TM-8126200502

SQUELCH SPEAKER PANEL

MX-1201

OPERATION AND MAINTENANCE MANUAL

SUNAIR 3101 SW Third Avenue, Ft. Lauderdale, FL 33315-3389

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Conventions Used in this Manual

- Button names, names of screens and key names are printed in **bold**.
- **Notes:** provide information to help you accomplish tasks efficiently or to avoid problems.
- Mouse clicks:

  Unless otherwise specified, the *left* mouse button is used for all mouse actions.
  Single-click on an item to activate buttons.
  Double-click on most other items to activate function.

- Dialog boxes (combo boxes, list box, text box, drop-down menus)

  A combo box is a control, similar to a list box and text box combined in which you enter a value or select an item from a list.

  A list box is a control that provides a list of items to choose from.

  A text box is a control that allows you to enter or view text in a form. Usually, text boxes hold a single line of text

  Some options require that you enter additional information. You either type additional information in a text box (field), select from a drop-down list accessed by up or down arrows, or select (click on) a button.

- ☞ Directs you to additional references about a subject.

TABLE of STANDARD ABBREVIATIONS

ADDR Address
AGC Automatic Gain Control
ALC Automatic Level Control
AM Amplitude Modulation
AME Amplitude Modulation Equivalent
AMP/AMPL Amplifier
ARQ Automatic Request
AUD Audio
AUTO Automatic
AUX Auxiliary
BAUD A variable unit of data transmission speed (bits per second)
BELL U.S. Telephone standards
BFO Beat Frequency Oscillator
BITE Built In Test Equipment
BRD Board
CH /CHAN /CHL/CHN Channel
CLR Clear
CMOS Complementary Metal Oxide Semiconductor
CPLR Coupler
CPU Computer
CW Carrier Wave
dB Decibel
dBm Decibels referred to 1 milliwatt across 600 ohms
DSBSC Double Sideband Suppressed Carrier
DSP Display
DUART Dual Asynchronous Receive/Transmit
EEPROM Electrically Erasable and Programmable Read Only Memory
EPROM Electrically Programmable Read Only Memory
EMI Electromagnetic Radiation Interference
ENTR Enter
FAX Facsimile
FEC Forward Error Correction
FREQ Frequency
FSK Frequency Shift Keying
FWD Forward
GRP Group
HF High Frequency
Hz Hertz
IC Integrated Circuit
IF Intermediate Frequency
I/O Input/Output
IONCAP Ionospheric Communications Analysis and Prediction
ISB Independent Sideband
kHz Kilohertz
kW Kilowatt
LCD Liquid Crystal Display
LCL Local
LED Light Emitting Diode
LK Link
LO Local Oscillator
LP/LPX Lincompex
LRU Lowest Repairable Unit
LSB Lower Sideband
LT Light
LVL Level
MAN Manual
M CH Manual Channel
MED Medium
MHz Megahertz
MIC Microphone
MIL-STD Military Standard
MNL Manual
ms Millisecond
MTTR Mean Time To Repair
MTR Meter
NAR Narrow
O.D. Olive Drab
PA Power Amplifier
PC Printed Circuit
PEP Peak Envelope Power
PLL Phase-Locked Loop
P/N Part Number
PNL Panel
POSTSL Post-Selector
PRESEL Pre-Selector
PTT Push-To-Talk
PWR Power
RCV/RX Receive
REFL Reflected
REV Revision
RF Radio Frequency
RFI Radio Frequency Interference
RFL Reflected
RMT Remote
RS232 Computer control, hardwired up to 50 feet maximum
RS422 Computer control, hardwired up to 4000 feet maximum
RS485 Computer control, hardwired for multiple users
RTTY Radio Teletype
SEL Select
SLO Slow
S MTR Signal Strength Meter
SPKR Speaker
SPLX Simplex
SRAM Static Random Access Memory
SSB Single Sideband
TCXO Temperature Controlled Crystal Oscillator
TGC Transmit Gain Control
THD Total Harmonic Distortion
TTL Transistor Transistor Logic
TX/XMT Transmit
USB Upper Sideband
UTC Universal Time
VCO Voltage Controlled Oscillator
VHF Very High Frequency
VRMS Volts Root Mean Square
VSWR Voltage Standing Wave Ratio
W Watt
WPM Words Per Minute

* Asterisk indicates function selected

SAFETY INFORMATION

The following safety information is not necessarily related to a specific procedure in this particular document. However, the information should be reviewed, understood and applied in all phases of operation and maintenance before operating the equipment described here.

Standard practice uses hazard notices that are ranked in order of severity and designed to prevent damage, injury, or death.

- A ***caution*** prevents mistakes that could result in injury or equipment damage. For example, Electrostatic Discharge Sensitive Devices (EDSD) must be handled with certain precautions to minimize the effect of static build-up.

- A ***warning*** alerts users to potential hazards to life or limb. For example, to avoid casualties, always remove power and discharge circuits to ground before touching any circuit components.

- A ***danger*** identifies an immediate hazard to life or limb. For example, dangerous voltages exist in certain equipment. Before removing any cover, disconnect primary power.

Some personnel in the work place should be trained in rendering first aid. In those places where high voltages are present, they should be familiar with methods of resuscitation.

Keep Away from Live Circuits

Operating personnel must observe at all times all safety regulations. Do not replace components inside the equipment with the power supply turned on. Under certain conditions, dangerous potentials may exist when the power control is in the off position due to circuit design or charges retained by capacitors. Remove watches and rings before performing any maintenance procedures.

Do not service or adjust alone

Under no circumstances should any person reach into or enter the enclosure to service or adjust the equipment except in the presence of someone who is capable of rendering aid.

Resuscitation

Personnel working with or near high voltage should be familiar with methods of resuscitation.

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SECTION I
GENERAL INFORMATION

1.1 SCOPE

This section contains information necessary to install, operate and maintain the MX-1201 Squelch/Speaker Panel.

1.2 DESCRIPTION

The MX-1201 Squelch/Speaker Panel provides four independent Squelch/Speaker facilities in an EIA 3-RU (5.25") 19" rack mount panel.

Each Squelch/Speaker facility is supplied with a 600-Ohm balanced input for terminated or single panel operation or a high-impedance differential input for multiple speaker operation. A 600-Ohm line-out driver is also supplied to drive external data-modems.

Audio from either the 600-Ohm line or differential inputs is filtered by a bandpass filter, controlled by the syllabic squelch and supplied to a five-Watt speaker driver. Individual LED standby and activity indicators are provided on the front panel.

The Squelch/Speaker Panel is supplied with four Push To Talk (PTT) Mute circuits. A ground on any PTT Mute circuit will mute all four speakers. A Master/Slave PTT Mute circuit is also provided to mute two additional panels or receive a mute signal from two additional panels. A **PTT Mute** LED (red) indicator is provided on the front panel.

Four independent Cipher detect circuits are provided to alert the operator when secure voice activity is occurring. Independent **Cipher** LED (red) indicators are provided on the front panel.

Power is supplied by an internal 90-260 V AC, 47-63 Hz, switching power supply.

1.3 SPECIFICATIONS

1.3.1 General

The following specifications apply to each of the four Squelch/Speaker assemblies except where noted.

Audio Input Interface:

- 600-Ohm Balanced. Adjustable: -20 dBm to +10 dBm
- High-Impedance Differential (minimum 60 k Ohm), Bridged across a 600-Ohm balanced line. Adjustable: -20 to +10 dBm.
- Audio Output Interface: 600-Ohm Balanced Line Driver, 0 dBm (adjustable).
- Parallel Operation: 100 feet maximum. Any panel, parallel or terminator, can be turned-off without interrupting or degrading the desired signal.

- Line Transient Protection: Gas Spark Surge Arrester and MOV Varistors across the 600-Ohm line input.

Bandpass Filter: 300 Hz to 3000 Hz, 3 dB minimum attenuation at the bandpass edges.

Squelch: Syllabic type, voice activated.

Squelch Control: Squelch level control with **Bypass** switch for each speaker.

Activity Indicator: **Activity** LED (green) for each speaker.

Speaker Driver: 5-Watts, single-tone.

Total Harmonic Distortion (THD): 5% or less at rated audio output, (1.5 kHz, 0 dBm input).

Speaker: 8-Ohm, 8-Watts peak power, 3.5" square, waterproof.

Volume Control: Volume level control for each speaker.

Standby Switch: **Standby** (STBY) switch with panel LED (amber) for each speaker.

Cipher Detect:

- Four independent Cipher detect circuits, one for each speaker.
- Cipher detect LED (red) for each speaker.
- Cipher detect voltage level greater than 2.0 V DC will illuminate the **Cipher** LED (red).
- Cipher detect input impedance greater than 10 k.Ohm.

PTT Mute:

- Four PTT Mute input circuits.
- PTT Mute input voltage level less than 1.0 V DC will mute all speakers and illuminate a single **PTT Mute** LED (red).
- PTT Mute input impedance greater than 10 k Ohms.
- PTT Mute Master/Slave circuit allows any one of the three panels to mute the remaining two panels.
- An open-circuit (no connection) on any PTT Mute input circuit will not mute the speakers on the master or slave panel.
- An open-circuit (no connection) on the PTT Mute/Slave will not mute the speakers on the respective panel.

AC Power:

- Auto-range 90-260 V AC, 47-63 Hz, 115 VA maximum, single phase.
- Panel power switch and LED (green) power-on indicator.

Size: 5.25" (3 RU) 19" rack mount panel, 11" deep.
Weight: 10.75 lbs.

Color and Finish:

- Front Panel: Black with white silk-screen.
- Chassis: Clear iridite.
- Rear Panel: Clear iridite with black silk-screen.

Rear Panel Connectors:

Speakers 1-4: DB-9 female connectors, quantity-2 per speaker.

Control: DB-25 male connector, quantity-1.

AC Power: Power, MS3102A-14S-5P, 5-pin round, quantity-1.

1.3.2 Environmental

Temperature:

Operating: 0 to +40 C

Storage: -40 to +70 C

1.4 EQUIPMENT SUPPLIED

MX-1201 Speaker Squelch Panel (qty: 1)	8126200014
AC Power Cord Assembly (qty: 1)	8123504004
Manual, Maintenance, MX-1201 (qty: 1)	8126200502
Connector, DB-9 Male, (qty: 8)	1013320000
Hood W/Lock Screws, DB-9 (qty: 8)	1011970015
Connector, DB-25 Female (qty: 1)	1012770028
Hood W/Lock Screws, DB-25 (qty: 1)	1012750001
Screw, Ornamental: #10-32 x 1/2" long (qty: 4)	0538870001
Terminal, Crimp #10 (qty: 1)	0528710001

1.5 EQUIPMENT REQUIRED – NOT SUPPLIED

Audio Signal Cable: Twisted-Pair, shielded, # 22-AWG.

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SECTION II

INSTALLATION

2.1 GENERAL

Section II contains all necessary instructions for the unpacking, inspection, and if necessary, reshipping of damaged equipment or parts. In addition, further information regarding location, mounting considerations and power requirements are also provided.

2.2 UNPACKING AND INSPECTION

As soon as you have received your unit(s), unpack and inspect all components and accessories. Check the packing list to be sure you have received all items ordered, and that all items necessary for operation have been ordered.

NOTE: Be sure to retain the carton and its associated packing materials should it be necessary to reship the equipment.

Do not accept a shipment when there are visible signs of damage to the cartons until a complete inspection is made. If there is a shortage of items or any evidence of damage, insist on a notation to that effect on the shipping papers before signing the receipt from the carrier. If concealed damage is discovered after the shipment has been accepted, notify the carrier immediately in writing and await his inspection before making any disposition of the shipment. A full report should also be forwarded to Sunair's Product Services Department. Please be sure to include the following information for prompt service:

a) ORDER NUMBER.
b) MODEL AND SERIAL NUMBER.
c) NAME OF TRANSPORTATION AGENCY.
d) APPLICABLE DATES.

Upon receipt of this information, Sunair will arrange for repair or replacement.

2.3 RETURN OF EQUIPMENT TO FACTORY

The shipping cartons for the system components have been designed to protect the equipment during shipment. The container and its associated packing material should be used to reship the unit.

When necessary to return equipment to Sunair for warranty or non-warranty repair, an authorization number is required. This number can be obtained from our Product Services Department:

TELEPHONE: 954.525.1505.
FACSIMILE: 954.765.1322.
E-mail: techsupport@sunairhf.com

If the original shipping carton is not available, be sure to carefully pack each unit separately, using suitable cushioning material where necessary. Very special attention should be given to providing enough packing material around connectors and other protrusions from the unit. Rigid cardboard should be placed at the corners of the equipment to protect against denting. DO NOT USE DUNNAGE (e.g., STYROFOAM PEANUTS) FOR PACKING PROTECTION; they may allow the unit to shift while being shipped and become damaged.

When returning subassemblies or components for repair or replacement, be sure to pack each separately, using suitable cushioning material.

Shipment is to be made PREPAID and consigned to:

Sunair Electronics, Inc.
Product Services Department
3101 SW Third Avenue
Fort Lauderdale, Florida 33315-3389
U.S.A.

Plainly mark all mailing documents with indelible ink as follows:

US Goods Returned for Repair
Value for Customs - $ (Amt.)

Mark ALL SIDES of the package:

FRAGILE-ELECTRONIC EQUIPMENT!

NOTE: Before shipping, carefully inspect the package to be sure it is marked properly and is securely wrapped.

2.4 POWER REQUIREMENTS

Connect the AC Power Cord Assembly to the rear panel connector J1 90-260 V AC. Connect the Power Cord Assembly US standard 3-wire plug to a 115 V AC wall socket capable of supplying at least 115 VA.

For 208-230 V AC operation remove (cut) the 3-wire plug and replace it with the appropriate connector or plug.

2.5 INSTALLATION CONSIDERATIONS AND MOUNTING INFORMATION

2.5.1 Rackmount

The MX-1201 is designed for EIA-19 inch rackmount applications and requires 3-RU (5.25") vertical panel and interior rack space. The unit is secured with four #10-32 rackmount screws (supplied).

2.5.2 Electrical Installation

2.5.2.1 Audio Input Connections, Multiple Panels

General

Multiple Squelch/Speaker panels may be paralleled. To achieve this, one panel, preferably the last in the physical arrangement will be configured as the terminator (600-Ohm Line In). The paralleled panels will be configured for differential high impedance service.

High-Impedance Differential Input: Any Position, Any Panel Speaker 1, 2, 3 or 4

Differential Input, IN (A): J1-5

Differential Input, IN (B): J1-9

Differential Output, OUT (A): J2-5

Differential Output, OUT (B): J2-9

600-Ohm Termination: Single Position, Speaker 1, 2, 3 or 4

600-Ohm Balanced Line IN: J2-1

600-Ohm Balanced line IN: J2-6

Multiple Squelch/Speaker Panel Three-Panel example. Refer to Figure 2.5 Multiple Squelch/Speaker Panel Installation.

#1-Squelch/Speaker Panel (High Impedance, Differential Mode)

- 600-Ohm Audio (customer furnished) connects to Speaker-1 Differential Input J1-5 and J1-9.
- 600-Ohm Audio from Speaker-1 Differential Output J2-5 and J2-9 is supplied to the #2-Squelch/Speaker Panel.

#2-Squelch/Speaker Panel (High Impedance, Differential Mode)

- 600-Ohm Audio from the #1-Squelch/Speaker Panel connects to Speaker-1, Differential Input J1-5 and J1-9.
- 600-Ohm Audio from Speaker-2 Differential Output J2-5 and J2-9 connects to the #3-Squelch/Speaker Panel

#3-Squelch/Speaker Panel (Low Impedance, 600-Ohm Terminator Mode)

- 600-Ohm Audio from the #2-Squelch/Speaker Panel connects to Speaker-1 Low Impedance Input J1-1 and J1-6.

2.5.2.2 Audio Connections, Single Panel, Single Connection

General

A Squelch/Speaker Panel may be used to terminate up-to four 600-Ohm audio lines with transformer- coupled balanced 600-Ohm terminations.

600-Ohm Termination, Single Position, Speaker 1, 2, 3 or 4

600-Ohm Balanced Line IN: J1-1

600-Ohm Balanced line IN: J1-6

2.5.2.3 PTT Mute

Four separate PTT Mute circuits are provided to monitor the status of four individual transmitter keylines. A DC input voltage of less than one-volt will mute all speakers on the respective panel and mute all speakers on two additional panels if the PTT Master In/Out circuits are connected.

J2 Control

Pin	Function
1	PTT Mute Master In/Out
14	PTT Mute Master In/Out
2	PTT Mute Master In/Out Gnd
15	PTT Mute Master In/Out Gnd
3	PTT Mute 1
16	PTT Mute 1 Gnd
4	PTT Mute 2
17	PTT Mute 2 Gnd
5	PTT Mute 3
18	PTT Mute 3 Gnd
6	PTT Mute 4
19	PTT Mute 4 Gnd

Multiple Squelch/Speaker Panel, Three-Panel example. Refer to Figure 2.5 Multiple Squelch/Speaker Panel Installation.

- Individual transmitter keylines are connected to their respective PTT Mute positions (1-4) on each panel.
- PTT Mute Master In/Out circuits are connected between each panel.

In this example, when any transmitter on any panel is keyed all speakers on each of the three panels will mute and illuminate the **PTT MUTE** LED (red) on each panel.

2.5.2.4 Cipher Detect

Four separate Cipher Detect circuits are provided to monitor the status of four individual Cipher units. A DC input voltage greater than 2.0 V DC will illuminate the front panel **CIPHER** LED (red).

J2 Control

Pin	Function
7	Cipher-1
20	Cipher-1 Gnd
8	Cipher-2
21	Cipher-2 Gnd
9	Cipher-3
22	Cipher-3 Gnd
10	Cipher-4
23	Cipher-4 Gnd

2.5.2.5 Level Adjustments

The MX-1201 individual Squelch/Speaker assemblies are factory adjusted for 0-dBm in, for rated speaker audio output. The 600-Ohm line driver is set for 0-dBm out (reference 600-Ohms). If other line input/output levels are required consult Section V Maintenance, paragraph 5.3 Electrical Alignment for details.

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SECTION III
OPERATION

3.1 GENERAL

This section provides operating instructions for the MX-1201 Squelch/Speaker Panel.

The MX-1201 employes a syllabic-type squelch system. This system is designed to recognize voice and ignore steady state tones and noise. When a signal first appears, regardless of its type, the squelch will open allowing the operator the opportunity to evaluate the signal. If the signal is a steady state signal, such as a tone, the squelch will close after approximately 5-seconds and remain closed for the duration of the signal. If the signal is a voice signal, the squelch will remain open for the duration of the signal and close approximately 5-seconds after the voice signal ends.

3.2 OPERATING THE MX-1201

3.2.1 Normal Operation

1. **AC Power:** Turn the Front Panel Power Switch **ON.** The front panel **POWER** LED (green) will illuminate.

NOTE: The application of AC power to a unit that has been off for an extended period may result in the power supply soft-starting through a series of short power pulses.

NOTE: The following operating procedure applies to Speaker positions 1-4.

2. **Squelch:** Turn the **SQUELCH** control full **CCW** until the control knob indicates **BYPASS**.
3. **Volume:** Adjust the **VOLUME** control for a comfortable listing level while receiving a station.
4. **Squelch:** There are two methods available for adjusting the squelch.
   a. During a pause of 5-seconds or more in voice activity, adjust the **SQUELCH** control **CW** until the speaker mutes.
   b. Turn the **SQUELCH** control full **CW** while receiving a voice signal. Adjust the **SQUELCH** control **CCW** while monitoring the **ACTIVITY** LED (green) until the indicator flashes at the voice signal syllabic rate.
5. **Activity:** The **ACTIVITY** LED (green) will flash at the signal syllabic rate when receiving voice audio.

3.2.2 Squelch Bypass

1. **Squelch:** Turn the **SQUELCH** control full **CCW** until the control knob indicates **BYPASS.** This disables the syllabic squelch system. Audio will appear continuously at the speaker.

NOTE: The ACTIVITY LED (green) will remain active when the SQUELCH control is in the BYPASS position.

3.2.3 Volume Standby

1. Volume: Turn the **VOLUME** control full **CCW** until the knob indicates **STBY**. This disables the speaker audio. The **STANDBY** LED (amber) will illuminate.

NOTE: The ACTIVITY LED (green) will remain active when the VOLUME control is in the STBY position

3.2.4 PTT Mute

1. The PTT Mute system automatically mutes Speakers 1-4 and illuminates the **PTT MUTE** LED (red) when the PTT Mute is asserted.

NOTE: Operation is automatic. No operator control or adjustment required.

3.2.5 Cipher Detect

1. The Cipher Detect indicator system is automatic and illuminates the appropriate **CIPHER** LED (red) when a Cipher system is engaged.

NOTE: Operation is automatic. No operator control or adjustment required.

SECTION IV
THEORY OF OPERATION

4.1 GENERAL

This section discusses the theory of operation for the MX-1201 Squelch/Speaker Panel.

The MX-1201 Squelch/Speaker Panel provides four independent Squelch/Speaker facilities in an EIA 3-RU (5.25") 19" Rack mount panel.

Each Squelch/Speaker facility is supplied with a 600-Ohm balanced input for terminated or single panel operation or a high-impedance differential input for multiple speaker operation. A 600-Ohm line-out driver is also supplied to drive external data-modems.

Audio from either the 600-Ohm line or differential input is filtered by a bandpass filter, controlled by the syllabic squelch and supplied to a five-Watt speaker driver. Individual LED standby and activity indicators are provided on the front panel.

The Squelch/Speaker Panel is supplied with four Push To Talk (PTT) Mute circuits. A ground on any PTT Mute circuit will mute all four speakers. A Master/Slave PTT Mute circuit is also provided to mute two additional panels or receive a mute signal from two additional panels. A **PTT Mute** LED (red) indicator is provided on the front panel.

Four independent Cipher detect circuits are provided to alert the operator when secure voice activity is occurring. Independent **Cipher** LED (red) indicators are provided on the front panel.

Power is supplied by an internal 90-260 V AC, 47-63 Hz, switching power supply.

4.2 SQUELCH/SPEAKER ASSEMBLY

The following discusses the theory of operation of the Squelch/Speaker Assembly. There are four Squelch/Speaker Assemblies installed in the MX-1201 interconnected by the Connector Interface Assembly.

4.2.1 600-Ohm Line Input

The 600-Ohm line input appears on J1-1 and J1-6. It is a balanced 600-Ohm transformer coupled input restively terminated with 600-Ohms. The input is protected from line-transients by Surge Arrester SA1 and MOVs ZS1 and ZS2. The output level is adjusted by potentiometer **R17 LOW-Z LEVEL**.

4.2.2 Differential Input

The differential input appears on J1-5, J1-9 and J2-5, J2-9. Input resistors R1 and R5 and capacitors C2 and C4 provide a lowpass RFI filter. The differential amplifier consists of operational amplifiers U2-A and U2-B and associated components. The output level is adjusted by potentiometer **R4 HI-Z LEVEL**.

4.2.3 Summing Amplifier

Operational amplifier U2-D sums the outputs from the differential amplifier and the 600-Ohm line source. The output of U2-D is supplied to the 600-Ohm line driver and the Bandpass Filter.

4.2.4 600-Ohm Line Output

The 600-Ohm Line Out circuit consists of U2-C, transformer T2 and associated components. The output level is adjusted by potentiometer **R55 600-OHM LINE OUT**. The output is factory adjusted for 0-dBm (600-Ohm reference).

4.2.5 Bandpass Filter

The Bandpass filter consists of operational amplifiers U1-A and U1-B and associated components. The filter provides a Butterworth response with a minimum 3-dB bandwidth of 300 Hz to 3000 Hz.

The output of the filter is supplied to squelch gate U6-A and the input of the squelch limiter U4-B.

4.2.6 Squelch

4.2.6.1 Squelch Detector

The squelch circuit is a true syllabic type which operates on the syllabic characteristics of voice and rejects noise and steady state tones such as data. Operational amplifiers U4-B and U4-A amplify and limit the received audio. The limited audio is supplied to U6-A and U6-B configured as a one-shot. The short pulse generated by the one-shot are supplied to a filter consisting of components, C19, C48, R27, CR5, R28, R29, R30 and C31.

The resulting low frequency output is supplied to operational amplifier U4-D. U4-D amplifies the signal and supplies it to the front panel **SQUELCH** level control. The output of the **SQUELCH** level control is supplied to the active rectifier U4-C. The output of U4-C goes low in the presence of an input signal which triggers the squelch timer, U9-C and U9-D through diode CR8.

The output of the squelch timer is high (+12 V DC) during signal detection and low (< 1 V DC) when no signal is present. The high level signal is supplied through diode CR9 and control gate U6-B. If U6-B is enabled the resulting high will turn on audio gate U6-A and audio will pass to the speaker preamplifier and speaker driver.

4.2.6.2 Squelch Activity Indicator

When speech activity is detected, the output of U4-C drives FET inverter Q4 and Lamp driver FET Q1 at the speech syllabic rate.

4.2.6.3 Squelch Bypass

When the front panel **VOLUME** control is turned full **CCW**, (**STBY**) FET Q4 is turned on. Q4 turns U6-B off through diode CR12. With U6 off, the squelch gate U6-A is off. FET Q4 also illuminates the front panel **STANDBY** LED (amber).

4.2.6.4 Volume Standby

When the front panel **SQUELCH** control is turned full **CCW**, (**BYPASS**) FET Q3 is turned off. Resistor R52 will turn the audio gate U6-A on through CR10 and U6-B.

4.2.7 Speaker Driver

The speaker driver U3 is an integrated circuit speaker driver. It is capable of supplying 5-Watts average power to an 8-Ohm speaker while maintaining Total Harmonic Distortion (THD) performance of 5% or less. The level to the speaker driver is controlled by the front panel **VOLUME** control.

4.2.8 Cipher Detector

The Cipher detector input appears on Control connector J2. The input is protected from RFI by lowpass filter R34 and capacitor C40 and from transients by diode CR2 and CR1. The output of the lowpass filter is supplied to U8 a non-inverting comparator. The comparators reference level is factory set to 2.0 V DC. When the input exceeds 2 V DC, the comparator output goes high turning on FET Q6 and illuminating the front panel **CIPHER** LED (red).

4.2.9 PTT Mute

The PTT Mute detector input appears on Control connector J2. The input is protected from RFI by lowpass filter R41 and capacitor C27 and from transients by diode CR4 and CR3. The output of the lowpass filter is supplied to U8 a non-inverting comparator. The comparators reference level is factory set for 1.0 V DC. When the input goes below 1 V DC, the comparator output goes low turning off FET Q7. Resistor R66 turns on FET Q5 illuminating the front panel **PTT MUTE** LED (red).

FET Q5 also turns U6-B off through diode CR11 which mutes the speaker audio. The PTT Mute line (J4-14 PTT Mute) is ORed with each Squelch/Speaker Assembly PTT Mute line on the Connector Interface Assembly. The Connector Interface Assembly provides this connection on the rear panel connector Control, J2 and is designated PTT Mute Master IN/OUT.

When a low is applied to the PTT Mute or the PTT Mute Master IN/OUT, it will mute all the speakers in the panel and all speakers in the panel that the PTT Mute Master IN/OUT is connected to.

4.3 CONNECTOR INTERFACE ASSEMBLY, FRONT PANEL ASSEMBLY AND REAR PANEL ASSEMBLY

The following discusses the theory of operation of the Connector Interface Assembly and Front Panel Assembly.

4.3.1 Connector Interface Assembly and Front Panel Assembly

The Connector Interface Assembly interconnects the four Squelch/Speaker Assemblies with the Front Panel, Rear Panel and Power Supply assemblies. The Connector Interface Assembly also provides the current limiting resistors for the front panel display LEDs.

4.3.2 Rear Panel Assembly

The rear panel contains Speaker 1-4, connectors J1, J2 and the Control connector J2. The Control connector interfaces to the customer furnished individual PTT and Cipher circuits. It also provides two connections for the PTT Mute Master IN/OUT circuits.

4.4 AC POWER SUPPLY

The power supply is a high efficiency AC/DC switching power supply. The supply provides a single regulated +24 V DC output over an AC input line voltage range from 90 V AC to 260 V AC.

SECTION V

MAINTENANCE

5.1 GENERAL

This section provides procedures for preventive maintenance, repair and alignment to the Lowest Repairable Unit.

5.1.1 Technical Support

For technical support contact Sunair at:

Sunair Electronics, Inc.
3101 South West Third Avenue
Fort Lauderdale, FL 33315

Telephone: 954.525.1505
Fax: 954.765.1322
E-mail: techsupport@sunairhf.com

5.1.2 Preventive Maintenance Scheduled / Activities

Scheduled preventive maintenance ensures reliable operation of the MX-1201 Squelch/Speaker Panel.

Interval: Once a year.

1. Remove the top cover, (see Section 5.2.1 Top Cover Removal), and perform the following procedure:
   a. Vacuum the interior.
   b. Vacuum the left and right panel ventilation holes.
   c. Inspect connectors for broken parts, check insulation for cracks and check connector pins for damage, misalignment or bad plating.
   d. Inspect chassis wiring and subassemblies for any signs of physical damage or charring.
   e. Inspect for leaky, blistered, charred or cracked electronic or electrical components. Check for loose or corroded terminal connections.

5.2 DISASSEMBLY

Disassembly should only be to the extent necessary to accomplish the repair or replacement of the defective LRU.

DANGER: △ Disconnect the MX-1201 from the AC power source before conducting this procedure.

5.2.1 Top Cover Removal

Unscrew the six Phillips 6-32 flat head screws.

5.2.2 Squelch/Speaker Assembly Removal. Applies to Speaker positions 1-4.

DANGER: • Disconnect the MX-1201 from the AC power source before conducting this procedure.

NOTE: To remove Squelch/Speaker Assembly position-4, remove the AC power Supply first. See paragraph 5.2.3 AC Power Supply Removal before proceeding.

1. Unscrew the four 4-40 Jackscrews on the rear panel assembly using a 3/16" Nut-Driver.
2. Release the ribbon cable connector (AP1 through DP1) from the Connector Interface Assembly.
3. Release the speaker connector (AP1 through DP2) from the Squelch/Speaker Assembly.
4. Unscrew the four Phillips 6-32 pan head screws on the Squelch/Speaker Assembly.
5. Remove the Squelch/Speaker Assembly.
6. If replacement is required, replace it with Sunair part number: 8126202017.

5.2.3 AC Power Supply Assembly Removal/Replacement.

DANGER: • Disconnect the MX-1201 from the AC power source before conducting this procedure.

1. Unscrew the four Phillips 4-40 power supply safety cover screws.
2. Release the Molex power connectors from positions J2 and J7.
3. Unscrew the four Hex 4-40 standoffs and remove the power supply.
4. If replacement is required, replace it with Sunair part number: 1013930002. (Serial Numbers 102-113)
   1014010004. (Serial Numbers 114 and above)

DANGER: • If the power supply is removed or replaced complete step 5 before applying AC Power.

5. When installing the power supply ensure that the power supply is correctly installed in the chassis. The AC power connector, three-pin Molex, should face the rear panel and the DC power connector, six-pin Molex, should face the front panel. Confirm this before applying AC power.

5.2.4 AC Power Supply Replacement

There are no serviceable parts in the AC Power supply. If service is required, replace it with Sunair part number: 1013930002. (Serial Numbers 102-113)
1014010004. (Serial Numbers 114 and above)

5.2.5 Front Panel Replacement Components

Lamp, Green, LED: 1009100092

Lamp, Amber, LED: 1009100921

Lamp, Red, LED: 1009100939

Potentiometer, 1 k Ohm Audio Taper, SPST SW: 1014000009

Handle, Offset, 3x1.5, ¼ Diameter: 1011870037

Speaker, 3.5" 8-Ohm, 8-Watt: 8126000601

Knob, 0.90 Diameter, Black, Skirted: 1011770032

Knob Installation Tool:

Xcelite 99-62 Bristol or 99-20 Hex.

NOTE: Knobs may have Bristol or Hex set screws.

5.3 ELECTRICAL ALIGNMENT

5.3.1 Receive Audio

The MX-1201 is designed to operate over the input range of -20 dBm to +10 dBm (600 Ohm reference). The unit is factory configured for 0 dBm input. For levels other than 0 dBm, consult the following procedure.

1. Apply a 1.5 kHz test tone at the desired input level, -20 dBm to +10 dBm, 600 Ohm reference.
2. Set the **SQUELCH** control to the **BYPASS** position.
3. Set the **VOLUME** control to the **STBY** position.
4. Observe TP-3 with an Oscilloscope.
5. Line Level Adjustment
   - Low-Z Level: Adjust R17 for 150 mV ppk at TP-3
   - High-Z Level: Adjust R4 for 150 mV ppk at TP-3.
6. Observe the Speaker driver test point TP-5 with an Oscilloscope.
7. Turn the **VOLUME** control full **CW,** TP-5 should indicate 17.9 V ppk with no visible distortion.

5.3.2 600-Ohm Line Out Audio

1. Adjust **R55 600 Ohm Line Out** for 0 dBm (reference 600-Ohms). Factory set: 0 dBm (± 1dB) reference 600 Ohms.

5.3.3 PTT Mute Level

1. Adjust **R47 PTT Mute Level (TP10)** for the desired PTT mute level. Factory set 1.0 V DC. Range: 1-8 V DC.

5.3.4 Cipher Level

1. Adjust **R58 Cipher Detect Level (TP11)** for the desired cipher detect level. Factory set: 2.0 V DC. Range: 1-8 V DC.

5.4 SCHEMATICS

The following section contains schematics and wiring diagrams for the MX-1201 Squelch/Speaker Panel.

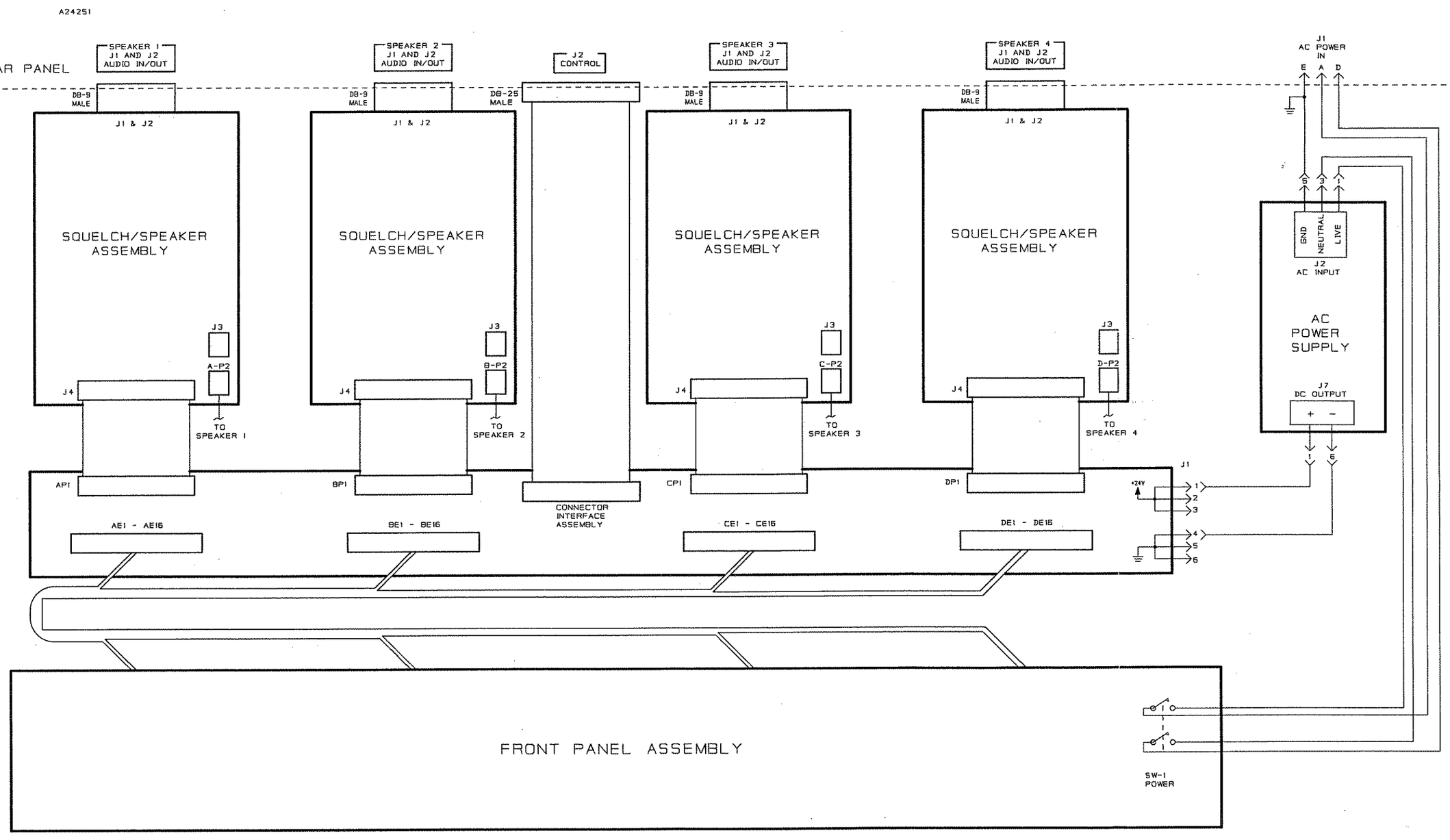


Figure 5.1 Squelch Speaker Sub-Assembly Interconnect Diagram, page 1 of 1.

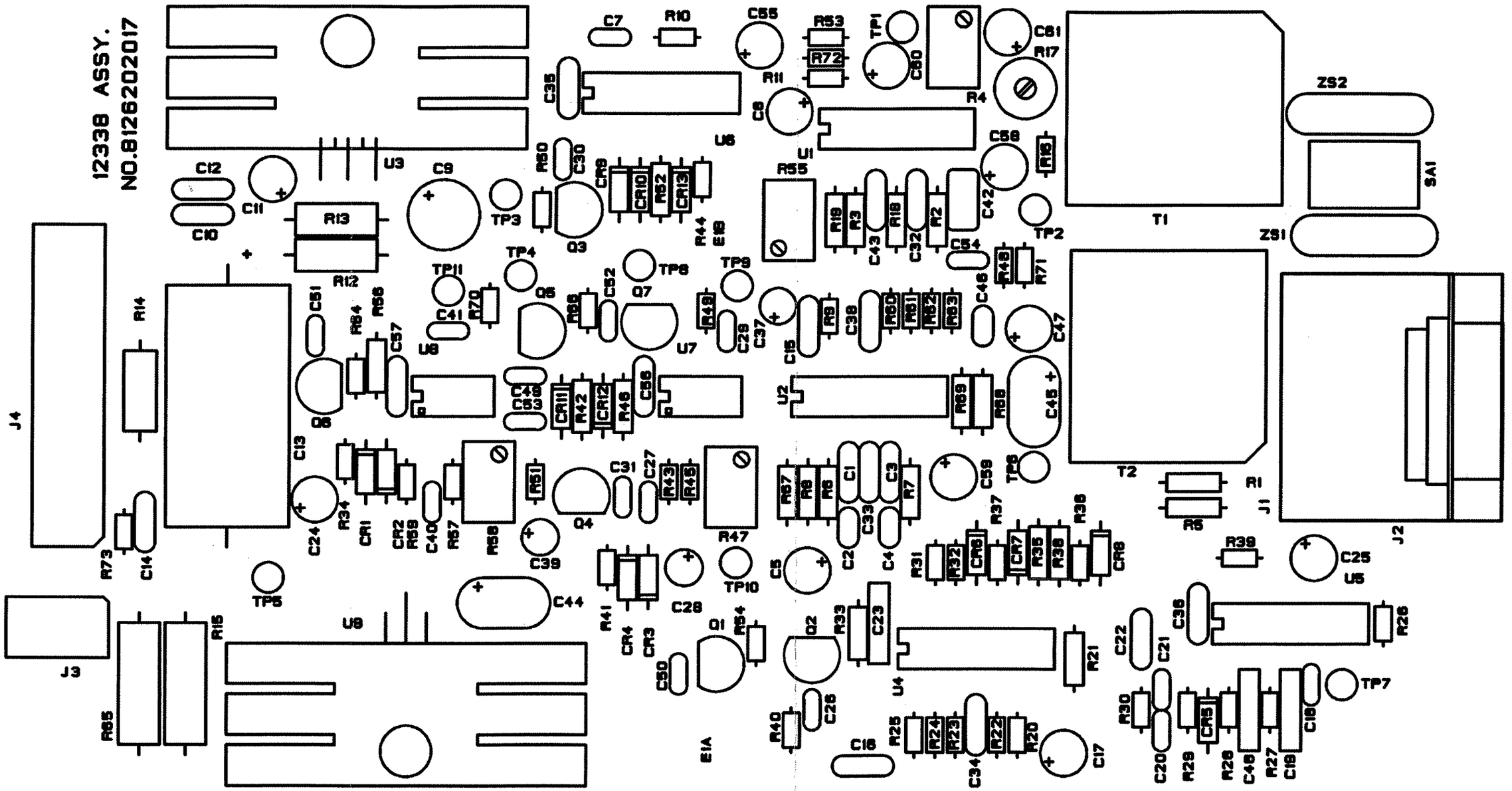


Figure 5.2 PC Assembly Squelch Speaker, page 1 of 2.

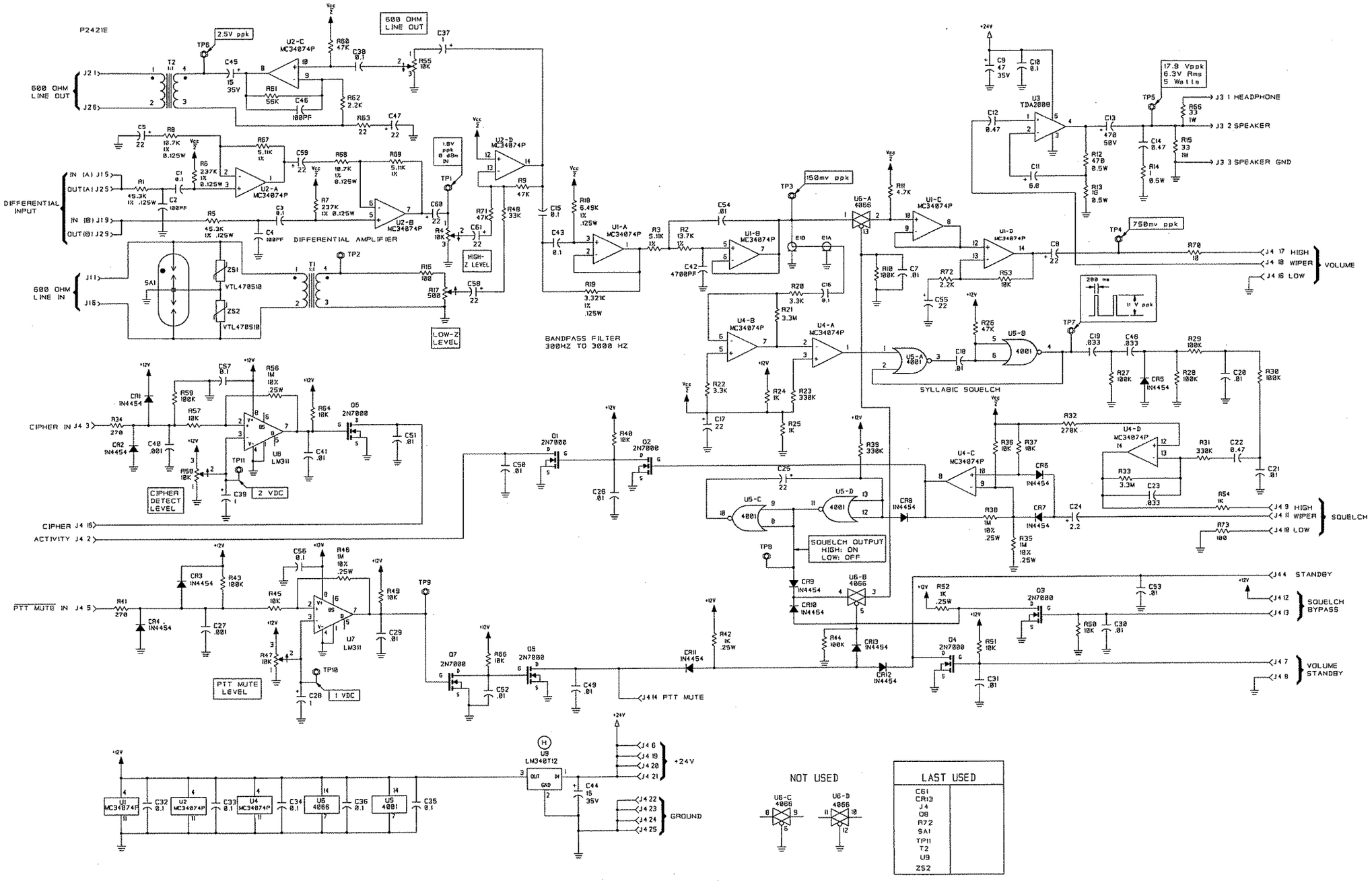


Figure 5.2 PC Assembly Squelch Speaker, page 2 of 2.

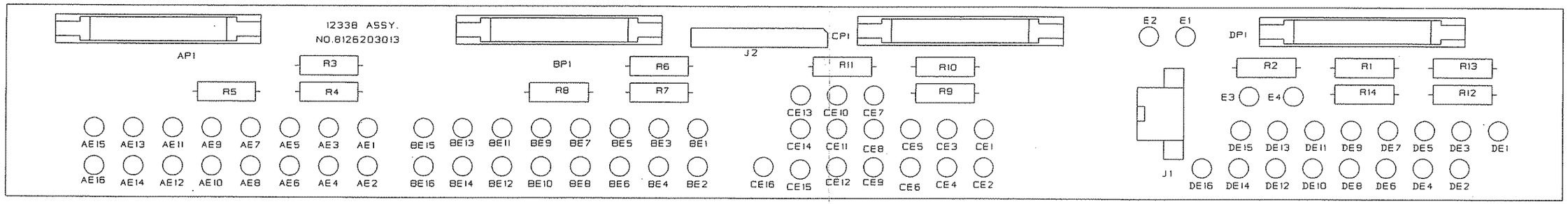
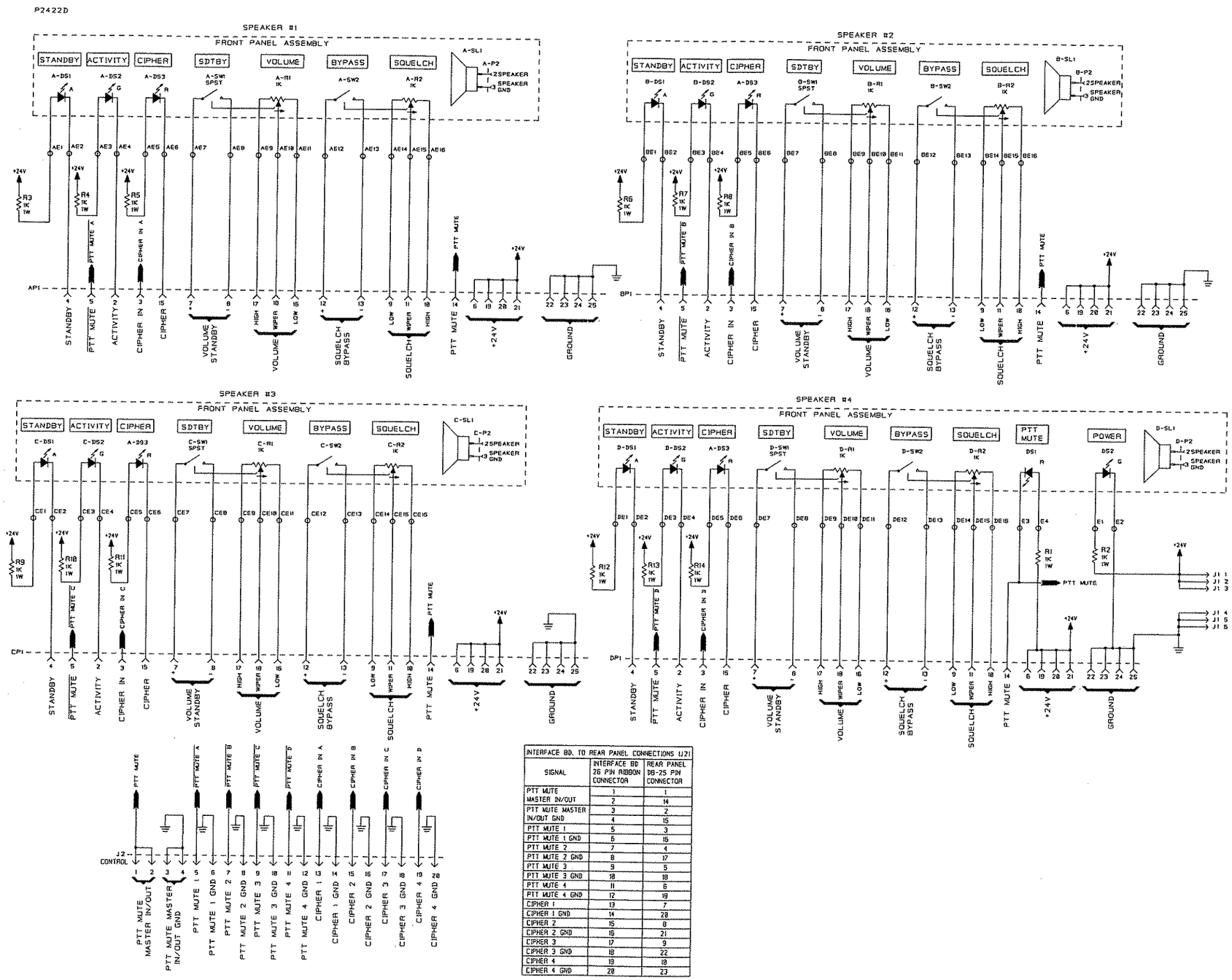


Figure 5.3 PC Assembly Connector Interface and Front Panel Assembly, page 1 of 2.



INTERFACE BD. TO REAR PANEL CONNECTIONS U21		
SIGNAL	INTERFACE BD 26 PIN RIBBON CONNECTOR	REAR PANEL DB-25 PIN CONNECTOR
PTT MUTE MASTER IN/OUT	1	1
	2	14
PTT MUTE MASTER IN/OUT GND	3	2
	4	15
PTT MUTE 1	5	3
PTT MUTE 1 GND	6	16
PTT MUTE 2	7	4
PTT MUTE 2 GND	8	17
PTT MUTE 3	9	5
PTT MUTE 3 GND	10	18
PTT MUTE 4	11	6
PTT MUTE 4 GND	12	19
CIPHER 1	13	7
CIPHER 1 GND	14	20
CIPHER 2	15	8
CIPHER 2 GND	16	21
CIPHER 3	17	9
CIPHER 3 GND	18	22
CIPHER 4	19	10
CIPHER 4 GND	20	23

Figure 5.3 PC Assembly Connector Interface and Front Panel Assembly, page 2 of 2.

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