 61000-4-6: 1996	Conducted RF Immunity
EN 61000-4-8: 1993	Radiated Magnetic Field Immunity
EN 61000-4-11: 1994	Voltage Dips and Voltage Interruptions

73/23/EEC "Low Voltage Directive (LVD)":

| EN 60950: 1992 | Safety of Information Technology Equipment, Including A1, A2, A3, A4 and A11 Electrical Business Equipment. |

Telecommunications Terminal Equipment:

CTR21   Attachment requirements for pan-European approval for connection to the Public Switched Telephone Network.

Appendix F: Block Diagram

TERL + TERLE = Total Telco Echo Reduction
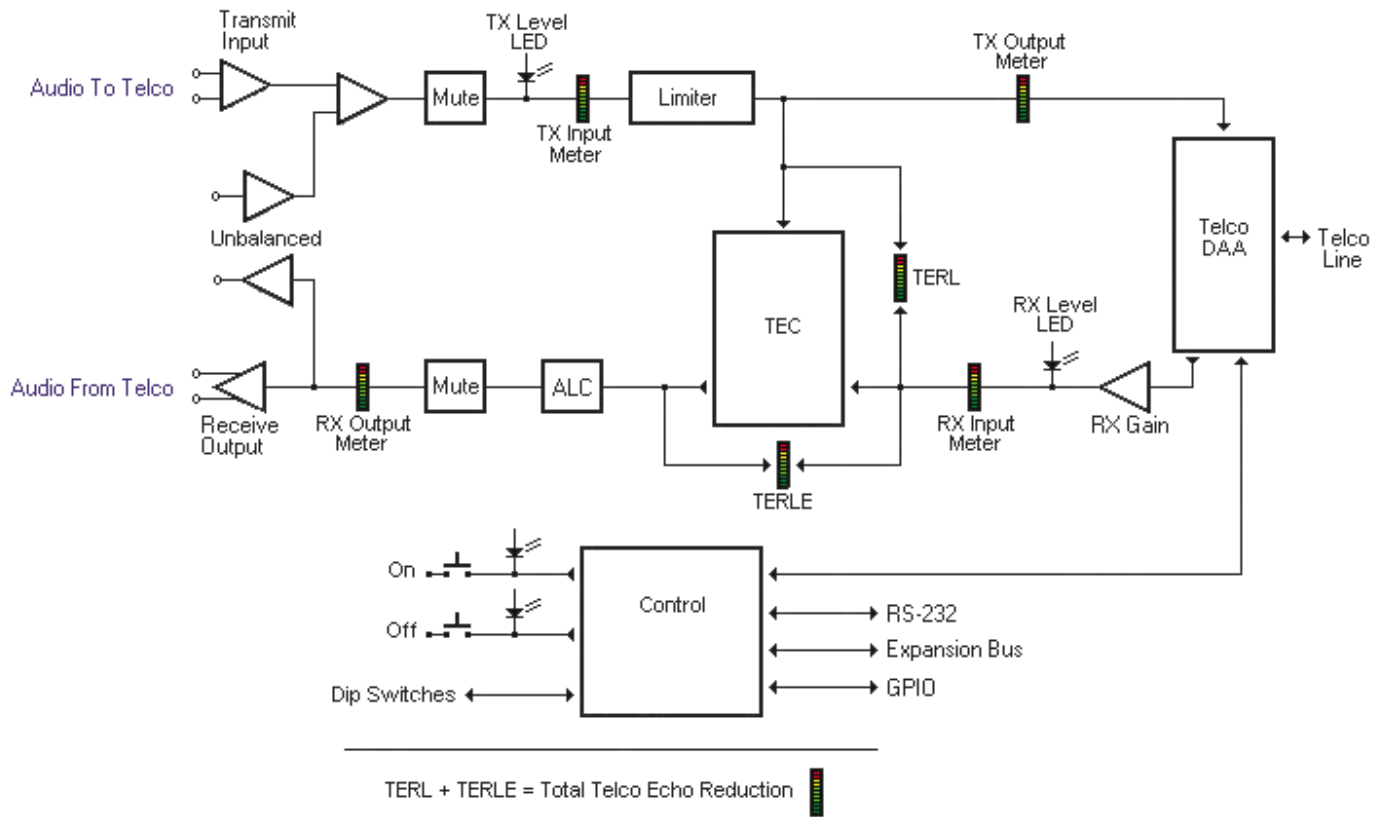
Glossary

Acoustic Echo Cancellation (AEC) A process in which acoustical echo is removed from a signal. AEC can be used to remove unwanted signals from mic audio if the unwanted acoustic signal is available separately as an electronic signal.

Ambient Noise The existing room-level noise, such as that caused by ventilation systems, paper shuffling, and background chatter.

ASCII The American Standard Code (for) Information Interchange. Standard code for transmitting alphanumeric characters electronically.

Attenuation A reduction of signal amplitude.

Audio Processor A device that modifies an audio signal in response to certain requirements.

Automatic Level Control (ALC) Automatically increases or decreases audio level to maintain a consistent audio level.

Baud Rate The number of signal transitions per second, or the clock rate of the serial bit stream in hertz. Given 7 or 8 bits for data plus start and stop, the approximate ASCII character transmission rate is one-tenth the baud rate.

Clipping A condition in which a signal level exceeds the maximum level a circuit can handle. This is usually caused by overdriving an input. It always causes distortion and typically leads to listener fatigue and accelerated failure of loudspeaker drivers.

Compression An induced reduction in the dynamic range of part or all of an audio signal. Compression is usually used to protect individual loudspeaker components from the damaging effects of transients.

DSP Digital signal processor.

Echo Canceller Reference The signal point which contains an electronic copy of all signals which will be removed from the signal the mics pick up. This is always the far-end audio and, optionally, local program material.

Expansion Bus Consists of two RJ-45 connectors on the rear panel of the XAP TH2. An expansion bus allows multiple XAP TH2s to be networked together using category five twisted-pair (10BaseT) cable.

Gain The amount a signal is increased over a given reference, typically 0. It is normally specified in dB (decibels). On the XAP 800, gain is adjustable from -65 to 20dB (85dB range) in .5dB increments.

Gain Structure The configuration of parameters which define gain adjustment of a signal. The optimal input gain setting is one which provides both an adequate signal-to-noise ratio and reasonable headroom.

GPIO (general purpose input/output) The Remote port on the rear of the XAP TH2 unit.

G-Ware Software The XAP TH2's setup and configuration software.

Macro A series of user-created instructions, stored within the unit, which can be executed from an RS-232 command or contact closure.

Matrix Mixer A mixer that allows routing of any input or combination of inputs to an output or any combination of outputs. In the case of the XAP 800, the matrix mixer permits level control at each cross point in the matrix.

Mute A condition in which an audio signal is attenuated below the audible threshold.

Reverberation A diffuse acoustic energy field fed and maintained by sound reflections from the room surfaces.

Serial Command A bit description designed to execute an instruction or command.

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