222 HARTREY AVE., EVANSTON, IL. 60204 U.S.A.
SHURE MICROPHONES AND ELECTRONIC COMPONENTS
AREA CODE 312/866-2200 • CABLE: SHUREMICRO
TWX: 910-231-0048 TELEX: 72-4381

DATA SHEET MODEL SR108 EXTENDED RANGE SPEAKER SYSTEM

OPERATION AND SERVICE INSTRUCTIONS

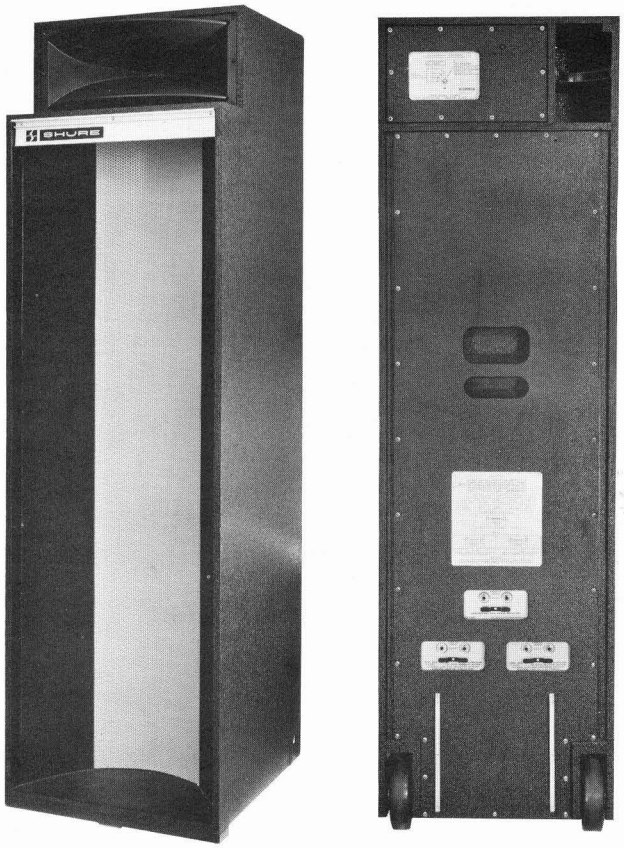


FIGURE A.
SR108 SPEAKER SYSTEM

DESCRIPTION

The Shure Model SR108 Extended Range Speaker System is a rugged, heavy-duty, two-way speaker system designed primarily for high sound-pressure-level reproduction of wide-frequency-range program material in sound reinforcement applications. The SR108 can be used with Shure Model SR105 or similar high-power amplifiers, in either a single-amplifier mode (conventional full-range operation with passive crossover) or, with a Shure Model SR106 Electronic Crossover, in a biamplification mode of operation. The SR108 is also ideal for monitoring applications requiring wide frequency response and high signal level capabilities. When properly installed and connected, the SR108 will provide outstanding performance in critical, high-level applications due to its extremely wide frequency response, low distortion and smooth dispersion characteristics. The SR108 has a nominal impedance of 16 ohms and is designed to operate with up to 57 volts rms input (200 watts continuous program material). In the biamplification mode, the low-frequency section accepts up to 200 watts and the high-frequency section up to 100 watts of continuous program material. The SR108 can be used either direct-coupled or with a constant-voltage 70-volt line using a Shure A102A Transformer.

The superior sound quality of the SR108 is achieved through the use of six eight-inch low-frequency speakers, mounted in a linear array in a front-ported, horn-loaded, bass reflex enclosure (fourth-order Butterworth response) plus four high-frequency drivers coupled to a single radial horn. The front-porting bass reflex design of the enclosure provides extreme low-frequency enhancement, and horn-loading optimizes the lower mid-range frequencies. A built-in series-type passive crossover network is used with single-amplifier inputs, and includes a four-position high-frequency attenuator switch (LOUDSPEAKER OPERATION).

The LOUDSPEAKER OPERATION Switch is also used to select between the single-amplifier, passive crossover input and separate high- and low-frequency inputs for operation in the biamplification mode. The Shure Model SR106 Electronic Crossover provides the proper low-frequency and high-frequency signal splitting ahead of the power amplifiers for biamplified operation.

The high-frequency section of the SR108 also contains automatic protection circuitry to avoid driver damage at extremely high input levels. Additional high-frequency driver protection is included in the biamplification mode to protect against damage from low-frequency signals.

The SR108 is a portable unit, and is primarily designed for easy installation either indoors or in a protected outdoor environment, such as under an open pavilion. The system is supplied with a 15.2m (50-foot), 18-gauge, rubber-jacketed connecting cable with phone plugs. (A second connecting cable—Shure No. RKC4, not supplied—is required for operation in the biamplification mode.) The upper right rear section of the SR108 contains a cable storage compartment.

The SR108 is constructed of 15.9 mm (⅝ in.) heavy durable wood, coated with black, scuff-resistant, textured vinyl. All adhesives used in the SR108 are moisture-resistant, and internal bracing is provided to minimize vibration and maximize structural integrity. The metal grille assembly is finished in durable gold enamel. The radial horn is ruggedly constructed of high-density, structural urethane foam, with fastening hardware selected to provide strength and minimize corrosion and visible wear. The SR108 is equipped with an integral rear-panel handle and two heavy-duty, hard-rubber wheels for mobility.

27A1355 (QC)

Printed in U.S.A.

SPECIFICATIONS

Power Rating
(Program Material)
Single Amplifier Input..200 watts max.
Low-Frequency Input
(Biamplification Mode)..200 watts max.
High-Frequency Input
(Biamplification Mode)..100 watts max.

Power Load for
Constant-Voltage
Operation ..... 39 watts
(25-volt input, 16 ohms)
50 watts
(70.7-volt input, through optional A102A Transformer)

Impedance .....16 ohms nominal for both conventional full-range and biamplified operation (see Figure B)

Frequency Response ....40 Hz — 15 kHz
(see Figure C)

Crossover Frequency ....2600 Hz nominal

Sound Pressure
Level (SPL) .....EIA rating: 54 dB at 9.2m (30 feet) from 1 milliwatt; equivalent to 102 dB at 1.2m (4 feet) with 1-watt input

Total Harmonic
Distortion .....Less than 2% at 1 kHz and 10 kHz; less than 3% at 100 Hz [measured at 1.8m (6 feet) and 106 dB SPL]

Phasing (Polarity)
Single Amplifier Input..Positive voltage applied to phone plug tip produces positive sound pressure.

Biamplification Mode..Low Frequency: Positive voltage applied to phone plug tip produces positive sound pressure.
High Frequency: Positive voltage applied to phone plug tip produces negative sound pressure.

High-Frequency
Section .....120° radial horn

Horizontal Distribution ..140° (see Figure D)

Vertical Distribution ..... 90° (1 kHz −10 dB)

Operating Temperature.. −7° to 43°C (20° to 110°F)

Storage Temperature .... −29° to 71°C (−20° to 160°F)

Connectors .....Two parallel-wired phone jacks for each input: conventional full-range, low frequency and high frequency

Overall Dimensions
(see Figure E) .....1730 mm height × 495 mm width × 517 mm depth (68⅛ in. × 19½ in. × 20⅜ in.)

Weight .....64.5 kg (142 lb) incl. cable

Construction .....15.9 mm (⅝ in.) wood, black vinyl finish, gold-painted metal grille, anodized aluminum rear panel rails, structural urethane foam horn

Supplied Accessories ....One 15.2m (50-foot) heavy-duty cable with phone plugs (RKC4)

Optional Accessories ....A102A 70-Volt Transformer
A50XC 15.2m (50-foot) Extension Cable with male and female phone plugs
RKC4 15.2m (50-foot) Heavy-Duty Cable with male phone plugs (for biamplified operation)

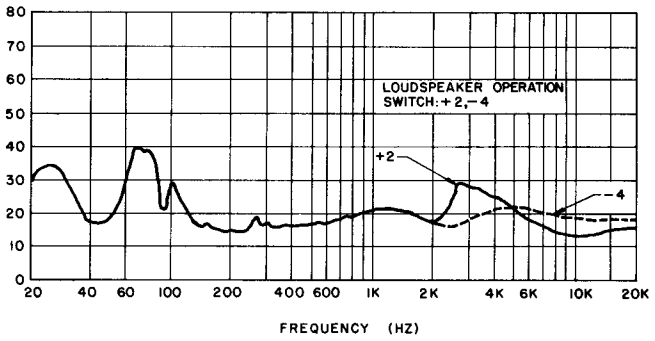


FIGURE B.
IMPEDANCE CURVE

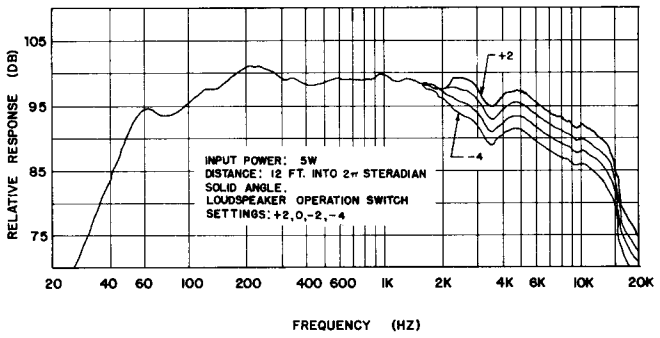


FIGURE C.
TYPICAL FREQUENCY RESPONSE

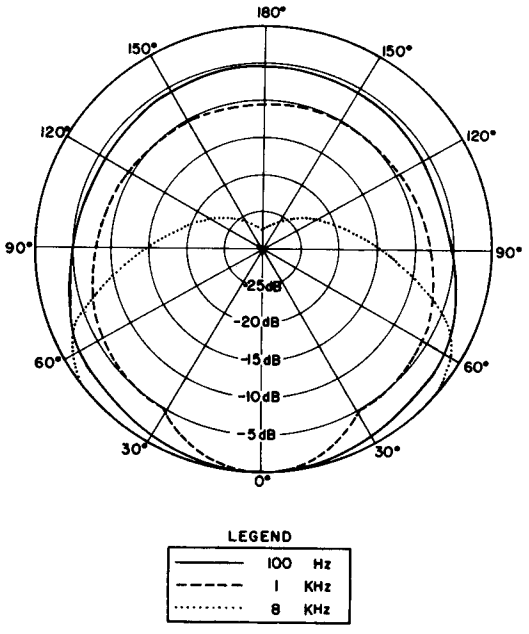


FIGURE D.
TYPICAL HORIZONTAL POLAR PATTERN

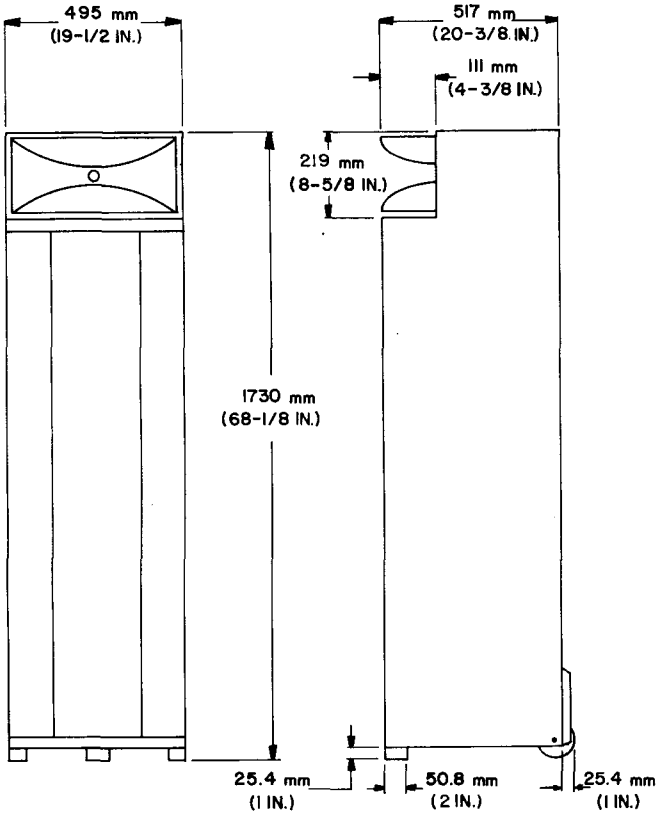


FIGURE E.
OVERALL DIMENSIONS

CIRCUIT DESCRIPTION

In conventional, full-range, single-amplifier operation, input signals from the power amplifier are connected to the SR108 through the uppermost set of parallel-wired jacks to a series-type, passive LC crossover network composed of two capacitors and two inductors (see Figure F). The crossover provides a 6 dB/octave rolloff for the low-frequency speakers and an 18 dB/octave rolloff for the high-frequency drivers. The inductance of the low-frequency speaker voice coils provides an additional 6 dB/octave rolloff, resulting in a total of 12 dB/octave low-frequency rolloff.

Low-frequency signals are routed from the crossover directly to the six low-frequency speakers through the rear-panel LOUDSPEAKER OPERATION Switch. The low-frequency speakers are wired in two parallel sets of three series-connected speakers, providing a total nominal impedance of 16 ohms. High-frequency signals are routed from the crossover through the LOUDSPEAKER OPERATION Switch attenuator network which provides high-frequency level adjustments of −4, −2, 0, and +2 dB in the first four positions of the switch. From the attenuator network, high-frequency signals enter a protection circuit designed to prevent damage to the high-frequency drivers by extremely high signal levels. Signal levels greater than 28 volts rms (approximately 50 watts) for longer than 15 milliseconds are sensed through a diode bridge, causing a relay to engage high-wattage resistors which decrease the high-level signals to the high-frequency drivers by approximately 7 dB. The circuitry automatically resets itself when the high-frequency signals drops below a safe threshold level. The output of the protection circuitry feeds the four

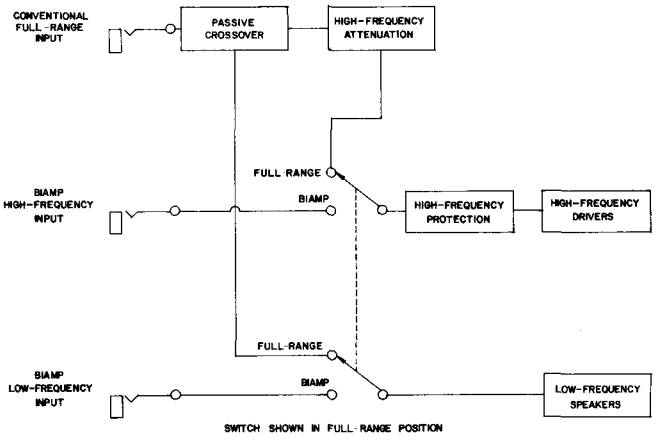


FIGURE F.
SR108 BLOCK DIAGRAM

high-frequency drivers which are wired in series-parallel and provide a total nominal impedance of 16 ohms.

Operation in the biamplification mode is accomplished by feeding separate high- and low-frequency signals from an external 2600 Hz electronic crossover, such as the Shure Model SR106 Electronic Crossover, through separate high- and low-frequency power amplifiers, such as the Shure Model SR105 Power Amplifier, to the HIGH and LOW FREQUENCY input jacks of the SR108 (see Figure G). With the rear-panel LOUDSPEAKER OPERATION Switch in the BIAMP position, the internal passive crossover of the SR108 is bypassed, and the low-frequency signals are routed directly to the low-frequency speakers. High-frequency signals also bypass the attenuator network, going directly from the LOUDSPEAKER OPERATION Switch through the high-frequency protection circuit and a 12 dB/octave filter to the high-frequency drivers. The filter serves to protect the drivers from low-frequency transient signals produced by connecting input cables to the power amplifier, turn-on thumps, or operating errors.

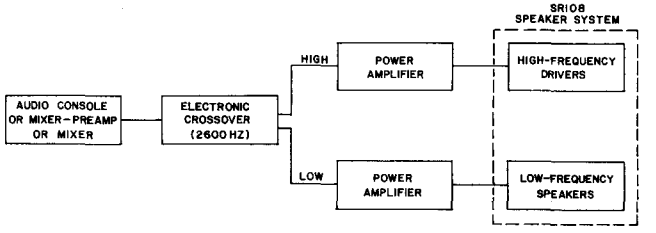


FIGURE G.
BIAMPLIFIED OPERATION

INSTALLATION

General

In planning a sound system using the SR108 Extended Range Speaker System, care must be taken to observe the horizontal (140°) and vertical (90°) sound distribution. Maximum coverage for sound reinforcement installations is generally obtained with SR108's on each side of the sound source and as far forward as possible. Assuming a single SR108 to either side of the sound source, the SR108's should be positioned so that an imaginary line from the center of each SR108 runs to the back row of the audience area. For "clustered" SR108 installations

covering a wide area, each SR108 should be positioned so that its angle of coverage slightly overlaps that of the SR108 next to it as their sound output enters the audience area.

The problem of audience penetration may be likened to illuminating a dark area with a floodlight: the object is to provide maximum area coverage (audience) with the available floodlights (SR108's). At the same time, care must be taken to avoid illuminating reflective surfaces. A blinding reflection (echo or "slapback") may be more of a problem than inadequate coverage of the desired area.

Of the remaining common sound installation problems, acoustic feedback can usually be dealt with by judicious placement of SR108's and microphones, and/or the use of feedback filters on the audio console. Extreme background noise or acoustic absorption generally requires a greater volume level to maintain an acceptable sound level. However, it must be remembered that excessive sound levels may be intolerable to that part of the audience nearest the SR108's. In this case, or in those cases where the architectural design leaves audience areas that are not reached by the SR108's, the use of secondary or auxiliary speaker systems should be considered.

Conventional Full-Range Direct-Coupled Operation

The SR108 is designed to accept program material where the average power level reaches 200 watts on a continuous basis. However, sine-wave or pink or white noise signals of levels approaching 200 watts should be avoided in that their duty cycle is much greater than that of program material. Consequently, when setting up or adjusting a sound system with SR108's, avoid the use of high-level, continuous-type test signals. It should be pointed out that the various speaker input jack pairs are for paralleling additional speakers and *not* amplifiers.

CAUTION

Amplifier damage may result if two amplifiers are plugged into parallel jacks.

To insure safe operation of SR108's with program material inputs, do not connect any input jack to an amplifier or amplifiers with output capabilities greater than shown in Figure H.

70-Volt Operation

The SR108 Speaker System may be used on a constant-voltage, 70.7-volt line by using a 70-volt transformer such as the Shure Model A102A. This transformer provides power taps of 50, 25, 12, and 6 watts and speaker impedance taps of 8 or 16 ohms (see Figure J).

In the biamplification mode, connect A102A transformers using one transformer for the high-frequency input and one for the low-frequency input. Connect the low-frequency amplifier 70-volt line to the power tap of one A102A transformer, choosing the tap that produces the desired power level. Connect the high-frequency amplifier 70-volt line to the power tap of the other transfomer offering the most suitable balance of high- to low-frequency sound. First try the high-frequency power tap that is one-half the power of the low-frequency tap. Listen to program material

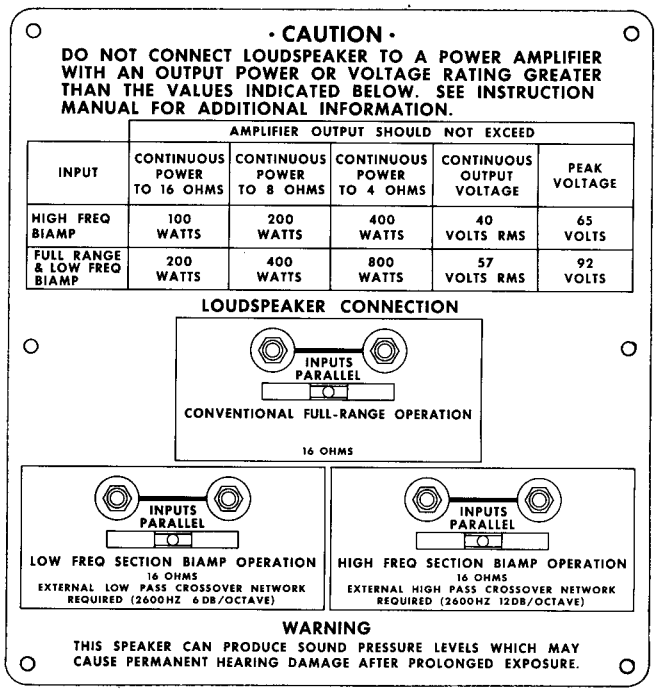


FIGURE H.
SPEAKER INPUTS

through the sound system and adjust the high-frequency power tap if a different high-frequency/low-frequency balance is desired.

Phasing (Polarity)

The SR108 is phase-wired for conventional, full-range operation as follows: A positive voltage applied to the CONVENTIONAL FULL-RANGE OPERATION Input Jack tips will produce a positive sound pressure below 2600 Hz and a negative sound pressure above 2600 Hz. In biamplified operation, a positive voltage applied to the LOW FREQ/BIAMP OPERATION Input Jack tips produces a positive sound pressure, and a positive voltage applied to the HIGH FREQ/BIAMP OPERATION Input Jack tips produces a negative sound pressure. This conforms to the requirements of the SR108 internal passive crossover network, which provides the proper phase relationships at the crossover frequency.

When using the SR108 in biamplified operation with an external active electronic crossover network and separate power amplifiers, the following considerations should be given to phasing: When using a Shure Model SR106 Electronic Crossover and identical power amplifiers (Shure SR105 or equivalent) to power an SR108, the phasing is correct. Dissimilar high- and low-frequency power amplifiers may be

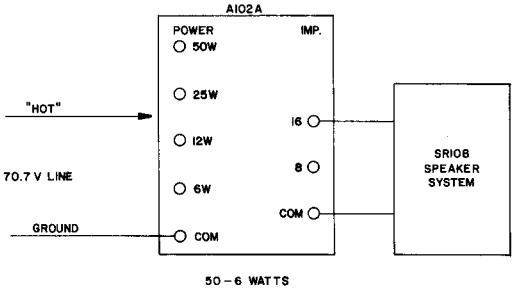


FIGURE J.
70-VOLT OPERATION

used as long as all low-frequency sections are in phase with one another and all high-frequency sections are in phase with one another. A potential problem exists only when there is a phase reversal between the high- or low-frequency sections of the speaker systems in use. To check for a possible out-of-phase condition, the following listening test should be performed on both high- and low-frequency sections of the SR108's. The test should be made feeding two SR108's at a time (using one SR108 as a phase reference) with the same program material (vocal material, or pink noise). Connect the SR106, power amplifiers, SR108's, and program input equipment.

CAUTION

Do not interchange high- and low-frequency speaker cables. Damage to high-frequency drivers from high-level, low-frequency signals may result.

Turn on the sound system and adjust for a moderate level. Disconnect the high-frequency driver input cables. Stand approximately mid-way between the two SR108's and listen to the program material while reversing the "hot" and common leads to one of the low-frequency speaker sections. (This may be accomplished by wire-reversing or by a simple cross-wired, double-pole, double-throw switch.) Use the connection that gives a localized sound, centered between the SR108's; this is the correct phase connection. A diffuse, directionless sound indicates improper phasing.

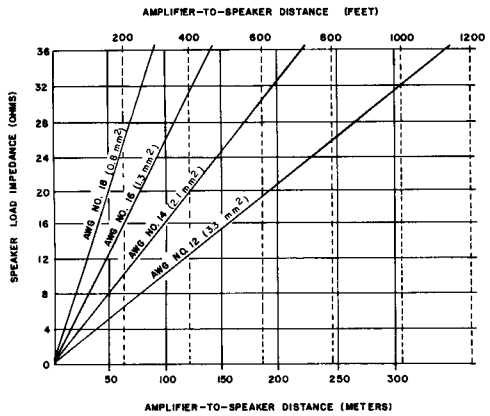


FIGURE K.
RECOMMENDED WIRE GAUGE:
DIRECT-COUPLED AMPLIFIER OUTPUT

Reconnect the high-frequency driver sections and disconnect the low-frequency sections. Perform the same test as above. Correct phasing will provide a localized sound, centered between the SR108's; incorrect phasing is indicated by the sound appearing to come predominantly from one SR108 and to shift from one SR108 to another as the listener moves around the audience area. NOTE: In a mixed system (both conventional full range *and* biamplified) the high-frequency driver sections are normally out of phase with one another. Therefore, the biamplified high-frequency signals must be reversed to assure that the high-frequency drivers of all speaker systems are in phase. This may be accomplished with a Shure A15PR Phase Reverser at the high-frequency amplifier input or the SR106 high-frequency output.

Wiring

The cables used to connect the SR108 should be at least 18-gauge and rubber-jacketed. Determine the approximate distance from the amplifier to the SR108 and refer to Figures K or L to find the proper wire gauge for direct or 70-volt amplifier output (with A102A transformer) operation. Recommended cables for the sizes listed in Figure K and L are:

Gauge	Belden #	Area (mm^2)*
AWG 18	8460, 8461, 9720, 8452	0.8
AWG 16	8470, 8471, 8472	1.3
AWG 14	8473	2.1
AWG 12	8477	3.3
AWG 10	—	5.3

*Cross-section of American Wire Gauge (AWG)

To avoid frequency cancellations, poor coverage, dead zones, etc., resulting from improper speaker phasing, the SR108's must be wired in proper polarity. The cables listed above are color-coded to ensure that identical connections are used for each amplifier-SR108 hookup. Note that even common 18-gauge lamp cord ("zip cord") is phase-coded with a ribbed outer jacket, color-coded threads, or tinned and untinned conductors.

When using the 15.2m (50-foot), heavy-duty cable supplied with the SR108 in conventional full-range operation, connect the right-angle plug to a phone jack marked CONVENTIONAL FULL-RANGE OPERATION and twist the cable downward behind the locking bar to prevent accidental disconnection. The other phone jack may be used for additional, parallel-connected SR108's. When not in use, the cable may be stored in the compartment at the top right of the rear panel.

When wiring the SR108 for biamplification operation, a second cable (Shure RKC4) must be obtained to provide connections to both the HIGH and LOW FREQ input phone jacks. The same wire gauge constraints listed above for conventional full range operation apply to operation in the biamplification mode. Two separate cables (four wires) should be used for amplifier-to-SR108 interconnection in biamplified operation. Note that the SR108 high- and low-frequency inputs are isolated and a three-wire cable *could* be used; however, the wire gauge of the common wire should be one size larger than the gauge indicated in Figure K.

When wiring the SR108's consideration should be given to positioning of the cables. While most local electrical codes do not require locating speaker cables in conduits or raceways, make sure that cable placement minimizes traffic interference and physical abuse to the cable or SR108.

Placement

The SR108 Extended Range Speaker System is primarily designed for free-standing operation. In positioning for optimum sound coverage, care must be taken to locate the SR108's on stable surfaces and away from areas where the movement of performers,

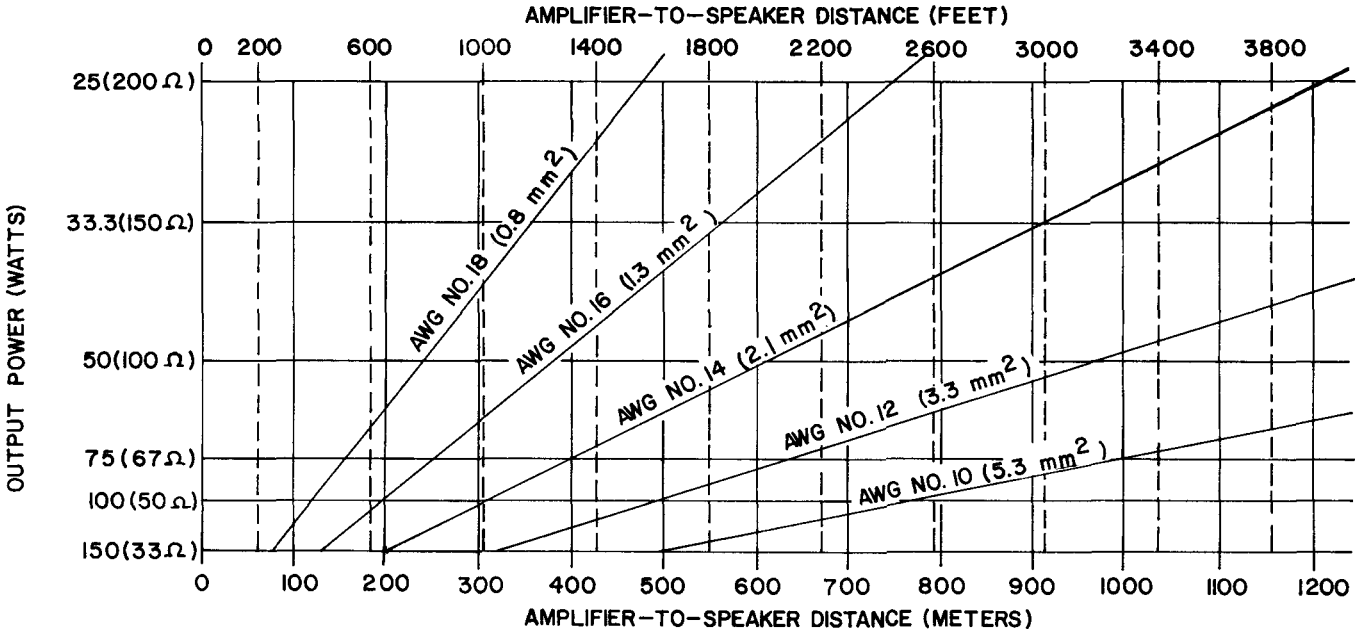


FIGURE L.
RECOMMENDED WIRE GAUGE: 70-VOLT AMPLIFIER OUTPUT (USING A102A TRANSFORMER)

audience, curtains or stage sets may cause inadvertent movement (tipping or sliding). If potentially hazardous locations cannot be avoided, the SR108's should be secured with rope, cable or strapping to maintain their physical positions and prevent accidents.

If it becomes necessary to elevate the SR108 for proper sound coverage, adequate support for elevations up to about three feet can usually be obtained using a sturdy table or bench. It should be established in advance that the surface is capable of supporting the 64.5 kg (142 lb) weight of the SR108.

For elevations greater than three feet, it is important to note that the SR108 is *not* designed for simple chain, cable or bracket mounting. A heavy-duty shelf-type mounting capable of supporting the weight of the SR108 should be devised for wall-mounted locations. Shelf and supporting materials, hardware and wall structure must be carefully considered when planning this type of mounting. The building contractor, architect or engineer should be consulted to provide building construction information and verify the safety of the proposed mounting plan. Whenever possible, a backplate should be used on the opposite side of the mounting wall to secure the mounting hardware, and some means of preventing possible sliding off the shelf must be devised.

WARNING

Under no circumstances should an SR108 be hung by eyebolts and chains or cables attached to the sides, rear, handle or top. The SR108 enclosure is not designed to withstand the stresses incurred in this type of mounting.

If suspended mounting, using chains or cables attached to beams or girders, is an absolute necessity, a platform must be devised which will be capable of both supporting the SR108 and retaining the chains or cables. As in wall-mounting, careful consideration must be given to the materials, hardware and chain or cable mounting surface. The cable or chains must be located at each corner of the platform, and should be capable of supporting four times the total weight of the SR108 *plus* the platform.

If the SR108 is to be used on a constant-voltage system, a Shure A102A 70-Volt Transformer must be connected between each amplifier and SR108. If the A102A Transformer is used, it should be located as close to the SR108 as possible. If mounted to the rear of the SR108, the transformer adds approximately 82 mm (3¼ in.) in depth and 2.95 kg (6 lb) in weight to the SR108.

Checking Sound Coverage

When the SR108's, amplifiers and other equipment have been installed and connected, apply a fairly constant level signal to the system (preferably a uniform level, full frequency range program material) and walk around the audience area. Listen for a smooth, even output from the SR108's with minimal differences in volume and tone, and no distortion or "dead spots." A dead spot—for audio purposes, an audience area where no sound is heard, or where the sound level is appreciably lower than the rest of the audience area—may mean that the SR108's are not covering that area, or that the SR108 speaker wires are connected out-of-phase. Proper phasing (polarity) may be readily determined by checking the connections to the phone jacks on each SR108 to make sure they are the same; inadequate coverage generally requires repositioning the SR108's.

Should a dead area be encountered, it should be carefully examined to determine if the problem can be corrected without resorting to auxiliary speakers.

BIAMPLIFICATION

The data in this section relates only to the use of the SR108 in the biamplified mode. Some portions of data in preceding sections are repeated here to provide a comprehensive section on biamplification.

Circuit Description

Biamplified operation is accomplished by feeding separate high- and low-frequency signals from an external 2600 Hz active crossover network, such as the Shure Model SR106 Electronic Crossover, through separate high- and low-frequency power amplifiers, such as the Shure Model SR105 Power Amplifier, to the HIGH and LOW FREQ Input Jacks of the SR108 (see Figure G). With the rear-panel LOUDSPEAKER OPERATION Switch in the BIAMP position, the internal passive crossover of the SR108 is bypassed, with the low-frequency signals routed directly to the low-frequency speakers (see Figure F). High-frequency signals also bypass the internal passive crossover and bypass the attenuator network, going directly from the LOUDSPEAKER OPERATION Switch through the high-frequency protection circuit to the high-frequency drivers. In the biamplified mode, the high-frequency protection circuit includes an overvoltage attenuator network, and a capacitor-inductor, low-frequency roll-off network which protects the high-frequency drivers from low-frequency transient signals produced by connecting input cables to the power amplifier, turn-on thumps, or operating errors.

Direct-Coupled Operation

To avoid damage to speakers or drivers when setting up or adjusting a sound system using the SR108, avoid the use of high-level, continuous-type test signals. Program-type material up to 200 watts may be used without special precautions.

For optimum safe operation in the biamplified mode, do not connect the HIGH or LOW FREQ Input Jacks of the SR108 to amplifiers with output capabilities exceeding those shown in Figure H.

CAUTION

Do not interchange the high- and low-frequency speaker cables. Damage to the high-frequency drivers due to high-level, low-frequency signals may result.

70-Volt Operation

For biamplified operation from a constant-voltage, 70-volt line, connect Shure A102A 70-Volt Transformers between the power amplifiers and SR108 as follows:

1. For low-frequency input power levels from 6 to 50 watts connect the "hot" side of the 70-volt line to the appropriate tap on the A102A Transformer (50-6W) (Figure J). Connect the ground side of the 70-volt line to the COM power tap of the A102A, and the COM impedance tap of the A102A to the negative (phone plug sleeve) terminal of the SR108 LOW FREQ Input Jack. Connect the 16-ohm impedance tap of the A102A to the positive (phone plug tip) terminal of the SR108 LOW FREQ Input Jack.
2. For the high-frequency 70-volt input (any power level up to 50 watts), connect the "hot" side of the 70-volt line to the power tap of a second A102A Transformer offering the most suitable balance of high- to low-frequency sound. First try the high-frequency power tap that is one-half the power of the low-frequency tap. Connect the ground side of the 70-volt line to the A102A COM power tap. Connect the A102A 16-ohm impedance tap to the positive (phone plug tip) terminal of the SR108 HIGH FREQ Input Jack, and the A102A COM impedance tap to the negative (phone plug sleeve) terminal of the SR108 HIGH FREQ Input Jack. Listen to program material through the sound system and adjust the high-frequency power tap if a different high-frequency/low-frequency balance is desired.

Phasing (Polarity)

The SR108 is phase-wired for biamplified operation as follows: A positive voltage applied to a LOW FREQ Input Jack tip produces a positive sound pressure, and a positive voltage applied to a HIGH FREQ Input Jack tip produces a negative sound pressure. This conforms to the requirements of the internal passive crossover network, and to the design of most two-way speaker systems.

When using the SR108 with an external active electronic crossover network and separate power amplifiers, the following considerations should be given to phasing: When a Shure Model SR106 Electronic Crossover and identical high- and low-frequency power amplifiers (Shure Model SR105 or equivalent) are used, the phasing is correct. A different crossover network *or* dissimilar high- and low-frequency power amplifiers may be used as long as all low-frequency sections are in phase with one another and all high-frequency sections are in phase with one another. A potential problem exists only when there is a phase reversal between the high- or low-frequency sections of the speaker systems in use. To check for possible out-of-phase condition, the following listening test should be performed on both high- and low-frequency sections of the SR108's. The test should be made feeding two SR108's at a time (using one SR108 as a phase reference) with the same program material (vocal material, or pink noise). After connecting the equipment, turn on the sound system and adjust for a moderate level. Disconnect the high-frequency driver input cables. Stand approximately mid-way between the two SR108's and listen to the program material while reversing the "hot" and common leads to one of the low-frequency speaker sections. (This may be accomplished by wire-reversing or by a simple cross-wired, double-pole, double-throw switch.) Use the connection that gives a localized sound, centered between the SR108's; this is the correct phase connection. A diffuse, directionless sound indicates improper phasing.

Reconnect the high-frequency driver sections, disconnect the low-frequency sections, and perform the same test as above. Correct phasing will provide a localized sound, centered between the SR108's; incorrect phasing is indicated by the sound appearing to come predominantly from one SR108, and to shift from one SR108 to another as the listener moves around the audience area. NOTE: In a mixed system (both conventional full range *and* biamplified) the high-frequency driver sections are normally out of phase with one another. Therefore, the biamplified high-frequency signals must be reversed to assure that the high-frequency drivers of all SR108's are in phase.

Wiring

For biamplified operation, a second cable must be obtained (Shure RKC4 or equivalent). When using other cables, or when using extension cables, the wire gauge constraints shown in Figures K and L

apply. As in conventional full-range operation, the second HIGH and LOW FREQ Input Jacks may be used for additional, parallel-connected biamplified SR108's.

BASIC OPERATING HINTS

Should any difficulty be encountered in SR108 operation, the problem may often be traced to some simple source such as an error in interconnection. The following is offered as a basic guide to problems of this sort.

Symptom: SR108 is "dead" (no output)

Check:
1. Check inputs and outputs of all equipment driving SR108.
2. Check interconnecting cables and connectors.
3. Check to see that LOUDSPEAKER OPERATION Switch position corresponds to desired operating mode.

Symptom: Poor or no high-frequency output (normal low-frequency output)

Check:
1. Check setting of LOUDSPEAKER OPERATION Switch.
2. If symptom appears only when LOUDSPEAKER OPERATION Switch is in BI-AMP position, check output of equipment driving high-frequency drivers.
3. Check high-frequency response of program material.

Symptom: Poor or no low-frequency output (normal high-frequency output)

Check:
1. If symptom appears only when LOUDSPEAKER OPERATION Switch is in BI-AMP position, check output of equipment driving low-frequency speakers.
2. Check low-frequency response of program material.

SERVICE INSTRUCTIONS

Speaker Servicing

1. To measure dc resistance of high-frequency driver assembly (LOUDSPEAKER SWITCH in any position), first remove speaker cables. Remove 10 Phillips head screws securing upper rear panel to enclosure. Remove panel and disconnect wiring harness (P1) from its socket (J7) on printed circuit board (see Figure M). Unsolder high-frequency driver leads from inductor L2 and measure dc resistance of high-frequency driver assembly (LS7-LS10). Total dc resistance of assembly should be between 12.5 and 14.5 ohms.

   To measure dc resistance of each high-frequency driver (LS7-LS10), remove five bolts securing high-frequency driver assembly support bracket (3/8" and 9/16" socket wrench may be used) and remove bracket. Do not permit high-frequency driver assembly to drop when bracket is removed. Carefully withdraw high-frequency driver assembly (drivers and throat adapter assembly) from compartment. Disconnect one lead between the four high-frequency drivers. Measure resistance of each high-frequency driver voice coil. Each driver should measure between 12.5 and 14.5 ohms. Replace any defective drivers as described in *High-Frequency Driver Replacement.*

2. If above tests do not locate defective high-frequency driver, check for voice coil rubbing or binding by driving each driver with a test signal (4V max.) from a sweep oscillator and amplifier covering the frequency range from 2600 to 10,000 Hz.

WARNING

Sound pressure levels generated by this test may be damaging to your hearing. Aim drivers away from listeners and toward sound-absorbent material (curtains, blanket, etc.). Carefully adjust test signal amplitude to avoid unnecessarily high sound pressure levels for prolonged periods.

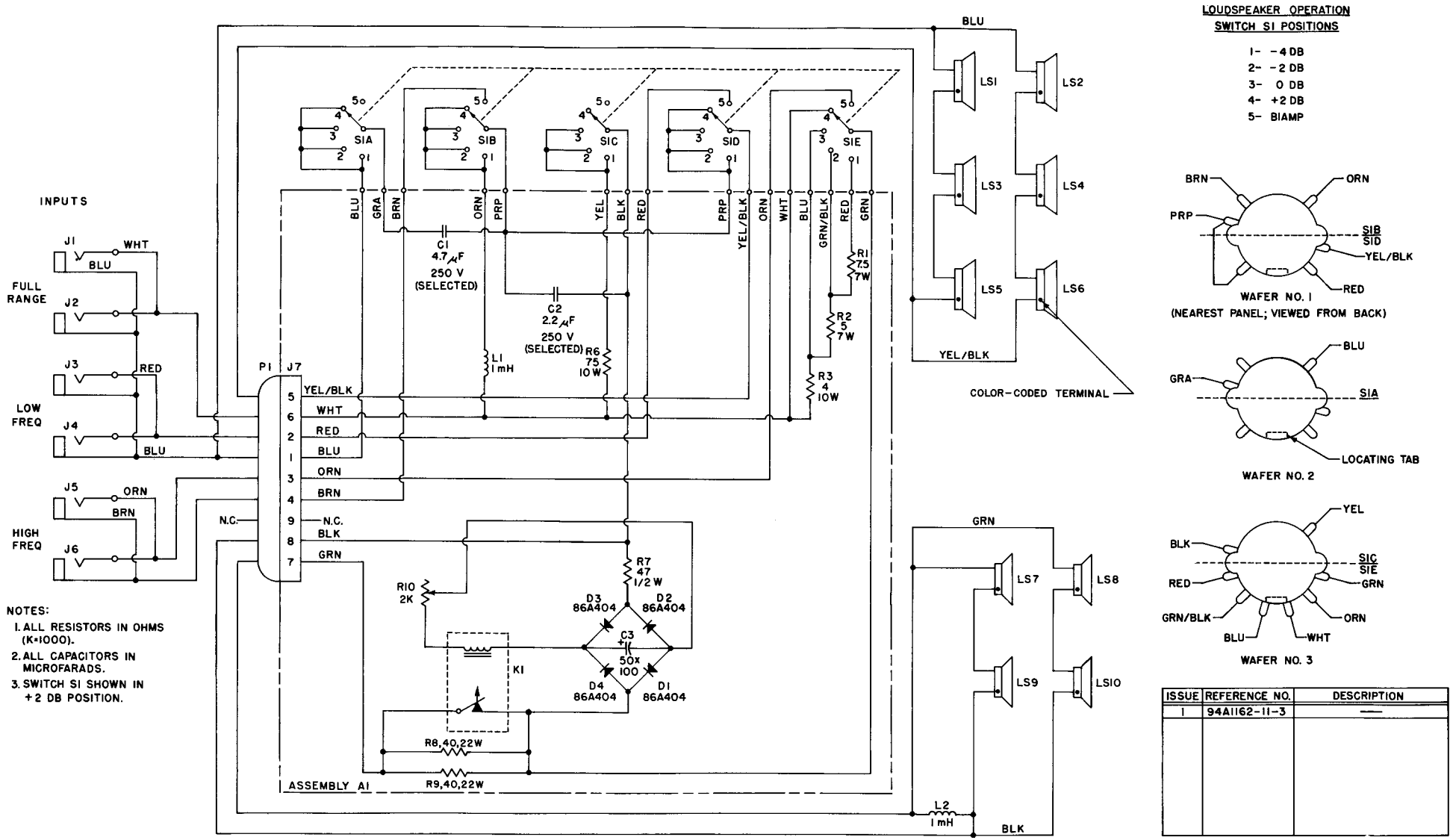
   Sound from high-frequency drivers should be clean and free from buzzes or rattles which may indicate driver failure. Replace any defective drivers as described in *High-Frequency Driver Replacement.*

3. To measure dc resistance of low-frequency speakers, connect an ohmmeter between tip and sleeve connections of FULL-RANGE Input Jacks J1 or J2 (LOUDSPEAKER OPERATION Switch in −4, −2, 0 or +2 position), or between tip and sleeve connections of LOW FREQ/BIAMP OPERATION Input Jacks J3 or J4 (LOUDSPEAKER OPERATION Switch in BIAMP position). The FULL-RANGE resistance reading should be between 11.25 and 13.35 ohms, and the BIAMP reading should be between 11.25 and 12.75 ohms. Readings outside these limits indicate possible low-frequency speaker failure. To measure dc resistance of each low-frequency speaker (LS1-LS6), remove 26 Phillips head screws securing lower rear panel to enclosure. Remove rear panel and rest it on floor, taking care not to stress input jack wiring. Using ohmmeter, measure resistance of each low-frequency speaker coil. A clicking sound will be made by a "good" speaker when ohmmeter is connected or disconnected. Each low-frequency speaker should measure between 7.5 and 8.5 ohms with speaker leads disconnected. Replace any speakers found defective.

4. If above tests do not locate defective low-frequency speaker, check for voice coil rubbing or binding by first disconnecting lead between two top low-frequency speakers. Set sweep oscillator and amplifier to produce test signal (8V max.) and sweep each speaker over the frequency range of 50 to 2600 Hz.

WARNING

Sound pressure levels generated by this test may be damaging to your hearing. Aim drivers away from listeners and toward sound-absorbent material (curtains, blanket, etc.). Carefully adjust test signal amplitude to avoid unnecessarily high sound pressure levels for prolonged periods.



LOUDSPEAKER OPERATION
SWITCH S1 POSITIONS

1- -4 DB
2- -2 DB
3- 0 DB
4- +2 DB
5- BIAMP

WAFER NO. 1
(NEAREST PANEL; VIEWED FROM BACK)

WAFER NO. 2

WAFER NO. 3

ISSUE	REFERENCE NO.	DESCRIPTION
1	94A1162-11-3	—

FIGURE M.
SR108 EXTENDED RANGE SPEAKER SYSTEM CIRCUIT DIAGRAM

Sound from low-frequency speakers should be clean and free from buzzes or rattles which may indicate speaker failure. Replace any speakers found defective. Be sure to resolder disconnected leads and fasten all hardware securely to avoid rattles.

High-Frequency Driver Replacement

To replace a high-frequency driver, follow these steps:

1. Disassemble the high-frequency driver assembly as described in *Speaker Servicing.*
2. Unsolder leads from driver terminals.
3. Remove three 6-32 × 1⅜ in. screws securing high-frequency drivers to gasket and mounting plate of throat adapter assembly.
4. Replace driver diaphragm and voice coil assembly as described in *High-Frequency Driver Diaphragm and Coil Assembly Replacement.*
5. Carefully place repaired or new high-frequency driver in position over gasket and mounting plate, taking care to line up holes in driver over holes in gasket and mounting plate. Be sure that driver terminals are in same position as when removed.
6. Replace three 6-32 × 1⅜ in. screws, and tighten high-frequency driver assembly in upper enclosure compartment.
7. Resolder removed driver leads.
8. Reassemble upper rear panel to enclosure and fasten securely to avoid rattles.

High-Frequency Driver Diaphragm and Coil Assembly Replacement

The high-frequency driver is attached to the mounting plate with three 6-32 × 1⅜ in. screws. Refer to Figure N for further identification of driver components.

Replace the diaphragm and coil assembly in the high-frequency driver as follows:

1. Disassemble high-frequency driver assembly from enclosure as described in *Speaker Servicing* above.
2. Unsolder leads connected to driver terminals.
3. Remove screws securing driver to mounting plate.

CAUTION

Do not allow driver to drop when removed.

4. Prepare clean work area, free of drafts and metallic dust and chips. Cover work area with clean kraft paper or newspaper.
5. Place driver on work surface. With three 6-32 × 1⅜ in. screws securing driver to mounting plate previously removed, remove phasing plug.
6. Remove diaphragm and coil assembly by lifting upward. This is a snug fit and a gentle prying force may be required.
7. Clean voice-coil gap in magnetic structure as follows: Insert strip of masking tape into voice-coil gap with adhesive side *outward.* Draw tape around gap several times to provide good wiping action. Repeat process with new piece of tape with adhesive side facing *inward.*

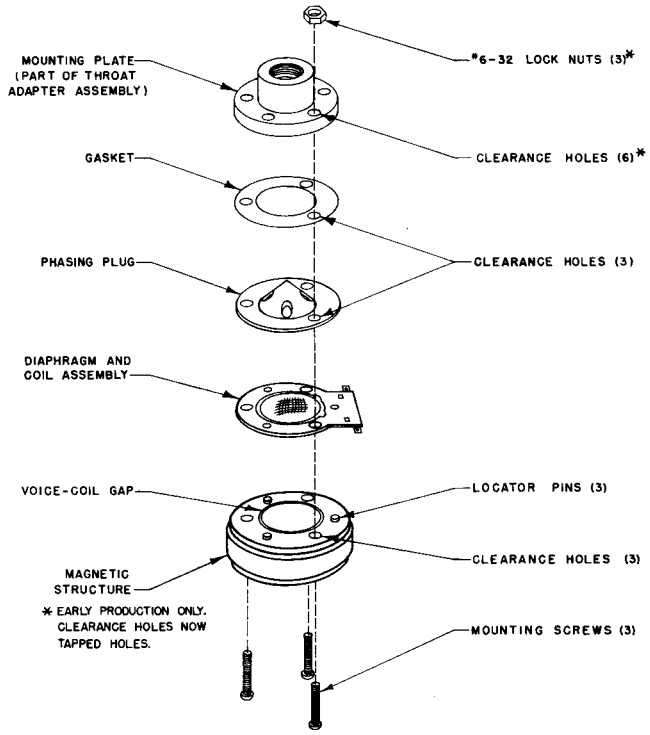


FIGURE N.
DIAPHRAGM AND COIL ASSEMBLY REPLACEMENT

CAUTION

The diaphragm and coil assembly is a delicate part. Do not touch voice coil and bobbin, or allow it to come in contact with work surface, tools, etc. If assembly is placed on work surface, rest it on diaphragm with voice coil upward.

8. Assemble new diaphragm and coil assembly to to magnetic structure with coil facing magnetic structure. Locate three *small* holes in diaphragm and coil assembly over locator pins in magnetic structure. Three *large* holes in diaphragm and coil assembly will line up with holes in magnetic structure.
9. Assemble driver and phasing plug to mounting plate. Position mounting holes so that solder terminals are outward and do not interfere with adjacent drivers.
10. Replace three screws and tighten them securely but do not over-tighten. Resolder driver leads.

Reassemble the high-frequency driver into the high-frequency driver assembly and replace assembly in speaker enclosure.

Overvoltage Attenuator Network Threshold Adjustment

The protection circuitry of the SR108 high-frequency driver array contains a 2000-ohm rheostat (R10) which may under certain conditions (component replacement, extreme shock, etc.) require readjustment. This may be accomplished as follows.

1. Turn rear-panel LOUDSPEAKER OPERATION Switch (S1) to BIAMP position.

2. Remove upper rear panel as described in *Speaker Servicing* above.
3. Unsolder high-frequency driver assembly leads (black and green) from inductor assembly L2, and place a dummy load (16 ohms, 50 watts minimum) across L2.
4. Connect an ac voltmeter (Simpson 260 or equivalent) across dummy load.
5. Apply a 5 kHz ac voltage from a power amplifier across one HIGH FREQ/BIAMP OPERATION Input Jack (J5 or J6). Slowly increase voltage until 28 Vac is reached. Relay K1 should open, as indicated by ac voltmeter reading suddenly dropping to approximately 13 Vac. If it does not, adjust rheostat R10 until relay K1 operates as input voltage reaches 28 Vac. Remove input voltage to release relay.
6. Remove ac voltage, disconnect dummy load and voltmeter, and resolder high-frequency driver leads. Replace rear panel and tighten all screws securely to avoid rattles.

Radial Horn Replacement

To replace the SR108 high-frequency radial horn, follow these steps:

1. Remove 10 #8 Phillips head screws securing horn to front of enclosure.
2. Lift horn outward from front of enclosure, insert new horn, and replace 10 Phillips head screws.
3. Replace foam screen in horn throat, apply PLIOBOND (or equivalent) cement around edges to hold it in place. Make sure all hardware is tightly fastened to avoid rattles.

Grille Assembly Replacement

To remove and replace the SR108 front-panel grille assembly, follow these steps:

1. With SR108 lying flat on a firm surface, use a short length of wood (2 in. × 4 in. is recommended) to apply firm, steady pressure at center of grille approximately one-third distance from top.
2. As grille is pushed back, edges will appear in left and right slots. Use a screwdriver or knife to gently pry edges of grille up over edge of slot on either left or right side.
3. Begin removing grille assembly from top, taking care not to scratch enclosure with edge of grille.

WARNING

Grille assembly is under tension and effectively presents a spring-loaded rough edge as it is removed. Take care not to handle assembly at edges during removal.

4. As grille edge near top comes free, move hand applying pressure and screwdriver edge downward to free remainder of grille.
5. Replace new grille assembly by centering it in enclosure, and applying pressure at center until grille assembly "pops" into slots.

Wheel Assembly Replacement

To replace a wheel or other parts of the SR108 wheel assembly, follow these steps (see Figure R):

1. Place SR108 face downward on flat surface and remove lower rear panel as described in *Speaker Servicing.*
2. While holding ¾ in. locknut with a socket wrench, insert a ⅜ in. Allen wrench in wheel assembly capscrew and unscrew capscrew from the assembly.
3. With locknut, flat washer and capscrew removed, wheel and bushings may now be removed.
4. When reassembling wheel assembly, be sure to replace flat washer before tightening locknut. Tighten capscrew and locknut firmly.
5. Install back panel and tighten securely to avoid rattles.

Model RKC149 Crossover Assembly

A complete crossover assembly may be obtained from Shure Brothers Inc. as Model RKC149. This assembly provides complete facilities for high- and low-frequency signal separation, and overvoltage protection. A general description of the crossover assembly is included in the *CIRCUIT DESCRIPTION* section, and biamplified operation is described in the *BIAMPLIFICATION* section.

The Model RKC149 consists of the components listed in Table 1 (refer to Figures M and P, and the *Replacement Parts List).*

The LOUDSPEAKER OPERATION switch (S1) contains the following settings:

Position 1 (full CCW):	FULL RANGE −4 dB
Position 2:	FULL RANGE −2 dB
Position 3:	FULL RANGE 0 dB
Position 4:	FULL RANGE +2 dB
Position 5 (full CW):	BIAMPLIFIED

Connector P1 is a nine-pin connector in which eight pins are connected as follows (see Figures M and P):

Pin 1:	FULL RANGE common input LOW FREQ common input Low-frequency speaker common output
Pin 2:	LOW FREQ "hot" input
Pin 3:	HIGH FREQ "hot" input
Pin 4:	HIGH FREQ common input
Pin 5:	Low-frequency speaker "hot" output
Pin 6:	FULL RANGE "hot" input
Pin 7:	High-frequency driver common output
Pin 8:	High-frequency driver "hot" output

GUARANTEE

This Shure product is guaranteed in normal use to be free from electrical and mechanical defects for a period of one year from the date of purchase. Please retain proof of purchase date. This guarantee includes all parts and labor.

SHIPPING INSTRUCTIONS

Carefully remove the defective part without damaging the unit, repack it, and return it prepaid to the factory. If outside the United States, return the part to your Authorized Shure Service Center for repair. The part will be returned to you prepaid.

For service or instructions on the complete speaker system or enclosure, contact your Authorized Shure Service Center or the Shure Factory.

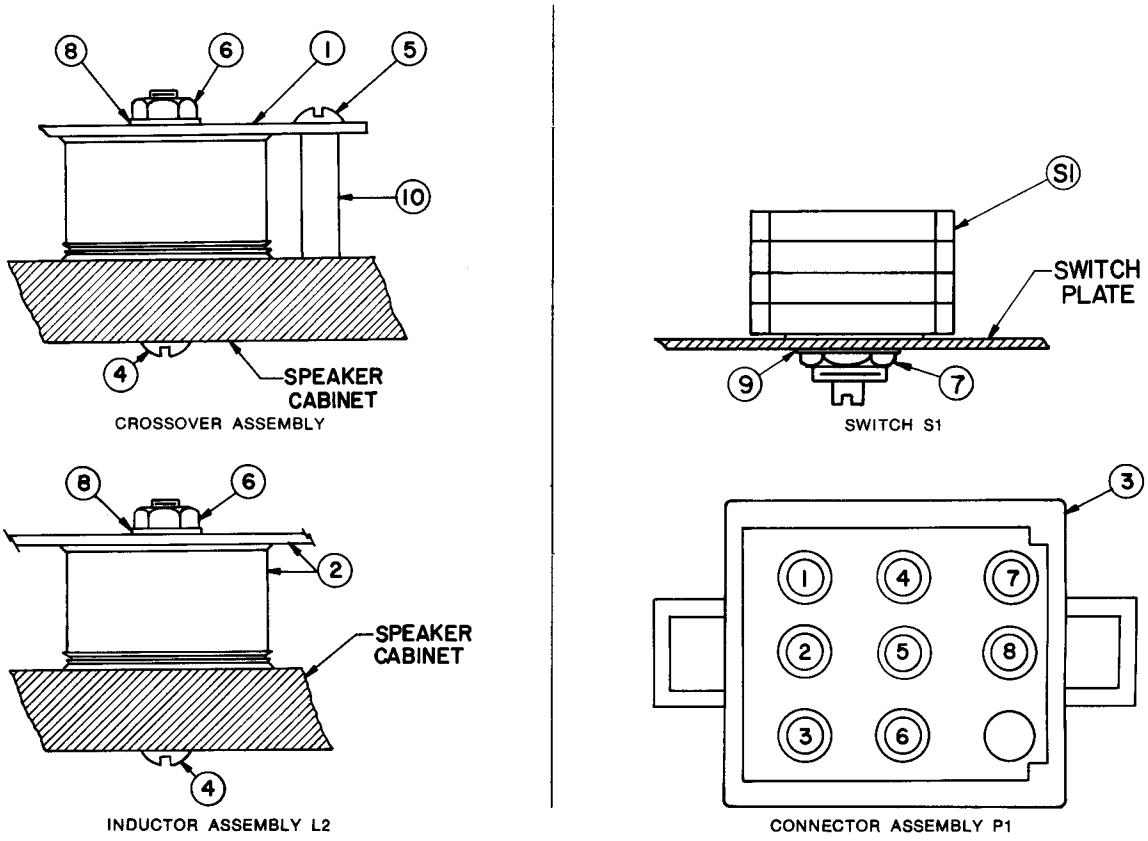


FIGURE P. RKC149 COMPONENTS

Table 1. Crossover Assembly Components

Item	Qty.	Shure Part No.	Component	Use
1	1	90A2451	Crossover Assembly (A1, S1)	Separates high and low frequencies, and provides overvoltage protection
2	1	90A2112	Inductor Assembly (L2 with terminal board)	With C2, provides high-frequency driver protection
3	1	90A2070	Connector Assembly (P1 with leads	Connects input connectors and speakers to A1
4	2	30A1002B	Carriage Bolt, Aluminum, 2″	Secures A1 and L2 to speaker cabinet
5	2	30H1035A	Screw, Round Head, Type A, No. 10	Secures A1 to speaker cabinet
6	2	30A775	Hex Nut, No. 10-24NC-2	Secures A1 and L2 to speaker cabinet
7	1	30A964A	Hex Locknut, No. ⅜-32NEF-2B	Secures S1 to speaker cabinet
8	2	30A136	Lockwasher, ⅜″	Secures A1 and L2 to speaker cabinet
9	1	30A960A	Lockwasher, ½″	Secures S1 to speaker cabinet
10	2	31A1199	Spacer, Aluminum, 1″	Secures A1 to speaker cabinet
11	5	80A255	Cable Tie, Nylon	Secures leads of P1 wiring harness

REPLACEMENT PARTS LIST (See Figures Q and R)

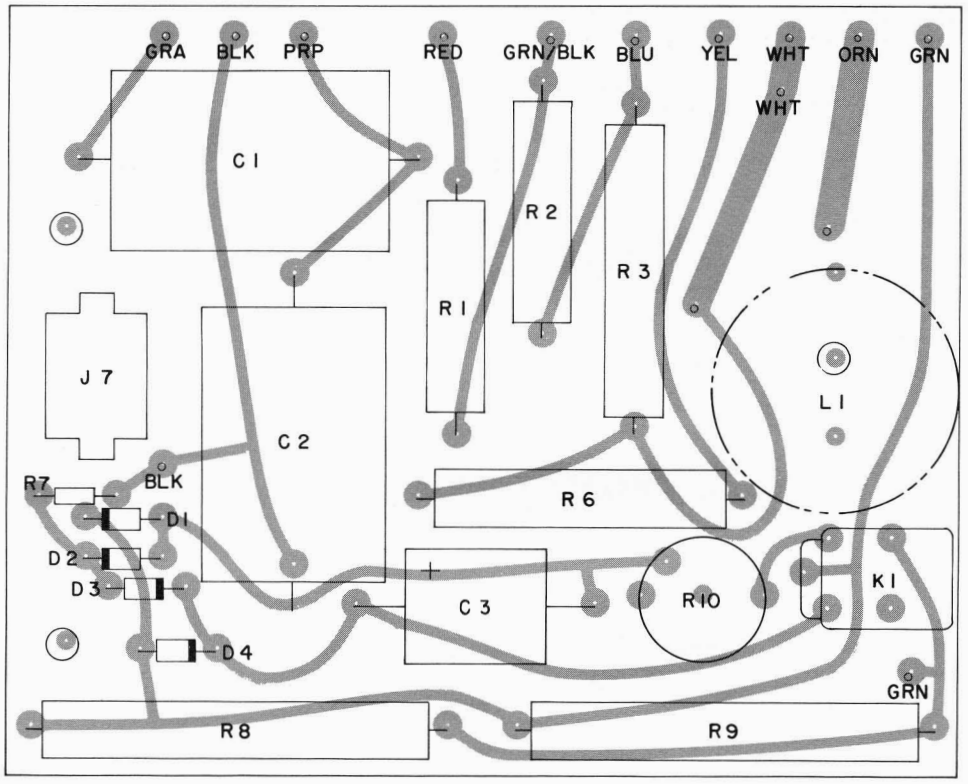
Reference Designation	Replacement Kit No.*	Replacement Kit Consists Of:		
		Qty.	Part No.	Description
A1	—	—	90A2063	Crossover Network Assembly
A2	—	—	90A2068	High-Frequency Driver Assembly (LS7-LS10, A3)
A3	—	—	90A2064	High-Frequency Driver Throat Assembly (without drivers)
A4	—	—	90E1375	Jack Panel Assembly (including connectors)
A5	RKC132	1	94A1182	High-Frequency Driver Diaphragm and Coil Assembly
C1	—	—	50A71	Capacitor, Metallized Mylar, Non-polarized, 4.7 μF, 250 WVdc**
C2	—	—	50B71	Capacitor, Metallized Mylar, Non-polarized, 2.2 μF, 250 WVdc**
C3	—	—	86K630	Capacitor, Electrolytic, 50 μF, 100 WVdc
D1-D4	RKC21	4	86A404	Silicon Rectifier, 100V, ½A
J1-J6	RKC68	1	95B446	Connector, Phone Jack, 2-Conductor, Open Circuit (Switchcraft 11)
J7	—	—	90A2074	Socket Assembly, 9-Contact
K1	—	—	80A280	Relay, SPDT, 24 Vdc
L1, L2	—	—	95A640	Inductor, 1 mH, 0.6 Ohms
LS1-LS6	RKC136	1	80A276 80A278	8-Inch Loudspeaker (interchangeable parts)
LS7-LS10	—	—	80A275	High-Frequency Driver (see A5 for replacement diaphragm and coil assembly)
MP1	—	—	60A57	Speaker System Enclosure Assembly (*with* Lower Rear Panel; *without* Upper Rear Panel, Horn, Grille Assembly, Crossover Assembly, High-Frequency Driver Assembly, Switch Panel Assembly, Wheel Assemblies, Low-Frequency Speakers, Jack Panel Assemblies, Fiber Glass, Caution Plate, Front- and Rear Panel Trim, and Hardware)
MP2	—	—	90A2196	Radial Horn Assembly
MP3	—	—	48E35A	Front-Panel Rail
MP4	—	—	39A422	Nameplate
MP5	—	—	90A2062	Grille Assembly
MP6	—	—	11A141	Fiber Glass (Sound Absorber)
MP7	—	—	53A1335	Rotary Switch Panel (*without* Switch)
MP8	—	—	60A58	Upper Rear Panel
MP9	—	—	39A387	Caution Plate
MP10	—	—	53A1376A	Support Bracket, High-Frequency Driver Assembly

*Parts listed as RKC Kits should be ordered by that number.
Any orders received for piece parts where RKC Kit number is shown will be shipped in RKC quantities.
**Selected for low dissipation factor.

REPLACEMENT PARTS LIST (Continued)

Reference Designation	Replacement Kit No.*	Replacement Kit Consists Of:		
		Qty.	Part No.	Description
MP11	—	—	95A638	Wheel
MP12	—	—	95A641	Cable Compartment Strap and Socket Assembly
MP13	—	—	48A47A	Rail
MP14	—	—	36A336	Foam Screen
MP15	—	—	30C806C	Phillips Finishing Head Thread-Cutting Screw, Black, #8, 1 in. (Horn, Upper and Lower Rear Panels to Enclosure)
MP16	—	—	30D832D	Phillips Flat Head Wood Screw, #6, ¾ in. (Front-Panel Rail to Enclosure)
MP17	—	—	30H832D	Phillips Flat Head Wood Screw, #6, 1⅛ in. (Rear-Panel Rails to Lower Rear Panel)
MP18	—	—	30A1007A	Capscrew, ⅜ in., Black, ½-13UN-3A Thread, 3½ in. long (Wheel Assembly)
MP19	—	—	30A1008A	Locknut, ½-13UN-2B Thread, ¾ in. (Wheel Assembly)
MP20	—	—	31A1224A	Wheel Bushing, Steel, 38.1 mm (1½ in.) OD (Wheel Assembly)
MP21	—	—	53A1334A	Washer, Steel, 34.9 mm (1⅜ in.) OD (Wheel Assembly)
MP22	—	—	90A2155A	Front Bracket Assembly, High-Frequency Driver Assembly
P1	—	—	90A2070	Plug Assembly, 9-Pin
R1	—	—	45HC758C	Power Resistor, 7.5 Ohms, 7W, 10%
R2	—	—	45HC508C	Power Resistor, 5 Ohms, 7W, 10%
R3	—	—	45HC408D	Power Resistor, 4 Ohms, 10W, 10%
R6	—	—	45HC750D	Power Resistor, 75 Ohms, 10W, 10%
R7	—	—	45CC470B	Resistor, Carbon Composition, 47 Ohms, ½W, 10%
R8, R9	—	—	45EC400G	Power Resistor, 40 Ohms, 22W, 10%
R10	—	—	45A40	Rheostat, 2k, 3W
S1	—	—	55A106	Switch, Rotary, 6-Pole, 5-Position, LOUDSPEAKER OPERATION
W1	RKC4	1	90B1373	15.2m (50-foot) Cable Assembly with Male Phone Plugs

*Parts listed as RKC Kits should be ordered by that number.
Any orders received for piece parts where RKC Kit number is shown will be shipped in RKC quantities.



2063-6/595-5

FIGURE Q.
PRINTED CIRCUIT BOARD PARTS LOCATION

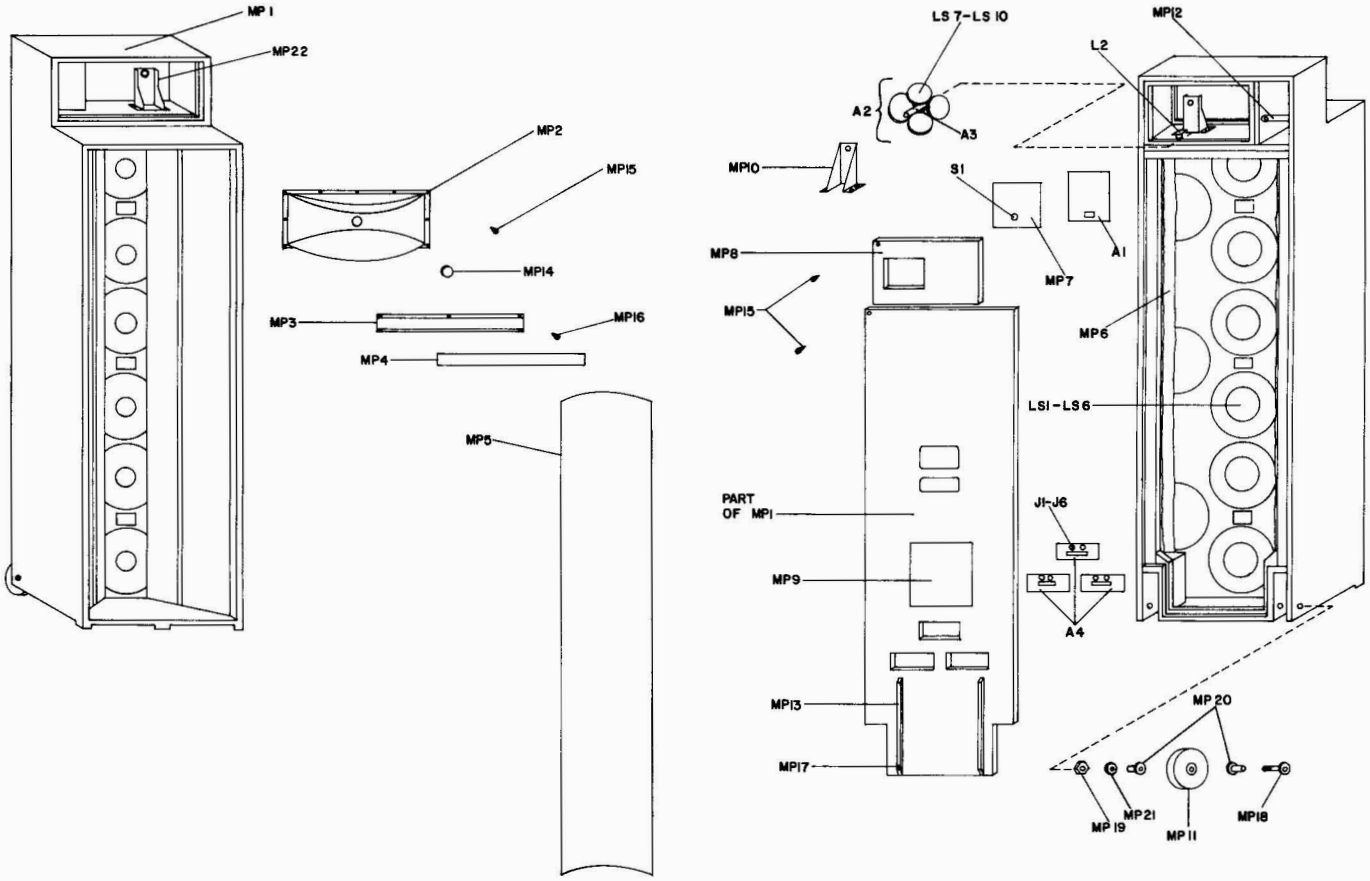


FIGURE R.
PARTS LOCATION

ARCHITECTS' AND ENGINEERS' SPECIFICATIONS

The Speaker System shall be an extended range, two-way speaker system designed for high sound-pressure-level reproduction of wide frequency range program material in sound reinforcement applications. The Speaker System shall utilize six 8-inch cone-type speakers with a total speaker cone area of 1097 cm^2 (170 in^2) and four high-frequency drivers. Pressure sensitivity of the Speaker System shall be an EIA rating of 54 dB at 9.2m (30 feet) from 1 milliwatt (equivalent to 102 dB at 1.2m—4 feet—with a 1-watt input).

The sound power distribution shall be nominally uniform over a 140° angle in the horizontal plane and a 90° angle in the vertical plane. The Speaker System enclosure shall be a bass reflex design to provide extreme low-frequency enhancement, with low-frequency speakers column-mounted in a horn-loaded, front-ported enclosure, and high-frequency drivers coupled to a single radial horn.

The frequency response of the Speaker System shall be uniform and peak-free from 40 Hz to 15,000 Hz when driven by a constant-voltage amplifier and radiating into an acoustical half-space.

In conventional, full-range, single-amplifier operation, the continuous power rating of the Speaker System shall be 200 watts maximum (57-volt source) and the nominal impedance shall be 16 ohms. In biamplified operation, the low-frequency section shall accept up to 200 watts of program material and the high-frequency section up to 100 watts.

The six low-frequency speakers shall be wired in a series-parallel configuration and mounted in a column configuration against the front baffle of the Speaker System. The four high-frequency drivers shall be wired in a series-parallel configuration at the top and coupled to a throat adapter assembly connected to a single radial horn. The high-frequency drivers shall be wired through an integral passive crossover network with a crossover frequency of 2600 Hz. A rear-panel LOUDSPEAKER OPERATION Switch shall provide four selectable high-frequency level positions of −4, −2, 0 and +2 dB for conventional full-range operation, and a BIAMP position for biamplified operation. The inputs shall consist of a pair of parallel-wired phone jacks for (1) conventional full-range operation, (2) low-frequency biamplified operation, and (3) high-frequency biamplified operation.

The Speaker System enclosure shall be 15.9 mm (⅝ in.) wood construction covered with black, textured, scuff-resistant vinyl, and have anodized, solid aluminum rear-panel rails. The enclosure shall have an integral rear-panel handle and two heavy-duty hard rubber wheels for mobility, and shall contain a cable storage compartment at the top rear. The radial horn shall be of high-density, structural urethane foam. A plug-in 15.2m (50-foot) speaker cable shall be supplied. The Speaker System shall measure 1730 mm in height, 495 mm in width, and 517 mm in depth (68⅛ in. × 19½ in. × 20⅜ in.). The weight, including the supplied cable, shall be 64.5 kg (142 lb).

The operating temperature range of the Speaker System shall be −7°C to 43°C (20°F to 110°F). The storage temperature range shall be −29°C to 71°C (−20°F to 160°F). The Speaker System shall meet all specifications when operated within the operating temperature limits.

Any Speaker System not meeting all of the above specifications, or having a sealed cabinet which prevents internal inspection and servicing, shall be deemed unacceptable under this specification. The Speaker System shall be a Shure Model SR108.