Receive Audio (635-0748-001)

Rockwell International

instructions

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1. DESCRIPTION

Receive Audio 635-0748-001, shown in figure 1, is a 2-layer planar card with a 56-pin edge-on connector (2 layers, 28 pins each).

The receive audio card consists of audio input switching circuits, channel A line audio amplifier, channel B line audio amplifier, headphone audio amplifier, speaker audio amplifier, and squelch control circuits.

2. PRINCIPLES OF OPERATION

2.1 General

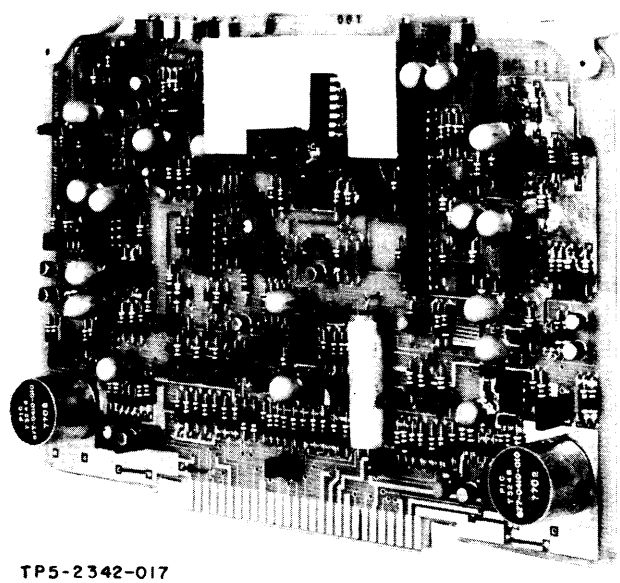
The receive audio card receives audio inputs from AM audio, FM audio, SSB audio, ISB audio, or sidetone audio circuits. These inputs are switched to common line audio amplifiers and supplied through output audio circuits to other audio circuits, speakers, headphones, and performance monitors.

The receive audio card also receives a level controlled speaker audio input and supplies a squelch/mute controlled speaker audio output.

2.2 Audio Input Switching (Refer to figure 2.)

Since the audio input switching circuits are identical for all modes, the following discussion centers on the AM af (audio) input switching.

With an AM audio signal and an AM enable signal applied to bilateral switch U11D, AM audio is supplied through closed switch U11D to the input of the channel A audio amplifier. With a mute or rf xmt signal applied, the AM enable signal is removed. Switch U11D cannot be closed, and the AM audio signal is muted from the input of the channel A audio amplifier.



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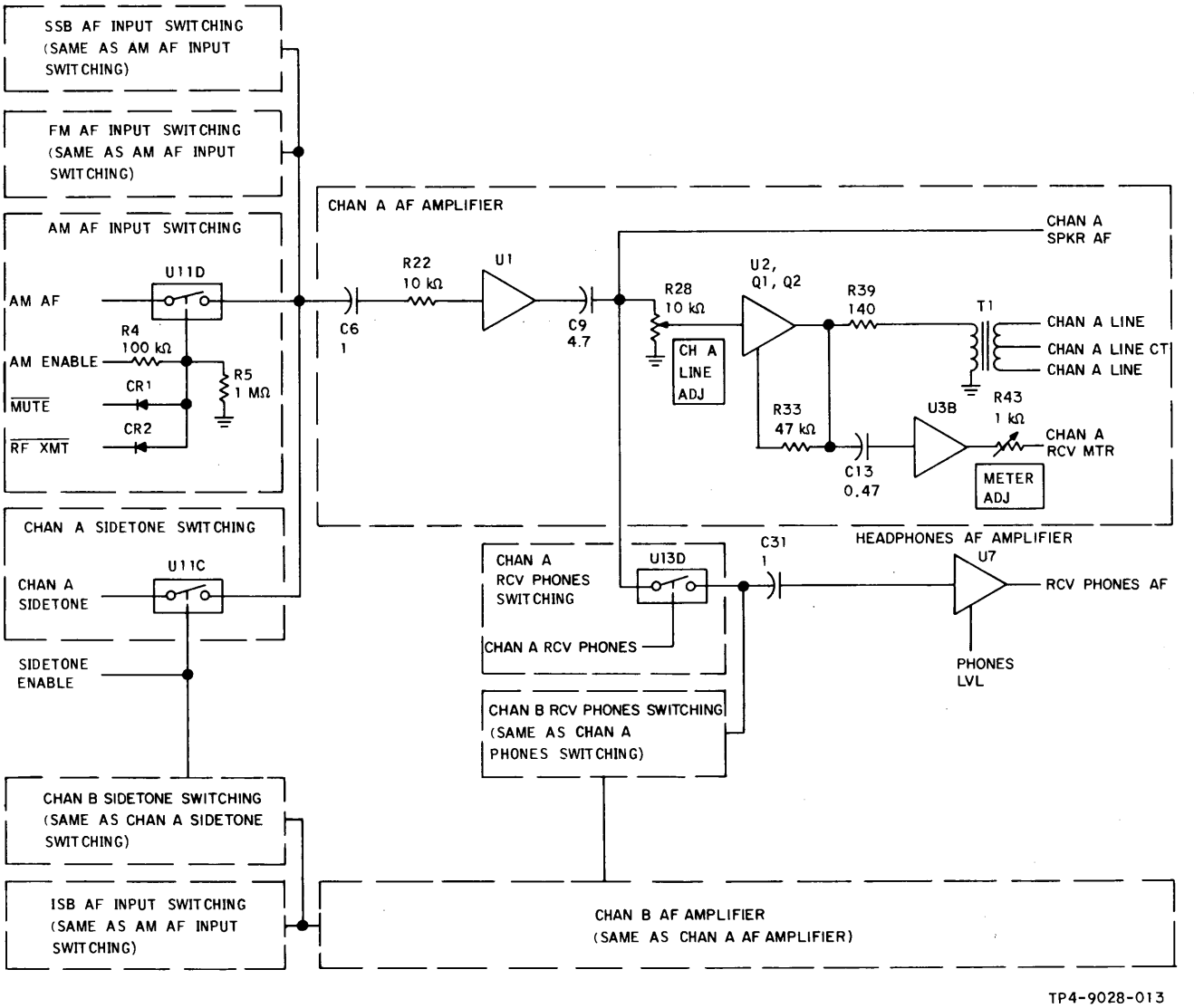
Receive Audio
Figure 1



Audio Input Switching and Associated Amplifiers
Figure 2

With a channel A sidetone signal and a sidetone enable signal applied to bilateral switch U11C, sidetone is applied through closed switch U11C to the input of the channel A audio amplifier. Note that sidetone and a sidetone enable signal are supplied only during transmit; thus the rf xmt signal is applied to all other audio input switching circuits and mutes these other audio signals.

2.3 Line Audio Amplifiers (Refer to figure 2.)

The line audio amplifiers consist of a channel A audio amplifier and a channel B audio amplifier. These two line audio amplifiers are identical in operation; thus the following paragraphs discuss only the channel A audio amplifier.

An audio input to the channel A audio amplifier is amplified by U1 and supplied as three audio outputs: input to the speaker audio amplifier, input to the headphones audio amplifier, and input to the channel A line audio amplifier.

The input to the channel A line audio amplifier is level controlled by the CH A LINE ADJ potentiometer and amplified by amplifiers U2, Q1, and Q2. The output of these amplifiers is supplied to performance monitor U3B and audio output transformer

T1. Audio output transformer T1 provides a balanced 600-ohm audio output for external use. U3B provides an adjustable (METER ADJ potentiometer) dc level output to the channel A receive level meter to allow constant monitoring of the channel A audio output level.

2.4 Headphones Audio Amplifier (Refer to figure 2.)

With an audio signal from the channel A input audio amplifier and a channel A receive phones enable signal applied, audio is supplied through closed bilateral switch U13D to headphones amplifier U7. The output of U7 is level controlled externally and supplies audio for an external headphone set.

The channel B headphone audio circuit is identical to the channel A circuit.

2.5 Speaker Audio Amplifier (Refer to figure 3.)

With a speaker audio input signal applied to transistor switch Q9 and the squelch signal removed from Q9, audio is supplied through a closed switch to speaker amplifier U8.

When a squelch signal is applied to Q9, Q9 is opened and speaker audio is squelched.

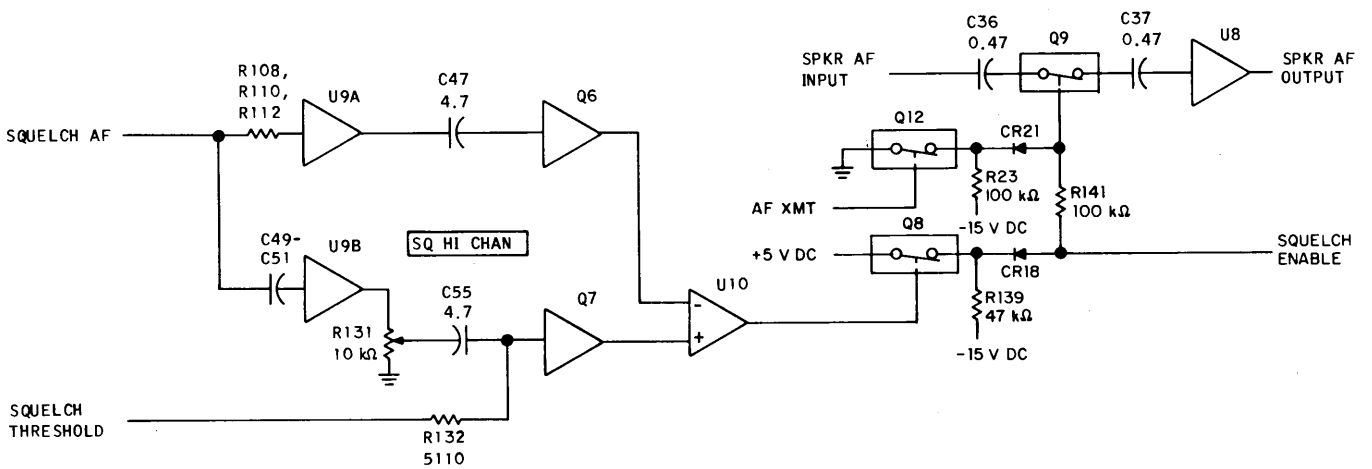
A speaker squelch signal can be applied from one of three sources; squelch enable input, af xmt input, or squelch control circuit.

2.6 Squelch Control Circuit (Refer to figure 3.)

Squelch audio (or noise) signals are supplied at squelch low channel input amplifier U9A and squelch high channel input amplifier U9B. The squelch low-channel signal is level detected by Q6 and applied to the inverting input of U10. The squelch high channel signal is level detected by R131 and Q7 and applied to the noninverting input of U10. When the output of Q7 is lower than the output of Q6, a negative signal is applied from U10 to Q8. Q8 is closed and the squelch signal is removed from Q9. When the output of Q7 exceeds the output of Q6, a positive signal is applied from U10 to Q8. Q8 is opened and the squelch signal is applied to Q9 (noise only or squelched audio condition).

2.7 Operational Amplifier MC1741CP1 (Refer to figure 4.)

The MC1741CP1 is an operational amplifier designed for use as a summing amplifier, integrator, or amplifier with operating characteristics as a function of the external feedback components.



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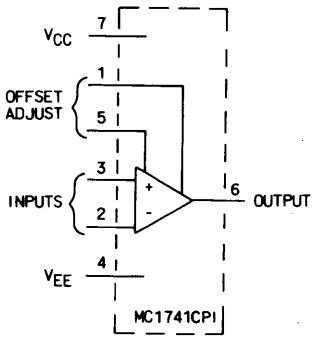
Speaker Amplifier and Squelch Control Circuit
Figure 3



CHARACTERISTICS
SUPPLY VOLTAGE: V_{CC} +22 V DC MAX
V_{EE} -22 V DC MAX
INPUT DIFF VOLTAGE: ±30 V MAX
INPUT COMMON MODE VOLTAGE:
±15 V MAX ⟨1⟩
OUTPUT SHORT CIRCUIT DURATION:
CONTINUOUS ⟨2⟩
INPUT RESISTANCE: 300 kΩ MIN, 2.0 MΩ MAX
OUTPUT RESISTANCE: 75Ω TYPICAL
VOLTAGE GAIN: 25 MIN

NOTES:
⟨1⟩ FOR SUPPLY VOLTAGE LESS THAN ±15.0 V, MAX INPUT VOLTAGE EQUAL TO SUPPLY VOLTAGE.
⟨2⟩ SUPPLY VOLTAGE EQUAL TO OR LESS THAN 15 V.

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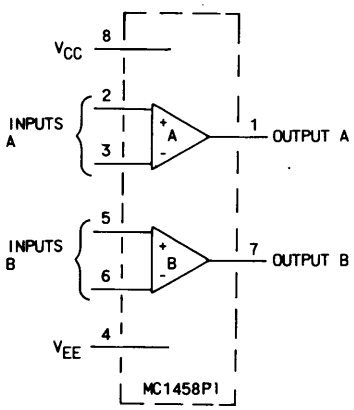
Operational Amplifier MC1741CP1
Figure 4



CHARACTERISTICS
SUPPLY VOLTAGE: V_{CC} +18 V DC MAX
V_{EE} -18 V DC MAX
INPUT DIFF VOLTAGE: ±30 V MAX
INPUT COMMON MODE VOLTAGE:
±15 V MAX ⟨1⟩
OUTPUT SHORT CIRCUIT DURATION:
CONTINUOUS ⟨2⟩
INPUT RESISTANCE: 300 kΩ MIN, 2.0 MΩ MAX
OUTPUT RESISTANCE: 75Ω TYPICAL
VOLTAGE GAIN: 15 MIN

NOTES:
⟨1⟩ FOR SUPPLY VOLTAGE LESS THAN ±15.0 V, MAX INPUT VOLTAGE EQUAL TO SUPPLY VOLTAGE.
⟨2⟩ SUPPLY VOLTAGE EQUAL TO OR LESS THAN 15 V.

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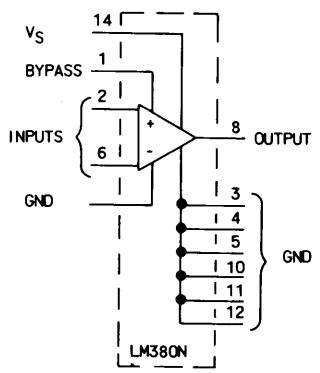
Dual Operational Amplifier MC1458P1
Figure 5



CHARACTERISTICS
SUPPLY VOLTAGE: +22 V DC MAX
INPUT DIFF VOLTAGE: ±0.5 V MAX
BANDWIDTH: 100 kHz TYPICAL
INPUT RESISTANCE: 150 kΩ TYPICAL
OUTPUT RESISTANCE: 8Ω TYPICAL
VOLTAGE GAIN: 40 MIN, 60 MAX
OUTPUT VOLTAGE SWING: 14 V p-p TYPICAL
OUTPUT POWER: 2.5 W MIN

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Audio Power Amplifier LM380N
Figure 6

2.8 Dual Operational Amplifier MC1458P1 (Refer to figure 5.)

The MC1458P1 consists of two operational amplifiers in one package designed for use as summing amplifiers, integrators, or amplifiers with operating characteristics as a function of the external feedback components.

2.9 Audio Power Amplifier LM380N (Refer to figure 6.)

The LM380N is an audio power amplifier with an internal fixed gain of 34 dB.

2.10 COS/MOS Quad Bilateral Switch CD4066 (Refer to figure 7.)

CD4066 consists of four bilateral switches in one package. The CD4066 bilateral switches exhibit a low closed-switch impedance (60 to 360 Ω typical) and relative constant impedance (±5 Ω) over the full input signal range.

3. TESTING/TROUBLESHOOTING PROCEDURES

3.1 Test Equipment and Power Requirements

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

3.2 Testing

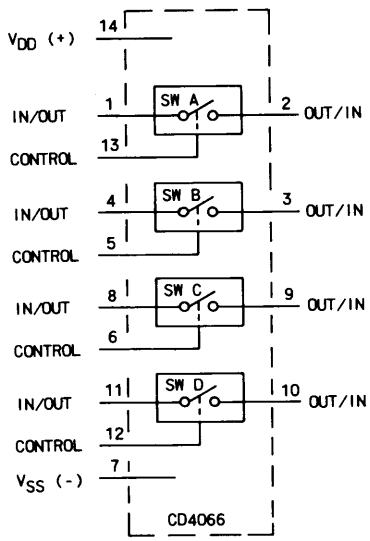
The test procedures in table 1 check the total performance of the receive audio card. These test procedures permit isolation of a fault to a specific component or circuit when the results are used with the schematic to circuit trace the fault.

4. ALIGNMENT/ADJUSTMENT

4.1 Channel A Receive Line Amplifier Adjustment

Adjustment of CH A RCV LINE ADJ (R28) is as follows:

a. Perform test setup of table 1, test 1.
b. Set front-panel MODE switch to AM.
c. Connect an audio oscillator to P1-35.
d. Set the audio oscillator to 1000 Hz at 10-mV rms output.
e. Connect a 600-Ω load across CH A AUD OUT terminals.
f. Connect an audio voltmeter across 600-Ω load.
g. Adjust CH A LINE ADJ (R28) for a 0-dB mW (+775-mV rms) reading on audio voltmeter.



TYPICAL CHARACTERISTICS

V_{DD} TO V_{SS} VOLTS	CONTROL VOLTS	CLOSED-SWITCH IMPEDANCE		TYPICAL OPEN-SWITCH IMPEDANCE
		TYPICAL	MAX	
15	15	60-145Ω	220-320Ω	10 kΩ
10	10	89-190Ω	400-550Ω	10 kΩ
5	5	160-360Ω	3000-5500Ω	10 kΩ

NOTE: CONTROL VOLTAGE MUST EQUAL V_{DD} TO CLOSE SWITCH.
CONTROL VOLTAGE MUST EQUAL V_{SS} TO OPEN SWITCH.

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COS/MOS Quad Bilateral Switch CD4066
Figure 7

Table 1. Receive Audio, Testing and Troubleshooting Procedures.

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
1. Setup	a. Remove top cover of unit containing the receive audio that is to be tested.		
	b. Remove receive audio card. Install it on an extender card and place it in the unit.		
	c. Set unit LINE SELECTOR switch to 115 V.		
	d. Connect unit to 115-V ac power source and set power on.		
	e. Measure dc voltages between the following pins and ground (TP1, brown):		
	P1-23	+15 ±1.0 V dc.	Check associated power supply.
	P1-27	+5 ±0.5 V dc.	
	P1-6	-15 ±1.0 V dc.	
	P1-18	+18 ±1.0 V dc.	
2. Channel A, line amplifier gain	a. Set front-panel MODE switch to AM.		
	b. Connect an audio oscillator to P1-35.		
	c. Adjust audio oscillator for 1000 Hz at 10 mV rms.		
	d. Connect a 600-Ω load across CH A AUD OUT terminals.		
	e. Connect an oscilloscope across the 600-Ω load.		
	f. Adjust R28 for maximum output with no visible distortion.		
	g. Connect audio voltmeter across 600-Ω load. Note output level.	NLT +15 dB mW.	Check Q1, Q2, U1, U2, and associated circuits.
	h. Adjust R28 for +10-dB mW output.	Reference.	
	i. Set front-panel MODE switch to SSB/CW.		
	j. Connect the audio oscillator to P1-34.		
	k. Set audio oscillator for 1000 Hz at 10 mV rms.		
	l. Note output level.	+10 ±1 dB mW.	If too high check U11D and associated circuit.
	Note		If too low check U11A and associated circuit.
	Steps m thru p are applicable only if receiver has FM MODE switch position.		
(Cont)			

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
2. (Cont)	m. Connect the audio oscillator to P1-7.		
	n. Set front-panel MODE switch to FM.		
	o. Set audio oscillator for 1000 Hz at 10 mV rms.		
	p. Note output level.	+10 ±1 dB mW.	Check U11B and associated circuit.
	q. Connect an 800-Ω load between P1-5 and ground.		
	r. Connect the audio oscillator to P1-5.		
	s. Apply +5-V dc signal to P1-38.		
	t. Set audio oscillator for 1000 Hz at 10 mV rms.		
	u. Note output level.	+10 ±1 dB mW.	Check U11C and associated circuit.
	v. Remote +5 V dc from P1-38.		
	w. Set front-panel MODE switch to AM.		
	x. Connect the audio oscillator to P1-35.		
	y. Adjust audio oscillator for 1000 Hz at 10 mV rms.		
	z. Adjust R28 for 0-dB mW output level.		
3. Channel A, frequency response	a. Set front-panel MODE switch to AM.		
	b. Connect an audio oscillator to P1-35.		
	c. Connect a 600-Ω load across CH A AUD OUT terminals.		
	d. Connect an audio voltmeter across 600-Ω load.		
	e. Adjust audio oscillator from 0 to 10 000 Hz with a constant 10-mV rms output.		
	f. Note maximum level and frequencies at point 1 dB below maximum level.	Upper 1 dB frequency NLT 8000 Hz, NMT 12 kHz. Lower 1 dB frequency, NMT 250 Hz.	Check Q1, Q2, U1, U2, and associated circuits.
4. Channel A, total harmonic distortion (Cont)	a. Set front-panel MODE switch to AM.		
	b. Connect an audio oscillator to P1-35.		
	c. Connect a 600-Ω load across CH A AUD OUT terminals.		

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
4. (Cont)	d. Connect distortion analyzer across 600-Ω load.		
	e. Adjust audio oscillator to 300 Hz at 10-mV rms output.		
	f. Measure total harmonic distortion using distortion analyzer.	NMT 3%.	Check bypass and dc blocking capacitors.
	g. Repeat step f with audio oscillator set at:		
	1000 Hz	NMT 0.5%.	Same as step f.
	6000 Hz	NMT 0.5%.	Same as step f.
5. Channel B, line amplifier gain	a. Set front-panel MODE switch to ISB.		
	b. Connect an audio oscillator to P1-50.		
	c. Adjust audio oscillator for 1000 Hz at 10 mV rms.		
	d. Connect a 600-Ω load across CH B AUD OUT terminals.		
	e. Connect an oscilloscope across the 600-Ω load.		
	f. Adjust R65 for maximum output with no visible distortion.		
	g. Note output level.	NLT 15 dB mW.	Check Q4, Q5, U4, U5, and associated circuits.
	h. Adjust R65 for +10-dB mW output.		
	i. Connect an 800-Ω load between P1-22 and ground.		
	j. Connect the audio oscillator to P1-22.		
	k. Apply +5-V dc signal to P1-38.		
	l. Set audio oscillator for 1000 Hz at 10 mV rms.		
	m. Note output level.	+10 ±1 dB mW.	If too high check U12B and associated circuits. If too low check U12C and associated circuits.
	n. Remove +5 V dc from P1-38.		
(Cont)	o. Connect the audio oscillator to P1-50.		

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
5. (Cont)	p. Adjust audio oscillator for 1000 Hz at 10 mV rms. q. Adjust R65 for 0-dB mW output level.		
6. Channel B, frequency response	a. Set front-panel MODE switch to ISB. b. Connect an audio oscillator to P1-50. c. Connect a 600-Ω load across CH B AUD OUT terminals. d. Connect an audio voltmeter across 600-Ω load. e. Adjust audio oscillator from 0 to 10 000 Hz with a constant 10-mV rms output. f. Note maximum level and frequencies at point 1 dB below maximum level.	Upper 1 dB frequency NLT 8000 Hz, NMT 12 kHz. Lower 1 dB frequency, NMT 250 Hz.	Check Q4, Q5, U4, U5, and associated circuit.
7. Channel B, total harmonic distortion	a. Set front-panel MODE switch to ISB. b. Connect an audio oscillator to P1-50. c. Connect a 600-Ω load across CH B AUD OUT terminals. d. Connect a distortion analyzer across 600-Ω load. e. Adjust audio oscillator to 300 Hz at 10-mV rms output. f. Measure total harmonic distortion using distortion analyzer. g. Repeat step f with audio oscillator set at: 1000 Hz 6000 Hz	NMT 3%. NMT 0.5%. NMT 0.5%.	Check bypass and dc blocking capacitors. Same as step f.
8. Headphone amplifier, gain (Cont)	a. Set front-panel MODE switch to AM. b. Connect an audio oscillator to P1-35. c. Connect a distortion analyzer to P1-12. d. Adjust audio oscillator to 1000 Hz at 10-mV rms output. e. Set front panel PHONES level control to minimum.		

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
8. (Cont)	f. Set front-panel PHONES switch to CH A.		
	g. Note that a negligible audio output is present on the audio voltmeter.	NLT 30 dB below level of step i.	
	h. Set front-panel PHONES level control to maximum.		
	i. Note level on the audio voltmeter.	NLT +15 dB mW.	Check U13D, U7, and associated circuits.
	j. Set front-panel MODE switch to ISB.		
	k. Connect the audio oscillator to P1-50.		
	l. Adjust audio oscillator to 1000 Hz at 10-mV rms output.		
	m. Set front-panel PHONES switch to CH B.		
	n. Note level on the audio voltmeter.	NLT +15 dB mW.	Check U13B and associated circuits.
9. Headphone amplifier, frequency response	a. Set front-panel MODE switch to AM.		
	b. Connect an audio oscillator to P1-35.		
	c. Connect an audio voltmeter to P1-12.		
	d. Set front-panel PHONES level control to midrange.		
	e. Set front-panel PHONES switch to CH A.		
	f. Adjust audio oscillator from 0 to 10 000 Hz with a constant 10-mV rms output.		
	g. Note maximum output level and frequencies at point 1 dB below maximum level.	Upper 1-dB frequency NLT 6000 Hz. Lower 1-dB frequency, NLT 250 Hz.	Check U7 and associated circuits.
10. Headphone amplifier, total harmonic distortion	a. Set front-panel MODE switch to AM.		
	b. Connect an audio oscillator to P1-35.		
	c. Connect a distortion analyzer to P1-12.		
	d. Set front-panel PHONES switch to CH A.		
(Cont)	e. Adjust audio oscillator to 1000 Hz at 10-mV rms output.		

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
10. (Cont)	f. Adjust front-panel PHONES level control for 0 ±1 dB mW at P1-12.		
	g. Measure total harmonic distortion using distortion analyzer.	NMT 0.5%.	Check bypass and dc blocking capacitors.
11. Speaker amplifier, gain	a. Set front-panel MODE switch to AM.		
	b. Set front-panel SPKR switch to CH A.		
	c. Connect an audio oscillator to P1-35.		
	d. Connect an audio voltmeter between P1-19 and P1-17.		
	e. Adjust audio oscillator to 1000 Hz at 10-mV rms output.		
	f. Set SQUELCH control to off (fully ccw).		
	g. Increase front-panel AF GAIN control until distortion analyzer indicates 4 V rms.		
	h. Measure distortion using the distortion analyzer.	NMT 3%.	Check U8 and associated circuits.
	i. Set front-panel MODE switch to ISB.		
	j. Set front-panel SPKR switch to CH B.		
	k. Connect an audio oscillator to P1-50.		
	l. Adjust AF GAIN control until distortion analyzer indicates 4 V rms.		
	m. Measure distortion using the distortion analyzer.	NMT 3%.	Same as step h.
12. Speaker amplifier, frequency response	a. Set front-panel MODE switch to AM.		
	b. Set front-panel SPKR switch to CH A.		
	c. Connect an audio oscillator to P1-35.		
	d. Connect an audio voltmeter between P1-19 and P1-17.		
	e. Set SQUELCH control to off (fully ccw).		
	f. Adjust audio oscillator to 1000 Hz at 10-mV rms output.		
	g. Adjust AF GAIN control for 0.5 V rms as indicated on audio voltmeter.		
(Cont)	h. Adjust audio oscillator from 0 to 10 000 Hz.		

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
12. (Cont)	i. Note maximum output level and frequencies at point 1 dB below maximum level.	Upper 1 dB frequency, NLT 6000 Hz. Lower 1 dB frequency, NMT 250 Hz.	Check Q9, U8, and associated circuit.
13. Speaker amplifier, total harmonic distortion	a. Set front-panel MODE switch to AM. b. Set front-panel SPKR switch to CH A. c. Connect an audio oscillator to P1-35. d. Connect a distortion analyzer between P1-19 and P1-17. e. Set SQUELCH control to off (fully ccw). f. Adjust audio oscillator to 1000 Hz at 10-mV rms outputs. g. Adjust front-panel AF GAIN control until distortion analyzer indicates 4 V rms.		
	h. Measure total harmonic distortion using distortion analyzer.	NMT 3%.	Check bypass and dc blocking capacitors.
14. Squelch	a. Set front-panel MODE switch to AM. b. Set front-panel SPKR switch to CH A. c. Connect audio oscillator to P1-35. d. Connect an audio voltmeter between P1-19 and P1-17. e. Set front-panel SQUELCH control on (away from fully ccw). f. Adjust the squelch threshold for minimum resistance (SQUELCH control near full ccw). g. Set audio oscillator to 500 Hz at 10-mV rms output. h. Set AF GAIN control for 0.5 V rms as indicated by audio voltmeter.		
(Cont)	i. Slowly increase audio oscillator frequency until audio output is squelched. Note frequency.	Between 600 and 2500 Hz.	If too low, check Q7, U9B, and associated circuit. If too high, check Q6, U9A, and associated circuit.

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
14. (Cont)	j. Return audio oscillator to 500 Hz and note that audio output returns.		
	k. Quickly switch from 500 to 3000 Hz audio and note time required for audio to squelch.	NMT 3 seconds.	Check Q7, U9B, U10, Q8, and associated circuit.
15. Channel A, performance monitor	a. Set front-panel MODE switch to AM.		
	b. Connect an audio oscillator to P1-35.		
	c. Connect a dvm to P1-2.		
	d. Set audio oscillator to 1000 Hz at 10-mV rms output.		
	e. Note dvm reading.	NMT 0.5 V dc.	Check U3A, Q10, and associated circuits.
	f. Decrease audio oscillator output by 10 dB.		
	g. Note dvm reading.	NLT +3.0 V dc.	Same as step e.
16. Channel B, performance monitor	a. Set front-panel MODE switch to ISB.		
	b. Connect an audio oscillator to P1-50.		
	c. Connect a dvm to P1-51.		
	d. Set audio oscillator to 1000 Hz at 10-mV rms output		
	e. Note dvm reading.	NMT 0.5 V dc.	Check U6B, Q11, and associated circuits.
	f. Decrease audio oscillator output by 10 dB.		
	g. Note dvm reading.	NLT +3.0 V dc.	Same as step e.
17. Channel A receive meter	a. Set front panel MODE switch to AM.		
	b. Connect an audio oscillator to P1-35.		
	c. Connect a 600-Ω load between CH A AUD OUT terminals.		
	d. Set front-panel METER switch to CH A AF (+3FS).		
	e. Set audio oscillator to 1000 Hz at 10-mV rms output.		
	f. Note front-panel meter reading.	≅ 0 dB mW.	Adjust per paragraph 4.3. Check U3B and associated circuit.
(Cont)			

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
17. (Cont)	g. Decrease audio oscillator output by 10 dB.		
	h. Note front-panel meter reading.	≅ -10 dB mW.	Same as step e.
18. Channel B, receive meter	a. Set front-panel MODE switch to ISB.		
	b. Connect an audio oscillator to P1-50.		
	c. Connect a 600-Ω load between CH B AUD OUT terminals.		
	d. Set front-panel METER switch to CH B AF (+3FS).		
	e. Set audio oscillator to 1000 Hz at 10-mV rms output.		
	f. Note front-panel meter reading.	≅ 0 dB mW.	Adjust per paragraph 4.4. Check U6A and associated circuit.
	g. Decrease audio oscillator output by 10 dB.		
	h. Note front-panel meter reading.	≅ -10 dB mW.	Same as step e.
19. Rf transmit	a. Set front-panel MODE switch to AM.		
	b. Connect an audio oscillator to P1-35.		
	c. Set front-panel METER switch to CH A AF (+3FS).		
	d. Set audio oscillator to 1000 Hz at 10-mV rms output.		
	e. Reference front-panel meter reading.	Reference.	
	f. Apply a +5-V dc signal at P1-41.		
	g. Note front-panel meter reading.	No deflection.	Check Q3, CR2, U11D, and associated circuit.
	h. Remove +5 V dc from P1-41.		
	i. Note front-panel meter reading.	Step e reference.	
	j. Set front-panel MODE switch to SSB/CW (receiver) or USB (receiver-exciter).		
	k. Remove audio oscillator from P1-35 and connect it to P1-34 (same 10-mV output).		
(Cont)	l. Reference front-panel meter reading.	Reference.	

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
19. (Cont)	m. Apply a +5-V dc signal at P1-41.		
	n. Note front-panel meter reading.	No deflection.	Check CR4, U11A, and associated circuit.
	o. Remove +5 V dc from P1-41.		
	p. Note front-panel meter reading.	Step l reference.	
	q. Apply +5-V dc signal at P1-10.		
	r. Remove audio oscillator from P1-34 and connect it to P1-7 (same 10-mV output).		
	s. Reference front-panel meter reading.	Reference.	
	t. Apply a +5-V dc signal at P1-41.		
	u. Note front-panel meter reading.	No deflection.	Check CR6, U11B, and associated circuit.
	v. Remove +5 V dc from P1-41.		
	w. Note front-panel meter reading.	Step s reference.	
	x. Remove +5 V dc from P1-10.		
	y. Apply +5 V dc from P1-38.		
	z. Remove audio oscillator from P1-7 and connect it to P1-5 (same 10-mV output).		
	aa. Reference front-panel meter reading.	Reference.	
	ab. Apply a +5-V dc signal at P1-41.		
	ac. Note front-panel meter reading.	Step aa reference.	Check for shorts or unauthorized modification.
	ad. Remove +5 V dc from P1-41.		
	ae. Note front-panel meter reading.	Step aa reference.	
	af. Remove +5 V dc from P1-38.		
	ag. Set front-panel MODE switch to ISB.		
	ah. Remove audio oscillator from P1-5 and connect it to P1-50 (same 10-mV output).		
	ai. Reference front-panel meter reading.	Reference.	
(Cont)	aj. Apply a +5-V dc signal at P1-41.		

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
19. (Cont)	ak. Note front-panel meter reading.	No deflection.	Check CR12, U12B, and associated circuit.
	al. Remove +5 V dc from P1-41.		
	am. Note front-panel meter reading.	Step ai reference.	
	an. Apply +5-V dc signal to P1-38.		
	ao. Remove audio oscillator from P1-50 and connect it to P1-22 (same 10-mV output).		
	ap. Reference front-panel meter reading.	Reference.	
	aq. Apply a +5 V dc signal at P1-41.		
	ar. Note front-panel meter reading.	Step ap reference.	Same as step ac.
	as. Remove +5 V dc from P1-41.		
	at. Note front-panel meter reading.	Step ap reference.	
20. Mute	a. Set front-panel MODE switch to AM.		
	b. Connect an audio oscillator to P1-35.		
	c. Set front-panel METER switch to CH A AF (+3FS).		
	d. Set audio oscillator to 1000 Hz at 10-mV rms output.		
	e. Reference front-panel meter reading.	Reference.	
	f. Apply a ground signal at P1-13.		
	g. Note front-panel meter reading.	No deflection.	Check CR1 and associated circuit.
	h. Remove ground from P1-13.		
	i. Note front-panel meter reading.	Step e reference.	
	j. Set front-panel MODE switch to SSB/CW (receiver) or USB (receiver-exciter).		
	k. Remove audio oscillator from P1-35 and connect it to P1-34 (same 10-mV output).		
	l. Reference front-panel meter reading.	Reference.	
	m. Apply a ground signal at P1-13.		
(Cont)	n. Note front-panel meter reading.	No deflection.	Check CR3 and associated circuit.

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
20. (Cont)	o. Remove ground from P1-13.		
	p. Note front-panel meter reading.	Step l reference.	
	q. Apply +5-V dc signal at P1-10.		
	r. Remove audio oscillator from P1-34 and connect it to P1-7 (same 10-mV output).		
	s. Reference front-panel meter reading.	Reference.	
	t. Apply a ground signal at P1-13.		
	u. Note front-panel meter reading.	No deflection.	Check CR5 and associated circuit.
	v. Remove ground from P1-13.		
	w. Note front-panel meter reading.	Step s reference.	
	x. Remove +5 V dc from P1-10.		
	y. Apply +5-V dc signal to P1-38.		
	z. Remove audio oscillator from P1-7 and connect it to P1-5 (same 10-mV output).		
	aa. Reference front panel meter reading.	Reference.	
	ab. Apply a ground signal at P1-13.		
	ac. Note front-panel meter reading.	Step aa reference.	Check for shorts or unauthorized modifications.
	ad. Remove ground from P1-13.		
	ae. Note front-panel meter reading.	Step aa reference.	
	af. Remove +5 V dc from P1-38.		
	ag. Set front-panel MODE switch to ISB.		
	ah. Remove audio oscillator from P1-5 and connect it to P1-50 (same 10-mV output).		
	ai. Reference front-panel meter reading.	Reference.	
	aj. Apply a ground signal to P1-13.		
	ak. Note front-panel meter reading.	No deflection.	Check CR11 and associated circuit.
	al. Remove ground from P1-13.		
	am. Note front-panel meter reading.	Step ai reference.	
(Cont)	an. Apply +5-V dc signal to P1-38.		

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

TEST	PROCEDURE	NORMAL INDICATION	IF INDICATION IS ABNORMAL
20. (Cont)	ao. Remove audio oscillator from P1-50 and connect it to P1-22 (same 10-mV output).		
	ap. Reference front-panel meter reading.	Reference.	
	aq. Apply a ground signal at P1-13.		
	ar. Note front-panel meter reading.	Step ap reference.	Check for shorts or unauthorized modifications.
	as. Remove ground from P1-13.		
	at. Note front-panel meter reading.	Step ap reference.	
21. Af transmit	a. Set front-panel MODE switch to AM.		
	b. Set front-panel SPKR switch to CH A.		
	c. Connect an audio oscillator to P1-35.		
	d. Connect an audio voltmeter between P1-19 and P1-17.		
	e. Adjust audio oscillator to 1000 Hz at 10-mV rms output.		
	f. Set SQUELCH control to off (fully ccw).		
	g. Adjust front-panel AF GAIN control until audio voltmeter indicates 0.5 V rms.		
	h. Apply +5-V dc signal to P1-4.		
	i. Note audio voltmeter reading.	0.0 V rms.	Check Q12, Q9, CR21, and associated circuit.
	j. Remove +5 V dc from P1-4.		
	k. Note audio voltmeter reading.	0.5 V rms.	Same as step i.

4.2 Channel B Receive Line Amplifier Adjustment

Adjustment of CH B RCV LINE ADJ (R65) is as follows:

a. Perform test setup of table 1, test 1.
b. Set front-panel MODE switch to ISB.
c. Connect an audio oscillator to P1-50.
d. Set the audio oscillator to 1000 Hz at 10-mV rms output.
e. Connect a 600-Ω load across CH B AUD OUT terminals.
f. Connect an audio voltmeter across 600-Ω load.
g. Adjust CH B LINE ADJ (R65) for a 0-dB mW (+775-mV rms) reading on audio voltmeter.

4.3 Channel A Meter Adjustment

Adjustment of METER ADJ (R43) is as follows:

a. Perform channel A line amplifier adjustment per paragraph 4.1.
b. Perform test setup of table 1, test 1.
c. Set front-panel MODE switch to AM.
d. Connect an audio oscillator to P1-35.
e. Set front-panel METER switch to RCV-CH A AF (+3FS).
f. Set the audio oscillator to 1000 Hz at 10-mV rms output.
g. Adjust METER ADJ (R43) for a 0-dB mW reading on the front-panel meter.

4.4 Channel B Meter Adjustment

Adjustment of METER ADJ (R80) is as follows:

a. Perform channel B line amplifier adjustment per paragraph 4.2.
b. Perform test setup of table 1, test 1.
c. Set front-panel MODE switch to ISB.
d. Connect an audio oscillator to P1-50.
e. Set the audio oscillator to 1000 Hz at 10-mV rms output.
f. Set front-panel METER switch to RCV-CH B AF (+3FS).
g. Adjust METER ADJ (R80) for a 0-dB mW reading on the front-panel meter.

4.5 Squelch Adjustment

Perform squelch high-channel adjust (R131) as follows:

a. Perform test setup of table 1, test 1.
b. Set front-panel MODE switch to AM.
c. Set front-panel SPKR switch to CH A.
d. Connect an audio oscillator to P1-35.
e. Connect audio voltmeter to TP5 (green), voltmeter common to TP1 (brown).
f. Adjust audio oscillator (10-mV rms output) from 0 through 10 000 Hz and note maximum indication on audio voltmeter (frequency should be 600 ±100 Hz). Note amplitude.
g. Connect audio voltmeter to TP4 (yellow), voltmeter common to TP1 (brown).
h. Adjust audio oscillator (10-mV rms output) from 0 through 10 000 Hz and note maximum indication on audio voltmeter (frequency should be 2400 ±400 Hz).
i. Set audio oscillator to frequency (10-mV rms output) that gave the maximum indication in step h.
j. Adjust R131 to produce a level at TP4 (yellow), 12 dB below the amplitude noted in step f.

5. REPAIR

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

6. PARTS LIST/DIAGRAMS

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 8). 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.

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.

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

CIRCUIT CARD/ SUBASSEMBLY	COLLINS PART NUMBER	LATEST EFFECTIVITY
Receive audio	635-0748-001	REV J

PARTS LIST

REF DES	DESCRIPTION	COLLINS PART NO	USABLE ON CODE
	RECEIVE AUDIO 635-0748-001		
CR1-CR21	SEMICOND DEVICE, 1N4454	353-3644-010	
C1-C4	CAPACITOR, FXD, ELCTLT, 1μF, 20%, 35V	184-9102-350	
C5	CAPACITOR, FXD, CER DIEL, 0.1μF, 10%, 100V	913-5019-440	
C6	CAPACITOR, FXD, ELCTLT, 1μF, 20%, 35V	184-9102-350	
C7	CAPACITOR, FXD, CER DIEL, 56pF, 10%, 200V (A2)	913-4003-000	
C7	CAPACITOR, FXD, DER DIEL, 18pF, 10%, 200V	913-5019-040	
C8	CAPACITOR, FXD, ELCTLT, 47μF, 20%, 20V	184-9102-190	
C9	CAPACITOR, FXD, CER DIEL, 56pF, 10%, 200V (A2)	913-4003-000	
C9	CAPACITOR, FXD, CER DIEL, 47pF, 10%, 200V	913-4002-000	
C10	CAPACITOR, FXD, CER DIEL, 0.1μF, 10%, 100V	913-5019-440	
C11	CAPACITOR, FXD, CER DIEL, 1μF, 20%, 50V	913-3279-270	
C12	CAPACITOR, FXD, ELCTLT, 47μF, 20%, 20V	184-9102-190	
C13	CAPACITOR, FXD, CER DIEL, 0.1μF, 10%, 100V	913-5019-440	
C14, C15	CAPACITOR, FXD, ELCTLT, 47μF, 20%, 20V	184-9102-190	
C16-C18	CAPACITOR, FXD, ELCTLT, 1μF, 20%, 35V	184-9102-350	
C19	CAPACITOR, FXD, CER DIEL, 56pF, 10%, 200V (A2)	913-4003-000	
C19	CAPACITOR, FXD, CER DIEL, 18pF, 10%, 200V	913-5019-040	
C20	CAPACITOR, FXD, ELCTLT, 10μF, 20%, 20V	184-9102-170	
C21	CAPACITOR, FXD, CER DIEL, 0.1μF, 10%, 100V	913-5019-440	
C22	CAPACITOR, FXD, CER DIEL, 1μF, 20%, 50V	913-3279-270	
C23	CAPACITOR, FXD, ELCTLT, 47μF, 20%, 20V	184-9102-190	
C24	CAPACITOR, FXD, CER DIEL, 0.1μF, 10%, 100V	913-5019-440	
C25-C27	CAPACITOR, FXD, ELCTLT, 47μF, 20%, 20V	184-9102-190	
C28	CAPACITOR, FXD, ELCTLT, 1μF, 20%, 35V	184-9102-350	
C29	CAPACITOR, FXD, ELCTLT, 10μF, 20%, 20V	184-9102-170	
C30, C31	CAPACITOR, FXD, ELCTLT, 1μF, 20%, 35V	184-9102-350	
C32	CAPACITOR, FXD, CER DIEL, 56pF, 10%, 200V (A2)	913-4003-000	
C32	CAPACITOR, FXD, CER DIEL, 47pF, 10%, 200V	913-4002-000	
C33	CAPACITOR, FXD, CER DIEL, 0.1μF, 10%, 100V	913-5019-440	
C34, C35	CAPACITOR, FXD, ELCTLT, 47μF, 20%, 20V	184-9102-190	
C36	CAPACITOR, FXD, CER DIEL, 0.1μF, 10%, 100V	913-5019-440	
C37	CAPACITOR, FXD, CER DIEL, 0.47μF, 20%, 50V	913-3279-250	
C38	CAPACITOR, FXD, ELCTLT, 33μF, 20%, 25V	183-9102-260	
C39, C40	CAPACITOR, FXD, CER DIEL, 0.1μF, 10%, 100V	913-5019-440	
C41	CAPACITOR, FXD, ELCTLT, 220μF, -10%+75%, 20V	183-1277-200	
C42	NOT USED		
C43	CAPACITOR, FXD, ELCTLT, 4.7μF, 20%, 10V	184-9102-070	
C44	CAPACITOR, FXD, CER DIEL, 0.022μF, 10%, 50V	913-5019-240	
C45, C46	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	
C47, C48	CAPACITOR, FXD, ELCTLT, 4.7μF, 20%, 10V	184-9102-070	
C49	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V (A2)	913-5019-200	
C50, C51	CAPACITOR, FXD, CER DIEL, 330pF, 10%, 200V	913-4012-000	
C52	CAPACITOR, FXD, CER DIEL, 680pF, 10%, 200V	913-4016-000	
C53	CAPACITOR, FXD, ELCTLT, 4.7μF, 20%, 10V	184-9102-070	
C54	CAPACITOR, FXD, CER DIEL, 0.01μF, 10%, 100V	913-5019-200	
C55, C56	CAPACITOR, FXD, ELCTLT, 4.7μF, 20%, 10V	184-9102-070	
C57	CAPACITOR, FXD, ELCTLT, 33μF, 20%, 25V	183-9102-260	
C58	CAPACITOR, FXD, CER DIEL, 3300pF, 10%, 100V	913-5019-140	
C59, C60	CAPACITOR, FXD, ELCTLT, 47μF, 20%, 20V	184-9102-190	
C61	CAPACITOR, FXD, ELCTLT, 10μF, 20%, 20V	184-9102-170	
C62	CAPACITOR, FXD, ELCTLT, 4.7μF, 20%, 10V	184-9102-070	
C63	NOT USED		
C64, C65	CAPACITOR, FXD, ELCTLT, 47μF, 20%, 20V	184-9102-190	
C66, C67	CAPACITOR, FXD, ELCTLT, 10μF, 20%, 20V	184-9102-170	
C68	CAPACITOR, FXD, CER DIEL, 100pF, 10%, 200V	913-4006-000	
C69-C72	CAPACITOR, FXD, ELCTLT, 47μF, 20%, 20V	184-9102-190	
Q1	TRANSISTOR, 2N2222A	352-0661-020	
Q2	TRANSISTOR, 2N2907A	352-0551-010	
Q3, Q4	TRANSISTOR, 2N2222A	352-0661-020	
Q5	TRANSISTOR, 2N2907A	352-0551-010	
Q6, Q7	TRANSISTOR, 2N2222A	352-0661-020	
Q8	TRANSISTOR, 2N2907A	352-0551-010	
Q9	TRANSISTOR, 2N4092	352-0759-020	
Q10, Q11	TRANSISTOR, 2N2222A	352-0661-020	
Q12	TRANSISTOR, 2N2608	352-0605-010	
R1	RESISTOR, FXD, CMPSN, 680Ω, 10%, 1/4W	745-0743-000	
R2	RESISTOR, FXD, CMPSN, 0.22MΩ, 10%, 1/4W	745-0833-000	
R3	RESISTOR, FXD, CMPSN, 0.47MΩ, 10%, 1/4W	745-0845-000	

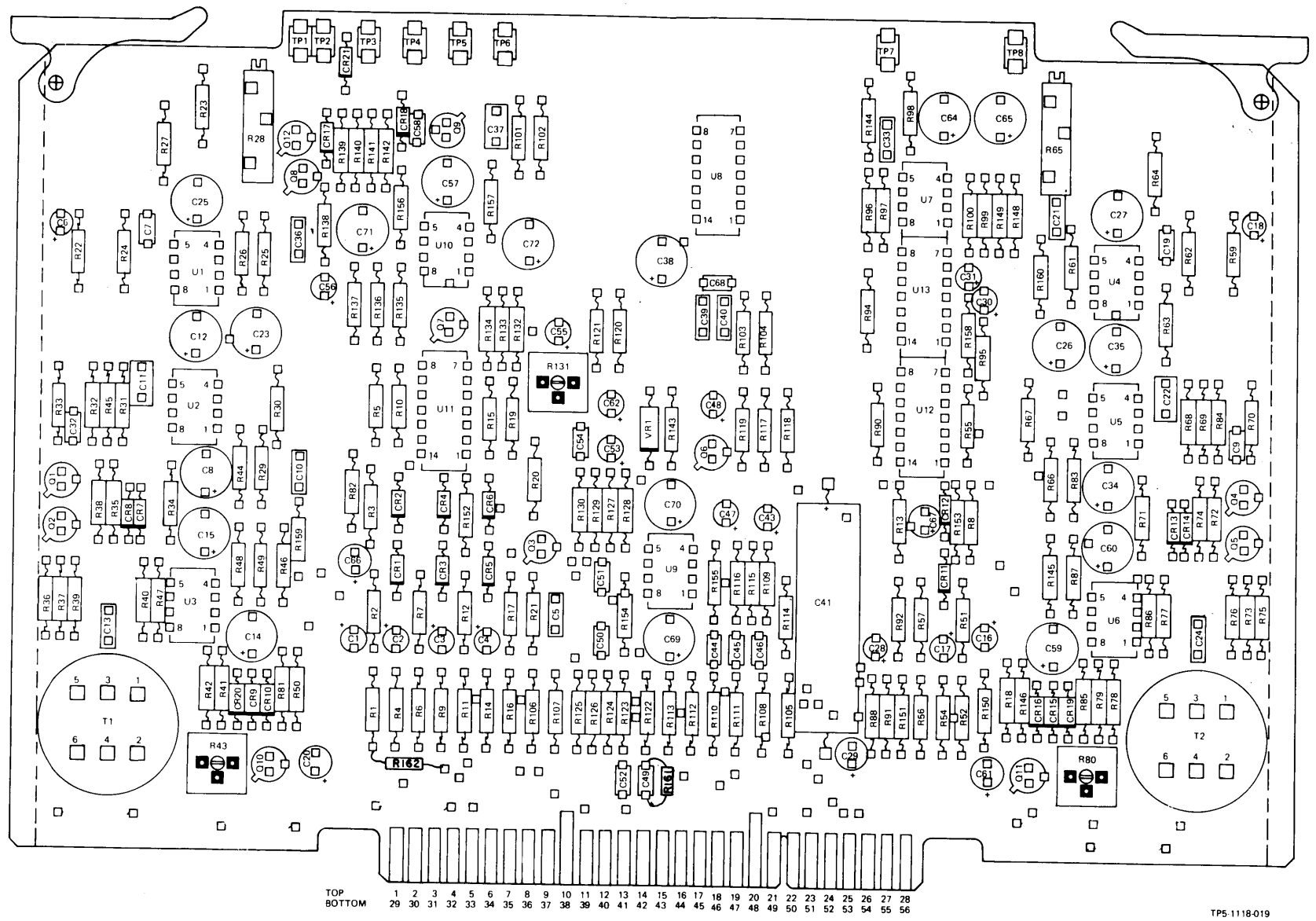
PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NO	USABLE ON CODE
R4	RESISTOR, FXD, CMPSN, 0.01MΩ, 10%, 1/4W	745-0821-000	
R5	RESISTOR, FXD, CMPSN, 1MΩ, 10%, 1/4W	745-0857-000	
R6	RESISTOR, FXD, CMPSN, 680Ω, 10%, 1/4W	745-0743-000	
R7	RESISTOR, FXD, CMPSN, 0.22MΩ, 10%, 1/4W	745-0833-000	
R8	RESISTOR, FXD, CMPSN, 0.47MΩ, 10%, 1/4W	745-0845-000	
R9	RESISTOR, FXD, CMPSN, 0.01MΩ, 10%, 1/4W	745-0821-000	
R10	RESISTOR, FXD, 1MΩ, 10%, 1/4W	745-0857-000	
R11	RESISTOR, FXD, CMPSN, 680Ω, 10%, 1/4W	745-0743-000	
R12	RESISTOR, FXD, CMPSN, 0.22MΩ, 10%, 1/4W	745-0833-000	
R13	RESISTOR, FXD, 1MΩ, 10%, 1/4W	745-0857-000	
R14	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R15	RESISTOR, FXD, CMPSN, 1MΩ, 10%, 1/4W	745-0857-000	
R16	RESISTOR, FXD, CMPSN, 27kΩ, 10%, 1/4W	745-0800-000	
R17	RESISTOR, FXD, CMPSN, 0.22MΩ, 10%, 1/4W	745-0833-000	
R18	RESISTOR, FXD, CMPSN, 0.10Ω, 10%, 1/4W	745-0821-000	
R19	RESISTOR, FXD, CMPSN, 1MΩ, 10%, 1/4W	745-0857-000	
R20	RESISTOR, FXD, CMPSN, 47kΩ, 10%, 1/4W	745-0809-000	
R21	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R22	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R23	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R24	RESISTOR, FXD, CMPSN, 0.15MΩ, 10%, 1/4W	745-0827-000	
R25	RESISTOR, FXD, CMPSN, 200Ω, 10%, 1/4W	745-0725-000	
R26	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R27	RESISTOR, FXD, CMPSN, 220Ω, 10%, 1/4W	745-0725-000	
R28	RESISTOR, VAR, 10kΩ, 10%, 3/4W	382-0012-290	
R29	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R30	RESISTOR, FXD, CMPSN, 68kΩ, 10%, 1/4W	745-0815-000	
R31, R32	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R33	RESISTOR, FXD, CMPSN, 68kΩ, 10%, 1/4W	745-0815-000	
R34	RESISTOR, FXD, CMPSN, 100Ω, 10%, 1/4W	745-0713-000	
R35	RESISTOR, FXD, CMPSN, 4.7kΩ, 10%, 1/4W	745-0773-000	
R36, R37	RESISTOR, FXD, CMPSN, 47Ω, 10%, 1/4W	745-0701-000	
R38	RESISTOR, FXD, CMPSN, 4.7kΩ, 10%, 1/4W	745-0773-000	
R39	RESISTOR, FXD, FILM, 140Ω, 1%, 1/8W	705-0955-000	
R40	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R41, R42	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R43	RESISTOR, VAR, 10kΩ, 20%, 1/2W	382-0038-070	
R44-R47	RESISTOR, FXD, CMPSN, 220Ω, 10%, 1/4W	745-0725-000	
R48	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R49	RESISTOR, FXD, CMPSN, 68kΩ, 10%, 1/4W	745-0815-000	
R50	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R51	RESISTOR, FXD, CMPSN, 0.22MΩ, 10%, 1/4W	745-0833-000	
R52	RESISTOR, FXD, CMPSN, 680Ω, 10%, 1/4W	745-0743-000	
R53	NOT USED		
R54	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R55	RESISTOR, FXD, CMPSN, 1MΩ, 10%, 1/4W	745-0857-000	
R56	RESISTOR, FXD, CMPSN, 27kΩ, 10%, 1/4W	745-0800-000	
R57	RESISTOR, FXD, CMPSN, 0.22MΩ, 10%, 1/4W	745-0833-000	
R58	NOT USED		
R59	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R60	NOT USED		
R61	RESISTOR, FXD, CMPSN, 220Ω, 10%, 1/4W	745-0725-000	
R62	RESISTOR, FXD, CMPSN, 0.15MΩ, 10%, 1/4W	745-0827-000	
R63	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R64	RESISTOR, FXD, CMPSN, 220Ω, 10%, 1/4W	745-0725-000	
R65	RESISTOR, VAR, 10kΩ, 10%, 3/4W	382-0012-290	
R66	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R67	RESISTOR, FXD, CMPSN, 68kΩ, 10%, 1/4W	745-0815-000	
R68, R69	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R70	RESISTOR, FXD, CMPSN, 68kΩ, 10%, 1/4W	745-0815-000	
R71	RESISTOR, FXD, CMPSN, 100Ω, 10%, 1/4W	745-0713-000	
R72	RESISTOR, FXD, CMPSN, 4.7kΩ, 10%, 1/4W	745-0773-000	
R73	RESISTOR, FXD, CMPSN, 47Ω, 10%, 1/4W	745-0701-000	
R74	RESISTOR, FXD, CMPSN, 4.7kΩ, 10%, 1/4W	745-0773-000	
R75	RESISTOR, FXD, CMPSN, 47Ω, 10%, 1/4W	745-0701-000	
R76	RESISTOR, FXD, FILM, 140Ω, 1%, 1/8W	705-0955-000	
R77	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R78, R79	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R80	RESISTOR, VAR, 10kΩ, 20%, 1/2W	382-0038-070	
R81	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	

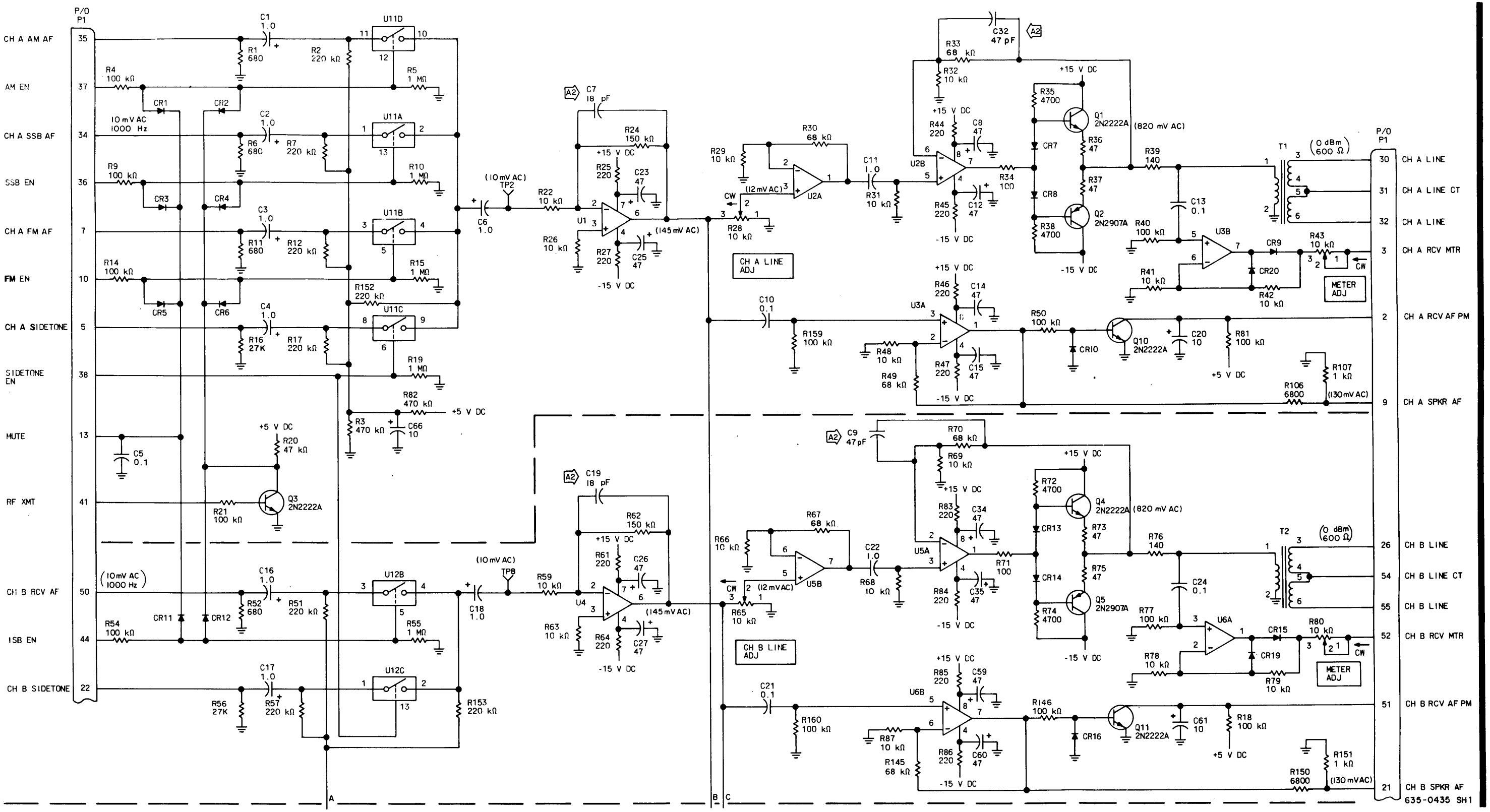
PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NO	USABLE ON CODE
R82	RESISTOR, FXD, CMPSN, 0.47MΩ, 10%, 1/4W	745-0845-000	
R83-R86	RESISTOR, FXD, CMPSN, 220Ω, 10%, 1/4W	745-0725-000	
R87	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R88	RESISTOR, FXD, CMPSN, 0.22MΩ, 10%, 1/4W	745-0833-000	
R89	NOT USED		
R90	RESISTOR, FXD, CMPSN, 1MΩ, 10%, 1/4W	745-0857-000	
R91	RESISTOR, FXD, CMPSN, 0.47MΩ, 10%, 1/4W	745-0845-000	
R92	RESISTOR, FXD, CMPSN, 0.22MΩ, 10%, 1/4W	745-0833-000	
R93	NOT USED		
R94	RESISTOR, FXD, CMPSN, 1MΩ, 10%, 1/4W	745-0857-000	
R95, R96	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R97	RESISTOR, FXD, CMPSN, 68kΩ, 10%, 1/4W (A2)	745-0815-000	
R97	RESISTOR, FXD, FILM, 56.2kΩ, 1%, 1/8W	705-1080-000	
R98	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R99	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R100	RESISTOR, FXD, CMPSN, 0.15MΩ, 10%, 1/4W (A2)	745-0827-000	
R100	RESISTOR, FXD, FILM, 287kΩ, 1%, 1/8W	705-1114-000	
R101	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R102, R103	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R104	RESISTOR, FXD, CMPSN, 2.7Ω, 5%, 1/4W	745-4377-000	
R105	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R106	RESISTOR, FXD, CMPSN, 6.8kΩ, 10%, 1/4W	745-0779-000	
R107	RESISTOR, FXD, CMPSN, 1kΩ, 10%, 1/4W	745-0749-000	
R108	RESISTOR, FXD, CMPSN, 6.8kΩ, 10%, 1/4W (A1)	745-0779-000	
R108	RESISTOR, FXD, CMPSN, 15kΩ, 10%, 1/4W	745-0791-000	
R109	RESISTOR, FXD, CMPSN, 510Ω, 5%, 1/4W	745-0738-000	
R110	RESISTOR, FXD, CMPSN, 27kΩ, 10%, 1/4W	745-0800-000	
R111	RESISTOR, FXD, CMPSN, 1kΩ, 10%, 1/4W	745-0749-000	
R112	RESISTOR, FXD, CMPSN, 27kΩ, 10%, 1/4W	745-0800-000	
R113	RESISTOR, FXD, CMPSN, 510Ω, 5%, 1/4W	745-0738-000	
R114	RESISTOR, FXD, CMPSN, 13kΩ, 5%, 1/4W	745-0789-000	
R115	RESISTOR, FXD, CMPSN, 51kΩ, 5%, 1/4W (A2)	745-0810-000	
R115	RESISTOR, FXD, FILM, 51.1kΩ, 1%, 1/8W	705-1078-000	
R116	RESISTOR, FXD, CMPSN, 56kΩ, 10%, 1/4W (A2)	745-0812-000	
R116	RESISTOR, FXD, FILM, 56.2kΩ, 1%, 1/8W	705-1080-000	
R117	RESISTOR, FXD, FILM, 31.6kΩ, 1%, 1/8W	705-1068-000	
R118	RESISTOR, FXD, FILM, 5.76kΩ, 1%, 1/8W	705-3605-360	
R119	RESISTOR, FXD, CMPSN, 4.7kΩ, 10%, 1/4W	745-0773-000	
R120	RESISTOR, FXD, CMPSN, 0.47MΩ, 10%, 1/4W	745-0845-000	
R121	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R122	RESISTOR, FXD, CMPSN, 10kΩ, 10%, 1/4W	745-0785-000	
R123	RESISTOR, FXD, CMPSN, 75kΩ, 5%, 1/4W	745-0816-000	
R124	RESISTOR, FXD, CMPSN, 0.15MΩ, 10%, 1/4W	745-0827-000	
R125	RESISTOR, FXD, CMPSN, 510Ω, 5%, 1/4W	745-0738-000	
R126	RESISTOR, FXD, CMPSN, 0.15MΩ, 10%, 1/4W	745-0827-000	
R127	RESISTOR, FXD, CMPSN, 56kΩ, 10%, 1/4W (A2)	745-0812-000	
R127	RESISTOR, FXD, FILM, 56.2kΩ, 1%, 1/8W	705-1080-000	
R128	RESISTOR, FXD, CMPSN, 51kΩ, 5%, 1/4W (A2)	745-0810-000	
R128	RESISTOR, FXD, FILM, 51.1kΩ, 1%, 1/8W	745-1078-000	
R129	RESISTOR, FXD, CMPSN, 510Ω, 5%, 1/4W	745-0738-000	
R130	RESISTOR, FXD, CMPSN, 3.3kΩ, 10%, 1/4W	745-0767-000	
R131	RESISTOR, VAR, 10kΩ, 20%, 1/2W	382-0038-070	
R132	RESISTOR, FXD, FILM, 5.11kΩ, 1%, 1/8W	705-1030-000	
R133	RESISTOR, FXD, FILM, 31.6kΩ, 1%, 1/8W	705-1068-000	
R134	RESISTOR, FXD, FILM, 56.2kΩ, 1%, 1/8W (A1)	705-1080-000	
R134	RESISTOR, FXD, FILM, 24.9kΩ, 1%, 1/8W	705-1063-000	
R135	RESISTOR, FXD, CMPSN, 4.7kΩ, 10%, 1/4W	745-0773-000	
R136	RESISTOR, FXD, CMPSN, 0.47MΩ, 10%, 1/4W	745-0845-000	
R137	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R138	RESISTOR, FXD, CMPSN, 1kΩ, 10%, 1/4W	745-0749-000	
R139	RESISTOR, FXD, CMPSN, 47kΩ, 10%, 1/4W	745-0809-000	
R140	RESISTOR, FXD, CMPSN, 100Ω, 10%, 1/4W	745-0713-000	
R141	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R142	RESISTOR, FXD, CMPSN, 1MΩ, 10%, 1/4W	745-0857-000	
R143	RESISTOR, FXD, CMPSN, 680Ω, 10%, 1/4W	745-0743-000	
R144	RESISTOR, FXD, CMPSN, 4.7kΩ, 10%, 1/4W (A2)	745-0773-000	
R144	RESISTOR, FXD, CMPSN, 27kΩ, 10%, 1/4W	745-0800-000	
R145	RESISTOR, FXD, CMPSN, 68kΩ, 10%, 1/4W	745-0815-000	
R146	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R147	NOT USED		

Receive Audio, Schematic Diagram
Figure 8 (Sheet 2)



Receive Audio, Schematic Diagram
Figure 8 (Sheet 1 of 5)



Receive Audio, Schematic Diagram
Figure 8 (Sheet 3)

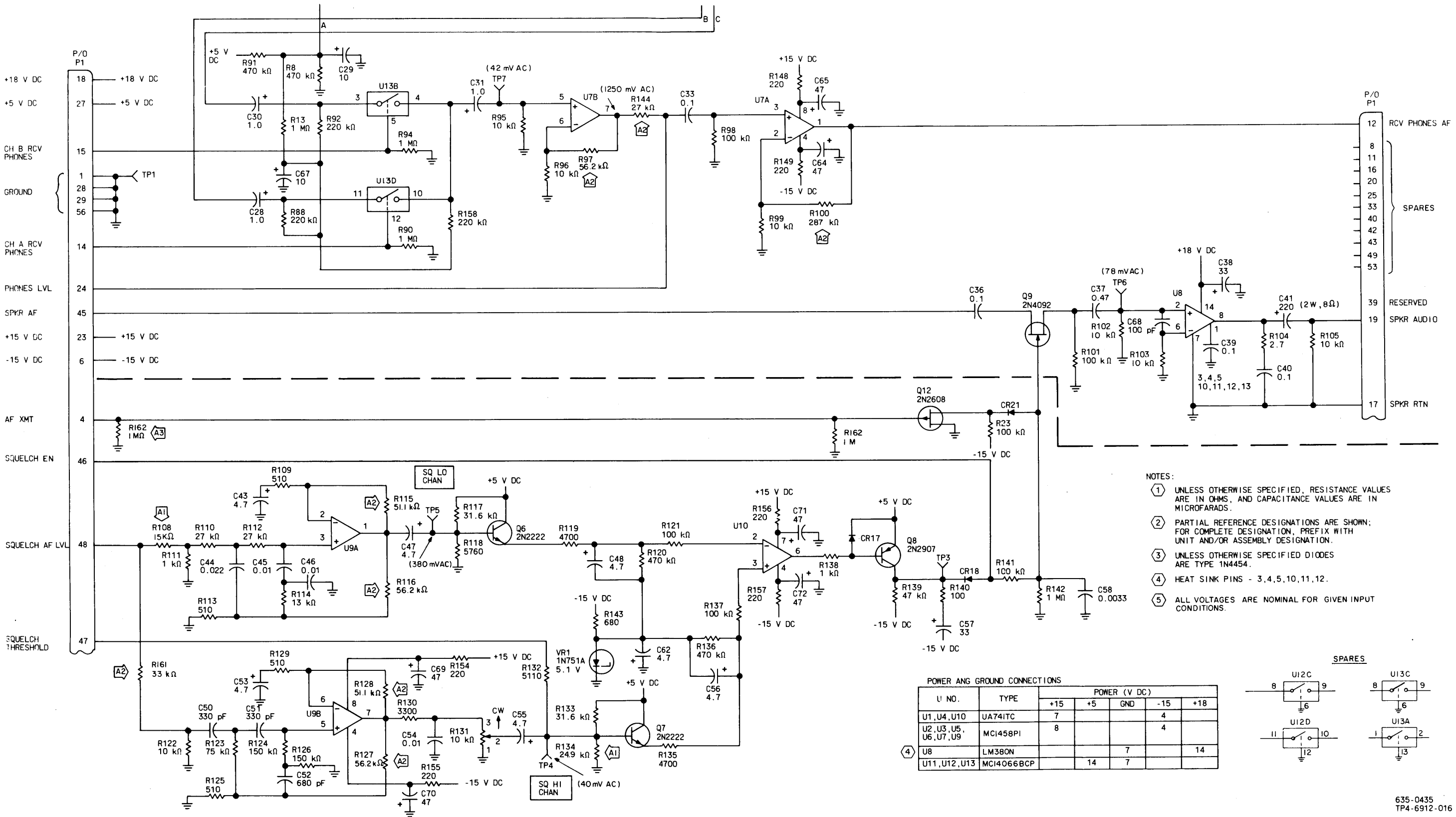
PARTS LIST (Cont)

REF DES	DESCRIPTION	COLLINS PART NO	USABLE ON CODE
R148, R149	RESISTOR, FXD, CMPSN, 220Ω, 10%, 1/4W	745-0725-000	
R150	RESISTOR, FXD, CMPSN, 6.8kΩ, 10%, 1/4W	745-0779-000	
R151	RESISTOR, FXD, CMPSN, 1kΩ, 10%, 1/4W	745-0749-000	
R152, R153	RESISTOR, FXD, CMPSN, 0.22MΩ, 10%, 1/4W	745-0833-000	
R154-R157	RESISTOR, FXD, CMPSN, 220Ω, 10%, 1/4W	745-0725-000	
R158	RESISTOR, FXD, CMPSN, 0.22MΩ, 10%, 1/4W	745-0833-000	
R159, R160	RESISTOR, FXD, CMPSN, 0.10MΩ, 10%, 1/4W	745-0821-000	
R161	RESISTOR, FXD, CMPSN, 33kΩ, 10%, 1/4W (A2)	745-0803-000	
R162	RESISTOR, FXD, CMPSN, 1MΩ, 10%, 1/4W (A3)	745-0857-000	
T1, T2	TRANSFORMER, AUD	677-0410-010	
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	
TP6	JACK, TIP, BLU	360-0484-080	
TP7	JACK, TIP, VIC	360-0484-090	
TP8	JACK, TIP, GRA	360-0484-100	
U1	INTEGRATED CKT, UA741TC	351-1110-020	
U2, U3	INTEGRATED CKT, MC1458P1	351-1071-070	
U4	INTEGRATED CKT, UA741TC	351-1110-020	
U5-U7	INTEGRATED CKT, MC1458P1	351-1071-070	
U8	INTEGRATED CKT, LM380N	351-1118-010	
U9	INTEGRATED CKT, MC1458P1	351-1071-070	
U10	INTEGRATED CKT, UA741TC	351-1110-020	
U11-U13	INTEGRATED CKT, MC14066BCP	351-8252-010	
VR1	SEMICOND DEVICE, 1N751A	353-2710-000	

MODIFICATION HISTORY

REVISION IDENT	DESCRIPTION OF REVISION AND REASON FOR CHANGE	EFFECTIVITY
A1	Changed: R108 from 6800Ω to 15kΩ. R134 from 56.2kΩ to 24.9kΩ.	REV E and above
A2	Removed C49, 0.01 μF. Added R161, 33kΩ, in same location as C49 was removed. Changed: C7 from 56 pF to 18 pF C9 from 56 pF to 47 pF C19 from 56 pF to 18 pF C32 from 56 pF to 47 pF R97 from 68kΩ to 56.2kΩ R100 from 150kΩ to 287kΩ R115 from 51kΩ, 5% to 51.1kΩ, 1% R116 from 56kΩ, 10% to 56.2kΩ, 1% R127 from 56kΩ, 10%, to 56.2kΩ, 1% R128 from 51kΩ, 5% to 51.1kΩ, 1% R144 from 4700Ω to 27kΩ Added R161, 33kΩ	REV F and above
A3	Added R162, 1MΩ	REV H and above

Receive Audio, Schematic Diagram
Figure 8 (Sheet 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. UNLESS OTHERWISE SPECIFIED DIODES ARE TYPE 1N4454.
4. HEAT SINK PINS - 3,4,5,10,11,12.
5. ALL VOLTAGES ARE NOMINAL FOR GIVEN INPUT CONDITIONS.

POWER ANG GROUND CONNECTIONS

	U NO.	TYPE	POWER (V DC)				
			+15	+5	GND	-15	+18
	U1,U4,U10	UA741TC	7			4	
	U2,U3,U5, U6,U7,U9	MC1458P1	8			4	
4	U8	LM380N			7		14
	U11,U12,U13	MC14066BCP		14	7		

SPARES

635-0435
TP4-6912-016

Receive Audio, Schematic Diagram
Figure 8 (Sheet 5)