User Guide

ICS-22 Speaker Station

Part Number:399G223 Rev A

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Clear-Com AN HME COMPANY

Document Reference

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Part Number: 399G223 Rev A

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Table of Contents

1 Important safety instructions

For your safety, it is important to read and follow these instructions before operating a ICS-22 speaker panel:

Warning!	To reduce the risk of fire or electric shock, do not expose a ICS-22 speaker panel to rain or moisture. Do not operate a ICS-22 speaker panel near water, or place objects containing liquid on it. Do not expose a ICS-22 speaker panel to splashing or dripping water.

(2) For proper ventilation, make sure ventilation openings are not blocked. Install the ICS-22 speaker panel following the directions in the Installation chapter of this manual.

(3) Do not install a ICS-22 speaker panel near a heat source such as a radiator, heat register, stove, or other apparatus (including amplifiers) that produces heat. Do not place naked flame sources such as candles on or near a ICS-22 speaker panel.

(4) Only use attachments/accessories specified by Clear-Com Intercom Systems.

(5) Unplug the ICS-22 speaker panel during lightning storms or when unused for long periods of time.

(6) Refer all servicing to qualified service personnel. Servicing is required when:

- The ICS-22 speaker panel has been damaged in any way.
- Liquid has been spilled or objects have fallen into the ICS-22 speaker panel chassis.
- The ICS-22 speaker panel has been exposed to rain or moisture.
- The ICS-22 speaker panel does not operate normally.
- The ICS-22 speaker panel has been dropped.

Please familiarize yourself with the safety symbols in Figure 1-1. When you see these symbols on a ICS-22 speaker panel, they warn you of the potential danger of electric shock if the ICS-22 speaker panel is used improperly. They also refer you to important operating and maintenance instructions in the manual.

This symbol alerts you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.

This symbol alerts you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.

This symbol informs you that important operating and maintenance instructions are included in the literature accompanying this product.

Figure 1-1 Safety symbols

2 Operation

2.1 Description

The Clear-Com ICS-22 is a two-channel speaker panel designed for use in theatres, live performances, industrial environments, and small television facilities. It features excellent speech intelligibility, even in high noise levels, and can be customized through its programmable options.

In addition, the ICS-22 contains a jack for an optional Clear-Com gooseneck panel microphone and a close-in, voice-operated circuit (VOX). This circuit allows automatic, alternate dipping of the panel microphone and the speaker in response to conversation.

Selectable talking and/or listening allows the operator to communicate on two talk/listen paths. The dual-action talk button operates in electronic momentary or latching mode. Monitoring can be done through the headset, the integral speaker, or both simultaneously. The ICS-22 offers both visible and audible call signaling to attract the attention of operators.

A balanced program input allows the monitoring of external audio using the headset or speaker. This program input can also be used as a paging function.

The ICS-22 speaker panel accepts dynamic headsets, such as the Clear-Com PL-Pro™ Series HS-6 Telephone Handset, or PT-4 Push-to-Talk Hand Microphone. A sidetone control allows the operator to vary the level of his voice heard through the headset and speaker.

The integral speaker can be turned on or off by a convenient front-panel switch. An automatic speaker dipping circuit will lower the level of the speaker whenever the talk button is activated. The

ICS-22's close-in VOX dips the speaker or gooseneck microphone automatically as the panel is used. These features help minimize acoustical feedback.

The ICS-22 will need to be powered locally. In permanent wall installations, a 16-VAC doorbell transformer will provide a convenient source of power. In DT-Box installations, a 14- to 18-VAC wall-mounted transformer will suffice. The connections to this transformer are made to the circuit board's two-terminal, plug-on connector.

The unit mounts either in a standard USA four-gang electrical outlet box or in an optional Clear-Com DT-Box. The extra thick front panel and compact, surface-mounted circuitry results in a reduced size and lighter weight package that maintains Clear-Com ruggedness.

2.2 Operation

Normal operation of the ICS-22 speaker panel only requires the front panel controls. For intercom operation, set the intercom level control to the desired level and press the talk button when talking. If a headset or handset is used, set the sidetone control for each channel for the desired amount of sidetone in the earphone. If the PT-4 hand-held, push-to-talk microphone is used, or if the panel microphone is used, set the sidetone controls for minimum feed-through to the speaker to prevent acoustic feedback.

2.3 EHX System Configuration for ICS-22 Panels

The Eclipse Configuration System (EHX) software does not directly support the ICS-22 speaker panel. To configure an ICS-22 panel, the port is configured to drive an ICS-1008 panel with 14 keys (7 pairs of buttons). The two ICS-22 selectors are mapped onto the ICS-1008 keys starting from the left. Only the leftmost two pairs of keys on the ICS-1008 can be used to program the ICS-22; any other keys on the ICS-1008 will have no effect.

There must be a corresponding listen key on the top row to the talk key on the bottom row of the ICS-1008 configuration for the ICS-22 panel to work correctly. If a talk key only is configured on the ICS-1008 in EHX the Talk key on the ICS-22 will not latch.

Note that the panel signalling and control protocol used by the Eclipse matrix differs from the Matrix Plus 3. So, the operation of these panels with an Eclipse matrix may be slightly different to their operation with a Matrix Plus 3.

2.4 Front panel

The controls, indicators, and connectors on the ICS-22 front panels are shown below and are described in the text that follows.

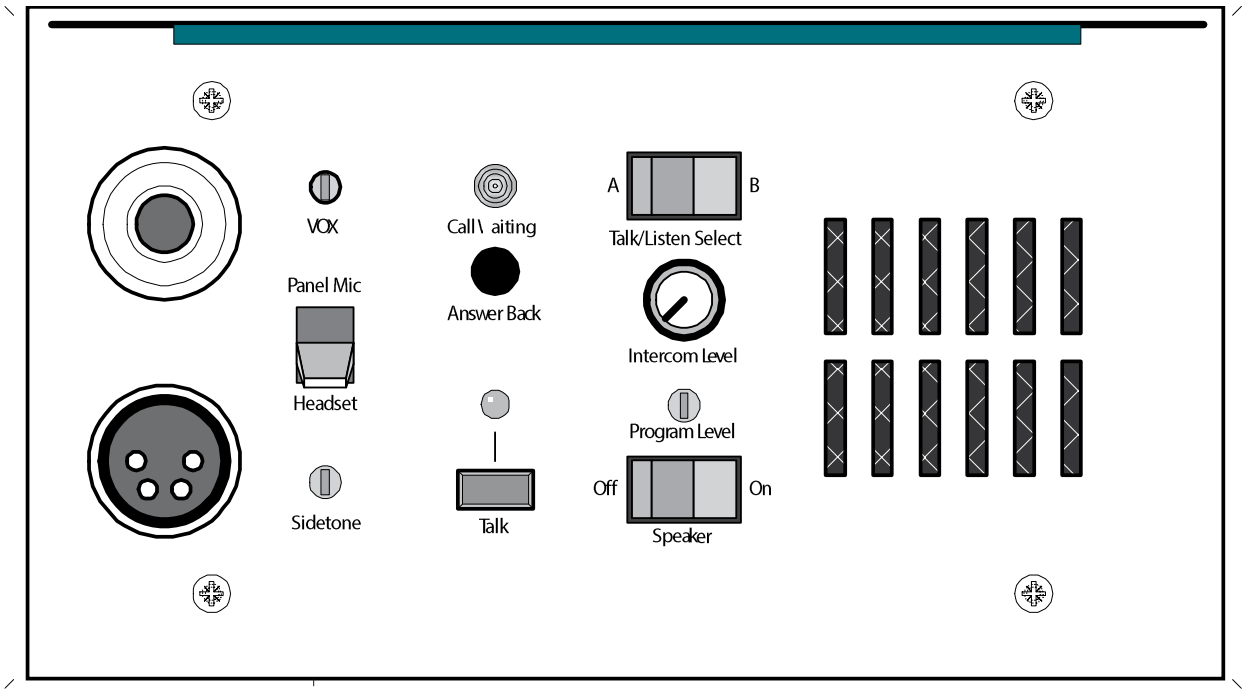


Figure 2-1: ICS-22 Front Panel

2.4.1 Talk Button and Light

This button transmits the headset or gooseneck microphone audio to the selected talk/listen panel/interface or the answer-back label. The talk button has a dual action (momentary or latching) depending upon how the button is pressed. The Talk button Latch/Non-Latching operation cannot be defeated in EHX even for latch disabled labels.

The following describes the various functions of this button:

- Momentary—Press and hold the talk button while speaking. Release it when finished. The light will be illuminated when the button is pressed.
- Latching—Press and release the button quickly to latch the talk function. Press and release the button again to turn off the talk function. The light will be illuminated while the button is latched.
- Talk indication—The associated talk light will illuminate green when the talk function is activated.

- VOX indication—When the VOX feature is enabled, the talk light will illuminate green when the talk function is activated, but will turn red when the panel microphone is in use. This automatically dips the speaker volume.
- Speaker dip—If the front-panel speaker is turned on and the VOX feature is not used, pressing the talk button will reduce the speaker output level to avoid feedback.

Note: The call-waiting light does not light when a call is received from a programmed label.

2.4.2 Answer-Back Facility

The answer-back facility answers calls from panels or interfaces that the panel has not currently selected.

Call-Waiting Light

This dual-function light:

- is steadily lit when a call signal is received
- flashes to indicate a call waiting signal, which has priority over a call signal.

Answer-Back Button

This three-function button:

- sends a call signal to the selected, programmed label when the call waiting light is off
- directs audio to the longest-waiting call in the call-waiting stack when the call waiting light is flashing
- ends the current conversation from the call-waiting stack when the call waiting light is steadily on.

Answer-Back Stack

The answer-back stack tracks incoming calls from any label that is not assigned to the panel. These calls are available in the order they were received. The length of time the calls are available before they are automatically removed is set in the configuration program.

Note: The label programmed to and selected by the panel will never appear in the answer-back stack and duplicate labels are never added.

Answering a Call from the Answer-Back Stack

To answer a call from the answer-back stack:

1) Press and release the answer-back button to select the longest waiting call.

2) Press the answer-back button while responding. The call waiting light will be on steadily.

Terminating Calls Answered with the Answer-Back Button

To terminate a call answered with the answer-back button, turn off the call waiting light, and recover the previous call:

- The receiving panel can terminate the call by pressing and releasing the answer-back button.
- The calling panel can terminate the call.

Note: The configuration program can be set to also send an audible signal through the speaker, which can only be heard if the intercom level is turned up.

Note: Forcing the trimpots past their stop points will damage them.

Answering Another Call from the Answer-Back Stack

To answer another call from the answer-back stack:

- If the calling panel disconnected the call, the call waiting light will flash.
- If the receiving panel disconnected the call, a call from another unselected label will be activated when the answer-back button is released.

Sending a Call Signal

The answer-back button can send call signals to a panel or interface currently on the selected talk/listen path when the call-waiting light is not on. The light will turn on when the button is pressed and turn off when it is released.

Receiving a Call Signal

The call waiting light turns on when another panel sends a call signal and remains on during the call.

2.4.3 Tone Alerts

Tone alerts are set through the configuration program. The panel has the following three tones:

Tone	Meaning
Four rapid beeps	Call signal
Two beeps	Label change
Single beep	Monitoring

Table 2-1 ICS-22 Tone alerts

2.4.4 Intercom-Level Control

This control sets the listen level required on the speaker or headset. It does not affect the program-input level.

2.4.5 Sidetone Control

This knob adjusts the level of the operator's voice that is heard while talking on the intercom. Setting a comfortable level of sidetone will ensure that the intercom line sounds alive, and also helps modulate the operator's voice relative to other voices on the line.

Typically, different sidetone settings are needed depending upon whether the speaker is used. Turn the knob clockwise to increase the sidetone and counter clockwise to decrease it. Minimum sidetone is recommended when the speaker is used.

Note: Do not connect Pins 1 and 3 together. Headset extension cords or headset "Y" cables are not recommended because they may increase crosstalk between channels.

2.4.6 Program-Level Control

This control sets the program input audio level heard in the headset or panel speaker.

2.4.7 Speaker ON/OFF Switch

This switch turns the front-panel speaker on or off. It also controls whether the tone alert is heard through the speaker. The speaker volume will automatically dip when the talk function is set, unless the VOX function is enabled.

2.4.8 Mic-Select Switch

This switch selects whether the panel microphone or the headset microphone is active. When the VOX feature is enabled, it is only operational when the panel microphone is active.

2.4.9 Talk/Listen Select Switch

This switch selects the panel/interface label (A or B) for communication.

2.4.10 Headset Connector

This connector is located on the front panel. All Clear-Com headsets are recommended for use with the ICS-22. The Clear-Com PT-4

Push-to-Talk Microphone or the HS-6 Telephone Handset will also plug into the headset connector. The following is a description of the characteristics of a suitable headset:

- Mic Type—Dynamic; 150 to 400 ohms impedance; -55 dB output level.
- Headphone—Dynamic; 50 to 2000 ohms impedance. The wiring of the headset is to be as follows:

Pin number	Description
1	Microphone ground (shield)
2	Microphone hot
3	Headphone ground
4	Headphone hot

Table 2-2 ICS-22 headset wiring

The microphone and headphone wiring in the headset cord must be individually shielded.

Caution: Do not connect Pins 1 and 3 together. Headset extension cords or headset "Y" cables are not recommended because they may increase crosstalk between channels.

2.4.11 Panel-Mic connector

Clear-Com recommends that the GM-9 (9-in. long) and GM-18 (18-in. long) plug-in panel microphones be used with the ICS-22. Both are the electret type. The 1/4-in. phone jack on the microphone mates with the panel-mic receptacle on the ICS-22's front panel.

To install a GM-9 or GM-18 microphone there are four steps.

1) Remove the plastic plug from the jack, if present.

2) If a set screw is present in the microphone-mounting flange, check and unscrew it to make sure it is clear of the threads in the bushing.

3) Screw the microphone into the bushing and tighten.

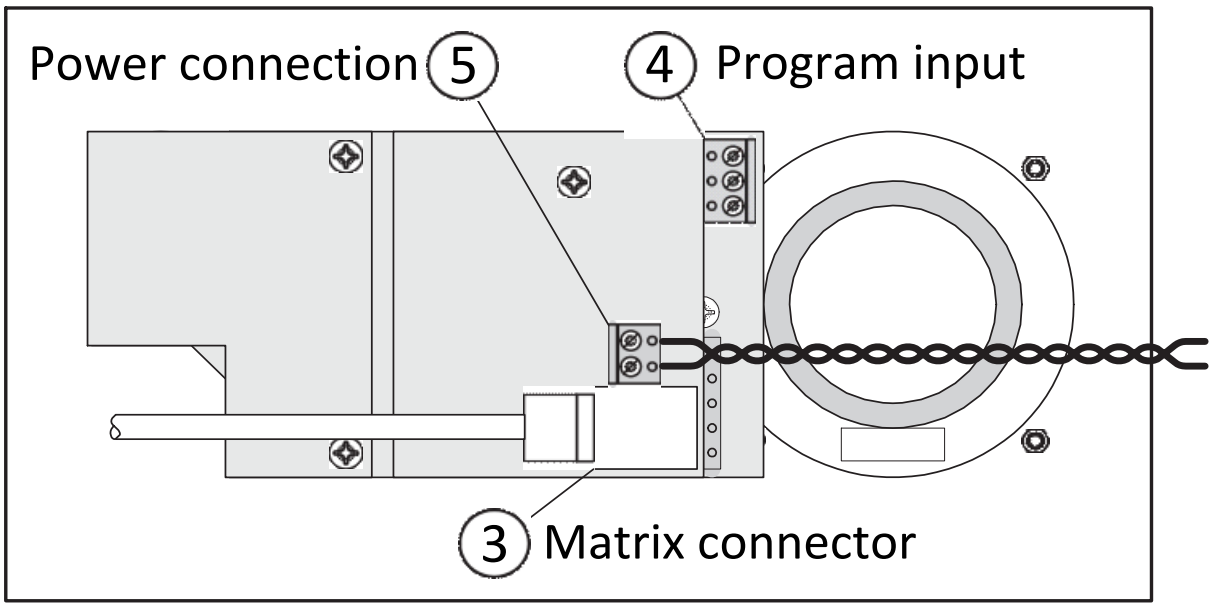
4) Optional: Replace the set screw supplied with the gooseneck microphone on top of the microphone-mounting flange and turn it clockwise to lock the microphone in place.

2.4.12 VOX Control

When the panel microphone is selected on the ICS-22, the VOX control should be adjusted for proper operation. This control is located to the right of the panel microphone connector and is recessed slightly into the front panel. Use a narrow, flat-bladed screwdriver such as a "greenie" or "tweaker" for this adjustment. When the adjustment is correctly set, the talk lamp will be red when speaking into the panel microphone and will be green when hearing audio from the speaker. Turning the control clockwise makes the ICS-22 more sensitive. The VOX feature can be disabled by turning the VOX control fully counter clockwise.

2.5 Internal connections

These controls are not to be adjusted on this panel, but are set as follows:



VIEW FROM TOP OF ICS-22

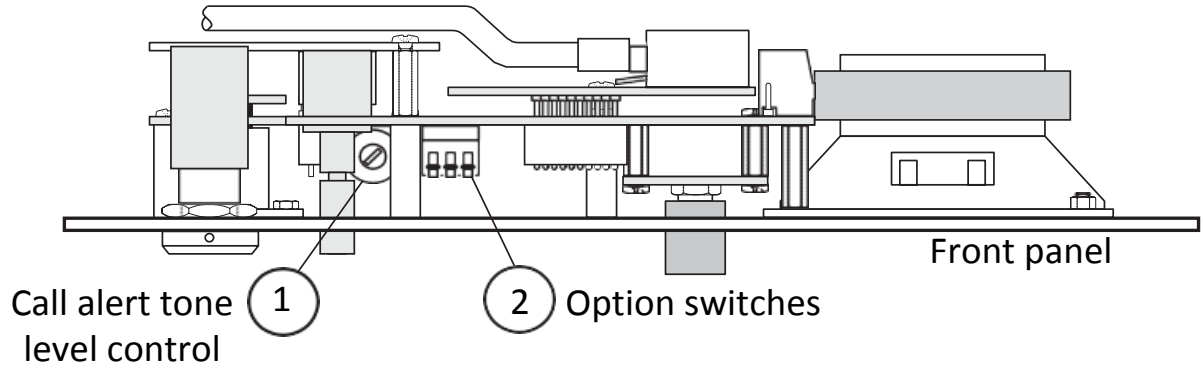


Figure 2-2 Internal adjustments and connections

Note:	The ON position of each option switch is toward the circuit board and the OFF position is toward the front panel. The default position of the switches is the OFF position.

2.5.1 Call alert tone level control (1)

This feature must be disabled by turning the control fully counter clockwise.

2.5.2 Option Switches (2)

The three option switches are set to the OFF position by the factory and should not be changed.

2.5.3 Matrix Connector (3)

This eight-wire modular jack (RJ-45) provides an audio and data communications link to the Matrix system.

2.5.4 Program-Input Connector (4)

A three-terminal, plug-on connector provides the program input to the panel. Program is fed to the headset and speaker. The level to the speaker or headset is controlled by the program-level control. The program-input connector accepts a balanced or unbalanced line-level audio signal from -20 dBu to +10 dBu. If this input is connected to the stage announce (SA) output of a main panel it can be used as a paging input. Since the level of this input is independently adjustable from the intercom audio volume, it can be used to override the intercom audio.

Note:	The Program Input can be set between -20 dBu to +10 dBu.

The pinout of this connector is as follows:

Pin number	Function
1	Ground (shield)
2	Positive signal
3	Negative signal

Table 2-3 ICS-22 XLR pinout

Note:	Both 10-VAC and 16-VAC doorbell transformers are commonly available at hardware stores, but only the 16-VAC transformers are suitable in this case. The panel can obtain power from three different sources.

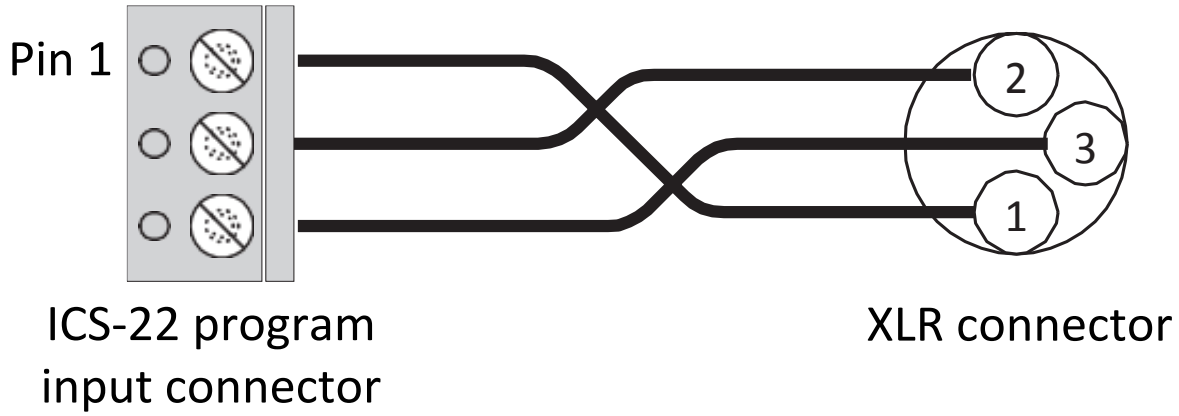


Figure 2-3 ICS-22 Program-Input Cable Wiring

2.5.5 Power Connection (5)

The panel requires local power, which can come from various sources, including:

16-VAC Doorbell Transformer

A doorbell transformer can be attached to a separate box containing the power-line connection and the low-voltage, 16-VAC can be routed to the connector on the EB7-4W circuit board. This connection is especially useful if the headset or speaker panel is installed in a wall.

14-VAC Wall-Mounted Power Supply

A Clear-Com wall-mounted power supply (part number 400008) can be used for powering the panel from 120 VAC. (Use part number 400011 for 220 VAC power.) This connection is a better choice if the headset or speaker is mounted in a desktop box, such as a Clear-Com DT-Box, which is not located on a wall.

24- to 28-VDC Source

The headset or speaker panel can be powered from a DC source, such as batteries.

To connect the selected power supply:

1) Connect the two wires from the power source to the two-position, plug-on terminal strip.

2) Plug this connector onto the circuit board as shown in Figure 2-2.

3 Quick start

Use the Quick Start approach to get panels up and running in minutes.

1) Unpack the unit and inspect it for any damage that may have occurred during shipping.

2) Set the option switches to the default (up) position.

3) Connect the RJ-45 connector to the Matrix frame.

4) Connect 14- to18-VAC power to the two-terminal, plug-on connector.

5) Install the ICS-22 into the USA standard four-gang outlet box.

6) Set listen levels and sidetones (see Figure 2-2).

7) The speaker panel should now be operating properly.

8) Read the rest of this manual for further information.

Note: When the panel is initially powered, the call-waiting lamp will blink slowly indicating the panel is attempting to communicate with the Matrix frame. Once communication is established, the blinking will stop.

4 Installation

1) Connect the 14- to 18-VAC power to the two-position terminal strip. Plug the terminal strip onto the P2 as shown in Figure 2-2.

2) Connect the eight-wire, modular RJ-45 connector to J1 as shown in Figure 2-2.

3) If the RJ-45 Matrix connector should need to be unplugged, use the following procedure:

   a) Remove power from the panel.

   b) If the panel is installed in a DT-Box, remove the front panel. It is retained with four screws.

   c) Using long-nosed pliers, grasp the top and bottom of the plug so that the retaining clip will be depressed. Pull the plug out with the pliers.

Note: If the panel is installed in a DT-Box, the back cover of the DT-Box must first be removed. It is retained with four screws. Feed the power cable through one slot and fasten it to the strain relief as shown in Figure 2-2.

Note: If the panel is installed in a DT-Box, the back cover of the DT-Box must first be removed. Feed the Matrix cable through one slot and fasten it to the strain relief as shown in Figure 4-1 at right.

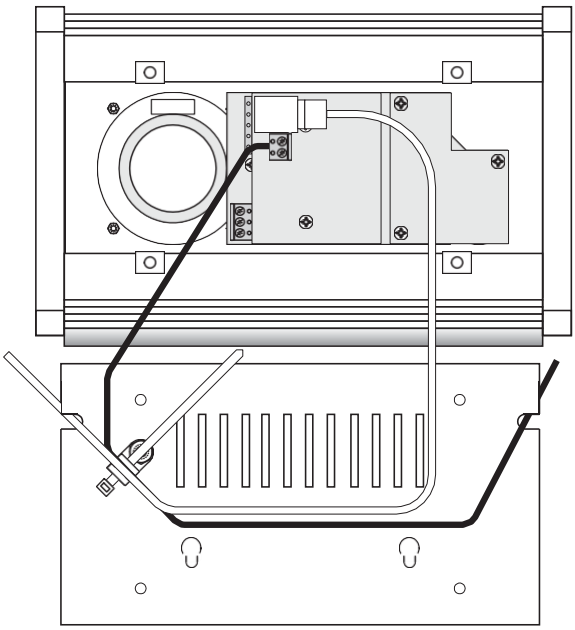


Figure 4-1 ICS-22 DT-box wiring

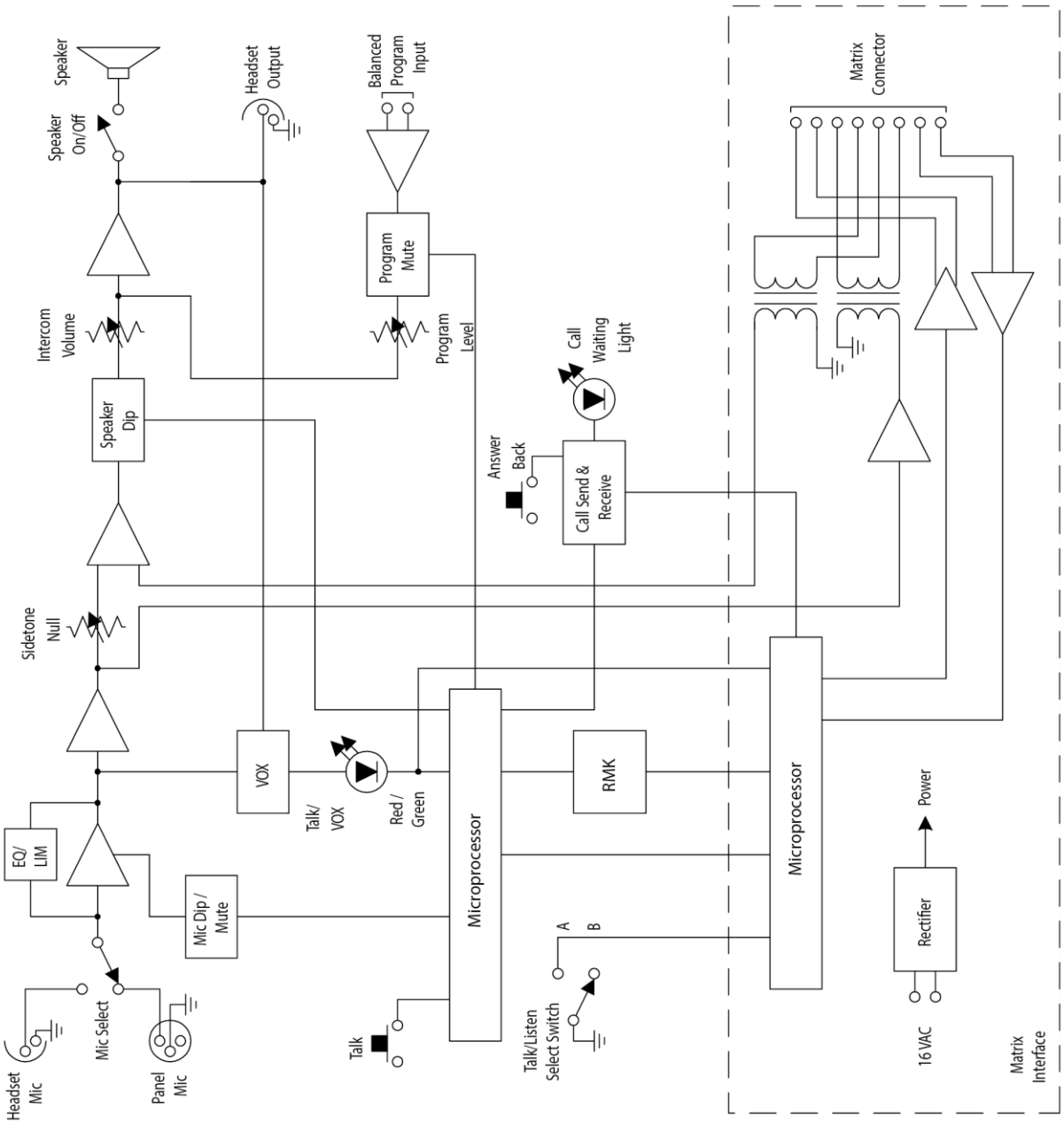
5 Maintenance

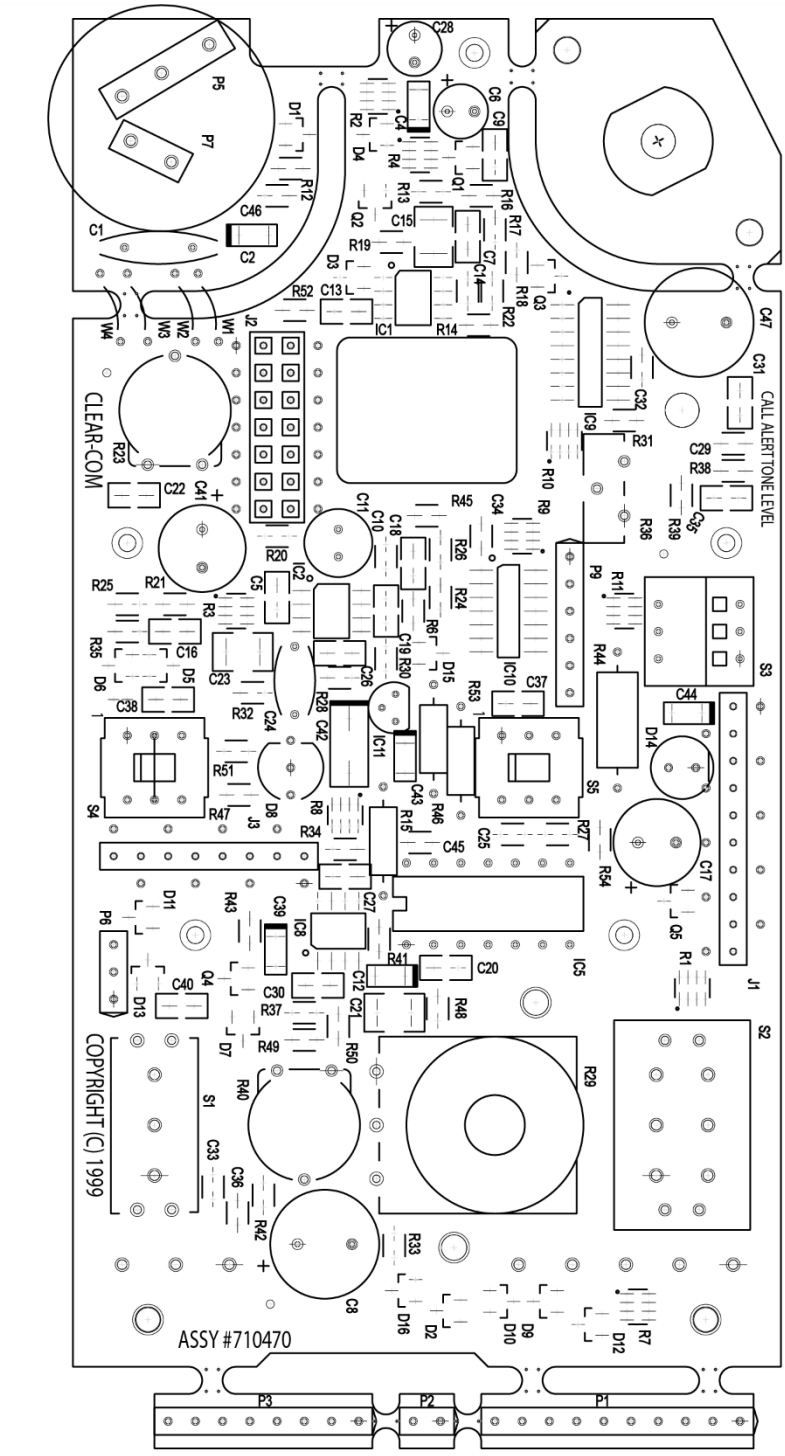
5.1 Troubleshooting tips

Symptom	Cause	Solution
System does not operate and the talk light does not turn on when talk button is pressed.	1. The panel is not receiving 14- to 16-VAC power. 2. The panel has an has an internal failure.	1. Check the circuit powering the panel and make sure all plug connections are secure. 2. The panel requires servicing.
System does not operate and the call waiting light blinks slowly.	Communication with the system is lost.	Make sure each eight-wire, modular connector is securely plugged in, check the wiring, and ensure that the Matrix system is turned on.
System does not operate and the call waiting light blinks quickly.	An incompatibility problem with the Matrix system.	Contact the dealer or Clear-Com's technical service.
Speaker does not operate, but the talk light comes on when talk button is pressed.	1. The speaker knob is turned all the way down. 2. The speaker plug or wiring has come loose.	1. Adjust control appropriately. 2. Make sure speaker is connected internally.
Hum or buzz in system.	Inductive pickup caused by close proximity of this speaker panel or connected panels to power lines or transformers.	Relocate the offending unit or wiring.

Symptom	Cause	Solution
System feedback (acoustical).	1. The intercom-level control at this panel or another panel is set too high. 2. The sidetone control at the panel or another panel is incorrectly adjusted. 3. A headset extension cord was used.	1. Adjust. 2. Adjust (Figure 2-1) . 3. Remove the extension cord because its use is not recommended.
VOX problems.	1. VOX stays tripped (red light on); the sensitivity is set too high. 2. VOX will not trip when speaking (green light on); the sensitivity is set too low.	1. Turn the VOX sensitivity control counterclockwise. 2. Turn the VOX sensitivity control clockwise.
The program signal sounds distorted.	1. The program-level control is set too high. 2. The program-input circuit is overloaded.	1. Turn the program-level control counterclockwise. 2. Reduce the gain of the program signal at the source, such as an audio mixer.
Rapid clicking noise.	1. Defective wiring or connectors. 2. Defective IC1 on 710533 assembly.	1. Repair/replace wiring or connectors. 2. Replace IC1.

TECHNICAL REFERENCE

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CALL ALERT TONE LEVEL
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5.2 BILLS OF MATERIALS

5.2.1 ICS-22 Main PCB (Part No. 710470)

CAPACITORS

Designator	Description	Qty
C8 C47	220 uF Aluminum 35V	2
C1	.01 uF Ceramic Disc 1.4KV 20%	1
C28	22 uF Tantalum 16V	1
C6	4.7 uF Tantalum 35V	1
C11	4.7 uF Aluminum NP 50V	1
C24	.047 uF Mylar 100V 5%	1
C17 C41	100 uF Aluminum 35V	2
C14	22 pF Ceramic SMD 50V 5%	1
C5 C19 C27 C30	47 pF Ceramic SMD 50V 5%	4
C26	220 pF Ceramic SMD 50V 5%	1
C7 C46	470 pF Ceramic SMD 50V 5%	2
C16	.0022 uF Ceramic SMD 50V 10%	1
C9 C20 C22	.0047 uF Ceramic SMD 50V 10%	3
C13 C37 C38 C40 C31 C29	.01 uF Ceramic SMD 50V 10%	6
C18 C35	.047 uF Ceramic SMD 50V 10%	2
C10 C25 C32 C33 C34 C36 C45	.1 uF Ceramic SMD 50V 10%	7
C15 C21 C23	.22 uF Ceramic SMD 50V 10%	3
C44 C39	.47 uF Tantalum SMD 35V 10%	2
C2 C4 C12 C43	1 uF Tantalum SMD 16V 10%	4
C42	10 uF Tantalum SMD 25V 10%	1

RESISTORS

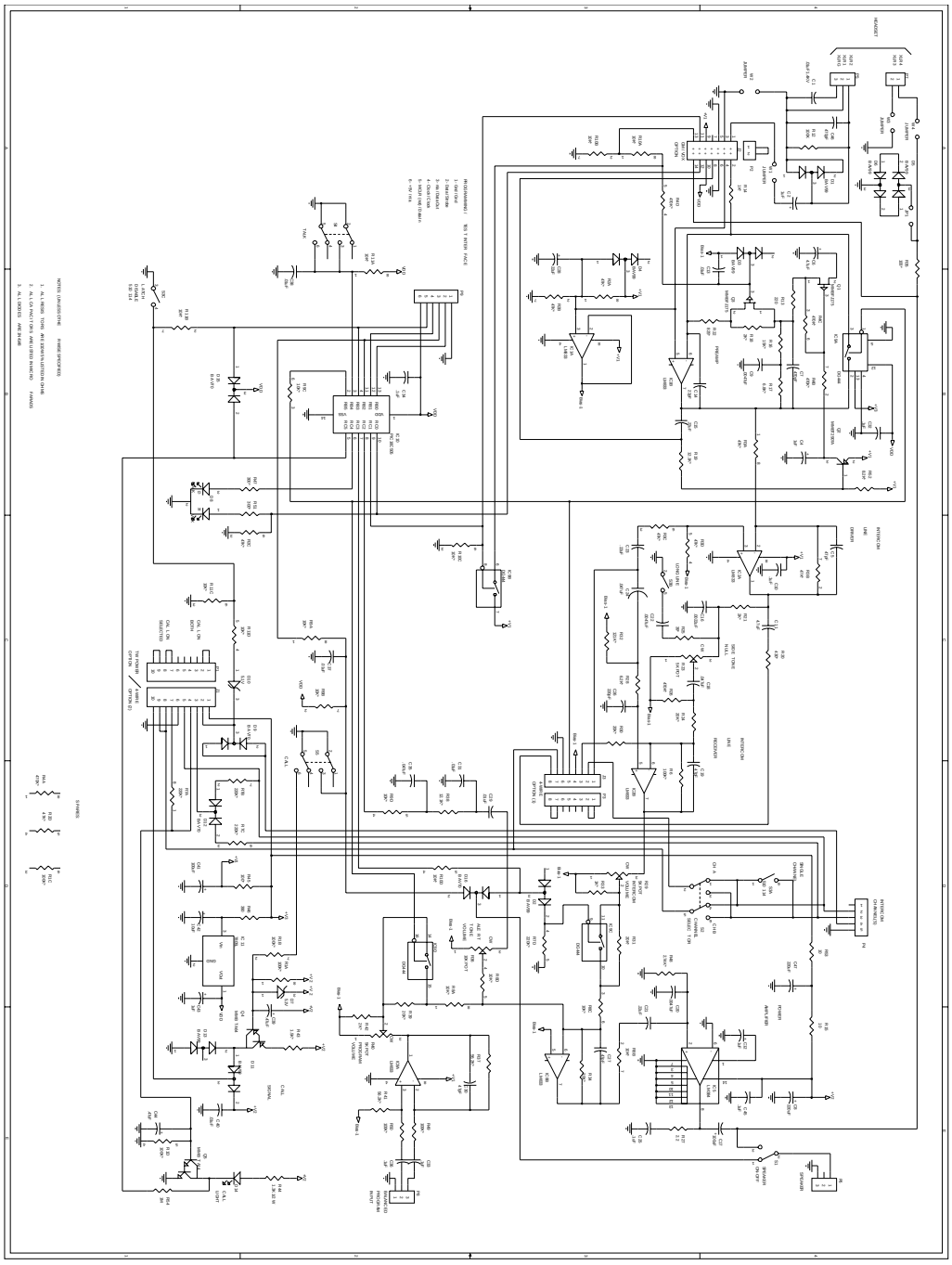
Designator	Description	Qty
R15 R53	10 OHM 1/4 Carbon Film 5%	2
R46	390 OHM 1/4 Carbon Film 5%	1
R44	1.3K OHM 1/2 Carbon Film 5%	1
R27	2.2 OHM 1/10 SMD 5%	1
R25	39.2 OHM 1/10 SMD 1%	1
R45 R35	100 OHM 1/10 SMD 1%	2
R13	221 OHM 1/10 SMD 1%	1
R47 R51	301 OHM 1/10 SMD 1%	2
R20	432 OHM 1/10 SMD 1%	1
R22	825 OHM 1/10 SMD 1%	1
R14 R33	1.00K OHM 1/10 SMD 1%	2
R43	1.50K OHM 1/10 SMD 1%	1
R18 R21 R42	2.00K OHM 1/10 SMD 1%	3
R48	2.74K OHM 1/10 SMD 1%	1
R28	6.19K OHM 1/10 SMD 1%	1
R17	6.81K OHM 1/10 SMD 1%	1
R52	8.25K OHM 1/10 SMD 1%	1
R19 R38	12.1K OHM 1/10 SMD 1%	2
R16	15.0K OHM 1/10 SMD 1%	1
R24 R30 R31 R34 R39	20.0K OHM 1/10 SMD 1%	5
R37 R41	56.2K OHM 1/10 SMD 1%	2
R6 R12 R49 R50	100K OHM 1/10 SMD 1%	4
R32	121K OHM 1/10 SMD 1%	1
R26	475K OHM 1/10 SMD 1%	1
R54	1.0M OHM 1/10 SMD 5%	1
R8 R9 R10 R11	10K OHM X4 SMD DIP Isolated	4
R2 R3	47K OHM X4 SMD DIP Isolated	2
R1	100K OHM X4 SMD DIP	1
R7	220K OHM X4 SMD DIP	1
R4	470K OHM X4 SMD DIP	1
R36	Pot 10K TRIMPOT	1
R40 R23	Pot 5K TRIMPOT	2
R29	Pot 5K POT	1

DIODES AND TRANSISTORS

DESIGNATOR	DESCRIPTION	QTY
D8	LED BI-COLOR RED/GREEN	1
D14	LED, YLW, ULTRA BRGHT	1
IC5	IC LM384 POWER 4W OP AMP	1
IC11	IC 7805L POS 5V REGLTR	1
D9 D12 D15 D16	Diode BAV70 DUAL DIODE	4
IC1 IC2 IC8	IC 833 DUAL OP AMP	3
Q2	Transistor 2907A PNP 60V	1
D1 D2 D3 D4 D5 D6 D11	Diode BAV99 DUAL DIODE	8
Q5	Transistor MPSA14 DNPN 30V	1
IC9	IC DG444 QUAD CMOS	1
Q1 Q3	Transistor J175 P-CHANNEL	2
D7 D10	Diode 5.1V 5% ZENER 1/4W	2
Q4	Transistor MPSA64 DPNP 30V	1
C10	IC MICROPROCESSOR,	1

MISCELLANEOUS

Designator	Description	Qty
P4	Connector 5 POS, SCREW TERM	1
	XLR 4 PIN M FLSH MNT	1
P10	Connector 3 POS, SCREW TERM.	1
R29	Pot KNOB GRY INSRT .45 DIA PT TO RD	1
S5	Button RND MINIATURE BUTTON, BLCK	1
S4	Button RECT. MINIATURE BUTTON, BLCK	1
D14	Lens LENS, YELLOW, ROUND	1
	Speaker 2 1/2 IN. SPKR 16 OHM 3.5W	1
S4 S5	Switch DPDT P.B.	2
S2	Switch DPDT ROCKER PC MNT W/BRCKT	1
S3	Switch DIP SWITCH PIANO 3 POS	1
S1	Switch SPDT ROCKER	1



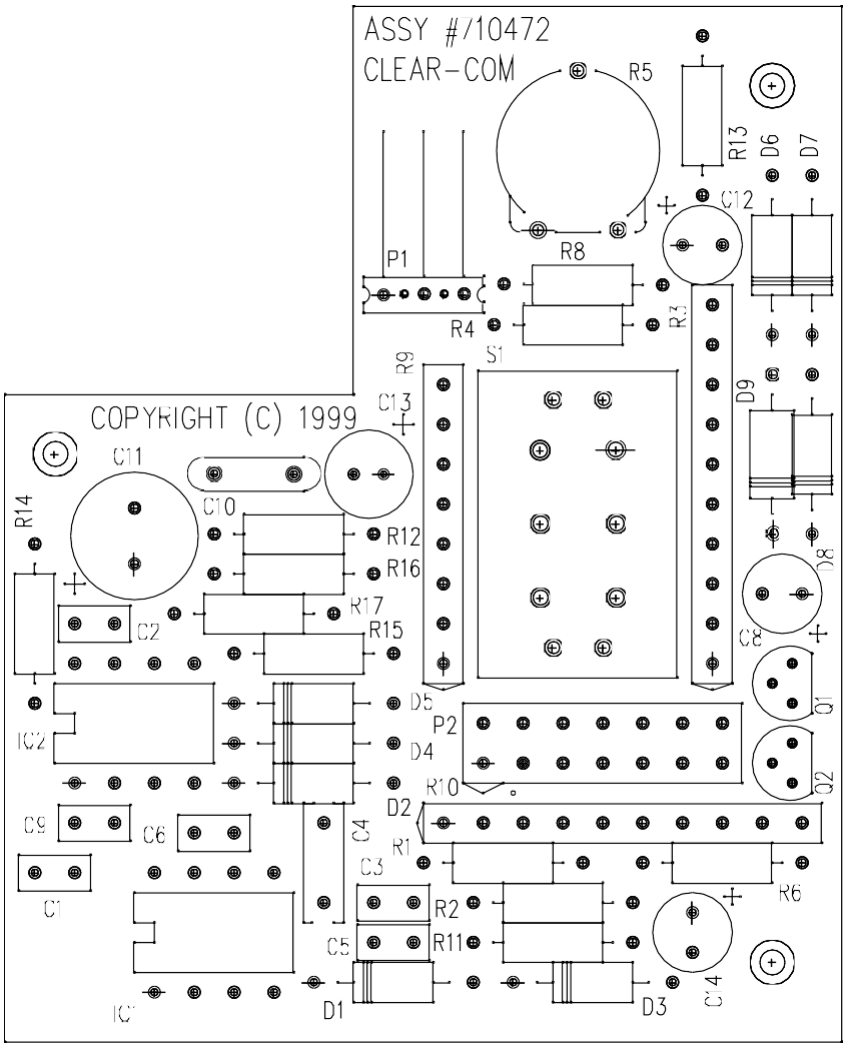


Figure 5-1 VOX PCB component layout (part no. 710472)

Capacitors

Designator	Description	Qty
C13	1 uF Aluminum NP 50V 10%	1
C10	470 pF Ceramic Disc 50V 10%	1
C8 C12	4.7 uF Tantalum 16V	2
C1 C2 C3	.1 uF Monolithic 50V 10%	3
C5	680 pF Ceramic Disc 50V 10%	1
C4	.022 uF Monolithic 50V 10%	1
C6 C9	.01 uF Monolithic 50V 20%	2
C11	220 uF Aluminum 16V 20%	1
C14	22 uF Tantalum 10V 10%	1

Resistors

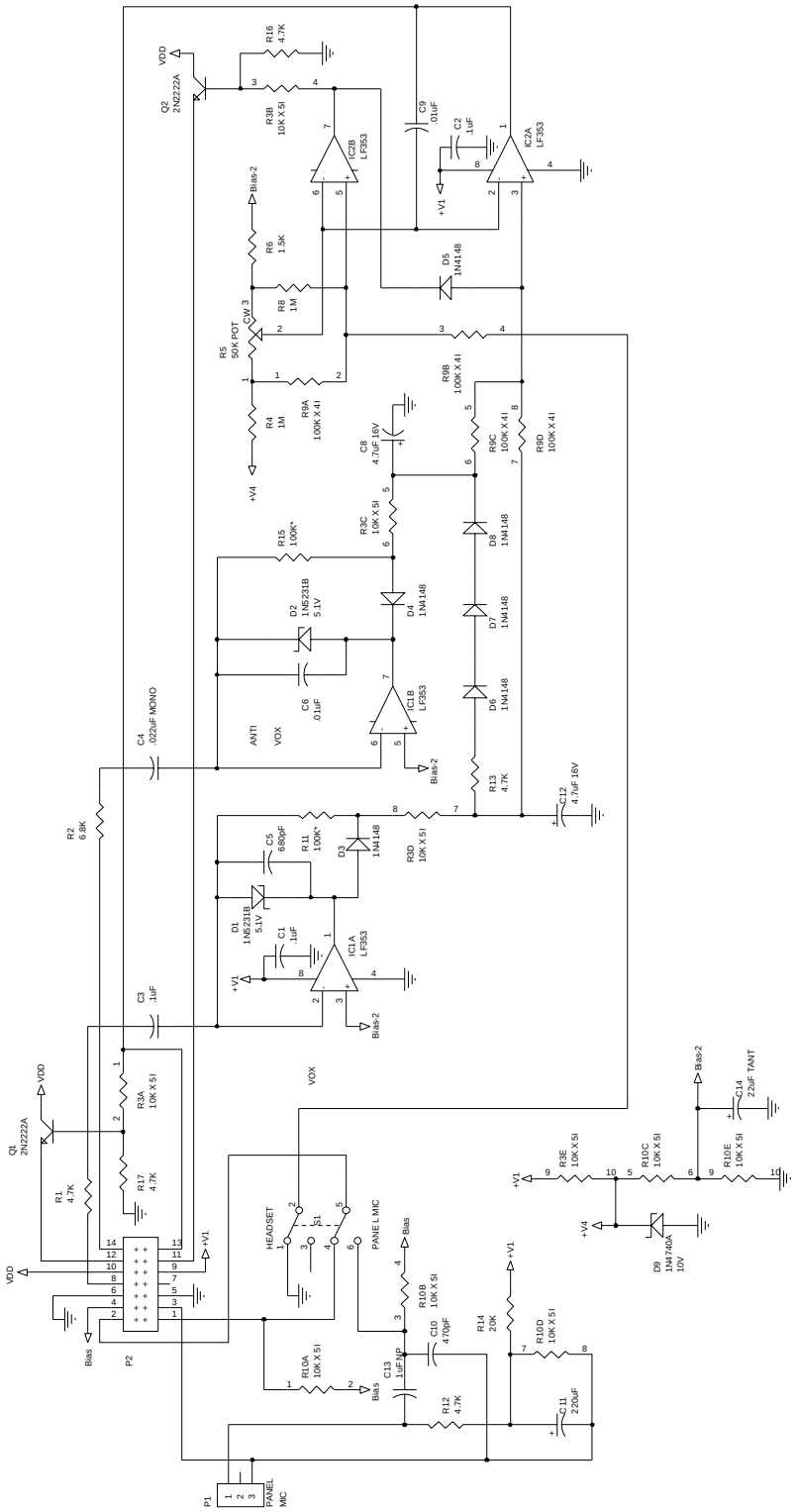
Designator	Description	Qty
R1 R12 R16 R17 R13	4.7K OHM 1/4 Carbon Film 5%	5
R2	6.8K OHM 1/4 Carbon Film 5%	1
R6	1.5K OHM 1/4 Carbon Film 5%	1
R4 R8	1M OHM 1/4 Carbon Film 5%	2
R11 R15	100K OHM 1/4 Metal Film 1%	2
R14	20K OHM 1/4 Carbon Film 5%	1
R3 R10	10K OHM X5 SIP ISOLATED	2
R9	100K OHM X4 SIP ISOLATED	1
R5	Pot 50K TRIMPOT	1

Diodes and transistors

Designator	Description	Qty
D3 D4 D5 D6 D7 D8	Diode 1N4148 SIGNAL 10MA 75PIV	6
Q1 Q2	Transistor PN2222A NPN 30V	2
IC1 IC2	IC LF353 BIFET OP AMP	2
D1 D2	Diode 1N5231B ZENER 5.1V .5W 5%	2
D9	Diode 1N4740A ZENER 10V 0.5W 5%	1

Miscellaneous

Designator	Description	Qty
	Panel Mic Jack PHONE JACK	1
R5	Pot SHAFT FOR PIHER POT BLACK	1
S1	Switch DPDT TOGGLE	1


VDD
Q2 2N2222A
R16 4.7K
R3B 10K X SI
IC2B LF353
C9 .01uF
C2 1uF
IC2A LF353
+V1
Bias-2
R6 1.5K
D5 1N4148
R8 1M
CW 3
R5 50K POT
R4 1M
R9A 100K X 4I
+V4
R9B 100K X 4I
R9C 100K X 4I
R9D 100K X 4I
C8 4.7uF 16V
R3C 10K X SI
R15 100K*
D8 1N4148
D2 1N5231B 5.1V
D4 1N4148
D7 1N4148
C6 .01uF
ANTI
VOX
IC1B LF353
D6 1N4148
C4 .022uF MONO
R13 4.7K
C12 4.7uF 16V
R2 6.8K
C5 680pF
R11 100K*
D3 1N4148
R3D 10K X SI
D1 1N5231B 5.1V
C1 .1uF
IC1A LF353
C3 .1uF
Q1 2N2222A
R2A 10K X SI
R1 4.7K
R17 4.7K
HEADSET
J1
PANEL MIC
Bias
R10B 10K X SI
C10 470pF
R14 20K
R10D 10K X SI
C13 1uFNP
R10A 10K X SI
R12 4.7K
C11 220uF
P2
P1
PANEL MIC
R3E 10K X SI
R10C 10K X SI
R10E 10K X SI
C14 22uF TANT
D9 1N4740A 10V

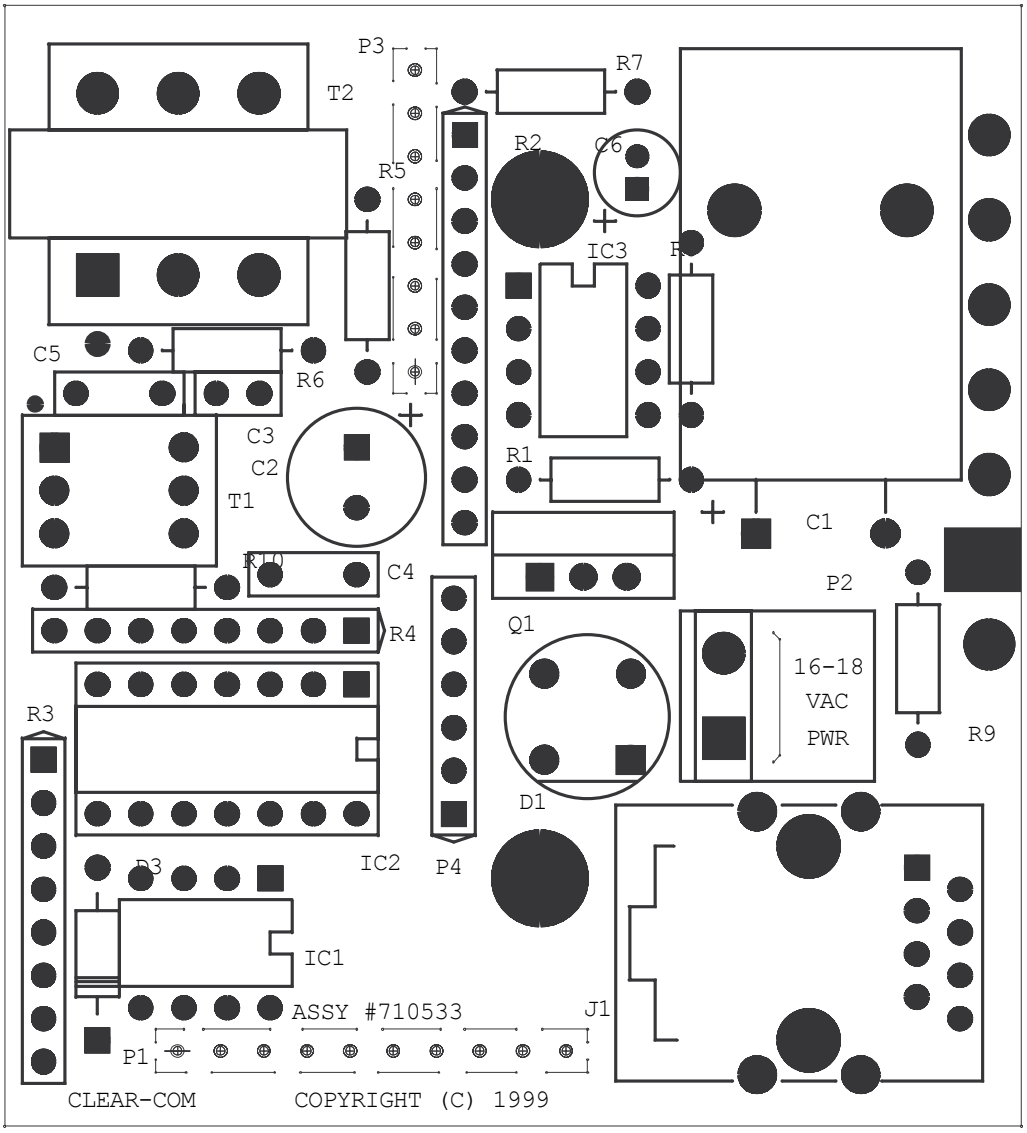


Figure 4-6: Matrix Option PCB Component Layout (part no. 710533)

Matrix Option PCB (Part No. 710533)

CAPACITORS

Figure 5-2 Matrix option PCB component layout (part no. 710533)

Capacitors

Designator	Description	Qty
C6	10 uF Aluminum 50V	1
C5	.022 uF Monolithic 50V 10%	1
C4	.1 uF Monolithic 100V 10%	1

C3	.0022 uF Monolithic 50V 10%	1
C2	100 uF Aluminum 35V	1
C1	2200 uF Aluminum 35V 20%	1

Resistors

Designator	Description	Qty
R5	2K OHM 1/4 Carbon Film 5%	1
R6	47K OHM 1/4 Carbon Film 5%	1
R8	1.5K OHM 1/4 Carbon Film 5%	1
R9	330 OHM 1/4 Carbon Film 5%	1
R1 R7	100 OHM 1/4 Carbon Film 5%	2
R10	2.2M OHM 1/4 Carbon Film 5%	1
R2	10K OHM X5 SIP ISOLATED	1
R4	4.7K OHM X 4 SIP ISOLATED	1
R3	100K OHM X4 SIP ISOLATED	1

Diodes and transistors

Designator	Description	Qty
D3	Diode 1N4148 SIGNAL 10MA 75PIV	1
Q1	Transistor TIP41 NPN 40V 6A	1
D1	Diode 1.5A 200V BRIDGE	1

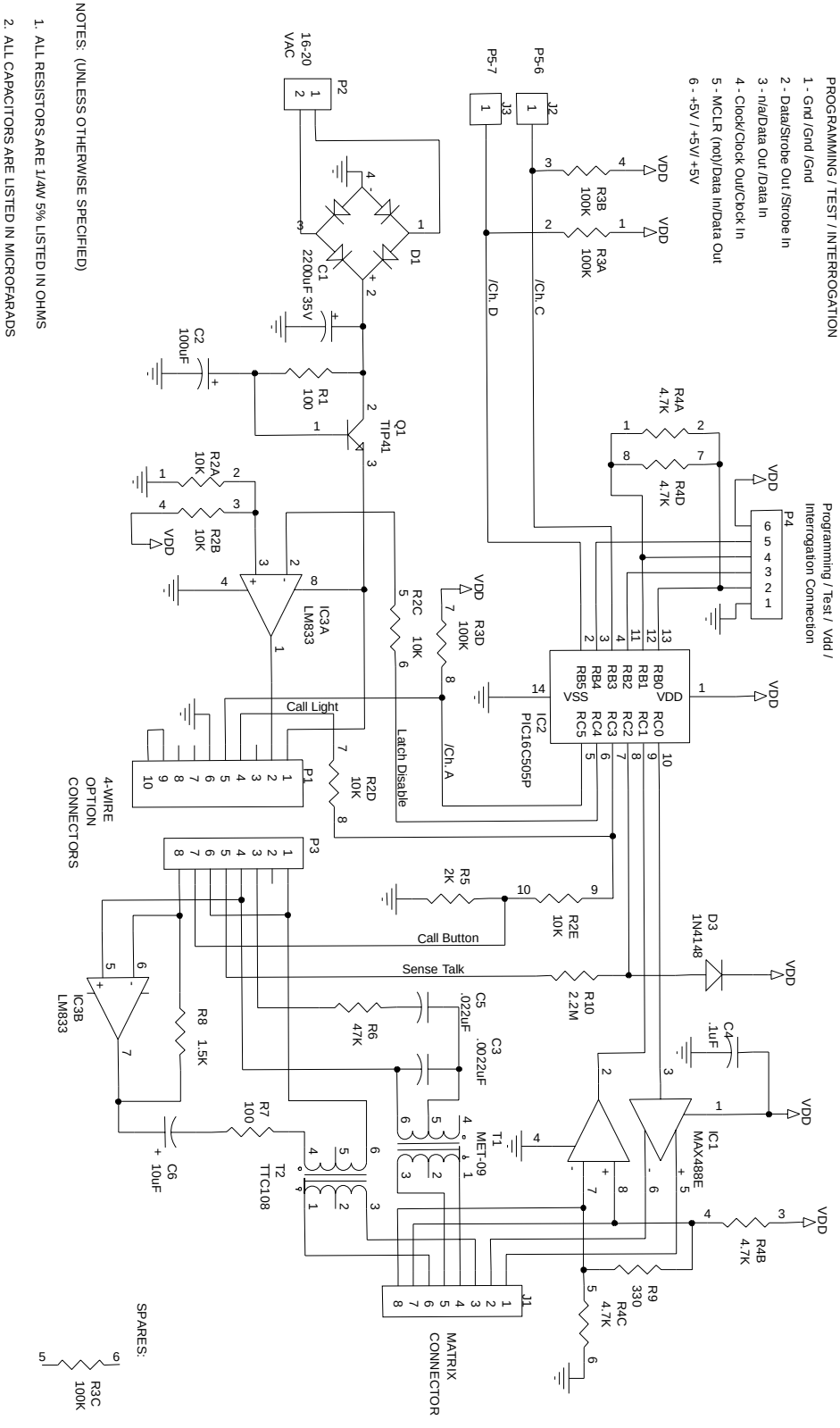
Integrated circuits

Designator	Description	Qty
IC3	IC LM833N	1
IC1	IC 488E RS-422 XCVR	1

Miscellaneous

Designator	Description	Qty
T2	Transformer 600CT/600CT	1

T1	Transformer 10K:10K	1
IC2	IC MICRO, KB/MR MATRIX OPTION	1
P2	Connector 2 POS HSING, SCRW TRM.	1


PROGRAMMING / TEST / INTERROGATION
1 - Gnd /Gnd /Gnd
2 - Data/Strobe Out /Strobe In
3 - n/a/Data Out /Data In
4 - Clock/Clock Out/Clock In
5 - MCLR (not)/Data In/Data Out
6 - +5V / +5V/ +5V
Programming / Test / Vdd / Interrogation Connection
P4
P5-6
P5-7
J2
J3
R3B 100K
R3A 100K
R4A 4.7K
R4D 4.7K
/Ch. D
/Ch. C
16-20 VAC
P2
C1 2200uF 35V
D1
C2 100uF
R1 100
Q1 TIP41
R2A 10K
R2B 10K
IC3A LM833
R2C 10K
R3D 100K
IC2 PIC16C505P
RB0 RB1 RB2 RB3 RB4 RB5 VSS VDD RC0 RC1 RC2 RC3 RC4 RC5
Call Light
Latch Disable
/Ch. A
R2D 10K
P1
4-WIRE OPTION CONNECTORS
P3
R5 2K
R2E 10K
Call Button
Sense Talk
D3 1N4148
R10 2.2M
C5 .022uF
C3 .0022uF
C4 .1uF
R6 47K
R8 1.5K
IC3B LM833
R7 100
C6 10uF
T1 MET-09
T2 TTC108
IC1 MAX488E
R4B 4.7K
R9 330
R4C 4.7K
J1
MATRIX CONNECTOR
SPARES:
R3C 100K
NOTES: (UNLESS OTHERWISE SPECIFIED)
1. ALL RESISTORS ARE 1/4W 5% LISTED IN OHMS
2. ALL CAPACITORS ARE LISTED IN MICROFARADS

6 Specifications

6.1 Notice About Specifications

While Clear-Com makes every attempt to maintain the accuracy of the information contained in its product manuals, that information is subject to change without notice. Performance specifications included in this manual are design-center specifications and are included for customer guidance and to facilitate system installation. Actual operating performance may vary.

Note: 0 dBu is referenced to 0.775 V RMS

6.2 Headset Microphone Pre-Amp

Input Type Dynamic

Impedance 1k ohm

Input Level -55 dBu nominal; -10 dBu max.

6.3 Panel Microphone Pre-Amp (KB-211GM only)

Input Type Electret

Input Level -45 dBu nominal

6.4 Pre-Amp Response Curve

Frequency Response 250 Hz to 12 kHz, contoured for intelligibility

Limiter Range 20 dB

6.5 Headphone Amplifier

Load Impedance Range 50 ohm to 2k ohm

Output Level at least +20 dBu across 600 ohm

Distortion < 0.5% THD at 1 kHz

Frequency Response 200 Hz to 15 kHz, ±3 dB

Power Output 110 dB SPL

6.6 Speaker Amplifier

Speaker Type 2.5 in. round, 16 ohm

Power Output	2 W into 16 ohms
Frequency Response	200 Hz to 15 kHz, ±3 dB
Signal-to-Noise	75 dB
Distortion	< 0.5% THD at 1 kHz
Speaker Level	98 dB SPL at 3 ft.

6.7 Program Amplifier

(Transformerless, balanced differential input)

Input Level	-20 dBu
Input Impedance	> 100k ohm
Frequency Response	150 Hz to 15 kHz, ± 3 dB

6.8 Power Requirements

Voltage	30-VDC standard unit;
	16- to 18-VAC with 4-Wire Option Module
Current	100 mA average

6.9 Internal Connectors

Program	Three-position, plug-on screw terminals
AC Power	Two-position, plug-on screw terminals

6.10 Front Panel Connectors

Panel Mic	(1) 1/4-in. panel mounting jack
Headset:	(1) XLR-4M

6.11 Front Panel Controls and Indicators

Panel/headset-mic switch	(1)
Program-level control	(1)
Intercom-volume control	(1)
Sidetone control	(1)
Talk button	(1)
Answer-back button	(1)
VOX control	(1)

Talk/listen selector (1)

Speaker on-off switch (1)

Talk light (1)

Call-waiting light (1)

6.12 Environmental

0 to 50C (32 to 122F)

6.13 Dimensions

8.25 in. W x 4.5 in. H x 1.75 in. D (210 mm x 114 mm x 44 mm)

6.14 Weight

1.34 lb. (0.61 kg)

7 Limited warranty

HME Clear-Com warrants that at the time of purchase, the equipment supplied complies with any specification in the order confirmation when used under normal conditions, and is free from defects in workmanship and materials during the warranty period.

During the warranty period HME Clear-Com, or any service company authorized by HME Clear-Com, will in a commercially reasonable time remedy defects in materials, design, and workmanship free of charge by repairing, or should HME Clear-Com in its discretion deem it necessary, replacing the product in accordance with this limited warranty. In no event will HME Clear-Com be responsible for incidental, consequential, or special loss or damage, however caused.

7.1 WARRANTY PERIOD

The product may consist of several parts, each covered by a different warranty period. The warranty periods are:

- Cables, accessories, components, and consumable items have a limited warranty of 90 days.
- Headsets, handsets, microphones, and spare parts have a limited warranty of one year.
- UHF wireless IFB products have a limited warranty of one year.
- UHF wireless intercom systems have a limited warranty of three years.
- All other Clear-Com and Drake brand systems and products, including beltpacks, have a limited warranty of two years.

The warranty starts at the time of the product's original purchase. The warranty start date for contracts which include installation and commissioning will commence from the earlier of date of the Site Acceptance Test or three months from purchase.

7.2 TECHNICAL SUPPORT

To ensure complete and timely support to its customers, HME Clear-Com's User Support Center is staffed by qualified technical personnel. Telephone and email technical support is offered worldwide by the User Support Center.

The User Support Center is available to HME Clear-Com's customers during the full course of their warranty period.

Instructions for reaching HME Clear-Com's User Support Centers are given below.

Telephone for Europe, Middle East and Africa: +49 40 6688 4040 or

+44 1223 815000

Telephone for the Americas and Asia: +1 510 337 6600

Once the standard warranty period has expired, the User Support Center will continue to provide telephone support if you have purchased an Extended Warranty.

For latest contact information please refer to the Service and Support section at www.clearcom.com.

7.3 WARRANTY REPAIRS AND RETURNS

Before returning equipment for repair, contact a User Support Center to obtain a Return Material Authorization (RMA). HME Clear-Com representatives will give you instructions and addresses for returning your equipment. You must ship the equipment at your expense, and the support center will return the equipment at HME Clear-Com's expense.

HME Clear-Com has the right to inspect the equipment and/or installation or relevant packaging.

For latest contact information please refer to the Service and Support section at www.clearcom.com.

NON-WARRANTY REPAIRS AND RETURNS

For items not under warranty, you must obtain an RMA by contacting the User Support Center. HME Clear-Com representatives will give you instructions and addresses for returning your equipment.

You must pay all charges to have the equipment shipped to the support center and returned to you, in addition to the costs of the repair.

7.4 EXTENDED WARRANTY

You can purchase an extended warranty at the time of purchase or at any time during the first two years of ownership of the product. The purchase of an extended warranty extends to five years the warranty of any product offered with a standard two-year warranty. The total warranty period will not extend beyond five years.

Note:	HME Clear-Com does not offer warranty extensions on UHF wireless intercom systems, or on any product with a 1-year or 90-day warranty.

7.5 LIABILITY

THE FOREGOING WARRANTY IS HME CLEAR-COM'S SOLE AND EXCLUSIVE WARRANTY. THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A

PARTICULAR PURPOSE AND ANY OTHER REQUIRED IMPLIED WARRANTY SHALL EXPIRE AT THE END OF THE WARRANTY PERIOD. THERE ARE NO OTHER WARRANTIES (INCLUDING WITHOUT LIMITATION WARRANTIES FOR CONSUMABLES AND OTHER SUPPLIES) OF ANY NATURE WHATSOEVER, WHETHER ARISING IN CONTRACT, TORT, NEGLIGENCE OF ANY DEGREE, STRICT LIABILITY OR OTHERWISE, WITH RESPECT TO THE PRODUCTS OR ANY PART THEREOF DELIVERED HEREUNDER, OR FOR ANY DAMAGES AND/OR LOSSES (INCLUDING LOSS OF USE, REVENUE, AND/OR PROFITS). SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR THE LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. IN ANY EVENT, TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW, HME CLEAR-COM'S LIABILITY TO CUSTOMER HEREUNDER SHALL NOT UNDER ANY CIRCUMSTANCES EXCEED THE COST OF REPAIRING OR REPLACING ANY PART(S) FOUND TO BE DEFECTIVE WITHIN THE WARRANTY PERIOD AS AFORESAID.

This warranty does not cover any damage to a product resulting from cause other than part defect and malfunction. The HME Clear-Com warranty does not cover any defect, malfunction, or failure caused beyond the control of HME Clear-Com, including unreasonable or negligent operation, abuse, accident, failure to follow instructions in the manual, defective or improperly associated equipment, attempts at modification and repair not approved by HME Clear-Com, and shipping damage. Products with their serial numbers removed or defaced are not covered by this warranty.

This warranty does not include defects arising from installation (when not performed by HME Clear-Com), lightning, power outages and fluctuations, air conditioning failure, improper integration with non-approved components, defects or failures of customer furnished components resulting in damage to HME Clear-Com provided product.

This limited warranty is not transferable and cannot be enforced by anyone other than the original consumer purchaser.

This warranty gives you specific legal rights and you may have other rights which vary from country to country.

8 FCC Compliance

- Applicant Name: Clear-Com LLC
- Applicant Address: 1301 Marina Village Pky, Suite 105, Alameda CA 94501, USA
- Manufacturer Name: HM Electronics, Inc.
- Manufacturer Address: 14110 Stowe Drive, Poway, CA 92064, USA
- Country of Origin: USA

- Brand: CLEAR-COM
- Product Name: User Panel
- Product Regulatory Model Number: ICS-22X (where suffix X can be any alpha-numeric character 0-9, A-Z or blank)
- Country of Origin: USA

Caution: All products are compliant with regulatory requirements detailed in this document when installed correctly in Clear-Com product per Clear-Com specifications.

Caution: Product modification not expressly approved by the party responsible for compliance can void the user's authority to operate the equipment

USA FCC EMC Class A

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

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

Canada ICES-003 EMC Class A

Industry Canada ICES-003 Compliance Label: CAN ICES-3 (A)/NMB-3(A)

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numèrique de la classe A est conforme á la norme NMB-003 du Canada.

European Union (CE)

CE

Directives:

EMC Directive 2014/30/EU

Low Voltage Directive 2014/35/EU

Standards:

EN55022

EN55024

EN55032