



356M-1 Monitor Amplifier

unit instructions

Collins Radio Company | Dallas, Texas

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Printed in United States of America

523-0558096-002438

1 June 1967

1. GENERAL DESCRIPTION

1.1 Purpose of Unit

The 356M-1 Monitor Amplifier (figure 1) is a 10-watt, high-fidelity audio amplifier. The 356M-1 is normally used in an audio console to drive program monitor speakers.

1.2 Unit Description

The 356M-1 consists of an input transformer, a 13-transistor amplifier with a level control, and associated components on a plug-in, etched circuit card. A remotely controlled photoconductive device controls the output level. An external capacitor is required for proper operation. The capacitor is not supplied with the 356M-1, but is normally installed in the console.

Caution

Be sure the external capacitor is connected as shown in figure 4 before energizing the equipment. Otherwise, the amplifier and speaker may be damaged.

2. UNIT CHARACTERISTICS

2.1 Physical Characteristics

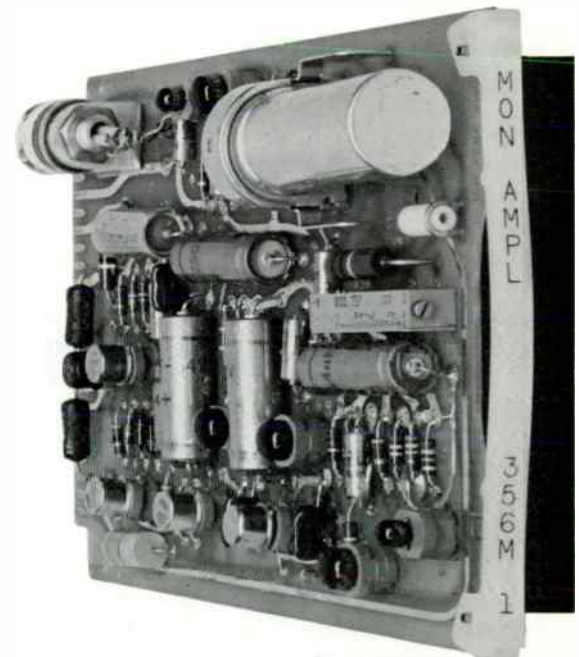
Size:

4 by 6 by 3-3/8 inches

Weight:
15 ounces

Type of Construction:
Etched circuit card

Type of Mounting:
22-contact card receptacle
(CPN 372-7009-000)



B502-014-Pb

Figure 1. 356M-1 Monitor Amplifier

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:

47 volts dc at 750 ma, 5 mv pp maximum ripple
6 volts dc at 60 ma, regulated

Input Impedance:
600 ohms, balanced

Input Level:
-50 dbm nominal

Output Impedance (Unbalanced):
8 ohms nominal

Output Level:
10 watts (rms) into 8 ohms

Gain:
90 db

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

Distortion:
1%, maximum

3. CIRCUIT DESCRIPTION

The 356M-1 (figure 4) consists of an input transformer, six amplifier stages, five emitter followers, a photoconductive level control, and associated components. Transformer T1 and capacitor C1 couple the input signal to the base of transistor Q1, which is direct coupled to the base of emitter follower Q2. The network consisting of

R4, R5, and C2 provides negative feedback. Remotely controlled photoconductive level control RV1 shunts the signal path. Potentiometer R38, in series with the lamp in the photoconductive level control, is a fine gain adjustment. The cascaded stages consisting of transistors Q4 through Q8 amplify the signal. Class A amplifier Q9 drives the phase inverter, transistors Q10 and Q11. The phase inverter drives the class AB output stage, which consists of transistors Q13 and Q14. Silicon diodes CR1, CR2, and CR3 provide the bias for transistors Q10 and Q11. The external capacitor, charged by conduction through Q14, supplies the operating voltage for transistor Q13. The output impedance of the amplifier is 8 ohms.

The photoconductive level control consists of a photocell and a 6-volt lamp sealed in a can. The resistance of the photocell, shunting the signal path, decreases as the voltage applied to the lamp is increased.

4. MAINTENANCE

4.1 Troubleshooting

When trouble is suspected in the 356M-1, replace the card with a spare, if available. If the replacement card remedies the problem, visually inspect the defective card for loose connections and signs of component damage. If no faults are found, extend the card on the card extender and check for the dc voltages and ac signal levels indicated on the schematic diagram.

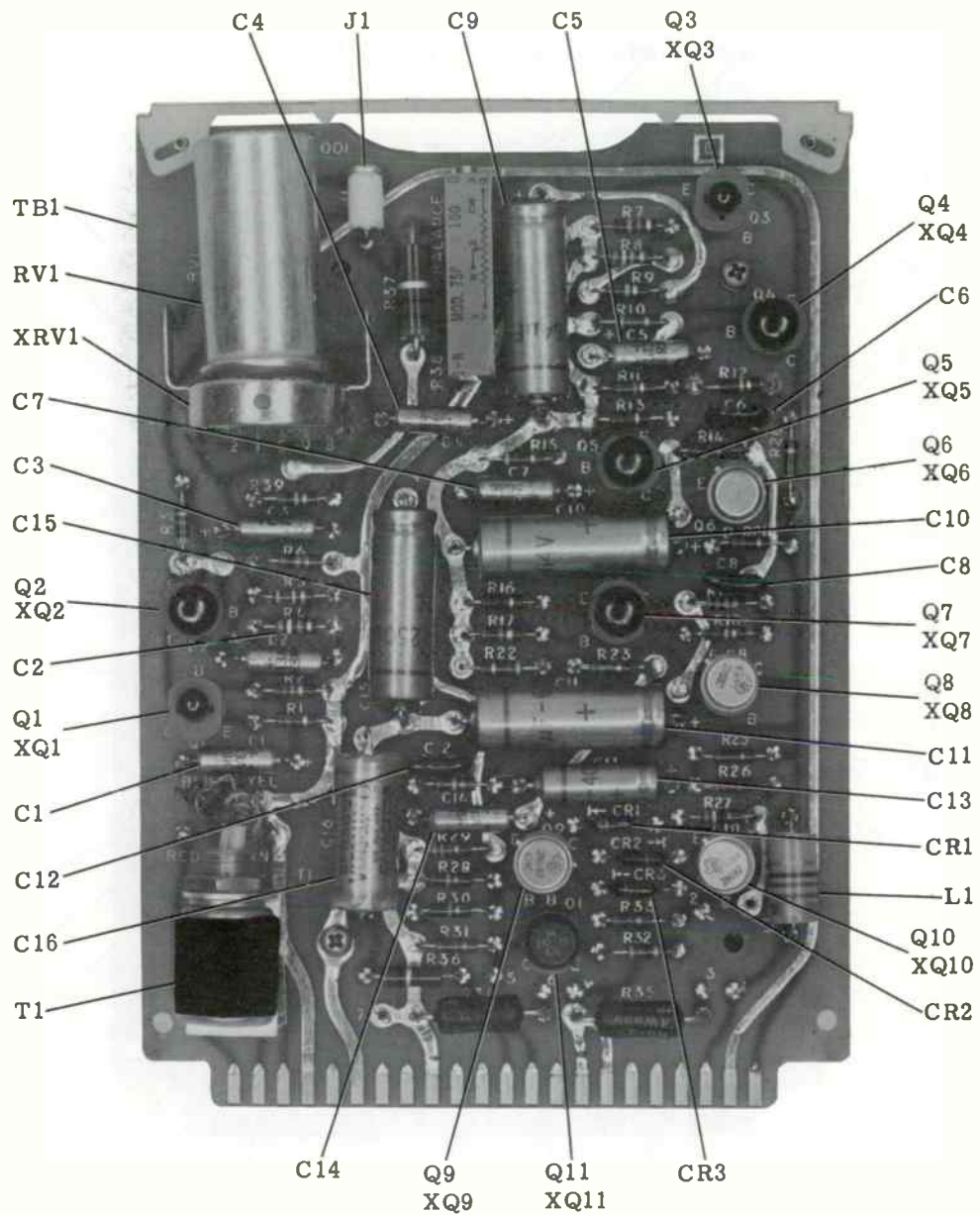
Caution

When making repairs, 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.

4.2 Spare Parts

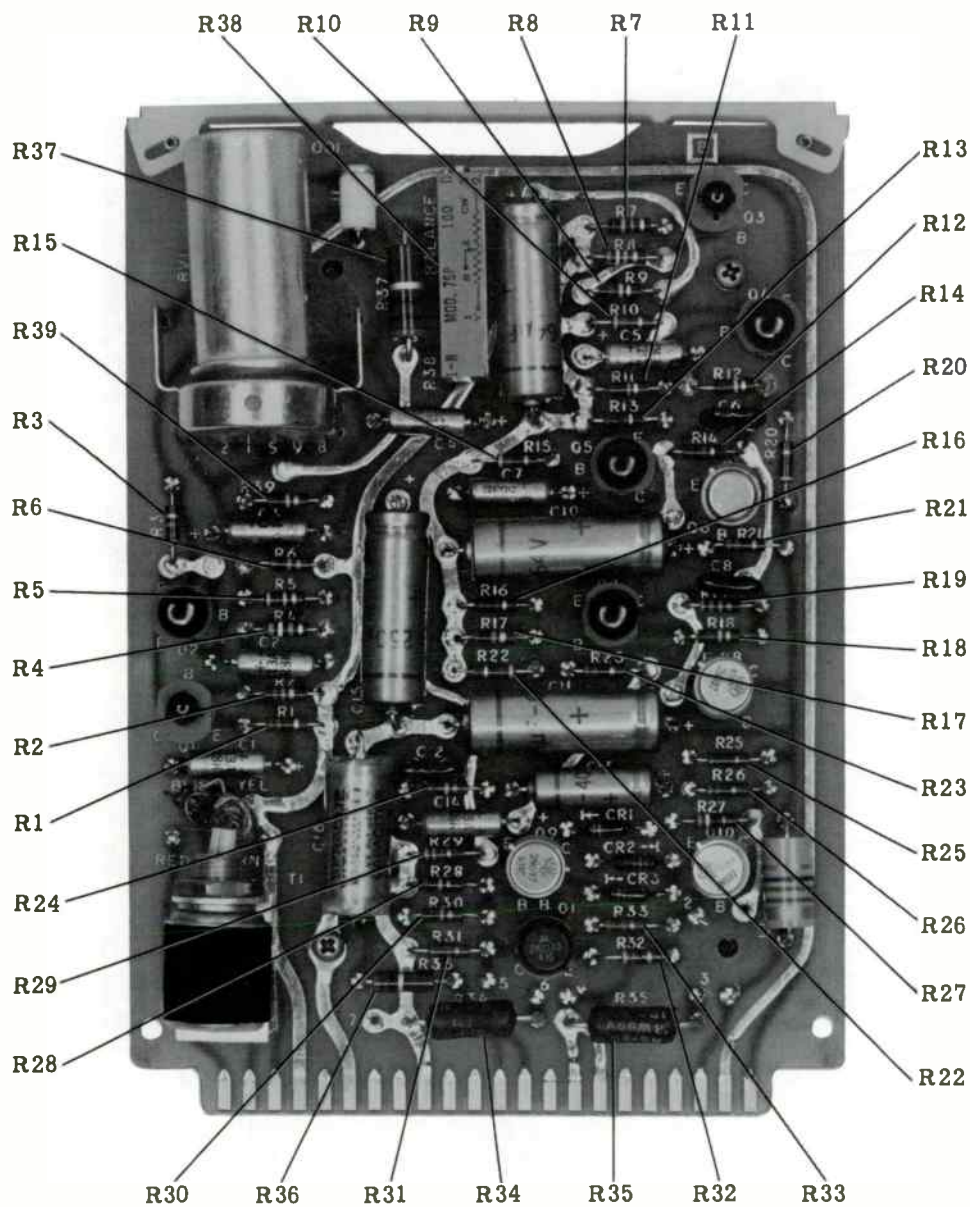
Spare parts may be ordered from the following address:

Collins Radio Company
Service Parts Department
Dallas, Texas 75207



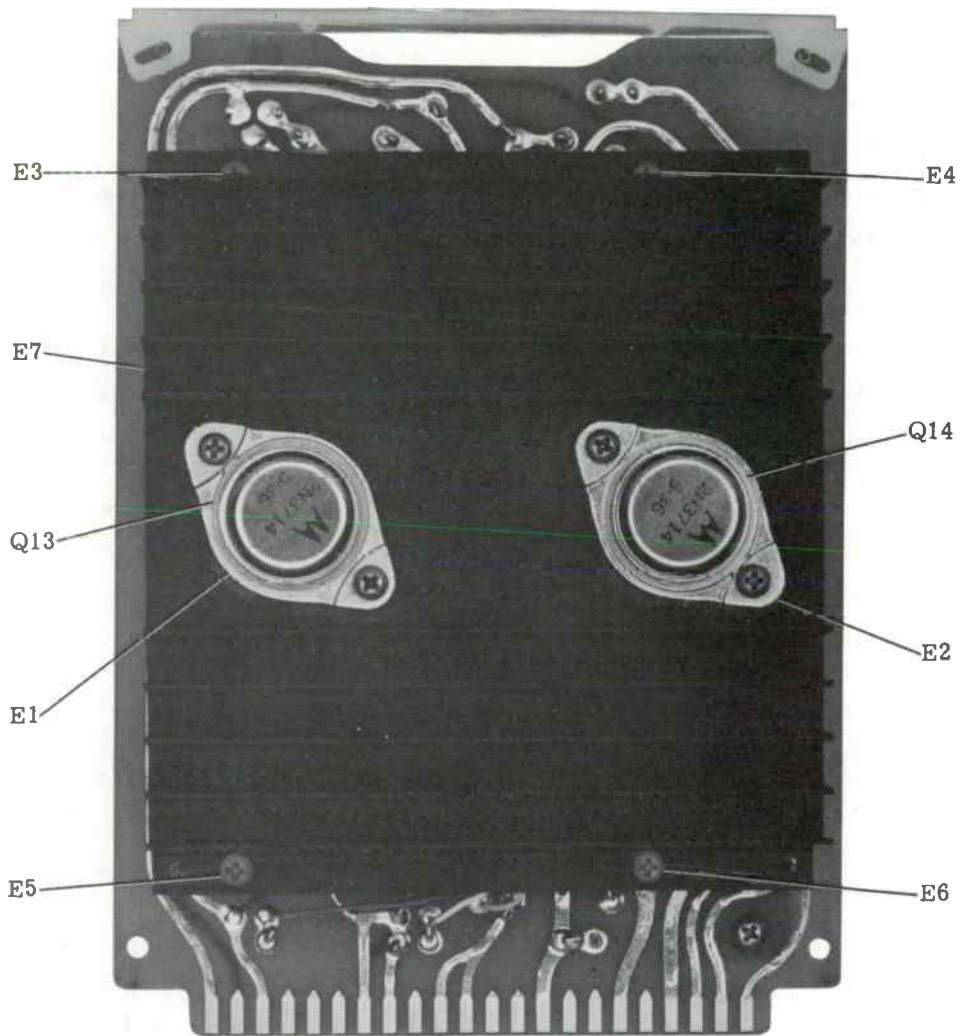
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Figure 2. 356M-1 Monitor Amplifier, Front View (Sheet 1 of 2)



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Figure 2. 356M-1 Monitor Amplifier, Front View (Sheet 2 of 2)



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Figure 3. 356M-1 Monitor Amplifier, Rear View

5. PARTS LIST

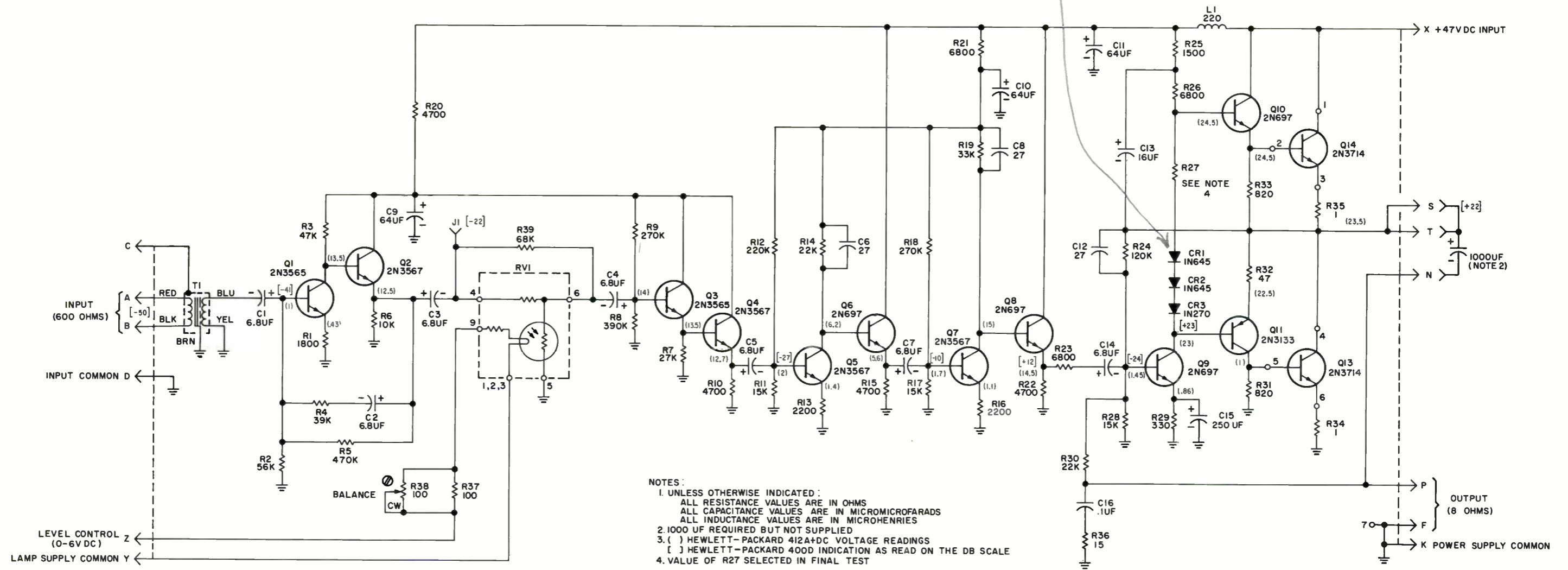
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
356M-1 MONITOR AMPLIFIER			522-3883-001	
C1	CAPACITOR, FXD, ELECTROLYTIC 6.8 UF, 20% TOL, 35 VDCW	CS138F685M	81349	184-6216-000
C2 THROUGH C5	SAME AS C1			
C6	CAPACITOR, FXD, MICA 27 UUF, 5% TOL, 500 VDCW	CM05E270J03	81349	912-2774-000
C7	SAME AS C1			
C8	SAME AS C6			
C9	CAPACITOR, FXD, ALUMINUM 64 UF, PLUS 50% MINUS 10%, 64VDCW	C437ARH64	73445	183-2355-110
C10	SAME AS C9			
C11	SAME AS C9			
C12	SAME AS C6			
C13	CAPACITOR, FXD, ALUMINUM 16 UF, PLUS 50% MINUS 10%, 40 VDCW	C426ARG16	73445	183-2354-230
C14	SAME AS C1			
C15	CAPACITOR, FXD, ALUMINUM 250 UF, PLUS 50% MINUS 10%, 16 VDCW	C437ARE250	73445	183-2355-060
C16	CAPACITOR, FXD, PAPER 0.1 UF, 20% TOL, 100 VDCW	SD81K01104M	53021	931-4488-000
CR1	SEMICONDUCTOR DEVICE, DIODE	1N645	07688	353-2607-000
CR2	SAME AS CR1			
CR3	SEMICONDUCTOR DEVICE, DIODE	1N270	07688	353-2018-000
E1	INSULATOR, PLATE	DM103	08289	352-9854-000
E2	SAME AS E1			
E3	WASHER, PLASTIC, SHOULDER OD, 0.063 IN. THK, POLYPHENYLENE OXIDE	COML	07896	302-0489-000
E4	SAME AS E3			
E5	SAME AS E3			
E6	SAME AS E3			
E7	HEATSINK, TRANSISTOR			764-7395-002
J1	JACK, TIP WHITE	SKT103FC	98291	360-0172-000
L1	COIL, RF 220 UH, 10% TOL	3500-16	71895	240-0831-000
Q1	TRANSISTOR	2N3565	07688	352-0638-010
Q2	TRANSISTOR	2N3567	07688	352-0629-010
Q3	SAME AS Q1			
Q4	SAME AS Q2			
Q5	SAME AS Q2			
Q6	TRANSISTOR	2N697	07263	352-0197-000
Q7	SAME AS Q2			
Q8	SAME AS Q6			
Q9	SAME AS Q6			
Q10	SAME AS Q6			
Q11	TRANSISTOR	2N3133	07688	352-0591-010
Q12	NOT USED			
Q13	TRANSISTOR	2N3714	07688	352-0677-020
Q14	SAME AS Q13			
R1	RESISTOR, FXD, COMPOSITION 1800 OHMS, 10% TOL, 1/4 WATT	RC07GF182K	81349	745-0758-000
R2	RESISTOR, FXD, COMPOSITION 56K OHMS, 10% TOL, 1/4 WATT	RC07GF563K	81349	745-0812-000
R3	RESISTOR, FXD, COMPOSITION 47K OHMS, 10% TOL, 1/4 WATT	RC07GF473K	81349	745-0809-000
R4	RESISTOR, FXD, COMPOSITION 33K OHMS, 10% TOL, 1/4 WATT	RC07GF393K	81349	745-0806-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R5	RESISTOR, FXD, COMPOSITION 470K OHMS, 10% TOL, 1/4 WATT	RC07GF474K	81349	745-0845-000
R6	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/4 WATT	RC07GF103K	81349	745-0785-000
R7	RESISTOR, FXD, COMPOSITION 27K OHMS, 10% TOL, 1/4 WATT	RC07GF273K	81349	745-0880-000
R8	RESISTOR, FXD, COMPOSITION 390K OHMS, 10% TOL, 1/4 WATT	RC07GF394K	81349	745-0842-000
R9	RESISTOR, FXD, COMPOSITION 270K OHMS, 10% TOL, 1/4 WATT	RC07GF274K	81349	745-0836-000
R10	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/4 WATT	RC07GF103K	81349	745-0773-000
R11	RESISTOR, FXD, COMPOSITION 15K OHMS, 5% TOL, 1/4 WATT	RC07GF153J	81349	745-0790-000
R12	RESISTOR, FXD, COMPOSITION 220K OHMS, 10% TOL, 1/4 WATT	RC07GF224K	81349	745-0833-000
R13	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/4 WATT	RC07GF222K	81349	745-0761-000
R14	RESISTOR, FXD, COMPOSITION 22K OHMS, 5% TOL, 1/4 WATT	RC07GF223J	81349	745-0796-000
R15	SAME AS R10			
R16	SAME AS R13			
R17	SAME AS R11			
R18	SAME AS R9			
R19	RESISTOR, FXD, COMPOSITION 33K OHMS, 10% TOL, 1/4 WATT	RC07GF333K	81349	745-0803-000
R20	SAME AS R10			
R21	RESISTOR, FXD, COMPOSITION 6800 OHMS, 5% TOL, 1/4 WATT	RC07GF682J	81349	745-0778-000
R22	SAME AS R6			
R23	SAME AS R21			
R24	RESISTOR, FXD, COMPOSITION 120K OHMS, 5% TOL, 1/4 WATT	RC07GF124J	81349	745-0823-000
R25	RESISTOR, FXD, COMPOSITION 1500 OHMS, 5% TOL, 1/4 WATT	RC07GF152J	81349	745-0754-000
R26	SAME AS R21			
R27	SELECT R27 FROM THE FOLLOWING LIST			
	RESISTOR, FXD, COMPOSITION 10 OHMS, 5% TOL, 1/4 WATT	RC07GF100J	81349	745-0676-000
	RESISTOR, FXD, COMPOSITION 22 OHMS, 5% TOL, 1/4 WATT	RC07GF220J	81349	745-0688-000
	RESISTOR, FXD, COMPOSITION 39 OHMS, 5% TOL, 1/4 WATT	RC07GF390J	81349	745-0697-000
	RESISTOR, FXD, COMPOSITION 47 OHMS, 5% TOL, 1/4 WATT	RC07GF470J	81349	745-0700-000
	RESISTOR, FXD, COMPOSITION 56 OHMS, 5% TOL, 1/4 WATT	RC07GF560J	81349	745-0703-000
	RESISTOR, FXD, COMPOSITION 68 OHMS, 5% TOL, 1/4 WATT	RC07GF680J	81349	745-0706-000
	RESISTOR, FXD, COMPOSITION 82 OHMS, 5% TOL, 1/4 WATT	RC07GF820J	81349	745-0709-000
	RESISTOR, FXD, COMPOSITION 100 OHMS, 5% TOL, 1/4 WATT	RC07GF101J	81349	745-0712-000
	RESISTOR, FXD, COMPOSITION 120 OHMS, 5% TOL, 1/4 WATT	RC07GF121J	81349	745-0714-000
R28	SAME AS R11			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R29	RESISTOR, FXD, COMPOSITION 330 OHMS, 5% TOL, 1/4 WATT	RC07GF331J	81349	745-0730-000
R30	SAME AS R14			
R31	RESISTOR, FXD, COMPOSITION 820 OHMS, 5% TOL, 1/4 WATT	RC07GF821J	81349	745-0745-000
R32	RESISTOR, FXD, COMPOSITION 47 OHMS, 10% TOL, 1/4 WATT	RC07GF470K	81349	745-0701-000
R33	SAME AS R31			
R34	RESISTOR, FXD, WIRE WOUND 1 OHM, 5% TOL, 3 WATTS	710-2863-000	13499	710-2863-000
R35	SAME AS R34			
R36	RESISTOR, FXD, COMPOSITION 15 OHMS, 10% TOL, 1/2 WATT	RC20GF150K	81349	745-1275-000
R37	RESISTOR, FXD, COMPOSITION 10 OHMS, 10% TOL, 1 WATT	RC32GF100K	81349	745-3268-000
R38	RESISTOR, VAR 100 OHMS, 20% TOL, 3/4 WATT	75PR100	80740	382-0004-220
R39	RESISTOR, FXD, COMPOSITION 68K OHMS, 10% TOL, 1/4 WATT	RC07GF683K	81349	745-0815-000
RV1	RESISTOR, VOLTAGE SENSITIVE	764-9918-001	13499	764-9918-001
T1	TRANSFORMER, AF, INPUT LEAD BLACK TO RED 660 OHMS	BV35752	GOTHA	667-0155-010
TB1	TERMINAL BOARD 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 0.145-IN. ID, 0.375-IN. SOCKET, TRANSISTOR			764-7373-002
XQ1	SOCKET, TRANSISTOR	05-3307-51	91662	352-9903-000
XQ2				
THROUGH	SAME AS XQ1			
XQ11				
XRV1	SOCKET, ELECTRON TUBE	RA9AX	00656	220-1384-070
MANUFACTURERS CODES				
CODE	MANUFACTURER			
GOTHA	GOTHAM AUDIO CORP. NEW YORK, N. Y.			
00656	AEROVOX CORP. NEW BEDFORD, MASS.			
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP. SEMICONDUCTOR DIVISION MOUNTAIN VIEW, CALIF.			
07688	MILITARY SPECIFICATIONS			
07896	SANGAMO ELECTRIC CO. SPRINGFIELD, ILL.			
08289	BLINN DELBERT CO. POMONA, CALIF.			
13499	COLLINS RADIO CO. CEDAR RAPIDS, IOWA			
53021	SANGAMO ELECTRIC CO. SPRINGFIELD, ILL.			
71895	DELAVAN MFG. CO. WEST DES MOINES, IOWA			
73445	AMPEREX ELECTRONIC CO. DIVISION OF NORTH AMERICAN PHILIPS CO. INC. HICKSVILLE, N. Y.			
80740	BECKMAN INSTRUMENTS, INC.			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
81349 91662 98291	FULLERTON, CALIF. MILITARY SPECIFICATIONS ELCO CORP. WILLOW GROVE, PA. SEALCTRO CORP. MAMARONECK, N. Y.			

*GI are ?
T1 are good
can replace w/ 1N4003*



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Figure 4. 356M-1 Monitor Amplifier, Schematic Diagram

