



DPT-1

Dial Access Paging Terminal (19" Rack Mount)

DPT-2

Dial Access Paging Terminal (Desktop Box)

Manual Revision: 2013-07-19

Covers Firmware Revisions:

DPT: 1.58 and higher

Covers Hardware Revisions:

DPT-1: E and higher

DPT-2: G and higher

SPECIFICATIONS

VOLTAGE/CURRENT

Operating Voltage	13-18 VDC
Operating Current	25 mA
LED Current	4 mA
Fuse Protection Auto Resettable	200mA
Power Control	Single pole toggle switch

INPUT FROM RADIO

RX Input Level	150 mV-2.5V p/p pot adjustable (52 mV RMS – 880 mV RMS)
RX Input Impedance	100K Ω
Discriminator Input level	pot adjustable
Discriminator Input Impedance	100K Ω
Programming Input	3-pin stereo jack
Frequency Range	300-3000
DTMF Decode Sinad Ratio	9 dB
Dynamic Range	30 dB
COR Input	0-5 V

OUTPUTS TO RADIO

Audio Output Tone Level	2/3 system deviation
Audio Output Impedance	<20K Ω
PTT Out	FET switch to ground

TELEPHONE LINE INPUT

Input Level	-14 - +4 dB, pot adjustable
Input Impedance	600 Ω balanced
Ring Detector	opto-isolator
Seizure Output	FET opto-isolator

MECHANICAL

19" Rack Dimension (DPT-1)	19" W x 1.75" H x 1.4" D
Desktop Terminal Dimension (DPT-2)	6" W x 1.45" H x 7.6" D
Operating Temperature	-30° to +60°C

GENERAL INFORMATION

Dial Access Paging Terminal: Midian's DPT series dial access paging terminals connect between a PBX or a regular landline and a base station radio or repeater. This enables a telephone caller to dial into the paging terminal and page users in POCSAG, 2-Tone, DTMF and 5-Tone. There are 100 available pre-canned messages for use with POCSAG paging and the Talk-Back paging feature allows paged portable and mobile radios to talk back to the caller.

Midian's DPT-1 and DPT-2 Dial Access Paging Terminals support the following paging protocols:

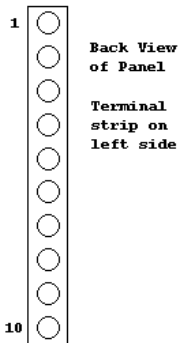
- **POCSAG:** 512, 1200, 2400 baud with 100 pre-canned messages for alpha-numeric paging
- **2-Tone:** Motorola Quick Call 1 (2+2), Motorola Quick Call 2 (1+1), Plectron, GE Type 99, Reach, AvCall (2+2)
- **DTMF:** 0-9, *, #, A-D
- **5-Tone:** EIA and Eurosignal

INSTALLATION

Following are instructions for each connection that is required by the terminal for proper operation. A qualified two-way radio technician should perform the installation and adjustment of the terminal. Once the installation has been successfully completed, continue with the adjustment section of the manual. The adjustment procedures require some programming steps to be done concurrently. Therefore, frequent reference to the Programming section may be necessary. **Note:** Be sure to follow standard anti-static procedures when handling any of Midian's products.

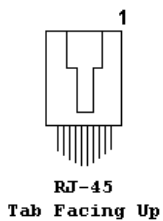
DPT1 TERMINAL STRIP WIRING INFORMATION

Terminal #	Description
P1:1	Tone/Data Output
P1:2	RX Audio In
P1:3	Voice Audio Output
P1:4	Discriminator Audio Input
P1:5	Wiretap Switch
P1:6	Wiretap Audio
P1:7	Radio COR Busy Detect
P1:8	Radio PTT
P1:9	VIN 13 – 18 Volts DC
P1:10	Ground



DPT-2 RJ-45 WIRING INFORMATION

Wire Color	Pin #	Description
Gray	1	RX Audio In
Orange	2	Radio COR Busy Detect
Violet	3	Radio PTT
Yellow	4	Tone/Data Output
Green	5	Discriminator Audio Input
Red	6	VIN 13-18 Volts DC
Black	7	Ground
White	8	Voice Audio Output
Blue	9	Wiretap Switch
Brown	10	Wiretap Audio



Voice Audio Output: This connection supplies the transmitter with processed audio from the telephone line. This connection should be made to the transmitter's microphone audio input. The level is adjustable using adjustment pot VR5 (XMIT LEVEL TO RADIO). DTMF signaling is also processed through this output.

RX Audio In: This lead is connected to the radio's RX audio. This is used to pass voice and signaling into the terminal. This input also feeds audio in to the high-pass noise squelch filter quieting detector circuit and the audio high-pass filter to remove the CTCSS/DCS squelch tones. The level is adjustable using pot VR2 (RECEIVE LEVEL FROM RADIO).

Radio COR Busy Detect: The Carrier Operated Relay (COR) connects to the radio's squelch detect circuit. The COR connection should be made to a point in the radio receiver's squelch circuit that changes in DC voltage level when the squelch control is opened and closed or when a carrier comes through and breaks the squelch. Such a point usually exists at the output of the noise rectifier. The COR polarity can be either active high or active low. (See programming section.)

There is also a separate noise squelch busy detector that is derived from the discriminator input if no COR input is available. Any one of these may be used for detecting busy channels (See Programming Help Menu).

Discriminator Audio In: This optional connection is supplied by unfiltered discriminator audio from the receiver to the terminal's microprocessor for detecting high frequency noise via IC10B, IC14C, IC10C, IC10D, IC14B, IC12B and finally IC12A. It determines if the carrier is present for busy lockout determination. This connection must be made directly to the discriminator output of the associated receiver. The Disc Audio input must be connected at a point before de-emphasis. VR1 on IC10B sets the level.

PTT Out: The PTT output is an open drain FET transistor with RF bypassing on its output lead. This simply pulls the push-to-talk input of the radio to ground to key up the radio when activated by the TERMINAL microprocessor.

Ground: This connection is the main negative ground return between the radio and the TERMINAL.

Tone Data Output: Used on the DPT for all encoding, except DTMF. Connect to the radio's data/flat TX input.

VIN 13-18 Volts DC: Power for the terminal is derived from the radio. Due to the drop on the terminal's 12-volt regulator input, the voltage should be at least 13 volts with a maximum of 18 VDC.

RJ-11 Connector for Telco Interface

Pin 3 - Telco Audio Tip

Pin 4 - Telco Audio Ring

This is the balanced 600-ohm telephone line interface. This interface has RF bypassing on the tip and ring to ground as well as spark suppressors DK4 and DK5 and a self-resetting poly-switch fuse (F-2). Line balancing is accomplished by selecting the right values of phasing capacitance using SW2 and adjusting VR8 for minimum trans-hybrid side tone return audio on the TX Audio during receive from the radio to Telco.

Initial Radio Calibration

Using an FM service monitor, check the associated radio's frequency error to make sure that it is in spec with manufacturer's specifications.

Check the radio's modulation, bearing in mind that modulation is additive. Most radios are supposed to run ± 5 KCs of modulation. The CTCSS tone modulation is supposed to run about .75 KCs of deviation, thus leaving approximately 4 KCs of voice modulation for an additive total of 4.75 KCs.

Check the radio receiver's sensitivity to make sure it conforms to the particular manufacturer's specifications. Also check to make sure the receiver is on frequency.

Set the radio receiver's audio level. In the following adjustment section, we will be setting receive levels into the terminal. If someone changes the radio's level significantly, it may overdrive the terminal and cause distortion of the decode tones or voice audio.

If the RX input level to the terminal is too high, the input receive level pot on the terminal may have to be turned down so far that the adjustment becomes critical. Try to keep the level at the input at around 150 mV – 2.5 V Peak-to-Peak.

Calibration

Proceed with the terminal adjustments using the following steps. Refer to the terminal schematic and printed circuit board layout for location of test points and adjustment potentiometers. As a note of caution, be sure that the antenna output of the radio transmitter is properly terminated because the terminal will be automatically keyed at various points in the adjustment sequence below:

Be sure that the terminal is properly connected to the radio. The telephone line must be connected to a dBm meter, which in turn must be connected to the terminal via the RJ-11 female connector.

1. Plug the PC programmer into the programming jack on the terminal. Go to the top of the screen on the menu bar. Click on Diagnostics and select Calibration.
2. Start by initiating a telephone call to the terminal using an extra phone line or cell phone. When ringing is heard, click on the RECEIVE AUDIO option using your mouse. This will complete the phone line connection and turn on the audio path from the RX Input all the way through to IC15, the hybrid transformers T1 and T2, and the phone line via the RJ-11 connector. Using an FM signal generator or an FM service monitor with a 1 KHz test tone set to maximum system deviation (ie. 5 KHz for a wide band system or 2.5 for a narrow band system) and with enough signal to quiet the radio, adjust RECEIVE LEVEL FROM RADIO pot VR2 for 2.4V peak-to-peak sine wave or 800 MV RMS or Zero (0) dB or just below clipping on Pin 7 of IC9B while monitoring with an oscilloscope. Under a loaded condition (i.e., terminal connected to Telephone line), set the dBm meter with a balanced input to a bridging position. Set the TX LEVEL TO TEL LINE pot VR7 to a level between -14 and +4 dBm so that a test tone is heard in the telephone earpiece at a desired volume.

Next, check the trans-hybrid isolation as part of this tune up procedure. Connect the scope to pin 1 of IC9A and observe that the 1kHz test tone is present at this point, although at low amplitude. This amplitude at this point must be reduced to the minimum possible using the balancing network. The balancing network consists of the balancing pot VR8 and a 4-position DIP-switch (SW2), which switches the balancing caps C70-C73 on and off. Use the DIP switch to select a combination that reduces crossover in the hybrid as seen on pin 1 of IC9A. Each time you change DIP switch settings, fine-tune balancing pot VR8 to reduce the signal on pin 1 of IC9A. Repeat this process until the best combination is found. If this is not set properly, voice transmitted to the phone line from the mobile radio will be fed back into the terminal transmit path via T1/T2 trans-hybrid. In simplex mode the audio fed back from the phone line may cause the telephone line VOX to respond and cause the terminal to key up when the mobile terminal speaks loudly and the anti-VOX feature is not turned on.

3. With the mouse, select the TELEPHONE DTMF encode path. The microprocessor will now turn on IC8 pins 7 and 8 and the phone line will remain seized (off hook). It will also turn on IC13B and generate a DTMF tone that is fed through to the hybrid transformer to the phone line via the RJ-11 connector. Set DTMF LEVEL TO TEL LINE pot VR4 for -15.0 to 0 dBm to the telephone line using a dbm meter in bridging mode.
4. Next, select the TRANSMIT AUDIO using your mouse. After selecting this with your mouse, the microprocessor will turn on the audio path from the telephone line hybrid all the way through to the radio via TX Input (P1-8 Voice Audio Out) IC11C. Use the voice network analyzer or other instrument to transmit a 1kHz test tone at 0 dBm across the RJ11C and adjust the RX LEVEL FROM PHONE LINE pot VR6 so that 2.4 V peak-to-peak sine wave or 800 MV RMS or Zero (0) dB is seen at IC-9A Pin 1. Next set TX LEVEL TO RADIO pot VR5 so that the transmitter is modulating at the desired system deviation while monitoring with the service monitor. The TX path has now been calibrated. If you are unable to get enough modulation, it may be necessary to reduce the value of R23 from $27K\Omega$ to perhaps $1K\Omega$ for low impedance Mic circuits.
5. With the mouse, select the RADIO DTMF encode path. The microprocessor will now release the phone line, key the radio's PTT line, and generate a DTMF tone through Q3 into FET switches IC14A and IC13A and out the P1-3 Voice Audio Out line. Adjust DTMF LEVEL TO RADIO pot VR3 for $2/3$ of system deviation using an FM service monitor.

You may find it necessary to make further adjustments in order to fine-tune the operation of the terminal. This may include increasing the RX LEVEL FROM PHONE LINE if the telephone caller's voice is dropping out. This can be determined by actually using the terminal to make a call.

After calibrating the unit, select UNIT RESET under the diagnostic menu.

CONTROLS & INDICATORS

The dial access paging terminal has an on-off switch on the front of the unit to control the power from the connector to the Terminal. There is a programming input jack on the top left front of the DPT-1 (when swung open) or on the front of the DPT-2. This allows a PC to program all of the features for these products. There are 7 indicator LED's:

1. The **Transmit LED** is a push-to-talk indicator, which shows when the radio is being keyed via the unit's processor.
2. The **DTMF LED** shows when DTMF digits are being received from either the radio or the telephone line.
3. The **Carrier LED** for busy channel detection receives its indication from the radio's COR detector, the terminal's quieting filter detectors, radio voice detector.
4. The **Tone/Sync LED** is not currently used.
5. The **Hook LED** shows when the terminal has seized the phone line (off hook condition).
6. The **Ring LED** displays incoming rings from the telephone line.
7. The **Power LED** is the power indicator that indicates 13-18 VDC is present.

OPERATION

1. To begin, the phone caller should dial the phone number of the phone line plugged into the Dial Access Paging Terminal.
2. The paging terminal will answer the incoming call after the number of rings programmed into the unit.
3. Once answered the unit will give a tone prompt to the caller to indicate to enter the 4-digit ID associated with the desired subscriber.
4. When calling a numeric POCSAG pager, after entering the 4-digit access code, you can transmit your telephone number by entering 7-15 digits after the tone prompt. When calling an alpha-numeric pager, following the 4-digit access code you may enter "*" followed by two digits for a pre-canned message stored in the terminal and a 7-15 digit phone number. The pager will display the number first and then the pre-canned alpha-numeric text (25 characters maximum).
5. When calling a tone or tone and voice pager the paging terminal will send out the page for alerting the unit. If tone and voice, after the paging sequence has been transmitted the terminal will give another tone to indicate to the caller that the tones have gone out and it is okay to speak the voice message.
6. If Talkback paging is being used, after the subscriber receives the voice message from the phone caller, the subscriber can key their unit to talk back to the caller. Note: If using a simplex base station, if the caller wishes to respond to the subscriber's talk back, there will be a delay while VOX is detected and the radio keys. It is recommended that when the caller wishes to respond to the talk back that the caller press a key on the DTMF keypad or say something prior to speaking the desired message. This will keep upwards of the first second of the response being missed due to VOX detection and key-up and receive delays. This is not an issue when using a half-duplex or full-duplex base station.
7. When the caller is done with the page, the caller should hang up the telephone. When the subscriber's Voice Limit timer expires the call will be disconnected.

The DPT is programmed using the KL-4F and KL-4F-PC1 programming cables and the DPT programming Software (not the MPS).

Software Installation:

Insert the CD into your CD-ROM drive. If your CD-ROM drive has AutoPlay enabled, the Installation Wizard will appear once your computer has had a moment to examine the contents of the CD. If AutoPlay is not enabled on your computer, double left click with the mouse pointing at the "My Computer" icon on your desktop. Double left click with the mouse pointing at the CD-ROM drive icon. If the Installation Wizard does not appear, double left click with the mouse pointing at "setup.exe" which should be located on the CD. After the Installation Wizard has started, follow the on-screen instructions to install the software.

NOTE: Please make sure any programs that are running have been closed prior to installing this software. Also, even though it is not required, it is good practice to reboot the system after installation of new software.

Online Help:

You can access online help at any time within the program when the "?" mark icon is located in the upper right hand corner of the current window. To utilize the online help left-click on the mouse while pointing at the "?" mark icon. This will change the pointer to a pointer with a question mark. Place the pointer with the question mark over the field that you need help with and left-click the mouse. This will display the online help for that field or by pressing F1 while the is highlighted.

Load an Existing Configuration File:

The Configuration File contains subscriber information and system parameters for the terminal. On the Main Screen of the program, located on the menu bar you will see the word File. With the mouse pointing to the word File, left click the mouse. This will open a submenu and you will see the word Load in the submenu. With the mouse pointing to the word Load, left click the mouse. The action that was just performed should open a new window with a title of Open. With the mouse pointing to the name of the file that you wish to load, left click the mouse twice. This will automatically select the file to open and load the configuration file into the program.

Setting the Communications Port:

On the Main Screen of the program, located on the menu bar you will see the word "Config." With the mouse pointing to the word "Config," left click the mouse. This will open a submenu and you will see the word "Communications" in the submenu. With the mouse pointing to the word "Communications" another submenu will popup to the right displaying selections COM1 – COM4. With the mouse pointing to the COM port that you wish to use, left click the mouse.

Read from the terminal:

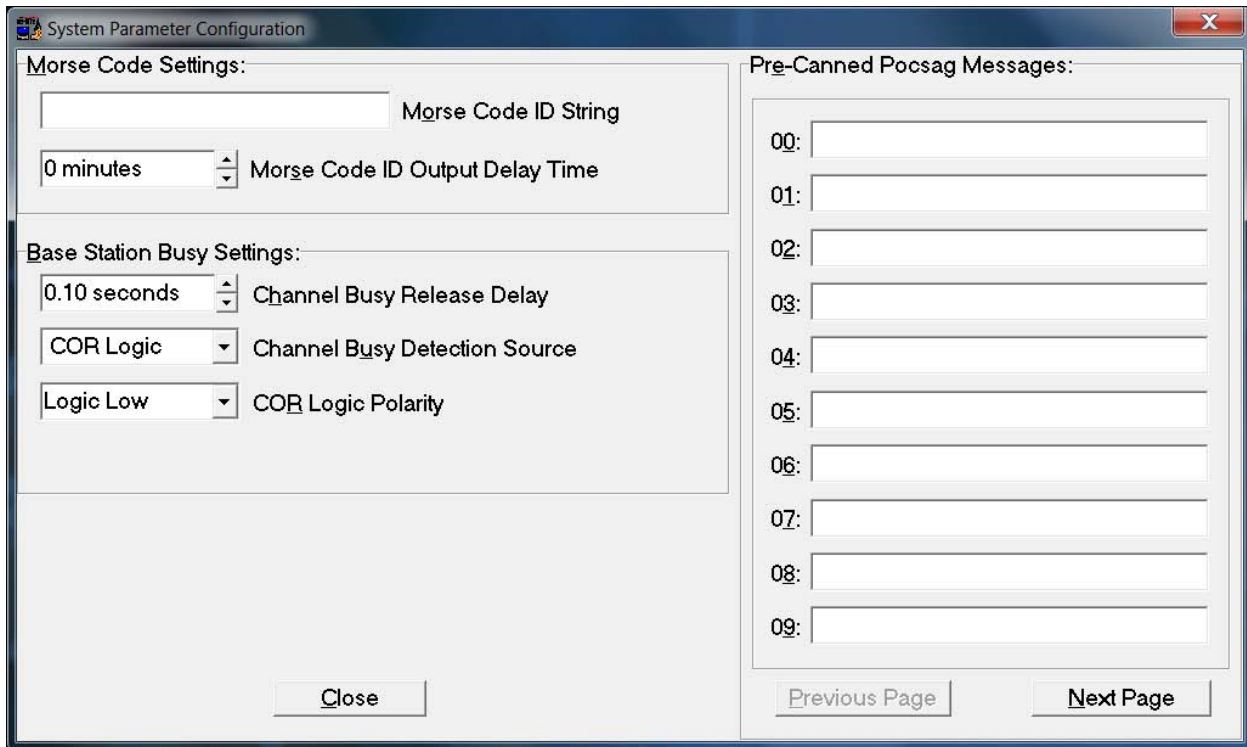
On the Main Screen of the program, located on the menu bar you will see the word "Programming." With the mouse pointing to the word "Programming," left click the mouse. This will open a submenu and you will see the word "Read" in the submenu. With the mouse pointing to the word "Read," left click the mouse. The action that was just performed should open a new window with a title of "Reading Unit's System Parameters." If the communication port has been setup correctly and the KL-4F has been plugged into the terminal and the pc, you should see the word "RETRIEVING" being displayed in the middle of the window. Upon successful retrieval of the data from the terminal, you will see the word "SUCCESS" displayed in the window. If you see any other message, check the COM port selection, make sure the KL-4F is properly attached and there is power to the terminal.

Write to the terminal:

On the Main Screen of the program, located on the menu bar you will see the word "Programming." With the mouse pointing to the word "Programming," left click the mouse. This will open a submenu and you will see the word "Write" in the submenu. With the mouse pointing to the word "Write," left click the mouse. The action that was just performed should open a new window with a title of "Sending Unit Parameters." If the communication port has been setup correctly and the KL-4F has been plugged into the terminal and the pc, you should see the word "WRITING" being displayed in the middle of the window. Upon successful writing of the data to the terminal, you will see the word "SUCCESS" displayed in the window. If you see any other message, check the COM port selection, make sure the KL-4F is properly attached and there is power to the terminal.

Verify the terminal:

On the Main Screen of the program, located on the menu bar you will see the word "Programming." With the mouse pointing to the word "Programming," left click the mouse. This will open a submenu and you will see the word "Verify" in the submenu. With the mouse pointing to the word "Verify," left click the mouse. The action that was just performed should open a new window with a title of "Verifying Unit's System Parameters." If the communication port has been setup correctly and the KL-4F has been plugged into the terminal and the pc, you should see the word "RETRIEVING" being displayed in the middle of the window. Upon successful reading of the data and comparison to the configuration currently loaded into the program, you will see the phrase "UNIT MATCHES" displayed in the window. If the data that was retrieved from the terminal does not match the configuration currently loaded into the program you will see the phrase "UNIT DOES NOT MATCH." If you see any other messages, check the COM port selection, make sure the KL-4F is properly attached and there is power to the terminal.



Morse Code Settings > Morse Code ID String: This sets the Morse Code message up to 15 characters in length. This item will be ignored if no characters are entered. Otherwise, the characters entered will be converted to the appropriate Morse Code equivalents before being transmitted.

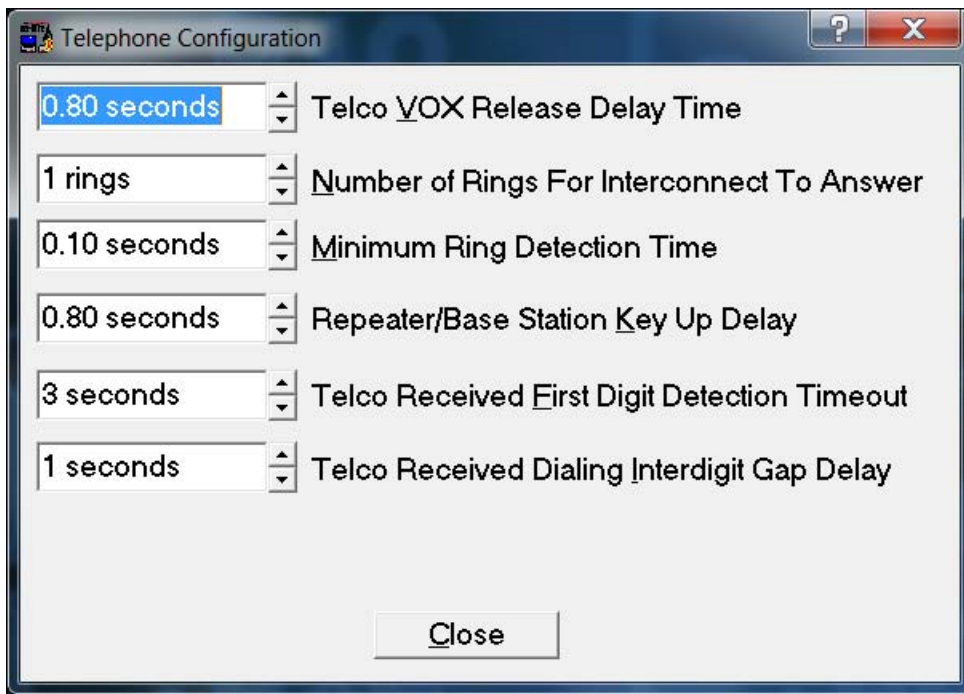
Morse Code Settings > Morse Code ID Output Delay Time: This field is programmable for 0 minutes to 60 minutes in one minute increments. This field instructs the DPT when to issue the CW-ID String. If the CW-ID String has no characters defined and the Delay Timer is greater than 0 Minutes then nothing will be transmitted. If the Delay Timer is set to 0 Minutes and the CW-ID String has characters defined nothing will be transmitted.

Base Station Busy Settings > Channel Busy Release Delay: This field is programmable for 0.00 second to 2.00 seconds in 10 millisecond increments. This is the amount of time after the unit sees the COR Busy Detection Source go inactive before the unit considers the channel available. When VOX is selected for the radio busy detect, this timer works much like the VOX release delay time used for the telephone line VOX.

Base Station Busy Settings > Channel Busy Detection Source: This is selectable between COR Logic or VOX. If your base station radio provides a COR or TOR, this is the preferred means of detection. If COR or TOR is not available then use VOX.

Base Station Busy Settings > COR Logic Polarity: This is selectable between a Logic High or a Logic Low. Set this to the active polarity of the busy detection source.

Pre-Canned Pocsag Messages (00-99): These 100 programming registers can be programmed with up to 25 alpha-numeric characters for POCsag paging. This area is used to pre-program text and numeric based messages that can be used by all calls coming in from the telephone and going to a valid Pocsag subscriber. This feature can be accessed by first entering in the valid Pocsag Subscriber ID and waiting for the Go-Ahead indication and then entering in a star digit on the telephone followed by a 2 digit number ranging from 00 to 99 for the message that will be sent. After the 2 digit precanned message number has been entered, the telco caller has the option of entering in a phone number that will be prefixed to the alpha text message that is sent to the Pocsag pager. **Note:** This feature will only work with Alpha-Numeric Pocsag pagers.



Telco VOX Release Delay Time: This field is programmable for 0.00 seconds to 2.00 seconds in 10 millisecond increments. The VOX circuit in the DPT is a fast attack detector that triggers the micro's input when someone speaks. To prevent it from dropping out between words, the micro has a programmable release time. We recommend using at least 800ms. This time can be extended if the telephone caller's voice drops out between words.

Number of Rings for Interconnect to Answer: This field is programmable for 1 ring to 9 rings. This controls how many times the telephone must ring before the DPT will go off-hook and answer an incoming Telco call. For example, if set to 2, the DPT will go off-hook during the second ring.

Minimum Ring Detection Time: This field is programmable for 0.10 seconds to 2.00 seconds in 10 millisecond increments. This controls how long a ringing signal from Telco must be present in order to register one ring. A value of 800 milliseconds to 1 second should prove adequate for most Telco systems.

Repeater/Base Station Key-Up Delay: This field is programmable for 0.00 seconds to 2.00 seconds in 10 millisecond increments. This programs how long the DPT will wait to send any paging tones over the channel. This should take into consideration how long it takes the associated transmitter to key up, come up to full power, and how long it takes the receiving unit to wake up its carrier detect.

Telco Received First Digit Detection Timeout: This field is programmable for 1 second to 20 seconds in one second increments. This field is used to limit the amount of time the telephone caller has to enter in the first digit after being sent a Go Ahead tone message. If the telephone caller exceeds this delay the DPT system will either automatically process the already collected information or will disconnect after sending an error tone message to telephone caller.

Telco Received Dialing Interdigit Gap Delay: This field is programmable for 1 second to 9 seconds in one second increments. This field is used to limit the amount of time the telephone caller has to enter digits after the first digit has been entered. If the telephone caller exceeds this delay the DPT system will either automatically process the already collected information or will disconnect after sending an error tone message to the telephone caller.

Subscribers Configuration

Subscriber Quick Pick: Subscriber Enabled

ID: User Name: CapCode: Record Status:

Subscriber Quick Pick: This field provides a list of all already programmed subscribers. To edit a subscriber, select the desired subscriber from this list.

ID: Enter a 4-digit ID into this field. This is the number that will be entered by the phone caller to page the subscriber.

User Name: Enter the subscriber's name (up to 20 characters).

CapCode: Enter the subscriber's cap code. For 2-Tone paging this is a 3-digit code, for Plectron it is a 4-digit code, Quick Call 1 is an 8-digit alpha code, AvCall is a 4-digit alpha code and POCSAG is an 8-digit code.

Record Status: If the Subscriber Enabled box is checked, the record is active. If unchecked the record is Disabled.

The screenshot shows a 'Subscribers Configuration' window with the following fields and options:

- Subscriber Quick Pick:** A dropdown menu showing 'N/A'. A checked box labeled 'Subscriber Enabled' is to its right.
- ID:** Text box containing '1234'.
- User Name:** Text box containing 'John Smith'.
- CapCode:** Text box containing '123'.
- Record Status:** Text box containing 'Active'.
- Pager Types:** A horizontal tabbed menu with 'Motorola' selected. Other tabs include Motorola Extended, GE 99, Reach, Plectron, EIA Mot 5 Tone, Eurosignal, Touch Tone, Pocsag, and Aviatio.
- Pager Option:** A group box containing two radio buttons: 'Tone Only' (selected) and 'Tone And Voice'.
- Voice Limit:** A spinner box set to '5 Seconds'.
- Talkback Paging:** An unchecked checkbox.
- Enable Simplex Handling:** An unchecked checkbox.
- Tone 1 Time:** A spinner box set to '0.000 seconds'.
- Gap Time:** A spinner box set to '0.000 seconds'.
- Tone 2 Time:** A spinner box set to '0.000 seconds'.
- Tone 1 Time Default:** Text box containing '1.000 seconds'.
- Gap Time Default:** Text box containing '0.000 seconds'.
- Tone 2 Time Default:** Text box containing '3.000 seconds'.
- Tone 1 Frequency:** Text box containing '368.5 hz.'.
- Tone 2 Frequency:** Text box containing '389.0 hz.'.

At the bottom of the window are navigation buttons: First, Next, Previous, Last, Add, Edit, Cancel, Update, and Close.

For 2-Tone paging formats of Motorola, Motorola Extended, GE Type 99, Reach and Plectron the following fields are used. A 3-digit cap code should be used for these formats.

Pager Option: Select the type of pager being used; Tone Only or Tone and Voice. If Tone and Voice then set the Voice Limit field for 5 seconds to 180 seconds in one second increments.

Talkback Paging: If the subscriber is capable of Talkback paging and the feature is desired, check this box. If the system is being used in simplex mode rather than duplex mode, check the Enable Simplex Handling box for use with Talkback Paging.

Tone 1 Time: This field is programmable for 0.001 to 10.000 1 millisecond increments. If left at 0.000 the Tone 1 Time Default will be used. 2-Tone paging is typically 1 second for Tone 1 Time (A tone).

Gap Time: This field is programmable for 0.001 to 10.000 1 millisecond increments. If left at 0.000 the Gap Time Default will be used. 2-Tone paging typically does not have a gap time.

Tone 2 Time: This field is programmable for 0.001 to 10.000 1 millisecond increments. If left at 0.000 the Tone 2 Time Default will be used. 2-Tone paging is typically 3 seconds for Tone 2 Time (B tone).

Tone 1 Frequency & Tone 2 Frequency: These fields show the associated tone frequencies of the cap code entered above.

ID:	User Name:	CapCode:	Record Status:
1234	John Smith	12345	Active
Pager Types:			
Motorola Motorola Extended GE 99 Reach Pllectron EIA Mot 5 Tone Eurosignal Touch Tone Pocsag Aviatio			
Pager Option: <input checked="" type="radio"/> Tone Only <input type="radio"/> Tone And Voice		Voice Limit: 5 Seconds	XTone Frequency: 2010.0 hz.
		<input type="checkbox"/> Talkback Paging <input type="checkbox"/> Enable Simplex Handling	XTone Time: 0.052 seconds
<input type="checkbox"/> Preamble Tone Enable/Disable		Preamble Tone: 0 Tone Code	Preamble Frequency: Not Used
Tone Time: 0.000 seconds	Gap Time: 0.000 seconds	Preamble Time: Not Used	Preamble Gap Time: Not Used
Tone Time Default: 0.033 seconds	Gap Time Default: 0.000 seconds		
Tone 1 Frequency: 741.0 hz.	Tone 2 Frequency: 882.0 hz.	Tone 3 Frequency: 1023.0 hz.	Tone 4 Frequency: 1164.0 hz.
			Tone 5 Frequency: 1305.0 hz.
First Next Previous Last Add Edit Cancel Update Close			

For 5-Tone paging formats of EIA and Eurosignal the following fields are used.

Pager Option: Select the type of pager being used; Tone Only or Tone and Voice. If Tone and Voice then set the Voice Limit field for 5 seconds to 180 seconds in one second increments.

Talkback Paging: If the subscriber is capable of Talkback paging and the feature is desired, check this box. If the system is being used in simplex mode rather than duplex mode, check the Enable Simplex Handling box for use with Talkback Paging.

Tone Time: This field is programmable for 0.001 to 10.000 1 millisecond increments. If left at 0.000 the Tone Time Default will be used. EIA is typically 33 milliseconds and Eurosignal is 100 milliseconds.

Gap Time: This field is programmable for 0.001 to 10.000 1 millisecond increments. If left at 0.000 the Gap Time Default will be used. 5-Tone paging typically does not have a gap time.

Tone 1-5 Frequency: These fields show the tone frequencies of the sequence entered above.

XTone Frequency & Time: This only applies to EIA. This field shows the default Motorola XTone Frequency used by EIA. In order for a subscriber to use the Motorola XTone feature, a star digit must be dialed after dialing the 4-digit subscriber ID. These fields set the frequency and time of the XTone.

Preamble Tone: If enabled the DPT will send a preamble tone followed by a gap time before the subscriber's cap code is generated. This can be used as a wake up tone.

The screenshot shows a 'Subscribers Configuration' window. At the top, there is a 'Subscriber Quick Pick' dropdown menu set to 'N/A' and a checked checkbox for 'Subscriber Enabled'. Below this are four input fields: 'ID' (1234), 'User Name' (John), 'CapCode' (12345), and 'Record Status' (Active). A 'Pager Types' tabbed interface is shown with 'Touch Tone' selected. The 'Pager Option' section has 'Tone Only' selected. The 'Voice Limit' is set to '5 Seconds'. There are checkboxes for 'Talkback Paging' and 'Enable Simplex Handling', both of which are unchecked. The 'Tone On Time' is set to '0.06 seconds' and the 'Tone Off Time' is set to '0.04 seconds'. At the bottom, there is a row of buttons: 'First', 'Next', 'Previous', 'Last', 'Add', 'Edit', 'Cancel', 'Update', and 'Close'.

For DTMF the following fields are used. Up to 8-digits can be used.

Pager Option: Select the type of pager being used; Tone Only or Tone and Voice. If Tone and Voice then set the Voice Limit field for 5 seconds to 180 seconds in one second increments.

Talkback Paging: If the subscriber is capable of Talkback paging and the feature is desired, check this box. If the system is being used in simplex mode rather than duplex mode, check the Enable Simplex Handling box for use with Talkback Paging.

Tone On Time: This field is programmable for 0.00 to 100.00 seconds in 10 millisecond increments. DTMF is typically 60 milliseconds on.

Tone Off Time: This field is programmable for 0.00 to 100.00 seconds in 10 millisecond increments. DTMF is typically 40 milliseconds off.

The screenshot shows a 'Subscribers Configuration' window. At the top, there is a 'Subscriber Quick Pick' dropdown menu set to 'N/A' and a checked 'Subscriber Enabled' checkbox. Below this are four input fields: 'ID' (1234), 'User Name' (John), 'CapCode' (1234578), and 'Record Status' (Active). A 'Pager Types' tabbed interface is visible, with 'Pocsag' selected. The main configuration area contains several sections: 'Pager Option' with radio buttons for 'Tone Only' (selected), 'Tone And Voice', and 'Numeric And Alpha Message'; 'Voice Limit' set to '5 Seconds'; checkboxes for 'Talkback Paging', 'Enable Simplex Handling', and 'Force Only Alpha Encoding'; 'Data Polarity Inverted' checkbox; 'Pager Function Select' with radio buttons for 'Function 1' (selected), 'Function 2', 'Function 3', and 'Function 4'; and 'Baud Rate' with radio buttons for '512' (selected), '1200', and '2400'. At the bottom, there are navigation buttons: 'First', 'Next', 'Previous', 'Last', 'Add', 'Edit', 'Cancel', 'Update', and 'Close'.

For POCSAG the following fields are used. POCSAG uses an 8-digit cap code.

Pager Option: Select the type of pager being used; Tone Only, Tone and Voice or Numeric and Alpha Message. If Tone and Voice then set the Voice Limit field for 5 seconds to 180 seconds in one second increments.

Talkback Paging: If the subscriber is capable of Talkback paging and the feature is desired, check this box. If the system is being used in simplex mode rather than duplex mode, check the Enable Simplex Handling box for use with Talkback Paging.

Force Only Alpha Encoding: If checked, the subscriber will receive only alpha based POCSAG encoding. If, unchecked the DPT will determine if the POCSAG message to be sent will be encoded as alpha or numeric based on the content of the message.

Data Polarity Inverted: This allows for inverting of the POCSAG signaling data when the signaling path has an odd number of inverting amplifier stages.

Pager Function Select: This feature is useful for selecting different tone formats when sending POCSAG messages. Depending on the pager manufacturer these functions are used to control certain sub-functions within the pager.

Baud Rate: Set this field to match the baud rate of the POCSAG pager. Select between 512, 1200 or 2400 baud.

Subscriber Quick Pick: Subscriber Enabled

ID: User Name: CapCode: Record Status:

Pager Types: Motorola Extended | GE 99 | Reach | Plectron | EIA Mot 5 Tone | Eurosignal | Touch Tone | Pocsag | **Aviation** | Motorola

Pager Option:
 Tone Only
 Tone And Voice

A -> 312.6 hz.	E -> 473.2 hz.	J -> 716.1 hz.	P -> 1083.9 hz.
B -> 346.7 hz.	F -> 524.8 hz.	K -> 794.3 hz.	Q -> 1202.3 hz.
C -> 384.6 hz.	G -> 582.1 hz.	L -> 881.0 hz.	R -> 1333.5 hz.
D -> 426.6 hz.	H -> 645.7 hz.	M -> 977.2 hz.	S -> 1479.1 hz.

Voice Limit: Talkback Paging Enable Simplex Handling

Tone 1 Time: Gap Time: Tone 2 Time:

Tone 1 Time Default: Gap Time Default: Tone 2 Time Default:

Tone 1A Frequency: Tone 1B Frequency: Tone 2A Frequency: Tone 2B Frequency:

Buttons: First | Next | Previous | Last | Add | Edit | Cancel | Update | Close

For AvCall paging the following fields are used. A 4-digit alpha cap code from the table shown should be used.

Pager Option: Select the type of pager being used; Tone Only or Tone and Voice. If Tone and Voice then set the Voice Limit field for 5 seconds to 180 seconds in one second increments.

Talkback Paging: If the subscriber is capable of Talkback paging and the feature is desired, check this box. If the system is being used in simplex mode rather than duplex mode, check the Enable Simplex Handling box for use with Talkback Paging.

Tone 1 Time: This field is programmable for 0.001 to 10.000 1 millisecond increments. If left at 0.000 the Tone 1 Time Default will be used. AvCall is typically 1.250 seconds for Tone 1A and 1B Times.

Gap Time: This field is programmable for 0.001 to 10.000 1 millisecond increments. If left at 0.000 the Gap Time Default will be used. AvCall is typically 0.2 seconds for the gap time.

Tone 2 Time: This field is programmable for 0.001 to 10.000 1 millisecond increments. If left at 0.000 the Tone 2 Time Default will be used. AvCall is typically 1.0 second for Tone 2A and 2B Times.

Tone Frequency: These fields show the associated tone frequencies of the cap code entered above.

Subscribers Configuration

Subscriber Quick Pick: Subscriber Enabled

ID: User Name: CapCode: Record Status:

Pager Types: GE 99 | Reach | Plectron | EIA Mot 5 Tone | Eurosignal | Touch Tone | Pocsag | Aviation | **Motorola Quick Call 1**

Pager Option:

Tone Only Tone And Voice

Voice Limit:

Talkback Paging

Enable Simplex Handling

Tone 1 Time: Gap Time: Tone 2 Time:

Tone 1 Time Default: Gap Time Default: Tone 2 Time Default:

Tone 1A Frequency: Tone 1B Frequency: Tone 2A Frequency: Tone 2B Frequency:

Buttons: First | Next | Previous | Last | Add | Edit | Cancel | Update | Close

For Motorola Quick Call 1 paging the following fields are used. An 8-digit alpha cap code from the Motorola Quick Call 1 plan should be used.

Pager Option: Select the type of pager being used; Tone Only or Tone and Voice. If Tone and Voice then set the Voice Limit field for 5 seconds to 180 seconds in one second increments.

Talkback Paging: If the subscriber is capable of Talkback paging and the feature is desired, check this box. If the system is being used in simplex mode rather than duplex mode, check the Enable Simplex Handling box for use with Talkback Paging.

Tone 1 Time: This field is programmable for 0.001 to 10.000 1 millisecond increments. If left at 0.000 the Tone 1 Time Default will be used. Quick Call 1 is typically 1.00 second for Tone 1A and 1B Times.

Gap Time: This field is programmable for 0.001 to 10.000 1 millisecond increments. If left at 0.000 the Gap Time Default will be used. Motorola Quick Call 1 is typically 0.2 seconds for the gap time.

Tone 2 Time: This field is programmable for 0.001 to 10.000 1 millisecond increments. If left at 0.000 the Tone 2 Time Default will be used. Quick Call is typically 1.0 second for Tone 2A and 2B Times.

Tone Frequency: These fields show the associated tone frequencies of the cap code entered above.

Power Requirements

The TERMINAL receives its 13–18 VDC from the radio via the P1-9. The TERMINAL incorporates a 12V regulator, IC4, to power the Telephone Audio Line Driver, IC15A and B. This 12 volt regulator requires a minimum of 13 volts to properly regulate. There is also a separate analog pseudo-ground bias source, R75/76 and C60, to put a 6V analog pseudo-ground reference on IC15. All of the other audio and logic circuitry utilize a 5V regulator, IC3. IC3 also has a low voltage reset to protect the micro and EEPROM during power glitches. Both regulators are controlled by the on-off switch and are protected by an auto-resettable fuse (F1), surge protector DK1, and RF bypass cap C11. D4 provides polarity protection by opening the fuse if power is reversed. There is also a 2.5V analog pseudo-ground reference for the audio circuitry. IC10A and its associated components R19, R20, C16, 17, 18, 19, 20, & 21, generate this reference.

DTMF Decode Audio Path

The DTMF decoder receives audio from either the Telephone line or the radio. During an incoming land line call, the microprocessor will steer the DTMF audio from the Telephone line via T1, adjustment pot VR6 (REC LEVEL FROM TELCO) and IC9A to FET switch U13C. It is then fed from Pin 4 of IC13C to input coupling cap C1 and gain resistors R2 and R3 of the DTMF decoder chip IC2. The DTMF decoder then presents binary information and strobe to the microprocessor for decoding and processing.

DTMF and voice audio from the radio receiver comes into the RX input and is RF bypassed by C22. It is then presented to IC9B for an adjustable gain controlled by adjustment pot VR2 (REC LEVEL FROM RADIO). DTMF and voice audio out of Pin 7 of IC9B is fed to a hipass filter to remove CTCSS/DCS tone squelch via IC9C & IC9D. The output of the hipass feeds back to an input on IC13C, Pin 3, where it is again steered back to the decoder circuit as shown in the paragraph above.

DTMF Encode Audio Path

DTMF is generated in IC2 and output on Pin 8 where it is fed into the base of Q3, an emitter-follower that has a FET switch that can steer two different pot-adjustable emitter resistors for transmitting DTMF audio either to the Telephone switch or to the radio transmitter modulator.

DTMF adjustment pot VR4 (DTMF LEVEL TO TELCO) feeds over to IC13B Pin 1, where it's audio is steered to the RX audio driver circuit, IC15A & B, to feed into the Telephone line.

DTMF adjustment pot VR3 (DTMF LEVEL TO RADIO) feeds over to IC13A Pin 13, where the microprocessor steers its audio into the TX audio circuit, IC11C. The output of this circuit feeds the radio transmitter modulator and has an RF bypass cap, C25.

Radio Receive Audio Path

The receive audio from the radio to the Telephone line is applied across RF bypass cap C22. It is then fed into adjustable gain stage IC9B. Pot VR2 (RECEIVE LEVEL FROM RADIO) sets the input level to the DTMF decoder and the high-pass filter IC9C and IC9D. The high-pass filter removes the low frequency CTCSS/DCS if the radio does not already do so. Filtered audio is then fed into Pin 2 of IC13B, where the microprocessor switches it out on Pin 15 of IC13B to pot VR7 (TX LEVEL TO TEL LINE). VR7 can then be set to the appropriate level to drive the Telephone line tip and ring. IC15A and B is a differential line driver that drives Pins 1 & 10 of T2. It has its own 6V analog pseudo-ground reference, R75/76 and C80, on both of the non-inverting inputs. The phone line hybrid T1/T2 employs a surge protection device, DK5 & DK4, and two RF bypass caps to ground C68 and C69.

Radio Transmit Audio Path

The transmit audio path from the Telephone line to the transmitter modulator originates on T1 pin 10. DK2 across the winding of T1 acts as a surge suppresser. Audio is coupled into the hybrid winding of T1 and across pot VR6 (RECEIVE LEVEL FROM TELCO). The audio is fed into gain stage IC9A and coupled over to IC13A, Pin 12. The microprocessor steers the audio through IC13A to Pin 14. Pot VR5 (TX LEVEL TO RADIO) passes the audio through gain stage IC11C, to the TX output via coupling resistor R23 and capacitor C28. Resistor R23 can be lowered if necessary to drive lower impedance Mic inputs. C25 is an RF bypass cap.

Telco Line VOX

The TERMINAL is designed to be used in duplex or simplex. In simplex, the radio transmitter must be able to key up automatically when the phone line party desires to talk. Audio from the Telephone line on T1 is fed through U9A to Telco line circuit Vox IC11B and 11A. This is a fast attack circuit through Q5 discharging C40. The output of IC11A is fed into Pin 39/40 of the U1, so it can control the push-to-talk transistor Q1 which provides a logic low to the PTT line of the radio. There is also a PTT LED indicator to show when the radio is being keyed. The release time is programmable in software by the VOX release delay time register.

Busy Lockout Methods

Radio VOX: There is an identical radio anti-VOX circuit that receives audio from 2 different paths. These paths are selected by the microprocessor, which controls IC14B & also IC14C. If the micro has been programmed for radio VOX busy lockout, then receive audio from IC9B goes into the high-pass filters IC9C & IC9D and into Pin 1 of IC14B, where it is routed to the radio VOX circuit IC12B/A. When voice audio from this path is detected, the microprocessor considers the channel to be busy. There is a busy LED that illuminates when a busy condition is detected.

COR: There is also available a carrier operated relay input lead that turns on Q6 to tell the microprocessor that the radio's own squelch circuit has detected a signal and therefore provides a busy indication to the terminal.

Ring Detector

Opto-isolator IC8 pins 5 and 6 are used to detect ringing on the Telco line. This causes Pin 3 of IC8 to go low during the presence of inbound ringing, turning on Ring LED 2 and driving the micro to detect an incoming call.

Line Seizure (Off Hook)

IC8 pins 7 and 8 are used to seize the phone line. This opto-isolator is also used for pulse dialing when DTMF is not available. LED3 indicates Off-Hook seizure or pulse dialing.

Microprocessors and EEPROMs

U1 is a Motorola 8-bit microprocessor and is the controller for the terminal. It is read-write programmable via the programming interface jack, using a stereo 3.5mm jack. There are two EEPROMs, IC5 and IC6. IC7 is a PIC processor that decodes the CTCSS/DCS and presents it to U1 for validation. IC7 is also used for controlling the wire tap switch. This feature can cause one or more subscriber's calls to be recorded for legal wire taps. Q6 & Q7 share a common emitter resistor to feed TX and RX audio to the recorder.

Hybrid Transformer

T1 and T2 is a hybrid transformer for interfacing to the phone line. DIP switch SW2 is used to select phasing caps C70, 71, 72, & 73 for nulling the hybrid. Fine adjustment is accomplished by adjusting balance pot VR8. During receive calibration test a scope can be connected to pin 1 of IC9 and pot VR8 adjusted for minimum trans-hybrid return signal when the hybrid is seizing the phone line and passing radio receive audio to the telephone line.

MIDIAN CONTACT INFORMATION

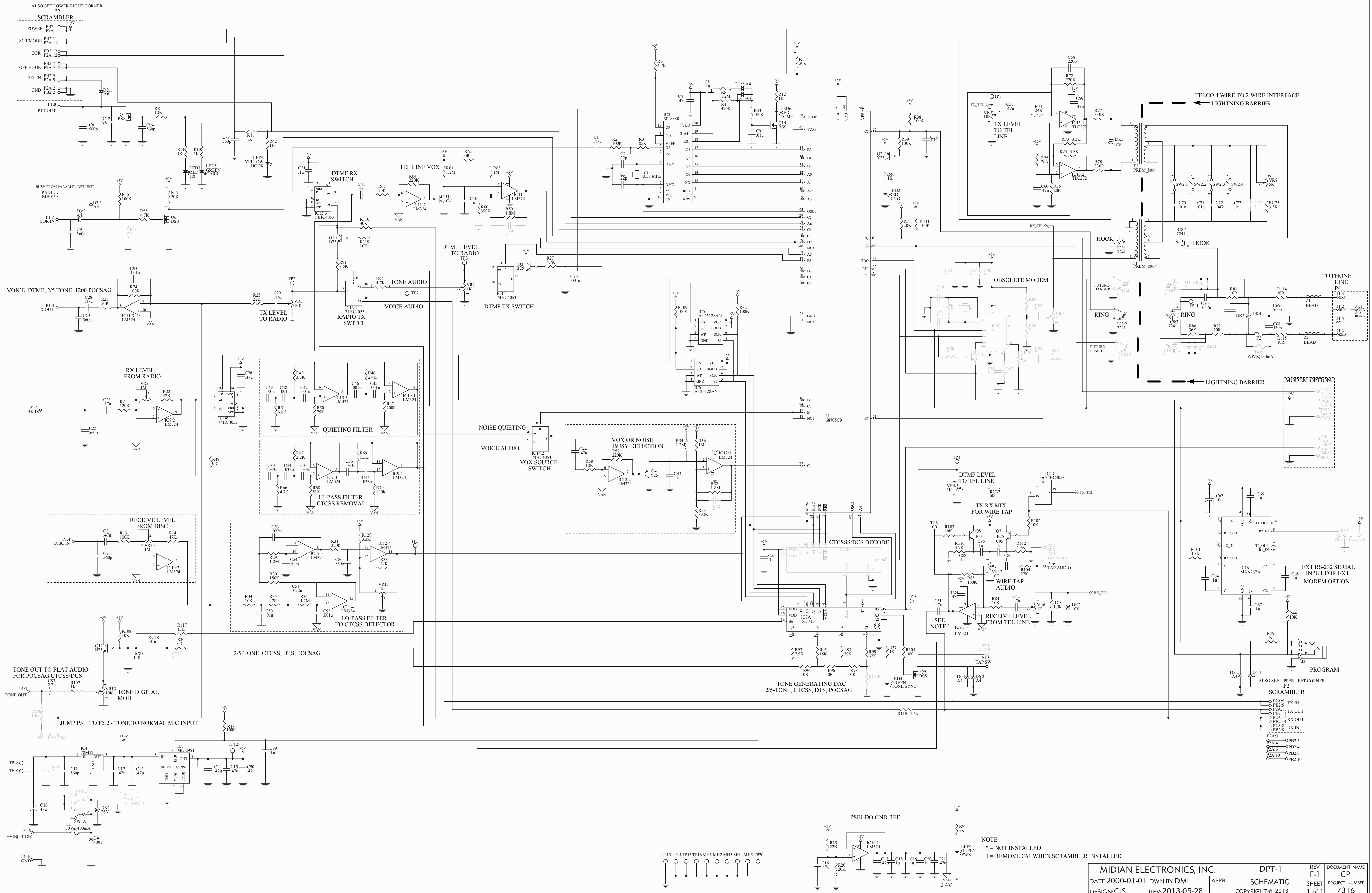
MIDIAN ELECTRONICS, INC.
2030 N. Forbes Blvd. #101
Tucson, Arizona 85745 USA

Toll-Free: 1-800-MIDIANS

Main: 520-884-7981

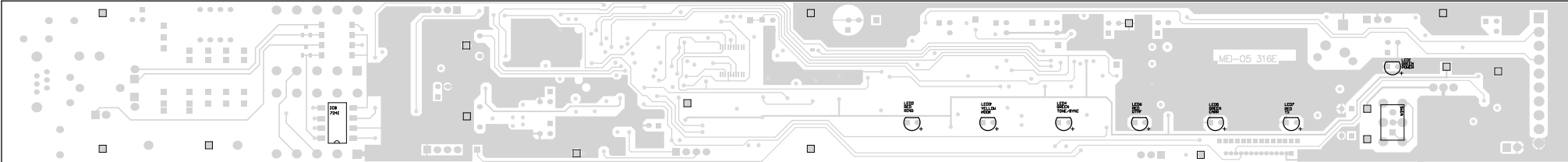
E-mail: sales@midians.com

Web: www.midians.com



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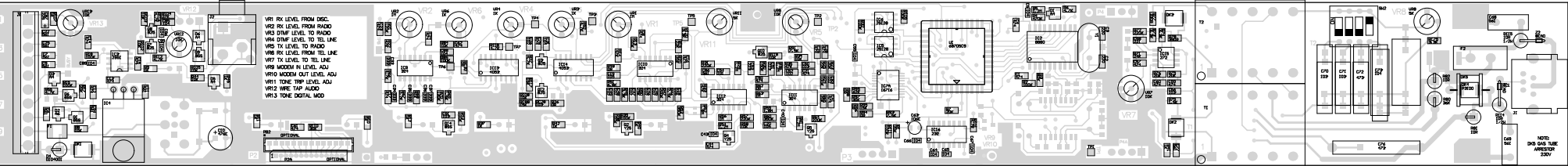


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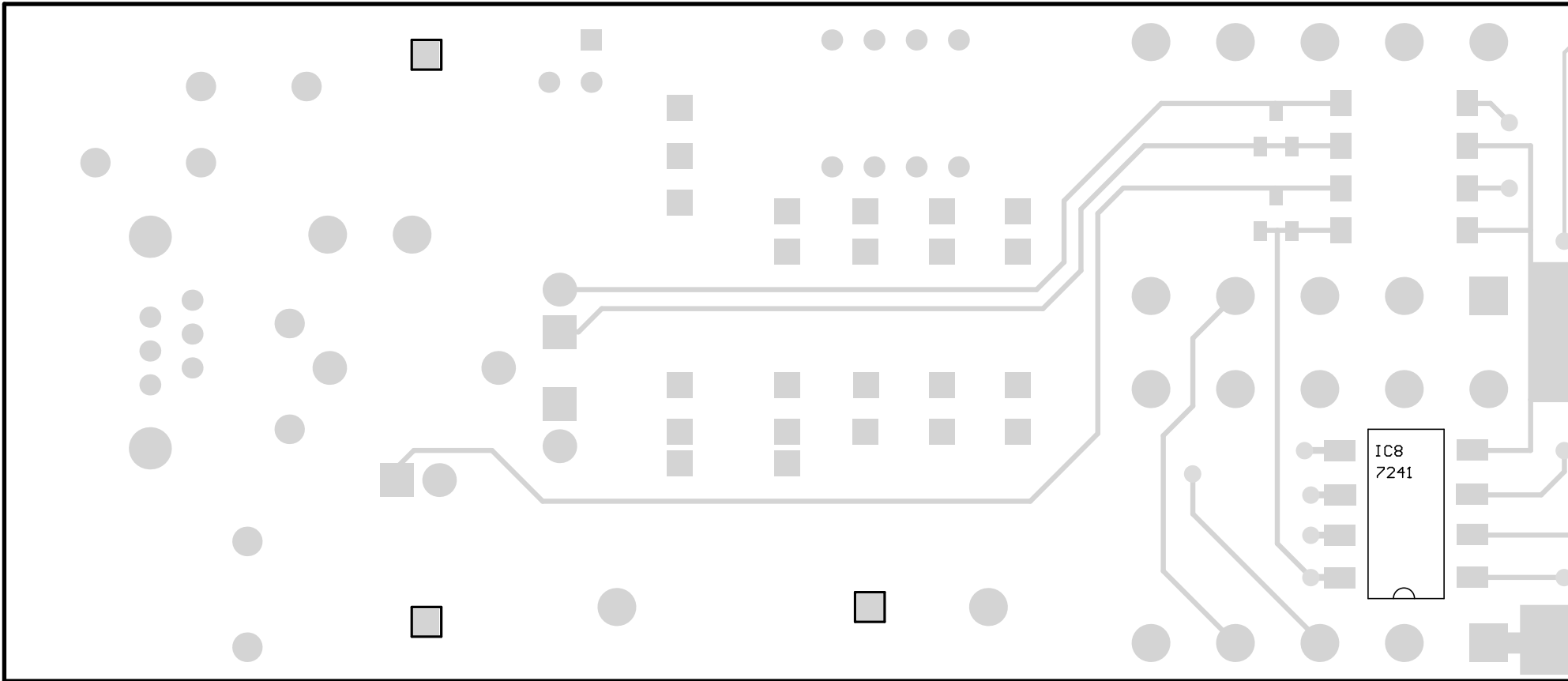


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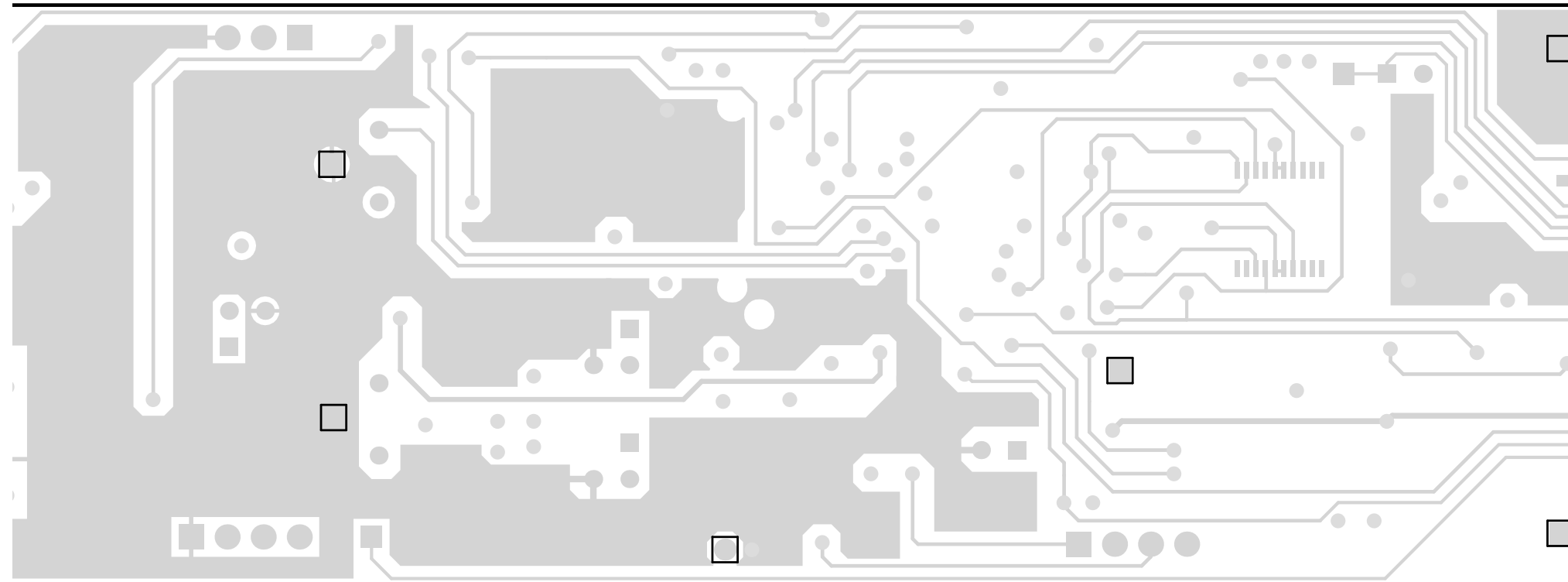
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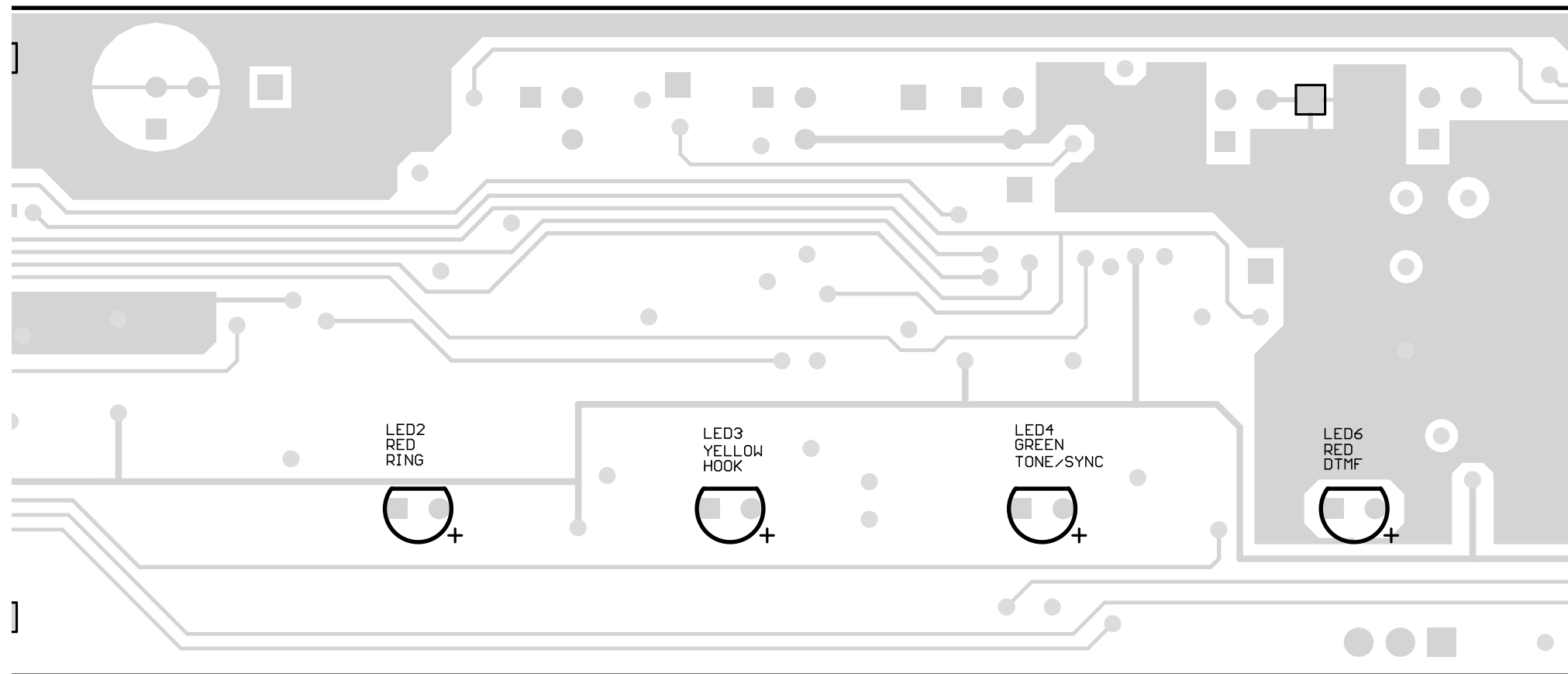
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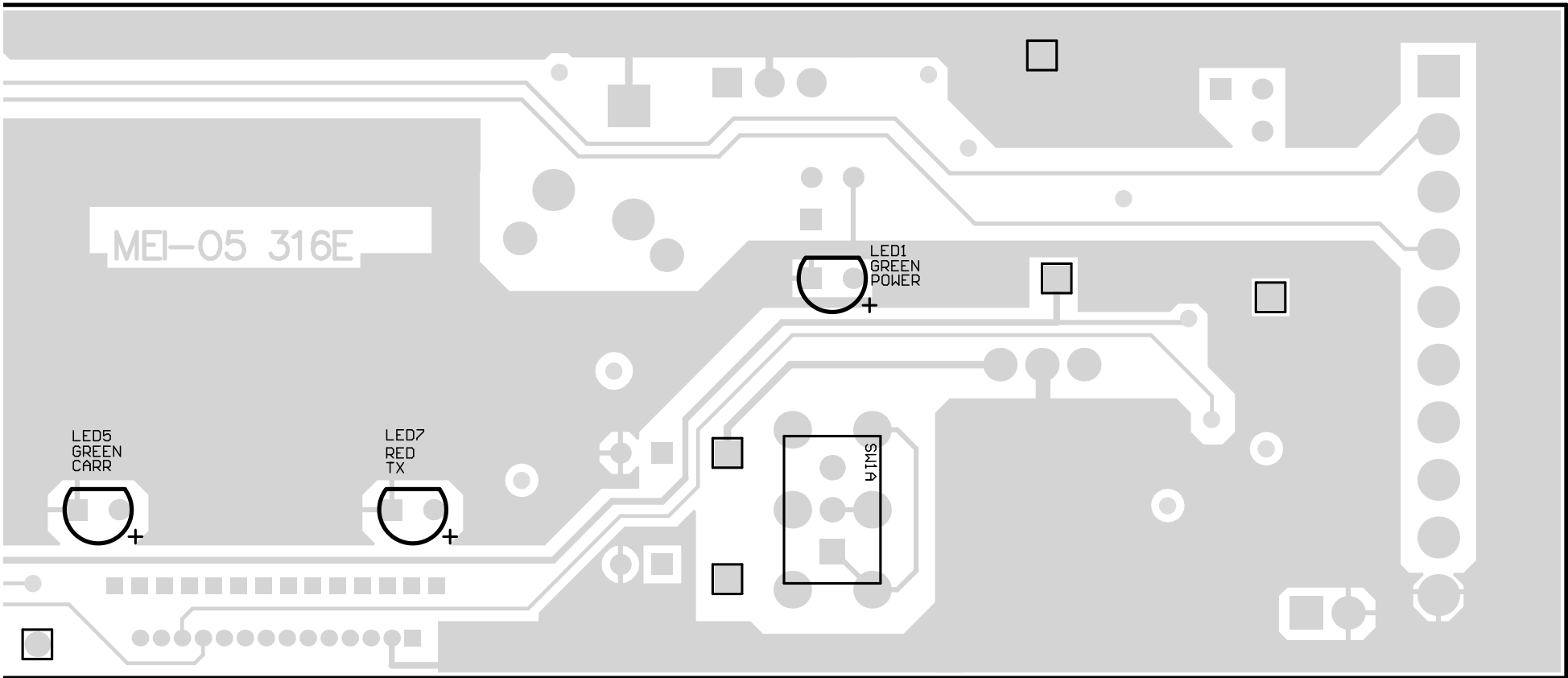
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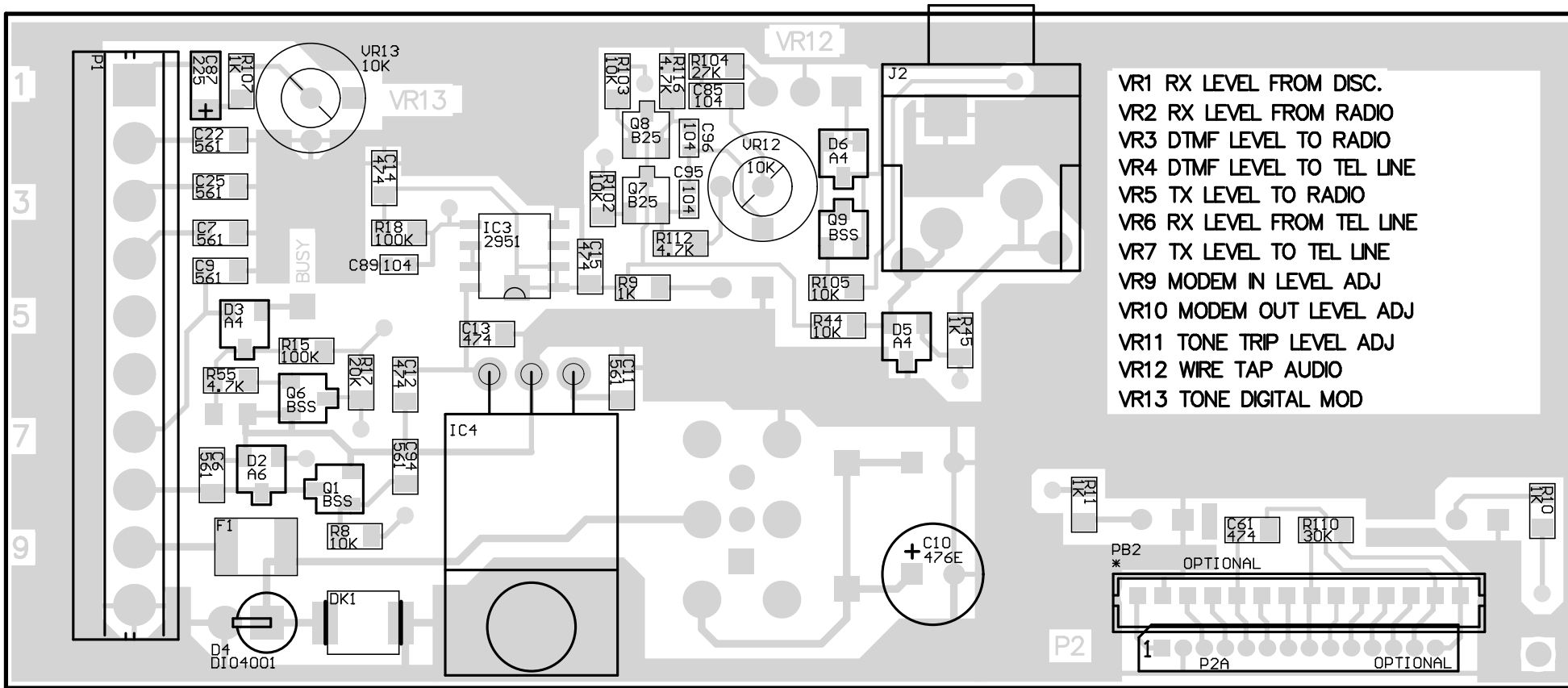
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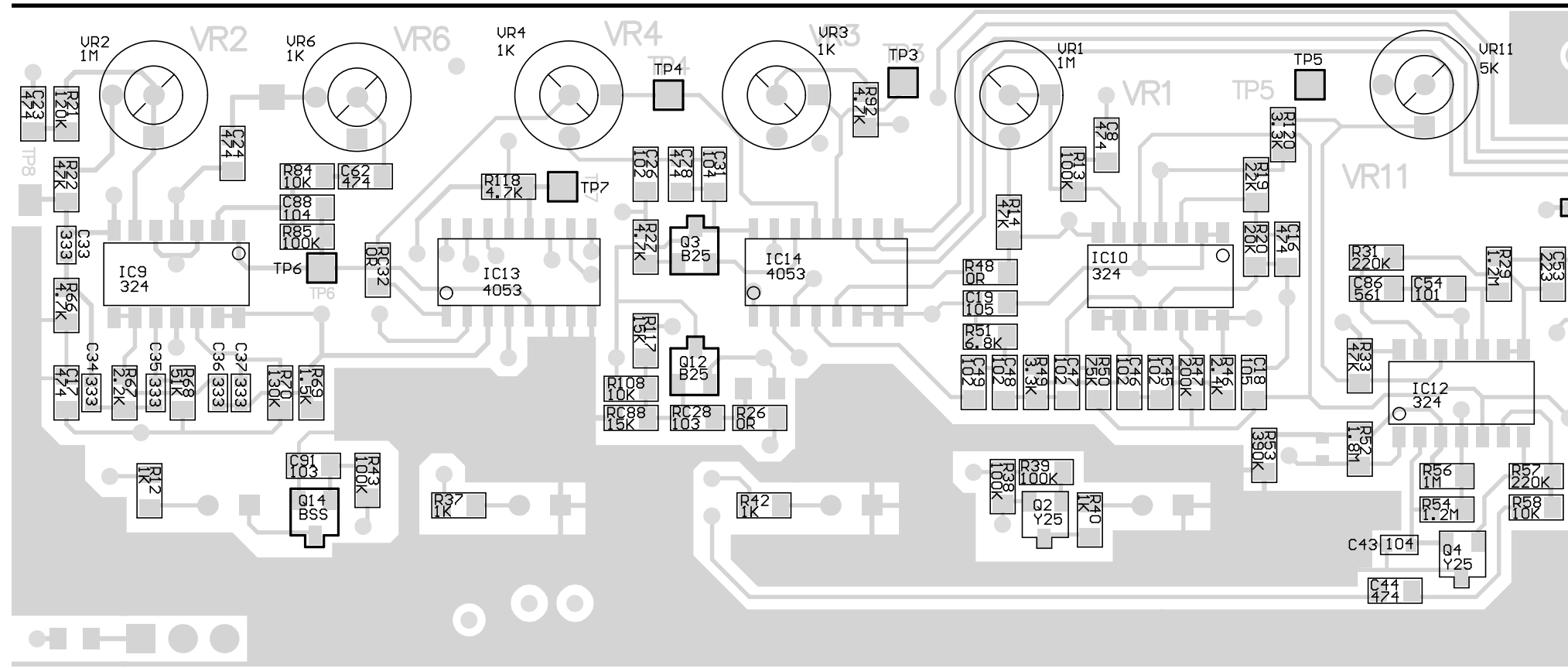
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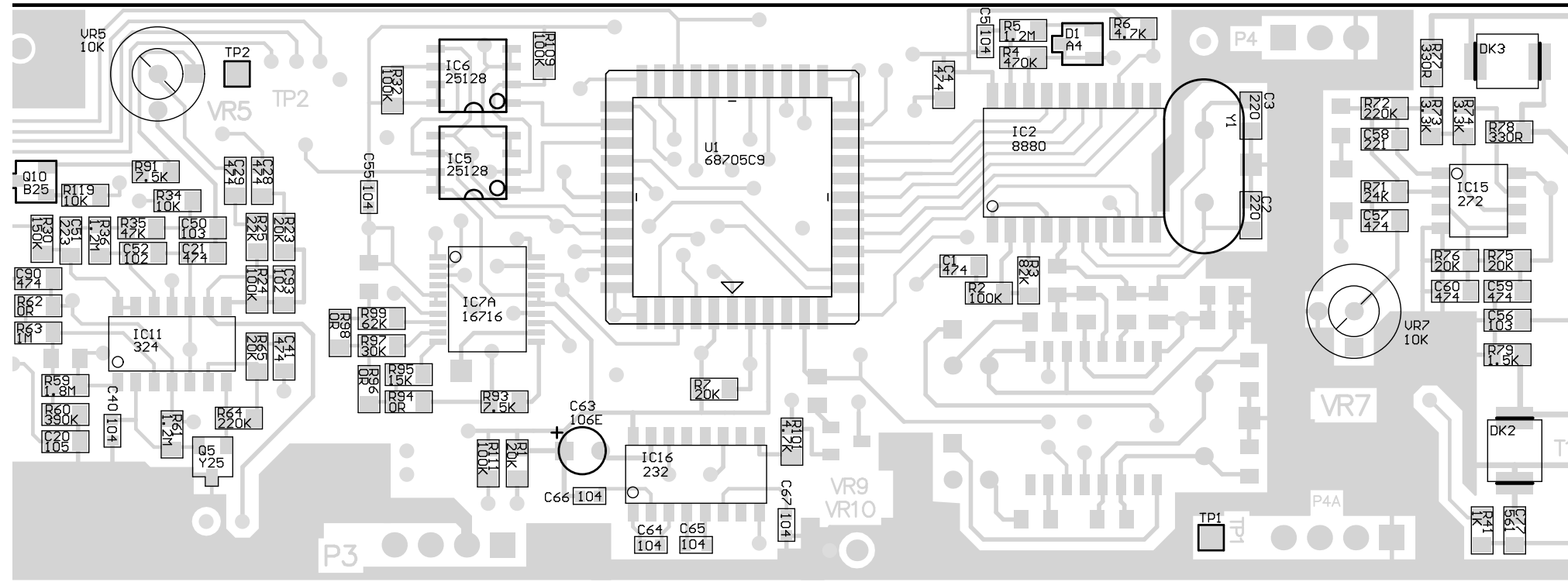
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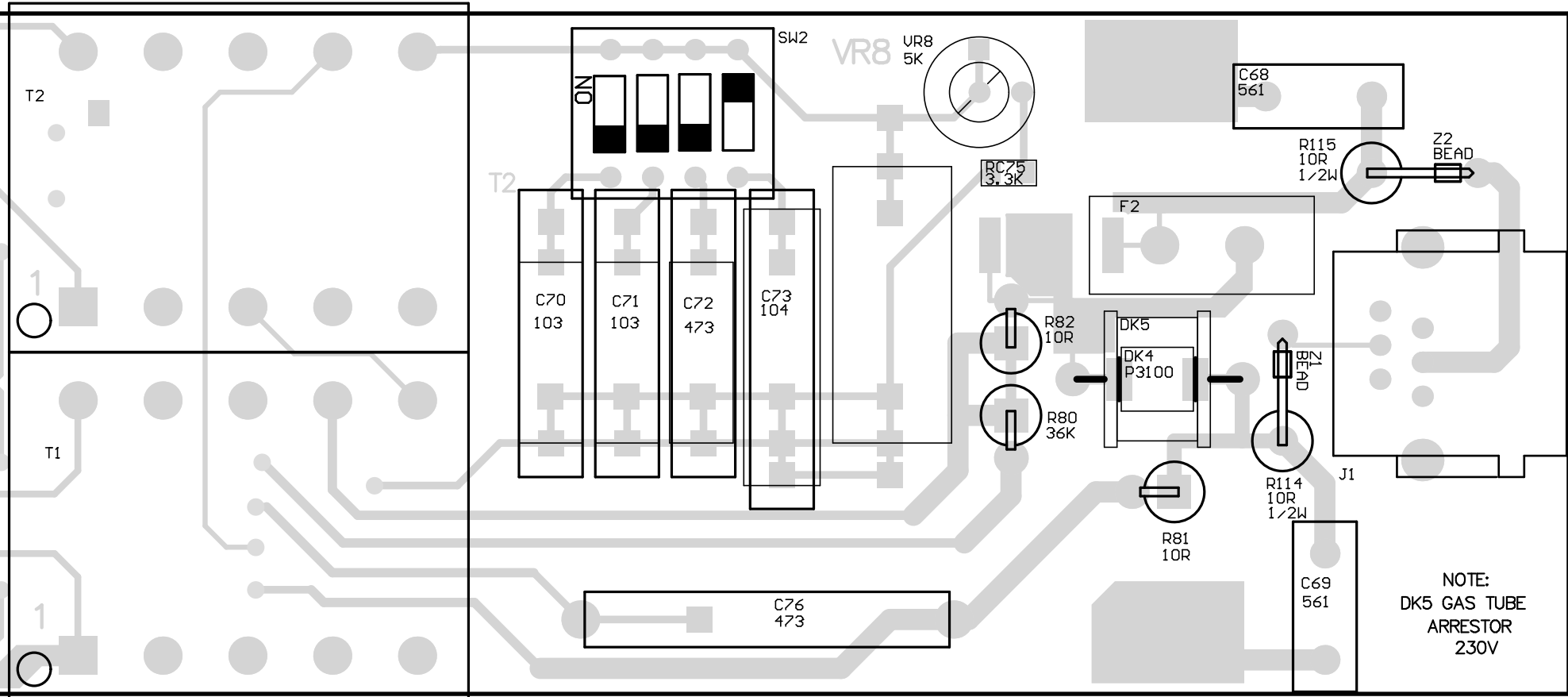
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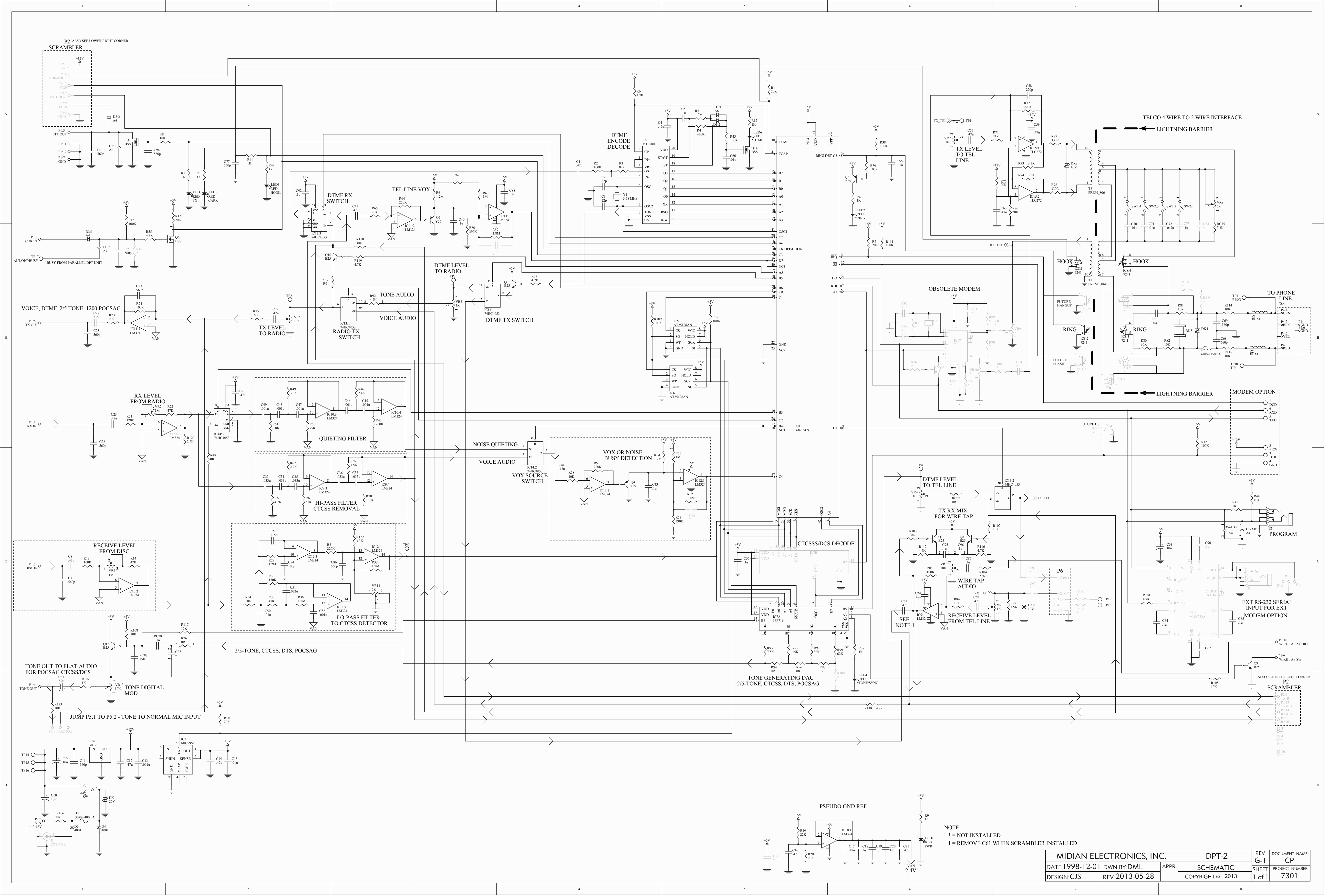
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NOTE
 * = NOT INSTALLED
 1 = REMOVE C61 WHEN SCRAMBLER INSTALLED

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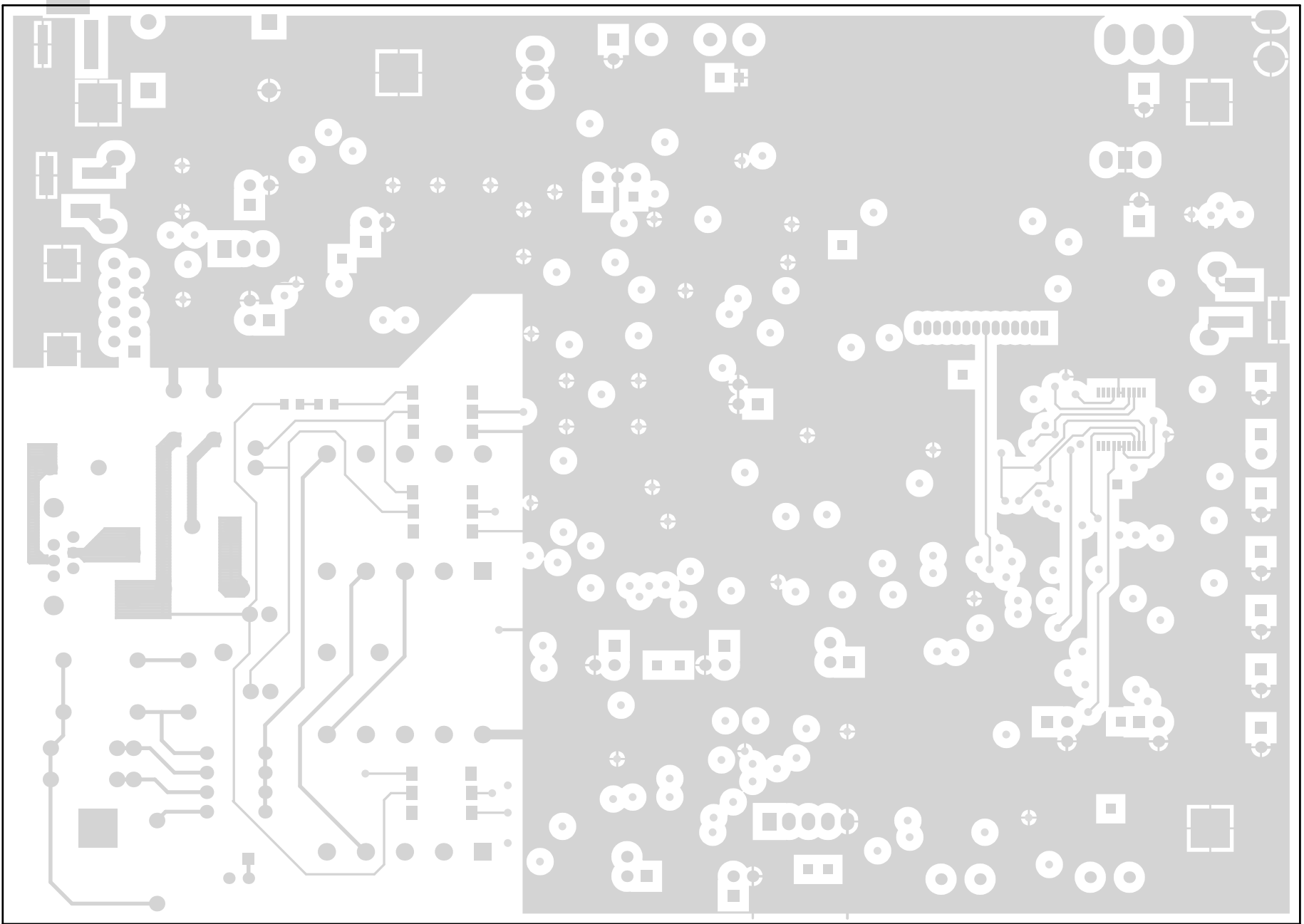
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- UR2 RX LEVEL FROM RADIO
- UR3 DTMF LEVEL TO RADIO
- UR4 DTMF LEVEL TO TEL LINE
- UR5 TX LEVEL TO RADIO
- UR6 RX LEVEL FROM TEL LINE
- UR7 TX LEVEL TO TEL LINE
- UR9 MODEM IN LEVEL ADJ
- UR10 MODEM OUT LEVEL ADJ
- UR11 TONE TRIP LEVEL ADJ
- UR12 WIRE TAP AUDIO
- UR13 TONE DIGITAL MOD

IC7A : DPT-2 INSTALLED
IC7B : DPT-2 NOT INSTALLED

- TRANSMIT LED7
- DTMF LED6
- CARRIER LED5
- ONE/SYNC LED4
- HOOK LED3
- RING LED2
- PWR LED1

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