

Film-Tech

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OPERATING INSTRUCTIONS

Theater Sound System

TYPES PG-240, 242

DESCRIPTION

The PG-240 theater sound reproducing system is designed for theaters and auditoriums containing up to 1500 seats. The PG-242 reproducing system is designed for theaters and auditoriums containing up to 2800 seats. Either system may be used with any of the standard 35-mm projectors and projector bases.

The soundheads furnished are the MI-9030 (60 cycle) or the MI-9031 (50 cycle) type. Fader boxes, designed for mounting on the front wall of the projection room adjacent to each soundhead, are furnished with the equipment. These boxes contain the volume controls and fader switches.

The amplifier rack is encased in an aluminum cover. Mounted on the rack are the following components: monitor amplifier, voltage amplifier, power amplifier, crossover network, compensator, emergency switch and exciter lamp supply. The amplifier rack is shown in figures 1 and 2. One power amplifier is mounted on the rack for PG-240 system, and two power amplifiers are mounted on the rack for a PG-242 system. The monitor amplifier may be used as an emergency amplifier to drive the speakers. Turning the emergency switch to the EMG position substitutes the monitor amplifier for the voltage amplifier and the power amplifier in the system.

The stage speaker system consists of a multi-

TECHNICAL DATA

Application

Theater sound reproduction from standard 35-mm motion picture film sound track

Voltage Rating

Amplifiers

105-125 volts
50-60 cycles

Soundheads

115 volts
50-60 cycles

Power Consumption

Amplifiers and Power Supply

580 watts at 115 volts (PG-240)
750 watts at 115 volts (PG-242)

Soundhead Motor Rating

¼ horsepower
Running current 4.5 amperes

Audio Power Output

25 watts (PG-240)
50 watts (PG-242)

With less than 2% distortion from 50 to 5000 cycles.

Frequency Response

Adjustable for optimum film response in the theater in accordance with specifications of the Academy of Motion Picture Arts and Sciences

Tubes

Voltage Amplifier, MI-9328-A
2 RCA 1620

Monitor Amplifier, MI-9257-E

2 RCA 1620
1 RCA 6SN7-GT
2 RCA 1622
1 RCA 5U4-G
2 RCA 991 Neon tubes

Power Amplifier, MI-9354-D

3 RCA 1620
4 RCA 1622
2 RCA 5U4-G
1 RCA 874

Soundhead, MI-9030—9031

1 RCA 868 Phototube
1 RCA 28050 Exciter Lamp; 5 amperes, 10 volts

Exciter Lamp Supply, MI-9502-C

2 RCA 2000

2. Test the tubes in the voltage amplifier and the power amplifier (PG-240) and in both power amplifiers (PG-242). Use the meter and switch as explained below under *Tubes and Fuses*. To obtain proper operation, make certain that each tube is firmly seated in its socket.

3. Make certain that the speaker switches, on the crossover panel, are in the NORM and ON positions, and that the emergency channel switch, on the switch panel, is set for normal operation. Turn the system volume control, in the fader box, to a very low setting, and adjust the monitor control for low sound output from the monitor speaker. Test the overall system for operation by interrupting the light beam in each soundhead with a piece of cardboard or a toothpick, using the fader switches to connect the soundhead being tested to the amplifier-input circuit. A thumping sound will be heard from the loudspeakers if the system is in operating condition.

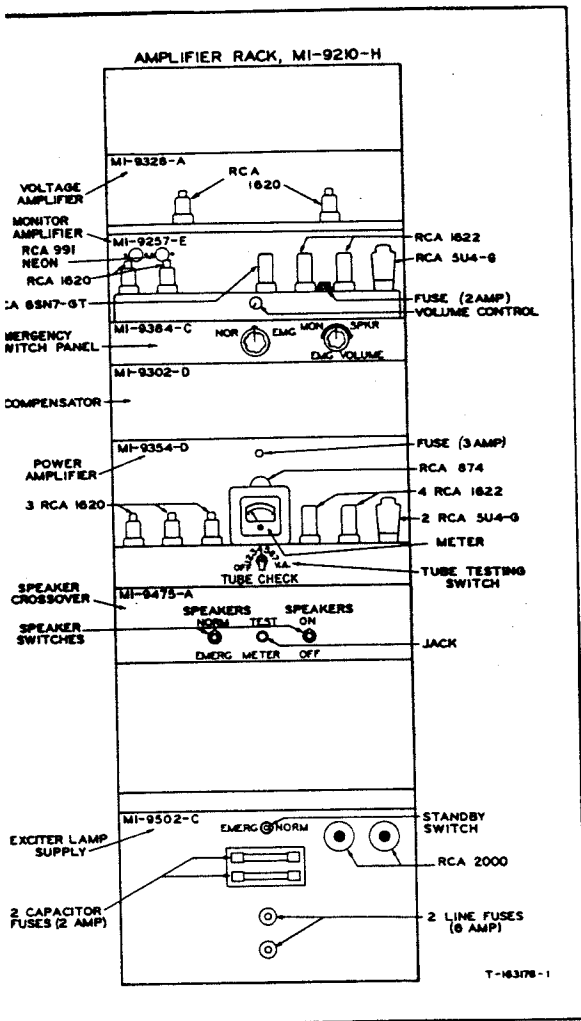


Figure 1—Amplifier Rack, Type PG-240;
Location of Parts

ular high-frequency horn and a low-frequency
rn. Heavy-duty permanent-magnet speaker units
e used with these horns.

OPERATING PROCEDURE

Where a motor-generator set or a rotary converter
used to provide power for operation of the sound
stem, start the power equipment before turning
N the switch connecting the sound system to the
quipment.

Adjust, test and operate the equipment as out-
red below:

1. Turn ON the service switch connecting the
stem to the a-c supply. Start both projectors, and
perate them for several minutes until all units
ach a state of thermal stability; this aids in pro-
ucing quiet and uniform operation.

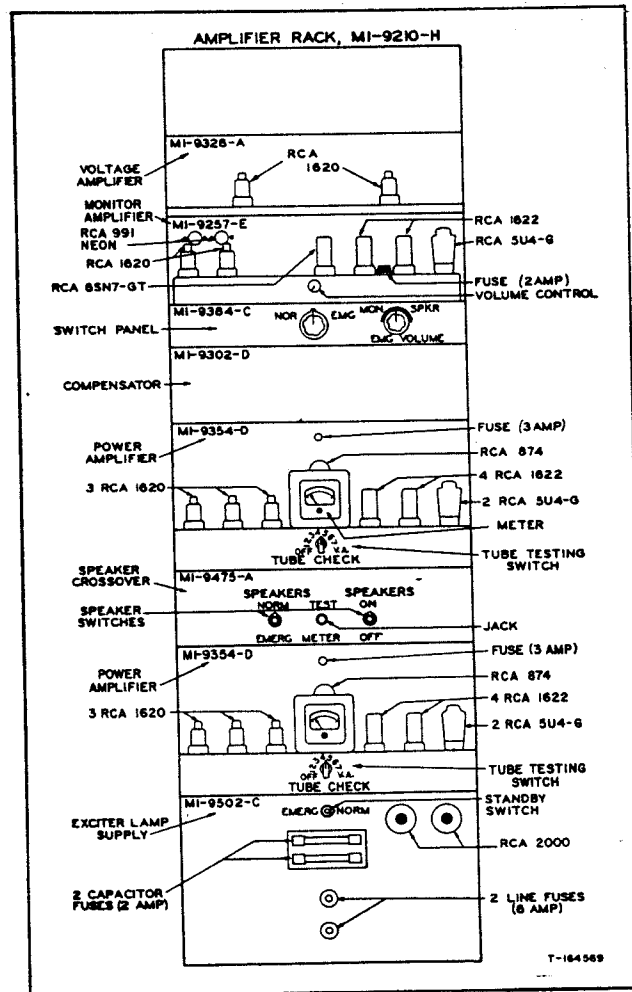


Figure 2—Amplifier Rack, Type PG-242;
Location of Parts

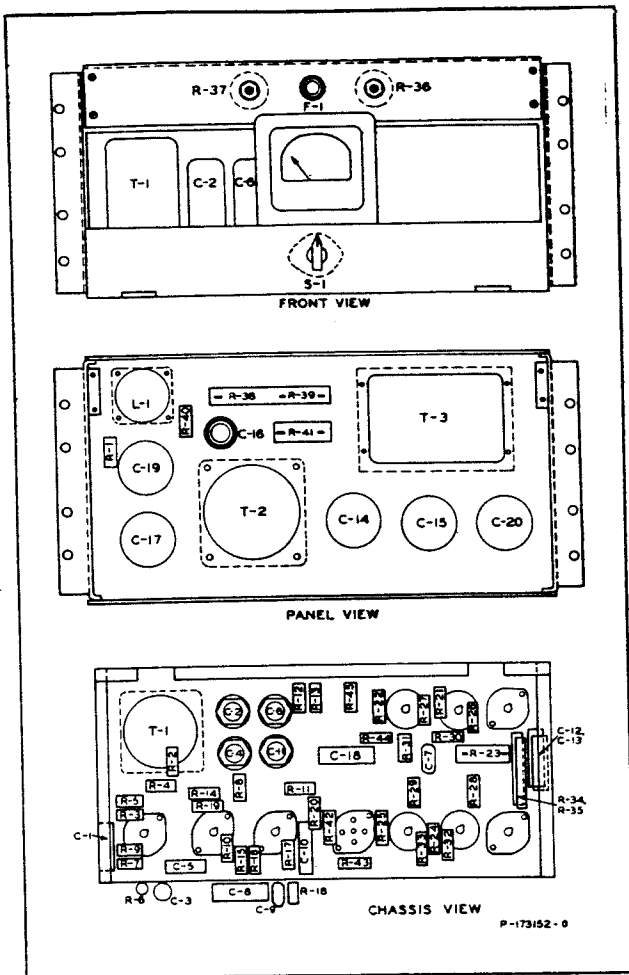


Figure 3—Power Amplifier, MI-9354-D;
Location of Parts

CAUTION: A hard surfaced material should not be used to interrupt the light beam as it might accidentally scratch the objective lens of the optical system. The volume control should not be turned to a high setting during this test as damage to the loudspeakers may result.

4. The number of persons in the auditorium will be an important factor in determining the adjustment of the volume control. A full auditorium requires an advanced setting of the volume control as compared to the setting when the auditorium is only partially filled. The projectionist will have to estimate the approximate volume control setting which will be required during the show. However, the volume control should be set at zero until the show has started.

5. Make certain that the sound is *not* faded to the soundhead to be threaded, and then thread the film in the projector and soundhead as shown in the soundhead instructions. (The fader controls are

interconnected so that either may be used at any time to transfer the sound.)

6. When the performance is to begin, make certain that the sound is *not* faded to the projector and soundhead which is to be started first, and then start the soundhead motor. After the motor has attained full operating speed (approximately three seconds), set the fader switch knob to the number corresponding to the machine in operation, and adjust the system volume control to obtain the required sound level in the auditorium.

7. Adjust the monitor loudspeaker volume control to obtain a suitable sound level in the projection room.

8. While the film is running in the first machine, thread the next reel of film in the idle projector and soundhead. When the film in the first projector nears the end, watch for the motor cue on the screen and when it appears switch ON the motor of the second machine. When the change-over cue is observed on the screen turn the fader switch knob to the number corresponding to the second projector and soundhead.

EMERGENCY OPERATION PG-240 and PG-242

Amplifier Channel

An amplifier selector switch having a NOR and an EMG position is mounted on a panel below the monitoring amplifier (see figures 1 and 2). In the NOR position the voltage amplifier and power amplifier channel operates the loudspeakers, and in the EMG position of the switch the monitoring amplifier replaces the normal amplifier channel. This switch should be turned to the EMG position in the event of trouble with either the voltage amplifier or the power amplifier. When the switch is in the EMG position the sound level in the auditorium can be controlled only by the monitor volume control. This control should be adjusted to obtain sufficient volume in the auditorium immediately after the selector switch is thrown to the EMG position.

Loudspeakers

Two speaker switches are provided on the speaker crossover panel. During normal operation the switch on the right should be in the ON position and the switch on the left in the NORM position. The switch on the left should be thrown to the EMERG position only in the event of trouble with the high-frequency loudspeaker. When the switch

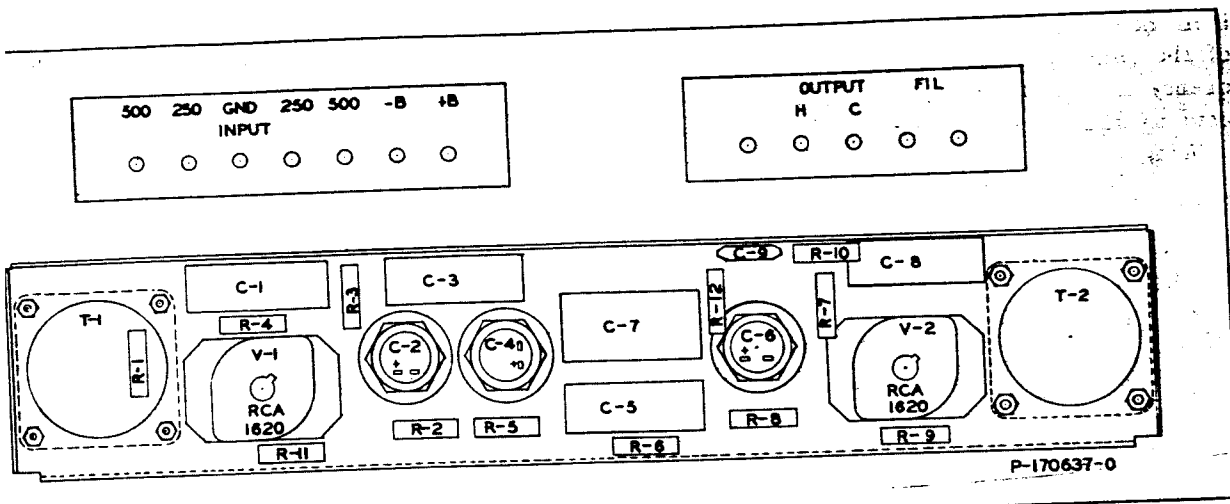


Figure 4—Voltage Amplifier, MI-9328-A; Location of Parts

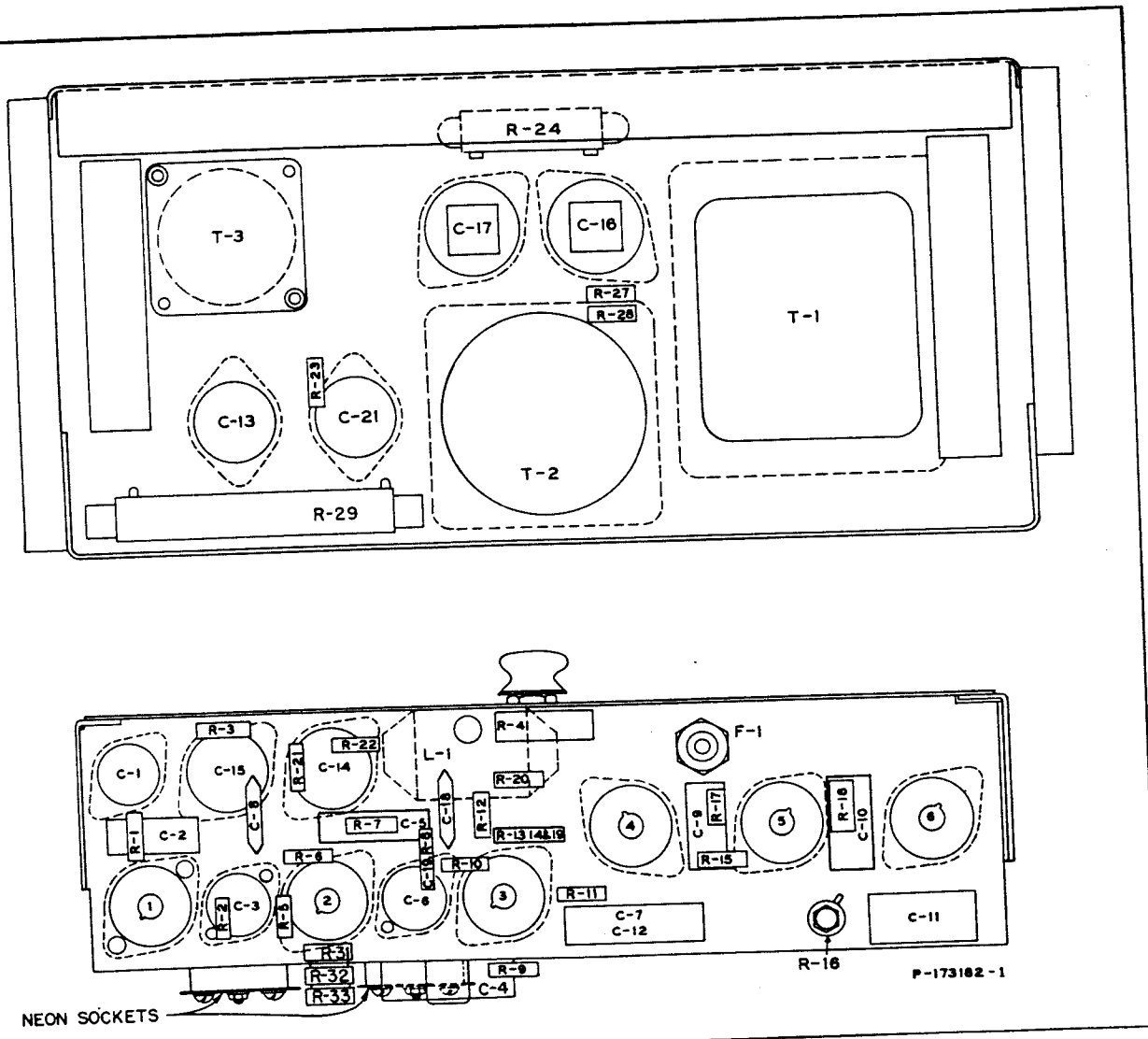


Figure 5—Monitor Amplifier, MI-9257-E; Location of Parts

is in the EMERG position the full frequency range of the audio system is directed into the low-frequency loudspeaker. The switch on the right is used to disconnect the speakers while the system is being serviced or adjusted.

Exciter Lamp Supply

A standby switch having a NORM and an EMERG position is mounted on the exciter lamp supply unit. When the switch is in the NORM position direct current is supplied to the exciter lamp, and when it is in the EMERG position low voltage alternating current is supplied to the exciter lamp. In the event of trouble with the d-c supply, this switch should be thrown to the EMERG position.

TUBES AND FUSES

Tubes

In both the PG-240 and the PG-242 equipments a meter and a switch mounted on the front of the upper power amplifier are used to test the amplifier

tubes in that amplifier and in the voltage amplifier. Seven positions of the switch are numbered to correspond to the tube numbers marked near the amplifier-tube sockets in the power amplifier, and these positions of the switch are used to test the power amplifier tubes. The extreme clockwise position of the switch, marked V.A., is used to test simultaneously both of the RCA 1620 tubes in the voltage amplifier. The dial of the meter is divided into red and green areas. When tested, tubes in good condition will cause the pointer of the meter to move into the green area on the dial. A tube should be replaced if the meter pointer remains in the red dial areas. If all tubes test low, replace the RCA 5U4-G rectifier tubes and retest before replacing any amplifier tube. In the PG-242 equipment the meter and switch on the lower power amplifier are used to test the amplifier tubes in that amplifier only. The meter is inoperative when the switch is in the V.A. position.

The tubes in the monitor amplifier should be tested periodically to determine their condition.

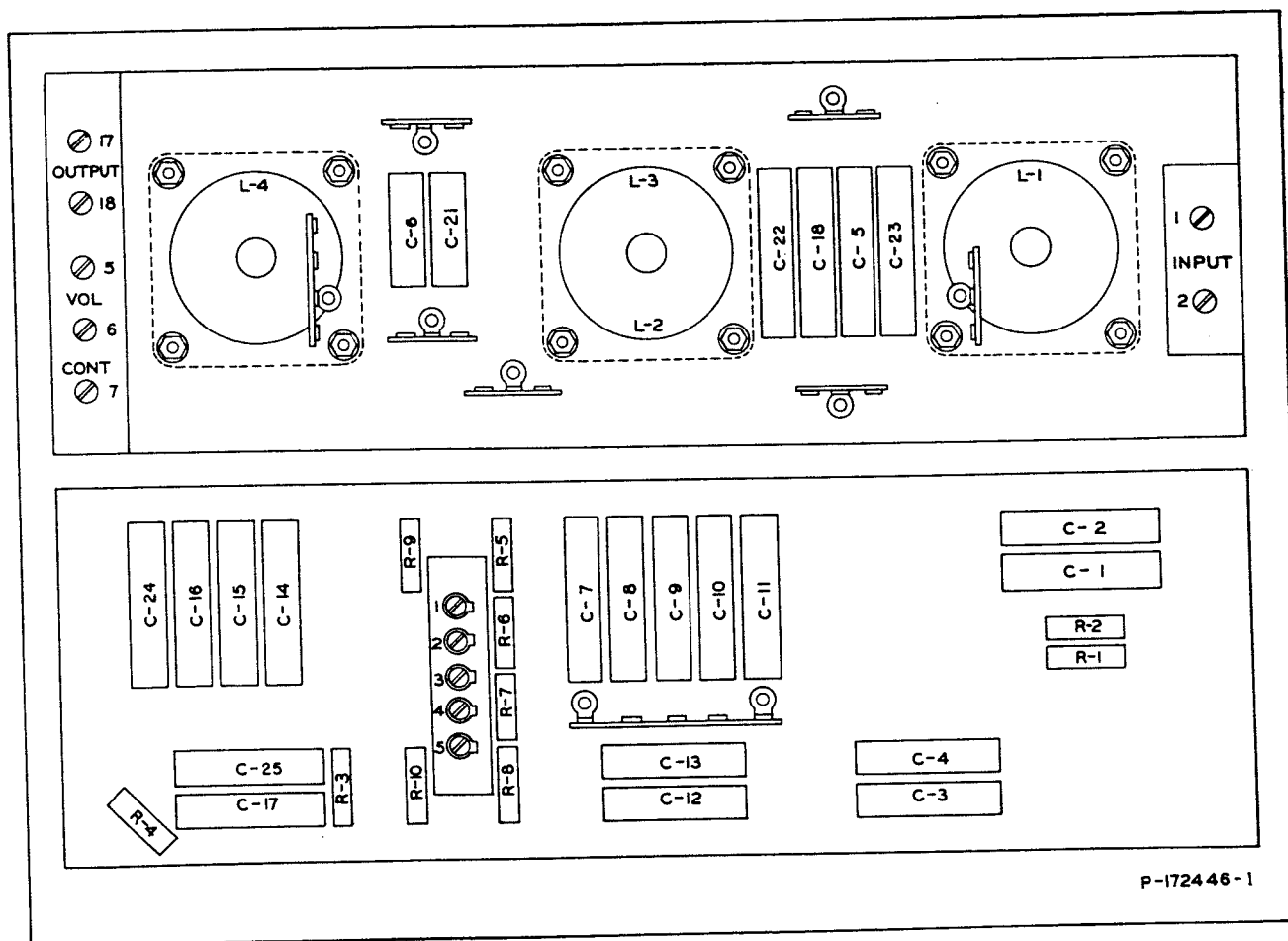


Figure 6—Compensator, MI-9302-D; Location of Parts

The RCA 1620 and 1622 tubes in the monitor amplifier may be inserted in the correct sockets in the power amplifier and tested with the tube meter. Tubes found to be of poor quality should be replaced immediately. In the event of trouble with exciter lamp current, check the rectifier tubes in the exciter lamp supply by replacing with new tubes. A defective tube or tubes will usually be the cause of low exciter lamp voltage.

CAUTION: Turn OFF the service switch to disconnect the sound system from the a-c power service before replacing any tubes or fuses.

Fuses

In the PG-240 equipment the common fuse for the voltage amplifier and the power amplifier is contained in a receptacle located on the back panel of the power amplifier. In the PG-242 equipment the fuse in the upper power amplifier protects that amplifier and the voltage amplifier, and the fuse in the lower power amplifier protects that amplifier only. A fuse may be removed by turning the knurled extractor post. Should a fuse blow out replace the RCA 5U4-G tubes (the most probable place for a short circuit is between the filament and plate of this tube) before replacing the fuse. The removed tubes may be tested later at a more convenient time.

The fuse for the monitor amplifier is contained in a receptacle on the amplifier chassis, and may be removed by turning the knurled extractor post. Should the fuse blow replace the 5U4-G tube before replacing the fuse. Line and capacitor fuses are mounted on the exciter lamp supply panel. If excessive hum is noticed in the speakers the capacitor fuses should be checked and replaced if necessary. Refer to figures 1 and 2 for location of the fuses and their ratings.

CAUTION: None of these fuses should be replaced with a fuse having a rating higher than specified.

REPLACEMENT PARTS

The following parts list is included to provide identification when ordering replacement parts. Order from *RCA Replacement Parts Department, Camden, New Jersey*, giving the *Stock Number* and *Description* of the parts wanted. Replacement parts supplied may be slightly different in form or size from the original parts but will be completely interchangeable with them.

LIST OF PARTS

Symbol No.	Description	Stock No.
Amplifier, Monitor; MI-9257-E		
C-1, -3, -6	Capacitor, dry electrolytic, 40 mf, 25 v	19807
C-2	Capacitor, .05 mf, 400 v	70615
C-4	Capacitor, .25 mf, 400 v	70618
C-5	Capacitor, .05 mf, 600 v	70636
C-7, -12	Capacitor, 0.1 mf, 600 v	70638
C-8	Capacitor, mica, 2,700 mmf, 500 v	65400
C-9, -10	Capacitor, .0025 mf, 1000 v	70644
C-11	Capacitor, dry electrolytic, 40 mf, 150 v	31584
C-13, -21	Capacitor, dry electrolytic, metal can, 20 mf, 450 v	32400
C-14, -15	Capacitor, dry electrolytic, metal can, 20 mf, 450 v	32400
C-16, -17	Capacitor, dry electrolytic, metal can, 80 mf, 450 v	18950
C-18	Capacitor, mica, 3,300 mmf, 500 v	65760
C-19	Capacitor, mica, 150 mmf, 500 v	47049
F-1	Fuse, 2 amperes, 250 v	3883
L-1	Reactor, 0.5 henries, 475 ohms d-c resistance	50336
R-1, -3, -33	Resistor, 100,000 ohms, ½ w	30493
R-2	Resistor, 1,500 ohms, ½ w	30654
R-4	Resistor, variable, 250,000 ohms	51260
R-5	Resistor, 1,800 ohms, ½ w	30930
R-6	Resistor, 1.0 meg, ½ w	30652
R-7	Resistor, 270,000 ohms, ½ w	30651
R-8	Resistor, 470,000 ohms, ½ w	30648
R-9	Resistor, 560,000 ohms, ½ w	30653
R-10, -11	Resistor, 2,700 ohms, ½ w	30730
R-12, -20	Resistor, 82,000 ohms, 1 w	30435
R-13, -15	Resistor, 150,000 ohms, ½ w	30493
R-14	Resistor, 12,000 ohms, ½ w	30436
R-16	Resistor, fixed, wire wound, vitreous enamel, 180 ohms, 10 w	44154
R-17, -18	Resistor, 470 ohms, 1 w	30681
R-19	Resistor, 22,000 ohms, ½ w	30492
R-21, -22	Resistor, 10,000 ohms, ½ w	3078
R-23	Resistor, 10,000 ohms, 1 w	13097
R-24	Resistor, wire wound, 3000 ohms, 7.4 w	50879
R-27, -28	Resistor, 33 ohms, 1 w	71290
R-29	Resistor, fixed, wire wound, 18,000 ohms, 14.4 w	51256
R-31	Resistor, 68,000 ohms, ½ w	14138
R-32	Resistor, 56,000 ohms, ½ w	30650
T-1	Transformer, power	30183
T-2	Transformer, output	43679
T-3	Transformer, input	28796
X-1	Socket, tube, 8 contact, octal, black phenolic; with metal mounting plate	28413
X-2, -3, -4, -5, -6	Socket, tube, 8 contact, octal, black phenolic; with metal mounting plate	31319

Symbol No.	Description	Stock No.
MI-9257-E (cont'd)		
X-7, -8	Socket, lamp, 2 contact, bayonet; for RCA-991 Neon	51259
	Knob assembly	30075
	Plate, capacitor mounting; for C-1, -3, -6	19820
	Plate, capacitor mounting; for C-13, -14, -15, -21	28452
	Plate, capacitor mounting; for C-16, -17	18469
	Receptacle, fuse	48894
Amplifier, Power; MI-9354-D		
C-1, -5	Capacitor, .05 mf, 600 v	70636
C-2, -6, -11	Capacitor, dry electrolytic, metal can, 25 mf, 50 v	26410
C-3	Capacitor, 0.5 mf, 200 v	52943
C-4	Capacitor, dry electrolytic, metal can, 10 mf, 475 v	13224
C-7	Capacitor, mica, 390 mmf, 500 v	91403
C-8, -10	Capacitor, 0.1 mf, 600 v	70638
C-9	Capacitor, mica, 56 mf	39622
C-12, -13	Capacitor, .0035 mf, 1000 v	70646
C-14, -15, -17, -19, -20	Capacitor, dry electrolytic, metal can, 25 mf, 475 v	13036
C-16	Capacitor, dry electrolytic, metal can, 10 mf, 475 v	13224
C-18	Capacitor, 25 mf, 400 v	70618
F-1	Fuse, cartridge, glass body, 3 amp, 250 v	10907
L-1	Reactor, iron core	17569
R-1	Resistor, 160 ohms, 1/2 w	32484
R-2	Resistor, 68,000 ohms, 1/2 w	14138
R-3	Resistor, 1 meg, 1/2 w	30652
R-4	Resistor, 39 ohms, 1/2 w	11956
R-5	Resistor, 1,000 ohms, 1/2 w	34766
R-6, -7, -42	Resistor, 220,000 ohms, 1/2 w	14583
R-8	Resistor, 15,000 ohms, 1/2 w	36714
R-9, -15, -16	Resistor, 82,000 ohms, 1 w	39059
R-10	Resistor, 470,000 ohms, 1/2 w	30648
R-11, -14	Resistor, 2,200 ohms, 1/2 w	34767
R-12, -13	Resistor, 33 ohms, 1/2 w	30789
R-17	Resistor, 12,000 ohms, 1/2 w	30436
R-18, -20	Resistor, 150,000 ohms, 1/2 w	30493
R-19	Resistor, 27,000 ohms, 1 w	13477
R-21, -22, -24, -25	Resistor, 47,000 ohms, 1/2 w	30787
R-23	Resistor, fixed, wire wound, vitreous enamel, 90 ohms, 25 w	27982
R-26, -27, -28, -29	Resistor, fixed, wire wound, 1 ohm, 1/2 w	28711
R-30, -31, -32, -33	Resistor, 47 ohms, 1 w	30732
R-34, -35	Resistor, 470 ohms, 2 w	32165
R-36, -37	Resistor, variable, wire wound, 200 ohms, 2 w	17905
R-38, -39	Resistor, wire wound, vitreous enamel, 2 section, 1650 ohms, 10 w, 15,000 ohms, 35 w	27984

Symbol No.	Description	Stock No.
MI-9354-D (cont'd)		
R-40	Resistor, 4,700 ohms, 1 w	30788
R-41	Resistor, fixed, wire wound, vitreous enamel, 15,000 ohms, 25 w	27983
R-43	Resistor, 100,000 ohms, 1/2 w	3252
R-44	Resistor, 4,700 ohms, 1 w	30788
R-45	Resistor, 10 ohms, 1/2 w	34761
T-1	Transformer, audio	28796
T-2	Transformer, audio	28795
T-3	Transformer, power	27987
	Knob assembly, meter switch	7960
	Meter, d-c milliammeter, 100 ohms, 1 ma; with red and green dial	27985
	Receptacle, fuse; for type 3AG or 4AG fuse	65796
	Socket, tube, 4 contact, black bakelite, metal mounting plate	19448
	Socket, tube, 8 contact, octal; with snap ring and washer	18007
	Socket, tube, 8 contact, octal, black phenolic, metal mounting plate	31319
	Switch, 2 gang; meter switch	28787
Amplifier, Voltage; MI-9328-A		
C-1	Capacitor, .07 mf, 1,000 v	54165
C-2, -6	Capacitor, dry electrolytic, metal can, 25 mf, 50 v	26410
C-3	Capacitor, 0.5 mf, 200 v	52943
C-4	Capacitor, dry electrolytic, metal can, 4 mf, 475 v	13919
C-5	Capacitor, 0.1 mf, 600 v	70638
C-7	Capacitor, .25 mf, 400 v	70618
C-8	Capacitor, .025 mf, 1,000 v	70654
C-9	Capacitor, mica; 47 mmf, 500 v	68737
R-1, -4	Resistor, 100,000 ohms, 1/2 w	3252
R-2	Resistor, 1,000 ohms, 1/2 w	34766
R-3	Resistor, 180,000 ohms, 1/2 w	11959
R-5	Resistor, 56,000 ohms, 1/2 w	30650
R-6	Resistor, 470,000 ohms, 1/2 w	30648
R-7	Resistor, 270,000 ohms, 1/2 w	30651
R-8	Resistor, 820 ohms, 1/2 w	30158
R-9	Resistor, 150,000 ohms, 1/2 w	30493
R-11	Resistor, 220,000 ohms, 1/2 w	14583
R-12	Resistor, 390,000 ohms, 1/2 w	11988
T-1	Transformer, input transformer	27995
T-2	Transformer, output transformer	18051
	Shield, top cap tube shield	12110
	Socket, tube, 8 contact; for cushion socket	33084
Compensator Panel, MI-9302-D		
C-1, -9, -14	Capacitor, .025 mf, 1,000 v	70654
C-2	Capacitor, .035 mf, 1,000 v	70656
C-3	Capacitor, .070 mf, 1,000 v	54165
C-4, -7, -10, -15	Capacitor, .05 mf, 400 v	70615

Symbol No.	Description	Stock No.
MI-9302-D (cont'd)		
C-5, -18, -21	Capacitor, 1.0 mf, 150 v	70620
C-6, -8, -23	Capacitor, .25 mf, 400 v	70618
C-11	Capacitor, .10 mf, 400 v	70617
C-12	Capacitor, .01 mf, 1,000 v	70652
C-13	Capacitor, .007 mf, 1,000 v	70650
C-16, -17, -22, -24, -25	Capacitor, .50 mf, 200 v	70619
L-1, -4	Reactor, iron core, .75 henry, center tap	27997
L-2, -3	Reactor, air core, 2 section, .023 henry	27996
R-1, -3	Resistor, 1,500 ohms, 1 w	3153
R-2	Resistor, 1,000 ohms, 1 w	51888
R-4	Resistor, 160 ohms, ½ w	32484
R-5, -6	Resistor, 270 ohms, ½ w	30929
R-7, -8, -9	Resistor, 330 ohms, ½ w	8063
R-10	Resistor, 180 ohms, ½ w	30618
Crossover Network, MI-9475-A		
C-1	Capacitor, oil, 1 mf, 600 v	45807
C-2	Capacitor, oil, 2 mf, 600 v	53920
C-3, -4	Capacitor, oil, 1 mf, 600 v	53921
L-1	Reactor, XT-2947A	28017
L-2	Reactor	28016
J-1	Jack, junior type, 2 circuit	14094
R-1	Resistor, fixed, wire wound, 250 ohms, 20 w	28722
S-1, -2	Switch, toggle, D.P.D.T., 3 amperes, 250 v	28001
Emergency Switch Panel, MI-9384-C		
R-1, -3	Resistor, 39,000 ohms, ½ w	30147
R-2, -4, -6, -7	Resistor, 270 ohms, ½ w	30929
R-5	Resistor, fixed, wire wound, 250 ohms, 30 w	50745
R-9	Resistor, variable, wire wound, 35 ohms, 25 w	51258
	Knob, emergency switch	30075
	Switch, emergency, 3 gang	52023
Exciter Lamp Supply, MI-9502-C		
C-1 to C-8 inclusive	Capacitor, dry electrolytic, metal can, 1,000 mf, 25 v	18374
F-1, -2	Fuse, 2 amperes, type 3-AG	3883
F-3, -4	Fuse, screw plug, 6 amperes	23633
L-1, -2	Reactor, iron-core, .017 henry, .09 ohm, d-c resistance	28047
R-1, -2	Resistor, adjustable, wire wound, 2 ohms, 160 w	26228

Symbol No.	Description	Stock No.
MI-9502-C (cont'd)		
R-3	Resistor, fixed, wire wound, vitreous enamel, 30 ohms, 55 w	23632
S-1	Switch, toggle, D.P.D.T.	28714
T-1	Transformer, power, XT-3058	28046
	Receptacle, plug fuse	16156
	Receptacle, cartridge fuse	13535
	Plate, capacitor mounting; for C-1 to C-8 inclusive	18469
	Socket, exciter lamp	52962
Fader, Main; MI-9701-B Fader, Extension; MI-9702-B		
C-1	Capacitor, 0.5 mf, 200 v	52943
	Catch, cabinet	28687
	Gear, miter, 24 teeth	28035
	Gear, miter, 24 teeth	28034
	Knob, volume control	17269
	Knob, fader switch	28688
P-1	Resistor, volume control, 200,000 ohms, ½ w	23548
R-1, -2	Resistor, 120,000 ohms, ½ w	30180
P-2	Resistor, attenuator, T pad	48691
	Screw, set screw, 8-32 x ¼ lg.	44732
*S-1, -2, -3	Switch, rotary, fader	48692
*	Switch, mercury	28036
* Used in MI-9701-B only.		
Speaker, High-Frequency; MI-9458		
	Cover, bakelite, rear cover	53434
	Diaphragm	51034
Speaker, Low-Frequency; MI-9449		
	Clamp, centering clamp	45763
	Cone and Voice Coil Assembly	54045
	Post, binding post	53839
Speaker, Monitor; MI-9405-C		
	Cone and Voice Coil Kit	49125
Transformer, Phototube; MI-9181		
	Cushions, transformer mounting	28070
	Transformer, XT-2874-B	28794
Transformer, Speaker Coupling; MI-9472		
	Transformer	28051

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