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UNCLASSIFIED

TECHNICAL MANUAL

*for*

LOUDSPEAKER PANEL

MODEL HSS-8



THE TECHNICAL MATERIEL CORPORATION  
MAMARONECK, N. Y.

OTTAWA, CANADA

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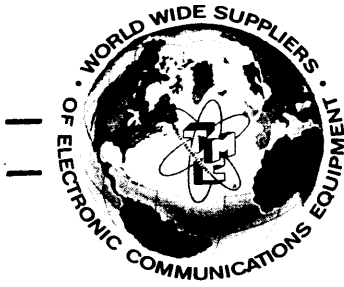
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## NOTICE

THE CONTENTS AND INFORMATION CONTAINED IN THIS INSTRUCTION MANUAL IS PROPRIETARY TO THE TECHNICAL MATERIEL CORPORATION TO BE USED AS A GUIDE TO THE OPERATION AND MAINTENANCE OF THE EQUIPMENT FOR WHICH THE MANUAL IS ISSUED AND MAY NOT BE DUPLICATED EITHER IN WHOLE OR IN PART BY ANY MEANS WHATSOEVER WITHOUT THE WRITTEN CONSENT OF THE TECHNICAL MATERIEL CORPORATION.



# THE TECHNICAL MATERIEL CORPORATION

C O M M U N I C A T I O N S   E N G I N E E R S

700 FENIMORE ROAD

MAMARONECK, N. Y.

## W a r r a n t y

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment (except electron tubes,\* fuses, lamps, batteries and articles made of glass or other fragile or other expendable materials) purchased hereunder to be free from defect in materials and workmanship under normal use and service, when used for the purposes for which the same is designed, for a period of one year from the date of delivery F.O.B. factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, F.O.B. factory, which may fail within the stated warranty period, PROVIDED:

1. That any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction.
2. That the defect is not the result of damage incurred in shipment from or to the factory.
3. That the equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise.
4. That any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

Electron tubes\* furnished by TMC, but manufactured by others, bear only the warranty given by such other manufacturers. Electron tube warranty claims should be made directly to the manufacturer of such tubes.

TMC's obligation under this warranty is limited to the repair or replacement of defective parts with the exceptions noted above.

At TMC's option any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid. No parts or equipment shall be returned to TMC, unless a return authorization is issued by TMC.

No warranties, express or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the Buyers sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of TMC Products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

\*Electron tubes also include semi-conductor devices.

### *PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT*

Should it be necessary to return equipment or material for repair or replacement, whether within warranty or otherwise, a return authorization must be obtained from TMC prior to shipment. The request for return authorization should include the following information:

1. Model Number of Equipment.
2. Serial Number of Equipment.
3. TMC Part Number.
4. Nature of defect or cause of failure.
5. The contract or purchase order under which equipment was delivered.

### *PROCEDURE FOR ORDERING REPLACEMENT PARTS*

When ordering replacement parts, the following information must be included in the order as applicable:

1. Quantity Required.
2. TMC Part Number.
3. Equipment in which used by TMC or Military Model Number.
4. Brief Description of the Item.
5. The *Crystal Frequency* if the order includes crystals.

### *PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT*

TMC's Warranty specifically excludes damage incurred in shipment to or from the factory. In the event equipment is received in damaged condition, the carrier should be notified immediately. Claims for such damage should be filed with the carrier involved and not with TMC.

All correspondence pertaining to Warranty Claims, return, repair, or replacement and all material or equipment returned for repair or replacement, within Warranty or otherwise, should be addressed as follows:

THE TECHNICAL MATERIEL CORPORATION  
Engineering Services Department  
700 Fenimore Road  
Mamaroneck, New York





INSTRUCTION BOOK CHANGE NOTICE

Date 17 August 1966

Manual affected: Loudspeaker Panel Model HSS-8 IN -3001J  
(issue date: 15 August 1965)

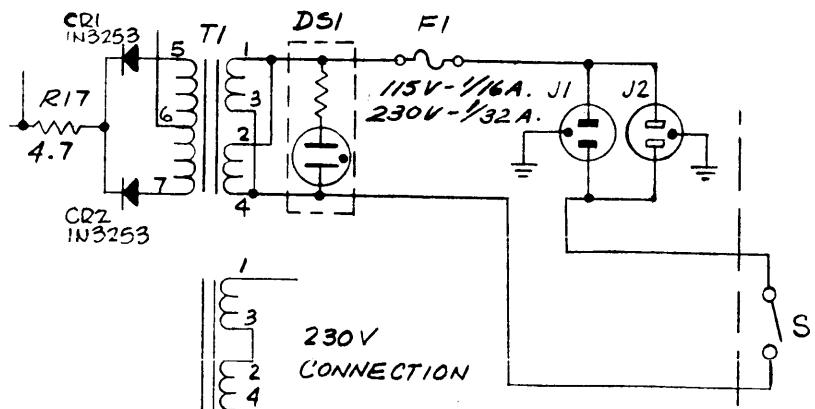
1. Page 5-1 Parts List

Change description and TMC part number for fuses **F1** as indicated below.

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
F1	FUSE, CARTRIDGE: 1/16 amp; time lag; 1-1/4" long x 1/4" dia.; slow blow. (For 115 V operation)	FU102- .062
F1	FUSE, CARTRIDGE: 1/32 amp; time lag; 1-1/4" long x 1/4" dia.; slow blow. (For 230 V operation)	FU102- .032

2. Page 6-1. Figure 6-1

Change figure 6-1 as indicated below:



SHOULD ADDITIONAL COPIES OF THIS CHANGE NOTICE BE REQUIRED, PLEASE CONTACT:

THE TECHNICAL MATERIEL CORP., 700 Fenimore Road, Mamaroneck, New York

Attn.: Director of Eng. Services.

EMN 15626

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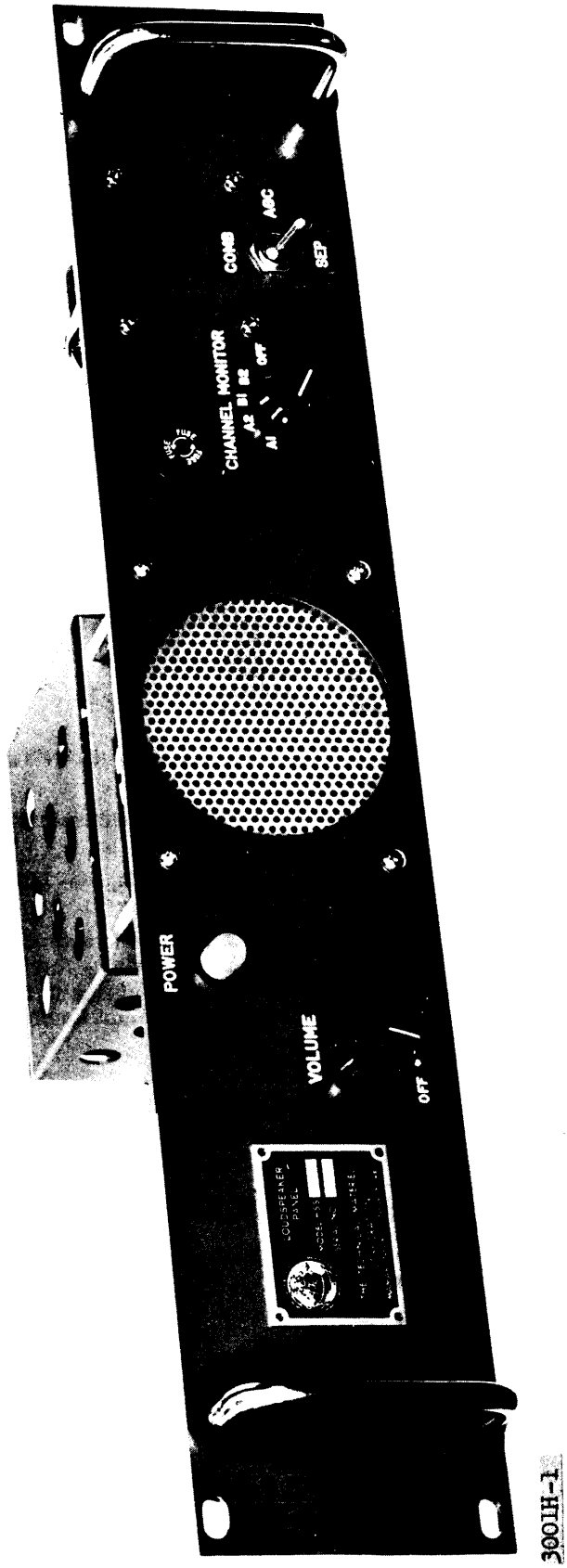


Figure 1-1. Loudspeaker Panel, Model HSS-8

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## SECTION 1 GENERAL INFORMATION

### 1-1. DESCRIPTION.

Loudspeaker Panel, Model HSS-8 (figure 1-1), is a self-contained amplifier speaker unit that can be used to monitor any one of four audio channels (A1, A2, B1, or B2). When the HSS is configured in diversity receiver systems, a front-panel control enables the operator to combine or separate the agc circuits of two separate receivers for diversity or non-diversity operation.

The HSS is mounted on a 19-inch wide rack panel, and is 3-1/2 inches high and 6-3/4 inches deep. Basically, the unit comprises: an amplifier, a 2.0 watt speaker, a volume control, a channel-selector switch, and an agc separating/combining switch.

### 1-2. TECHNICAL SPECIFICATIONS.

Input Impedance:	10,000 ohms balanced
Output Impedance:	45 ohms nom.
Power Gain:	36 db (1 watt output for -6 db input)
Frequency Response:	±2 db, 200 cps to 7000 cps
Hum Level:	-40 db at 1 watt output
Distortion:	2% at 1 watt at 400 cps
Input Power:	115/230 vac ±10%, 60 cps, 8 watts at full power

### 1-2. TECHNICAL SPECIFICATIONS (CONT).

Output Power:	1.0 watt at -6 dbm input at 1000 cps
Operating Temperature:	10°C to 65°C
Speaker Power Rating:	2.0 watts
Speaker Size:	3 inches x 5 inches
Physical Dimensions:	3-1/2 inches high x 19 inches wide x 6-3/4 inches deep

**TABLE 1-1. TRANSISTOR AND DIODE COMPLEMENT**

Ref Symbol	Type
Q1	2N697
Q2	2N697
Q3	2N2108
Q4	2N1131
Q5	2N2186
Q6	2N2186
CR1, CR2	1N3253
CR3 thru CR6	1N599

## SECTION 2 INSTALLATION

### 2-1. INITIAL INSPECTION.

Each HSS has been thoroughly checked and tested at the factory before shipment. When it arrives at the operating site, inspect the packing case and its contents immediately for possible damage. Unpack the equipment carefully. Inspect all packing material for parts which may have been shipped as loose items.

With respect to damage to the equipment for which the carrier is liable, The Technical Materiel Corporation will assist in describing methods of repair and the furnishing of replacement parts.

### 2-2. MECHANICAL INSTALLATION.

The HSS is equipped with a 19 inch wide rack panel, designed to be mounted into any standard width equipment rack. The panel is to be screw fastened to the rack frame.

### 2-3. ELECTRICAL INSTALLATION.

The HSS is factory wired to receive an input line voltage of 115 volts a-c. The input power transformer however, incorporates voltage taps making it possible

to receive an input line voltage of 230 volts a-c. See figure 2-1 for input line voltage changeover connections.

See Figure 6-1 at the end of this manual for input and output connections.

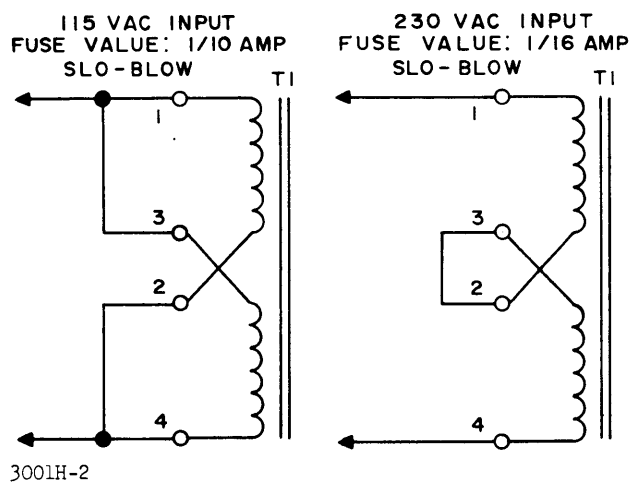


Figure 2-1. Power Supply Changeover Connections

## SECTION 3 OPERATOR'S SECTION

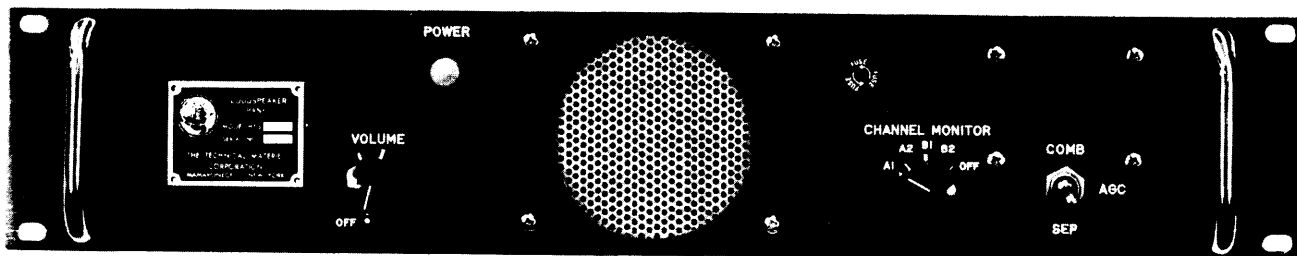
### 3-1. OPERATING INSTRUCTIONS.

All HSS controls and indicators are located on the front panel and are clearly marked (see figure 3-1). The operator merely selects the desired channel to be monitored by means of the CHANNEL MONITOR switch, and adjusts speaker volume by means of the VOLUME control. Depending upon the receiver system in which the HSS is employed and also upon operational requirements, the operator can combine or separate the agc circuits of two separate receivers

(for diversity or non-diversity operation) by means of the COMB/AGC/SEP switch.

### 3-2. OPERATOR'S MAINTENANCE.

Due to the simplicity of design and operation of the HSS, operator's maintenance consists mainly of keeping the unit clean and observing for proper control settings, fuse condition, and for secure interconnections.



3001H-3

Figure 3-1. Front Panel Controls and Indicators, HSS

## SECTION 4 PRINCIPLES OF OPERATION

Basically, the HSS comprises an audio amplifier section and a selector switch that applies one of four input signals to the amplifier. Refer to figure 4-1.

Audio input signals applied to terminal board TB1 are extended to the base of amplifier Q1. The amplified output of Q1 is then applied to the base element of Q2. The amplified output of Q2 is then applied to the base elements of drivers Q3 and Q4. A diode circuit keeps a potential separation between Q3 and Q4.

Transistors Q3 and Q4 are connected as emitter followers, supplying drive currents for power amplifiers Q5 and Q6. The power amplifier stage (Q5 and Q6) output is then applied to the speaker circuit.

The input line voltage is applied to a step-down transformer T1. The stepped-down secondary output voltage is rectified and filtered, and routed to the various transistor circuits.

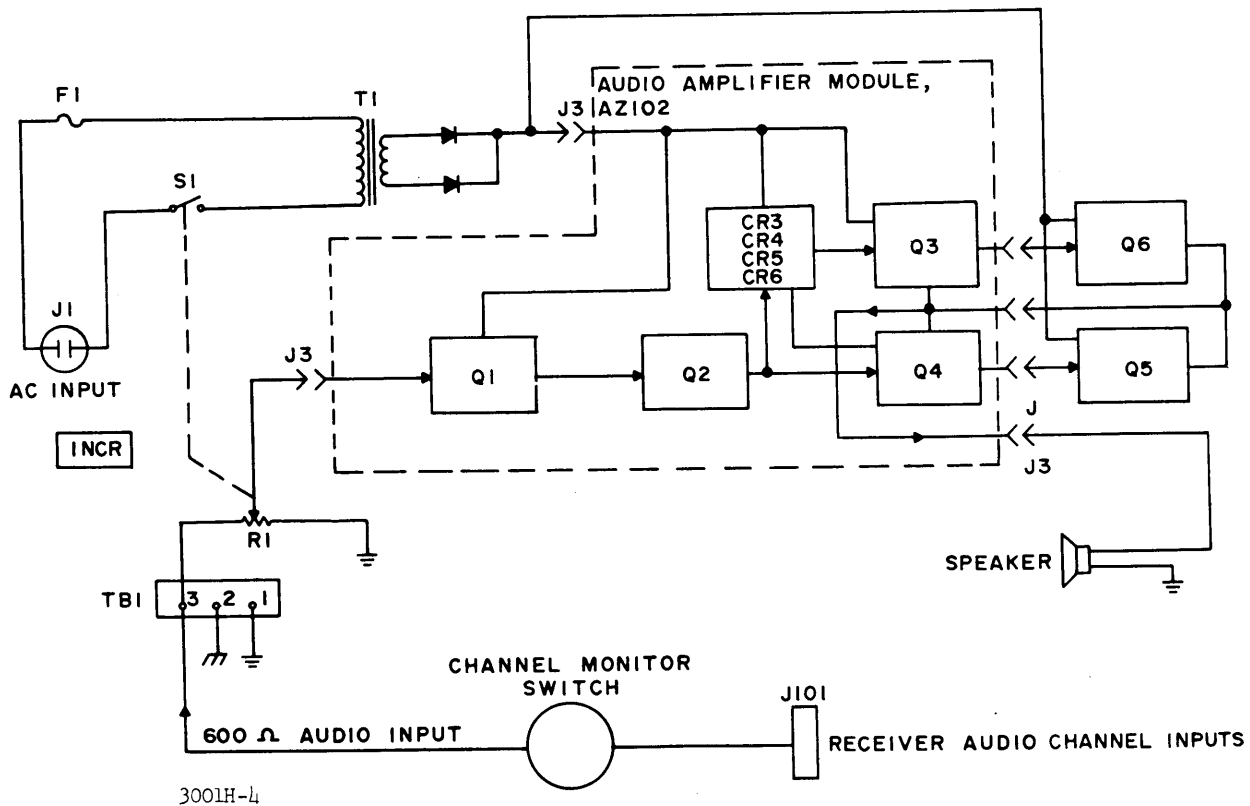


Figure 4-1. Functional Block Diagram, HSS

## SECTION 5 PARTS LIST

### 5-1. INTRODUCTION.

Reference designations have been assigned to identify all electrical parts of the equipment. These designations are used for marking the equipment (adjacent to the part they identify) and are included on drawings, diagrams and the parts list. The letters of a reference designation indicate the kind of part (generic group), such as resistor, capacitor, transistor, etc.

The number differentiates between parts of the same generic group. Sockets associated with a particular plug-in device, such as transistor or fuse, are identified by a reference designation which includes the reference designation of the plug-in device. For example, the socket for fuse F1 is designated XF1. To expedite delivery, when ordering replacement parts, specify the TMC part number and the model number of the equipment.

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AF Bridging Amplifier, AZ102 . . . . .	5-2

### LOUDSPEAKER PANEL, MODEL HSS-8

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
AR1	AMPLIFIER, BRIDGING: power output 1.0 watt at -6 DBM input at 1,000 cps; input impedance 10K ohms-min. -balanced (not grounded); output impedance 45 ohms nom.; frequency response +2 db 200 cps to 7,000 cps; power input 115/230 VAC, +10%; 60 cps; approx. 8 watts at full output. (SEE SEPARATE PARTS LIST FOR BREAKDOWN)	AZ102
C1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC.	CC100-16
DS1	LAMP, GLOW: neon; 110-125 VAC/VDC; nom. current rating 1.7 ma; T-2 type lamp; midget flange base.	BI111-2
F1	FUSE, CARTRIDGE: 1/10 amp; time lag; 1-1/4" long x 1/4" dia.; slow blow. (For 115 V operation)	FU102-.100
F1	FUSE, CARTRIDGE: 1/16 amp; time lag; 1-1/4" long x 1/4" dia.; slow blow. (For 230 V operation)	FU102-.062
J101	CONNECTOR, RECEPTACLE, ELECTRICAL: panel mount; 24 number 20 female socket type contacts; nom. current rating 7.5 amperes, 500 V RMS.	JJ200-3
L1	COIL, RADIO FREQUENCY: fixed; 10.0 uh, +10%; 0.30 ohms DC resistance; molded case.	CL270-10
LS1	LOUDSPEAKER, PERMANENT MAGNET: 3" x 5" oval; frequency response 150 to 6,000 cps; resonance 200 cps; voice coil impedance 45 ohms, +10%; power rating 2 watts; steel enclosure.	LS107-2
R1	RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms, +10%; 1 watt; taper C; consists of a SPST normally open switch rated at 3.0 amperes at 117 VAC, symbol number S1.	RV4NBYS503C
S1	See R1.	
S101	SWITCH, ROTARY	SW157

LOUDSPEAKER PANEL, MODEL HSS-8

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
S102	SWITCH, TOGGLE: SPST; 6 amps, 125 VAC; 28° angle of throw; solder lug terminals.	ST12A
XDS1	LIGHT, INDICATOR: sub-miniature type; white lens; w/built-in resistor, rated at 18K ohms; for use with lamp, TMC part number BI111-2.	TS175-1
XF1	FUSEHOLDER: extractor post type; movable end terminals.	FH100-1

AF AMPLIFIER, AZ102

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 20,000 uuf, +80% -20%; 500 WVDC.	CC100-24
C2	Same as C1.	
C3	CAPACITOR, FIXED, ELECTROLYTIC: polarized; 1,000 uf; 50 WVDC; max. temperature range 0°C to +85°C; hermetically sealed aluminum case with clear vinyl plastic sleeve.	CE116-8VN
C4	CAPACITOR, FIXED, ELECTROLYTIC: 25 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-25-50
C5	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 30,000 uuf, +10%; 100 WVDC.	CC100-36
C6	CAPACITOR, FIXED, ELECTROLYTIC: 6 uf, -10% +150% at 120 cps at 25°C; 15 WVDC; polarized; insulated tubular case.	CE105-6-15
C7	Same as C4.	
C8	CAPACITOR, FIXED, MICA DIELECTRIC: 470 uuf, +5%; 500 WVDC; char. B.	CM15B471J
C9	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, -10% +150% at 120 cps at 25°C; 50 WVDC; polarized; insulated tubular case.	CE105-50-50
C10	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 470,000 uuf, +20%; 25 WVDC from -55°C to +85°C; radial lead type terminals.	CC112R474M
CR1	SEMICONDUCTOR DEVICE, DIODE	1N3253
CR2	Same as CR1.	
CR3	SEMICONDUCTOR DEVICE, DIODE	1N599
CR4	Same as CR3.	
CR5	Same as CR3.	
CR6	SEMICONDUCTOR DEVICE, DIODE	1N91

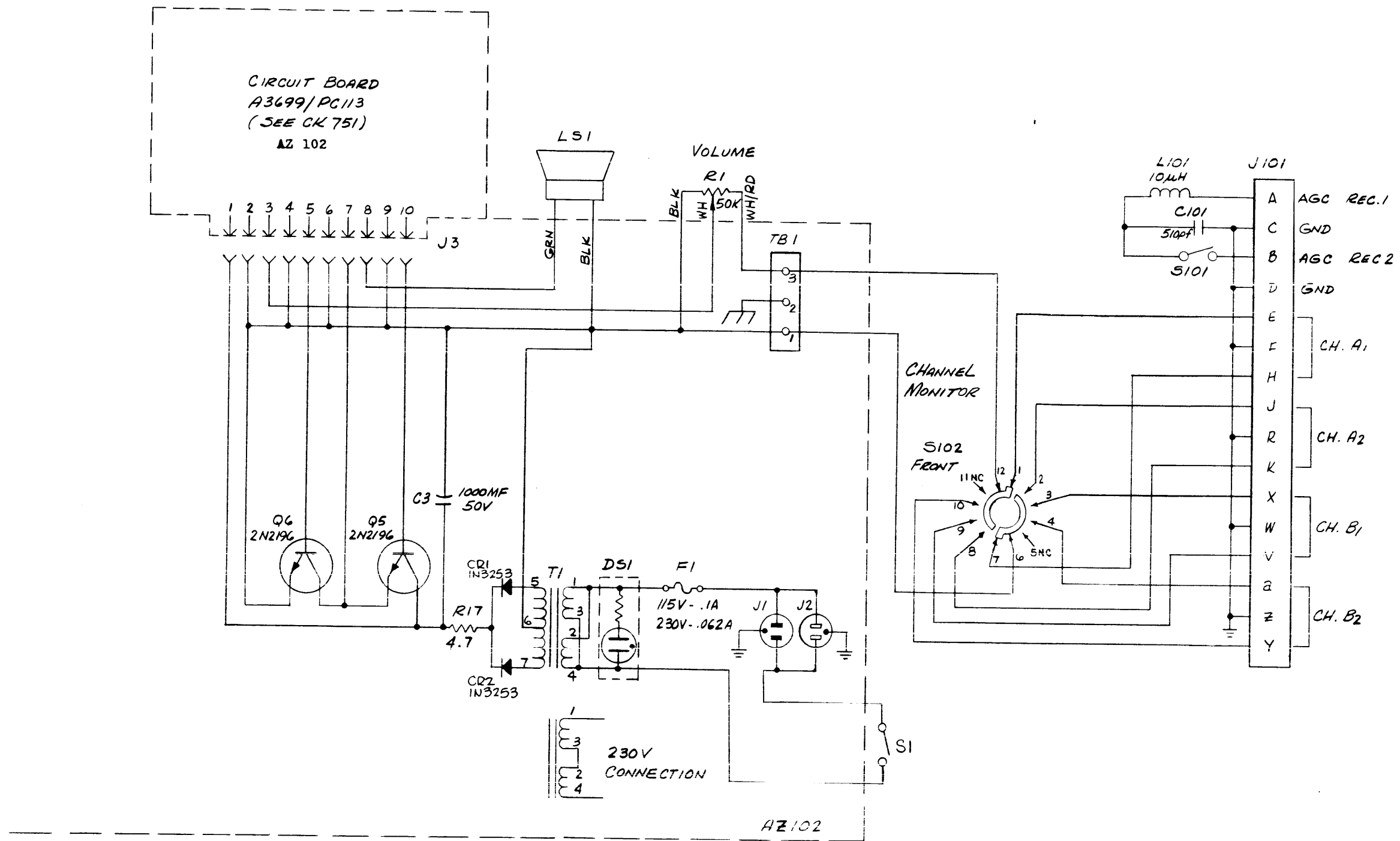
REF SYMBOL	DESCRIPTION	TMC PART NUMBER
J1	CONNECTOR, RECEPTACLE, ELECTRICAL: 2 female contacts, twist lock; rated at 10 amps, 250 V or 15 amps, 125 V.	JJ235
J2	CONNECTOR, RECEPTACLE, ELECTRICAL: AC; 2 male contacts; 10 amps, 250 V or 15 amps, 125 V; polarized; twist lock.	JJ175
J3	CONNECTOR, RECEPTACLE, ELECTRICAL: printed circuit board type; 10 female contacts.	JJ319-10SFE
Q1	TRANSISTOR: NPN; silicon mesa; collector to base voltage 60 V; collector to emitter voltage 40 V; emitter to base voltage 5 V; collector current 175 ma; power dissipation 2 watts at 25°C; junction temperature 175°C; hermetically sealed metal case.	2N697
Q2	Same as Q1.	
Q3	TRANSISTOR	2N2108
Q4	TRANSISTOR	2N1131
Q5	TRANSISTOR	2N2196
Q6	Same as Q5.	
R1	NOT USED	
R2	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF332K
R3	RESISTOR, FIXED, COMPOSITION: 150,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF154K
R4	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF472K
R5	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF473K
R6	RESISTOR, FIXED, COMPOSITION: 1,500 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF152K
R7	Same as R6.	
R8	RESISTOR, FIXED, COMPOSITION: 6,800 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF682K
R9	RESISTOR, FIXED, COMPOSITION: 120,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF124K
R10	RESISTOR, FIXED, COMPOSITION: 18,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF183K
R11	RESISTOR, FIXED, COMPOSITION: 390 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF391K
R12	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF102J
R13	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 5\%$ ; 1/2 watt.	RC20GF221J
R14	Same as R12.	
R15	RESISTOR, FIXED, COMPOSITION: 22 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF220K
R16	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF683K
R17	RESISTOR, FIXED, COMPOSITION: 4.7 ohms, $\pm 10\%$ ; 1/2 watt.	RC20GF4R7K



AF AMPLIFIER, AZ102

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
T1	TRANSFORMER, POWER, STEP-DOWN: primary- 115/230 V, 50/60 cps, single pole; secondary- 44 V, 22 V center tap, current rating 420 ma; 7 solder lug type terminals; hermetically sealed open frame case.	TF287
TB1	TERMINAL BOARD, BARRIER: 3 terminals; 6-32 thd x 1/4 inch long binder head screws; phenolic black bakelite body.	TM100-3

**SECTION 6**  
**SCHEMATIC DIAGRAMS**



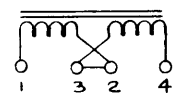
UNLESS OTHERWISE SPECIFIED:  
ALL RESISTORS ARE IN OHMS 1/2W  
ALL CAPACITORS ARE IN MICRO-FARAD

LAST SYMBOLS  
C101 LSI  
J101 R1  
L101 S1  
S102

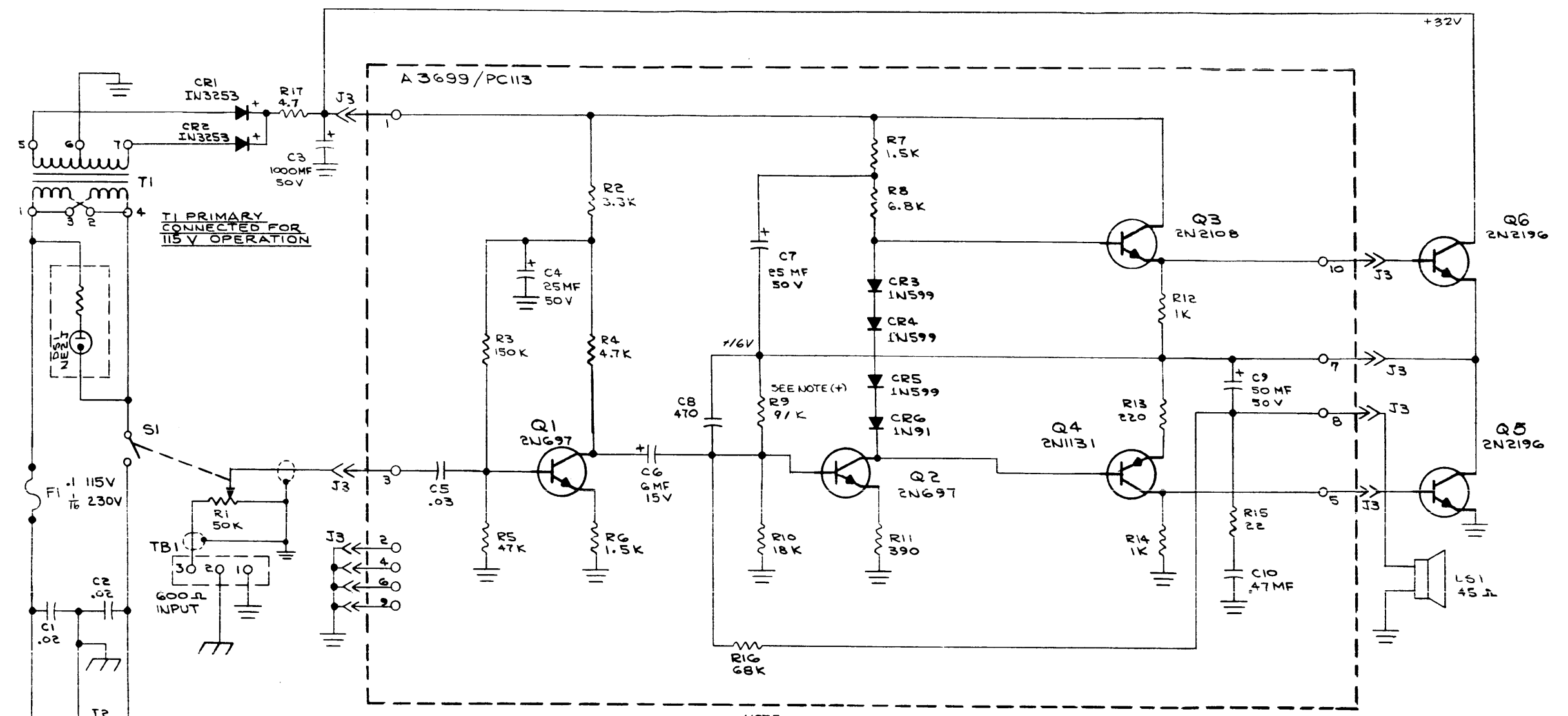
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Figure 6-1. Schematic Diagram, Loudspeaker Panel, HSS



TI PRIMARY CONNECTION FOR 230V OPERATION



NOTE + NOMINAL VALUE OF R9 IS 91K. ACTUAL VALUE ADJUSTED AT FACTORY FOR 1/2 SUPPLY VOLTAGE ACROSS Q5 (COLLECTOR TO EMITTER)

LAST SYMBOLS	
C10	
CR6	
DS1 *	
F1 *	
J3	
LS1 *	
Q6	
R17 *	
S1 *	
T1	
TB1	

\* SEE NOTE NO 5

- ~ UNLESS OTHERWISE SPECIFIED ~
- 1 ~ ALL RESISTOR VALUES ARE OHMS, 1/2 WATT.
  - 2 ~ ALL CAPACITOR VALUES ARE  $\mu$ f.
  - 3 ~  $\perp$  DENOTES CHASSIS GROUND
  - 4 ~  $\pm$  DENOTES COMMON CIRCUIT GROUND
  - 5 ~ SYMBOLS LS1, F1, DS1, R1, S1, ARE NOT PART OF AMPL, AZ102, AND ARE SHOWN FOR REF. ONLY.

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Figure 6-2. Schematic Diagram, Audio Amplifier Module, AZ102