AP400

Audioconferencing System

Installation & Operation Manual

Gentner®

Audio Perfect® 400 Installation and Operations Manual
Gentner Part No. 800-150-101
July 2001 (Rev 4.0)

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1ntroduction

Description

The Audio Perfect® 400 (AP400) provides the highest possible audio quality available for a variety of conferencing applications. The AP400 uses Distributed Echo Cancellation, which places an echo canceller and an audio processor on every microphone input. This technology is vastly superior to traditional system-wide echo cancellation because it eliminates the gating and audio processing issues that often hamper such systems. An integrated telephone interface enables telephone participants of an audio or videoconference to sound as if they are actually in the same room. It contains an internal power amplifier for easy installation of a loudspeaker. In addition, the AP400 performs automatic gating of microphones, microphone mixing, audio processing and matrix routing all in a one-rack-mountable unit that seamlessly integrates the functions of each component. All of the AP400's parameters and functions are programmable with AP-Ware software. AP-Ware is easy to use and provides complete audioconferencing system configuration and management.

Each unit has four mic/line inputs, four line-level inputs (for video codecs, VCRs, CD players, etc.), and eight line outputs. Each input uses automatic gain control to compensate for loud or soft talkers. The mic/line inputs also offer channelized equalization for continuous cut or boost, as well as high-pass filtering to reduce unwanted low-frequency noise.

For more microphone coverage, AP400's and AP800's can be combined for up to 64 total microphones. When multiple telephone lines are needed, up to 16 AP10 units can also be added. All units are G-Linked together using Gentner's high-speed digital network bus, and can be controlled and diagnosed via a single RS-232 connection.

If you need technical help on how to install, set up or operate your AP400 system, please contact Gentner in any of the following ways:

Telephone:	1.800.283.5936 (USA)	**or** 1.801.974.3760
Fax:	1.800.933.5107 (USA)	**or** 1.801.977.0087
Internet:	www.gentner.com	**e-mail:** tech2@gentner.com

Gentner Communications Corporation
1825 Research Way, Salt Lake City, UT 84119

Unpacking

Ensure that the following items were received with your shipment:

! **Gentner Communications 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 damaged, retain the original boxes and packing material for inspection by the carrier. Contact your carrier immediately.**

AP400
Part 850-150-101

AC
Power Cord
Part 699-150-006
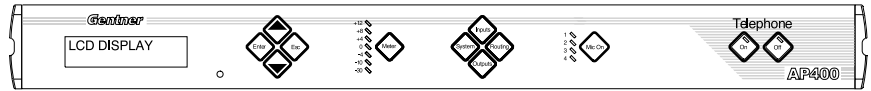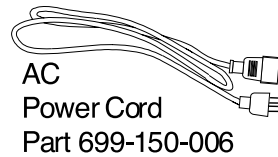
12-foot Telephone Cable
Part 830-000-012

Phoenix Push-On
Blocks (x16)
Part 673-016-003

G-Link
Terminator
Part 830-150-003

18-inch G-Link
Cable
Part 830-150-004

AP400

Audio Perfect® 400
Audioconferencing System

Installation and Operation manual
Gentner

AP400 Installation
and Operation Manual
Part 800-150-101

Audio/Video Products CD
Part 800-000-001

Optional

Microphones

Mic Cables

Speaker

Figure 1. AP400 Unpacking Diagram

Warranty Registration

Please register your AP400 online by visiting Gentner Technical Support at **www.gentner.com**. When your product is properly registered, Gentner Communications will be able to serve you better should you require technical assistance or desire to receive upgrades or new product information.

2Overview

About the AP400

· Easy to install, simple to operate

· Distributed Echo Cancellation® technology on each mic/line input dramatically improves overall system performance, flexibility and setup

· AP-Ware software for easy configuration of system parameters and functions

· Automatic microphone gating reduces background noise and reverberation, resulting in crystal-clear, transparent audio

· Simultaneous two-wire/four-wire capability enables video and telephone participants to communicate simultaneously with full-duplex audio

· Truly linkable, the AP400 can be expanded (via the G-Link) to accommodate applications requiring up to 64 microphones—all system parameters are linked and function as one system

· Each of the eight inputs incorporates automatic gain control to compensate for loud or soft talkers, while the four mic/line inputs offer channelized equalization for continuous cut or boost and high-pass filtering to reduce unwanted frequency noise

· Programmable matrix allows simple system customization for a wide variety of applications and individual customer requirements

· On-the-fly configuration changes—six customizable preset programs can be accessed from AP-Ware, a remote control, or the front panel

· Integrated touch-tone dialing for easy dialing through remote control

· Gentner's Digital Signal Processing technology ensures crystal-clear audio with the deepest, most reliable hybrid null

· 8kHz sampling rate allows continual adaptation to telephone-line conditions

· Full-time Telco echo cancellation with 31 milliseconds of tail time

· Selectable auto-answer and auto-disconnect enables integrators to choose auto-disconnect without auto-answer and vice versa

· All G-Linked devices can be accessed, controlled, and programmed via a single RS-232 connection

· Lockout front-panel access for security

· Phoenix push-on blocks make pin-for-pin wiring easy

· Worldwide compliance includes FCC, CSA and CE

· All this in a rack-mountable unit

Applications

The AP400 contains many unique features that make the AP400 easy to set up and use. Specific user-programmable capabilities make the AP400 suitable for many applications including audioconferencing, videoconferencing, distance learning, boardrooms, conference rooms, teletraining, telemedicine, courtrooms, hotels and convention centers.

For diagrams of AP400 applications, see Appendix D.

Product Description

The AP400 performs a variety of complex, integrated audio functions, all implemented using digital signal processors (DSPs). In the simplest terms, the AP400 is a microphone mixing matrix. As such, all microphone-mixing parameters can be customized and any input or combination of inputs can be routed to any output. Adjustments in routing, level, and all other functions can be made in one of four ways: AP-Ware software, front-panel programming, presets activated through a closure on the rear panel, and an RS-232 serial interface.

However, the AP400 is much more than a simple microphone-mixing matrix. The AP400 operates on four basic principles: gating microphones, Distributed Echo Cancellation, decisions for each microphone, and network architecture. The AP400 gates microphones on and off when the sound within a microphone's acceptance pattern reaches a certain level. The AP400 provides Distributed Echo Cancellation which makes decisions for each microphone individually, based on each microphone's specific conditions.

Each microphone reacts independently, observing its own ambient levels and making decisions based on its individual environment. Thus, a microphone located in a highly reverberant part of a conference room is able to compensate for the changes in its own area. The AP400 monitors audio levels at each microphone and reduces the mixing level for microphones not in use and/or eliminates echo. This improves the audio quality for the listener and decreases the possibility of feedback. An integrated telephone interface provides the AP400's teleconferencing capability and can be customized according to your needs. The telephone interface can be set to automatically answer upon detection of a valid ring and automatically disconnect on loop drop or call progress tones.

The AP400 also includes a built-in power amp. The amp delivers five watts of output power into a 4 ohm speaker, eliminating the need to provide external amps for the speakers.

While a single AP400 satisfies the requirements of most small audio-conferencing environments, the system can also be expanded to supply additional connections or cover larger areas. The Audio Perfect G-link network allows you to change the system configuration as you need and control it from a central location.

AP-Ware software provides complete configuration capabilities for the AP400. Please refer to the AP-Ware help file for more information.

Front Panel

The AP400 front panel LCD window and the push-button controls (Figure 2) enable you to view or modify current AP400 status and settings.

The numbered items in Figure 2 correspond to the following descriptions. (For more detail on using the front-panel control, refer to the Installation section.)
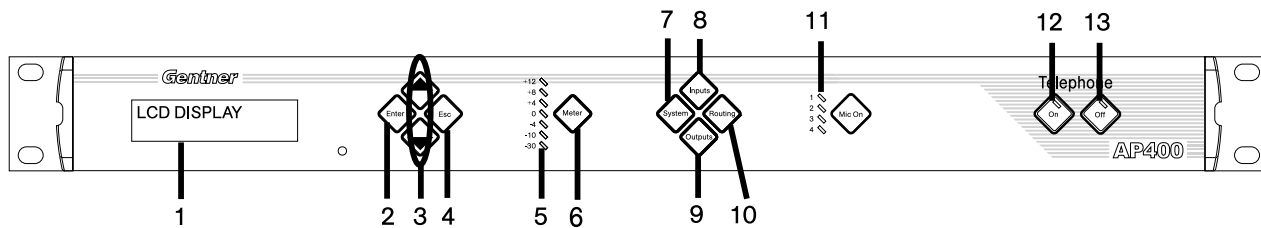

Figure 2. AP400 Front Panel Controls

1. LCD window: The two-line, 16-character-per-line LCD display is used for AP400 setup and level adjustments in conjunction with the four associated front panel buttons [2, 3 and 4]. Functions that can be accessed through the front panel LCD include setup, programming, troubleshooting, and numeric audio level and gain readouts.

2. Enter. This button is used to move deeper within a menu, or to edit or store a selected parameter.

3. ▲/▼. These buttons scroll up and down through menu options within a specific parameter; these buttons also increase or decrease a numeric value.

4. Esc. This button steps out of a selected parameter without changing its value, or moves the display to the next higher menu level.

5. LED Meter. This LED bar meter displays the audio level of any input or output of the AP400 as well as displaying Echo Return Loss (ERL) and Echo Return Loss Enhancement (ERLE) for microphone channels 1−4. The LED meter also displays Telco Echo Return Loss (TERL) and Telco Echo Return Loss Enhancement (TERLE) for the telephone hybrid.

6. Meter. This button displays the Meter branch of the AP400's LCD menu tree from which you can view or enter settings.

7. System. This button displays the System branch of the AP400's LCD menu tree.

**8.** Inputs. This button displays the Inputs branch of the AP400's LCD menu tree.

9. Outputs. This button displays the Outputs branch of the AP400's LCD menu tree.

10. Routing. This button displays the Routing branch of the AP400's LCD menu tree.

11. Mic On LEDs. These LEDs show which microphones are active.

12. On. The On switch connects and adapts the AP400 to the telephone line. Pressing and holding the ON button for more than two seconds while the AP400 is active readapts the unit.

13. Off. The Off switch disconnects the AP400 from the telephone line and mutes all audio to and from the telephone line.
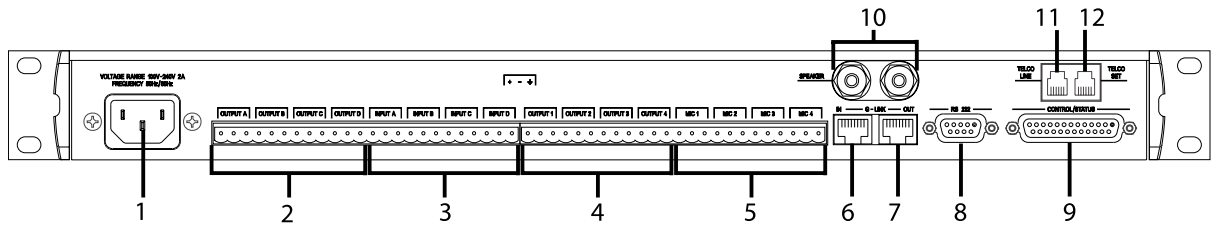
Figure 3. AP400 Rear Panel Connectors

Rear Panel

Power and all auxiliary equipment connects to the AP400 through connectors on the back-panel. Figure 3 illustrates these connectors as described below.

1. Power. This power module accommodates power ranging from 100–240VAC, 50/60Hz, 30W. No switching is required.

2. Output A–D. This bank enables connection of four line-level outputs with the three-terminal Phoenix connectors. Outputs can include video codecs, AP800s, AP10 Telephone Interfaces, and VCRs. These outputs may be configured to contain any combination of gated and non-gated inputs. The nominal output level is 0dBm.

3. Input A–D. This bank enables connection of four line-level inputs with the Phoenix connectors. Inputs can include video codecs, AP10 Telephone Interfaces, VCRs, or CD players, or other audio sources. These inputs can be mixed in any combination with the gated inputs to any of the eight outputs. Nominal input is 0dBu. Mix level can be easily set for each non-gated input. For electrical specifications, see Specifications, page 47.

The three-terminal Phoenix push-on connectors provide a common method of connecting a variety of devices to the rear panel.

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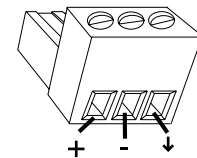
4. Output 1–4. This is an additional bank of Phoenix block connectors. These outputs are defaulted as direct outputs of the four mic inputs, but can be configured to contain a mix of any individual mic or line-level inputs. Nominal output is 0dBm. For electrical specifications, see Specifications, page 47.

5. Mic 1–4 This bank of Phoenix block connectors is for connection of up to four mic/line-level inputs (selectable) with the three-terminal Phoenix connector(s).

6. G-Link In. This RJ-45 connector is part of the AP400's high-speed digital bus network, which passes audio between units. The first Gentner unit in the G-Link network must be terminated in the G-LINK IN connector with a G-Link terminator. The first Gentner unit's G-LINK OUT connector is then attached to the G-LINK IN connector on the next Gentner unit, forming a daisy-chain network.

7. G-Link Out. This RJ-45 connector is part of the AP400's high-speed digital bus network, which passes audio between units. The last Gentner unit in the G-Link network must have the G-LINK OUT connector terminated with a G-Link terminator. The first Gentner unit's G-LINK OUT connector is attached to the G-LINK IN connector on the next Gentner unit, forming a daisy-chain network.

8. RS-232. This female DB-9 serial port is for connection between the AP400 and a PC, modem, or other custom remote control. For serial communications protocol, see Appendix F, page 57.

9. Control/Status. This female DB-25 connector is used to interface parallel control to the AP400. Most of the pins on this connector can be programmed to perform any function via a contact closure to ground. For instructions on how to program the control and status pins, see page 74-75 or the AP-Ware help file. The default settings allow control and status of the front panel, mics, outputs, volume, presets and inputs. These pins go low when active. The six presets can be activated at any time via these connectors. For pinouts, including a description of the default settings, see Appendix C, page 52.

10. Speaker. One five watt, 4-16 ohm speaker can be directly connected to the AP400, eliminating the need for a power amplifier.

11. Telco Line. Connects to your telephone line source.

12. Telco Set. Connects to your telephone handset.

G-Link Networking

Digital technology can provide a distinct advantage in designing and controlling teleconferencing systems. One of Audio Perfect's approaches to teleconferencing is its use of networking for room combining and separation, or when more than four mics are needed. A network is ideally suited for these applications, while minimizing the necessity for redundant equipment.

A G-Link network allows interconnection of a maximum of 64 microphones, from any combination of AP400s and AP800s (no more than eight units of each type—see note). Up to 16 AP10 units may also be added to one G-Link network.

> **!** **Do not attempt to create a system using more than 64 microphones. You may combine eight AP800s or eight AP400s maximum (or any combination that does not exceed 64 mics).**

G-Link Bus

This digital bus appears on every Audio Perfect product. It is a mix-minus bus which allows audio to be routed to any destination on the G-Link network. The AP400 has four digital buses: X-Bus, Y-Bus, Z-Bus and G-Link EC Reference Bus.

X-Bus. This mix-minus bus is defined as the master microphone mix, and it supports NOM (see page 34). All gated microphones are default routed to this bus.

Y-Bus. This mix-minus bus is defined as the line input master mix. All line-level audio inputs such as video codecs, AP800s, AP10 Telephone Interfaces, VCRs, etc., are default routed to this bus. Y-Bus does not support NOM.

Z-Bus. This mix-minus bus is a user-defined auxiliary mix bus. Z-Bus does not support NOM.

G-Link EC Reference Bus. This bus provides a system-wide echo canceller reference signal. It allows the reference signal to be passed to additional G-Linked mic channels and their associated echo cancellers. Typically, one output on one unit will be passed along the G-Link EC Reference Bus.

Network Requirements

The G-Link gives you the ability to interconnect the AP400 with other Audio Perfect units (additional AP400s, AP10s, and AP800s). The maximum distance between connected Gentner units is 20 feet. Gentner Communications recommends that category five twisted-pair (10Base) cable be used.

3 Installation

Before You Install

The AP400 is designed to work in almost any acoustic environment. However, to maximize the audio quality, we recommend that you prepare your site by taking the following factors into consideration:

Room Planning

Before installing your AP400, we recommend that you carefully plan your installation to ensure that you achieve the best possible results. A basic understanding of room acoustics and conference room design will not only help you install and operate your AP400, but will assist you in the installation and operation of other equipment used in your conference.

Acoustics

Conference and broadcasting rooms have unique acoustic environments. Each room has a different acoustic makeup (Figure 4). The acoustic makeup of the room determines how sound travels within the room. Wall fabrics, windows or hard surfaces, room size, people walking or other movements, and the audio equipment used are all factors that impact a room's acoustic conditions.

Directly related to the room's acoustic make up are several problems common to all conferencing and broadcast situations: reverberation, acoustic echo, and ambient noise. The objective is to minimize the impact that these conditions have on your audioconference.
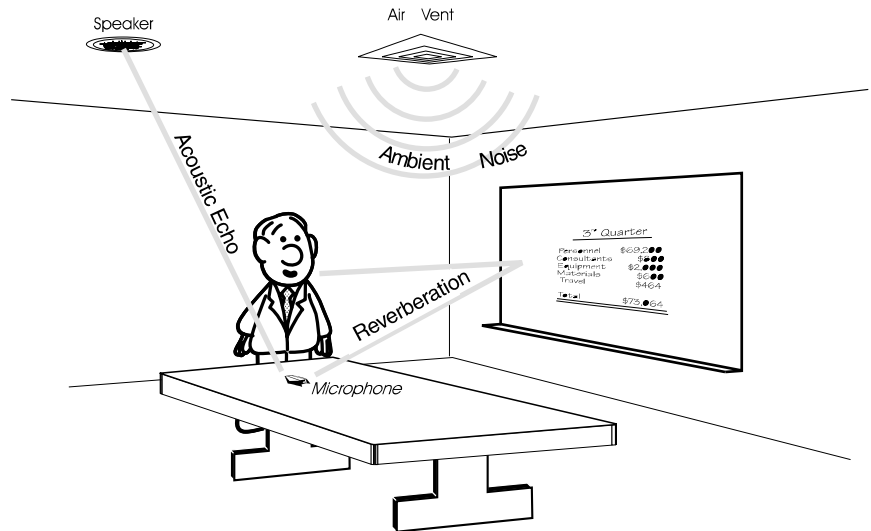
Figure 4. Room Acoustics

Reverberation. Reverberation is the persistence of sound due to repeated reflections from walls, ceiling, floor, furniture and occupants in a room. Reverberation dissipates over a fixed period of time determined by the room's environment.

Acoustic Echo. Acoustic echo is the sudden return of sound (rather than a smooth decay) caused primarily by a delay in the network or environment. It occurs before or after a signal leaves a speaker and enters a microphone for the return transmission, entering the originating site later. In other words, people speaking at the remote location hear their own voices echoed back to them through the speakers and microphones at the opposite location.

Ambient Noise. Ambient noise, also known as room noise, is unwanted background noise picked up by the conference room microphones. Air conditioning, heating fans, and noises created outside the room but still audible inside the room are all examples of ambient noise.

Acoustic Room Treatment
Conference room treatment is recommended to improve audio quality. Rooms that have large areas of windows, whiteboards, hard floors, etc. are acoustically "live." These areas increase the amount of audio reverberation.

You can improve room acoustics by installing acoustic panels, drapes, and other wall fabrics. Another way to improve overall room acoustics is to keep ambient noise to a minimum. Also, the AP400's Distributed Echo Cancellation greatly reduces the effects of acoustic echo.

Microphone Selection

The type of microphone you select can have a dramatic impact on the audio quality of your conference. In particular, the type of microphone used affects the voice pick-up pattern, audio level, and amount of noise introduced into the system. Typically, a unidirectional microphone with a cardioid pattern is the preferred choice for teleconferencing applications. Its design allows for maximum pickup from the front of the microphone and minimum pickup from the rear. Cardioid microphones are available in several styles including tabletop, podium and lavaliere.
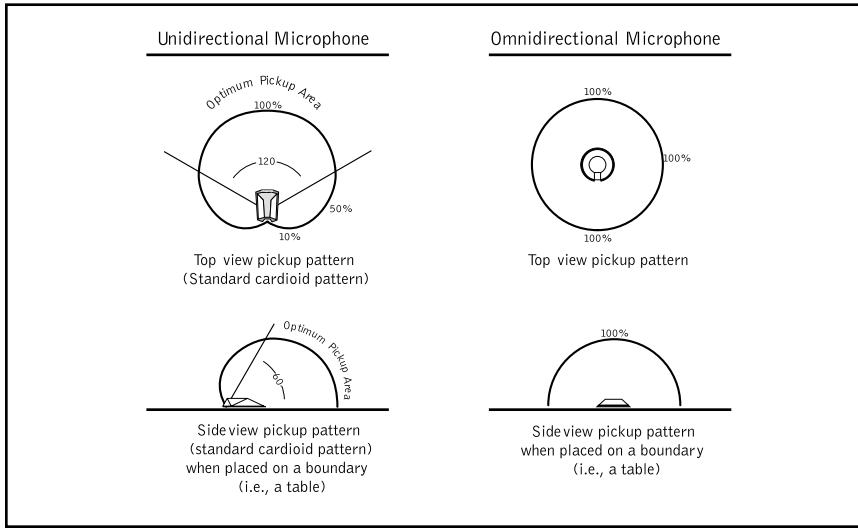
Figure 5. Microphone Isolation

Tabletop

Tabletop (boundary) microphones are designed for large, flat surfaces other than the ceiling. They are most commonly placed on the center of the table, facing outward.

Podium

Podium (gooseneck) microphones are typically used in a lectern application. They are gaining acceptance in some ceiling-type applications and are sometimes used on conference room tables as well.

Lavaliere

Lavaliere microphones are used when speaker mobility is necessary. They are inconspicuous and can be adapted to a wireless configuration.

Microphone Placement

One of the most effective ways to minimize the problems encountered with audioconferencing is to position the speakers and microphones so that you achieve the maximum amount of acoustic isolation (isolation between loudspeaker audio and microphone audio). This can be accomplished using unidirectional microphones and placing the loudspeaker out of the optimum pickup area (Figure 5).

Conference Room Layout

Figure 6 illustrates a basic audioconferencing installation using the AP400. The AP400 mixes microphone audio, cancels echo, and directs the audio to a video codec. Audio from the video codec and the telephone line is routed to the AP400 and sent to the speaker(s). A standard telephone set is used to place calls to the remote conference room.

**Figure 6. Conference Room
Block Diagram**
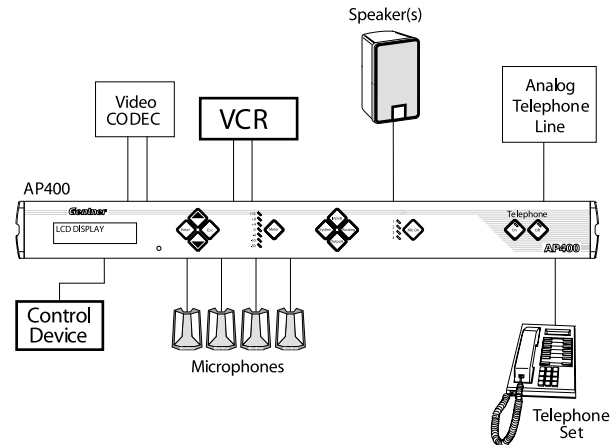
Operational Requirements

Power Requirements

The AP400 accommodates an AC voltage-input of 100–240VAC, 50/60Hz, 30W.

Auxiliary Equipment

Any auxiliary equipment to be used with the AP400 (such as additional Audio Perfect products, desktop kit, microphones, speakers, recording equipment, etc.) should be available at the time of installation.

Equipment Placement

The AP400 is designed for mounting in a 19-inch equipment rack. Do not block any of the unit's ventilation holes. With a desktop kit, the AP400 can be adapted for tabletop placement.

Environmental Requirements

The AP400 can be safely operated in a room with varying temperatures between 32° and 122° F (0-50°C).

Telephone Line Requirements

The AP400's telephone interface operates on a standard analog telephone line and connects with a standard RJ-11C modular jack. If you do not have an RJ-11C jack where you want to install the AP400, contact your telephone company for installation.

Network Requirements (Optional)

The G-Link gives you the ability to interconnect the AP400 with multiple Gentner units (additional AP400s, AP800s, or AP10s). The maximum distance between interconnected Gentner units is 20 feet. Gentner Communications recommends that category five twisted-pair (10BaseT) cable be used.

Equipment Connections

This section provides step-by-step instructions for installing your AP400 system. Figure 7 shows the rear panel connections of a fully-installed, single-unit AP400 system.
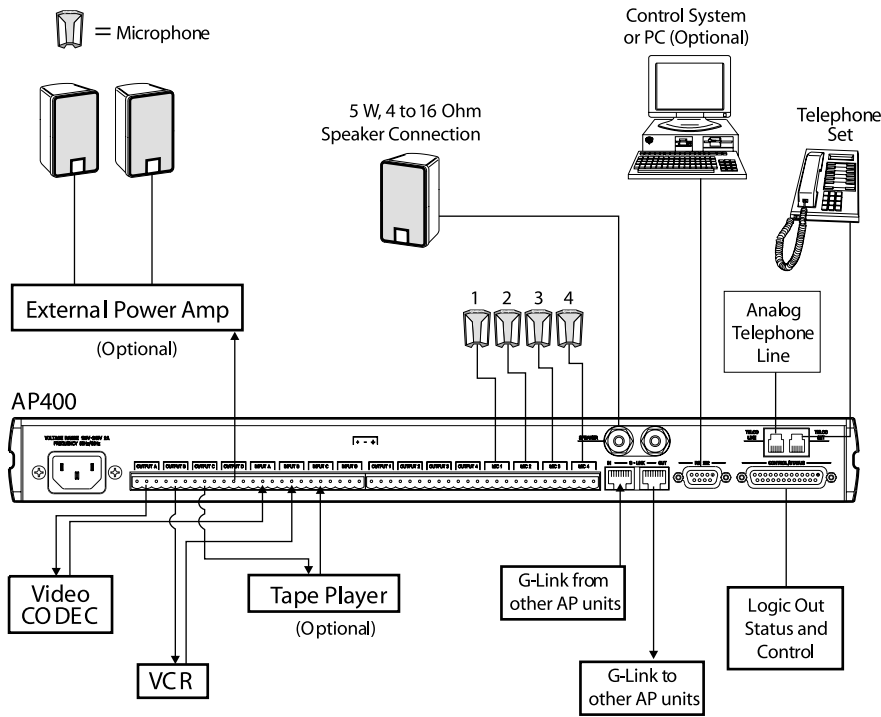
Figure 7. AP400 Installation

Gentner®
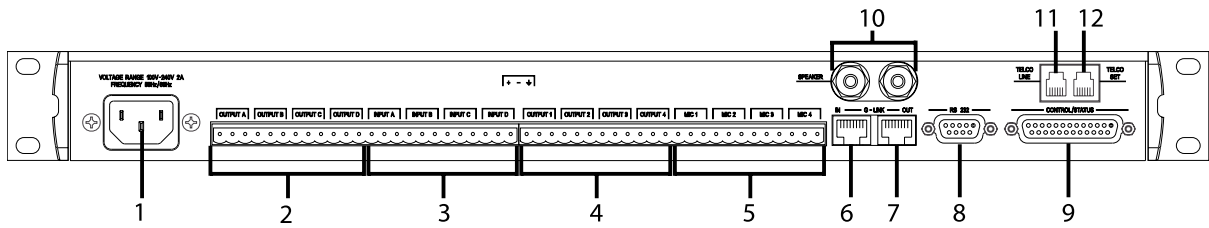
Figure 8. Rear Panel Connections

Step 1 — Rear Panel Connections

The connections are discussed in the order they are numbered in Figure 8. Individual connectors are also shown in the margin next to each description.
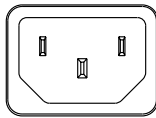
1. Power. Connect the power cable. As soon as power is supplied to the unit, the AP400 initializes and all front-panel LEDs and the LCD light. The power module accommodates 100–240VAC, 50/60Hz, 30W.
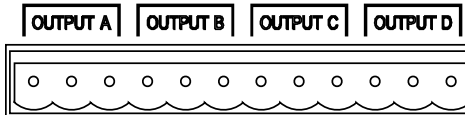
2. Output A–D. Connect up to four line-level outputs to external equipment (video codecs, AP800s, AP10 Telephone Interfaces, VCRs, tape recorders) using the three-terminal Phoenix connectors.
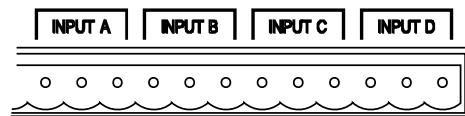
3. Input A–D. Connect up to four line-level inputs from external equipment (video codecs, AP800s, AP10s, VCRs, etc.) using the three-terminal Phoenix connectors.
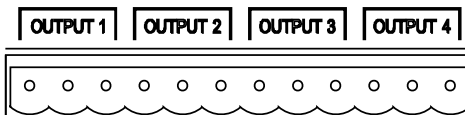
4. Output 1–4. Connect up to four line-level outputs to external equipment using the three-terminal Phoenix connectors.
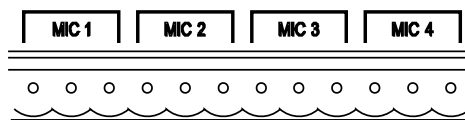
5. Mic 1–4 Connect up to four microphones using the three-terminal Phoenix connectors.
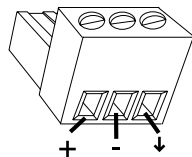
WIRING THE PHOENIX BLOCK CONNECTORS:
One three-terminal Phoenix connector is provided for each line-level input and output. Note that each position on the three-terminal Phoenix connector has three wiring positions: + (positive), - (negative), and ↓ (ground). Simply insert the appropriate wire into the appropriate connector opening and tighten down the top screw. Once the leads are wired into the connector, insert it into the rear panel connector on the AP400 with the set screws on top. Note the position of the connector in relation to the screened legend on the back of the unit; overlapping from one channel to the another can cause improper operation.

6. & 7. G-Link Connections are explained on page 18.

8. RS-232. Connect the RS-232 port (right) to a free COM port of a PC or to a custom remote controller. The AP400's default baud rate is 9,600 (bps) baud. However, if your application requires a different baud rate (19,200 or 38,400), refer to Baud Rate, page 30, to change this setting. For serial communications protocol, see Appendix F, page 57.

9. Control/Status: Connect the DB25 CONTROL/STATUS port to any device you wish to use for parallel control or status indication.

10. Speaker. Connect the speaker wire to the + (red) and - (black) binding post connectors. One five watt, 4-16 ohm speaker can be directly connected to the AP400, eliminating the need for an external power amplifier.

11. Telco Line. Plug your telephone line from the source into the RJ11C TELCO LINE jack.

12. Telco Set. Plug your telephone set into the RJ11C TELCO SET jack (right).

If you are installing only one AP400 (and you have followed the recommendations of page 11) and you are not connecting it to any other AP products, you have completed the installation. The unit's factory defaults work fine for many applications, but you can customize the system's settings to meet specific venue requirements. If you are finished configuring the system, skip to **Chapter 5—Operation**, beginning on page 43.

If you want to customize the setup, refer to the section on **LCD Programming** beginning on page 21.

If you are connecting additional Audio Perfect units to your system, continue with Step 2 on the next page.
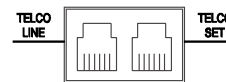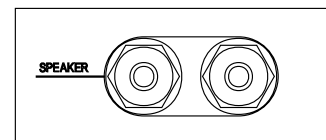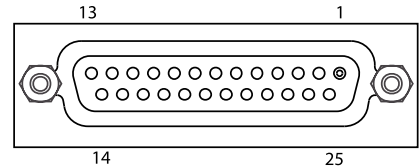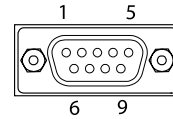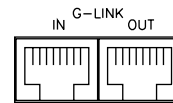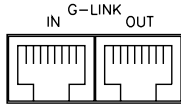
Figure 9. AP400 G-Link Connectors

A G-Link network supports connection of a maximum of 64 microphones (through any combination of AP400s and AP800s). It also supports up to 16 additional AP10s, for a maximum of 24 telephone lines.

Step 2 — G-Link Connections

If you want more than one Audio Perfect unit to function together as one system, the units will need to be connected to form a G-Link network. Place the AP400s (and other AP800s or AP10s) in the desired locations. The G-Link network is formed by connecting the devices in a daisy-chain fashion using category-five twisted-pair cable (10BaseT). If the AP units to be networked are stacked vertically on an equipment rack, connect them using the short RJ-45 jumper (provided). For networking over greater distances (maximum distance 20 feet), use category-five twisted-pair cable (10 BaseT).

For a single-unit system, no connection is required in either G-LINK IN or G-LINK OUT connectors.

For the first AP unit in a network: Insert a G-Link terminator (provided) in the G-LINK IN connector. Insert one end of the G-Link jumper in the G-LINK OUT connector and the other end in the next unit's G-LINK IN connector. Continue connecting the units until all are connected.

For the last AP unit in the network: Connect the previous unit's G-LINK OUT cable to the G-LINK IN connector. Insert a G-Link terminator in the G-LINK OUT connector.
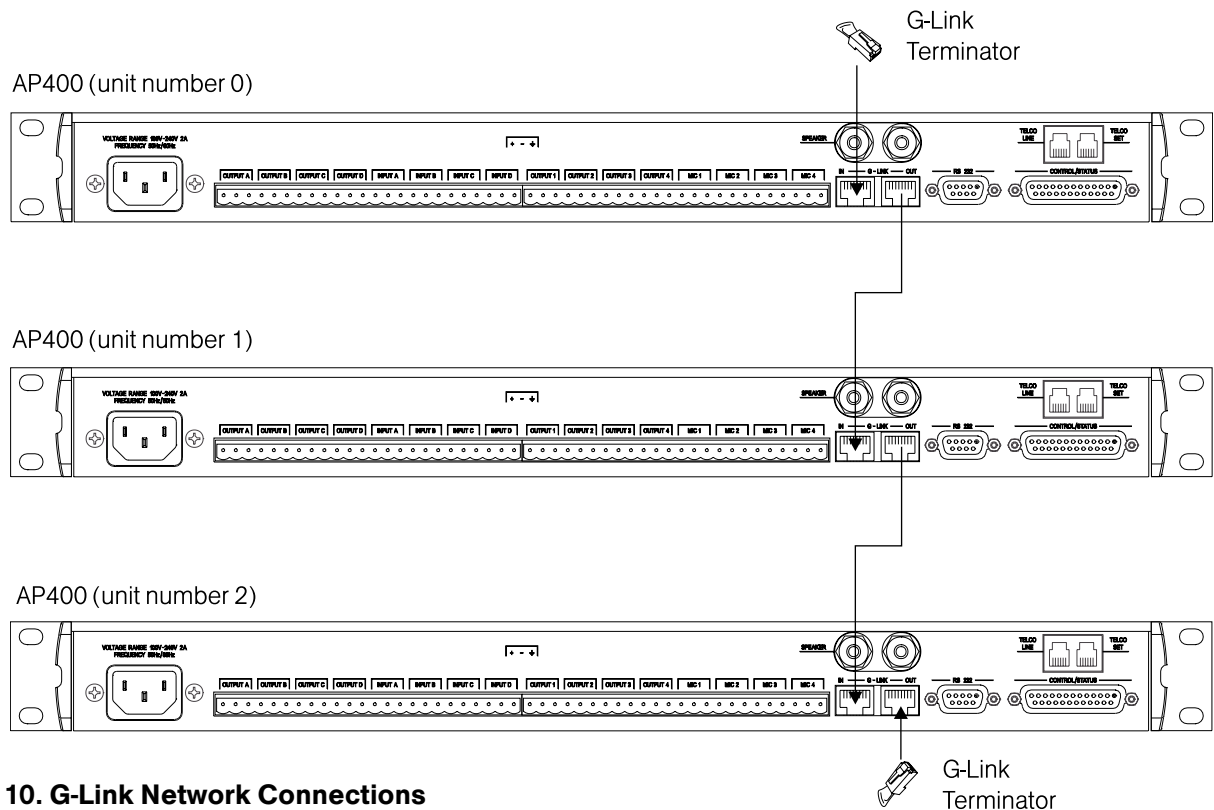
Figure 10. G-Link Network Connections

If the units are not connected correctly, you may experience a synchro-nization error. This error occurs when slave units are not receiving a sig-nal from the master unit. Meter LED "+12" will flash red and Meter LEDs "0", "-4", and "-30" flash green on affected slave units. The error is the result of one of two problems: incorrect master/slave configuration or a broken G-Link connection.

If it is a master/slave configuration error, LEDs will flash on a unit that is designated as a slave unit but does not have a master unit. To correct the problem, make certain that MIXER MODE for the master unit is set to MASTER-LINKED and not to MASTER-SINGLE (See **Step 4—SET MIXER MODE**, next page).

If the error is in the G-Link connection, LEDs flash on the units that are not physically connected to master unit. To correct the problem, check for broken connections and reconnect the G-Links.

Step 3 — Set Device ID on each unit

Once your physical G-Link network is established (and if you have more than one Audio Perfect unit at a site), you need to specify unique DEVICE ID numbers for each AP400 on the network. As shipped from the factory, all AP400 units default as DEVICE ID "0". Set DEVICE ID numbers for each Gentner unit at your site by manipulating the front-panel LCD.

To set the DEVICE ID:
1. Press the SYSTEM button, then scroll through the menu until you see DEVICE ID.
2. Press ENTER, then scroll through the eight (0–7) options.
3. Press ENTER to select the appropriate DEVICE ID.

Repeat this process until the DEVICE ID for each AP product on the G-Link network has been established.

If the same DEVICE ID is assigned to more than one unit of the same type on the G-Link network, Meter LED "+12" will flash red and Meter LED "0", "-4", "-30", and Mic 4 will flash green on the affected units. To correct the problem, change the DEVICE ID on one of the units.

Device Types

DEVICE IDs are automatically assigned a Device Type. AP400s always start with the Device Type of "3" (AP800 Device Types are "1"; AP10 Device Types are "2."). The DEVICE ID # selected is added to the Device Type "3" to generate the unique address for that unit. For example, the first AP400 unit in your G-Link network would be identified as "30", "3" being the Device Type, and "0" being the DEVICE ID you have set for that unit.

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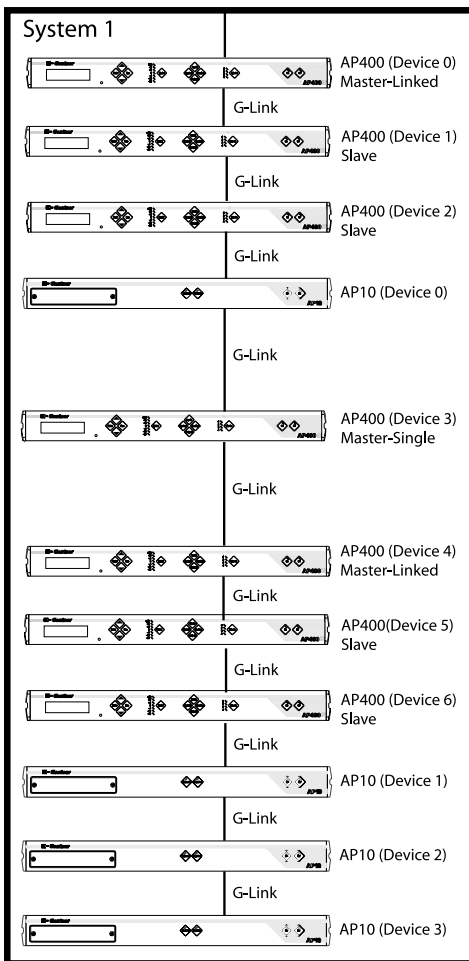
Figure 11. Multiple AP Systems

Step 4 — Set Mixer Mode

Once your physical G-Link network is established and unique G-Link DEVICE ID numbers for each AP400 on the network are established, the mixer mode must be set. There are three mixer-mode settings (see Figure 11): master-single (default), master-linked, and slave.

Master-single must be used when only one AP400 is used in a system.

Master-linked denotes the master AP400 unit when more than one AP400 is on the network; only one AP400 can be designated as master-linked when multiple AP400s are used in a system.

Slave is used for all networked AP400s that are not designated as master-linked or master-single. If two AP400s are part of the same system, one must be set with the master-linked parameter. The other must be set with the slave parameter.

A system is defined as one or more AP units that communicate to perform mixing functions. A system may consist of one unit in master-single mode or several units that work together with one master-linked unit and multiple slave units. Systems may be G-Linked together for easy reconfiguration, as shown in Figure 11. The physical location on the G-Link network determines which system individual units belong to. In Figure 11, for example, AP400 Device 4 has been designated as master-linked. The units located below this unit on the G-Link network constitute System 3, while units above it belong to different systems. The entire network could be easily reconfigured into one system by changing the mixer mode on Devices 3 and 4 to slave units which would then refer to the only master-linked unit on the system: AP400 Device 0.

To set Mixer Mode:
1. Press the SYSTEM button. Scroll through the menu until you see MIXER MODE.
2. Press ENTER, then scroll through the three options.
3. Press ENTER at the appropriate option to select it.
4. Repeat this process for all AP units in the G-Link network.

Hardware installation is now complete.

Step 5 — EC Reference

When multiple AP400 units are linked together and will be using only one output channel to drive the speaker system, this output must be defined as the acoustic source which will be used by all of the linked AP400s. In other words, the output which the master unit will use as the EC reference must be identified to the slave units via the G-Link. See page 36 for details on Echo Cancellation Setup for multiple units.

LCD Programming

For most installations, the default settings in the AP400 do not need to be changed; the system can be used as soon as power is applied. However, if you need to customize any settings, such as telephone connection options or unique routing requirements, you can do so though the front panel user interface or with AP-Ware software.

The front panel includes a 2x16 character LCD, menu buttons, level LED bar meter and gate LED indicators.

When power is applied to the AP400, all LEDs light and the LCD panel reads INITIALIZING. If initialization is completed without any errors, a title screen appears, showing the product name (top line) and the version number (bottom line). The title screen remains on display until you initiate some action that writes information to the LCD panel or the AP400 detects and displays an error. (If an error is displayed, contact technical support.)

Menu Trees

Five menu trees (menu categories) comprise all of the AP400 options you can control through the front panel: **System, Inputs, Outputs, Routing,** and **Meter**. You enter each of the trees, or move from one tree to another, by pressing the corresponding button (right).

The menu trees are structured in levels, such that the first level (top of the tree) branches into multiple subcategories (see Figure 13, next page). These branches typically end when an adjustable parameter or viewable value is reached.
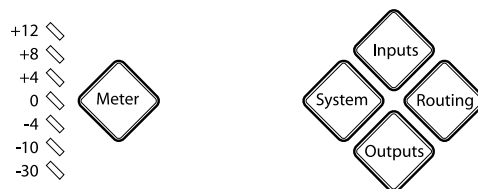
Figure 12. Front Panel Buttons

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Moving Among the Menu Items

Use the ▲ and ▼ buttons to scroll through the menu items at a particular level. When you reach the last menu item, the display scrolls back to the beginning of the list, and vice-versa. If you hold down a ▲/▼ button, the scrolling speed increases.

To descend a menu level (go deeper into the tree), press ENTER. To ascend a menu level (go back toward the top of the tree), press ESC.

Power-Up Screen

Gentner AP400 Version X.X

System	Inputs	Outputs	Routing	Meter
Select Preset	Input 1-4	Output 1-4	Route to Outputs 1-4	Input
Lock Panel	Input A-D, Telco	Output A-D, Telco	Route to Telco	Output
Set Passcode	Subbus		Route to Outputs A-D	ERL/TERL
Device ID			Route to Subbus	ERLE/TERL
Unit ID			Route to G-Link X, Y, Z	Default Meter
Mixer Mode			Route to EC Ref & PA	
Gate Parameters			Route to G-Link Ref	
RS-232				
Telco				

Figure 13. LCD Menu Tree

Pressing ESC at the top of the menu tree has no effect.

Switching from One Main Menu Category to Another

To switch between main menu categories, press the **System, Routing, Outputs, Inputs,** or **Meter** buttons. If the menu tree is left inactive for a period of time (see Timeout, page 30), the LCD reverts to the title screen.

Adjusting a Value

To adjust a parameter, first verify that it is flashing. If the parameter is not flashing, it cannot be adjusted. If the parameter is flashing, adjust the value with the ▲ and ▼ buttons. As the value is adjusted, the parameter is updated immediately. For example, if you adjust input gain, you should be able to hear the difference as it changes. To store the new value, press ENTER. To discard the change and revert back to the old value, press ESC. If you press a menu category button while a parameter is being adjusted, it is the same as pressing the Esc key.

In general, while adjusting parameters, numerical values do not wrap around when the end is reached. However, parameters that toggle between two values (or are a list of values) will wrap around. When adjusting a parameter and a ▲/▼ button is held, after 2 seconds the parameter will scroll through its values at a faster rate.

Security

The AP400 can be secured from unauthorized adjustments by locking the front panel and establishing a user passcode. Menu items can still be viewed when the panel is locked, but settings cannot be altered or entered until the panel is unlocked by entering the appropriate passcode.

Locking the Front Panel

To lock the front panel:
1. Press the SYSTEM button
2. Scroll through the menu items to select LOCK PANEL, and press ENTER.
3. Select ON, and press ENTER again.

To unlock the front panel:
1. Attempt to adjust a parameter. The AP400 prompts you for the passcode.
2. Begin entering the passcode. Once you have correctly entered the fifth character, the front panel unlocks. (The default passcode for all units is ▲▲▼▼ENTER.)

LOCK PANEL NOTE:
If you enter a passcode and unlock the system, you must lock it again after making any changes. Otherwise the panel will remain unlocked and accessible to anyone.

Set Passcode

Once you have unlocked the AP400, you can change the passcode. Before the AP400 allows passcode changes, the new passcode must be entered, then re-entered to validate it. The passcode must be five front panel buttons (in any combination or multiple).

A good way to remember the new passcode is to create a word using the first letters of the buttons. For example, using ROOMS as the passcode would be the key sequence: Routing, Output, Output, Meter, System.

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```
┌─────────────────────────────────┐
│       Power-Up Screen           │
│   ┌─────────────────────┐       │
│   │  Gentner AP400      │       │
│   │  Version X.X        │       │
│   └─────────────────────┘       │
│            │                    │
│   ┌─────────────────────┐       │
│   │      System         │       │
│   └─────────────────────┘       │
│   Select Preset                 │
│                                 │
│   Lock Panel                    │
│                                 │
│   Set Passcode                  │
│                                 │
│   Device ID                     │
│                                 │
│   Unit ID                       │
│                                 │
│   Mixer Mode                    │
│                                 │
│   Gate Parameters               │
│                                 │
│   RS-232                        │
│                                 │
│   Telco                         │
└─────────────────────────────────┘
```

Figure 14. System-Level LCD Parameters

When multiple AP400s are used in a system, the gate parameters on all units must be set the same.

System Parameters

The System button enables you to view and adjust nine parameters (see Figure 14): Select Preset, Lock Panel, Set Passcode, Device ID, Unit ID, Mixer Mode, Gate Parameters, RS-232, and Telco. For default settings, see the programming worksheet (Figure 15). Items printed in boldface are the factory defaults.

SELECT PRESET

The SELECT PRESET menu item allows you to select and load one of the six available preset configurations into the AP400. For example, you can set the AP400 for different room microphone configurations: Preset 1 for a two-mic presentation, Preset 2 for an four-mic conference, Preset 3 for a three-mic priority panel discussion with 20 mics for audience questions.

To select a preset, scroll through the numbered presets until you see the desired preset. Press ENTER. The preset is immediately loaded into AP400 memory for active use.

Device ID

The DEVICE ID menu selection lets you choose from eight G-Link network positions (0–7). See Step 3 — Device ID (page 19).

Unit ID Number

The UNIT ID # allows you to view the read-only unit address set at the factory. This unique ID number identifies that particular unit and cannot be changed.

Gate Parameters

There are nine gate parameters that can be adjusted via the front-panel LCD (Figure 17, page 26). The parameters in this submenu include: PA adaptive mode, maximum number of mics, first mic priority, last mic mode, gate ratio, off attenuation, hold time, decay rate and manual ambient. These are discussed beginning on page 26.

AP400 Parameters Worksheet

System Wide Parameters

Program Parameter	Selection Range
Preset	1 - 6
Lock Front Panel	On, **Off**
Set Passcode	Any Five Front Panel Keys
Device ID No.	**0 - 7**
Unit ID No.	Factory Programmed
Mixer Mode	**Master-Single**/Linked, Slave
RS-232 Baud Rate	**9.6**, 19.2, 38.4kbps
RS-232 Flow Control	On, **Off**
Modem Mode	On, **Off**
Clear Modem Password	**Enter**
Timeout	0 - 15 (**10**)
Auto Answer	On, **Off**
Auto Disconnect	Off, **Loop Drop**, Call Prog., LD + CP
*Telco Adapt Mode	**Auto**, Burst
*Hook Duration	50 ms, **500ms**
*Receive Reduction	On, **Off**

Auto Mix Parameters

Program Parameter	Selection Range
PA Adaptive	**On**, Off
Maximum No. of Mics	Off, 1-8 (**4**)
First Mic Priority	**On**, Off
Last Mic Mode	Last On, **Off**, or Mic 1
Gate Ratio	0 - 50 dB (**15**)
Off Attenuation	0 - 50 dB (**12**)
Hold Time	.1 - 8.0 seconds (**.3**)
Decay Rate	**Slow**, Medium, Fast
Manual Ambient	0dB to -70dB (**-30**)

Input Channel

Program Parameter	Selection Range	1	2	3	4	A	B	C	D	Telco	S1
Input Gain Adjust	-20dB to 20dB (**0**)										
Subbus Attenuation	0dB to -20dB (**-6dB**)										
Input Type	**Mic 55dB**, Mic 25dB, Line										
Microphone Activation	**Auto**, Override On/Off, Manual On/Off										
Mute	On, **Off**										
Phantom Power	**On**, Off										
AGC	On, **Off**										
High-Pass Filter	On, **Off**										
EQ	On, **Off**										
*Low Band EQ	-12dB to 12dB (**0**)										
*Mid Band EQ	-12dB to 12dB (**0**)										
*High Band EQ	-12dB to 12dB (**0**)										
Chairman Mic	On, **Off**										
Adaptive Ambient	**On**, Off										
Echo Cancellation	**On**, Off										
NLP	Off, **Soft**, Medium, Aggressive										

Output Channel

Program Parameter	Selection Range	1	2	3	4	A	B	C	D	Telco
Output Gain Adjust	-20dB to 20dB (**0**)									
Mute	On, **Off**									
NOM	On (**A - C, Telco**) or Off (**1 - 4, D**)									

* Set up only by serial port

Figure 15. Default Programming Worksheet

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PA Adaptive Mode. The AP400 recognizes how much loudspeaker audio is picked up by the microphones. It then uses this level as the new ambient level when audio is present at the power amplifier (see Figure 16). This prevents loudspeaker audio from gating on a microphone while still allowing people in the room to gate on microphones as they speak. This mode can be turned on (default) or off by selecting the option and pressing ENTER. Gentner Communications recommends leaving this feature on.

Figure 16. PA Adaptive Mode

New Gate Ratio

New Ambient Level

Gate Ratio

Ambient Level

When the AP400 detects audio in the power amplifier, it increases the ambient level to match the level of the speaker audio at the microphones. This prevents the speaker audio from turning on the microphones.

Power-Up Screen

Gentner AP400 Version X.X

System

Gate Parameters

PA Adaptive Mode

Max # of Mics

1st Mic Priority

Last Mic Mode

Gate Ratio

Off Attenuation

Hold Time

Decay Rate

Manual Ambient

Figure 17. Gate Parameters LCD Submenu
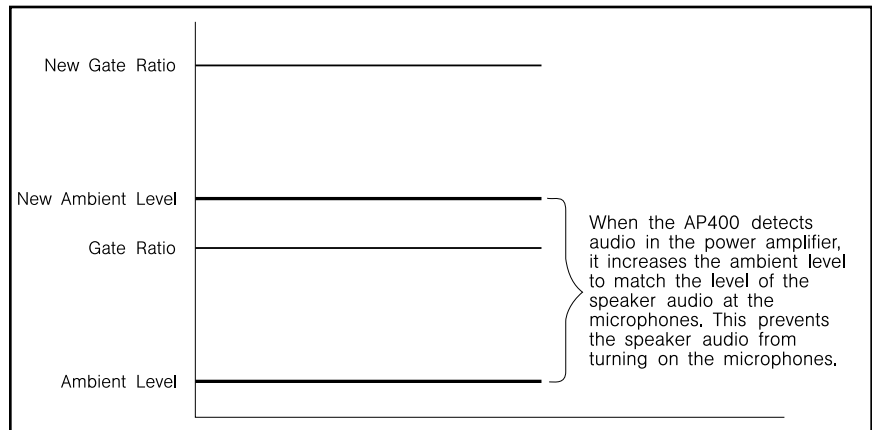
Maximum Number of Mics. This parameter sets the maximum number of microphones that can be gated on at any one time. This range can be set from one to eight microphones or off. The default setting is four. To set the maximum number of microphones, scroll through the number ranges (one through eight), select the desired number and press ENTER.

First Mic Priority. This feature helps maintain maximum audio intelligibility by allowing only one microphone to gate on when one person is speaking. Gentner Communications recommends leaving this setting on. When turned off, usually two or more microphones gate on when only one person speaks. However, when this parameter is turned on, one person will usually be able to gate on only one microphone. First Mic Priority does this by determining the audio level received by all microphones when the first microphone is gated on. This audio level is then used as the ambient level for all other microphones. This mode can be turned on (default) or off by selecting the option and pressing ENTER.

<u>Last Mic Mode.</u> There are three modes of last mic operation: last on, mic 1 and off. Last on leaves the last-activated microphone full on until another microphone input is gated on. Mic 1 allows the AP400 to revert back to a mic 1 input when all microphones gate off. The default setting for Last Mic Mode is off. To change a last mic mode option, select it, edit the value, and press ENTER.

<u>Gate Ratio.</u> The gate ratio specifies how much louder the microphone audio level must be above the ambient level before a microphone gates on. Remember, this value is relative to the ambient level. If adaptive ambient mode is on, the actual on threshold changes as the ambient level changes. The adjustment range is from 0–50dB in 1dB increments. Default setting is 15. If microphones frequently gate on when no one is speaking, increase the gate ratio.

<u>Off Attenuation</u>. This sets the amount of level reduction applied to a microphone when it is off (Figure 18, below). Low values increase the amount of echo and reverberation allowed into the system. If the value is set high, you may be able to hear the microphones gate on and gate off as the background noise is reduced. The adjustment range is from 0–50dB in 1dB increments. Default setting is 12. As more microphones are added to the system, the off attenuation should be adjusted toward 50 (high).
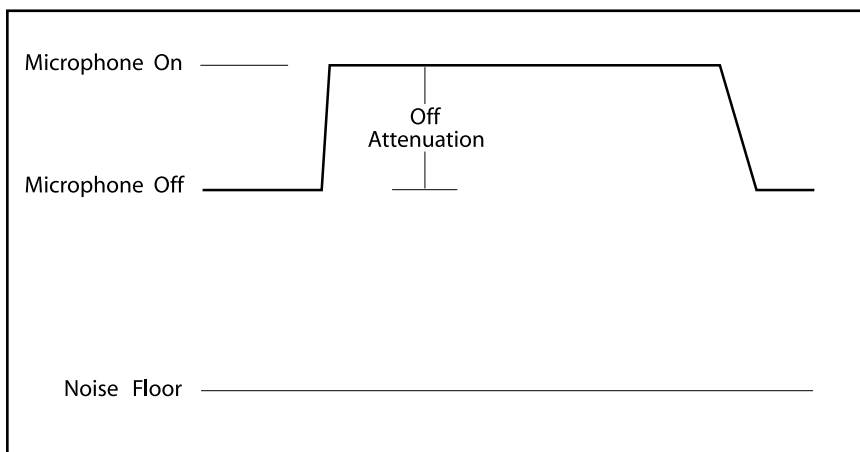
Figure 18. Off Attenuation

Hold Time. This feature determines the length of time a microphone remains on after the microphone audio level drops below the gate ratio (see Figure 19). Values range from 0.1–8.0 seconds in one-tenth of a second increments. Default setting is 0.3. Setting this value too low may cause the microphones to gate on and off too frequently during brief pauses of speech. However, setting this value too high may cause too many microphones to be on at one time.
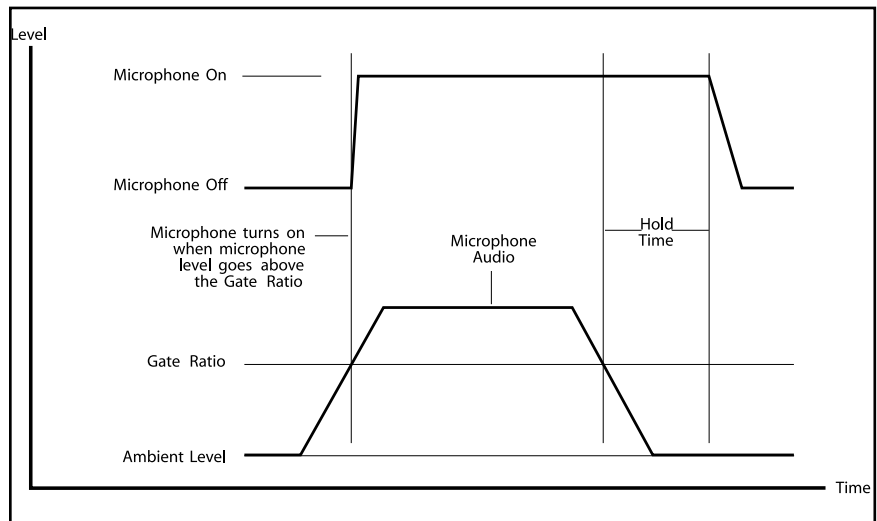
Figure 19. Hold Time

Decay Rate. This feature determines how fast a microphone gates off after the hold time expires (see Figure 20). Three options are available for this feature: slow (default), medium, and fast.

If your room has very low ambient noise, set the value to fast. This reduces the effects of echo and reverberation. If you hear ambient noise "swoosh down" while the microphones decay, set this value to either medium or slow.
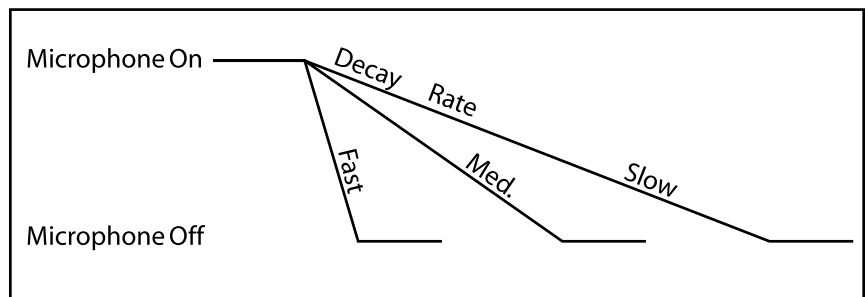
Figure 20. Decay Rate

Manual Ambient. This setting is relevant only if the adaptive ambient mode is off on a mic channel (see Adaptive Ambient on page 32). Best results are usually achieved when the adaptive ambient mode is on. However, if you need to set the ambient level to a fixed value, turn off the adaptive ambient mode on the desired microphone channels. A manual ambient setting is a global setting and will affect all mics equally which are set to adaptive ambient off. The ambient level ranges from 0dB to -70dB. The default setting is -30dB. You can determine the ambient level by following the steps below.

Any combination of channels may be set in adaptive ambient or manual ambient modes. Only individual channels cannot be set with both modes active.

Step 1. Check your current gate ratio from the GATE PARAMETERS menu. Make a note of the value. Example: "Gate Ratio: 15."

Step 2. Select MANUAL AMBIENT from the GATE PARAMETERS menu. Press Enter to change the dB value.

Step 3. Scroll up or down through the dB values until the mic gates on (gating is indicated when the mic LED lights up). Individual room conditions will determine whether you need to scroll up or down. When the LED flickers, the dB value indicated on the LCD display is the ambient level of the room.

Step 4. Deduct the gate ratio value from the ambient level value you have just determined. For example, if the ambient noise level of the room is identified as -50dB and the gate ratio is 15, the manual ambient setting would be -35dB.

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Power-Up Screen

Gentner AP400
Version X.X

System

RS-232

Baud Rate

Flow Control

Modem Mode

Clear Password

**Figure 21. RS-232 Parameters
LCD Submenu**

**Disabling the timeout will
allow the AP400 to remain
in the same position in the
LCD menu until the LCD menu is
manipulated again.**

RS-232

Four RS-232 parameters can be adjusted through the front panel LCD
(Figure 21). The parameters in this submenu include baud rate, flow
control, modem mode and clear password.

If data is lost during serial access through the RS-232 port, a serial over-
run error will occur. This is indicated by flashing microphone LEDs. If the
error is caused by incoming data, Meter LED "+12" flashes red; Meter
LED "-10" and "Mic 4" flash green. If the error is caused by outgoing
data, Meter LED "+12" flashes red; Meter LED"-10" and "Mic 3" flash
green. Call Gentner Tech Support for help correcting this error.

Baud Rate. This parameter sets the AP400's RS-232 port communi-
cation rate at either 9,600 (default), 19,200, or 38,400 baud (bps).
To set the baud rate, scroll through the three settings to select the
desired baud rate, then press ENTER.

Flow Control. This parameter allows activation and deactivation of
hardware flow control. The two options are on and off (default). To
activate the flow control, scroll to on and press ENTER. To deacti-
vate it, scroll to off and press ENTER.

Modem Mode. This parameter controls whether the AP400 is set to
communicate by a modem through its RS-232 port. Upon activating
modem mode or when power is turned on when modem mode is
already active, the AP400 sends an init string to the modem to initial-
ize it. (The init string can only be set through the RS-232 port. See
Appendix F, page 70 for information on the the MINIT serial com-
mand.) The default setting is off. To activate modem mode, scroll to
the on setting and press ENTER. To deactivate modem mode again,
scroll to off and press ENTER.

Clear Password. This parameter clears the RS-232 password for
modem access. This password is set with the RS-232 command
MPASS (see Appendix F, page 71). The CLEAR PASSWORD function
is helpful if the password is forgotten and needs to be reset.
However, the password cannot be set through the front-panel LCD.
It can be set through the RS-232 port. This password is not to be
confused with the front panel passcode, which performs a com-
pletely different security function.

Timeout. The AP400 has a system mode called TIMEOUT. This
parameter may be adjusted through the RS-232 port using the
TOUT command (see Appendix F, page 78). TIMEOUT controls the
delay time (in minutes) before the LCD panel will automatically switch
back to the title screen and default meter. The range is zero to 15 min-
utes. Default is 10 minutes; zero disables this mode.

Telco

The telephone interface can be set to automatically answer an incoming call (AUTO ANSWER ON), or allow the call to be handled manually (AUTO ANSWER OFF). The interface can also be set to disconnect upon LOOP DROP, CALL PROGRESS, LOOP DROP + CP (call progress), or to disconnect manually (AUTO DISCONNECT OFF).

Input Parameters

There are three main submenus under the inputs menu tree: Input 1–4, Input A-D/Telco, and Subbus.

Input 1–4

The parameter submenus below this level control how an input channel deals with input audio. All parameters described can be applied to INPUT 1–4. The 12 mic input parameters (see Figure 22) are gain adjust, mic/line input, mic activation, mute, phantom power, AGC, high-pass filter, EQ status, chairman mic, adaptive ambient, echo canceller, and NLP adjust.

> Gain Adjust. This adjusts the level for each gated input's gain (ranging between -20dB and 20dB). In conjunction with the LCD readout and the LED bar graph, all gated inputs can be simply calibrated for the right level on the mix bus. The default setting is 0dB.

> Mic/Line Input. Each input defaults as a microphone level input (55, 25dB gain) but may be switched to a line-level input (0dB).

> Mic Activation. Each input defaults to the auto-gate mode, but may be switched to manual mode (manual gate on, manual gate off, gate override on, gate override off). Auto-Gate is where a microphone does not gate on until audio is present at the mic. The AP400 decides to gate the microphone on or off based on parameters set elsewhere in the AP400 (i.e. gate ratio, etc.). Manual On activates a microphone unit until it is manually deactivated. Manual Off deactivates a microphone until it is manually activated. In both cases, this can be done via the CONTROL/ STATUS port. Override On activates a microphone but does not allow it to contribute to mixing parameters, such as set in NOM, maximum number of microphones, etc. Override Off deactivates the microphone.

> Mute. This parameter mutes a particular mic channel.

> Phantom Power. Each input will default with 24V phantom power enabled, but may be switched off to accommodate input devices not requiring phantom power.

Power-Up Screen

Gentner AP400
Version X.X

Inputs

Input 1-4

Gain Adjust

Mic/Line Input

Mic Activation

Mute

Phantom Power

AGC

High Pass Filter

EQ Status

Chairman Mic

Adaptive Ambient

Echo Canceller

NLP Adjust
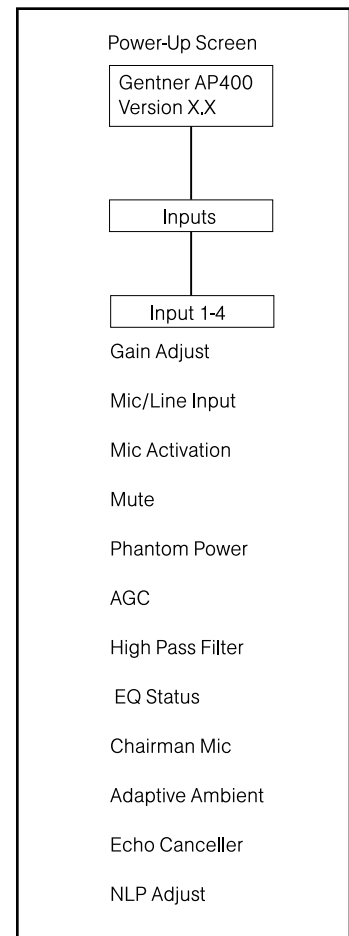
Figure 22. Mic Inputs 1–4 Parameters LCD Submenu

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AGC. Each input can use automatic gain control (AGC). This feature keeps softer and louder talkers at a consistent transmit level. This feature is disabled when shipped from the factory. The target gain is 0dB. It adjusts at 2dB per second. The AGC start adjustment is +20dB, but will adjust only +6dB. Adjustments will not be made at .5dB either side of the target (0dB).

High-Pass Filter. A high-pass filter may be selected on each gated input to reduce unwanted noise. The filter has a break frequency at 250Hz, suppresses the signal -3dB at 200Hz, then rolls off at 6dB per octave. This feature is disabled when shipped from the factory.

EQ Status. A graphic equalizer can be enabled (on) or disabled (off) for each input. The equalizer helps match characteristics of dissimilar microphones and adjust general circuit tuning. This EQ circuit provides 12dB of cut or boost centered at frequencies of 250Hz, 1kHz and 4kHz, Q factor of 1.4. This feature is disabled when shipped from the factory. The levels of each band can be adjusted through the RS-232 port with the MEQ command and in AP-Ware.

Chairman Mic. Each input may be selected as the chairman override microphone, allowing the chairman's microphone to gate on, regardless of which other microphones may be on. As shipped from the factory, this feature is disabled. This feature may have a single microphone selected or a group of microphones selected.

Adaptive Ambient. The adaptive ambient mode can be turned on (default) and off. The recommended setting is on. However, if the ambient noise in the room is constantly changing and the AP400 is unable to track properly (see Figure 23), turn this mode off and set the ambient level manually (see Manual Ambient, page 29). Fixed values range from 0dB to -70dB with increments of 1dB.

Figure 23. Adaptive Ambient
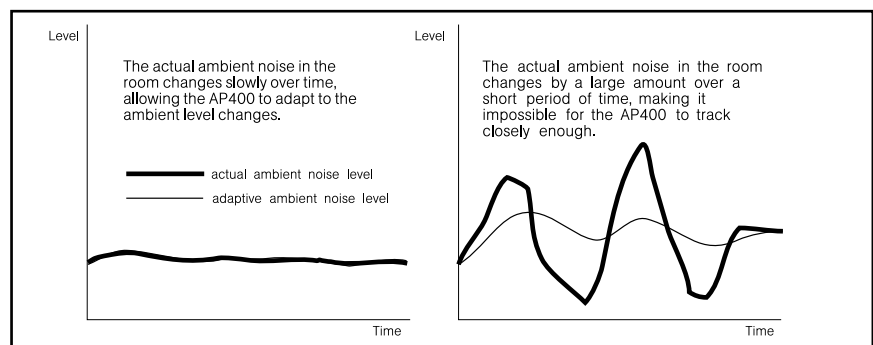
Echo Canceller. Activate or deactivate the echo cancellation feature for each gated input. Factory default is on.

NLP Adjust. Non-linear processing (NLP) has four settings: soft (6 dB), medium (12dB), aggressive (18dB), and off. NLP adds additional echo cancelling "horsepower" to the echo canceller in difficult acoustic environments. Care should be taken when using NLP because of the corresponding trade-offs, which can include suppression and half-duplex operation. The factory default is soft.

Inputs A-D, Telco

The parameter submenus below this level control how inputs A, B, C and D and Telco In deal with input audio. All parameters described can be applied to INPUT A–D and Telco. Three input parameters can be applied to the inputs: gain adjust, AGC and mute (see Figure 24).

Gain. This adjusts each input's gain (ranging between -20dB and 20dB). In conjunction with the LCD readout and the LED bar graph, all gated inputs can be simply calibrated for the right level on the mix bus. The default setting is 0dB.

AGC. Each input can use automatic gain control (AGC). This feature keeps softer and louder input audio at a consistent level. This feature is disabled when shipped from the factory.

Mute. This parameter mutes a particular input channel.

Subbus

The subbus parameter allows control of gain (attenuation) of mix audio from the microphones into the speaker audio. The attenuation can be adjusted in dB.

Gain. The subbus gain can be adjusted over a range of 0 to -20dB, in 1 dB increments. The default setting is -6dB.
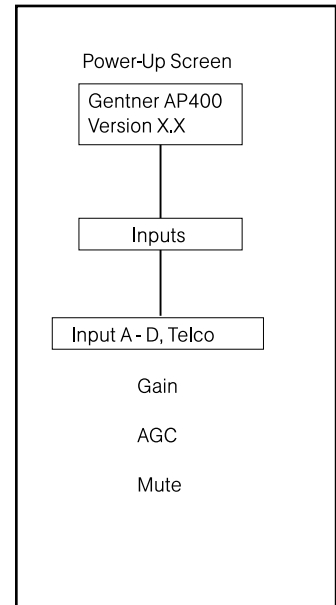
Figure 24. Inputs A–D Parameters LCD Submenu
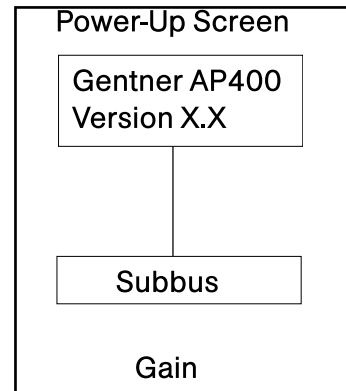
Figure 25. Inputs A–D Parameters LCD Submenu

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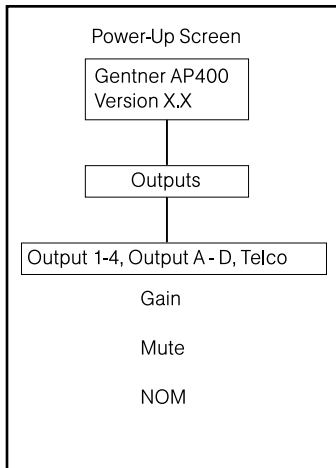
Figure 26. Output Parameters LCD Submenu
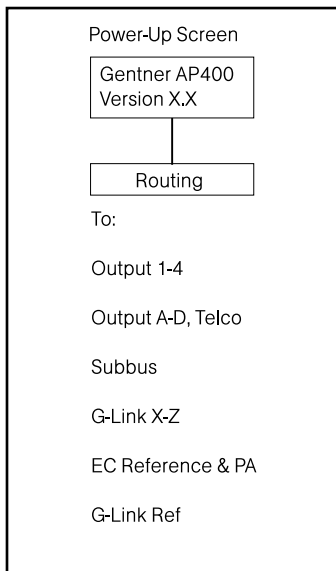
Output Parameters

There are two main submenus under the outputs menu tree: **Output 1–4** and **Output A-D/Telco Out**. The two main submenus contain the same menus at the next menu depth: gain adjust, mute and NOM (Figure 26). Each parameter is applied to the respective outputs (1–4 or A–D/Telco Out).

> Gain Adjust. This adjusts each output's gain (ranging between -20dB and 20dB). In conjunction with the LCD readout and the LED bar meter, all gated outputs can be simply calibrated for the right level on the mix bus. Default is 0dB.

> Mute. This parameter mutes a particular output channel.

> NOM. Number of open mics (NOM) corrects for increased output level when more than one microphone is gated on. As microphones gate on, the AP400 reduces the level according to the number of active microphones. This mode can be turned on (default for outputs A-C, Telco) or off (default for outputs 1-4, and output D). NOM adjusts at 10log of the number of open microphones, or approximately 3dB every time the mics double.

Routing Parameters

When programming routing through the front-panel LCD, there are multiple submenus (routing destinations) below the ROUTING menu (see Figure 27): route to output 1–4, route to Telco Out, route to output A–D, route to Subbus, route to G-Link X–Z, route to EC reference and PA, or route to G-Link Ref. Select one of these parameters and press ENTER to scroll through the inputs available for routing to that output. When the appropriate input is visible, press ENTER to route it to that output.

Routing consists of determining which inputs go to which outputs. When considering routing, refer to the default routing matrix (Figure 28). There is also a routing matrix worksheet at the end of this manual (see Appendix G, page 79).

Routing Guidelines
The audio matrix is made of sources and destinations. There are 17 possible input sources and 13 destinations on the AP400 matrix.

Internal Subbus
The AP400 is equipped with one internal sub-mix bus. The subbus is a matrix output which allows signals to be mixed and level controlled. The subbus is then made available as an input to the matrix for further signal routing.

Figure 27. Routing Parameters LCD Submenu

Routing Matrix Setup

		To Codec Transmit (A)	To Tape Record (B)	To PA System (Amp/Speakers) (C)	To Telco Transmit (Phone Line) (D)	Mics 1-4 to X Bus (X)	Inputs A, B, C, D to Telco Y bus (Y)			Direct Output 1	Direct Output 2	Direct Output 3	Direct Output 4
		Outputs				G-Link			Sub bus	Outputs			
		A	B	C	D Telco	X	Y	Z		1	2	3	4
From Codec Receive	Input A		X	X	X X		X						
	Input B	X		X	X X		X						
Tape Play	Input C	X	X		X X		X						
	Input D	X	X	X	X X		X						
From Telco Receive	Telco Receive	X	X	X	X		X						
Mic Inputs from other APs	G-Link X Bus	X	X	X	X		X						
Line Inputs from other APs	G-Link Y Bus	X	X	X	X X								
	G-Link Z Bus												
	Sub-bus												
Mic 1	Mic/Line 1*	G	G	G	G	G				N			
Mic 2	Mic/Line 2*	G	G	G	G	G					N		
Mic 3	Mic/Line 3*	G	G	G	G	G						N	
Mic 4	Mic/Line 4*	G	G	G	G	G							N

*Inputs 1-4   G = Gated   N = Non gated

Figure 28. Default Routing Matrix

G-Link Bus

This digital bus appears on every Audio Perfect product. This mix-minus bus allows audio to be routed to any destination on the G-Link network. The AP400 has four digital buses: X-Bus, Y-Bus, Z-Bus and G-Link EC Reference Bus (see Echo Cancellation Setup, next page).

X-Bus. This mix-minus bus is defined as the master microphone mix, and it supports NOM. As a default, all gated microphones are routed to this bus.

Y-Bus. This mix-minus bus is defined as the line input master mix. As a default, all line-level audio such as video codecs, AP10 Telephone Interfaces, VCRs, etc. are routed to this bus. This subbus does not support NOM.

Z-Bus. This mix-minus bus is a user-defined auxiliary mix bus. This subbus does not support NOM.

Echo Cancellation Setup

<u>EC Reference and PA.</u> The EC reference tells the microphones which output will be used as the sample reference for echo cancellation. EC REF references Output D (typically used for connection to an external amp speaker). A unit will support one common EC reference for all four microphones (as shown in Figure 29). Note that the PA output follows the settings for the EC Ref. This is because any audio being sent to a speaker must be used as EC Ref for Echo Cancellation to work properly.

Echo Cancellation Setup	Outputs				Outputs				G-Link EC Ref
	A	B	C	D	1	2	3	4	
Define EC Ref & PA (Speaker Output)				X					
Define G-Link EC Ref									

Figure 29. Echo Cancellation Setup Default Matrix

<u>G-Link EC Reference Bus.</u> This bus provides a system-wide echo canceller reference signal. When multiple AP units are linked together and will be using only one output channel to drive the speaker system, that output must be defined as the sample reference which will be used by all of the linked AP units for echo cancellation. It allows the reference signal to be passed to additional G-Linked mic channels and their associated echo cancellers. For echo cancellation to function properly, the output which the master unit will use as the EC reference must be identified to the slave units through the G-Link (see Figures 30 & 31 for ROUTING configuration). The following example illustrates the echo cancellation setup necessary to communicate the EC reference from the master unit to the slave unit:

Master Unit

"Define EC Ref and PA" tells the master unit which output (in this case output D) will be used as the reference for echo cancellation for the master unit. This output (D) must also be defined as the "G-Link EC Ref Bus" which slave units will refer to when you are defining their EC references (see Figure 30).

Echo Cancellation Setup	Outputs				Outputs				G-Link EC Ref
	A	B	C	D	1	2	3	4	
Define EC Ref & PA (Speaker Output)				X					
Define G-Link EC Ref				X					

Figure 30. EC Setup for Multiple Units to One Output (Master-Unit Example Matrix)

Slave Unit

Because the slave unit will not usually be using one of its own outputs as the EC reference, "EC Ref and PA" should be defined as the "G-Link EC Ref" only (as shown in Figure 31). The slave unit will then use the master's defined output (in this case, output D) as its reference for echo cancellation.

Echo Cancellation Setup	Outputs				Outputs				G-Link EC Ref
	A	B	C	D	1	2	3	4	
Define EC Ref & PA (Speaker Output)									X
Define G-Link EC Ref									

Figure 31. EC Setup for Multiple Units to One Output (slave-Unit Example Matrix)

Meter Parameters

There are five main submenus under the Meter menu tree: inputs, outputs, ERL/TERL, ERLE/TERLE, and Default Meter (Figure 32).

The first four submenus are all handled in the same way. Using the LCD, press the METER button, then scroll through the options (inputs, outputs, ERL/TERL and ERLE/TERLE) to specify which is to be metered by the front-panel LED meter. When the appropriate option is visible, press ENTER to begin monitoring its status on the front-panel LED.

The default meter parameter determines what is being displayed on the LED meter when a parameter is not using the LED bar graph, and the AP400 times out (see Timeout, page 30).

Power-Up Screen

Gentner AP400
Version X.X

Meter

Inputs

Outputs

ERL/TERL

ERLE/TERLE

Default Meter
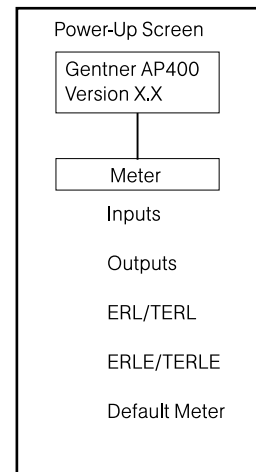
Figure 32. Meter Parameters

4 AP-Ware Software

Description

AP-Ware software is an all-new system software for Audio Perfect products. It replaces AP Tools software in Gentner's software line. AP-Ware provides increased configuration and system monitoring capabilities, and is straightforward to use. Virtually all AP400 functions can be configured with AP-Ware.

AP-Ware must operate on computer equipment that meets the following minimum requirements:

Operational Requirements
Operating system: Windows 95® OSR 2.1/98/2000/NT

PC Hardware Requirements
    Pentium 200MHz
    20MB free hard drive space
    PCI or AGP video card with 2MB RAM (minimum); 4MB RAM recommended
    Video monitor with 800x600 video resolution, 256 colors, and 16-bit color depth (minimum); 1024x768 video resolution recommended
    RS-232 COM port
    CD-ROM drive
    Mouse

AP-Ware can be used with systems set up with AP Tools. System settings and presets will not be lost when upgrading to AP-Ware.

Installation Procedure

To select an alternate desti-
nation directory, click
Browse and use the
Choose Directory window
to find the desired location. Click
OK to return to the previous window.

1. Boot the PC to the Windows operating system. Ensure that all other programs or applications are closed. Insert the Audio and Video Products CD into the CD-ROM drive.

If the Autorun feature is enabled on the PC, the Gentner Welcome window opens. Click the **Software** tab to continue setup. Two drop-down tabs appear—AP-Ware and G-Ware. Click the AP-Ware tab.

If the Autorun window does not open, open the Windows Start menu and choose Run. Type "<drive>:\\gentner.exe" where <drive> is the letter of the CD-ROM drive (e.g., D:\\gentner.exe).

2. At the AP-Ware window, click **Install AP-Ware** near the bottom of the window.

3. The InstallShield Wizard opens and guides you through the Welcome and License Agreement windows. At the Choose Destination Location window, choose the directory where AP-Ware will be installed. We recommend that you use the default directory.

4. Click **Next** or **Yes** to move to proceed through the windows that follow, or **No** or **Cancel** to end the installation process.

Choose Destination Location Window

5. The Select Program Folder window shows which Program Folder starts the AP-Ware software.

Select Program Folder Window

6. Click **Next**. The Install Summary window shows the current install settings.

7. Click **Next** to begin installation. A window will appear, asking if you wish to create a desktop icon for AP-Ware. Make your selection. After a few moments, a window appears, indicating that installation is complete.

8. You must restart your computer to finalize the installation process. You can restart now or wait until later. Click **Finish** to complete the installation procedure.

The AP-Ware Program Folder is now installed in your Start menu.

When you complete the software installation, launch AP-Ware by going to the Start menu, selecting Gentner AP-Ware, then AP-Ware - Main Program. Or, if you have created a desktop icon for AP-Ware, double-click on the icon. The AP-Ware Main Screen appears.

For complete information about how to configure AP-Ware, press the F1 key to access AP-Ware's comprehensive help file system.

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5 Operation

Front Panel

A correctly installed AP400 virtually runs by itself. Typical operations involve changing volume of an output, muting an input or output, or handling calls on the connected telephone handset. For most installations a custom remote control (optional) would be used.

Controlling Volume
When participating in a conference, you may find it necessary to increase or decrease the volume of a particular output. For instance when the audio at a distant location is too soft, adjust the output to the speakers so that the level is comfortable.

To adjust the volume:
1. Determine which output needs to be adjusted.
2. Press the OUTPUTS button, select the appropriate output and scroll to the GAIN selection. Press ENTER.
3. Adjust the gain level using the ▲ and ▼ buttons. You should be able to hear the volume level adjust while increasing or decreasing the gain.
4. Press ENTER when you reach the desired volume level.

Muting
When participating in a conference, you may find it necessary to mute (or unmute) a particular input or output.

Muting or Unmuting an Input
1. Determine the input you want to mute.
2. Press the INPUTS button, and scroll to the desired input channel. Press ENTER.
3. Scroll through the input parameters until you see Mute. Press ENTER.
4. Use the ▲ and ▼ buttons to select On, then press ENTER.

The input is now muted. To unmute the input, follow the same procedure, but select Off to deactivate the mute function.

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Muting or Unmuting an Output
1. Determine the output you want to mute.
2. Press the OUTPUTS button, then scroll to the desired output channel. Press ENTER.
3. Scroll through the output parameters until you see MUTE. Press ENTER.
4. Use the ▲ and ▼ buttons to select On, then press ENTER.

The output is now muted. To unmute the output, follow the same procedure, but select Off to deactivate the mute function.

Answering a Call
An incoming call rings on the telephone set connected to the AP400 and causes the On LED to flash.

There are four ways to answer an incoming call:
1. Set AUTO ANSWER ON to answer the call automatically.
2. Set AUTO ANSWER OFF and press the Telephone/ON button to answer the call manually.
3. Send a serial command (for example, #30 TE 1) through the RS-232 port (see AP400 Serial Commands).
4. Pick up the telephone handset to answer manually. When you're ready to connect the call to the AP400, press the Telephone/ON button or send the "#30 TE 1" serial command.

To answer a call on the AP400, press the ON button on either the front panel or from the RS-232 port (#30 TE 1). The green ON LED lights. The red OFF LED turns off.

To answer the call yourself, just pick up the handset. Then press ON to put the caller onto the AP400, or type #30 TE 1 from the RS-232 port.

If AUTO ANSWER is turned on under SYSTEM settings, the AP400 answers the call after the first complete ring.

When using the DIAL serial port command, the AP400 automatically engages the interface; you do not need to press the ON button.

Making a Call

Call the party normally, using your handset. After the other party has answered, route the call through the AP400 by pressing the ON button. The On LED lights and the AP400 takes control of the call, disabling the telephone set. You may now safely hang up the handset without disconnecting the call.

Disconnecting a Call

If the call is routed through the AP400 (the On LED glows green), press the OFF button on the front panel or send a command through the RS-232 port (#30 TE 0). The Off LED glows red, and the On LED turns off.

If auto-disconnect is turned on in SYSTEM settings, the AP400 disconnects upon sensing loop drop or call-progress tones.

Custom Controller Options

The AP products are designed to function with remote control systems. The controller is connected to the AP400 through the RS-232 port. The G-Link network and all AP products can be accessed and controlled through that single point.

You can perform the following actions through the custom controller:

· Turn the AP400 telephone connection on or off
· Mute transmitted and received audio
· Generate DTMF tones
· Adjust volume on received audio
· Query the AP400 by binary address
· Re-null the telephone hybrid
· Meter input and output
· Read TERL and TERLE

Gentner Communications recommends use of a custom remote controller for user interface. Refer to the manufacturer's documentation for your particular custom remote controller.

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6 Appendices

Dimensions

19"/48.3cm x 1.75"/4.45cm x 10"/25.4cm (WxHxD)

Weight

7 lbs./3.18 kg dry   12 lbs./5.4kg shipped

Connectors

Power:	Auto-adjusting power module; 100-240VAC; 50/60Hz; 30W
RS-232:	DB9 female, 9,600/19,200/38,400 (bps) baud selectable
CONTROL/ STATUS I/O:	DB25 female; (2) +5VDC pins, 100mA each
STATUS OUTPUTS:	DB25 female; open collector, 40V max, 300mA each (2) +5VDC, 300mA each 40V
CONTROL INPUTS:	Input activation selectable; momentary or latching ground
Speaker Output:	Binding post; 5 watts max into 4 ohms
G-Link IN:	RS-485; 38.4kbps; 110kohm impedance, category-five twisted pair cable; 20-foot limit between networked units
G-Link OUT:	RS-485; 38.4kbps; 110kohm impedance, category-five twisted pair cable; 20-foot limit between networked units
Telco Line:	RJ-11 connector—POTS (Plain Old Telephone Service) line or analog extension from PBX

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Telco Set: RJ-11 connector—analog telephone set

Mic/Line Inputs

Connector:	Removable Phoenix block connector, -55 -25, or 0dBu nominal, adjustable, balanced, bridging
Impedance:	4kohms
Frequency Response:	20Hz to 15kHz, ±2dB
Phantom Power:	24VDC input, selectable
Noise:	-125dBu, EIN 20Hz to 15kHz
THD:	<.03%*

Line-Level Inputs

Connector:	Removable Phoenix block connector, 0dBu nominal, adjustable, balanced bridging
Impedance:	20kohms
Frequency Response:	20Hz to 15kHz ±2dB
SNR:	>85dB*
THD:	<.01%*

Line Outputs

Connector:	Removable Phoenix block connector, 0dBu nominal, adjustable, balanced bridging
Impedance:	50 ohms (designed to drive >600 ohm inputs)
Frequency Response:	20Hz to 15kHz, ±2dB
SNR:	>85dB*
THD:	<.01%*

Telco Audio Performance

Frequency Response:	±2dB from 250Hz to 3.3kHz (AGC disabled)
SNR:	>60dB (reference at −15dBm on/off the telephone line)
THD:	<2%, 250Hz to 3.3kHz (AGC disabled) (referenced at −15dBm on/off the phone line)
Pre-Emphasis:	+4dB at 2kHz

Echo Cancellation Tail Time

>120 milliseconds, each gated input

Telco Cancellation Tail Time

31 milliseconds

Operating Temperature

32 - 122 F (0 -50 C)

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* All measurements are referenced to maximum output level with a bandpass of 20Hz to 20kHz unless otherwise specified. Specifications are subject to change without notice.

Appendix B: Warranty & Compliance

Warranty

Gentner Communications Corporation (Manufacturer) warrants that this product is free of defects in both materials and workmanship. Should any part of this equipment 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 the original purchase, provided the owner returns the equipment 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 equipment 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 equipment 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 equipment 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 equipment which, in the determination of the Manufacturer, shall have affected the performance, safety or reliability of the equipment; or,

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

NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE, APPLIES TO THE EQUIPMENT, nor is any person or company authorized to assume any warranty for the Manufacturer or any other liability in connection with the sale of the Manufacturer's products.

Manufacturer does not assume any responsibility for consequential damages, expenses, or loss of revenue or property, inconvenience, or interruption in operation experienced by the customer due to a malfunction in the purchased equipment. No warranty service performed on any product shall extend the applicable warranty period.
In case of unsatisfactory operation, the purchaser 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 equipment, or such other matters as it elects to honor this warranty as above provided. This warranty does not cover damage to the equipment 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 purchaser and is not assignable or transferable.

Gentner Communications Corporation, 1825 Research Way, Salt Lake City, Utah 84119

FCC Part 15 Compliance

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Part 68 Compliance

A label containing, among other information, the FCC registration number and Ringer Equivalence Number (REN) for this equipment is prominently posted on the equipment. If requested, this information must be provided to your telephone company.

USOC Jacks: This device uses RJ11C 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 Gentner Communications Corporation, 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.

Industry Canada Compliance

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 individ-

ual 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 Gentner 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.

European Compliance (for international unit part no. 910-150-101 only)

This equipment has been approved in accordance with Council Decision 98/482/EC for pan-European single terminal connection to the public switched telephone network (PSTN). However, due to differences between the individual PSTNs provided in different countries, the approval does not, of itself, give an unconditionally assurance of successful operation on every PSTN network termination point.
In the event of problems, you should contact your equipment supplier in the first instance.

Gentner Communications Corporation of 1825 Research way, Salt Lake City, Utah 84119, U.S.A. declares that this equipment is designed to be compatible with the following networks: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom.

CE **This equipment complies with the requirements of the EU guidelines:**

89/336/EEC   "Electromagnetic Compatibility"
73/23/EEC   "Electrical operating material for use within specific voltage limits"
1999/5/EC   "Radio Equipment and Telecommunications Equipment"

Conformity of the equipment with the above guidelines is attested by the CE mark.

Safety Information

CAUTION: Users should contact the appropriate electrical inspection authority, or electrician, as appropriate.

Appendix C: Connector Pinouts
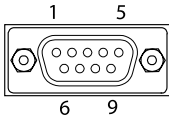
Table 1. RS-232 COM DCE Port Pinout

Pin Number	Control	Pin Number	Control
1	DCD	6	DSR
2	TXD	7	CTS
3	RXD	8	RTS
4	DTR	9	No connection
5	Ground		

Table 2. Control/Status Port Pinout

Pin Number	User Definable*	Status	Momentary /Latching	Default Description
1	Yes	C	M	Lock front panel toggle
2	Yes	S		Status of front panel lock
3	Yes	C	M	Mute all mics toggle
4	Yes	S		Status of mute all mics
5	Yes	C	M	Telephone On/Off toggle
6	Yes	S		Telephone status
7	Yes	C	M	Auto answer toggle
8	Yes	S		Status of auto answer
9	Yes	C	M	Mute Output A toggle
10	Yes	S		Status of Output A mute
11	Yes	C	M	Mute Input A toggle
12	Yes	S		Status of Input A mute
13	Yes	C	M	Volume Up PA (1dB)
14	Yes	S		Not Active
15	Yes	C	M	Volume Down PA (1dB)
16	Yes	S		Not Active
17	No	S		Mic #1 Gate Status
18	No	S		Mic #2 Gate Status
19	No	S		Mic #3 Gate Status
20	No	S		Mic #4 Gate Status
21	No	S		Ring indication
22	No connection			
23	No	*		+5VDC
24	No	*		+5VDC
25	No	*		Ground

STATUS OUTPUTS: DB25 female; open collector, 40V max, 300mA each (2) +5VDC, 300mA each 40V

CONTROL INPUTS: Input activation selectable; momentary or latching ground
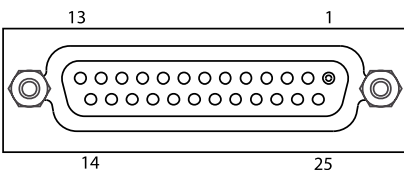
The first 16 pins of the Control/Status port are programmable through direct serial port commands. See pin programming, pages 74-75.

Appendix D: Applications

Audioconferencing/Videoconferencing

As teleconferencing continues to grow, sophisticated equipment will make the difference between an average (or even frustrating) meeting and a high class, perfectly managed meeting. Executives at all levels appreciate the carefree ease of use that the AP400 provides for conferencing.

The benefit derived from using the AP400 in conferencing is its ability to use multiple, gating microphones. This keeps unused microphones closed, preventing reverberation and echo. When someone speaks at the "closed" microphone, it will automatically gate on (if properly programmed).

When the AP400 is used at multiple sites, and linked through telephone connections, each site can program its AP400 to accommodate the type of conference (audioconference and/or videoconference) and the size of the conference room. The AP400 can be easily programmed to tailor each system to the application. The program allows you to specify adaptive ambient mode, ambient level (dBu), constant gain mode, decay rate, first-mic priority mode, gate ratio (dB), hold time (tenth of a second), last-mic mode, maximum number of microphones, off attenuation (dB) and PA adaptive mode.

The AP400 includes a single-line, digital hybrid telephone interface. If you want multiple telephone lines, you can add AP10 units.
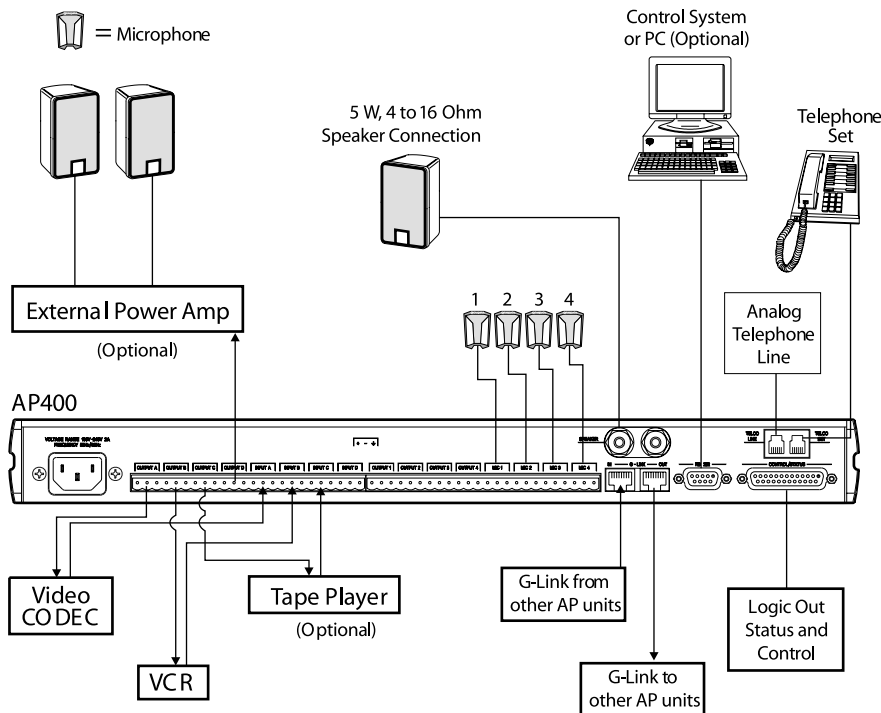
Figure 33. AP400 Teleconferencing Application Block Diagram

GENTNER®

Also commonly used in a teleconferencing scenario are Gentner's AP800 and Assistive Listening System (ALS) products: RX-1A Assistive Listening Receiver, RX-6 Assistive Listening Receiver, TX-37A Transmitter.

For more information on these products, visit us at www.gentner.com.

Distance Learning

The demand for teaching institutions to ensure quality education for students at multiple and distant locations has created an increasing need for quality equipment to meet various specifications and setups. The AP400 meets that need.

Figure 34 illustrates one common setup distance-learning configuration using the AP400 and AP800.

This unique combination allows the lecturer full control when taking incoming calls from the various distant locations. The caller audio is easily transmitted back to all participants at all locations, allowing them full interactive communication for the entire lecture.

Figure 34. AP400 Distance-Learning Application Block Diagram

External Power Amp

Instructor

Speaker with Caller Audio

VCR

AP400

Telephone line

Speaker with Caller Audio

To Distant Site — CODEC

G-Link

Control Device

AP80 0

Video Control (Logic Output)

Students

= Microphone   = G-Link Terminator
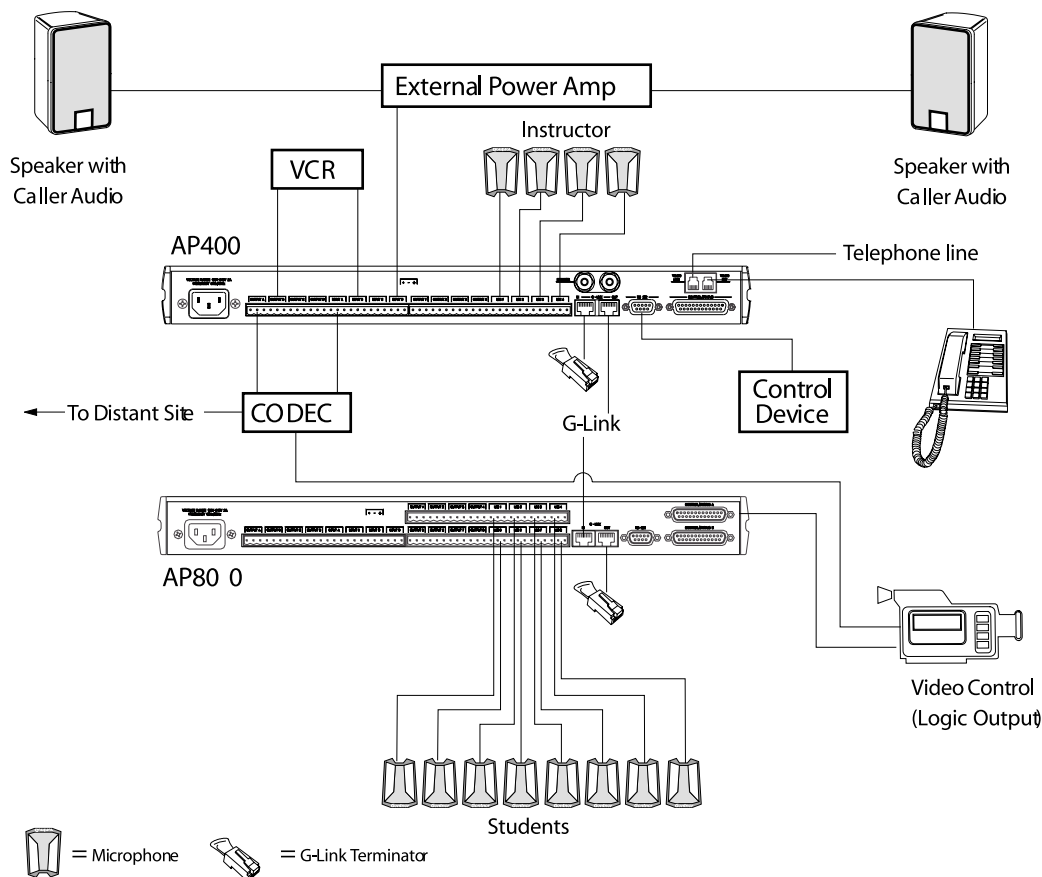
Courtrooms

Sophisticated courtrooms use microphones at the attorney stands or desks, the judicial bench and the witness stand. The AP400 can be used successfully in this and other types of forums and public meeting rooms where multiple microphones are used for audience and panel participation.

Because this application requires multiple microphones, the AP400's automatic gating feature and preset or programmable AP-Ware software setup helps control the microphones for optimum audio quality.

Where only one site needs to be monitored through one or more AP400s, some equipment used in some other conferencing applications is not necessary. If your courtroom application requires communication with an off-site location, the configuration diagrammed in Figure 35 is a possible setup using Gentner equipment for multisite communication.

Figure 35. AP400 Courtroom Application Block Diagram
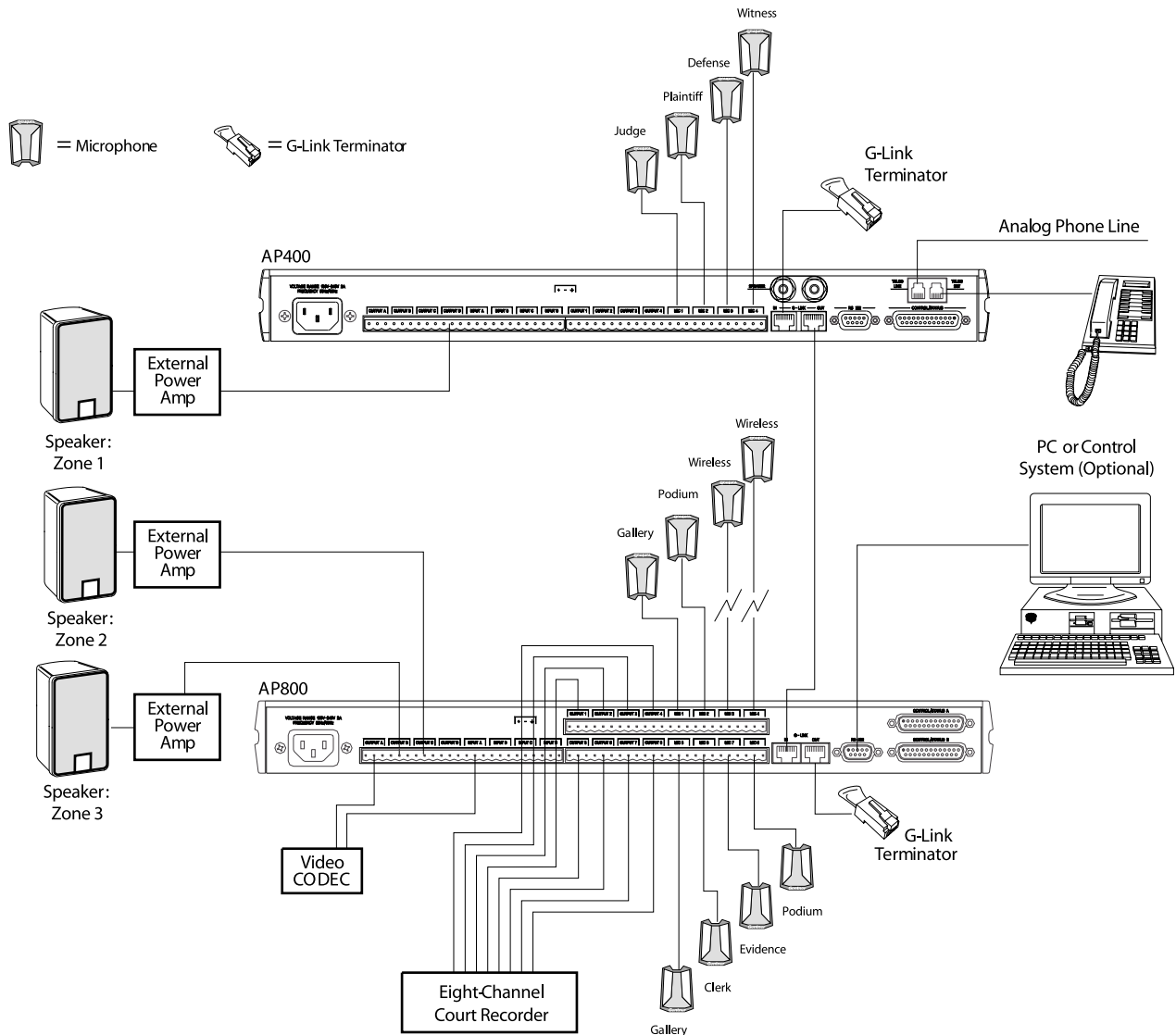
Convention Center/Hotel Dividable Meeting Rooms

Gentner equipment supports meetings set up for panel discussions in conference centers and hotels. This type of meeting requires a different setup than that of a business meeting or distance learning application.

Each AP400 in this application provides up to four microphones with the power and amplification necessary to conduct a successful meeting. The automatic microphone gating minimizes room and microphone noise. Using Gentner equipment allows the installer greater layout and setup flexibility. Figure 36 details one possible layout. The preprogrammed presets allow instant room reconfiguration at the touch of a button.

Contact Gentner Communications for help specifying your equipment and setup requirements.

Figure 36. AP400 Convention-Center Application Block Diagram
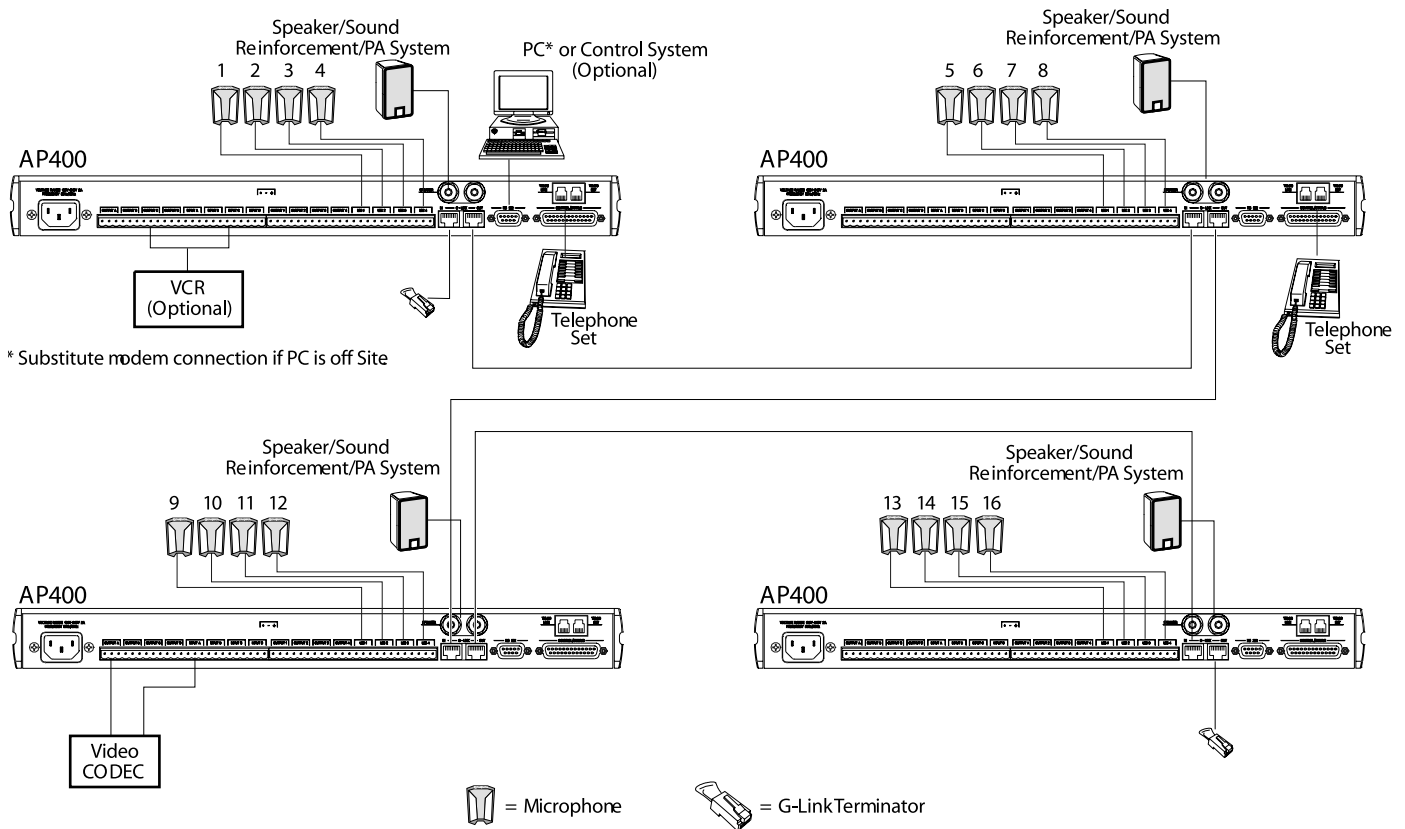
Appendix E: Accessories

Accessory	Gentner Part Number
AP800	910-150-001
AP10 Telephone Interface	910-150-201
Tabletop Omni Microphone	910-103-160 (with cable)
Tabletop Uni Microphone	910-103-161 (with cable)
Tabletop Omni Microphone	910-103-162 (black button)/910-103-163 (white button)
Tabletop Uni Microphone	910-103-164 (black button)/910-103-165 (white button)
Delta Microphone	910-103-340
Desktop Kit	860-150-002
Wall Mount Speaker	910-103-010

Appendix F: Serial Port Commands

The AP products accept serial commands through the AP400 serial port. The commands are then channeled along the G-Link network to all interconnected AP products. The commands provide the same control as the LCD menu structure, plus some additional controls. The following commands pertain only to the AP400.

RS-232 serial port protocol is 9,600 (default), 19,200, or 38,400 baud, 8 bits, 1 stop bit, no parity.

The AP400 accepts the commands outlined on page 59. The structure of serial commands is as follows:

(indicating the start of a command line), **device ID**, **command**, then any additional options in the order that they appear in the command descriptions on the following pages.

Commands can be either uppercase or lower case. Return values are always in uppercase. For a command to be recognized by the serial port, the command must be terminated by a carriage return.

For example, a command to disable automatic gain control (AGC) for Mic 2 on AP400 device "0" would have the command line: #30 AGC 2 0. In this command line, 3=AP400, 0=unit 0, AGC=command, 2=mic channel, 0=off state). If a command calls for a "null" value, leave a blank in the command line (for example, "#30 AGC 2" would return the current AGC state of Mic 2 on device 30).

Command Syntax

All command lines in this manual are set off by the symbol "⏎". The serial command line that fol-
lows the "⏎" uses the following typographic conventions:

<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 ALL CAPS bold indicate command text
[DEVICE]	Device type and number on G-Link network. (Valid combinations depend on con-nected devices. For an AP400, device type is 3, and device ID number will always be 0–7.) If omitted, the product that first receives the command processes it.
"*"	Can be used to set a parameter on all microphone channels, but it can't be used to query all mic channels. Note: Using the all-mic toggle may not produce the desired result, depending on the state they are in. For example, if one mic is muted and all other mics are not, an all-mic toggle would mute all others, but unmute that particular mic.

Error Codes

The following lists possible error messages and their explanations:

ERROR 1	The address is not valid/out of range or an invalid character.
ERROR 2	Could not extract a command from the string received.
ERROR 3	Serial overrun.
ERROR 4	Reserved.
ERROR 5	Invalid parameter.
ERROR 6	Unrecognized command.

The command string will then be explained (where necessary), followed by the returned values
and (where necessary) an example.

AP400 Serial Commands

Command	Function	Command	Function
AA	Selects/rprts Auto Answer for Telco port	MDMODE	Enables/disables modem mode
AAMB	Enables/disables adaptive ambient*	MEQ	Sets/reports three-band equalization*
AD	Selcts/rprts Auto Disconn. for Telco port	MHP	Enables/disables high-pass filter*
AGC	Enables/disables AGC*	MINIT	Sets/reports modem initialization string
AMBLVL	Sets/reports ambient level	MLINE	Sets/reports mic/line level*
BAUD	Sets/reports RS-232 port baud rate	MMAX	Sets/reports maximum number/mics
BYE	RS-232 password protection	MPASS	Programs modem password string
CHAIRO	Enable/disable chairman override*	MREF	Sets/reports echo canceller reference*
DECAY	Sets/reports decay rate	MTRX	Programs/reports matrix configuration*
DFLTM	Sets/reports default meter	MUTE	Sets/reports mute status*
DIAL	Sends dial string to Telco port	NLP	Sets/reports nonlinear processing*
EC	Enables/disables echo canceller*	NOM	Enables/disables NOM attenuation*
ERL	Returns ERL for a mic channel*	NULL	Sends Null command to Telco port
ERLE	Returns ERLE for a mic channel*	OFFA	Sets/reports off attenutation
EQ	Enables/disables equalization*	PAA	Enables/disables PA adaptive mode
FLOW	Enables/disables flow-control	PCMD	Programs/reports
FMP	Enables/disables first mic priority	PEVNT	Programs/reports GPIO status pin
FPP	Sets/reports front-panel passcode	PP	Enables/disables phantom power*
GAIN	Sets/reports gain setting*	PRESET	Sets/reports active preset
GATE	Reports mic gating status	REFSEL	Sets/reports output for EC reference
GMODE	Sets/reports gating mode*	RING	(Ring indication only)
GRATIO	Sets/reports gate ratio	RXRD	Selects/reports Receive to Telco port
HOLD	Sets/reports hold time	TAMODE	Selects/reports Telco Adapt mode
HOOK	Sends Hook/Flash command	TE	Selects/reports Telco Off Hook status
HOOKD	Selects/reports Hook duration time	TERL	Returns echo return loss for Telco channel
LFP	Enables/disables front-panel lock	TERLE	Returns echo return loss enhance. for Telco channel
LMO	Sets/reports last-mic-on mode	TOUT	Sets/reports inactivity timeout
LVL	Reports level*	UID	Returns unit identification number
MASTER	Sets/reports master/slave settings	VER	Returns current version of software

* Applied to a specific channel

Figure 35. AP400 Serial Commands

Serial Command Parameters and Explanations

The symbol "⊵" signals the start of a command line. For serial port command protocol and syntax, see page 58.

AA

This command activates and deactivates the auto answer feature.

⊵ [DEVICE] **AA** <X>

Explanation

<X>

X=0	Parameter disables auto-answer
X=1	Parameter enables auto-answer
X=2	Parameter to toggle the state from one state to the other (regardless of current state)
X=Null	Parameter to report back the current state

Return Values

The command will return the updated condition (On=1, Off=0) of the auto answer in the same format as the command.

AAMB

This command changes or reports back the state of the adaptive ambient for a microphone.

⊵ [DEVICE] **AAMB** <CH> <X>

Explanation

<CH>

CH= 1-4	Parameter to apply to the specified microphone channel
CH= *	Parameter to apply command to all microphone channels

<X>

X=0	Parameter to set the state to OFF
X=1	Parameter to set the state to ON
X=Null	Parameter to return the current state

Return Values

The command will return the updated condition (On=1, Off=0) of the adaptive ambient in the same format as the command.

AD

This command changes the state of the auto disconnect function.

⊵ [DEVICE] **AD** <X>

Explanation

<X>

X=0	Parameter to set Auto Disconnect to OFF
X=1	Parameter to set Auto Disconnect to LOOP
X=2	Parameter to set Auto Disconnect to Call Progress (CP)
X=3	Parameter to set Auto Disconnect to LOOP+CP
X=Null	Parameter to report back the current state

Return Values

The command will return the updated connection state of the unit in the same format as the command. If the sent command changes the state of the unit, the updated state is returned.

If:	command returns:
current disconnect state is OFF	[DEVICE] AD 0
current disconnect state is LOOP	[DEVICE] AD 1
current disconnect state is CP	[DEVICE] AD 2
current disconnect state is LOOP+CP	[DEVICE] AD 3

AGC

This command changes or reports back the state of the AGC for a microphone or line input.

      ⤷ [DEVICE] **AGC** <CH> <X>

Explanation

<CH>

CH= 1-4	Parameter to apply to the specified microphone channel
CH= A-D	Parameter to apply to the specified line input
CH= *	Parameter to apply command to all microphone channels

<X>

X=0	Parameter to set the state to OFF
X=1	Parameter to set the state to ON
X=2	Parameter to toggle the state from one state to the other (regardless of current state)
X=Null	Parameter to return the current state

Return Values

The command will return the updated condition (On=1, Off=0) of the AGC in the same format as the command.

AMBLVL

This command changes or reports back the setting of the fixed ambient level for each AP400. This value is only used if adaptive ambient is not enabled.

      ⤷ [DEVICE] **AMBLVL** <X>

Explanation

<X>

X=0 to -70	Parameter to set the ambient level (in dB)
X=Null	Parameter to return the ambient level

Return Values

The command will return the updated ambient level for the selected AP400 in the same format as the command.

BAUD

This command selects or returns the baud rate for the RS-232 port on the AP400.

      ⤷ [DEVICE] **BAUD** <X>

Explanation

<X>

X=1	Selects 9,600 baud (bps) rate
X=2	Selects 19,200 baud (bps) rate
X=3	Selects 38,400 baud (bps) rate
X=Null	Parameter to return the baud (bps) rate

Return Values

The command will return the updated condition (1=9,600 baud, 2=19,200 baud, 3=38,400 baud) of the RS-232 baud rate in the same format as the command.

BYE

This command immediately enables password protection when modem mode is active.

      ⤷ [DEVICE] **BYE**

Note: This command is applicable only to the unit that is connected through the RS-232 port.

CHAIRO

This command changes or reports back the state of the chairman override for a microphone channel

↳ [DEVICE] **CHAIRO** <CH> <X>

Explanation

<CH>

CH= 1-4	Parameter to apply to the specified microphone channel
CH= *	Parameter to apply command to all microphone channels

<X>

X=0	Parameter to set the state to OFF
X=1	Parameter to set the state to ON
X=2	Parameter to toggle the state from one state to the other (regardless of current state)
X=Null	Parameter to return the current state

Return Values

The command will return the updated condition (On=1, Off=0) of the chairman override in the same format as the command.

DECAY

This command changes or reports back the setting of the decay rate for a given AP400.

↳ [DEVICE] **DECAY** <X>

Explanation

<X>

X=1	Parameter to set the decay rate to slow
X=2	Parameter to set the decay rate to medium
X=3	Parameter to set the decay rate to fast
X=Null	Parameter to return the current decay rate

Return Values

The command will return the updated decay rate for the selected AP400 in the same format as the command.

DFLTM

This command changes and reports back the status of the default meter.

↳ [DEVICE] **DFLTM** <CH> <W>

Explanation

<CH>

CH= 1-4	Parameter to apply to the specified channel
CH= A-D,T	Parameter to apply to the specified channel
CH= Null	Parameter to return the current state of the default meter

<W>

W= I	Parameter to specify an input channel
W= O	Parameter to specify an output channel

Return Values

The command will return the current default meter in the same format as the command.

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DIAL

This command generates DTMF tones. The capability remains active after the call is place so tones can be issued for use with voice mail and pagers.

⌦ [DEVICE] **DIAL** <STRING>

Explanation

<STRING> is any valid combination of touch tone characters. A comma indicates a two-second pause. STRING has a maximum length of 15 characters. Valid characters are 0 through 9, A through D, #, *, and ",".

Return Values

DIAL returns the dialed string of numbers. For example, the following command dials the number 801-975-7200. A "9" and a pause are generated to get an outside line on a PBX:

The number to be dialed on device #20:   The following is returned out the serial port:

#20 DIAL 9,8019757200   #20 DIAL 9,8019757200

EC

This command changes or reports back the state of the echo canceller for a microphone.

⌦ [DEVICE] EC <CH> <X>

Explanation

<CH>

CH= 1-4	Parameter to apply to the specified microphone channel
CH= *	Parameter to apply command to all microphone channels

<X>

X=0	Parameter to set the state to OFF
X=1	Parameter to set the state to ON
X=Null	Parameter to return the current state

Return Values

The command will return the updated condition (On=1, Off=0) of the echo canceller in the same format as the command.

ERL

This command reports back the echo return loss (ERL) for a microphone channel in dB.

⌦ [DEVICE] **ERL** <CH>

Explanation

<CH>

CH= 1-4	Parameter to apply to the specified microphone channel

Return Values

The command will return the ERL of the microphone channel in the same format as the command (#10 ERL 1 20).

ERLE

This command reports back the echo return loss enhancement (ERLE) for a microphone channel in dB.

⌦ [DEVICE] **ERLE** <CH>

Explanation

<CH>

CH= 1-4	Parameter to apply to the specified microphone channel

Return Values

The command will return the ERLE of the microphone channel in the same format as the command (#10 ERLE 1 20).

EQ

This command changes or reports back the state of the equalizer for a microphone.

⮒ [DEVICE] **EQ** <CH> <X>

Explanation

<CH>

CH= 1-4	Parameter to apply to the specified microphone channel
CH= *	Parameter to apply command to all microphone channels

<X>

X=0	Parameter to set the state to OFF
X=1	Parameter to set the state to ON
X=2	Parameter to toggle the state from one state to the other (regardless of current state)
X=Null	Parameter to return the current state

Return Values

The command will return the updated condition (On=1, Off=0) of the equalizer in the same format as the command.

FLOW

This command selects or reports whether hardware flow control is enable or disabled for the AP400. Hardware flow control is implemented using RTS and CTS.

⮒ [DEVICE] **FLOW** <X>

Explanation

<X>

X=0	Sets flow control to OFF
X=1	Sets flow control to ON
X=Null	Parameter to return the current mode

Return Values

The command will return the updated condition (On=1, Off=0) of the AP400 in the same format as the command.

FMP

This command selects or returns the current status of the first microphone priority mode for the AP400.

⮒ [DEVICE] **FMP** <X>

Explanation

<X>

X=0	Parameter to select first microphone priority mode to OFF
X=1	Parameter to select first microphone priority mode to ON
X=Null	Parameter to return the current mode

Return Values

The command will return the updated condition (On=1, Off=0) of first mic priority mode in the same format as the command.

FPP

This command sets and reports the current passcode setting for the AP400.

⮒ [DEVICE] **FPP** <XXXXX>

Explanation

<XXXXX>

X=1	▲ button
X=2	ENTER button
X=3	ESC button

FPP (cont.)

Explanation (cont.)

X=4	▼ button
X=5	METER button
X=6	INPUT button
X=7	SYSTEM button
X=8	OUTPUT button
X=9	ROUTING button
X=Null	Parameter to return current passcode

Return Values

The command returns the current or updated condition of the front panel passcode.

GAIN

This command changes or reports back the input gain for a channel. The command supports all inputs, outputs, and subbus.

🖰 [DEVICE] **GAIN** <CH> <W> <X> [<Y>]

Explanation

<CH>

CH= 1-4	Parameter to apply to select the microphone channel
CH= A-D,T	Parameter to apply to select the line channel
CH= 1	Parameter to apply to select the subbus channel
CH= *	Parameter to apply command to all microphone channels

<W>

W=S	Parameter to set subbus
W=I	Parameter to set input
W= O	Parameter to set output

<X>

X= -20 to 20	Parameter to set the level
X=Null	Parameter to return the current level

<Y>

Y=R	Parameter to indicate relative
Y=A	Parameter to set the level absolute
Y= Null	Parameter will default to R (relative)

Return Values

The command will return the updated level of the channel in the same format as the command. The level returned is always absolute.

Examples

The following command lowers the gain 3dB on microphone input channel 2.

This command applies only to the unit to which the serial cable is connected (the device is not specified)

GAIN 2 I -3

The following is returned out the serial port, indicating an updated gain value.

GAIN 2 I -12

GATE

This command reports back the microphone gating status of an AP400. This command is read only.

       🖰 [DEVICE] **GATE**

Return Values

The command will return the current status of microphone gating for a given unit with a hex value.

Example

The following command requests the gate status from device 34. (When this command was issued mics 1and 4 were gated on.)

#34 GATE

The following is returned out the serial port indicating an updated gate value.

#34 GATE 9

Microphone Gating Key

Mic #	4 3 2 1	Hex value
	0 0 0 0	0
	0 0 0 1	1
	0 0 1 0	2
	0 0 1 1	3
	0 10 0	4
	0 1 0 1	5
	through	
	1 1 1 1	F

GMODE

This command changes or reports back the gating mode for a microphone.

       🖰 [DEVICE] **GMODE** <CH> <X>

Explanation

<CH>

CH= 1-4	Parameter to apply to the specified microphone channel
CH= *	Parameter to apply command to all microphone channels

<X>

X=1	Parameter to set the state to AUTO
X=2	Parameter to set the state to MANUAL ON
X=3	Parameter to set the state to MANUAL OFF
X=4	Parameter to set the state to OVERRIDE ON
X=5	Parameter to set the state to OVERRIDE OFF
X=Null	Parameter to return the current state

Return Values

The command will return the updated condition of the gating in the same format as the command.

GRATIO

This command changes or reports back the setting of the gate ratio.

⮐ [DEVICE] **GRATIO** <X>

Explanation

<X>

X=0-50   Parameter to set the Gate Ratio (in dB)

X=Null   Parameter to return the current gate ratio

Return Values

The command will return the updated gate ratio (0–50) in the same format as the command.

HOLD

This command changes or reports back the setting of the hold time.

⮐ [DEVICE] **HOLD** <X>

Explanation

<X>

X=100-8000   Parameter to set the hold time (in milliseconds)

X=Null   Parameter to return the current hold time

Return Values

The command will return the updated hold time in the same format as the command.

HOOK

This command sends a momentary interruption in the line seizure (hook flash) to the telephone line.

⮐ [DEVICE] HOOK

Return Values

If hook flash succeeded, the following is returned out the port:

[DEVICE] HOOK 0

Example

The following command request hook flash from device 30:   The following is returned out the serial port:

#30 HOOK   #30 HOOK

HOOKD

This command controls and reports the Hook Duration of the unit.

⮐ [DEVICE] **HOOKD** <X>

Explanation

<X>

X=1   Parameter to set Hook Duration to 50ms

X=2   Parameter to set Hook Duration to 500ms

X=Null   Parameter to report back the current state

Return Values

The command returns the current hook duration of the unit in the same format as the command. If the sent command changes the hook duration of the unit, the updated hook duration is returned.

LFP

This command locks, unlocks, or returns the current state of the front panel from the serial port.

    🖰 [DEVICE] **LFP** <X>

Explanation

<X>

X=0	Parameter to unlock the front panel.
X=1	Parameter to lock the front panel
X=2	Parameter to toggle the state from one state to the other (regardless of current state)
X=Null	Parameter to return the current state of the front panel

Return Values

The command will return the updated condition of the front panel.

LMO

This command changes or reports back the setting of the last microphone on mode for each AP400.

    🖰 [DEVICE] **LMO** <X>

Explanation

<X>

X=0	Parameter to set the mode to OFF
X=1	Parameter to set the mode to Microphone #1
X=2	Parameter to set the mode to Last Microphone On
X=Null	Parameter to return the current mode

Return Values

The command will return the updated mode for the selected AP400 in the same format as the command.

LVL

This command reports back the level for a given channel.

    🖰 [DEVICE] **LVL** <CH> <W>

Explanation

<CH>

CH= 1-4	Parameter to apply to the specified channel
CH= A-D,T	Parameter to apply to the specified channel

<W>

W= I	Parameter to specify an input meter
W= O	Parameter to specify an output meter
W= A	Parameter to specify an adaptive ambient meter (channels 1-4 only)

Return Values

The command will return the input level of the channel in the same format as the command.

MASTER

This command selects or returns the current mode of the AP400 from the serial port.

      ↵ [DEVICE] **MASTER** <X>

Explanation

<X>

X=1	Parameter to designate the AP400 as master-single
X=3	Parameter to designate the AP400 as slave
X=4	Parameter to designate the AP400 as master-linked
X=Null	Parameter to return the current mode

Return Values

The command will return the updated condition of the mixer in the same format as the command.

MDMODE

This command enables or disables the modem mode for the AP400. When the modem mode is enabled, the modem initialization string is sent out the serial port and the serial port then requires a password before a command is processed. Note: The default password is a carriage return (enter). If the password is forgotten, it may be cleared back to a carriage return via the front panel.

      ↵ [DEVICE] **MDMODE** <X>

Explanation

<X>

X=0	Sets modem mode to OFF
X=1	Sets modem mode to ON

Return Values

The command will return the updated condition (1=On, 0=Off) of the pin in the same format as the command.

INACTIVITY NOTE:
After five minutes of serial inactivity, the password will be requested to continue serial activity.
For immediate password protection, see BYE command (page 61).

MEQ

This command changes or reports back the state of the equalizer adjustment for a microphone input.

      ↵ [DEVICE] **MEQ** <CH> <BAND> <X>

Explanation

<CH>

CH= 1-4	Parameter to apply to the specified microphone channel
CH= *	Parameter to apply command to all microphone channels

<BAND>

BAND=H, M, L	Parameter to select which band is modified

<X>

X= -12 –12	Parameter to set level of the band
X=Null	Parameter to return the current level

Return Values

The command will return the updated condition of the equalizer in the same format as the command.

MHP

This command changes or reports back the state of the high pass filter for a microphone.

      🖫 [DEVICE] **MHP** <CH> <X>

Explanation

<CH>

	CH= 1-4	Parameter to apply to the specified microphone channel
	CH= *	Parameter to apply command to all microphone channels

<X>

	X=0	Parameter to set the state to OFF
	X=1	Parameter to set the state to ON
	X=Null	Parameter to return the current state

Return Values

The command will return the updated condition (On=1, Off=0) of the high pass filter in the same format as the command.

MINIT

This command sets or reports the current setting for the initialization string sent to the modem when in modem mode.

      🖫 [DEVICE] **MINIT** <STRING>

Explanation

STRING can be any character combination up to 30 characters. If STRING is not specified the command returns the currently assigned string. To specify no initialization string, set STRING to "CLEAR".

Return Values

The command will return the updated string in the same format as the command was issued.

MLINE

This command changes or reports back how much gain is applied to the microphone input. The three settings are 0dB, 25dB, and 55dB.

      🖫 [DEVICE] **MLINE** <CH> <X>

Explanation

<CH>

	CH= 1-4	Parameter to apply to the specified microphone channel
	CH= *	Parameter to apply command to all microphone channels

<X>

	X=1	Parameter to set the state to 55dB gain
	X=2	Parameter to set the state to 25dB gain
	X=3	Parameter to set the state to 0dB (line level)
	X=Null	Parameter to return the current state

Return Values

The command will return the updated condition of the gain applied in the same format as the command.

MMAX

This command changes or reports back the setting for the maximum number of microphones on each AP400.

      🖫 [DEVICE] **MMAX** <X>

Explanation

<X>

	X=0	Parameter to set the maximum to no limit
	X=1-8	Parameter to set the maximum number of microphones allowed on
	X=Null	Parameter to return the maximum number of microphones allowed on

MMAX (cont.)

Return Values

The command will return the updated maximum number of microphones allowed on for the selected AP400 in the same format as the command.

MPASS

This command sets the current password for modem mode. Note: The default password is a carriage return (enter). If the password is forgotten, it may be cleared back to a carriage return via the front panel.

> ⌨ [DEVICE] **MPASS** <STRING>

Explanation

STRING can be any character combination up to 8 characters. If STRING is not specified the command returns the currently assigned string. To specify no initialization string, set STRING to "CLEAR"

Return Values

Once the command is given, the unit responds by echoing back the command.

MTRX

This command programs or reports the configuration of a routed input. The data is in a hex format. See the matrix configuration table for specific routing information.

> ⌨ [DEVICE] **MTRX** <INPUT> <OUTPUTMIX>

Explanation

<INPUT>

INPUT=1-25 Selects the input to be routed to mix outputs

Input	Input word assignment		Input	Input word assignment
1	Mic input 1 post gate		13	Subbus 1
2	Mic input 2 post gate		14	Reserved
3	Mic input 3 post gate		15	G-Link X
4	Mic input 4 post gate		16	G-Link Y
5	Reserved		17	G-Link Z
6	Reserved		18	Mic input 1 pregate
7	Reserved		19	Mic input 2 pregate
8	Reserved		20	Mic input 3 pregate
9	Line input a		21	Mic input 4 pregate
10	Line input b		22	Telco input pregate
11	Line input c		23	Reserved
12	Line input d		24	Reserved
			25	Reserved

<OUTPUTMIX>

OUTPUTMIX=hex word	The selected input will be routed to the outputs indicated.
OUTPUTMIX=null	Mix Command to return the current setting for the input.

<OUTPUTMIX>Note:
When entering the hex value of the <OUTPUTMIX>, it is not necessary to add the leading zeros, only zeros that follow the value, as in examples 1 & 2, next page.

Example 1

The following command routes PREGATE MIC INPUT 1 audio to OUTPUT 1. This command applies only to the box the serial cable connects to, since a device is not specified.

G-Link Z-BUS	G-Link Y-BUS	G-Link X-BUS	Reserved	Sub BUS 1	Output D	Output C	Output B	Output A	Reserved	Reserved	Reserved	Telco	Output 4	Output 3	Output 2	Output 1
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Example 1. OUTPUTMIX matrix
#34 MTRX 18 1

Example 2

The following command routes MIC INPUT 1 POST GATE audio to OUTPUTS A, B, and C, and to the G-LINK X-BUS.

G-Link Z-BUS	G-Link Y-BUS	G-Link X-BUS	Reserved	Sub BUS 1	Output D	Output C	Output B	Output A	Reserved	Reserved	Reserved	Telco	Output 4	Output 3	Output 2	Output 1
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0

Example 2. OUTPUTMIX matrix.
MTRX 1 4700

Return Values

The command will return the updated condition of the matrix for the selected input in the same format as the command was issued.

MUTE

This command changes or reports the state of mute for a given channel.

📖 [DEVICE] **MUTE** <CH> <W> <X>

Explanation

<CH>

	CH= 1-4	Parameter to apply to the specified microphone channel
	CH= A-D, T	Parameter to apply to select the line channel
	CH= 1	Parameter to apply to select the subbus channel
	CH= *	Parameter to apply to all microphone channels

<W>

	W= S	Parameter to set subbus
	W=I	Parameter to set input
	W=O	Parameter to set output

<X>

	X=0	Set mute to OFF
	X=1	Set mute to ON (mute the selected channel)
	X=2	Parameter to toggle the state from one state to the other (regardless of current state)
	X=NULL	Report the current state of mute for the selected channel

Return Values

The command will return the mute status (On=1, Off=0) in the same format as the command.

NLP

This command changes or reports back the state of the nonlinear processing for a microphone.

> ↳ DEVICE] **NLP** <CH> <X>

Explanation

<CH>

	CH= 1-4	Parameter to apply to the specified microphone channel
	CH= *	Parameter to apply command to all microphone channels

<X>

	X=0	Parameter to set the state to OFF
	X=1	Parameter to set the state to soft
	X=2	Parameter to set the state to medium
	X=3	Parameter to set the state to aggressive
	X=Null	Parameter to return the current state

Return Values

The command will return the updated condition (0=Off, 1=Soft, 2=Medium, 3=Aggressive) of the nonlinear processing in the same format as the command.

NOM

This command changes or reports back state of NOM attenuation for each channel.

> ↳ [DEVICE] **NOM** <CH> <X>

Explanation

<CH>

	CH= 1-4	Parameter to apply to the specified direct output channel
	CH= A-D, T	Parameter to apply to the specified line output

<X>

	X=0	Parameter to set NOM attenuation to OFF
	X=1	Parameter to set NOM attenuation to ON
	X=Null	Parameter to return the current state of NOM attenuation

Return Values

The command will return the updated condition (On=1, Off=0) of NOM attenuation for the selected channel in the same format as the command.

NULL

This command sends a short noise burst down the telephone line and forces the AP400 to adapt to the telephone line.

> ↳ [DEVICE] **NULL**

Return Values

If the NULL succeeds, the following is returned out the serial port:

[DEVICE] NULL

If the NULL fails, the following is returned out the serial port:

[DEVICE] NULL

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OFFA

This command changes or reports back the setting of off attenuation.

⌨ [DEVICE] **OFFA** <X>

Explanation

<X>

X=0-50	Parameter to set the amount of off attenuation (in dB)
X=Null	Parameter to return the current value of off attenuation

Return Values

The command will return the updated value of off attenuation in the same format as the command.

PAA

This command selects or returns the current status of the PA adaptive mode.

⌨ [DEVICE] **PAA** <X>

Explanation

<X>

X=0	Parameter to select PA adaptive mode to OFF
X=1	Parameter to select PA adaptive mode to ON
X=Null	Parameter to return the current mode

Return Values

The command will return the updated condition (On=1, Off=0) of the PA adaptive mode in the same format as the command.

PCMD

This command programs or returns the program of the GPIO control pins from the serial port. COMMAND can be any valid command. These values are not part of the preset and do not change when presets are loaded.

⌨ [DEVICE] **PCMD** <LOCATION> <COMMAND>

Explanation

<LOCATION>

LOCATION=1	Control pin 1 active
LOCATION=2	Control pin 1 inactive
LOCATION=3	Control pin 3 active
LOCATION=4	Control pin 3 inactive
LOCATION=5	Control pin 5 active
LOCATION=6	Control pin 5 inactive
LOCATION=7	Control pin 7 active
LOCATION=8	Control pin 7 inactive
LOCATION=9	Control pin 9 active
LOCATION=10	Control pin 9 inactive
LOCATION=11	Control pin 11 active
LOCATION=12	Control pin 11 inactive
LOCATION=13	Control pin 13 active
LOCATION=14	Control pin 13 inactive
LOCATION=15	Control pin 15 active
LOCATION=16	Control pin 15 inactive

PCMD (cont.)

Explanation (cont.)

<COMMAND>

	COMMAND=String	Pin will execute string when actuated
	COMMAND=Null	Parameter to return the current programming for the pin
	COMMAND=Clear	Parameter to clear current programming (do nothing state)

COMMAND LIST: AA, AD, AGC, CHAIRO, EQ, GAIN, GMODE, HOOK, LFP, MUTE, NULL, PRESET, TE

Return Values

The command will return the updated condition of the pin in the same format as the command. If the command did not alter the state, the command returns the current command for which the pin is programmed.

Example

The PCMD command line contains both the PCMD command and the command being programmed. To program AP400 unit 0 control/status pin 1 to toggle mute on mic 1, the command would appear as follows:

> #30 PCMD 1 MUTE 1 I 2   (toggles mute to the opposite state: ON to OFF and vice-versa)

PEVNT

This command programs or returns the program of the GPIO status pins from the serial port. The command line follows the same format as shown in the PCMD example above.

> 🖑 [DEVICE] **PEVNT** <LOCATION> <EVENT>

Explanation

<LOCATION>

	LOCATION=1	Status pin 2 active
	LOCATION=2	Status pin 2 inactive
	LOCATION=3	Status pin 4 active
	LOCATION=4	Status pin 4 inactive
	LOCATION=5	Status pin 6 active
	LOCATION=6	Status pin 6 inactive
	LOCATION=7	Status pin 8 active
	LOCATION=8	Status pin 8 inactive
	LOCATION=9	Status pin 10 active
	LOCATION=10	Status pin 10 inactive
	LOCATION=11	Status pin 12 active
	LOCATION=12	Status pin 12 inactive
	LOCATION=13	Status pin 14 active
	LOCATION=14	Status pin 14 inactive
	LOCATION=15	Status pin 16 active
	LOCATION=16	Status pin 16 inactive

Preset Command Note: PRESET has two status parameters which can be set in a PEVNT command line: preset and NOT preset. To indicate NOT preset, add "!" to the end of the string. For example, this could be used to show when PRESET 1 occurs and then shut off if any other preset is selected. You would enter PRESET 1 in the active location and PRESET 1! in the inactive location for the desired pin.

<EVENT>

	EVENT=String	Pin will execute string when actuated
	EVENT=Null	Parameter to return the current programming for the pin
	EVENT=Clear	Parameter to clear current programming (do nothing state)

EVENT LIST: AA, AD, AGC, CHAIRO, EQ, GAIN, GMODE, LFP, MUTE, PRESET, TE

Return Values

The command will return the updated condition of the pin in the same format as the command. If the command did not alter the state, the command returns the current event for which the pin is programmed.

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PP

This command changes or reports back the state of the phantom power for a microphone.

      ✍ [DEVICE] **PP** <CH> <X>

Explanation

<CH>

	CH= 1-4	Parameter to apply to the specified microphone channel
	CH= *	Parameter to apply command to all microphone channels

<X>

	X=0	Parameter to set the state to OFF
	X=1	Parameter to set the state to ON
	X=Null	Parameter to return the current state

Return Values

The command will return the updated condition (On=1, Off=0) of the phantom power in the same format as the command.

PRESET

This command selects or reports the current preset configuration used by the AP400.

      ✍ [DEVICE] **PRESET** <X>

Explanation

<X>

	X=1-6	Sets the preset to the number specified
	X=Null	Parameter to return the current preset

Return Values

The command will return the current preset. If the command changed the preset, the updated preset is returned.

REFSEL

This command selects or returns the output to be used as the EC Reference and PA (speaker output).

      ✍ [DEVICE] **REFSEL** <X> <OUTPUT>

Explanation

<X>

	X=1	Parameter to select the EC Reference and PA (speaker output)
	X=2	Parameter to select the G-Link EC Ref bus

<OUTPUT>

	OUTPUT=1-4	Parameter to select 1-4 as the EC reference and PA (speaker output)
	OUTPUT=A-D	Parameter to select A-D as the EC reference and PA (speaker output)
	OUTPUT=E	Parameter to select G-Link EC Ref bus as the EC Reference and PA (speaker output)
	OUTPUT=F	Parameter to select none
	OUTPUT=Null	Parameter to return the EC reference and PA (speaker output) value

Return Values

The command will return the updated condition of the reference and PA (speaker output) select in the same format as the command.

RING

This command reports the presence of a ring on the Telco port. (This is an indication only.)

> ⏚ [DEVICE] **RING**

Return Value

The Ring is sent if a valid ring has been sensed on the Telco line:

> [DEVICE] RING

RXRD

This command controls or reports the Receive Reduction control of the unit.

> ⏚ [DEVICE] **RXRD** <X>

Explanation

<X>

X=0	Parameter to set Receive Reduction to OFF
X=1	Parameter to set Receive Reduction to ON
X=2	Parameter to toggle the current state
X=Null	Parameter to report back the current state

Return Values

The command returns the updated connection state of the unit in the same format as the command.

TAMODE

This command controls or reports the Telephone Adapt Mode control of the unit.

> ⏚ [DEVICE] **TAMODE** <X>

Explanation

<X>

X=0	Parameter to set Telephone Adapt Mode to Auto
X=1	Parameter to set Telephone Adapt Mode to Burst
X=Null	Parameter to report back the current state

Return Values

The command returns the updated connection state of the unit in the same format as the command.

TE

This command controls or reports the connection status of the unit.

> ⏚ [DEVICE] **TE** <X>

Explanation

<X>

X=0	Parameter to set the unit to disconnect from the line
X=1	Parameter to set the unit to connect to the line
X=2	Parameter to toggle the state from one state to the other
X=Null	Parameter to report back the current state

Return Value

If the current state is ON, the following is returned out the serial port:

[DEVICE] TE 1

If the current state is OFF, the following is returned out the serial port:

[DEVICE] TE 0

TERL

This command reports back the telephone echo return loss (TERL) for the AP400 in decibels.

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    ⌨ [DEVICE] **TERL**

Example

If the current TERL level is 10 dB, the following is returned out the serial port:

    [DEVICE] TERL 10

TERLE

This command reports back the telephone echo return loss enhancement (TERLE) for the AP400 in decibels.

    ⌨ [DEVICE] **TERLE**

Example

If the current TERLE level for the telephone canceller is 20dB, the following is returned out the serial port:

    [DEVICE] TERLE 20

TOUT

This command sets or reports the current inactivity timeout before returning to the title screen used by the unit.

    ⌨ [DEVICE] **TOUT** <X>

Explanation

<X>

	X=0	Disables inactivity timeout
	X=1-15	Sets the number of minutes specified
	X=Null	Parameter to return the current number of minutes

Return Values

The command will return the current timeout value. If the command changed the timeout, the updated timeout is returned.

UID

This command returns the unique ID number, the device type and the device number of the AP400. This command is read only. The unique ID number is preprogrammed at the factory and is unique to the unit, while the device number is set by the user at the time of installation.

    ⌨ [DEVICE] **UID**

Return Values

UID returns the device type, device number and unique ID number. The unique ID is composed of an eight-digit hex number assigned at the factory to uniquely identify the unit.

Example

The following command requests the unit ID

from device 31:   The following is returned out the serial port:

#31 UID   #31 UID A4EF906C

VER

This command returns current version of firmware. This version is unique to a released version of firmware and is comprised of the DSP, the FPGA, and HC11 firmware. This command is read only.

    ⌨ [DEVICE] **VER**

Return Values

VER returns the version of firmware in the same format as the command. The Version is composed of a major version number, followed by a period and a minor version number.

Example

The following command requests the

firmware version from device 31:   The following is returned out the serial port:

#31 VER   #31 VER 2.0

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Appendix G: Routing Matrix Worksheet

Routing Matrix Setup

	Outputs			Telco	G-Link			Sub bus	Outputs			
	A	B	C	D	X	Y	Z		1	2	3	4
Input A												
Input B												
Input C												
Input D												
Telco Receive												
G-Link X Bus												
G-Link Y Bus												
G-Link Z Bus												
Sub-bus												
Mic / Line 1*												
Mic / Line 2*												
Mic / Line 3*												
Mic / Line 4*												

*Inputs 1-4   G = Gated   N = Non gated

Echo Cancellation Setup

	Outputs				Outputs				G-Link EC Ref
	A	B	C	D	1	2	3	4	
Define EC Ref & PA (Speaker Output)									
Define G-Link EC Ref									

Appendix H: Programming Worksheet

AP400 Parameters Worksheet

System Wide Parameters

Program Parameter	Selection Range
Preset	1 - 6
Lock Front Panel	On, **Off**
Set Passcode	Any Five Front Panel Keys
Device ID No.	**0** - 7
Unit ID No.	Factory Programmed
Mixer Mode	**Master-Single**/Linked, Slave
RS-232 Baud Rate	**9.6**, 19.2, 38.4kbps
RS-232 Flow Control	On, **Off**
Modem Mode	On, **Off**
Clear Modem Password	**Enter**
Timeout	0 - 15 (**10**)
Auto Answer	On, **Off**
Auto Disconnect	Off, **Loop Drop**, Call Prog, LD + CP
*Telco Adapt Mode	**Auto**, Burst
*Hook Duration	50 ms, **500ms**
*Receive Reduction	On, **Off**

Input Channel

Program Parameter	Selection Range	1	2	3	4	A	B	C	D	Telco	S1
Input Gain Adjust	-20dB to 20dB (**0**)										
Subbus Attenuation	0dB to -20dB (**-6dB**)										
Input Type	**Mic 55dB**, Mic 25dB, Line										
Microphone Activation	**Auto**, Override On/Off, Manual On/Off										
Mute	On, **Off**										
Phantom Power	**On**, Off										
AGC	On, **Off**										
High-Pass Filter	On, **Off**										
EQ	On, **Off**										
*Low Band EQ	-12dB to 12dB (**0**)										
*Mid Band EQ	-12dB to 12dB (**0**)										
*High Band EQ	-12dB to 12dB (**0**)										
Chairman Mic	On, **Off**										
Adaptive Ambient	**On**, Off										
Echo Cancellation	**On**, Off										
NLP	Off, **Soft**, Medium, Aggressive										

Output Channel

Program Parameter	Selection Range	1	2	3	4	A	B	C	D	Telco
Output Gain Adjust	-20dB to 20dB (**0**)									
Mute	On, **Off**									
NOM	On (**A - C, Telco**) or Off (**1 - 4, D**)									

Auto Mix Parameters

Program Parameter	Selection Range
PA Adaptive	**On**, Off
Maximum No. of Mics	Off, 1-8 (**4**)
First Mic Priority	**On**, Off
Last Mic Mode	Last On, **Off**, or Mic 1
Gate Ratio	0 - 50 dB (**15**)
Off Attenuation	0 - 50 dB (**12**)
Hold Time	.1 - 8.0 seconds (**.3**)
Decay Rate	**Slow**, Medium, Fast
Manual Ambient	0dB to -70dB (**-30**)

* Set up only by serial port

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Appendix I:
Audio Flow Block
Diagram