

DH30



Digital Telephone Hybrid

Installation & Operations Manual



Gentner

Perfect Communication through Technology, Service, and Education.™

DH30 Installation and Operations Manual
Gentner Part No. 800-012-301
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The connection ports on the DH30 are to be used as follows:

Power	Connection to the provided power cord
Remote	Connection to external controlling device
Monitor Out	Connection to external speaker or headphones
Send In	Connection to audio output devices
Cue In	Connection to audio output devices
Caller Out	Connection to audio input devices
Aux Out	Connection to audio input devices
Telephone Line	Connection to telephone line
Telephone Set	Connection to telephone set
Record Control	Connection to external recorder control
RS232	Connection to external remote control device or PC
AES/EBU In	Connection to digital AES/EBU output devices
AES/EBU Out	Connection to digital AES/EBU input devices

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"

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



98/482/EC "Single terminal connection to the public switched telephone network (PSTN)"

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1 Introduction

With the variety of telephone systems in the world today, from cellular to digital to analog, it is becoming increasingly difficult to have all callers sound the same on-air. To help bring uniformity and high quality sound to a broadcast talk show environment, we have created the Digital Hybrid 30 (DH30). The DH30 provides a high quality telephone interface between a telephone line and audio equipment. This telephone interconnection system uses digital hybrid technology, invented by Gentner, to continually adapt to telephone-line conditions—providing consistent high-quality sound. Its auto mix-minus generation and acoustic echo cancellation allow the DH30 to be used in any studio environment.

What's In This Manual

The manual is divided into the following sections:

"Overview" summarizes the main capabilities of the DH30, along with the pre-installation site requirements.

"Connecting the Equipment" explains how to connect DH30 cables and how to interconnect the DH30 with your other equipment.

"Setup and Operation" describes how to use the front panel controls to connect and disconnect calls, adjust volume, and customize settings for your unique environment.

"Glossary" defines some of the industry-standard terminology, as well as other technical terms that you may find throughout this manual.

"Appendices" includes DH30 specifications, connector pinouts, serial commands for remote control of the DH30, detailed warranty and compliance information, and schematics.

For additional information on how to install, set up, or operate your system, please contact Gentner in any of the following ways:

Sales and Customer Service

Telephone: 1.800.945.7730 (USA) **or** 1.801.975.7200
Fax: 1.800.933.5107 (USA) **or** 1.801.977.0087
e-mail: bcastinfo@gentner.com

Technical Support

Telephone: 1.800.283.5936 (USA) **or** 1.801.974.3760
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e-mail: tech1@gentner.com

Gentner Communications Corporation

www.gentner.com

1825 Research Way, Salt Lake City, UT 84119

Unpacking

Please make sure you received all the following items:



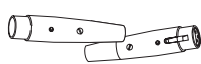
DH30

Part 910-012-301 (domestic)
Part 910-012-302 (international)

AC Power Cord
Part 699-150-006
 (domestic)



International power cord supplied with international DH30

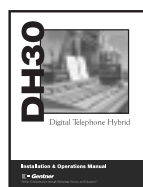


XLRs

1 male, 1 female
Parts 664-600-003
and 664-500-003



12-foot Modular
 Telephone Cable
Part 830-000-012



DH30 Installation and
 Operations Manual
Part 800-012-301

! 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 to be damaged, retain the original boxes and packing material for inspection by the carrier. Contact your carrier immediately.

Warranty Instructions

Please register your DH30 online by visiting Gentner Technical Support on the World Wide Web 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 want to receive upgrades or new product information.

2 Overview

About the DH30

The DH30 continually adapts to telephone-line conditions, providing the best, most-reliable null possible. This ability, along with its programmable auto-answer, auto-disconnect, and caller control functions, makes the DH30 a truly smart digital hybrid. The DH30 has selectable auto mix-minus and acoustic echo cancellation, allowing it to operate in a variety of closed or open studio environments. It also has call monitoring capability with a built-in 2-watt monitoring amplifier and front-panel volume control. AES/EBU connections let you establish a direct digital audio link between the DH30 and a digital console. Analog connections are made using the send and cue inputs and the caller and aux outputs. Each input and output has its own adjustable gain control, ensuring the best audio mix in every application.

Audio Processing

The DH30's 24-bit digital signal processing (DSP) produces high-quality audio with expansion, compression, equalization, and bass boost capabilities. The downward expander, compressor, and 3-band EQ allow you to fine tune the sound of the caller audio, making the DH30 the best sounding telephone hybrid on the market.

Telephone Echo Cancellation

Gentner-developed DSP technology provides a high quality telephone interface between a standard analog telephone line and user audio equipment. The primary function of the hybrid is to separate send and caller audio (null). The hybrid provides >55 dB send/caller isolation between 250 Hz to 3.5 kHz.

User-Adjustable Controls

The DH30 is easily customized. The Enter, Esc, ▲/▼ buttons, along with the LCD display, provide useful control options, including:

- Selectable answer and disconnect options
- Integrated monitor amplifier with push-button volume control
- Adjustable caller audio control
- Adjustable three-band equalization
- Password protection
- Adjustable compressor/limiter and expander

Presets

Presets are the programmable operating parameters that control how the DH30 responds to the telephone line. The DH30 can store up to three presets. The unit ships with Preset 1 containing a set of default values. You can keep these settings or modify them, and you can also set up two additional presets. The Presets feature allows you to easily change to a completely different operating profile. If power is lost, the DH30 powers up with the last preset used, custom presets are not lost.

Operational Requirements

The DH30 is designed to work in almost any acoustic environment. However, to improve audio quality and ease of installation, we recommend that you take the following factors into consideration:

Acoustic Room Treatment

Rooms that have large areas of windows, white boards, hard floors, etc., are acoustically live. These areas increase the amount of audio reverberation in the room which, in turn, reduces audio quality. To achieve the best results using the DH30, you should minimize the amount of audio reverberation wherever possible. You can improve room acoustics by installing acoustic panels, drapes, and other wall fabrics. Another way to improve overall room acoustics is to keep room noise (i.e. computers and fans) to a minimum.

Environmental Requirements

The room temperature at which the DH30 can operate ranges from 32–100 degrees F / 0–38 degrees C, with relative humidity of 0–80 percent.

Telephone Line Requirements

The DH30 operates on standard telephone lines and connects to a standard RJ11C modular jack. If you do not have an RJ11C jack where you want to install the DH30, call your telephone company for installation.

Equipment Placement

The DH30 is designed for installation in a standard 19-inch equipment rack.

Power Requirements

The DH30 automatically adjusts to voltages between 100–240 Vac, 50–60 Hz. Manual voltage switching is not required.

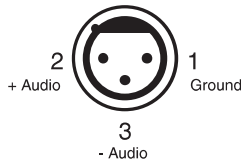
Console Connections

The DH30 ties into console functions through these connectors:

Analog Audio

Send In

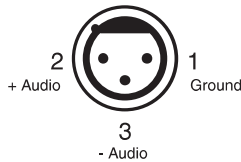
This is the audio that the caller will hear. Connect a mic or line output from the studio console to the Send In input of the DH30.



If the DH30's echo canceller feature is disabled, you must send mix-minus audio to the Send In connector. If you are using a microphone connected directly to the DH30 that requires phantom power, you will need to activate the phantom power circuit. Refer to Appendix J.

Cue In

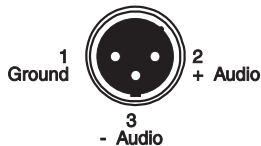
This is the audio the caller will hear when the cue feature, located on the front panel, is activated. Connect a mic or line output from the studio console to the Cue In input of the DH30.



No auto mix-minus or acoustic echo cancellation is performed on the Cue audio and therefore the audio sent to this input must be a mix-minus.

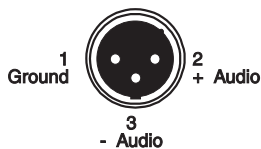
Caller Out

This is the output of the callers voice. Connect the Caller Out to an input channel of the studio console.



Aux Out

This is the output of the caller audio and the send or cue audio (whichever is selected via the Cue button). Connect the Aux Out to an input channel of your studio console or recording device.



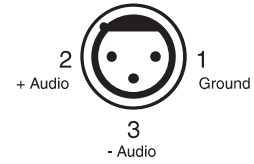
The caller/send mix is programmable through the front panel LCD display.

Digital Audio

AES/EBU In

This is the audio that the caller will hear. Connect an AES/EBU output from the studio console to the AES/EBU In input of the DH30.

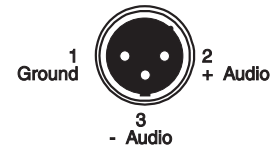
This connection provides a digital audio input directly to the Digital Signal Processor (DSP). The AES/EBU digital audio input is stereo. The left channel is designated as the send audio input and the right channel is the cue audio input. The DH30 automatically synchronizes to the AES/EBU sample rate connected at the input.



AES/EBU Out

This is the output of the callers voice. Connect the AES/EBU Out to an AES/EBU input channel of the studio console.

This connection provides a digital audio output directly from the DSP. The output sample rate follows the AES/EBU input sample rate. If no AES/EBU sample rate is provided, the rate defaults to 32 kHz.

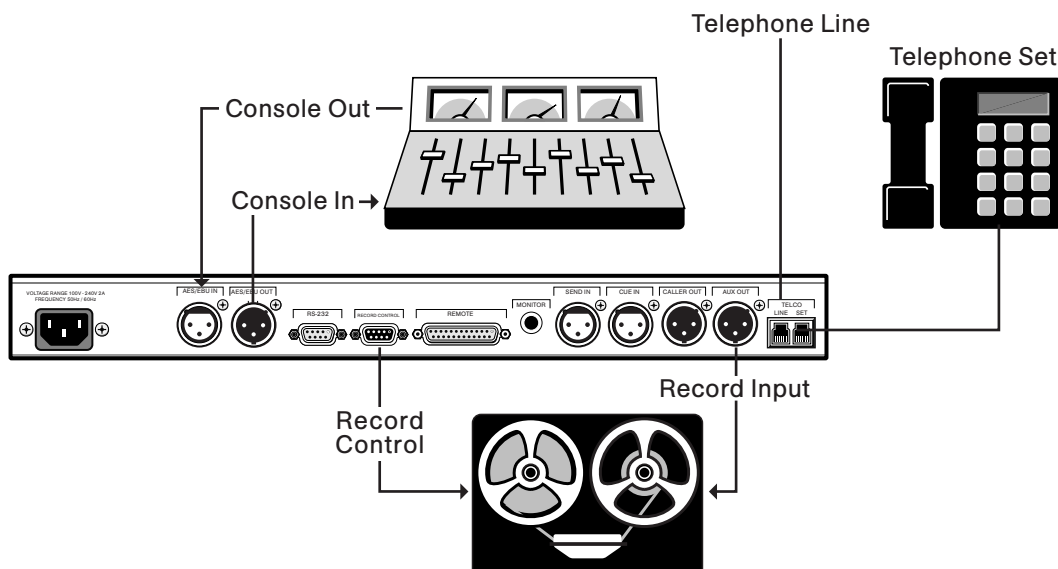


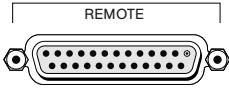
The AES/EBU digital audio output is stereo. The left channel is designated as the caller audio out and the right channel contains the send or cue audio (whichever is selected via the Cue button).



You should cycle power anytime you disconnect AES/EBU connectors from the DH30.

The diagram below shows a typical DH30 digital installation:





Remote

Connect a DB25 parallel cable to this connector to provide control and status via your console remote port or contact-closure switches. This connector also contains unbalanced audio inputs and outputs. See Appendix B for pinouts.



Call Monitor Monitor

Connect a speaker or mono headphones to this 1/4-inch phone jack to produce a 2-watt amplified audio signal for call monitoring. Only caller audio is present on this output. Stereo headphones will contain caller audio in one earpiece only.

(The front panel volume buttons control the level of this output. See Setup and Operations section for front panel usage.)

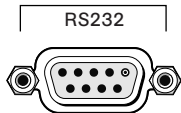


Recording Devices

Record Control

Control a tape deck or other external recording device with this DB9 Record Control connector.

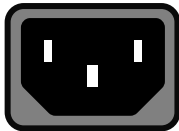
This DB9 female connector sends start, stop, and enable commands for automatic telephone call recording. This connector provides control only. Use the Aux Out connector to route audio to the recording device.



RS232 Serial Connection

This DB9 female connector connects to the serial port of a PC or other RS232 device. The serial port settings are fixed at 9600 baud, 8-bit, no parity, 1 stop bit. This port receives commands to remotely control operation, request status, or download firmware upgrades. Refer to Appendix C for serial communications protocol.

VOLTAGE RANGE 100V - 240V 2A
FREQUENCY 50Hz / 60Hz



Power Connection

The power connection automatically adjusts to accept voltages between 100–240 Vac, 50–60 Hz.

The AC power cord is a NEMA type connector which allows use of domestic US power cords as well as other international power cords.

4 Setup and Operation

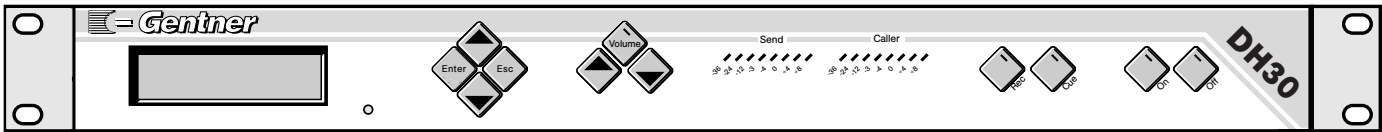
As soon as you connect power and the DH30 completes its initialization cycle (about two seconds), it is functional. The factory default settings that are active upon power-up can accommodate basic operation. You can immediately use the hybrid to connect, disconnect, and record calls.

Before initial use, it is recommended that the DH30 be calibrated to your telephone system and audio controls. Depending on your site's unique needs, some settings may require modification.

This section covers:

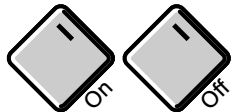
- Viewing or changing operating parameters through the LCD panel
- Connecting, disconnecting, and recording calls
- Adjusting gain
- Changing presets
- Fine tuning audio
- Echo cancellation

Quick Guide to the Front Panel Controls



On and Off

When the DH30 is plugged in, it defaults with the hybrid off, indicated by the red Off LED.



The On button connects the DH30 to the telephone line and causes the hybrid to adapt to the line. Pressing the On button while the DH30 is connected to a telephone line readapts the hybrid. A steady green LED indicates that the DH30 is on. A flashing green LED indicates an incoming call.

When the Off button is pressed, the DH30 disconnects from the telephone line and mutes caller audio. The red Off LED illuminates.

Record

The Rec button controls the start or stop of an external recording device connected to the DH30 through the Record Control output on the rear panel.



The Record LED flashes red when recording, appears solid red in record-ready (standby) mode, and is not lit when record mode is off.

Cue

The Cue button enables the talent to speak to a caller off the air. When you press the Cue button, the Cue LED illuminates and audio from the cue input is routed to the caller. When the Cue button is off, the Cue LED turns off and audio from the send input is routed to the caller.

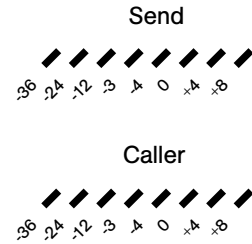


The DH30 defaults with the cue mode off. Neither auto mix-minus nor acoustic echo cancellation is performed on the cue input. Therefore, a mix-minus audio source must be provided to the cue input.

VU Meters (Send and Caller)

These LEDs indicate the audio levels at the Send and Caller XLR connectors.

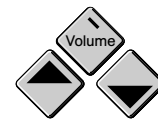
The Send meter indicates the level of the audio sent to the caller. The input gain should be set so that the average send level is at 0 dBu with occasional peaks to +4 dBu.



The Caller meter indicates the level of the audio being received by the hybrid. Caller processing (compressor, EQ, gain, and the other caller processing parameters) is reflected in the Caller meter reading.

Volume

The up and down arrows (▲/▼) raise or lower the volume level of the internal 2-watt power amplifier to the speaker or headphone connected to the Monitor jack on the rear panel. Pressing a button once increases or decreases the level by 3 dB. Holding down a button sweeps the volume up or down.

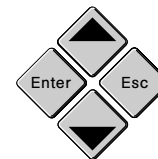


At power up, the monitor volume defaults to a nominal reference of 0dB. The volume may be adjusted between +18 dB and -27 dB. Reducing the volume past -27 dB turns off the monitor and mutes the power amplifier output, indicated by the solid red Volume LED.

Pressing ▲ and ▼ simultaneously will reset the volume to nominal (0 dBu).

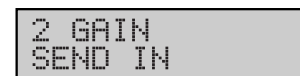
Enter, Esc, ▲/▼

These four buttons allow you to navigate through the menus and adjust parameters on the adjacent LCD panel. They are also used in setting and entering the password.



LCD Display

The LCD display is a two-line, 16-character alphanumeric display. The first line displays the main menu categories. The second line displays the adjustable parameters.



Handling Calls



To set up the DH30 for automatic answer or disconnect, refer to System Parameters (pages 26–27).



If the handset is off hook when the Off button is pressed, the caller will remain on the handset.

Receiving a Call

On-Air

When a call rings on the telephone line connected to the DH30, the On LED will flash and the telephone connected to the Set output will ring. Answer the call by pressing the On button or activating the hybrid from your remote console control (if applicable). This routes the call through the hybrid, and the green On LED illuminates. Upon connection, the DH30 automatically adjusts to line conditions.

Off-Air

Answer the call by picking up the telephone handset and talking to your party over the telephone. Do not press On.

Disconnecting a Call

If the call is routed through the DH30 (the On LED is lit), press the Off button to disconnect the call. The Off LED illuminates, and the On LED goes out.

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

Making a Call

Call the party normally, using your telephone handset. After the other party has answered, put the call on-air by pressing the On button. The On LED lights and the DH30 takes control of the call, disabling the telephone set. You may safely hang up the handset without disconnecting your call. When the conversation is complete, press the Off button to disconnect the call. If you wish to take the caller off the air without hanging up, pick up the handset and then press the Off button.

To make a telephone call off-air, call the party normally, using your telephone handset. After the other party has answered, conduct your call as you normally would and hang up the handset when finished.

Recording a Call

The record function controls a recording device through the DB9 Record Control connector. To use the record function, a recording device must be connected to the DB9 Record Control connector. The Aux Out connector of the DH30 must also be connected to the recording device.

The record function has three settings: off, record-ready (standby), and on (recording). Pressing the Record button has different effects, depending on whether the DH30 is on or off.

When the hybrid is recording, the LED flashes. When the hybrid is in record-ready mode, the LED is steady. And when the hybrid is not recording, the LED is not lit.

Recording Manually

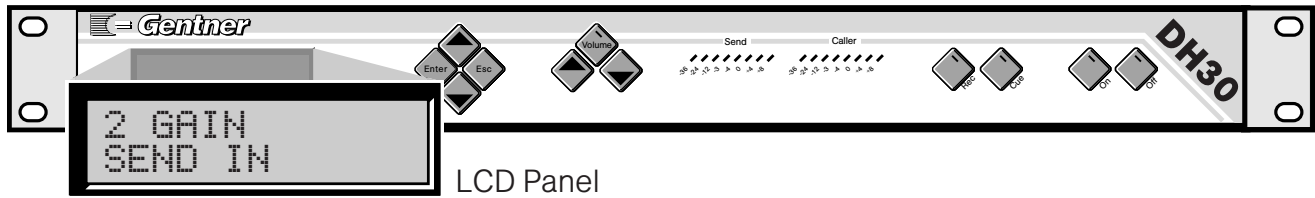
When the hybrid is on, press Record to begin recording. The LED will flash. When you turn the hybrid off or when you press Record again, recording will stop and the LED will go off.

Using Record Ready

Press Record when the hybrid is off. The Record LED will illuminate. When the On button is pressed, recording begins automatically and the Record LED flashes. When the hybrid is turned off or when you manually press the Record button again, recording stops and the Record LED becomes steady, indicating record-ready mode is still active.



The On and Off buttons of the hybrid control the start and stop signals of the record connector in record-ready mode. This is ideal for unsupervised applications that use auto answer/disconnect in conjunction with recording devices.



LCD Panel

Using the Navigating Buttons and Adjusting Parameters

To scroll through the menu items on the LCD panel, press the Up and Down buttons. When a desired menu item is reached, press Enter. Use the Up and Down buttons to scroll through the parameters. Press Esc to go back one level in the menu. At the end of the list of menu items, the menu will wrap around to the beginning.

Adjusting Parameters

As you enter a menu item and reach an adjustable parameter, the current value is displayed on the second line. To adjust the parameter, press Enter. The parameter will begin to blink, indicating that the Up and Down buttons will adjust the value. As values are adjusted up and down, the change takes effect immediately. For example, as you adjust the caller out gain, you'll hear the level change. While adjusting a parameter up and down, an asterisk appears when the displayed value matches the preset value.

When you have adjusted the parameter to the desired value, press Enter. This stores the value in the menu and it becomes the new preset value. If you press Esc, no changes will be made to the parameter, leaving the original setting as the preset value.

Viewing or Changing Settings Through the LCD Panel

The table below summarizes the settings available through the LCD panel. Refer to Appendix I (page 58) for a worksheet version of this chart.

Menu Category	Selections	Function	Defaults
Presets		Store 3 sets of unique configurations that can be selected	
	Select Preset	Selects Preset 1, 2, or 3 – loads all parameters associated with selected preset	1
	Copy Preset	Copies settings from the active preset into one of the other two presets	N/A
	Recall Default	Restores settings to factory default for current preset	N/A
Gain		Set gain for inputs and outputs	
	Send In	Adjusts send audio level as heard by caller	0dB
	Send Mic/Line	Adjusts send input for mic or line input	Line
	Cue In	Adjusts cue audio level as heard by caller	0dB
	Cue Mic/Line	Adjusts cue input for mic or line input	Line
	Call Out Gain	Adjusts caller's audio level out of DH30	0dB
	Aux Send	Adjusts send audio level at Aux output	0dB
	Aux Caller	Adjusts caller audio level at Aux output	0dB
Caller Processing		Adjust audio for incoming calls	
	3 Band EQ	Adjusts to tonal quality of the caller's voice	Bypass
	Compressor	Enables DH30 to handle wide range of caller voice levels	Bypass
	Expander	Attenuates line or background noise when caller is not talking	Bypass
	Bass Boost	Enhances caller bass	Bypass
	Caller Control	Allows talent to talk over caller	0dB
	Noise Burst	Toggles whether noise burst is sent down telephone line when connection to the phone line is made	On
Echo Canceller		Adjust auto mix-minus/AEC	
	Mix-minus/AEC	Turns mix-minus/acoustic echo cancellation on/off	On
	Echo Reduction	Selects echo reduction enhancement	Normal
	EC Train	Trains echo canceller to the room environment (acoustic) or studio (auto mix-minus) during setup	N/A
	Diagnostics	Displays measurements for troubleshooting	N/A
	Test Signal	Turns on/off noise generator to test receive or transmit	Off
System		Adjusts various system parameters	
	Auto Answer	Turns on/off automatic phone answer on first ring	Off
	Auto Disconnect	Selects type of auto disconnect	Off
	Remote Control	Sets remote On pin for momentary or latching control	Momentary
	Remote Auxpins	Selects auxpins for preset selection or audio muting control	Select Presets
	Sample Rate	Displays system sample rate	32,000 internal
	Send to Aux	Selects type of send audio routed to Aux output	Processed
	Set Passcode	Sets passcode used to lock and unlock adjustment presets	▼▼▲▲
	Version	Displays firmware version of DH30	Enter
			N/A
Lock Panel		Locks Adjustment of Parameters	
	On/Off	Toggles adjustment of presets off and on, offering protection to preset parameters. "L" appears in the bottom right corner of LED screen when locked	Off

Using Presets

Preset 1

Preset 2

Preset 3

The DH30 allows the pre-configuration of up to three complete usage profiles through the Presets menu.

First, select the preset (Preset 1, Preset 2, or Preset 3) you want to work with.

Within the Preset menu you can copy preset values into one of the other two presets, you can edit current parameters, or you can choose to restore the values in that preset to the factory defaults (Recall Defaults option).

Any time you change values within the LCD menus, you are changing the values of the selected preset. Once you have entered changes in a preset, those values remain until they are manually reconfigured. Losing power does not affect the presets.

Setting Levels

When adjusting levels, the hybrid should be connected to the telephone line. Have someone call the DH30 from another location. Answer the line by pressing the On button. (If the auto-answer feature is active, the unit will answer the call after one complete ring.) Modify the level settings as follows:

1. Press Gain from the LCD panel and use the arrow keys to locate the appropriate function.
2. Press Enter.
3. Use the arrow buttons to adjust levels. (You can observe Send In and Caller Out level changes on the Send and Caller meter LEDs.)
4. Press Enter to save the value into the current-selected preset.

Submenu Options	Function	Hints for Setting
Send In Gain	The Send In level is set for a nominal input level of 0dB. This line-level input is adjustable from -20dB to 20dB	Adjust to select a value that registers 0dB on the Send meter LED
Send Mic/Line Gain	Adds 55 dB fixed gain	Set to LINE unless you are connecting directly to a microphone
Cue In Gain	The Cue In level is set for a nominal input level of 0dB. This input level is adjustable from -20dB to 20dB	With Cue audio selected, adjust to select a value that registers 0dB on the Send meter LED
Cue Mic/Line Gain	Adds 55 dB fixed gain	Set to LINE unless you are connecting directly to a microphone
Caller Out Gain	The Caller Out level is set for a nominal output value of 0dB. This output is adjustable from -20dB to 20dB	Adjust to match the nominal input level requirements of your console
Aux Send/Caller Output Gain	The Aux Send and Caller level is set for a nominal output value of 0dB. This output is adjustable from -20dB to 20dB	Adjust the balance of this and the following option so they are matched in level for nominal input to your recorder from the AUX output

Auto Mix-Minus and Acoustic Echo

The DH30 can cancel two types of echo: electronic and acoustic (room) echo. By setting the mix-minus/acoustic echo cancellation, you can cancel either or both types of echo.

Electronic echo is the echo caused by the caller's audio being sent back to the caller through the mixing console. This can be prevented by creating a mix-minus at the mixing console. Mix-minus is the mix of everything you want the caller to hear minus the caller's own audio.

Acoustic echo is the echo in a room environment. In an application such as a talk show, speaker audio may be picked up by microphones and fed back to the caller. Acoustic echo cancellation prevents this audio from being fed back to the caller.

Mix-Minus/Acoustic Echo Cancellation

Mix-minus and acoustic echo cancellation (AEC) are turned on and off through the Echo Canceller menu in the LCD panel. Although the DSP automatically adjusts to cancel echo, it is recommended you train the echo canceller to the echo when you first install the DH30. (See EC Train, page 22)

1. Use the arrow buttons to display **Echo Canceller**. Press Enter.
2. Use arrow buttons to display **Mix-minus/AEC**.
3. Select On or Off, then press Enter to activate your selection.
4. Press Esc to return to the previous menu level.



If your mixing console is feeding mix-minus to the DH30 and you have removed acoustic echo in the studio, you should turn off the Mix-minus/AEC function of the DH30.

Echo Reduction

Echo reduction provides additional echo cancelling capability to the echo canceller in difficult acoustical environments. To activate, set the amount of non-linear processing the DH30 uses. The more aggressive the setting, the greater the chance of cutting off the caller's audio during a conversation.

1. Use the arrow buttons to display **Echo Canceller**. Press Enter.
2. Use the arrow buttons to display **Echo Reduction**. Press Enter.
3. Use the arrow buttons to display the appropriate option: **Off**, **Soft**, **Normal** (default), **Aggressive**, or **Max**. Press Enter to activate your selection.
4. Press Esc to return to the previous menu level.

EC Train

Once mics and monitors are positioned in the studio and the levels are set on the mixing board, the DH30 should be trained to electronic and acoustic echo.

Training the DH30

Select Echo Canceller/EC Train in the LCD display. The display shows both the Echo Return Loss (ERL) and the current Echo Cancellation (EC).

1. Place a call and route it through the DH30, or have someone call in. If echo is present, continue with steps 2–7.
2. Select **EC Train** from the Echo Canceller menu and press **Enter**. This sends a constant burst of white noise out of the Caller Out output. The EC Train uses this white noise to monitor how much noise comes back to the DH30 through the acoustic and electronic environment.
3. View the ERL reading on the DH30 LCD display. The ERL should be at a reading of 0 or below.
4. If the reading is in the positive, decrease the speaker monitor level and/or the caller audio level of the program mix until the ERL reading is 0 or lower.
5. Press **Esc**. This stops the white noise.
6. Have the person on the other end of the telephone line tell you if an echo is present.
7. If an echo is heard, go back to step one and readjust your levels for an even lower reading OR adjust the amount of echo reduction (see Echo Reduction).

Diagnostics

The diagnostics feature is used to troubleshoot echo. This feature gives you the real time and average readings for:

TERL—Telephone Echo Return Loss
TEC—Telephone Echo Cancellation
TNLR—Telephone Non Linear Processing
AERL—Acoustic Echo Return Loss
AEC—Acoustic Echo Cancellation
ANLR—Acoustic Non Linear Processing

The Telephone Diagnostic Bits (TDB) and Acoustic Diagnostic Bits (ADB) readings are reserved for technical support troubleshooting.

To view these readings:

1. Use the arrow buttons to display **Echo Canceller**. Press Enter.
2. Select **Diagnostics**. Press Enter.
3. Use the arrow buttons to select the desired readout.
4. Press Enter to generate a test signal.
5. Press Enter to cycle through receive, transmit, and receive and transmit test signals.

Test Signal

When configuring your DH30, you can send a test signal through the monitor (receive), through the telephone line (transmit), or through both.

1. Use the arrow buttons to display **Echo Canceller**. Press Enter.
2. Use the arrow buttons to select **Test Signal**. Press Enter.
3. Use the arrow buttons to select Receive, Transmit, or both.
4. Press Enter to send the test signal.
5. To stop the signal, use the arrow buttons to select Off. Press Enter.



When generating tones during the diagnostic, you must scroll through all three readouts before the test signal ceases. Pressing Esc will take you out of the diagnostic, but will not stop the test signal.

Customizing the Sound of Your System

Setting Caller Processing

The Caller Processing menu category in the LCD panel includes six submenu items for controlling various facets of the caller audio.

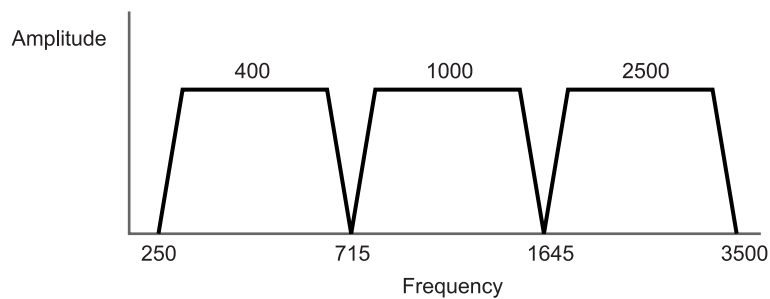
EQ (Equalizer)

The equalizer function is used to modify the tonal quality of the caller audio. The basic function is a simple three-band graphic equalizer. The adjustments to each band determine how much adjustment is made to the caller audio signal.

When active, the graphic caller equalizer will have the following characteristics:

- LowBand = 250 Hz – 715 Hz
- MidBand = 715 Hz – 1,645 Hz
- HiBand = 1,645 Hz – 3,500 Hz

Adjustment in each band is from -12 to +12 dB.



Compressor

The function of the compressor is to keep the caller output at the same level regardless of the incoming level. The caller level should be set to accommodate the quiet callers. The DH30 compresses, or attenuates, the louder levels.

The compressor works in conjunction with its threshold setting. The threshold setting is the level at which compression will begin. The ratio determines the attenuation applied to levels above threshold. For example, a 2:1 ratio means that for every 2 dB the caller is above threshold, the audio level will increase only 1 dB. The larger the ratio, the more compression is applied. The limiter setting keeps the level from exceeding the threshold. The bypass setting disables the compressor.

- Ratio options are: Bypass, 2:1, 3:1, 4:1, 6:1, and Limiter.
- Threshold is referenced to the level of the caller audio on the VU meter. Adjustable from -20 dBu to 20 dBu.
- Post gain adds gain to all audio to compensate for compression. Adjustable from 0 to 20 dB.
- Attack sets the time required to compress when audio exceeds threshold. Adjustable from <1 to 50 ms.
- Release sets the time required to release compression when audio falls below threshold. Adjustable from 100 ms to 2000 ms (2 seconds).

Expander (Downward expander)

The expander reduces telephone line noise when the caller is not talking by decreasing audio gain when caller audio falls below the threshold level. As long as the caller audio remains above the threshold, the expander function remains at unity gain (no expansion). When the caller audio sample drops below the expander threshold, the expander function decreases the gain by the ratio determined at setup.

The expander has the following characteristics:

- Expansion ratio is adjustable in the following ratios: Bypass, 2:1, 3:1, 4:1, or 6:1.
- Threshold is referenced to the caller out level. Adjustable from -50 dBu to 0 dBu.
- Expansion attack time adjustable from <1 to 50 ms.
- Expansion release time adjustable from 100 ms to 2000 ms (2 seconds).



If the expander threshold is set too high, the DH30 may treat the caller as noise.

This results in downward expansion of caller audio.



If you have increased the bass in the Caller Processing menu, you may need to add echo reduction to compensate.

Bass Boost

Boosting the bass gives a fuller sound to the caller's audio by enhancing frequencies below 250 Hz. The front panel LCD program allows you to adjust the Bass Boost feature over a range of 0 to 10, with 10 being most enhanced.

Caller Control

Caller control allows the talent to talk over the caller, reducing caller audio whenever send audio is present. When send audio is present, the caller will attenuate/duck by the amount adjusted. You can adjust the amount of caller attenuation provided, from 0 to -30 dB. A typical setting would be -6 to -12 dB.

Noise Burst

If activated, a momentary noise burst will be sent to the telephone line when turning the hybrid on. The noise burst allows the DSP to adapt the telephone echo canceller and provides a better null at the beginning of the call. Without the noise burst, the DSP may add attenuation on the caller audio until the DSP has adapted to an acceptable null.

The tradeoff in setting noise burst on is that the caller hears a momentary noise burst, but the telephone audio is immediately adapted. Setting the noise burst off spares the caller the brief noise, but the DH30 may require 5 to 20 seconds to adapt.

Training the Telephone Echo Canceller

- To retrain a connection to a telephone line, momentarily press the On button after the hybrid is already connected to the telephone line. This initiates the same noise burst mentioned above and retrains the hybrid.

System Parameters

These parameters control the telephone connect and disconnect modes, remote control switching mode, quality of audio sent to the Aux Out jack, sample rate for equipment synchronization, passcode protection, notice of the firmware version level, and the panel locking feature.

Activating Auto Answer

1. Select Auto Answer from the system menu and press Enter.
2. Use the arrow buttons to select On.
3. Press Esc to exit the function.

In the auto-answer mode, the DH30 automatically answers telephone calls after one complete ring. Upon answering, the red Off LED goes out and the green On LED comes on. The call is routed through the digital hybrid and its connection to the console.

Activating Auto Disconnect

1. Select Auto Disconnect from the system menu and press Enter.
2. Use the arrow buttons to select the signal type the DH30 must detect before disconnecting the call: Loop Drop Only, Call Progress Only, or Loop Drop+CP.
3. Press Esc to exit the function.

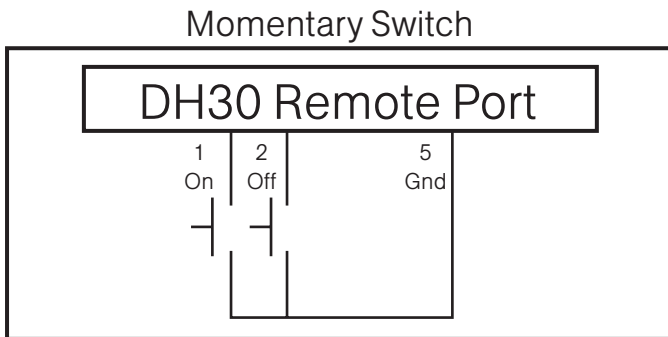
When the call is terminated, the digital hybrid senses the hang up and automatically turns the digital hybrid off. The green On LED goes out and the red Off LED comes on.

Remote Control

DH30 on and off functions can be remotely controlled by momentary or latching switches. To change the setting, select Remote Control from the system menu and press Enter. Then select Momentary or Latching and press Enter.

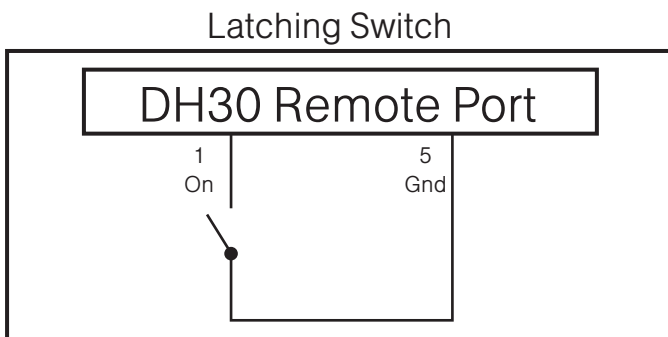
Momentary

If you prefer to use a momentary switch to remotely control the DH30, select Momentary in the Remote Control menu. Pins 1 and 2 when shorted to ground, will remotely turn the DH30 on and off respectively.



Latching

If you prefer to use a single switch to remotely control the DH30, then select Latching in the Remote Control menu.



Auto disconnect may not function as described with some PBX systems.

Problems in auto-answer mode may be caused by ring timing. Also, some PBX systems do not provide loop drop or loop reversal when disconnecting calls. If your PBX only provides reorder tone or busy signals, the call-progress function must be enabled for auto-disconnect to function properly.



The DH30 disconnects on all reorder tones with a cadence.



The RECORD and CUE functions can only be activated by momentary closures. See Appendix B for pinout information.

Remote Aux Pins

This feature offers pin reassignment to the preset/mute audio pins. When Mute Audio is selected: Mute Caller mutes the caller audio, Mute Monitor mutes the monitor output, and Mute Send mutes the send audio. When Select Presets is selected, you can choose between three user-programmed settings by activating the associated preset pin. See Appendix B for pinout information.

Send to Aux

This option determines the type of send audio that goes to Aux Out and AES/EBU Send output. Audio types include Off, Processed (echo cancelled and bandwidth limited), and Full (full bandwidth and not echo cancelled). If Mix-minus/AEC is on, then Send to Aux must be off or processed.

AES/EBU Sample Rate

A 32 kHz internal digital sample rate is supported by the DH30 (view the rate through the LCD panel). This sample rate will follow the sample rate of the external AES/EBU equipment connected to the DH30 AES/EBU input. Digital audio and analog audio are always operational simultaneously on the hybrid.

Set Passcode

The DH30 user passcode can be user programmed. The default passcode is ▲▲▼▼Enter.

1. Use the arrow buttons to display **System**. Press Enter.
2. Use the arrow buttons to display **Passcode**. Press Enter.
3. You will be prompted for a new five character passcode. The ▼, ▲, Esc, or Enter keys are valid passcode keys.
4. Once you enter the new passcode, you will be prompted to verify the passcode.
5. If you enter the new passcode incorrectly, **Mismatch** will appear and you will have to begin again. If you enter it correctly, **Passcode Changed** will appear and the new passcode will be activated.

Version

Displays current operating version of the DH30.

Lock Panel

Toggles the lock on/off. You will need to enter the passcode to lock or unlock the panel controls. When the panel is locked, the user can select presets but cannot change the parameters of the presets. To verify that the panel is locked, an 'L' will appear in the bottom right corner of the LCD display.

5 Glossary

AES/EBU. Audio Engineering Society/European Broadcasting Union. The protocol for communicating two-channel digital audio information over a serial link.

AEC. Acoustic Echo Cancellation. The process of removing echo before it returns to its source.

AERL. Acoustic Echo Return Loss. The amount of echo returned to the audio source in an acoustic environment.

Analog Line. A telephone line that is not digital.

Balanced Audio. A two-line audio signal without reference to ground (i.e. differential-mode audio).

Bass Boost. Spectral enhancement of frequencies below 250 Hz.

Bypass. A route where current flows around instead of through a component or circuit.

Cadence. Any tone on a telephone line that has a distinct pattern.

Call Progress Tones. Tones sent from the telephone switch to inform the caller or devices that a call has ended. These tones include a busy signal, dial tone, fast busy, or dual-tones.

Caller. The caller's voice as it enters the hybrid from the telephone line.

Caller Control. Suppression of caller audio when send audio is present.

Compressor. See Limiter.

Console. The audio mixer used to combine all programming sources. A console is also called a mixing board, a mixer, audio board, etc.

Cue. Audio heard by caller when cue mode is active.

Digital Signal Processing. Digitally modifying a signal to provide a specific function or output.

Dryline. A telephone circuit over which voice signals are transmitted and which contains no DC offset voltage.

DSP. Digital Signal Processing/Processor.

Echo Cancellation. Digital removal of speaker audio that is picked up by the microphone.

Equalizer. A device that allows the user to tailor frequency response.

Expander. More accurately called the downward expander, this suppresses noise when the caller is not talking.

Handset. The hand-held part of a communications system, usually consisting of a speaker and microphone.

Hybrid. See Telephone Hybrid.

Latching. A control signal that remains in a fixed state until you release it. This is opposed to momentary control, which is a pulsed signal.

LED. Light emitting diode. A semiconductor diode used in an electronic display that emits a light when subjected to an applied voltage.

Limiter. A circuit whose output signal amplitude remains at a predetermined level despite variations in input signal amplitude.

Loop Drop. A temporary interruption on the telephone line's DC voltage.

Mix-Minus. Audio that must be sent to callers to prevent feedback on the audio system through the hybrid. Mix-minus is a mix of all audio on the console, minus the caller's audio. Without a mix-minus feed, the caller audio appearing on the console is sent back to the caller, where it is retransmitted to the studio through the caller's telephone. This feedback can create anything from an echo to a howling squeal.

Noise Burst. A burst of white noise used by the hybrid to optimize echo cancellation and null performance.

Null. The ability of the analog hybrid to separate send audio from caller audio. (Also known as trans-hybrid loss or side tone.)

Off. The DH30 front panel control that disconnects callers who are active on the system. This control does not affect DH30 power.

On-Air. Callers are put on-air with the announcer so the listening audience can hear the conversation.

PBX. Private Branch Exchange. See Telephone Line.

Phantom Power. Power provided by audio equipment to power microphones that contain active components. This provides a DC offset voltage to the signal.

Pinouts. Configuration of signal-carrying lines on a connector.

Send. Refers to audio sent to the caller from the studio mixer or microphone.

TEC. Telephone Echo Cancellation. The process of removing echo before it returns to its source over a telephone line.

TERL. Telephone Echo Return Loss. The amount of echo returned to the audio source over a telephone line.

Telephone Hybrid. A device that converts a telephone line (2-wire, low-level signal) into a balanced, 4-wire, line-level signal with independent send and receive ports. A telephone hybrid provides the necessary electronic matching between the telephone line and the audio equipment. Generally referred to in this manual as simply "hybrid."

Telephone Line. The line delivered by the telephone company to an individual subscriber. Sometimes known as a POTS (Plain Old Telephone Service) line, this is an analog line required by fax machines and modems. The DH30 requires analog telephone lines for its phone line connection. PBX systems or other digital telephone systems must be equipped with an analog extension for use with the DH30.

Threshold. A predetermined point for the start of operation of a circuit.

Unbalanced Audio. A circuit that is referenced to ground.

Wet Line. A telephone circuit over which voice signals are transmitted and which contains DC offset voltage.

6 Appendices

Appendix A: Specifications

Dimensions

17"/43.2cmW x 1.75"/4.5cmH x 8"/25.4cm D

Weight

7 lbs./3.2kg (dry); 12.1 lbs./5.5kg (shipping)

Operating Temperature

32–100 degrees F / 0–38 degrees C

Humidity

0–80 percent

Connectors

POWER: Auto-adjusting power module from 100–240 Vac,
50/60 Hz, 30 W

AES/EBU IN: 3-pin female XLR; pin 1=ground, pin 2=+phase,
pin 3=–phase. 32, 44.1, or 48 kHz sample rate

AES/EBU OUT: 3-pin male XLR; pin 1=ground, pin 2=+phase,
pin 3=–phase. 32, 44.1, or 48 kHz sample rate

RS232: DB9 female connector; 9,600 baud rate; 8-bit,
no parity, 1 stop bit

REC CTRL: DB9 female connector; all start, stop, and enable
controls are open collector outputs rated at 40 Vdc and
50 mA max

REMOTE: DB25 female connector

Remote Send Input:

0 dBu nominal, adjustable, unbalanced,
20 kOhm impedance

Remote Caller and Aux Outputs:

0 dBu nominal, adjustable, unbalanced
50 Ohm impedance

Control Inputs:

Remotely activate any of the following functions with a simple switch closure to ground: On, Off, Cue, and Rec along with preset selection controls 1, 2, and 3 or with Send, Caller, and Monitor Mute Controls

Status Outputs:

Remotely check the status of the hybrid using status outputs for On, Off, Cue, Rec, Send Presence, and Caller Presence status outputs. All are open collector outputs rated at 40 Vdc and 50 mA maximum

MONITOR: 1/4" stereo jack; tip=+phase, ring=-phase; sleeve=-phase, 2W output into an 8 Ohm load

SEND IN: XLR female; Mic/Line selectable -55 or 0 dBu nominal, adjustable, balanced bridging 20 kOhm impedance, Selectable 12 Vdc Phantom Power

CUE IN: XLR female; Mic/Line selectable -55 or 0 dBu nominal, adjustable, balanced bridging 20 kOhm impedance, Selectable 12 Vdc Phantom Power

CALLER OUT: XLR male; 0 dBu nominal, adjustable, balanced bridging, 50 Ohm impedance

AUX OUT: XLR male; 0 dBu nominal, adjustable, balanced bridging, 50 Ohm impedance

LINE: RJ11 connector; A-lead supervision provided

SET: RJ11 connector

Telephone Transmit

(All measurements referenced at -15 dBm level on the telephone line.)

Frequency response: +/- 1 dB from 250 Hz to 3.5 kHz

Signal to noise: >70 dB

Distortion: <0.15%

Telephone Receive

(All measurements referenced at -15 dBm level on the telephone line with caller processing options bypassed.)

Frequency response: +/- 1 dB from 250 Hz to 3.5 kHz

Signal to noise: >70 dB

Distortion: <0.1%

Echo Cancellation/Mix-minus Tail Time

120 milliseconds

Telco Cancellation Tail Time

32 milliseconds

Appendix B: Pinouts

Remote Connector Pinout

Pin	Description	Pin	Description
1	Remote on *	14	Remote on Indication **
2	Remote off *	15	Remote off Indication **
3	Remote Record *	16	Record Indication **
4	Remote Cue *	17	Cue Indication **
5	Switch/Indicator Common	18	Indicator Common
† 6	Select Preset 1/Send Mute *	19	Send Presence Indicator **
† 7	Select Preset 2/Caller Mute *	20	Caller Presence Indicator **
8	N/C	21	Indicator Common
9	Unbalanced Send #	22	Unbalanced Audio Common #
10	Unbalanced Caller ##	23	Unbalanced Audio Common ##
11	Unbalanced Aux Out ###	24	Unbalanced Audio Common ##
† 12	Select Preset 3/Monitor Mute*	25	Switch Common
13	N/C		

* Remote control provided via contact closure to digital ground

** Remote indicators provided via open collector outputs, <40 V, 50 mA

0dB line-level input with >20 kOhm impedance

0dB line level output with a <50 Ohm impedance

† These control inputs will perform preset selection or audio path muting as set by the system menu selection of Remote aux pins

RS232 Connector Pinout

Pin	Description	Pin	Description
1	N/C	6	N/C
2	TXD	7	N/C
3	RXD	8	N/C
4	N/C	9	N/C
5	GROUND		

Record Control Pinout

Pin	Description	Pin	Description
1	Start	6	Start Common
2	N/C	7	N/C
3	N/C	8	Stop Common
4	Stop	9	Record Enable Common
5	Record Enable		

Line Connector Pinout

Pin	Description	Pin	Description
1	To pin 6 of SET RJ11C	4	Ring
2	To pin 5 SET of RJ11C	5	To pin 2 of SET RJ11C
3	Tip	6	To pin 1 of SET RJ11C

Set Connector Pinout

Pin	Description	Pin	Description
1	To pin 6 of LINE RJ11C	4	Tip
2	To pin 5 of LINE RJ11C	5	To pin 2 of LINE RJ11C
3	Ring	6	To pin 1 of LINE RJ11C

XLR Connector Pinout

Pin	Description
1	Ground
2	+ Phase audio
3	- Phase audio

Monitor Connector Pinout

Pin	Description
Tip	+ Phase audio
Ring	- Phase audio
Sleeve	- Phase audio

Appendix C: Serial Communications Protocol

The RS232 port on the DH30 is a serial communications port used to control DH30 operations through an external device such as a PC or a control device. This appendix describes the protocol and serial commands used to control the DH30.

The RS232 serial port runs at 9600 baud, no parity, eight data bits, and one stop bit.

Serial commands to the DH30 can control the following types of operations: **Hybrid On/Off, Cuing, Recording, Monitor volume, Preset selection and Detection of an Incoming Call.**

Function	Serial Command	Returned Status
On/Off	TE<cr>	TE 0<cr> or TE 1<cr>
Off	TE 0<cr>	TE 0
On	TE 1<cr>	TE 1
Cue Status	CUE<cr>	CUE 0 or CUE 1
Cue Off	CUE 0<cr>	CUE 0
Cue On	CUE 1<cr>	CUE 1
Cue Toggle	CUE 2<cr>	CUE 0 or CUE 1 (toggled)
Record Status	REC<cr>	REC 0/1/2/3
Record Off	REC 0<cr>	
Record On	REC 1<cr>	(see note below)
Record Toggle	REC 2<cr>	
Monitor Volume Up*	VOLUP<cr>	VOLUP
Monitor Volume Down	VOLDWN<cr>	VOLDWN
* no value given		
Current Preset	PRESET<cr>	
Select Preset 1	PRESET 1<cr>	PRESET 1
Select Preset 2	PRESET 2<cr>	PRESET 2
Select Preset 3	PRESET 3<cr>	PRESET 3
Incoming Call	N/A	RING

NOTE: The returned status is dependent on the current setting of the hybrid. See the table below:

Status Returned	Record-Ready	Recording
0	no	no
1	yes	no
2	no	yes
3	yes	yes

The structure of serial commands is an option/value, followed by a carriage return:

command x

Commands can be either UPPER CASE or lower case terminated by a carriage return. Characters are not echoed back to the sending device as they are sent. After a command has been sent, including the carriage return, the command is echoed back in uppercase with the new value followed by a DH30> command prompt.

For example, a command to turn Cue on would be formatted like this:

CUE 1<cr>

(CUE =function command, 1=On, as shown in the facing table.)

The returned response would be:

**CUE 1
DH30>**

If the Cue feature was off and the toggle Cue command was sent:

CUE 2<cr>

The returned response would be:

**CUE 1
DH30>**

Indicating that the Cue feature had been turned on.

To get status back on what the current setting is, send the command without a parameter. For example if the Cue function is on when the command is sent:

CUE<cr>

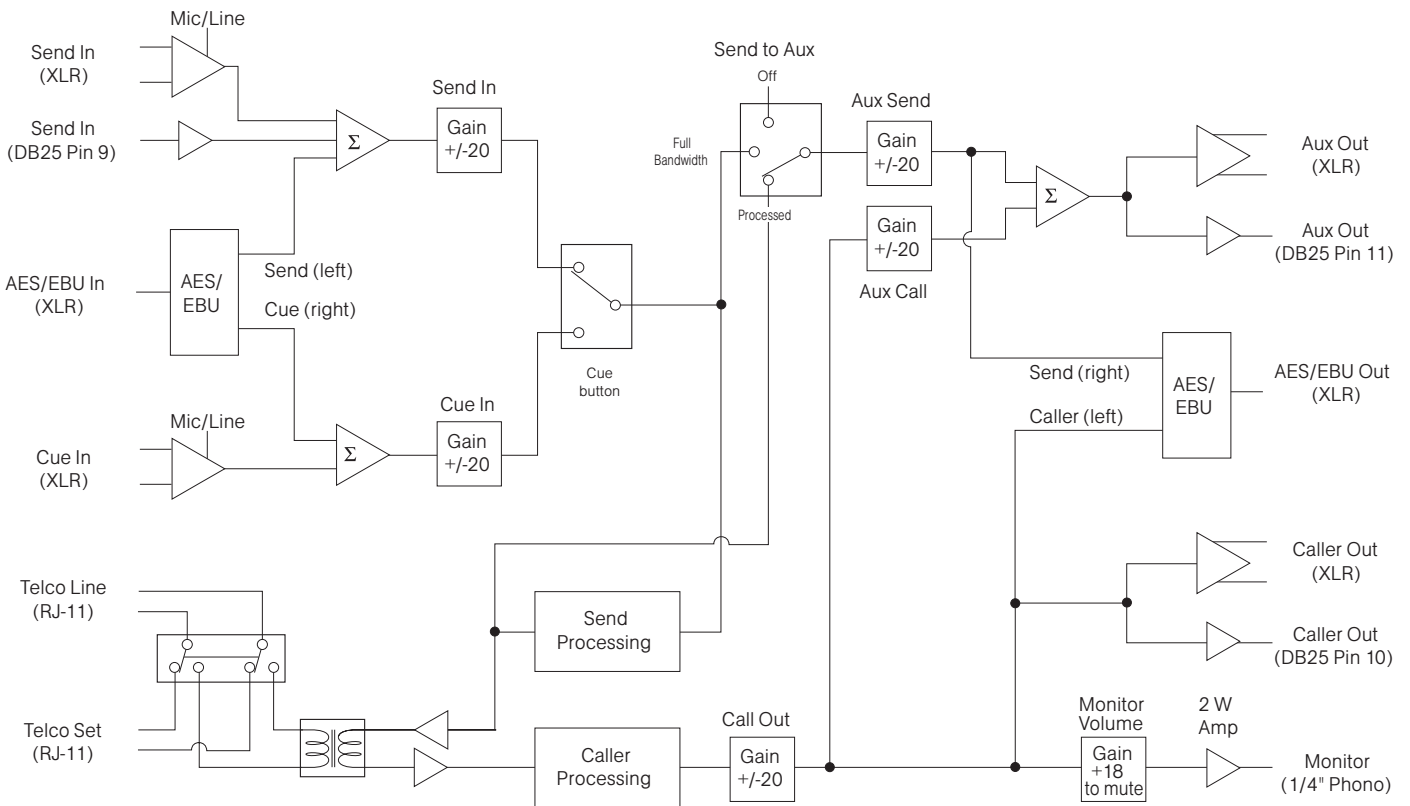
The response would be:

**CUE 1
DH30>**

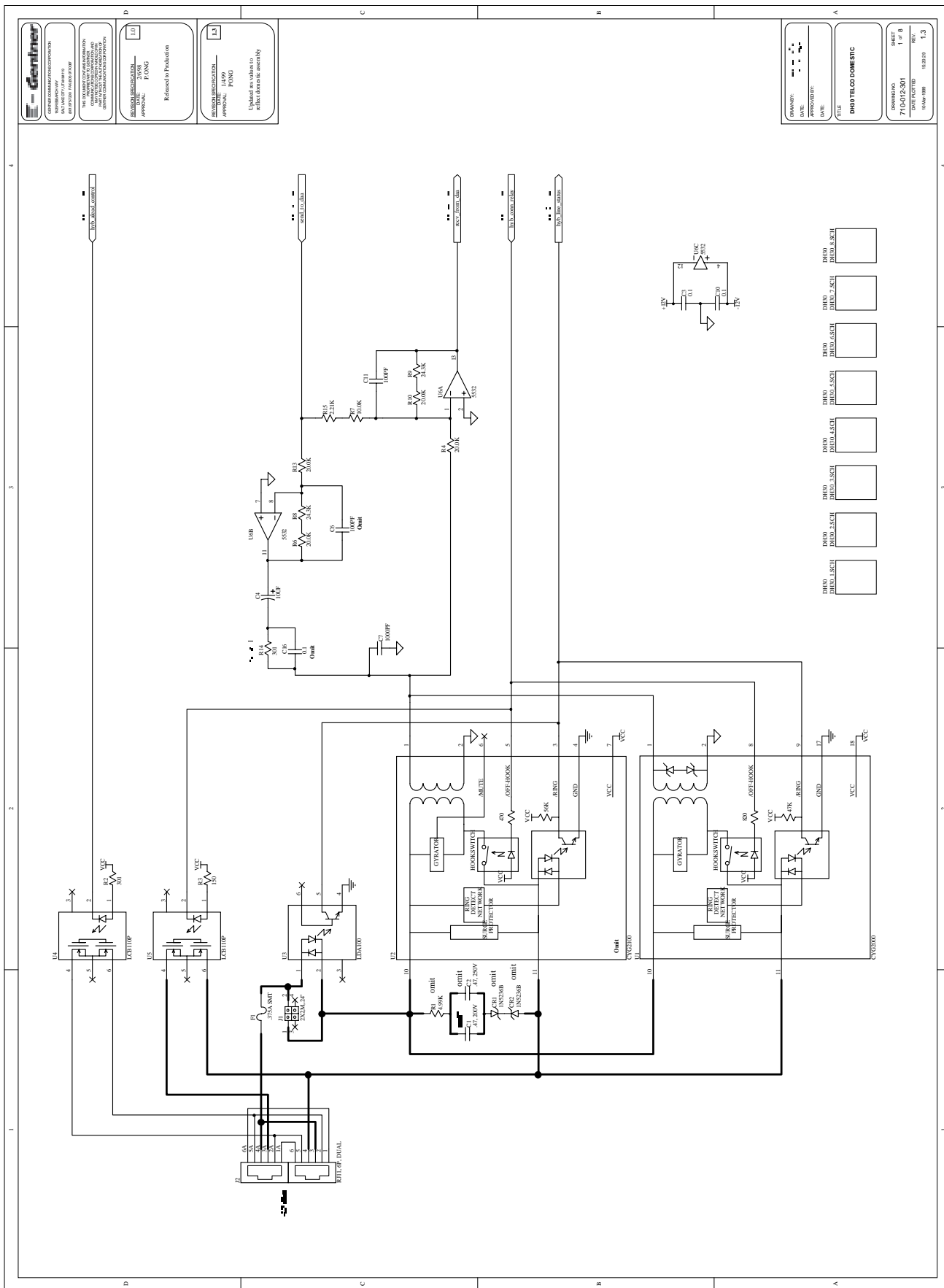
Appendix D: DH30 Audio Flow

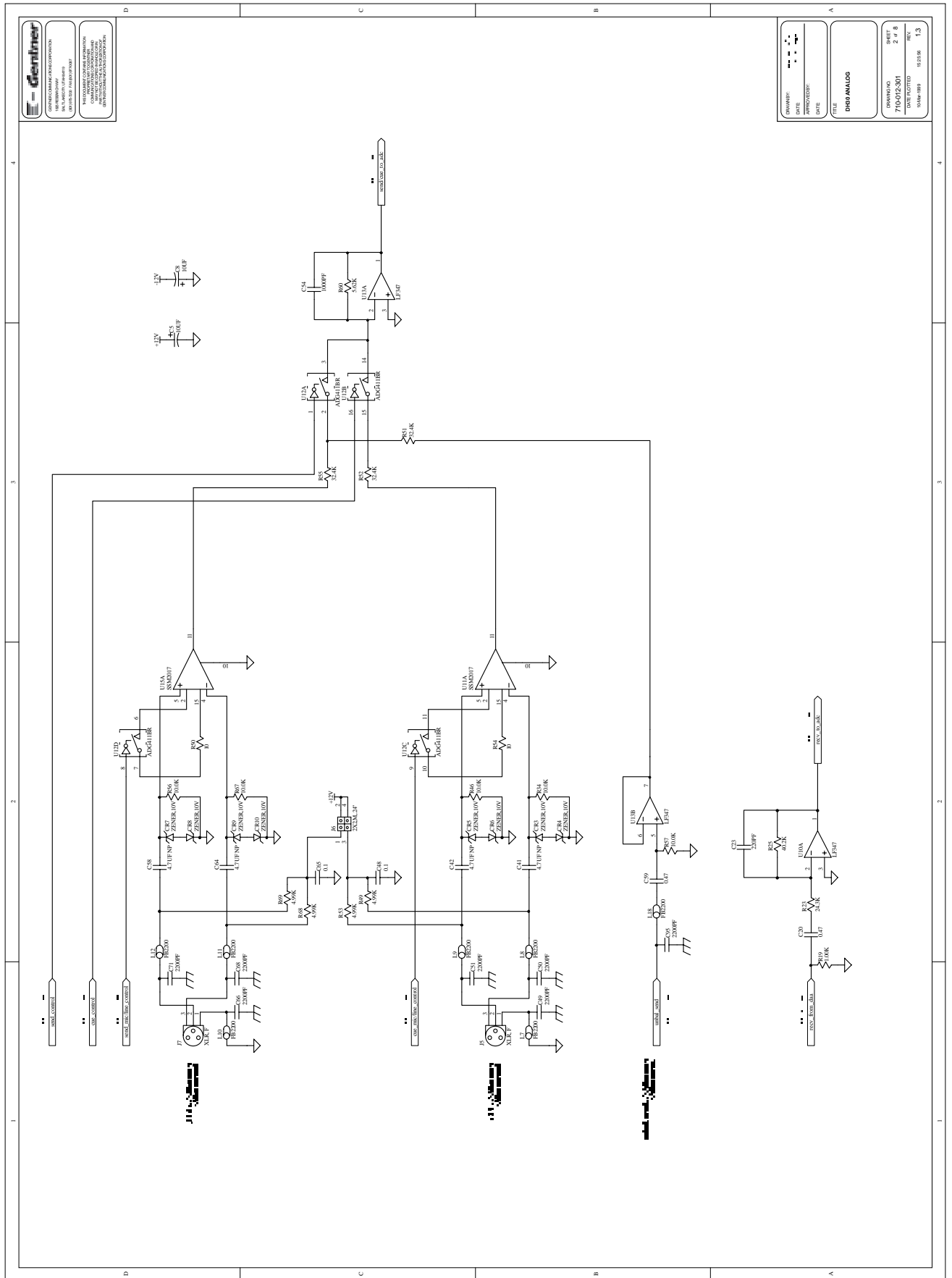
The diagram below shows all the audio inputs and outputs and associated gain blocks and mixing junctions. The inputs are on the left (however, the Telco Line and Set jacks are both input and output). The outputs are on the right.

DH30 Audio Flow



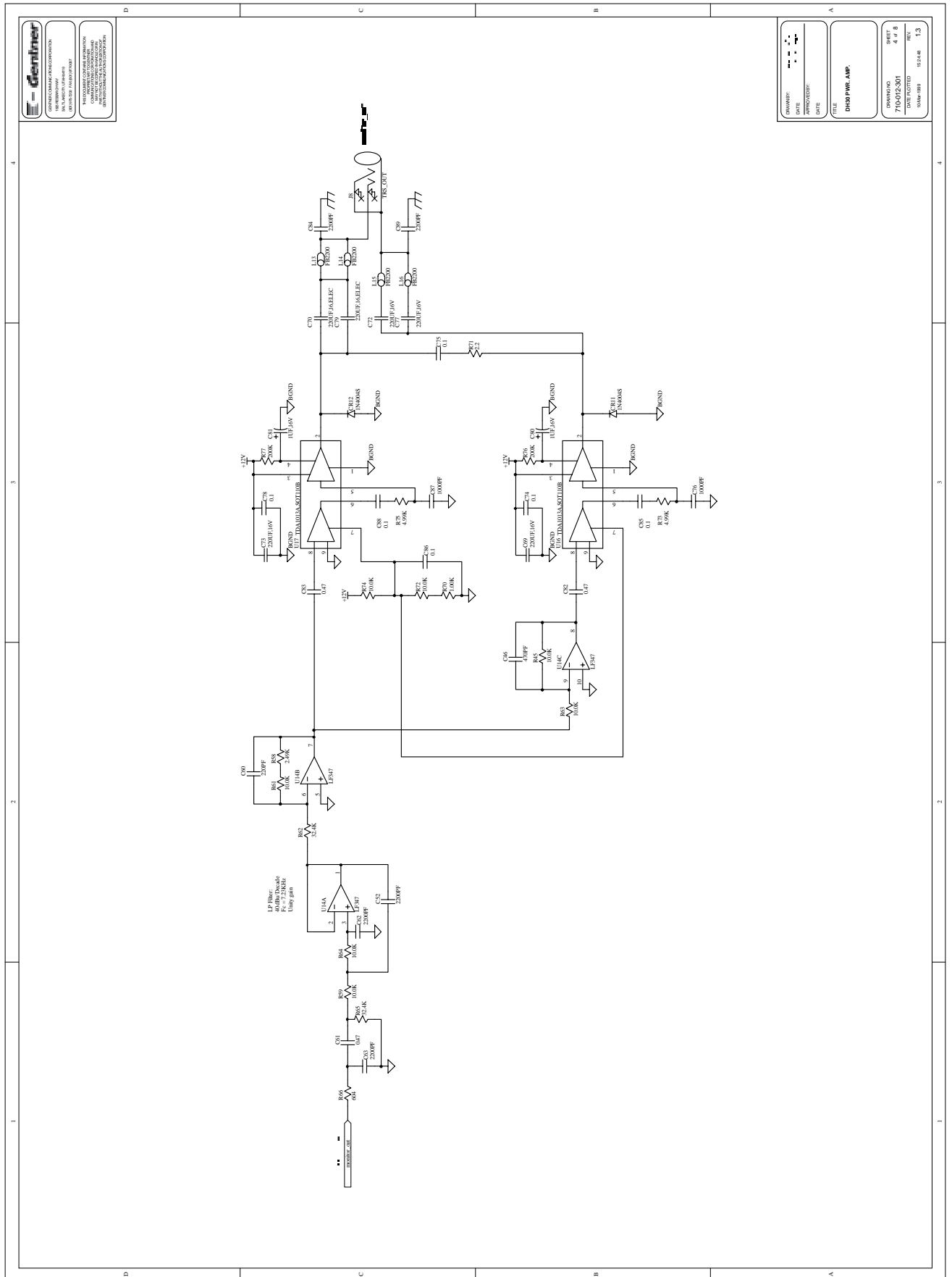
Appendix E: Schematics

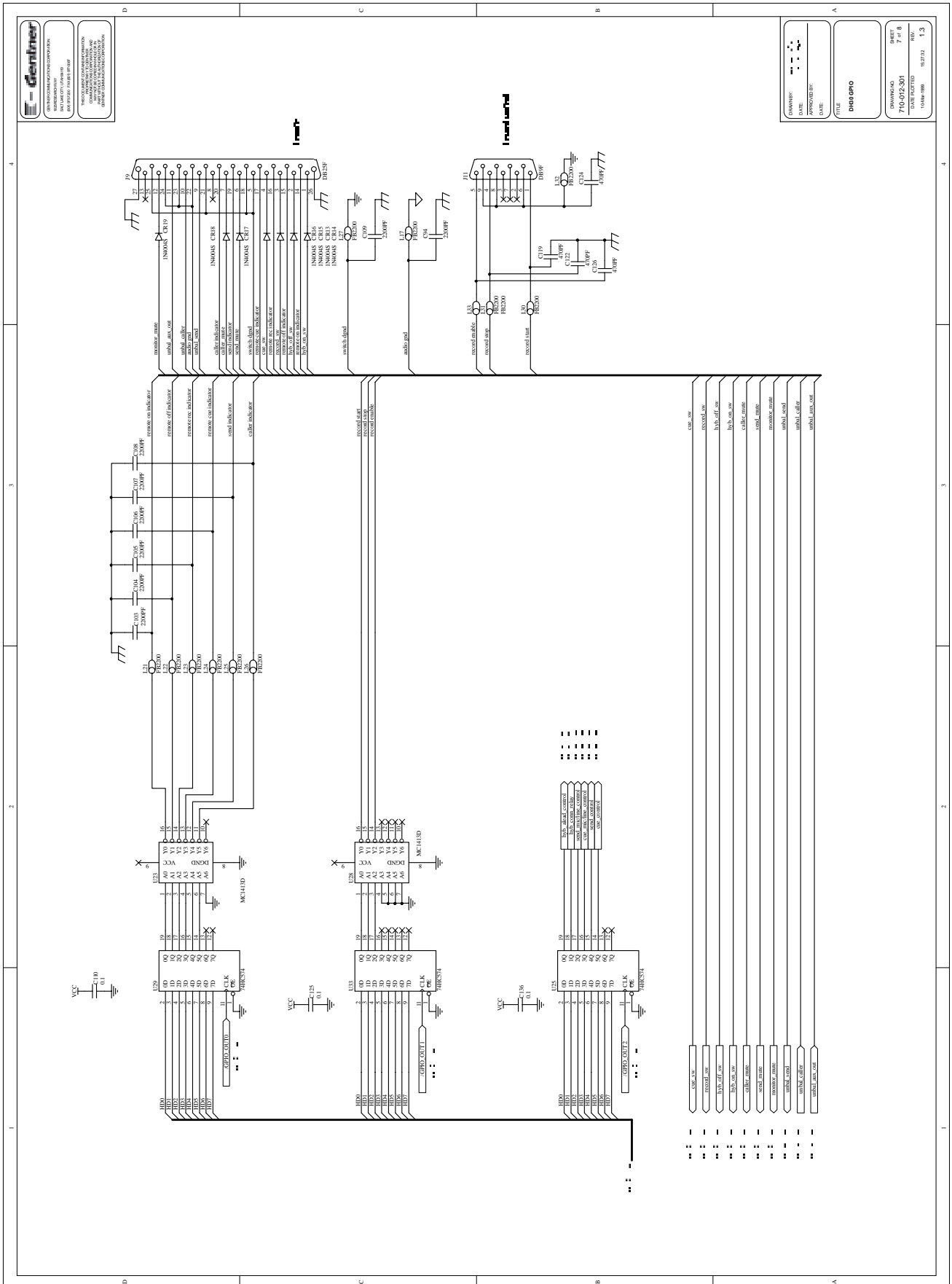


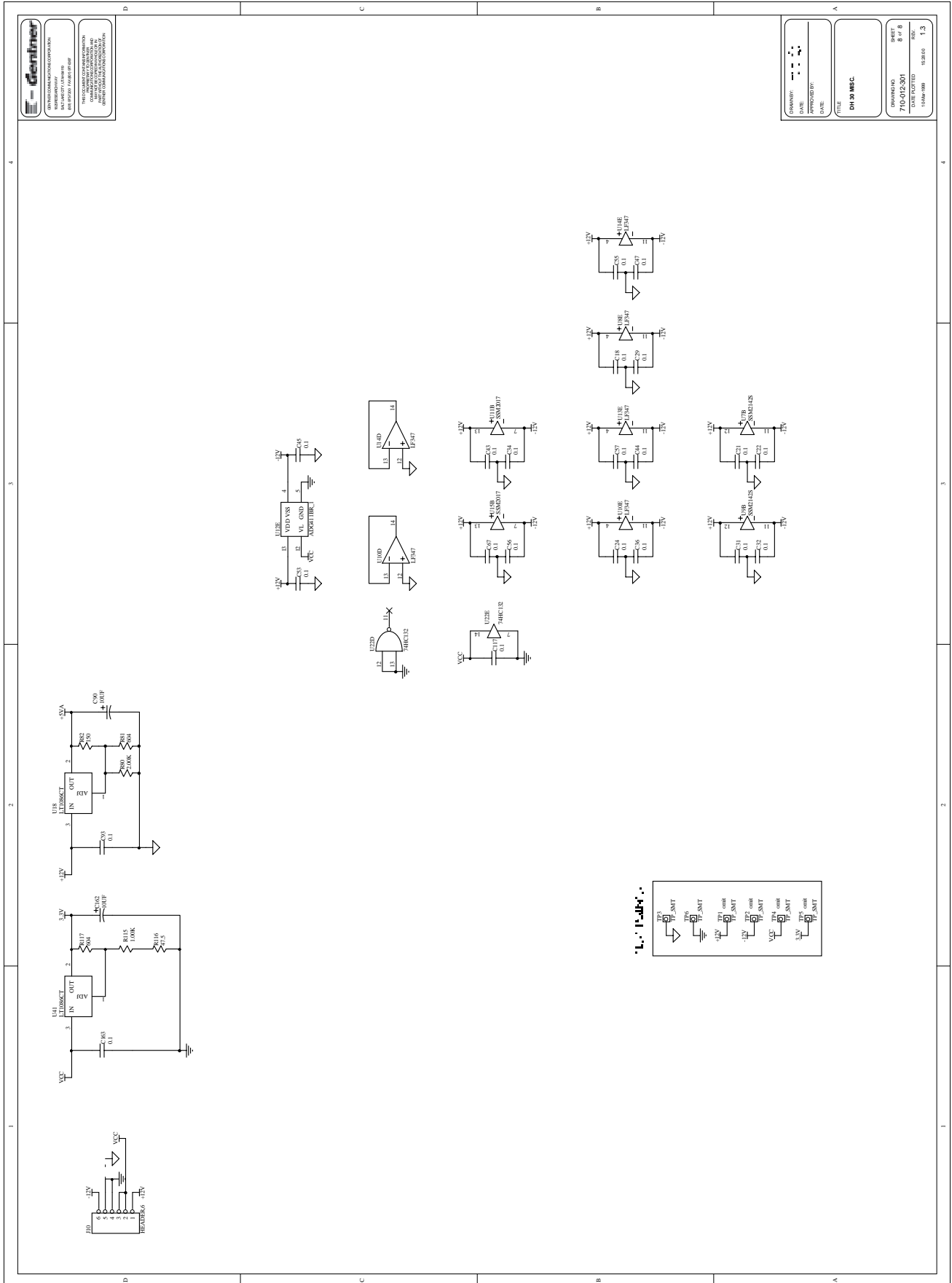


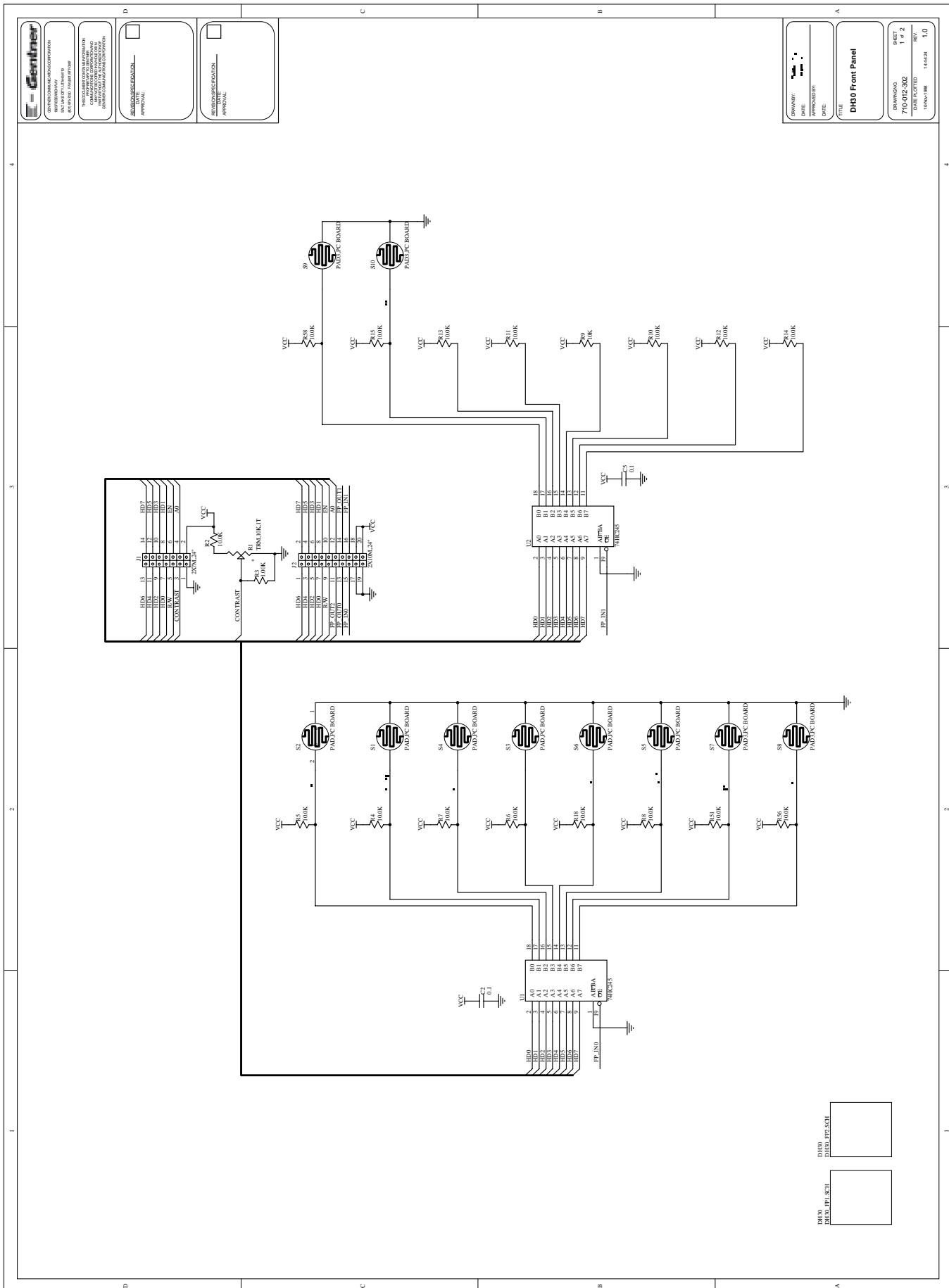
Gerber
 GERBER BOARD FABRIKATION
 300 N. LAKEVIEW AVENUE
 WILSON, NJ 07094
 TEL: 908.734.7000
 FAX: 908.734.7001
 WWW.GERBER.COM

DATE: 7/10/2001
 APPR: J. J. J.
 DATE: 7/10/2001
 FILE: DIG19 ANALOG
 SHEET: 2 of 8
 DRAWING NO: 710012-301
 DATE PLOTTED: 10/04/01
 REV: 1.3
 93296









Centner
 UNIVERSITÄT SACHSISCHER HOCHSCHULE
 TU BERGAKADEMIE FREIBERG
 TU BERGAKADEMIE FREIBERG

VERLEIHUNG VON ZEICHNUNGEN
 UND DRUCKEN
 AN FOLGENDE ANSTALTEN
 UND BÜROSTÄTTEN
 DER UNIVERSITÄT SACHSISCHER HOCHSCHULE
 TU BERGAKADEMIE FREIBERG

APPROVAL: _____
 APPROVAL: _____

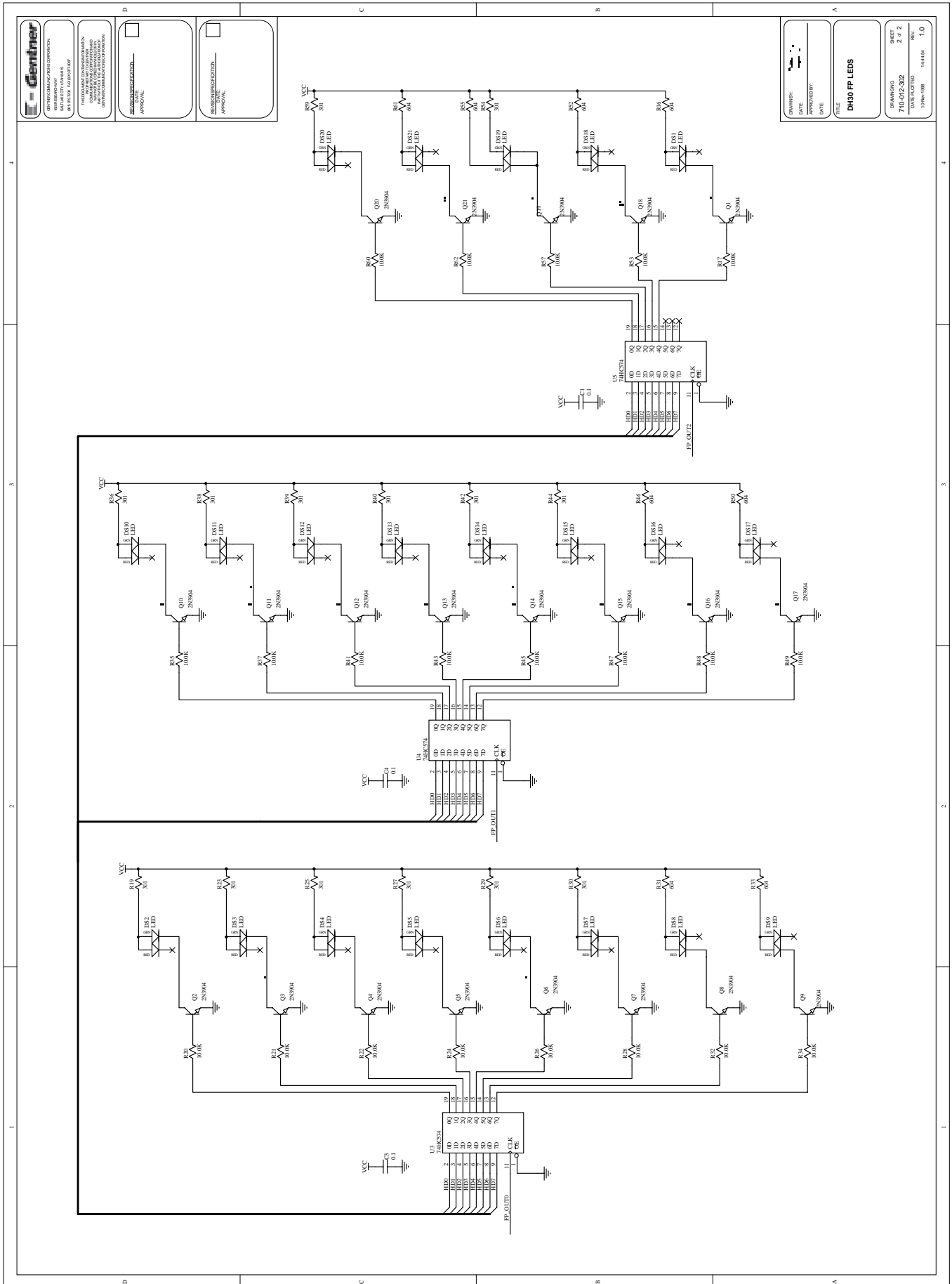
OWNER: _____
 DATE: _____
 APPROVED BY: _____
 DATE: _____

TITLE
DH90 Front Panel

REVISIONS
 NO. 1 OF 2
 DATE: 03/12/2003
 1096a-998 14.4.24 1.0

DH90
 2003.12.03

DH90
 2003.12.03



E-Genier
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 WWW.E-GENIER.COM

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 LA REPLICAZIONE, L'USO, LA DISTRIBUZIONE
 O LA MODIFICA DI QUESTO DOCUMENTO
 SONO SEVERAMENTE VIETATI
 TUTTI I DIRITTI RISERVATI

APPROVAZIONE:

 DATA: _____

REVISIONE:

 DATA: _____

DRAWING:

DATE: _____
 APPROVED BY: _____
 DATE: _____

TITLE: **DH30 FP LEDS**

DRAWING NO: **710-010-302**
 SHEET: **2 of 2**
 DATE PLOTTED: _____
 1000x1000 1:1 144454 1.0

Appendix F: Bill of Materials

The following bill of materials is accurate as of this printing. The information herein is subject to change without notice. If you are in need of a more current bill of materials, please contact technical support as noted on the bottom of the page.

DH30 (910-012-301)

Item	Item Description
850-012-301	UNIT ASSY, DH30
400-241-606	BOX, STANDARD KORRVU SHIPPING, 24X16X6
400-241-617	INSERT, TS612 MAINFRAME DIVIDER, CORR
400-300-009	INSERT, KORRVU SINGLE/DOUBLE RACK UNITS
400-300-011	INSERT, USE W/400-300-009 ACC. DIVIDER
432-000-019	LABEL, BLANK 3X3 1/4"w/pealaway, PKG I.D
860-012-301	ACC KIT, DH30

UNIT ASSY, DH30 (850-012-301)

Item	Item Description
401-000-060	BAG, 12" 4MIL CLR PLASTIC TUBING
432-000-018	LABEL, BLANK 1.75 X 2.5, PRODUCT I.D
432-012-004	LABEL, CANADA COMPLIANCE DH30
460-110-005	PWR SUPPLY, SWITCHING UNIVERSAL IN 40W
625-100-010	SWITCH, UP/DOWN, ENTER, ESC.
625-100-030	SWITCH, LEDS ONLY
625-100-050	SWITCH, UP/DOWN BUTTONS
625-100-051	SWITCH, ON/OFF BUTTONS
681-010-204	SCREW, 4-40 X 1/4" PPH BLK ANOD SELF-TAP
681-010-604	SCREW, 6-32 X 1/4" PPH
681-210-606	SCREW, 6-32 X 3/8" PPH BLK
682-010-020	NUT, 2-56 3/16 HEX
682-010-060	NUT, 6-32 X 1/4
683-046-403	SPACER, KIT M/F 4-40 X 3/16 W/HARDWARE
683-046-620	SPACER, M/F 6-32 X 1 1/4" HEX
683-050-437	SPACER, 0.115/Dx0.187O/Dx0.437LG
684-050-060	WASHER, #6 INTERN TOOTH
699-360-001	MOD, PWR ENTRY RECEPT W/EMI FILT 3 AMPS
740-012-002	COVER, DIGITAL HYBRID
740-012-003	BRACKET, LEFT & RIGHT RACK, DH
740-012-301	CHASSIS, DH30
740-150-006	WINDOW, LCD DISPLAY, AP800
820-012-301	PCB ASSY, MAIN, DH30
820-012-302	PCB ASSY, FP, DH30
820-150-004	PCB ASSY, LCD BRD., AP800
830-110-003	CABLE ASSY, MASC 6P/MASC 6P -9"
830-110-012	CABLE ASSY, CRIMP LUG/FASTON F -4" GRND
830-110-013	CABLE ASSY, FASTON F/MASC 3P -3"
830-150-001	CABLE ASSY, IDC 14-PIN 5"
830-150-002	CABLE ASSY, IDC 20-PIN 5"

ACC KIT, DH30 (860-012-301)

Item	Item Description
401-000-050	BAG, 6" 4MIL CLR PLASTIC TUBING
401-000-060	BAG, 12" 4MIL CLR PLASTIC TUBING
664-500-003	CONN, XLR F 3P CABLE MNT
664-600-003	CONN, XLR M 3P CABLE MNT
681-400-001	SCREW, RACK 10-32 X 5/8" DECORATIVE
684-400-001	WASHER, RACK CUP DECORATIVE
699-150-006	PWR CORD, MOLDED 8' BLK 3 COND
800-012-301	MANUAL, DH30
830-000-012	CABLE ASSY, TELEPHONE 12FT.

The bills of materials for the front panel PCB assembly (**820-012-302**) and LCD PCB assembly (**820-150-004**) are on page 51. The bill of materials for the main PCB assembly (**820-012-301**) is on pages 52 and 53.

PCB ASSY, FP, DH30 (820-012-302)

Item	Item Description	Item Location(s)
507-100-120S	LED, RED/GREEN CHIP SMT	DS1, DS2, DS3, DS4, DS5, DS6, DS7, DS8, DS9, DS10, DS11, DS12, DS14, DS14, DS15, DS16, DS17, DS18, DS19, DS20, DS21
511-011-301S	RES, 301 OHM 1/10 W 1% 0805 C SMT	R19, R23, R25, R27, R29, R30, R36, R38, R39, R40, R42, R44, R54, R59,
511-011-604S	RES, 604 OHM 1/10 W 1% 0805 C SMT	R16, R31, R33, R46, R50, R52, R55, R61
511-013-100S	RES, 10.0 KOHM 1/10 W 1% 0805 C SMT	R2, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R17, R18, R20, R21, R22, R24, R26, R28, R32, R34, R35, R37, R41, R43, R45, R47, R48, R49, R51, R53, R56, R57, R58, R60, R62
524-100-103S	RES, POT 4MM TOP ASJUST SMT	R1
533-200-245S	IC, DIG 74HC245 OCTAL TRIST XCEIV SOIC	U1, U2
533-204-574S	IC, DIG 74HC574W CMOS FLIP FLOP SMT	U3, U4, U5
561-103-904S	TRANS, 2N3904 SMT	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, Q21
616-104-501S	CAP, 0.1UF 50V Z5U 0805 C SMT	C1, C2, C3, C4, C5
720-012-302	PCB, FP, DH30	
511-012-100S	RES, 1.00 KOHM 1/10 W 1% 0805 C SMT	R3
678-224-014	PIN, STRIP DUAL 2X7=14 PIN .24 TALL	
678-224-020	PIN, STRIP DUAL 2X10=20 PIN .24 TALL	

PCB ASSY, LCD BRD., DH30 (820-150-004)

Item	Item Description	Item Location
508-001-001	LCD, 16X2 LED BACKLIT 6 O'CLOCK VIEW	10
678-224-014	PIN, STRIP DUAL 2X7=14 PIN .24 TALL	20

PCB ASSY, MAIN, DH30 (820-012-301)

Item	Item Description	Item Location(s)
500-004-004S	DIODE, 1N4004 1 AMP 400V DL41	CR11, CR12, CR13, CR14, CR15, CR16, CR17, CR18, CR19
502-005-010S	DIODE, ZENER 10V SOT23 CASE	CR3, CR4, CR5, CR6, CR7, CR8, CR9, CR10
511-000-022S	RES, 2.2 OHM 1/8 W 1% 1206 C SMT	R71
511-010-100S	RES, 10 OHM 1/10 W 1% 0805	R50, R54
511-010-475S	RES, 47.5 OHM 1/10 W 1% 0805 C SMT	R83, R84, R114, R116
511-011-100S	RES, 100 OHM 1/10 W 1% 0805 C SMT	R118
511-011-150S	RES, 150 OHM 1/10 W 1% 0805 C SMT	R3, R82
511-011-301S	RES, 301 OHM 1/10 W 1% 0805 C SMT	R2, R14
511-011-604S	RES, 604 OHM 1/10 W 1% 0805 C SMT	R5, R35, R40, R66, R78, R79, R81, R117
511-012-100S	RES, 1.00 KOHM 1/10 W 1% 0805 C SMT	R19, R70, R115
511-012-200S	RES, 2.00 KOHM 1/10 W 0805	R80
511-012-221S	RES, 2.21 KOHM 1/10 W 0805	R15 (domestic)
511-012-249S	RES, 2.49 KOHM 1/10 W 1% 0805 C SMT	R58
511-012-499S	RES, 4.99 KOHM 1/10 W 1% 0805 C SMT	R49, R53, R68, R69, R73, R75
511-012-562S	RES, 5.62 KOHM 1/10 W 1% 0805 C SMT	R60 or R7 (international)
511-012-604S	RES, 6.04 KOHM 1/10 W 0805	R15 (international)
511-013-100S	RES, 10.0 KOHM 1/10 W 1% 0805 C SMT	R7 (domestic), R11, R17, R22, R24, R26, R29, R32, R34, R37, R41, R42, R43, R44, R45, R46, R47, R48, R56, R57, R59, R61, R63, R64, R67, R72, R74, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100, R103, R104, R106, R107, R108, R109 R110, R111, R112, R113
511-013-200S	RES, 20.0 KOHM 1/10 W 1% 0805 C SMT	R4, R6, R10, R13, R16, R20, R21, R27, R28, R31
511-013-243S	RES, 24.3 KOHM 1/10 W 1% C SMT	R8, R9, R23
511-013-324S	RES, 32.4 KOHM 1/10 W 1% 0805 C SMT	R12, R33, R36, R38, R39, R51, R52, R55, R62, R65
511-013-402S	RES, 40.2 KOHM 1/10 W 0805	R18, R25, R30
511-013-475S	RES, 47.5 KOHM 1/10 W 1% 0805 C SMT	R101
511-014-200S	RES, 200 KOHM 1/10 W 0805	R76, R77
511-015-100S	RES, 1.00 MOHM 1/10 W 1% 0805 C SMT	R102, R105
533-200-132S	IC, DIG 74HC132 QUAD SCHMITT NAND GT	U22
533-200-245S	IC, DIG 74HC245 OCTAL TRIST XCEIV SOIC	U42
533-204-245S	IC, DIG 74LVXC4245 8BIT OU XCVR SOIC	U26
533-204-574S	IC, DIG 74HC574W CMOS FLIP FLOP SMT	U25, U29, U33
534-006-257S	IC, DIG 32KX8 STAT 35NS 5.0V SOJ	U39
534-056-303S	IC, DIG DSP56303 80MHZ TQFP	U31
534-068-111S	IC, DIG 68HC11A1 MICRO CONTROLLER	U30
534-071-256S	IC, DIG RAM 32KX8 15NS 3.3V SOJ	U36, U37, U38
534-084-001S	IC, DIG CS8401A-CS AUDIO INT TRANS	U32
534-084-011S	IC, DIG CS8411-CS AUDIO INT REC	U27
535-102-003S	IC, ANA ULN2003A TRANS ARRAY SMT or MC1413D	U23, U28
535-201-100S	IC, ANA LDA100 OPTO COUPLER SOLID STATE	U3
535-201-200	IC, ANA CYBERGATE 2000 DAA MODULE	U1
535-201-206	IC, ANA CYBERGATE 2111 DAA MODULE PAN EURO	U2 (international)
535-300-003S	IC, ANA ADG411BR SPST QUAD SWITCH	U12
535-300-004S	IC, ANA SWITCH RELAY NC 6P LCB110P	U4, U5
535-304-330S	IC, MIX CS4330 STEREO 18 BIT D/A SOIC8	U20, U21
535-305-330S	IC, MIX CS5330A-KS STEREO A/D CONV. SOIC	U19
537-127-120S	IC, DIG 29F010 1MBIT FLASH PROM 150NS	U40
540-001-202S	IC, MIX RS232 MAX202 TRANSCEVR SMT	U34
540-001-232S	IC, DIG MAX1232CSA WATCHD TIMER 8PSO SMT	U24
540-300-347S	IC, ANA LF347M QUAD BI-FET OP AMP SMT	U8, U10, U13, U14
540-301-013	IC, ANA TDA1013A 4W PWR AMP W/DC VOL	U16, U17
540-302-017S	IC, ANA SSM2017 AUD PRE-AMP	U11, U15

PCB ASSY, MAIN, DH30 (820-012-301)

Item	Item Description	Item Location(s)
540-302-142S	IC, ANA SSM2142 LINE DRIVER SOLI6	U7, U9
540-405-532S	IC, ANA NE5532D DUAL OP-AMP LW NOISE SMT	U6
543-000-086	IC, ANA REG LT1086CT 1.5A ADJ LW DRP OUT	U18, U41
550-010-001S	XFMR, DIGITAL AUDIO 29398	T1, T2
558-021-220S	FERRITE, CHIP BLM21B 2200 OHM 0805 C	L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L23, L24, L24, L25, L26, L27, L30, L31, L32, L33, L39, L40, L43, L44, L45, L46, L47, L48, L49, L50, L51, L52, L53, L54, L55, L56
573-220-000	WASHER #4 FIBER SHOULDER TO 220	U16, U17, U18, U41
573-220-060	HEATSINK, THRM LLY 6110-B	U16, U17
583-180-737S	CRYSTAL, 7.3728 MHZ FPX/SX2050P	Y1
583-181-819S	CRYSTALS, 8.192 MHZ HC-49/UP	Y2
601-900-188	CAP, 220 UF 16V NPO ELEC RAD	C69, C70, C72, C73, C77, C79
616-100-130S	CAP, 4.7UF, 25V ELEC NP C CASE 5X5.5 SMT	C41, C42, C58, C64
616-101-501S	CAP, 100PF 50V CERAMIC NPO 0805 SMT	C11
616-102-101S	CAP, 1000PF 100V NPO 0805 C SMT	C7, C25, C54, C76, C87
616-104-501S	CAP, 0.1UF 50V Z5U 0805 C SMT	C3, C10, C18, C21, C22, C24, C29, C31, C32, C34, C36, C43, C44, C45, C47, C48, C53, C55, C56, C57, C65, C67, C74, C75, C78, C85, C86, C88, C93, C100, C101, C102, C110, C112, C113, C117, C118, C125, C127, C128, C130, C131, C132, C133, C134, C135, C136, C137, C138, C140, C141, C142, C143, C144, C147, C148, C151, C152, C153, C154, C155, C156, C160, C163, C164
616-105-016S	CAP, 1UF 16V TANT 3216 C SMT	C80, C81
616-106-016S	CAP, 10UF 16V TAN 6032 C SMT	C4, C5, C8, C90, C162, C165
616-220-100S	CAP, 22PF 100V NPO 1206 C SMT	C114, C115, C120, C121
616-221-100S	CAP, 220PF 100V NPO 0805 C SMT	C17, C23, C28, C33, C60, C157, C158, C159, C161, C166, C167, C168, C169,
616-222-501S	CAP, 2200PF 50V NPO 1206 C SMT	C9, C12, C14, C15, C19, C26, C27, C30, C35, C38, C40, C49, C50, C51, C52, C62, C63, C66, C68, C71, C84, C89, C94, C95, C98, C99, C103, C104, C105, C106, C107, C108, C109
616-471-100S	CAP, 470PF 100V NPO 0805 C SMT	C46, C119, C122, C124, C126, C139, C145, C146, C149, C150
616-472-100S	CAP, 4700PF 100V NPO 1206 C SMT	C91, C92, C111, C116
616-474-501S	CAP, 0.47UF 50V Z5U 1812 C SMT	C13, C20, C37, C39, C59, C61, C82, C83, C96, C97
640-100-375S	FUSE, 3/8 AMP 125V SMT	F1
662-300-003	JACK, PHONE 1/4" W/NO	J8
664-260-003	CONN, XLR M 3P PC/ PNL BLK	J3, J4, J16
664-360-003	CONN, XLR F 3P PNL MNT BLK	J5, J7, J17
671-216-009	CONN, DB9 F R/A .318 FOOTPRINT	J11, J14
671-216-025	CONN, DB25 F R/A .318 FOOTPRINT	J9
673-012-006	CONN, HEADER POST 6P MASC .15C SPFL	J10
676-000-012	CONN, TELE RJ11 6P R/A JACK DU PORT PCB	J2
678-103-002S	TEST POINT, PC MOUNT SMT	TP3, TP6
678-224-004	PIN, STRIP DUAL 2X2=4PINS .24 TALL	J1, J6, J12
678-224-020	PIN, STRIP DUAL 2X10=20 PIN .24 TALL	J13
678-250-002	JUMPER, BLOCK F 2P W/HANDLE	J1, J6, J12 (NOTE 2PER ON J6 & J12)
681-010-406	SCREW, 4-40 X 3/8" PPH	U16, U17, U18, U41
682-010-040	NUT, 4-40	U16, U17, U18, U41
684-050-040	WASHER, #4 INTERN TOOTH	U16, U17, U18, U41
720-012-301	PCB, MAIN, DH30	
807-012-301	FIRMWARE, U35, DH30	

Appendix G: 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, UT 84119

Appendix H: Compliance

FCC Part 15 Compliance

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

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

FCC Part 68 Compliance

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

USOC Jacks: This device uses 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 telephone at (801) 975-7200 for repair and warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.

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

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

IC Compliance

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

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

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by 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.

Safety Information

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

International Compliance

Applies to DH30 910-012-302

Information for CTR21

The Digital Hybrid 30/DH30/910-012-302 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.

Network Compatibility Declaration

Gentner Communications Corporation of 1825 Research way, Salt Lake City, Utah 84119, U.S.A. declares that the product Digital Hybrid 30/DH30/910-012-302 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.

Appendix I: User-Defined Presets Worksheet

Use these worksheets to record the presets you configure for your site. For descriptions of the menu options, refer to Viewing or Changing Settings through the LCD Panel on page 19.

Appendix I

Menu Categories	Submenu Selections	Submenu Parameters	Submenu Ranges	Factory Default	User Preset 1	User Preset 2	User Preset 3
Presets	Select Preset			Preset 1			
	Copy Preset			n/a			
	Recall Default			n/a			
Gain	Send In Gain		-20 to 20dB	0dB			
	Send In Preamp		Line	Line			
			Mic				
	Cue In Gain		-20 to 20dB	0dB			
	Cue In Preamp		Line	Line			
			Mic				
	Call Out Gain		-20 to 20dB	0dB			
	Aux Send Gain		-20 to 20dB	0dB			
	Aux Call Gain		-20 to 20dB	0dB			
Caller	EQ	EQ Bypass	Off	On			
			On				
		EQ Low Band	-20 to 20dB	0dB			
		EQ Mid Band	-20 to 20dB	0dB			
		EQ High Band	-20 to 20dB	0dB			
	Compressor	Comp Ratio	Bypass	Bypass			
			2:1				
			3:1				
			4:1				
			6:1				
			Limiter				
		Comp Threshold	-20 to 20dB	0dB			
		Comp Post Gain	-20 to 20dB	0dB			
		Comp Attack	<1mS to 50mS	15mS			
		Comp Release	100 to 2000mS	500mS			
	Expander	Exp Ratio	Bypass	Bypass			
			2:1				
			3:1				
			4:1				
			6:1				
		Exp Threshold	-50 to 0dB	-40dB			
		Exp Attack	<1mS to 50mS	15mS			
		Exp Release	100 to 2000mS	500mS			
Bass Boost		0 to 30	0				
Caller Control		0 to -30dB	0dB				
Noise Burst		Off	On				
		On					

Appendix I

Menu Categories	Submenu Selections	Submenu Parameters	Submenu Ranges	Factory Default	User Preset 1	User Preset 2	User Preset 3
Echo Canceller	Mix-minus/AEC		Off	On			
			On				
	Echo Reduction		Off	Normal			
			Soft				
			Normal				
			Aggressive				
			Maximum				
	EC Train		Off	Off			
			On				
	Diagnostics		Off	Off			
			TERL				
			TEC				
			TNLP				
			TDB				
			AERL				
			AEC				
			ANLP				
			ADB				
	Test Signal		Off	Off			
			Receive				
		Transmit					
		Rcv & Transmit					
System	Auto Answer		Off	Off			
			On				
	Auto Disconnect		Off	Off			
			Loop Drop Only				
			Call Prog Only				
			Loop Drop + CP				
	Remote Control		Momentary	Momentary			
			Latching				
	Remote Aux Pins		Mute Audio	Select Presets			
			Select Presets				
	Send to Aux		Off	Processed			
			Processed				
			Full bandwidth				
	AES/EBU		32000 Internal	32000 Internal			
			*32000 External				
		*44100 External					
		*48000 External					
Set Passcode		New Passcode	▲▲▲▼ Enter				
Version			V1.0 01Feb1999				
Lock Panel			Off	Off			
			On-"L" will appear in lower right corner of screen				

*The DH30's AES/EBU sample rate will default to 32000 internal, until the AES/EBU input is connected. Once connected the DH30 will follow the sample rate of the external AES/EBU equipment.

Appendix J: Jumper Configurations

