



THIS IS

TECHNICAL MANUAL

FOR

LOUDSPEAKER ASSEMBLY

MODEL BSP-6D

A JP

PUBLICATION NUMBER

ISSUE DATE

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*DO NOT
ISSUE*

THE TECHNICAL MATERIEL CORPORATION

CABLE: TEPEI

700 FENIMORE ROAD, MAMARONECK, NY 10543 U.S.A.

TLX: 137-358

TEL: 914-698-4800

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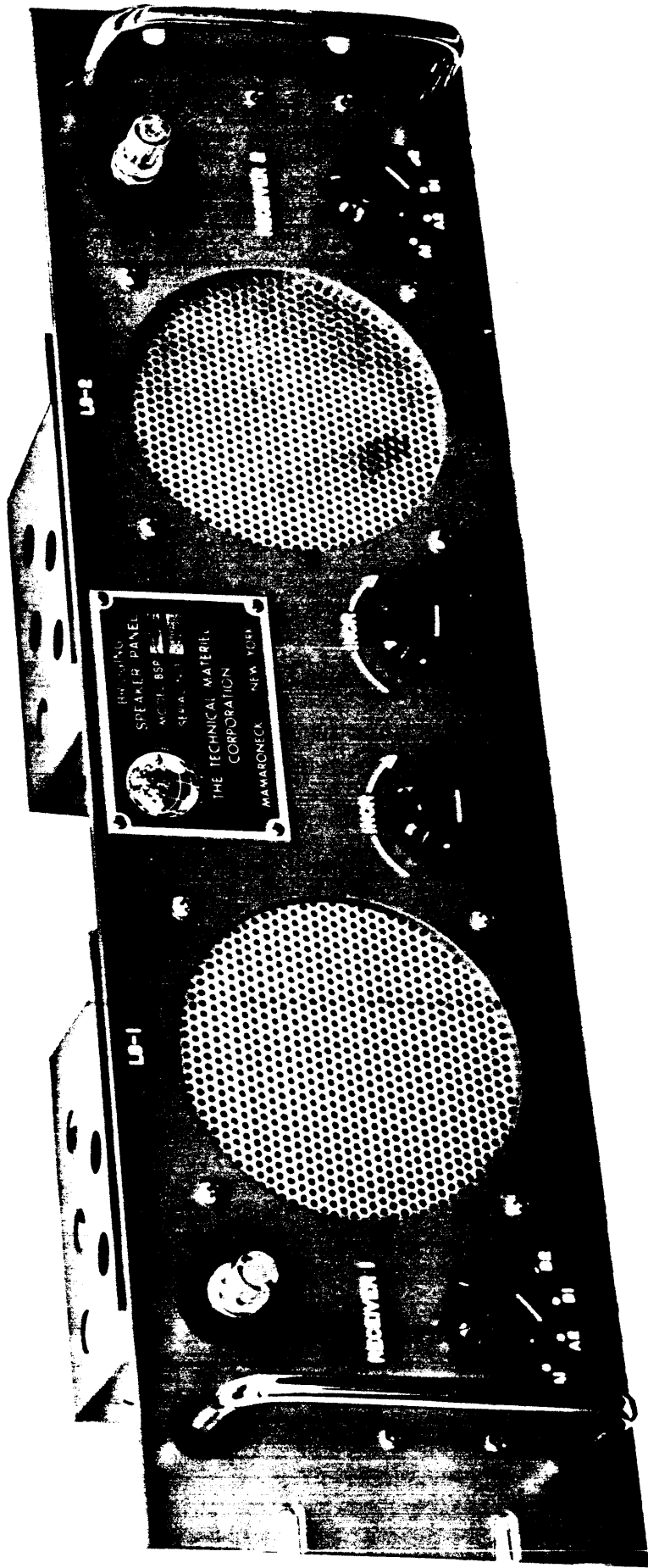


Figure 1-1. Loudspeaker Assembly, Model BSP-6

1-08006

SECTION 1

GENERAL DESCRIPTION

1-1. FUNCTIONAL DESCRIPTION

LOUDSPEAKER ASSEMBLY, Model BSP-6 (figure 1-1) is a self-contained dual amplifier/speaker unit.

LOUDSPEAKER ASSEMBLY BSP-6 (hereafter referred to as the BSP) comprises two separate audio amplifiers, each with an individually controlled loudspeaker, permitting an operator to select audio monitoring of either of two receivers. Monitoring of either sideband of a receiver is also possible by use of a four-position rotary switch provided for each receiver.

1-2. PHYSICAL DESCRIPTION

The BSP is mounted on a 19-inch wide rack panel, designed to be mounted into any standard width equipment rack. The front panel displays two 4-inch speakers, each with a INCR on/off loudness control and a receiver channel selector switch. Two line voltage fuses, also front panel mounted, are used to protect the line voltage circuit to each audio amplifier.

1-3. TECHNICAL SPECIFICATIONS

INPUT IMPEDANCE:	10,000 ohms balanced
OUTPUT IMPEDANCE:	45 ohms nom.
POWER GAIN:	36 db (1 watt output for -6 db input)

1-3. TECHNICAL SPECIFICATIONS

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.
OUTPUT POWER:	1.0 watt at -6 dbm input at 1000 cps.
OPERATING TEMPERATURE:	10 ⁰ C to 65 ⁰ C.
SPEAKER POWER RATING:	2.0 watts.
SPEAKER SIZE:	4 inches
PHYSICAL DIMENSIONS:	5-1/4 inches high x 19 inches wide x 6-1/2 inches deep.

Table 1-1. Transistor and Diode Complement

Ref Symbol	Type
Q1, Q2	2N697
Q3	2N2108
Q4	2N1131 2N1991
Q5, Q6	2N2186
CR1, CR2	1N3253
CR3, CR4, CR5	1N599
CR6	1N91

SECTION 2

INSTALLATION

2-1. INITIAL INSPECTION

Each BSP 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 that 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 BSP 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 BSP 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 2-2 for input and output connections.

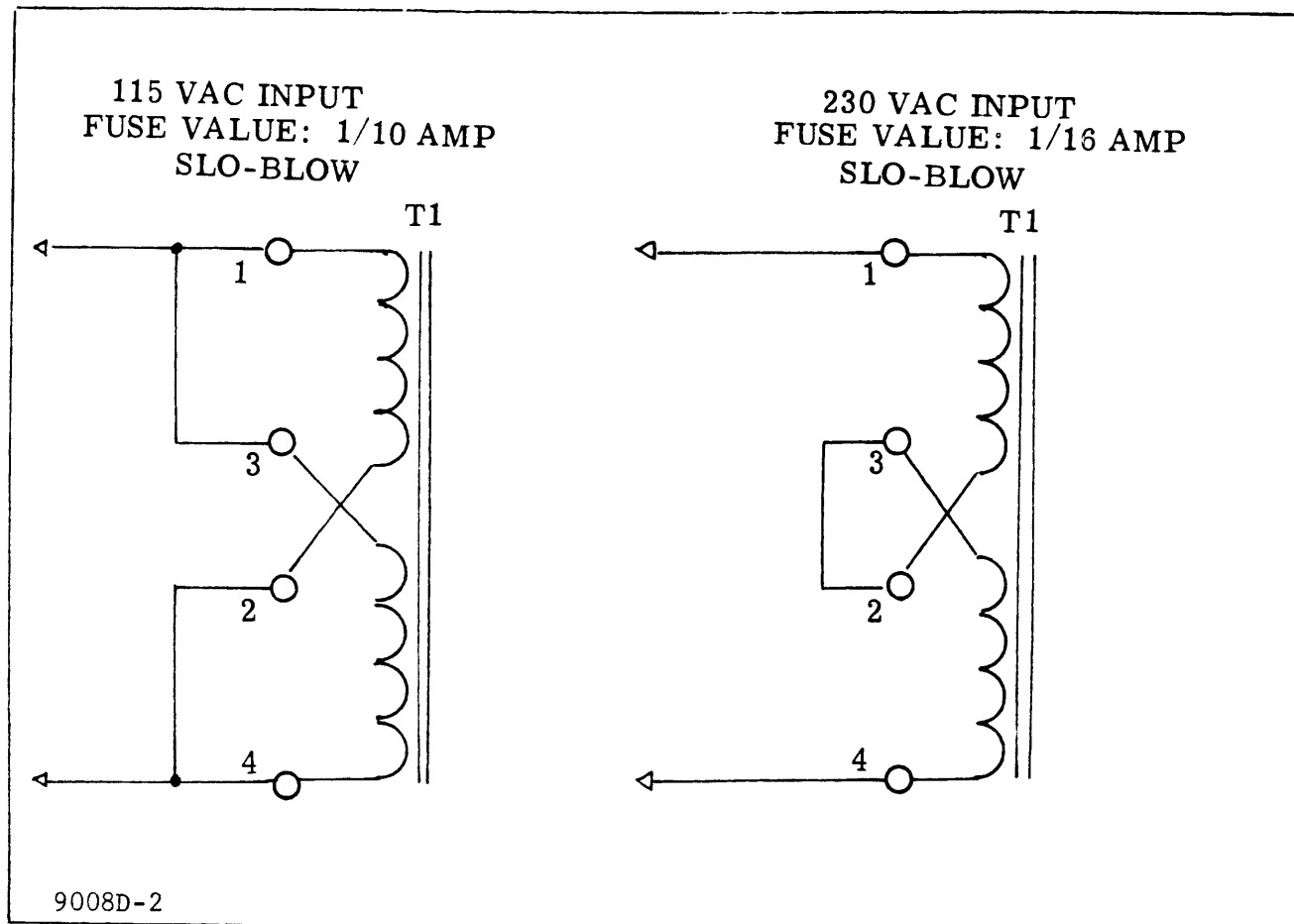


Figure 2-1. Power Supply Changeover Connections

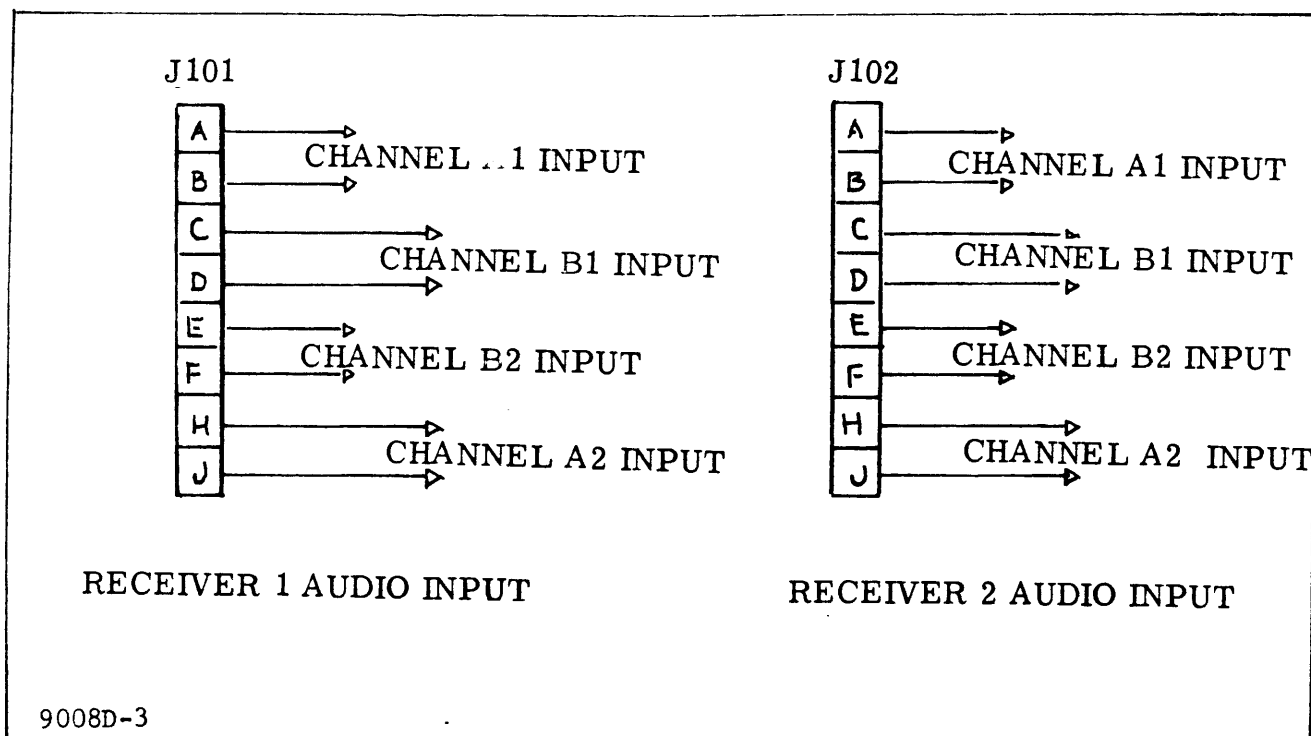


Figure 2-2. Interconnection Diagram

SECTION 3

OPERATOR'S SECTION

3-1. GENERAL

The BSP is functionally used as a receiver audio monitoring device. Each of the two BSP speakers are provided with an independent volume control, panel marked INCR. A clockwise rotation of the INCR control will activate the associated amplifier; further clockwise rotation will increase the audio volume of the selected speaker.

RECEIVER 1 and RECEIVER 2 selector switches provide selection of sidebands A1, A2, B1 and B2 of receivers 1 and 2.

Two line fuses, also front panel mounted, are used as line protective fuses for the individual audio amplifiers.

3-2. OPERATOR'S INSTRUCTIONS

Operation of the BSP has been designed for the highest degree of simplicity. The operator merely selects the desired channel to be monitored, by the RECEIVER 1 or RECEIVER 2 selector switches, and adjusts the volume to a comfortable level by use of the INCR volume control. Refer to table 3-1 for control descriptions and functions.

3-3. OPERATOR'S MAINTENANCE

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

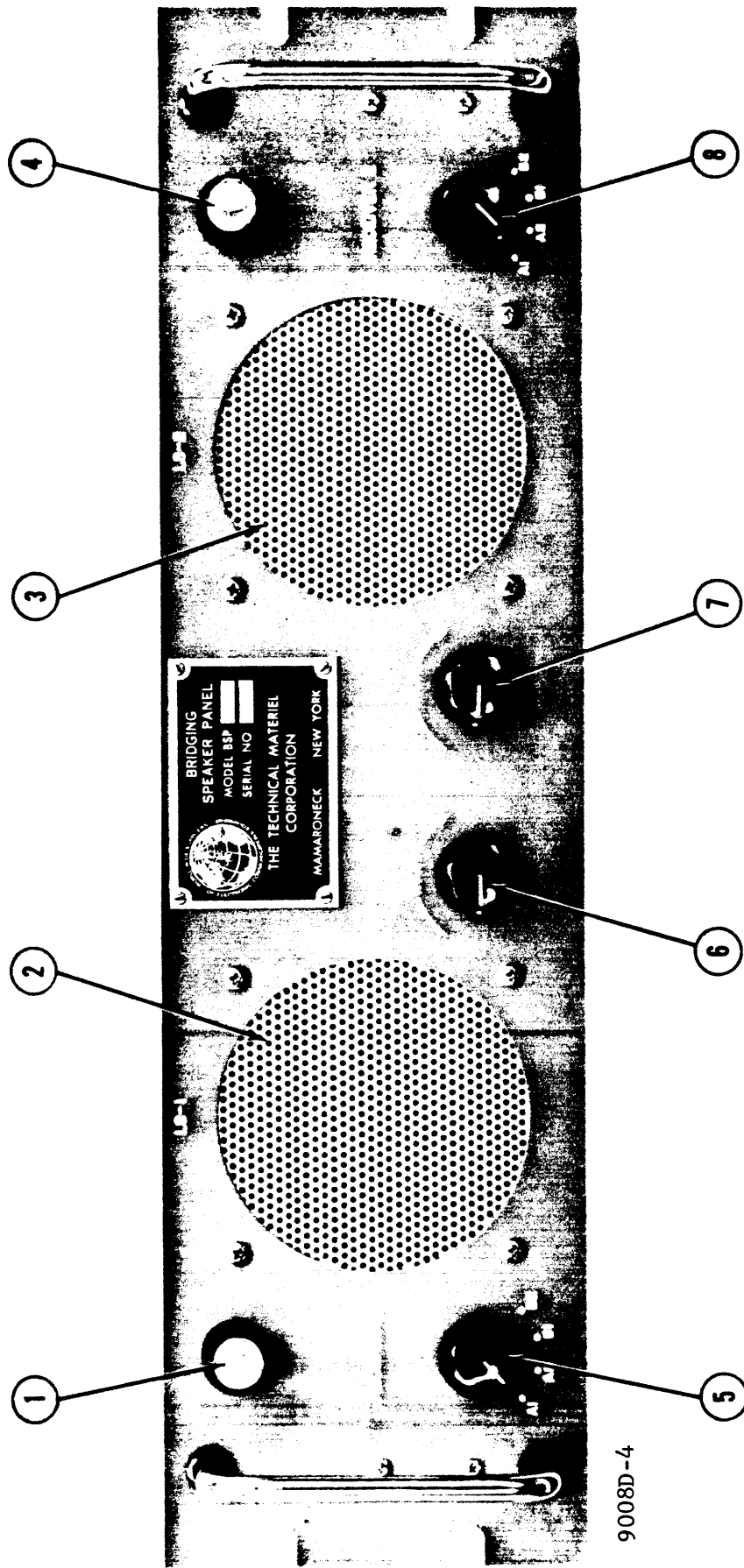


Figure 3-1. Operating Controls, BSP-6

TABLE 3-1. OPERATING CONTROLS AND INDICATORS

Item No. (Fig. 3-1)	Panel Designation	Reference Symbol	Function
1	115 V Line	F101	Line protective fuse for receiver 1 audio amplifier subassembly.
2	LS-1	LS101	Loudspeaker for receiver 1 monitoring.
3	LS-2	LS102	Loudspeaker for receiver 2 monitoring.
4	115 V Line	F102	Line protective fuse for receiver 2 audio amplifier subassembly.
5	RECEIVER 1	S101	Four position rotary selector switch. Used to select desired receiver 1 channel monitoring.
6	INCR	R101	Potentiometer, used to vary audio level of speaker monitoring receiver 1.
7	INCR	R102	Potentiometer, used to vary audio level of speaker monitoring receiver 2.
8	RECEIVER 2	S102	Four position rotary selector switch. Used to select desired receiver 2 channel monitoring.

SECTION 4

PRINCIPLES OF OPERATION

4-1. INTRODUCTION

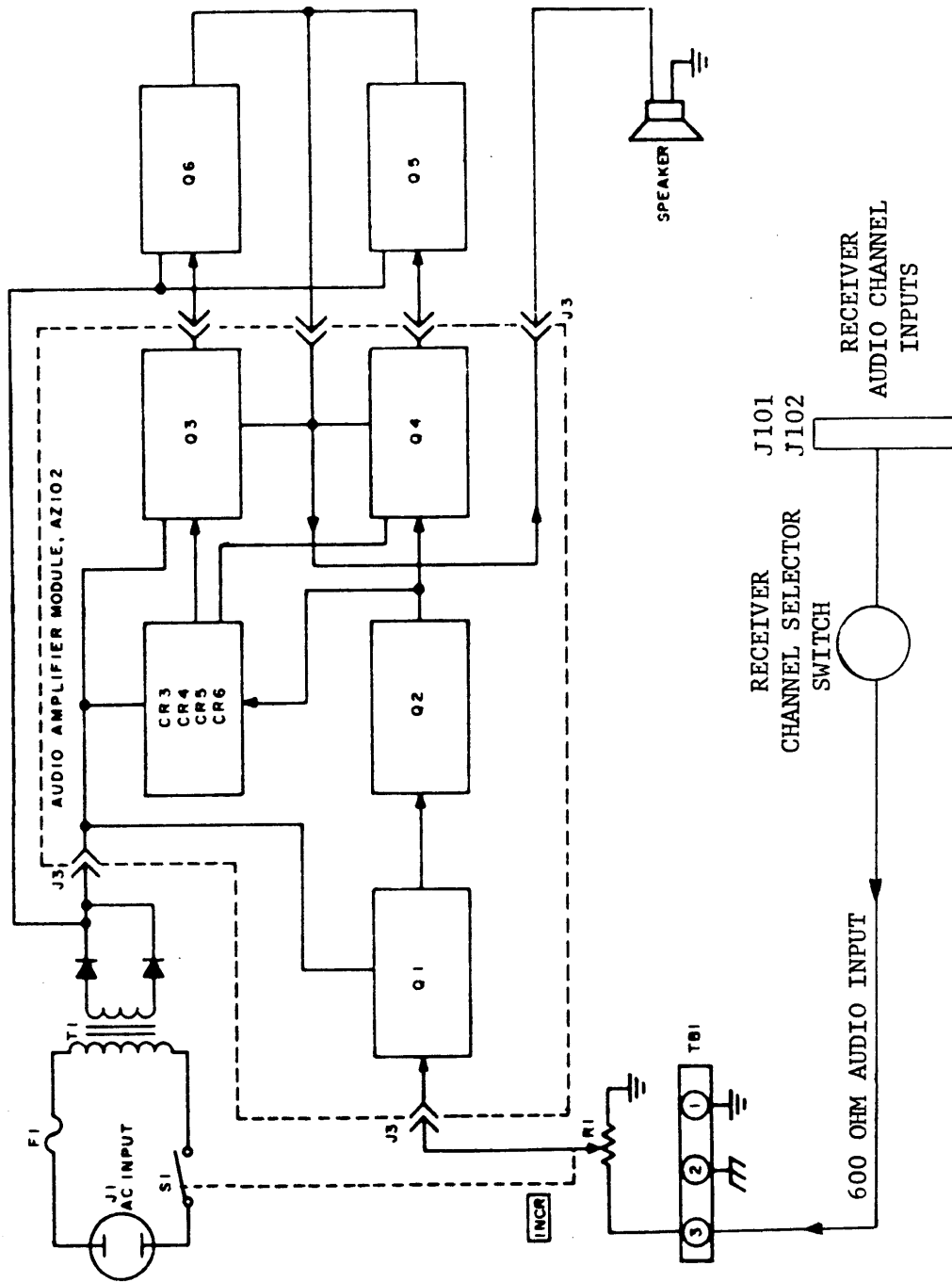
The BSP basically comprises two separate audio-amplifier sections, each individually fused and connected to an associated audio level controlled speaker. Both amplifier/speaker sections are completely independent of each other. See figure 4-1 for a simplified circuit diagram.

4-2. CIRCUIT DESCRIPTION

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.

Audio input signals, applied via terminal board TB1, are applied to the base of amplifier Q1. The amplified output of Q1 is then applied to the base element of amplifier Q2. The amplified output of Q2 is then applied to the base elements of drivers Q3 and Q4. A diode circuit (CR3 through CR6) 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 output of the power amplifier stage (Q5 and Q6) is then applied to the speaker circuit.



9008D-5

Figure 4-1. Block Diagram, BSP-6

SECTION 5

TROUBLESHOOTING

5-1. INTRODUCTION.

This section explains how to locate and diagnose equipment troubles. By proper use of the various troubleshooting aids provided in this section, the technician can locate and diagnose the fault at hand.

The following troubleshooting aids are provided.

- a. Troubleshooting techniques (paragraph 5-2).
- b. Simplified block diagram (figure 4-1).
- c. Schematic diagram (figures 8-1 thru 8-4).

5-2. TROUBLESHOOTING TECHNIQUES.

When a piece of equipment has been operating satisfactorily and suddenly fails, the cause of failure may be apparent because of circumstances occurring at the time of failure or because of symptoms analogous of past failures. The first check is to ascertain that proper equipment operating voltages are present and that all fuses and interconnecting cables are in proper functional condition.

If the above mentioned checks fail to locate the fault, the unit should be removed from the equipment rack, dust covers should be removed, and the unit should be visually checked for burned elements, charring, corrosion, arcing, excessive heat, dirt, dampness or any

other harmful condition.

If the fault is still not located, proceed with continuity and gain checks.

5-3. TROUBLESHOOTING PROCEDURES.

The amplifier sub-assembly is installed as a modular unit. Should the amplifier sub-assembly develop a fault, the entire sub-assembly should be replaced. On the first indication of a fault, the line protective fuses should be checked. The volume controls, receiver selector switches, speakers and interconnections should also be checked before attempting to replace the amplifier sub-assemblies. When the above mentioned checks, made visually and by continuity measurements, do not clear the fault, proceed with the following procedures.

The gain of the amplifier sub-assembly can be measured as follows:

a. Connect audio signal generator to terminals 1 and 2 of TB1; connect vtvm to pins 8 and 9 of J3. Turn INCR control fully counter-clockwise.

b. Set output of signal generator for a -6 dbm at 1000 cps. Adjust INCR control for a gain of 36 db \pm 3 db (1 watt) on vtvm.

c. Check frequency response between 200 cps and 7000 cps. It should not drop more than 3 db.

- d. Set output of signal generator for a -6 dbm output at 400 cps.
Adjust INCR control for a gain of 36 db \pm 3 db on vtm.
- e. Connect a distortion meter to the pins 8 and 9 of J3.
The distortion should not exceed two percent.

TABLE 5-1. TEST EQUIPMENT REQUIRED

ITEM	MANUFACTURER
Audio Signal Generator	Hewlett-Packard, Model 200CD or equivalent.
Distortion Meter	Barker-Williamson, Model 410 or equivalent.
AC Voltmeter	Ballantine, Model 314 or equivalent.
Three 12-ohm, 1 watt, <u>+5%</u> resistors.	Any manufacturer meeting the necessary specifications.

SECTION 6
MAINTENANCE

6-1. INTRODUCTION

Maintenance may be divided into three categories: operator's maintenance, preventive maintenance and corrective maintenance.

The operator may, at certain times, be required to perform various aspects of operator's maintenance. This type of maintenance may consist of simply keeping the unit clean and observing for tight interconnecting-cable connections. However, should normal operating procedures produce unsatisfactory results, a check of the interconnections and associated equipment levels to the BSP may clear the fault. A check of the fuses may also be necessary.

NOTE

Never replace a fuse with one of higher rating unless continued operation is more important than probable damage to the equipment. If a fuse burns out immediately after replacement, do not replace it a second time until the trouble has been located and corrected.

The corrective maintenance procedures provide information useful in locating and diagnosing equipment troubles and maladjustments.

The BSP has been designed to provide long-term, trouble-free operation under normal duty conditions. It is recommended that any necessary maintenance be performed by a competent maintenance technician familiar with troubleshooting techniques. If a fault cannot be corrected, it is recommended that the BSP be returned to The Technical Materiel Corporation for servicing.

6-2. PREVENTIVE MAINTENANCE

a. In order to prevent equipment failure due to dust, dirt and other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to.

b. At periodic intervals, the equipment should be removed from its mounting for cleaning and inspection. All accessible covers should be removed and the wiring and all components inspected for dirt, corrosion, charring, discoloring or grease. Remove dust with a soft brush or vacuum cleaner. Remove dirt or grease from other parts with any suitable cleaning solvent. Use of carbon tetrachloride should be avoided due to its highly toxic effects. Trichlorethylene or methyl chloroform may be used, providing the necessary precautions are observed.

WARNING

When using toxic solvents, make certain that adequate ventilation exists. Avoid prolonged or repeated contact with skin. Flammable solvents shall not be used on energized equipment or near any equipment from which a spark may be received. Smoking, "hot work", etc. is prohibited in the immediate area.

CAUTION

When using trichlorethylene, avoid contact with painted surfaces, due to its paint removing effects.

6-3. CORRECTIVE MAINTENANCE

Corrective maintenance of the BSP will consist mainly of component replacement. It should be noted that when replacing components, the technician should observe for exact or equivalent replacements by referring to the parts list in section 7. Polarity and positioning of certain components should be observed before removing so that the replacement component will fit and operate correctly.

SECTION 7
PARTS LIST

7-1. INTRODUCTION

Reference designations have been assigned to identify all maintenance parts of the equipment. They are used for marking the equipment (adjacent to the part they identify) and are included in drawings, diagrams and the parts list. The letters of a reference designation indicate the kind of part (generic group) such as resistor, amplifier, electron tubes, etc. Sockets associated with a particular plug-in device, such as electron tube or fuse, are identified by a reference designation which includes the reference designation of the plug-in device. For example, the socket for fuse F101 is designated XF101. The parts for each major unit are grouped together. Column 1 lists the reference series of each major unit, followed by the reference designations of the various parts in alphabetical and numerical order. Column 2 gives the name and describes the various parts. Major part assemblies are listed in their entirety; subparts of a major assembly are listed in alphabetical and numerical order with reference to their major assemblies.

Assembly or sub-assembly

Bridging Speaker Panel, BSP-6B	7-1
AF Amplifier, AZ102 (Symbol Series 10)	7-3

PARTS LIST
for
BRIDGING SPEAKER PANEL, BSP-6

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
AR101	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
AR102	Same as AR101.	
DS101	Non-replaceable item. Part of XF101.	
DS102	Non-replaceable item. Part of XF102.	
F101	FUSE, CARTRIDGE: 1/10 amp; time lag; 1-1/4" long x 1/4" dia.; slow blow. (For 115 V operation)	FU102-.100
F101	FUSE, CARTRIDGE: 1/16 amp; time lag; 1-1/4" long x 1/4" dia.; slow blow. (For 230 V operation)	FU102-.062
F102	Same as F101. (For 115 V operation)	
F102	Same as F101. (For 230 V operation)	
J101	CONNECTOR, RECEPTACLE, ELECTRICAL: 9 round male contacts rated for 7.5 amps, polarized, straight type, 2,000 V RMS.	JJ193-9P
J102	Same as J101.	
LS101	LOUDSPEAKER, PERMANENT MAGNET: 4 inch; voice coil impedance 45-50 ohms; power rated at 2.0 watts; 4-1/8 inch square x 1-3/8 inch deep.	LS-102
LS102	Same as LS101.	
P101	CONNECTOR, PLUG, ELECTRICAL: with cable clamp; 2 half round male contacts, 10 amps, 250 V, 15 amps, 125 V; polarized; twist lock. Part of W101.	PL177
P102	CONNECTOR, PLUG, ELECTRICAL: twist lock type; polarized; 2 female contacts, straight type, 10 amps, 250 V; midget size; brown bakelite. Part of W101.	PL176
P103	CONNECTOR, PLUG, ELECTRICAL: twist lock type; 3 male contacts, straight type. Part of W102.	PL218
P104	Same as P102. Part of W102.	

PARTS LIST (CONT)

BRIDGING SPEAKER PANEL, BSP-6

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R101	RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms, $\pm 10\%$; 2 watts, taper A; consists of a SPST normally open switch, rated at 3.0 amperes at 117 VAC, symbol S103.	RV4NBYS503A
R102	Same as R101. Consists of switch, symbol S104.	
R103	Non-replaceable item. Part of XF101.	
R104	Non-replaceable item. Part of XF102.	
S101	SWITCH, ROTARY: 2 poles, 4 positions, 1 section, non-shorting type contacts, rated at 5 amps, 28 VDC or 0.5 amp, 110 VAC.	SW120
S102	Same as S101.	
S103	See R101.	
S104	See R102.	
W101	CABLE ASSEMBLY, POWER ELECTRICAL: consists of 6" retracted length of 2 conductor insulated wire; 2 connectors, P101 and P102.	CA555-7
W102	CABLE ASSEMBLY, POWER ELECTRICAL: consists of 1' retracted length of 2 conductor insulated wire; 2 connectors, P103 and P104. (Shipped as a Loose Item)	CA555-4
XF101	FUSEHOLDER: extractor post type; for 1-1/4" long x 1/4" dia. fuse; with neon indicator lamp and 220K ohm resistor, clear octagonal lens; 100-250 V, 20 amps; consists of DS101 and R103.	FH104-2
XF102	Same as XF101. Consists of DS102 and R104.	

PARTS LIST
for
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.	CM15B47LJ
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
J1	CONNECTOR, RECEPTACLE, ELECTRICAL: 2 female contacts, twist lock; rated at 10 amps, 250 V or 15' amps, 125 V.	JJ235

PARTS LIST (CONT)

AF AMPLIFIER, AZ102

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
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.	JJ319-10FSE
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 2N1991
Q5	TRANSISTOR	2N2196
Q6	Same as Q5.	
R1	Not used.	
R2	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, ^{5%} +10% ; 1/2 watt.	RC20GF332K ^J
R3	RESISTOR, FIXED, COMPOSITION: 150,000 ohms, ^{5%} +10% ; 1/2 watt.	RC20GF154K ^J
R4	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, ^{5%} +10% ; 1/2 watt.	RC20GF472K ^J
R5	RESISTOR, FIXED, COMPOSITION: 470,000 ohms, ^{5%} +10% ; 1/2 watt.	RC20GF473K ^J
R6	RESISTOR, FIXED, COMPOSITION: 1,500 ohms, ^{5%} +10% ; 1/2 watt.	RC20GF152K ^J
R7	Same as R6.	
R8	RESISTOR, FIXED, COMPOSITION: 6,800 ohms, ^{5%} +10% ; 1/2 watt.	RC20GF682K ^J
R9	RESISTOR, FIXED, COMPOSITION: 120,000 ohms, ^{5%} +10% ; 1/2 watt.	RC20GF124K ^J
R10	RESISTOR, FIXED, COMPOSITION: 18,000 ohms, ^{5%} +10% ; 1/2 watt.	RC20GF183K ^J

PARTS LIST (CONT)
AF AMPLIFIER, AZ102

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R11	RESISTOR, FIXED, COMPOSITION: 390 ohms, ^J +10% ; 1/2 watt.	RC20GF391K ^J
R12	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, <u>+5%</u> ; 1/2 watt.	RC20GF102J
R13	RESISTOR, FIXED, COMPOSITION: 220 ohms, <u>+5%</u> ; 1/2 watt.	RC20GF221J
R14	Same as R12.	
R15	RESISTOR, FIXED, COMPOSITION: 22 ohms, ^{5%} +10% ; 1/2 watt.	RC20GF220K ^J
R16	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ^{5%} +10% ; 1/2 watt.	RC20GF683K ^J
R17	RESISTOR, FIXED, COMPOSITION: 4.7 ohms, ^{5%} +10% ; 1/2 watt.	RC20GF4R7K ^J
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 8
SCHEMATIC DIAGRAMS

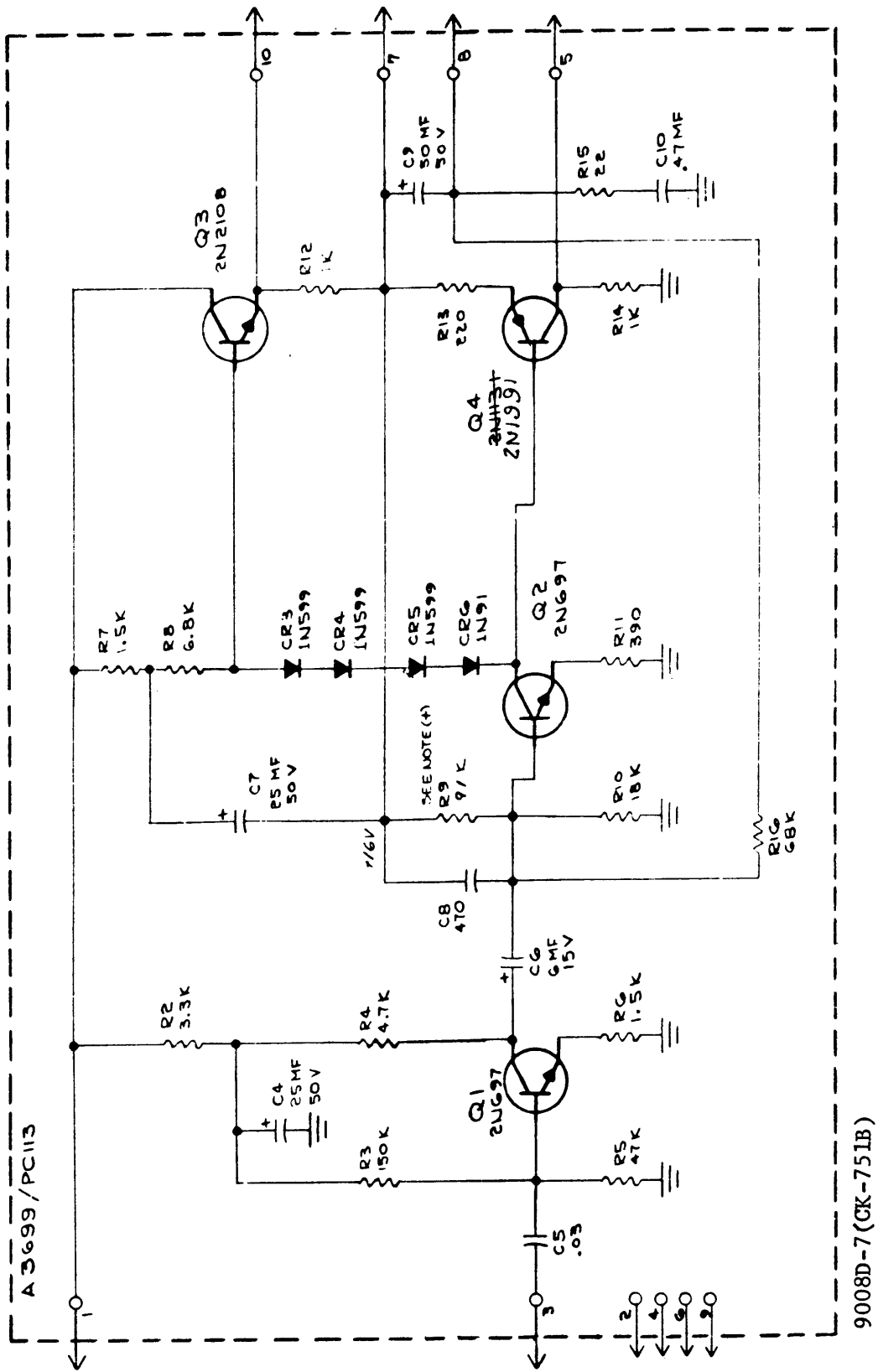


Figure 1. Schematic Diagram, BSP-6 (Sheet 2 of 2)

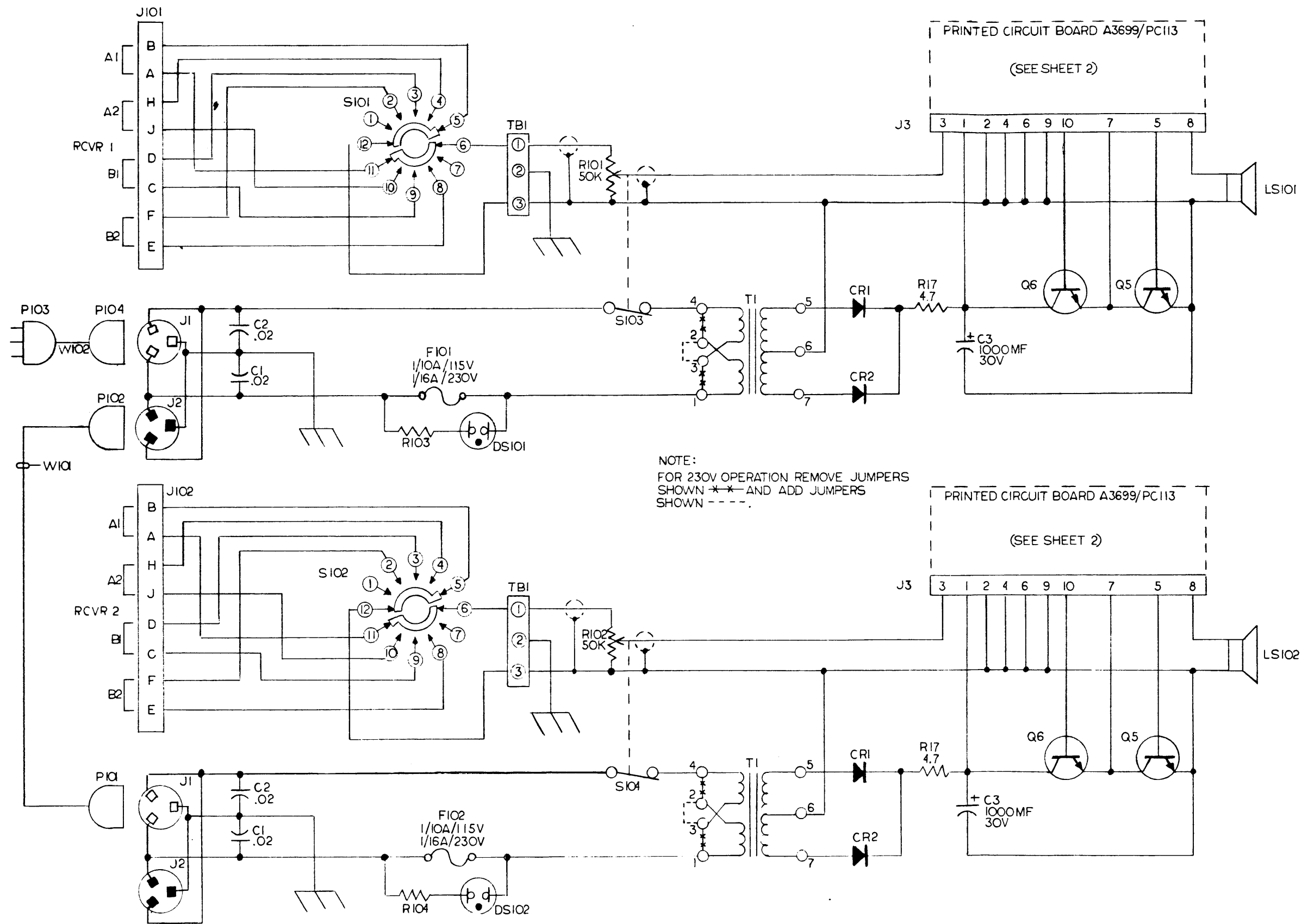


Figure 1. Schematic Diagram, BSP-67
(Sheet 1 of 2)

9008D-6 (CK-962B)

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