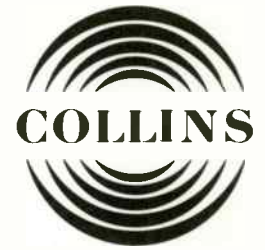


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system instructions

212S-1 Stereo Console

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Figure 1-1. 212S-1 Stereo Console

section 1

general description

1.1 PURPOSE OF INSTRUCTION BOOK

This instruction book contains information for the installation, adjustment, operation, and maintenance of the 212S-1 Stereo Console.

1.2 PURPOSE OF EQUIPMENT

The 212S-1 is a complete stereo or dual-channel console for programming at an am., fm, or tv station. Provision is made for 10 local stereo inputs, 1 stereo network input, and 4 stereo remote inputs. The number and type of inputs will depend on the number and type of cards installed in the console. The 150/600-ohm output may connect directly to a transmitter audio input. Ten-watt monitor amplifiers are available for listening to program material. Cue listening, control relays, and an intercommunication system are incorporated.

1.3 CUSTOMER OPTIONS

The 212S-1 Stereo Console utilizes plug-in circuit cards to provide a choice of amplifier units. The type and quantity of cards required will depend upon specific station requirements. Table 1-1 lists 21 different equipment options available. Table 1-2 lists the individual units available.

1.4 UNIT INSTRUCTIONS

Applicable unit instructions are listed in table 1-3 and are supplied in the back of this book.

1.5 DESCRIPTION OF MAJOR COMPONENTS

1.5.1 212S-1 Stereo Console

The 212S-1 is illustrated in figure 1-1. The front panel slopes backward 30° and is hinged at the bottom so that all servicing may be done from the front. The console may be permanently mounted.

Perforated panels in the top and back provide adequate convectional cooling. The two card cages, one for each channel, are mounted in the left rear of the console on hinges for easy access to the cards and card receptacles. The power supply is mounted near the right-hand side of the console. All connections are made at terminal boards on the floor of the console.

All controls and switches, except the two MASTER controls, control both channels simultaneously.

For stereo operation, cards are used in pairs, one card in the right-hand card cage (A3), another in the left-hand card cage (A2). Card receptacles A2XA1 and A3XA1 each accept 384D-1 Switch Matrix. Card receptacles A2XA8 and A3XA8 each accept 356P-1 Program Amplifier. Card receptacles A2XA9 and A3XA9 each accept 356M-1 Monitor Amplifier. Card receptacles A2XA2 through A2XA7 and A3XA2 through A3XA7 each accept 356P-1 Preamplifier, 356V-1 High-Level Input Card, 356R-1 Microphone-Phonograph Preamplifier, or 356U-1 Broadcast Audio Preamplifier.

1.5.2 384D-1 Switch Matrix

The 384D-1 switches one of the four remote line inputs to either the RMT position of the NET/RMT input switch of input amplifier 6 or the RMT position of the INTERCOM input switch. The unit consists of 16 photoconductive switches. The four REMOTE LINES switches on the upper right-hand side of the console front panel control the 384D-1.

1.5.3 Input Amplifiers

1.5.3.1 356T-1 Preamplifier Card

The 356T-1 amplifies one of two microphone inputs. The bus level output is switched to the audition or program bus. A cue level output is provided for the cue bus.

Table 1-1. 212S-1 Stereo Console Customer Options

PART NUMBER	EQUIPMENT INCLUDED							
	212S-1	356U-1	365P-1	356T-1	356V-1	356R-1	384D-1	409Z-1
522-3880-011	1	2	2	12	0	0	2	1
522-3880-021	1	2	2	10	0	2	2	1
522-3880-031	1	2	2	10	2	0	2	1
522-3880-041	1	2	2	8	0	4	2	1
522-3880-051	1	2	2	8	2	2	2	1
522-3880-061	1	2	2	8	4	0	2	1
522-3880-071	1	2	2	6	0	6	2	1
522-3880-081	1	2	2	6	2	4	2	1
522-3880-091	1	2	2	6	4	2	2	1
522-3880-101	1	2	2	6	6	0	2	1
522-3880-111	1	2	2	4	0	8	2	1
522-3880-121	1	2	2	4	2	6	2	1
522-3880-131	1	2	2	4	4	4	2	1
522-3880-141	1	2	2	4	6	2	2	1
522-3880-151	1	2	2	4	8	0	2	1
522-3880-161	1	2	2	2	0	10	2	1
522-3880-171	1	2	2	2	2	8	2	1
522-3880-181	1	2	2	2	4	6	2	1
522-3880-191	1	2	2	2	6	4	2	1
522-3880-201	1	2	2	2	8	2	2	1
522-3880-211	1	2	2	2	10	0	2	1

Table 1-2. 212S-1 Stereo Console Equipment Available

ITEM	WEIGHT	OVERALL DIMENSIONS W by L by H (inches)	COLLINS PART NUMBER	NUMBER REQUIRED
212S-1 Stereo Console	78 pounds	37-1/8 by 18 by 10-1/4	522-3880-001	1
384D-1 Switch Matrix	4 ounces	4-7/16 by 6-3/8 by 13/16	522-3888-001	2
356T-1 Preamplifier	7 ounces	4-7/16 by 6-3/8 by 1	522-3885-001	*2
356V-1 High-Level Input Card	7 ounces	4-7/16 by 6-3/8 by 1	522-3887-001	*2
356P-1 Program Amplifier	9 ounces	4-7/16 by 6-3/8 by 1	522-3884-001	2
356M-1 Monitor Amplifier	15 ounces	4-7/16 by 6-3/8 by 3-3/8	522-3883-001	2
409Z-1 Power Supply	30 pounds	8 by 13 by 8-1/2	522-3886-001	1
260S-1 Add-On Unit	15 pounds	10-1/4 by 8-3/4 by 13	522-3882-001	1
356U-1 Broadcast Audio Pre-amplifier	1 pound	4-7/16 by 6-3/8 by 1	772-5273-001	*2
356R-1 Microphone-Phonograph Preamplifier	8 ounces	4-7/16 by 6-3/8 by 1	758-5486-001	*2

*More than one pair may be used.

Table 1-3. Unit Instructions

TITLE	COLLINS PART NUMBER
384D-1 Switch Matrix	523-0558098-002438
356T-1 Preamplifier	523-0558093-002438
356V-1 High-Level Input Card	523-0558092-002438
356P-1 Program Amplifier	523-0558094-002438
356M-1 Monitor Amplifier	523-0558096-002438
409Z-1 Power Supply	523-0558095-002438
356U-1 Broadcast Audio Preamplifier	523-0559550-001438
356R-1 Microphone-Phonograph Preamplifier	523-0558097-002438
260S-1 Add-On Unit	523-0558811-002438

general description

1.5.3.2 356V-1 High-Level Input Card

The 356V-1 accepts one of two 0-dbm input signals. The bus level output is switched to the audition or program bus. A cue level output is provided for the cue bus.

1.5.3.3 356R-1 Microphone-Phonograph Preamplifier

The 356R-1 accepts either a microphone or a phonograph input. The bus level output is switched to the audition or program bus. A cue level output is provided for the cue bus.

1.5.3.4 356U-1 Broadcast Audio Preamplifier

The 356U-1 accepts one of two inputs from either a high-level or a low-level input device. The bus level output is switched to the audition or program bus. A cue level output is provided for the cue bus.

1.5.4 356P-1 Program Amplifier

The 356P-1 accepts audio from the program bus and delivers +8 dbm at the program output. A low-level output is provided for the simulcast mode of operation.

1.5.5 356M-1 Monitor Amplifier

The 356M-1 accepts audio at the program or audition bus level and delivers a maximum of 10 watts to a monitor speaker.

1.5.6 Intercom Amplifier

The intercom amplifier, mounted on the rear of the console front panel, amplifies audio signals from remote locations, slave speakers, or the cue bus. The PTT switch allows two-way communication between the console and remote locations or slave speakers.

1.5.7 Reverse Cue Amplifier

The reverse cue amplifier, interlocked with the NET/RMT and AUD/PGM switches of input ampli-

fier 6, amplifies the left channel program output for reverse cue listening at a remote location.

1.5.8 409Z-1 Power Supply

The 409Z-1 supplies all dc operating voltages for the console.

1.6 ELECTRICAL CHARACTERISTICS

Electrical characteristics of the 212S-1 Stereo Console are as follows:

Maximum Number of Inputs:

- 10, high- or low-level, local stereo inputs
- 4 remote, high-level stereo inputs
- 1 network, high-level, stereo input

Maximum Number of Outputs:

- 1 stereo or 2 monaural monitor outputs
- 1 stereo or 2 monaural program outputs
- 1 monaural cue output
- 1 headset output

Input Impedance:

- Low Level
30/150/250/600* ohms (balanced or unbalanced)

Phonograph

- 50 K ohms nominal at 1 kHz

High Level, Network, and Remote

- 600 ohms (balanced or unbalanced)
- 10K ohms (bridging)

Output Impedance:

- Program Line
150/600* ohms

Monitor

- 8 ohms

Headset (Clevite-Brush 206A or equivalent)

- 10 K

Input Level:

- Low Level
-65 dbm nominal
-26 dbm, maximum

*Factory-wired for 150-ohm low-level input impedance, 600-ohm program output impedance, and 115-volt power source.

High Level

~~+10 dbm~~, maximum
-10 DBM TO 0 DBM -

Network and Remotes
0 dbm

Phonograph

2 mv rms nominal
100 mv rms, maximum

Output Level:

Program
+8 dbm

Monitor

10 watts per channel

Intercom Amplifier

1/2 watt

Response:

30 to 15,000 Hz ± 1 db (referred to 1000 Hz)

Distortion:

Less than 1% nominal

Equivalent Input Noise:

-120 db or better

Audible Noise:

None

Ambient Temperature Range:

0° to 50°C (32° to 122°F)

Ambient Humidity Range:

Up to 95%

Altitude:

Up to 10,000 feet above msl

Power Source:

*115 volts ac, 4 amperes or 220 volts ac,
2 amperes $\pm 10\%$, 50/60 Hz

*Factory-wired for 150-ohm low-level input impedance, 600-ohm program output impedance, and 115-volt power source.

installation and adjustment

2.1 UNPACKING AND INSPECTING THE EQUIPMENT

Remove all packing material, and carefully lift the units from the crates. Check the equipment against the packing slips. Visually inspect the units for damaged or missing components. Check for proper operation of controls. Any claims for damage should be filed promptly with the transportation agency. If such claims are to be filed, all packing material must be retained.

2.2 INSTALLATION PROCEDURE

2.2.1 General

The arrangement of studio and control room facilities will determine the location of the console in a particular station. Carefully plan the placement of equipment and wiring before beginning any installation work.

All audio wiring should be shielded, twisted pair. Low-level audio leads must be separated from high-level audio leads. All audio leads must be separated from power and control wiring.

2.2.2 212S-1 Stereo Console Mounting Procedure

Refer to figure 2-1. External wiring enters through eight 9/16 by 4-5/8 inch slots in the floor of the console. Drill matching holes in the mounting surface for bringing in external wires.

2.2.3 Wiring Instructions

2.2.3.1 Terminal Boards

All external connections are made at terminal boards TB1 through TB6 and TB8 in the floor of the console. See figure 6-1.

2.2.3.2 Audio Input

All audio input leads must be two-wire shielded cables.

Note

Ground the cable shields at the console end only.

- a. Connect input amplifiers 1 through 5 as indicated in table 2-1. Inputs will be determined by the selection of cards. Refer to paragraph 2.2.4.2.
- b. Connect the remote line inputs as indicated in table 2-1. The inputs are internally wired through the 384D-1 Switch Matrix to the RMT side of the NET/RMT input switch of input amplifier 6.
- c. Connect the network input as indicated in table 2-1. This input is internally wired to the NET side of the NET/RMT input switch of input amplifier 6.
- d. Connect the external stereo line to be monitored through 7500/3900-ohm pads, as indicated in table 2-1. Refer to figure 2-2 and table 2-2.
- e. Connect the external monitor input signals from a Collins 900C FM Modulation Monitor or equivalent, as indicated in table 2-1. Nominal input should be 0 dbm from a 600-ohm, unbalanced source.

2.2.3.3 Interlocked Connections

- a. Refer to figure 2-3 for a typical connection at TB7. Select the four inputs to be interlocked. Relay A4K4 is factory wired to interlock the built-in speaker. Connect the relay control wires to TB7 as indicated in table 2-1.

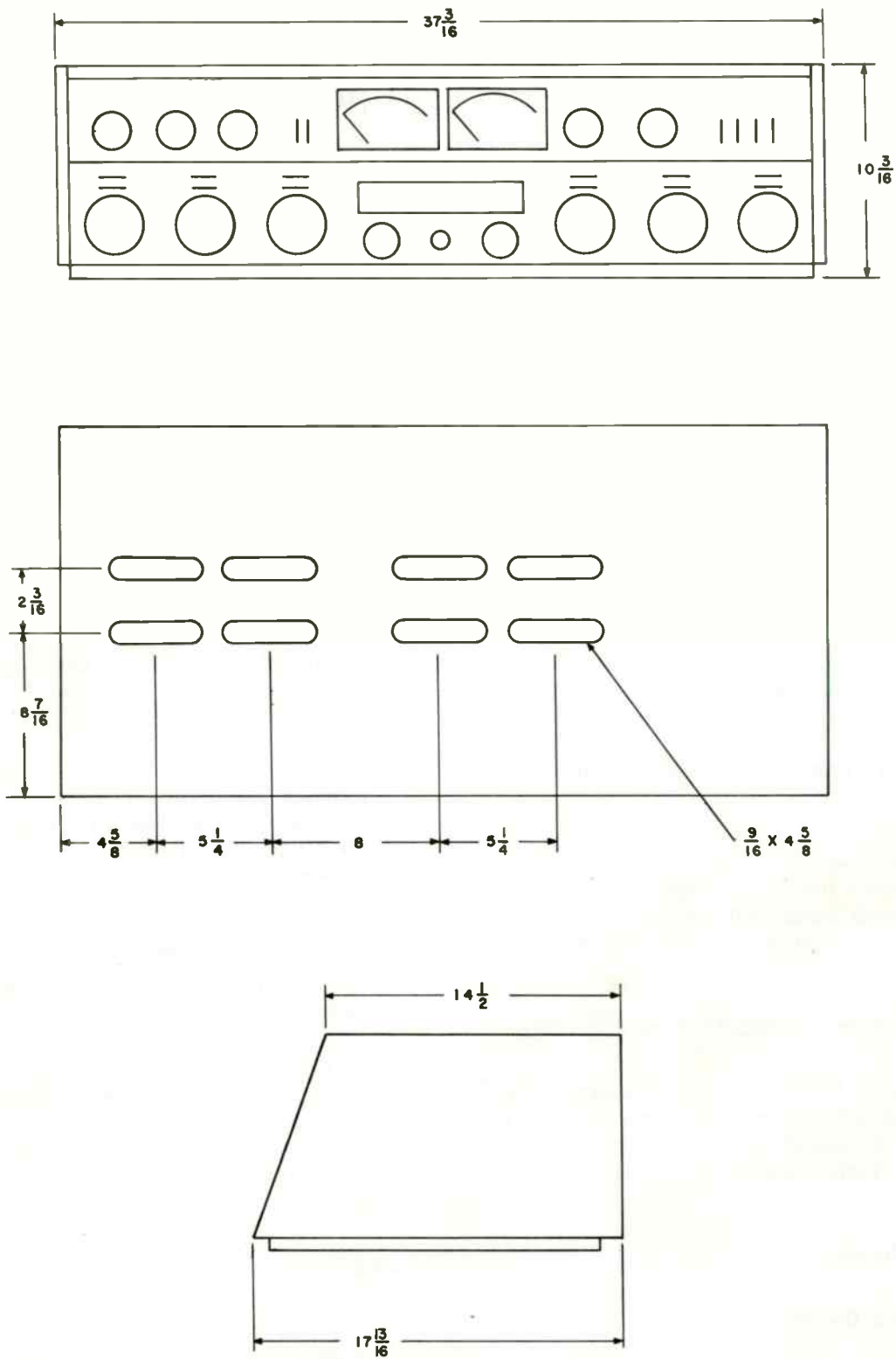


Figure 2-1. 212S-1 Stereo Console, Outline, and Dimension Drawing

Table 2-1. Connections to Terminal Boards

TERMINAL BOARD	TERMINAL	CHANNEL	FUNCTION	POLARIZATION
TB1	1	Left	Program line output	Tip
	2	Left	Program line output	Ring
	3	Left	Network line input	Tip
	4	Left	Network line input	Ring
	5	Left	Remote line 1 input	Tip
	6	Left	Remote line 1 input	Ring
	7	Left	Remote line 2 input	Tip
	8	Left	Remote line 2 input	Ring
	9	Left	Remote line 3 input	Tip
	10	Left	Remote line 3 input	Ring
	11	Left	Remote line 4 input	Tip
	12	Left	Remote line 4 input	Ring
	13	Left	Input A, input amplifier 1	Tip
	14	Left	Input A, input amplifier 1	Ring
	15	Left	Input A, input amplifier 2	Tip
	16	Left	Input A, input amplifier 2	Ring
	17	Left	Input A, input amplifier 3	Tip
	18	Left	Input A, input amplifier 3	Ring
	19	Left	Input A, input amplifier 4	Tip
	20	Left	Input A, input amplifier 4	Ring
	21	Left	Input A, input amplifier 5	Tip
	22	Left	Input A, input amplifier 5	Ring
	23	Left	Network input, input amplifier 6	Tip
	24	Left	Network input, input amplifier 6	Ring

DENOTES DIFFERENCES BETWEEN
212M-1 & 212S-1

Table 2-1. Connections to Terminal Boards (Cont)

TERMINAL BOARD	TERMINAL	CHANNEL	FUNCTION	POLARIZATION
TB2	1		Intercom speaker A	
	2		Intercom speaker B	
	3		Intercom speaker common	
	4		Intercom speaker C	
	5		Intercom speaker D	
	6		Spare	
	7	Left	Test input	Tip
	8	Left	Test input	Ring
	9	Left	External VU meter input	Tip
	10	Left	External VU meter input	Ring
	11	Left	Headset	Tip
	12	Left	Headset	Ring
	13	Left	Input B, input amplifier 1	Tip
	14	Left	Input B, input amplifier 1	Ring
	15	Left	Input B, input amplifier 2	Tip
	16	Left	Input B, input amplifier 2	Ring
	17	Left	Input B, input amplifier 3	Tip
	18	Left	Input B, input amplifier 3	Ring
	19	Left	Input B, input amplifier 4	Tip
	20	Left	Input B, input amplifier 4	Ring
	21	Left	Input B, input amplifier 5	Tip
	22	Left	Input B, input amplifier 5	Ring
	23	Left	Remote input, input amplifier 6	Tip
	24	Left	Remote input, input amplifier 6	Ring

Table 2-1. Connections to Terminal Boards (Cont)

TERMINAL BOARD	TERMINAL	CHANNEL	FUNCTION	POLARIZATION
TB3	1	Right	Input A, input amplifier 1	Tip
	2	Right	Input A, input amplifier 1	Ring
	3	Right	Input A, input amplifier 2	Tip
	4	Right	Input A, input amplifier 2	Ring
	5	Right	Input A, input amplifier 3	Tip
	6	Right	Input A, input amplifier 3	Ring
	7	Right	Input A, input amplifier 4	Tip
	8	Right	Input A, input amplifier 4	Ring
	9	Right	Input A, input amplifier 5	Tip
	10	Right	Input A, input amplifier 5	Ring
	11	Right	Network input, input amplifier 6	Tip
	12	Right	Network input, input amplifier 6	Ring
	13	Right	Remote line 1 input	Tip
	14	Right	Remote line 1 input	Ring
	15	Right	Remote line 2 input	Tip
	16	Right	Remote line 2 input	Ring
	17	Right	Remote line 3 input	Tip
	18	Right	Remote line 3 input	Ring
	19	Right	Remote line 4 input	Tip
	20	Right	Remote line 4 input	Ring
	21	Right	Network line input	Tip
	22	Right	Network line input	Ring
	23	Right	Program line output	Tip
	24	Right	Program line output	Ring

Table 2-1. Connections to Terminal Boards (Cont)

TERMINAL BOARD	TERMINAL	CHANNEL	FUNCTION	POLARIZATION
TB4	1	Right	Input B, input amplifier 1	Tip
	2	Right	Input B, input amplifier 1	Ring
	3	Right	Input B, input amplifier 2	Tip
	4	Right	Input B, input amplifier 2	Ring
	5	Right	Input B, input amplifier 3	Tip
	6	Right	Input B, input amplifier 3	Ring
	7	Right	Input B, input amplifier 4	Tip
	8	Right	Input B, input amplifier 4	Ring
	9	Right	Input B, input amplifier 5	Tip
	10	Right	Input B, input amplifier 5	Ring
	11	Right	Remote input, input amplifier 6	Tip
	12	Right	Remote input, input amplifier 6	Ring
	13	Right	Headset	Tip
	14	Right	Headset	Ring
	15	Right	External VU meter input	Tip
	16	Right	External VU meter input	Ring
	17	Right	Test input	Tip
	18	Right	Test input	Ring
	19		Spare	
	20	Left	External monitor input	Tip
	21	Left	External monitor input, common	Ring
	22	Monaural	External monitor input, monaural	Tip
	23	Right and Monaural	External monitor input, common	Ring
	24	Right	External monitor input	Tip

Table 2-1. Connections to Terminal Boards (Cont)

TERMINAL BOARD	TERMINAL	CHANNEL	FUNCTION	POLARIZATION
TB5	1		+12 volts dc	Positive
	2		12 volts dc, common	Negative
	3		Spare	
	4	Left	Monitor output	Tip
	5	Left	Monitor output, common	Ring
	6	Left	Monitor speaker 1	Tip
	7	Left	Monitor speaker 2	Tip
	8	Left	Monitor speaker 1	Ring
	9	Left	Monitor speaker 2 and 4	Ring
	10	Left	Monitor speaker 3	Tip
	11	Left	Monitor speaker 4	Tip
	12	Left	Monitor speaker 3	Ring
	13		Intercom speaker interlock A4K1	Tip
	14		Intercom speaker interlock A4K1	Ring
	15		Intercom speaker interlock A4K2	Tip
	16		Intercom speaker interlock A4K2	Ring
	17		Intercom speaker interlock A4K3	Tip
	18		Intercom speaker interlock A4K3	Ring
	19		Built-in speaker interlock A4K4	Tip
	20		Built-in speaker interlock A4K4	Ring
	21		Relay A4K1, control	Black/white
	22		Relay A4K2, control	Brown/white
	23		Relay A4K3, control	Red/white
	24		Relay A4K4, control	Orange/white

Table 2-1. Connections to Terminal Boards (Cont)

TERMINAL BOARD	TERMINAL	CHANNEL	FUNCTION	POLARIZATION
TB6	1		ON/OFF THE AIR lamp control A4K1	OFF
	2		On/OFF THE AIR lamp control A4K1	Common
	3		ON/OFF THE AIR lamp control A4K1	ON
	4		ON/OFF THE AIR lamp control A4K2	OFF
	5		ON/OFF THE AIR lamp control A4K2	Common
	6		ON/OFF THE AIR lamp control A4K2	ON
	7		ON/OFF THE AIR lamp control A4K3	OFF
	8		ON/OFF THE AIR lamp control A4K3	Common
	9		ON/OFF THE AIR lamp control A4K3	ON
	10		ON/OFF THE AIR lamp control A4K4	OFF
	11		ON/OFF THE AIR lamp control A4K4	Common
	12		ON/OFF THE AIR lamp control A4K4	ON
	13	Right	Monitor speaker 1	Tip
	14	Right	Monitor speaker 2	Tip
	15	Right	Monitor speaker 1	Ring
	16	Right	Monitor speakers 2 and 4	Ring
	17	Right	Monitor speaker 3	Tip
	18	Right	Monitor speaker 4	Tip
	19	Right	Monitor speaker 3	Ring
	20	Right	Monitor output	Tip
	21	Right	Monitor output common	Ring
	22		AC line input, common	
	23		AC line input, neutral	
	24		AC line input	

Table 2-1. Connections to Terminal Boards (Cont)

TERMINAL BOARD	TERMINAL	CHANNEL	FUNCTION	POLARIZATION
TB7	1		Input amplifier 1, A of A/B switch, relay operate grd	
	2		Input amplifier 1, B of A/B switch, relay operate grd	
	3		Input amplifier 2, A of A/B switch, relay operate grd	
	4		Input amplifier 2, B of A/B switch, relay operate grd	
	5		Input amplifier 3, A of A/B switch, relay operate grd	
	6		Input amplifier 3, B of A/B switch, relay operate grd	
	7		Input amplifier 4, A of A/B switch, relay operate grd	
	8		Input amplifier 4, B of A/B switch, relay operate grd	
	9		Input amplifier 5, A of A/B switch, relay operate grd	
	10		Input amplifier 5, B of A/B switch, relay operate grd	
	11		Spare	
	12		Spare	
TB8	1	Left	Audition bus	
	2	Left	Program bus	
	3	Left	Cue bus	
	4	Left	Bus, common	
	5	Right	Audition bus	
	6	Right	Program bus	
	7	Right	Cue bus	

Table 2-1. Connections to Terminal Boards (Cont)

TERMINAL BOARD	TERMINAL	CHANNEL	FUNCTION	POLARIZATION
TB-8	8	Right	Bus common	
	9		Spare	
	10		Spare	
	11	Left	+30 volts dc	Positive
	12	Left	30 volts dc, common	Negative
	13	Right	+30 volts dc	Positive
	14	Right	30 volts dc, common	Negative
	15		+6 volts dc	Positive
	16		+4 volts dc	Positive
	17		6 and 4 volts dc, common	Negative
	18		Spare	
	19		Spare	
	20		Spare	

Table 2-2. Calculated Resistance Values in Ohms

LEVEL TO BE METERED (dbm)	PAD LOSS FOR 0 VU READING (db)	R1 (Ohms)	R2 (Ohms)	R3 (Ohms)
+4	0	0	Open	0
+8	4	882.5	8177	882.5
+16	12	2334	2091	2334
+32	28	3601	311.1	3601

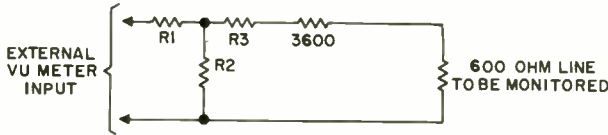


Figure 2-2. VU Pad for External Line

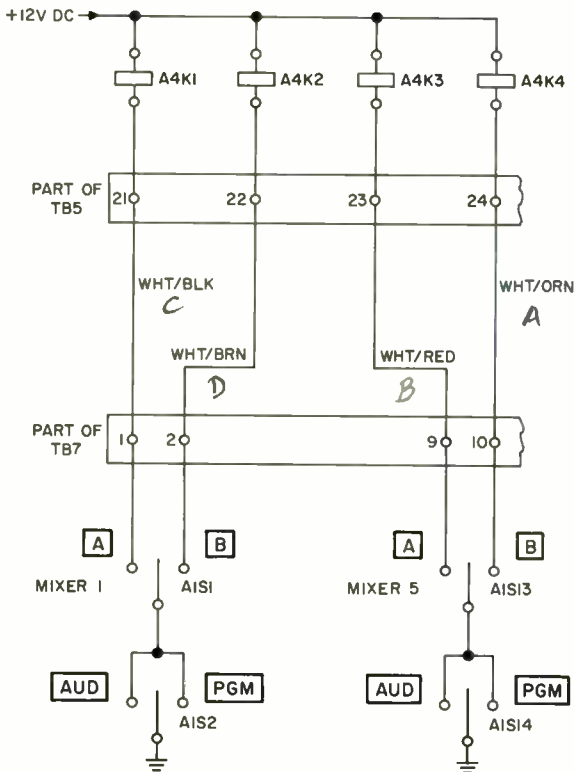


Figure 2-3. Relay Control, Simplified Schematic

Caution

Connect an 8-ohm 5-watt resistor across any unused speaker terminals.

- b. Refer to figure 2-4. Connect the monitor speakers as indicated in table 2-1.
- c. Refer to figure 2-5. Connect intercom speakers and jumpers as indicated in table 2-1. If interlocking is not desired, intercom speakers may be connected directly to TB2. Connect a 4-ohm, 1-watt resistor across unused intercom speaker terminals.

- d. Refer to figure 2-6. Connect the ON/OFF THE AIR lamps as indicated in table 2-1.

2.2.3.4 Audio Output Wiring

- a. Connect the program output lines as indicated in table 2-1.
- b. Connect the headset as indicated in table 2-1.

2.2.3.5 AC Input Wiring

Refer to figure 2-7.

- a. The 212S-1 is factory wired at plug P1 and terminal board TB6 for 115-volt operation. On plug P1, pins 1 and 5 and pins 3 and 6 are jumpered together. On terminal board TB6, terminals TB6-22 and TB6-23 are jumpered together. Connect the 115-volt ac input line to TB6-24 and TB6-23 (neutral). Use AWG No. 16 wire for the 115-volt ac input line.
- b. For 220-volt operation, remove the jumpers between pins 1 and 5 and pins 3 and 6 on plug P1. Jumper pin 3 to 5 on plug P1. Remove the strap between TB6-22 and TB6-23. Connect the 220-volt ac line to TB6-22 and TB6-24. Connect the neutral line to TB6-23. Use AWG No. 16 wire for the 220-volt ac input line.

2.2.4 Installing The Units

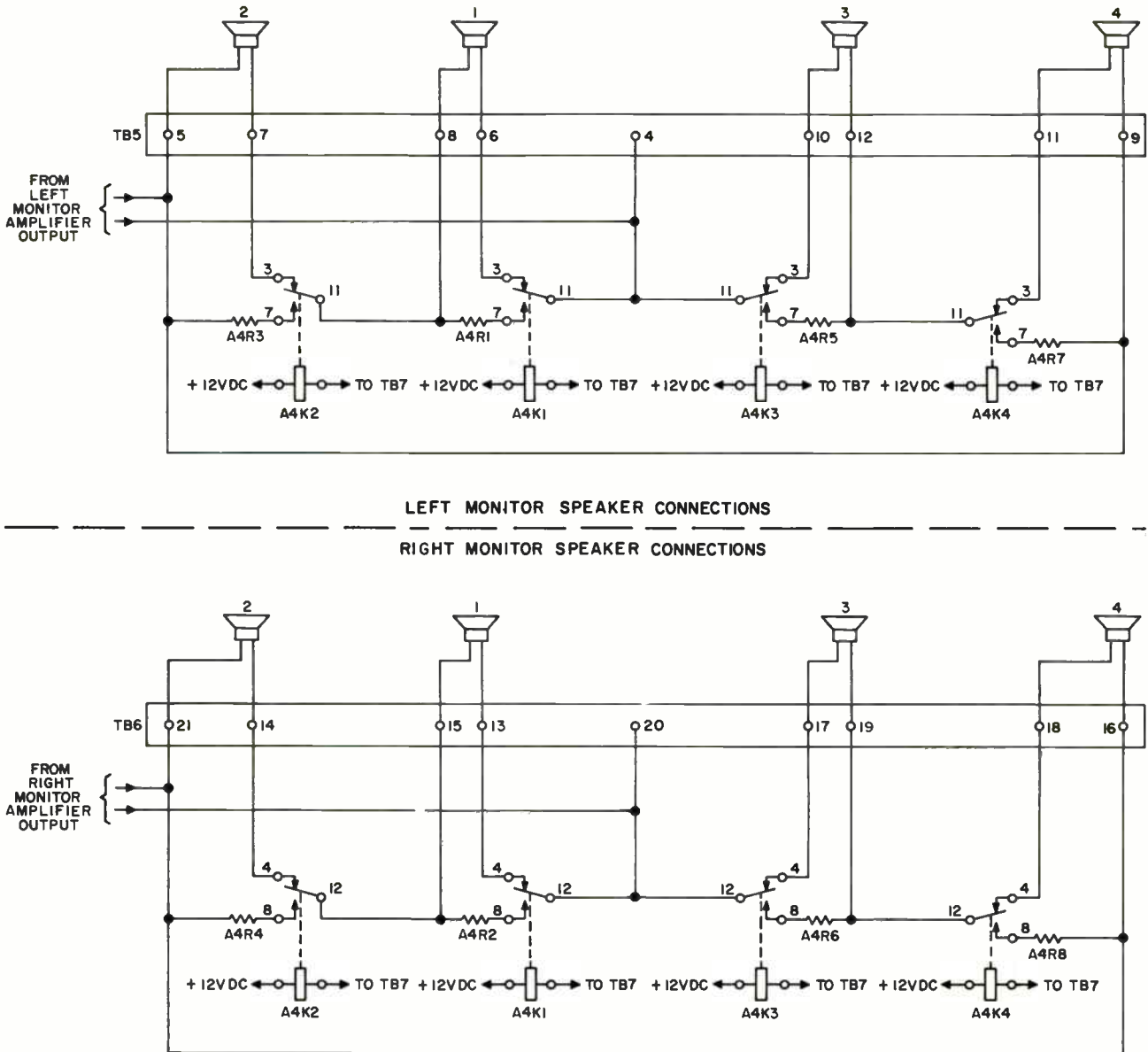
2.2.4.1 409Z-1 Power Supply

Place the power supply in the left-hand rear corner of the console, and secure it with the latches provided. Connect P1 in the console to J1 on the power supply. Temporarily connect the ac line input to TB6-22 and TB6-24. Set resistor R20 for +6.0 volts dc at TP6. Set resistor R13 for +4 volts dc at TP5. Remove the ac line input.

2.2.4.2 Cards

Refer to figure 4-1.

- a. Insert 384D-1 Switch Matrix cards in A2XA1 and A3XA1.



- NOTES :
1. R1 THROUGH R8 ARE 8 OHM, 5 WATT RESISTORS
 2. REPLACE ANY UNUSED SPEAKERS WITH AN 8 OHM 5 WATT RESISTOR

Figure 2-4. Monitor Speaker Interlocks, Simplified Schematics

b. Insert 356T-1 Preamplifiers, 356R-1 Microphone-Phonograph Preamplifiers, 356U-1 Audio Broadcast Preamplifiers, or 356V-1 High-Level Input Cards in A2XA2 through A2XA7 and A3XA2 through A3XA7. If the 384D-1 Switch Matrix is to be used, install 356T-1 Preamplifiers or 356U-1 Audio Broadcast Preamplifiers with low-level strapping in A2XA7 and A3XA7. Selection of

cards will depend on specific requirements. See paragraphs 1.5.2 through 1.5.5.

- c. Insert 356P-1 Program Amplifiers in A2XA8 and A3XA8.
- d. Insert 356M-1 Monitor Amplifiers in A2XA9 and A3XA9.

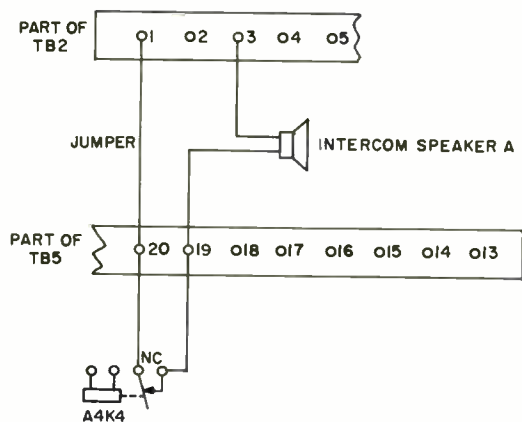


Figure 2-5. Intercom Speaker Interlocks, Simplified Schematics

2.3 INITIAL ADJUSTMENTS

2.3.1 Program Amplifiers

- Connect 600-ohm, 1/4-watt resistors across the left channel program output, TB1-1 and TB1-2 (common), and across the right channel program output TB3-23 and TB3-24 (common).
- Set the VU/REVERSE/EXT switch to VU.
- Connect a 5-ohm 1-kHz signal from an unbalanced, 600-ohm signal generator to the left channel test input, TB2-7 and TB2-8 (common).
- Set the CHANNEL 1 MASTER control for an indication of 0 vu on the left-hand vu meter.
- Move the signal generator to the right channel test input, TB4-17 and TB4-18 (common).
- Set the CHANNEL 2 MASTER control for an indication of 0 vu on the right-hand vu meter.
- Move the signal generator back to TB2-7 and TB2-8 (common).
- Set the STEREO/DUAL/SIMUL switch to SIMUL.
- Adjust R12 on the 356P-1 in the left-hand card cage for an indication of 0 vu on the right-hand VU meter.

2.3.2 Monitor Amplifiers

- Remove relays A4K1 through A4K4.
- Connect an 8-ohm, 10-watt resistor between TB5-4 and TB5-5. Connect an 8-ohm, 10-watt resistor between TB6-20 and TB6-21.
- Set BALANCE control R38, on both 356M-1 cards to the midpoints.
- Set the MONITOR INPUT switch to CH1 and CH2.
- Connect a 0-dbm 1-kHz, signal from an unbalanced, 600-ohm signal generator to the left channel test input, TB2-7 and TB2-8 (common).
- Set STEREO/DUAL/SIMUL switch to SIMUL.
- Connect an audio vtm across the right channel monitor output, TB6-20 and TB6-21 (common).

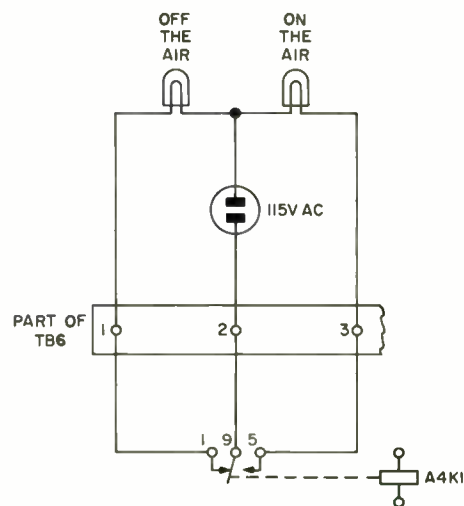


Figure 2-6. ON/OFF THE AIR Lamp, Simplified Schematic

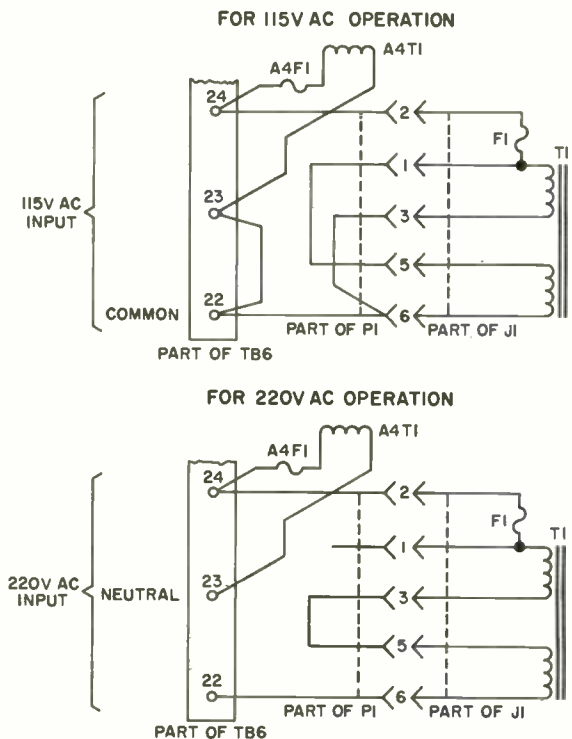


Figure 2-7. AC Input Wiring, Simplified Schematic

- h. Set the MONITOR gain control to indicate 6 volts rms on the vtm.
- i. Move the vtm to left channel monitor output, TB5-4 and TB5-5 (common).
- j. Set R38, BALANCE control, on the 356M-1 installed in the left-hand card cage for a reading of 6 volts rms on the vtm.
- k. Move the vtm back to TB6-20 and TB6-21 (common).
- l. Set BALANCE control R38 on the 356M-1 in the right-hand card cage for 6 volts rms on the vtm.
- m. Repeat steps i. through l. until BALANCE controls do not interact.
- n. Remove test equipment.

2.3.3 356V-1 High-Level Input Cards

- a. Set R22 on both cards to the clockwise stops.

- b. Set the STEREO/DUAL/SIMUL switch to STEREO.
- c. Set the VU/REVERSE/EXT switch to VU.
- d. Set the associated MIXER control to minimum gain.
- e. Set the associated AUD/PGM switch to PGM.
- f. Set the associated A/B switch to A.
- g. Connect an unbalanced, 600-ohm signal generator to right channel input A. Connect left channel input A to right channel input A.
- h. Set the signal generator to 1 kHz at 0.775 volt.
 0 DBM.
- i. Increase the associated MIXER control until one of the vu meters indicates 0 vu.
- j. Turn R22 on the card associated with the lower VU meter indication until both vu meters indicate the same level.
- k. Repeat steps i. and j. until both vu meters indicate 0 vu.

NOTE: WHEN BOTH VU METERS IND 0 VU, THE ASSOCIATED MIXER CONTROL MUST BE NEAR THE 12 O'CLOCK POS.. OTHERWISE, THE 2 STEREO CHANNELS WILL NOT TRACK TOGETHER.

2.3.4 356T-1 Preampfier

Perform the same procedure as for the 356V-1, except use R10 on the 356T-1 and a 5-millivolt input signal.

2.3.5 356R-1 Microphone-Phonograph Preampfier

If the 356R-1 is strapped for a high-level input, perform the same procedure as for the 356V-1, except use R35 on the 356R-1. If the 356R-1 is strapped for a low-level input, set the signal generator to 5 millivolts.

2.3.6 356U-1 Broadcast Audio Preampfier

If the 356U-1 is strapped for a high-level input, perform the same procedure as for the 356V-1, except use R24 on the 356U-1 and start with R24 set to the counterclockwise stop. If the 356U-1 is strapped for a low-level input, set the signal generator to 5 millivolts.

3.1 CONTROLS

This section locates, illustrates, and describes the function of each front panel control. Refer to figure 3-1 and table 3-1.

3.2 OPERATING PROCEDURES

3.2.1 Initial Setup

- a. Set all MIXER controls to the first mark from the counterclockwise stop.
- b. Set the NET/RMT, and all AUD/PGM, A/B, and REMOTE LINES switches to the center (off) positions.
- c. Set the INTERCOM switch to CUE.
- d. Set the VU/REVERSE/EXT switch to VU.
- e. Set the HEADSET, MONITOR INPUT, MONITOR, and LEVEL controls as desired.
- f. See paragraph 2.3.1.1 for the settings of the MASTER gain controls.

3.2.2 Stereo, Dual, and Simulcast Operation

3.2.2.1 Stereo Operation

- a. Perform the procedure in paragraph 3.2.1.
- b. Set the STEREO/DUAL/SIMUL switch to STEREO.
- c. Set the MIXER control to be used to the CUE position.
- d. Select the stereo program source with the associated A/B input switch.
- e. Set the associated AUD/PGM switch to PGM.
- f. On cue, rotate the MIXER control clockwise and set the level to 0 vu.

3.2.2.2 Dual Operation

- a. Perform the procedure in paragraph 3.2.1.
- b. Set the STEREO/DUAL/SIMUL switch to DUAL.
- c. For unambiguous operation, set the VU/REVERSE/EXT switch to REVERSE.

The audio on the right- and left-hand vu meters now corresponds to the right- and left-hand positions of the AUD/PGM switches.

- d. Set the MIXER controls to be used to the CUE positions.
- e. Select the two program sources to be broadcast with the A/B input switches.
- f. Set the AUD/PGM switch, associated with the program source to be put on the left channel, to PGM.
- g. Set the AUD/PGM switch, associated with the program source to be put on the right channel, to AUD.
- h. On cue, rotate the MIXER control associated with the program on the left channel, clockwise and set the level for 0 vu on the left hand vu meter.
- i. On cue, rotate the MIXER control, associated with the program on the right channel, clockwise and set the level to 0 vu on the right-hand vu meter.

3.2.2.3 Simulcast Operation

- a. Perform the procedure in paragraph 3.2.1.
- b. Set the STEREO/DUAL/SIMUL switch to SIMUL.
- c. Set the MIXER control to be used to CUE.

operation

- d. Select the program source with the associated A/B input switch.
- e. Set the associated AUD/PGM switch to PGM.
- f. On cue, rotate the MIXER control clockwise and set the level to 0 vu.

- 2. Set the NET/RMT switch to RMT.
- 3. Set MIXER 6 control to CUE.
- 4. Set the AUD/PGM switch to PGM.
- 5. On cue, rotate MIXER 6 control clockwise and set the level to 0 vu.

3.2.3 Remote Inputs

- a. Perform the procedure in paragraph 3.2.1.
- b. Set the STEREO/DUAL/SIMUL switch as desired.
- c. To monitor the remote line, set the INTER-COM switch to RMT and the desired REMOTE LINES switch to MON.
- d. To put the program output on a remote line for reverse cue to the remote location, set the desired REMOTE LINES switch to MIX.
- e. To put a remote line program on the air:
 - 1. Set the desired REMOTE LINES switch to MIX.

3.2.4 Network Input

- a. Perform the procedure in paragraph 3.2.1.
- b. Set the STEREO/DUAL/SIMUL switch as desired.
- c. Set the MIXER 6 control to CUE.
- d. Set the NET/RMT switch to NET.
- e. Set the associated AUD/PGM switch to PGM.
- f. On cue, rotate the MIXER 6 control clockwise and set the level to 0 vu.

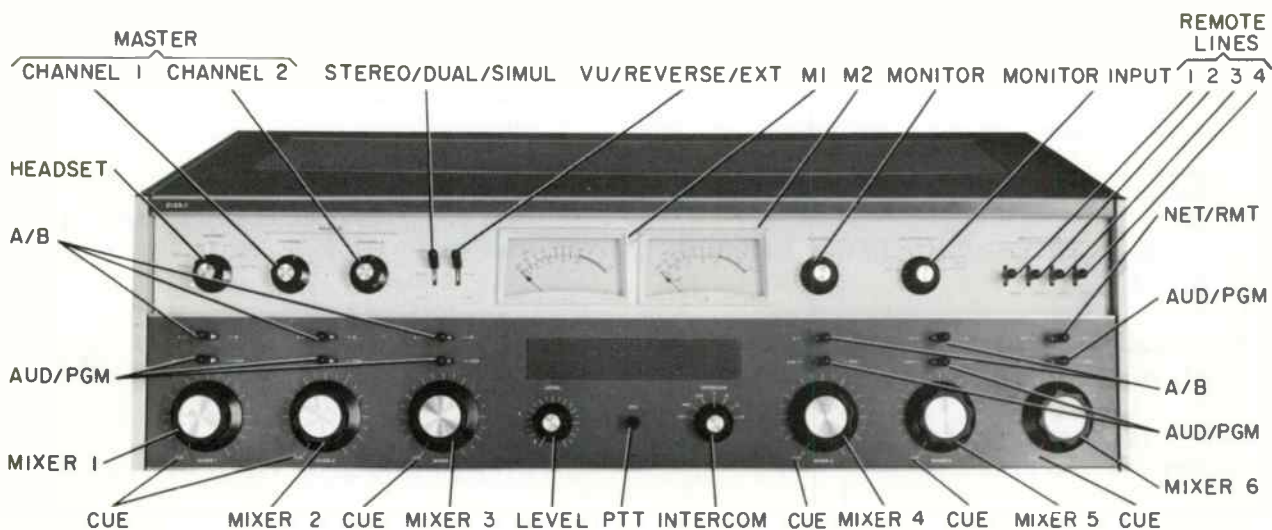


Figure 3-1. 212S-1 Stereo Console, Control Locations

Table 3-1. Front Panel Controls

CONTROL	FUNCTION																
HEADSET	<p>Selects the input to the headset. Switch positions and functions are as follows:</p> <table border="1"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>No input to the headset</td> </tr> <tr> <td>INT COM</td> <td>Transfers the intercom amplifier output from the built-in speaker to the headset</td> </tr> <tr> <td>RMT</td> <td>Connects the remote line, selected by the MON position of a REMOTE LINES switch, to the headset</td> </tr> <tr> <td>NET</td> <td>Connects the network input to the headset</td> </tr> <tr> <td>CH 1</td> <td>Connects the channel 1 program output to the headset</td> </tr> <tr> <td>CH 2</td> <td>Connects the channel 2 program output to the headset</td> </tr> <tr> <td>CH 1 and 2</td> <td>Connects the stereo program output to the headset</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	OFF	No input to the headset	INT COM	Transfers the intercom amplifier output from the built-in speaker to the headset	RMT	Connects the remote line, selected by the MON position of a REMOTE LINES switch, to the headset	NET	Connects the network input to the headset	CH 1	Connects the channel 1 program output to the headset	CH 2	Connects the channel 2 program output to the headset	CH 1 and 2	Connects the stereo program output to the headset
<u>Position</u>	<u>Function</u>																
OFF	No input to the headset																
INT COM	Transfers the intercom amplifier output from the built-in speaker to the headset																
RMT	Connects the remote line, selected by the MON position of a REMOTE LINES switch, to the headset																
NET	Connects the network input to the headset																
CH 1	Connects the channel 1 program output to the headset																
CH 2	Connects the channel 2 program output to the headset																
CH 1 and 2	Connects the stereo program output to the headset																
MASTER CHANNEL 1	Controls the output level of the channel 1 program amplifier																
MASTER CHANNEL 2	Controls the output level of the channel 2 program amplifier																
STEREO/DUAL/SIMUL	<p>Connects the proper inputs to the channel 2 program amplifier for the three modes of operation. The left channel program bus connects directly to the channel 1 program amplifier input. Switch positions and functions are as follows:</p> <table border="1"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>STEREO</td> <td>Connects the right channel (channel 2) program bus to the channel 2 program amplifier input for stereo operation</td> </tr> <tr> <td>DUAL</td> <td>Connects the left channel audition bus to the right channel (channel 2) program amplifier input for dual operation</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	STEREO	Connects the right channel (channel 2) program bus to the channel 2 program amplifier input for stereo operation	DUAL	Connects the left channel audition bus to the right channel (channel 2) program amplifier input for dual operation										
<u>Position</u>	<u>Function</u>																
STEREO	Connects the right channel (channel 2) program bus to the channel 2 program amplifier input for stereo operation																
DUAL	Connects the left channel audition bus to the right channel (channel 2) program amplifier input for dual operation																

Table 3-1. Front Panel Control (Cont)

CONTROL	FUNCTION										
<p>VU/REVERSE/EXT</p>	<p>SIMUL Connects the left channel program bus to the right channel (channel 2) program amplifier for simulcast operation</p> <p>Selects the input to the VU meters. Switch positions and functions are as follows:</p> <table border="0"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>VU</td> <td>Connects the left-hand VU meter to the left channel (channel 1) program amplifier output. Connects the right-hand VU meter to the right channel (channel 2) program amplifier output.</td> </tr> <tr> <td>REVERSE</td> <td>Connects the left-hand VU meter to the right channel (channel 2) program amplifier output. Connects the right-hand VU meter to the left channel (channel 1) program amplifier output. (This position maintains the physical relationship of vu meters and AUD/PGM switches in dual operation.)</td> </tr> <tr> <td>EXT</td> <td>Connects the vu meters to an external stereo line to be metered</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	VU	Connects the left-hand VU meter to the left channel (channel 1) program amplifier output. Connects the right-hand VU meter to the right channel (channel 2) program amplifier output.	REVERSE	Connects the left-hand VU meter to the right channel (channel 2) program amplifier output. Connects the right-hand VU meter to the left channel (channel 1) program amplifier output. (This position maintains the physical relationship of vu meters and AUD/PGM switches in dual operation.)	EXT	Connects the vu meters to an external stereo line to be metered		
<u>Position</u>	<u>Function</u>										
VU	Connects the left-hand VU meter to the left channel (channel 1) program amplifier output. Connects the right-hand VU meter to the right channel (channel 2) program amplifier output.										
REVERSE	Connects the left-hand VU meter to the right channel (channel 2) program amplifier output. Connects the right-hand VU meter to the left channel (channel 1) program amplifier output. (This position maintains the physical relationship of vu meters and AUD/PGM switches in dual operation.)										
EXT	Connects the vu meters to an external stereo line to be metered										
<p>MONITOR</p> <p>MONITOR INPUT</p>	<p>Controls the output level of the stereo monitor amplifier</p> <p>Selects the input to the stereo monitor amplifier. Switch positions and functions are as follows:</p> <table border="0"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>No input to the stereo monitor amplifier</td> </tr> <tr> <td>AUD</td> <td>Connects the stereo audition bus to the stereo monitor amplifier input</td> </tr> <tr> <td>CH 1</td> <td>Connects the channel 1 program amplifier output to both stereo monitor amplifier inputs.</td> </tr> <tr> <td>CH 2</td> <td>Connects the channel 2 program amplifier output to both stereo monitor amplifier inputs.</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	OFF	No input to the stereo monitor amplifier	AUD	Connects the stereo audition bus to the stereo monitor amplifier input	CH 1	Connects the channel 1 program amplifier output to both stereo monitor amplifier inputs.	CH 2	Connects the channel 2 program amplifier output to both stereo monitor amplifier inputs.
<u>Position</u>	<u>Function</u>										
OFF	No input to the stereo monitor amplifier										
AUD	Connects the stereo audition bus to the stereo monitor amplifier input										
CH 1	Connects the channel 1 program amplifier output to both stereo monitor amplifier inputs.										
CH 2	Connects the channel 2 program amplifier output to both stereo monitor amplifier inputs.										

Table 3-1. Front Panel Controls (Cont)

CONTROL	FUNCTION									
REMOTE LINES 1, 2, 3, 4	<p>CH 1 and 2 Connects the stereo program amplifier outputs to the stereo monitor amplifier inputs.</p>									
	<p>EXT STEREO Connects an external stereo input to the stereo monitor amplifier</p>									
	<p>EXT MONO Connects an external monaural input to both stereo monitor amplifier inputs.</p>									
	<p>Switch the remote line inputs. Switch positions and functions are as follows:</p>									
	<table border="0"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>Center</td> <td>Off</td> </tr> <tr> <td>MIX</td> <td>Connects the associated remote line to the RMT side of the NET/RMT switch</td> </tr> <tr> <td>MON</td> <td>Connects the associated remote line to the INTERCOM and HEADSET input switches.</td> </tr> </tbody> </table>		<u>Position</u>	<u>Function</u>	Center	Off	MIX	Connects the associated remote line to the RMT side of the NET/RMT switch	MON	Connects the associated remote line to the INTERCOM and HEADSET input switches.
<u>Position</u>	<u>Function</u>									
Center	Off									
MIX	Connects the associated remote line to the RMT side of the NET/RMT switch									
MON	Connects the associated remote line to the INTERCOM and HEADSET input switches.									
AUD/PGM	<p>Switches the output of the associated stereo amplifier. Switch positions and functions are as follows:</p>									
	<table border="0"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>Center</td> <td>Off</td> </tr> <tr> <td>AUD</td> <td>Connects the associated stereo amplifier output to the stereo audition bus</td> </tr> <tr> <td>PGM</td> <td>Connects the associated stereo amplifier output to the stereo program bus</td> </tr> </tbody> </table>		<u>Position</u>	<u>Function</u>	Center	Off	AUD	Connects the associated stereo amplifier output to the stereo audition bus	PGM	Connects the associated stereo amplifier output to the stereo program bus
	<u>Position</u>	<u>Function</u>								
	Center	Off								
AUD	Connects the associated stereo amplifier output to the stereo audition bus									
PGM	Connects the associated stereo amplifier output to the stereo program bus									
MIXER 1	<p>Controls the output level of the associated stereo amplifier. The CUE position, at the counterclockwise stop, disables the AUD/PGM switch and applies the associated stereo amplifier output to the cue bus.</p>									
MIXER 2 through MIXER 6	<p>Same as MIXER 1</p>									

Table 3-1. Front Panel Controls (Cont)

CONTROL	FUNCTION										
A/B	<p>Switches the input to the associated stereo amplifier. Switch positions and functions are as follows:</p> <table border="1"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>Center</td> <td>Off</td> </tr> <tr> <td>A</td> <td>Connects stereo input A to the associated stereo amplifier</td> </tr> <tr> <td>B</td> <td>Connects stereo input B to the associated stereo amplifier</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	Center	Off	A	Connects stereo input A to the associated stereo amplifier	B	Connects stereo input B to the associated stereo amplifier		
<u>Position</u>	<u>Function</u>										
Center	Off										
A	Connects stereo input A to the associated stereo amplifier										
B	Connects stereo input B to the associated stereo amplifier										
NET/RMT	<p>Selects the input to stereo amplifier 6. Switch positions and functions are as follows:</p> <table border="1"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>Center</td> <td>Off</td> </tr> <tr> <td>NET</td> <td>Connects the stereo network input to stereo amplifier 6</td> </tr> <tr> <td>RMT</td> <td>Connects the MIX output from the REMOTE LINES switches to stereo amplifier 6</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	Center	Off	NET	Connects the stereo network input to stereo amplifier 6	RMT	Connects the MIX output from the REMOTE LINES switches to stereo amplifier 6		
<u>Position</u>	<u>Function</u>										
Center	Off										
NET	Connects the stereo network input to stereo amplifier 6										
RMT	Connects the MIX output from the REMOTE LINES switches to stereo amplifier 6										
INTERCOM	<p>Selects the input to the intercom amplifier. Switch positions and functions are as follows:</p> <table border="1"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>No input to the intercom amplifier</td> </tr> <tr> <td>RMT</td> <td>Connects the MON output from the REMOTE LINES switches to the intercom amplifier</td> </tr> <tr> <td>CUE</td> <td>Connects the cue bus to the intercom amplifier</td> </tr> <tr> <td>A, B, C, D</td> <td>Connects the associated intercom slave speaker to the intercom amplifier</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	OFF	No input to the intercom amplifier	RMT	Connects the MON output from the REMOTE LINES switches to the intercom amplifier	CUE	Connects the cue bus to the intercom amplifier	A, B, C, D	Connects the associated intercom slave speaker to the intercom amplifier
<u>Position</u>	<u>Function</u>										
OFF	No input to the intercom amplifier										
RMT	Connects the MON output from the REMOTE LINES switches to the intercom amplifier										
CUE	Connects the cue bus to the intercom amplifier										
A, B, C, D	Connects the associated intercom slave speaker to the intercom amplifier										
LEVEL	Controls the output level of the intercom amplifier										
PTT (Push-To-Talk)	Switches the built-in speaker for two-way communication with a remote site or one of four slave speakers as selected by the INTERCOM switch										

4.1 GENERAL

Figure 4-1 is a functional block diagram of the 212S-1 Stereo Console. Blocks A2A1 through A2A9 and A3A1 through A3A9 are plug-in, etched circuit cards.

4.2 STEREO INPUT AMPLIFIERS

4.2.1 Stereo Input Amplifiers 1 Through 5

Figure 4-2 is a simplified schematic diagram of stereo input amplifier 1. Amplifiers 1 through 5 are identical.

MIXER 1 control A1R1 varies the current supplied to photoconductive level controls on the plug-in cards. Cue switch A1S3 operates when MIXER 1 control is in the extreme counterclockwise (CUE) position. The cue switch transfers +4 volts from the top contacts on AUD/PGM switch A1S2 to photoconductive cue output switches on the plug-in cards.

The top contacts on the AUD/PGM switch, in series with the cue switch, connect +4 volts to photoconductive switches on the plug-in cards to select the output bus.

The top contacts on A/B switch A1S1 connect +4 volts to photoconductive switches on the plug-in cards to select the input signal.

The bottom contacts on the A/B switch, in series with the bottom contacts on the AUD/PGM switch, provide a ground return path for control relays.

4.2.2 Stereo Input Amplifier 6

Figure 4-3 is a simplified schematic diagram of stereo input amplifier 6.

MIXER 6 control A1R11 varies the current to photoconductive level controls on the plug-in cards. Cue switch A1S18 operates when MIXER 6

control is in the extreme counterclockwise (CUE) position. The cue switch transfers +4 volts from the top contacts on AUD/PGM switch A1S17 to photoconductive cue output switches on the plug-in cards and the gate circuit on the reverse cue amplifier. Applying +4 volts to the gate circuit turns off the reverse cue amplifier.

In the NET position, NET/RMT switch A1S16 connects +4 volts to photoconductive network input switches on the plug-in cards. In the RMT position, the top contacts on the NET/RMT switch connect +4 volts to photoconductive remote input switches on the plug-in cards and the bottom contacts on the AUD/PGM switch. In the RMT position, the bottom contacts of the NET/RMT switch provide a ground return path to operate relay A1A1K1. Relay A1A1K1 disconnects the output of the reverse cue amplifier.

The top contacts on the AUD/PGM switch, in series with the cue switch, connect +4 volts to photoconductive output switches on the plug-in cards. The bottom contacts on the AUD/PGM switch connect +4 volts from the top contacts on the NET/RMT switch to the gate circuit of the reverse cue amplifier.

The MIX output from the left channel switch matrix connects to the input of stereo amplifier 6, A2A7, and the output of the reverse cue amplifier. The MON output from the left channel switch matrix connects to transformer A1A1T1 input. Transformer A1A1T1 output connects to the RMT position of the INTERCOM input switch to permit two-way communication through a remote line. The transformer matches the impedance of the remote line to the intercom amplifier. The REMOTE LINES switches control the switch matrixes in both card cages. Refer to 384D-1 Switch Matrix Unit Instructions bound in the back of this book.

The reverse cue amplifier accepts the padded output from the channel 1 program amplifier, A2A8, and applies it to the MIX output of the left channel switch matrix. Relay A1A1K1 and the gate circuit prevent feedback into input amplifier 6.

4.3 PROGRAM CIRCUITS

Refer to figures 4-1 and 7-1. The stereo program and audition outputs connect to the stereo program and audition buses. The left channel program bus connects to the left channel program amplifier input. The right channel program bus, left channel audition bus, and the simulcast output from the left channel program amplifier connect, through photoconductive switches, to the right channel program amplifier input. The right channel audition bus connects, through a photoconductive switch, to the MONITOR INPUT switch. STEREO/DUAL/SIMUL switch switches +4 volts to control the photoconductive switches.

4.3.1 Stereo Operation

In the STEREO position, the STEREO/DUAL/SIMUL switch turns on A3A8RV1 and A5RV4. Switch A3A8RV1 connects the right channel program bus to the right channel program amplifier input. Switch A5RV4 connects the right channel audition bus to the MONITOR INPUT switch.

4.3.2 Dual Operation

In the DUAL position, the STEREO/DUAL/SIMUL switch turns on A5RV3. Switch A5RV3 connects the left channel audition bus to the right channel program amplifier input.

4.3.3 Simulcast Operation

In the SIMUL position, the STEREO/DUAL/SIMUL switch turns on A5RV1 and A5RV2. Switches A5RV1 and A5RV2 connect the simulcast output from the left channel program amplifier to the right channel program amplifier input.

4.4 MONITOR CIRCUITS

The MONITOR INPUT switch selects the input to the stereo monitor amplifiers. Refer to figure 7-1 and table 3-1. Photoconductive switch A5RV4 connects the right channel audition bus to the right channel monitor amplifier input. Switch A5RV4 disconnects the right channel monitor amplifier input from the right channel audition bus in dual and simulcast operation. Refer to figure 2-4 for monitor speaker interlocking.

4.5 INTERCOM CIRCUITS

The INTERCOM switch, LEVEL control, and PTT switch control the intercom amplifier. Refer to table 3-1 for control functions. Refer to figure 4-3 for remote site intercommunication. The remote input line is used for the remote intercom line.

4.5.1 Cue Listening

The CUE position of INTERCOM switch connects the cue buses to the intercom amplifier. When a MIXER control is in the CUE position, the associated stereo amplifier output connects to the cue buses. The stereo cue buses are combined in transformers for a monaural input to the intercom amplifier.

Refer to figure 7-1. LEVEL control A1R13 controls signal level to the intercom amplifier. Class A amplifier A1A1Q3 drives emitter-follower, A1A1Q4. Emitter-follower A1A1Q4 matches the input impedance of transistor A1A1Q5 which drives the phase inverter, A1A1Q6 and A1A1Q7. The phase inverter drives the class AB power amplifier, A1A1Q8 and A1A1Q9. Silicon diodes A1A1CR1, A1A1CR2, and A1A1CR3, provide bias for transistors A1A1Q6 and A1A1Q7. The PTT switch normally connects the built-in speaker to the intercom amplifier output. When pushed, the PTT switch transfers the built-in speaker connection to the intercom amplifier input.

4.5.2 Reverse Cue to a Remote Site

SEE ADDENDUM PAGE 3

The padded channel 1 program output connects to the reverse cue amplifier input (figure 4-3 and 7-1).

Transformer A1A1T2 matches the impedance of the program output pad to the bases of transistors A1A1Q1 and A1A1Q2. The output of the class B amplifier, A1A1Q1 and A1A1Q2, couples through transformer A1A1T3 and normally closed contacts of A1A1K1 to the MIX output of the left channel switch matrix.

When MIXER 6 is in the CUE position, or when the NET/RMT switch is in the RMT position, and the AUD/PGM switch is in either the AUD or PGM position, transistor A1A1Q10 grounds the bases of A1A1Q1 and A1A1Q2. When the NET/RMT switch is in the RMT position, relay A1A1K1 disconnects the output of the reverse cue amplifier from the left channel switch matrix.

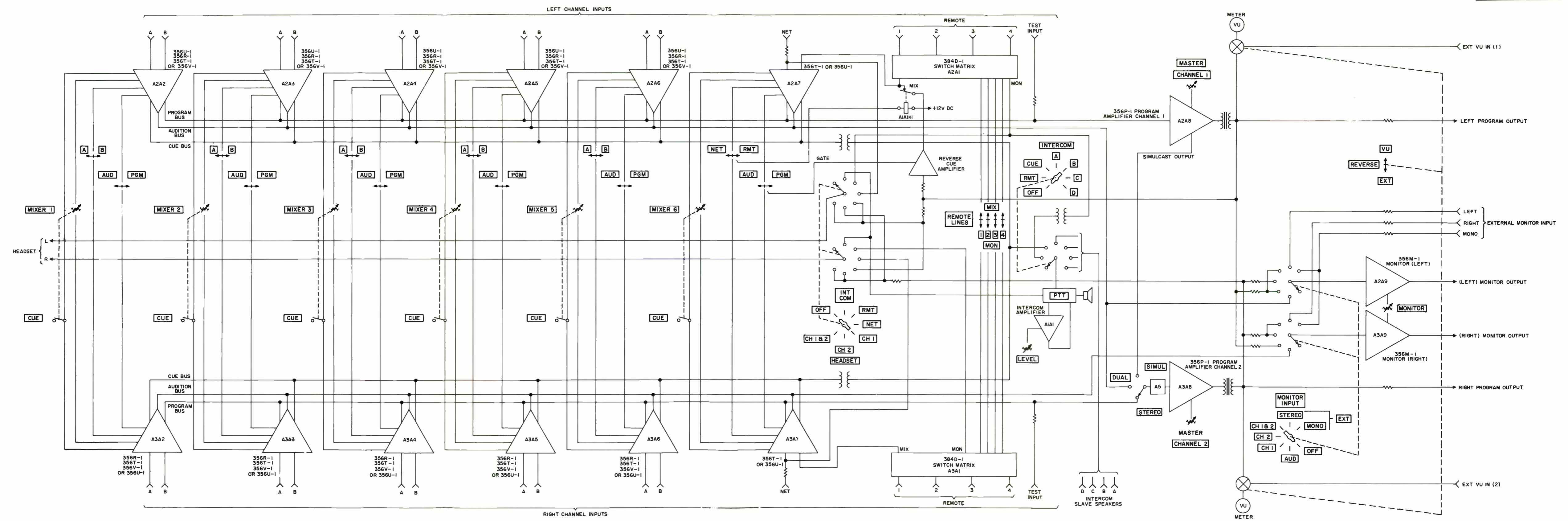
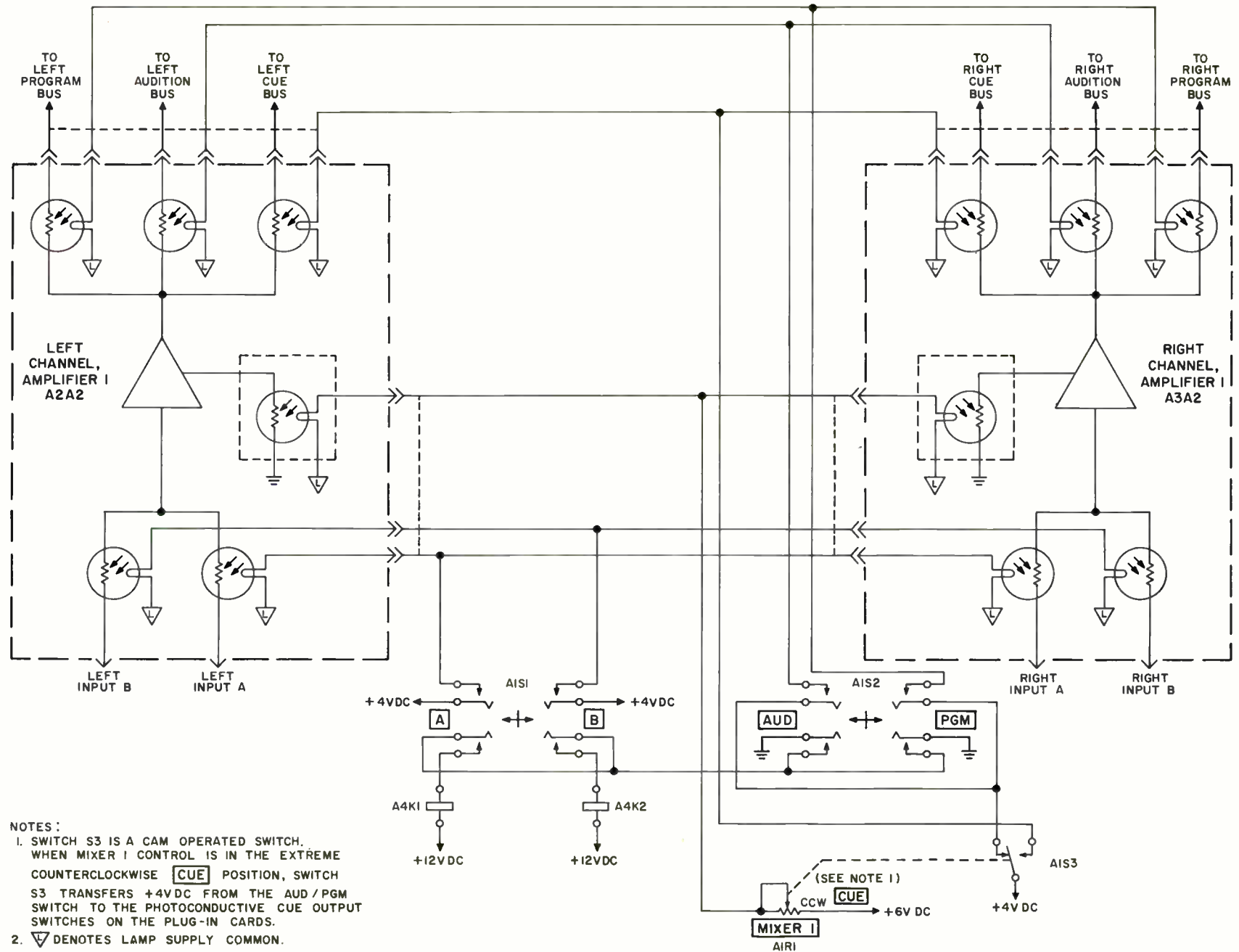


Figure 4-1. 212S-1 Stereo Console, Block Diagram

Figure 4-2. Typical Input Amplifier, Simplified Schematic



Principles of operation

The MIXER 6 control and the associated NET/RMT and AUD/PGM switches and the REMOTE LINES switches can connect the channel 1 program amplifier output to a remote line. With the switches properly set, the remote site operator can hear the program being broadcast. The MIXER 6 control must not be in the CUE position. The NET/RMT switch must not be in the RMT position. The desired REMOTE LINES switch must be in the MIX position. When the switches are set as stated above, the channel 1 program output connects to the desired remote line through the reverse cue amplifier, the closed contacts on relay A1A1K1, and switch matrix A2A1.

4.6 HEADSET

The headset connects to terminal boards on the floor of the console. The HEADSET switch selects the input to the headset. Refer to table 3-1.

4.7 INTERLOCKED CIRCUITS

Relays A1A1K1 through A1A1K4 interlock the monitor speakers, intercom speakers, and warning lights with four selected A/B switches to prevent program interruption. Refer to figures 2-3 and 7-1.

Because relays A1A1K1 through A1A1K4 are identical, only relay A1A1K1 will be discussed. A/B and AUD/PGM switches, selected by wiring at terminal board TB7, operate relay A1A1K1. Contacts 3, 7, and 11 control the left channel monitor speaker. Contacts 4, 12, and 8 control the right channel monitor speaker. Contacts 2 and 10 control the intercom speaker. Contacts 1, 9, and 5 control the warning lights.

Contacts 2 and 10 on relay A1A1K4 control the built-in speaker.

5.1 PREVENTIVE MAINTENANCE

5.1.1 Wiring

Periodically check the wiring in the 212S-1 for frayed insulation. Make sure that all terminal board screws are tight. Inspect each plug-in card for signs of component damage.

5.1.2 Mixer Controls

MIXER controls do not require cleaning because they are not in the signal path.

5.1.3 Lever Switches

Periodically clean all key switch contacts with a brush.

5.1.4 Relays

The four plug-in relays in the front left-hand corner of the console floor, are sealed units.

5.2 CORRECTIVE MAINTENANCE

Use the functional block diagram, figure 4-1, and the overall schematic, figure 7-1, as aids in localizing faults. Test points on the ends of the cards are accessible with the cards plugged into the card cage. The card extender provides access to components on individual cards.

Refer to the unit instructions, bound in the rear of this book, for maintenance data on the plug-in cards and power supply.

Refer to table 5-1 for a list of fuses, lamps, and plug-in relays.

Caution

When making repairs on the cards, do not use a soldering iron rated at more than 40 watts. Do not jar the card to remove excess solder. Jarring the card may damage the lamp filaments in the photoconductive devices.

5.3 SPARE PARTS

Spare parts may be ordered from the following address:

Collins Radio Company
Service Parts Department
Dallas, Texas 75207

5.4 TO-FROM WIRE LIST

Table 5-2 is a to-from wire list of the 212S-1 Stereo Console. The FROM column is in alphanumeric order. The TO column lists the termination of each wire. The WIRE NUMBER column allows pairing of wires. The wire numbers have three ending letters; A, B, and S. Letters A and B indicate the two wires in a pair. The letter S indicates a shield. The WIRE CODE column indicates the type, size, insulation, and color of the wire. An explanation of the wire code is included in the rear of this book.

The wire list includes only cables wires.

Table 5-1. Fuses, Lamps, and Plug-In Relays

PART	DESCRIPTION	MANUFACTURERS PART NUMBER
RELAY UNIT		
Fuse F1	0.5 amp	Bussman AGC 250-1/2
Relays K1 through K4	Relay	Potter and Brumfield KH 4394
FRONT PANEL		
VU meter lamps DS1 through DS4	14-volt, 0.08-amp lamps	GE 756
POWER SUPPLY		
Fuse F1	3 amp	Bussman MDX 3
Fuses F2 through F4	1.5 amp	Bussman AGC 250-1-1/2
Fuses F5 and F6	2.0 amp	Bussman AGC 250-2
Fuse F7	1.5 amp	Bussman AGC 250-1-1/2

Table 5-2. To-From Wire List

FROM	TO	WIRE NUMBER	WIRE CODE
-	A1-E3	1-67S	SHIELD
-	A1-E3	1-68S	SHIELD
-	A1-E3	1-97S	SHIELD
-	A1-E3	1-98S	SHIELD
-	A1-E3	1-100S	SHIELD
-	A1-E3	1-101S	SHIELD
-	A1-E3	1-105S	SHIELD
-	A1-E3	1-123S	SHIELD
-	A1-E3	3-86S	SHIELD
-	A1-E4	1-66S	SHIELD
-	A1-E4	1-99S	SHIELD
-	A1-E4	1-102S	SHIELD
-	A1-E4	1-103S	SHIELD
-	A1-E4	1-104S	SHIELD
-	A1-E4	1-106S	SHIELD
-	A1-E4	1-107S	SHIELD
-	A1-E4	1-108S	SHIELD
-	A1-E4	3-85S	SHIELD
-	A1-E5	1-70S	SHIELD
-	A1-E5	1-116S	SHIELD
-	A1-E5	1-117S	SHIELD
-	A1-E5	3-87S	SHIELD
-	A1-E6	1-109S	SHIELD
-	A1-E6	1-110S	SHIELD
-	A1-E6	2-47S	SHIELD
-	A1-E6	2-48S	SHIELD
-	A1-E7	1-111S	SHIELD
-	A1-E7	1-112S	SHIELD
-	A1-E7	3-88S	SHIELD
-	A1-E8	1-113S	SHIELD
-	A1-E8	1-114S	SHIELD
-	A1-E8	1-115S	SHIELD
-	A1-E8	3-89S	SHIELD
-	A1-E8	3-90S	SHIELD
-	A1-E8	3-91S	SHIELD
-	A1-E11	1-121S	SHIELD
-	A1-E11	1-127S	SHIELD
-	A1-E11	3-92S	SHIELD
-	A1-E12	1-69S	SHIELD
-	A1-E12	1-122S	SHIELD
-	A1-E12	1-126S	SHIELD
-	A1-E12	2-45C	SHIELD
-	A1-E12	2-46S	SHIELD
-	A1-E13	1-61S	SHIELD
-	A1-E13	1-62S	SHIELD
-	A1-E13	1-63S	SHIELD
-	A1-E13	1-64S	SHIELD
-	A1-E13	1-118S	SHIELD
-	A1-E13	1-119S	SHIELD
-	A1-E13	1-120S	SHIELD
-	A1-E13	1-124S	SHIELD
-	A1-E13	1-125S	SHIELD
-	A2-E1	1-56S	SHIELD
-	A2-E1	1-57S	SHIELD
-	A2-E1	1-58S	SHIELD
-	A2-E1	2-21S	SHIELD
-	A2-E1	2-22S	SHIELD
-	A2-E2	1-55S	SHIELD
-	A2-W1 M	1-47S	SHIELD

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
-	A2-W1 M	1-48S	SHIELD
-	A2-W1 M	1-49S	SHIELD
-	A2-W1 M	1-50S	SHIELD
-	A2-W1 M	1-51S	SHIELD
-	A2-W1 M	1-52S	SHIELD
-	A2-W1 M	1-53S	SHIELD
-	A2-W1 M	1-54S	SHIELD
-	A2-W1 M	1-59S	SHIELD
-	A2-W1 M	1-60S	SHIELD
-	A2-W1 M	1-128S	SHIELD
-	A2-W1 M	1-129S	SHIELD
-	A2-W1 M	2-1S	SHIELD
-	A2-W1 M	2-2S	SHIELD
-	A2-W1 M	2-3S	SHIELD
-	A2-W1 M	2-4S	SHIELD
-	A2-W1 M	2-5S	SHIELD
-	A2-W1 M	2-6S	SHIELD
-	A2-W1 M	2-7S	SHIELD
-	A2-W1 M	2-8S	SHIELD
-	A2-W1 M	2-9S	SHIELD
-	A2-W1 M	2-10S	SHIELD
-	A2-W1 M	2-11S	SHIELD
-	A2-W1 M	2-12S	SHIELD
-	A2-W1 M	2-13S	SHIELD
-	A2-W1 M	2-14S	SHIELD
-	A2-W1 M	2-15S	SHIELD
-	A2-W1 M	2-16S	SHIELD
-	A2-W1 M	2-17S	SHIELD
-	A2-W1 M	2-18S	SHIELD
-	A2-W1 M	2-19S	SHIELD
-	A2-W1 M	2-20S	SHIELD
-	A3-E1	2-43S	SHIELD
-	A3-E1	2-44S	SHIELD
-	A3-E1	3-67S	SHIELD
-	A3-E1	3-68S	SHIELD
-	A3-E2	3-99S	SHIELD
-	A3-W1 M	2-23S	SHIELD
-	A3-W1 M	2-24S	SHIELD
-	A3-W1 M	2-25S	SHIELD
-	A3-W1 M	2-26S	SHIELD
-	A3-W1 M	2-27S	SHIELD
-	A3-W1 M	2-28S	SHIELD
-	A3-W1 M	2-29S	SHIELD
-	A3-W1 M	2-30S	SHIELD
-	A3-W1 M	2-31S	SHIELD
-	A3-W1 M	2-32S	SHIELD
-	A3-W1 M	2-33S	SHIELD
-	A3-W1 M	2-34S	SHIELD
-	A3-W1 M	2-35S	SHIELD
-	A3-W1 M	2-36S	SHIELD
-	A3-W1 M	2-37S	SHIELD
-	A3-W1 M	2-38S	SHIELD
-	A3-W1 M	2-39S	SHIELD
-	A3-W1 M	2-40S	SHIELD
-	A3-W1 M	2-41S	SHIELD
-	A3-W1 M	2-42S	SHIELD
-	A3-W1 M	3-63S	SHIELD
-	A3-W1 M	3-64S	SHIELD
-	A3-W1 M	3-65S	SHIELD

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
-	A3-W1 M	3-66S	SHIELD
-	A3-W1 M	3-69S	SHIELD
-	A3-W1 M	3-70S	SHIELD
-	A3-W1 M	3-71S	SHIELD
-	A3-W1 M	3-72S	SHIELD
-	A3-W1 M	3-73S	SHIELD
-	A3-W1 M	3-74S	SHIELD
-	A3-W1 M	3-75S	SHIELD
-	A3-W1 M	3-76S	SHIELD
-	TB8-17	3-77S	SHIELD
-	TB8-17	3-79S	SHIELD
A1-A1-A	A1-TB1-8	1-98B	9XXX
A1-A1-AA	P1-18	3-92A	2XXX
A1-A1-B	A1-TB1-6	1-98A	5XXX
A1-A1-BB	A1-S19-11	1-122A	5XXX
A1-A1-C	A1-S20A-1	1-119A	5XXX
A1-A1-CC	A1-S19-8	1-122B	9XXX
A1-A1-CC	P1-19	3-92B	9XXX
A1-A1-D	A1-S20B-1	1-119B	9XXX
A1-A1-D	A1-S20B-8	1-120B	9XXX
A1-A1-E	A1-S20A-8	1-120A	5XXX
A1-A1-F	A2-A1-6	1-57A	5XXX
A1-A1-H	A1-XDS1-1	1-78	A22PB00X2XXX
A1-A1-H	TB5-1	1-131	A22PB00X2XXX
A1-A1-J	A1-S16-2BR	1-76	A22PB00X90XX
A1-A1-K	A2-A1-8	1-57B	9XXX
A1-A1-M	A1-E1	1-130	A22PB00X4XXX
A1-A1-P	A1-S17-2BR	1-77	A22PB00X93XX
A1-A1-R	TB8-3	2-46A	5XXX
A1-A1-S	TB8-4	2-46B	9XXX
A1-A1-T	A1-S20A-7	1-118A	5XXX
A1-A1-U	TB8-7	2-45A	5XXX
A1-A1-V	TB8-8	2-45B	9XXX
A1-A1-W	A1-TB1-25	1-108A	5XXX
A1-A1-X	A1-TB1-27	1-108B	9XXX
A1-A1-Y	A1-R13-2	1-121A	5XXX
A1-A1-Z	A1-S20B-7	1-118B	9XXX
A1-A1-Z	A1-R13-3	1-121B	9XXX
A1-E1	A1-A1-M	1-130	A22PB00X4XXX
A1-E1	A1-S1-1TR	1-79	A22PB00X4XXX
A1-E1	A1-S4-1TR	1-82	A22PB00X4XXX
A1-E1	A1-S7-1TR	1-85	A22PB00X4XXX
A1-E1	A1-S10-1TR	1-88	A22PB00X4XXX
A1-E1	A1-S13-1TR	1-91	A22PB00X4XXX
A1-E1	A1-S16-1TR	1-94	A22PB00X4XXX
A1-E1	A1-S22-3BR	1-71	A22PB00X4XXX
A1-E1	A1-S25-1BL	1-72	A22PB00X4XXX
A1-E1	P1-22	3-95	A16PB00X4XXX
A1-E1	P1-23	3-96	A16PB00X4XXX
A1-E1	TB8-16	3-93	A18PB00X4XXX
A1-E2	A1-R1-3	1-81	A22PB00X5XXX
A1-E2	A1-R3-3	1-84	A22PB00X5XXX
A1-E2	A1-R5-3	1-87	A22PB00X5XXX
A1-E2	A1-R7-3	1-90	A22PB00X5XXX
A1-E2	A1-R9-3	1-93	A22PB00X5XXX
A1-E2	A1-R11-3	1-96	A22PB00X5XXX
A1-E2	A1-R28-3	1-73	A22PB00X5XXX
A1-E2	A1-R31-3	1-74	A22PB00X5XXX
A1-E2	A1-R32-3	1-75	A22PB00X5XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A1-E2	P1-25	3-97	A16PB00X5XXX
A1-E2	P1-26	3-98	A16PB00X5XXX
A1-E2	TB8-15	3-94	A18PB00X5XXX
A1-E3	-	1-67S	SHIELD
A1-E3	-	1-68S	SHIELD
A1-E3	-	1-97S	SHIELD
A1-E3	-	1-98S	SHIELD
A1-E3	-	1-100S	SHIELD
A1-E3	-	1-101S	SHIELD
A1-E3	-	1-105S	SHIELD
A1-E3	-	1-123S	SHIELD
A1-E3	-	3-86S	SHIELD
A1-E4	-	1-66S	SHIELD
A1-E4	-	1-99S	SHIELD
A1-E4	-	1-102S	SHIELD
A1-E4	-	1-103S	SHIELD
A1-E4	-	1-104S	SHIELD
A1-E4	-	1-106S	SHIELD
A1-E4	-	1-107S	SHIELD
A1-E4	-	1-108S	SHIELD
A1-E4	-	3-85S	SHIELD
A1-E5	-	1-70S	SHIELD
A1-E5	-	1-116S	SHIELD
A1-E5	-	1-117S	SHIELD
A1-E5	-	3-87S	SHIELD
A1-E6	-	1-109S	SHIELD
A1-E6	-	1-110S	SHIELD
A1-E6	-	2-47S	SHIELD
A1-E6	-	2-48S	SHIELD
A1-E7	-	1-111S	SHIELD
A1-E7	-	1-112S	SHIELD
A1-E7	-	3-88S	SHIELD
A1-E8	-	1-113S	SHIELD
A1-E8	-	1-114S	SHIELD
A1-E8	-	1-115S	SHIELD
A1-E8	-	3-89S	SHIELD
A1-E8	-	3-90S	SHIELD
A1-E8	-	3-91S	SHIELD
A1-E9	A1-S2-1BL	1-80	A22PB00X0XXX
A1-E9	A1-S5-1BL	1-83	A22PB00X0XXX
A1-E9	A1-S8-1BL	1-86	A22PB00X0XXX
A1-E10	A1-S11-1BL	1-89	A22PB00X0XXX
A1-E10	A1-S14-1BL	1-92	A22PB00X0XXX
A1-E10	A1-S16-1BR	1-95	A22PB00X0XXX
A1-E11	-	1-121S	SHIELD
A1-E11	-	1-127S	SHIELD
A1-E11	-	3-92S	SHIELD
A1-E12	-	1-69S	SHIELD
A1-E12	-	1-126S	SHIELD
A1-E12	-	1-122S	SHIELD
A1-E12	-	2-45S	SHIELD
A1-E12	-	2-46S	SHIELD
A1-E13	-	1-61S	SHIELD
A1-E13	-	1-62S	SHIELD
A1-E13	-	1-63S	SHIELD
A1-E13	-	1-64S	SHIELD
A1-E13	-	1-118S	SHIELD
A1-E13	-	1-119S	SHIELD
A1-E13	-	1-120S	SHIELD

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A1-E13	-	1-124S	SHIELD
A1-E13	-	1-125S	SHIELD
A1-E14	TB5-2	1-132	A22PB00X0XXX
A1-LS1-1	A1-S19-6	1-126A	5XXX
A1-LS1-2	A1-S19-3	1-126B	9XXX
A1-M1-1	A1-S23-5TR	1-116A	5XXX
A1-M1-2	A1-S23-2TR	1-116B	9XXX
A1-M2-1	A1-S23-5TL	1-117A	5XXX
A1-M2-2	A1-S23-2TL	1-117B	9XXX
A1-R1-1	A2-XA2-Z	1-14	A22PB00X1XXX
A1-R1-1	A3-XA2-Z	3-15	A22PB00X1XXX
A1-R1-3	A1-E2	1-81	A22PB00X5XXX
A1-R3-1	A2-XA3-Z	1-20	A22PB00X3XXX
A1-R3-1	A3-XA3-Z	3-21	A22PB00X3XXX
A1-R3-3	A1-E2	1-84	A22PB00X5XXX
A1-R5-1	A2-XA4-Z	1-26	A22PB00X6XXX
A1-R5-1	A3-XA4-Z	3-27	A22PB00X6XXX
A1-R5-3	A1-E2	1-87	A22PB00X5XXX
A1-R7-1	A2-XA5-Z	1-32	A22PB00X7XXX
A1-R7-1	A3-XA5-Z	3-33	A22PB00X7XXX
A1-R7-3	A1-E2	1-90	A22PB00X5XXX
A1-R9-1	A2-XA6-Z	1-38	A22PB00X8XXX
A1-R9-1	A3-XA6-Z	3-39	A22PB00X8XXX
A1-R9-3	A1-E2	1-93	A22PB00X5XXX
A1-R11-1	A2-XA7-Z	1-44	A22PB00X9XXX
A1-R11-1	A3-XA7-Z	3-45	A22PB00X9XXX
A1-R11-3	A1-E2	1-96	A22PB00X5XXX
A1-R13-1	A1-S19-5	1-127A	5XXX
A1-R13-2	A1-A1-Y	1-121A	5XXX
A1-R13-3	A1-A1-Z	1-121B	9XXX
A1-R13-3	A1-S19-2	1-127B	9XXX
A1-R28-1	A2-XA8-Z	1-45	A22PB00X6XXX
A1-R28-3	A1-E2	1-73	A22PB00X5XXX
A1-R31-1	A3-XA8-Z	3-47	A22PB00X8XXX
A1-R31-3	A1-E2	1-74	A22PB00X5XXX
A1-R32-1	A2-XA9-Z	1-46	A22PB00X7XXX
A1-R32-1	A3-XA9-Z	3-48	A22PB00X7XXX
A1-R32-3	A1-E2	1-75	A22PB00X5XXX
A1-S1-1TR	A1-E1	1-79	A22PB00X4XXX
A1-S1-2BL	A3-TB7-1	3-53	A22PB00X926X
A1-S1-2BR	A3-TB7-2	3-54	A22PB00X925X
A1-S1-2TL	A2-XA2-T	1-9	A22PB00X90XX
A1-S1-2TL	A3-XA2-T	3-10	A22PB00X90XX
A1-S1-2TR	A2-XA2-U	1-10	A22PB00X91XX
A1-S1-2TR	A3-XA2-U	3-11	A22PB00X91XX
A1-S3-3	A2-XA2-V	1-11	A22PB00X902X
A1-S3-3	A3-XA2-V	3-12	A22PB00X902X
A1-S4-1TR	A1-E1	1-82	A22PB00X4XXX
A1-S4-2BL	A3-TB7-3	3-55	A22PB00X916X
A1-S4-2BR	A3-TB7-4	3-56	A22PB00X915X
A1-S4-2TL	A2-XA3-T	1-15	A22PB00X92XX
A1-S4-2TL	A3-XA3-T	3-16	A22PB00X92XX
A1-S4-2TR	A2-XA3-U	1-16	A22PB00X93XX
A1-S4-2TR	A3-XA3-U	3-17	A22PB00X93XX
A1-S5-1BL	A1-E9	1-83	A22PB00X0XXX
A1-S5-2TL	A2-XA3-W	1-18	A22PB00X912X
A1-S5-2TL	A3-XA3-W	3-19	A22PB00X912X
A1-S5-2TR	A2-XA3-X	1-19	A22PB00X913X
A1-S5-2TR	A3-XA3-X	3-20	A22PB00X913X

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A1-S6-3	A2-XA3-V	1-17	A22PB00X906X
A1-S6-3	A3-XA3-V	3-18	A22PB00X906X
A1-S7-1TR	A1-E1	1-85	A22PB00X4XXX
A1-S7-2BL	A3-TB7-5	3-57	A22PB00X906X
A1-S7-2BR	A3-TB7-6	3-58	A22PB00X905X
A1-S7-2TL	A2-XA4-T	1-21	A22PB00X95XX
A1-S7-2TL	A3-XA4-T	3-22	A22PB00X95XX
A1-S7-2TR	A2-XA4-U	1-22	A22PB00X96XX
A1-S7-2TR	A3-XA4-U	3-23	A22PB00X96XX
A1-S8-1BL	A1-E9	1-86	A22PB00X0XXX
A1-S8-2TL	A2-XA4-W	1-24	A22PB00X916X
A1-S8-2TL	A3-XA4-W	3-25	A22PB00X916X
A1-S8-2TR	A2-XA4-X	1-25	A22PB00X923X
A1-S8-2TR	A3-XA4-X	3-26	A22PB00X923X
A1-S9-3	A2-XA4-V	1-23	A22PB00X915X
A1-S9-3	A3-XA4-V	3-24	A22PB00X915X
A1-S10-1TR	A1-E1	1-88	A22PB00X4XXX
A1-S10-2BL	A3-TB7-7	3-59	A22PB00X96XX
A1-S10-2BR	A3-TB7-8	3-60	A22PB00X95XX
A1-S10-2TL	A2-XA5-T	1-27	A22PB00X902X
A1-S10-2TL	A3-XA5-T	3-28	A22PB00X902X
A1-S10-2TR	A2-XA5-U	1-28	A22PB00X903X
A1-S10-2TR	A3-XA5-U	3-29	A22PB00X903X
A1-S11-1BL	A1-E10	1-89	A22PB00X0XXX
A1-S11-2TL	A2-XA5-W	1-30	A22PB00X926X
A1-S11-2TL	A3-XA5-W	3-31	A22PB00X926X
A1-S11-2TR	A2-XA5-X	1-31	A22PB00X90XX
A1-S11-2TR	A3-XA5-X	3-32	A22PB00X90XX
A1-S12-3	A2-XA5-V	1-29	A22PB00X925X
A1-S12-3	A3-XA5-V	3-30	A22PB00X925X
A1-S13-1TR	A1-E1	1-91	A22PB00X4XXX
A1-S13-2BL	A3-TB7-9	3-61	A22PB00X6XXX
A1-S13-2BK	A3-TB7-10	3-62	A22PB00X5XXX
A1-S13-2TL	A2-XA6-T	1-33	A22PB00X905X
A1-S13-2TL	A3-XA6-T	3-34	A22PB00X905X
A1-S13-2TR	A2-XA6-U	1-34	A22PB00X906X
A1-S13-2TR	A3-XA6-U	3-35	A22PB00X906X
A1-S14-1BL	A1-E10	1-92	A22PB00X0XXX
A1-S14-2TL	A2-XA6-W	1-36	A22PB00X92XX
A1-S14-2TL	A3-XA6-W	3-37	A22PB00X92XX
A1-S14-2TR	A2-XA6-X	1-37	A22PB00X93XX
A1-S14-2TR	A3-XA6-X	3-38	A22PB00X93XX
A1-S15-3	A2-XA6-V	1-35	A22PB00X91XX
A1-S15-3	A3-XA6-V	3-36	A22PB00X91XX
A1-S16-1BR	A1-E10	1-95	A22PB00X0XXX
A1-S16-1TR	A1-E1	1-94	A22PB00X4XXX
A1-S16-2BR	A1-A1-J	1-76	A22PB00X90XX
A1-S16-2TL	A2-XA7-T	1-39	A22PB00X912X
A1-S16-2TL	A3-XA7-T	3-40	A22PB00X912X
A1-S16-2TR	A2-XA7-U	1-40	A22PB00X913X
A1-S16-2TR	A3-XA7-U	3-41	A22PB00X913X
A1-S17-2BR	A1-A1-P	1-77	A22PB00X93XX
A1-S17-2TL	A2-XA7-W	1-42	A22PB00X96XX
A1-S17-2TL	A3-XA7-W	3-43	A22PB00X96XX
A1-S17-2TR	A2-XA7-X	1-43	A22PB00X902X
A1-S17-2TR	A3-XA7-X	3-44	A22PB00X902X
A1-S18-3	A2-XA7-V	1-41	A22PB00X95XX
A1-S18-3	A3-XA7-V	3-42	A22PB00X95XX
A1-S19-1	A1-S20B-B	1-125B	9XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A1-S19-2	A1-R13-3	1-127B	9XXX
A1-S19-3	A1-LS1-2	1-126B	9XXX
A1-S19-4	A1-S20A-B	1-125A	5XXX
A1-S19-5	A1-R13-1	1-127A	5XXX
A1-S19-6	A1-LS1-1	1-126A	5XXX
A1-S19-6	TB5-20	1-69	1XXX
A1-S19-8	A1-A1-CC	1-122B	9XXX
A1-S19-8	A1-S21B-1	1-123A	9XXX
A1-S19-9	A1-S20B-D	1-124B	9XXX
A1-S19-10	A1-S21C-2	1-123B	5XXX
A1-S19-11	A1-A1-BB	1-122A	5XXX
A1-S19-12	A1-S20A-D	1-124A	5XXX
A1-S2-1BL	A1-E9	1-80	A22PB00XQXXX
A1-S2-2TL	A2-XA2-W	1-12	A22PB00X903X
A1-S2-2TL	A3-XA2-W	3-13	A22PB00X903X
A1-S2-2TR	A2-XA2-X	1-13	A22PB00X905X
A1-S2-2TR	A3-XA2-X	3-14	A22PB00X905X
A1-S20A-1	A1-A1-C	1-119A	5XXX
A1-S20A-3	TB2-5	1-64A	5XXX
A1-S20A-4	TB2-4	1-63A	5XXX
A1-S20A-5	TB2-2	1-62A	5XXX
A1-S20A-6	TB2-1	1-61A	5XXX
A1-S20A-7	A1-A1-T	1-118A	5XXX
A1-S20A-8	A1-A1-E	1-120A	5XXX
A1-S20A-B	A1-S19-4	1-125A	5XXX
A1-S20A-D	A1-S19-12	1-124A	5XXX
A1-S20B-B	A1-S19-1	1-125B	9XXX
A1-S20B-D	A1-S19-9	1-124B	9XXX
A1-S20B-1	A1-A1-D	1-119B	9XXX
A1-S20B-3	TB2-3	1-64B	9XXX
A1-S20B-4	TB2-3	1-63B	9XXX
A1-S20B-5	TB2-3	1-62B	9XXX
A1-S20B-6	TB2-3	1-61B	9XXX
A1-S20B-7	A1-A1-Z	1-118B	9XXX
A1-S20B-8	A1-A1-D	1-120B	9XXX
A1-S21A-4	A1-TB1-35	1-105A	5XXX
A1-S21A-5	A1-TB1-25	1-102A	5XXX
A1-S21A-6	A1-TB1-15	1-100B	9XXX
A1-S21A-7	A1-TB1-7	1-97B	9XXX
A1-S21A-13	A1-TB1-19	1-101B	9XXX
A1-S21A-14	A1-TB1-11	1-99B	9XXX
A1-S21B-1	A1-S19-8	1-123A	9XXX
A1-S21B-4	A1-TB1-37	1-105B	9XXX
A1-S21B-5	A1-TB1-27	1-102B	9XXX
A1-S21B-6	A1-TB1-13	1-100A	5XXX
A1-S21B-7	A1-TB1-5	1-97A	5XXX
A1-S21B-13	A1-TB1-17	1-101A	5XXX
A1-S21B-14	A1-TB1-9	1-99A	5XXX
A1-S21B-B	TB2-12	1-67B	9XXX
A1-S21B-D	TB4-14	3-86B	9XXX
A1-S21A-B	TB2-11	1-67A	5XXX
A1-S21A-D	TB4-13	3-86A	5XXX
A1-S21C-2	A1-S19-10	1-123B	5XXX
A1-S21C-3	TB5-19	1-68	1XXX
A1-S22-1BR	A3-XA8-W	3-46	A22PB00X1XXX
A1-S22-1TR	XA5-F	2-51	A22PB00X3XXX
A1-S22-2TL	XA5-J	2-49	A22PB00X90XX
A1-S22-2TR	XA5-N	2-50	A22PB00X9XXX
A1-S22-3BR	A1-E1	1-71	A22PB00X4XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A1-S23-2BL	A1-TB1-38	1-107A	9XXX
A1-S23-2BR	A1-TB1-30	1-104A	5XXX
A1-S23-2TL	A1-M2-2	1-117B	9XXX
A1-S23-3TL	TB4-16	3-87B	9XXX
A1-S23-2TR	A1-M1-2	1-116B	9XXX
A1-S23-3TR	TB2-10	1-70B	9XXX
A1-S23-5BL	A1-TB1-40	1-107B	5XXX
A1-S23-5BR	A1-TB1-32	1-104B	9XXX
A1-S23-5TL	A1-M2-1	1-117A	5XXX
A1-S23-5TR	A1-M1-1	1-116A	5XXX
A1-S23-6TL	TB4-15	3-87A	5XXX
A1-S23-6TR	TB2-9	1-70A	5XXX
A1-S24A-B	A2-XA9-A	2-20A	5XXX
A1-S24A-D	A3-XA9-A	2-42A	5XXX
A1-S24A-1	A1-TB2-8	1-110A	9XXX
A1-S24A-3	A1-TB2-37	1-114B	9XXX
A1-S24A-4	A1-TB2-31	1-113B	9XXX
A1-S24A-8	A1-TB2-2	1-109A	5XXX
A1-S24A-11	A1-TB2-43	1-115B	9XXX
A1-S24A-13	A1-TB2-20	1-112B	9XXX
A1-S24A-14	A1-TB2-16	1-111B	9XXX
A1-S24B-B	A2-XA9-B	2-20B	9XXX
A1-S24B-D	A3-XA9-B	2-42B	9XXX
A1-S24B-1	A1-TB2-10	1-110B	5XXX
A1-S24B-3	A1-TB2-35	1-114A	5XXX
A1-S24B-4	A1-TB2-29	1-113A	5XXX
A1-S24B-8	A1-TB2-4	1-109B	9XXX
A1-S24B-11	A1-TB2-41	1-115A	5XXX
A1-S24B-13	A1-TB2-18	1-112A	5XXX
A1-S24B-14	A1-TB2-14	1-111A	5XXX
A1-S25-1BL	A1-E1	1-72	A22PB00X4XXX
A1-S25-2BL	A2-XA1-B	1-1	A22PB00X1XXX
A1-S25-2BL	A3-XA1-B	3-1	A22PB00X1XXX
A1-S25-2TL	A2-XA1-C	1-2	A22PB00X3XXX
A1-S25-2TL	A3-XA1-C	3-2	A22PB00X3XXX
A1-S26-2BL	A2-XA1-F	1-3	A22PB00X6XXX
A1-S26-2BL	A3-XA1-F	3-3	A22PB00X6XXX
A1-S26-2TL	A2-XA1-H	1-4	A22PB00X7XXX
A1-S26-2TL	A3-XA1-H	3-4	A22PB00X7XXX
A1-S27-2BL	A2-XA1-L	1-5	A22PB00X8XXX
A1-S27-2BL	A3-XA1-L	3-5	A22PB00X8XXX
A1-S27-2TL	A2-XA1-P	1-6	A22PB00X9XXX
A1-S27-2TL	A3-XA1-P	3-6	A22PB00X9XXX
A1-S28-2BL	A2-XA1-T	1-7	A22PB00X90XX
A1-S28-2BL	A3-XA1-T	3-7	A22PB00X90XX
A1-S28-2TL	A2-XA1-U	1-8	A22PB00X91XX
A1-S28-2TL	A3-XA1-U	3-8	A22PB00X91XX
A1-TB1-20	TB3-22	3-85B	9XXX
A1-TB1-5	A1-S21B-7	1-97A	5XXX
A1-TB1-6	A1-A1-B	1-98A	5XXX
A1-TB1-6	A2-XA1-W	1-128A	5XXX
A1-TB1-7	A1-S21A-7	1-97B	9XXX
A1-TB1-8	A1-A1-A	1-98B	9XXX
A1-TB1-8	A2-XA1-X	1-128B	9XXX
A1-TB1-9	A1-S21B-14	1-99A	5XXX
A1-TB1-10	A3-XA1-W	3-73A	A22PB00X5XXX
A1-TB1-11	A1-S21A-14	1-99B	9XXX
A1-TB1-12	A3-XA1-X	3-73B	A22PB00X9XXX
A1-TB1-13	A1-S21B-6	1-100A	5XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A1-TB1-14	TB1-3	1-66A	5XXX
A1-TB1-15	A1-S21A-6	1-100B	9XXX
A1-TB1-16	TB1-4	1-66B	9XXX
A1-TB1-17	A1-S21B-13	1-101A	5XXX
A1-TB1-18	TB3-21	3-85A	5XXX
A1-TB1-19	A1-S21A-13	1-101B	9XXX
A1-TB1-25	A1-A1-W	1-108A	5XXX
A1-TB1-25	A1-S21A-5	1-102A	5XXX
A1-TB1-26	A1-TB2-15	1-103A	5XXX
A1-TB1-27	A1-A1-X	1-108B	9XXX
A1-TB1-27	A1-S21B-5	1-102B	9XXX
A1-TB1-28	A1-TB2-13	1-103B	9XXX
A1-TB1-30	A1-S23-2BR	1-104A	5XXX
A1-TB1-32	A1-S23-5BR	1-104B	9XXX
A1-TB1-32	A2-T1-4	1-55A	9XXX
A1-TB1-34	A2-T1-7	1-55B	5XXX
A1-TB1-35	A1-S21A-4	1-105A	5XXX
A1-TB1-36	A1-TB2-19	1-106A	5XXX
A1-TB1-37	A1-S21B-4	1-105B	9XXX
A1-TB1-38	A1-S23-2BL	1-107A	9XXX
A1-TB1-38	A1-TB2-17	1-106B	9XXX
A1-TB1-40	A1-S23-5BL	1-107B	5XXX
A1-TB2-2	A1-S24A-8	1-109A	5XXX
A1-TB2-4	A1-S24B-8	1-109B	9XXX
A1-TB2-4	TB8-4	2-47B	9XXX
A1-TB2-6	TB8-1	2-47A	5XXX
A1-TB2-8	A1-S24A-1	1-110A	9XXX
A1-TB2-10	A1-S24B-1	1-110B	5XXX
A1-TB2-10	XA5-K	2-48B	9XXX
A1-TB2-12	XA5-M	2-48A	5XXX
A1-TB2-13	A1-TB1-28	1-103B	9XXX
A1-TB2-14	A1-S24B-14	1-111A	5XXX
A1-TB2-15	A1-TB1-26	1-103A	5XXX
A1-TB2-16	A1-S24A-14	1-111B	9XXX
A1-TB2-17	A1-TB1-38	1-106B	9XXX
A1-TB2-17	A3-T1-4	3-99A	5XXX
A1-TB2-18	A1-S24B-13	1-112A	5XXX
A1-TB2-19	A1-TB1-36	1-106A	5XXX
A1-TB2-19	A3-T1-7	3-99B	9XXX
A1-TB2-20	A1-S24A-13	1-112B	9XXX
A1-TB2-27	TB4-20	3-88A	1XXX
A1-TB2-29	A1-S24B-4	1-113A	5XXX
A1-TB2-31	A1-S24A-4	1-113B	9XXX
A1-TB2-33	TB4-22	3-89A	1XXX
A1-TB2-35	A1-S24B-3	1-114A	5XXX
A1-TB2-35	TB4-21	3-91A	1XXX
A1-TB2-37	A1-S24A-3	1-114B	9XXX
A1-TB2-39	TB4-24	3-90A	1XXX
A1-TB2-41	A1-S24B-11	1-115A	5XXX
A1-TB2-43	A1-S24A-11	1-115B	9XXX
A1-TB7-1	A3-TB5-21	3-49	A22PB00X90XX
A1-TB7-3	A3-TB5-22	3-50	A22PB00X91XX
A1-TB7-5	A3-TB5-23	3-51	A22PB00X92XX
A1-TB7-7	A3-TB5-24	3-52	A22PB00X93XX
A1-XDS1-1	A1-A1-H	1-78	A22PB00X2XXX
A2-A1-1	TB1-23	2-21A	5XXX
A2-A1-2	TB1-3	1-56A	5XXX
A2-A1-3	TB1-24	2-21B	9XXX
A2-A1-4	TB1-4	1-56B	9XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A2-A1-5	TB2-23	2-22A	5XXX
A2-A1-6	A1-A1-F	1-57A	5XXX
A2-A1-6	A2-XA1-Y	1-129A	5XXX
A2-A1-7	TB2-24	2-22B	9XXX
A2-A1-8	A1-A1-K	1-57B	9XXX
A2-A1-8	A2-XA1-Z	1-129B	9XXX
A2-A1-10	TB1-1	1-58A	5XXX
A2-A1-12	TB1-2	1-58B	9XXX
A2-C1-1	A2-XA8-P	1-52	1XXX
A2-C1-2	A2-XA8-S	1-51A	5XXX
A2-C2-1	A2-XA9-N	1-53B	9XXX
A2-C2-2	A2-XA9-S	1-53A	5XXX
A2-E1	-	1-56S	SHIELD
A2-E1	-	1-57S	SHIELD
A2-E1	-	1-58S	SHIELD
A2-E1	-	2-21S	SHIELD
A2-E1	-	2-22S	SHIELD
A2-E2	-	1-55S	SHIELD
A2-T1-3	A2-XA8-K	1-51B	9XXX
A2-T1-4	A1-TB1-32	1-55A	9XXX
A2-T1-7	A1-TB1-34	1-55B	5XXX
A2-W1 M	-	1-47S	SHIELD
A2-W1 M	-	1-48S	SHIELD
A2-W1 M	-	1-49S	SHIELD
A2-W1 M	-	1-50S	SHIELD
A2-W1 M	-	1-51S	SHIELD
A2-W1 M	-	1-52S	SHIELD
A2-W1 M	-	1-53S	SHIELD
A2-W1 M	-	1-54S	SHIELD
A2-W1 M	-	1-59S	SHIELD
A2-W1 M	-	1-60S	SHIELD
A2-W1 M	-	1-128S	SHIELD
A2-W1 M	-	1-129S	SHIELD
A2-W1 M	-	2-1S	SHIELD
A2-W1 M	-	2-2S	SHIELD
A2-W1 M	-	2-3S	SHIELD
A2-W1 M	-	2-4S	SHIELD
A2-W1 M	-	2-5S	SHIELD
A2-W1 M	-	2-6S	SHIELD
A2-W1 M	-	2-7S	SHIELD
A2-W1 M	-	2-8S	SHIELD
A2-W1 M	-	2-9S	SHIELD
A2-W1 M	-	2-10S	SHIELD
A2-W1 M	-	2-11S	SHIELD
A2-W1 M	-	2-12S	SHIELD
A2-W1 M	-	2-13S	SHIELD
A2-W1 M	-	2-14S	SHIELD
A2-W1 M	-	2-15S	SHIELD
A2-W1 M	-	2-16S	SHIELD
A2-W1 M	-	2-17S	SHIELD
A2-W1 M	-	2-18S	SHIELD
A2-W1 M	-	2-19S	SHIELD
A2-W1 M	-	2-20S	SHIELD
A2-XA1-A	TB1-5	1-47A	5XXX
A2-XA1-B	A1-S25-2BL	1-1	A22PB00X1XXX
A2-XA1-C	A1-S25-2TL	1-2	A22PB00X3XXX
A2-XA1-D	TB1-6	1-47B	9XXX
A2-XA1-E	TB1-7	1-48A	5XXX
A2-XA1-F	A1-S26-2BL	1-3	A22PB00X6XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A2-XA1-H	A1-S26-2TL	1-4	A22PB00X7XXX
A2-XA1-J	TB1-8	1-48B	9XXX
A2-XA1-K	TB1-9	1-49A	5XXX
A2-XA1-L	A1-S27-2BL	1-5	A22PB00X8XXX
A2-XA1-P	A1-S27-2TL	1-6	A22PB00X9XXX
A2-XA1-R	TB1-10	1-49B	9XXX
A2-XA1-S	TB1-11	1-50A	5XXX
A2-XA1-T	A1-S28-2BL	1-7	A22PB00X90XX
A2-XA1-U	A1-S28-2TL	1-8	A22PB00X91XX
A2-XA1-V	TB1-12	1-50B	9XXX
A2-XA1-W	A1-TB1-6	1-128A	5XXX
A2-XA1-X	A1-TB1-8	1-128B	9XXX
A2-XA1-Y	A2-A1-6	1-129A	5XXX
A2-XA1-Z	A2-A1-8	1-129B	9XXX
A2-XA2-A	TB1-13	2-1A	5XXX
A2-XA2-B	TB1-14	2-1B	9XXX
A2-XA2-C	TB2-13	2-2A	5XXX
A2-XA2-D	TB2-14	2-2B	9XXX
A2-XA2-K	TB8-4	2-3B	9XXX
A2-XA2-P	TB8-3	2-3A	5XXX
A2-XA2-T	A1-S1-2TL	1-9	A22PB00X90XX
A2-XA2-U	A1-S1-2TR	1-10	A22PB00X91XX
A2-XA2-V	A1-S3-3	1-11	A22PB00X902X
A2-XA2-W	A1-S2-2TL	1-12	A22PB00X903X
A2-XA2-X	A1-S2-2TR	1-13	A22PB00X905X
A2-XA2-Z	A1-R1-1	1-14	A22PB00X1XXX
A2-XA3-A	TB1-15	2-4A	5XXX
A2-XA3-B	TB1-16	2-4B	9XXX
A2-XA3-C	TB2-15	2-5A	5XXX
A2-XA3-D	TB2-16	2-5B	9XXX
A2-XA3-K	TB8-4	2-6B	9XXX
A2-XA3-S	TB8-1	2-6A	5XXX
A2-XA3-T	A1-S4-2TL	1-15	A22PB00X92XX
A2-XA3-U	A1-S4-2TR	1-16	A22PB00X93XX
A2-XA3-V	A1-S6-3	1-17	A22PB00X906X
A2-XA3-W	A1-S5-2TL	1-18	A22PB00X912X
A2-XA3-X	A1-S5-2TR	1-19	A22PB00X913X
A2-XA3-Z	A1-R3-1	1-20	A22PB00X3XXX
A2-XA4-A	TB1-17	2-7A	5XXX
A2-XA4-B	TB1-18	2-7B	9XXX
A2-XA4-C	TB2-17	2-8A	5XXX
A2-XA4-D	TB2-18	2-8B	9XXX
A2-XA4-K	XA5-R	2-9B	9XXX
A2-XA4-S	XA5-P	2-9A	5XXX
A2-XA4-T	A1-S7-2TL	1-21	A22PB00X95XX
A2-XA4-U	A1-S7-2TR	1-22	A22PB00X96XX
A2-XA4-V	A1-S9-3	1-23	A22PB00X915X
A2-XA4-W	A1-S8-2TL	1-24	A22PB00X916X
A2-XA4-X	A1-S8-2TR	1-25	A22PB00X923X
A2-XA4-Z	A1-R5-1	1-26	A22PB00X6XXX
A2-XA5-A	TB1-19	2-10A	5XXX
A2-XA5-B	TB1-20	2-10B	9XXX
A2-XA5-C	TB2-19	2-11A	5XXX
A2-XA5-D	TB2-20	2-11B	9XXX
A2-XA5-F	TB2-8	2-12B	9XXX
A2-XA5-L	TB2-7	2-12A	5XXX
A2-XA5-T	A1-S10-2TL	1-27	A22PB00X902X
A2-XA5-U	A1-S10-2TR	1-28	A22PB00X903X
A2-XA5-V	A1-S12-3	1-29	A22PB00X925X

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A2-XA5-W	A1-S11-2TL	1-30	A22PB00X926X
A2-XA5-X	A1-S11-2TR	1-31	A22PB00X90XX
A2-XA5-Z	A1-R7-1	1-32	A22PB00X7XXX
A2-XA6-A	TB1-21	2-13A	5XXX
A2-XA6-B	TB1-22	2-13B	9XXX
A2-XA6-C	TB2-21	2-14A	5XXX
A2-XA6-D	TB2-22	2-14B	9XXX
A2-XA6-K	TB8-4	2-15B	9XXX
A2-XA6-R	TB8-2	2-15A	5XXX
A2-XA6-T	A1-S13-2TL	1-33	A22PB00X905X
A2-XA6-U	A1-S13-2TR	1-34	A22PB00X906X
A2-XA6-V	A1-S15-3	1-35	A22PB00X91XX
A2-XA6-W	A1-S14-2TL	1-36	A22PB00X92XX
A2-XA6-X	A1-S14-2TR	1-37	A22PB00X93XX
A2-XA6-Z	A1-R9-1	1-38	A22PB00X8XXX
A2-XA7-A	TB1-23	2-16A	5XXX
A2-XA7-B	TB1-24	2-16B	9XXX
A2-XA7-C	TB2-23	2-17A	5XXX
A2-XA7-D	TB2-24	2-17B	9XXX
A2-XA7-J	P1-7	2-18A	2XXX
A2-XA7-K	P1-8	2-18B	9XXX
A2-XA7-T	A1-S16-2TL	1-39	A22PB00X912X
A2-XA7-U	A1-S16-2TR	1-40	A22PB00X913X
A2-XA7-V	A1-S18-3	1-41	A22PB00X95XX
A2-XA7-W	A1-S17-2TL	1-42	A22PB00X96XX
A2-XA7-X	A1-S17-2TR	1-43	A22PB00X902X
A2-XA7-Z	A1-R11-1	1-44	A22PB00X9XXX
A2-XA8-A	A2-XA8-B	1-133	B22BA00XXXXX
A2-XA8-B	A2-XA8-A	1-133	B22BA00XXXXX
A2-XA8-F	XA5-E	2-19B	9XXX
A2-XA8-H	P1-20	1-59A	2XXX
A2-XA8-K	A2-T1-3	1-51B	9XXX
A2-XA8-K	P1-21	1-59B	9XXX
A2-XA8-P	A2-C1-1	1-52	1XXX
A2-XA8-R	XA5-C	2-19A	5XXX
A2-XA8-S	A2-C1-2	1-51A	5XXX
A2-XA8-Z	A1-R28-1	1-45	A22PB00X6XXX
A2-XA9-A	A1-S24A-B	2-20A	5XXX
A2-XA9-B	A1-S24B-B	2-20B	9XXX
A2-XA9-K	P1-17	1-60B	9XXX
A2-XA9-K	TB5-5	1-54B	9XXX
A2-XA9-N	A2-C2-1	1-53B	9XXX
A2-XA9-P	TB5-4	1-54A	5XXX
A2-XA9-S	A2-C2-2	1-53A	5XXX
A2-XA9-X	P1-16	1-60A	2XXX
A2-XA9-Z	A1-R32-1	1-46	A22PB00X7XXX
A3-A1-1	TB3-11	2-43A	5XXX
A3-A1-2	TB3-21	3-67A	A22PB00X5XXX
A3-A1-3	TB3-12	2-43B	9XXX
A3-A1-4	TB3-22	3-67B	A22PB00X9XXX
A3-A1-5	TB4-11	2-44A	5XXX
A3-A1-6	A3-XA1-Y	3-74A	A22PB00X5XXX
A3-A1-7	TB4-12	2-44B	9XXX
A3-A1-8	A3-XA1-Z	3-74B	A22PB00X9XXX
A3-A1-10	TB3-23	3-68A	A22PB00X5XXX
A3-A1-12	TB3-24	3-68B	A22PB00X9XXX
A3-C1-1	A3-XA8-P	3-64A	A22PB00X1XXX
A3-C1-2	A3-XA8-S	3-63A	A22PB00X5XXX
A3-C2-1	A3-XA9-N	3-65B	A22PB00X9XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A3-C2-2	A3-XA9-S	3-65A	A22PB00X5XXX
A3-E1	-	2-43S	SHIELD
A3-E1	-	2-44S	SHIELD
A3-E1	-	3-67S	SHIELD
A3-E1	-	3-68S	SHIELD
A3-E2	-	3-99S	SHIELD
A3-W1 M	-	2-23S	SHIELD
A3-W1 M	-	2-24S	SHIELD
A3-W1 M	-	2-25S	SHIELD
A3-W1 M	-	2-26S	SHIELD
A3-W1 M	-	2-27S	SHIELD
A3-W1 M	-	2-28S	SHIELD
A3-TB5-21	A1-TB7-1	3-49	A22PB00X90XX
A3-TB5-22	A1-TB7-3	3-50	A22PB00X91XX
A3-TB5-23	A1-TB7-5	3-51	A22PB00X92XX
A3-TB5-24	A1-TB7-7	3-52	A22PB00X93XX
A3-TB7-1	A1-S1-2BL	3-53	A22PB00X926X
A3-TB7-2	A1-S1-2BR	3-54	A22PB00X925X
A3-TB7-3	A1-S4-2BL	3-55	A22PB00X916X
A3-TB7-4	A1-S4-2BR	3-56	A22PB00X915X
A3-TB7-5	A1-S7-2BL	3-57	A22PB00X906X
A3-TB7-6	A1-S7-2BR	3-58	A22PB00X905X
A3-TB7-7	A1-S10-2BL	3-59	A22PB00X96XX
A3-TB7-8	A1-S10-2BR	3-60	A22PB00X95XX
A3-TB7-9	A1-S13-2BL	3-61	A22PB00X6XXX
A3-TB7-10	A1-S13-2BR	3-62	A22PB00X5XXX
A3-T1-3	A3-XA8-K	3-63B	A22PB00X9XXX
A3-T1-4	A1-TB2-17	3-99A	5XXX
A3-T1-7	A1-TB2-19	3-99B	9XXX
A3-W1 M	-	2-29S	SHIELD
A3-W1 M	-	2-30S	SHIELD
A3-W1 M	-	2-31S	SHIELD
A3-W1 M	-	2-32S	SHIELD
A3-W1 M	-	2-33S	SHIELD
A3-W1 M	-	2-34S	SHIELD
A3-W1 M	-	2-35S	SHIELD
A3-W1 M	-	2-36S	SHIELD
A3-W1 M	-	2-37S	SHIELD
A3-W1 M	-	2-38S	SHIELD
A3-W1 M	-	2-39S	SHIELD
A3-W1 M	-	2-40S	SHIELD
A3-W1 M	-	2-41S	SHIELD
A3-W1 M	-	2-42S	SHIELD
A3-W1 M	-	3-63S	SHIELD
A3-W1 M	-	3-64S	SHIELD
A3-W1 M	-	3-65S	SHIELD
A3-W1 M	-	3-66S	SHIELD
A3-W1 M	-	3-69S	SHIELD
A3-W1 M	-	3-70S	SHIELD
A3-W1 M	-	3-71S	SHIELD
A3-W1 M	-	3-72S	SHIELD
A3-W1 M	-	3-73S	SHIELD
A3-W1 M	-	3-74S	SHIELD
A3-W1 M	-	3-75S	SHIELD
A3-W1 M	-	3-76S	SHIELD
A3-XA1-A	TB3-13	3-69A	A22PB00X5XXX
A3-XA1-B	A1-S25-2BL	3-1	A22PB00X1XXX
A3-XA1-C	A1-S25-2TL	3-2	A22PB00X3XXX
A3-XA1-D	TB3-14	3-69B	A22PB00X9XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A3-XA1-E	TB3-15	3-70A	A22PB00X5XXX
A3-XA1-F	A1-S26-2BL	3-3	A22PB00X6XXX
A3-XA1-H	A1-S26-2TL	3-4	A22PB00X7XXX
A3-XA1-J	TB3-16	3-70B	A22PB00X9XXX
A3-XA1-K	TB3-17	3-71A	A22PB00X5XXX
A3-XA1-L	A1-S27-2BL	3-5	A22PB00X8XXX
A3-XA1-P	A1-S27-2TL	3-6	A22PB00X9XXX
A3-XA1-R	TB3-18	3-71B	A22PB00X9XXX
A3-XA1-S	TB3-19	3-72A	A22PB00X5XXX
A3-XA1-T	A1-S28-2BL	3-7	A22PB00X90XX
A3-XA1-U	A1-S28-2TL	3-8	A22PB00X91XX
A3-XA1-V	TB3-20	3-72B	A22PB00X9XXX
A3-XA1-W	A1-TB1-10	3-73A	A22PB00X5XXX
A3-XA1-X	A1-TB1-12	3-73B	A22PB00X9XXX
A3-XA1-Y	A3-A1-6	3-74A	A22PB00X5XXX
A3-XA1-Z	A3-A1-8	3-74B	A22PB00X9XXX
A3-XA2-A	TB3-1	2-23A	5XXX
A3-XA2-B	TB3-2	2-23B	9XXX
A3-XA2-C	TB4-1	2-24A	5XXX
A3-XA2-D	TB4-2	2-24B	9XXX
A3-XA2-K	TB8-8	2-25B	9XXX
A3-XA2-P	TB8-7	2-25A	5XXX
A3-XA2-T	A1-S1-2TL	3-10	A22PB00X90XX
A3-XA2-U	A1-S1-2TR	3-11	A22PB00X91XX
A3-XA2-V	A1-S3-3	3-12	A22PB00X902X
A3-XA2-W	A1-S2-2TL	3-13	A22PB00X903X
A3-XA2-X	A1-S2-2TR	3-14	A22PB00X905X
A3-XA2-Z	A1-R1-1	3-15	A22PB00X1XXX
A3-XA3-A	TB3-3	2-26A	5XXX
A3-XA3-B	TB3-4	2-26B	9XXX
A3-XA3-C	TB4-3	2-27A	5XXX
A3-XA3-D	TB4-4	2-27B	9XXX
A3-XA3-K	TB8-8	2-28B	9XXX
A3-XA3-S	TB8-5	2-28A	5XXX
A3-XA3-T	A1-S4-2TL	3-16	A22PB00X92XX
A3-XA3-U	A1-S4-2TR	3-17	A22PB00X93XX
A3-XA3-V	A1-S6-3	3-18	A22PB00X906X
A3-XA3-W	A1-S5-2TL	3-19	A22PB00X912X
A3-XA3-X	A1-S5-2TR	3-20	A22PB00X913X
A3-XA3-Z	A1-R3-1	3-21	A22PB00X3XXX
A3-XA4-A	TB3-5	2-29A	5XXX
A3-XA4-B	TB3-6	2-29B	9XXX
A3-XA4-C	TB4-5	2-30A	5XXX
A3-XA4-D	TB4-6	2-30B	9XXX
A3-XA4-K	XA5-K	2-31B	9XXX
A3-XA4-S	XA5-L	2-31A	5XXX
A3-XA4-T	A1-S7-2TL	3-22	A22PB00X95XX
A3-XA4-U	A1-S7-2TR	3-23	A22PB00X96XX
A3-XA4-V	A1-S9-3	3-24	A22PB00X915X
A3-XA4-W	A1-S8-2TL	3-25	A22PB00X916X
A3-XA4-X	A1-S8-2TR	3-26	A22PB00X923X
A3-XA4-Z	A1-R5-1	3-27	A22PB00X6XXX
A3-XA5-A	TB3-7	2-32A	5XXX
A3-XA5-B	TB3-8	2-32B	9XXX
A3-XA5-C	TB4-7	2-33A	5XXX
A3-XA5-D	TB4-8	2-33B	9XXX
A3-XA5-F	TB4-18	2-34B	9XXX
A3-XA5-L	TB4-17	2-34A	5XXX
A3-XA5-T	A1-S10-2TL	3-28	A22PB00X902X

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
A3-XA5-U	A1-S10-2TR	3-29	A22PB00X903X
A3-XA5-V	A1-S12-3	3-30	A22PB00X925X
A3-XA5-W	A1-S11-2TL	3-31	A22PB00X926X
A3-XA5-X	A1-S11-2TR	3-32	A22PB00X90XX
A3-XA5-Z	A1-R7-1	3-33	A22PB00X7XXX
A3-XA6-A	TB3-9	2-35A	5XXX
A3-XA6-B	TB3-10	2-35B	9XXX
A3-XA6-C	TB4-9	2-36A	5XXX
A3-XA6-D	TB4-10	2-36B	9XXX
A3-XA6-K	TB8-8	2-37B	9XXX
A3-XA6-R	TB8-6	2-37A	5XXX
A3-XA6-T	A1-S13-2TL	3-34	A22PB00X905X
A3-XA6-U	A1-S13-2TR	3-35	A22PB00X906X
A3-XA6-V	A1-S15-3	3-36	A22PB00X91XX
A3-XA6-W	A1-S14-2TL	3-37	A22PB00X92XX
A3-XA6-X	A1-S14-2TR	3-38	A22PB00X93XX
A3-XA6-Z	A1-R9-1	3-39	A22PB00X8XXX
A3-XA7-A	TB3-11	2-38A	5XXX
A3-XA7-B	TB3-12	2-38B	9XXX
A3-XA7-C	TB4-11	2-39A	5XXX
A3-XA7-D	TB4-12	2-39B	9XXX
A3-XA7-J	P1-9	2-40A	2XXX
A3-XA7-K	P1-10	2-40B	9XXX
A3-XA7-T	A1-S16-2TL	3-40	A22PB00X912X
A3-XA7-U	A1-S16-2TR	3-41	A22PB00X913X
A3-XA7-V	A1-S18-3	3-42	A22PB00X95XX
A3-XA7-W	A1-S17-2TL	3-43	A22PB00X96XX
A3-XA7-X	A1-S17-2TR	3-44	A22PB00X902X
A3-XA7-Z	A1-R11-1	3-45	A22PB00X9XXX
A3-XA8-C	XA5-D	2-41A	5XXX
A3-XA8-F	XA5-B	2-41B	9XXX
A3-XA8-H	P1-13	3-75A	A22PB00X2XXX
A3-XA8-K	A3-T1-3	3-63B	A22PB00X9XXX
A3-XA8-K	P1-15	3-75B	A22PB00X9XXX
A3-XA8-P	A3-C1-1	3-64A	A22PB00X1XXX
A3-XA8-S	A3-C1-2	3-63A	A22PB00X5XXX
A3-XA8-W	A1-S22-1BR	3-46	A22PB00X1XXX
A3-XA8-Z	A1-R31-1	3-47	A22PB00X8XXX
A3-XA9-A	A1-S24A-D	2-42A	5XXX
A3-XA9-B	A1-S24B-D	2-42B	9XXX
A3-XA9-K	TB6-21	3-66B	A22PB00X9XXX
A3-XA9-K	P1-12	3-76B	A22PB00X9XXX
A3-XA9-N	A3-C2-1	3-65B	A22PB00X9XXX
A3-XA9-P	TB6-20	3-66A	A22PB00X5XXX
A3-XA9-S	A3-C2-2	3-65A	A22PB00X5XXX
A3-XA9-X	P1-11	3-76A	A22PB00X2XXX
A3-XA9-Z	A1-R32-1	3-48	A22PB00X7XXX
E16	P1-14	3-82	A16PB00X0XXX
E16	P1-24	3-80	A16PB00X0XXX
E16	P1-27	3-81	A16PB00X0XXX
E16	TB8-17	3-83	A16PB00X0XXX
E17	XA5-H	2-52	A22PB00X0XXX
P1-2	TB6-24	3-78A	A16PB00X9XXX
P1-6	TB6-22	3-78B	A16PB00X0XXX
P1-7	A2-XA7-J	2-18A	2XXX
P1-7	TB8-11	3-77A	A22PB00X5XXX
P1-8	A2-XA7-K	2-18B	9XXX
P1-8	TB8-12	3-77B	A22PB00X9XXX
P1-9	A3-XA7-J	2-40A	2XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
P1-9	TB8-13	3-79A	2XXX
P1-10	A3-XA7-K	2-40B	9XXX
P1-10	TB8-14	3-79B	9XXX
P1-11	A3-XA9-X	3-76A	A22PB00X2XXX
P1-12	A3-XA9-K	3-76B	A22PB00X9XXX
P1-13	A3-XA8-H	3-75A	A22PB00X2XXX
P1-14	E16	3-82	A16PB00X0XXX
P1-15	A3-XA8-K	3-75B	A22PB00X9XXX
P1-16	A2-XA9-X	1-60A	2XXX
P1-17	A2-XA9-K	1-60B	9XXX
P1-18	A1-A1-AA	3-92A	2XXX
P1-19	A1-A1-CC	3-92B	9XXX
P1-20	A2-XA8-H	1-59A	2XXX
P1-21	A2-XA8-K	1-59B	9XXX
P1-22	A1-E1	3-95	A16PB00X4XXX
P1-23	A1-E1	3-96	A16PB00X4XXX
P1-24	E16	3-80	A16PB00X0XXX
P1-25	A1-E2	3-97	A16PB00X5XXX
P1-26	A1-E2	3-98	A16PB00X5XXX
P1-27	E16	3-81	A16PB00X0XXX
TB1-1	A2-A1-10	1-58A	5XXX
TB1-2	A2-A1-12	1-58B	9XXX
TB1-3	A1-TB1-14	1-66A	5XXX
TB1-3	A2-A1-2	1-56A	5XXX
TB1-4	A1-TB1-16	1-66B	9XXX
TB1-4	A2-A1-4	1-56B	9XXX
TB1-5	A2-XA1-A	1-47A	5XXX
TB1-6	A2-XA1-D	1-47B	9XXX
TB1-7	A2-XA1-E	1-48A	5XXX
TB1-8	A2-XA1-J	1-48B	9XXX
TB1-9	A2-XA1-K	1-49A	5XXX
TB1-10	A2-XA1-R	1-49B	9XXX
TB1-11	A2-XA1-S	1-50A	5XXX
TB1-12	A2-XA1-V	1-50B	9XXX
TB1-13	A2-XA2-A	2-1A	5XXX
TB1-14	A2-XA2-B	2-1B	9XXX
TB1-15	A2-XA3-A	2-4A	5XXX
TB1-16	A2-XA3-B	2-4B	9XXX
TB1-17	A2-XA4-A	2-7A	5XXX
TB1-18	A2-XA4-B	2-7B	9XXX
TB1-19	A2-XA5-A	2-10A	5XXX
TB1-20	A2-XA5-B	2-10B	9XXX
TB1-21	A2-XA6-A	2-13A	5XXX
TB1-22	A2-XA6-B	2-13B	9XXX
TB1-23	A2-A1-1	2-21A	5XXX
TB1-23	A2-XA7-A	2-16A	5XXX
TB1-24	A2-A1-3	2-21B	9XXX
TB1-24	A2-XA7-B	2-16B	9XXX
TB2-1	A1-S20A-6	1-61A	5XXX
TB2-2	A1-S20A-5	1-62A	5XXX
TB2-3	A1-S20B-3	1-64B	9XXX
TB2-3	A1-S20B-4	1-63B	9XXX
TB2-3	A1-S20B-5	1-62B	9XXX
TB2-3	A1-S20B-6	1-61B	9XXX
TB2-4	A1-S20A-4	1-63A	5XXX
TB2-5	A1-S20A-3	1-64A	5XXX
TB2-7	A2-XA5-L	2-12A	5XXX
TB2-8	A2-XA5-F	2-12B	9XXX
TB2-9	A1-S23-6TR	1-70A	5XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
TB2-10	A1-S23-3TR	1-70B	9XXX
TB2-11	A1-S21A-B	1-67A	5XXX
TB2-12	A1-S21B-B	1-67B	9XXX
TB2-13	A2-XA2-C	2-2A	5XXX
TB2-14	A2-XA2-D	2-2B	9XXX
TB2-15	A2-XA3-C	2-5A	5XXX
TB2-16	A2-XA3-D	2-5B	9XXX
TB2-17	A2-XA4-C	2-8A	5XXX
TB2-18	A2-XA4-D	2-8B	9XXX
TB2-19	A2-XA5-C	2-11A	5XXX
TB2-20	A2-XA5-D	2-11B	9XXX
TB2-21	A2-XA6-C	2-14A	5XXX
TB2-22	A2-XA6-D	2-14B	9XXX
TB2-23	A2-A1-5	2-22A	5XXX
TB2-23	A2-XA7-C	2-17A	5XXX
TB2-24	A2-A1-7	2-22B	9XXX
TB2-24	A2-XA7-D	2-17B	9XXX
TB3-1	A3-XA2-A	2-23A	5XXX
TB3-2	A3-XA2-B	2-23B	9XXX
TB3-3	A3-XA3-A	2-26A	5XXX
TB3-4	A3-XA3-B	2-26B	9XXX
TB3-5	A3-XA4-A	2-29A	5XXX
TB3-6	A3-XA4-B	2-29B	9XXX
TB3-7	A3-XA5-A	2-32A	5XXX
TB3-8	A3-XA5-B	2-32B	9XXX
TB3-9	A3-XA6-A	2-35A	5XXX
TB3-10	A3-XA6-B	2-35B	9XXX
TB3-11	A3-A1-1	2-43A	5XXX
TB3-11	A3-XA7-A	2-38A	5XXX
TB3-12	A3-A1-3	2-43B	9XXX
TB3-12	A3-XA7-B	2-38B	9XXX
TB3-13	A3-XA1-A	3-69A	A22PB00X5XXX
TB3-14	A3-XA1-D	3-69B	A22PB00X9XXX
TB3-15	A3-XA1-E	3-70A	A22PB00X5XXX
TB3-16	A3-XA1-J	3-70B	A22PB00X9XXX
TB3-17	A3-XA1-K	3-71A	A22PB00X5XXX
TB3-18	A3-XA1-R	3-71B	A22PB00X9XXX
TB3-19	A3-XA1-S	3-72A	A22PB00X5XXX
TB3-20	A3-XA1-V	3-72B	A22PB00X9XXX
TB3-21	A3-A1-2	3-67A	A22PB00X5XXX
TB3-21	A1-TB1-18	3-85A	5XXX
TB3-22	A3-A1-4	3-67B	A22PB00X9XXX
TB3-22	A1-TB1-20	3-85B	9XXX
TB3-23	A3-A1-10	3-68A	A22PB00X5XXX
TB3-24	A3-A1-12	3-68B	A22PB00X9XXX
TB4-1	A3-XA2-C	2-24A	5XXX
TB4-2	A3-XA2-D	2-24B	9XXX
TB4-3	A3-XA3-C	2-27A	5XXX
TB4-4	A3-XA3-D	2-27B	9XXX
TB4-5	A3-XA4-C	2-30A	5XXX
TB4-6	A3-XA4-D	2-30B	9XXX
TB4-7	A3-XA5-C	2-33A	5XXX
TB4-8	A3-XA5-D	2-33B	9XXX
TB4-9	A3-XA6-C	2-36A	5XXX
TB4-10	A3-XA6-D	2-36B	9XXX
TB4-11	A3-A1-5	2-44A	5XXX
TB4-11	A3-XA7-C	2-39A	5XXX
TB4-12	A3-A1-7	2-44B	9XXX
TB4-12	A3-XA7-D	2-39B	9XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
TB4-13	A1-S21A-D	3-86A	5XXX
TB4-14	A1-S21B-D	3-86B	9XXX
TB4-15	A1-S23-6TL	3-87A	5XXX
TB4-16	A1-S23-3TL	3-87B	9XXX
TB4-17	A3-XA5-L	2-34A	5XXX
TB4-18	A3-XA5-F	2-34B	9XXX
TB4-20	A1-TB2-27	3-88A	1XXX
TB4-21	A1-TB2-35	3-91A	1XXX
TB4-21	TB4-23	3-100	A22PB00X0XXX
TB4-22	A1-TB2-33	3-89A	1XXX
TB4-23	TB4-21	3-100	A22PB00X0XXX
TB4-24	A1-TB2-39	3-90A	1XXX
TB5-1	A1-A1-H	1-131	A22PB00X2XXX
TB5-2	A1-E14	1-132	A22PB00X0XXX
TB5-4	A2-XA9-P	1-54A	5XXX
TB5-5	A2-XA9-K	1-54B	9XXX
TB5-19	A1-S21C-3	1-68	1XXX
TB5-20	A1-S19-6	1-69	1XXX
TB6-20	A3-XA9-P	3-66A	A22PB00X5XXX
TB6-21	A3-XA9-K	3-66B	A22PB00X9XXX
TB6-22	P1-6	3-78B	A16PB00X0XXX
TB6-22	TB6-23	1-134	B18BA00XXXXX
TB6-23	TB6-22	1-134	B18BA00XXXXX
TB6-24	P1-2	3-78A	A16PB00X9XXX
TB8-1	A1-TB2-6	2-47A	5XXX
TB8-1	A2-XA3-S	2-6A	5XXX
TB8-2	A2-XA6-R	2-15A	5XXX
TB8-3	A1-A1-R	2-46A	5XXX
TB8-3	A2-XA2-P	2-3A	5XXX
TB8-4	A1-A1-S	2-46B	9XXX
TB8-4	A1-TB2-4	2-47B	9XXX
TB8-4	A2-XA2-K	2-3B	9XXX
TB8-4	A2-XA3-K	2-6B	9XXX
TB8-4	A2-XA6-K	2-15B	9XXX
TB8-5	A3-XA3-S	2-28A	5XXX
TB8-6	A3-XA6-R	2-37A	5XXX
TB8-7	A1-A1-U	2-45A	5XXX
TB8-7	A3-XA2-P	2-25A	5XXX
TB8-8	A1-A1-V	2-45B	9XXX
TB8-8	A3-XA2-K	2-25B	9XXX
TB8-8	A3-XA3-K	2-28B	9XXX
TB8-8	A3-XA6-K	2-37B	9XXX
TB8-11	P1-7	3-77A	A22PB00X5XXX
TB8-12	P1-8	3-77B	A22PB00X9XXX
TB8-13	P1-9	3-79A	2XXX
TB8-14	P1-10	3-79B	9XXX
TB8-15	A1-E2	3-94	A18PB00X5XXX
TB8-16	A1-E1	3-93	A18PB00X4XXX
TB8-17	-	3-77S	SHIELD
TB8-17	-	3-79S	SHIELD
TB8-17	E16	3-83	A16PB00X0XXX
XA5-B	A3-XA8-F	2-41B	9XXX
XA5-C	A2-XA8-R	2-19A	5XXX
XA5-D	A3-XA8-C	2-41A	5XXX
XA5-E	A2-XA8-F	2-19B	9XXX
XA5-F	A1-S22-1TR	2-51	A22PB00X3XXX
XA5-H	E17	2-52	A22PB00X0XXX
XA5-J	A1-S22-2TL	2-49	A22PB00X90XX
XA5-K	A1-TB2-10	2-48B	9XXX

Table 5-2. To-From Wire List (Cont)

FROM	TO	WIRE NUMBER	WIRE CODE
XA5-K	A3-XA4-K	2-31b	9XXX
XA5-L	A3-XA4-S	2-31A	5XXX
XA5-M	A1-TB2-12	2-48A	5XXX
XA5-N	A1-S22-2TR	2-50	A22PB00X9XXX
XA5-P	A2-XA4-S	2-9A	5XXX
XA5-R	A2-XA4-K	2-9B	9XXX

section **6**

parts list

6.1 GENERAL

This section contains a list of all replaceable electrical, electronic, and critical mechanical parts for the 212S-1 Stereo Console.

The manufacturers' codes appearing in the MFR Code column of the parts list are listed in numerical order at the end of the parts list. The code list provides the manufacturer's name and address as shown in the Federal Supply Code for Manufacturers' Handbook H4-1. Manufacturers not listed in Handbook H4-1 are assigned a five-letter code and will appear first in the code list.

6.2 LIST OF EQUIPMENT

	Page
212S-1 Stereo Console	6-2
Front Panel	6-5
Intercom Amplifier	6-9
Terminal Board 764-7428-001	6-13
Terminal Board 764-7429-001	6-15
Card Cage, Channel Unit	6-17
Relay Unit	6-19

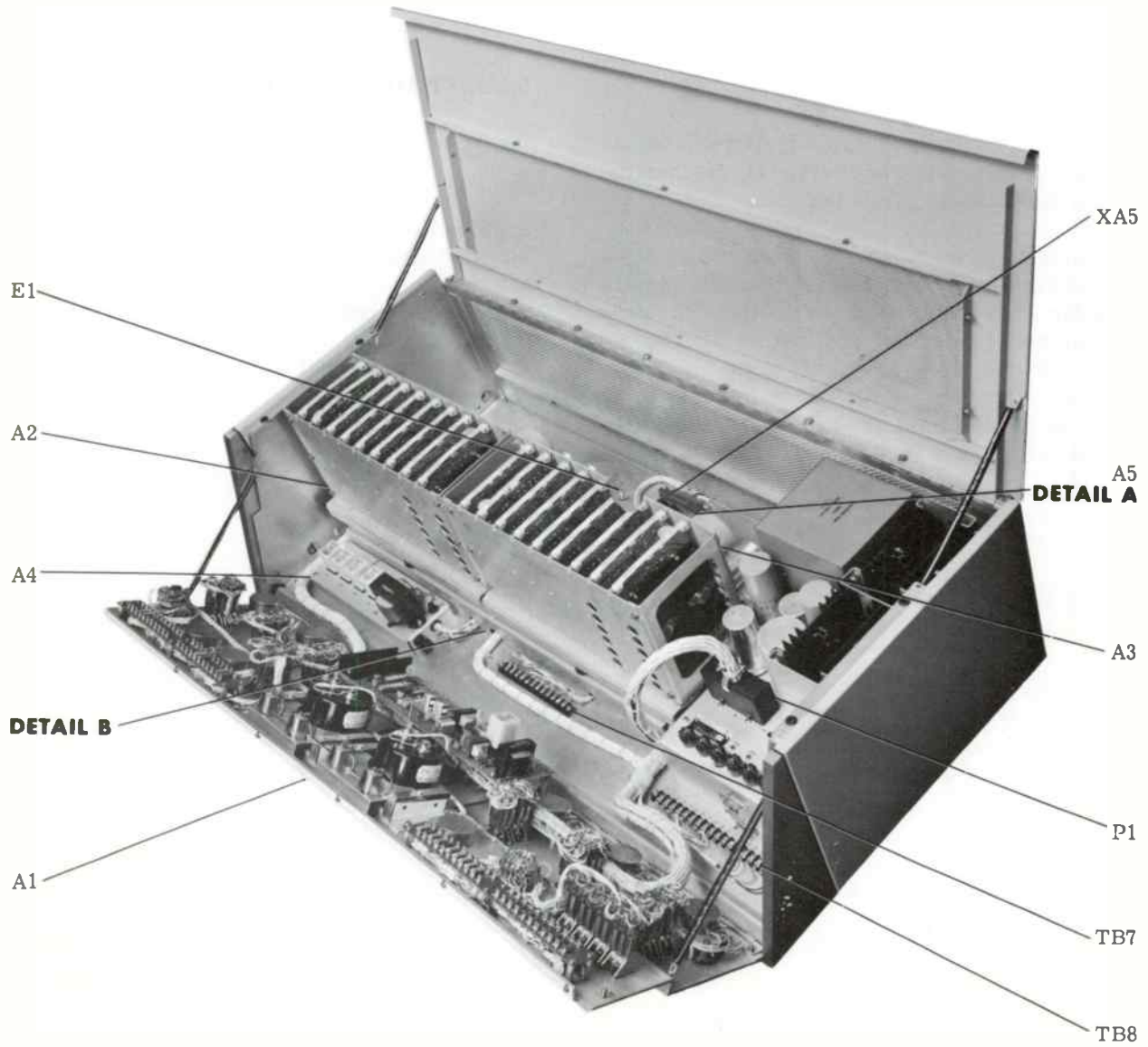
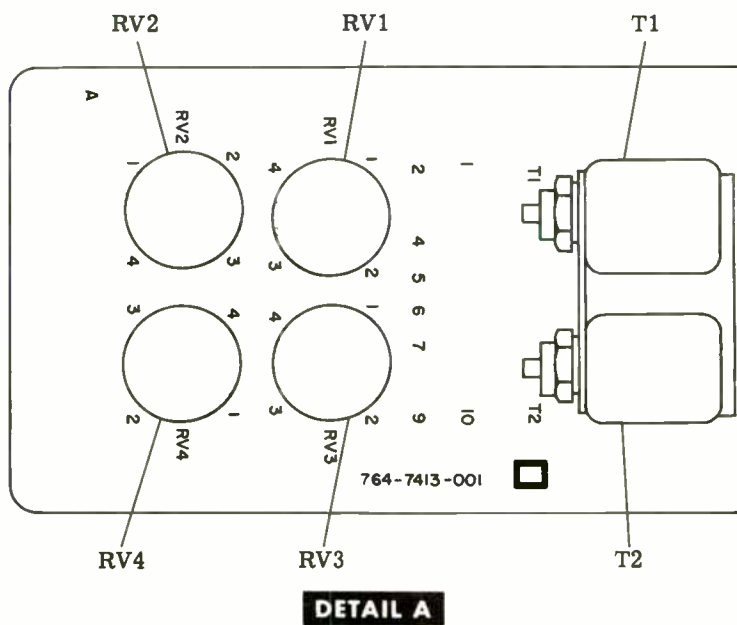
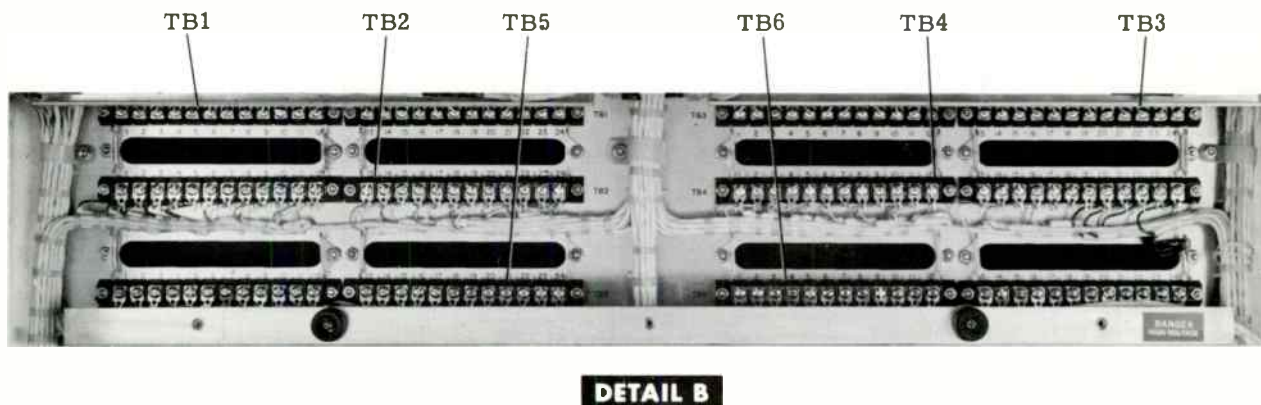


Figure 6-1. 212S-1 Stereo Console (Sheet 1 of 2)



Detail DUAL/SIMUL Switch Assembly



Detail B

Figure 6-1. 212S-1 Stereo Console (Sheet 2 of 2)

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
212S-1 STEREO CONSOLE				522-3880-001
A1	PANEL, FRONT SEE BREAKDOWN ON PAGE 6-7			764-7408-001
A2	CARD CAGE, CHANNEL UNIT SEE BREAKDOWN ON PAGE 6-18			764-7424-001
A3	SAME AS A2			
A4	RELAY UNIT SEE BREAKDOWN ON PAGE 6-20			764-7427-001
A5	DUAL/SIMUL SWITCH ASSEMBLY			764-7413-001
A5RV1	RESISTOR, VOLTAGE SENSITIVE	PL5C1	33173	714-3218-010
A5RV2	SAME AS A5RV1			
A5RV3	SAME AS A5RV1			
A5RV4	SAME AS A5RV1			
A5T1	TRANSFORMER, AF, INPUT LEAD BLACK TO RED 660 OHMS IMPEDANCE, LEAD GREEN TO RED 400 OHMS IMPEDANCE, LEAD GREEN TO BLUE 200 OHMS IMPEDANCE, LEAD WHITE CENTER TAP, LEAD BLUE TO RED 60 OHMS IMPEDANCE, LEAD YELLOW TO BLUE 2500 OHMS IMPEDANCE	BV35752	GOTHA	667-0155-010
A5T2	SAME AS A5T1			
E1	TERMINAL, LUG	2104-06-02-2520N	78189	304-0318-000
P1	CONNECTOR, ELECTRICAL 27 CONTACTS	S327CCTWI	75173	366-8270-000
TB1	TERMINAL BOARD 12 TERMINALS	599C3-4ST12	75382	367-1399-120
TB2 THROUGH TB7	SAME AS TB1			
TB8	TERMINAL BOARD 20 TERMINALS	599C3-4ST20	75382	367-1399-200
XA1 THROUGH XA4 XA5	NOT USED			
1	CONNECTOR, ELECTRICAL 15 CONTACTS EXTENDER, CIRCUIT BOARD 44 PIN	2VH15-1AB5	05574	372-7005-000
		762-5220-001	13499	762-5220-001

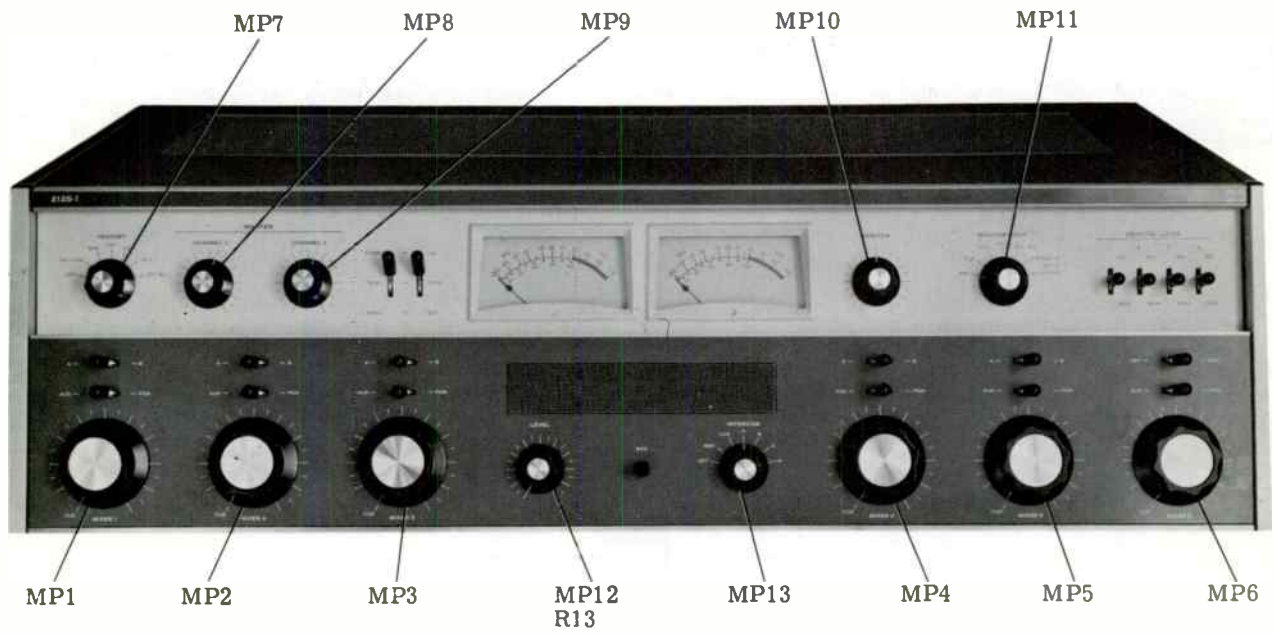
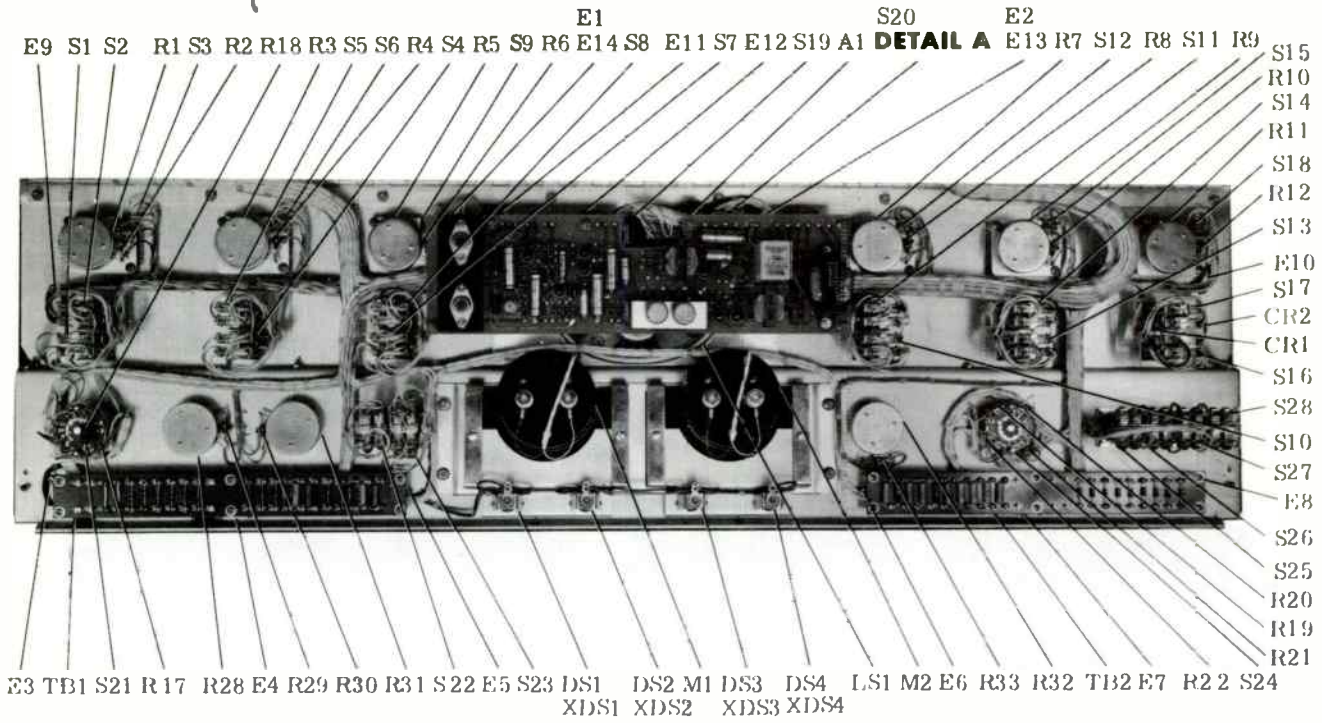
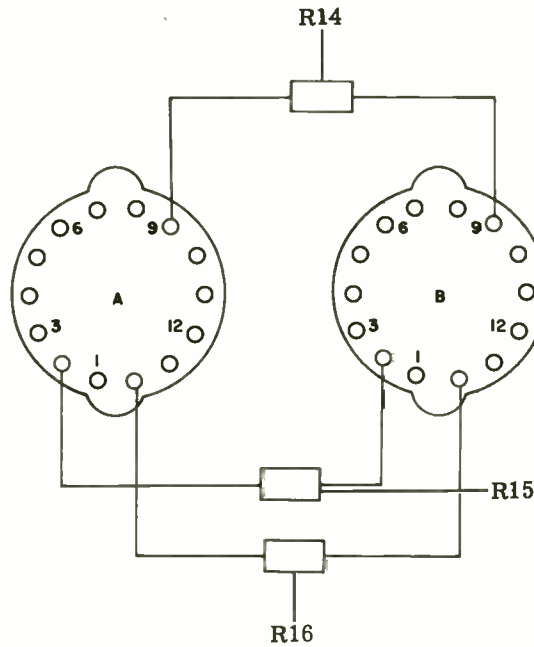


Figure 6-2. Front Panel, Unit A1 (Sheet 1 of 2)

CVE
CAM
764-7434-001



Rear View



DETAIL A

Detail A

Figure 6-2. Front Panel, Unit A1 (Sheet 2 of 2)

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
FRONT PANEL				764-7408-001
A1	INTERCOM AMPLIFIER SEE BREAKDOWN ON PAGE 6-10			764-7377-001
CR1	SEMICONDUCTOR DEVICE, DIODE	1N645	07688	353-2607-000
CR2	SAME AS CR1			
DS1	LAMP, INCANDESCENT 0.08 AMP, 14 VOLTS	756	08806	262-2193-010
DS2	SAME AS DS1			
DS3	SAME AS DS1			
DS4	SAME AS DS1			
E1	TERMINAL, LUG			547-5305-000
E2				
THROUGH	SAME AS E1			
E8				
E9	TERMINAL, LUG	2104-04-01-2520N	78189	304-0317-000
E10	SAME AS E9			
E11	TERMINAL, LUG	2104-06-02-2520N	78189	304-0318-000
E12	SAME AS E11			
E13	SAME AS E11			
E14	SAME AS E11			
LS1	LOUDSPEAKER, P M	35A05	74199	271-0234-000
M1	METER, AUDIO LEVEL	456-0062-020	13499	456-0062-020
M2	SAME AS M1			
MP1	KNOB, SKIRTED			546-1291-003
MP2				
THROUGH	SAME AS MP1			
MP6				
MP7	KNOB, SKIRTED			546-1294-003
MP8				
THROUGH	SAME AS MP7			
MP13				
R1	RESISTOR, VAR, WIRE WOUND 150 OHMS, 10% TOL, 4 WATTS	PR8193	71450	377-0709-070
R2	RESISTOR, FXD, COMPOSITION 1200 OHMS, 10% TOL, 1/2 WATT	RC20GF122K	81349	745-1356-000
R3	SAME AS R1			
R4	SAME AS R2			
R5	SAME AS R1			
R6	SAME AS R2			
R7	SAME AS R1			
R8	SAME AS R2			
R9	SAME AS R1			
R10	SAME AS R2			
R11	SAME AS R1			
R12	SAME AS R2			
R13	RESISTOR, VAR, COMPOSITION 1000 OHMS, 10% TOL, 1 WATT	RV4NAYS102C	81349	380-2687-000
R14	RESISTOR, FXD, COMPOSITION 560 OHMS, 10% TOL, 1/4 WATT	RC07GF561K	81349	745-0740-000
R15	RESISTOR, FXD, FILM 3.9 OHMS, 5% TOL, 3 WATTS	RW69V3R9J	81349	747-5367-000
R16	SAME AS R15			
R17	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/4 WATT	RC07GF103K	81349	745-0785-000
R18	SAME AS R15			
R19				
THROUGH	SAME AS R14			
R22				
R23				
THROUGH	NOT USED			
R27				
R28	RESISTOR, VAR, WIRE WOUND 300 OHMS, 10% TOL, 4 WATTS	PB3410	81450	377-0709-050
R29	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/2	RC20GF222K	81349	745-1366-000

382-0017-010
-020
-030
-040
-050
NEW

377-0709-040
-050
-070
-080
-090
OLD

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R30	WATT SAME AS R29			
R31	SAME AS R28			
R32	RESISTOR, VAR, WIRE WOUND 150 OHMS, 10% TOL, 4 WATTS	PB3409	71450	377-0709-040
R33	SAME AS R2			
S1	SWITCH, LEVER 1A CONTACT ARRANGEMENT	1G7942-89	01548	375-1020-020
S2	SAME AS S1			
S3	SWITCH, CONTACT ASSEMBLY 1C CONTACT ARRANGEMENT	13A8008-89	01548	266-6812-010
S4	SAME AS S1			
S5	SAME AS S1			
S6	SAME AS S3			
S7	SAME AS S1			
S8	SAME AS S1			
S9	SAME AS S3			
S10	SAME AS S1			
S11	SAME AS S1			
S12	SAME AS S3			
S13	SAME AS S1			
S14	SAME AS S1			
S15	SAME AS S3			
S16	SAME AS S1			
S17	SAME AS S1			
S18	SAME AS S3			
S19	SWITCH, PUSH BUTTON 3C CONTACT ARRANGEMENT	4C7709-89	01548	266-5381-020
S20	SWITCH, WAFER, ROTARY 2 SECTIONS, 7 POSITIONS	246021CK2	76854	259-2386-010
S21	SWITCH, WAFER, ROTARY 3 SECTIONS, 7 POSITIONS	246019CK3	76854	259-2387-010
S22	SWITCH, LEVER 1A, 1D CONTACT ARRANGEMENT	1G7944-89	01548	375-1020-040
S23	SWITCH, LEVER 2C CONTACT ARRANGEMENT	1G7943-89	01548	375-1020-030
S24	SAME AS S20			
S25				
THROUGH				
S28				
TB1	TERMINAL BOARD SEE BREAKDOWN ON PAGE 6-14			764-7428-001
TB2	TERMINAL BOARD SEE BREAKDOWN ON PAGE 6-16			764-7429-001
XDS1	LAMPHOLDER	7-14	72619	262-2151-000
XDS2	SAME AS XDS1			
XDS3	SAME AS XDS1			
XDS4	SAME AS XDS1			

SEE PREV PAGE

S23
S22

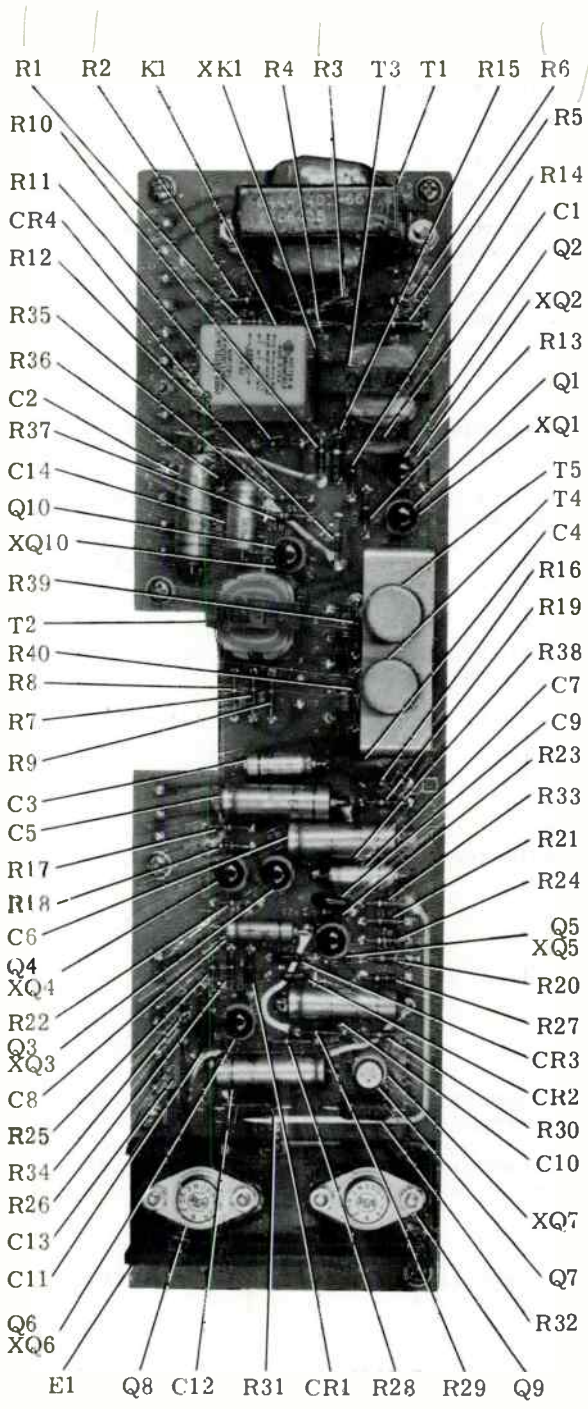


Figure 6-3. Intercom Amplifier, Unit A1A1

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
INTERCOM AMPLIFIER				764-7377-001
C1	CAPACITOR, FXD, CERAMIC 0.068 UF, PLUS 50% MINUS 20%, 500 VDCW	36C238	01939	913-3736-000
C2	CAPACITOR, FXD, ALUMINUM 64 UF, PLUS 50% MINUS 10%, 64 VDCW	C437ARH64	73445	183-2355-110
C3	CAPACITOR, FXD, ALUMINUM 10 UF, PLUS 50% MINUS 10%, 25 VDCW	C426ARF10	73445	183-2354-170
C4	CAPACITOR, FXD, CERAMIC 0.033 UF, PLUS 50% MINUS 20%, 500 VDCW	36C180	01939	913-3734-000
C5	SAME AS C2			
C6	SAME AS C2			
C7	SAME AS C3			
C8	CAPACITOR, FXD, ALUMINUM 16 UF, PLUS 50% MINUS 10%, 40 VDCW	C426ARG16	73445	183-2354-230
C9	CAPACITOR, FXD, MICA 68 UUF, 5% TOL, 500 VDCW	CM05E680J03	81349	912-2804-000
C10	SAME AS C2			
C11	CAPACITOR, FXD, MICA 220 UUF, 5% TOL, 500 VDCW	CM05F221J03	81349	912-2840-000
C12	SAME AS C2			
C13	SAME AS C4			
C14	CAPACITOR, FXD, ELECTROLYTIC 100 UF, PLUS 100% MINUS 10%, 6 VDCW	D29329	56289	183-1168-000
CR1	SEMICONDUCTOR DEVICE, DIODE	1N4003	04713	353-6442-030
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SAME AS CR1			
E1	HEATSINK			764-7383-001
K1	RELAY, ARMATURE 4C CONTACT ARRANGEMENT	KH4394	77342	970-2427-060
Q1	TRANSISTOR	2N697	07263	352-0197-000
Q2	SAME AS Q1			
Q3	TRANSISTOR	2N3567	07263	352-0629-010
Q4	SAME AS Q1			
Q5	SAME AS Q3			
Q6	SAME AS Q1			
Q7	TRANSISTOR	2N3133	07688	352-0591-010
Q8	TRANSISTOR	2N3054	07688	352-0581-010
Q9	SAME AS Q8			
Q10	SAME AS Q3			
R1	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10% TOL, 1/2 WATT	RC20GF332K	81349	745-1373-000
R2	RESISTOR, FXD, COMPOSITION 12 OHMS, 10% TOL, 1/2 WATT	RC20GF120K	81349	745-1272-000
R3 THROUGH R6	SAME AS R2			
R7	RESISTOR, FXD, COMPOSITION 8200 OHMS, 10% TOL, 1/4 WATT	RC07GF822K	81349	745-0782-000
R8	SAME AS R7			
R9	SAME AS R7			
R10	RESISTOR, FXD, COMPOSITION 6800 OHMS, 10% TOL, 1/4 WATT	RC07GF682K	81349	745-0779-000
R11	RESISTOR, FXD, COMPOSITION 1500 OHMS, 10% TOL, 1/4 WATT	RC07GF152K	81349	745-0755-000
R12	RESISTOR, FXD, COMPOSITION 220 OHMS, 10% TOL, 1/4 WATT	RC07GF221K	81349	745-0725-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R13	RESISTOR, FXD, COMPOSITION 10 OHMS, 10% TOL, 1/4 WATT	RC07GF100K	81349	745-0677-000
R14	SAME AS R13			
R15	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/2 WATT	RC20GF222K	81349	745-1366-000
R16	RESISTOR, FXD, COMPOSITION 18K OHMS, 10% TOL, 1/4 WATT	RC07GF183K	81349	745-0794-000
R17	RESISTOR, FXD, COMPOSITION 100K OHMS, 10% TOL, 1/4 WATT	RC07GF104K	81349	745-0821-000
R18	RESISTOR, FXD, COMPOSITION 27K OHMS, 10% TOL, 1/4 WATT	RC07GF273K	81349	745-0800-000
R19	RESISTOR, FXD, COMPOSITION 1K OHMS, 10% TOL, 1/4 WATT	RC07GF102K	81349	745-0749-000
R20	RESISTOR, FXD, COMPOSITION 2700 OHMS, 10% TOL, 1/4 WATT	RC07GF272K	81349	745-0764-000
R21	SAME AS R19			
R22	SAME AS R11			
R23	RESISTOR, FXD, COMPOSITION 82K OHMS, 10% TOL, 1/4 WATT	RC07GF823K	81349	745-0818-000
R24	SAME AS R16			
R25	SAME AS R11			
R26	SAME AS R10			
R27	RESISTOR, FXD, COMPOSITION 680 OHMS, 10% TOL, 1/4 WATT	RC07GF681K	81349	745-0743-000
R28	SAME AS R19			
R29	RESISTOR, FXD, COMPOSITION 27 OHMS, 10% TOL, 1/4 WATT	RC07GF270K	81349	745-0692-000
R30	SAME AS R19			
R31	RESISTOR, FXD, WIRE WOUND 1 OHM, 10% TOL, 3 WATTS	PW3-1-10	07716	710-9150-000
R32	SAME AS R31			
R33	RESISTOR, FXD, COMPOSITION 68K OHMS, 10% TOL, 1/4 WATT	RC07GF683K	81349	745-0815-000
R34	RESISTOR, FXD, COMPOSITION 12 OHMS, 10% TOL, 1/4 WATT	RC07GF120K	81349	745-0680-000
R35	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/4 WATT	RC07GF472K	81349	745-0773-000
R36	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/2 WATT	RC20GF101K	81349	745-1310-000
R37	RESISTOR, FXD, COMPOSITION 12K OHMS, 10% TOL, 1/4 WATT	RC07GF123K	81349	745-0788-000
R38	SAME AS R13			
R39	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10% TOL, 1/4 WATT	RC07GF332K	81349	745-0767-000
R40	RESISTOR, FXD, COMPOSITION 560 OHMS, 10% TOL, 1/4 WATT	RC07GF561K	81349	745-0740-000
T1	TRANSFORMER, AF LEAD 1 TO 2 500 OHMS IMPEDANCE, LEAD 3 TO 4 3.5 OHMS IMPEDANCE	T56435	96256	667-0163-010
T2	TRANSFORMER, AF OPEN FRAME, LEAD 1 TO 3 4000 OHMS IMPEDANCE, 10% TOL, LEAD 2 CENTER TAP, LEAD 4 TO 6 600 OHMS IMPEDANCE, LEAD 5 CENTER TAP	M5603	00348	667-1279-010

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
T3	TRANSFORMER, AF CHANNEL FRAME, LEAD 1 TO 3 600 OHMS IMPEDANCE, 15% TOL, LEAD 2 CENTER TAP, LEAD 4 TO 6 1200 OHMS IMPEDANCE, LEAD 5 CENTER TAP	M5602	00348	667-0047-010
T4	TRANSFORMER, AF, INPUT LEAD BLACK TO RED 660 OHMS IMPEDANCE, LEAD GREEN TO RED 400 OHMS IMPEDANCE, LEAD GREEN TO BLUE 200 OHMS IMPEDANCE, LEAD WHITE CENTER TAP, LEAD BLUE TO RED 60 OHMS IMPEDANCE, LEAD YELLOW TO BLUE 2500 OHMS IMPEDANCE	BV35752	60THA	667-0155-010
T5	SAME AS T4			
XK1	SOCKET, RELAY 14 CONTACTS	27E007	77342	220-1582-010
XQ1	SOCKET, TRANSISTOR 3 CONTACTS	05-3307-51	91662	352-9903-000
XQ2 THROUGH XQ7	SAME AS XQ1			
XQ8	NOT USED			
XQ9	NOT USED			
XQ10	SAME AS XQ1			

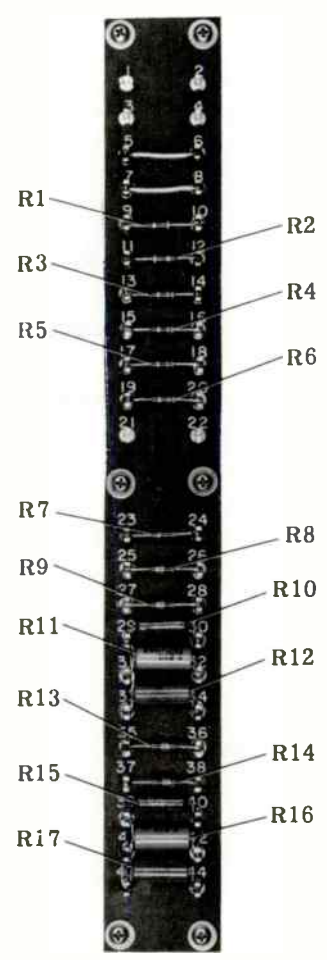


Figure 6-4. Terminal Board A1TB1

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
TERMINAL BOARD				764-7428-001
R1	RESISTOR, FXD. COMPOSITION 4700 OHMS, 10% TOL, 1/4 WATT	RC07GF472K	81349	745-0773-000
R2	SAME AS R1			
R3	RESISTOR, FXD. COMPOSITION 3300 OHMS, 10% TOL, 1/4 WATT	RC07GF332K	81349	745-0767-000
R4	SAME AS R3			
R5	SAME AS R3			
R6	SAME AS R3			
R7	RESISTOR, FXD. COMPOSITION 8200 OHMS, 10% TOL, 1/4 WATT	RC07GF822K	81349	745-0782-000
R8	RESISTOR, FXD. COMPOSITION 10K OHMS, 10% TOL, 1/4 WATT	RC07GF103K	81349	745-0785-000
R9	SAME AS R8			
R10	RESISTOR, FXD. FILM 1960 OHMS, 1% TOL, 1/4 WATT	RN60D1961F	81349	705-6610-000
R11	RESISTOR, FXD. FILM 2870 OHMS, 1% TOL, 1/4 WATT	RN60D2871F	81349	705-6618-000
R12	RESISTOR, FXD. FILM 5620 OHMS, 1% TOL, 1/4 WATT	RN60D5621F	81349	705-6632-000
R13	SAME AS R8			
R14	SAME AS R8			
R15	SAME AS R10			
R16	SAME AS R11			
R17	SAME AS R12			

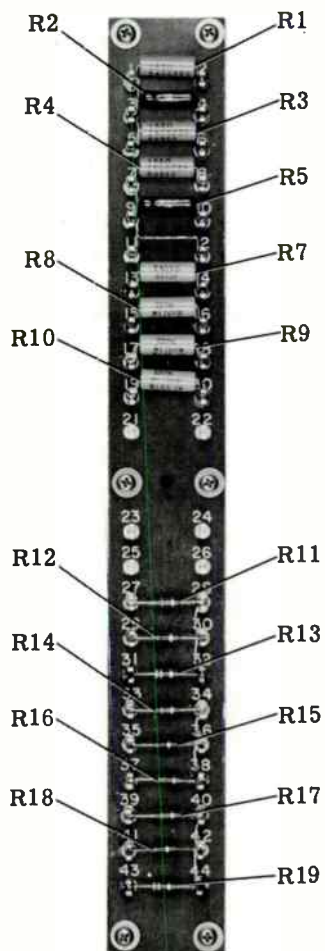


Figure 6-5. Terminal Board A1TB2

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
TERMINAL BOARD				764-7429-001
R1	RESISTOR, FXD, FILM 162 OHMS, 1% TOL, 1/4 WATT	RN60D1620F	81349	705-6558-000
R2	RESISTOR, FXD, FILM 1K OHMS, 1% TOL, 1/4 WATT	RN60D1001F	81349	705-6596-000
R3	SAME AS R1			
R4	SAME AS R1			
R5	SAME AS R2			
R6	NOT USED			
R7	RESISTOR, FXD, FILM 237K OHMS, 1% TOL, 1/4 WATT	RN65C2373F	81349	705-4552-000
R8	SAME AS R7			
R9	SAME AS R7			
R10	SAME AS R7			
R11	RESISTOR, FXD, COMPOSITION 560 OHMS, 10% TOL, 1/4 WATT	RC07GF561K	81349	745-0740-000
R12	RESISTOR, FXD, COMPOSITION 10 OHMS, 10% TOL, 1/4 WATT	RC07GF100K	81349	745-0677-000
R13	SAME AS R11			
R14	SAME AS R11			
R15	SAME AS R12			
R16	SAME AS R11			
R17	SAME AS R11			
R18	SAME AS R12			
R19	SAME AS R11			

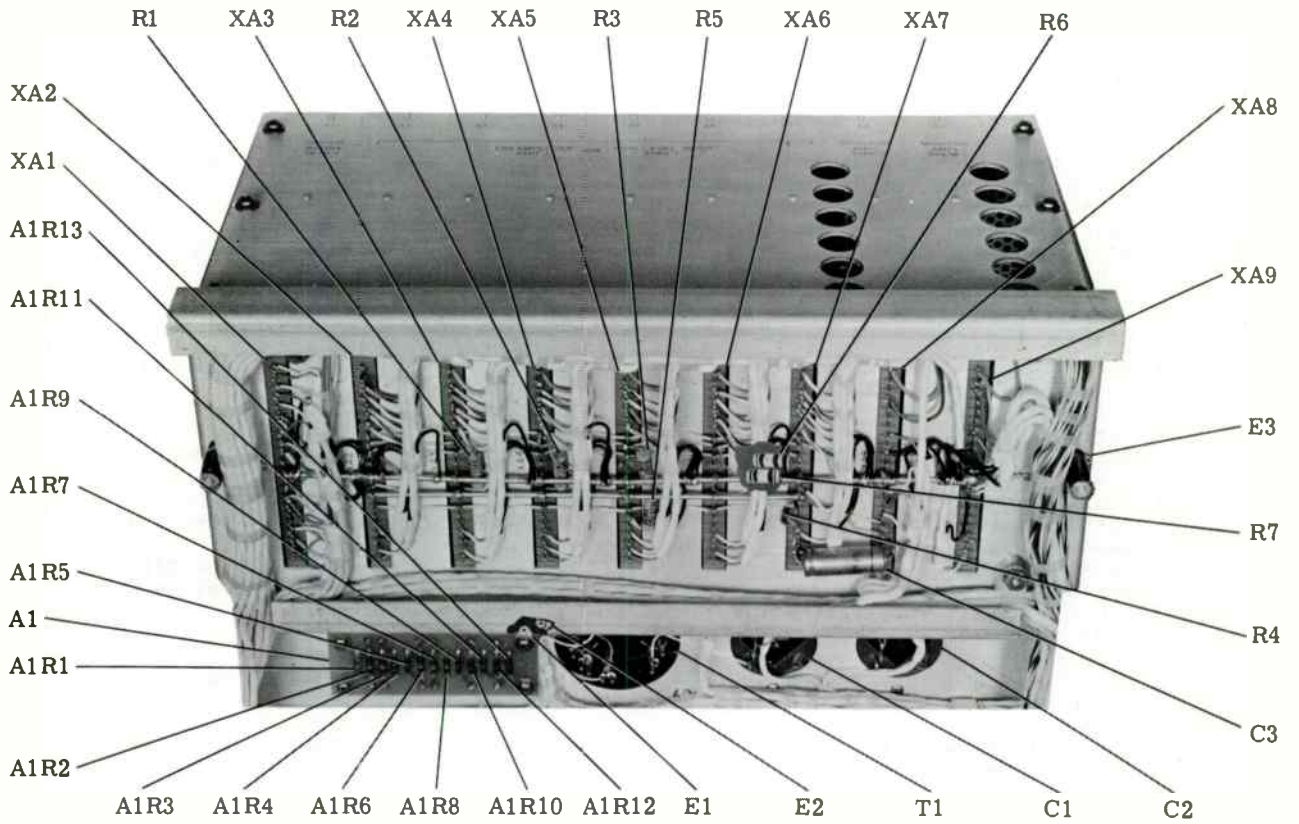
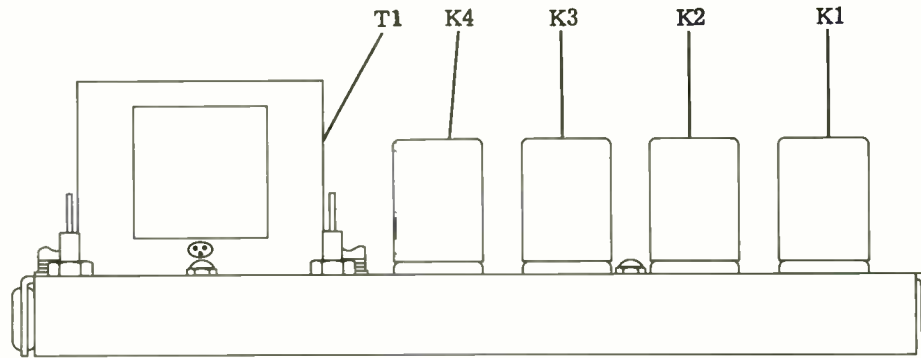


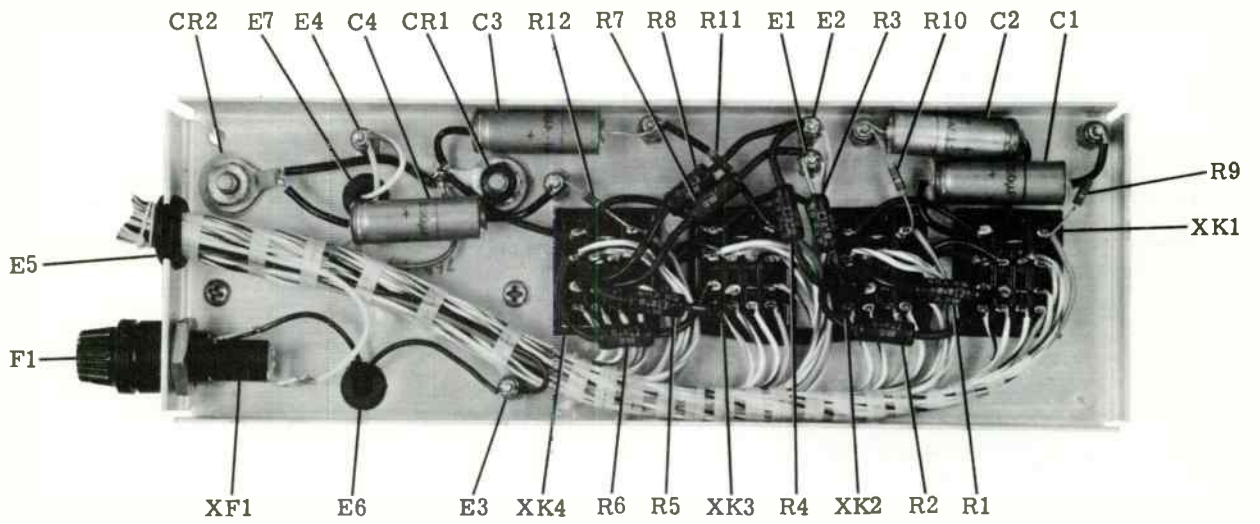
Figure 6-6. Card Cage, Channel Unit, Units A2 and A3

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
CARD CAGE, CHANNEL UNIT UNIT A2, A3				764-7424-001
A1	BOARD, RESISTOR			764-7445-001
A1R1	RESISTOR, FXD, COMPOSITION 150 OHMS, 10% TOL, 1/4 WATT	RC07GF151K	81349	745-0719-000
A1R2	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/4 WATT	RC07GF103K	81349	745-0785-000
A1R3	SAME AS A1R2			
A1R4	RESISTOR, FXD, COMPOSITION 560 OHMS, 10% TOL, 1/4 WATT	RC07GF561K	81349	745-0740-000
A1R5	SAME AS A1R1			
A1R6	SAME AS A1R2			
A1R7	SAME AS A1R2			
A1R8	SAME AS A1R6			
A1R9	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/4 WATT	RC07GF101K	81349	745-0713-000
A1R10	SAME AS A1R9			
A1R11	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1/4 WATT	RC07GF821K	81349	745-0746-000
A1R12	SAME AS A1R9			
A1R13	SAME AS A1R9			
C1	CAPACITOR, FXD, ELECTROLYTIC 1000 UF, PLUS 100% MINUS 10%, 50 VDCW	033643	56289	183-1403-000
C2	SAME AS C1			
C3	CAPACITOR, FXD, ALUMINUM 400 UF, PLUS 50% MINUS 10%, 40 VDCW	C437ARG400	73445	183-2355-160
E1	TERMINAL, LUG	2104-08-02-2520N	78189	304-0319-000
E2	SAME AS E1			
E3	TERMINAL, LUG	2104-04-01-2520N	78189	304-0317-000
R1	RESISTOR, FXD, FILM 619 OHMS, 1% TOL, 1/4 WATT	RN6006190F	81349	705-6586-000
R2	SAME AS R1			
R3	SAME AS R1			
R4	RESISTOR, FXD, COMPOSITION 120 OHMS, 10% TOL, 1/4 WATT	RC07GF121K	81349	745-0716-000
R5	RESISTOR, FXD, FILM 82.5K OHMS, 1% TOL, 1/4 WATT	RN60D8252F	81349	705-6688-000
R6	RESISTOR, FXD, COMPOSITION 56K OHMS, 10% TOL, 1/4 WATT	RC07GF563K	81349	745-0812-000
R7	SAME AS R6			
T1	TRANSFORMER, AF LEAD 1 TO 3 30 OHMS IMPEDANCE, LEAD 2 CENTER TAP, LEADS 4,6 TO 5,7 150 OHMS IMPEDANCE, LEAD 4 TO 7 600 OHMS IMPEDANCE	HR479	80223	667-0156-010
XA1	CONNECTOR, ELECTRICAL 22 CONTACTS	2VH22-1A85	05574	372-7009-000
XA2 THROUGH XA9	SAME AS XA1			



(Side View)



(Bottom View)

Figure 6-7. Relay Unit, Unit A4

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
RELAY UNIT				764-7429-001
C1	CAPACITOR, FXD, ELECTROLYTIC 250 UF, 16 VOLTS	C437ARE250	73445	183-2355-060
C2	SAME AS C1			
C3	SAME AS C1			
C4	SAME AS C1			
CR1	SEMICONDUCTOR DEVICE, DIODE	1N1612	01295	353-6449-010
CR2	SAME AS CR1			
E1	TERMINAL, STUD	RTMT12M	91663	306-0976-000
E2	SAME AS E1			
E3	SAME AS E1			
E4	SAME AS E1			
E5	GROMMET, RUBBER	43-104	74970	201-1080-000
E6	GROMMET, RUBBER	MS35489-4	96906	201-0001-000
E7	SAME AS E6			
F1	FUSE, CARTRIDGE 1/2 AMP CURRENT RATING	F02A250V1-2AS	81349	264-4030-000
K1	RELAY, ARMATURE 4C CONTACT ARRANGEMENT	KH4394	77342	970-2427-060
K2	SAME AS K1			
K3	SAME AS K1			
K4	SAME AS K1			
R1	RESISTOR, FXD, WIRE WOUND 8.2 OHMS, 5% TOL, 3 WATTS	RW69V8R2	81349	747-5318-000
R2 THROUGH R8	SAME AS R1			
R9	RESISTOR, FXD, COMPOSITION 470 OHMS, 10% TOL, 1/4 WATT	RC07GF471K	81349	745-0737-000
R10	SAME AS R9			
R11	SAME AS R9			
R12	SAME AS R9			
T1	TRANSFORMER, POWER OPEN FRAME	76331	81095	662-0245-010
XF1	FUSEHOLDER 15 AMP CURRENT RATING	265-1097-000	13499	265-1097-000
XK1	SOCKET, RELAY 14 CONTACTS	27E008	77342	220-1543-000
XK2	SAME AS XK1			
XK3	SAME AS XK1			
XK4	SAME AS XK1			
MANUFACTURERS CODES				
CODE	MANUFACTURER			
GOTHA	GOTHAM AUDIO CORP. NEW YORK, N. Y.			
00348	MICROTRAN CO., INC. VALLEY STREAM, N. Y.			
01295	TEXAS INSTRUMENTS, INC. SEMICONDUCTOR-COMPONENTS DIVISION, DALLAS, TEX.			
01548	CAPITOL MACHINE CO. DANBURY, CONN.			
01939	SPRAGUE ELECTRIC CO. OF WISCONSIN GRAFTON, WIS.			
05574	VIKING INDUSTRIES, INC. CANOGA PARK, CALIF.			
07688	MILITARY SPECIFICATIONS			
07716	INTERNATIONAL RESISTANCE CO. BURLINGTON, IOWA			
07933	RAYTHEON MFG. CO. SEMICONDUCTOR DIVISION MOUNTAIN VIEW, CALIF.			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
08806	MINIATURE LAMP DEPARTMENT GECO CLEVELAND, OHIO			
13409	COLLINS RADIO CO. CEDAR RAPIDS, IOWA			
33173	TUBE DEPARTMENT GECO OWENSBORO, KY.			
56289	SPRAGUE ELECTRIC CO. NORTH ADAMS, MASS.			
72619	DIALIGHT CORP. BROOKLYN, N. Y.			
73445	AMPEREX ELECTRONIC CO. DIVISION OF NORTH AMERICAN PHILIPS CO., INC. HICKSVILLE, N. Y.			
74199	QUAM NICHOLS CO. CHICAGO, ILL.			
7497C	E.F. JOHNSON CO. WASECA, MINN.			
75173	HOWARD B. JONES DIVISION OF CINCH MFG. CO. CHICAGO, ILL.			
75382	KULKA ELECTRIC CORP. MT. VERNON, N. Y.			
76854	OAK MFG. CO. CRYSTAL LAKE, ILL.			
77342	AMERICAN MACHINE AND FOUNDRY CO. POTTER AND BRUMFIELD DIVISION, PRINCETON, IND.			
78189	SHAKEPROOF DIVISION OF ILLINOIS TOOL WORKS ELGIN, ILL.			
80223	UNITED TRANSFORMER CO. NEW YORK, N. Y.			
81095	TRIAD TRANSFORMER CORP. 4055 REDWOOD AVE. VENICE, CALIF. ZIP CODE 90293			
81349	MILITARY SPECIFICATIONS			
81450	ERCO RADIO LABORATORIES, INC.			
91662	ELCO CORP. WILLOW GROVE, PA.			
91663	ARMEL ELECTRONICS, INC. NORTH BERGEN, N. J.			
96256	THORDARSON-MEISSNER DIVISION OF MACQUIRE INDUSTRIES, INC., MT. CARMEL, ILL.			
96906	MILITARY SPECIFICATIONS			

section 7

illustrations

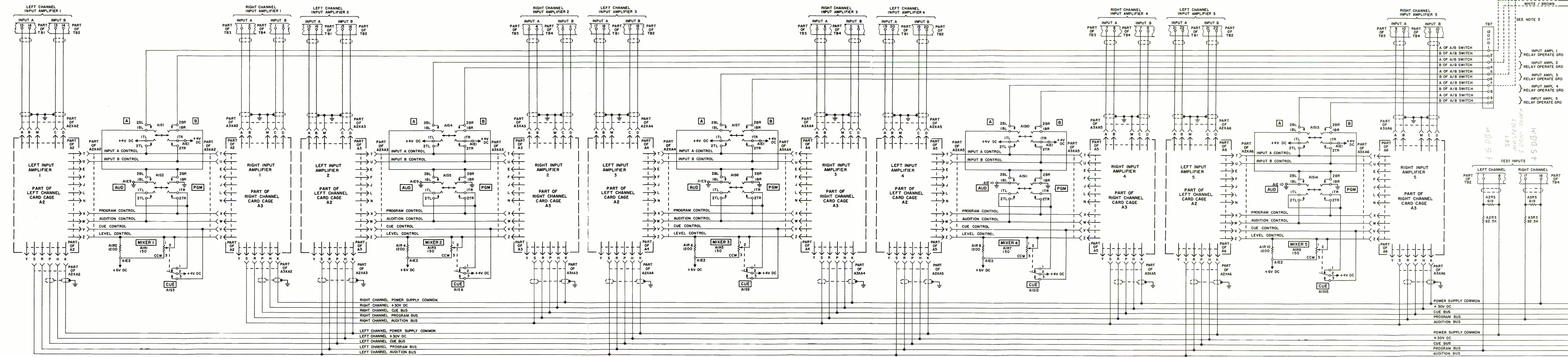
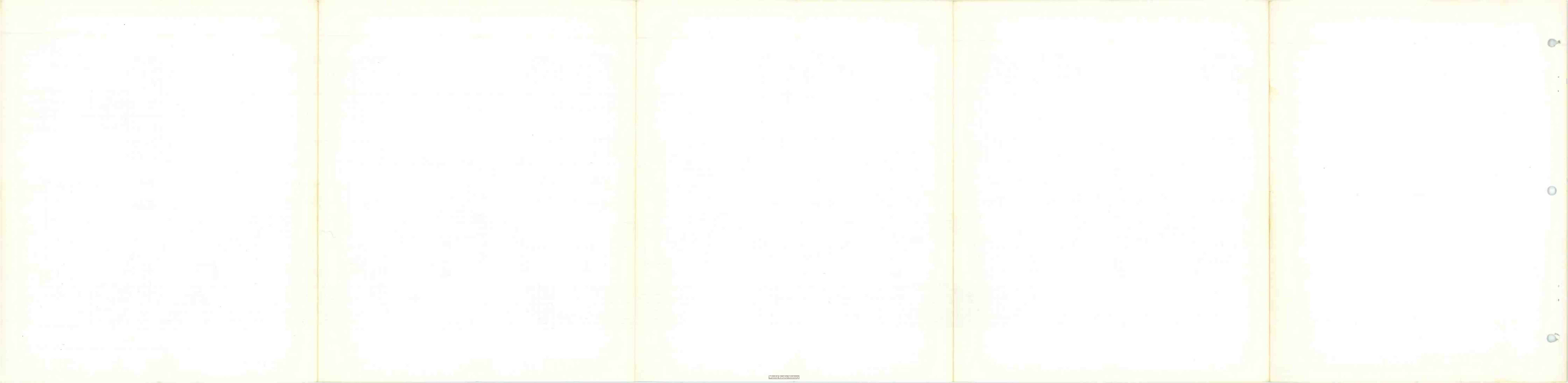
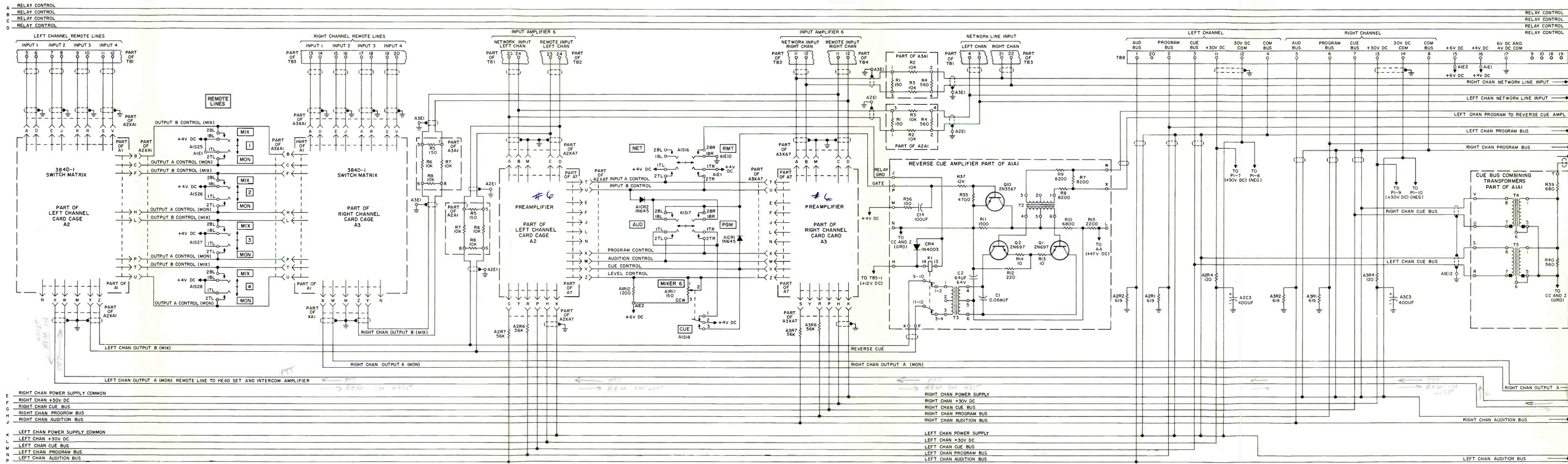


Figure 7-1. 2125-1 Stereo Console, Schematic Diagram (Sheet 1 of 4)





- E RIGHT CHAN POWER SUPPLY COMMON
- F RIGHT CHAN +30V DC
- G RIGHT CHAN CUE BUS
- H RIGHT CHAN PROGRAM BUS
- J RIGHT CHAN AUDITION BUS
- K LEFT CHAN POWER SUPPLY COMMON
- L LEFT CHAN +30V DC
- M LEFT CHAN CUE BUS
- N LEFT CHAN PROGRAM BUS
- P LEFT CHAN AUDITION BUS

- RIGHT CHAN POWER SUPPLY
- RIGHT CHAN +30V DC
- RIGHT CHAN CUE BUS
- RIGHT CHAN PROGRAM BUS
- RIGHT CHAN AUDITION BUS
- LEFT CHAN POWER SUPPLY
- LEFT CHAN +30V DC
- LEFT CHAN CUE BUS
- LEFT CHAN PROGRAM BUS
- LEFT CHAN AUDITION BUS

Figure 7-1. 212S-1 Stereo Console, Schematic Diagram (Sheet 2 of 4)

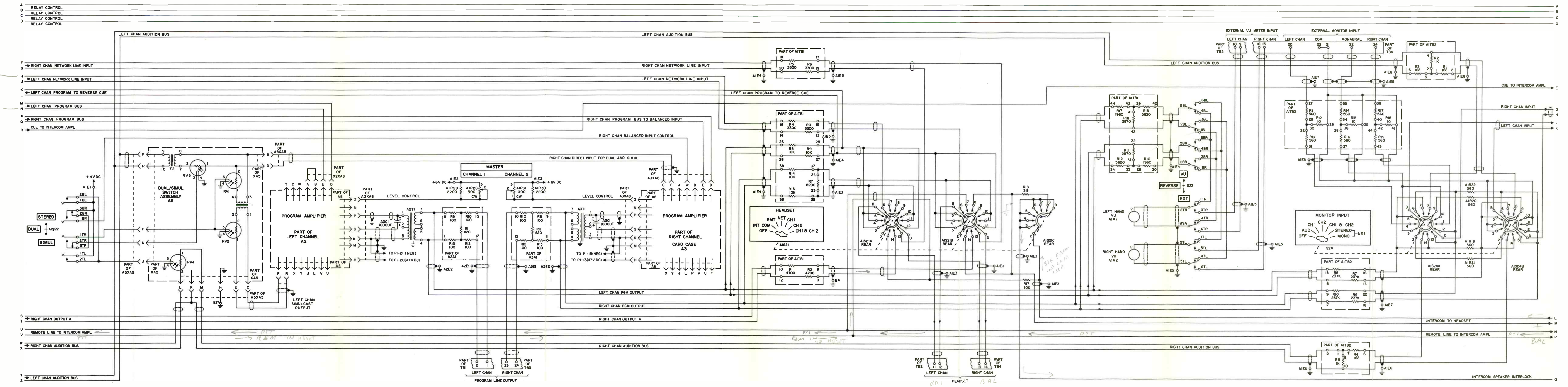


Figure 7-1. 212S-1 Stereo Console, Schematic Diagram (Sheet 3 of 4)

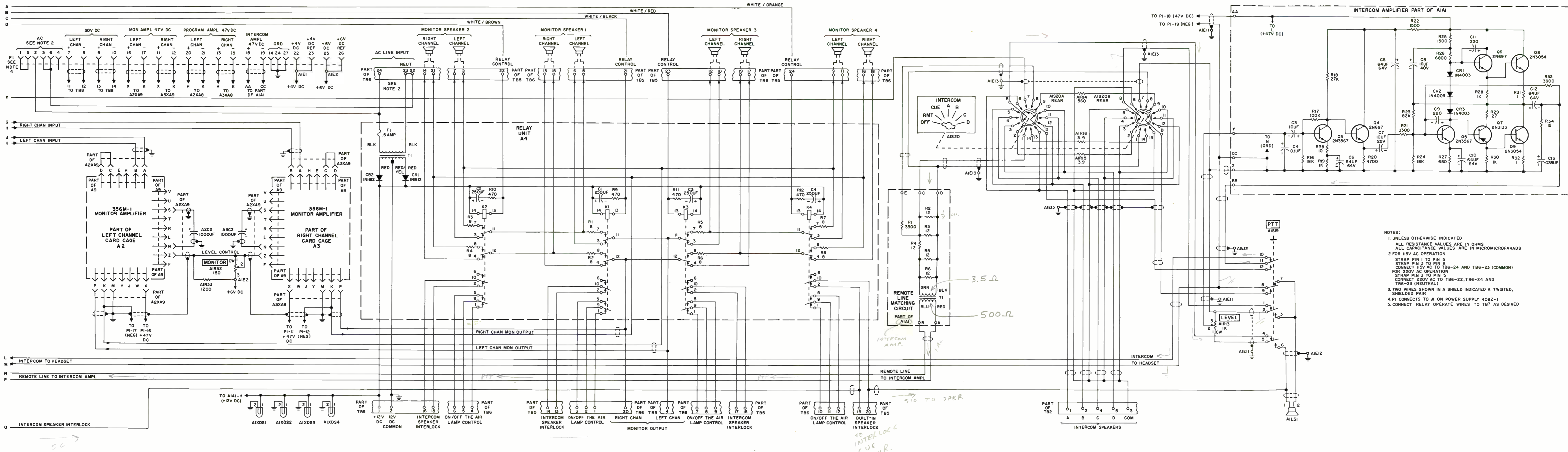


Figure 7-1. 212S-1 Stereo Console, Schematic Diagram (Sheet 4 of 4)



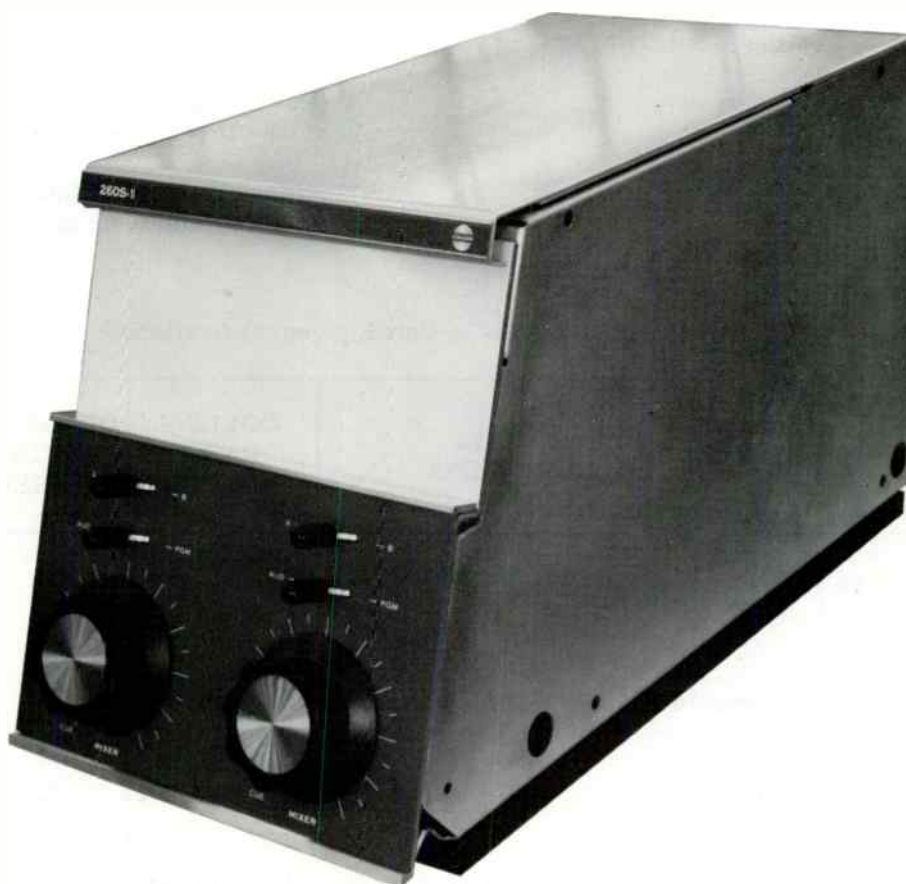
260S-1 Add-On Unit

unit instructions

Collins Radio Company | Dallas, Texas

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523-0558811002438
July 1, 1967



B502-138-Pb

Figure 1. 260S-1 Add-On Unit

1. GENERAL DESCRIPTION

1.1 Purpose of Unit

The 260S-1 Add-On Unit (figure 1) adds two stereo input amplifiers to 212S-1 Stereo Console or two monaural input amplifiers to 212M-1 Monaural Console.

1.2 Unit Description

The 260S-1 mounts on either side of the 212S-1 or 212M-1. Two MIXER controls, two A/B input switches, and two AUD/PGM output switches are on the 260S-1 front panel. The 260S-1 uses the etched circuit, plug-in cards listed in table 1.

2. UNIT CHARACTERISTICS

2.1 Physical Characteristics

Size:

10-1/4 by 8-3/4 (without end trim) by 13 inches

Weight:

15 pounds

Type of Construction:

Console

Type of Mounting:

Desk top

2.2 Operating Characteristics

Ambient Service Conditions:

Temperature

0° to 50°C (32° to 122°F)

Relative Humidity

Up to 95%

Altitude

Up to 10,000 feet above msl

Type of Service:

Continuous

2.3 Electrical Characteristics

Power Requirements:

30 volts dc at 40 ma, maximum (maximum ripple 1 mv)

4 volts dc at 0.5 amp, maximum (regulated)

6 volts dc at 0.5 amp, maximum (regulated)

(Power Supply 409Z-1 in the console provides all required power.)

Maximum Number of Inputs:

Four (monaural or stereo)

Table 1. 260S-1 Add-On Unit Equipment Available

ITEM	WEIGHT	OVERALL DIMENSIONS	COLLINS PART NUMBER	QUANTITY REQUIRED (STEREO)	QUANTITY REQUIRED (MONAURAL)
356R-1 Microphone-Phonograph Pre-amplifier	8 ounces	4-7/16 by 6-3/8 by 1 inches	758-5486-001	*2	*1
356V-1 High-Level Input Card	7 ounces	4-7/16 by 6-3/8 by 1 inches	522-3887-001	*2	*1
356U-1 Broadcast Audio Preamplifier	1 pound	4-7/16 by 6-3/8 by 1-1/16 inches	722-5273-001	*2	*1
356T-1 Preamplifier	7 ounces	4-7/16 by 6-3/8 by 1 inches	522-3885-001	*2	*1

*For each mixer

Table 2. Unit Instructions

ITEM	UNIT INSTRUCTIONS COLLINS PART NUMBER
356R-1 Microphone-Phonograph Preamplifier	523-0558097-002438
356V-1 High-Level Input Card	523-0558092-002438
356U-1 Broadcast Audio Preamplifier	523-0559550-001438
356T-1 Preamplifier	523-0558093-002438

Maximum Number of Outputs:
Six (monaural or stereo)

Cards installed determine all other parameters.

3. INSTALLATION

The 260S-1 may be installed on either side of the 212M-1 or 212S-1.

Note

If the 260S-1 is to be used for stereo operation, remove resistors R5 and R6.

To install the 260S-1 with an existing console, proceed as follows:

- Remove the five screws holding the end trim to the console.
- Align the holes in the end of the console with the holes in the end of the 260S-1.
- Fasten the 260S-1 to the console with the five screws removed in step a.
- Fasten the end panel to the 260S-1 with the five screws provided.
- Route the 260S-1 input wiring (twisted shielded pairs) to terminal boards TB3 and TB4 through the slots in the bottom of the 260S-1.
- Route the wiring from TB8 in the console to terminal boards TB1 and TB2 in the 260S-1 through the matching holes in the two units.

- Connect wiring as indicated in table 3.

4. CIRCUIT DESCRIPTION

The 260S-1 consists of two pairs of card receptacles, two MIXER controls, two A/B switches, two AUD/PGM switches, and a spare card receptacle. The 409Z-1 Power Supply in the associated console supplies all operating voltages for the 260S-1.

Spare card receptacle XA5 may be customer-wired to accept a 356T-1 Preamplifier, a 356R-1 Microphone-Phonograph Preamplifier, a 356V-1 High-Level Input Card, a 356U-1 Broadcast Audio Preamplifier, or a 356P-1 Program Amplifier.

4.1 Stereo Operation

Because the operation of the left- and right-hand input amplifiers is the same, only the left-hand input amplifier will be discussed.

MIXER control R1 varies the current supplied to photoconductive level controls on the plug-in cards. Cue switch S3 operates when MIXER control R1 is in the extreme counterclockwise (CUE) position. The cue switch transfers +4 volts from the top contacts on AUD/PGM switch S2 to photoconductive cue output switches on the plug-in cards.

The top contacts on the AUD/PGM switch, in series with the cue switch, connect +4 volts to photoconductive switches on the plug-in cards to select the output bus.

Table 3. Connections To Terminal Boards

TERMINAL BOARD	TERMINAL	CHANNEL	FUNCTION	POLARIZATION
TB1	1		Spare	
	2		Spare	
	3		Spare	
	4		+6 volts dc	Positive
	5		+4 volts dc	Positive
	6		6 and 4 volts dc, common	Negative
	7		Spare	
	8		Spare	
	9	Left	+30 volts dc	Positive
	10	Left	30 volts dc, common	Negative
	11	Right	+30 volts dc	Positive
	12	Right	30 volts dc, common	Negative
TB2	1	Left	Audition bus	Tip
	2	Left	Program, bus	Tip
	3	Left	Cue bus	Tip
	4	Left	Bus, common	Ring
	5	Right	Audition bus	Tip
	6	Right	Program bus	Tip
	7	Right	Cue bus	Tip
	8	Right	Bus, common	Ring
	9		Spare	
	10		Spare	
	11		Spare	
	12		Spare	

Table 3. Connections To Terminal Boards (Cont)

TERMINAL BOARD	TERMINAL	CHANNEL	FUNCTION	POLARIZATION
TB3	1	Left	Input A, input amplifier 1	Tip
	2	Left	Input A, input amplifier 1	Ring
	3	Left	Input B, input amplifier 1	Tip
	4	Left	Input B, input amplifier 1	Ring
	5	Left	Input A, input amplifier 2	Tip
	6	Left	Input A, input amplifier 2	Ring
	7	Left	Input B, input amplifier 2	Tip
	8	Left	Input B, input amplifier 2	Ring
	9		Spare	
	10		Spare	
	11		Spare	
	12		Spare	
TB4	1	Right	Input A, input amplifier 1	Tip
	2	Right	Input A, input amplifier 1	Ring
	3	Right	Input B, input amplifier 1	Tip
	4	Right	Input B, input amplifier 1	Ring
	5	Right	Input A, input amplifier 2	Tip
	6	Right	Input A, input amplifier 2	Ring
	7	Right	Input B, Input amplifier 2	Tip
	8	Right	Input B, input amplifier 2	Ring
	9	Left	Spare	
	10		Spare	
	11		Spare	
	12		Spare	

The top contacts on A/B switch S1 connect +4 volts to photoconductive switches on the plug-in cards to select the input signal.

The bottom contacts on the A/B switch, in series with the bottom contacts on the AUD/PGM switch, may be customer-wired to the interlock relays (Relay Unit A4) in the console.

4.2 Monaural Operation

For monaural operation, resistors R5 and R6 are connected. These resistors take the place of the photoconductive level controls on the unused plug-in cards.

Operation of all controls and switches is the same for monaural and stereo, except that the front panel controls operate one input amplifier card instead of a stereo pair.

5. MAINTENANCE

5.1 Preventive Maintenance

5.1.1 Wiring

Periodically check the wiring in the 260S-1 for frayed insulation. Ensure that all terminal board screws are tight. Inspect each plug-in card for signs of component damage.

5.1.2 Mixer Controls

MIXER controls do not require cleaning because they are not in the signal path.

5.1.3 Lever Switches

Periodically clean all lever switch contacts with a brush.

5.2 Corrective Maintenance

Use the schematic diagram as an aid in localizing faults. Test points on the ends of the plug-in cards are accessible with the cards plugged into the card receptacles. The card extender provides access to components on individual cards.

Refer to the unit instructions for maintenance data on the plug-in cards.

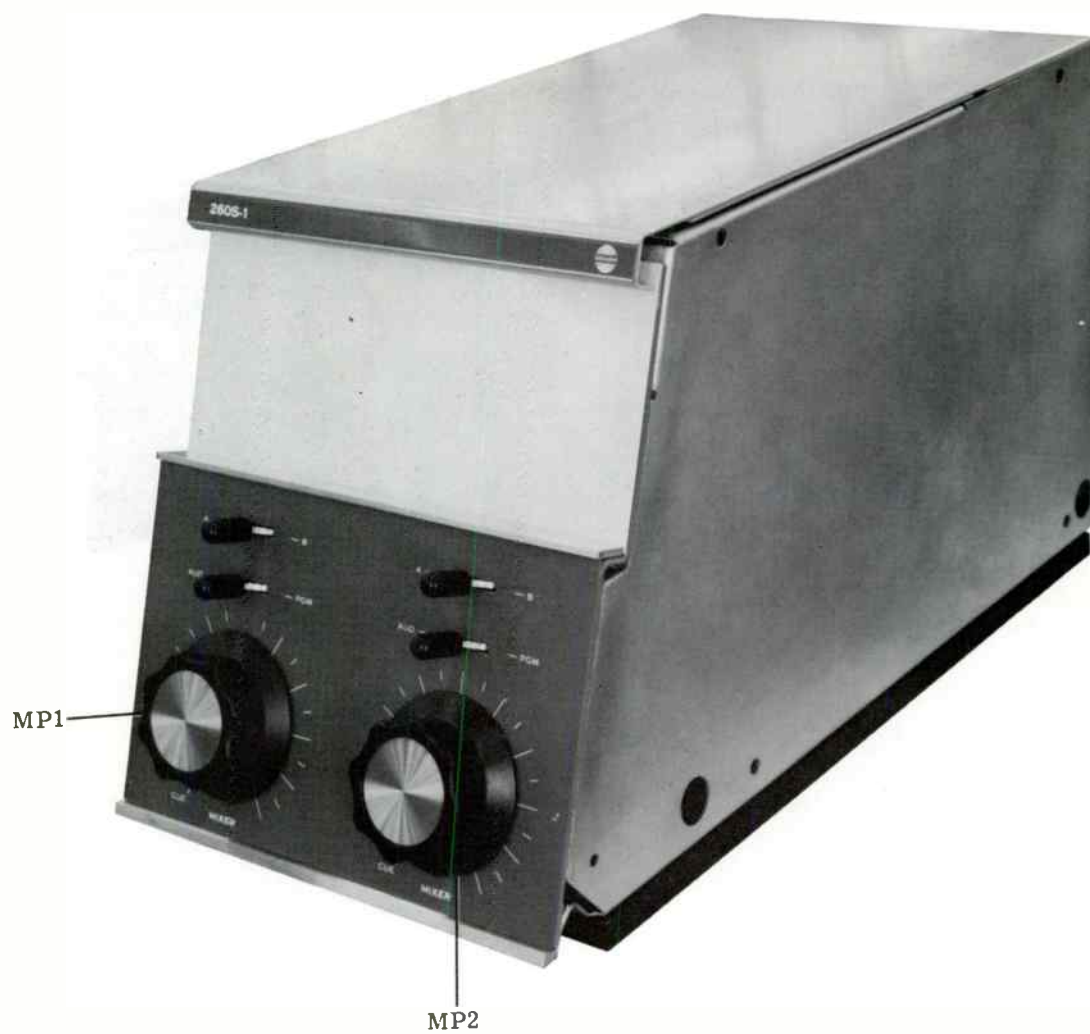
Caution

When making repairs on the cards, do not use a soldering iron rated at more than 40 watts. Do not jar the card to remove excess solder. Jarring the card may damage the lamp filaments in the photoconductive devices.

5.3 Spare Parts

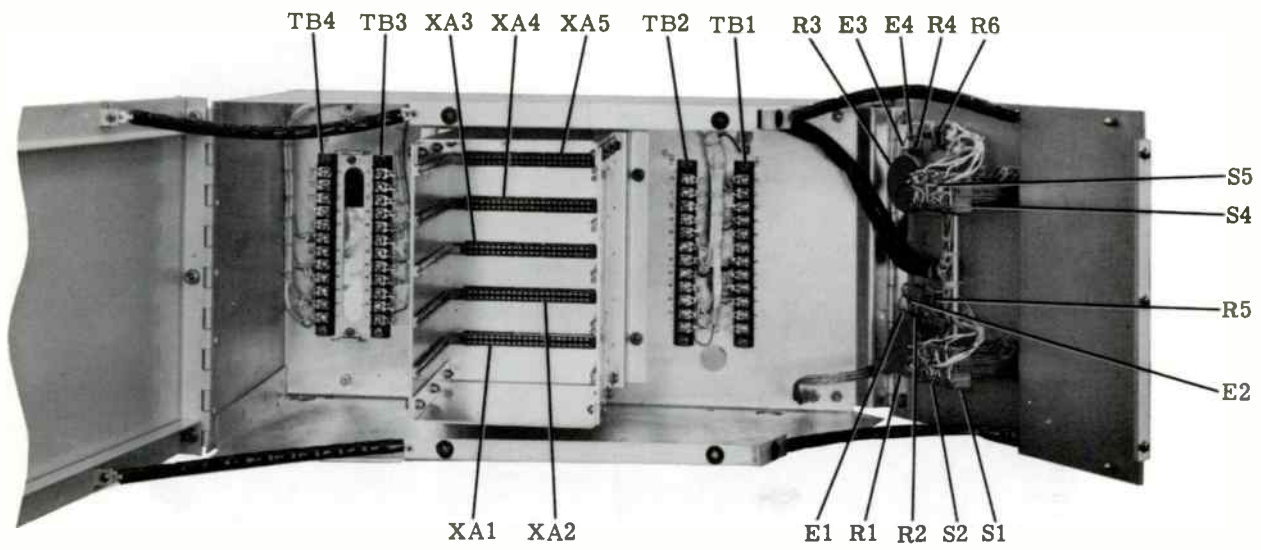
Spare parts may be ordered from the following address:

Collins Radio Company
Service Parts Department
Dallas, Texas 75207



B502-139-Pb

Figure 2. 260S-1 Add-On Unit, Front Panel



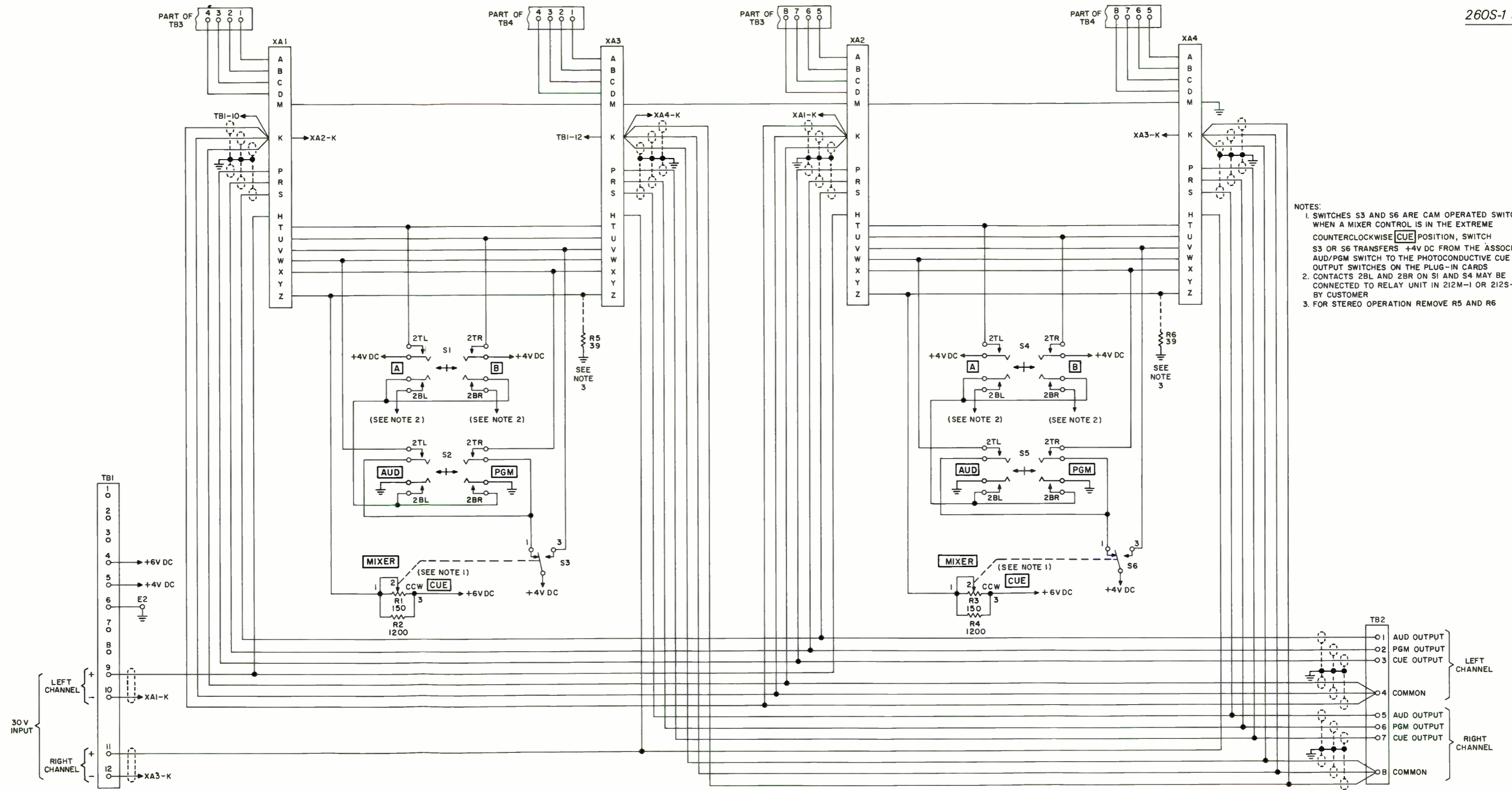
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Figure 3. 260S-1 Add-On Unit, Panel Open

6. PARTS LIST

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
ADD ON-UNIT-260S-1				522-3882-001
E1	TERMINAL, LUG	2104-06-02-2520N	78189	304-0318-000
E2	SAME AS E1			
E3	SAME AS E1			
E4	SAME AS E1			
MP1	KNOB, SKIRTED			546-1291-003
MP2	SAME AS MP1			
R1	RESISTOR, VAR, WIRE WOUND 150 OHMS, 10% TOL, 4 WATTS	PR8193	71450	377-0709-070
R2	RESISTOR, FXD, COMPOSITION 1200 OHMS, 10% TOL, 1/2 WATT	RC20GF122K	81349	745-1356-000
R3	SAME AS R2			
R4	SAME AS R2			
R5	RESISTOR, FXD, COMPOSITION 39 OHMS, 10% TOL, 1 WATT	RC32GF390K	81349	745-3293-000
R6	SAME AS R5			
S1	SWITCH, LEVER 1A CONTACT ARRANGEMENT	1G7942-89	01548	375-1020-020
S2	SAME AS S1			
S3	SWITCH, CONTACT ASSEMBLY 1C CONTACT ARRANGEMENT	13A8008-89	01548	266-6812-010
S4	SAME AS S1			
S5	SAME AS S1			
S6	SAME AS S3			
TB1	TERMINAL BOARD 12 TERMINALS	599C3-4ST12	75382	367-1399-120
TB2	SAME AS TB1			
TB3	SAME AS TB1			
TB4	SAME AS TB1			
XA1	CONNECTOR, ELECTRICAL 22 CONTACTS	2VH22-1A85	05574	372-7009-000
XA2 THROUGH XA5	SAME AS XA1			
MANUFACTURERS CODES				
CODE	MANUFACTURERS			
01548	CAPITOL MACHINE CO. DANBURY, CONN.			
05574	VIKING INDUSTRIES, INC. 21343 ROSCOE BLVD. CANOGA PARK, CALIF.			
71450	CHICAGO TELEPHONE SUPPLY CORP. ELKHART, IND.			
75382	KULKA ELECTRIC CORP. MT. VERNON N. Y.			
78189	SHAKPROOF DIVISION OF ILLINOIS TOOL WORKS ELGIN, ILL.			
81349	MILITARY SPECIFICATIONS			

382-0017-030
BAD



- NOTES:
1. SWITCHES S3 AND S6 ARE CAM OPERATED SWITCHES WHEN A MIXER CONTROL IS IN THE EXTREME COUNTERCLOCKWISE **CUE** POSITION, SWITCH S3 OR S6 TRANSFERS +4V DC FROM THE ASSOCIATED AUD/PGM SWITCH TO THE PHOTOCONDUCTIVE CUE OUTPUT SWITCHES ON THE PLUG-IN CARDS
 2. CONTACTS 2BL AND 2BR ON S1 AND S4 MAY BE CONNECTED TO RELAY UNIT IN 212M-1 OR 212S-1 BY CUSTOMER
 3. FOR STEREO OPERATION REMOVE R5 AND R6

B505-131-1

Figure 4. 260S-1 Add-On Unit, Schematic Diagram



356H-1 Phono Equalizer

instruction sheet

Cedar Rapids Division | Collins Radio Company, Cedar Rapids, Iowa

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Printed in U.S.A.

523-0171000-002411
2nd Edition, 1 March 1964

1. Description.

1.1 PURPOSE OF THE MANUAL.

This manual provides information on the 356H-1 Phono Equalizer. Topics which are discussed include a general description of the equipment, installation, operation, principles of operation, maintenance and illustrated parts list.

1.2 PURPOSE OF THE EQUIPMENT.

The 356H-1 Phono Equalizer, Collins part number 522-2468-00, is used to equalize and amplify the output signal of a magnetic phone cartridge or microphone,

see figure 1. The 356H-1 will replace passive equalizers and console or turntable preamplifiers.

1.3 TECHNICAL CHARACTERISTICS.

Frequency response . . . FLAT response, 20 to 20,000 cps ± 1.5 db.

RIAA response, RIAA (NAB) playback equalization curve.

HI BOOST response, RIAA (NAB) normal response with a 4-db rise at 15,000 cps.

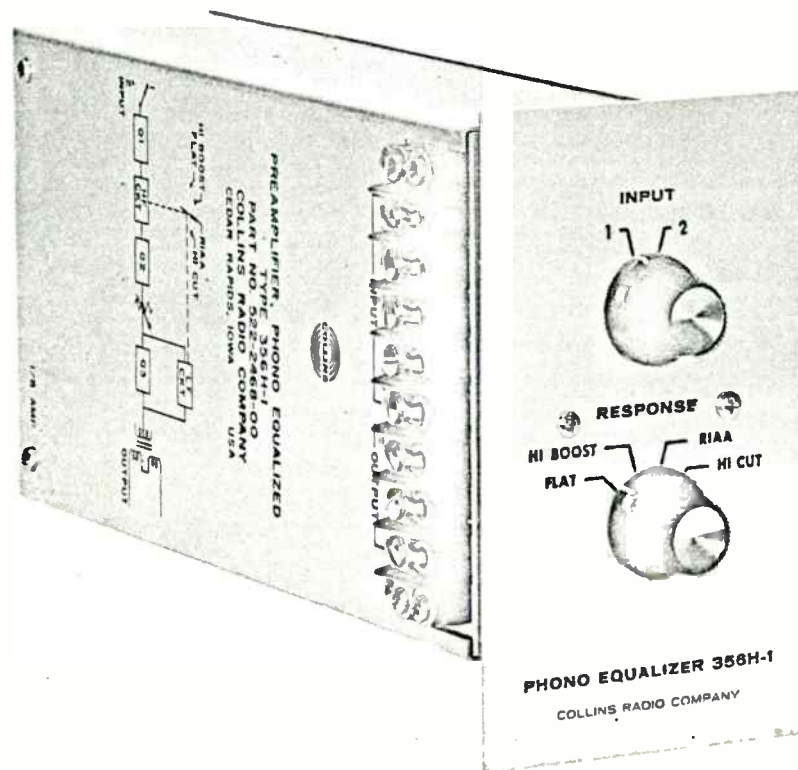


Figure 1. 356H-1 Phono Equalizer, Over-all View

C858-07-P



356H-1 Phono Equalizer

instruction sheet

Cedar Rapids Division | Collins Radio Company, Cedar Rapids, Iowa

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Printed in U.S.A.

523-0171000-002#11
2nd Edition, 1 March 1964

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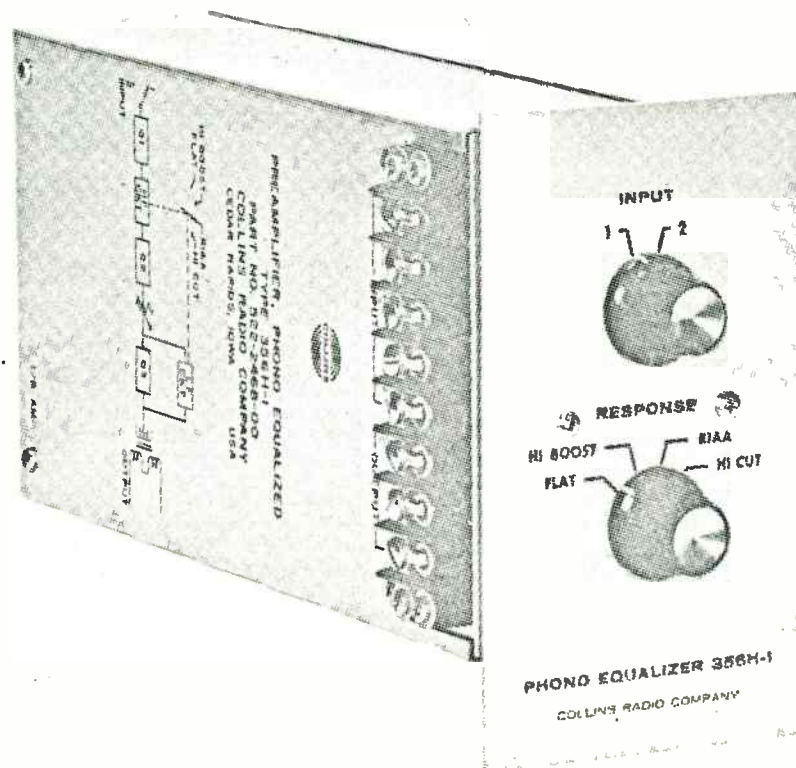


Figure 1. 356H-1 Phono Equalizer, Over-all View

C858-07.P

HI CUT response, RIAA (NAB) normal response with a 4-db drop at 15,000 cps.

- Output level -10 dbm, nominal.
- Output impedance 150/600 ohms, balanced or unbalanced.
- Input impedance High impedance, unbalanced.
- Distortion 1.0 percent maximum, 30 to 15,000 cps at -10 dbm output.
- Output noise Signal-to-noise ratio 60 db with -50 dbm input.
- Gain 40 db minimum at 1000 cps.
- Power source 120/240 volts a-c, ± 5 percent, 50/60 cps. (Shipped wired for 120-volt a-c operation.)
- Ambient temperature $+15^{\circ}\text{C}$ to $+45^{\circ}\text{C}$ ($+59^{\circ}\text{F}$ to $+113^{\circ}\text{F}$).
- Ambient humidity 95 percent.
- Dimensions 4 in. wide, 2 in. high, 7-3/4 in. deep.
- Weight 3-1/4 pounds.

1.4 TRANSISTOR, DIODE, AND FUSE COMPLEMENT.

Table 1 gives the transistors, fuse, and diode types used in the 356H-1.

**TABLE 1
TRANSISTOR, FUSE, AND DIODE COMPLEMENT**

REFERENCE SYMBOL	TYPE		
	1N1488	1/8 AMPERE	2N1175A
CR1, CR2	2		
F1		1	
Q1, Q2, Q3			3

2. Installation.

2.1 MOUNTING.

Figure 3 is an outline template of the 356H-1 and may be used directly when determining the location

of the holes used for mounting the 356H-1 to a turntable cabinet or other surface. The dotted line is an outline of the chassis under the front plate. Refer to figure 2.

2.2 POWER INPUT.

Connect the black and white leads of the a-c power cord to 110 volts, 50/60 cps. If 230-volt operation is to be used, refer to figure 7 for instructions to revise power transformer T2.



Use the green wire only when no other ground is provided. If more than one ground is used, the ground loops may cause excessive noise.

3. Operation.

3.1 GENERAL.

The 356H-1 Phono Equalizer is controlled locally. Power is applied to the 356H-1 by correcting the input power cord to a 120-volt, 60-cps source. If 240-volt operation is required, refer to figure 7. Controls provide a choice between two inputs and between four response curves.

3.2 FUNCTION OF CONTROLS.

The 356H-1 controls and their functions are listed in table 2.

**TABLE 2
356H-1 OPERATING CONTROLS**

CONTROL	FUNCTION
INPUT selector (S2)	Selects one of the two inputs connected to the INPUT lugs on the 356H-1.
RESPONSE selector (S1)	Selects one of the following four responses: FLAT - Used for test purposes and mike preamplifier use. The frequency response is 20 to 20,000 cps, ± 1.5 db. HI BOOST - Response has a 4-db rise above the RIAA (NAB) normal curve at 15,000 cps. RIAA - The RIAA (NAB) playback equalization response curve. HI CUT - Response has a 4-db drop below the RIAA (NAB) normal curve at 15,000 cps.

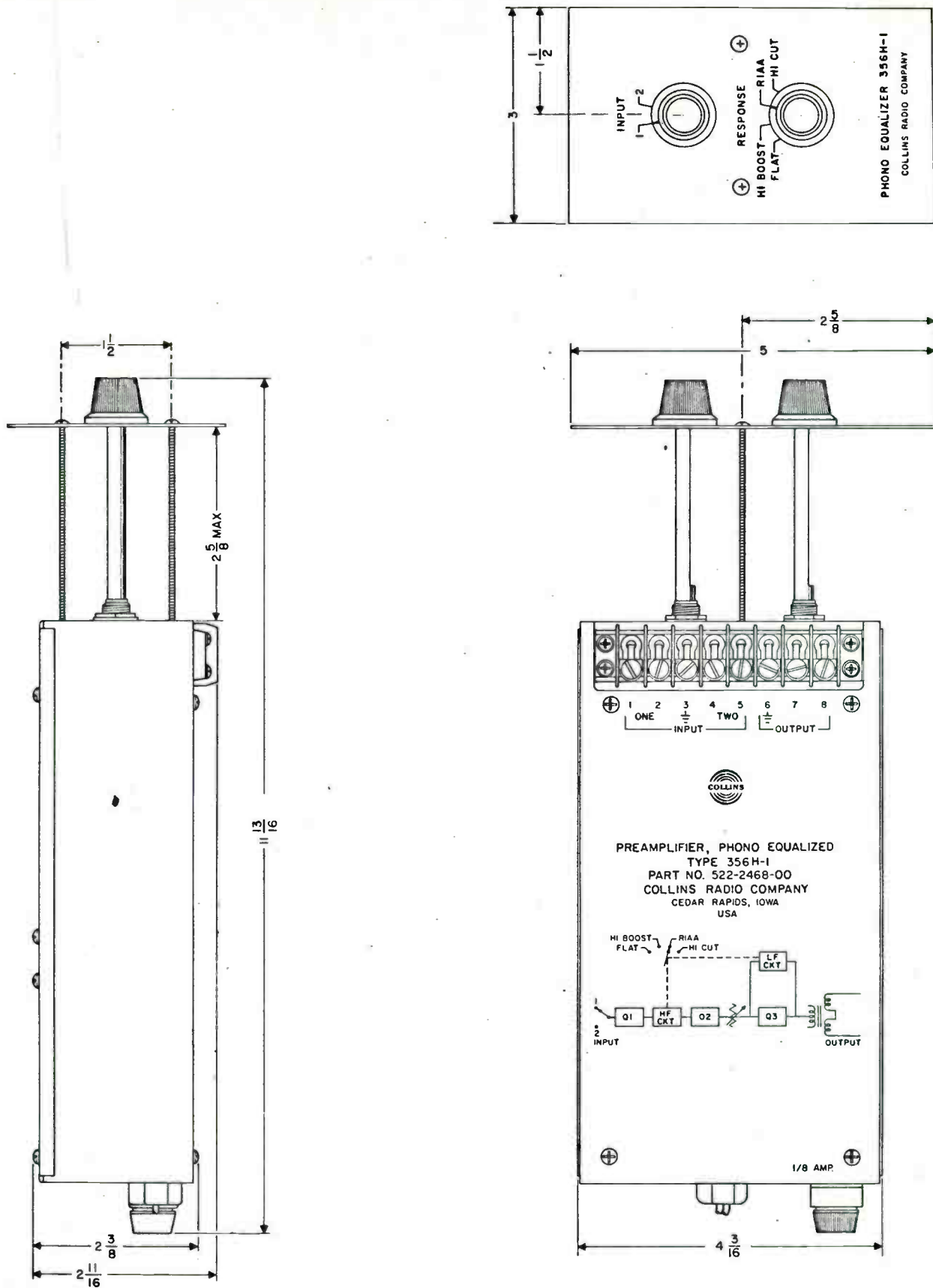


Figure 2. 356H-1 Phono Equalizer, Outline and Mounting Dimensions

C858-02-4

4. Principles of Operation.

4.1 GENERAL THEORY.

Input signals from a turntable arm, using a magnetic cartridge or a microphone, are connected to the INPUT terminals on TB1 (figure 4). INPUT switch S2 selects one of two inputs which is coupled through capacitor C1 to amplifier Q1. The amplifier stage has a high input impedance designed to bridge magnetic phono cartridges. The stage is decoupled by an R-C filter composed of capacitor C7 and resistor R16. Resistor R5 in the emitter circuit provides current feedback. The signal is coupled through capacitor C3 to the base of transistor Q2. RESPONSE selector S1A selects various resistor-capacitor combinations from the high frequency compensation network in the base circuit of Q2. When the selector is in the FLAT position, none of the high frequency components are selected. This provides a response of 20 to 20,000 cps ± 1.5 db. Components in the network are selected in the HI BOOST position to provide a high frequency boost of about 4 db above the normal RIAA (NAB) response at 15,000 cps. The RIAA (NAB) playback equalization curve is the response determined by component, selected when the selector is in the RIAA position. Components are selected in the high frequency compensation network to provide about a 4-db drop below the normal RIAA (NAB) response at 15,000 cps when the selector is in HI CUT position. A frequency compensating current feedback network, consisting of capacitors C14 and C15 and resistor R10, is in the emitter circuit of amplifier Q2. The signal is coupled through capacitor C5 to gain control R22 in the base of amplifier Q3. The gain control is adjusted to provide 40-db gain. RESPONSE selector S1B provides a means to select one of two types of feedback from the collector to the base of Q3. With the selector in FLAT position, voltage feedback is employed to give a low frequency response down to 30 cps. A low frequency compensated feedback provides the low frequency response to meet the RIAA (NAB) response curve when selector S1B is in HI BOOST, RIAA, or HI CUT position. The signal is coupled from the output of amplifier Q3, through transformer T1, to the OUTPUT terminals on TB1.

The power supply and filter, which is located in a separate compartment, provides approximately -20 volts d-c for emitter voltages. Power transformer T2 is shown, as it is shipped, wired for 120-volt a-c operation. It may be wired for 240-volt a-c operation as explained in figure 7.

5. Maintenance.

5.1 GENERAL.

This section contains maintenance procedures for servicing transistors in the 356H-1, and adjustments and voltage measurements for trouble-shooting the 356H-1.

5.2 TEST EQUIPMENT REQUIRED.

Test equipment listed in table 3, or its equivalent, is required for maintenance of the 356H-1.

TABLE 3
TEST EQUIPMENT REQUIRED

EQUIPMENT	MANUFACTURER AND TYPE
Voltmeter	Triplett 630A
VTVM	Hewlett-Packard 400D
Audio signal generator	Hewlett-Packard 200CD
Attenuator	Daven T693R
Input pad	Daven 6813
Output pad	Daven 6853

5.3 VOLTAGE MEASUREMENTS.

Table 4 gives the voltages on the elements of the transistors of the 356H-1, and the power supply voltage. Make the a-c voltage measurements with the input signal applied to the INPUT terminals to locate the defective stage. The d-c voltage measurements, to be made under no-signal conditions, will help locate the faulty component.

5.4 ADJUSTMENTS.

Gain control R22 (figure 4) is adjusted at the factory for an over-all gain in the 356H-1 of 40 db.

5.5 SERVICING TRANSISTOR CIRCUITS.

The servicing procedures and test equipments that have been used in the past with other types of electronic gear, for the most part, may be used with transistor circuits. The cases where special precautions must be used are listed below. If the equipment under test contains transistors, even though they may not be in the circuits under test, the precautions should be observed because of the possibility of accidentally contacting a transistor circuit.

5.5.1 USE OF TEST EQUIPMENT.

The damage to transistors by test equipment is usually the result of accidentally applying too much current or voltage to the transistor elements. The following equipment are common sources which may damage transistors when used for testing.

a. Transformerless power supplies. One source of such current is from the power line when test gear with transformerless power supply is used. This type of test gear can be used by employing an isolation transformer in the power line.

b. Line filter. It is still possible to damage transistors from line current, even though the test gear has a power transformer in the power supply, if the test gear is equipped with a line filter. This filter may act like a voltage divider and apply 55 volts a-c to the transistor. To eliminate trouble from this situation, connect a ground wire from the chassis of the test gear to the chassis of the equipment under test before any other connections are made.

TABLE 4. 356H-1 MEASUREMENTS

COMPONENT	POINT MEASURED AND VOLTAGE			
	TERMINAL 2	BASE	EMITTER	COLLECTOR
Transformer T1	-21.75 volts d-c			
Transistor Q1		.0047 volts a-c -6.2 volts d-c (12-volt d-c scale)	.0041 volts a-c -7.4 volts d-c (12-volt d-c scale)	.058 volts a-c -15.2 volts d-c (60-volt d-c scale)
Transistor Q2		.058 volts a-c -4.9 volts d-c (12-volt d-c scale)	.053 volts a-c -5.5 volts d-c (12-volt d-c scale)	.79 volts a-c -11.3 volts d-c (60-volt d-c scale)
Transistor Q3		.0037 volts a-c -12.8 volts d-c (60-volt d-c scale)	.00019 volts a-c -12.8 volts d-c (60-volt d-c scale)	1.0 volts a-c -21.0 volts d-c (60-volt d-c scale)
<p>Conditions:</p> <p>All voltages are measured under no-signal conditions using a Triplet 630A voltmeter.</p> <p>All a-c voltages are measured using a Hewlett-Packard 400D VTVM with a 1000-cps signal input at -50 dbm. The 1000-cps signal is coupled through the Daven T693R attenuator, and the attenuator input and output pads, 6813 and 6853.</p>				

c. Low-sensitivity multimeters. Another source of transistor damage is a multimeter that requires excessive current for adequate indications. Multimeters that have sensitivities of less than 5000 ohms per volt should not be used. A multimeter with lower sensitivity will draw too much current through many types of transistors and damage them. Use of 20,000-ohm-per-volt meters or vacuum-tube voltmeters is recommended. Check the ohmmeter circuits (even those in vtvm's) on all scales with an external, low-resistance milliammeter in series with the ohmmeter leads. If the ohmmeter draws more than one milliampere on any range, this range cannot be used safely on small transistors.

d. Power supply. Always use fresh batteries of the proper value for the equipment under test when testing power supplies. Never use battery eliminators because the regulation of these devices is poor at the current values drawn by transistor circuits. Be certain about identification of polarity before attaching the battery to the equipment under test; polarity reversal may damage the transistor.

e. Electric soldering irons. Electric soldering irons may damage transistors through leakage current. To check a soldering iron for leakage current, connect an a-c voltmeter between the tip of the iron and a ground connection (water pipe or line ground), allow the iron to heat up, then check for a-c voltage with the meter. Reverse the plug in the a-c receptacle, and again check for voltage. If there is any indication on the meter, isolate the iron from the line with a transformer. The iron may be used without the isolation transformer if the iron is plugged in and brought to temperature then unplugged for the soldering operation. It is also possible to use a ground wire between

the tip of the iron and the chassis of the equipment being repaired to prevent damage from leakage current.

Light-duty soldering irons of 20 to 25 watts capacity are adequate for transistor work and should be used. If it is necessary to use a heavier duty iron, wrap a piece of number 10 copper wire around the tip of the iron, and make it extend beyond the tip of the iron. Tin the end of the piece of copper wire, and use it as the soldering tip.

5.5.2 HEAT-SINK WHEN SOLDERING. When installing or removing a soldered-in transistor, grasp the lead, to which heat is being applied, between the solder joint and the transistor with long-nose pliers to bleed off some of the heat that conducts into the transistor from the soldering iron. Make sure that the wires that are being soldered to transistor terminals are properly pretinned so that the connection can be made quickly. Excessive heat will permanently damage a transistor.

5.5.3 REMOVAL OF TRANSISTORS FROM OPERATING CIRCUITS. Never remove or replace a plug-in transistor when the supply voltage is turned on. Transients thus produced may damage the transistor or others remaining in the circuit. If a transistor is to be evaluated in an external test circuit, be sure that no more voltage is applied to the transistor than is normally used in the circuit from which it came.

5.5.4 MAINTENANCE OF PLUG-IN TRANSISTORS. When servicing equipment that uses plug-in transistors, it is good practice to remove the transistors

from their sockets and reinsert them to break down any film of corrosion or dirt that may have formed.

5.5.5 MAKING RESISTANCE MEASUREMENTS IN TRANSISTOR CIRCUITS. When measuring resistances of circuits containing transistors or semiconductor diodes, remember that these components are polarity and voltage sensitive; therefore, follow the directions in the notes that are given on the resistance tables or drawings to be sure that the correct polarity and range is applied to the circuit from the ohmmeter. Any capacitors used in transistor circuits are usually of large values (especially in audio, servo, or power circuits), and it takes time to charge these capacitors when an ohmmeter is connected to a circuit in which they appear; thus, any reading obtained is subject to error if the capacitor is not allowed time to fully charge. In some cases, it may be best to isolate the components in question and individually measure them.

5.5.6 INSTALLING POWER TRANSISTOR HEAT SINKS. In some cases, power transistors are mounted on heat sinks that are designed to carry heat away from them, and in some power circuits, the transistor must also be insulated from ground. This insulating is done by means of insulating washers made of fiber and mica. When replacing transistors of this nature, be sure that the insulating washers are replaced in proper order. Before installing the mica washers, treat them with a film of silicone fluid, Collins part number 005-0273-00, or equivalent. This treatment helps in the transfer of heat. After the transistor is mounted and before making any connections to it, check from the case to ground with an ohmmeter to see that the insulation is effective.

5.5.7 USE OF TEST PRODS. Test prods should be clean and sharp. Because many of the resistors used in transistorized equipments are of low values, when checking resistance values any additional resistance produced by a dirty test prod will make a good resistor appear to be out of tolerance. In miniaturized equipment, the clearance between socket terminals, wires, and other components is usually very small. Because of this, it is easy to cause accidental short circuits with a test prod using a long exposed needle in the end. Short circuits can be very destructive to transistors, therefore it is a good practice to cover all of the exposed tip of the test prod, except about 1/8 inch, with plastic tape or other insulation.

5.5.8 TROUBLE-SHOOTING TRANSISTORS. The usual trouble-shooting practices apply to transistors. Be sure the test equipment and tools meet the requirements outlined in the above paragraphs. It is recommended that transistor testers be used to evaluate the transistor.

If a transistor tester is not available, a good ohmmeter may be used for testing. Be sure the ohmmeter meets the requirements as set forth in the paragraph on test equipment, above. To check a PNP transistor, connect the positive lead of the ohmmeter to the base and the negative lead to the emitter. (The red lead is not necessarily the positive lead on all ohmmeters.) Generally, a resistance reading of 50,000 ohms or more should be obtained. Connect the negative lead to the collector; again a reading of 50,000 ohms or more should be obtained. Reconnect the circuit with the negative lead of the ohmmeter to the base. With the positive lead connected to the emitter, a value of resistance in the order of 500 ohms or less should be obtained. Likewise, with the positive lead connected to the collector, a value of 500 ohms or less should be obtained. Similar tests made on an NPN transistor produces results as follows: With the negative ohmmeter lead connected to the base, the value of resistance between the base and the emitter and between the base and the collector should be high. With the positive lead of the ohmmeter connected to the base, the value of resistance between the base and the emitter and between the base and collector should be low. If the readings do not check out as indicated, the transistor probably is defective and should be replaced.

CAUTION

If a defective transistor is found, make sure that the circuit is in good operating order before inserting the replacement transistor. If a short circuit exists in the circuit, plugging in another transistor may result in another burned out transistor. Do not depend upon fuses to protect transistors.

Make sure that the bias resistors in series with the various transistor elements are correct. The transistor is very sensitive to improper bias voltages; therefore, a short or open circuit in the bias resistors may damage the transistor. For this reason, do not trouble shoot by shorting various points in the circuit to ground and listening for clicks.

6. Parts List.

ITEM	DESCRIPTION	COLLINS PART NUMBER
356H-1 PHONO EQUALIZER		522-2468-00
C1	CAPACITOR, FIXED, ELECTROLYTIC: 30 uf. -10% +100%, 10 v d-c	183-1377-00
C2	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf. -10% +100%, 15 v d-c; Sprague Electric Co. part no. 30D170A1	183-1157-00
C3 thru C5	CAPACITOR, FIXED, ELECTROLYTIC: same as C2	183-1157-00
C6	CAPACITOR, FIXED, ELECTROLYTIC: 250 uf. -10% +100%, 12 v d-c; Sprague Electric Co. part no. 30D157A1	183-1190-00
C7	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf. -10% +100%, 25 v d-c; Sprague Electric Co. part no. 30D188A1	183-1192-00
C8	CAPACITOR, FIXED, MICA: 4700 uuf, ±5%, 500 v d-c Electro Motive part no. DM30F472J	912-2711-00
C9	CAPACITOR, FIXED, MICA: same as C8	912-2711-00
C10	CAPACITOR, FIXED, MICA: 8200 uuf, ±5%, 500 v d-c; Electro Motive part no. DM30F822J	912-2729-00
C11	CAPACITOR, FIXED, MICA: 6800 uuf, ±5%, 500 v d-c; Electro Motive part no. DM30F682J	912-2723-00
C12	CAPACITOR, FIXED, ELECTROLYTIC: 150 uf. +100% -10%, 50 v d-c	183-1307-00
C13	CAPACITOR, FIXED, ELECTROLYTIC: 500 uf. -15% +100%, 25 v d-c; Cornell-Dubilier part no. BR110155V	183-1208-00
C14	CAPACITOR, FIXED, CERAMIC: 10,000 uuf. ±20%, 500 v d-c	913-1188-00
CR1	SEMICONDUCTOR DEVICE, DIODE: silicon; General Electric Co. part no. 1N1488	353-1657-00
CR2	SEMICONDUCTOR DEVICE, DIODE: same as CR1	353-1657-00
F1	FUSE, CARTRIDGE: glass enclosed; 1/8 amp rating; 250 v max; Bussman Mfg Co. part no. MDL-1/8	284-0290-00
O1	KNOB: round, push-on type, phenolic body; 0.840 in. dia by 21/32 in. thk	241-0415-00
O2	KNOB: same as O1	281-0415-00
P1	CONNECTOR, PLUG, ELECTRICAL: rubber body material; 15 amp at 125 v; 10 amp at 250 v	368-0030-00
Q1	TRANSISTOR: germanium; General Electric Co. part no. 2N1175A	352-0315-00
Q2	TRANSISTOR: same as Q1	352-0315-00
Q3	TRANSISTOR: same as Q1	352-0315-00
R1	RESISTOR, FIXED, FILM: 100,000 ohms, ±1%, 1/8 w	705-8692-00
R2	RESISTOR, FIXED, FILM: 147,000 ohms, ±1%, 1/8 w	705-6700-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
R3	RESISTOR, FIXED, FILM: 17,800 ohms, ±1%	705-6656-00
R4	NOT USED	
R5	RESISTOR, FIXED, FILM: 464 ohms, ±1%, 1/8 w	705-6580-00
R6	RESISTOR, FIXED, FILM: 10,000 ohms, ±1%, 1/4 w	705-7144-00
R7	RESISTOR, FIXED, FILM: 68,100 ohms, ±1%, 1/8 w	705-6684-00
R8	RESISTOR, FIXED, FILM: 178,000 ohms, ±1%, 1/8 w	705-6704-00
R9	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±10%, 1/4 w	745-0785-00
R10	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±10%, 1/4 w	745-0737-00
R11	RESISTOR, FIXED, FILM: same as R3	705-6656-00
R12	RESISTOR, FIXED, FILM: 2870 ohms, ±1%, 1/8 w	705-6618-00
R13	RESISTOR, FIXED, COMPOSITION: 82,000 ohms, ±10%, 1/4 w	745-0918-00
R14	RESISTOR, FIXED, COMPOSITION: same as R9	745-0785-00
R15	RESISTOR, FIXED, FILM: 51,100 ohms, ±1%, 1/8 w	705-6678-00
R16	RESISTOR, FIXED, COMPOSITION: 4700 ohms, ±10%, 1/4 w	745-0773-00
R17	RESISTOR, FIXED, COMPOSITION: 12 ohms, ±10%, 1/4 w	745-0680-00
R18	RESISTOR, FIXED, COMPOSITION: 1000 ohms, ±10%, 1/4 w	745-0740-00
R19	RESISTOR, FIXED, COMPOSITION: same as R9	745-0785-00
R20	NOT USED	
R21	RESISTOR, FIXED, COMPOSITION: 2700 ohms, ±10%, 1/4 w	745-0764-00
R22	RESISTOR, VARIABLE: composition; 5000 ohms, ±20%, 1/4 w	376-2549-00
R23	RESISTOR, FIXED, COMPOSITION: same as R21	745-0764-00
R24	RESISTOR, FIXED, COMPOSITION: 100 ohms, ±10%, 1/4 w	745-0713-00
S1	SWITCH, ROTARY: 2 circuit (2 pole), 4 positions, 1 section, 2 moving contacts, 9 fixed contacts	259-1524-00
S2	SWITCH, ROTARY: 4 circuit (4 pole), 2 positions, 1 section, 4 moving contacts, 12 fixed contacts	259-1523-00
T1	TRANSFORMER, AUDIO FREQUENCY: 8000 ohms pri, 300 ohms, 300 ohms sec; 2 mw operating power level; 50 cps to 15 kc freq range; Stancor Elect. p/n 32406	667-0105-00
T2	TRANSFORMER, POWER, STEP-DOWN: 120 v a-c, 120 v a-c pri; 50 v a-c, center tapped sec; 50 to 60 cps, continuous duty; Chicago Std Trans. p/n 30897	662-0036-00
TB1	TERMINAL, STRIP: phenolic, barrier type w/ lug for back connection, 8 terminals, 3-3/8 in. lg approx. 13/32 in. h, 7/8 in. w overall	367-0016-00
XF1	FUSE HOLDER: extractor post type; 125 v, 5 amp; accommodates 3AG cartridge fuse	265-1002-00

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1 June 1968



system instructions

212M-1 Monaural Console

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Figure 1-1. 212M-1 Monaural Console.

section 1

general description

1.1 PURPOSE OF INSTRUCTION BOOK

This instruction book contains information for the installation, adjustment, operation, and maintenance of the 212M-1 Monaural Console.

1.2 PURPOSE OF EQUIPMENT

The 212M-1 Monaural Console is a complete monaural console for programming at an AM., FM, or TV station. Provision is made for 10 local, 1 network, and 4 remote inputs. The number and type of inputs depends on the number and type of cards installed in the console.

The 150/600-ohm output may connect directly to a transmitter audio input. A 10-watt monitor amplifier is available for listening to program material. Cue listening, control relays, and an intercommunication system are incorporated.

1.3 CUSTOMER OPTIONS

The 212M-1 Monaural Console uses plug-in circuit cards to provide a choice of amplifier units. The number and quantity of cards required depend on specific station requirements. Table 1-1 lists 21 different equipment options available. Table 1-2 lists the individual units available.

1.4 UNIT INSTRUCTIONS

Applicable unit instructions are listed in table 1-3 and are supplied in the back of this book.

1.5 DESCRIPTION OF MAJOR COMPONENTS

1.5.1 212M-1 Monaural Console

The 212M-1 utilizes plug-in card construction to provide a choice of amplifier units. The front panel slopes backward 30° and is hinged at the bottom so that all servicing may be done from the front. The console may be permanently mounted. Perforated panels in the top and back provide adequate convective cooling. The card cage, in

the left rear of the console, is on hinges for easy access to the cards and card receptacles. The power supply is mounted in the right-hand side of the console. All connections are made at terminal boards on the floor of the console.

Card receptacles A2XA1, A2XA8, and A2XA9 accept the 384D-1 Switch Matrix, the 356P-1 Program Amplifier Card, and the 356M-1 Monitor Amplifier Card respectively. Card receptacles A2XA2 through A2XA7 accept either the 356T-1 Preamplifier Card, the 356V-1 High-Level Input Card, the 356U-1 Broadcast Audio Preamplifier, or the 356R-1 Microphone-Phonograph Preamplifier.

1.5.2 384D-1 Switch Matrix

The 384D-1 Switch Matrix switches one of the four remote line inputs to either the RMT position of the NET/RMT input switch of input amplifier 6 or the RMT position of the INTERCOM input switch and the output of the reverse cue amplifier. The unit consists of 16 photoconductive switches. The four REMOTE LINES switches control the 384D-1.

1.5.3 Input Amplifiers

1.5.3.1 356T-1 Preamplifier Card

The 356T-1 amplifies one of two microphone inputs. The bus level output is switched to the audition or program bus. The cue level output is switched to the cue bus.

1.5.3.2 356V-1 High-Level Input Card

The 356V-1 accepts one of two 0-dbm input signals. The bus level output is switched to the audition or program bus. A cue level output is provided for the cue bus.

1.5.3.3 356R-1 Microphone-Phonograph Preamplifier

The 356R-1 accepts either a microphone or a phonograph input. The bus level output is switched

to the audition or program bus. A cue level output is provided for the cue bus.

1.5.3.4 356U-1 Broadcast Audio Preamplifier

The 356U-1 accepts one of two inputs from either a high-level or a low-level device. The bus level output is switched to the audition or program bus. A cue level output is provided for the cue bus.

1.5.4 356P-1 Program Amplifier Card

The 356P-1 Program Amplifier Card accepts audio from the program bus and delivers +8 dbm at the program output.

1.5.5 356M-1 Monitor Amplifier Card

The 356M-1 Monitor Amplifier Card accepts audio at the program or audition bus level and delivers a maximum of 10 watts to a monitor speaker.

1.5.6 Intercom Amplifier

The intercom amplifier, mounted on the rear of the console front panel, amplifies audio signals from remote locations, slave speakers, or the cue bus. The (push-to-talk) PTT switch allows 2-way communication between the console and remote locations or slave speakers.

1.5.7 Reverse Cue Amplifier

The reverse cue amplifier, interlocked with the NET/RMT and AUD/PGM switches of input amplifier 6, amplifies the program output for reverse cue listening at a remote location.

1.5.8 409Z-1 Power Supply

The 409Z-1 supplies the following operating voltages for the console:

- 47 volts dc - 4 outputs
- 30 volts dc - 2 outputs
- 6 volts dc - 1 output
- 4 volts dc - 1 output

1.5.9 260S-1 Add-On Unit

The 260S-1 adds two input amplifier sockets and associated switches to the 212M-1 Monaural Console.

1.6 ELECTRICAL CHARACTERISTICS

Electrical characteristics of the 212M-1 Monaural Console are as follows:

Maximum Number of Inputs:

- 10, high- or low-level, local inputs
- 4 remote, high-level, inputs
- 1 network, high-level, input

Maximum Number of Outputs:

- 1 program output
- 1 monitor output
- 1 cue output
- 1 headset output

Input Impedance:

- Low-Level
30/150/250/600 ohms* (balanced or unbalanced)

- High-Level, Network, and Remote
600 ohms (balanced or unbalanced)

Output Impedance:

- Program
150/600 ohms* (balanced)

- Monitor
8 ohms

- Headset (Clevite-Brush BA-206-1, or equivalent)
10K

Input Level:

- Low-Level
-60 dbm

- High-Level
0 dbm

- Network and Remote
0 dbm

Output Level:

- Program
+8 dbm

- Monitor
10 watts (maximum)

- Intercom Amplifier
1/2 watt

*Factory wired for 150-ohm, low-level input impedance; 600-ohm, program output impedance.

Response:
30-15,000 Hz ± 1 db (referred to 1000 Hz)

Distortion:
Less than 1%

Equivalent Input Noise:
-120 db or better

Audible Noise:
None

Ambient Service Conditions:
Temperature
0° to 50°C (32° to 122°F)

Relative Humidity
Up to 95%

Altitude
Up to 10,000 feet above msl

Power Source:*
115 volts ac, 4 amperes $\pm 10\%$ or
220 volts ac, 2 amperes $\pm 10\%$
50 to 60 Hz.

Table 1-1. 212M-1 Monaural Console Customer Options.

212M-1 PART NUMBER	EQUIPMENT INCLUDED						
	356M-1 Monitor Amplifier 522-3883-001	356P-1 Program Amplifier 522-3884-001	356T-1 Preamplifier Card 522-3885-001	409Z-1 Power Supply 522-3886-001	356V-1 High Level Input Card 522-3887-001	384D-1 Switch Matrix Card 522-3888-001	356R-1 Microphone- Phonograph Preamplifier 522-5486-001
522-3879-011	1	1	6	1	0	1	0
522-3879-021	1	1	5	1	0	1	1
522-3879-031	1	1	5	1	1	1	0
522-3879-041	1	1	4	1	0	1	2
522-3879-051	1	1	4	1	1	1	1
522-3879-061	1	1	4	1	2	1	0
522-3879-071	1	1	3	1	0	1	3
522-3879-081	1	1	3	1	1	1	2
522-3879-091	1	1	3	1	2	1	1
522-3879-101	1	1	3	1	3	1	0
522-3879-111	1	1	2	1	0	1	4
522-3879-121	1	1	2	1	1	1	3
522-3879-131	1	1	2	1	2	1	2
522-3879-141	1	1	2	1	3	1	1
522-3879-151	1	1	2	1	4	1	0
522-3879-161	1	1	1	1	0	1	5
522-3879-171	1	1	1	1	1	1	4
522-3879-181	1	1	1	1	2	1	3
522-3879-191	1	1	1	1	3	1	2
522-3879-201	1	1	1	1	4	1	1
522-3879-211	1	1	1	1	5	1	0

*Factory wired for 115-volt ac power source.

Table 1-2. 212M-1 Monaural Console Equipment Available.

EQUIPMENT AVAILABLE	WEIGHT	OVERALL DIMENSIONS W x L x H (inches)	COLLINS PART NUMBER	NUMBER REQUIRED
212M-1 Monaural Console	65 lbs	37-1/8 x 18 x 10-1/4	522-3879-001	1
260S-1 Add-On Unit	15 lbs	10-1/4 x 8-3/4 x 13	522-3882-001	*
384D-1 Switch Matrix	4 oz	4-7/16 x 6-3/8 x 13/16	522-3888-001	1
356R-1 Microphone- Phonograph Preamplifier	7 oz	4-7/16 x 6-3/8 x 1	758-5486-001	*
356T-1 Preamplifier Card	7 oz	4-7/16 x 6-3/8 x 1	522-3885-001	*
356U-1 Broadcast Audio Preamplifier	7 oz	4-7/16 x 6-3/8 x 1-1/16	772-5273-001	*
356V-1 High-Level Input Card	7 oz	4-7/16 x 6-3/8 x 1	522-3887-001	*
356P-1 Program Amplifier Card	9 oz	4-7/16 x 6-3/8 x 1	522-3884-001	1
356M-1 Monitor Amplifier Card	15 oz	4-7/16 x 6-3/8 x 3-3/8	522-3883-001	1
409Z-1 Power Supply	30 lbs	8 x 13 x 8-1/2	522-3886-001	1
*Quantity depends on application.				

Table 1-3. Unit Instructions.

PUBLICATION	COLLINS PART NUMBER
384D-1 Switch Matrix, Unit Instructions	523-0558-098
356T-1 Preamplifier Card, Unit Instructions	523-0558-093
356V-1 High-Level Input Card, Unit Instructions	523-0558-092
356P-1 Program Amplifier Card, Unit Instructions	523-0558-094
356M-1 Monitor Amplifier Card, Unit Instructions	523-0558-096
409Z-1 Power Supply, Unit Instructions	523-0558-095
356U-1 Broadcast Audio Preamplifier, Unit Instructions	523-0559-550
356R-1 Microphone-Phonograph Preamplifier, Unit Instructions	523-0558-097
260S-1 Add-On Unit, Unit Instructions	523-0558-811

2.1 UNPACKING AND INSPECTING THE EQUIPMENT

Remove all packing material, and carefully lift the unit from their crates. Check the equipment against the packing slips. Visually inspect the units for damaged or missing components. Check for proper operation of controls. Any claims for damage should be filed promptly with the transportation agency. If such claims are to be filed, all packing material must be kept.

2.2 INSTALLATION PROCEDURE

2.2.1 General

The arrangement of studio and control room facilities determines the location of the console in a particular station. Carefully plan the placement of equipment and wiring before beginning any installation work.

All audio wiring should be shielded, twisted pair. To avoid ground loops, ground only one end of the shield. Low-level audio leads must be separated from high-level audio leads. All audio leads must be separated from power and control wiring.

2.2.2 212M-1 Monaural Console Mounting Procedure

Refer to figure 2-1. External wiring enters through eight, 9/16- by 4-5/8-inch slots in the floor of the console. Drill matching holes in the mounting surface for bringing in external wires.

2.2.3 Wiring Instructions

2.2.3.1 Terminal Boards

All external connections are made at terminal boards TB1, TB2, TB5, TB6, and TB8 in the floor of the console. See figure 6-1.

2.2.3.2 Audio Input

All audio input leads must be 2-wire, shielded cables.

Note

Ground the cable shields at the console end only.

- a. Input Amplifiers 1 Through 5. Connect input amplifiers 1 through 5 as indicated in table 2-1. Inputs are determined by the selection of cards. Refer to paragraph 2.2.4.2.
- b. Remote Line Inputs. Connect the remote line inputs as indicated in table 2-1. The inputs are internally wired through the 384D-1 Switch Matrix to the RMT side of the NET/RMT input switch of input amplifier 6.
- c. Network Input. Connect the network input as indicated in table 2-1. This input is internally wired to the NET side of the NET/RMT input switch of input amplifier 6.
- d. External VU Meter Input. Connect the external line to be monitored through a 7500/3900-ohm pad, as indicated in table 2-1. Refer to figure 2-2 and table 2-2.
- e. External Monitor Input. Connect the external monitor input signal as indicated in table 2-1. Nominal input should be 0 dbm from a 600-ohm, unbalanced source.

Three additional inputs may be wired directly to the MONITOR INPUT switch.

2.2.3.3 Interlocked Connections

- a. Relay Unit. Refer to figure 2-3 for a typical connection at TB7. Select the four inputs to be interlocked. Relay A4K4 is factory wired to interlock the built-in speaker. Connect the relay control wires to TB7 as indicated in table 2-1.

Caution

Connect an 8-ohm, 5-watt resistor across any unused speaker terminals.

- b. Monitor Speakers. Refer to figure 2-4. Connect the monitor speakers as indicated in table 2-1.

- c. Intercom Speakers. Refer to figure 2-5. Connect intercom speakers and jumpers as indicated in table 2-1. If interlocking is not desired, intercom speakers may be connected directly to TB2. Connect a 4-ohm, 1-watt resistor across unused intercom speaker terminals.
- d. ON/OFF THE AIR Lamps. Refer to figure 2-6. Connect the ON/OFF THE AIR lamps as indicated in table 2-1.

2.2.3.4 Audio Output Wiring

- a. Program Output. Connect the program output line as indicated in table 2-1.
- b. Headset. Connect the headset as indicated in table 2-1.

2.2.3.5 AC Input Wiring

- a. 115-Volt Operation (figure 2-7). The 212M-1 is factory wired at plug P1 and terminal board TB6 for 115-volt operation. On plug P1, pins 1 and 5 and pins 3 and 6 are jumpered together. On terminal board TB6, terminals TB6-22 and TB6-23 are jumpered together. Connect the 115-volt ac input line to TB6-24 and TB6-23 (neutral). Use AWG No. 16 wire for the 115-volt ac input line.
- b. 220-Volt Operation (figure 2-7). For 220-volt operation, remove the jumpers between pins 1 and 5 and pins 3 and 6 on plug P1. Jumper pin 3 to 5 on plug P1. Remove the strap between TB6-22 and TB6-23. Connect the 220-volt ac line to TB6-22 and TB6-24. Connect the neutral line to TB6-23. Use AWG No. 16 wire for the 220-volt ac input line.

2.2.4 Installing the Units

2.2.4.1 409Z-1 Power Supply

Place the power supply in the right-hand rear corner of the console, and secure it with the latches provided. Connect P1 in the console to J1 on the power supply. Temporarily connect the ac line input to TB6-22 and TB6-24. Set resistor R20 for +6 volts dc at TP6. Set resistor R13 for +4 volts dc at TP5. Remove the ac input line.

2.2.4.2 Cards

Refer to figure 4-1.

- a. Insert 384D-1 Switch Matrix in A2XA1.

- b. Insert the 356T-1 Preamplifier Card, the 356V-1 High-Level Input Card, the 356U-1 Broadcast Audio Preamplifier, or the 356R-1 Microphone-Phonograph Preamplifier in A2XA2 through A2XA6. If the 384D-1 Switch Matrix is to be used, install the 356T-1 Preamplifier Card in A2XA7. Selection of cards depends on specific requirements. See paragraphs 1.5.2 through 1.5.5.
- c. Insert the 356P-1 Program Amplifier Card in A2XA8.
- d. Insert the 356M-1 Monitor Amplifier Card in A2XA9.

2.3 INITIAL ADJUSTMENTS

2.3.1 Program Amplifier

- a. Connect a 600-ohm, 1/4-watt resistor across the program output, TB1-1 and TB1-2.
- b. Set the VU/EXT switch to VU.
- c. Connect a 0.003-volt, 1-kHz signal from an unbalanced, 600-ohm signal generator to TB8-2 and TB8-4 (common).
- d. Set the MASTER gain control for an indication of 0 vu on the VU meter.
- e. Check for +8 dbm at TB1-1 and TB1-2.
- f. Remove the signal generator.

2.3.2 Monitor Amplifier

- a. Remove relays A4K1 through A4K4.
- b. Connect an 8-ohm, 10-watt resistor between TB5-4 and TB5-5.
- c. Set BALANCE control R38 on the 356M-1 card to the midpoint.
- d. Set the MONITOR INPUT switch to PGM.
- e. Set the MONITOR gain control to the 12 o'clock position.
- f. Connect a 0.003-volt, 1-kHz signal from an unbalanced, 600-ohm signal generator to TB8-2 and TB8-4 (common).
- g. Connect an audio vtvm to monitor output, TB5-4 and TB5-5 (common).
- h. Set BALANCE control R38 on the 356M-1 for a reading of 6 volts rms on the vtvm.
- i. Remove test equipment.

2.3.3 356V-1 High-Level Input Card

- a. Set R22 on the 356V-1 to the counterclockwise stop.
- b. Set the VU/EXT switch to VU.
- c. Set the associated MIXER control to minimum gain.
- d. Set the associated AUD/PGM switch to PGM.

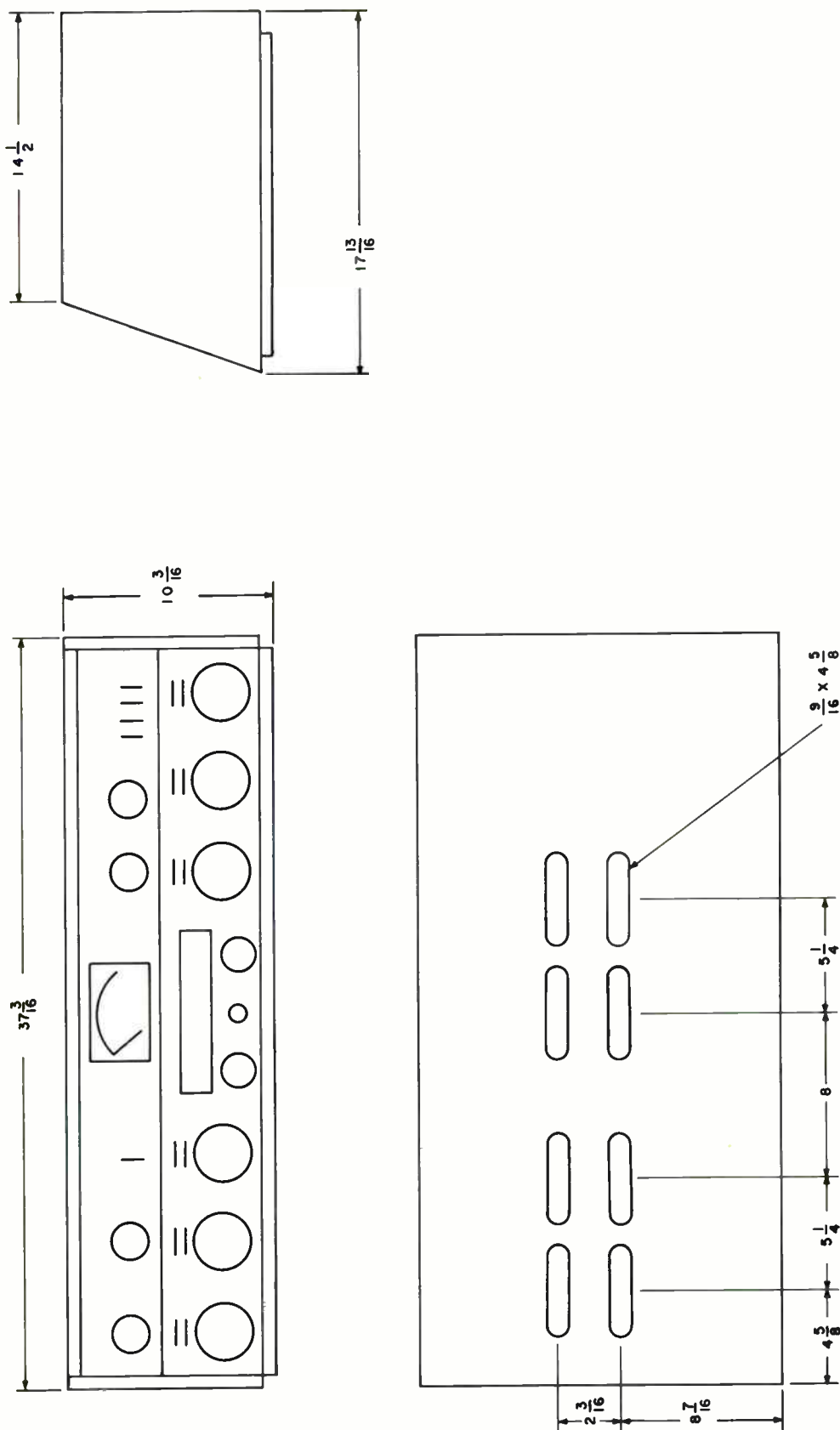


Figure 2-1. Outline and Dimensions, 212M-1 Monaural Console.

- e. Set the associated A/B input switch to A.
- f. Connect an unbalanced, 600-ohm signal generator to input A.
- g. Set the signal generator to 1 kHz at 0 dbm.
- h. Set the associated MIXER control to the 1 o'clock position.
- i. Turn R22 on the 356V-1 until the VU meter indicates 0 vu.
- j. Remove the signal generator.

2.3.4 356T-1 Preamplifier Card

Perform the same procedure as for the 356V-1, except use R10 on the 356T-1 and a 0.001-volt input signal.

2.3.5 356R-1 Microphone-Phonograph Preamplifier

If the 356R-1 is strapped for a high-level input, perform the same procedure as for the 356V-1, except use R35 on the 356R-1. If the 356R-1 is strapped for a low-level input, set the signal generator to 5 millivolts.

2.3.6 356U-1 Broadcast Audio Preamplifier

If the 356U-1 is strapped for a high-level input, perform the same procedure as for the 356V-1, except use R24 on the 356U-1 and start with R24 set to the counterclockwise stop. If the 356U-1 is strapped for a low-level input, set the signal generator to 5 millivolts.

Table 2-1. Connections to Terminal Boards.

TERMINAL BOARD	TERMINAL	FUNCTION	POLARIZATION
TB1	1	Program line output	Tip
TB1	2	Program line output	Ring
TB1	3	Network line input	Tip
TB1	4	Network line input	Ring
TB1	5	Remote line 1 input	Tip
TB1	6	Remote line 1 input	Ring
TB1	7	Remote line 2 input	Tip
TB1	8	Remote line 2 input	Ring
TB1	9	Remote line 3 input	Tip
TB1	10	Remote line 3 input	Ring
TB1	11	Remote line 4 input	Tip
TB1	12	Remote line 4 input	Ring
TB1	13	Input A, input amplifier 1	Tip
TB1	14	Input A, input amplifier 1	Ring
TB1	15	Input A, input amplifier 2	Tip
TB1	16	Input A, input amplifier 2	Ring
TB1	17	Input A, input amplifier 3	Tip
TB1	18	Input A, input amplifier 3	Ring
TB1	19	Input A, input amplifier 4	Tip
TB1	20	Input A, input amplifier 4	Ring
TB1	21	Input A, input amplifier 5	Tip
TB1	22	Input A, input amplifier 5	Ring
TB1	23	Network input, input amplifier 6	Tip
TB1	24	Network input, input amplifier 6	Ring
TB2	1	Intercom speaker A	
TB2	2	Intercom speaker B	
TB2	3	Intercom speaker (common)	
TB2	4	Intercom speaker C	
TB2	5	Intercom speaker D	
TB2	6	Spare	

□ DENOTES DIFFERENCES BETWEEN 212M-1 & 212S-1

Table 2-1. Connections to Terminal Boards (Cont).

TERMINAL BOARD	TERMINAL	FUNCTION	POLARIZATION
TB2	7	External monitor input 1	Tip
TB2	8	External monitor input 1 (common)	Ring
TB2	9	External VU meter input	Tip
TB2	10	External VU meter input	Ring
TB2	11	Headset	Tip
TB2	12	Headset	Ring
TB2	13	Input B, input amplifier 1	Tip
TB2	14	Input B, input amplifier 1	Ring
TB2	15	Input B, input amplifier 2	Tip
TB2	16	Input B, input amplifier 2	Ring
TB2	17	Input B, input amplifier 3	Tip
TB2	18	Input B, input amplifier 3	Ring
TB2	19	Input B, input amplifier 4	Tip
TB2	20	Input B, input amplifier 4	Ring
TB2	21	Input B, input amplifier 5	Tip
TB2	22	Input B, input amplifier 5	Ring
TB2	23	Remote input, input amplifier 6	Tip
TB2	24	Remote input, input amplifier 6	Ring
TB5	1	+12 vdc	Positive
TB5	2	12 vdc, common	Negative
TB5	3	Spare	
TB5	4	Monitor output	Tip
TB5	5	Monitor output (common)	Ring
TB5	6	Monitor speaker 1	Tip
TB5	7	Monitor speaker 2	Tip
TB5	8	Monitor speaker 1	Ring
TB5	9	Monitor speakers 2 and 4	Ring
TB5	10	Monitor speaker 3	Tip
TB5	11	Monitor speaker 4	Tip
TB5	12	Monitor speaker 3	Ring
TB5	13	Intercom speaker interlock A4K1	Tip
TB5	14	Intercom speaker interlock A4K1	Ring
TB5	15	Intercom speaker interlock A4K2	Tip
TB5	16	Intercom speaker interlock A4K2	Ring
TB5	17	Intercom speaker interlock A4K3	Tip
TB5	18	Intercom speaker interlock A4K3	Ring
TB5	19	Built-in speaker interlock A4K4	Tip
TB5	20	Built-in speaker interlock A4K4	Ring
TB5	21	Relay A4K1, control	Black/white
TB5	22	Relay A4K2, control	Brown/white
TB5	23	Relay A4K3, control	Red/white
TB5	24	Relay A4K4, control	Orange/white
TB6	1	ON/OFF THE AIR lamp control A4K1	OFF
TB6	2	ON/OFF THE AIR lamp control A4K1	Common
TB6	3	ON/OFF THE AIR lamp control A4K1	ON
TB6	4	ON/OFF THE AIR lamp control A4K2	OFF
TB6	5	ON/OFF THE AIR lamp control A4K2	Common
TB6	6	ON/OFF THE AIR lamp control A4K2	ON

Table 2-1. Connections to Terminal Boards (Cont).

TERMINAL BOARD	TERMINAL	FUNCTION	POLARIZATION
TB6	7	ON/OFF THE AIR lamp control A4K3	OFF
TB6	8	ON/OFF THE AIR lamp control A4K3	Common
TB6	9	ON/OFF THE AIR lamp control A4K3	ON
TB6	10	ON/OFF THE AIR lamp control A4K4	OFF
TB6	11	ON/OFF THE AIR lamp control A4K4	Common
TB6	12	ON/OFF THE AIR lamp control A4K4	ON
TB6	13	Spare	
TB6	14	Spare	
TB6	15	Spare	
TB6	16	Spare	
TB6	17	Spare	
TB6	18	Spare	
TB6	19	Spare	
TB6	20	Spare	
TB6	21	Spare	
TB6	22	Ac line input	
TB6	23	Ac line input, neutral	
TB6	24	Ac line input	
TB7	1	Input amplifier 1, A of A/B switch, relay operate grd	
TB7	2	Input amplifier 1, B of A/B switch, relay operate grd	
TB7	3	Input amplifier 2, A of A/B switch, relay operate grd	
TB7	4	Input amplifier 2, B of A/B switch, relay operate grd	
TB7	5	Input amplifier 3, A of A/B switch, relay operate grd	
TB7	6	Input amplifier 3, B of A/B switch, relay operate grd	
TB7	7	Input amplifier 4, A of A/B switch, relay operate grd	
TB7	8	Input amplifier 4, B of A/B switch, relay operate grd	
TB7	9	Input amplifier 5, A of A/B switch, relay operate grd	
TB7	10	Input amplifier 5, B of A/B switch, relay operate grd	
TB7	11	Spare	
TB7	12	Spare	
TB8	1	Audition bus	
TB8	2	Program bus	
TB8	3	Cue bus	
TB8	4	Bus, common	
TB8	5	Spare	
TB8	6	Spare	
TB8	7	Spare	
TB8	8	Spare	

Table 2-1. Connections to Terminal Boards (Cont).

TERMINAL BOARD	TERMINAL	FUNCTION	POLARIZATION
TB8	9	Spare	Positive
TB8	10	Spare	
TB8	11	+30 vdc	
TB8	12	30 vdc, common	
TB8	13	Spare	Positive
TB8	14	Spare	
TB8	15	+6 vdc	
TB8	16	+4 vdc	
TB8	17	6 and 4 vdc, common	Negative
TB8	18	Spare	
TB8	19	Spare	
TB8	20	Spare	

Table 2-2. Calculated Resistance Values in Ohms.

LEVEL TO BE METERED (dbm)	PAD LOSS FOR 0 VU READING (db)	R1 (ohms)	R2 (ohms)	R3 (ohms)
+4	0	0	Open	0
+8	4	882.5	8177	882.5
+16	12	2334	2091	2334
+32	28	3601	311	3601

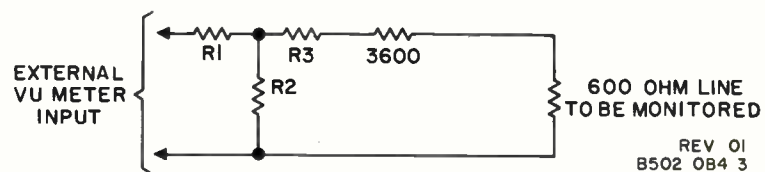


Figure 2-2. VU Meter Pad.

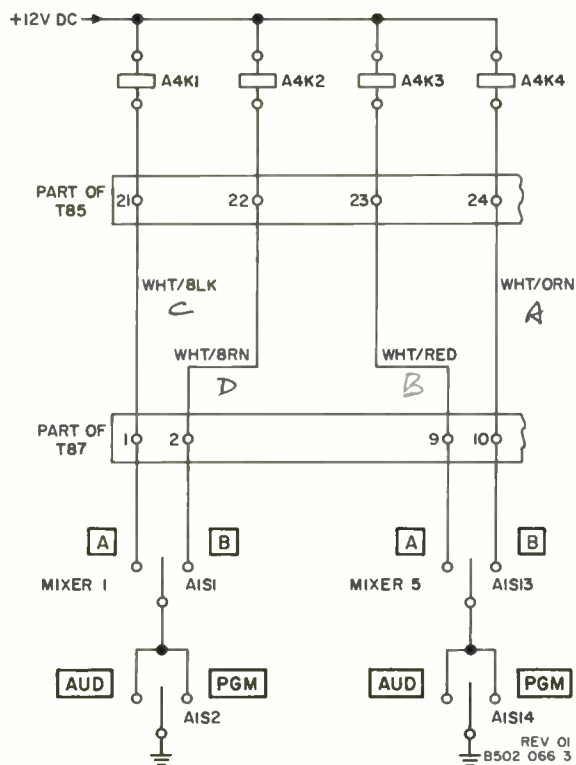
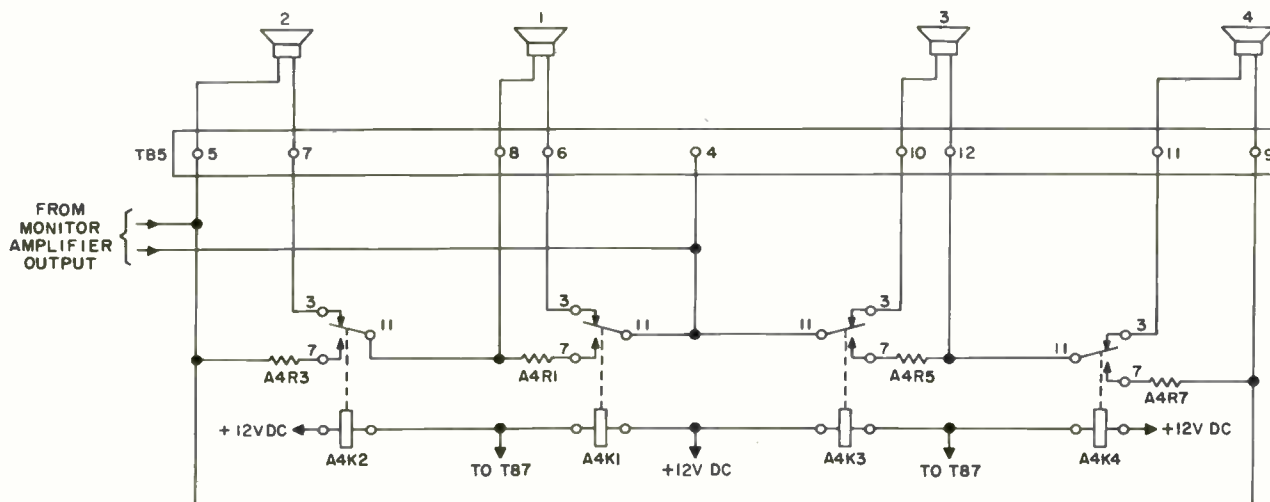


Figure 2-3. Relay Control, Simplified Schematic.

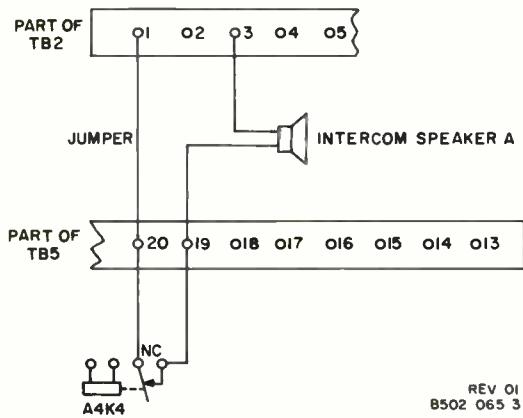


MONITOR SPEAKER CONNECTIONS

- NOTES:
1. R1, R3, R5, AND R7 ARE 8 OHM, 5 WATT RESISTORS
 2. REPLACE ANY UNUSED SPEAKERS WITH AN 8 OHM, 5 WATT RESISTOR
 3. IF NO MUTING IS DESIRED, REMOVE RELAYS OR RELAY OPERATE WIRES AND CONNECT AN 8 OHM SPEAKER TO T85-4 AND T85-5

REV 01
B502 III 3

Figure 2-4. Monitor Speaker Interlocks, Simplified Schematic.



REV 01
B502 065 3

Figure 2-5. Intercom Speaker Interlocks, Simplified Schematic.

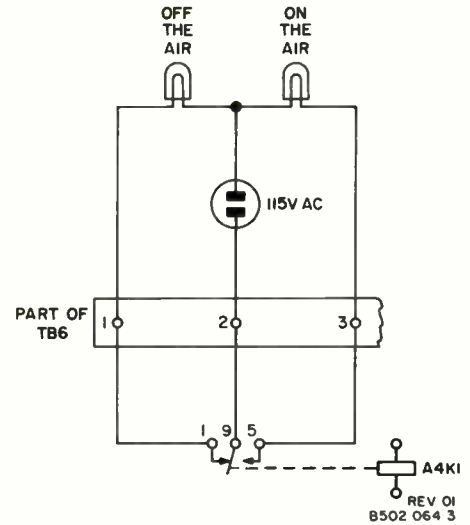


Figure 2-6. ON/OFF THE AIR Lamps, Simplified Schematic.

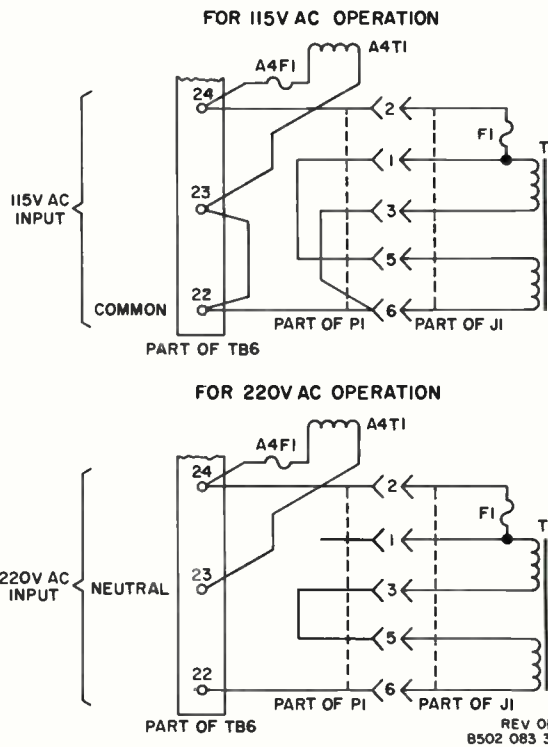


Figure 2-7. AC Input Wiring, Simplified Schematic.

section 3

operation

3.1 CONTROLS

This section locates, illustrates, and describes the function of each front panel control (figure 3-1 and table 3-1).

3.2 OPERATING PROCEDURES

3.2.1 Initial Setup

- Set all MIXER controls to the first mark from the counterclockwise stop.
- Set the NET/RMT, and all AUD/PGM, A/B, and REMOTE LINES switches to their center (off) positions.
- Set the INTERCOM switch to CUE.
- Set the VU/EXT switch to VU.
- Set the HEADSET, MONITOR INPUT, MONITOR, and LEVEL controls as desired.
- See paragraph 2.3.1.1 to set the MASTER gain control.

3.2.2 Remote Inputs

- Perform the procedure in paragraph 3.2.1.
- To monitor a remote line, set the INTERCOM switch to RMT and the desired REMOTE LINES switch to MON. The MON position of the REMOTE LINES switch disables the reverse cue function. The intercom PTT switch allows 2-way communication with the remote site.
- To put the program output on the remote line for reverse cue to the remote site:
 - Set the NET/RMT switch to the center (off) position.
 - Set the associated AUD/PGM switch to the center (off) position.
 - Set the MIXER 6 control to the first mark from the counterclockwise stop.
 - Set the desired REMOTE LINES switch to MIX.

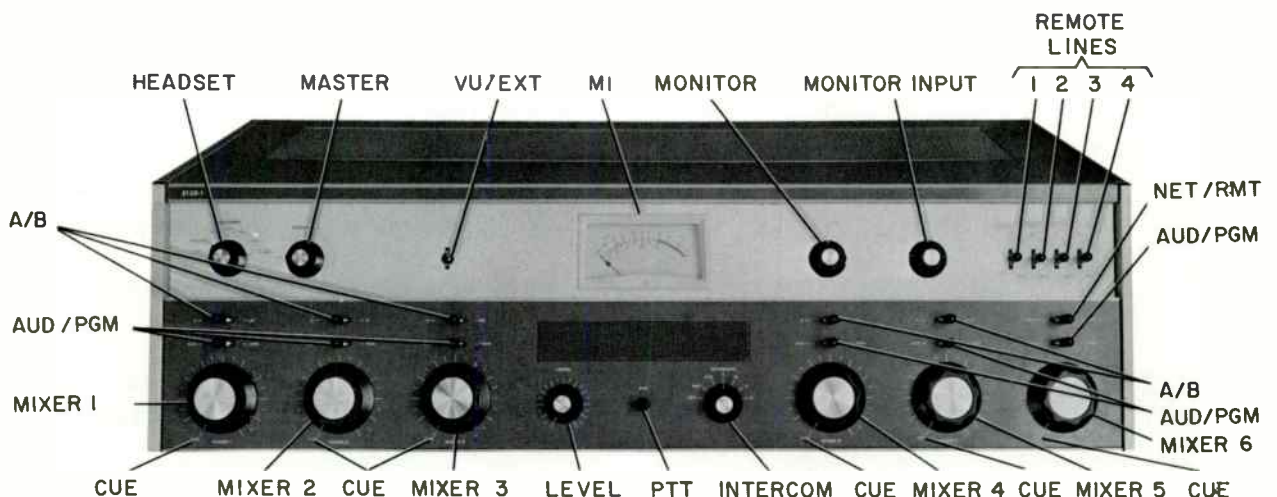


Figure 3-1. Control Locations, 212M-1 Monaural Console.

- d. To broadcast a remote program:
1. Set the desired REMOTE LINES switch to MIX.
 2. On cue:
 - (a) Set the NET/RMT switch to RMT.
 - (b) Set the associated AUD/PGM switch to PGM.
 - (c) Set the MIXER 6 control for a level of 0 vu.

3.2.3 Network Input

- a. Perform the procedure in paragraph 3.2.1.
- b. Set MIXER 6 to CUE.
- c. Set the NET/RMT switch to NET.
- d. Set the associated AUD/PGM switch to PGM.
- e. On cue, rotate MIXER 6 clockwise and set the level to 0 vu.

Table 3-1. Front Panel Controls.

CONTROL	FUNCTION																
HEADSET	<p>Selects the input to the headset. Switch positions and functions are as follows:</p> <table border="0"> <thead> <tr> <th style="text-align: left;"><u>Position</u></th> <th style="text-align: left;"><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>No input to the headset</td> </tr> <tr> <td>INT COM</td> <td>Transfers the intercom amplifier output from the built-in speaker to the headset</td> </tr> <tr> <td>RMT</td> <td>Connects the remote line, selected by the MON position of a REMOTE LINES switch, to the headset</td> </tr> <tr> <td>NET</td> <td>Connects the network input to the headset</td> </tr> <tr> <td>PGM</td> <td>Connects the program output to the headset</td> </tr> <tr> <td>EXT A</td> <td>Connects external input A to the headset</td> </tr> <tr> <td>EXT B</td> <td>Connects external input B to the headset</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	OFF	No input to the headset	INT COM	Transfers the intercom amplifier output from the built-in speaker to the headset	RMT	Connects the remote line, selected by the MON position of a REMOTE LINES switch, to the headset	NET	Connects the network input to the headset	PGM	Connects the program output to the headset	EXT A	Connects external input A to the headset	EXT B	Connects external input B to the headset
<u>Position</u>	<u>Function</u>																
OFF	No input to the headset																
INT COM	Transfers the intercom amplifier output from the built-in speaker to the headset																
RMT	Connects the remote line, selected by the MON position of a REMOTE LINES switch, to the headset																
NET	Connects the network input to the headset																
PGM	Connects the program output to the headset																
EXT A	Connects external input A to the headset																
EXT B	Connects external input B to the headset																
MASTER VU/EXT	<p>Controls the output level of the program amplifier Selects the input to the VU meter. Switch positions and functions are as follows:</p> <table border="0"> <thead> <tr> <th style="text-align: left;"><u>Position</u></th> <th style="text-align: left;"><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>VU</td> <td>Connects the VU meter to the program amplifier output</td> </tr> <tr> <td>EXT</td> <td>Connects the VU meter to an external line to be metered</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	VU	Connects the VU meter to the program amplifier output	EXT	Connects the VU meter to an external line to be metered										
<u>Position</u>	<u>Function</u>																
VU	Connects the VU meter to the program amplifier output																
EXT	Connects the VU meter to an external line to be metered																
MONITOR MONITOR INPUT	<p>Controls the output level of the monitor amplifier Selects the input to the monitor amplifier. Switch positions and functions are as follows:</p> <table border="0"> <thead> <tr> <th style="text-align: left;"><u>Position</u></th> <th style="text-align: left;"><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>No input to the monitor amplifier</td> </tr> <tr> <td>AUD</td> <td>Connects the audition bus to the monitor amplifier input</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	OFF	No input to the monitor amplifier	AUD	Connects the audition bus to the monitor amplifier input										
<u>Position</u>	<u>Function</u>																
OFF	No input to the monitor amplifier																
AUD	Connects the audition bus to the monitor amplifier input																

Table 3-1. Front Panel Controls (Cont).

CONTROL	FUNCTION																
<p>REMOTE LINES 1, 2, 3, 4</p> <p>AUD/PGM</p>	<p>PGM Connects the program amplifier output to the monitor amplifier input</p> <p>EXT 1 Connects external input 1 to the monitor amplifier input</p> <p>EXT 2 Connects external input 2 to the monitor amplifier input</p> <p>EXT 3 Connects external input 3 to the monitor amplifier input</p> <p>EXT 4 Connects external input 4 to the monitor amplifier input</p> <p>Select the associated remote line input. Switch positions and functions are as follows:</p> <table border="0"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>Center</td> <td>Off</td> </tr> <tr> <td>MIX</td> <td>Connects the associated remote line to the RMT side of the NET/RMT switch</td> </tr> <tr> <td>MON</td> <td>Connects the associated remote line to the INTERCOM and HEADSET input switches</td> </tr> </tbody> </table> <p>Switches the outputs of the associated amplifier. Switch positions and functions are as follows:</p> <table border="0"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>Center</td> <td>Off</td> </tr> <tr> <td>AUD</td> <td>Connects the output of the associated amplifier to the audition bus</td> </tr> <tr> <td>PGM</td> <td>Connects the output of the associated amplifier to the program bus</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	Center	Off	MIX	Connects the associated remote line to the RMT side of the NET/RMT switch	MON	Connects the associated remote line to the INTERCOM and HEADSET input switches	<u>Position</u>	<u>Function</u>	Center	Off	AUD	Connects the output of the associated amplifier to the audition bus	PGM	Connects the output of the associated amplifier to the program bus
<u>Position</u>	<u>Function</u>																
Center	Off																
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<u>Position</u>	<u>Function</u>																
Center	Off																
AUD	Connects the output of the associated amplifier to the audition bus																
PGM	Connects the output of the associated amplifier to the program bus																
<p>MIXER 1</p> <p>MIXER 2 through MIXER 6 A/B</p>	<p>Controls the output level of the associated input amplifier. The CUE position, at the counterclockwise stop, disables the AUD/PGM switch and connects the output of the associated amplifier to the cue bus.</p> <p>Same as MIXER 1</p> <p>Selects the input to the associated amplifier. Switch positions and functions are as follows:</p> <table border="0"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>Center</td> <td>Off</td> </tr> <tr> <td>A</td> <td>Connects input A to the associated amplifier</td> </tr> <tr> <td>B</td> <td>Connects input B to the associated amplifier</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	Center	Off	A	Connects input A to the associated amplifier	B	Connects input B to the associated amplifier								
<u>Position</u>	<u>Function</u>																
Center	Off																
A	Connects input A to the associated amplifier																
B	Connects input B to the associated amplifier																

Table 3-1. Front Panel Controls (Cont).

CONTROL	FUNCTION										
NET/RMT	<p>Selects the input to amplifier 6. Switch positions and functions are as follows:</p> <table border="0"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>Center</td> <td>Off</td> </tr> <tr> <td>NET</td> <td>Connects the network input to amplifier 6</td> </tr> <tr> <td>RMT</td> <td>Connects the MIX output from the REMOTE LINES switches to amplifier 6</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	Center	Off	NET	Connects the network input to amplifier 6	RMT	Connects the MIX output from the REMOTE LINES switches to amplifier 6		
<u>Position</u>	<u>Function</u>										
Center	Off										
NET	Connects the network input to amplifier 6										
RMT	Connects the MIX output from the REMOTE LINES switches to amplifier 6										
INTERCOM	<p>Selects the input to the intercom amplifier. Switch positions and functions are as follows:</p> <table border="0"> <thead> <tr> <th><u>Position</u></th> <th><u>Function</u></th> </tr> </thead> <tbody> <tr> <td>Off</td> <td>No input to the intercom amplifier</td> </tr> <tr> <td>RMT</td> <td>Connects the MON output from the REMOTE LINES switches to the intercom amplifier</td> </tr> <tr> <td>CUE</td> <td>Connects the cue bus to the intercom amplifier</td> </tr> <tr> <td>A.B.C.D</td> <td>Connects the associated intercom slave speaker to the intercom amplifier</td> </tr> </tbody> </table>	<u>Position</u>	<u>Function</u>	Off	No input to the intercom amplifier	RMT	Connects the MON output from the REMOTE LINES switches to the intercom amplifier	CUE	Connects the cue bus to the intercom amplifier	A.B.C.D	Connects the associated intercom slave speaker to the intercom amplifier
<u>Position</u>	<u>Function</u>										
Off	No input to the intercom amplifier										
RMT	Connects the MON output from the REMOTE LINES switches to the intercom amplifier										
CUE	Connects the cue bus to the intercom amplifier										
A.B.C.D	Connects the associated intercom slave speaker to the intercom amplifier										
LEVEL PTT (push-to-talk)	<p>Controls the output level of the intercom amplifier Switches the built-in speaker for 2-way communication with a remote site or one of four slave speakers as selected by the INTERCOM switch</p>										

section 4

principles of operation

4.1 GENERAL

Figure 4-1 is a functional block diagram of the 212M-1 Monaural Console. Blocks A2A1 through A2A9 are plug-in, etched circuit cards.

4.2 INPUT AMPLIFIERS

4.2.1 Input Amplifiers 1 Through 5

Figure 4-2 is a simplified schematic of input amplifier 1. Amplifiers 1 through 5 are identical.

MIXER 1 control A1R1 varies the current supplied to the photoconductive level control on the plug-in card. Cue switch A1S3 operates when the MIXER 1 control is in the extreme counterclockwise (CUE) position. The cue switch transfers +4 volts from the top contacts of AUD/PGM switch A1S2 to the photoconductive cue output switch on the plug-in card.

The top contacts of the AUD/PGM switch, in series with the cue switch, connect +4 volts to photoconductive switches on the plug-in card to select the input signal.

The bottom contacts of the A/B switch, in series with the bottom contacts of the AUD/PGM switch, provide a ground return path for control relays.

4.2.2 Input Amplifier 6

Figure 4-3 is a simplified schematic of input amplifier 6. Cards A2A1 and A2A7 are the 384D-1 Switch Matrix and the 356T-1 Preamplifier Card respectively.

MIXER 6 control A1R11 varies the current to the photoconductive level control on the plug-in card. Cue switch A1S18 operates when the MIXER 6 control is in the extreme counterclockwise (CUE) position. The cue switch transfers +4 volts from the top contacts of AUD/PGM switch A1S17 to the photoconductive cue output switch on the plug-in card and the gate circuit in the reverse cue amplifier. Applying +4 volts to the gate circuit turns off the reverse cue amplifier.

In the NET position, NET/RMT switch A1S16 connects +4 volts to the photoconductive remote input switch on the plug-in card and the bottom contacts on the AUD/PGM switch. In the RMT position, the bottom contacts of the NET/RMT switch provide a ground return path to operate relay A1A1K1. Relay A1A1K1 disconnects the output of the reverse cue amplifier.

The top contacts of the AUD/PGM switch, in series with the cue switch, connect +4 volts to photoconductive output switches on the plug-in card. The bottom contacts of the AUD/PGM switch connect +4 volts from the top contacts of the NET/RMT switch to the gate circuit of the reverse cue amplifier.

The MIX output from the switch matrix connects to the input of amplifier 6 and the output of the reverse cue amplifier. The MON output of the switch matrix connects to transformer A1A1T1 input. Transformer A1A1T1 output connects to the RMT position of the INTERCOM input switch to permit 2-way communication through a remote line. The transformer matches the impedance of the remote line to the intercom amplifier. The REMOTE LINES switches control the switch matrix. Refer to the 384D-1 Switch Matrix Unit Instructions bound in the back of this book.

The reverse cue amplifier accepts the padded output from the program amplifier and applies it to the MIX output of the switch matrix. Relay A1A1K1 and the gate circuit prevent feedback into input amplifier 6.

4.3 PROGRAM CIRCUITS

The program and audition outputs of the input amplifiers connect to the program and audition buses respectively. The program bus connects to the program amplifier input. The audition bus connects to MONITOR INPUT switch A1S23.

4.4 MONITOR CIRCUITS

The MONITOR INPUT switch selects the input to the monitor amplifier. Refer to figure 7-1 and

table 3-1. Refer to figure 2-4 for monitor speaker interlocking.

4.5 INTERCOM CIRCUITS

The INTERCOM switch, LEVEL control, and PTT switch control the intercom amplifier. Refer to table 3-1 for control functions. Refer to figure 4-3 for remote location intercommunication. The remote input line is used for remote intercom.

4.5.1 Cue Listening

The CUE position of the INTERCOM switch connects the cue bus to the intercom amplifier input. When a MIXER control is in the CUE position, the associated amplifier output connects to the cue bus.

LEVEL control A1R13 controls signal level to the intercom amplifier. Class A amplifier A1A1Q3 drives emitter-follower A1A1Q4. Emitter-follower A1A1Q4 matches the input impedance of transistor A1A1Q5, which drives phase inverter A1A1Q6 and A1A1Q7. The phase inverter drives class AB power amplifier A1A1Q8 and A1A1Q9. Silicon diodes A1A1CR1, A1A1CR2, and A1A1CR3 provide bias for transistors A1A1Q6 and A1A1Q7. The PTT switch normally connects the built-in speaker to the intercom amplifier output. When pushed, the PTT switch transfers the built-in speaker connection to the intercom amplifier input.

4.5.2 Reverse Cue Circuits

The padded program output connects to the reverse cue amplifier input (figure 4-3).

Transformer A1A1T2 matches the impedance of the program output pad to the bases of transistors A1A1Q1 and A1A1Q2. The output of class B amplifier A1A1Q1 and A1A1Q2 couples through transformer A1A1T3 and the normally closed contacts of A1A1K1 to the MIX output of the left channel switch matrix.

When MIXER 6 is in the CUE position or when the NET/RMT switch is in the RMT position and the AUD/PGM switch is in either the AUD or PGM position, transistor A1A1Q10 grounds the bases of A1A1Q1 and A1A1Q2. When the NET/RMT switch is in the RMT position, relay A1A1K1 disconnects the output of the reverse cue amplifier from the left channel switch matrix.

The MIXER 6 control, and the associated NET/RMT and AUD/PGM switches, and the REMOTE LINES switches can connect the program output to a remote line. With the switches properly arranged, the remote site operator can listen to the program being broadcast. The MIXER 6 control must not be in the CUE position. The NET/RMT switch must not be in the RMT position. The AUD/PGM switch must be in the center (off) position. The desired REMOTE LINES switch must be in the MIX position. When the switches are set as stated above, the program output connects to the desired remote line through the reverse cue amplifier, the closed contacts on relay A1A1K1, and switch matrix A2A1.

4.6 HEADSET

The headset connects to a terminal board on the floor of the console. The HEADSET switch selects the input to the headset. Refer to table 3-1.

4.7 INTERLOCKED CIRCUITS

Relays A4K1 through A4K4 interlock the monitor speakers, intercom speakers, and warning lights with four selected A/B switches to prevent program interruption. Refer to figure 2-3.

The A/B and AUD/PGM switches, selected by wiring at a terminal board TB7, operates relay A4K1. Contacts 3, 7, and 11 control the monitor speaker. Contacts 2 and 10 control the intercom speaker. Contacts 1, 9, and 5 control the warning lights. Relays A4K2 through A4K4 operate in the same manner except that contacts 2 and 10 on relay A4K4 control the built-in speaker.

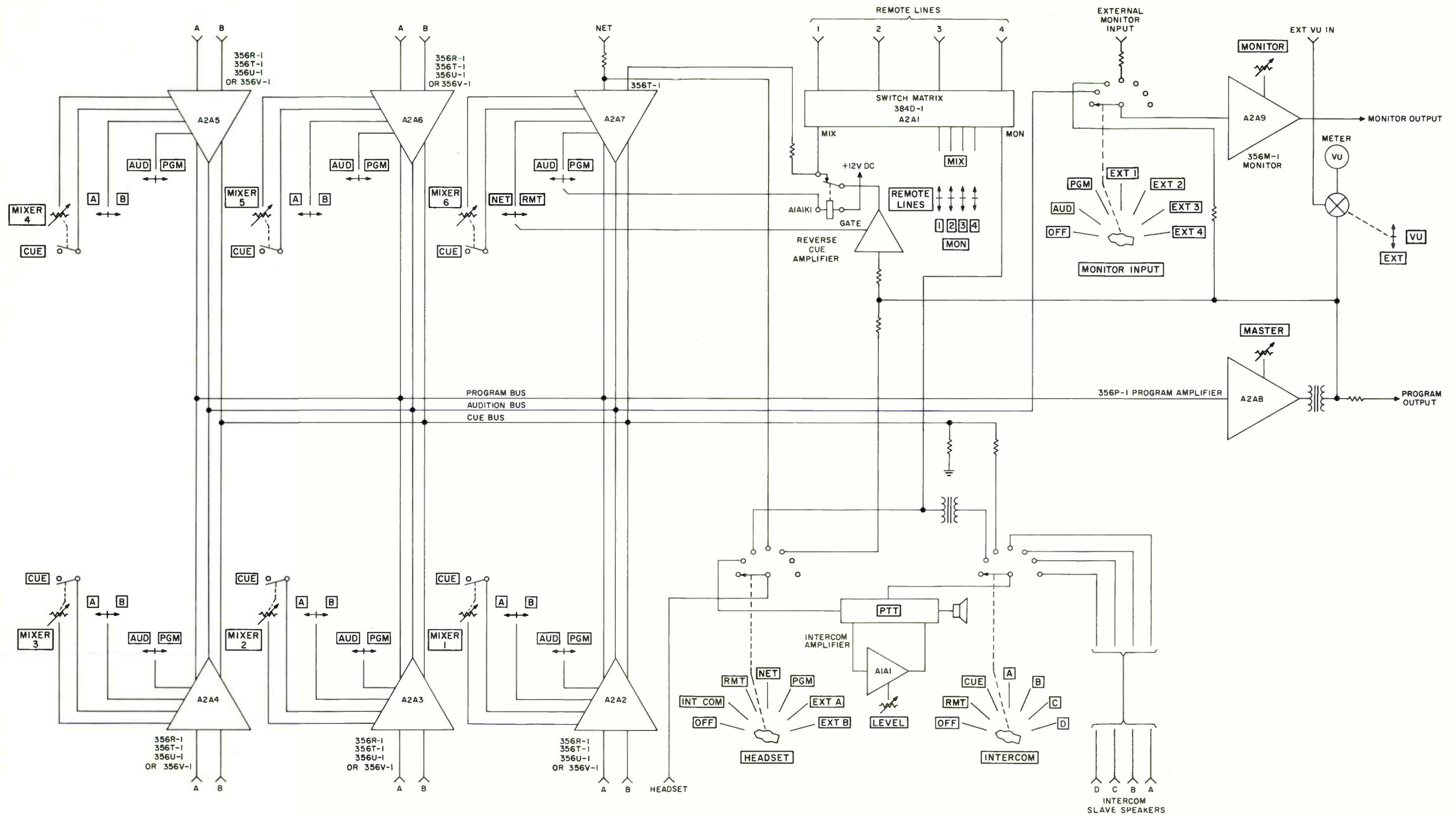


Figure 4-1. Block Diagram, 212M-1 Monaural Console.

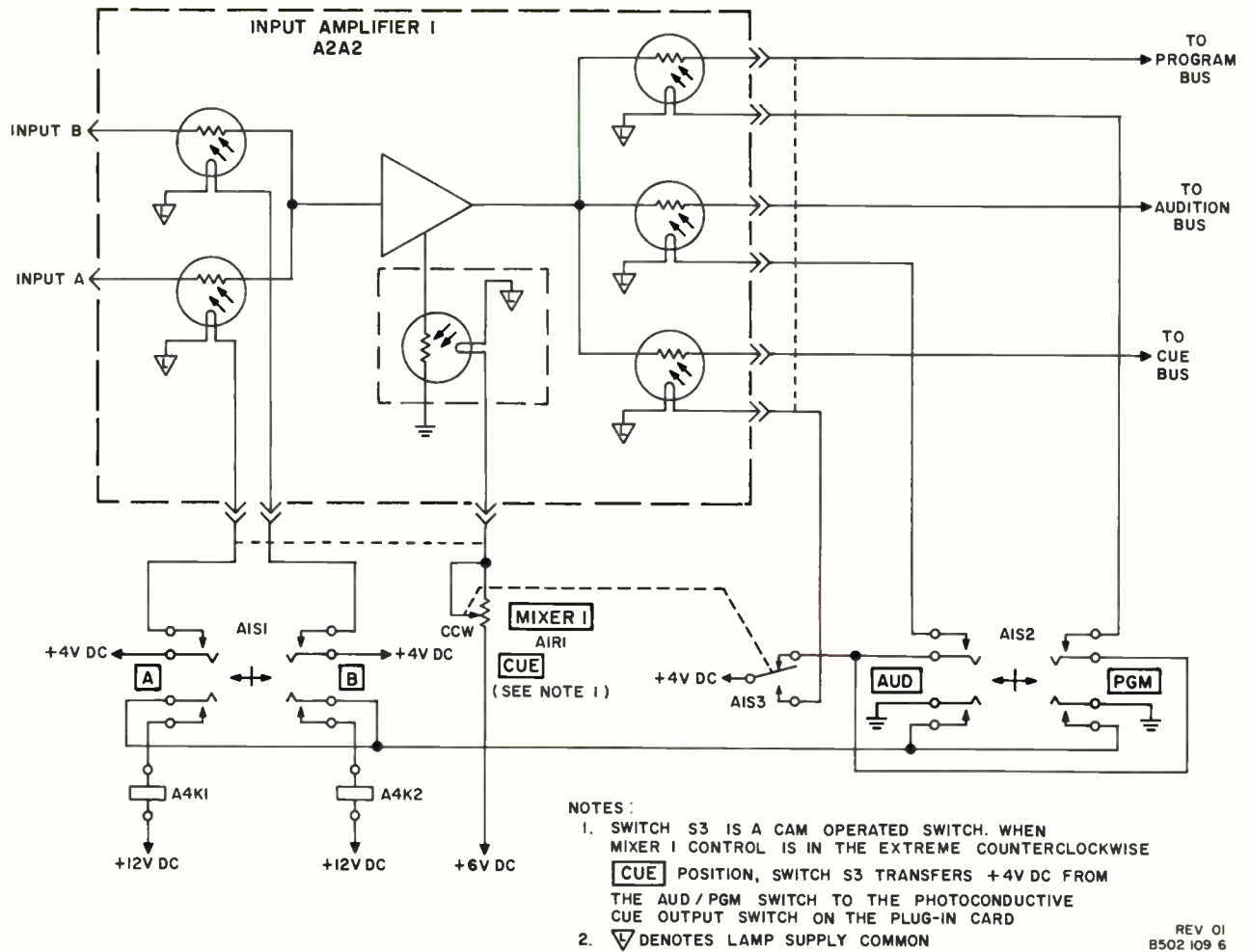


Figure 4-2. Typical Input Amplifier, Simplified Schematic.

section 5

maintenance

5.1 PREVENTIVE MAINTENANCE

5.1.1 Wiring

Periodically check the wiring in the 212M-1 for frayed insulation. Make sure that all terminal board screws are tight. Inspect each plug-in card for signs of component damage.

5.1.2 Mixer Controls

MIXER controls do not require cleaning because they are not in the signal path.

5.1.3 Lever Switches

Periodically clean all key switch contacts with a brush.

5.1.4 Relays

The four plug-in relays, in the front left-hand corner of the console floor, are sealed units.

5.2 CORRECTIVE MAINTENANCE

Use the functional block diagram, figure 4-1, and the overall schematic, figure 7-1, as aids in localizing faults. Test points on the ends of the cards

are accessible with the cards plugged into the card cage. The card extender provides access to components on individual cards.

Refer to the unit instructions, bound in the rear of this book, for maintenance data on the plug-in cards and power supply.

Refer to table 5-1 for a list of fuses, lamps, and plug-in relays.

Caution

When making repairs on the cards, do not use a soldering iron rated at more than 40 watts. Do not jar the card to remove excess solder. Jarring the card may damage the lamp filaments in the photoconductive devices.

5.3 SPARE PARTS

Spare parts may be ordered from the following address:

Collins Radio Company
Service Parts, 412-024
1225 North Alma Road
Richardson, Texas 75080

Table 5-1. Fuses, Lamps, and Plug-In Relays.

PART	DESCRIPTION	MANUFACTURER'S PART NUMBER
RELAY UNIT		
Fuse F1 Relays K1 through K4	0.5 amp Relay	Bussman AGC 250-1/2 Potter & Brunfield KH 4394
FRONT PANEL		
VU meter lamps DS1 and DS2	14-volt, 0.08-amp lamps	GE 756

Table 5-1. Fuses, Lamps, and Plug-In Relays (Cont).

PART	DESCRIPTION	MANUFACTURER'S PART NUMBER
POWER SUPPLY		
Fuse F1	3 amp	Bussman MDX 3
Fuses F2 through F4	1.5 amp	Bussman AGC 250-1-1/2
Fuses F5 and F6	2 amp	Bussman AGC 250-2
Fuse F7	1.5 amp	Bussman AGC 250-1-1/2

5.4 FROM-TO WIRING INFORMATION

Table 5-2 contains FROM-TO information for cables in 212M-1 Monaural Console. The table is useful for tracing point-to-point wiring in the 212M-1. The FROM column is in alphanumeric

order. To trace a particular wire, establish the point from which tracing is to be initiated. Locate that point in the FROM column; the TO column gives the location of the other end of the wire. See the WIRE CODE for types and colors of insulation.

Table 5-2. Wire List.

FROM	TO	WIRE CODE	FROM	TO	WIRE CODE
A1 A 1-BB	A1-S19-11	5XXX	A1-E 1	A1-S16- 1TR	A22PB00X4XXX
A1 A 1-CC	A1-S19- 8	9XXX	A1-E 1	A1-S 1- 1TR	A22PB00X4XXX
A1-A 1- A	A1-TB 1-26	5XXX	A1-E 1	A1-S 4- 1TR	A22PB00X4XXX
A1-A 1- B	A1-TB 1-28	9XXX	A1-E 1	A1-S10- 1TR	A22PB00X4XXX
A1-A 1- C	A1-S20A- 1	5XXX	A1-E 1	A1-S 7- 1TR	A22PB00X4XXX
A1-A 1- D	A1-S20B- 8	9XXX	A1-E 1	A1-S13- 1TR	A22PB00X4XXX
A1-A 1- D	A1-S20B- 1	9XXX	A1-E 2	A1-R 9- 3	A22PB00X5XXX
A1-A 1- E	A1-S20A- 8	5XXX	A1-E 2	A1-R 7- 3	A22PB00X5XXX
A1-A 1- F	A2-A 1- 6	5XXX	A1-E 2	A1-R11- 3	A22PB00X5XXX
A1-A 1- H	A1-XDS 1- 1	A22PB00X2XXX	A1-E 2	A1-R14- 3	A22PB00X5XXX
A1-A 1- H	TB 5- 1	A18PB00X2XXX	A1-E 2	A1-R 5- 3	A22PB00X5XXX
A1-A 1- J	A1-S16- 2BR	A22PB00X90XX	A1-E 2	A1-R 1- 3	A22PB00X5XXX
A1-A 1- K	A2-A 1- 8	9XXX	A1-E 2	A1-R 3- 3	A22PB00X5XXX
A1-A 1- M	A1-E 1	A22PB00X4XXX	A1-E 2	A1-R16- 3	A22PB00X5XXX
A1-A 1- P	A1-S17- 2BR	A22PB00X93XX	A1-E 2	TB 8- 5	A18PB00X5XXX
A1-A 1- R	TB 8- 3	1XXX	A1-E 2	P 1-25	A16PB00X5XXX
A1-A 1- S	TB 8- 4	B18BA00X9XXX	A1-E 2	P 1-26	A16PB00X5XXX
A1-A 1- T	A1-S20A- 7	5XXX	A1-E 3	NC	SHIELD
A1-A 1- W	A1-TB 1-37	5XXX	A1-E 3	NC	SHIELD
A1-A 1- X	A1-TB 1-35	9XXX	A1-E 3	NC	SHIELD
A1-A 1- Y	A1-R13- 2	5XXX	A1-E 4	NC	SHIELD
A1-A 1- Z	A1-S20B- 7	9XXX	A1-E 4	NC	SHIELD
A1-A 1- Z	A1-R13- 3	9XXX	A1-E 4	NC	SHIELD
A1-A 1-AA	P 1-18	2XXX	A1-E 4	NC	SHIELD
A1-A 1-CC	P 1-19	9XXX	A1-E 4	NC	SHIELD
A1-E 1	TB 8-16	A18PB00X4XXX	A1-E 5	NC	SHIELD
A1-E 1	P 1-22	A16PB00X4XXX	A1-E 5	NC	SHIELD
A1-E 1	P 1-23	A16PB00X4XXX	A1-E 5	NC	SHIELD
A1-E 1	A1-S24- 18L	A22PB00X4XXX	A1-E 5	NC	SHIELD
A1-E 1	A1-A 1- M	A22PB00X4XXX	A1-E 5	NC	SHIELD

Table 5-2. Wire List (Cont).

FROM	TO	WIRE CODE	FROM	TO	WIRE CODE
A1-E 6	NC	SHIELD	A1-M 1- 1	A1-S22- 2TR	5XXX
A1-E 6	NC	SHIELD	A1-M 1- 2	A1-S22- 2TL	9XXX
A1-E 6	NC	SHIELD	A1-R 1- 1	A2-XA 2- Z	A22PB00X1XXX
A1-E 7	NC	SHIELD	A1-R 1- 3	A1-E 2	A22PB00X5XXX
A1-E 7	NC	SHIELD	A1-R 3- 1	A2-XA 3- Z	A22PB00X3XXX
A1-E 9	A1-S 2- 1BL	A22PB00X0XXX	A1-R 3- 3	A1-E 2	A22PB00X5XXX
A1-E 9	A1-S 8- 1BL	A22PB00X0XXX	A1-R 5- 1	A2-XA 4- Z	A22PB00X6XXX
A1-E 9	A1-S 5- 1BL	A22PB00X0XXX	A1-R 5- 3	A1-E 2	A22PB00X5XXX
A1-E-13	NC	SHIELD	A1-R 7- 1	A2-XA 5- Z	A22PB00X7XXX
A1-E10	A1-S16- 1BR	A22PB00X0XXX	A1-R 7- 3	A1-E 2	A22PB00X5XXX
A1-E10	A1-S11- 1BL	A22PB00X0XXX	A1-R 9- 1	A2-XA 6- Z	A22PB00X8XXX
A1-E10	A1-S14- 1BL	A22PB00X0XXX	A1-R 9- 3	A1-E 2	A22PB00X5XXX
A1-E11	NC	SHIELD	A1-R11- 1	A2-XA 7- Z	A22PB00X9XXX
A1-E11	NC	SHIELD	A1-R11- 3	A1-E 2	A22PB00X5XXX
A1-E11	NC	SHIELD	A1-R13- 1	A1-S19- 5	5XXX
A1-E12	NC	SHIELD	A1-R13- 2	A1-A 1- Y	5XXX
A1-E12	NC	SHIELD	A1-R13- 3	A1-A 1- Z	9XXX
A1-E12	NC	SHIELD	A1-R13- 3	A1-S19- 2	9XXX
A1-E12	NC	SHIELD	A1-R14- 1	A2-XA 8- Z	A22PB00X6XXX
A1-E13	NC	SHIELD	A1-R14- 3	A1-E 2	A22PB00X5XXX
A1-E13	NC	SHIELD	A1-R16- 1	A2-XA 9- Z	A22PB00X7XXX
A1-E13	NC	SHIELD	A1-R16- 3	A1-E 2	A22PB00X5XXX
A1-E13	NC	SHIELD	A1-S 1- 1TR	A1-E 1	A22PB00X4XXX
A1-E13	NC	SHIELD	A1-S 1- 2BL	TB 7- 1	A22PB00X926X
A1-E13	NC	SHIELD	A1-S 1- 2BR	TB 7- 2	A22PB00X925X
A1-E13	NC	SHIELD	A1-S 1- 2TL	A2-XA 2- T	A22PB00X90XX
A1-E13	NC	SHIELD	A1-S 1- 2TR	A2-XA 2- U	A22PB00X91XX
A1-E14	TB 5- 2	A18PB00X0XXX	A1-S 2- 1BL	A1-E 9	A22PB00X0XXX
A1-LS 1- 1	A1-S19- 6	5XXX	A1-S 2- 2TL	A2-XA 2- W	A22PB00X903X
A1-LS 1- 2	A1-S19- 3	9XXX	A1-S 2- 2TR	A2-XA 2- X	A22PB00X905X

Table 5-2. Wire List (Cont).

FROM	TO	WIRE CODE	FROM	TO	WIRE CODE
A1-S 3- 3	A2-XA 2- V	A22PB00X902X	A1-S13- 2BR	TB 7-10	A22PB00X5XXX
A1-S 4- 1TR	A1-E 1	A22PB00X4XXX	A1-S13- 2TL	A2-XA 6- T	A22PB00X905X
A1-S 4- 2BL	TB 7- 3	A22PB00X916X	A1-S13- 2TR	A2-XA 6- U	A22PB00X906X
A1-S 4- 2BR	TB 7- 4	A22PB00X915X	A1-S14- 1BL	A1-E10	A22PB00X0XXX
A1-S 4- 2TL	A2-XA 3- T	A22PB00X92XX	A1-S14- 2TL	A2-XA 6- W	A22PB00X92XX
A1-S 4- 2TR	A2-XA 3- U	A22PB00X3XXX	A1-S14- 2TR	A2-XA 6- X	A22PB00X93XX
A1-S 5- 1BL	A1-E 9	A22PB00X0XXX	A1-S15- 3	A2-XA 6- V	A22PB00X91XX
A1-S 5- 2TL	A2-XA 3- W	A22PB00X912X	A1-S16- 1BR	A1-E10	A22PB00X0XXX
A1-S 5- 2TR	A2-XA 3- X	A22PB00X913X	A1-S16- 1TR	A1-E 1	A22PB00X4XXX
A1-S 6- 3	A2-XA 3- V	A22PB00X906X	A1-S16- 2BR	A1-A 1- J	A22PB00X90XX
A1-S 7- 1TR	A1-E 1	A22PB00X4XXX	A1-S16- 2TL	A2-XA 7- T	A22PB00X912X
A1-S 7- 2BL	TB 7- 5	A22PB00X906X	A1-S16- 2TR	A2-XA 7- U	A22PB00X913X
A1-S 7- 2BR	TB 7- 6	A22PB00X905X	A1-S17- 2BR	A1-A 1- P	A22PB00X93XX
A1-S 7- 2TL	A2-XA 4- T	A22PB00X95XX	A1-S17- 2TL	A2-XA 7- W	A22PB00X96XX
A1-S 7- 2TR	A2-XA 4- U	A22PB00X96XX	A1-S17- 2TR	A2-XA 7- X	A22PB00X902X
A1-S 8- 1BL	A1-E 9	A22PB00X0XXX	A1-S18- 3	A2-XA 7- V	A22PB00X95XX
A1-S 8- 2TL	A2-XA 4- W	A22PB00X916X	A1-S19- 1	A1-S20B- B	9XXX
A1-S 8- 2TR	A2-XA 4- X	A22PB00X923X	A1-S19- 2	A1-R13- 3	9XXX
A1-S 9- 3	A2-XA 4- V	A22PB00X915X	A1-S19- 3	A1-LS 1- 2	9XXX
A1-S10- 1TR	A1-E 1	A22PB00X4XXX	A1-S19- 4	A1-S20A- B	5XXX
A1-S10- 2BL	TB 7- 7	A22PB00X96XX	A1-S19- 5	A1-R13- 1	5XXX
A1-S10- 2BR	TB 7- 8	A22PB00X95XX	A1-S19- 6	A1-LS 1- 1	5XXX
A1-S10- 2TL	A2-XA 5- T	A22PB00X902X	A1-S19- 6	TB 5-20	1XXX
A1-S10- 2TR	A2-XA 5- U	A22PB00X903X	A1-S19- 8	A1-S21A- 1	5XXX
A1-S11- 1BL	A1-E10	A22PB00X0XXX	A1-S19- 8	A1 A 1-CC	9XXX
A1-S11- 2TL	A2-XA 5- W	A22PB00X926X	A1-S19- 9	A1-S20B- D	9XXX
A1-S11- 2TR	A2-XA 5- X	A22PB00X90XX	A1-S19-10	A1-S21B- 8	9XXX
A1-S12- 3	A2-XA 5- V	A22PB00X925X	A1-S19-11	A1 A 1-BB	5XXX
A1-S13- 1TR	A1-E 1	A22PB00X4XXX	A1-S19-12	A1-S20A- D	5XXX
A1-S13- 2BL	TB 7- 9	A22PB00X6XXX	A1-S20A- B	A1-S19- 4	5XXX

Table 5-2. Wire List (Cont).

FROM	TO	WIRE CODE	FROM	TO	WIRE CODE
A1-S20A- D	A1-S19-12	5XXX	A1-S22- 2TL	A1-M 1- 2	9XXX
A1-S20A- 1	A1-A 1- C	5XXX	A1-S22- 2TR	A1-M 1- 1	5XXX
A1-S20A- 3	TB 2- 5	5XXX	A1-S22- 3TL	TB 2-10	9XXX
A1-S20A- 4	TB 2- 4	5XXX	A1-S22- 3TR	TB 2- 9	5XXX
A1-S20A- 5	TB 2- 2	5XXX	A1-S23A- C	A2-XA 9- A	1XXX
A1-S20A- 6	TB 2- 1	5XXX	A1-S23A- 1	A1-TB 2- 6	9XXX
A1-S20A- 7	A1-A 1- T	5XXX	A1-S23A-13	A1-TB 2-12	9XXX
A1-S20A- 8	A1-A 1- E	5XXX	A1-S23A-14	A1-TB 2-13	5XXX
A1-S20B- 8	A1-S19- 1	9XXX	A1-S23B- D	A2-XA 9- B	B18BAJ0X9XXX
A1-S20B- D	A1-S19- 9	9XXX	A1-S23P- 1	A1-TB 2- 4	5XXX
A1-S20B- 1	A1-A 1- D	9XXX	A1-S23P-13	A1-TB 2-10	5XXX
A1-S20B- 3	TB 2- 3	9XXX	A1-S23P-14	A1-TB 2-15	9XXX
A1-S20B- 4	TB 2- 3	9XXX	A1-S24- 1BL	A1-E 1	A22PB00X4XXX
A1-S20B- 5	TB 2- 3	9XXX	A1-S24- 2BL	A2-XA 1- B	A22PE00X1XXX
A1-S20B- 6	TB 2- 3	9XXX	A1-S24- 2TL	A2-XA 1- C	A22PE00X3XXX
A1-S20B- 7	A1-A 1- Z	9XXX	A1-S25- 2BL	A2- F	A22PB00X6XXX
A1-S20B- 8	A1-A 1- D	9XXX	A1-S25- 2TL	A2- H	A22PE00X7XXX
A1-S21A- D	TB 2-11	5XXX	A1-S26- 2BL	A2- L	A22PE00X8XXX
A1-S21A- 1	A1-S19- 8	5XXX	A1-S26- 2TL	A2- P	A22PB00X9XXX
A1-S21A-12	A1-TB 1-35	5XXX	A1-S27- 2BL	A2- T	A22PE00X90XX
A1-S21A-13	A1-TB 1-17	5XXX	A1-S27- 2TL	A2- U	A22PB00X91XX
A1-S21A-14	A1-TB 1-25	5XXX	A1-TB 1-17	A1-S21A-13	5XXX
A1-S21B- D	TB 2-12	9XXX	A1-TB 1-18	TB 1- 3	5XXX
A1-S21B- 8	A1-S19-10	9XXX	A1-TB 1-19	A1-S21B-13	9XXX
A1-S21B- 9	TB 5-19	1XXX	A1-TB 1-20	TB 1- 4	9XXX
A1-S21B-12	A1-TB 1-37	9XXX	A1-TB 1-25	A1-S21A-14	5XXX
A1-S21B-13	A1-TB 1-19	9XXX	A1-TB 1-26	A2-XA 1- W	5XXX
A1-S21B-14	A1-TB 1-27	9XXX	A1-TB 1-26	A1-A 1- A	5XXX
A1-S22- 1TL	A1-TB 1-42	9XXX	A1-TB 1-27	A1-S21B-14	9XXX
A1-S22- 1TR	A1-TB 1-40	5XXX	A1-TB 1-28	A2-XA 1- X	9XXX

Table 5-2. Wire List (Cont).

FROM	TO	WIRE CODE	FROM	TO	WIRE CODE
A1-TB 1-28	A1-A 1- B	9XXX	A2-A 1- 1	TB 1-23	1XXX
A1-TB 1-35	A1-A 1- X	9XXX	A2-A 1- 2	TB 1- 3	5XXX
A1-TB 1-35	A1-S21A-12	5XXX	A2-A 1- 3	TB 1-24	B18EA00X9XXX
A1-TB 1-36	A1-TB 2-14	5XXX	A2-A 1- 4	TB 1- 4	9XXX
A1-TB 1-36	A2-T 1- 4	5XXX	A2-A 1- 5	TB 2-23	1XXX
A1-TB 1-37	A1-A 1- W	5XXX	A2-A 1- 6	A2-XA 1- Y	5XXX
A1-TB 1-37	A1-S21B-12	9XXX	A2-A 1- 6	A1-A 1- F	5XXX
A1-TB 1-38	A2-T 1- 7	9XXX	A2-A 1- 7	TB 2-24	B18EA00X9XXX
A1-TB 1-38	A1-TB 2-16	9XXX	A2-A 1- 8	A2-XA 1- Z	9XXX
A1-TB 1-40	A1-S22- 1TR	5XXX	A2-A 1- 8	A1-A 1- K	9XXX
A1-TB 1-42	A1-S22- 1TL	9XXX	A2-A 1-10	TB 1- 1	5XXX
A1-TB 2- 2	TB 8- 1	5XXX	A2-A 1-12	TB 1- 2	9XXX
A1-TB 2- 4	A1-S23B- 1	5XXX	A2-C 1- 1	A2-XA 8- P	1XXX
A1-TB 2- 4	TB 8- 4	9XXX	A2-C 1- 2	A2-XA 8- S	5XXX
A1-TB 2- 6	A1-S23A- 1	9XXX	A2-C 2- 1	A2-XA 9- N	9XXX
A1-TB 2- 8	TB 2- 7	5XXX	A2-C 2- 2	A2-XA 9- S	5XXX
A1-TB 2-10	A1-S23B-13	5XXX	A2-E 1	NC	SHIELD
A1-TB 2-10	TB 2- 8	9XXX	A2-E 1	NC	SHIELD
A1-TB 2-12	A1-S23A-13	9XXX	A2-E 1	NC	SHIELD
A1-TB 2-13	A1-S23A-14	5XXX	A2-E 1	NC	SHIELD
A1-TB 2-14	A1-TB 1-36	5XXX	A2-E 1	NC	SHIELD
A1-TB 2-15	A1-S23B-14	9XXX	A2-E 2	NC	SHIELD
A1-TB 2-16	A1-TB 1-38	9XXX	A2-T 1- 3	A2-XA 8- K	9XXX
A1-XDS 1- 1	A1-A 1- H	A22PB00X2XXX	A2-T 1- 4	A1-TB 1-36	5XXX
A2- F	A1-S25- 2BL	A22PB00X6XXX	A2-T 1- 7	A1-TB 1-38	9XXX
A2- H	A1-S25- 2TL	A22PB00X7XXX	A2-W1 (M)	NC	SHIELD
A2- L	A1-S26- 2BL	A22PB00X8XXX	A2-W1 (M)	NC	SHIELD
A2- P	A1-S26- 2TL	A22PB00X9XXX	A2-W1 (M)	NC	SHIELD
A2- T	A1-S27- 2BL	A22PB00X90XX	A2-W1 (M)	NC	SHIELD
A2- U	A1-S27- 2TL	A22PB00X91XX	A2-W1 (M)	NC	SHIELD

Table 5-2. Wire List (Cont).

FROM	TO	WIRE CODE	FROM	TO	WIRE CODE
A2-W1 (M)	NC	SHIELD	A2-XA 1- K	TB 1- 9	5XXX
A2-W1 (M)	NC	SHIELD	A2-XA 1- R	TB 1-10	9XXX
A2-W1 (M)	NC	SHIELD	A2-XA 1- S	TB 1-11	5XXX
A2-W1 (M)	NC	SHIELD	A2-XA 1- V	TB 1-12	9XXX
A2-W1 (M)	NC	SHIELD	A2-XA 3- W	A1-TB 1-26	5XXX
A2-W1 (M)	NC	SHIELD	A2-XA 1- X	A1-TB 1-28	9XXX
A2-W1 (M)	NC	SHIELD	A2-XA 1- Y	A2-A 1- 6	5XXX
A2-W1 (M)	NC	SHIELD	A2-XA 1- Z	A2-A 1- 8	5XXX
A2-W1 (M)	NC	SHIELD	A2-XA 2- A	TB 1-13	1XXX
A2-W1 (M)	NC	SHIELD	A2-XA 2- B	TB 1-14	B18BA00X9XXX
A2-W1 (M)	NC	SHIELD	A2-XA 2- C	TB 2-13	1XXX
A2-W1 (M)	NC	SHIELD	A2-XA 2- D	TB 2-14	B18BA00X9XXX
A2-W1 (M)	NC	SHIELD	A2-XA 2- K	TB 8- 4	B18BA00X9XXX
A2-W1 (M)	NC	SHIELD	A2-XA 2- P	TB 8- 3	1XXX
A2-W1 (M)	NC	SHIELD	A2-XA 2- T	A1-S 1- 2TL	A22PB00X90XX
A2-W1 (M)	NC	SHIELD	A2-XA 2- U	A1-S 1- 2TR	A22PB00X91XX
A2-W1 (M)	NC	SHIELD	A2-XA 2- V	A1-S 3- 3	A22PB00X902X
A2-W1 (M)	NC	SHIELD	A2-XA 2- W	A1-S 2- 2TL	A22PB00X903X
A2-W1 (M)	NC	SHIELD	A2-XA 2- X	A1-S 2- 2TR	A22PB00X905X
A2-W1 (M)	NC	SHIELD	A2-XA 2- Z	A1-R 1- 1	A22PB00X1XXX
A2-W1 (M)	NC	SHIELD	A2-XA 3- A	TB 1-15	1XXX
A2-W1 (M)	NC	SHIELD	A2-XA 3- B	TB 1-16	B18BA00X9XXX
A2-W1 (M)	NC	SHIELD	A2-XA 3- C	TB 2-15	1XXX
A2-W1 (M)	NC	SHIELD	A2-XA 3- D	TB 2-16	B18BA00X9XXX
A2-XA 1- A	TB 1- 5	5XXX	A2-XA 3- K	TB 8- 4	B18BA00X9XXX
A2-XA 1- B	A1-S24- 2BL	A22PB00X1XXX	A2-XA 3- S	TB 8- 1	1XXX
A2-XA 1- C	A1-S24- 2TL	A22PB00X3XXX	A2-XA 3- T	A1-S 4- 2TL	A22PB00X92XX
A2-XA 1- D	TB 1- 6	9XXX	A2-XA 3- U	A1-S 4- 2TR	A22PB00X3XXX
A2-XA 1- E	TB 1- 7	5XXX	A2-XA 3- V	A1-S 6- 3	A22PB00X906X
A2-XA 1- J	TB 1- 9	9XXX	A2-XA 3- W	A1-S 5- 2TL	A22PB00X912X

Table 5-2. Wire List (Cont).

FROM	TO	WIRE CODE	FROM	TO	WIRE CODE
A2-XA 3- X	A1-S 5- 2TR	A22PB00X913X	A2-XA 6- V	A1-S15- 3	A22PB00X91XX
A2-XA 3- Z	A1-R 3- 1	A22PB00X3XXX	A2-XA 6- W	A1-S14- 2TL	A22PB00X92XX
A2-XA 4- A	TB 1-17	1XXX	A2-XA 6- X	A1-S14- 2TR	A22PB00X93XX
A2-XA 4- B	TB 1-18	B18BA00X9XXX	A2-XA 6- Z	A1-R 9- 1	A22PB00X8XXX
A2-XA 4- C	TB 2-17	1XXX	A2-XA 7- A	TB 1-23	1XXX
A2-XA 4- D	TB 2-18	B18BA00X9XXX	A2-XA 7- B	TB 1-24	B18BA00X9XXX
A2-XA 4- T	A1-S 7- 2TL	A22PB00X95XX	A2-XA 7- C	TB 2-23	1XXX
A2-XA 4- U	A1-S 7- 2TR	A22PB00X96XX	A2-XA 7- D	TB 2-24	B18BA00X9XXX
A2-XA 4- V	A1-S 9- 3	A22PB00X915X	A2-XA 7- J	P 1- 7	5XXX
A2-XA 4- W	A1-S 8- 2TL	A22PB00X916X	A2-XA 7- K	P 1- 8	9XXX
A2-XA 4- X	A1-S 8- 2TR	A22PB00X923X	A2-XA 7- T	A1-S16- 2TL	A22PB00X912X
A2-XA 4- Z	A1-R 5- 1	A22PB00X6XXX	A2-XA 7- U	A1-S16- 2TR	A22PB00X913X
A2-XA 5- A	TB 1-19	1XXX	A2-XA 7- V	A1-S18- 3	A22PB00X95XX
A2-XA 5- B	TB 1-20	B18BA00X9XXX	A2-XA 7- W	A1-S17- 2TL	A22PB00X96XX
A2-XA 5- C	TB 2-19	1XXX	A2-XA 7- X	A1-S17- 2TR	A22PB00X902X
A2-XA 5- D	TB 2-20	B18BA00X9XXX	A2-XA 7- Z	A1-R11- 1	A22PB00X9XXX
A2-XA 5- T	A1-S10- 2TL	A22PB00X902X	A2-XA 8- A	A2-XA 8- B	B18BA00XXXXX
A2-XA 5- U	A1-S10- 2TR	A22PB00X903X	A2-XA 8- B	A2-XA 8- A	B18BA00XXXXX
A2-XA 5- V	A1-S12- 3	A22PB00X925X	A2-XA 8- H	P 1-20	2XXX
A2-XA 5- W	A1-S11- 2TL	A22PB00X926X	A2-XA 8- K	A2-T 1- 3	9XXX
A2-XA 5- X	A1-S11- 2TR	A22PB00X90XX	A2-XA 8- K	P 1-21	9XXX
A2-XA 5- Z	A1-R 7- 1	A22PB00X7XXX	A2-XA 8- P	A2-C 1- 1	1XXX
A2-XA 6- A	TB 1-21	1XXX	A2-XA 8- S	A2-C 1- 2	5XXX
A2-XA 6- B	TB 1-22	B18BA00X9XXX	A2-XA 8- Z	A1-R14- 1	A22PB00X6XXX
A2-XA 6- C	TB 2-21	1XXX	A2-XA 9- A	A1-S23A- D	1XXX
A2-XA 6- D	TB 2-22	B18BA00X9XXX	A2-XA 9- B	A1-S23B- D	B18BA00X9XXX
A2-XA 6- K	TB 8- 4	B18BA00X9XXX	A2-XA 9- K	TB 5- 5	9XXX
A2-XA 6- R	TB 8- 2	1XXX	A2-XA 9- K	P 1-17	9XXX
A2-XA 6- T	A1-S13- 2TL	A22PB00X905X	A2-XA 9- N	A2-C 2- 1	9XXX
A2-XA 6- U	A1-S13- 2TR	A22PB00X906X	A2-XA 9- P	TB 5- 4	5XXX

Table 5-2. Wire List (Cont).

FROM	TO	WIRE CODE	FROM	TO	WIRE CODE
A2-XA 9- S	A2-C 2- 2	5XXX	NC	A1-E-13	SHIELD
A2-XA 9- X	P 1-16	2XXX	NC	A2-W1 (M)	SHIELD
A2-XA 9- Z	A1-R16- 1	A22PB00X7XXX	NC	A1-E13	SHIELD
E16	P 1-14	A16PB00X0XXX	NC	A1-E 5	SHIELD
E16	TB 8-17	A16PB00X0XXX	NC	A2-W1 (M)	SHIELD
F16	P 1-27	A16PB00X0XXX	NC	A2-E 2	SHIELD
E16	P 1-24	A16PB00X0XXX	NC	A1-E 3	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A1-E 3	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A1-E11	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A1-E13	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A1-E12	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A1-E 4	SHIELD
NC	A1-E12	SHIELD	NC	A1-E 4	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A2-W1 (M)	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A1-E 6	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A2-E 1	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A1-E11	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A2-W1 (M)	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A2-W1 (M)	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A1-E 5	SHIELD
NC	A1-E 3	SHIELD	NC	A1-E13	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A2-E 1	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A1-E 4	SHIELD
NC	A2-E 1	SHIELD	NC	A1-E 4	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A1-E11	SHIELD
NC	A2-E 1	SHIELD	NC	A1-E13	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A1-E 7	SHIELD
NC	A2-W1 (M)	SHIELD	NC	A2-W1 (M)	SHIELD
NC	A1-E12	SHIELD	NC	A1-E 4	SHIELD
NC	A1-E 5	SHIELD	NC	A1-E 6	SHIELD

Table 5-2. Wire List (Cont).

FROM	TO	WIRE CODE	FROM	TO	WIRE CODE
NC	A2-W1 (M)	SHIELD	P 1-22	A1-E 1	A16PB00X4XXX
NC	A1-E12	SHIELD	P 1-23	A1-E 1	A16PB00X4XXX
NC	A1-E13	SHIELD	P 1-24	E16	A16PB00X0XXX
NC	A2-E 1	SHIELD	P 1-25	A1-E 2	A16PB00X5XXX
NC	A2-W1 (M)	SHIELD	P 1-26	A1-E 2	A16PB00X5XXX
NC	A1-E 7	SHIELD	P 1-27	E16	A16PB00X0XXX
NC	A1-E13	SHIELD	TB 1- 1	A2-A 1-10	5XXX
NC	A1-E 5	SHIELD	TB 1- 2	A2-A 1-12	9XXX
NC	A2-W1 (M)	SHIELD	TB 1- 3	A1-TB 1-18	5XXX
NC	A2-W1 (M)	SHIELD	TB 1- 3	A2-A 1- 2	5XXX
NC	A1-E 6	SHIELD	TB 1- 4	A2-A 1- 4	9XXX
NC	A2-W1 (M)	SHIELD	TB 1- 4	A1-TB 1-20	9XXX
NC	A1-E13	SHIELD	TB 1- 5	A2-XA 1- A	5XXX
NC	A1-E13	SHIELD	TB 1- 6	A2-XA 1- D	9XXX
NC	A2-W1 (M)	SHIELD	TB 1- 7	A2-XA 1- E	5XXX
NC	A1-E 5	SHIELD	TB 1- 8	A2-XA 1- J	9XXX
NC	TB 8-17	SHIELD	TB 1- 9	A2-XA 1- K	5XXX
P 1- 2	TB 6-24	A16PB00X9XXX	TB 1-10	A2-XA 1- R	9XXX
P 1- 6	TB 6-22	A16PB00X0XXX	TB 1-11	A2-XA 1- S	5XXX
P 1- 7	TB 8-11	2XXX	TB 1-12	A2-XA 1- V	9XXX
P 1- 7	A2-XA 7- J	5XXX	TB 1-13	A2-XA 2- A	1XXX
P 1- 8	A2-XA 7- K	9XXX	TB 1-14	A2-XA 2- B	B18BA00X9XXX
P 1- 8	TB 8-12	5XXX	TB 1-15	A2-XA 3- A	1XXX
P 1-14	E16	A16PB00X0XXX	TB 1-16	A2-XA 3- B	B18BA00X9XXX
P 1-16	A2-XA 9- X	2XXX	TB 1-17	A2-XA 4- A	1XXX
P 1-17	A2-XA 9- K	5XXX	TB 1-18	A2-XA 4- B	B18BA00X9XXX
P 1-18	A1-A 1-AA	2XXX	TB 1-19	A2-XA 5- A	1XXX
P 1-19	A1-A 1-CC	9XXX	TB 1-20	A2-XA 5- B	B18BA00X9XXX
P 1-20	A2-XA 8- H	2XXX	TB 1-21	A2-XA 6- A	1XXX
P 1-21	A2-XA 8- K	9XXX	TB 1-22	A2-XA 6- B	B18BA00X9XXX

Table 5-2. Wire List (Cont).

FROM	TO	WIRE CODE	FROM	TO	WIRE CODE
TB 1-23	A2-XA 7- A	1XXX	TB 2-24	A2-XA 7- D	B18BA00X9XXX
TB 1-23	A2-A 1- 1	1XXX	TB 2-24	A2-A 1- 7	B18BA00X9XXX
TB 1-24	A2-A 1- 3	B18BA00X9XXX	TB 5- 1	A1-A 1- H	A18PE00X2XXX
TB 1-24	A2-XA 7- B	B18BA00X9XXX	TB 5- 2	A1-E14	A18PE00X0XXX
TB 2- 1	A1-S20A- 6	5XXX	TB 5- 4	A2-XA 9- P	5XXX
TB 2- 2	A1-S20A- 5	5XXX	TB 5- 5	A2-XA 9- K	5XXX
TB 2- 3	A1-S20B- 4	9XXX	TB 5-19	A1-S21B- 9	1XXX
TB 2- 3	A1-S20B- 5	9XXX	TB 5-20	A1-S19- 6	1XXX
TB 2- 3	A1-S20B- 3	9XXX	TB 5-21	TB 7- X	A22PB00X90XX
TB 2- 3	A1-S20B- 6	9XXX	TB 5-22	TB 7- X	A22PB00X91XX
TB 2- 4	A1-S20A- 4	5XXX	TB 5-23	TB 7- X	A22PB00X92XX
TB 2- 5	A1-S20A- 3	5XXX	TB 5-24	TB 7- X	A22PB00X93XX
TB 2- 7	A1-TB 2- 8	5XXX	TB 6-22	P 1- 6	A16PB00X0XXX
TB 2- 8	A1-TB 2-10	9XXX	TB 6-22	TB 6-23	B18BA00XXXXX
TB 2- 9	A1-S22- 3TR	5XXX	TB 6-23	TB 6-22	B18BA00XXXXX
TB 2-10	A1-S22- 3TL	9XXX	TB 6-24	P 1- 2	A16PB00X9XXX
TB 2-11	A1-S21A- D	5XXX	TB 7- X	TB 5-23	A22PB00X92XX
TB 2-12	A1-S21B- D	9XXX	TB 7- X	TB 5-24	A22PB00X93XX
TB 2-13	A2-XA 2- C	1XXX	TB 7- X	TB 5-22	A22PB00X91XX
TB 2-14	A2-XA 2- D	B18BA00X9XXX	TB 7- X	TB 5-21	A22PB00X90XX
TB 2-15	A2-XA 3- C	1XXX	TB 7- 1	A1-S 1- 2BL	A22PB00X926X
TB 2-16	A2-XA 3- D	B18BA00X9XXX	TB 7- 2	A1-S 1- 2BR	A22PB00X925X
TB 2-17	A2-XA 4- C	1XXX	TB 7- 3	A1-S 4- 2BL	A22PE00X916X
TB 2-18	A2-XA 4- D	B18BAC0X9XXX	TB 7- 4	A1-S 4- 2BR	A22PB00X915X
TB 2-19	A2-XA 5- C	1XXX	TB 7- 5	A1-S 7- 2BL	A22PB00X906X
TB 2-20	A2-XA 5- D	B18BA00X9XXX	TB 7- 6	A1-S 7- 2BR	A22PB00X905X
TB 2-21	A2-XA 6- C	1XXX	TB 7- 7	A1-S10- 2BL	A22PE00X96XX
TB 2-22	A2-XA 6- D	B18BA00X9XXX	TB 7- 8	A1-S10- 2BR	A22PB00X95XX
TB 2-23	A2-XA 7- C	1XXX	TB 7- 9	A1-S13- 2BL	A22PB00X6XXX
TB 2-23	A2-A 1- 5	1XXX	TB 7-10	A1-S13- 2BR	A22PB00X5XXX

Table 5-2. Wire List (Cont).

FROM	TO	WIRE CODE	FROM	TO	WIRE CODE
TB 8- 1	A1-TB 2- 2	5XXX	TB 8- 4	A2-XA 2- K	B18BA00X9XXX
TB 8- 1	A2-XA 3- S	1XXX	TB 8- 4	A1-TB 2- 4	9XXX
TB 8- 2	A2-XA 6- R	1XXX	TB 8- 5	A1-E 2	A18PE00X5XXX
TB 8- 3	A1-A 1- R	1XXX	TB 8-11	P 1- 7	2XXX
TB 8- 3	A2-XA 2- P	1XXX	TB 8-12	P 1- 8	9XXX
TB 8- 4	A2-XA 3- K	B18BA00X9XXX	TB 8-16	A1-E 1	A18PE00X4XXX
TB 8- 4	A1-A 1- S	B18BA00X9XXX	TB 8-17	E16	A16PB00X0XXX
TB 8- 4	A2-XA 6- K	B18BA00X9XXX	TB 8-17	NC	SHIELD

section 6

parts list

6.1 GENERAL

This section contains a list of all replaceable electrical, electronic, and critical mechanical parts for 212M-1 Monaural Console.

The manufacturers' codes appearing in the MFR Code column of the parts list are listed in numerical order at the end of the parts list. The code list provides the manufacturer's name and address as shown in the Federal Supply Code for Manufacturers' Handbook H4-1. Manufacturers not listed in Handbook H4-1 are assigned

a five-letter code and will appear first in the code list.

6.2 LIST OF EQUIPMENT

	Page
212M-1 Monaural Console.	6-2
Front Panel, A1	6-5
Intercom Amplifier, A1A1.	6-9
Terminal Board, A1TB1	6-13
Terminal Board, A1TB2	6-15
Card Cage, A2	6-17
Relay Unit, A4	6-19

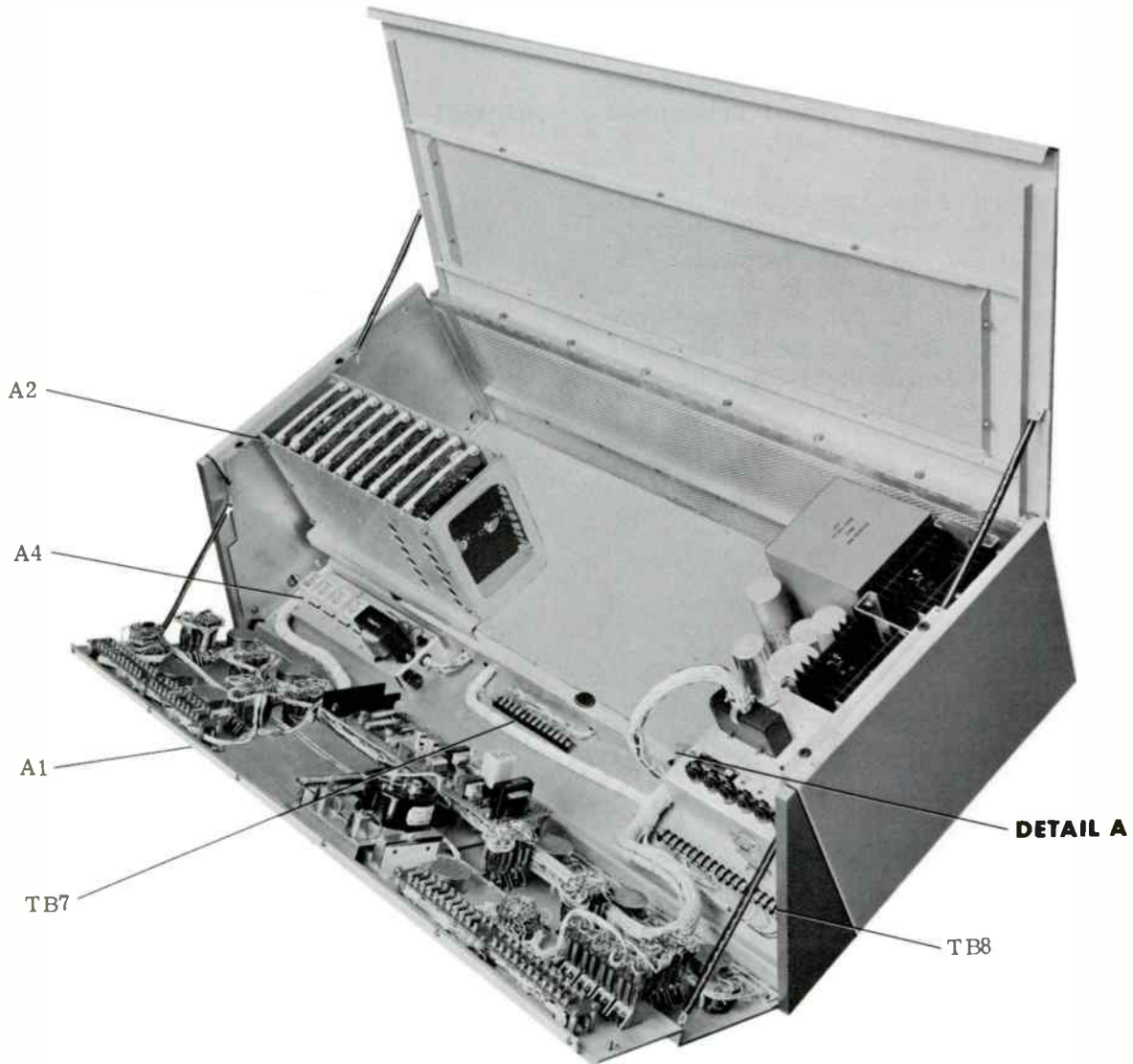


Figure 6-1. 212M-1 Monaural Console, Overall View (Sheet 1 of 2).

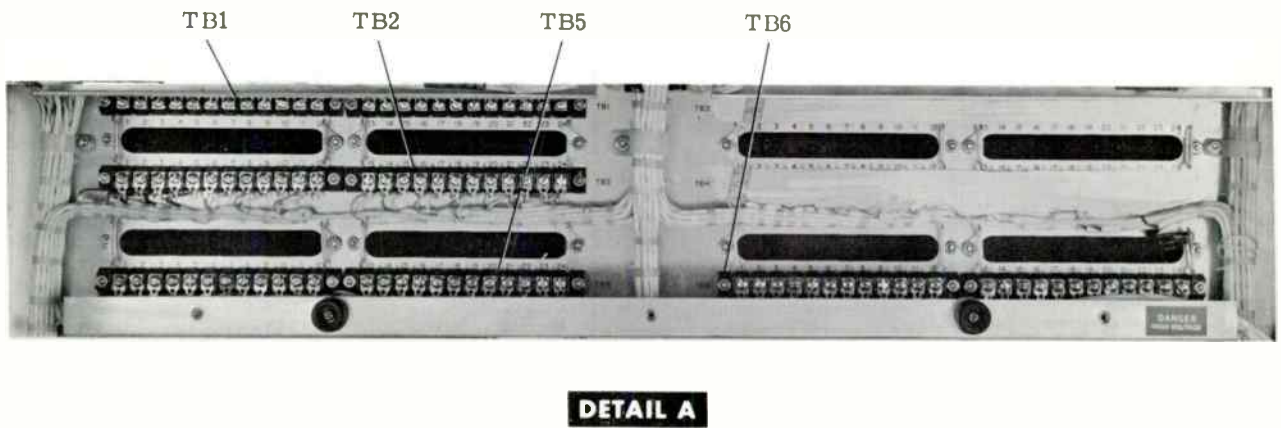


Figure 6-1. 212M-1 Monaural Console, Floor Under Card Cage (Sheet 2 of 2).

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
212M-1 MONAURAL CONSOLE				522-3879-001
A1	FRONT PANEL			764-7407-001
A2	SEE BREAKDOWN ON PAGE 6-7			
A3	CARD CAGE, CHANNEL UNIT			764-7424-001
A4	SEE BREAKDOWN ON PAGE 6-18			
A3	NOT USED			
A4	RELAY UNIT			764-7427-001
TB1	SEE BREAKDOWN ON PAGE 6-20			
TB1	TERMINAL BOARD	599C3-4ST12	75382	367-1399-120
TB2	12 TERMINALS			
TB2	SAME AS TB1			
TB3	NOT USED			
TB4	NOT USED			
TB5	SAME AS TB1			
TB6	SAME AS TB1			
TB7	SAME AS TB1			
TB8	TERMINAL BOARD	599C3-4ST20	75382	367-1399-200
TB8	20 TERMINALS			

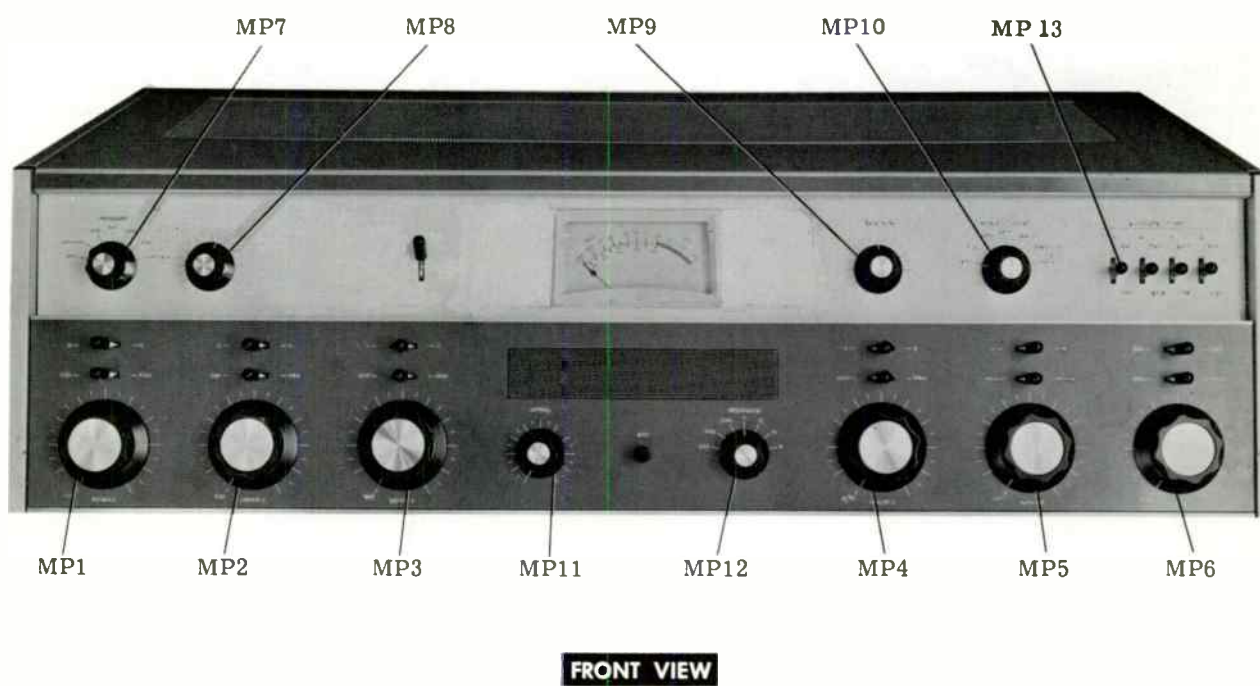


Figure 6-2. Front Panel, A1 (Sheet 1 of 2).

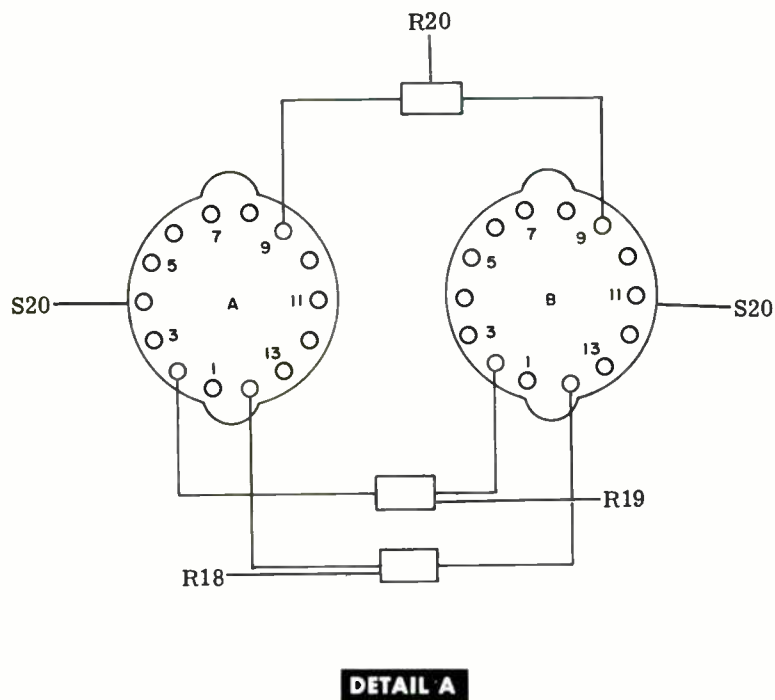
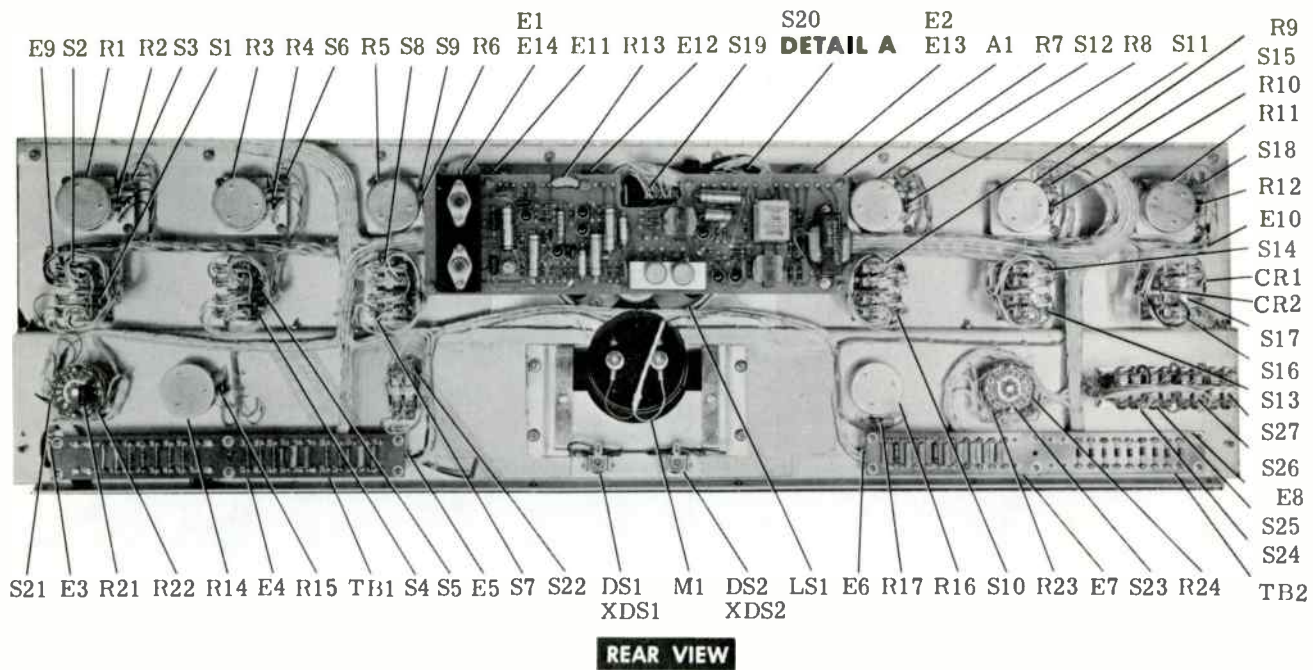


Figure 6-2. Front Panel, A1 (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
FRONT PANEL. A1				764-7407-001
A1	INTERCOM AMPLIFIER SEE BREAKDOWN ON PAGE 6-10			764-7377-001
CR1	SEMICONDUCTOR DEVICE, DIODE	1N645	07688	353-2607-000
CR2	SAME AS CR1			
DS1	LAMP, INCANDESCENT 0.08 AMP, 14 VOLTS	756	08806	262-2193-010
DS2	SAME AS DS1			
E1	TERMINAL, LUG			547-5305-000
E2	SAME AS E1			
E3	TERMINAL, LUG	2104-04-01-2520N	78189	304-0317-000
E4				
THROUGH E10	SAME AS E3			
E11	TERMINAL, LUG	2104-06-02-2520N	78189	304-0318-000
E12	SAME AS E11			
E13	SAME AS E11			
E14	SAME AS E11			
LS1	LOUDSPEAKER, P M	35A05	74199	271-0234-000
M1	METER, AUDIO LEVEL	456-0062-020	13499	456-0062-020
MP1	KNOB, SKIRTED			546-1291-003
MP2				
THROUGH MP6	SAME AS MP1			
MP7	KNOB, SKIRTED			546-1294-003
MP8				
THROUGH MP12	SAME AS MP7			
MP13				
R1	KNOB RESISTOR, VAR, WIRE WOUND 300 OHMS, 10% TOL, 4 WATTS	HL-75-1 PR8194	01548 81450	375-1020-060 377-0709-080
R2	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/2 WATT	RC20GF222K	81349	745-1366-000
R3	SAME AS R1			
R4	SAME AS R2			
R5	SAME AS R1			
R6	SAME AS R2			
R7	SAME AS R1			
R8	SAME AS R2			
R9	SAME AS R1			
R10	SAME AS R2			
R11	SAME AS R1			
R12	SAME AS R2			
R13	RESISTOR, VAR, COMPOSITION 1000 OHMS, 10% TOL, 1 WATT	RV4NAYS102C	81349	380-2687-000
R14	RESISTOR, VAR, WIRE WOUND 300 OHMS, 10% TOL, 4 WATTS	PB3410	81450	377-0709-050
R15	SAME AS R2			
R16	SAME AS R14			
R17	SAME AS R2			
R18	RESISTOR, FXD, FILM 3.9 OHMS, 5% TOL, 3 WATTS	RW69V3R9	81349	747-5367-000
R19	SAME AS R18			
R20	RESISTOR, FXD, COMPOSITION 560 OHMS, 10% TOL, 1/4 WATT	RC07GF561K	81349	745-0740-000
R21	SAME AS R18			
R22	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/4 WATT	RC07GF103K	81349	745-0785-000
R23	SAME AS R20			
R24	SAME AS R20			
S1	SWITCH, LEVER 1A CONTACT ARRANGEMENT	1G7942-89	01548	375-1020-020
S2	SAME AS S1			
S3	SWITCH, CONTACT ASSEMBLY 1C CONTACT ARRANGEMENT	13A8008-89	01548	266-6812-010
S4	SAME AS S1			
S5	SAME AS S1			
S6	SAME AS S3			

382-0017-010
 -020
 (NEW) -030
 -040
 -050

300 Ω

377-0709-040
 -050
 -070
 -080
 -090
 (OLD)

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
S7	SAME AS S1			
S8	SAME AS S1			
S9	SAME AS S3			
S10	SAME AS S1			
S11	SAME AS S1			
S12	SAME AS S3			
S13	SAME AS S1			
S14	SAME AS S1			
S15	SAME AS S3			
S16	SAME AS S1			
S17	SAME AS S1			
S18	SAME AS S3			
S19	SWITCH, PUSH BUTTON 3C CONTACT ARRANGEMENT	4C7709-89	01548	266-5381-020
S20	SWITCH, WAFER, ROTARY 2 SECTIONS, 7 POSITIONS	246021CK2	76854	259-2386-010
S21	SAME AS S20			
S22	SWITCH, LEVER 2C CONTACT ARRANGEMENT	1G7943-89	01548	375-1020-030
S23	SAME AS S20			
S24				
THROUGH	SAME AS S1			
S27				
TB1	TERMINAL BOARD SEE BREAKDOWN ON PAGE 6-14			764-7430-001
TB2	TERMINAL BOARD SEE BREAKDOWN ON PAGE 6-16			764-7431-001
XDS1	LAMPHOLDER	7-14	72619	262-2151-000
XDS2	SAME AS XDS1			

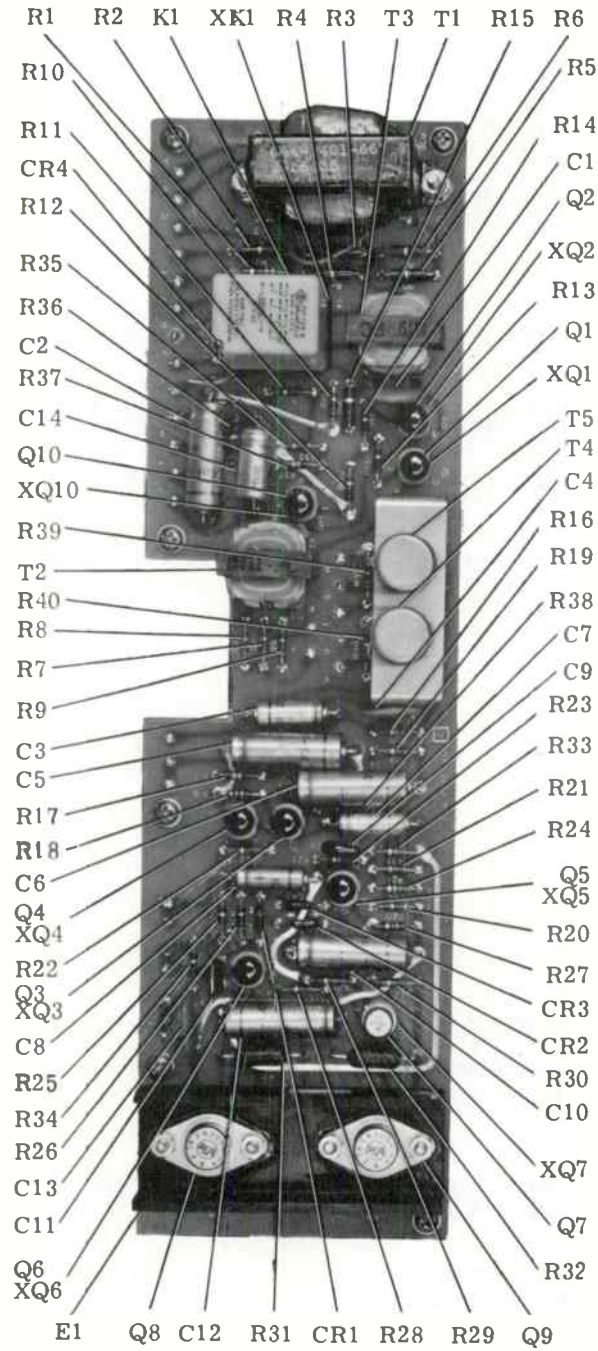


Figure 6-3. Intercom Amplifier, A1A1.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
INTERCOM AMPLIFIER, A1A1				764-7377-001
C1	CAPACITOR, FXD, CERAMIC 0.068 UF, PLUS 50% MINUS 20%, 500 VDCW	36C238	01939	913-3736-000
C2	CAPACITOR, FXD, ALUMINUM 64 UF, PLUS 50% MINUS 10%, 64 VDCW	C437ARH64	73445	183-2355-110
C3	CAPACITOR, FXD, ALUMINUM 10 UF, PLUS 50% MINUS 10%, 25 VDCW	C426ARF10	73445	183-2354-170
C4	CAPACITOR, FXD, CERAMIC 0.033 UF, PLUS 50% MINUS 20%, 500 VDCW	36C180	01939	913-3734-000
C5	SAME AS C2			
C6	SAME AS C2			
C7	SAME AS C3			
C8	CAPACITOR, FXD, ALUMINUM 16 UF, PLUS 50% MINUS 10%, 40 VDCW	C426ARG16	73445	183-2354-230
C9	CAPACITOR, FXD, MICA 68 UUF, 5% TOL, 500 VDCW	CM05E680J03	81349	912-2804-000
C10	SAME AS C2			
C11	CAPACITOR, FXD, MICA 220 UUF, 5% TOL, 500 VDCW	CM05F221J03	81349	912-2840-000
C12	SAME AS C2			
C13	SAME AS C4			
C14	CAPACITOR, FXD, ELECTROLYTIC 100 UF, PLUS 100% MINUS 10%, 6 VDCW	D29329	56289	183-1168-000
CR1	SEMICONDUCTOR DEVICE, DIODE	1N4003	04713	353-6442-030
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SAME AS CR1			
E1	HEATSINK			764-7383-001
K1	RELAY, ARMATURE 4C CONTACT ARRANGEMENT	KH4394	77342	970-2427-060
Q1	TRANSISTOR	2N697	07263	352-0197-000
Q2	SAME AS Q1			
Q3	TRANSISTOR	2N3567	07263	352-0629-010
Q4	SAME AS Q1			
Q5	SAME AS Q3			
Q6	SAME AS Q1			
Q7	TRANSISTOR	2N3133	07688	352-0591-010
Q8	TRANSISTOR	2N3054	07688	352-0581-010
Q9	SAME AS Q8			
Q10	SAME AS Q3			
R1	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10% TOL, 1/2 WATT	RC20GF332K	81349	745-1373-000
R2	RESISTOR, FXD, COMPOSITION 12 OHMS, 10% TOL, 1/2 WATT	RC20GF120K	81349	745-1272-000
R3 THROUGH R6	SAME AS R2			
R7	RESISTOR, FXD, COMPOSITION 8200 OHMS, 10% TOL, 1/4 WATT	RC07GF822K	81349	745-0782-000
R8	SAME AS R7			
R9	SAME AS R7			
R10	RESISTOR, FXD, COMPOSITION 6800 OHMS, 10% TOL, 1/4 WATT	RC07GF682K	81349	745-0779-000
R11	RESISTOR, FXD, COMPOSITION 1500 OHMS, 10% TOL, 1/4 WATT	RC07GF152K	81349	745-0755-000
R12	RESISTOR, FXD, COMPOSITION 220 OHMS, 10% TOL, 1/4 WATT	RC07GF221K	81349	745-0725-000
R13	RESISTOR, FXD, COMPOSITION 10 OHMS, 10% TOL, 1/4 WATT	RC07GF100K	81349	745-0677-000
R14	SAME AS R13			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R15	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/2 WATT	RC20GF222K	81349	745-1366-000
R16	RESISTOR, FXD, COMPOSITION 18K OHMS, 10% TOL, 1/4 WATT	RC07GF183K	81349	745-0794-000
R17	RESISTOR, FXD, COMPOSITION 100K OHMS, 10% TOL, 1/4 WATT	RC07GF104K	81349	745-0821-000
R18	RESISTOR, FXD, COMPOSITION 27K OHMS, 10% TOL, 1/4 WATT	RC07GF273K	81349	745-0800-000
R19	RESISTOR, FXD, COMPOSITION 1K OHMS, 10% TOL, 1/4 WATT	RC07GF102K	81349	745-0749-000
R20	RESISTOR, FXD, COMPOSITION 2700 OHMS, 10% TOL, 1/4 WATT	RC07GF272K	81349	745-0764-000
R21	SAME AS R19			
R22	SAME AS R11			
R23	RESISTOR, FXD, COMPOSITION 82K OHMS, 10% TOL, 1/4 WATT	RC07GF823K	81349	745-0818-000
R24	SAME AS R16			
R25	SAME AS R11			
R26	SAME AS R10			
R27	RESISTOR, FXD, COMPOSITION 680 OHMS, 10% TOL, 1/4 WATT	RC07GF681K	81349	745-0743-000
R28	SAME AS R19			
R29	RESISTOR, FXD, COMPOSITION 27 OHMS, 10% TOL, 1/4 WATT	RC07GF270K	81349	745-0692-000
R30	SAME AS R19			
R31	RESISTOR, FXD, WIRE WOUND 1 OHM, 10% TOL, 3 WATTS	PW3-1-10	07716	710-9150-000
R32	SAME AS R31			
R33	RESISTOR, FXD, COMPOSITION 68K OHMS, 10% TOL, 1/4 WATT	RC07GF683K	81349	745-0815-000
R34	RESISTOR, FXD, COMPOSITION 12 OHMS, 10% TOL, 1/4 WATT	RC07GF120K	81349	745-0680-000
R35	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/4 WATT	RC07GF472K	81349	745-0773-000
R36	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/2 WATT	RC20GF101K	81349	745-1310-000
R37	RESISTOR, FXD, COMPOSITION 12K OHMS, 10% TOL, 1/4 WATT	RC07GF123K	81349	745-0788-000
R38	SAME AS R13			
R39	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10% TOL, 1/4 WATT	RC07GF332K	81349	745-0767-000
R40	RESISTOR, FXD, COMPOSITION 560 OHMS, 10% TOL, 1/4 WATT	RC07GF561K	81349	745-0740-000
T1	TRANSFORMER, AF LEAD 1 TO 2 500 OHMS IMPEDANCE, LEAD 3 TO 4 3.5 OHMS IMPEDANCE	T56435	96256	667-0163-010
T2	TRANSFORMER, AF OPEN FRAME, LEAD 1 TO 3 4000 OHMS IMPEDANCE, 10% TOL, LEAD 2 CENTER TAP, LEAD 4 TO 6 600 OHMS IMPEDANCE, LEAD 5 CENTER TAP	M5603	00348	667-1279-010
T3	TRANSFORMER, AF CHANNEL FRAME, LEAD 1 TO 3 600 OHMS IMPEDANCE, 15% TOL, LEAD 2 CENTER TAP, LEAD 4 TO 6 1200 OHMS IMPEDANCE, LEAD 5 CENTER TAP	M5602	00348	667-0047-010
T4	TRANSFORMER, AF, INPUT LEAD BLACK TO RED 660 OHMS IMPEDANCE, LEAD GREEN TO RED 400 OHMS IMPEDANCE, LEAD GREEN TO BLUE 200 OHMS IMPEDANCE, LEAD WHITE CENTER TAP, LEAD BLUE TO RED 60 OHMS IMPEDANCE, LEAD YELLOW TO BLUE 2500 OHMS IMPEDANCE	BV35752	GOTHA	667-0155-020
T5	SAME AS T4			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
XK1	SOCKET, RELAY 14 CONTACTS	27E007	77342	220-1582-010
XQ1	SOCKET, TRANSISTOR 3 CONTACTS	05-3307-51	91662	352-9903-000
XQ2 THROUGH	SAME AS XQ1			
XQ7	NOT USED			
XQ8	NOT USED			
XQ9	NOT USED			
XQ10	SAME AS XQ1			

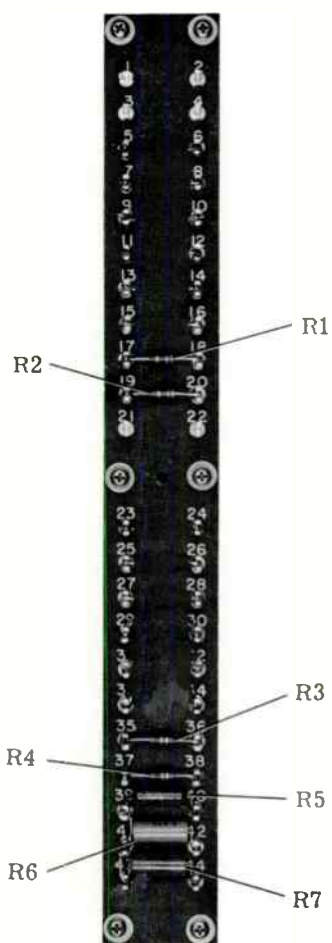


Figure 6-4. Terminal Board, A1TB1.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
TERMINAL BOARD, A1TB1				764-7430-001
R1	RESISTOR, FXD, COMPOSITION 3.3K OHMS, 10% TOL, 1/4 WATT	RC07GF332	81349	745-0767-000
R2	SAME AS R1			
R3	RESISTOR, FXD, COMPOSITION	RC07GF103K	81349	745-0785-000
R4	10K OHMS, 10% TOL, 1/4 WATT			
R5	SAME AS R5			
R6	RESISTOR, FXD, FILM	RN60D1961F	81349	705-6610-000
R7	1960 OHMS, 1% TOL, 1/4 WATT			
R8	RESISTOR, FXD, FILM	RN60D2871F	81349	705-6618-000
R9	2870 OHMS, 1% TOL, 1/4 WATT			
R10	SAME AS R5			

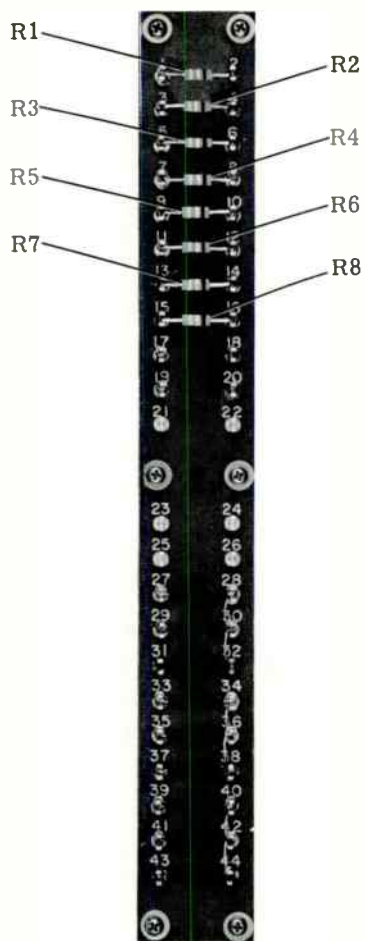


Figure 6-5. Terminal Board, A1TB2.

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
TERMINAL BOARD, A1TB2				764-7431-000
R1	RESISTOR, FXD, FILM 162 OHMS, 1% TOL, 1/4 WATT	RN60D1620F	81349	705-6558-000
R2	RESISTOR, FXD, FILM 1K OHMS, 1% TOL, 1/4 WATT	RN60D1001F	81349	705-6596-000
R3	SAME AS R1			
R4	RESISTOR, FXD, COMPOSITION 560 OHMS, 10% TOL, 1/4 WATT	RC07GF561	81349	745-0740-000
R5	RESISTOR, FXD, COMPOSITION 10 OHMS, 10% TOL, 1/4 WATT	RC07GF100	81349	745-0677-000
R6	SAME AS R4			
R7	RESISTOR, FXD, FILM 237K OHMS, 1% TOL, 1/4 WATT	RN60D2373F	81349	705-6710-000
R8	SAME AS R7			

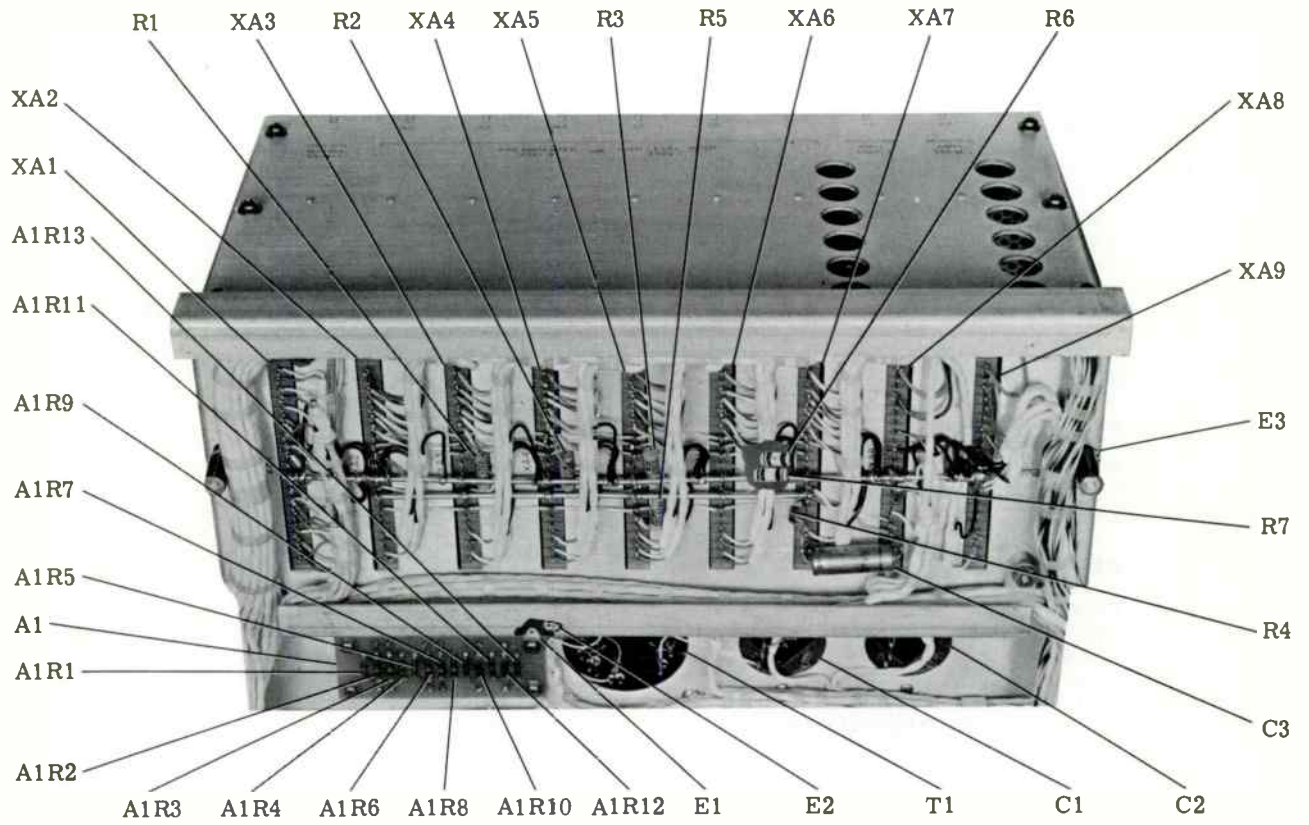


Figure 6-6. Card Cage, A2.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
CARD CAGE, A2				764-7424-001
A1	BOARD, RESISTOR			764-7445-001
A1R1	RESISTOR, FXD, COMPOSITION 150 OHMS, 10% TOL, 1/4 WATT	RC07GF151K	81349	745-0719-000
A1R2	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/4 WATT	RC07GF103K	81349	745-0785-000
A1R3	SAME AS A1R2			
A1R4	RESISTOR, FXD, COMPOSITION 560 OHMS, 10% TOL, 1/4 WATT	RC07GF561K	81349	745-0740-000
A1R5	SAME AS A1R1			
A1R6	SAME AS A1R2			
A1R7	SAME AS A1R2			
A1R8	SAME AS A1R2			
A1R9	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/4 WATT	RC07GF101K	81349	745-0713-000
A1R10	SAME AS A1R9			
A1R11	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1/4 WATT	RC07GF821K	81349	745-0746-000
A1R12	SAME AS A1R9			
A1R13	SAME AS A1R9			
C1	CAPACITOR, FXD, ELECTROLYTIC 1000 UF, PLUS 100% MINUS 10%, 50 VDCW	D33643	56289	183-1403-000
C2	SAME AS C1			
C3	CAPACITOR, FXD, ALUMINUM 400 UF, PLUS 50% MINUS 10%, 40 VDCW	C437ARH40	73445	183-2355-160
E1	TERMINAL, LUG	2104-08-02-2520N	78189	304-0319-000
E2	SAME AS E1			
E3	TERMINAL, LUG	2104-04-01-2520N	78189	304-0317-000
R1	RESISTOR, FXD, FILM 619 OHMS, 1% TOL, 1/4 WATT	RN60D6190F	81349	705-6586-000
R2	SAME AS R1			
R3	SAME AS R1			
R4	RESISTOR, FXD, COMPOSITION 120 OHMS, 10% TOL, 1/4 WATT	RC07GF121K	81349	745-0716-000
R5	RESISTOR, FXD, FILM 82.5K OHMS, 1% TOL, 1/4 WATT	RN60D8252F	81349	705-6688-000
R6	RESISTOR, FXD, COMPOSITION 56K OHMS, 10% TOL, 1/4 WATT	RC07GF563	81349	745-0812-000
R7	SAME AS R6			
T1	TRANSFORMER, AF LEAD 1 TO 3 30 OHMS IMPEDANCE, LEAD 2 CENTER TAP, LEADS 4, 6 TO 5, 7 150 OHMS IMPEDANCE, LEAD 4 TO 7 600 OHMS IMPEDANCE	HR479	80223	667-0156-010
XA1	CONNECTOR, ELECTRICAL 22 CONTACTS	2VH22-1AB5	05574	372-7009-000
XA2 THROUGH XA9	SAME AS XA1			

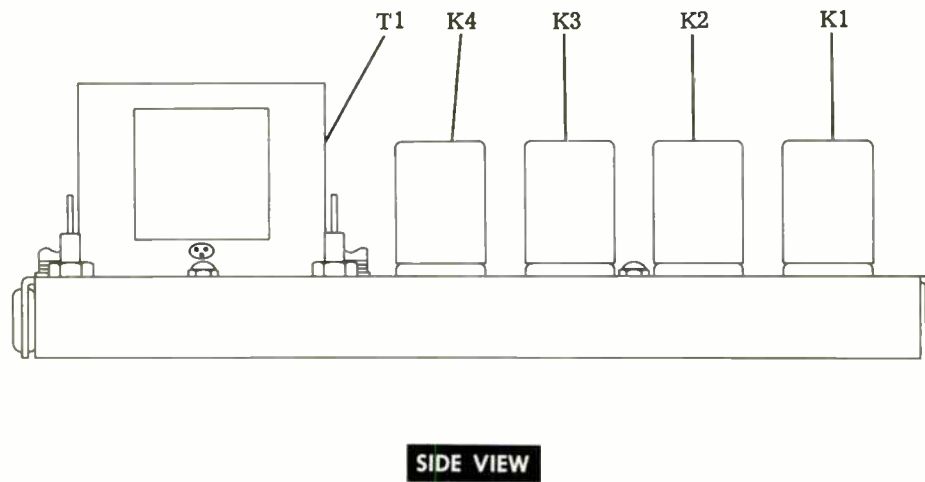
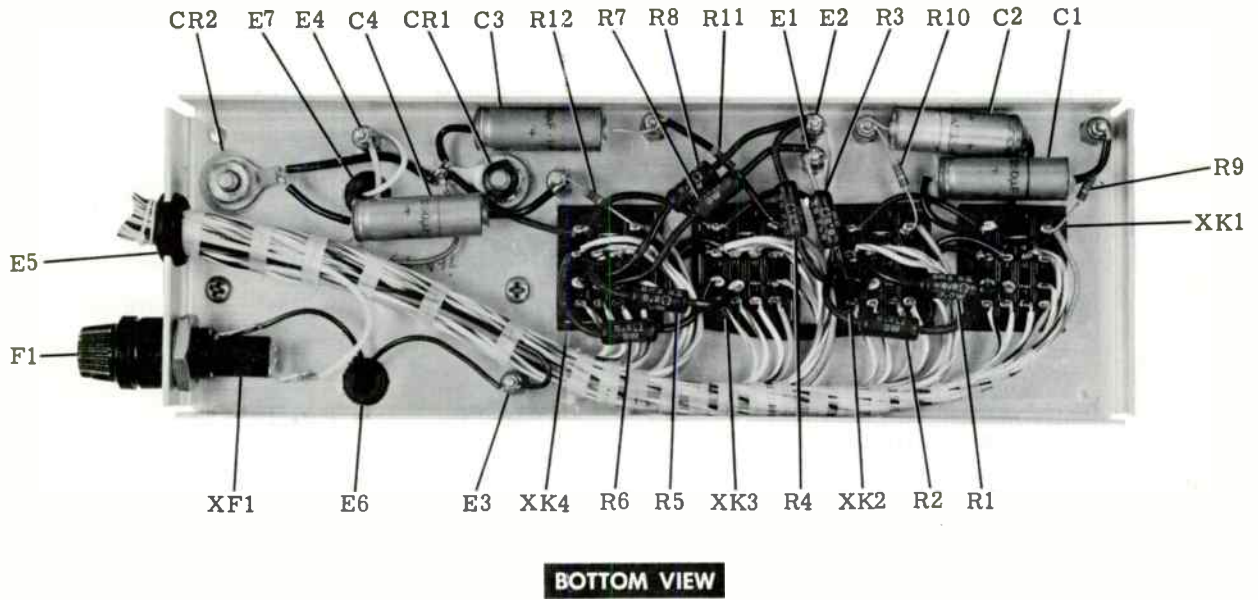


Figure 6-7. Relay Unit A4.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
RELAY UNIT, A4				764-7429-001
C1	CAPACITOR, FXD, ELECTROLYTIC 250 UF, 16 VOLTS	C437ARE250	73445	183-2355-060
C2	SAME AS C1			
C3	SAME AS C1			
C4	SAME AS C1			
CR1	SEMICONDUCTOR DEVICE, DIODE	1N1612	01295	353-6449-010
CR2	SAME AS CR1			
E1	TERMINAL, STUD	RTMT12M	91663	306-0976-000
E2	SAME AS E1			
E3	SAME AS E1			
E4	SAME AS E1			
E5	GROMMET, RUBBER	43-104	74970	201-1080-000
E6	GROMMET, RUBBER	MS35489-4	96906	201-0001-000
E7	SAME AS E6			
F1	FUSE, CARTRIDGE 1/2 AMP CURRENT RATING	F02A250V1-2AS	81349	264-4030-000
K1	RELAY, ARMATURE 4C CONTACT ARRANGEMENT	KH4394	77342	970-2427-060
K2	SAME AS K1			
K3	SAME AS K1			
K4	SAME AS K1			
R1	RESISTOR, FXD, WIRE WOUND 8.2 OHMS, 5% TOL, 3 WATTS	RW69V8R2	81349	747-5318-000
R2 THROUGH R8 R9	SAME AS R1			
R9	RESISTOR, FXD, COMPOSITION 470 OHMS, 10% TOL, 1/4 WATT	RC07GF471K	81349	745-0737-000
R10	SAME AS R9			
R11	SAME AS R9			
R12	SAME AS R9			
T1	TRANSFORMER, POWER OPEN FRAME	76331	81095	662-0245-010
XF1	FUSEHOLDER 15 AMP CURRENT RATING	265-1097-000	13499	265-1097-000
XK1	SOCKET, RELAY 14 CONTACTS	27E008	77342	220-1543-000
XK2	SAME AS XK1			
XK3	SAME AS XK1			
XK4	SAME AS XK1			
MANUFACTURERS CODES				
CODE	MANUFACTURER			
GOtha	GOthAM AUDIO CORP. NEW YORK, N. Y.			
00348	MICROTRAN CO., INC. VALLEY STREAM, N. Y.			
01295	TEXAS INSTRUMENTS, INC. SEMICONDUCTOR-COMPONENTS DIVISION, DALLAS, TEX.			
01548	CAPITOL MACHINE CO. DANBURY, CONN.			
01939	SPRAGUE ELECTRIC CO. OF WISCONSIN GRAFTON, WIS.			
05574	VIKING INDUSTRIES, INC. CANOGA PARK, CALIF.			
07688	MILITARY SPECIFICATIONS			
07716	INTERNATIONAL RESISTANCE CO. BURLINGTON, IOWA			
07933	RAYTHEON MFG. CO. SEMICONDUCTOR DIVISION MOUNTAIN VIEW, CALIF.			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
08806	MINIATURE LAMP DEPARTMENT GECO CLEVELAND, OHIO			
13499	COLLINS RADIO CO. CEDAR RAPIDS, IOWA			
33173	TUBE DEPARTMENT GECO OWENSBORO, KY.			
56289	SPRAGUE ELECTRIC CO. NORTH ADAMS, MASS.			
72619	DIALIGHT CORP. BROOKLYN, N.Y.			
73445	AMPEREX ELECTRONIC CO. DIVISION OF NORTH AMERICAN PHILIPS CO., INC. HICKSVILLE, N.Y.			
74199	QUAM NICHOLS CO. CHICAGO, ILL.			
74970	E. F. JOHNSON CO. WASECA, MINN.			
75173	HOWARD B. JONES DIVISION OF CINCH MFG. CO. CHICAGO, ILL.			
75382	KULKA ELECTRIC CORP. MT. VERNON, N.Y.			
76854	OAK MFG. CO. CRYSTAL LAKE, ILL.			
77342	AMERICAN MACHINE AND FOUNDRY CO. POTTER AND BRUMFIELD DIVISION, PRINCETON, IND.			
78189	SHAKEPROOF DIVISION OF ILLINOIS TOOL WORKS ELGIN, ILL.			
80223	UNITED TRANSFORMER CO. NEW YORK, N.Y.			
81095	TRIAD TRANSFORMER CORP. 4055 REDWOOD AVE. VENICE, CALIF. ZIP CODE 90293			
81349	MILITARY SPECIFICATIONS			
81450	ERCO RADIO LABORATORIES, INC.			
91662	ELCO CORP. WILLOW GROVE, PA.			
91663	ARMEL ELECTRONICS, INC. NORTH BERGEN, N.J.			
96256	THORDARSON-MEISSNER DIVISION OF MACGUIRE INDUSTRIES, INC., MT. CARMEL, ILL.			
96906	MILITARY SPECIFICATIONS			

section 7
illustrations

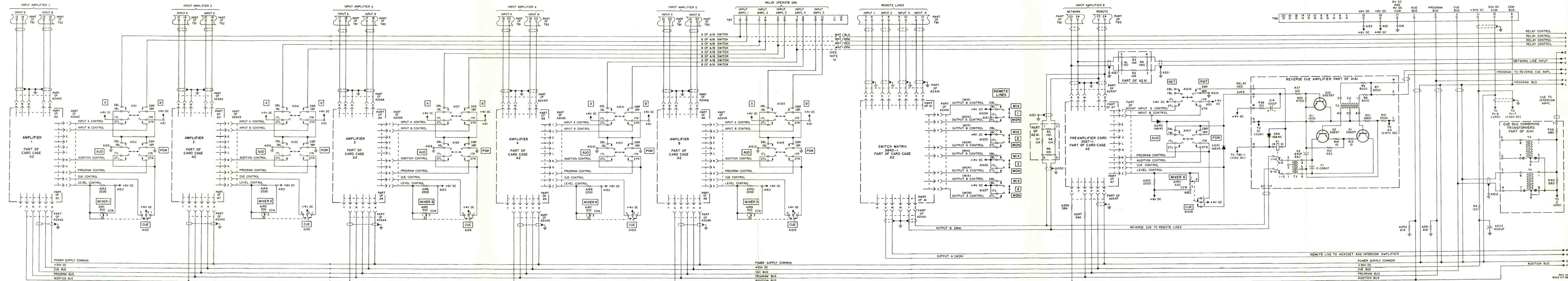
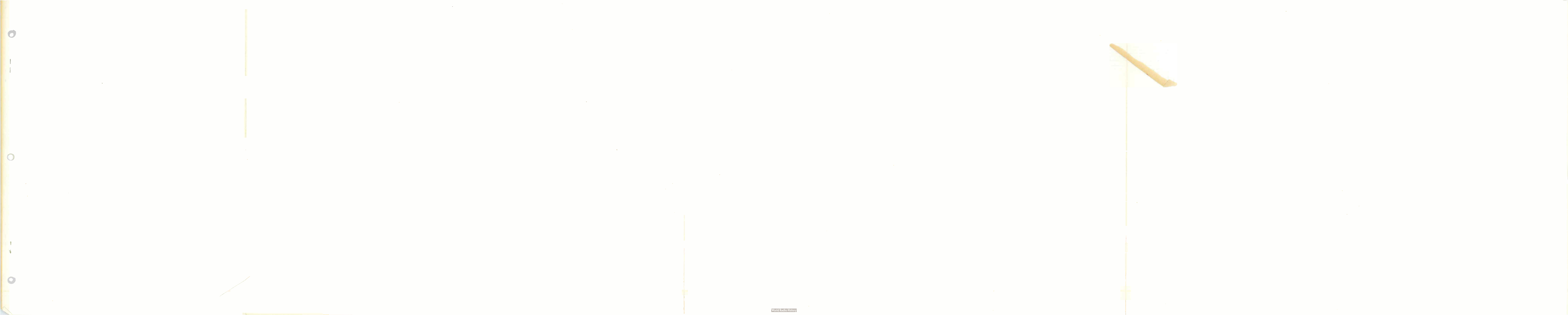


Figure 7-1. Overall Schematic, 212M-1 Monaural Console (Sheet 2 of 2)





instruction manual

STOLEN FROM A.R. NOTT

212S-1 Stereo Console

This Manual Includes:

<i>212S-1 Stereo Console</i>	<i>523-0558572-002439</i>
<i>389D-1 Switch Matrix</i>	<i>523-0558098002438</i>
<i>356T-1 Preamplifier</i>	<i>523-0558093-002438</i>
<i>356V-1 High Level Input Card</i>	<i>523-0558092-002438</i>
<i>356R-1 Microphone-Phonograph Preamplifier</i>	<i>523-0558097-002438</i>
<i>356U-1 Broadcast Audio Preamplifier</i>	<i>523-0559550-001438</i>
<i>356P-1 Program Amplifier</i>	<i>523-0558094-002438</i>
<i>356M-1 Monitor Amplifier</i>	<i>523-0558096-002438</i>
<i>409Z-1 Power Supply</i>	<i>523-0558095-002438</i>
<i>260S-1 Add-On Unit</i>	<i>523-0558811-002438</i>

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product support

SERVICE BULLETIN

COLLINS RADIO COMPANY

EQUIPMENT SERIES: 212M and 212S SERVICE BULLETIN NO. 1 DATE: Page 1 of 5

EQUIPMENT TYPE: 212M-1 and 212S-1 BROADCAST CONSOLES

SUBJECT: INCREASED DELAY TIME IN RELAY UNIT A-4

The modification in this bulletin involves replacing four 1N645 diodes with a capacitor and resistor in series in order to increase the delay time in the operation of the relays. This eliminates audio feedback which has been evident in the stereo and monaural consoles under certain switching conditions.

MODIFICATION PROCEDURE:

1. Lay out and drill four 0.136-inch diameter holes as indicated by arrows in figure 1.
2. Install four standoffs (306-0976-000) using a no. 4 lock-washer (310-0279-000) under each standoff and secure with a 4-40 X 1/4 PPH screw (343-0133-000).
3. Remove the four 1N645 diodes that are across coil terminals 13 and 14 of K1, K2, K3 and K4.
4. Install four 250-uf, 16-volt capacitors (183-2355-060) as shown in figure 2. Use sleeving (152-1347-000) on each lead. Be sure that the negative lead of each capacitor is connected to the standoff terminal.
5. Connect four 470-ohm, 1/4-watt resistors as shown in figure 2. Use sleeving on each lead.
6. Inspect all new connections to see that they are properly soldered.
7. The completed modification is shown in figure 3 and a revised schematic in figure 4.

PARTS REQUIRED:

Modification Kit 764-7485-001 consists of the following items:

<u>Qty</u>	<u>Description</u>	<u>Collins Part Number</u>
4	Capacitors, 250-uf, 16-Volt	183-2355-060
4	Standoff Insulators	306-0976-000
4	Washers No. 4 Lock	310-0279-000
4	Screws, 4-40 x 1/4 PPH	343-0133-000
4	Resistors, 470-ohm, 10%, 1/4-watt	745-0737-000
1.5 ft	Sleeving, No. 20	152-1347-000

The parts required for this modification are included with this service bulletin.

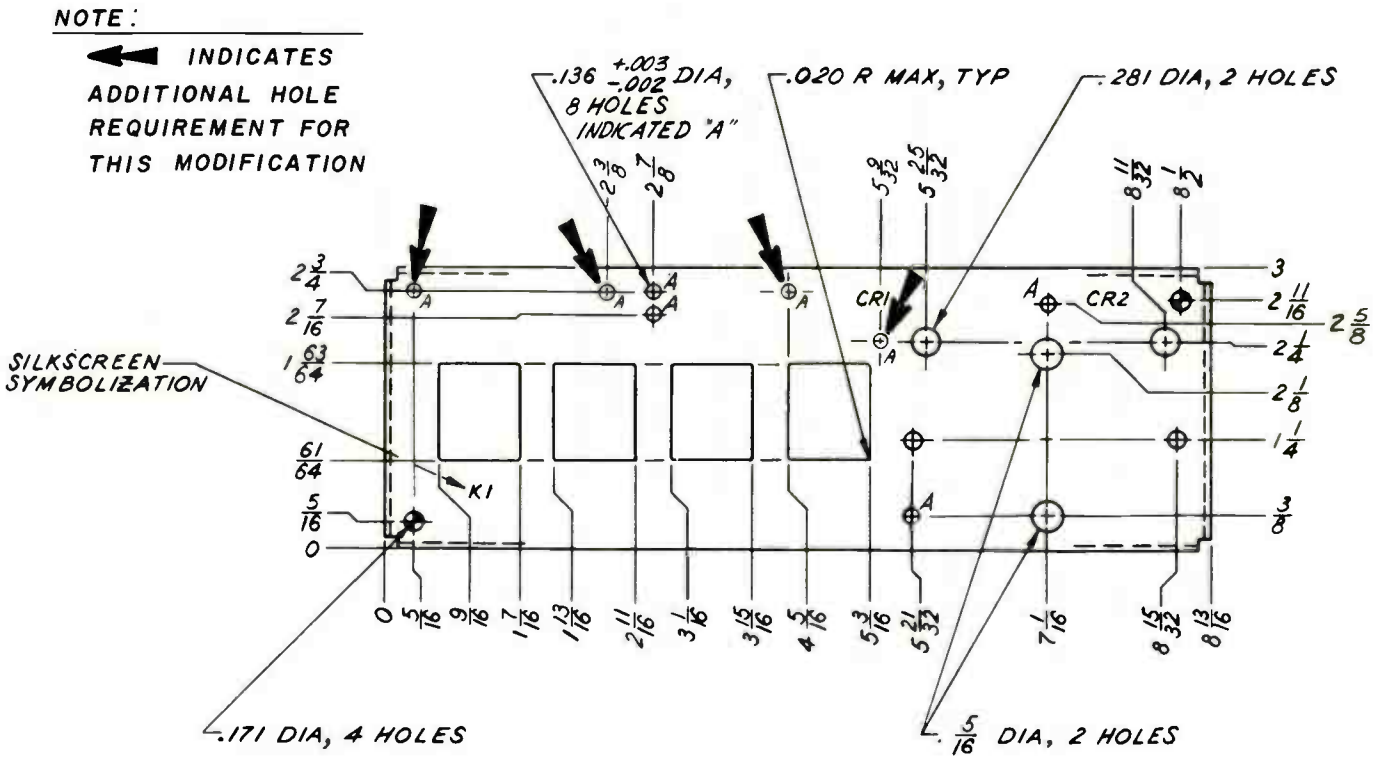


Figure 1. Relay Module Chassis, Hole Locations

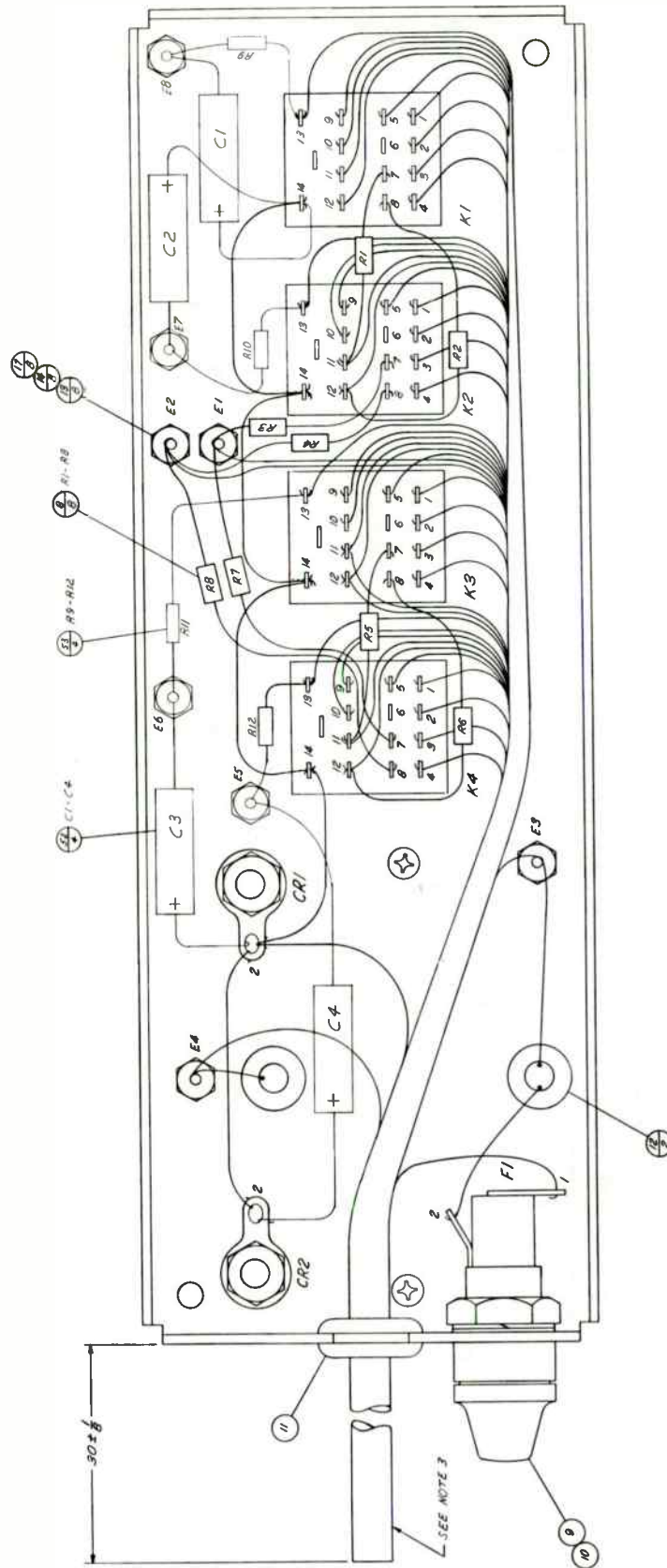


Figure 2. Relay Module, Component Location

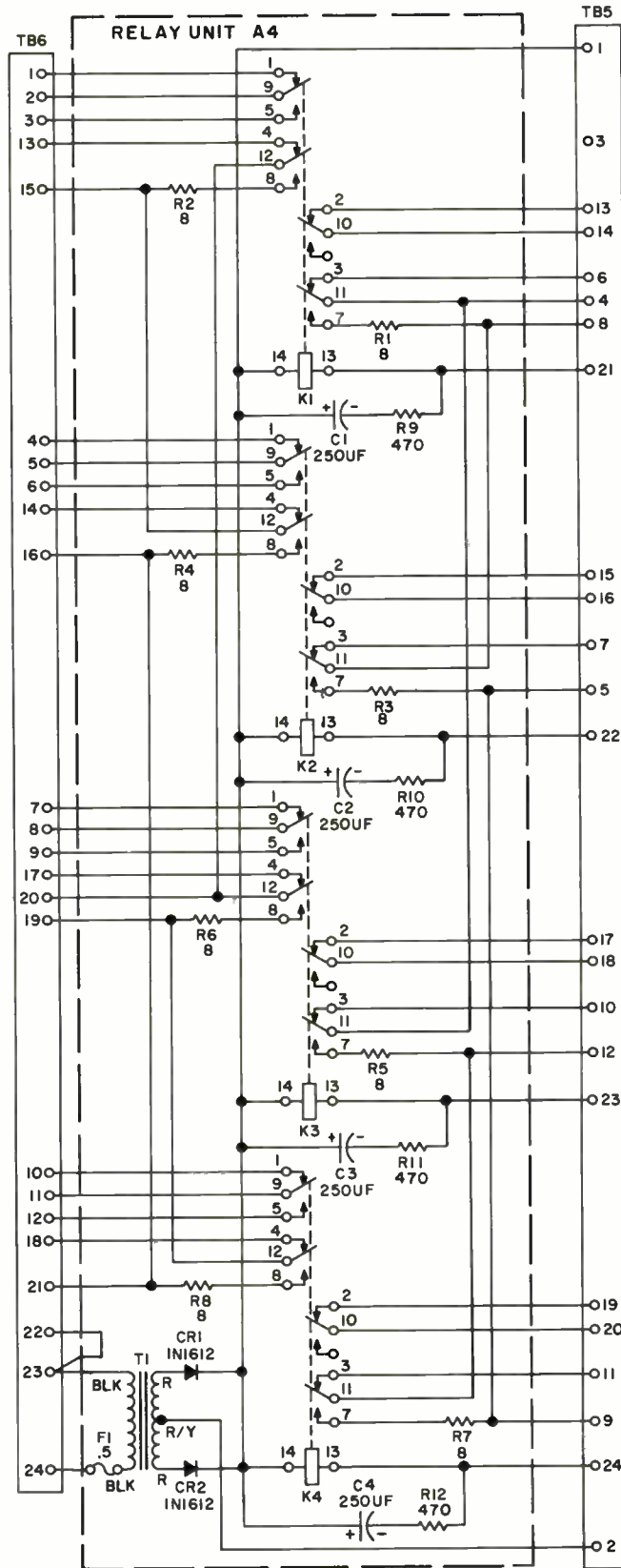


Figure 3. Relay Module, Revised Schematic

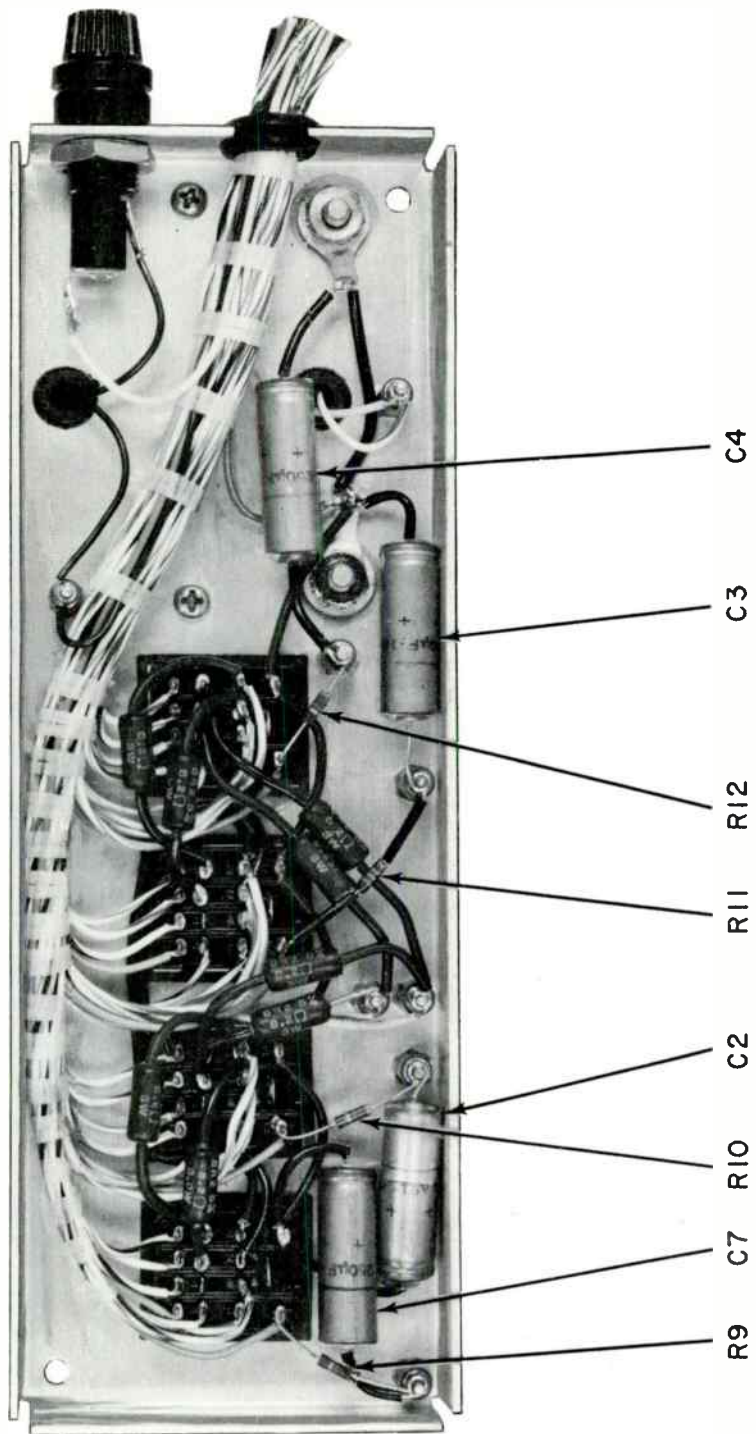


Figure 4. Completed Modification, Relay Module





product support

SERVICE BULLETIN

COLLINS RADIO COMPANY

SERVICE BULLETIN NO. 1

EQUIPMENT SERIES: 356T

DATE: 5-12-66
Page 1 of 3

EQUIPMENT TYPE: 356T-1

SYSTEM USE: 212M-1 and 212S-1 BROADCAST CONSOLES

The modification described in this service bulletin increases the gain of the preamplifier by changing the value of three resistors on the preamplifier card. This modification is applicable to 356T-1 preamplifiers installed in 212M-1 serial numbers 1 through 28 and 212S-1 serial numbers 1 through 25.

It is recommended that Collins Service Information Letter "Repair of Printed Circuits", be read prior to starting this modification.

MODIFICATION PROCEDURE:

Refer to Figure 1 for component locations.

1. Remove R9, 56K 1/4 watt resistor. Clean eyelets and install 12K 1/4 watt 5% (745-0787-00) resistor.
2. Remove R12, 470K 1/4 watt resistor. Clean eyelets and install 680K 1/4 watt 5% (745-0850-00) resistor.
3. Remove R14, 4700 1/4 watt resistor. Clean eyelets and install 2.2K 1/4 watt 5% (745-0760-00) resistor.
4. Figure 2 is a revised schematic of the 356T-1 preamplifier card.

PARTS REQUIRED:

The following parts are required:

<u>QTY</u>	<u>DESCRIPTION</u>	<u>COLLINS PART NUMBER</u>
1	Resistor, 2.2K ohm 1/4 watt 5%	745-0760-00
1	Resistor, 12K ohm 1/4 watt 5%	745-0787-00
1	Resistor, 680K ohm 1/4 watt 5%	745-0850-00

The parts required for this modification are included with this service bulletin.

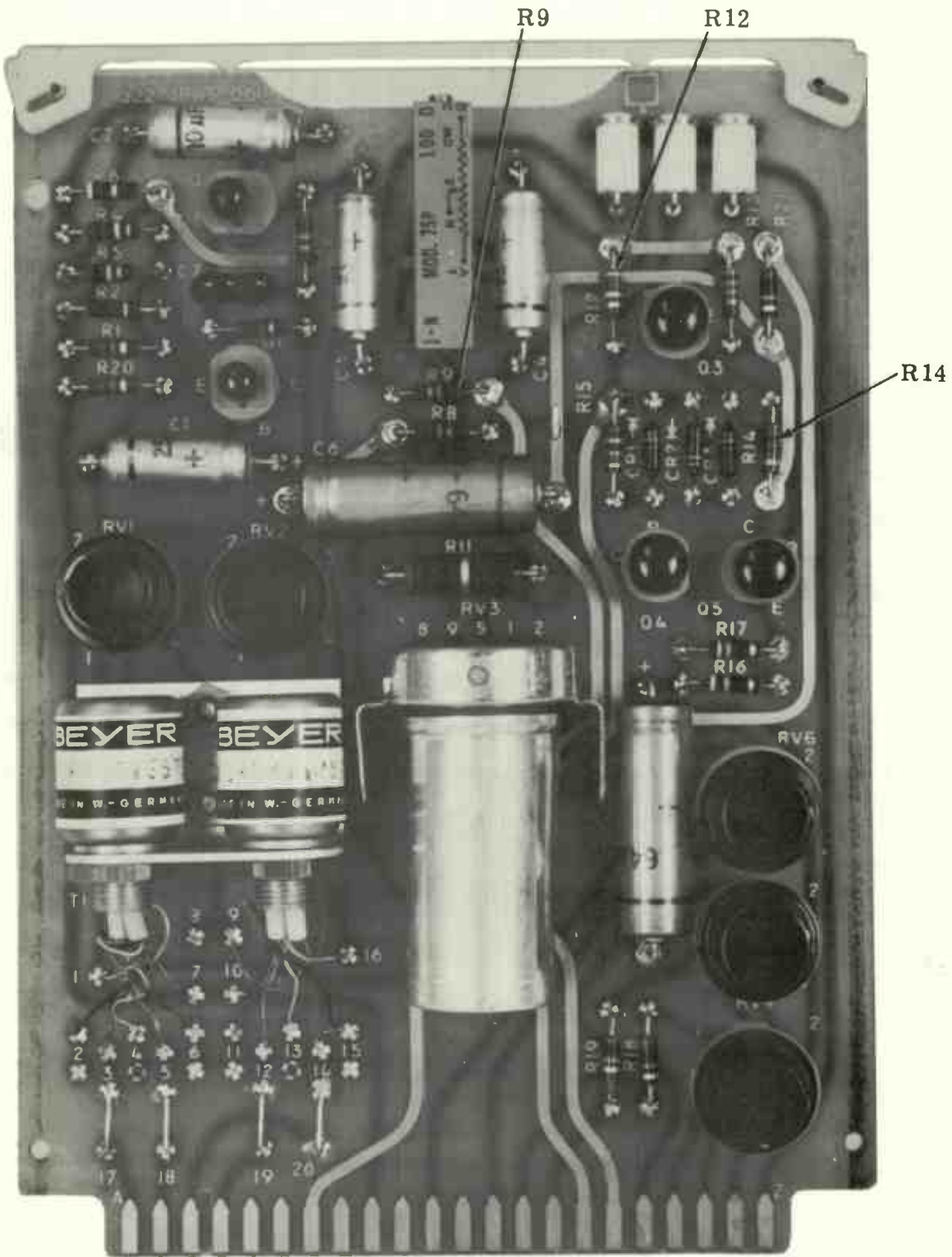


Figure 1. Component Location

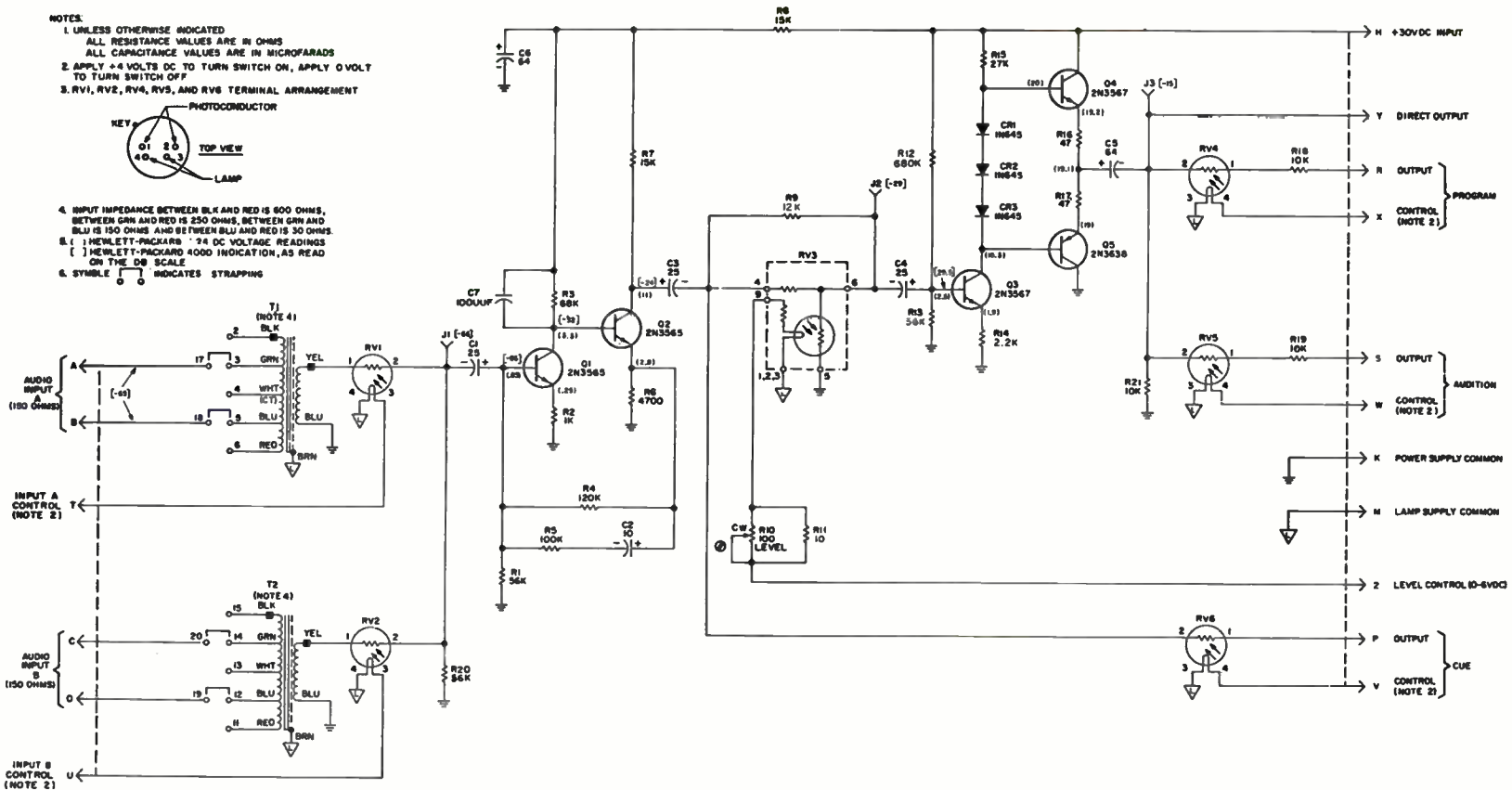


Figure 2. Preamplifier Card 356-T-1, Revised Schematic



product support

SERVICE BULLETIN

COLLINS RADIO COMPANY

SERVICE BULLETIN NO. 3

EQUIPMENT SERIES: 212 M/S

DATE: 12-19-66
Page 1 of 1

EQUIPMENT TYPE: 356 ()-1

The modification described in this service bulletin improves the operation of the gain control circuit by substitution of an improved photo electric cell. This modification is applicable to and recommended for the following cards; 356M-1, 356R-1, 356T-1 and 356V-1.

MODIFICATION PROCEDURE:

1. Remove the plug in photo cell attenuator.
2. Install the replacement photo cell attenuator ~~764-9918-001~~.
3. Clip the leads to, and remove the 10 ohm 1 watt resistor. This is the only one watt resistor on the card.
4. If it is desired to restrict the adjustment range of the photo cell attenuator a 100 ohm 1/2 watt resistor may be installed where the 10 ohm resistor was removed.

PARTS REQUIRED:

The following parts are required:

<u>QUANTITY</u>	<u>DESCRIPTION</u>	<u>COLLINS PART NUMBER</u>
1	Photo Attenuator	764-9918-001
1	100Ω 1/2 Watt	745-1310-000

The parts required for this modification are included with this service bulletin.

→ 714-0013-010

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product support

SERVICE BULLETIN

COLLINS RADIO COMPANY

SERVICE BULLETIN NO. 2

EQUIPMENT SERIES: 212M and 212S

DATE: 5-20-66

Page 1 of 5

EQUIPMENT TYPE. 212M-1 and 212S-1 BROADCAST CONSOLES

SUBJECT: COMPENSATION OF LEVEL DUE TO INCREASED GAIN OF PREAMPLIFIERS

The modification described in this bulletin compensates for the increased gain of the pre-amplifiers as described in Service Bulletin No. 1 on the 356T-1. The net input pad attenuation is increased by changing resistors. The output level is reduced by adding resistors in series with the audition and program outputs of the net/remote amplifier.

The modification applies to 212M-1 serial numbers 1 through 28. On the 212S-1 it applies to serial numbers 1 through 25.

It is recommended that Collins Service Information Letter "Repair of Printed Circuits" be read prior to starting this modification.

MODIFICATION PROCEDURE:

1. Refer to Figure 1 for the location of A1 and remove the four 4-40 PPH screws that secure the circuit board to the chassis below A2, left channel card cage.
2. Remove the 4-40 standoff at the upper right corner of A1. This will free the ground wire and permit swinging the card out.
3. Clip the leads, near the board, of A1R2 and A1R3 22K ohm 1/4 watt resistors and discard.
4. Use a small pencil iron, heat the eyelets and remove the clipped leads and solder from the eyelets with a toothpick.
5. Insert 10K ohm, 1/4 watt resistors (745-0785-000) in A1R2 and A1R3 eyelets, bend leads back against board, clip and solder.
6. Remount the 4-40 standoff, placing the ground lug between chassis and standoff. The card cage will have to be moved forward in order to replace the 4-40 PPH screw.
7. Secure the printed circuit board A1 to the four standoffs using the 4-40 PPH screws removed in step 1.
8. Figure 2 is a revised schematic of A1.
9. Repeat the steps 1 through 5 on A1 located below A3, right channel card cage.
10. Steps 1 through 7 only will apply to the 212M-1 Monaural Broadcast Console.
11. The following changes are made on card cages A2 and A3 in the 212S-1 and A2 in the 212M-1. Refer to Figure 3 for all connector terminal locations. Figure 4 is a revised schematic of A2 and A3.
12. Remove the bus wire from the following card connector terminals:
 - (a) A2XA7-R to A2XA8-D
 - (b) A2XA7-R to A2XA6-R
 - (c) A2XA7-S to A2XA6-S

13. Connect a bus wire between the following terminals:
 - (a) A2XA6-R to A2XA7-N
 - (b) A2XA7-N to A2XA8-D
14. Connect a 56K ohm 1/4 watt resistor (745-0812-000) from A2XA6-R to A2XA7-R.
15. Connect a 56K ohm 1/4 watt resistor (745-0812-000) from A2XA6-S to A2XA7-S.
16. Check all connections to be sure they are correct and properly soldered.

PARTS REQUIRED:

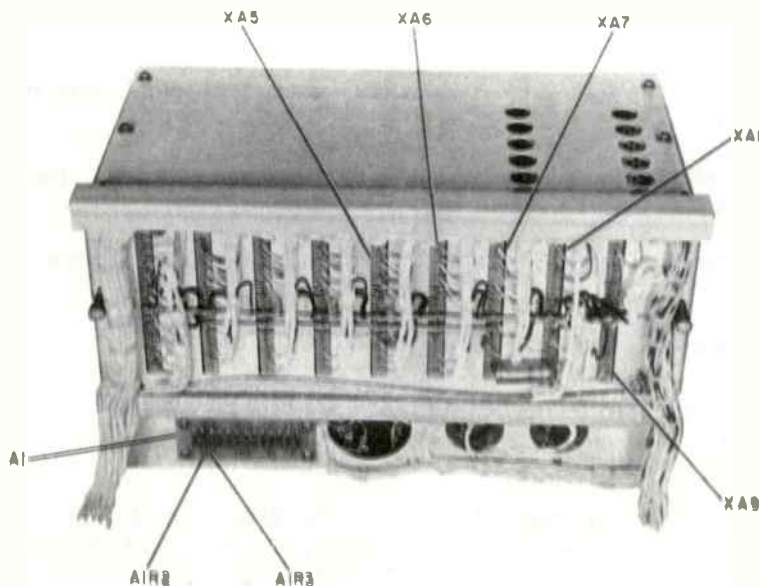
The following parts are required for the 212M-1 modification.

<u>QTY</u>	<u>DESCRIPTION</u>	<u>COLLINS PART NUMBER</u>
2	Resistors, 10K ohm 1/4 watt	745-0785-000
2	Resistors, 56K ohm 1/4 watt	745-0812-000
1.0FT	Wire, No.22, Tinned	421-2220-000
1.0FT	Sleeving, No.20	152-1347-000

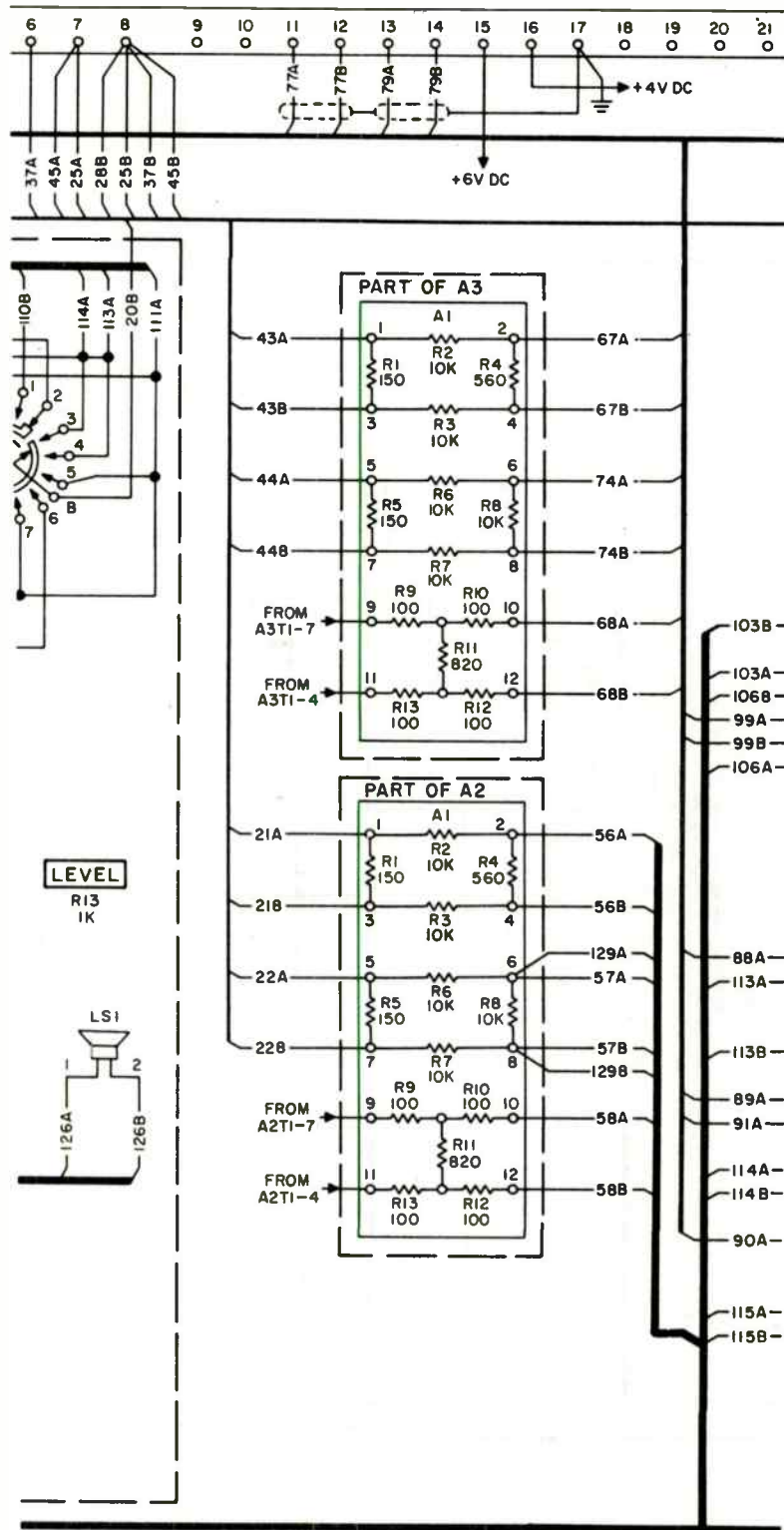
The following parts are required for the 212S-1 modification:

<u>QTY</u>	<u>DESCRIPTION</u>	<u>COLLINS PART NUMBER</u>
4	Resistors, 10K ohm 1/4 watt	745-0785-000
4	Resistors, 56K ohm 1/4 watt	745-0812-000
2.0FT	Wire, No.22 Tinned	421-2220-000
2.0FT	Sleeving, No.20	152-1347-000

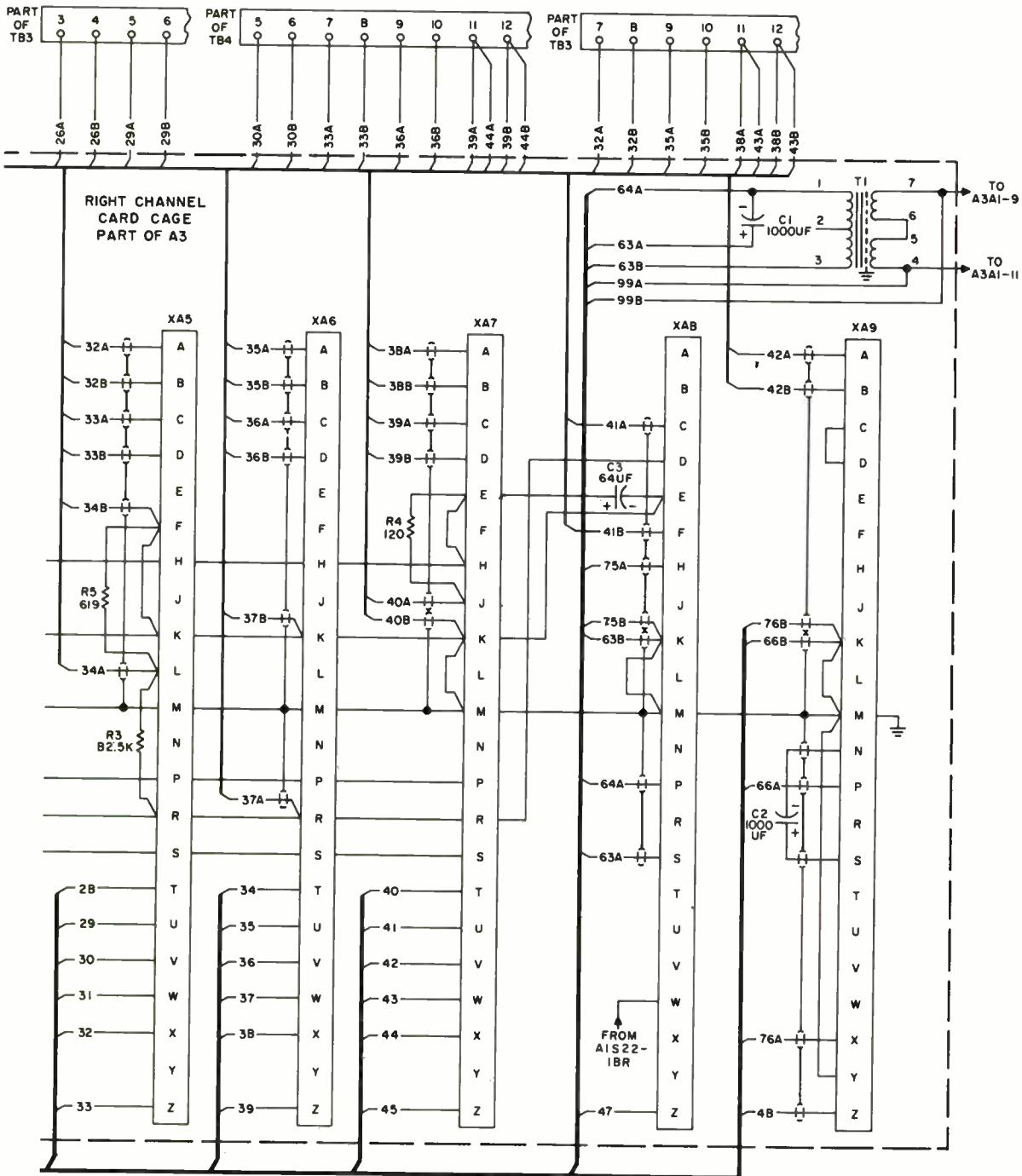
The parts required for this modification are included with this service bulletin.



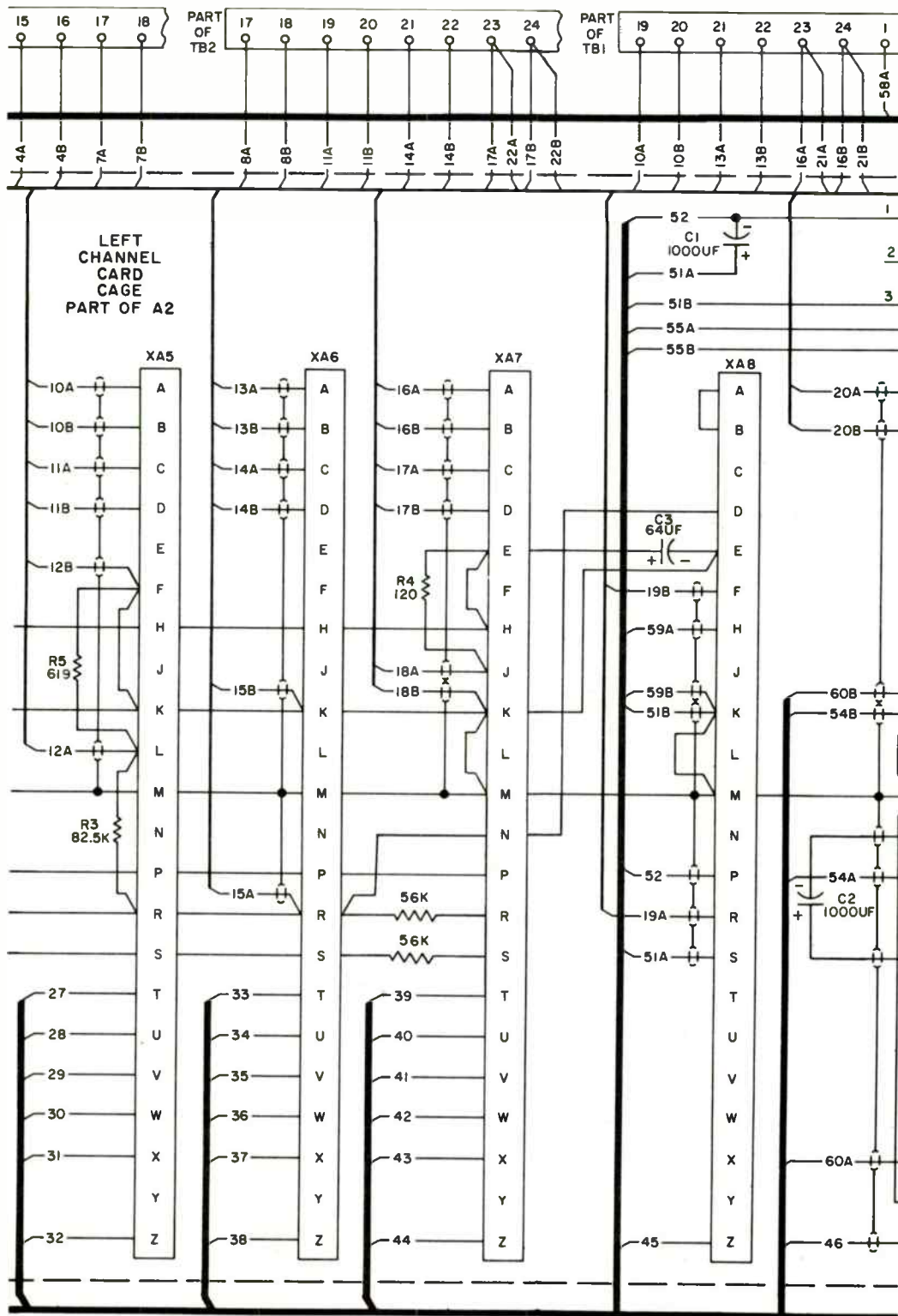
**Component Locations
Figure 1**



Revised Schematic of A1
Figure 2



Terminal Locations
Figure 3



Revised Schematic A2 and A3
Figure 4



product support

SERVICE BULLETIN

COLLINS RADIO COMPANY

SERVICE BULLETIN NO. 4

EQUIPMENT SERIES: 212 M/S

DATE: 12-19-66
Page 1 of 2

EQUIPMENT TYPE: 356P-1

SUBJECT: IMPROVED GAIN CONTROL

The modification described in this service bulletin improves the operation of the gain control circuit by substitution of an improved photo electric cell RV2. This modification is applicable to and recommended for all 356P-1 cards.

MODIFICATION PROCEDURE:

Refer to figure 1 for component locations.

1. Remove the plug in photo cell attenuator RV2.
2. Install the new photo cell attenuator 764-9918-001.
3. Remove R10, 56K 1/4 watt resistor. Clean eyelets.
4. Install 27K, 1/4 watt resistor, 745-0800-000.
5. Figure 2 is a revised schematic of the 356P-1.

PARTS REQUIRED:

<u>QUANTITY</u>	<u>DESCRIPTION</u>	<u>COLLINS PART NUMBER</u>
1	Photo Attenuator	764-9918-001
1	27K 1/4 Watt Resistor	745-0800-000

The parts required for this modification are included with this service bulletin.

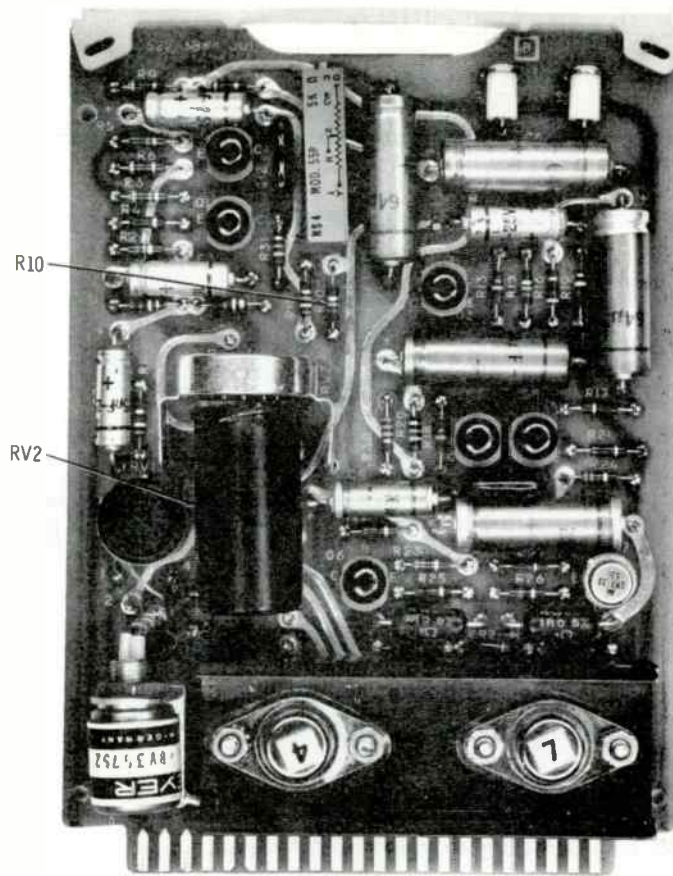


Figure 1. Component Locations

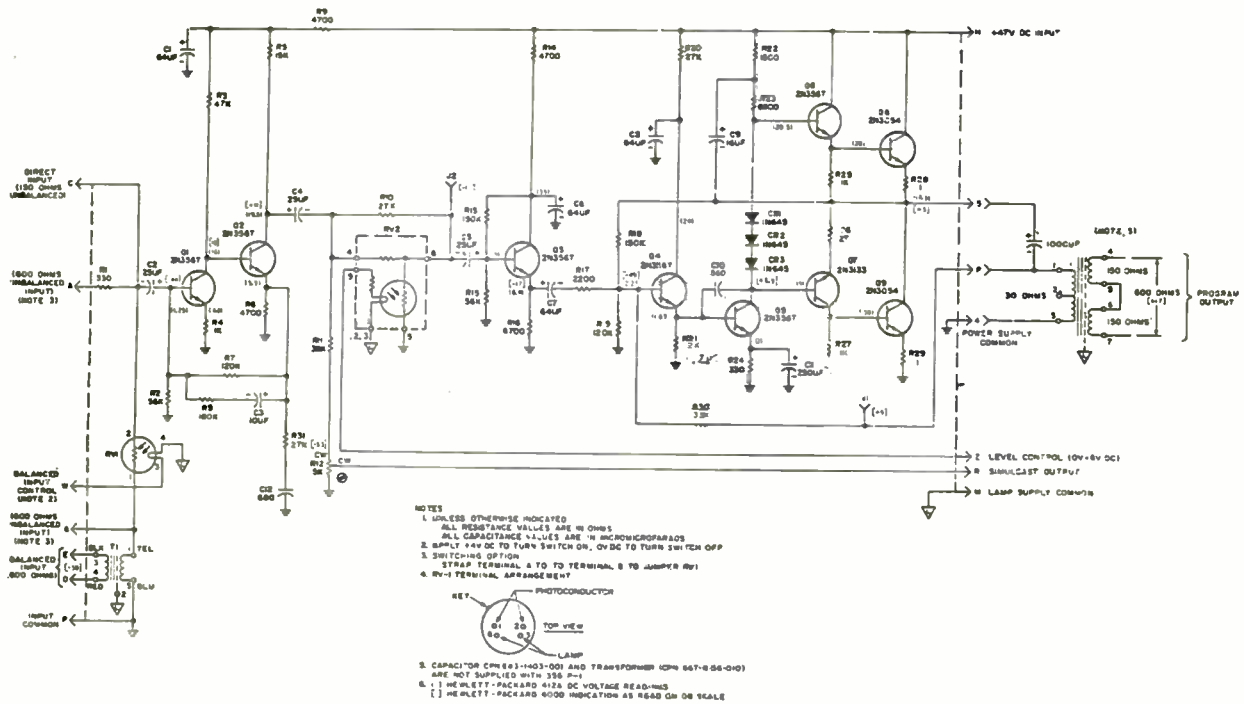


Figure 2. Revised Schematic 356P-1



product support

SERVICE BULLETIN

COLLINS RADIO COMPANY

SERVICE BULLETIN NO. 4

EQUIPMENT SERIES: 212 M/S

DATE: 12-19-66
Page 1 of 2

EQUIPMENT TYPE: 356P-1

SUBJECT: IMPROVED GAIN CONTROL

The modification described in this service bulletin improves the operation of the gain control circuit by substitution of an improved photo electric cell RV2. This modification is applicable to and recommended for all 356P-1 cards.

MODIFICATION PROCEDURE:

Refer to figure 1 for component locations.

1. Remove the plug in photo cell attenuator RV2.
2. Install the new photo cell attenuator 764-9918-001.
3. Remove R10, 56K 1/4 watt resistor. Clean eyelets.
4. Install 27K, 1/4 watt resistor, 745-0800-000.
5. Figure 2 is a revised schematic of the 356P-1.

PARTS REQUIRED:

<u>QUANTITY</u>	<u>DESCRIPTION</u>	<u>COLLINS PART NUMBER</u>
1	Photo Attenuator	764-9918-001
1	27K 1/4 Watt Resistor	745-0800-000

The parts required for this modification are included with this service bulletin.

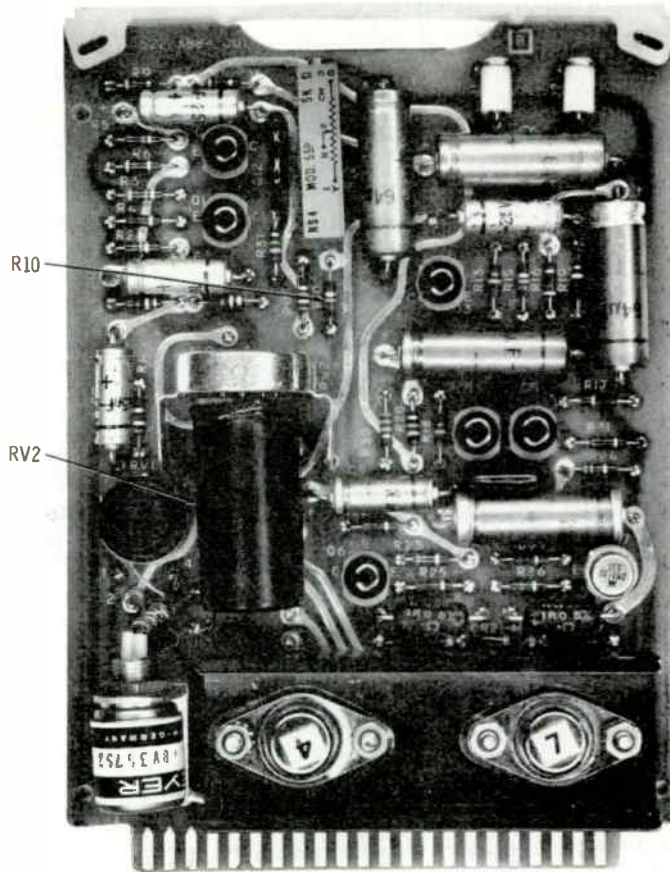


Figure 1. Component Locations

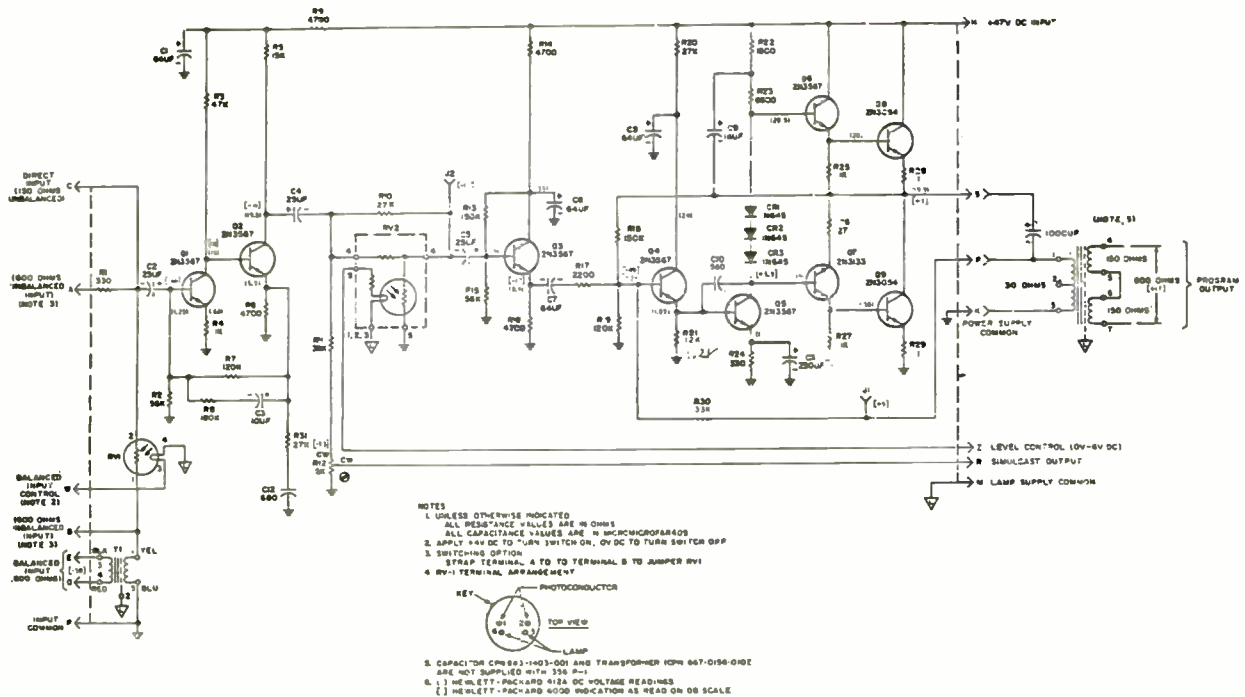


Figure 2. Revised Schematic 356P-1



product support

SERVICE BULLETIN

COLLINS RADIO COMPANY

1 March 1967

SERVICE BULLETIN NO. 5

EQUIPMENT SERIES: 212M/S

EQUIPMENT TYPE: 212M-1 and 212S-1 Broadcast Consoles

SUBJECT: Improved Preamplifier Decoupling

The modification described in this service bulletin improves preamplifier decoupling by increasing the value of C3.

This modification is recommended for all units.

1. MODIFICATION PROCEDURE

Refer to figure 6-6 of the instruction books for the 212M-1 and the 212S-1 for the following steps:

- a. Locate the bus connecting terminal "K" of XA5, XA6 and XA7.
- b. Place the 400-uf, 40-volt, capacitor 183-2355-160, on the metal chassis parallel to XA6 and XA7 with the negative end of the capacitor toward the bus.
- c. Wrap the negative lead of the capacitor around the bus and solder.
- d. Connect the positive lead to XA7-E and solder. This will parallel the new capacitor with C3.

NOTE

The above procedure will apply to A2 of the 212M-1 and to A2 and A3 of the 212S-1.

2. PARTS REQUIRED

The following parts are required for the 212M-1 modification:

<u>QUANTITY</u>	<u>DESCRIPTION</u>	<u>COLLINS PART NUMBER</u>
1	Capacitor, 400 uf, 40 volt	183-2355-160

Service Bulletin No. 5

The following parts are required for the 212S-1 modification:

<u>QUANTITY</u>	<u>DESCRIPTION</u>	<u>COLLINS PART NUMBER</u>
2	Capacitor, 400 uf, 40 volt	183-2355-160

The parts required for this modification are enclosed with this service bulletin.



product support

SERVICE BULLETIN

COLLINS RADIO COMPANY

1 March 1967

SERVICE BULLETIN NO. 6

EQUIPMENT SERIES: 212 M/S

EQUIPMENT TYPE: 356V-1 High Level Input Amplifier

SYSTEM USE: 212M-1 and 212S-1 Broadcast Consoles

The modification described in this service bulletin increases the gain of the preamplifier by changing the value of three resistors on the preamplifier card. This modification is applicable to all 356V-1 preamplifiers installed in 212M-1 and 212S-1 broadcast consoles.

It is recommended that Collins Service Information Letter "Repair of Printed Circuits", be read prior to starting this modification.

1. MODIFICATION PROCEDURE

Refer to figure 2 in the Unit Instructions for the 356V-1 contained in the instruction book for the 212M-1 and 212S-1 consoles for the following steps:

- a. Remove R21, 100K ohm 1/4-watt resistor. Clean eyelets and install 56K ohm 1/4-watt 5% (745-0811-000) resistor.
- b. Remove R24, 470K ohm 1/4-watt resistor. Clean eyelets and install 680K ohm 1/4-watt 5% (745-0850-000) resistor.
- c. Remove R27, 4700 ohm 1/4-watt resistor. Clean eyelets and install 2.2K ohm 1/4-watt 5% (745-0760-00) resistor.
- d. Make the necessary corrections on the schematic in the 356V-1 unit instructions.

2. PARTS REQUIRED

The following parts are required:

<u>QUANTITY</u>	<u>DESCRIPTION</u>	<u>COLLINS PART NUMBER</u>
1	Resistor, 2.2K ohm 1/4 watt 5%	745-0760-000
1	Resistor, 56K ohm 1/4 watt 5%	745-0811-000
1	Resistor, 680K ohm 1/4 watt 5%	745-0850-000

The parts required for this modification are included with this service bulletin.

1470, 1471