Gentner

DH20/DH22

*Installation and
Operations Manual*

Copyright Information ≡

APPROVED for connection to telecommunications systems specified in the instructions for use subject to the conditions set out in them.

☏ **504334**

The connection ports on the DH20/DH22 are to be used as follows:

Power	Connection to the power cord provided
Remote	Connection to external controlling device
Monitor Out	Connection to external speaker
Send In	Connection to audio sent along telephone line
Caller Out	Connection to audio coming in along telephone line
Aux Mix	Connection to caller audio or caller mixed with send
Telephone Line	Connection to telephone line
Telephone Set	Connection to telephone set

This equipment complies with the requirements of the EU guidelines:

CE

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.

Gentner Communications Corporation is committed to protecting the environment and preserving our natural resources.

This manual has been printed entirely on recycled paper.

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Introduction ≡

Congratulations on purchasing the DH Digital Hybrid. All digital hybrid models use the latest digital technology to maintain the highest quality. The digital hybrid models are designed to clarify incoming telephone calls that will be broadcast on-air by eliminating connection noise before it reaches your audience.

The DH20 and DH22 Digital Hybrids use digital-signal processing (DSP) technology to separate the send and caller audio to eliminate distortion, weak signals and feedback. They continually filter low and high frequency noise to provide pure, clear audio.

The DH20 is a single digital hybrid, allowing connection of a single external telephone line for on-air use. The DH22 is a dual digital hybrid, allowing connection of two external telephone lines for use on-air. When coupled with adherence to compliance standards in the United States, Canada, the United Kingdom and mainland Europe, the digital hybrid models are optimal for virtually any application.

This manual explains how to install, set up and operate the digital hybrid in a step-by-step format. It also supplies instructions on how to resolve technical problems, should any arise.

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

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FAX-On-Demand International Line 801.974.3661

Worldwide Web Page @ http:\\www.gentner.com

Warranty Registration

Please register your digital hybrid by completing the self-addressed, postage prepaid warranty registration card and return it to Gentner Communications by mail. You may also FAX it to the above listed fax number or call Gentner Communications. 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, new product information, etc.

Unpacking ≡

Ensure that the following items (See Figure 1, below.) were received with your shipment:

AC Power Cord

XLRs
DH20: One male, One female
DH22: One male, Two female

DH20 *OR* DH22

6-foot Modular Telephone Cable

Gentner Screwdriver

DH20/DH22 Installation and Operations Manual

Warranty Registration Card
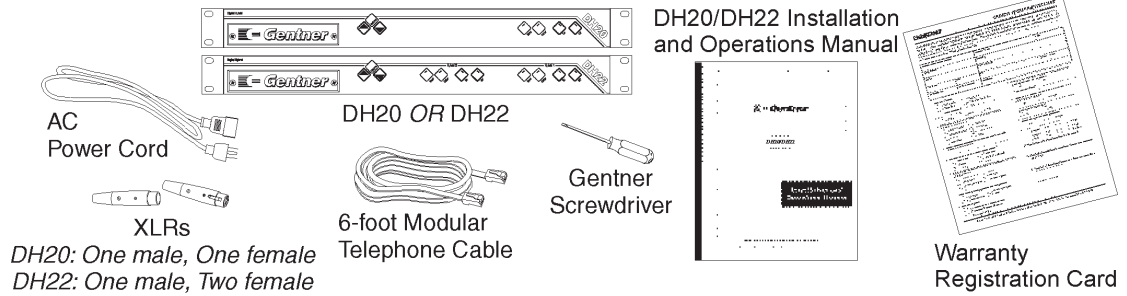
Figure 1. Equipment diagram

SHIPPING NOTE:
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.

Features and Benefits ≡

- Optical telephone interface

- DSP isolates send from receive audio, providing clean, consistent audio quality

- Sixteen-bit digital audio

- 9.6kHz sampling rate allows continual adaptation to telephone-line conditions

- Analog anti-alias filter minimizes hum and Central Office switching noise

- Integrated monitor amplifier with push-button volume control

- Remote ON/OFF control via rear-panel connection

- Selectable caller control (0, -6, -12 or -18dB) through front-panel dip switches

- Selectable single-ring auto-answer

- Selectable auto-disconnect with loop-current interruption

- Selectable auto-disconnect with busy/reorder tone detector

- Selectable caller automatic gain control (AGC)

- Selectable automatic mix-minus echo cancellation (26-millisecond tail time)

Product Description ≡

The digital hybrid models contain superior telephone integration into broadcast applications with both the DH20 and DH22.

DH20

The DH20 contains a new optical telephone interface. This, coupled with a 9.6kHz sampling rate allows continual adaptation to telephone-line conditions. The DH20 also provides easy control of volume levels through front-panel push buttons, and selectable caller control at 0dB, -6dB, -12dB or -18dB. Selectable auto-answer, auto-disconnect and call progress detection,

with auto-disconnect (loop-current interruption) make the DH20 a "smart" digital hybrid. The DH20's automatic mix-minus (when selected) provides echo cancellation with a 26-millisecond tail. This allows easy installation to consoles with no mix-minus capability.

DH22

The DH22 (while still a single rack-mount unit) contains all features of the DH20, but in duplicate (i.e. the DH22 is, in essence, *two* DH20s). The two hybrids contain a common send-audio input, and the two lines are internally conferenced. Callers one and two can be brought out as a mix to a single input on your console, or individually to two inputs on your console.

Echo Cancellation

Gentner-developed DSP technology and firmware provide a high quality telephone interface between a standard analog POTS line and user audio equipment. The primary function of the hybrid is to provide maximum separation of send and caller audio. The hybrid will provide >55dB send/ caller isolation between 250Hz to 3.5kHz

Automatic Gain Control (AGC)

AGC on the caller audio provides consistent caller level. The AGC threshold is -40dBm on the telephone circuit. The AGC runs at 3dB/500ms gain change working to achieve an equivalent average caller level of -15dBm on the telephone circuit.

Automatic Mix-Minus

The digital hybrid's automatic mix-minus creates a mix-minus for the hybrid when one is not available from the audio console. Caller/send isolation is equal to or greater than 50dB between 250Hz to 3.5KHz with 10dB maximum external loop gain. However, be aware that rapid changes in the caller audio level can cause the hybrid to introduce send audio suppression of 12dB.

Front-Panel Controls

The digital hybrid front-panel controls (See Figure 2, below.) perform the following functions:

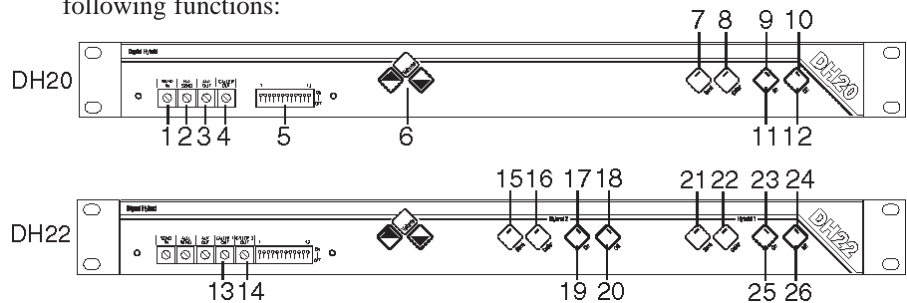**Figure 2.** Digital hybrid models front-panel controls: (Top) DH20, (Bottom) DH22

1. *Send.* This trim pot adjusts the level of the send audio onto the phone line. At its midpoint, 12 o'clock, the trim pot is set for nominal send input level of (0dBm).

2. *AUX Send.* This trim pot will adjust the level of the aux input audio onto the phone line. At its midpoint, 12 o'clock, the trim pot is set for a nominal

Product Description
Continued ≡

input level (0dBm).

3. *AUX Out.* This trim pot (See Figure 2a, below.) will adjust the level of the aux-out audio. At its midpoint, 12 o'clock, the trim pot is set for nominal caller level (0dBm).
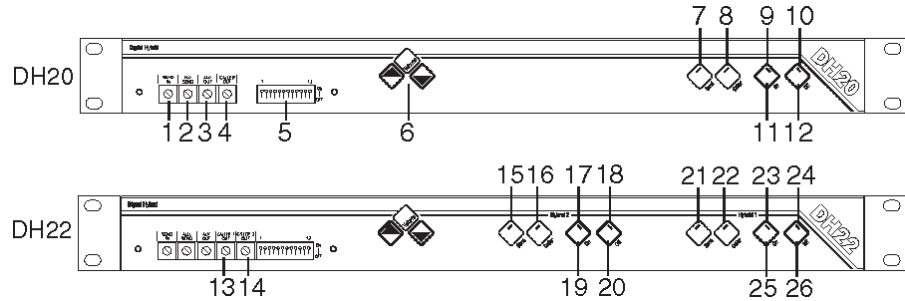

Figure 2a. Digital hybrid models front-panel controls: (Top) DH20, (Bottom) DH22

4. *Caller.* On the *DH20,* this trim pot controls the caller level to the user equipment. At its midpoint, 12 o'clock, the trim pot is set for nominal caller level (0dBm).

On the *DH22,* this function controls caller level for hybrid 1 [13] and hybrid 2 [CALLER 2; 14] (each of the internal telephone hybrids).

5. *Dip Switches.* Dip switches are used to configure the digital hybrid system. Individual switch functions are defined in the Operational Features section (Page 8).

6. *Volume.* These up/down buttons control the audio level of the MONITOR amplifier.

7. *Send LED.* On the *DH20,* this bicolor LED indicates the relative level of the send audio into the digital hybrid. Green indicates nominal level, amber indicates caution, red indicates clipping.

On the *DH22,* this function is duplicated for hybrid 1 [15] and hybrid 2 [21] (each of the internal hybrids).

8. *Caller LED.* On the *DH20,* this bicolor LED indicates the relative level of the caller audio from the telephone line. Green represents nominal level, amber indicates caution, red indicates clipping.

On the *DH22,* this function is duplicated for hybrid 1 [16] and hybrid 2 [22] (each of the internal hybrids).

9. *On LED.* On the *DH20,* this bicolor LED indicates the hybrid's ON state. The LED will illuminate green when the hybrid is in the ON state. This LED will also flash to indicate an incoming call.

On the *DH22,* this function is duplicated for hybrid 1 [17] and hybrid 2 [23].

10. *Off LED.* On the *DH20,* this bicolor LED indicates the hybrid's OFF state. The LED will illuminate red when the hybrid is in the OFF state.

On the *DH22,* this function is duplicated for hybrid 1 [18] and hybrid [24].

11. *On.* On the DH20, the ON switch (momentary), connects the hybrid to the telephone line, and automatically adapts the hybrid to the line. Pressing the ON button for more than a half-second while the hybrid is active will

readapt the hybrid.

On the DH22, this function is duplicated for hybrid 1 [19] and hybrid 2 [25].

12. *Off.* On the *DH20,* the OFF switch (momentary), disconnects the hybrid from the telephone line and mutes all audio.

On the *DH22,* this function is duplicated for hybrid 1 [20] and hybrid 2 [26].

Rear-Panel Connectors

1. *Power.* The AC power cord input (See Figure 3, below.) is a NEMA type connector allowing 100–240Vac, 50/60Hz.
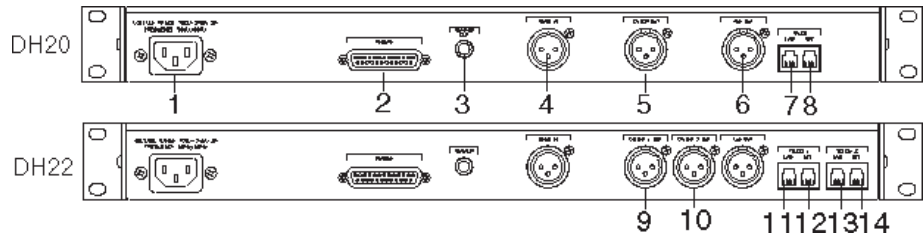

Figure 3. Digital hybrid models back-panel connectors (Top) DH20, (Bottom) DH22

2. *Remote.* This DB25 female connector provides remote control and status of the hybrid. It also provides addditional send and caller audio connections for conferencing multiple hybrids.

3. *Monitor Out.* This quarter-inch phone jack provides a 1W amplified caller audio signal for monitoring.

4. *Send In.* This is audio sent to the caller, and is a balanced, female 3-pin XLR. This input must be mix-minus audio when the automatic mix-minus feature is disabled. If the audio attached to this input contains caller audio, the automatic mix-minus feature must be enabled.

5. *Caller Out*. On the *DH20,* this balanced, male 3-pin XLR output contains caller audio only.

On the *DH22,* CALLER 1 OUT [9] contains a mix of hybrid 1 and hybrid 2 caller audio. Disable the caller-mix feature to prevent CALLER 2 OUT [10] from being mixed with CALLER 1 OUT.

6. *Aux Out*. This balanced, male 3-pin XLR output contains caller audio only *or* caller mixed with send, depending upon the selection of the AUX MIX-select switch (dip switch 12).

7. *Line*. On the *DH20,* this RJ11 connector provides connection of the telephone line to the hybrid.

On the *DH22,* this connection is duplicated for hybrid 1 [11] and hybrid 2 [13].

8. *Set*. On the *DH20,* this RJ11 connector allows connection to a standard analog telephone set. Tip and ring from the phone line are present at this connector when the hybrid is in its OFF state. Tip and ring from the phone line are not present at this point when the hybrid is in its ON state.

On the *DH22,* this connection is duplicated for hybrid 1 [12] and hybrid 2 [14].

Before You Install ≡

Power Requirements

The digital hybrid automatically accommodates voltage requirements of 100–240Vac, 50/60Hz.

Telephone Line Requirements

The digital hybrid models operate on standard telephone lines and connect to the telephone system with a standard RJ11C modular jack. If you do not have an RJ11C jack where you want to install your digital hybrid, call your telephone company for installation.

DRY LINE NOTE:
The DH20 and DH22 will not operate with telephone dry Telco lines.

Equipment Placement

The digital hybrid models are designed for installation into a standard 19-inch equipment rack.

Installation ≡

The digital hybrid models are designed for easy installation and setup. All necessary interface connection are made through rear-panel connectors. This makes for easy installation, removal and, if necessary, service. Refer to digital hybrid back-panel connections (See Figure 3a, below.) for a description and placement of each of the connections you will be making. Each connection is numbered for easy identification.
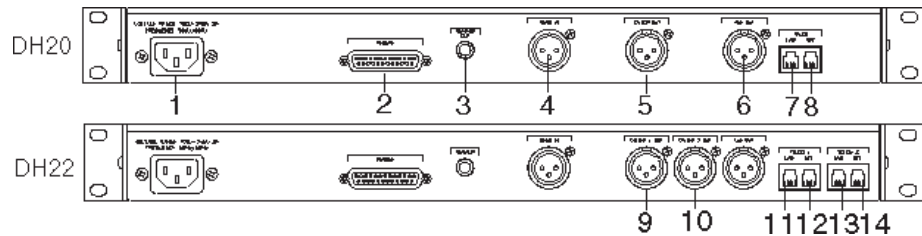

Figure 3a. Digital hybrid models back-panel connectors (Top) DH20, (Bottom) DH22

To install your digital hybrid, follow these step-by-step instructions:

Completed Installation

The following block diagrams (See Figure 4, below, Figures 5–6 next page, top.) illustrate typical DH20 and DH22 installations.
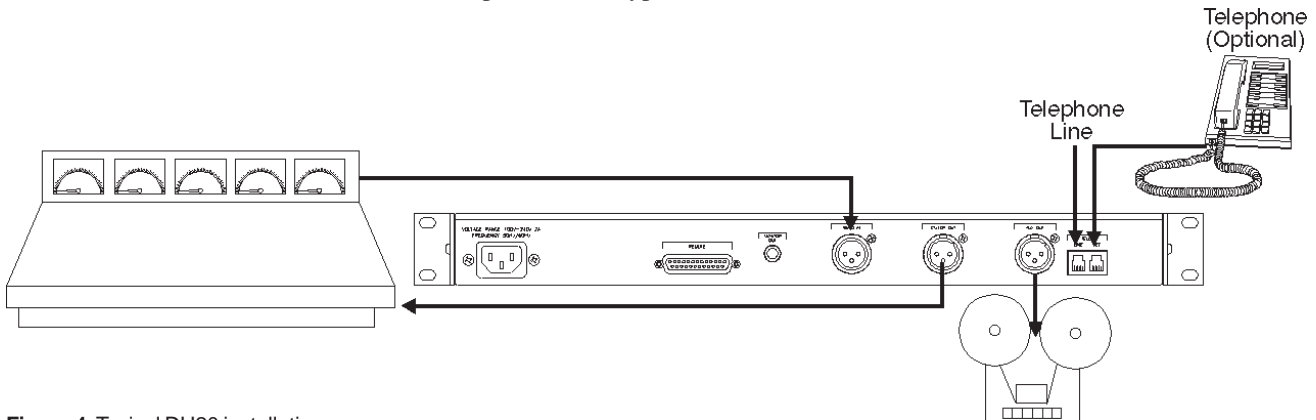

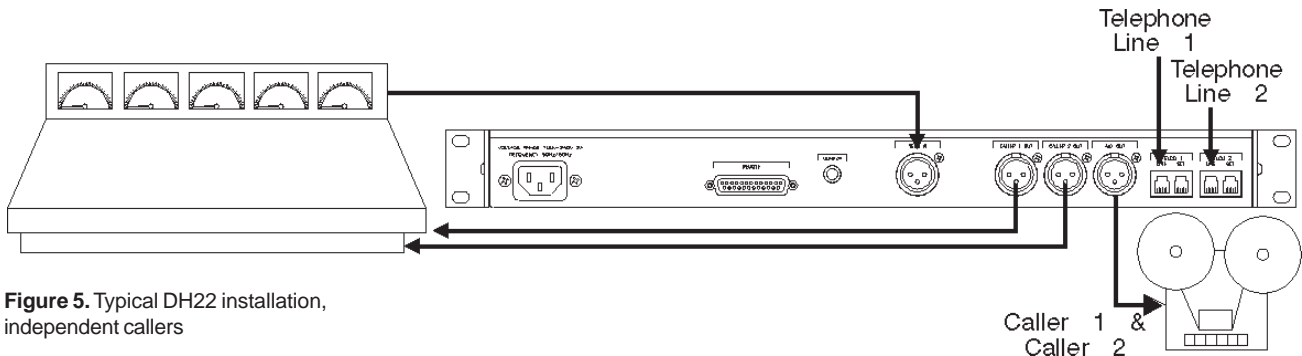**Figure 4.** Typical DH20 installation

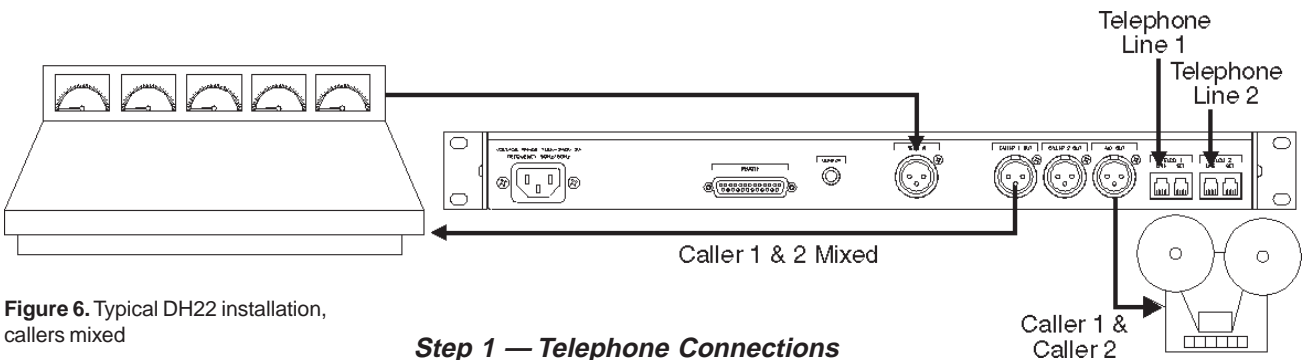**Figure 5.** Typical DH22 installation, independent callers

Figure 6. Typical DH22 installation, callers mixed
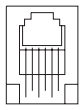

Figure 7. RJ11C telephone-line connector

Step 1 — Telephone Connections

DH20
Line. Plug your telephone line from the telephone company into the RJ11C LINE jack [7] (Figure 3, previous page; Figure 7, left).

Set. Plug your telephone set into the RJ11C SET jack [8].

DH22
Line. Plug the *first* of your telephone lines from the source into the RJ11C LINE jack [11] (Figure 7, left). Plug the *second* of your telephone lines from the source into the second RJ11C LINE jack [13].

Set. Plug your *first* telephone set into the RJ11C SET jack [12]. Plug your *second* telephone set into the second RJ11C SET jack [14].

Step 2 — Back-Panel Connections
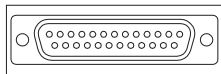
Figure 8. Remote DB25 connector

Remote
If using a remote control for control and hybrid status, plug it into the DB25 REMOTE connector [2] (Figure 8, left). For pinouts, see Appendix A: Connector Pinouts (Page 20).

Caller Out
DH20. Connect the DH20's CALLER OUT male XLR plug [5] (See Figure 9, left.) to the studio console. This is balanced line-level audio.

DH22. Connect the DH22's CALLER 1 OUT male XLR plug [9] (See Figure 9, left.) to the studio console. The is balanced line-level audio. Connect the DH22's CALLER 2 OUT male XLR plug [10] to the studio console. This, also, is balanced line-level audio.
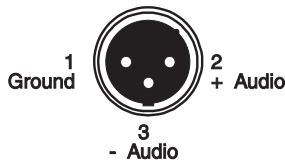
Figure 9. Caller audio male XLR connector

SEPARATE CALLER NOTE:
Disable caller mix (dip switch 11) and connect CALLER 2 OUT if your application requires separate callers to be routed into the audio console.

Installation Continued ≡
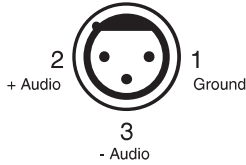
Figure 10. Send audio female XLR connector

Figure 11. Digital hybrid models back-panel connectors (Top) DH20, (Bottom) DH22

Figure 12. Aux audio male XLR connector

Figure 13. DH monitor jack

VOLTAGE RANGE 85V - 240V
FREQUENCY 50 HZ / 60 HZ

Figure 14. Digital hybrid power module

Send In

Connect the digital hybrid's SEND IN input to the studio console [4] (Figure 10, left, Figure 11, below). This female XLR 's audio *must be* mix-minus when the digital hybrid's automatic mix-minus feature is *disabled*; if the audio attached to this input *contains caller audio,* the automatic mix-minus feature *must be enabled.*
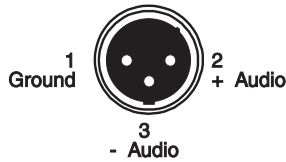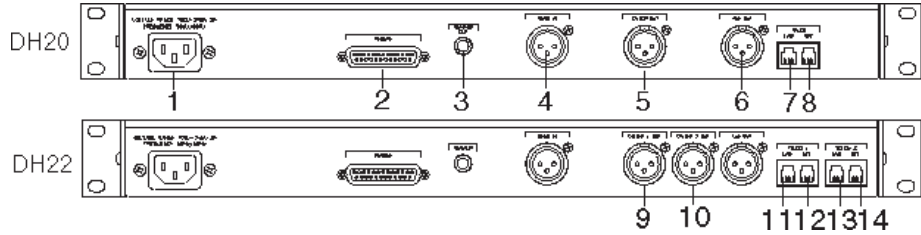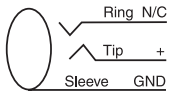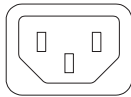

Aux Out

Connect his male XLR connector [6] (See Figure 12, left.) to your studio console or recording device. This connector contains caller audio only *or* caller mixed with send, depending on the position of the AUX MIX-select switch (dip switch 12).

Monitor Out

Connect a speaker to this quarter-inch TRS jack [3] (See Figure 13, left.) to monitor a 1W-amplified caller signal.

Step 3 — Power Connection

The power cord [1] (See Figure 14, left.) will operate at any level between 100–240Vac, 50–60Hz.

Mix-Minus ≡

Mix-minus refers to the 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 will be sent back to the caller, where it will be retransmitted to the studio via the caller's telephone. This feedback can create anything from echo to a howling squeal. Many broadcast consoles provide a mix-minus feed via a telephone module.

When using the digital hybrid models with mix-minus, there are several ways of going about generating mix-minus externally or internally. If a mixing console is used to feed the digital hybrid's SEND input, the audio going down the line *must not* contain any caller audio. There are six ways to accomplish this: separate mix channel, internal mix bus, "build your own" mix-minus, discrete microphone mixer, one-channel send and internal mix-minus.

Separate Mix Channel

If the console has an extra mixing output channel, use this channel to mix all the audio you want to send to the digital hybrid *except* the channel that will be connected to caller audio.

Phone Module

A phone module creates a sum of all the audio sources in the console *minus* the caller audio. Many console manufacturers provide this feature.

"Build Your Own" Mix-Minus

You can build your own mix-minus by summing all audio sourced to be sent to the caller using an external mixer.

Discrete Microphone Mixer

If only microphone audio will be sent down the line, a separate microphone mixer (such as the Gentner MPAII Mixer/Power Amplifier) may be utilized. This audio can then be sent to the digital hybrid's SEND input as well as the console input.

One Channel Send

If a single-source audio will be sent to the caller (i.e. from a microphone), simply use the line-level output from the microphone preamplifier.

Automatic Mix-Minus
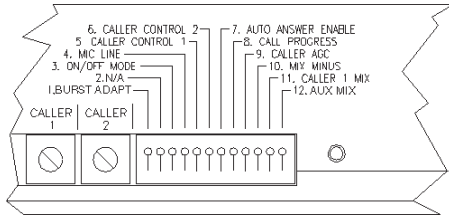
Figure 15. Digital hybrid dip switches

As shipped from the factory, the digital hybrid automatic mix-minus function is disabled. To enable the digital hybrid's internal automatic mix-minus, switch dip switch 10 (See Figure 15, left.) behind the digital hybrid front access panel to the ON (UP) position.

When first powered up in automatic mix-minus mode, a test call should be made. The automatic mix-minus should be allows to adapt for 4–5 seconds with only caller audio present in the console's program mix.

Operational Features ≡

The digital hybrid models have a variety of operational features that can be selected or disabled through dip-switch settings. Operational features include automatic gain control, auto-answer/auto-disconnect, AUX-mix select, caller control, caller-mix select, call-progress detection, mic/line select, receive audio gain, remote ON/OFF control, send-audio gain.

Burst Adapt

In some applications, it may be desirable to adapt the hybrid with a white-noise burst, rather than allowing the hybrid to adapt automatically to line conditions. To enable this feature, dip switch 1 behind the digital hybrid's front panel (See Figure 15, above, left.) is used to enable/disable the noise burst (Table 1, below).

Table 1. Burst Adapt Dip Switch Settings

Dip Switch	Position	Description
1	ON (UP)	Burst adapt enabled
1	OFF (DOWN)	Burst adapt disabled

Remote ON/OFF Control

Dip switch 3 determines the type of external control used to turn the hybrid ON and OFF: latching or momentary (Table 2, next page, top).

Operational Features
Continued ≡

Table 2. Remote ON/OFF Dip Switch Settings
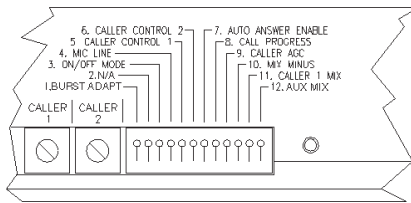
Dip Switch	Position	Description
3	ON (UP)	Latching
3	OFF (DOWN)	Momentary

Figure 15a. Digital hybrid dip switches

Mic/Line Select

Dip switch 4 (See Figure 15a, left.) determines the SEND input's gain. When this dip switch is selected, the input will provide 55dB of gain to provide for an external microphone connection (Table 3, below).

Table 3. Mic/Line Select Dip Switch Settings

Dip Switch	Position	Description
4	ON (UP)	+55dB (Mic)
4	OFF (DOWN)	0dB (Line)

Caller Control

Caller control reduces the caller audio when send audio is present on the hybrid(s). Two dip switches 5 and 6 behind the digital hybrid's front access panel are used to select preset reduction levels (Table 4, below).

Table 4. Caller Control Dip Switch Settings

Dip Switch 5 Position	Dip Switch 6 Position	Maximum Reduction
OFF (DOWN)	OFF (DOWN)	0dB reduction
ON (UP)	OFF (UP)	-6dB reduction
OFF (DOWN)	ON (UP)	-12dB reduction
ON (UP)	ON (UP)	-18dB reduction

Auto-Answer/Auto-Disconnect

Dip switches 7 and 8 behind the digital hybrid's front access panel enable/disable the auto-answer/auto-disconnect feature. The type of signaling used for auto-disconnect is loop drop/interrupt unless call-progress detection is enabled (Table 5, below).

Table 5. Auto-Answer/Auto-Disconnect Dip Switch Settings

Dip Switch 7 Position	Dip Switch 8 Position	Description
ON (UP)	OFF (DOWN)	Auto-answer/disconnect, call progress and loop drop
OFF (DOWN)	ON (UP)	Auto-disconnect, loop drop only
ON (UP)	ON (UP)	Auto-answer, loop drop only
OFF (DOWN)	OFF (DOWN)	Auto-answer/disconnect disabled

Call-Progress Detection

Dip switch 8 behind the digital hybrid's front access panel enables/disables the call-progress decoder to disconnect the line upon detection of a valid call-progress signal (Table 6, next page, top). Call progress will detect reorder tone and busy for the United States, Canada, the United Kingdom, France and Germany.

Table 6. Call-Progress Detection Dip Switch Settings

Dip Switch	Position	Description
8	ON (UP)	Call-Progress Detection Enabled
8	OFF (DOWN)	Call-Progress Detection Disabled

Automatic Gain Control (AGC)

Dip switch 9 behind the digital hybrid's front access panel enables/disables the AGC function in the firmware (Table 7, below).

Table 7. AGC Dip Switch Settings

Dip Switch	Position	Description
9	ON (UP)	AGC Enabled
9	OFF (DOWN)	AGC Disabled

Caller Mix Select: DH22 Only

Dip switch 11 determines the output signal type on the CALLER 1 output (Table 8, below).

Table 8. Caller Mix Dip Switch Settings (DH22 Only)

Dip Switch	Position	Description
11	ON (UP)	Caller 2 + Caller 1
11	OFF (DOWN)	Caller 1 Only

CALLER MIX NOTE:
On the DH20, this dip switch is disabled.

AUX Mix Select

Dip switch 12 determines the output signal type on the AUX output. When selected, the AUX output will contain a mix of the caller audio and the SEND input audio (Table 9, below). When disabled, the output will contain caller audio *only*.

Table 9. AUX Mix Dip Switch Setting

Dip Switch	Position	Description
12	ON (UP)	Caller + Send
12	OFF (DOWN)	Caller Only

AUX-MIX NOTE:
When the automatic mix-minus mode is enabled (See Mix-Minus, Page 7.) this function is internally disabled and not available.

Calibration ≡

The following information will help you make adjustments to optimize your system performance. Verify all components and all connections. Ensure that proper power is supplied to the digital hybrid and that the unit is OFF (the red OFF LED [10, 18, 24] will be lit; Figure 16, below). If the green ON LED [9, 21, 23] is lit, press the OFF button [12, 20, 26].
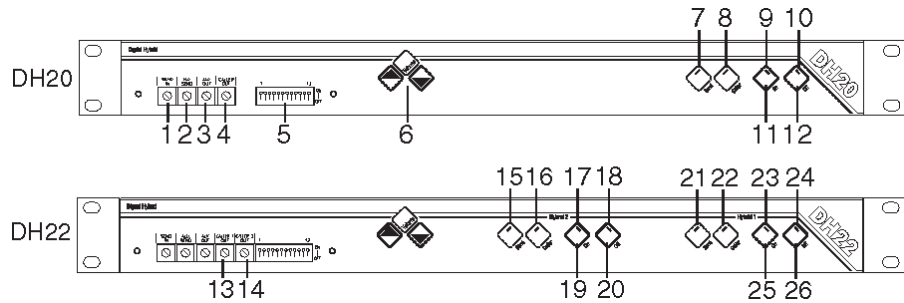

Figure 16. Digital hybrid models front-panel controls: (Top) DH20, (Bottom) DH22

CALIBRATION NOISE NOTE:
Some echo and ringing may be heard while calibrating the digital hybrid. Disregard it and continue with calibration until the end of the procedure. The echo and ringing will disappear.

Step 1 — Trim Pot Levels

Figure 17. Digital hybrid models trim-pot locations

Due to the various operating modes front-panel level settings will need to be preset as follows:

Set both the SEND IN trim pot [2] and CALLER trim pot(s) [4, 13, 14] at the 12 o'clock position (Figure 17, left).
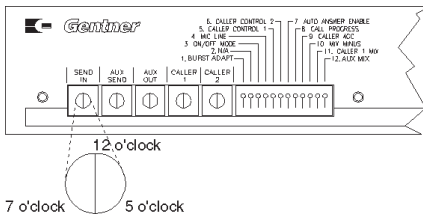
Step 2 — Caller Adjustment

From another location, have someone call the digital hybrid. Answer the line by pressing the ON button [11, 19, 25]. (If the auto-answer feature is active, the unit will answer the call after one complete ring.)

As the caller talks, adjust *only* the active CALLER trim pot(s) [4, 13, 14] identified in Step 1 (above), and/or your mixing board for a correct level going into your board.

RECEIVE LED NOTE:
The CALLER trim pot(s) [4, 13, 14] has no effect on the RECEIVE LED [8, 16, 22]. The RECEIVE LED indicates actual level on the phone line only.

Step 3 — Send Adjustment

Send normal voice program audio. Adjust your console or active SEND IN trim pot [1] until the SEND LED(s) [7, 15, 21].

Watch the SEND LED(s) [7, 15, 21] light green as the host speaks. If the LED peaks red frequently or peaks red before the RECEIVE LED(s) [8, 16, 22], turn the SEND IN trim pot [1] down (counterclockwise, toward 7 o'clock) until the frequency of red peaks declines.

Conclude your conversation and press the OFF button [12, 20, 26]. (If the auto-answer/auto-disconnect feature is active, the hybrid will disconnect the call upon sensing loop drop.)

Operation ≡

Easy-to-access and read front-panel controls make operation of the digital hybrid simple. Figure 16 (previous page) shows each front panel LED and button by number.

Answering a Call

An incoming call will ring on the telephone set connected to the digital hybrid (ON LED will flash). Answer the call by pressing the ON button [11, 19, 25] on either the front panel or from your remote control. This will route the call through the digital hybrid, and the green ON LED [9, 17, 23] will light. The red OFF LED [10, 18, 24] will extinguish. Upon connection, the digital hybrid automatically adjusts to the line conditions.

Or

If you want to talk *off-air,* you can answer the call by picking up the telephone handset and talking to your party over the telephone. *Do not* activate the digital hybrid; your call *will not* be handled by the hybrid.

Making a Call

Off-Air
The digital hybrid should be OFF (the red OFF LED [10, 18, 24] will be lit). Using your telephone set, dial the phone number of the party you wish to call. Conduct your call as you normally would and hang up the handset when finished.

On-Air
Call the party normally, using your handset. After the other party has answered, put the call on-air by pressing the ON button [11, 19, 25]. The ON LED [9, 1 7, 23] will light and the digital hybrid will take 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 [12, 20, 26] to disconnect the call.

DH22 NOTE:
Ensure that you press the OFF button that corresponds with the hybrid you wish to disconnect.

Disconnecting a Call

If the call is routed through the digital hybrid (the ON LED [9, 17, 23] will be lit), press the OFF button [12, 20, 26]. The OFF LED [10, 18, 24] will light, and the ON LED [9, 17, 23] will extinguish.

If your call is through the handset only (the red OFF LED [10, 18, 24] will be lit), hang up when the conversation is complete.

Training the Telephone Echo Canceller

On first connection to a telephone line after the digital hybrid is powered up, the digital hybrid will emit a burst of white noise to "train" the telephone echo canceller. This noise burst gives a good approximation of the echo returning from the telephone network, allowing cancellation.

However, it may be necessary occasionally to retrain the system. To do this,

**Operation
Continued ☰**

press the ON button [11, 19, 25] (See Figure 18, below.) for longer than a half-second. This will initiate the same noise burst mentioned above, and yield maximum echo cancellation.

DH22 RETRAIN NOTE:
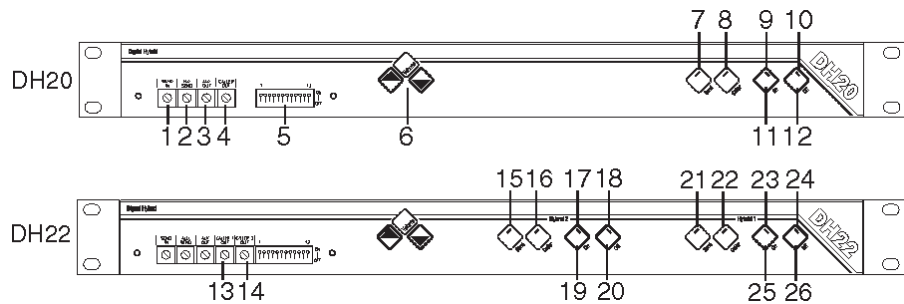*If performing this procedure, be sure to retrain each of the DH22's hybrids.*

Figure 18. Digital hybrid models front-panel controls: (Top) DH20, (Bottom) DH22

Pressing the ON button momentarily (less than a half-second) will connect the telephone line and not initiate a retrain. However, if you wish to retrain on connection to the phone line, simply press and hold the ON button for greater than a half-second, and the retrain will occur on connection. With a little practice, you can select between connecting with no retrain (short press) and connecting with retain (long press).

Auto-Answer/Auto-Disconnect Mode

Figure 19. DH dip switches

Activating Auto-Answer/Auto-Disconnect
To put the digital hybrid in auto-answer mode, move the AUTO-ANSWER dip switch 7 (See Figure 19, left.) to the ON position. In the auto-answer mode, the digital hybrid will automatically answer telephone calls after one complete ring. Upon answering, the red OFF LED [10, 18, 24] will extinguish and the green ON LED [9, 17, 23] will light. Your call will be routed through the digital hybrid and its connection to the console.
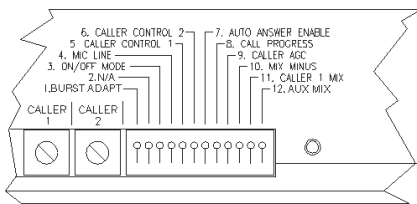
When the call is terminated, the digital hybrid will sense loop drop and automatically turn the digital hybrid OFF, extinguishing the green ON LED [9, 17, 23] and lighting the red OFF LED [10, 18, 24].

AUTO-ANSWER/AUTO-DISCONNECT NOTE:
This mode may not function as described with some PBX systems. The difficulty with the auto-answer mode may be caused by ring timing. Auto-disconnect requires loop drop or loop reversal to function. If your PBX only provides reorder tone or busy signals, the call-progress function must be enabled for auto-disconnect.

Terminating Auto-Answer/Auto-Disconnect
Move the AUTO-ANSWER dip switch 7 to OFF position.

Remote Control Option

A customer-supplied remote control or contact-closure switch can be used to perform three functions: mute on/off, system on and system off.

If using a remote-control device, internal dip switch 3 will select a momentary or latching ON closure. (See Table 8, Page 11.)

Recording Option

To record a call, your recording device must be connected to the AUX connector on the digital hybrid's back panel. While on a connected call, the mix of both send and receive audio will be routed to the AUX connector. See Figure 20 (below) for possible configurations. Turn on your recording device and set it to record. Turn the recording device off when the call is finished.
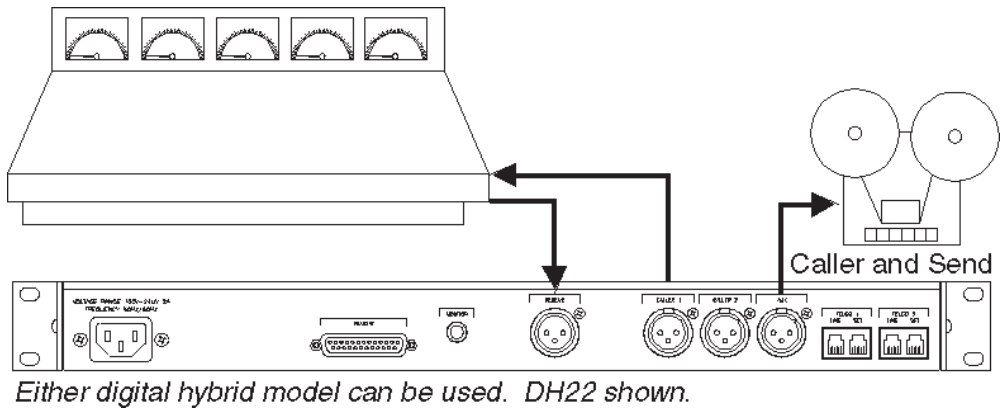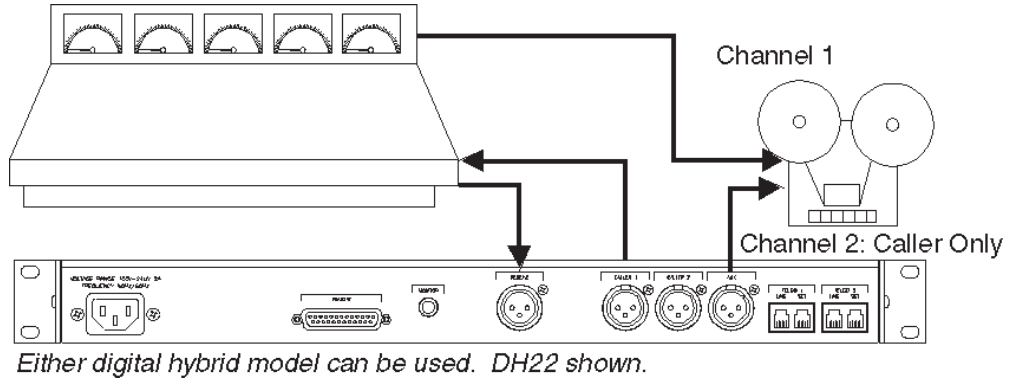

Either digital hybrid model can be used. DH22 shown.

Figure 20. Two typical recording configurations

Either digital hybrid model can be used. DH22 shown.

When Not in Use

The digital hybrid is inactive when the red OFF LED [10, 18, 24] lit.

If the AUTO-ANSWER dip switch 7 is OFF, the red OFF LED [10, 18, 24] will be lit and the green ON LED [9, 17, 23] will be off. If the AUTO-ANSWER dip switch 7 is ON, the green ON LED [9, 17, 23] will be lit and the red OFF LED [10, 18, 24] will be dim.

POWER NOTE:
Power should be maintained to the unit at all times.

Specifications ≣   *DH20/DH22*

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

Weight: DH20
7 lbs/3.2kg (dry)   12.1 lbs./5.5kg (shipping)

Weight: DH22
7.5 lbs/3.4kg (dry)   12.6 lbs./5.7kg (shipping)

Connectors

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

REMOTE: DB25 female connector.

MONITOR: 1/4" stereo jack; tip = +phase, ring = no connection; sleeve = -phase ground, 1W output into an 8ohm load

SEND: 3-pin female XLR; pin 1 = analog ground, pin 2 = +phase, pin 3 = -phase; +20dBm maximum input, 0dBu nominal level, >20kOhm impedance

CALLER: 3-pin male XLR; pin 1 = analog ground, pin 2 = +phase, pin 3= -phase; +20dBm maximum into 600ohms, 0dbu nominal level

*CALLER 1: 3-pin male XLR; pin 1 = analog ground, pin 2 = +phase, pin 3= -phase; +20dBm maximum into 600ohms, 0dbu nominal level

*CALLER 2: 3-pin male XLR; pin 1 = analog ground, pin 2 = +phase, pin 3= -phase; +20dBm maximum into 600ohms, 0dbu nominal level

AUX OUT: 3-pin male XLR; pin 1 = analog ground, pin 2 = +phase, pin 3= -phase; +20dBm maximum into 600ohms, 0dbu nominal level

LINE: RJ11 connector; A-lead supervision provided

*LINE 1:   RJ11 connector; A-lead supervision provided

*LINE 2:   RJ11 connector; A-lead supervision provided

SET: RJ11 connector

*SET 1:   RJ11 connector

*SET 2:   RJ11 connector

* *DH22 only*

Power Requirements

100–240Vac, 50/60Hz, 30W

Audio Performance

Frequency Response
±1dB from 250Hz to 3.5kHz (with AGC disabled)

Signal-to-Noise Ratio
>56dB reference to 0dBu at -15dBm on the telephone line

Receive Audio: Distortion
<.3% THD, 250Hz to 3.5kHz (AGC disabled)

Remote

Unbalanced Audio
0dB line level output with a < 50ohm impedance

On/Off Control
Momentary closures to the switch common, unless latching-mode enabled (dip-switch option); latching mode, hybrid remains active while closure from the ON control to switch common is present (OFF control nonfunctional in this mode).

Send and Caller Presence Indication
Open collector outputs go low when send and/or caller levels are nominal

Monitor Mute
Control input mutes monitor output with closure from mute input to switch common

Operating Temperature

32–100° F / 0–38° C

Humidity
0–80 percent

All specifications are subject to change without notice.

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 of 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 equipments 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 equipment has been tested and found to comply with the limits for a Class B 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 ≡

FCC Registration Number: FBIUSA-31573-BR-N
Ringer Equivalence Number (REN): 1.1B

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

USOC Jacks: This device uses 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.

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.

DH20/DH22 Ringer Equivalence Number (REN): 1.1
DH20 IC Certification Number: 1970 8175 A
DH22 IC Certification Number: 1970 8177 A

Safety Information ≡

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

BABT Recording Requirements ≡

This condition applies in circumstances where you wish to use telecommunications apparatus comprised in or connected to your system to record, silently monitor or intrude into live-speech telephone calls. (It does not apply where the apparatus in question is not telecommunications apparatus; i.e. is not apparatus that had been constructed or adapted for use in transmitting or receiving telecommunications messages.) Silent monitoring is the establishment of a receive-only transmission path to a third terminal, enabling a third party to hear the call. Instrusion is the establishment of a bothway speech transmission to another terminal enabling a third party to hear and be heard by at least one of the other parties to the call. The condition does not apply to the monitoring of telephone calls for a systems control or diagnostic purposes where the meaningful content of the call itself is monitored.

This condition provides that you should make every reasonable effort to inform all parties to a call that it may or will be recorded, silently monitored or intruded into. The particular means by which you choose to do this are not specified in the condition. Acceptable options, depending on circumstances, might include warning tones, prerecorded messages, spoken warnings by the operator or written warnings included in publicity material, telephone directories, contracts, terms of business, staff notices, etc. It may not always be possible to warn first-time callers with whom you have had no previous contact but what is important is that you have a systemic procedure in place which provides the necessary information wherever this is a realistic possibility.

For recording and silent monitoring, this condition recognises two forms of warning: a written notice before the call or a warning during the call itself. Both warnings should also inform all parties to a call why it is being recorded or silently monitored. In the case of intrusion, a warning before the intrusion takes place is sufficient as both parties will become aware that a third party has joined their conversation.

This condition does not specify the detail of how these forms of warning should be given. A written statement included in any of the following — contractural terms, conditions of employment, publicity material, staff notices, telephone directory entries — would be a possible method.

The essential point is that the equipment user must be able to demonstrate that a determined attempt has been made to reach prospective callers; as an illustration, we would expect any warning included in a company's publicity material to be presented in such a way that it would not be missed by anyone looking for that company's telephone number(s). A warning which is not clearly visibly would fail to meet this requirement.

Where the warning is to be given during the call itself, the possibilities include a recorded message at the beginning of the call or a spoken message at any time during the conversation.

You should also maintain a record of the means by which callers have been warned which the Director may request sight of. This does not mean that you have to log each phone call; rather, that should a dispute arise, it will be possible for you to show from records how callers were being made aware at the time.

This condition does not apply where apparatus is being used for the purpose of law enforcement or in the interests of national security or to calls involved the national Emergency Organisations. It also provides that other licensees may be excluded, by means of a Director's consent, where there are compelling factors that outweigh the normal expectation of privacy. Such factors might apply where security is a consideration or in the case of specialised users such as helplines. In accordance with Section 19 of the Telecommunications Act of 1984, these consents will be entered on a register open to public inspection.

This condition attempts to secure objectives similar to those which weere previously achieved through an approval requirement that equipment capable of recording, silently monitoring or intruding into telephone conversations should emit warning tones as these operations take place. The removal of warning tones was permitted by an OFTEL General Variation provided that an alternative form of warning was given. The expectation is that procedures complying with the General Variation should, generally, also meet the requirements of this condition.

Appendix A:
Connector Pinouts ≡

Table 10. Remote Connector Pinout

Pin	Description	Pin	Description
1	Remote hybrid 1 ON *	14	Hybrid 1 ON indication **
2	Remote hybrid 1 OFF *	15	Hybrid 1 OFF indication **
3	Remote hybrid 2 ON * #	16	Hybrid 2 ON indication ** #
4	Remote hybrid 2 OFF * #	17	Hybrid 2 OFF indication ** #
5	Switch/Indicator Common	18	Switch/Indicator Common
6	Hybrid 2 send/presence indication ** #	19	Hybrid 1 send presence indicator **
7	Hybrid 2 caller presence indication** #	20	Hybrid 1 caller presence indicator **
8	N/C	21	Switch/Indicator Common
9	Unbalanced Send Audio Input (0dBu nominal)	22	Audio Common
10	Unbalanced Caller Audio Output (0dBu nominal)	23	Audio Common
11	Unbalanced Aux Audio Output (0dBu nominal)	24	Audio Common
12	Monitor Mute Control*	25	Switch/Indicator Common
13	Audio Common		

* Remote control provided via contact closure to Switch/Indicator Common
** Remote indicators provided via open collector outputs to Indicator Common (<15V, <39mA)
# DH22 Only

Table 11. Line Connector Pinout

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

Table 12. Set Connector Pinout

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

Appendix B: DH20
Schematics ≡
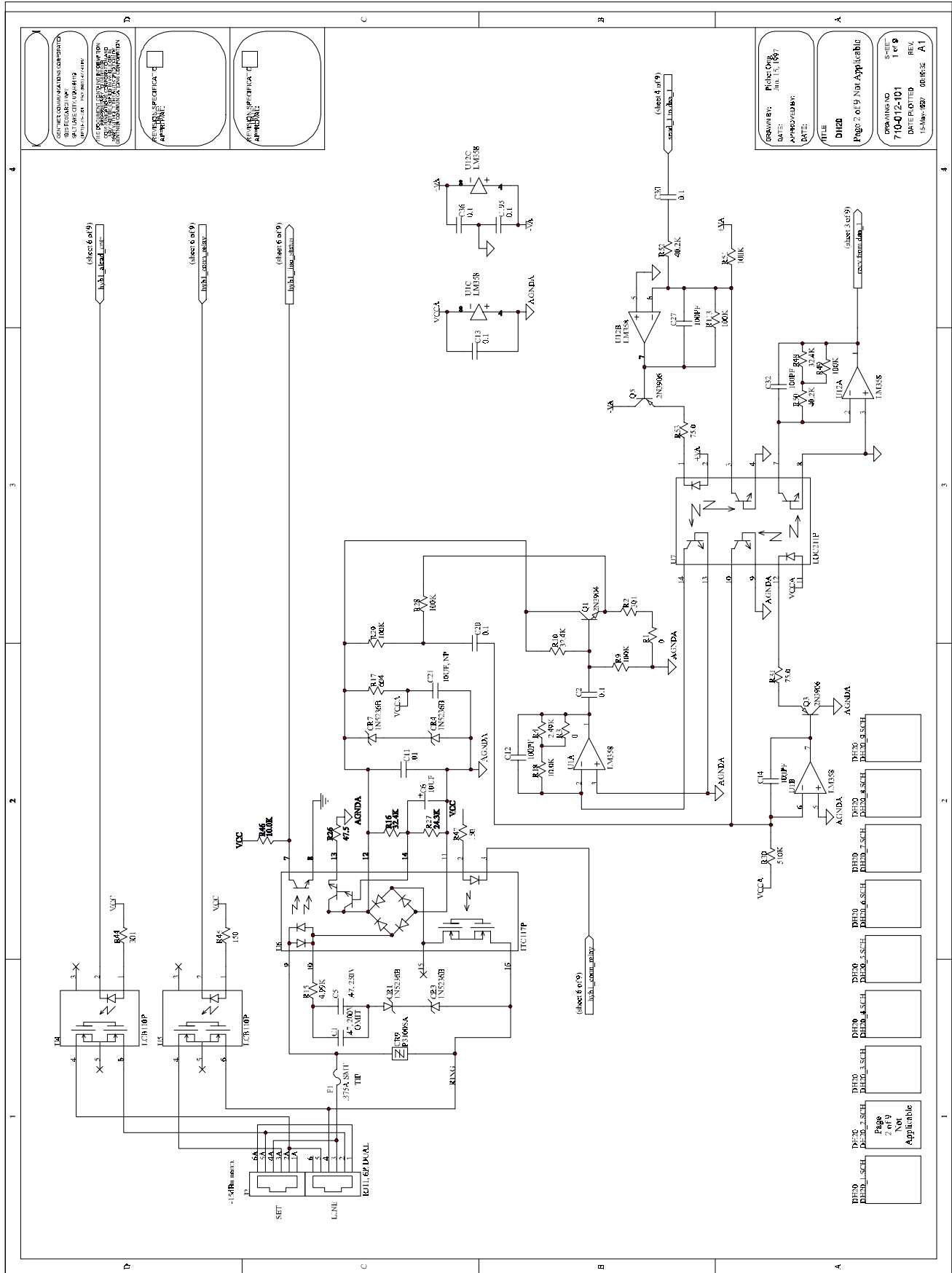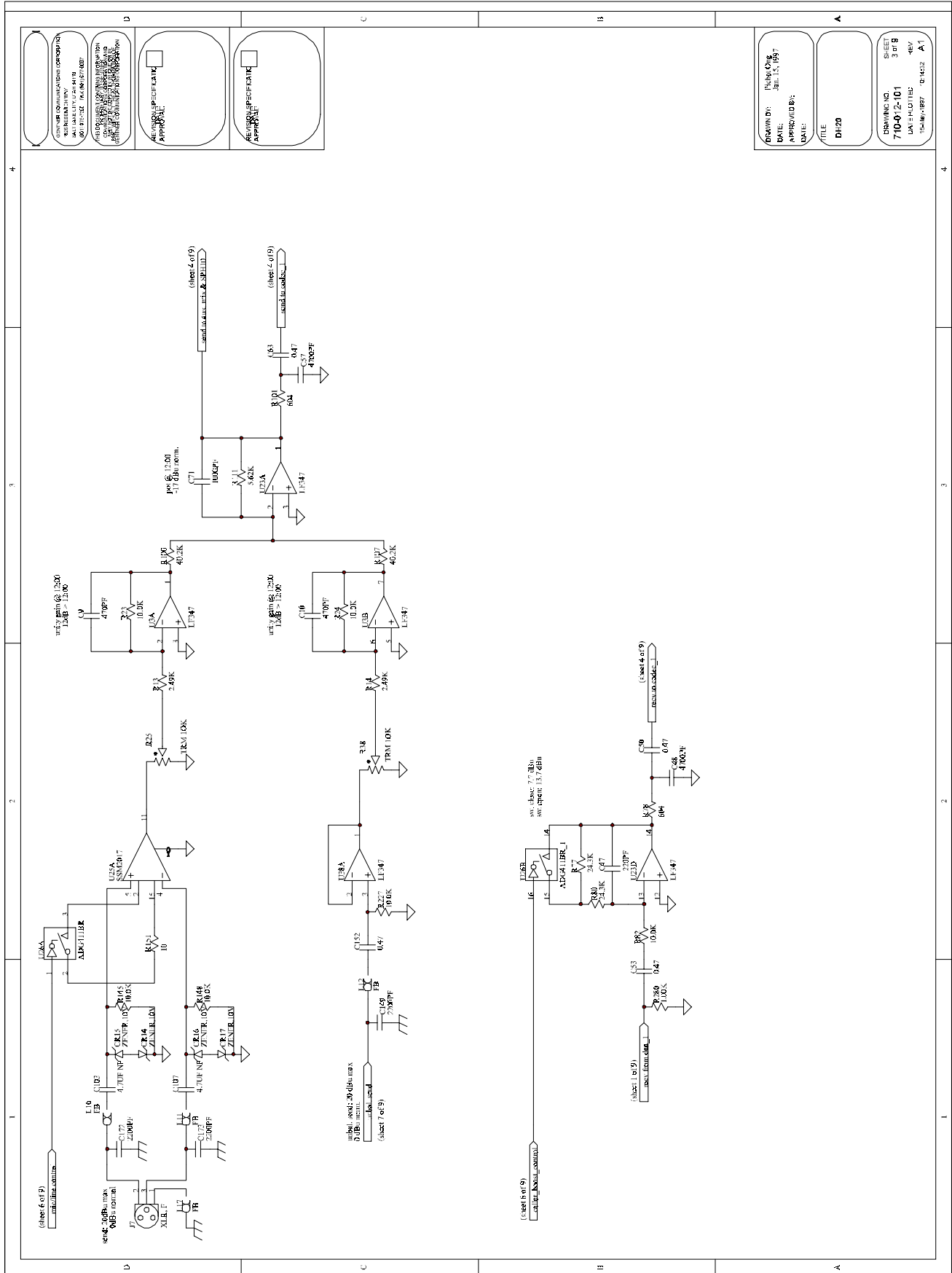
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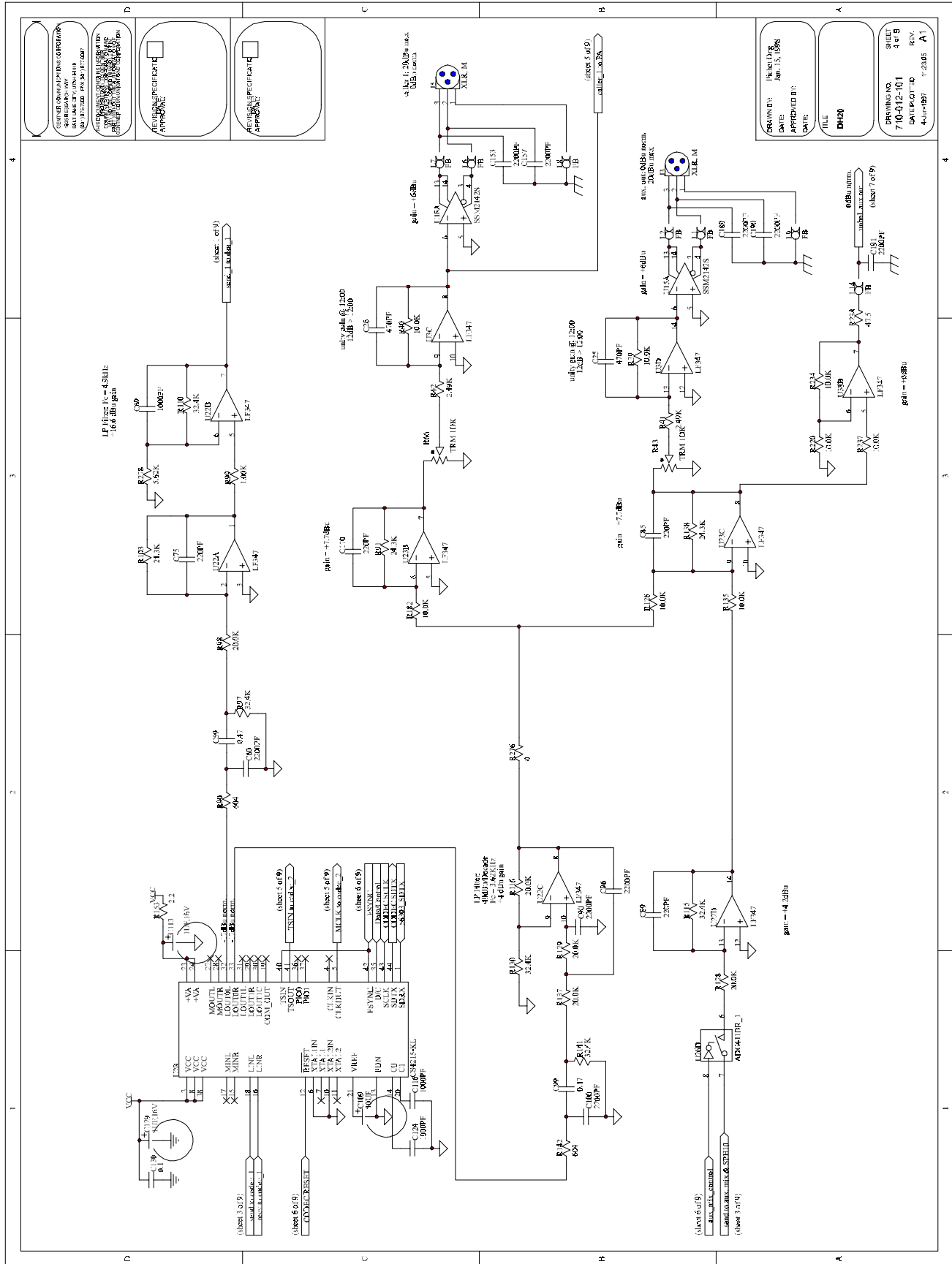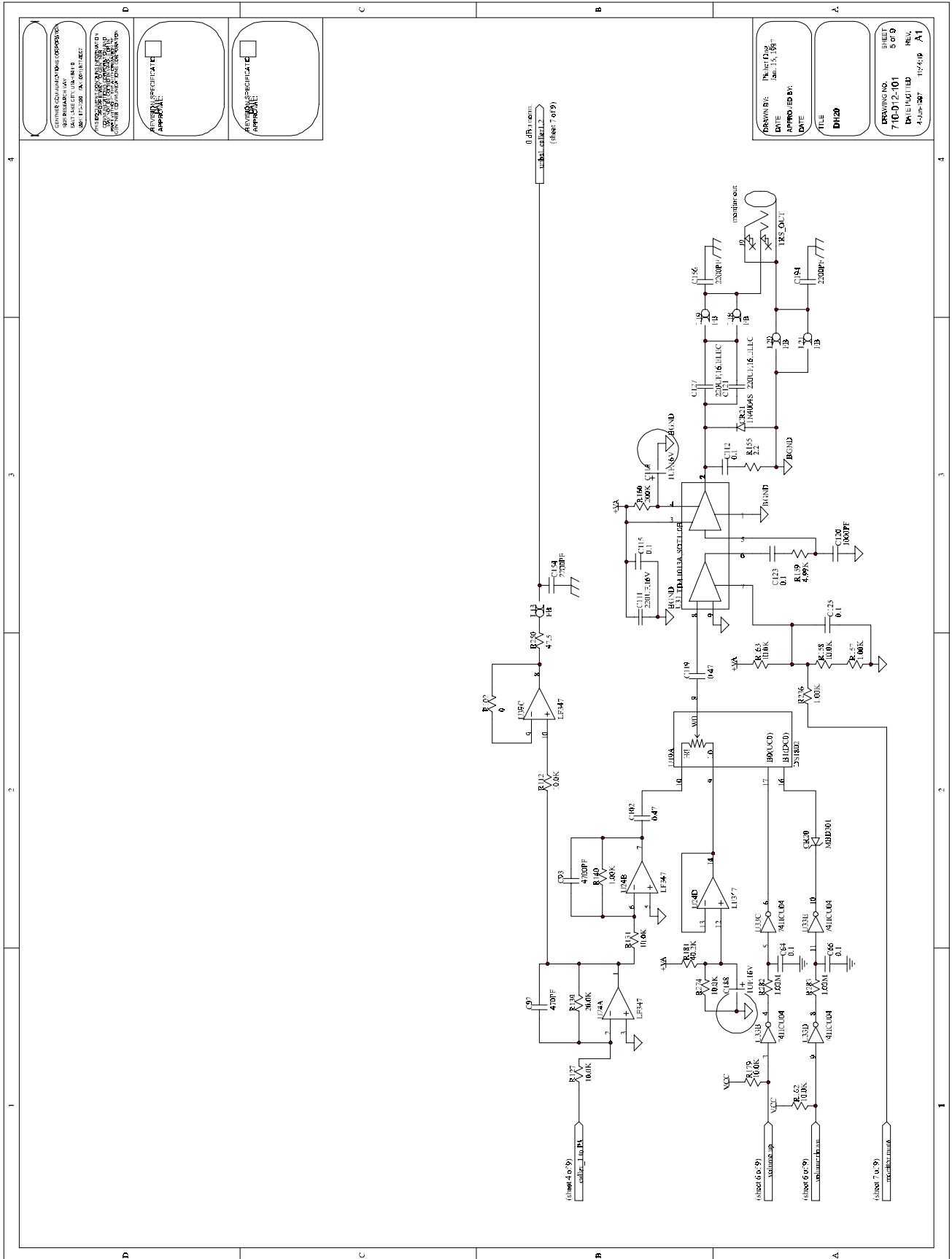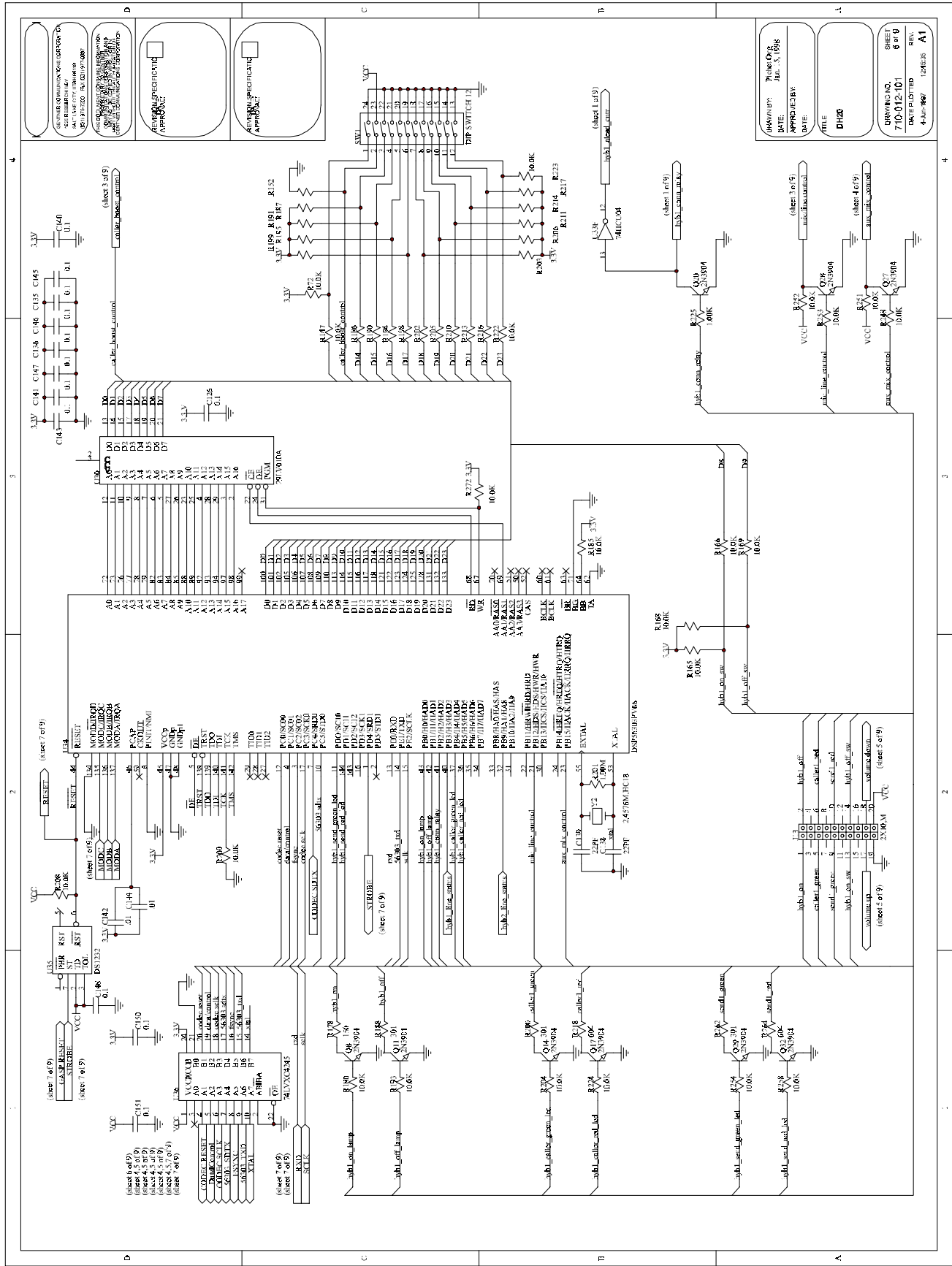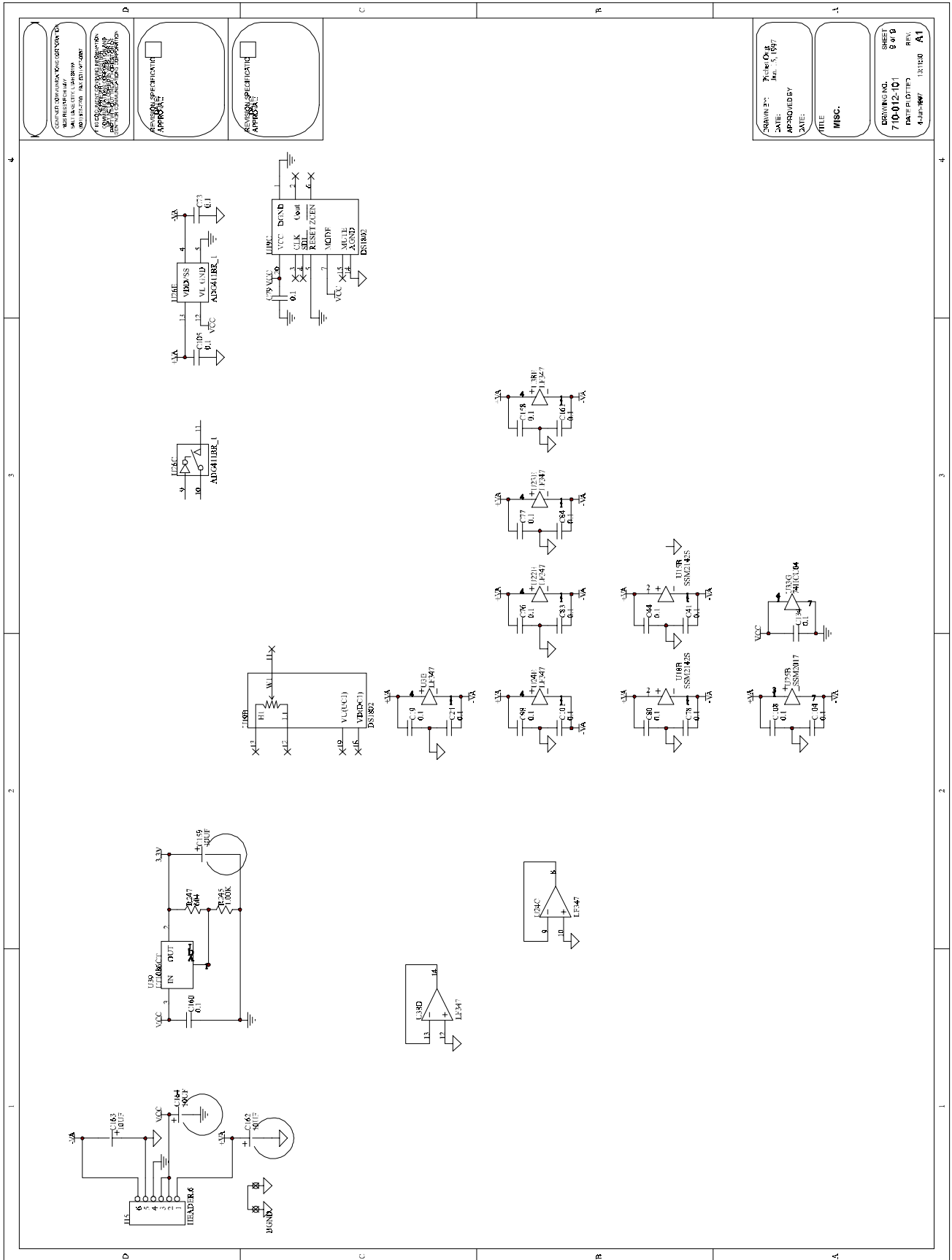
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Continued ≡

Appendix B:
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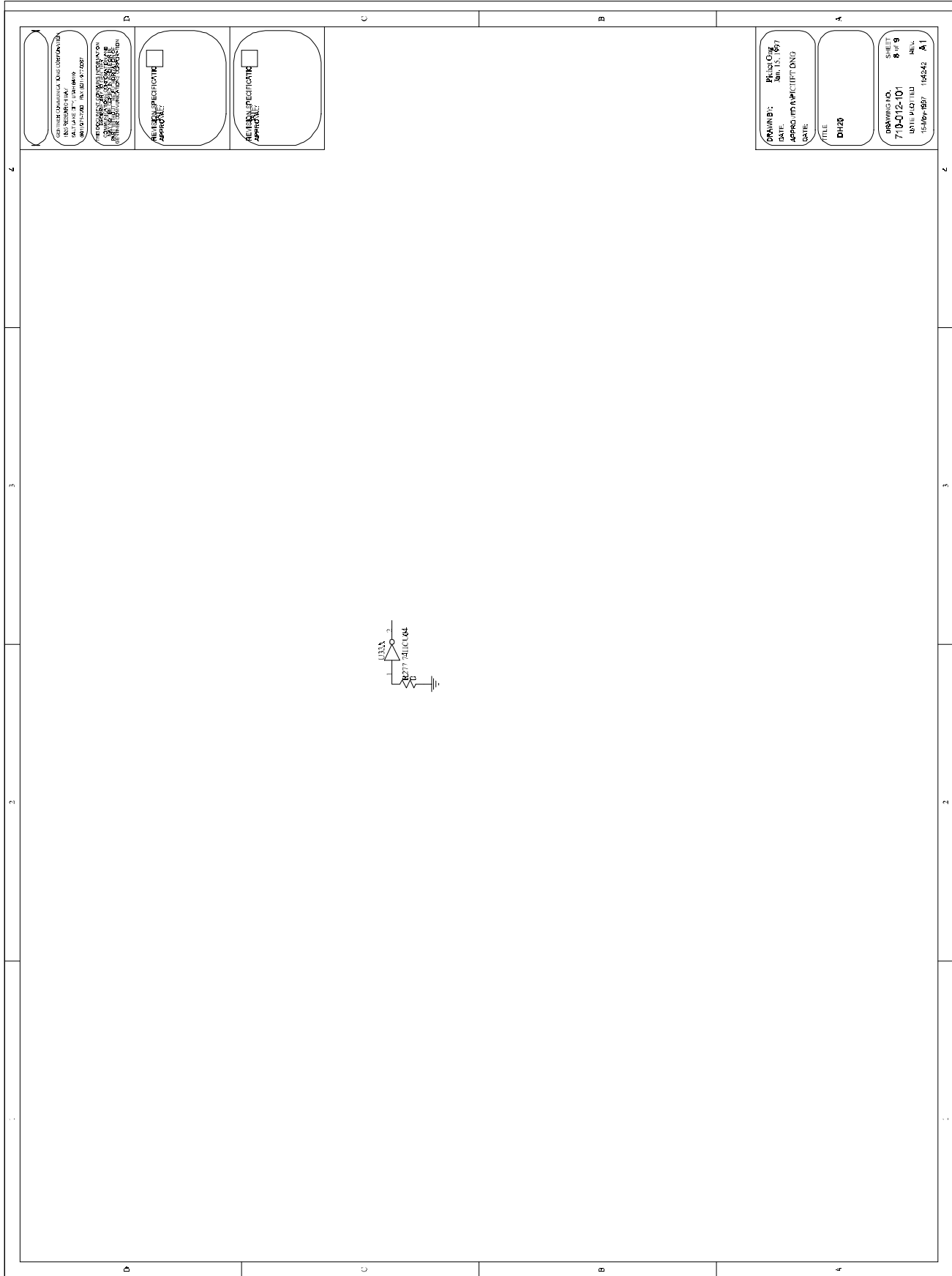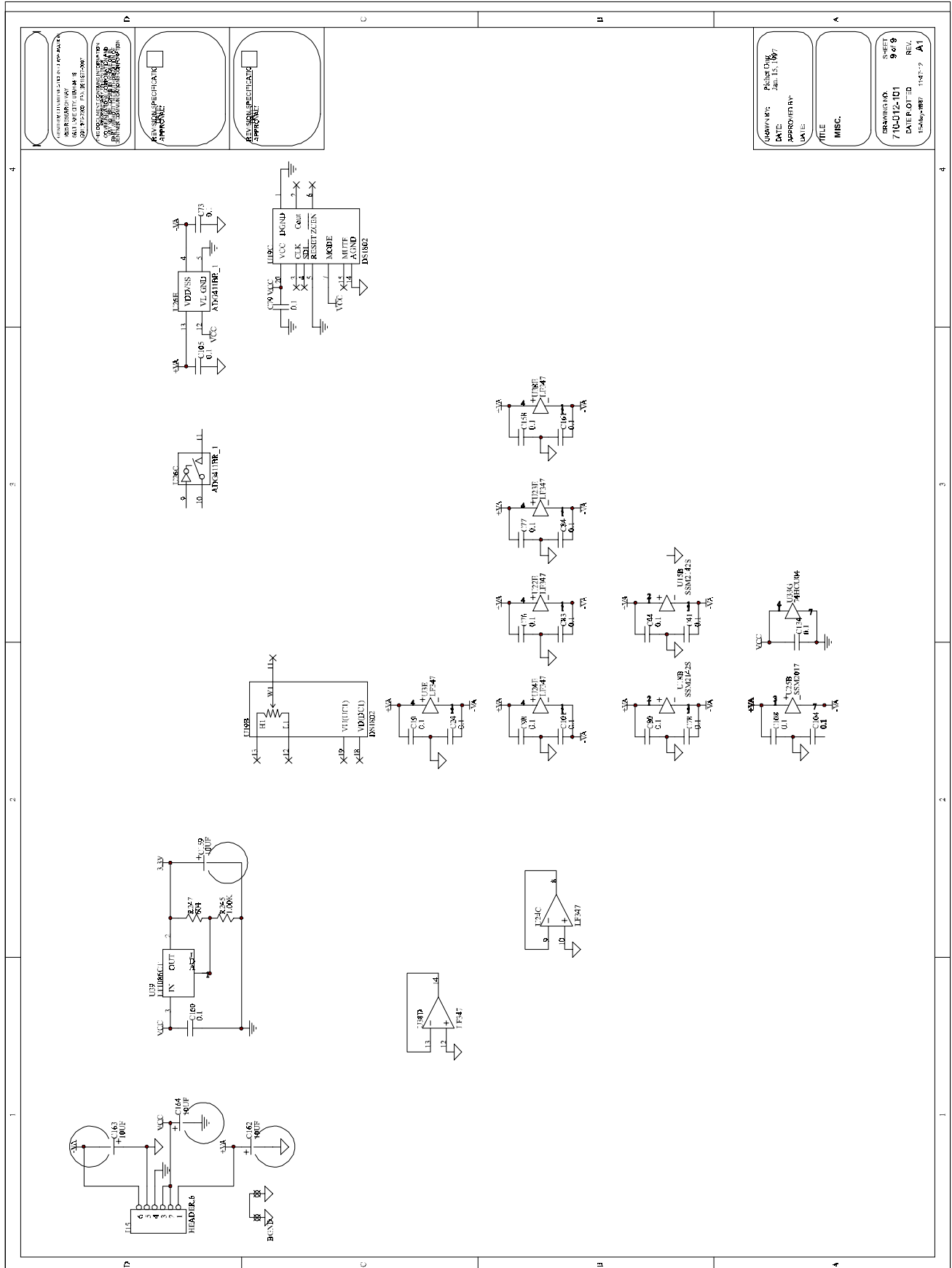
Appendix C: DH22
Schematics ≣
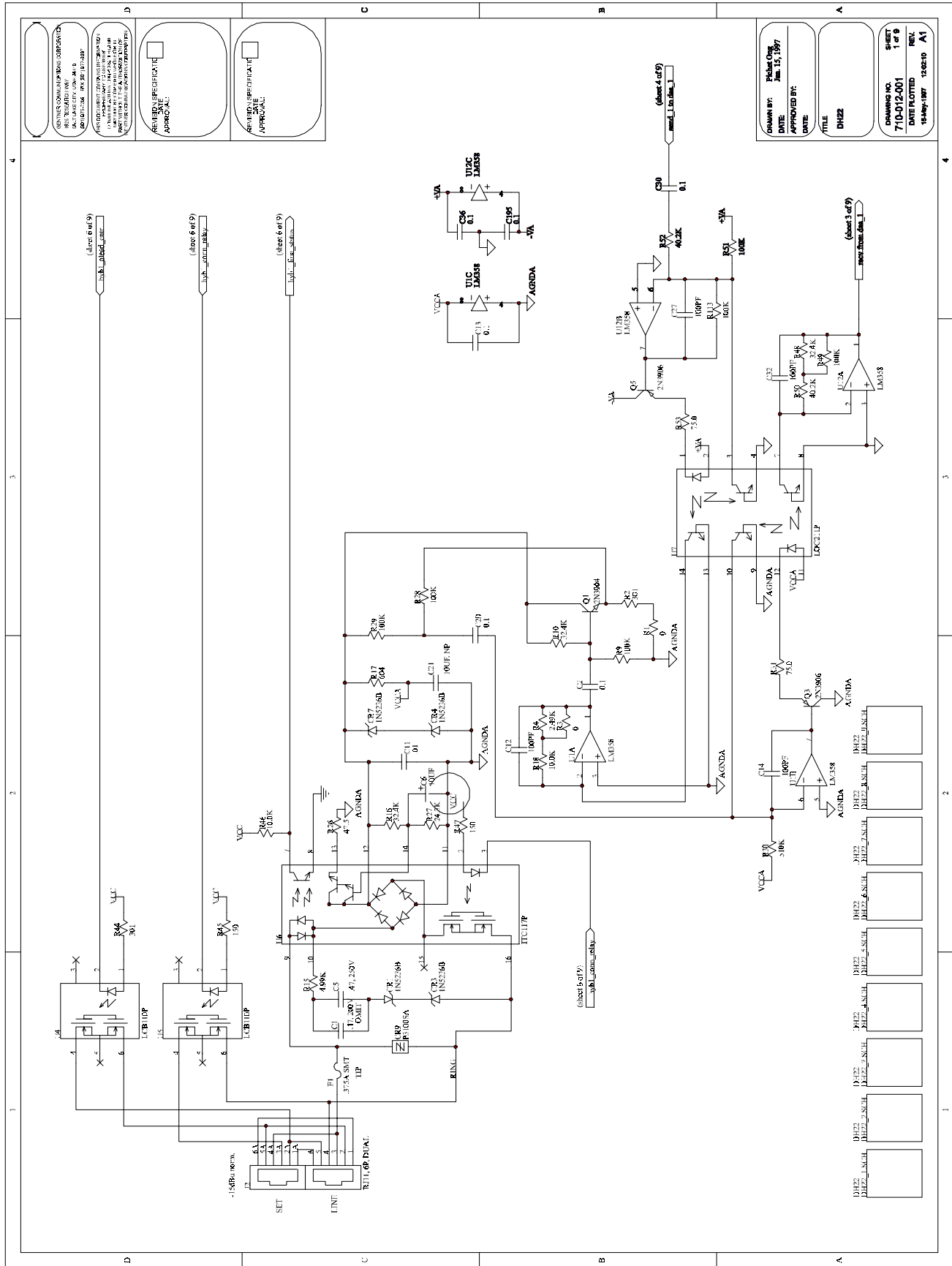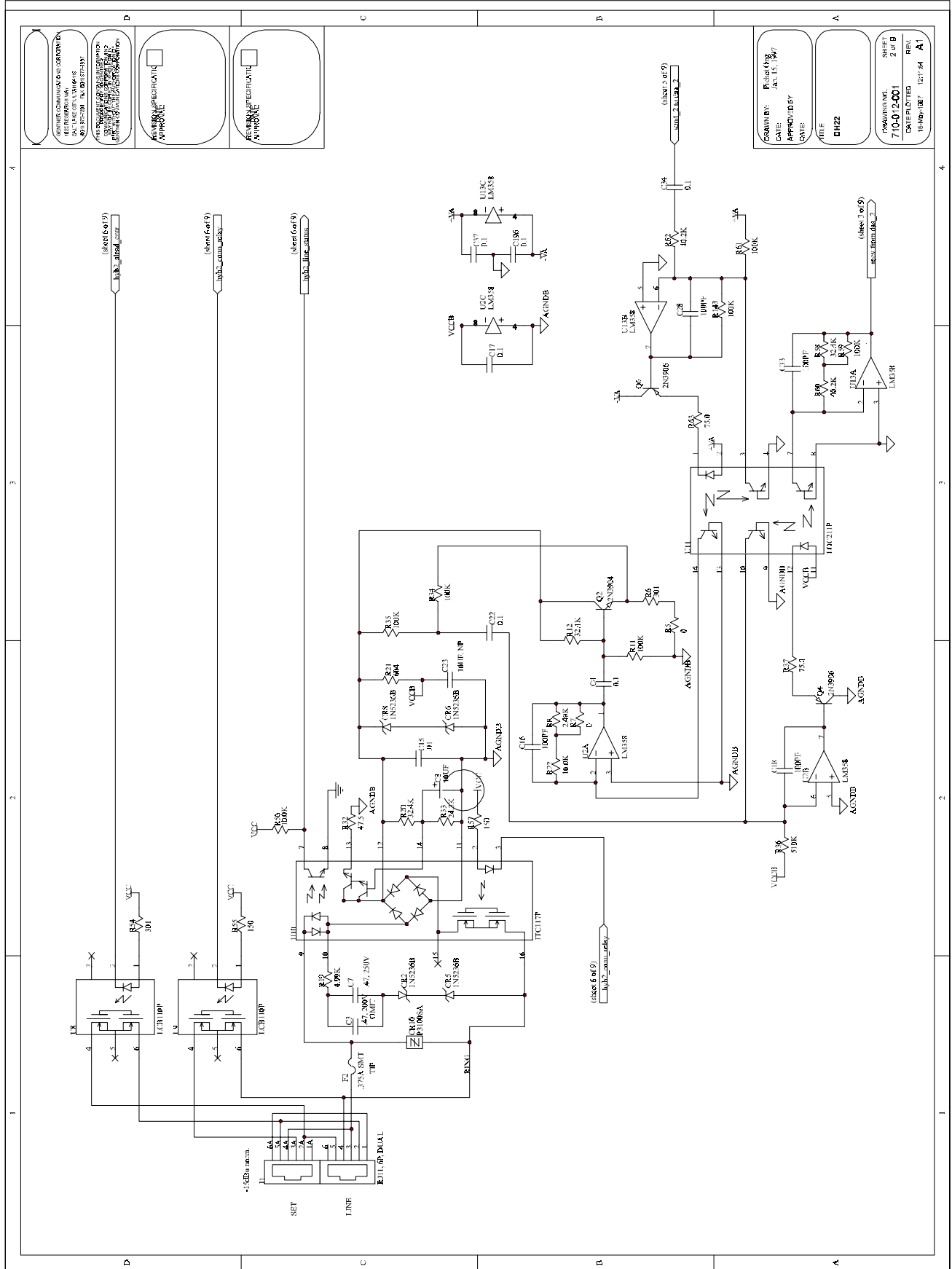
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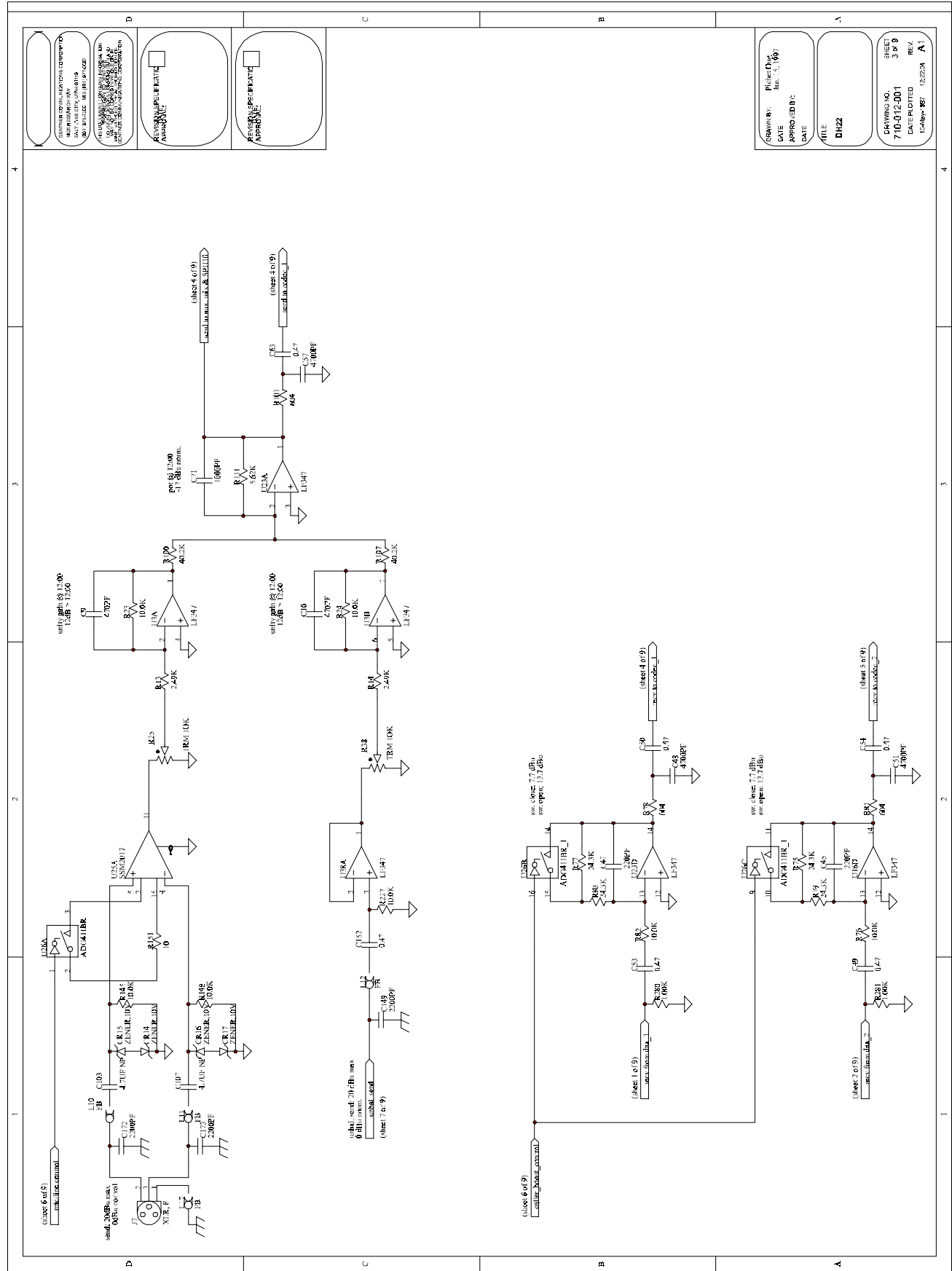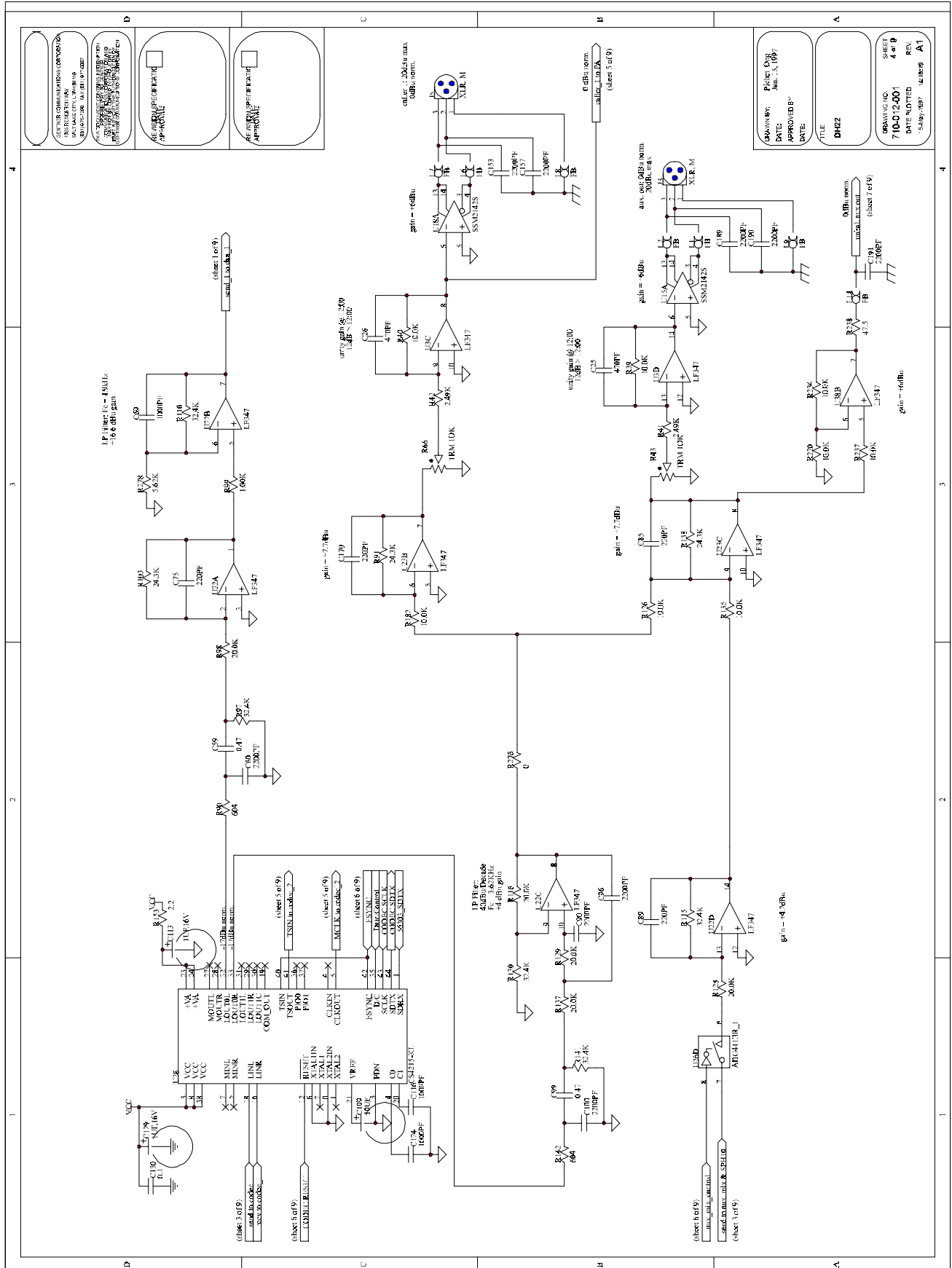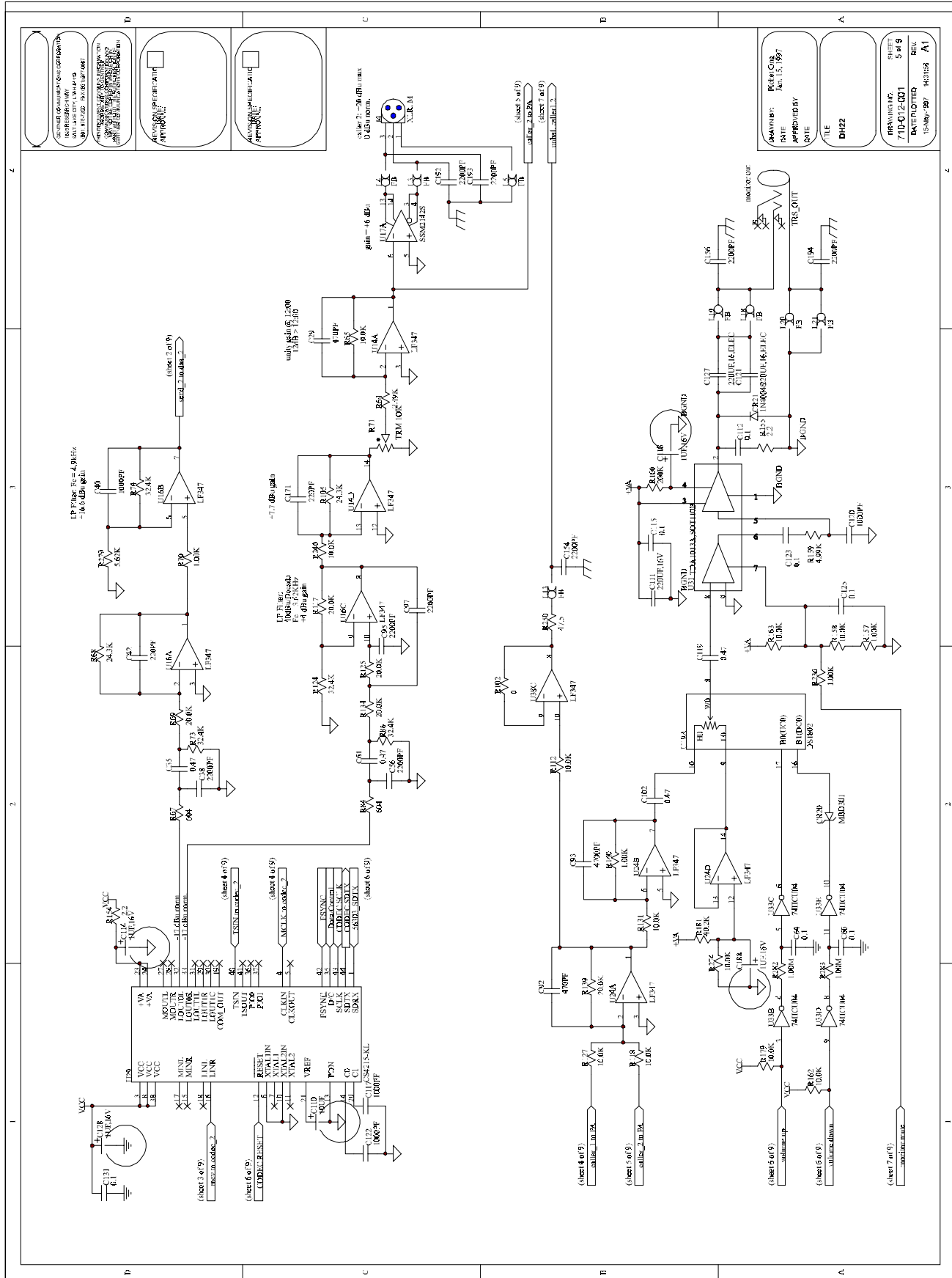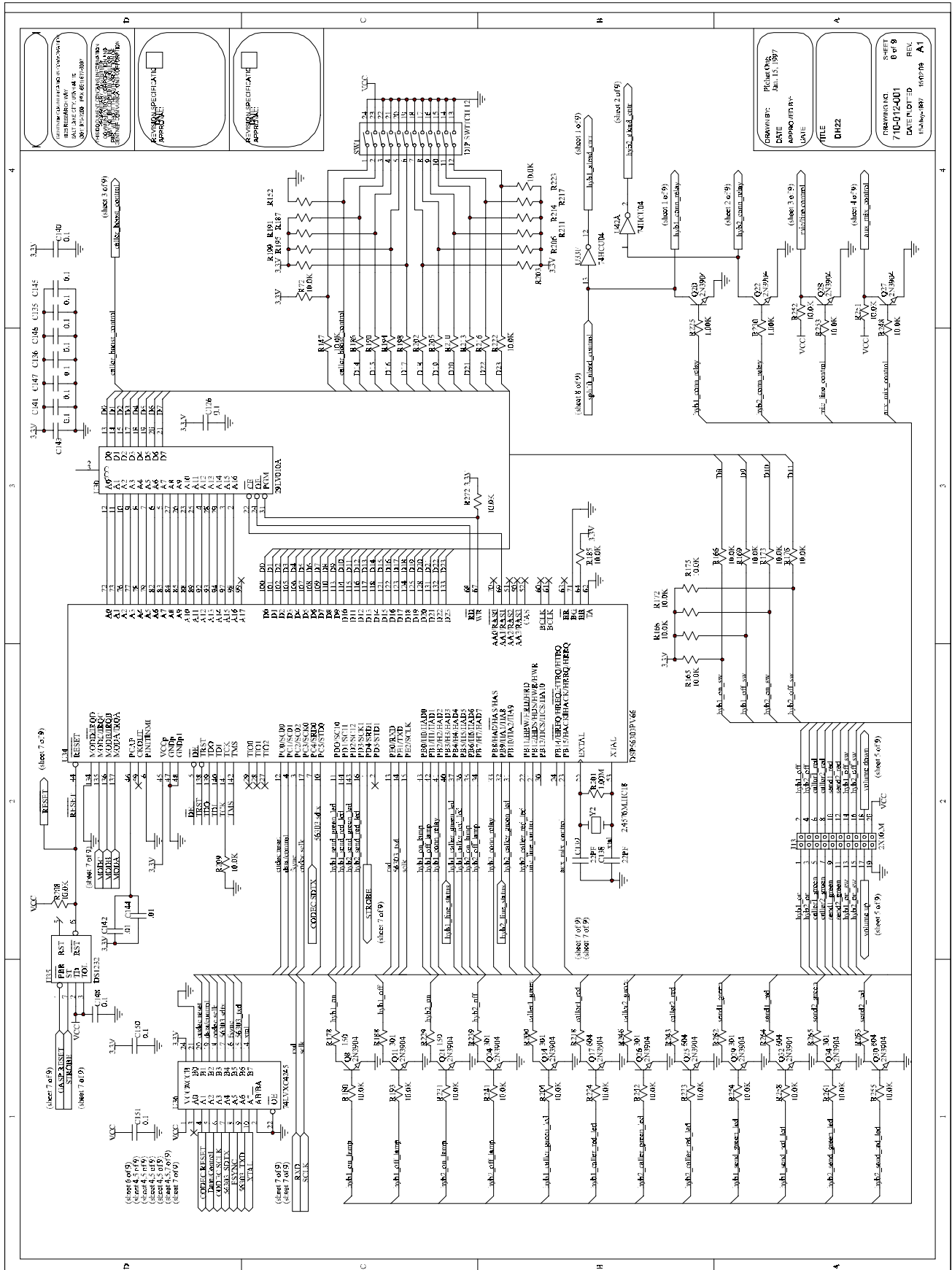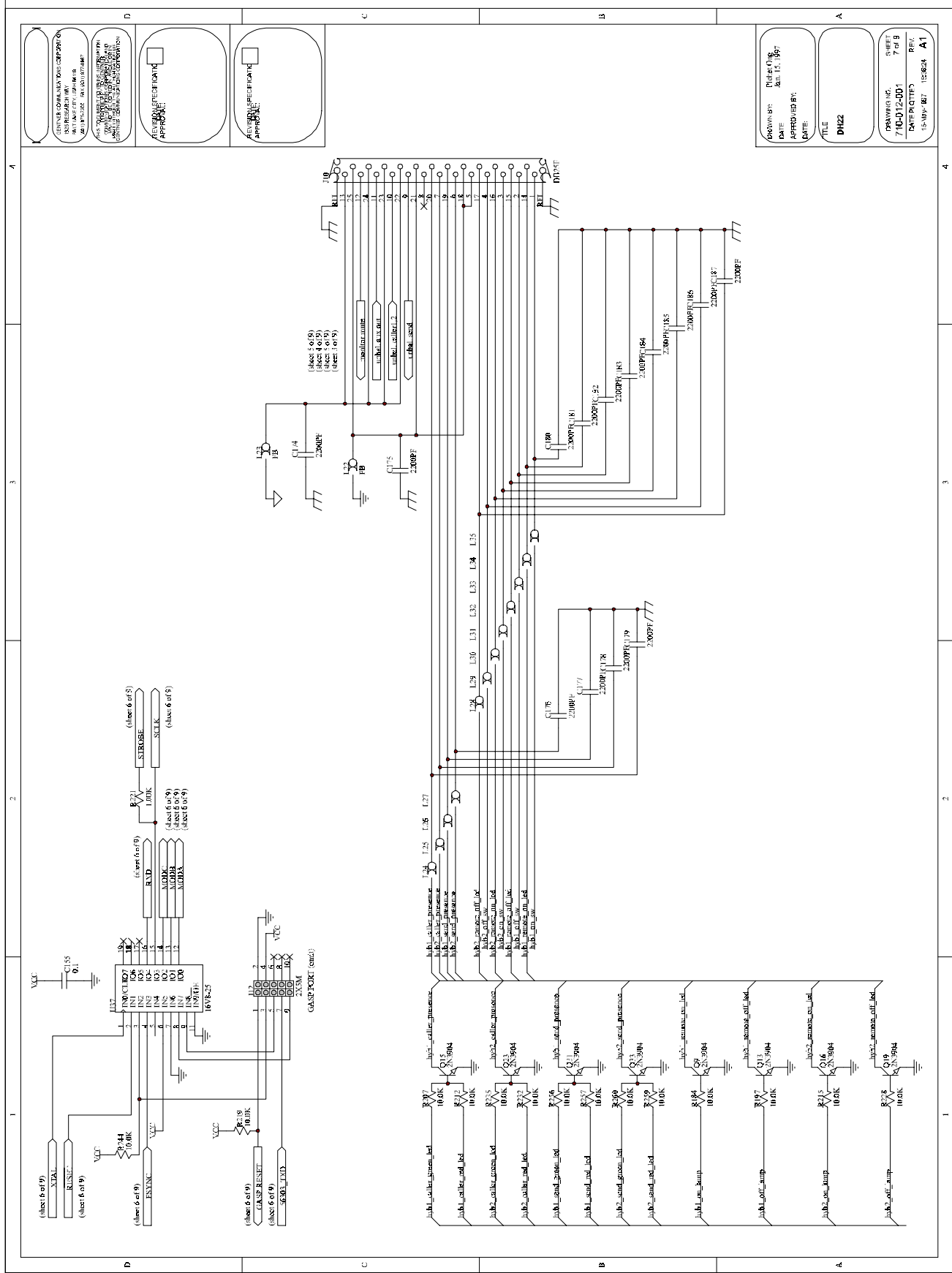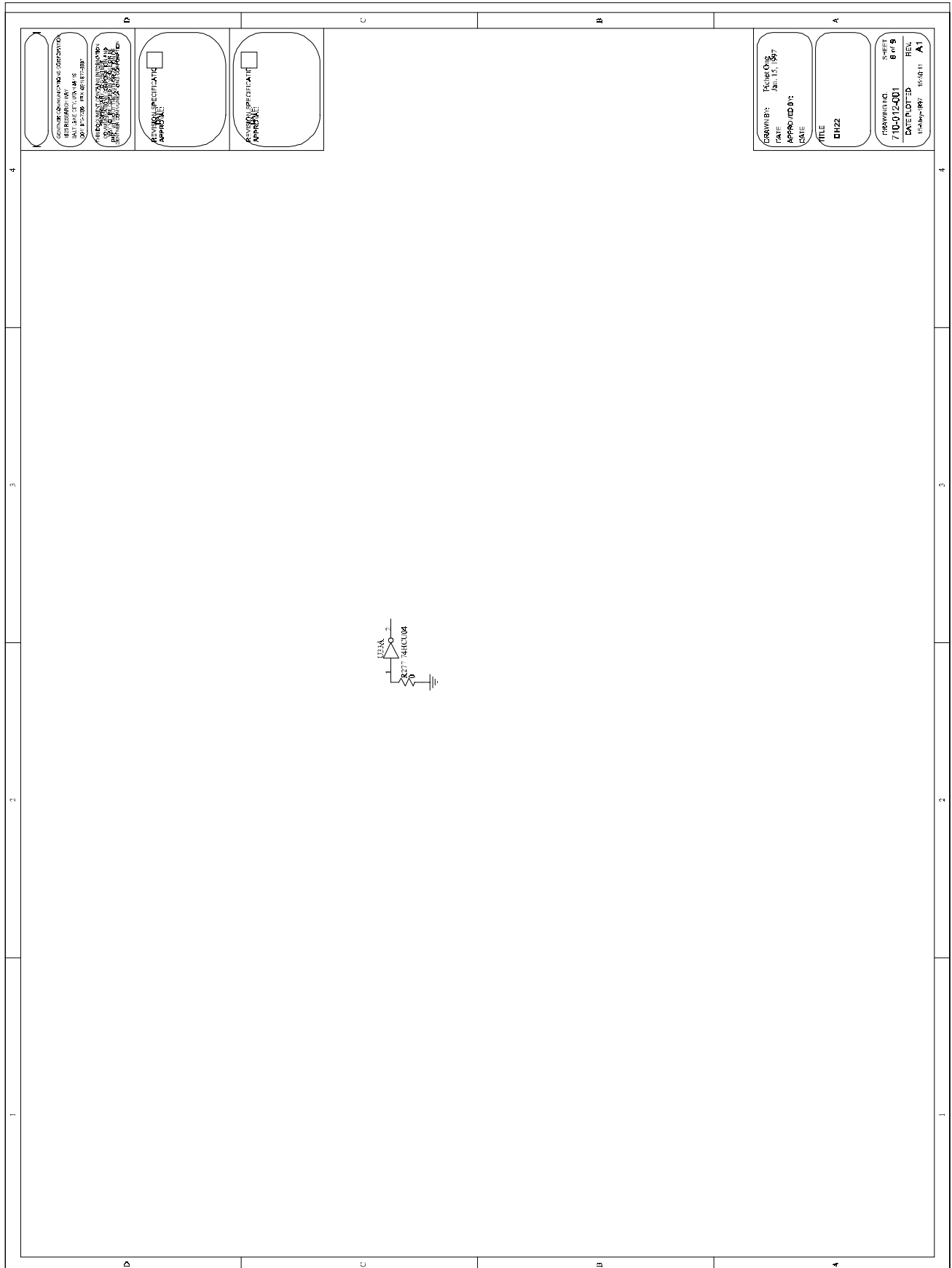
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Appendix C:
Continued

Appendix C:
Continued ≡

Appendix D: DH20
Block Diagram ≡
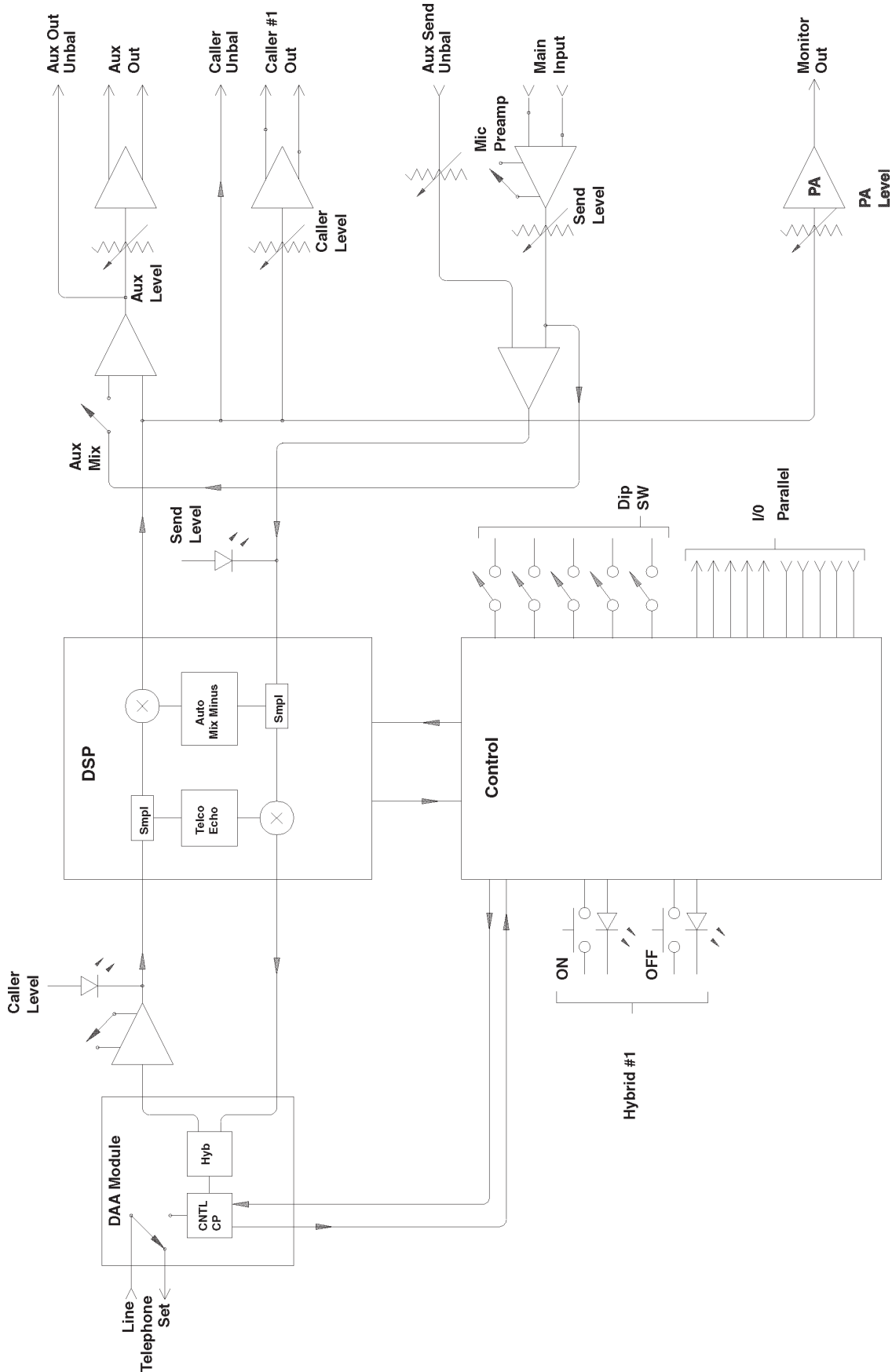
Appendix E: DH22
Block Diagram ≡

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