Control Receive Audio (642-3572-( ))

Rockwell International

instructions

Collins Telecommunications Products Division

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1. DESCRIPTION

Control Receive Audio 642-3572-( ), shown in figure 1, is a 2-layer planar card with a 56-pin (2-layers, 28 pins each) edge-on connectors. All test points and adjustable resistors are mounted at the top edge of the card for easy access with the card installed in the unit.

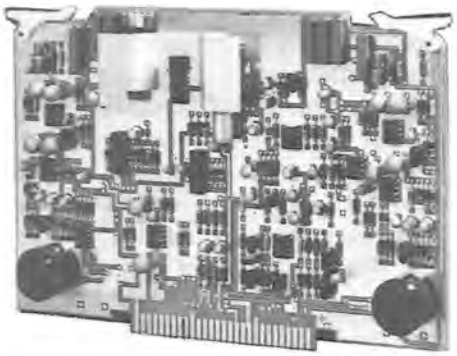
The control receive audio card configuration differences are as follows:

a. 642-3572-001 has an output transformer for use with 4-channel type radios.
b. 642-3572-002 has an output transformer for use with 2-channel type radios.

2. PRINCIPLES OF OPERATION

2.1 General

The control receive audio card consists of four primary circuits: (1) channel A line amplifier, (2) channel B line amplifier, (3) headphone amplifier, and (4) squelch circuit, including speaker amplifier. Additionally, two zener diodes are used to develop voltages for the squelch amplifier and headphone channel selector switching transistors. Other circuit voltages are applied directly from the unit power supply.



TPA-3179-017

Control Receive Audio
Figure 1

2.2 Line Audio Amplifiers (Refer to figure 2.)

Since the channel A and channel B line preamplifier/amplifier circuits are the same, only the channel A circuit is discussed.

The line input to channel A is amplified by U1B and applied to U1A through the CH A SPKR LVL potentiometer. The output of U1A is applied to U10A for application to the speaker selector switch, to headphone amplifier channel selector switch U6D, and to U2B through the CH A LINE ADJ potentiometer. Amplifier U2B is a driver for push-pull amplifier Q1/Q2. The output of Q1/Q2 goes to transformer T1 for output to external circuits and to U2A for rectification and filtering to develop the channel A receive metering signal.

2.3 Headphone Amplifier (Refer to figure 2.)

Amplification of the line amplifier output signals to the headphones is by a 2-stage amplifier. A level control (on the unit front panel) provides the operator with manual control of headphone signal level. This control is a gain adjustment for one stage of the amplifier circuit.

Signals to the headphone amplifier input are selectable between channel A and channel B. With channel A selected (by the front panel switch), Q9 conducts applying an enable signal to U6D through U6A. Switch U6D couples the line audio amplifier signal to the headphone amplifier circuit. Similar operation occurs when channel B is selected. Only one channel at a time can be selected for application to the headphone amplifier.

2.4 Squelch Circuit and Speaker Amplifier (Refer to figure 2.)

The output from speaker amplifier U9 is controlled by two sources: the front panel af gain control and the squelch amplifier. Input to the speaker amplifier passes through FET Q8. The FET serves as a squelch gate. With the squelch circuit disable (squelch enable line grounded), Q8 will conduct all signals applied to it. These signals are obtained from the channel A and B line amplifiers through the front panel speaker channel selector switch and the af gain control potentiometer.

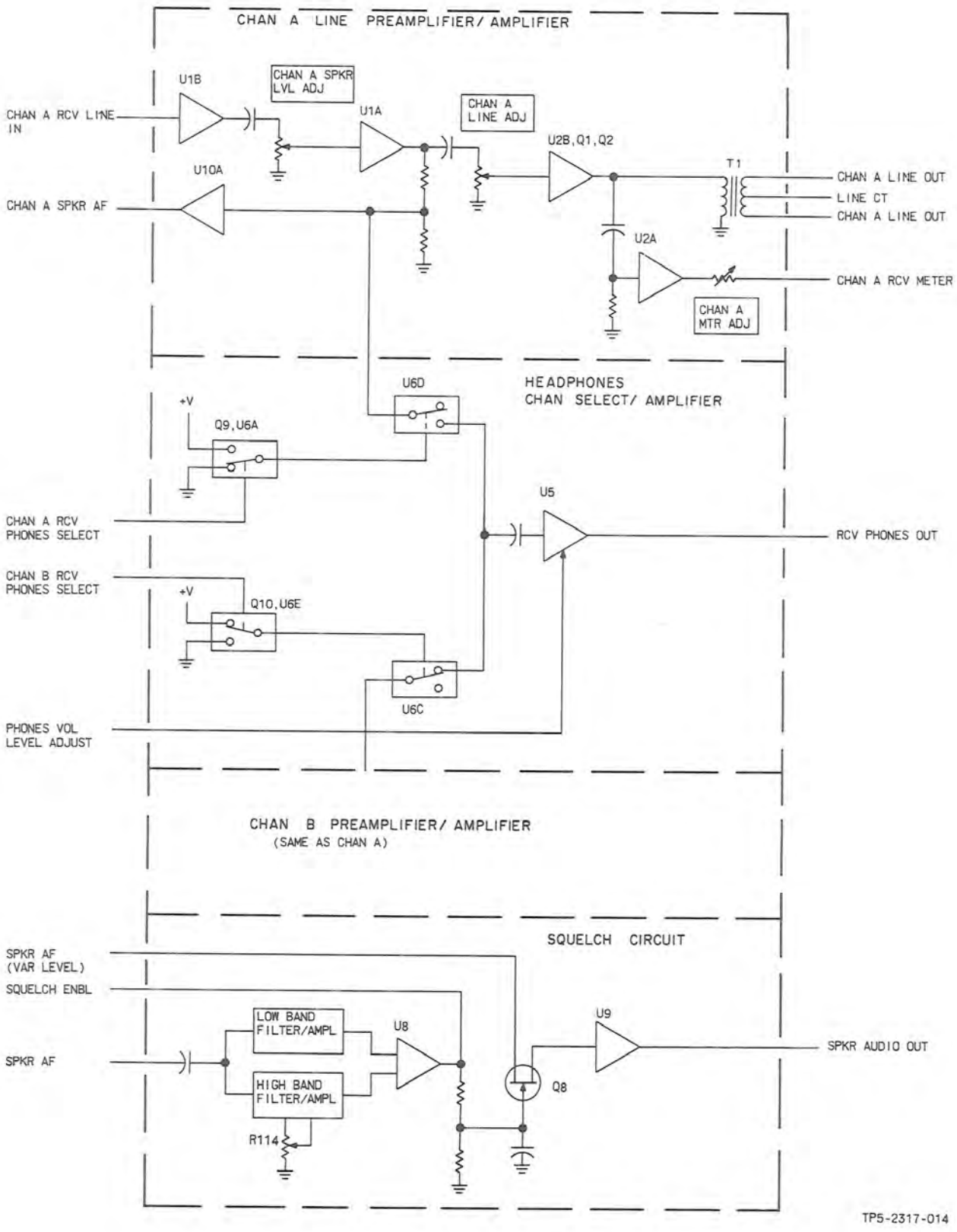
With squelch enabled, Q8 will conduct only when gated on by the output of a comparator in the squelch circuit. (The af signal level to he input of the speaker amplifier is controlled, as when squelch is disabled, by the front panel af gain control.) The squelch gating signal is developed from a comparison between the high and low frequencies of the audio signal from the line audio amplifier. A low frequency (voice) signal level greater than the high frequency (background noise) level will cause the squelch comparator to turn on the FET gate. This permits the audio signal to be applied to the speaker amplifier. With less low frequency signal level, the high frequency signals cause the comparator to keep Q8 gated off. The level at which Q8 gates on is adjustable by the squelch threshold signal from the front panel squelch control.

Paragraph 2.5 discusses the squelch circuit operation in detail.

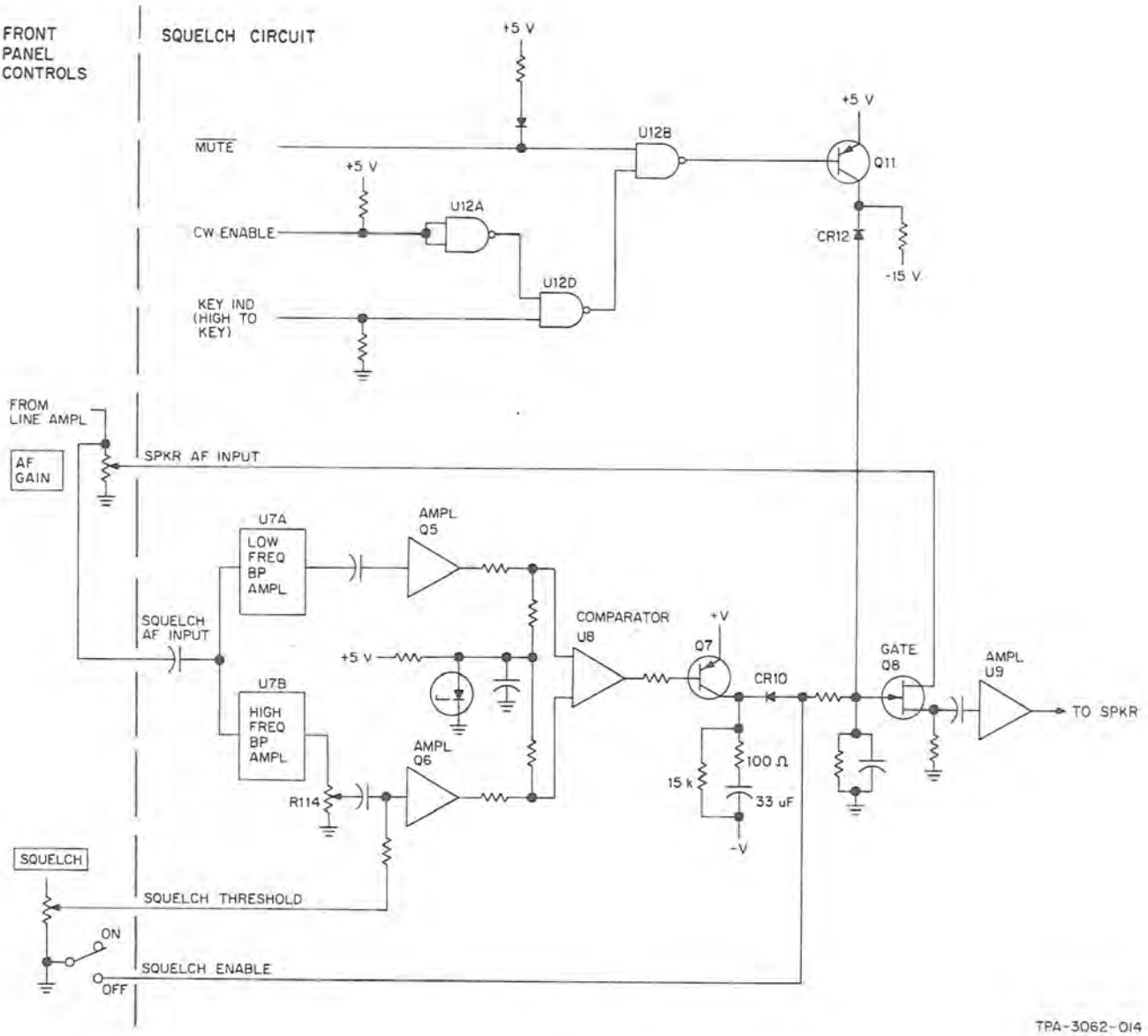
2.5 Squelch Circuit (Refer to figure 3.)

When the squelch circuit is enabled, the front panel squelch switch is disconnected from ground and the signal coupled through CR10 controls the gate voltage of Q8. (If no voltage is applied, Q8 is in the fully conducting mode. A negative voltage will cause Q8 to turn off.) This is the squelch gating for the received audio signal.

The squelch af signal is the received audio signal coupled from the line audio amplifier through the front panel speaker selection switch. This signal is applied in parallel to the low-frequency and high-frequency bandpass amplifiers. The low-frequency bandpass is centered on 600 Hz and the high-frequency bandpass on 2400 Hz. The high-frequency amplifier output is applied to amplifier Q6 through potentiometer R114. This permits adjusting the signal to Q6 to be greater than the signal applied directly to Q5 from the low-frequency amplifier. Because of this difference in levels, when no received audio signal is present the high-frequency signal input to comparator U8 will be greater than the low-frequency input to the comparator. Under this condition, the comparator output will keep transistor Q7 reverse biased. This causes CR10 to conduct, applying a negative voltage to the gate of Q8. With the gate negative, Q8 is biased off and no audio signals can be applied to the speaker amplifier. When a received audio signal is present, the low-frequency amplifier output is increased (due to the low-frequency components of voice characteristics). As the low frequency input to the comparator exceeds the high-frequency input, the comparator output forward biases Q7. This reverse biases CR10 and permits Q8 to conduct the received audio signals to the speaker amplifier.



Control Receive Audio, Simplified Diagram
Figure 2

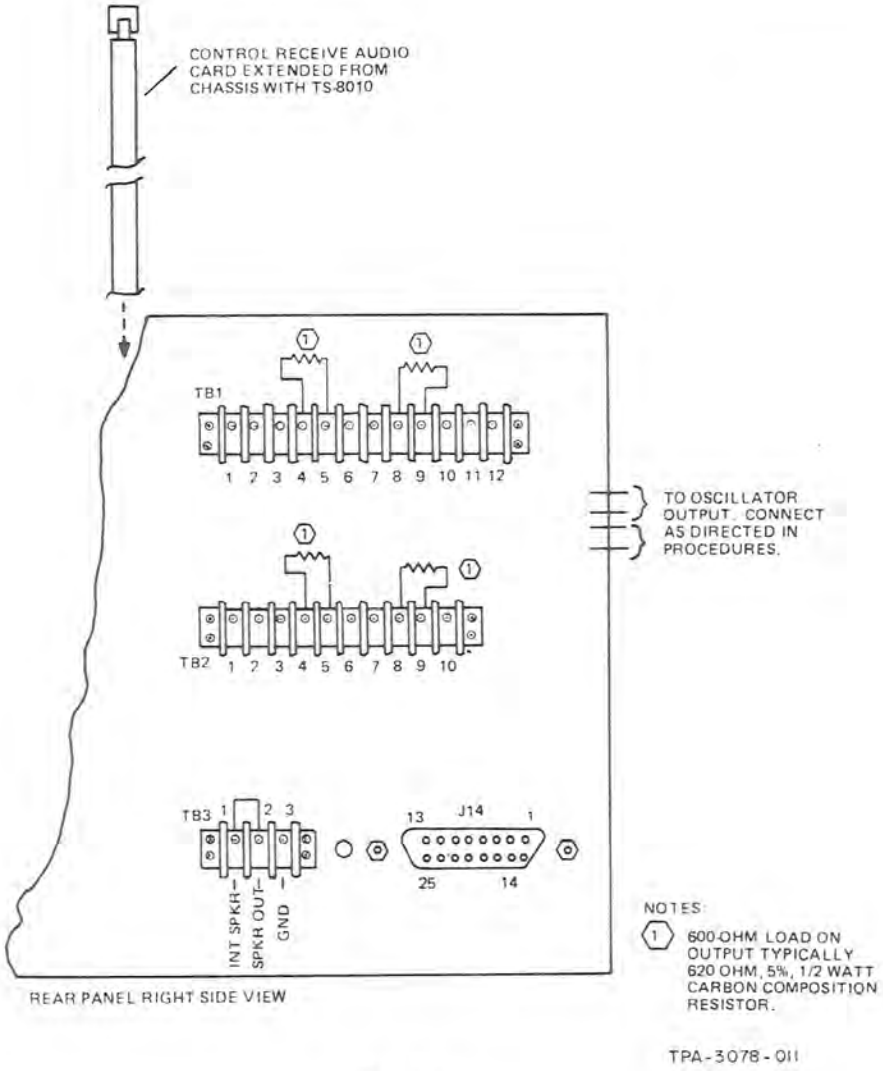


Squelch Circuit Diagram
Figure 3

The threshold at which squelch operation becomes effective is operator-adjustable at the front panel squelch control. This control is a potentiometer in the input circuit to Q6. By decreasing the squelch threshold, the comparator input from Q6 is changed to approach the inptu level of Q5. This decrease in the difference in signal levels to the comparator causes Q8 to be gated on sooner.

The speaker amplifier output is also controlled by the $\overline{\text{MUTE}}$, CW ENABLE and KEY IND logic inputs. To continuously mute the speaker audio, the $\overline{\text{MUTE}}$ input is utilized. A logic 0 $\overline{\text{MUTE}}$ ($\overline{\text{MUTE}}$ input grounded) input to U12B produces a logic 1 at the base of Q11, cutting off Q11. With Q11 cutoff a negative voltage is applied to the gate of Q8 through CR12. With the gate negative, Q8 is biased off and no audio signals can be applied to speaker amplifier U9.

The KEY IND and CW ENABLE inputs are for use with the HF-8092 Receiver-Exciter Control to control the speaker amplifier output during cw operation and when a microphone input is used.



Test Setup
Figure 4

When a microphone input is used, speaker to microphone feedback is prevented by the KEY IND input going to logic 1 when the microphone is keyed (MUTE is logic 1 and CW ENABLE is logic 0). This combination of logic inputs produces a logic 1 at the base of Q11 and, as described above, no audio can be applied to the speaker amplifier.

For cw operation, it is desirable to have speaker audio. To prevent the key input (KEY IND) from muting the speaker, the CW ENABLE input is a logic 1 ($\overline{\text{MUTE}}$ is also logic 1). The $\overline{\text{MUTE}}$ and CW ENABLE inputs produce a logic 0 at the base of Q11 (the logic 1 and 0 input at KEY IND input cannot affect the signal now at the base of Q11). A logic 0 on the base of Q11 causes Q11 to conduct. With Q11 conducting, a positive voltage is applied to the gate of Q8. With the gate positive, Q8 conducts and the audio is applied to the speaker amplifier.

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

Test equipment and power sources required to test, troubleshoot, and repair the control receive audio card are listed in the maintenance section of this instruction book.

3.2 Testing

The test procedures in table 1 check total performance of the control receive audio card. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault.

4. ALIGNMENT/ADJUSTMENT

Procedures for adjusting the variable controls on the control receive audio card are contained in the test procedures (table 1).

Perform the test setup step in the table. Refer to steps refrenced below for the applicable circuit adjustment.

Preamplifiers and line amplifiers	Step 2
Squelch	Step 4
Meter amplifier	Step 7

5. REPAIR

Repair of the control receive audio card is accomplished using standard maintenance and planar card repair procedures. Refer to the maintenance section of this instruction book for circuit card repair procedures.

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Test setup	a. Make sure the PWR switch is off. b. Remove the control audio card to be tested. Install it on an extender card and connect it to J4 in the control unit. c. Refer to test setup diagram and make connections shown.		
2. Preamplifiers and line amplifiers	***Note*** For testing purposes, the preamplifier/amplifier gain is standardized at unity (signal in = signal out). The gains are operator adjustable and may be set later as desired for individual unit operating conditions.		
2.1 Channel A	Perform test setup (test 1). Connect oscillator to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Set R6 and R15 fully cw (max gain). Turn on PWR switch.		
2.1.1 Signal presence	Adjust oscillator output to 1000 ±100 Hz and 0.77 V ac (0 dB mW). Check for output at TB1-4 and -5 (CH A1 RCV AF 600 ohms OUT).	Signal present. (Level not critical.)	If signal not present, check for signal at U1B-7. If no signal there, troubleshoot that circuit. If present, troubleshoot R6/U1A circuit. If signal present at U1A-1, set METER switch to A1AF +13FS and check for meter indication. If meter indicates output, troubleshoot T1 circuit. If output not present, check for signal at U2B-7. If no signal, troubleshoot U2B/R15 circuit. If signal is there, troubleshoot Q1, Q2 circuit.
2.1.2 Gain (Cont)	Measure output level at TB1-4 and -5.	Output not less than 3.9 V ac (+14 dB mW).	If output is less, measure signal level at U1B-7. If level less than 0.72 V ac, troubleshoot U1B circuit for low gain. If level equal to or greater than 0.72 V ac check level at U1A-1 for 8.0 V ac. If level at U1A-1 less than 8.0 V ac, troubleshoot

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2.1.2 (Cont)	a. Adjust R6 as required to obtain 4.3 ±0.5 V ac (+15 ±1 dB mW) at TB1-4 and -5. b. Adjust R15 as required to obtain 0.77 ±0.05 V ac (0 ±1 dB mW) at TB1-4 and -5.		U1A circuit for low gain. If level more than 8.0 V ac, troubleshoot U2B/Q1, Q2 circuit for low gain.
2.2 Channel B	Disconnect oscillator from TB1-2 and -3, and connect it to TB1-6 and -7 (CH B1 RCV AF 600 OHMS IN). Set R39 and R48 fully cw (max gain). Check that PWR switch is on.		
2.2.1 Signal presence	Adjust oscillator output to 1000 ±100 Hz and 0.77 V ac (0 dB mW). Check for output at TB1-8 and -9 (CH B1 RCV AF 600 OHMS OUT)	Signal present. (Level not critical.)	If signal not present, check for signal at U3B-7. If no signal there, troubleshoot that circuit. If present troubleshoot R39/U3A circuit. If signal is present at U3A-1, set METER switch to B1 AF (+13FS) and check for meter indication. If meter indicates output, troubleshoot T2 circuit. If no output, check for signal at U4B-7. If no signal there, troubleshoot U4B/R48 circuit. If signal is there, troubleshoot Q3, Q4 circuit.
2.2.2 Gain (Cont)	Measure output level at TB1-8 and -9.	Output not less than 3.9 V ac (+14 dB mW).	If output less, measure signal level at U3B-7. If level less than 0.72 V ac, troubleshoot U3B circuit for low gain. If level equal to or greater than 0.72 V ac, check level at U3A-1 for 8.0 V ac. If level at U3A-1 less than 8.0 V ac, troubleshoot U3A circuit for low gain. If level more than 8.0 V ac, troubleshoot U4B/Q3, Q4 circuit for low gain.

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2.2.2 (Cont)	a. Adjust R39 as required to obtain 4.3 ±0.5 V ac (+15 ±1 dB mW) at TB1-8 and -9. b. Adjust R48 as required to obtain 0.77 ±0.05 V ac (0 ±1 dB mW) at TB1-8 and -9.		
3. Headphone amplifier	Perform test setup (test 1) and connect oscillator output to TB1-6 and -7. Adjust oscillator for 1000 ±100 Hz and 0.77-V ac (0-dB mW) output. Set PHONES switch to B1, and connect headphones to PHONES jack or connect 600-Ω resistor across PHONES jack. Adjust PHONES level to midrange.		
3.1 Signal presence	Check headphone output for signal presence. (Adjust PHONES level as required.)	Signal present. (Level not critical.)	If signal not present, check for signal at U5A-1. If no signal there, troubleshoot U5A circuit. If signal is present, troubleshoot U5B and A2S19 circuits.
3.2 Gain	Set PHONES level to max cw position. Measure output level at PHONES jack (across headphones connector terminals, or 600-Ω resistor if used).	Output not less than 2.5 V ac (+10 dB mW).	If output less, troubleshoot U5A and U5B circuits for low gain.
4. Squelch	Perform test setup (test 1). Connect oscillator to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Set SPEAKER switch to A1. Turn on PWR switch. Turn on SQUELCH control and set to minimum (max ccw position before detent). Adjust AF GAIN to midrange or comfortable listening level.		
4.1 Operation	a. Set oscillator output level to 0 dB mW. Slowly vary frequency from 500 toward 3000 Hz until squelch occurs (audio output inhibited). Not frequency at which squelch occurs.	Squelch occurs between 1000 and 2000 Hz.	Perform squelch adjustment. If squelch not normal after adjustment, troubleshoot U8, Q6, Q7, and Q8 circuits.
	b. Measure the squelch delay for a fast frequency change from 600 to 3000 Hz.	The delay shall not exceed 3 seconds.	If delay is excessive, check delay at TP3. If delay is normal at TP3, troubleshoot Q8 circuit. If delay is abnormal at TP3, troubleshoot Q7 circuit.
	c. Reset oscillator frequency to 500 Hz and increase SQUELCH setting to midrange. Slowly increase frequency until squelch occurs. Note frequency at squelch.	Frequency at squelch is less than frequency noted in step a.	Same as step a.

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4.2 Adjustment	Set oscillator output level to -20 dB mW and frequency to 500 Hz.		
	a. Observe ac voltage at TP4 while slowly increasing oscillator frequency from 500 to 700 Hz. Note maximum voltage at TP4.	Voltage reaches a peak at frequency between 500 and 700 Hz.	Troubleshoot U7A circuit.
	b. Observe ac voltage at TP5 while slowly increasing oscillator frequency from 2000 to 2800 Hz. Note maximum voltage at TP5.	Voltage reaches a peak at frequency between 2000 and 2800 Hz.	Troubleshoot U7B circuit.
	c. Adjust R114 to obtain TP5 voltage 12 dB below that noted at TP4.		
5. Speaker amplifier	Perform test setup (test 1). Connect oscillator to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Adjust oscillator for 1000 Hz and 0-dB mW output. Set SPEAKER switch to A1, AF GAIN to maximum (max cw position), and SQUELCH to off (max ccw position). Turn on PWR switch.		
	Measure ac voltage across TB3-2 and -3 (speaker).	Voltage not less than 3.5 V ac.	Troubleshoot U9 circuit.
6. Switching	Perform test setup (test 1). Connect oscillator to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Adjust oscillator for 1000 ±100 Hz and 0.77 V ac (0 dB mW). Connect headphones or 600-Ω load to PHONES jack.		
6.1 Channel A phones	Set PHONES switch to A1. Adjust PHONES level control to midrange or comfortable volume level.		
	a. Check for signal at PHONES jack.	Signal present.	Troubleshoot Q9, U6A, and U6D circuits.
	b. Set PHONES switch to B1. Check for signal at PHONES jack.	No signal.	Troubleshoot Q9, U6A, and U6D circuits.
6.2 Channel B phones	Disconnect oscillator from TB1-2 and -3 and connect it to TB1-6 and -7.		
	a. Check for signal at PHONES jack.	Signal present.	Troubleshoot Q10, U6B, and U6C circuits.
	b. Set PHONES switch to A1. Check for signal at PHONES jack.	No signal.	Troubleshoot Q10, U6B, and U6C circuits.

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
7. Meter amplifier	Perform test setup (test 1). Connect oscillator output to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Adjust oscillator for 1000 ±100 Hz. Turn on PWR switch.		
7.1 Channel A	Adjust oscillator output level to obtain +10-dB mW signal at TB1-4 and -5 (CH A1 RCV AF 600 OHMS OUT).		
	a. Set METER switch to A1 AF +13FS and adjust R30 as required to obtain +10 DBM on meter.	+10 DBM attainable on meter.	Troubleshoot U2A circuit.
	b. Adjust oscillator output level to obtain 0-dB mW signal at TB1-4 and -5.		
	c. Set METER switch to A1 AF +3FS and observe meter indication.	Meter indicates 0 ±1 DBM.	Troubleshoot U2A circuit. If circuit check normal, troubleshoot front panel meter circuit.
7.2 Channel B	Disconnect oscillator from TB1-2 and -3 and connect it to TB1-6 and -7 (CH B1 RCV AF 600 OHMS IN). Adjust oscillator output level to obtain +10-dB mW signal at TB1-8 and -9 (CH B1 RCV AF 600 OHMS OUT).		
	a. Set METER switch to B1 AF +13FS and adjust R63 as required to obtain +10 DBM on meter.	+10 DBM attainable on meter.	Troubleshoot U4A circuit.
	b. Adjust oscillator output level to obtain 0-dB mW signal at TB1-8 and -9.		
	c. Set METER switch to B1 AF +3FS and observe meter indication.	Meter indicates 0 ±1 DBM.	Troubleshoot U4A circuit. If circuit checks normal, troubleshoot front panel meter circuit.
8. Mute	a. Perform test setup 1. Connect oscillator to TB1-2 and -3 (CH A1 RCV AF 600 OHMS IN). Turn on PWR switch.		
	b. Adjust oscillator for 1000 Hz and 0-dB mW output.		
	c. Set SPEAKER switch to A1, AF GAIN to maximum (max cw position), and SQUELCH to off (max ccw position).		
	d. Ground TB1-11 and check for signal at speaker.	No signal present.	Troubleshoot CR12, Q11 and U12B circuits.
(Cont)	e. Remove ground from TB1-11 and check for signal at speaker.	Signal present.	Troubleshoot U12B circuit.

Table 1. Control Receive Audio Card Testing and Troubleshooting Procedures (Cont).

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8. (Cont)	f. Ground J3 pin 38 and check for signal at speaker.	Signal present.	Troubleshoot U12D circuit.
	g. Connect +5 V dc to J3 pin 37 and check for signal at speaker.	No signal present.	Troubleshoot U12B, U12D and U12A circuits.
	h. Remove ground from J3 pin 38 and check for signal at speaker.	Signal present.	Troubleshoot U12B, U12D and U12A circuits.
	i. Remove the +5 V dc from J3 pin 37.		

6. PARTS LIST/DIAGRAMS

6.1 Introduction

Caution

This equipment contains electrostatic discharge sensitive (ESDS) devices. Special handling methods and materials must be used to prevent equipment damage. Refer to the maintenance section for the equipment before assembly/disassembly or repair is performed. ESDS items are identified in the description column of the parts list by (ESDS).

All supporting parts list illustrations that contain ESDS items are shown with the following symbol.

This paragraph assists in identification, requisition, and issuance of parts and in maintenance of the equipment. A parts location illustration, schematic diagram, parts list tabulation, and modification history are included in the schematic diagram (figure 5). The parts location illustration is a design engineering drawing that shows exact component placement on the circuit cards.

Use the reference designator indicated on the schematic and parts location diagram to locate parts in the parts list tabulation. The Collins part number and description are listed for each reference designator. In addition, the manufacturer's code and part number are listed when applicable.

6.2 Parts List

REF DES Column - Reference designator of each part/subassembly are listed in alphanumeric sequence. These are the reference designators shown on the parts location drawing and schematic diagram.

DESCRIPTION Column - Lists the noun name, modifier, descriptive information, and modifications.

Modifications are identified by an alphanumeric identifier assigned to each design change. These identifiers are referenced in the DESCRIPTION column of the parts list in parentheses and on the schematic diagram inside an arrow that points to the change. Each change relates to the revision identifier (REV) stamped on the circuit card/subassembly and is listed in the EFFECTIVITY column of the modification history.

COLLINS PART NUMBER Column - Lists the Collins part number for each item in the parts list.

USABLE ON CODE Column - Part variations within a group of equipment are indicated by a letter code (A, B, C, etc). Absence of a code indicates part applies to all models.

MFR CODE Column - Lists the manufacturer's code from which selected parts can be procured.

MFR PART NUMBER Column - Lists the manufacturer's part number for the selected parts.

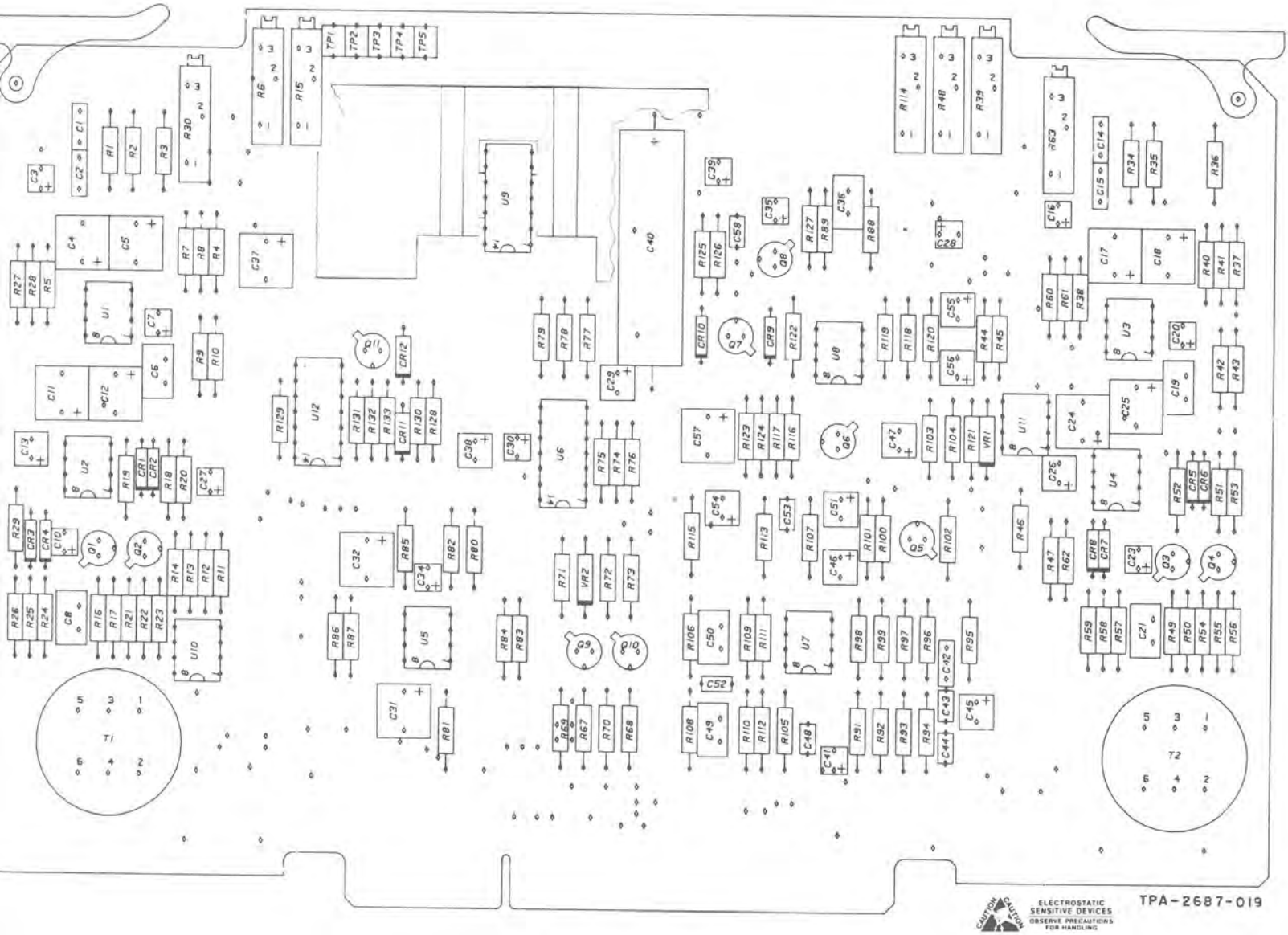
Listed below are the manufacturer's names and addresses for the manufacturer's codes used in this parts list.

CODE	MANUFACTURER'S NAME AND ADDRESS
00872	Teledyne Systems Co. Microelectronics Div. 12964 Panama St. Los Angeles, CA 90066
02735	RCA Corp. Solid State Division Route 202 Somerville, NJ 08876
03508	General Electric Co. Semi-Conductor Products Dept. W Genesee St. Auburn, NY 13021
04713	Motorola Inc. Semiconductor Products Group 5005 E McDowell Rd. Phoenix, AZ 85008
07263	Fairchild Camera and Instrument Corp. Semiconductor Div. 464 Ellis St. Mountain View, CA 94042
15818	Teledyne Semiconductor 1300 Terra Bella Ave. Mountain View, CA 94043
16546	Globe-Union Inc. USCC/Centralab Electrics Div. 4561 Colorado Los Angeles, CA 90039
27014	National Semiconductor Corp. 2900 Semiconductor Dr. Santa Clara, CA 95051
56289	Sprague Electric Co. North Adams, MA 01247
73386	Freed Transformer Co., Inc. 1736 Weirfield St. Brooklyn, NY 11227
74970	Johnson E.F. Co. 299 10th Ave. SW Waseca, MN 56093
80294	Bourns Inc. Instrument Div. 6135 Magnolia Ave. Riverside, CA 92506
81349	Military Specification
98330	Polyphase Instrument Co. E Fourth St. Bridgeport, PA 19405

6.3 Equipment Covered

Listed below are the circuit cards/subassemblies with the latest effectivity covered by these instructions.

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Control Receive Audio	642-3572-001	REV A
Control Receive Audio	642-3572-002	REV A



Control Receive Audio, Schematic Diagram
Figure 5 (Sheet 1 of 4)

PARTS LIST

REF DES	DESCRIPTION	COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
	CONTROL RECEIVE AUDIO (ESDS)	642-3572-001	A		
	CONTROL RECEIVE AUDIO (ESDS)	642-3572-002	B		
CR1-CR12	SEMICOND DEVICE	353-3644-010		03508	1N4454GE
C1,C2	CAPACITOR,FXD CER DIEL, 1UF, 20%, 50V	913-3279-270		16546	CY30C105M
C3	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C4,C5	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C6	CAPACITOR,FXD MICA DIEL, 82PF, 5%, 500V	912-3873-000		81349	CM04ED820J03
C7	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C8	CAPACITOR,FXD MICA DIEL, 150PF, 5%, 500V	912-3891-000		81349	CM04FD151J03
C9	NOT USED				
C10	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C11,C12	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C13	CAPACITOR,FXD TNTLM ELCTLT, 10UF, 20%, 20V	184-9102-170		56289	199D106X0020CB1
C14,C15	CAPACITOR,FXD CER DIEL, 1UF, 20%, 50V	913-3279-270		16546	CY30C105M
C16	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C17,C18	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C19	CAPACITOR,FXD MICA DIEL, 82PF, 5%, 500V	912-3873-000		81349	CM04ED820J03
C20	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C21	CAPACITOR,FXD MICA DIEL, 150PF, 5%, 500V	912-3891-000		81349	CM04FD151J03
C22	NOT USED				
C23	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C24,C25	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C26	CAPACITOR,FXD TNTLM ELCTLT, 10UF, 20%, 20V	184-9102-170		56289	199D106X0020CB1
C27,C28	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C29	CAPACITOR,FXD TNTLM ELCTLT, 10UF, 20%, 20V	184-9102-170		56289	199D106X0020CB1
C30	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C31,C32	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C33	NOT USED				
C34	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C35	CAPACITOR,FXD TNTLM ELCTLT, 0.47UF, 20%, 35V	184-9102-330		56289	199D474X0035AB1
C36	CAPACITOR,FXD MICA DIEL, 82PF, 5%, 500V	912-3873-000		81349	CM04ED820J03
C37	CAPACITOR,FXD TNTLM ELCTLT, 47UF, 20%, 20V	184-9102-630		56289	199D1022
C38	CAPACITOR,FXD TNTLM ELCTLT, 0.47UF, 20%, 35V	184-9102-330		56289	199D474X0035AB1
C39	CAPACITOR,FXD TNTLM ELCTLT, 0.33UF, 20%, 35V	184-9102-320		56289	199D334X0035AB1
C40	CAPACITOR,FXD ELCTLT, 220UF, M10%P75%, 20V	183-1277-200		56289	600D227G020DG5
C41	CAPACITOR,FXD TNTLM ELCTLT, 1UF, 20%, 35V	184-9102-350		56289	199D105X0035BB1
C42	CAPACITOR,FXD CER DIEL, 0.022UF, PORM10%, 100V	913-5019-360		81349	CK06BX223K
C43,C44	CAPACITOR,FXD CER DIEL, 0.01UF, PORM10%, 100V	913-5019-200		81349	CK05BX103K
C45-C47	CAPACITOR,FXD TNTLM ELCTLT, 4.7UF, 20%, 35V	184-9102-390		56289	199D475X0035DB1
C48	CAPACITOR,FXD CER DIEL, 0.01UF, PORM10%, 100V	913-5019-200		81349	CK05BX103K
C49,C50	CAPACITOR,FXD MICA DIEL, 330PF, 5%, 100V	912-3915-000		81349	CM04FA331J03
C51	CAPACITOR,FXD TNTLM ELCTLT, 4.7UF, 20%, 35V	184-9102-390		56289	199D475X0035DB1
C52	CAPACITOR,FXD CER DIEL, 680PF, 10%, 200V	913-4016-000		81349	CK05BX681K
C53	CAPACITOR,FXD CER DIEL, 0.01UF, PORM10%, 100V	913-5019-200		81349	CK05BX103K
C54-C56	CAPACITOR,FXD TNTLM ELCTLT, 4.7UF, 20%, 35V	184-9102-390		56289	199D475X0035DB1
C57	CAPACITOR,FXD TNTLM ELCTLT, 33UF, 20%, 25V	184-9102-700		56289	199D1024
C58	CAPACITOR,FXD CER DIEL, 3300PF, PORM10%, 100V	913-5019-140		81349	CK05BX332K
Q1	TRANSISTOR	352-0661-020		07263	2N2222A
Q2	TRANSISTOR	352-0551-010		15818	2N2907A
Q3	TRANSISTOR	352-0661-020		07263	2N2222A
Q4	TRANSISTOR	352-0551-010		15818	2N2907A
Q5,Q6	TRANSISTOR	352-0661-020		07263	2N2222A
Q7	TRANSISTOR	352-0551-010		15818	2N2907A
Q8	TRANSISTOR (ESDS)	352-0759-020		00853	2N4092
Q9,Q10	TRANSISTOR	352-0661-020		07263	2N2222A
Q11	TRANSISTOR	352-0551-010		15818	2N2907A
R1	RESISTOR,FXD FILM, 604 OHMS, 1%, 1/8W	705-3600-860		81349	RN55D6040F
R2-R5	RESISTOR,FXD FILM, 100K, 1%, 1/8W	705-1092-000		81349	RN55D1003F
R6	RESISTOR,VAR CERMET, 10K, 10%, 3/4W	382-0012-290		80294	3006P1-103
R7,R8	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R9	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R10	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R11	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000		81349	RCR07G101KS
R12,R13	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000		81349	RCR07G102KS
R14	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R15	RESISTOR,VAR CERMET, 10K, 10%, 3/4W	382-0012-290		80294	3006P1-103
R16	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R17	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W	745-0809-000		81349	RCR07G473KS
R18	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000		81349	RCR07G101KS
R19,R20	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000		81349	RCR07G472KS
R21,R22	RESISTOR,FXD CMPSN, 47 OHMS, 10%, 1/4W	745-0701-000		81349	RCR07G470KS
R23	RESISTOR,FXD FILM, 140 OHMS, 1%, 1/8W	705-0955-000		81349	RN55D1400F
R24,R25	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R26	RESISTOR,FXD CMPSN, 12K, 10%, 1/4W	745-0788-000		81349	RCR07G123KS
R27,R28	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R29	RESISTOR,FXD CMPSN, 560 OHMS, 10%, 1/4W	745-0740-000		81349	RCR07G561KS
R30	RESISTOR,VAR CERMET, 5K, 10%, 3/4W	382-0012-280		80294	3006P1-502
R31-R33	NOT USED				
R34	RESISTOR,FXD FILM, 604 OHMS, 1%, 1/8W	705-3600-860		81349	RN55D6040F
R35-R38	RESISTOR,FXD FILM, 100K, 1%, 1/8W	705-1092-000		81349	RN55D1003F
R39	RESISTOR,VAR CERMET, 10K, 10%, 3/4W	382-0012-290		80294	3006P1-103
R40,R41	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R42	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS
R43	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000		81349	RCR07G104KS
R44	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000		81349	RCR07G101KS
R45,R46	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000		81349	RCR07G102KS
R47	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000		81349	RCR07G221KS
R48	RESISTOR,VAR CERMET, 10K, 10%, 3/4W	382-0012-290		80294	3006P1-103
R49	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000		81349	RCR07G103KS

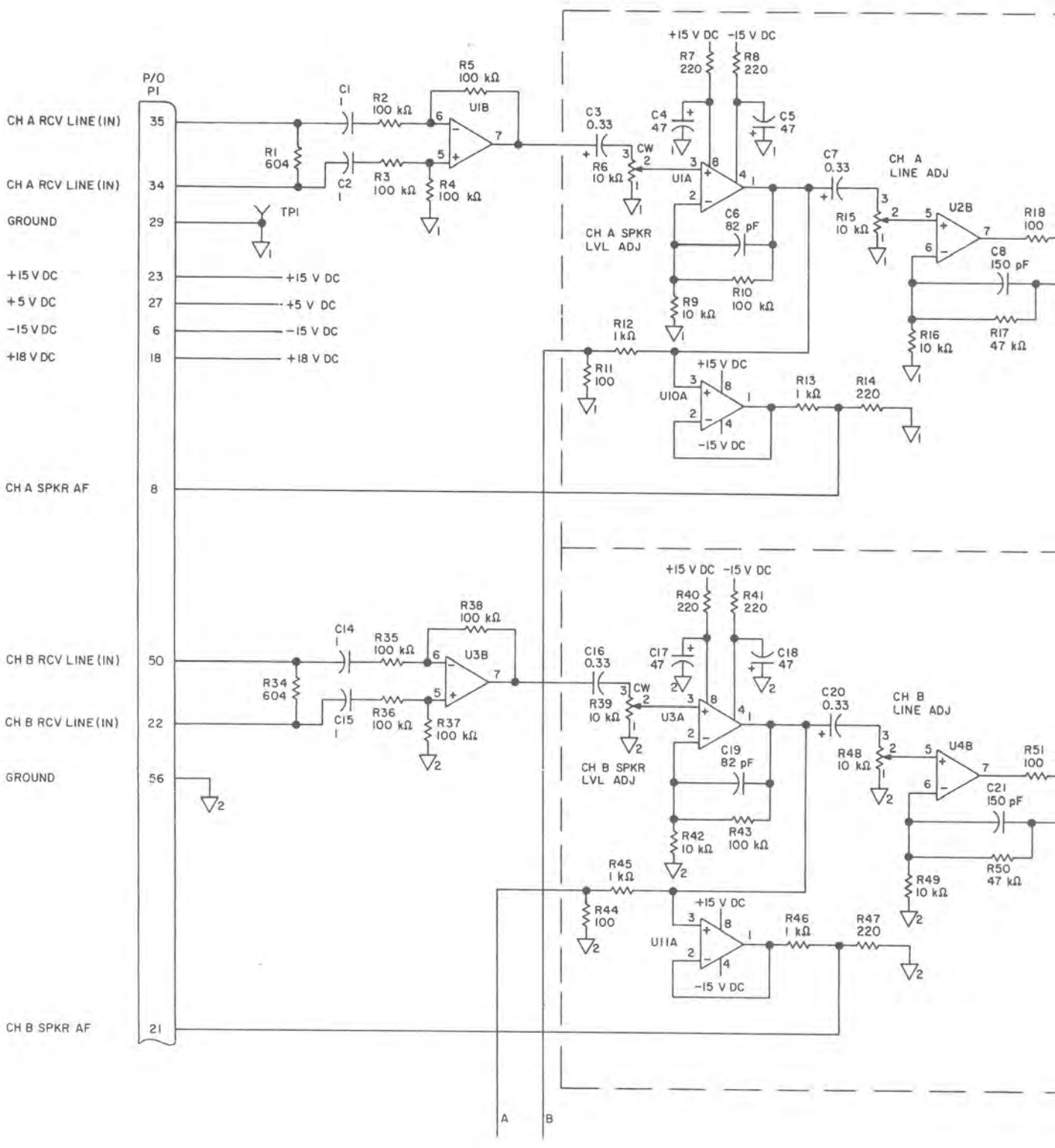
PARTS LIST (Cont)

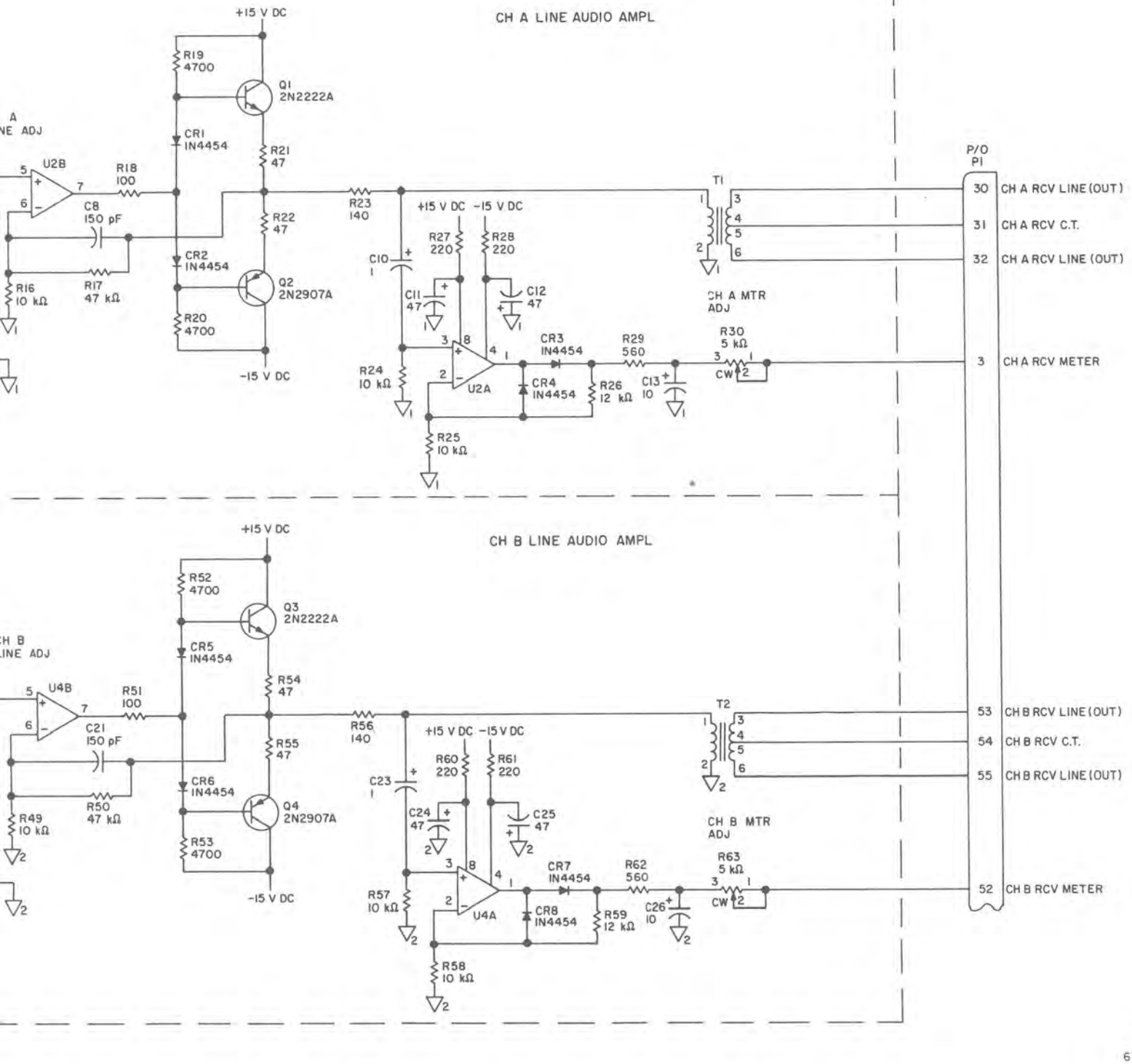
REF DES	DESCRIPTION	COLLINS PART NUMBER	US ON CO
R50	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W	745-0809-000	
R51	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000	
R52,R53	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R54,R55	RESISTOR,FXD CMPSN, 47 OHMS, 10%, 1/4W	745-0701-000	
R56	RESISTOR,FXD FILM, 140 OHMS, 1%, 1/8W	705-0955-000	
R57,R58	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R59	RESISTOR,FXD CMPSN, 12K, 10%, 1/4W	745-0788-000	
R60,R61	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000	
R62	RESISTOR,FXD CMPSN, 560 OHMS, 10%, 1/4W	745-0740-000	
R63	RESISTOR,VAR CERMET, 5K, 10%, 3/4W	382-0012-280	
R64-R66	NOT USED		
R67,R68	RESISTOR,FXD CMPSN, 82K, 10%, 1/4W	745-0818-000	
R69,R70	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000	
R71	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R72,R73	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R74-R77	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R78,R79	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000	
R80	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R81,R82	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W	745-0725-000	
R83	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R84	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R85	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R86	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R87	RESISTOR,FXD CMPSN, 0.12MEGO, 10%, 1/4W	745-0824-000	
R88,R89	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R90	NOT USED		
R91	RESISTOR,FXD CMPSN, 15K, 10%, 1/4W	745-0791-000	
R92	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000	
R93,R94	RESISTOR,FXD FILM, 27.4K, 1%, 1/8W	705-1065-000	
R95,R96	RESISTOR,FXD FILM, 511 OHMS, 1%, 1/8W	705-0982-000	
R97	RESISTOR,FXD FILM, 13K, 1%, 1/8W	705-3605-530	
R98	RESISTOR,FXD FILM, 51.1K, 1%, 1/8W	705-1078-000	
R99	RESISTOR,FXD FILM, 56.2K, 1%, 1/8W	705-1080-000	
R100	RESISTOR,FXD FILM, 31.6K, 1%, 1/8W	705-1068-000	
R101	RESISTOR,FXD FILM, 5.76K, 1%, 1/8W	705-3605-360	
R102	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R103	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R104	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000	
R105	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
R106	RESISTOR,FXD FILM, 75K, 1%, 1/8W	705-1086-000	
R107,	RESISTOR,FXD FILM, 511 OHMS, 1%, 1/8W	705-0982-000	
R108			
R109,	RESISTOR,FXD FILM, 150K, 1%, 1/8W	705-3604-090	
R110			
R111	RESISTOR,FXD FILM, 51.1K, 1%, 1/8W	705-1078-000	
R112	RESISTOR,FXD FILM, 56.2K, 1%, 1/8W	705-1080-000	
R113	RESISTOR,FXD CMPSN, 3.3K, 10%, 1/4W	745-0767-000	
R114	RESISTOR,VAR CERMET, 10K, 10%, 3/4W	382-0012-290	
R115	RESISTOR,FXD FILM, 5.11K, 1%, 1/8W	705-1030-000	
R116	RESISTOR,FXD FILM, 31.6K, 1%, 1/8W	705-1068-000	
R117	RESISTOR,FXD FILM, 24.9K, 1%, 1/8W	705-1063-000	
R118	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R119	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R120	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W	745-0845-000	
R121	RESISTOR,FXD CMPSN, 680 OHMS, 10%, 1/4W	745-0743-000	
R122	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W	745-0749-000	
R123	RESISTOR,FXD CMPSN, 15K, 10%, 1/4W	745-0791-000	
R124	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W	745-0713-000	
R125	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R126	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000	
R127	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R128	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W	745-0857-000	
R129	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R130	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W	745-0773-000	
R131	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W	745-0821-000	
R132	RESISTOR,FXD CMPSN, 0.15MEGO, 10%, 1/4W	745-0827-000	
R133	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W	745-0785-000	
TP1	JACK,TIP BRN	360-0484-070	
TP2	JACK,TIP RED	360-0484-020	
TP3	JACK,TIP ORN	360-0484-050	
TP4	JACK,TIP YEL	360-0484-060	
TP5	JACK,TIP GRN	360-0484-040	
T1,T2	TRANSFORMER	667-0327-010	A
T1,T2	TRANSFORMER,AUD	677-0410-010	B
U1-U5	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-1071-070	
U6	INTEGRATED CIRCUIT (ESDS)	351-8252-010	
U7	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-1071-070	
U8	INTEGRATED CIRCUIT	351-1110-020	
U9	INTEGRATED CIRCUIT	351-1118-010	
U10,U11	INTEGRATED CIRCUIT OPNL AMPLIFIER	351-1071-070	
U12	INTEGRATED CIRCUIT DGTL MOS (ESDS)	351-8159-340	
VR1	SEMICOND DEVICE	353-2710-000	
VR2	SEMICOND DEVICE	353-3591-060	

PARTS LIST (Cont)

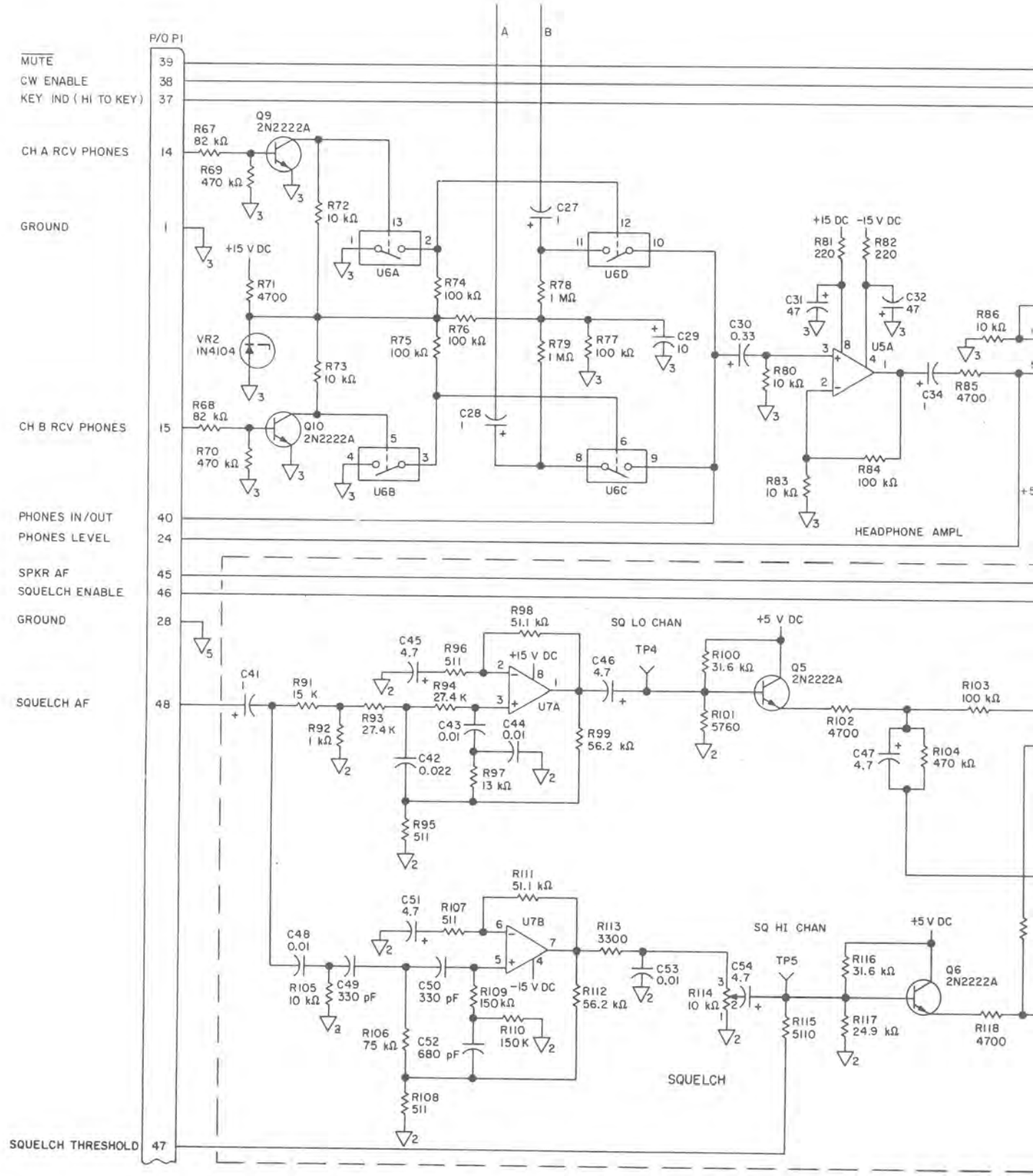
COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER	REF DES	DESCRIPTION
642-3572-001	A			R50	RESISTOR,FXD CMPSN, 47K, 10%, 1/4W
642-3572-002	B			R51	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W
353-3644-010		03508	1N4454GE	R52,R53	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W
913-3279-270		16546	CY30C105M	R54,R55	RESISTOR,FXD CMPSN, 47 OHMS, 10%, 1/4W
184-9102-320		56289	199D334X0035AB1	R56	RESISTOR,FXD FILM, 140 OHMS, 1%, 1/8W
184-9102-630		56289	199D1022	R57,R58	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W
912-3873-000		81349	CM04ED820J03	R59	RESISTOR,FXD CMPSN, 12K, 10%, 1/4W
184-9102-320		56289	199D334X0035AB1	R60,R61	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W
912-3891-000		81349	CM04FD151J03	R62	RESISTOR,FXD CMPSN, 560 OHMS, 10%, 1/4W
				R63	RESISTOR,VAR CERMET, 5K, 10%, 3/4W
184-9102-350		56289	199D105X0035BB1	R64-R66	NOT USED
184-9102-630		56289	199D1022	R67,R68	RESISTOR,FXD CMPSN, 82K, 10%, 1/4W
184-9102-170		56289	199D106X0020CB1	R69,R70	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W
913-3279-270		16546	CY30C105M	R71	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W
184-9102-320		56289	199D334X0035AB1	R72,R73	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W
184-9102-630		56289	199D1022	R74-R77	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W
912-3873-000		81349	CM04ED820J03	R78,R79	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W
184-9102-320		56289	199D334X0035AB1	R80	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W
912-3891-000		81349	CM04FD151J03	R81,R82	RESISTOR,FXD CMPSN, 220 OHMS, 10%, 1/4W
				R83	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W
184-9102-350		56289	199D105X0035BB1	R84	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W
184-9102-630		56289	199D1022	R85	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W
184-9102-170		56289	199D106X0020CB1	R86	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W
184-9102-350		56289	199D105X0035BB1	R87	RESISTOR,FXD CMPSN, 0.12MEGO, 10%, 1/4W
184-9102-170		56289	199D106X0020CB1	R88,R89	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W
184-9102-320		56289	199D334X0035AB1	R90	NOT USED
184-9102-630		56289	199D1022	R91	RESISTOR,FXD CMPSN, 15K, 10%, 1/4W
				R92	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W
184-9102-350		56289	199D105X0035BB1	R93,R94	RESISTOR,FXD FILM, 27.4K, 1%, 1/8W
184-9102-330		56289	199D474X0035AB1	R95,R96	RESISTOR,FXD FILM, 511 OHMS, 1%, 1/8W
912-3873-000		81349	CM04ED820J03	R97	RESISTOR,FXD FILM, 13K, 1%, 1/8W
184-9102-630		56289	199D1022	R98	RESISTOR,FXD FILM, 51.1K, 1%, 1/8W
184-9102-330		56289	199D474X0035AB1	R99	RESISTOR,FXD FILM, 56.2K, 1%, 1/8W
184-9102-320		56289	199D334X0035AB1	R100	RESISTOR,FXD FILM, 31.6K, 1%, 1/8W
183-1277-200		56289	600D227G020DD5	R101	RESISTOR,FXD FILM, 5.76K, 1%, 1/8W
184-9102-350		56289	199D105X0035EB1	R102	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W
913-5019-360		81349	CK06BX223K	R103	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W
913-5019-200		81349	CK05BX103K	R104	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W
184-9102-390		56289	199D475X0035DB1	R105	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W
913-5019-200		81349	CK05BX103K	R106	RESISTOR,FXD FILM, 75K, 1%, 1/8W
912-3915-000		81349	CM04FA331J03	R107,	RESISTOR,FXD FILM, 511 OHMS, 1%, 1/8W
184-9102-393		56289	199D475X0035DB1	R108	
913-4016-000		81349	CK05BX681K	R109,	RESISTOR,FXD FILM, 150K, 1%, 1/8W
913-5019-200		81349	CK05BX103K	R110	
184-9102-390		56289	199D475X0035DB1	R111	RESISTOR,FXD FILM, 51.1K, 1%, 1/8W
184-9102-700		56289	199D1024	R112	RESISTOR,FXD FILM, 56.2K, 1%, 1/8W
913-5019-140		81349	CK05BX332K	R113	RESISTOR,FXD CMPSN, 3.3K, 10%, 1/4W
352-0661-020		07263	2N2222A	R114	RESISTOR,VAR CERMET, 10K, 10%, 3/4W
352-0551-010		15818	2N2907A	R115	RESISTOR,FXD FILM, 5.11K, 1%, 1/8W
352-0661-020		07263	2N2222A	R116	RESISTOR,FXD FILM, 31.6K, 1%, 1/8W
352-0551-010		15818	2N2907A	R117	RESISTOR,FXD FILM, 24.9K, 1%, 1/8W
352-0661-020		07263	2N2222A	R118	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W
352-0551-010		15818	2N2907A	R119	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W
352-0759-020		00872	2N4092	R120	RESISTOR,FXD CMPSN, 0.47MEGO, 10%, 1/4W
352-0661-020		07263	2N2222A	R121	RESISTOR,FXD CMPSN, 680 OHMS, 10%, 1/4W
352-0551-010		15818	2N2907A	R122	RESISTOR,FXD CMPSN, 1K, 10%, 1/4W
705-3600-860		81349	RN55D6040F	R123	RESISTOR,FXD CMPSN, 15K, 10%, 1/4W
705-1092-000		81349	RN55D1003F	R124	RESISTOR,FXD CMPSN, 100 OHMS, 10%, 1/4W
382-0012-290		80294	3006P1-103	R125	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W
745-0725-000		81349	RCR07G221KS	R126	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W
745-0785-000		81349	RCR07G103KS	R127	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W
745-0821-000		81349	RCR07G104KS	R128	RESISTOR,FXD CMPSN, 1MEGO, 10%, 1/4W
745-0713-000		81349	RCR07G101KS	R129	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W
745-0749-000		81349	RCR07G102KS	R130	RESISTOR,FXD CMPSN, 4.7K, 10%, 1/4W
745-0725-000		81349	RCR07G221KS	R131	RESISTOR,FXD CMPSN, 0.10MEGO, 10%, 1/4W
382-0012-290		80294	3006P1-103	R132	RESISTOR,FXD CMPSN, 0.15MEGO, 10%, 1/4W
745-0785-000		81349	RCR07G103KS	R133	RESISTOR,FXD CMPSN, 10K, 10%, 1/4W
745-0809-000		81349	RCR07G473KS	TP1	JACK,TIP BRN
745-0713-000		81349	RCR07G101KS	TP2	JACK,TIP RED
745-0773-000		81349	RCR07G472KS	TP3	JACK,TIP GRN
745-0701-000		81349	RCR07G470KS	TP4	JACK,TIP YEL
705-0955-000		81349	RN55D1400F	TP5	JACK,TIP GRN
745-0785-000		81349	RCR07G103KS	T1,T2	TRANSFORMER
745-0788-000		81349	RCR07G123KS	T1,T2	TRANSFORMER,AUD
745-0725-000		81349	RCR07G221KS	U1-U5	INTEGRATED CIRCUIT OPNL AMPLIFIER
745-0740-000		81349	RCR07G561KS	U6	INTEGRATED CIRCUIT (ESDS)
382-0012-280		80294	3006P1-502	U7	INTEGRATED CIRCUIT OPNL AMPLIFIER
				U8	INTEGRATED CIRCUIT
705-3600-860		81349	RN55D6040F	U9	INTEGRATED CIRCUIT
705-1092-000		81349	RN55D1003F	U10,U11	INTEGRATED CIRCUIT OPNL AMPLIFIER
382-0012-290		80294	3006P1-103	U12	INTEGRATED CIRCUIT DGTL MOS (ESDS)
745-0725-000		81349	RCR07G221KS	VR1	SEMICOND DEVICE
745-0785-000		81349	RCR07G103KS	VR2	SEMICOND DEVICE
745-0821-000		81349	RCR07G104KS		
745-0713-000		81349	RCR07G101KS		
745-0749-000		81349	RCR07G102KS		
745-0725-000		81349	RCR07G221KS		
382-0012-290		80294	3006P1-103		
745-0785-000		81349	RCR07G103KS		

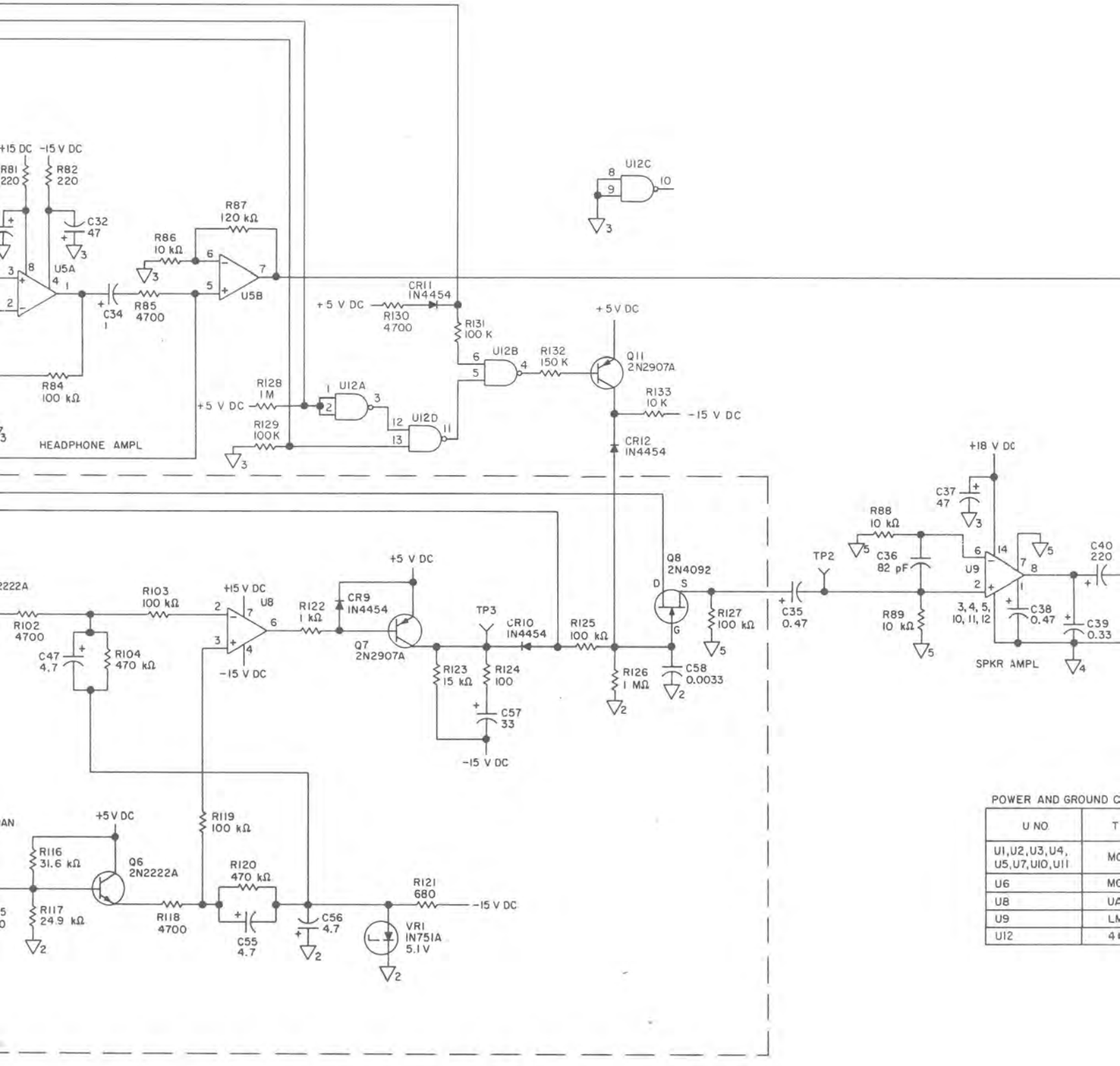
COLLINS PART NUMBER	USABLE ON CODE	MFR CODE	MFR PART NUMBER
745-0809-000		81349	RCR07G473KS
745-0713-000		81349	RCR07G101KS
745-0773-000		81349	RCR07G472KS
745-0701-000		81349	RCR07G470KS
705-0955-000		81349	RN55D1400F
745-0785-000		81349	RCR07G103KS
745-0788-000		81349	RCR07G123KS
745-0725-000		81349	RCR07G221KS
745-0740-000		81349	RCR07G561KS
382-0012-280		80294	3006P1-502
745-0809-000		81349	RCR07G473KS
745-0713-000		81349	RCR07G101KS
745-0773-000		81349	RCR07G472KS
745-0701-000		81349	RCR07G470KS
745-0785-000		81349	RCR07G103KS
745-0788-000		81349	RCR07G123KS
745-0725-000		81349	RCR07G221KS
745-0740-000		81349	RCR07G561KS
382-0012-280		80294	3006P1-502
745-0809-000		81349	RCR07G473KS
745-0713-000		81349	RCR07G101KS
745-0773-000		81349	RCR07G472KS
745-0701-000		81349	RCR07G470KS
705-0955-000		81349	RN55D1400F
745-0785-000		81349	RCR07G103KS
745-0788-000		81349	RCR07G123KS
745-0725-000		81349	RCR07G221KS
745-0740-000		81349	RCR07G561KS
382-0012-280		80294	3006P1-502
360-0484-070		74970	105-1108-011
360-0484-020		74970	105-1102-011
360-0484-050		74970	105-1106-011
360-0484-060		74970	105-1107-011
360-0484-040		74970	105-1104-011
667-0327-010	A	98330	T4465
677-0410-010	B	73386	41712
351-1071-070		07263	UA1458TC
351-8252-010		02735	CD4066BE
351-1071-070		07263	UA1458TC
351-1110-020		07263	UA741TC
351-1118-010		27014	LM380N
351-1071-070		07263	UA1458TC
351-8159-340		07263	4011BPC
353-2710-000		07263	1N751A
353-3591-060		04713	1N4104


P/O P1
CH A RCV LINE (IN) 35
CH A RCV LINE (IN) 34
GROUND 29
+15 V DC 23
+5 V DC 27
-15 V DC 6
+18 V DC 18
CH A SPKR AF 8
CH B RCV LINE (IN) 50
CH B RCV LINE (IN) 22
GROUND 56
CH B SPKR AF 21
TP1
+15 V DC
+5 V DC
-15 V DC
+18 V DC
C1 1
R1 604
C2 1
R2 100 kΩ
R3 100 kΩ
R4 100 kΩ
R5 100 kΩ
U1B
C3 0.33
R6 10 kΩ CW
C4 47
C5 47
R7 220
R8 220
U1A
C6 82 pF
R9 10 kΩ
R10 100 kΩ
CH A SPKR LVL ADJ
C7 0.33
CH A LINE ADJ
R15 10 kΩ
U2B
R18 100
C8 150 pF
R16 10 kΩ
R17 47 kΩ
R11 100
R12 1 kΩ
U10A
R13 1 kΩ
R14 220
C14 1
R34 604
C15 1
R35 100 kΩ
R36 100 kΩ
R37 100 kΩ
R38 100 kΩ
U3B
C16 0.33
R39 10 kΩ CW
C17 47
C18 47
R40 220
R41 220
U3A
C19 82 pF
R42 10 kΩ
R43 100 kΩ
CH B SPKR LVL ADJ
C20 0.33
CH B LINE ADJ
R48 10 kΩ
U4B
R51 100
C21 150 pF
R49 10 kΩ
R50 47 kΩ
R44 100
R45 1 kΩ
U11A
R46 1 kΩ
R47 220
A
B



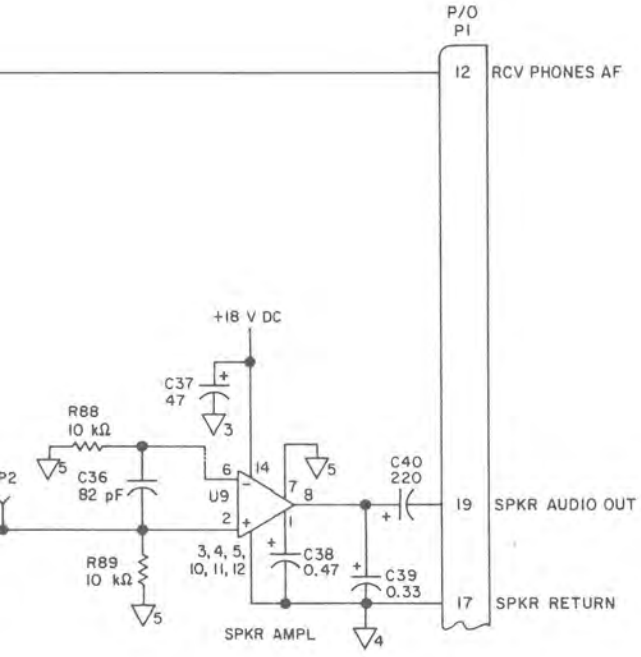
Control Receive Audio, Schematic Diagram
Figure 5 (Sheet 3)


P/O P1
A
B
MUTE
39
CW ENABLE
38
KEY IND (HI TO KEY)
37
CH A RCV PHONES
14
GROUND
1
CH B RCV PHONES
15
PHONES IN/OUT
40
PHONES LEVEL
24
SPKR AF
45
SQUELCH ENABLE
46
GROUND
28
SQUELCH AF
48
SQUELCH THRESHOLD
47
Q9 2N2222A
R67 82 kΩ
R69 470 kΩ
R72 10 kΩ
+15 V DC
R71 4700
VR2 IN4104
R73 10 kΩ
R68 82 kΩ
R70 470 kΩ
Q10 2N2222A
U6A
U6B
U6C
U6D
R74 100 kΩ
R75 100 kΩ
R76 100 kΩ
R78 1 MΩ
R79 1 MΩ
R77 100 kΩ
C27 1
C28 1
C29 10
C30 0.33
+15 DC
-15 V DC
R81 220
R82 220
C31 47
C32 47
U5A
R80 10 kΩ
R83 10 kΩ
R84 100 kΩ
C34 1
R85 4700
R86 10 kΩ
HEADPHONE AMPL
R98 51.1 kΩ
C45 4.7
R96 511
R94 27.4 K
C41 1
R91 15 K
R93 27.4 K
R92 1 kΩ
C43 0.01
C44 0.01
C42 0.022
R97 13 kΩ
R99 56.2 kΩ
R95 511
U7A
SQ LO CHAN
TP4
C46 4.7
+5 V DC
R100 31.6 kΩ
R101 5760
Q5 2N2222A
R102 4700
R103 100 kΩ
C47 4.7
R104 470 kΩ
R111 51.1 kΩ
C51 4.7
R107 511
U7B
C48 0.01
R105 10 kΩ
C49 330 pF
C50 330 pF
R109 150 kΩ
R110 150 K
R106 75 kΩ
C52 680 pF
R108 511
R113 3300
C53 0.01
R112 56.2 kΩ
SQ HI CHAN
TP5
C54 4.7
R114 10 kΩ
R115 5110
R116 31.6 kΩ
R117 24.9 kΩ
Q6 2N2222A
R118 4700
SQUELCH



POWER AND GROUND C

U NO.	T
U1, U2, U3, U4, U5, U7, U10, U11	MC
U6	MC
U8	UA
U9	LM
U12	4



NOTES:

1. UNLESS OTHERWISE SPECIFIED, RESISTANCE VALUES ARE IN OHMS AND CAPACITANCE VALUES ARE IN MICROFARADS.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT AND/OR ASSEMBLY DESIGNATION.
3. TYPE DESIGNATIONS SHOWN MAY BE GENERIC IN FORM AND ARE FOR REFERENCE ONLY. SEE APPLICABLE PARTS LIST FOR REPLACEMENT PARTS.
4. THIS EQUIPMENT CONTAINS ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICES. SPECIAL HANDLING METHODS AND MATERIALS MUST BE USED TO PREVENT EQUIPMENT DAMAGE.

POWER AND GROUND CONNECTIONS

U NO	TYPE	POWER (VDC)				
		+15	+10	+5	GND	−15
U1, U2, U3, U4, U5, U7, U10, U11	MC1458P1					
U6	MC14066BCP		14		7 ▽3	
U8	UA741TC					
U9	LM380N					
U12	4011			14	7 ▽3	

634-6906

Control Receive Audio, Schematic Diagram
Figure 5 (Sheet 4)