

# Film-Tech

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## OPERATING INSTRUCTIONS

# Drive-In Theater Sound System

TYPE PG-250, 251

### DESCRIPTION

The PG-250 theater sound reproducing system is intended for drive-in theaters having a car capacity up to 625 cars. The PG-251 reproducing system is intended for drive-in theaters having a car capacity up to 1250 cars. Either of these systems may be used with any of the standard 35-mm projectors and projector bases.

The soundheads supplied with this equipment are the MI-9030 (60 cycle) or the MI-9031 (50 cycle) types. The RCA rotary stabilizer is incorporated in these soundheads to assure constant film speed at the sound take-off, thus preventing wows or rasp in the reproduction. Motors, connected directly to the soundheads through flexible couplings, drive projectors and soundheads at the standard film speed of 90 feet per minute.

Streamlined covers placed over the motors give the soundheads an attractive appearance. The finish on the exterior of the soundheads is black wrinkle and chromium, and the interior finish is glossy white. The bright interior enables the projectionist to quickly determine the position of the film, and to observe the presence of dirt and oil.

A 125-watt amplifier, designed for drive-in theater operation, is supplied with the PG-250 equipment. The amplifier rack contains one preamplifier and one power amplifier. Space has been provided for the installation of a second amplifier and the necessary switches to double the power output and to make dual channel operation possible.

The PG-251 equipment includes two preamplifiers and two power amplifiers comprising a dual-channel 250-watt amplifier. Complete emergency features assure continuity of performance and make

### TECHNICAL DATA

#### Application

Drive-in theater, sound reproduction from standard 35-mm motion picture film sound track.

#### Voltage Rating

Amplifier  
105-125 volts  
50-60 cycles

Soundhead  
115 volts  
50-60 cycles

#### Power Consumption

Amplifier  
400 watts at 115 volts (PG-250)  
800 watts at 115 volts (PG-251)

Soundhead Motor Rating  
¼ horsepower  
Running current 4.5 amperes

#### Audio Power Output

125 watts (PG-250)

250 watts (PG-251)

With less than 3½% distortion from 50 to 5000 cps.

#### Frequency Response

50-5000 cycles ( $\pm 2$  db); adjustable for optimum film response

#### Tube Complement

##### Preamplifier

1 RCA VR-150-30 OD3  
2 RCA 1620 - SPECIAL 6J7

##### Power Amplifier

4 RCA 809  
3 RCA 5R4-GY  
2 RCA 2A3 SAME AS W.F. 300B  
1 RCA 6SL7GT

##### Soundhead

1 RCA 868 Phototube  
1 RCA 28153 Exciter Lamp; 7½ amperes, 10 volts

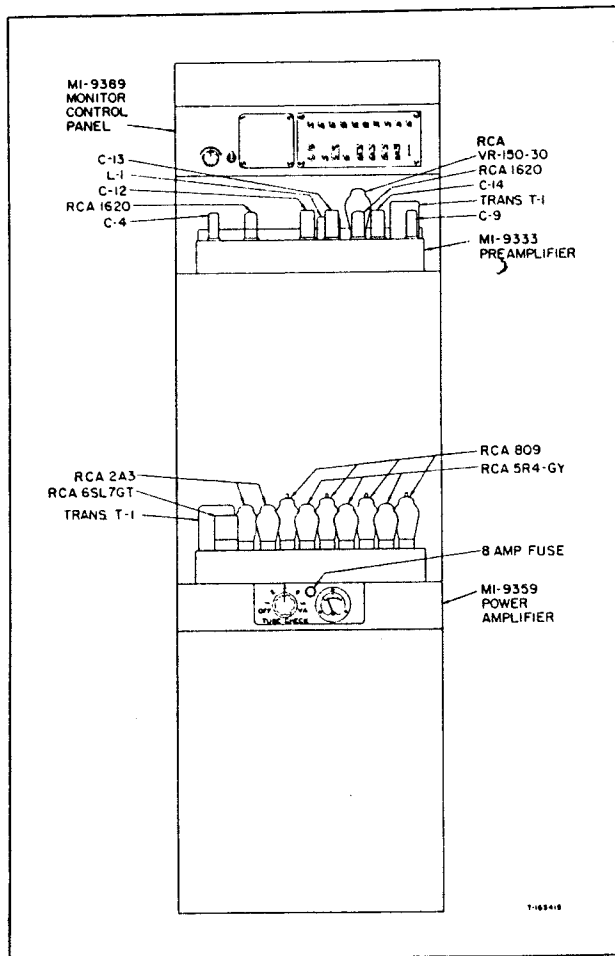


Figure 1—Amplifier Rack, Type PG-250, MI-9211;  
Location of Parts

it possible to isolate amplifier units for test while the show continues. The emergency channel switch is shown in figure 6. In the event of trouble with one amplifier, the projectionist can transfer the speaker load to the other amplifier by turning the emergency channel switch to either the EMERG-1 or the EMERG-2 position. The disabled amplifier can be repaired without interrupting the performance.

Amplifiers and associated components are rack mounted for ease of installation and servicing. A door 18 inches wide and the full height of the rack provides ready access to all the components on the rack. Units may easily be inspected, and tubes tested or replaced.

A three position switch is mounted adjacent to the monitor speaker volume control for selecting channels and for monitoring. In the PG-250 system position A or B may be used for monitoring. In the PG-251 system positions A and B monitor

channels 1 and 2 respectively. The middle position of the switch is OFF.

The soundheads are connected to the volume control unit by short lengths of low-capacity cable. The volume control unit is connected to the amplifier by a 40-foot low-capacity cable. All low-capacity cable is furnished with the equipment.

Volume control and sound changeover are accomplished by controls located adjacent to each machine. The controls are accessible from each operating position. The amplifier has been designed to prevent a noticeable variation in the volume level of the speakers in use as individual speakers are turned on or off. This makes it unnecessary for the operator to be continually changing the volume control setting of the amplifier.

The individual in-car speakers designed for use with this equipment contain Alnico permanent magnets. The speakers are efficient, sensitive, and have high-power-handling capacity. The speaker cone will faithfully reproduce all frequencies neces-

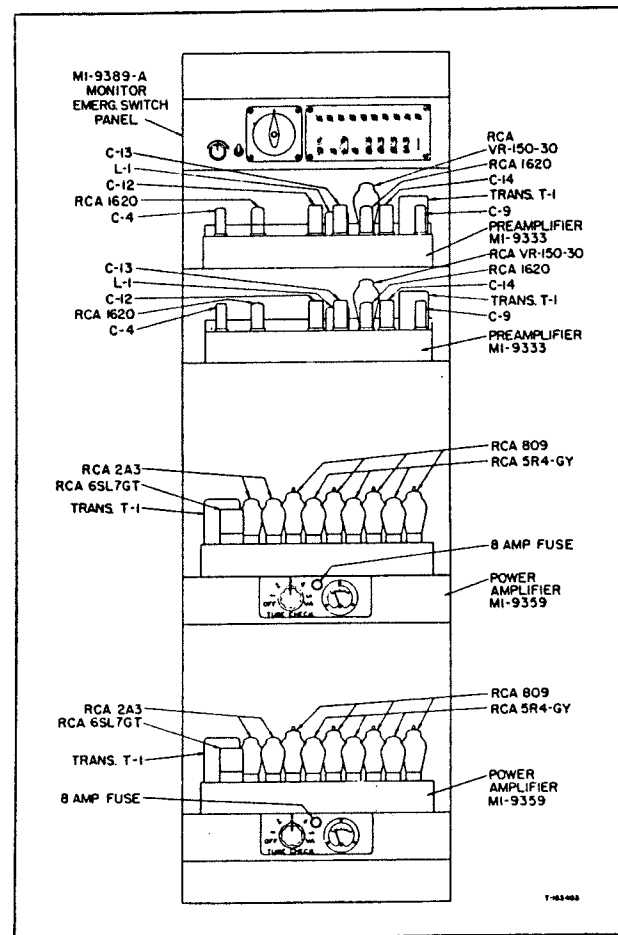


Figure 2—Amplifier Rack, Type PG-251, MI-9212;  
Location of Parts

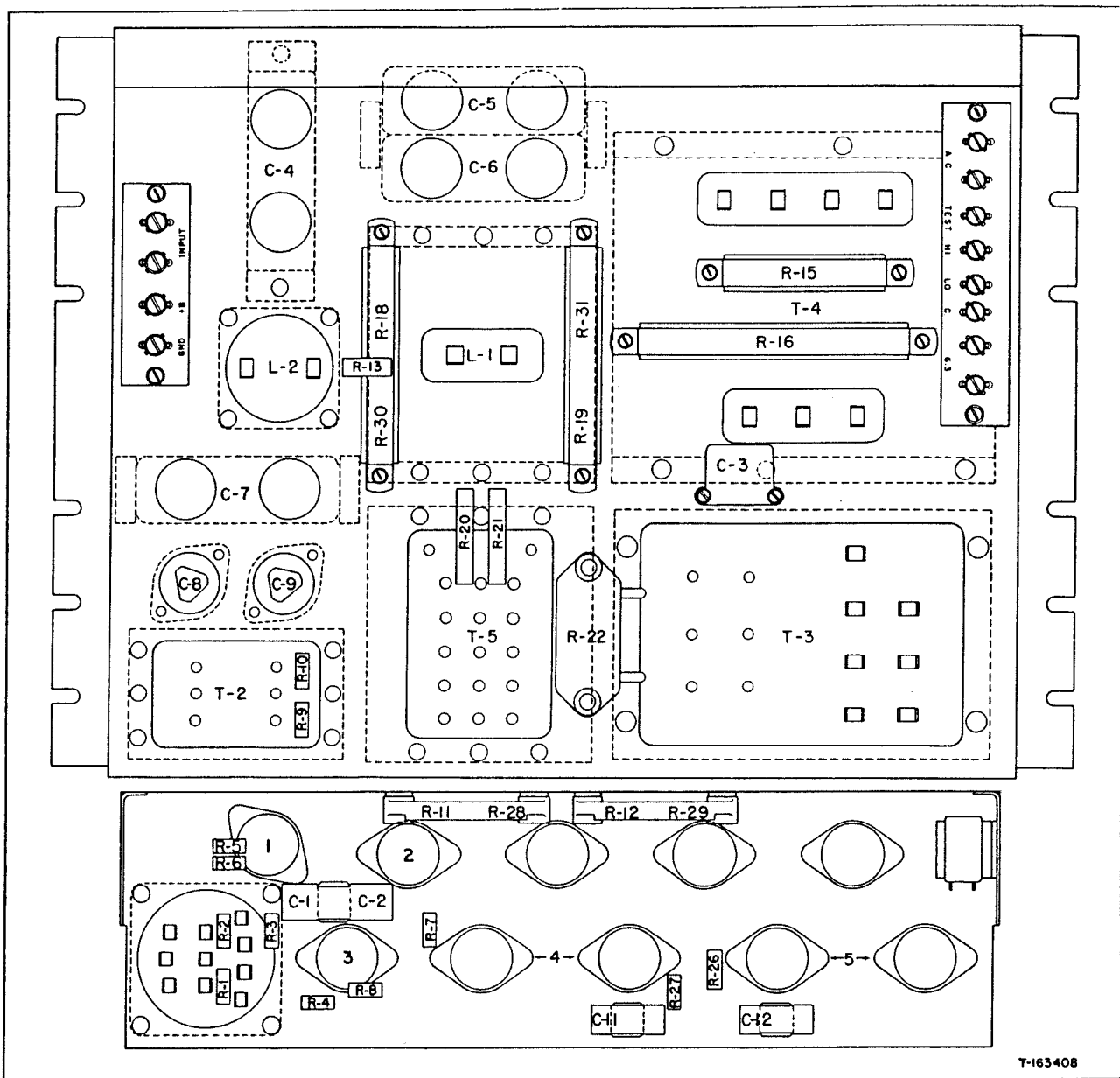


Figure 3—Power Amplifier, MI-9359; Location of Parts

sary for pleasing speech and music. The speaker unit is housed in an ultra-modern aluminum case which is rugged, durable and weatherproof. A bracket is attached to the case so that it may easily be hung on the car door or window.

A seven-foot length of rubber covered cable is attached to each speaker for easy installation. Speaker mounting brackets are used for mounting the speakers on posts in the parking area while not in use. These mounting brackets are easy to install, and make it possible for the patron to reach the speaker without leaving his car.

## GENERAL

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

## OPERATING PROCEDURE

Make a complete test of the equipment as outlined below:

1. Turn ON the service switch connecting the

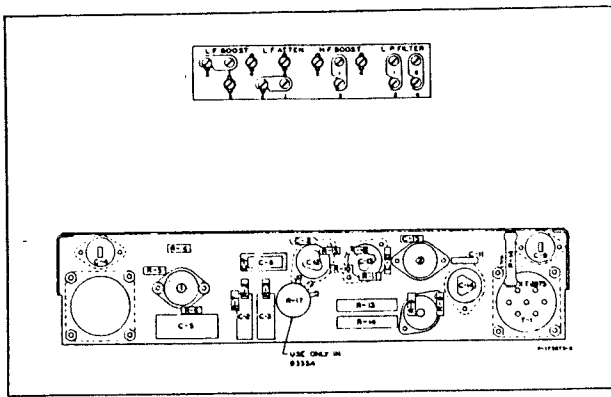


Figure 4—Preamplifier, MI-9333; Location of Parts

system to the a-c supply. If the two channel system (PG-251) is being used, set the emergency switch to the NORM position. This switch is located on the emergency switch and monitor control panel at the top of the amplifier rack. Start both projectors, and operate them for several minutes until all units reach a state of thermal stability, this aids in producing quiet and uniform operation.

2. Test the tubes in the amplifiers, using the meter and switch as explained below under *Tube Test*.

3. Turn the system volume control to a low setting. 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 toothpick, using the fader switches to turn on the exciter lamp of the machine to be tested. A thumping sound and other noises will be heard from the monitor speaker, if the system is in operating condition. The in-car speakers should repeat the noise. Turn the system volume control to zero after making this test.

**CAUTION:** A hard surfaced material should not be used to interrupt the light beam as one 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 approximate volume control setting which will be required during the show must be estimated by the projectionist. 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 instruction card. (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 which is to be started first, and then start the soundhead motor. After the motor has run for approximately three seconds set the fader switch to the number corresponding to the machine in operation, and adjust the volume control as required.

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. Watch for the motor cue, as the film in the first projector nears the end, and when the cue appears on the screen switch ON the motor of the second projector. When the change-over cue is observed on the screen, switch the exciter lamp current and the sound circuit to the other projector by operating either fader switch.

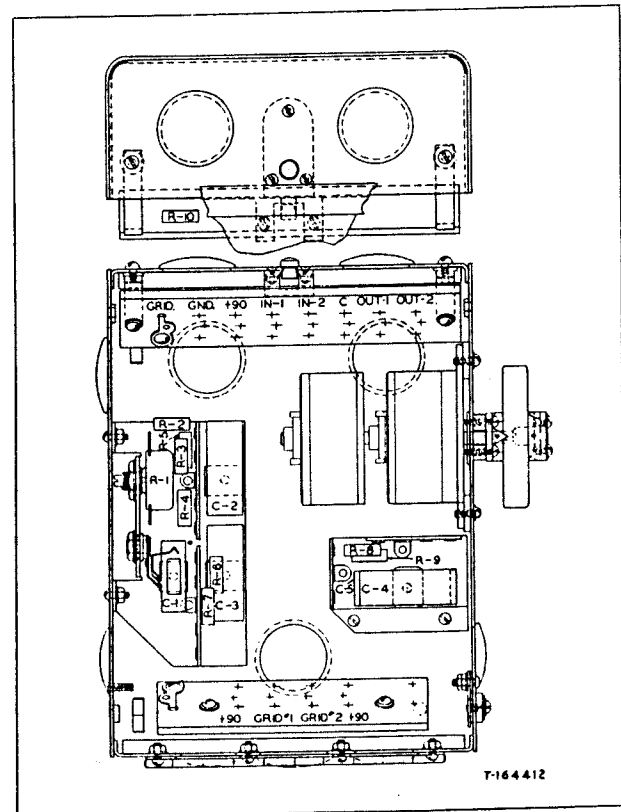


Figure 5—Volume Control Unit, MI-9726; Location of Parts

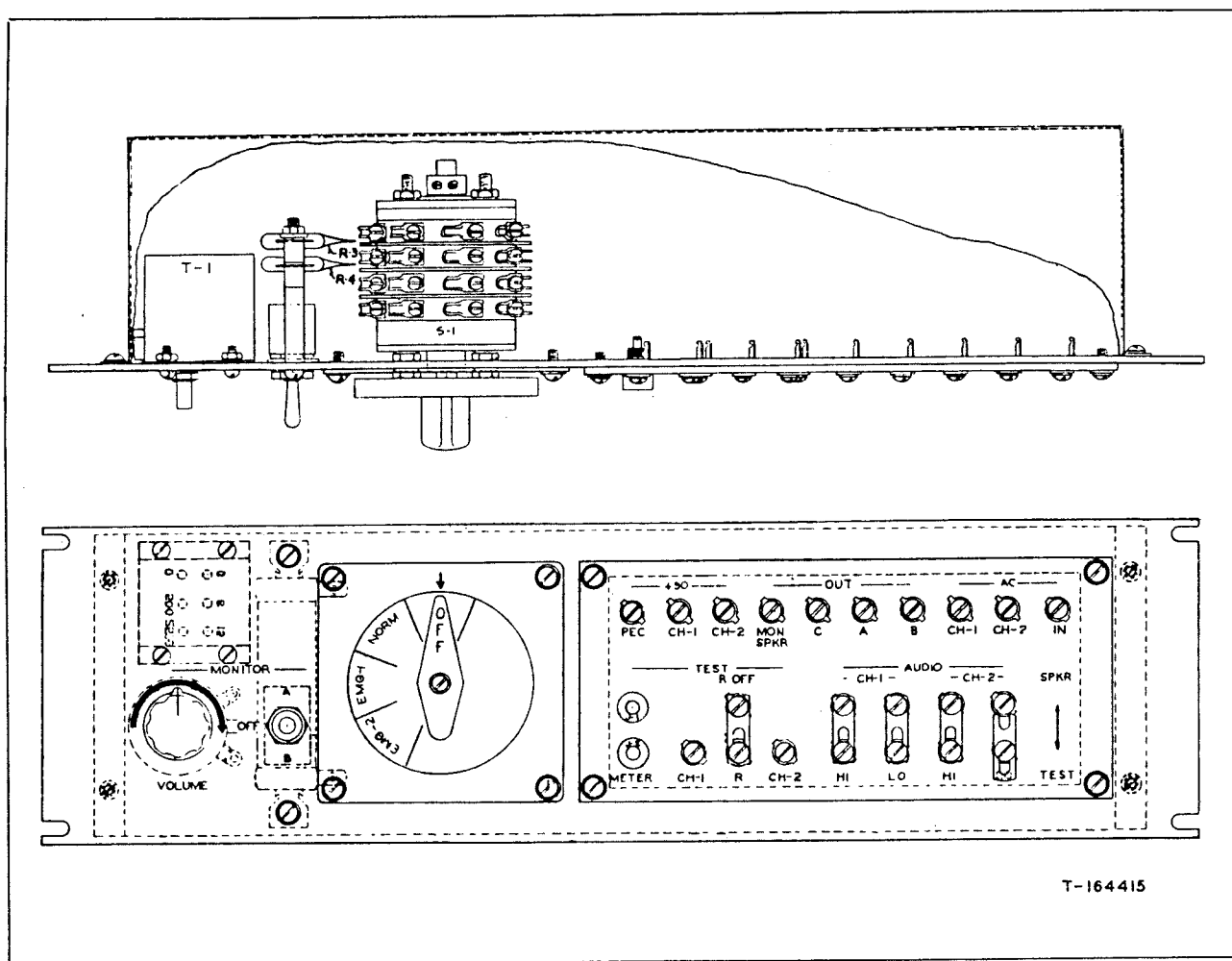


Figure 6—Emergency Channel Switch, MI-9389-A; Location of Parts

## EMERGENCY OPERATION FOR PG-251

### Emergency Switch

An emergency channel selector switch having an OFF, NORM, EMG-1, and EMG-2 position is mounted on the panel at the top of the type PG-251 amplifier rack. When the switch is in the NORM position the signal from the soundhead is fed through two channels, each channel consisting of a preamplifier and a power amplifier. During normal operation each channel drives one half of the total quantity of loudspeakers utilized in the system. In the event of trouble in either channel throw the emergency switch to the EMG position that corresponds to the other channel. With the switch in either of the EMG positions, the signal is fed through one channel only and all of the speakers are connected to the output of the channel selected for operation.

As soon as the system has been switched to an emergency channel the volume control should be readjusted to the proper level.

When the emergency switch is set to an emergency channel the inoperative preamplifier and power amplifier may be opened for inspection.

## POWER AMPLIFIERS AND PREAMPLIFIERS

### Fuse

The common fuse for these amplifiers is located on the front panel of the power amplifier (See Figs. 1 and 2), and may be removed by turning the knurled extractor post. If the fuse burns out replace the 5R4-GY tube (as the most likely place for a short circuit is between the filament and plate of this tube) before replacing the fuse. The removed tubes may be checked later at a more convenient time.

**IMPORTANT:** Turn OFF the service switch to disconnect the sound system from the a-c supply before replacing any tubes or the fuse in the PG-250 system. In the PG-251 system tubes or fuses may be replaced in the inoperative channel by turning the emergency switch to the other channel. Never replace a fuse with one of a rating higher than eight amperes.

### Tube Test

A meter and a switch mounted on the front of the power amplifier are used to test the power amplifier and the preamplifier tubes. Five positions on the switch are numbered. The numbers marked on or between sockets in figure 3 indicate the power-amplifier tubes which are tested with the switch in the numbered positions. The extreme clockwise position of the switch is marked VA. The sockets numbered 1 and 2 in figure 4 indicate the preamplifier tubes under test with the switch in the latter position.

Positions number one, two and three of the switch are used to test the 6SL7 and the two 2A3 tubes in the power amplifier. Positions four and five are each used to test two of the four 809 tubes in the power amplifier. The position marked VA is used to test both of the 1620 tubes in the preamplifier.

Test the tubes under no signal conditions, that is, with no soundtrack interrupting the light beam in the soundhead. With the meter switch in position one, two or three the meter should indicate between 0.3 and 0.7 volts in each position. A read-

ing outside these limits indicates that the corresponding tube should be replaced. Turn the switch to position four and to position five. If the meter indicates between 0.2 and 0.3 volts, the corresponding tubes are in satisfactory operating condition. Turn the switch to the VA position. The meter should indicate between 0.3 and 0.7 volts, or the tubes in the preamplifier should be removed and tested separately.

If meter indications are uniformly low, as the switch is turned to each position, replace the 5R4-GY rectifier tubes and repeat the test.

### System Output

The meter and switch located on the front of the power amplifier can also be used to determine the amplitude of the system output during the performance. Rotate the switch to either position four or five and notice the meter deflection. The pointer should not go off scale at any time. If it tends to do so, the output is too great and the volume control should be adjusted.

## 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.
<b>Preamplifier, MI-9333</b>		
C-2	Capacitor, .025 mf, 300 v	70612
C-3, C-7	Capacitor, .05 mf, 300 v	70615
C-4, C-9	Capacitor, 40 mf, 25 v	19807
C-5	Capacitor, .25 mf, 300 v	70618
C-6	Capacitor, .005 mf, 500 v	70627
C-8	Capacitor, 120 mmf, 500 v, mica	39630
C-10	Capacitor, 680 mmf, 500 v, mica	50338
C-11	Capacitor, 820 mmf, 500 v, mica	47048
C-12, C-13, C-14	Capacitor, 20 mf, 450 v	32400
C-15	Capacitor, 390 mmf, 500 v, mica	68542
L-1	Reactor, 0.5 henry, 475 ohms, d-c resistance	50336
R-2	Resistor, 150,000 ohms, ½ w	30493
R-3	Resistor, 82,000 ohms, ½ w	8064
R-4	Resistor, 100,000 ohms, ½ w	3252
R-5, R-9	Resistor, 1,800 ohms, ½ w	30930

Symbol No.	Description	Stock No.
<b>MI-9333 (Cont'd)</b>		
R-6	Resistor, 1.2 megohms, ½ w	30162
R-7	Resistor, 220,000 ohms, ½ w	14583
R-8	Resistor, 390,000 ohms, ½ w	11988
R-10	Resistor, 33,000 ohms, ½ w	64748
R-11	Resistor, 10,000 ohms, 1 w	13097
R-12	Resistor, 8,200 ohms, 10 w	45490
R-13	Resistor, 18,000 ohms, 2 w	62426
R-14	Resistor, 12,000 ohms, 2 w	43765
R-15	Resistor, 680,000 ohms, ½ w	30562
R-16	Resistor, 1 megohm, ½ w	35498
T-1	Transformer, audio, XT-2875	18051
	Cap, tube	12110
	Plate, capacitor mounting, for C-4, C-9	19820
	Plate, capacitor mounting, for C-12, C-13, C-14	28452
	Socket, tube, for V-1, V-2	31319
	Socket, tube, for V-3	28413

Symbol No.	Description	Stock No.
<b>Power Amplifier, MI-9359</b>		
C-1, C-2	Capacitor, 0.1 mf, 600 v	70638
C-3	Capacitor, .004 mf, 5,000 v	50340
C-4	Capacitor, 10 mf, 1,000 v	50339
C-5, C-6, C-7	Capacitor, 8 mf, 600 v	48090
C-8, C-9	Capacitor, 20 mf, 450 v	32400
C-11, C-12	Capacitor, .0035 mf, 1,000 v	70646
F-1	Fuse, 8 amp, 250 v	50344
L-1	Reactor, XT-3984	41400
L-2	Reactor, XT-875-D	17569
M-1	Meter	40679
R-1, R-2	Resistor, 680,000 ohms, 1/2 w	30562
R-3	Resistor, 620 ohms, 1/2 w	11485
R-4	Resistor, 220 ohms, 1/2 w	5201
R-5, R-6	Resistor, 270,000 ohms, 1 w	19232
R-7, R-8	Resistor, 390,000 ohms, 1/2 w	11988
R-9, R-10	Resistor, 6,800 ohms, 1/2 w	14659
R-11, R-12, R-28, R-29	Resistor, 100 ohms, 20 w	41414
R-13	Resistor, 10,000 ohms, 1 w	18037
R-14	Resistor, 2,500 ohms, 100 w	41404
R-15	Resistor, 1,850 ohms, 5.8 w	50341
R-16	Resistor, 13,000 ohms, 9.5 w	50342
R-17	Resistor, 33 ohms, 1/2 w	30789
R-18, R-19, R-30, R-31	Resistor, 1,200 ohms, 10.5 w	50343
R-20, R-21	Resistor, 4.3 ohms, 2 w	61011
R-22	Resistor, 1,000 ohms, 20 w	40863
R-26, R-27	Resistor, 820 ohms, 1/2 w	30158
S-1	Switch	50652
T-1	Transformer, XT-2615-A	28870
T-2	Transformer, RT-397	16653
T-3	Transformer, XT-4460	50647
T-4	Transformer, XT-4615	50648
T-5	Transformer, XT-4459	50649
	Holder, for fuse F-1	48894
	Holder, tube	61139
	Knob assembly	30075
	Plate, capacitor mounting, for C-8, C-9	28452
	Switch, meter	28944
	Socket, tube, 4 contact	64397
	Socket, tube, 8 contact	31319
<b>Drive-in Speakers, MI-9433 B &amp; C</b>		
	Cable, straight cord assembly (MI-9433-B only)	51573
	Cable, coiled cord assembly (MI-9433-C only)	52240
	Case, front	51472
	Case, rear	51533
	Knob, control	51572
	Rheostat, wire wound, 50 ohms, 0.2 amp, 2 w	51571
	Screw, oval head, 8-32x2 1/4" lg.	51574
	Screw, self tapping, round head, 8-32x 5/16" lg.	51552
	Speaker	51534
	Spring	40708

Symbol No.	Description	Stock No.
<b>Channel Selector and Monitor Control, MI-9389 and MI-9389-A</b>		
J-1, J-2	Jack, pin	50646
R-3, R-4	Resistor, 500 ohms, 55 w	50348
R-5	Resistor, variable, 500 ohms	50698
S-1	Switch (MI-9389-A only)	50349
S-2	Switch	50645
T-1	Transformer, XT-4730-A	50644
	Knob, assembly, R-5	30075
<b>Exciter Lamp Supply, MI-9180</b>		
	Transformer, RT-388	23834
	Resistor, adjustable, 0.3 ohm, 25 w	45769
<b>Exciter Lamp Supply, MI-9180-C</b>		
	Transformer, RT-388-U	50659
	Resistor, adjustable, 0.3 ohm, 25 w	45769
	Note: Either MI-9180 or MI-9180-C is used.	
<b>In-Car Speaker Mounting Bracket, MI-9441</b>		
	Bracket, speaker mounting	51717
<b>In-Car Speaker Coupling Unit with Speaker Mounting Brackets, MI-9434</b>		
T-1	Transformer, XT-4803	52963
R-1	Resistor, 470 ohms, 1 w	30681
	Holder, drive-in speaker	51717
	Terminal strip, 5-position	53408
<b>LC Cable, MI-9778</b>		
	Cable, low capacity, 40 foot	
<b>LC Cable, MI-9791-3</b>		
	Cable, low capacity, 108 inch	53924
<b>LC Cable, MI-9791-5</b>		
	Cable, low capacity, 120 inch	53925
<b>Speaker, Monitor; MI-9405-C</b>		
	Cone and voice coil kit	49125
<b>Switch, Fader; MI-1708-D</b>		
	Switch	21802
<b>Volume Control Station, MI-9726</b>		
C-1	Capacitor, .05 mf, 400 v	70615
C-2, C-3	Capacitor, 1.0 mf, 400 v	70620
C-4, C-5	Capacitor, 0.25 mf, 400 v	70618
J-1	Jack, midget	23421
R-1	Control, 250,000 ohms	45496



Symbol No.	Description	Stock No.
<b>MI-9726 (Cont'd)</b>		
R-2, R-4	Resistor, 560,000 ohms, ½ w, 10%	30653
R-3	Resistor, 220,000 ohms, ½ w	14583
R-5, R-6	Resistor, 270,000 ohms, ½ w	30651
R-7	Resistor, 1 megohm, ½ w	30652

Symbol No.	Description	Stock No.
<b>MI-9726 (Cont'd)</b>		
R-8, R-9	Resistor, 270 ohms, ½ w, 10%	30929
R-10	Resistor, 180,000 ohms, ½ w	11959
	Control, volume (H Pad)	50763
	Knob, volume control	51257

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