

WAØUZ I

1259

Tone Control Panel

For
Mpac Base and Repeater Stations

Instruction Manual



AEROTRON, INC.

P.O. Box 27500, Raleigh, N.C. 27611, (919) 872-4400 Telex 579301

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SECTION 1
GENERAL DESCRIPTION

1.1 SCOPE

This publication is a serviceman's technical manual which describes the Model 1259 tone control panel. This manual includes sections on general description, installation, circuit description, maintenance, parts lists, and drawings.

1.2 INTRODUCTION

The Model 1259 tone control panel interfaces compatible tone remote control consoles to Aerotron MPAC series remote base or repeater stations. The 1259 provides up to 12 functions (see Table 1.1 on the following page) and the audio circuitry for a transmitter, two receivers, and optional intercom. Other optional features provide increased channel capability of up to four transmit and receive channels.

The 1259 is completely solid state and features modular construction. Key electronic components and individual circuit blocks are mounted on readily accessible plug-in printed circuit boards. Replacement parts are readily obtainable.

Maintenance is quick and can consist of replacing PC boards for repair at a more convenient time. All test points are easily reached. Field retrofitting to install plug-in options can be accomplished within minutes.

The 1259 houses up to eight standard PC boards, with each board performing a unique system function. The 1259 is compatible with any transmission circuit capable of handling audio frequencies in the 300 to 3000 Hz frequency range at compatible levels. Transmission line protection is provided by a gas discharge tube.

1.3 DIMENSIONS AND WEIGHT

Height	3.50 in	8.89 cm
Width (without mounting tabs)	17.00 in	43.18 cm
Width (with mounting tabs)	19.00 in	48.26 cm
Depth	5.25 in	13.34 cm
Weight	7.00 lb	3.15 kg
Shipping weight	9.00 lb	4.05 kg

TABLE 1.1
1259 FUNCTIONS

FUNCTION	TONE FREQ. (Hz)
Auxiliary Function II OFF	1050
Auxiliary Function II ON	1150
Auxiliary Function I OFF	1250
Auxiliary Function I ON	1350
UNICALL Disable or Maximum Squelch or Repeater Disable	1450
UNICALL Enable or Minimum Squelch or Repeater Enable	1550
Receive Frequency 2	1650
Receive Frequency 1	1750
Transmit Frequency 2	1850
Transmit Frequency 1	1950
Receive UNICALL Disable	2050
Transmit Hold	2175

Duration of each tone is 40 ms.

SECTION 2

INSTALLATION AND OPERATION

The 1259 is shipped completely assembled and aligned. Alignment during installation is not necessary and should not be performed. (The receive and transmit level controls on the optional intercom printed circuit board, if installed, may be adjusted.) The unit may be inspected to ensure that the PC boards are properly seated.

When the 1259 is shipped as part of a complete base or repeater station, the 1259 and interconnect wiring are factory installed in the cabinet. Except for the leased lines, no additional interconnections are necessary unless otherwise specified. (On special orders with optional equipment, additional installation and interconnections may be necessary.)

When the 1259 is shipped as a separate unit, installation and interconnections must be performed in the field. All connections are made at the backplane interconnect PC board; see drawings D1259-107 and D1259-007 in Section 6 of this manual. Installation assistance is available from the Aerotron Service Department.

CAUTION

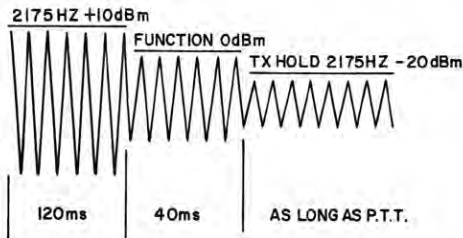
The interconnect PC board houses a gas-filled discharge tube which protects against voltage transients. Previously installed protection devices may have to be removed from the leased lines prior to installing and energizing the 1259.

The 1259 has no operating controls other than on/off switch S01 located on the power supply regulator PC board. When S01 is turned on, the entire 1259 is energized. When S01 is turned off, the 1259 is de-energized with exception of the optional intercom PC board (if installed). The intercom PC board is powered directly from the backplane wiring.

SECTION 3
CIRCUIT DESCRIPTION

3.1 GENERAL

The 1259 utilizes audio tones which are applied to the transmission path at the local operating console to provide a selected function to the radio system. Up to 12 functions are available; see Table 1.1 in the preceding section. Each selected function starts a sequence of audio tones, commencing with the transmission of a high-level (+10 dBm) 2175 Hz burst. This is followed by a low-level (0 dBm) function. When a transmit function tone is selected, a third tone of 2175 Hz is transmitted at a -20 dBm level. See the following diagram.



The transmitter is enabled as long as the 2175 Hz tone is present. Any interruption of the 2175 Hz tone disables the transmitter.

3.2 AUDIO LINE TERMINATION PC BOARD

The audio line termination PC board houses a line transformer, line driver, audio limiter, broadly tuned 2175 Hz bandpass filter, and 2175 Hz notch filter.

T01 is a balanced line transformer which is designed so that power transfer from the primary (pins 7, 8, 9, and 10) is reduced below 300 hz when the load is in place (R03).

Q01 and Q04 form a Class A push-pull current amplifier. Q02 is the phase splitter/driver, R28 is the receive audio line level adjustment, and Q03 forms a mute in the receiver-to-line audio path during transmission.

During the transmit function, and so long as the PTT button is depressed, a 2175 Hz hold tone (-20 dBm level) is mixed with the transmit audio. IC02 forms a broadly tuned 2175 Hz bandpass filter and a 2175 Hz notch filter. The notch filter removes the 2175 Hz hold tone from the transmit audio path prior to the AGC function. The 2175 Hz bandpass is a prefilter for the 2175 Hz detect PC board.

IC01B, C10, R33, RC01, R34, RC02, R35, and C11 form an audio limiter for the individual function PC boards.

3.3 AUDIO PROCESSING PC BOARD

The audio processor has two audio paths. One path sums audio from station receivers for the line amplifier while the other path is comprised of a gated AGC amplifier in combination with an ungated summing amplifier. The ungated amplifier combines audio from the local operating console with the microphone and/or repeater audio for the transmitter.

IC01B sums the outgoing 3.2 ohm audio outputs from receivers one and two with the intercom (if installed) output. IC01 reduces the signal level by 13 dB because the level is higher than that actually required by the line amplifier.

Incoming audio from the audio line termination PC board enters on pin 2. A pad located on this board reduces the level to 0.5-volt peak-to-peak maximum, which is applied to electronic attenuator IC02. When the system is not transmitting, IC02 is gated to 80 dB (or greater) attenuation to effectively disconnect the line audio path from the transmitter.

IC03A is an adjustable gain buffer which feeds summing amplifier IC01A and peak detector IC03B. The input for the microphone summing comes from pin 8 which is connected to the microphone/repeater audio output terminal. This path is not gated. (When the repeat audio interface PC board is not installed in an Aerocom MPAC receiver, R40 provides the bias necessary to operate the base station microphone.)

The peak detector is pre-emphasized, thus the AGC characteristics are more like those required for pre-emphasized transmitter audio processing. The peak detector drives Q03 which is operated as a charge pump to holding capacitors C12 and C13, and to time constant C06 and R26 (C06 charges much faster than C12 and C13). The time constant determines the hold time.

When the hold-time voltage decays, the output of IC04B is switched to a high state, saturating Q04. This provides a rapid discharge path through R36 and holding capacitors C12 and C13 so there is a rapid increase in gain (about 20 dB per second) at the end of the hold time. The hold-time circuit consisting of IC04B and Q04 never operates at a normal speech rate. Lapses in conversation or changes in line or path loss operate the circuit to establish a new AGC level. This discharge also occurs between transmissions when Q02 saturates and discharges the hold-time circuit through CR02 and R15. If Q02 is not saturated (on), IC04A operates as a voltage follower.

Pin 9 is grounded when TX F1 or TX F2 is activated, causing Q01 to saturate. This turns Q02 off and allows the AGC circuit to operate normally. There is no ground on pin 9 during a receive function, so Q02 is saturated (on). This discharges C06, C12, and C13, grounding the negative input of IC04A and causing the output to saturate positive. IC02 is then in the maximum attenuation condition.

3.4 2175 Hz DETECT PC BOARD

The 2175 Hz detect PC board houses a High-Q 2175 Hz bandpass filter, an activity detector, the timing control, and the PTT logic.

The audio input from the 2175 Hz bandpass of the audio line termination PC board appears on pin J02 of the 2175 Hz detect PC board. IC03, IC06, IC05, Q03, and Q04 form a High-Q 2175 Hz bandpass filter. Q02 and R27 form an attenuator which, in the initial state, is turned on. This brings the initial 2175 Hz tone burst down to the detect level of the bandpass. Upon reception of this tone, a digitized sinewave appears at pin 12 of IC03. This causes the charge pump comprised of R10, R11, R12, Q3, and C17 to place a voltage on pin 10 of IC03. Pin 8 goes high when the voltage on pin 10 is slightly greater than that of pin 9, turning on Q04 through R14. This is the 2175 Hz detect signal.

The system timing (see Figure 3.1 at the back of this section) is initiated when the 2175 Hz detect signal goes high on pin 9 of IC01. This high level, in turn, causes a high level on the collector of Q05 for a period of time determined by C21/R28 and C22/R29. Activity detector IC04 places a high level on pin 1 of IC02. This provides a double check to ensure that an audio signal is present in the 2175 Hz detect circuitry.

The timing signal on pin 2 of IC02 and a high level on activity detect pin 1 of IC02 cause pin 3 of IC02 to go high for a period of time equal to that of pin 2. The high level on pin 3 is the reset pulse going to the transmit control PC board through J08. When the transmit reset of J08 goes low, function enable pulse J05 goes high for a period of time determined by C23/R32 and C24/R33. The function enable pulse allows the individual function PC boards to decode the respective function tones.

If one of the tones is a transmit function, a high appears at J06 and pin 9 of IC02. Pin 8, which is still high from the initial 2175 Hz tone burst, causes pin 10 to go high and turn off the attenuator. The 2175 Hz detector then decodes the -20 dBm 2175 Hz hold tone. Q07, Q08, and Q09 are turned on so long as one of the transmit functions remains active and the 2175 Hz tone is present. Q07 pulls J09 (UNICALL disable) high, Q08 pulls J11 (PTT) low, and Q09 pulls J10 (mute) low.

3.5 TRANSMIT CONTROL PC BOARD

The transmit control PC board houses the bandpass filters which decode tones for TX F1, TX F2, and UNICALL. All bandpass filters are identical and each is tuned to a specific frequency by varying a multiturn potentiometer.

Limited audio is applied to the board at J02 which is tied to the inputs of all bandpass filters. IC01B, IC01C, and IC01D form a bandpass filter. The output on Pin 7 of IC01C is passed through rectifier C04 and R10 to the input of amplifier IC01A. C05 charges through R13, raising the voltage on pin 2 of IC04A. Pin 1 of IC04A pulls R19 to near ground when the voltage on pin 2 rises to that of pin 3 of IC04A. Q01 is set into conduction, placing a high level pin 1 of IC06A. This sets flip-flop IC06A/IC06B, forcing Q02 and Q09 to conduct. This in turn, places 9.5 volts onto J12, bringing the TCXO for TX F1 into operation. Simultaneously, flip-flop IC05C/IC05D is reset by a high level on pin 13 of IC05D, thus assuring that the TCXO for TX F2 is turned off.

The circuitry for TX F2 and the circuitry for UNICALL are identical to that just described.

3.6 RECEIVE CONTROL PC BOARD

The receive control PC board houses the bandpass filters for two receiver channels. An input is provided to each flip-flop to facilitate slaving the receive channels to the transmit channels. Channel 1 receive (RX 1) is slaved to channel 1 transmit through J12 and channel 2 receive (RX 2) is slaved to channel 2 transmit through J04.

Limited audio is applied to the board at J02. Both inputs to the bandpass filters are also connected to J02. IC01A forms a summing amplifier while IC01B and IC01C form two integrators. IC01A sums the output of IC01B at its noninverting input, with the output of IC01C at its inverting input so that a bandpass is seen at pin 7 of IC01B. The bandpass output is rectified by C04 and R10, then amplified by IC03A.

C05 charges through R13 when the voltage on pin 6 of IC03B rises to a point slightly above that of pin 5 of IC03B (caused by the charging of C05). The output of the comparator then pulls R19 near ground, placing Q01 into conduction. Flip-flop IC04A/IC04B latches when pin 1 of IC04A goes high. Q05 then forces Q04 to conduct and place 9.5 volts onto RX1 TCXO output pin J13. When Q01 forces RX1 flip-flop IC04A/IC04B to latch, it simultaneously forces RX2 flip-flop IC04C/IC04D to reset. This interlock assures that only one receive channel at a time is activated.

The RX2 function is activated in the same manner as the RX1 function just described.

3.7 POWER SUPPLY PC BOARD

The power supply PC board is powered from the base or repeater station power supply and provides a regulated 9.5 volts dc supply to the 1259. IC01 is a monolithic voltage regulator whose current capability is increased with external pass transistor Q01. The voltage is adjusted with potentiometer R04.

3.8 REAR APRON CIRCUITRY

All 1259 PC board interconnections and terminals for connections to the MPAC base or repeater station and leased lines are provided on the rear apron (backplane interconnect PC board). Protection from voltage transients across the leased lines is provided by a gas-filled discharge tube mounted on the board. The tube reacts to a voltage transient within one microsecond of occurrence. (Other transient protection devices must be removed from the leased lines prior to installing the 1259.)

3.9 OPTIONAL AUXILIARY CONTROL PC BOARD

The optional auxiliary control PC board houses the circuits necessary to open and close relay K01 to provide a variety of functions, depending on user requirements.

Two bandpass filters detect a preset tone to set or reset a flip-flop. These filters are similar to those of the transmit control and receive control PC boards and have similar functions. They are described in preceding sections 3.5 and 3.6.

3.10 OPTIONAL INTERCOM PC BOARD

a. Receive Section

Receive audio enters the intercom PC board through J2, then is amplified and contoured by amplifier Q1. The speaker is driven by audio power amplifier IC1. The audio level is controlled by potentiometer R6 which can be adjusted to a desired audio level.

b. Transmit Section

The electret microphone, located directly behind the front panel, drives amplifier Q03. Q03 amplifies the transmitted signal which then is contoured by C14. Push-to-talk switch S02 normally grounds the output of the microphone amplifier until the switch is depressed for transmission. The speaker is alternately disconnected to eliminate feedback. The transmit level is controlled by potentiometer R17 which can be adjusted to provide a desired level at the distant receiving end.

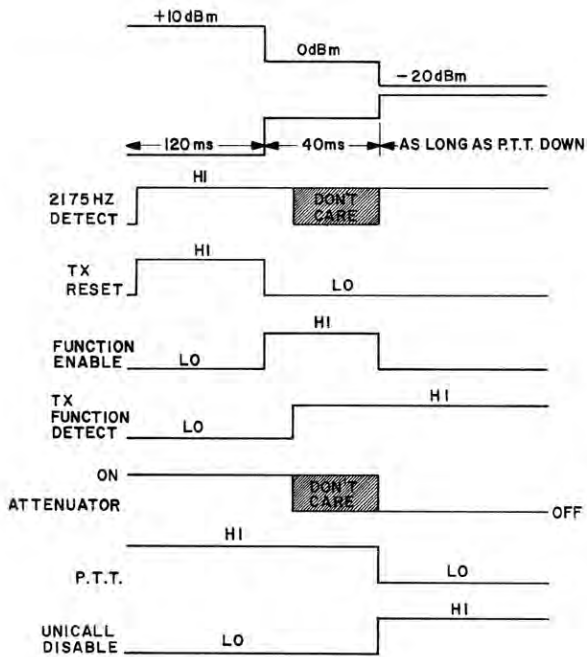


Figure 3.1 System Timing

SECTION 4

MAINTENANCE

4.1 GENERAL

The 1259 is completely solid state and modular with individual circuits mounted on plug-in printed circuit boards. See rear apron interconnect schematic D1259-007 in Section 6 for locations of the PC boards.

a. PC Board Replacement

In most cases faults can be quickly corrected by replacing a defective PC board with a known good board. When replacing a PC board, ensure that the board is properly seated. Do not force the board into place.

CAUTION

The 1259 should be turned off and disconnected from its power source before replacing a PC board or any other component.

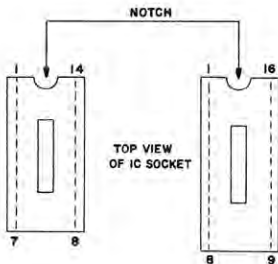
b. Component Replacement

When a component must be replaced, check the respective parts list and schematic diagram to determine the proper type, value, and part number. In many cases a component's type and value are critical and the component must not be replaced with another type or value. In some circuits improper substitution of components may result in degraded or improper performance and ultimately could cause violation of FCC regulations.

Do not use excess heat or tension to remove components from a PC board. Component removal may be facilitated by cutting the leads of the defective component from the top (component) side of the board, then removing the remaining lead segments with a low-heat soldering iron and needlenose pliers. A solder sucker also can facilitate component removal. Removing components from a plated-through-hole PC board may be somewhat difficult because a pronounced solder wicking effect develops.

When replacing a component, use only rosin core solder and a low-heat soldering iron, preferably one that does not exceed 30 watts.

Use caution when replacing dual in-line integrated circuits as the pins are very delicate. Place one row of pins lightly in the socket, press the other row of pins into alignment with a straight edge, then press firmly on the IC to seat it. Do not remove an IC with fingers; use an IC puller or similar tool to gently pry the IC from its socket. All socket mounted ICs should be oriented so that the notch located on one end of the IC is aligned with the notch located on the socket; see the following diagram.



Semiconductor and miscellaneous pin identification is presented in Figure 3.1.

c. Component Values

All resistor color codes are standard, although some resistors may have an additional band which should not be confused with the actual color code value.

Most capacitors have their values stamped on the capacitor body but, in some cases, the stamped value is a coded number and letter combination. Since manufacturers are not consistent with their coding systems, some judgement must be used. A typical coding system example is 271J which signifies a 270 pF, +5% capacitor wherein two significant numbers are known and a complete value determination may be made by referring to the schematic diagram.

Some capacitors are color coded. See Figure 3.2.

4.2 ADJUSTMENT PROCEDURES

a. Bandpass Filter

The bandpass filter tuning procedure should be performed on a PC board when the board has had components replaced or when a PC board malfunction is suspected. Every PC board (except the optional intercom PC board) has a bandpass filter. Since all bandpass filters have identical circuitry, the following steps described for the auxiliary control PC board apply to bandpass filters.

- (1). Refer to auxiliary control PC board schematic C1259-001 in Section 6.
- (2). Turn off the equipment. Pull out the auxiliary control PC board and reconnect through the extender board. Turn on the equipment.

- (3). Apply the board function tone to the line and adjust the tone amplitude until the tone is just below clipping when monitored at TP01 with one channel of a dual-channel oscilloscope.

NOTE

On the auxiliary control PC board, adjust the relay set tone with turn-on potentiometer R14 and the relay reset tone with turn-off potentiometer R12.

- (4) Apply and monitor the relay set tone at TP01 and the bandpass filter output at TP03.
- (5) Adjust R14 until the bandpass output is 180 degrees out of phase with the input. The phase difference occurs only at the resonant frequency of the filter. Relay K01 should activate and indicator CR01 should turn on.
- (6) Apply and monitor the reset tone at TP03.
- (7) Adjust R12 for a 180 degree phase difference at TP02. K01 should deactivate and CR01 should turn off.

Adjust the bandpass turn-on and turn-off potentiometers located on the other PC boards as just described. Refer to the respective schematic diagram for each PC board. The individual LED should turn on when the turn-on potentiometer is properly adjusted and should turn off when the turn-off potentiometer is properly adjusted.

b. Intercom PC Board Audio Level

Adjust audio receive potentiometer R6 for a desired audio level and transmit potentiometer R17 for a desired level at the distant receiving end.

4.3 FIELD RETROFITTING

Field retrofitting consists of installing or removing one or more PC boards to increase or decrease system capability. The locations of the PC boards are shown in backplane interconnect PC board schematic diagram D1259-007. No 1259 rewiring is necessary when a PC board is installed or removed.

LEAD	ZN5222	ZN5486 ZN5480	MSD6150
1	BASE	DRAIN	CATHODE
2	EMITTER	SOURCE	CATHODE
3	COLLECTOR	GATE	ANODE

NOTE
IF THE FOLLOWING FEATURES MUST BE PROVIDED, DO NOT EXCEED 5 INCH MILLIFRACTION THROUGH ALL POINTS UNLESS SHOWN BY DRAWING.

MS2101	MS2379	MS2751
MS2170	MS2371	MS2888
MS2801	MS2539	



FINISH
1. BY POLISH
2. BY BRASS
3. BY BRASS
4. BY BRASS
5. BY BRASS
6. BY BRASS



LEAD	ZN5395	3N187	MRF502
1	SOURCE	DRAIN	EMITTER
2	DRAIN	GATE 2	BASE
3	GATE	GATE 1	COLLECTOR
4	CASE	SOURCE	CASE

ZN5209 ZN2415
MPS3838A ZN5223
MOT3048 ZN5226
MPS383A ZN5223
MPS383A ZN5223
MPS383A ZN5223



ZN3646, ZN3658



MS280, MS2801, MS2806



CA308A (BOTTOM VIEW)
CA308A.

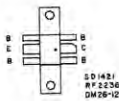
CM25-12 CM40-12
CM40-12 J8 3030
BM70-12 J8 3701
CD2772 CD2773
CD3286



50134
244427
245913
501270
24709
2N1222



CA508B
AC1733C
CA10B9E



SD1421
RF2236
DM28-12



E421
1. SOURCE 1
2. DRAIN 1
3. GATE 1
4. SOURCE 2
5. DRAIN 2
6. GATE 2



RECEPTACLE, CRIMPON
0150-0000-012



D1B0

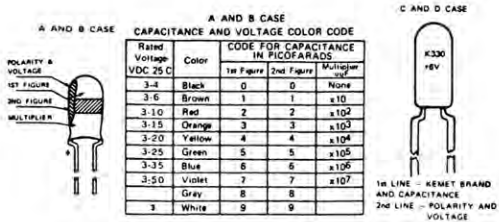


CD3E76

ZN6094	4 3-12
ZN5589	4 60-12
ZN5590	5 12-28
ZN5591	4 30-12
ZN6090	
ZN6091	
ZN6092	
CD2786	

4204-0000-016, Rev. A

Figure 4.1. Semiconductor and miscellaneous pin information.



The capacitors are color coded as follows:

COLOR	1st figure of capacitance value	2nd figure of capacitance value	Multiplying factor	Capacitance tolerance	Working voltage	Body color
black	0	0	10 ⁰	±20%	—	—
brown	1	1	10 ¹	—	100V	—
red	2	2	10 ²	—	250V	—
orange	3	3	10 ³	—	—	—
yellow	4	4	10 ⁴	—	400V	—
green	5	5	10 ⁵	—	—	—
blue	6	6	—	—	630V	—
violet	7	7	—	—	—	—
grey	8	8	—	—	—	—
white	9	9	—	±10%	—	—

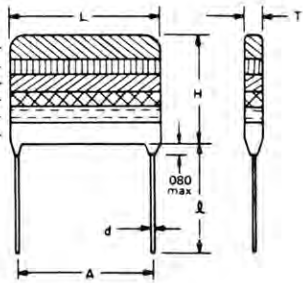


Figure 4.2. Capacitor color coding.

SECTION 5
REPLACEABLE PARTS

COMPONENT	PAGE
Four-Channel Tone Remote Assembly	5.2
Two-Channel (or Repeater) Tone Remote Assembly	5.2
Master Tone Remote Assembly	5.3
Miscellaneous Hardware	5.3
Two-Channel Receive Control PC Board	5.4
Audio Line Termination PC Board	5.6
2175 Hz Detect PC Board	5.8
Two-Channel Transmit Control PC Board	5.10
Audio Processing PC Board	5.12
Power Supply Regulator PC Board	5.13
Backplane Interconnect PC Board	5.14
Optional Auxiliary Control PC Board	5.15
Optional Intercom PC Board	5.16

**FOUR-CHANNEL TONE REMOTE ASSEMBLY
(1939-1259-110)**

SYMBOL	DESCRIPTION	PART NUMBER
	Master Tone Remote Assembly	1939-1259-108
	Two Channel Receive Control PC Board (2)	1939-1259-105
	Two-Channel Transmit Control PC Board	1939-1259-104
	Connector	2108-0000-050

**TWO-CHANNEL (OR REPEATER) TONE REMOTE ASSEMBLY
(1939-1259-109)**

SYMBOL	DESCRIPTION	PART NUMBER
	Master Tone Remote Assembly	1939-1259-108
	Two-Channel Receive Control PC Board	1939-1259-105
	Connector	2108-0000-050

MASTER TONE REMOTE ASSEMBLY
(1939-1259-108)

SYMBOL	DESCRIPTION	PART NUMBER
	Audio Line Termination PC Board	1939-1259-102
	2175 Hz Detect PC Board	1939-1259-103
	Two-Channel Transmit Control PC Board	1939-1259-104
	Power Supply PC Board	1939-1259-106
	Interconnect PC Board	1939-1259-107
	Audio Processing PC Board	1939-1259-111

MISCELLANEOUS HARDWARE

SYMBOL	DESCRIPTION	PART NUMBER
	Tab, mounting	1404-0654-033
	Plate, trim	1404-0654-038

TWO-CHANNEL RECEIVE CONTROL PC BOARD
(1939-1259-105)

SYMBOL	DESCRIPTION	PART NUMBER
	Capacitors	
C01	.47 uF	1526-4706-001
C02, C03, C06, C07	.0022 uF	1526-2204-001
C04, C05, C08, C09	2.2 uF, 25V	1538-2207-115
C10	33 uF	1538-3308-406
	Diodes	
CR01 thru CR04, CR07 thru CR10	1N4148	4803-0000-004
CR05, CR06	LED	4807-0000-001
	Integrated Circuits	
IC01, IC02, IC03	LM324	4850-0000-020
IC04	CD4001BE	4851-4001-001
	Transistors	
Q01, Q03, Q04, Q07	2N5226	4811-0000-028
Q02, Q05, Q06	MPS6514	4811-0000-012
	Resistors	
All fixed resistors are 1/4W, +5% unless otherwise indicated.		
R01, R22	270K	4764-2706-001
R02, R08, R10, R11, R23, R29, R31, R32, R43, R45, R47, R48	10K	4764-1005-001
R03, R04, R24, R25	15.4K, 1/4W, +1%	4774-1545-001
R05, R26	51.1K, 1/4W, +1%	4774-5115-001
R06, R27	Potentiometer, 200K	4735-2006-002
R07, R28	100K	4764-1006-001
R09, R30	464 ohms, 1/4W, +1%	4774-4643-001
R12, R33	180K	4764-1806-001
R13, R19, R34, R40, R50, R51	3.9K	4764-3904-001
R14, R16, R18, R20, R21, R39, R41, R42, R42, R46	1K	4764-1004-001
R15, R36	22K	4764-2205-001
R17, R38	1M	4764-1007-001
R49	18K	4764-1805-001

TWO-CHANNEL RECEIVE CONTROL PC BOARD
(CONTINUED)

SYMBOL	DESCRIPTION	PART NUMBER
TP01	Test points	
	White	2150-0000-008
TP02, TP03	Black	2150-0000-008
	Handle	1730-0000-001
	Assembly drawing	C1259-105
	Schematic diagram	D1259-004

AUDIO LINE TERMINATION PC BOARD
(1939-1259-102)

SYMBOL	DESCRIPTION	PART NUMBER
	Capacitors	
C01, C03, C04, C05, C09	.47 uF	1526-4706-001
C02	33 uF	1538-3308-406
C06, C07	.0022 uF	1526-2204-001
C08	.001 uF	1502-1004-001
C10, C11	6.8 uF	1538-6807-418
CR01, CR02	Diode, 1N4148	4803-0000-004
	Integrated Circuits	
IC01	Op-amp, MC1458CP	4850-0000-017
IC02	Op-amp, CM324	4850-0000-020
	Transistors	
Q01, Q04	2N2219	4811-0000-010
Q02, Q03	MPS6514	4811-0000-012
	Pad for Q01 and Q04	4891-0000-005
	Resistors	
All fixed resistors are 1/4W, +5% unless otherwise indicated.		
R01, R02, R04, R10, R12, R20, R24, R30, R31	10K, 1/4W, $\pm 1\%$	4774-1005-001
R03	560 ohms	4764-5603-001
R05	33K	4764-3305-001
R06, R11	82 ohms	4764-8202-001
R07	5.1K	4764-5104-001
R08, R15	68K	4764-6805-001
R09, R16, R21	22K	4764-2205-001
R13	100K	4764-1006-001
R14, R17, R18, R27, R35	1K	4764-1004-001
R19	51.1K, 1/4W, $\pm 1\%$	4774-5115-001
R22	12K	4764-1205-001
R23, R25	Potentiometer, 200K	4735-2006-002
R26, R33, R35	3.9K	4764-3904-001
R28	Potentiometer, 10K	4735-1005-001
R29	47K	4764-4705-001
R32	150K	4764-1506-001
R34	120K	4764-1206-001
T01	Transformer	5600-0000-002

AUDIO LINE TERMINATION PC BOARD
(CONTINUED)

SYMBOL	DESCRIPTION	PART NUMBER
TP01	Test points	
	White	2150-0000-008
TP02	Black	2150-0000-008
	Handle	1730-0000-001
	Assembly drawing	C1259-102
	Schematic diagram	D1259-005

2175 Hz DETECT PC BOARD
(1939-1259-103)

SYMBOL	DESCRIPTION	PART NUMBER
	Capacitors	
C01, C02, C13, C16, C19	0.1 uF	1505-1006-005
C03	220 pF	1513-2203-001
C04 thru C11	.22 uF	1526-2206-001
C12	68 uF, 15V	1538-6808-409
C14, C15	47 pF	1513-4702-006
C17, C18, C20	33 uF, 10V	1538-3308-406
C21 thru C24	2.2 uF, 25V	1538-2207-115
	Diodes	
CR01	LED	4807-0000-001
CR02, CR03	1N4148	4803-0000-004
	Integrated Circuits	
IC01	4049	4851-4049-001
IC02	4081	4851-4081-001
IC03	LM324	4850-0000-020
IC04	1458CN	4850-0000-017
IC05	4051	4851-4051-001
IC06	4060	4851-4060-002
	Transistors	
Q01, Q03	2N5226	4811-0000-028
Q02, Q04 thru Q09	MPS6514	4811-0000-012
	Resistors	
All resistors are 1/4W, $\pm 5\%$.		
R01, R38, R40	1.8K	4764-1804-001
R02	39K	4764-3905-001
R03	91K	4764-9105-001
R04	15M	4764-1508-001
R05, R09, R16, R17, R18, R22, R30, R34, R35, R42	10K	4764-1005-001
R06, R08, R19, R21, R36	100K	4764-1006-001
R07	390 ohms	4764-3903-001
R10, R13, R23, R26, R11, R15, R24, R31	3.9K	4764-3904-001
R39, R41	1K	4764-1004-001
R12, R25	47 ohms	4764-4702-001
R14, R32, R33	22K	4764-2205-001
R20	150 ohms	4764-1503-001
R27	56 ohms	4764-5602-001
R28, R29	33K	4764-3305-001
R37	4.7K	4764-4704-001

2175 Hz DETECT PC BOARD
(CONTINUED)

SYMBOL	DESCRIPTION	PART NUMBER
Y01	Crystal, 2.2272 MHz	2301-0000-012
	Handle	1730-0000-001
	Assembly drawing	C1259-103
	Schematic diagram	D1259-006

TWO-CHANNEL TRANSMIT CONTROL PC BOARD
(1939-1259-104)

SYMBOL	DESCRIPTION	PART NUMBER
	Capacitors	
C01	.47 uF	1526-4706-001
C02, C03, C06, C07, C10, C11	.0022 uF	1526-2204-001
C04, C05, C08, C09, C12, C13	Tant., 2.2 uF	1538-2207-115
C14	Tant., 33 uF	1538-3308-406
	Diodes	
CR01, CR03, CR06, CR07	1N4148	4803-0000-004
CR02, CR04, CR05	LED	4807-0000-001
	Integrated Circuits	
IC01 thru IC04	LM324	4850-0000-020
IC05, IC06	CD4001AE	4851-4001-002
	Transistors	
Q01, Q03, Q05, Q10, Q11	2N5226	4811-0000-028
Q02, Q04, Q07, Q08, Q09	MPS6514	4811-0000-012
Q06	MPS3646	4811-0000-005
	Resistors	
All fixed resistors are 1/4W, +5% unless otherwise indicated.		
R01, R22, R43	270K, +5%	4764-2706-001
R02, R03, R04, R08, R10, R11, R23, R24, R25, R29, R31, R32, R42, R44, R45, R46, R50, R52, R53, R63, R71, R75, R76, R77, R80	10K, 1/4W, +1%	4774-1005-001
R05, R26, R47	51.1K, 1/4W, +1%	4774-5115-001
R06, R27, R48	Potentiometer, 20-turn, 200K	4735-2006-002
R07, R28, R49	100K	4764-1006-001
R09, R30, R51	464 ohms, 1/4W, +1%	4774-4643-001
R12, R33, R54	180K	4764-1806-001
R13, R19, R34, R40, R55, R61, R66, R67, R79, R81	3.9K, 1/4W, +1%	4774-3904-001
R14, R16, R18, R20, R21, R39, R41, R60, R62, R65, R68, R69, R70, R73, R82	1K	4764-1004-001

TWO-CHANNEL TRANSMIT CONTROL PC BOARD
(CONTINUED)

SYMBOL	DESCRIPTION	PART NUMBER
R15, R36, R57	22K	4764-2205-001
R17, R38, R59	1M	4764-1007-001
R78	18K	4764-1805-001
	Test points	
TP01, TP03	Black	2150-0000-008
TP02	White	2150-0000-008
	Handle	1730-0000-001
	Assembly drawing	C1259-104
	Schematic diagram	D1259-003

AUDIO PROCESSING PC BOARD
(1939-1259-111)

SYMBOL	DESCRIPTION	PART NUMBER
	Capacitors	
C01, C02	Nonpolar, 6.8 uF	1536-6807-015
C03, C05, C09, C10, C11	.47 uF	1526-4706-001
C04	680 pF	1513-6803-001
C06	Stable, .01 uF	1526-1005-001
C07	10 uF	1538-1008-409
C08	33 uF	1538-3308-406
C12, C13	68 uF	1538-6808-409
C14	.005 pF	1510-5004-001
CR01 thru CR05	Diode, 1N4148	4803-0000-004
	Integrated Circuits	
IC01, IC03, IC04	MC1458CP	4850-0000-017
IC02	MC3340P	4850-0000-016
	Socket, IC, 8-pin	2136-0000-004
	Transistors	
Q01, Q02, Q04	MPS6514	4811-0000-012
Q03	2N5226	4811-0000-028
	Resistors	
All fixed resistors are 1/4W, +5%.		
R01, R16, R35	3.9K	4764-3904-001
R02, R05, R08, R14, R20, R23, R34, R40	1K	4764-1004-001
R03, R04, R27	2.2K	4764-2204-001
R06, R07, R10, R12, R19, R30 thru R33	10K	4764-1005-001
R09	Potentiometer, 10K	4735-1005-002
R11, R24	8.2K	4764-8204-001
R13, R17, R21	3.3K	4764-3304-001
R15, R37	220 ohms	4764-2203-001
R18	Potentiometer, 50K	4735-5005-005
R22	39 ohms	4764-3902-001
R25	47 ohms	4764-4702-001
R26	68K	4764-6805-001
R28, R29	47K	4764-4705-001
R36	22K	4764-2205-001
R38	6.8K	4764-6804-001
R39	2.7K	4764-2704-001
	Handle	1730-0000-001
	Assembly drawing	C1252-032
	Schematic diagram	D1252-006

POWER SUPPLY REGULATOR PC BOARD
(1939-1259-106)

SYMBOL	DESCRIPTION	PART NUMBER
	Capacitors	
C01	0.1 uF	1505-1006-005
C02	2.2 uF, 25V	1538-2207-115
C03	.01 uF	1505-1005-004
C04	2000 uF, 25V	1517-2010-003
	Diodes	
CR01, CR02	1N4148	4803-0000-004
CR03	LED	4805-0000-001
IC01	IC, CA3085	4850-0000-012
F01	Fuse, 1A Fuse clip	5150-1004-005 5160-0000-007
Q01	Transistor, MJE371	4811-0000-031
	Resistors	
All fixed resistors except R06 are 1/4W, +5%.		
R01	27 ohms	4764-2702-001
R02	10K	4764-1005-001
R03	3.3K	4764-3304-001
R04	Potentiometer, 1K	4735-1004-002
R05	470 ohms	4764-4703-001
R06	470 ohms, 1/2W, +5%	4762-4703-001
R07	1K	4764-1004-001
S01	Switch	5102-0000-003
TP01	Test point, black	2850-0000-008
	Handle	1730-0000-001
	Heat sink	4891-0000-002
	Assembly drawing	C1259-106
	Schematic diagram	B1259-002

BACKPLANE INTERCONNECT PC BOARD
(1939-1259-107)

SYMBOL	DESCRIPTION	PART NUMBER
J01 thru J04, J11	Connector	2108-0000-050
	Screws (29)	2851-0608-421
	Standoffs (29)	2877-0000-003
	Diodes, 1N4148 (10)	4803-0000-004
	Over-voltage protector	5154-0000-001
	Assembly drawing	D1259-107
	Schematic diagram	D1259-007

OPTIONAL AUXILIARY CONTROL PC BOARD
(1939-1259-101, Rev. A)

SYMBOL	DESCRIPTION	PART NUMBER
	Capacitors	
C02	.47 uF	1526-4706-001
C03 thru C06	.0022 uF	1526-2204-001
C07, C08, C12, C13	Tant., 2.2 uF, 25V	1538-2207-115
C10	Tant., 33 uF	1538-3308-406
	Diodes	
CR01	LED	4807-0000-001
CR02, CR03	1N4148	4803-0000-004
	Integrated Circuits	
IC01, IC02, IC03	Op-amp, LM324	4850-0000-020
IC04	CD4001	4851-4001-002
K01	Relay	4502-0000-008
	Transistors	
Q01, Q02	2N5226	4811-0000-028
Q03	MPSA13	4813-0000-001
Q04	MPS6514	4811-0000-012
	Resistors	
All fixed resistors are 1/4W, +5% unless otherwise indicated.		
R01, R02	270K	4764-2706-001
R03, R04	460 ohms, 1/4W, +1%	4774-4643-001
R05, R06, R16 thru R45	10K	4764-1005-001
R07, R10	51.5K, 1/4W, +1%	4774-5115-001
R08, R11, R13, R15	15.4K, 1/4W, +1%	4774-1545-001
R09, R26	100K	4764-1006-001
R12, R14	Potentiometer, 200K	4735-2006-002
R21, R23	180K	4764-1806-001
R22, R24, R33, R35	3.9K	4764-3924-001
R25, R31, R34, R36 thru R39	1K	4764-1004-001
R27, R30, R40	22K	4764-2205-001
R29, R32	1M	4764-1007-001
R44	18K	4764-1805-001
	Test points	
TP01, TP03	Black	2150-0000-008
TP02	White	2150-0000-008
	Handle	1730-0000-001
	Assembly drawing	C1259-101
	Schematic diagram	C1259-001

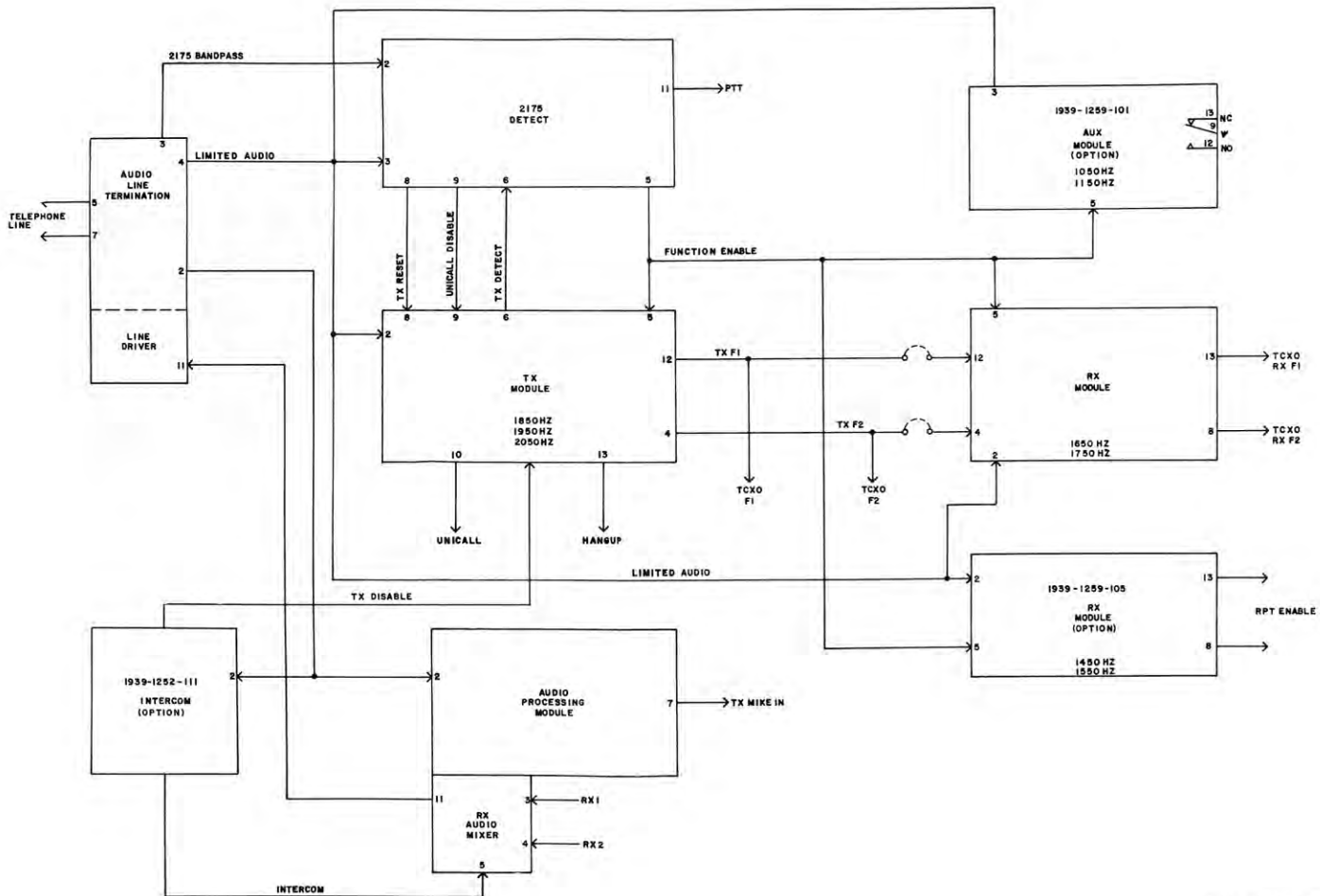
OPTIONAL INTERCOM PC BOARD
(1939-1252-111, Rev. B)

SYMBOL	DESCRIPTION	PART NUMBER
	Capacitors	
C1, C10, C11, C16	6.8 uF, 40V	1518-6807-021
C2, C9	0.1 uF	1505-1006-005
C3	150 uF, 25V	1518-1509-016
C4	Silver mica, 82 pF	1513-8202-001
C5, C6, C18	.22 uF	1526-2206-101
C7	Tant., 68 uF, 15V	1538-6808-409
C8	220 uF, 16V	1518-2209-018
C12, C13, C14, C17	.47 uF	1526-4706-001
C15	22 uF, 25V	1518-2208-019
C19	Tant., 22 uF, 15V	1538-2208-409
IC1	IC, CA2002	4850-0000-021
	Transistors	
Q1	MPSA13	4813-0000-001
Q2, Q3	MPS6514	4813-0000-012
	Resistors	
All fixed resistors except R9	are 1/4W, +5%.	
R1	820K	4764-8206-001
R2	22K	4764-2205-001
R3, R5, R12, R21	1K	4764-1004-001
R4, R18	100K	4764-1006-001
R6	Potentiometer, 50K	4735-5005-005
R7, R11	220 ohms	4764-2203-001
R8	22 ohms	4764-2202-001
R9	1 ohm, 1/2W, +10%	4701-1001-001
R10	100 ohms	4764-1003-001
R13	39K	4764-3905-001
R14	4.7K	4764-4704-001
R15	150K	4764-1506-001
R16	10K	4764-1005-001
R17	Potentiometer, 5K	4735-5004-003
R19	330 ohms	4764-3303-001
R20	12K	4764-1205-001
R22	33K	4764-3305-001
	Switches	
S1	Toggle	5106-0000-009
S2	Pushbutton	5141-0000-006
	Microphone	1363-0000-001
	Speaker	1304-9005-039
	Button	5141-0000-037
	Assembly drawing	C1252-047
	Schematic diagram	C1252-010

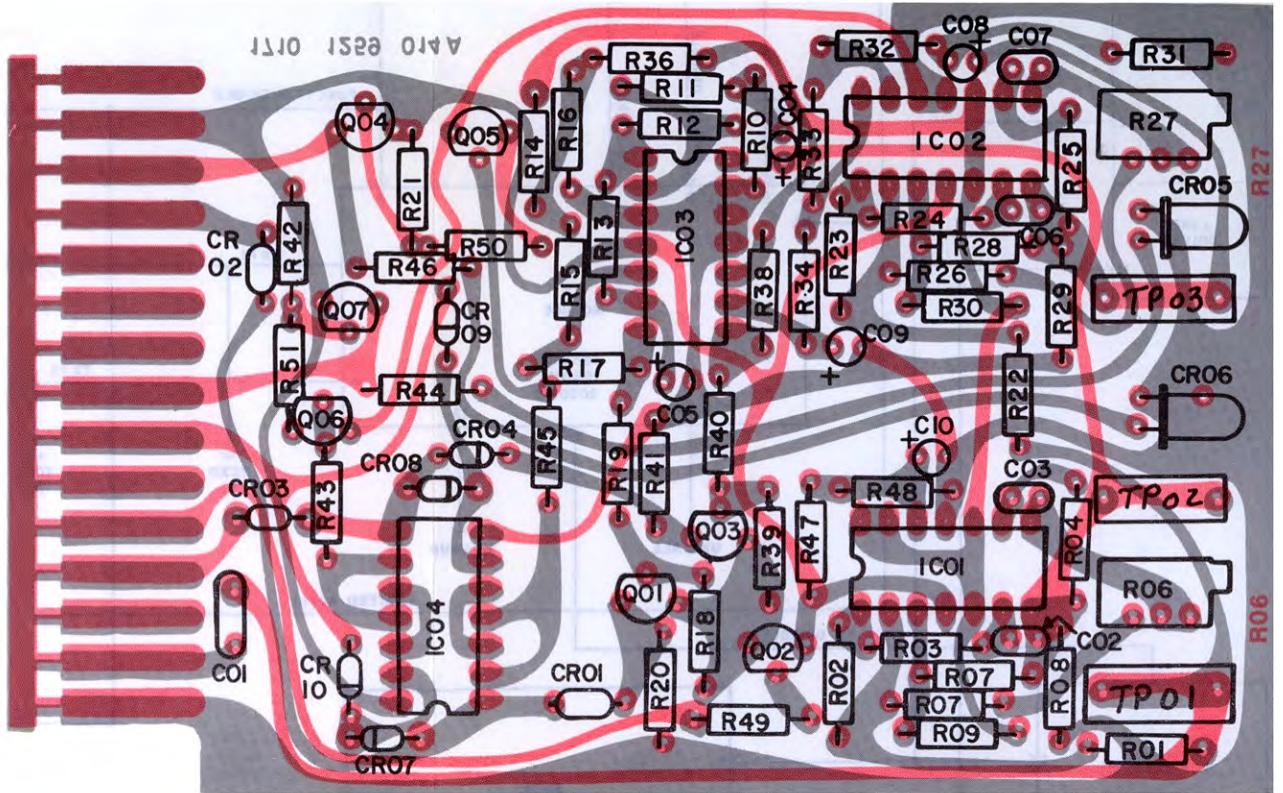
SECTION 6

DRAWINGS

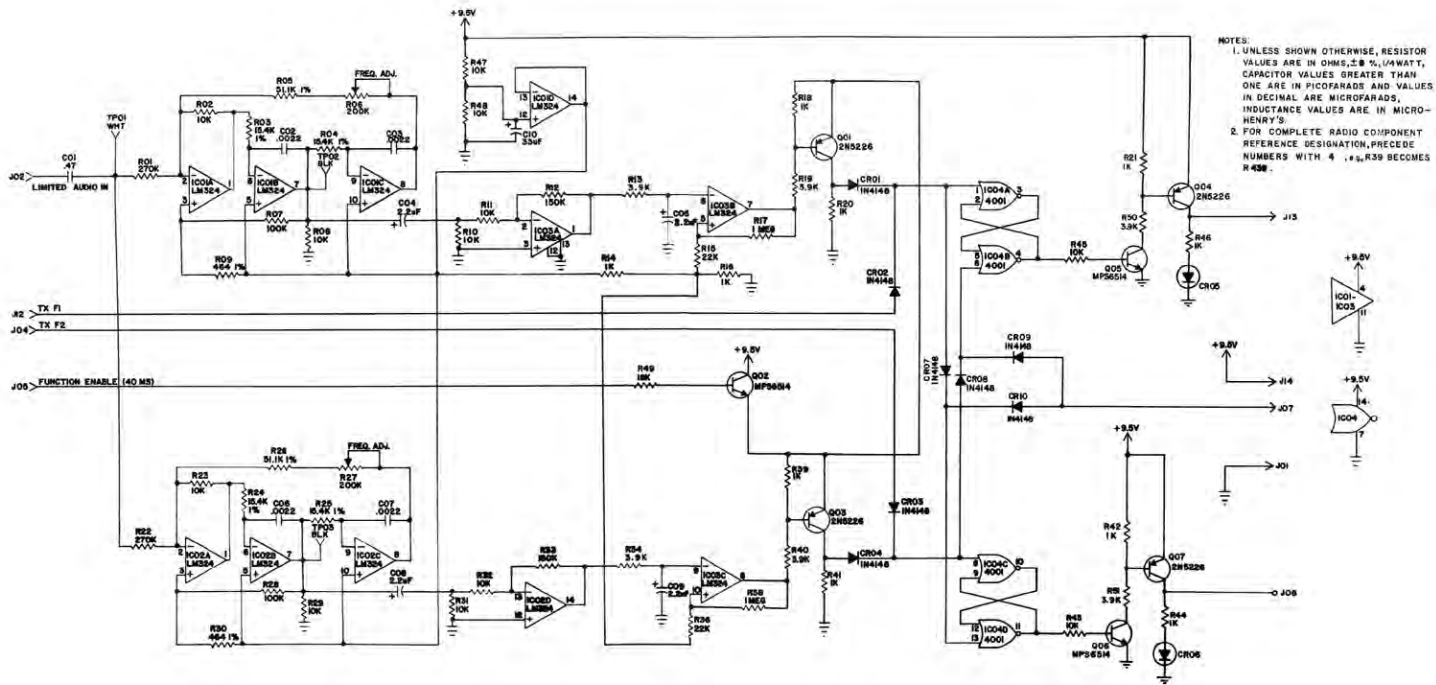
DESCRIPTION	DRAWING NO.	PAGE
1259 Block Diagram	D1259-008	6.3
Two-Channel Receive Control PCB Assembly	D1259-105	6.4
Two-Channel Receive Control PCB Schematic	D1259-004	6.5
Audio Line Termination PCB Assembly	C1259-102	6.6
Audio Line Termination PCB Schematic	D1259-005	6.7
2175 Hz Detect PCB Assembly	C1259-103	6.8
2175 Hz Detect PCB Schematic	D1259-006	6.9
Two-Channel Transmit Control PCB Assembly	C1259-104	6.10
Two-Channel Transmit Control Schematic	D1259-003	6.11
Audio Processing PCB Assembly	C1252-032	6.12
Audio Processing PCB Schematic	D1252-006	6.13
Power Supply Regulator PCB Assembly	C1259-106	6.14
Power Supply Regulator PCB Schematic	B1259-002	6.15
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Optional Auxiliary Control PCB Assembly	C1259-101	6.18
Optional Auxiliary Control PCB Schematic	C1259-001	6.19
Optional Intercom PCB Assembly	C1252-047	6.20
Optional Intercom PCB Schematic	C1252-010	6.21
Basic Wiring Diagram for Single Channel Base Station with Tone Remote	C1259-108	6.22



1259 Block diagram
D1259-008

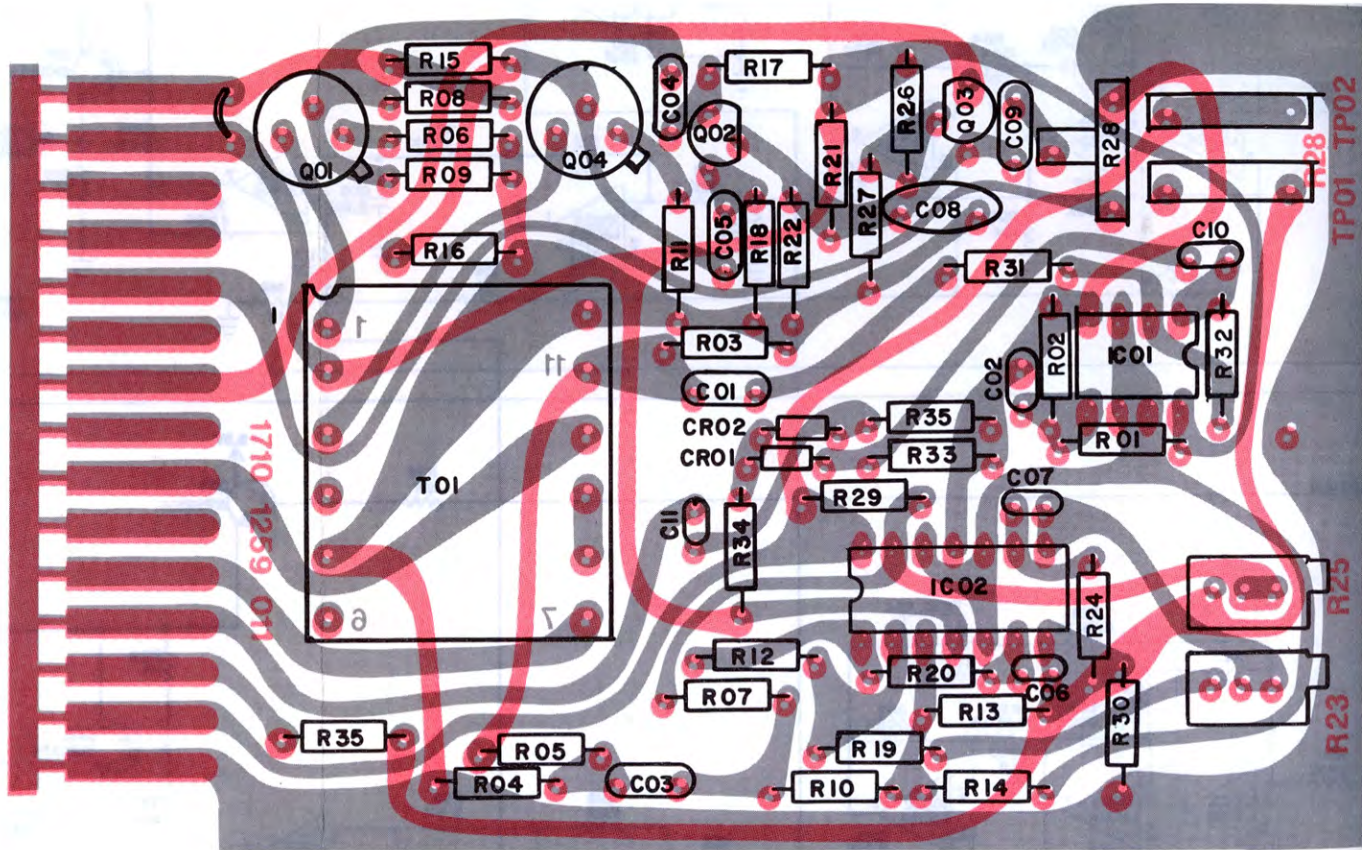


Two-channel receive control PCB
 Assembly
 C1259-105
 (See parts list 1939-1259-105)



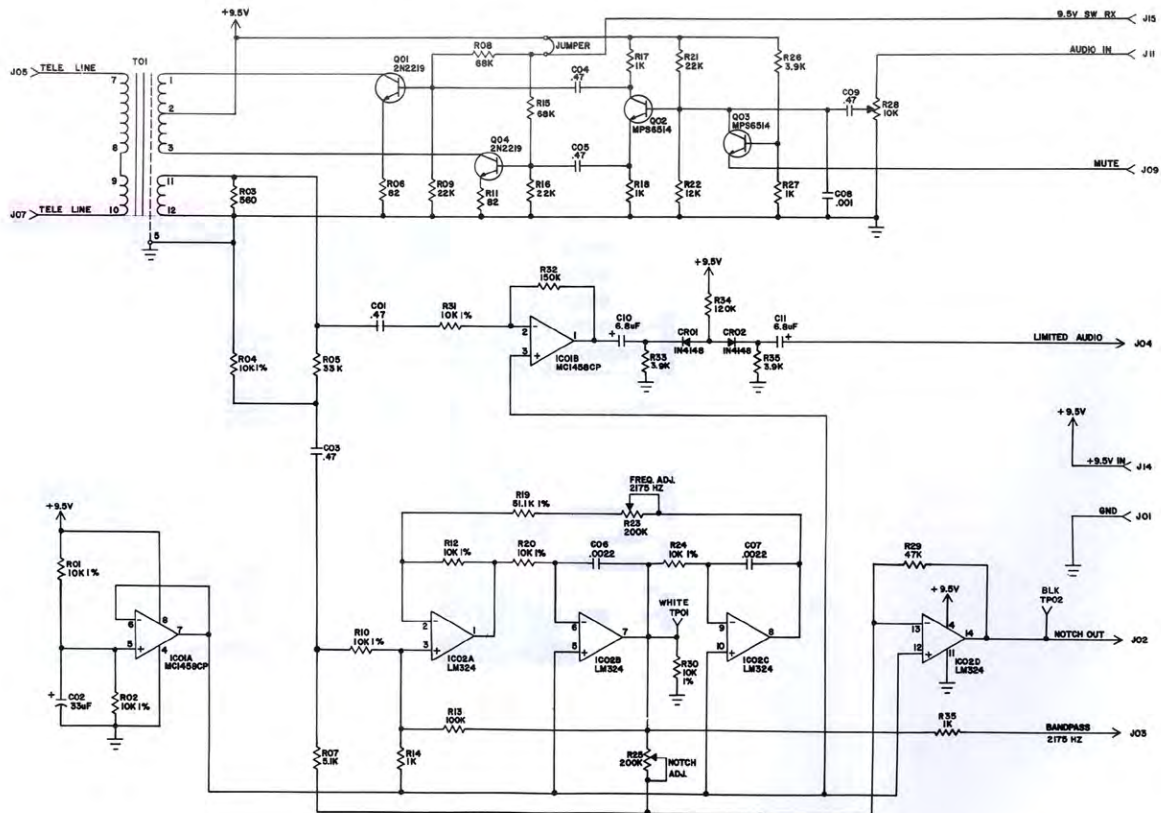
NOTES:
 1. UNLESS SHOWN OTHERWISE, RESISTOR VALUES ARE IN OHMS, 5.8 %, 1/4WATT, CAPACITOR VALUES GREATER THAN ONE ARE IN PICOFARADS AND VALUES IN DECIMAL ARE MICROFARADS, INDUCTANCE VALUES ARE IN MICRO-HENRY'S
 2. FOR COMPLETE RADIO COMPONENT REFERENCE DESIGNATION, PRECEDE NUMBERS WITH 4 . e.g., R39 BECOMES R439 .

Two-channel receive control PCB Schematic D1259-004

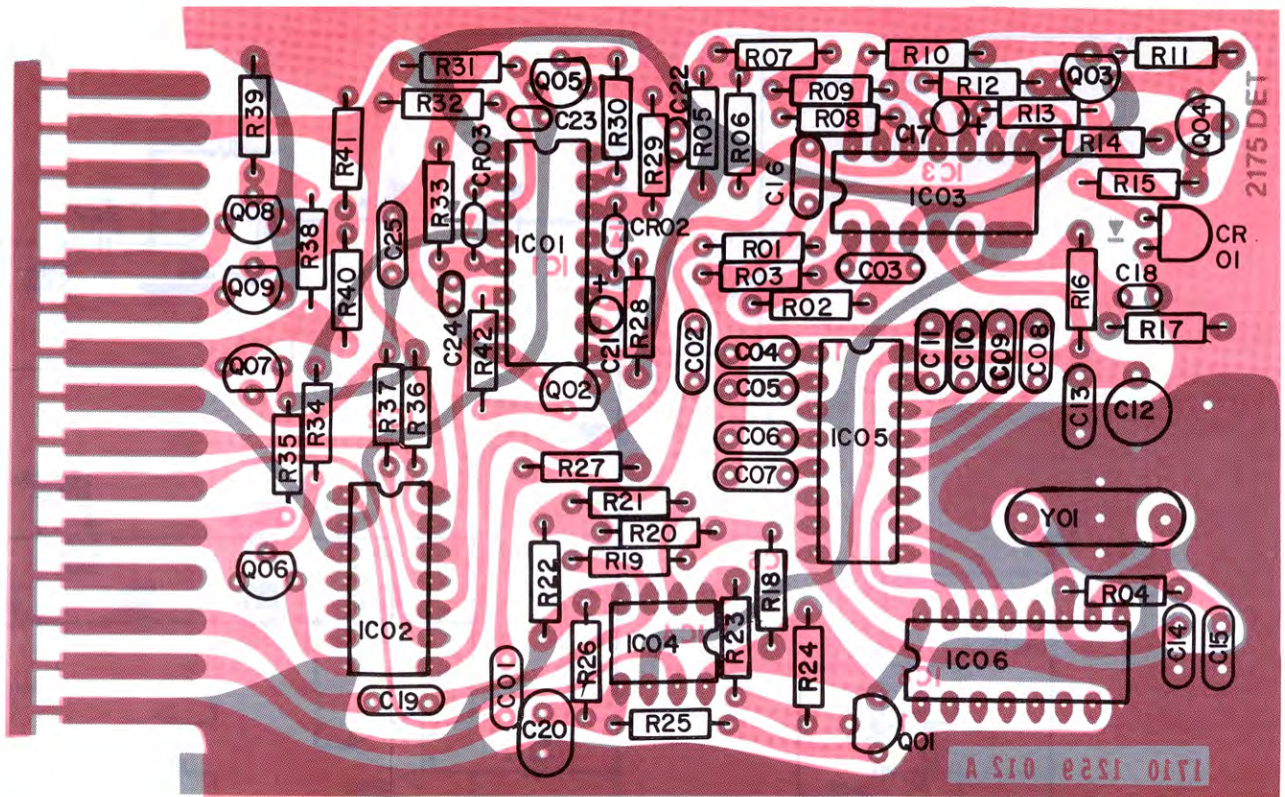


Audio line termination PCB
 Assembly
 C1259-102
 (See parts list 1939-1259-102)

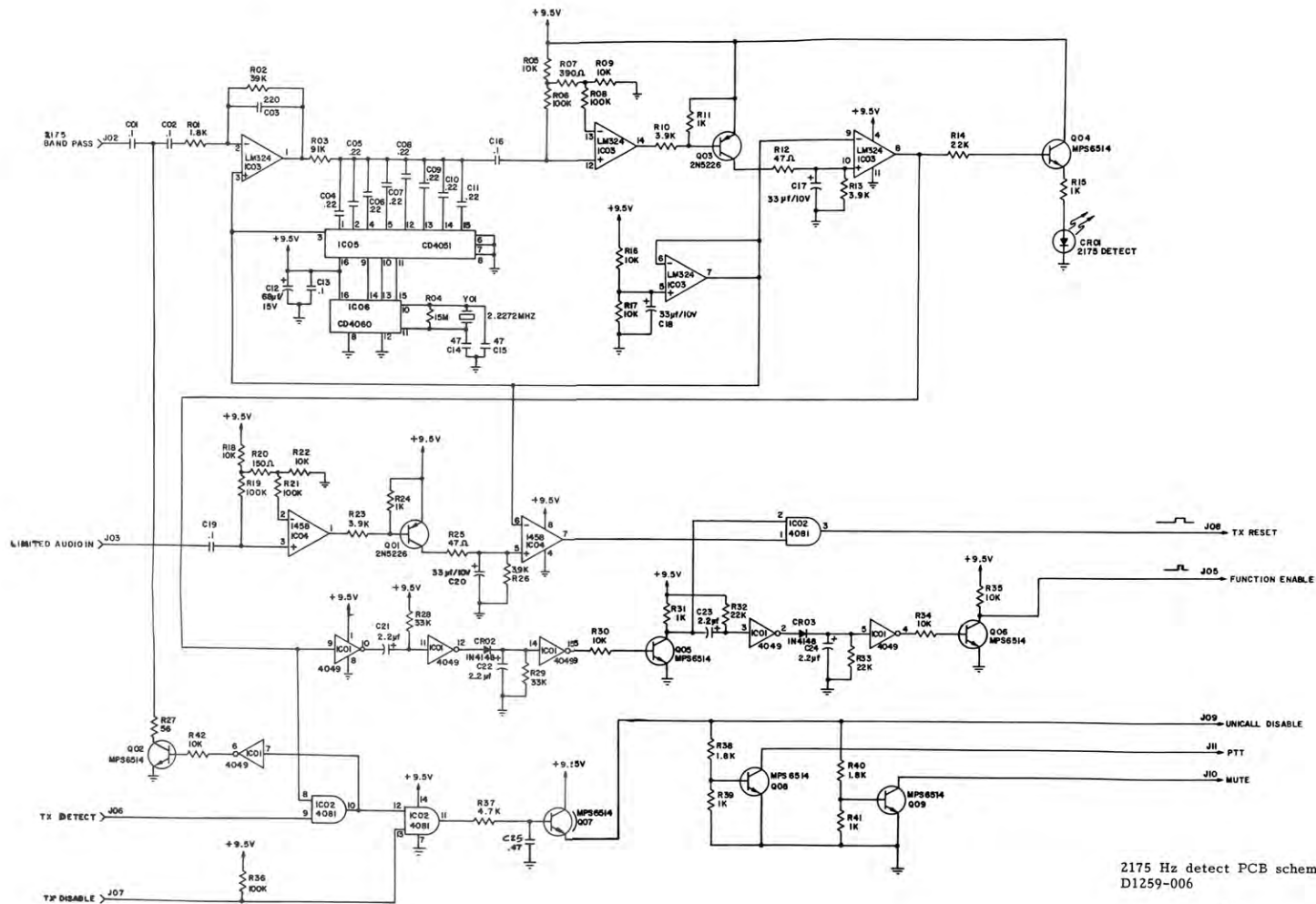
- NOTES:
- UNLESS SHOWN OTHERWISE, RESISTOR VALUES ARE IN OHMS, $\times 10^3$ K, $\times 10^4$ M, CAPACITOR VALUES GREATER THAN ONE ARE IN PICOFARADS AND VALUES IN DECIMAL ARE MICROFARADS, INDUCTANCE VALUES ARE IN MICRO-HENRY'S.
 - FOR COMPLETE RADIO COMPONENT REFERENCE DESIGNATION, PRECEDE NUMBERS WITH **S** . . . e.g. , R39 BECOMES R **S39** .



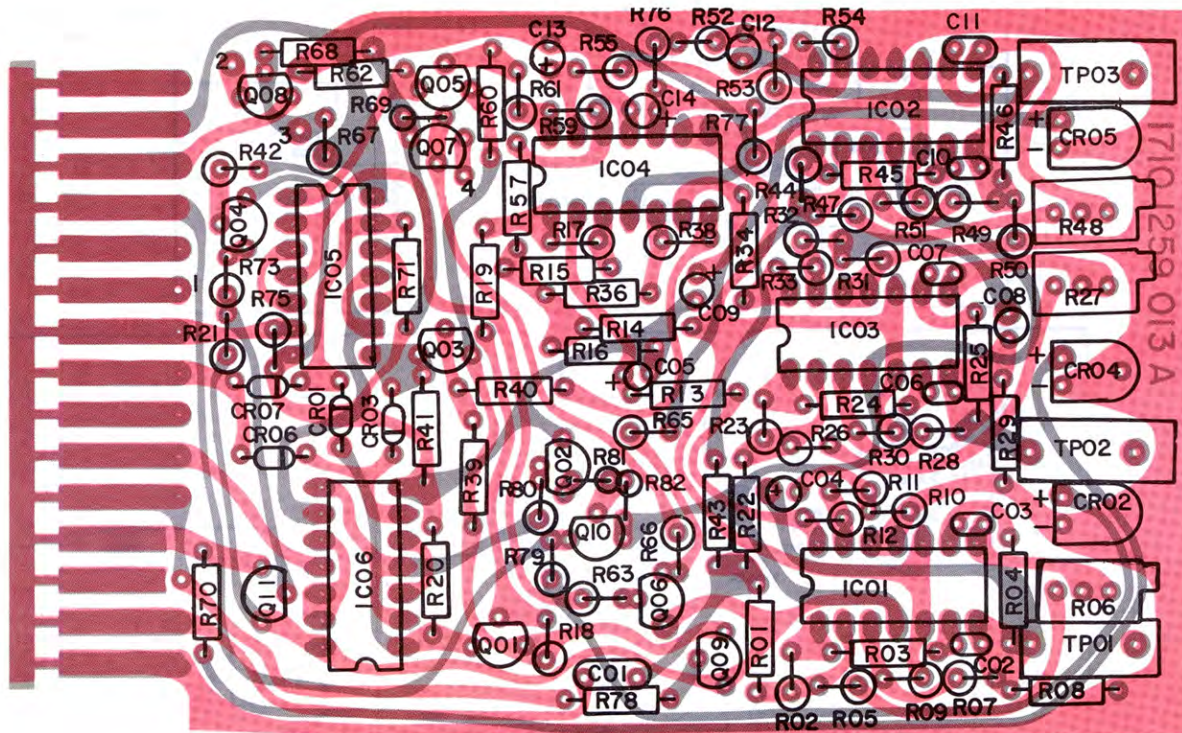
Audio line termination PCB
Schematic
D1259-005



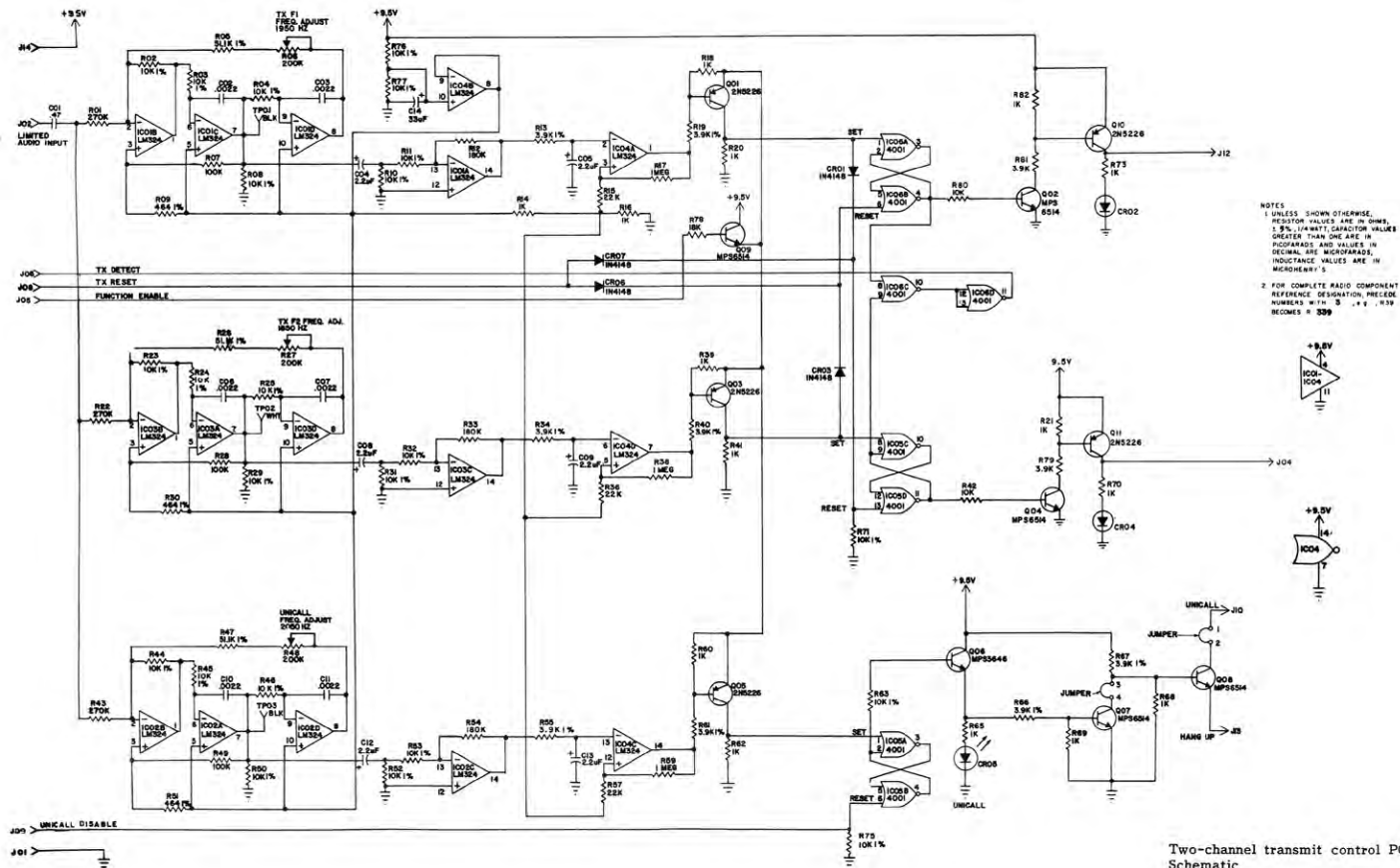
2175 Hz detect PCB assembly
 C1259-103
 (See parts list 1939-1259-103)



2175 Hz detect PCB schematic
D1259-006

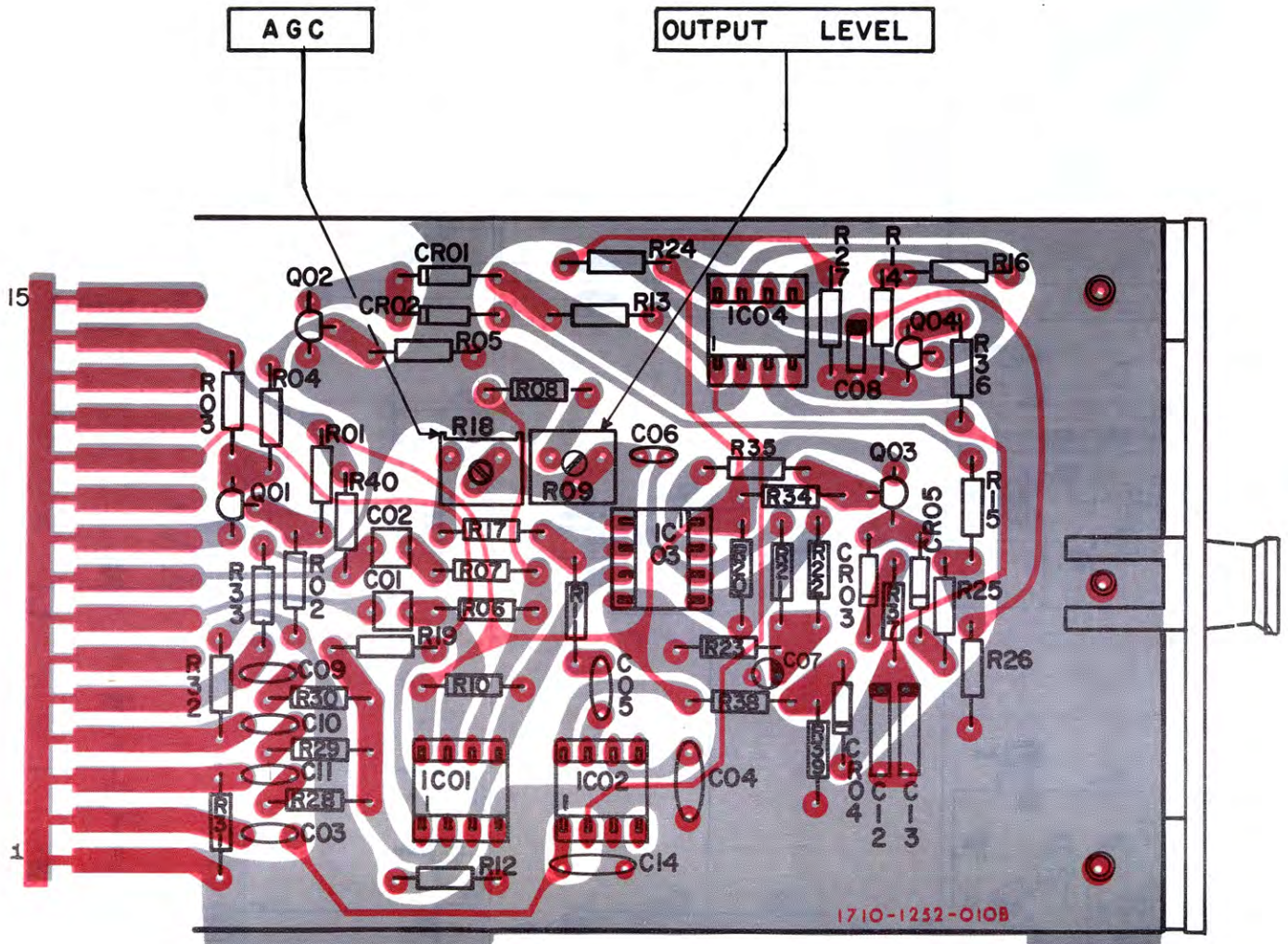


Two-channel transmit control PCB
 Assembly
 C1259-104
 (See parts list 1939-1259-104)

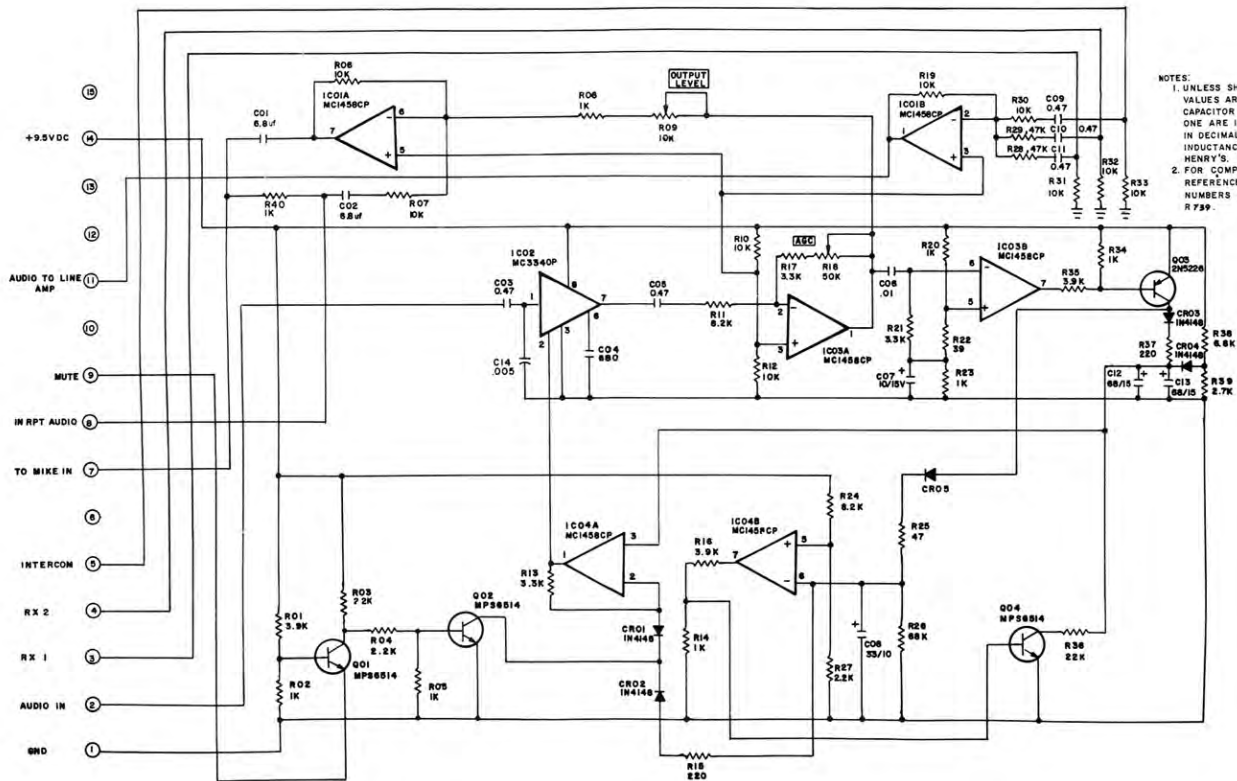


NOTES
 1 UNLESS SHOWN OTHERWISE, RESISTOR VALUES ARE IN OHMS, 5%, 1/4WATT, CAPACITOR VALUES GREATER THAN ONE ARE IN MICROFARADS AND VALUES IN DECIMAL ARE MICROFARADS, INDUCTANCE VALUES ARE IN MICROHENRYS.
 2 FOR COMPLETE RADIO COMPONENT REFERENCE DESIGNATION, PRECEED NUMBERS WITH: 3 . . . 4 . . . 5 . . . BECOMES # 339

Two-channel transmit control PCB Schematic D1259-003

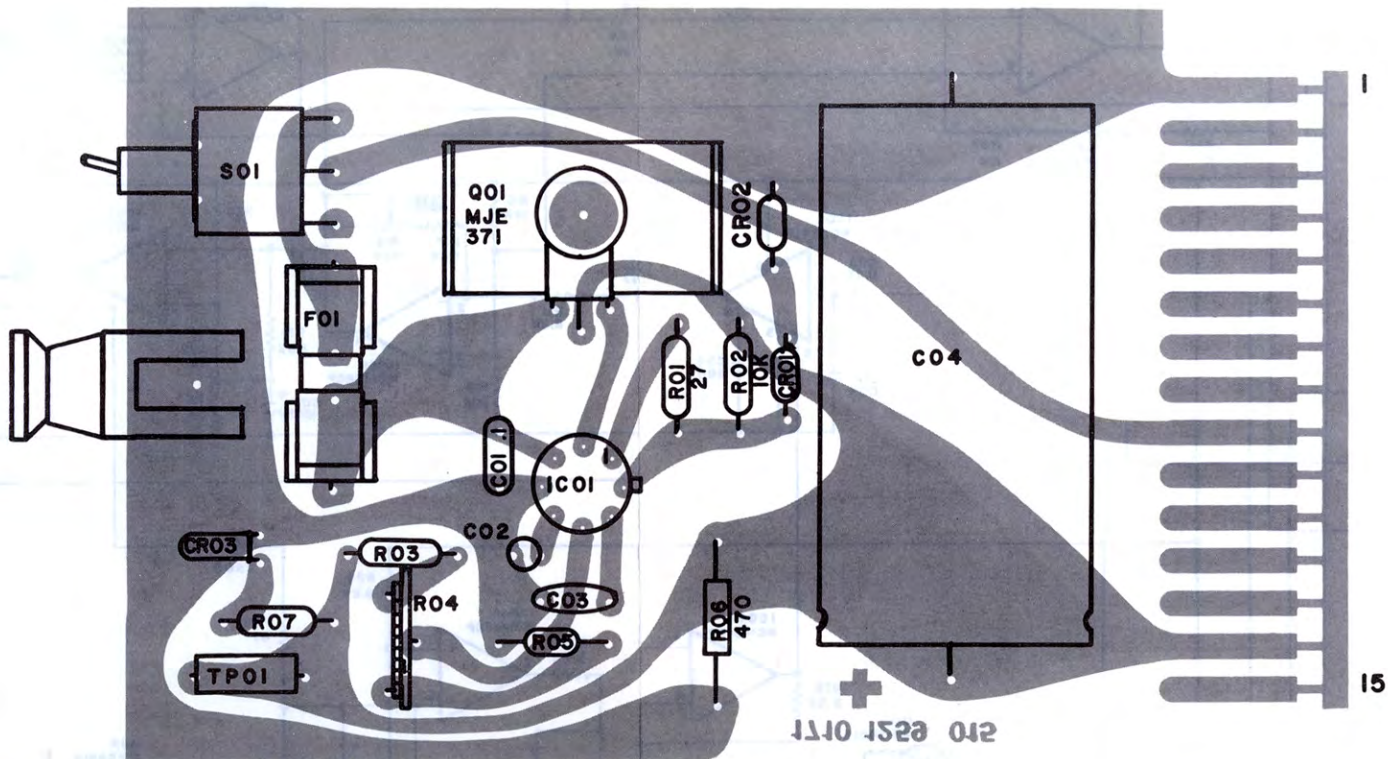


Audio processing PCB assembly
 C1252-032, Rev. B
 (See parts list 1939-1259-111)

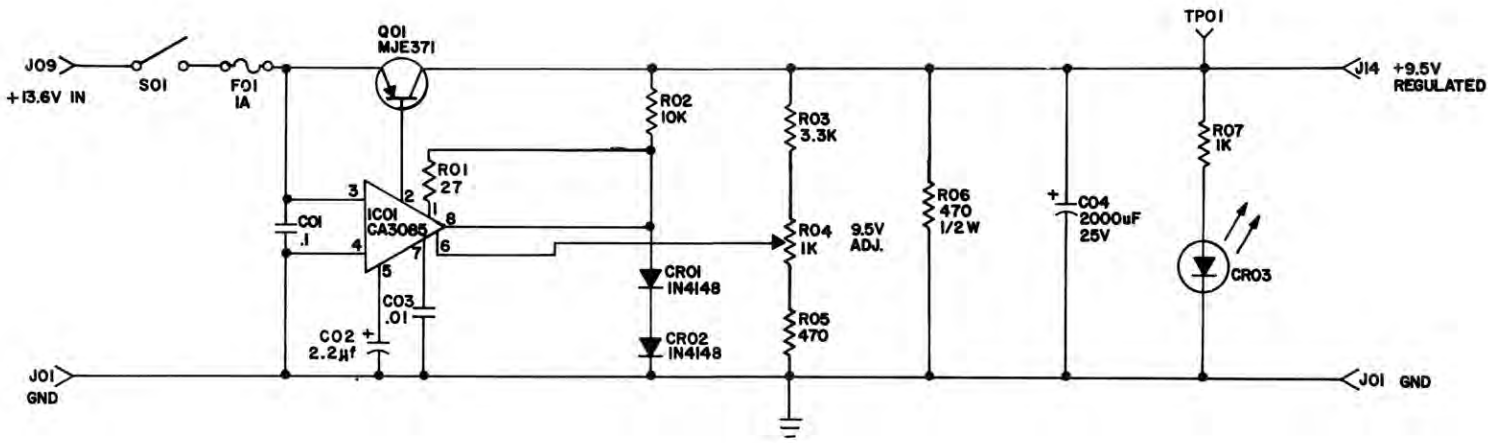


NOTES:
 1. UNLESS SHOWN OTHERWISE, RESISTOR VALUES ARE IN OHMS, 5.10%, 1/4WATT, CAPACITOR VALUES GREATER THAN ONE ARE IN PICOFARADS AND VALUES IN DECIMAL ARE MICROFARADS, INDUCTANCE VALUES ARE IN MICRO-HENRY'S.
 2. FOR COMPLETE RADIO COMPONENT REFERENCE DESIGNATION, PRECEDE NUMBERS WITH 7 .i.e., R39 BECOMES R739.

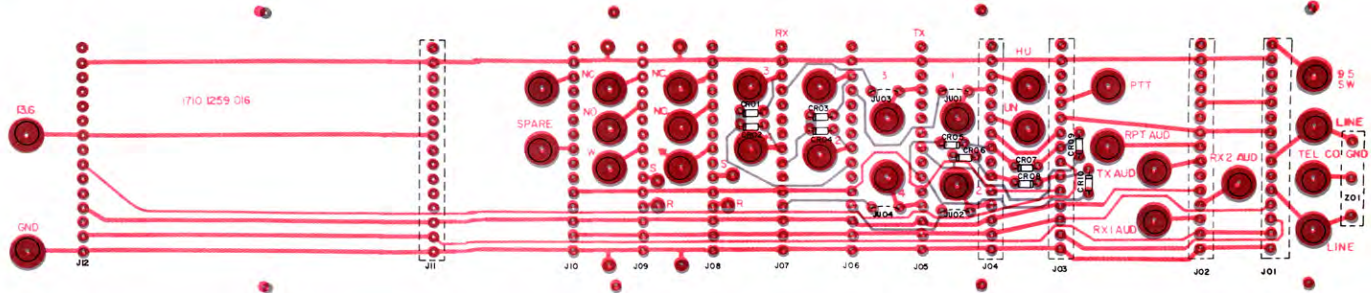
Audio processing PCB schematic
 D1252-006, Rev. B



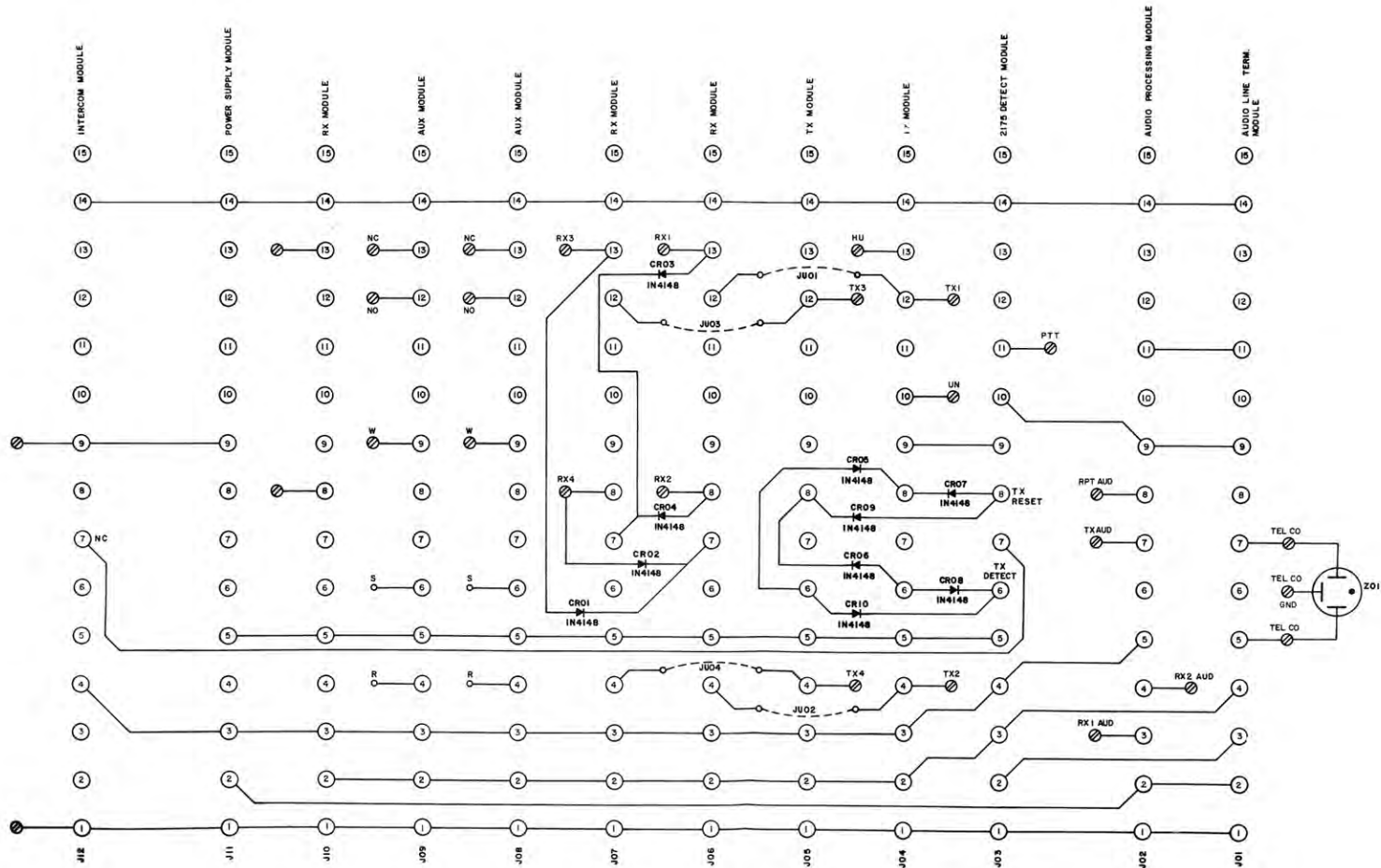
Power supply regulator PCB
 Assembly
 C1259-106, Rev. A
 (See part list 1939-1259-106)



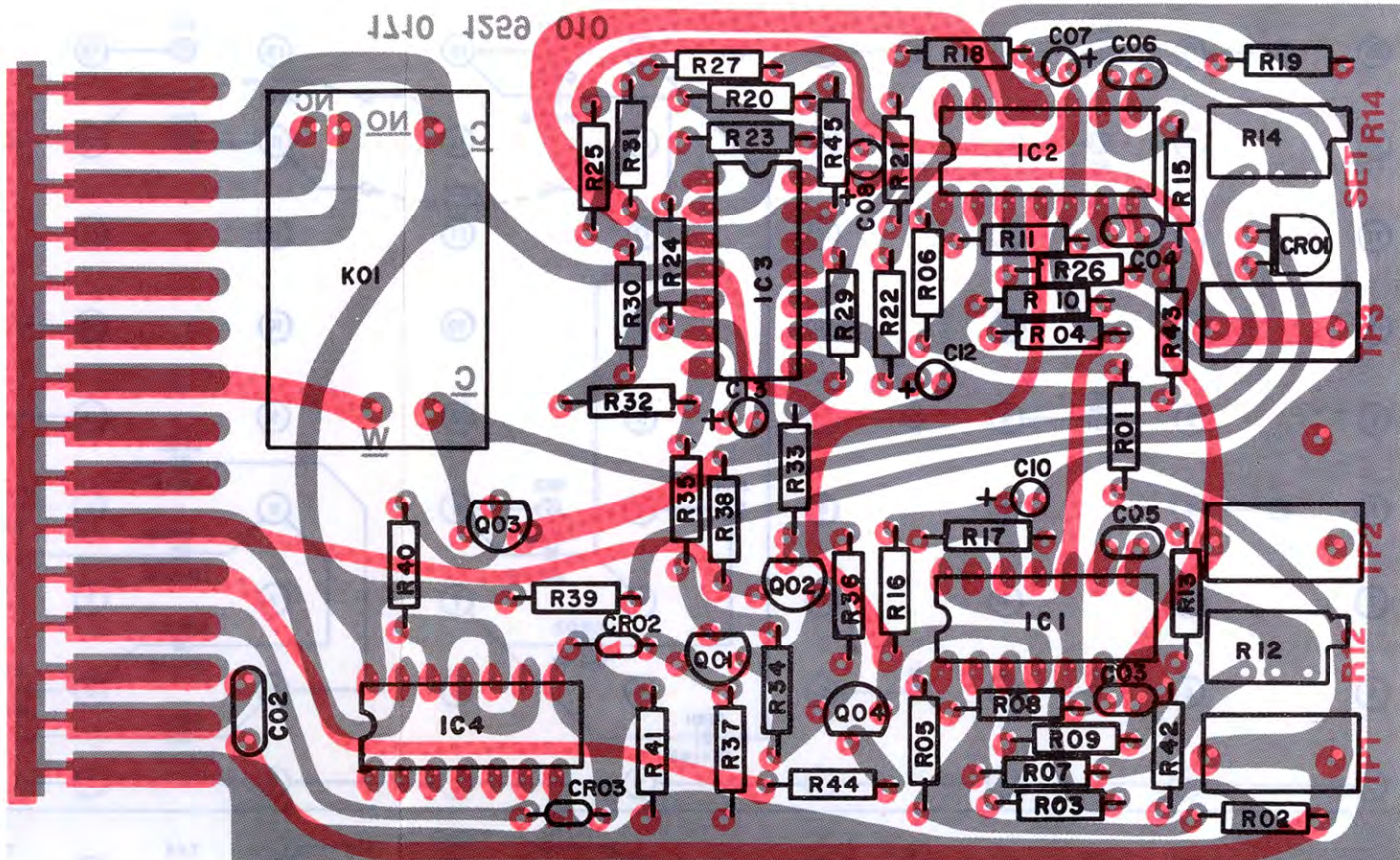
Power supply regulator PCB
 Schematic
 B1259-002, Rev. B



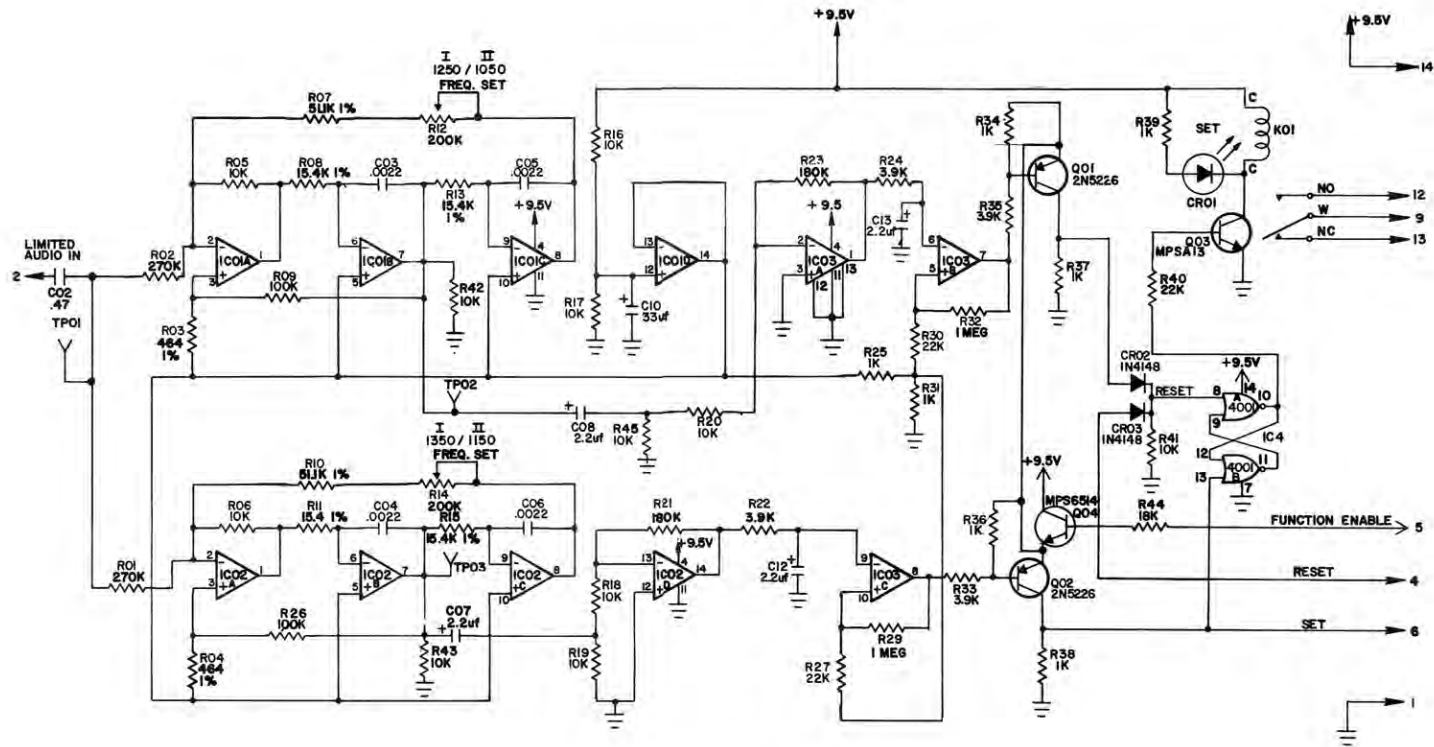
Backplane interconnect PCB
 Assembly
 D1259-107, Rev. A
 (See parts list 1939-1259-107)



Backplane interconnect PCB
Schematic
D1259-007, Rev. A

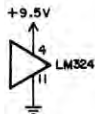


Optional auxiliary control PCB
 Assembly
 C1259-101
 (See parts list 1939-1259-101)

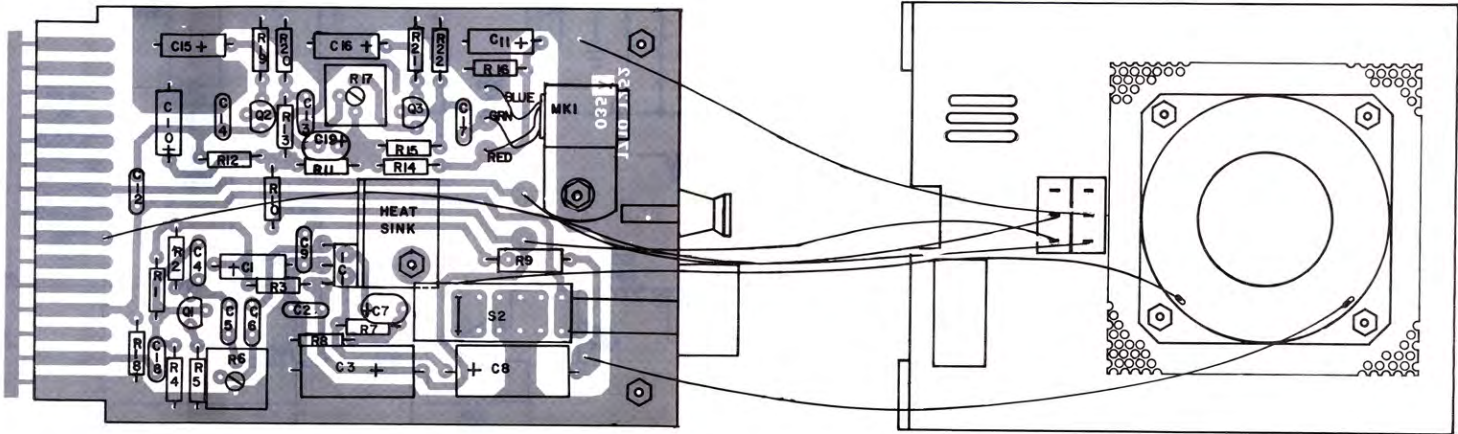


NOTES:

- UNLESS SHOWN OTHERWISE, ALL RESISTOR VALUES ARE IN OHMS, Ω , μ , k , M , CAPACITOR VALUES GREATER THAN ONE ARE IN PICOFARADS AND VALUES 26 DECIMAL ARE MICROFARADS. INDUCTANCE VALUES ARE IN MICRO- μ RYLES.
- FOR COMPLETE RADIO COMPONENT REFERENCE DESIGNATION, PRECEDE NUMBER WITH 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

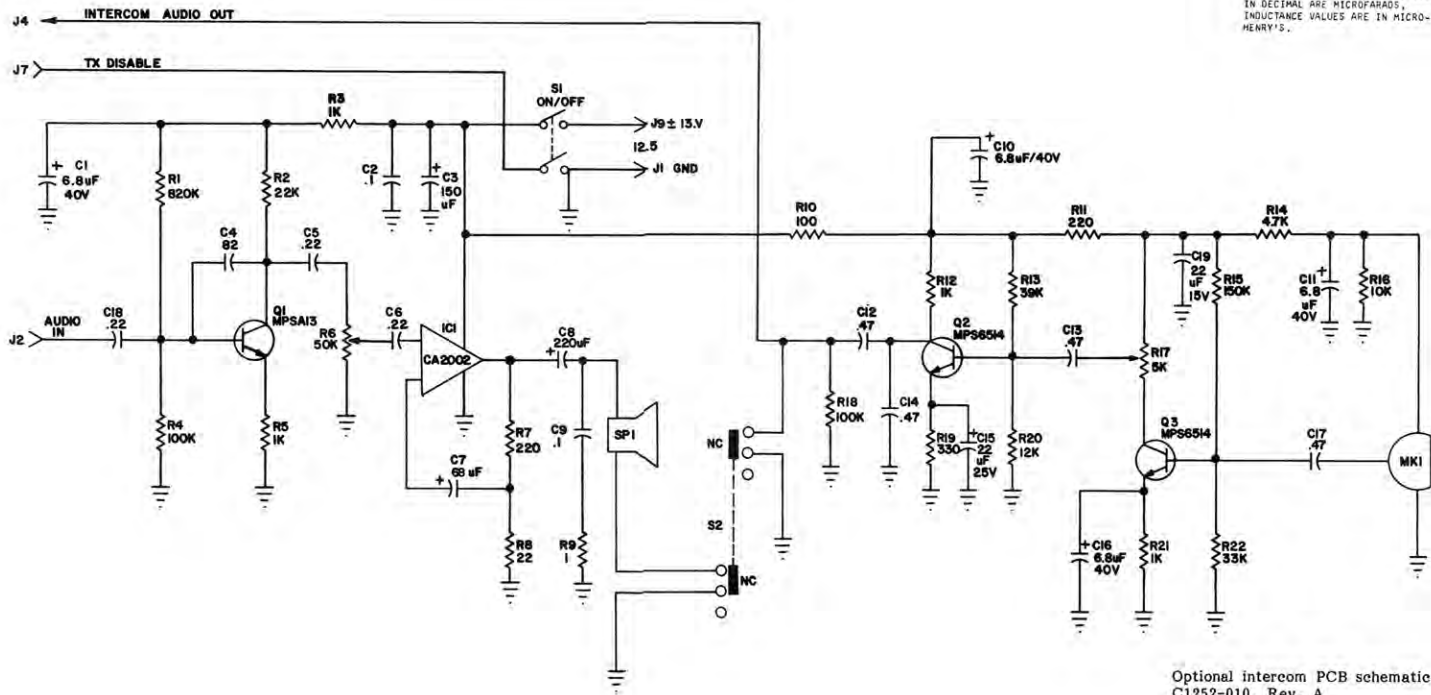


Optional auxiliary control PCB Schematic
C1259-001, Rev. A

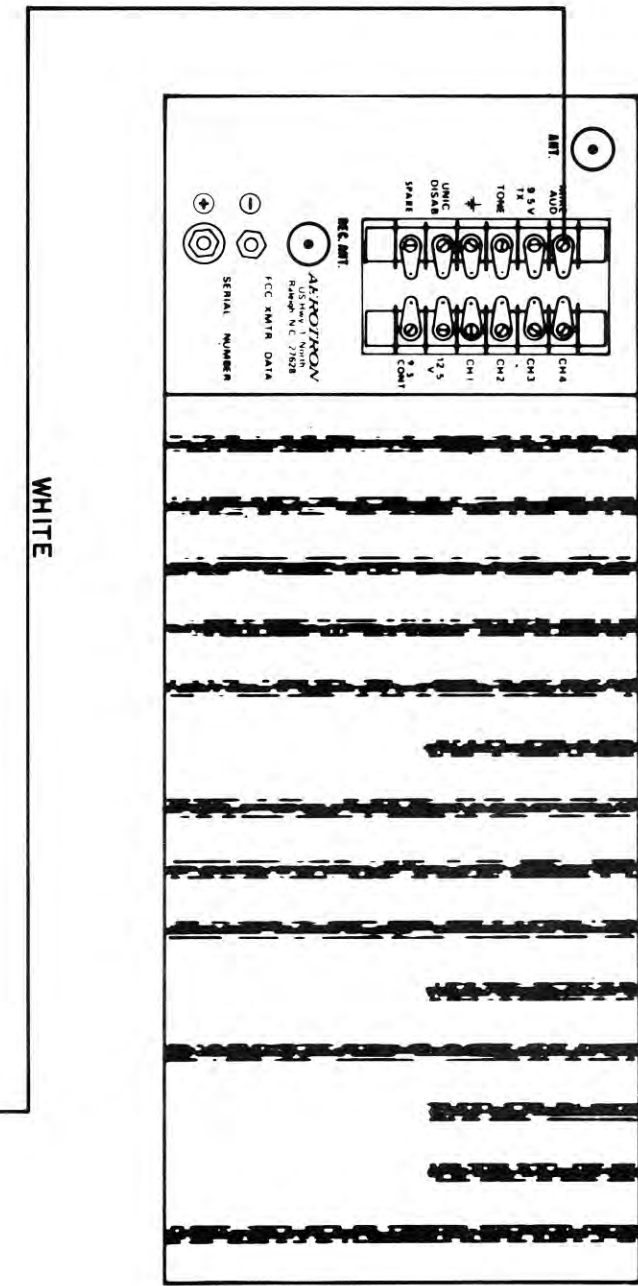
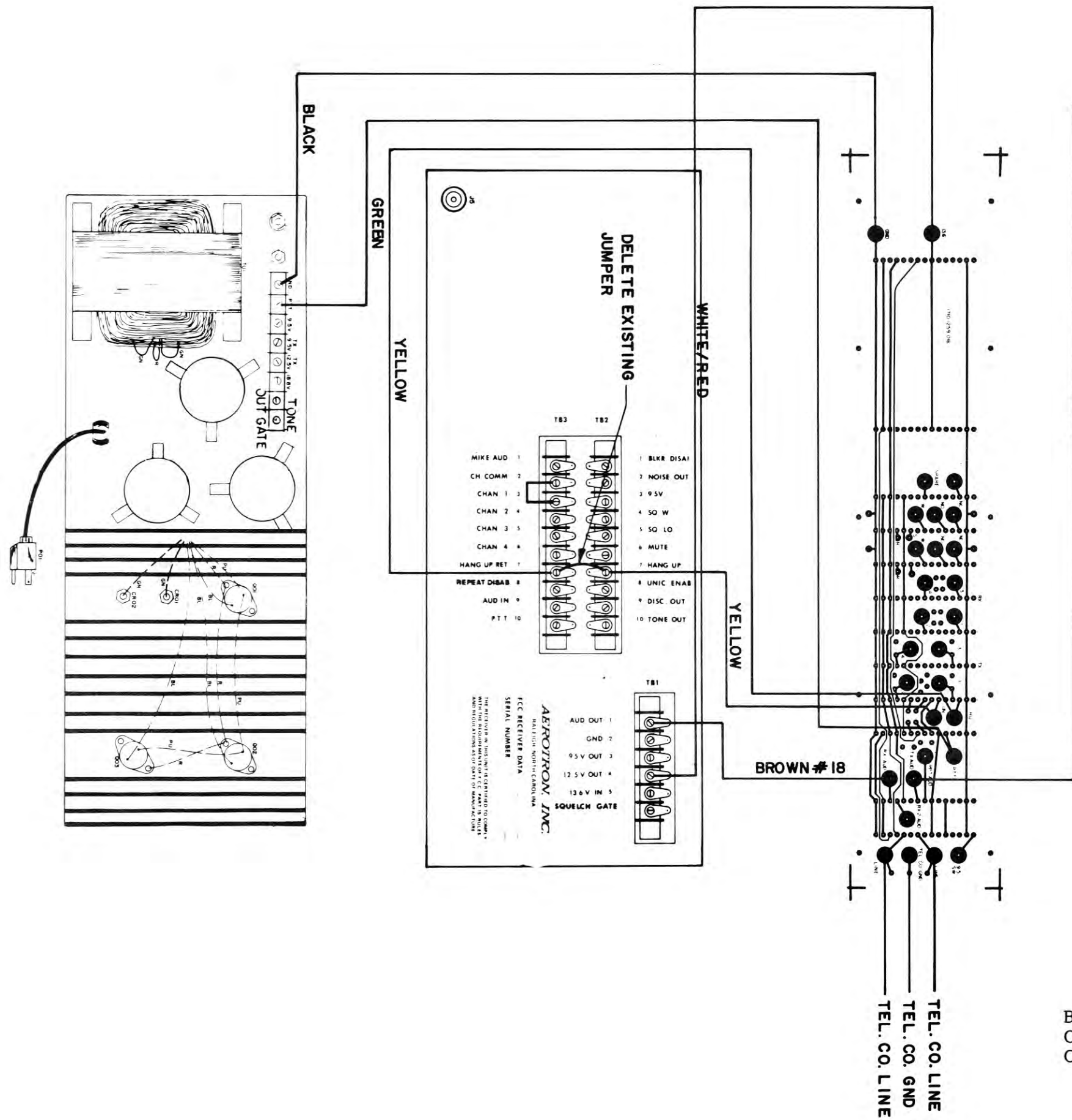


Optional intercom PCB assembly
 C1252-047, Rev. A
 (See parts list 1939-1252-111)

NOTES:
 1. UNLESS SHOWN OTHERWISE, RESISTOR VALUES ARE IN OHMS, $\pm 10\%$, $\frac{1}{4}$ WATT, CAPACITOR VALUES GREATER THAN ONE ARE IN PICOFARADS AND VALUES IN DECIMAL ARE MICROFARADS, INDUCTANCE VALUES ARE IN MICROHENRY'S.



Optional intercom PCB schematic
 C1252-010, Rev. A



Basic Wiring Diagram for Single Channel Base Station with Tone Remote C1259-108