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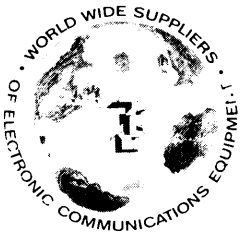
**Technical Manual**

for

**Bridging Speaker Panel**

***Models BSP-1, BSP-2 and BSP-3***

**The Technical Materiel Corporation**  
700 Fenimore Road  
Mamaroneck, New York 10543-0142 U.S.A.



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**THE TECHNICAL MATERIEL CORPORATION**  
COMMUNICATIONS ENGINEERS

# Warranty

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The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment - except electron tubes, semi-conductor devices, fuses, lamps, batteries, and articles made of glass or other fragile or expendable materials - purchased hereunder to be free from defect in workmanship and materials 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 FOB 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, FOB factory, which may fail within the stated warranty period, provided:

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- The defect is not the result of damage incurred in shipment from or to the factory;
- 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; and
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All inquiries should be directed to the following:

**THE TECHNICAL MATERIEL CORPORATION**

*700 Fenimore Road*

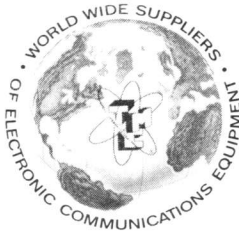
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## **RECORD OF REVISIONS**

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# Bridging Speaker Panel

## Models BSP-1, BSP-2, BSP-3 and BSP-7

Product Bulletin 107015

- *High Impedance Isolation*
- *Low Distortion*
- *200-7500Hz Operating Range*
- *One Watt Output*
- *Totally Solid State*
- *Optional Activity Lamp*
- *Redundant, modular design*



Model BSP-2

The BSP Series of Bridging Speaker Panels provide high-quality monitoring of voice circuits without disturbing line levels or balance. Up to four channels may be monitored on one panel, each channel with its own loudspeaker, volume control and optional channel activity lamp. This simple, but effective method of dynamically monitoring audio channels may be used with any make of communications receiver with an audio output impedance of 600 ohms balanced or up to 10K-ohms (unbal).

The BSP units are totally solid state and modular. Each channel monitored is provided with its own power supply, loudspeaker, audio amplifier assembly, and volume control. If one channel is lost due to a malfunction in one assembly, the other channels are not affected and in fact can easily be switched in to bypass the defective module. An added advantage of this design is that crosstalk or interaction between audio lines, caused by operating the BSP when receiver circuits are monitored simultaneously, is held to an absolute minimum.

All operator controls and indicators are located on the front panel with audio connections made conveniently to terminal strips at the rear of each module. A single power cord is bridged to each module, thereby providing the required primary operating voltages.

Since each module is calibrated at the TMC factory prior to shipment, the BSP unit can be installed immediately upon receipt at the site. No further adjustments are required. Optional audio jacks, mounted on the front panel, can be provided to mute each speaker and provide a measure of privacy to the operator.

Remote audio monitoring of discrete channels is easily handled by extending 600-ohm balanced lines from each module to the remote control site. Under these conditions, consideration should be given to balancing or equalizing the audio lines to prevent unwanted distortion in the received audio. This is particularly important if low speed data is being passed over the audio channels and monitored by the BSP.

Several sub-assemblies are mounted to individual modules on a single 19-inch aluminum alloy panel. These sub-assemblies perform the functions of power conversion, amplification, impedance matching and line sensing. They are arranged to simplify any required troubleshooting or repair. The majority of the components used in the assemblies are discrete, although extensive use is made of integrated circuits in the design. All non-power assemblies in the BSP are mounted to plug-in printed circuits cards which can be accessed directly from the front panel for servicing.

Four modules can be configured for each panel - providing a compact, economical package suitable for both commercial and military service. Based on the number of channels monitored, the speakers are sized to the panel spacing. Available for "off-the-shelf" delivery, the BSP units have been assigned both US military nomenclature and Federal stock numbers.

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**The designation "BSP" is used herein to refer interchangeably to the BSP-1, BSP-2 and BSP-3.  
Any variations to this convention are noted.**

# Section 1 - General Description

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## 1.1 Functional Description

### 1.1.1 Overview

The BSP Series of Bridging Speaker Panels provide high-quality monitoring of voice circuits without disturbing line levels or balance. Up to four channels may be monitored on one panel, each channel with its own loudspeaker, volume control and optional channel activity lamp. This simple, but effective method of dynamically monitoring audio channels may be used with any make of communications receiver with an audio output impedance of 600 ohms balanced or up to 10K-ohms (unbal).

### 1.1.2 Major Assemblies

The BSP units are totally solid state and modular. Each channel monitored is provided with its own power supply, loudspeaker, audio amplifier assembly, and volume control. If one channel is lost due to a malfunction in one assembly, the other channels are not affected and in fact can easily be switched in to bypass the defective module. An added advantage of this design is that crosstalk or interaction between audio lines, caused by operating the BSP when receiver circuits are monitored simultaneously, is held to an absolute minimum.

### 1.1.3 Controls and Indicators

All operator controls and indicators are located on the front panel with audio connections made conveniently to terminal strips at the rear of each module. A single power cord is bridged to each module, thereby providing the required primary operating voltages.

### 1.1.4 Input/Output Characteristics

Since each module is calibrated at the TMC factory prior to shipment, the BSP unit can be installed immediately upon receipt at the site. No further adjustments are required. Optional audio jacks, mounted on the front panel, can be provided to mute each speaker and provide a measure of privacy to the operator.

### 1.1.5 Remote Operation

Remote audio monitoring of discrete channels is easily handled by extending 600-ohm balanced lines from each module to the remote control site. Under these conditions, consideration should be given to balancing or equalizing the audio lines to prevent unwanted distortion in the received audio. This is particularly important if low speed data is being passed over the audio channels and monitored by the BSP.



## **1.2 Physical Description**

### **1.2.1 Equipment Mounting**

Several sub-assemblies are mounted to individual modules on a single 19-inch aluminum alloy panel. These sub-assemblies perform the functions of power conversion, amplification, impedance matching and line sensing. They are arranged to simplify any required troubleshooting or repair. The majority of the components used in the assemblies are discrete, although extensive use is made of integrated circuits in the design. All non-power assemblies in the BSP are mounted to plug-in printed circuits cards which can be accessed directly from the front panel for servicing.

Four modules can be configured for each panel - providing a compact, economical package suitable for both commercial and military service. Based on the number of channels monitored, the speakers are sized to the panel spacing. Available for "off-the-shelf" delivery, the BSP units have been assigned both US military nomenclature and Federal stock numbers.

### **1.2.2 Semiconductor Complement**

A list of a semiconductors used in the AMC are listed in Table 1.1.

**Table 1.1 - Semiconductor Complement**

Emitter Follower	2N697
Amplifier	2N697
Driver	2N2108
Driver	2N1131
Power Amplifier	2N2186
Rectifier	1N3253
Clamp	1N599

### 1.3 Technical Specifications

**Input Impedance** 10,000 ohms, ungrounded; **Optional:** 600 ohms balanced

**Speaker Impedance** 45 ohms

**Rear Panel Connection** Standard terminal block

**Power Gain** 36dB (1 Watt for -6dB input); Front panel volume control

**Frequency Response** 200 to 7500Hz, +/-2dB

**Hum Level** -40dBm at 1 Watt

**Distortion** Less than 2% with 1 Watt at 400Hz

**Input Power** 115/230VAC, 50/60Hz, One-phase

**Heat Dissipation** Nominal 15 Watts

**Cooling** Convection

**Speaker Size** 4 inches (10.2cm)

**Components** Solid state

**Construction** Aluminum alloy with external stainless-steel hardware

**Dimensions (Overall)** 5.25H x 19W x 6.5D inches

**Weight** BSP-1: 5 lbs (2.3Kg); BSP-2: 7.5 lbs (3.4Kg); BSP-3: 10 lbs (4.6Kg)

**Environmental** Operating 0° to +50°C; 95% R.H.

#### Ordering Information

<b>BSP-1</b>	<b>One-channel unit</b>
<b>BSP-2</b>	<b>Two-channel Unit</b>
<b>BSP-3</b>	<b>Three-channel Unit</b>

#### Options (each channel):

<b>/A</b>	<b>Activity/standby indicator</b>
<b>/B</b>	<b>600-ohm balanced input</b>
<b>/J</b>	<b>Audio input jack</b>

**Federal Stock Number (BSP-2)** 5830-00-010-5268

**US MIL Nomenclature (BSP-2)** LS-509/G

## 1.4 BSP Product Group

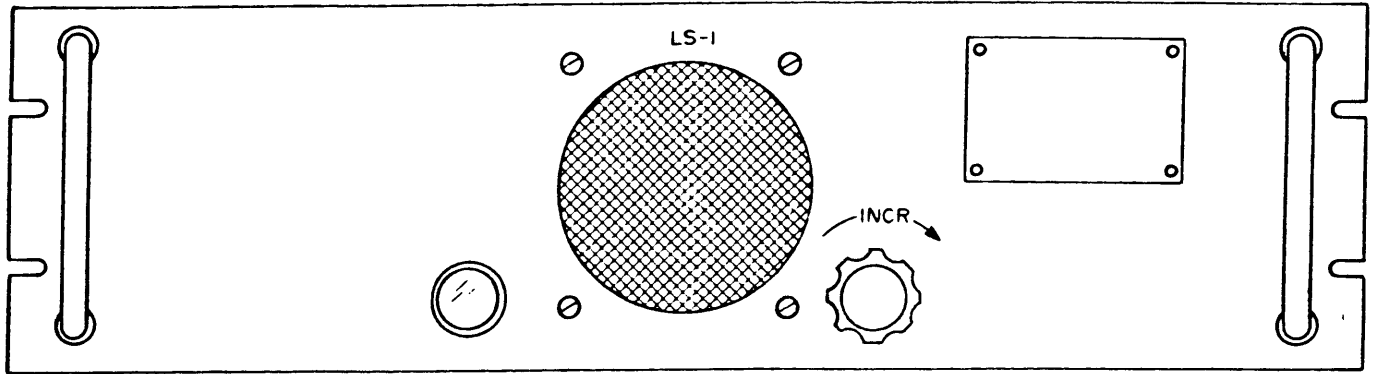
BSP-1	Bridging Speaker Panel, One-channel
BSP-2	Bridging Speaker Panel, Two-channel
BSP-3	Bridging Speaker Panel, Three-channel

BSP-7-1	Bridging Speaker Panel, One-channel
BSP-7-2	Bridging Speaker Panel, Two-channel
BSP-7-3	Bridging Speaker Panel, Three-channel
BSP-7-4	Bridging Speaker Panel, Four-channel

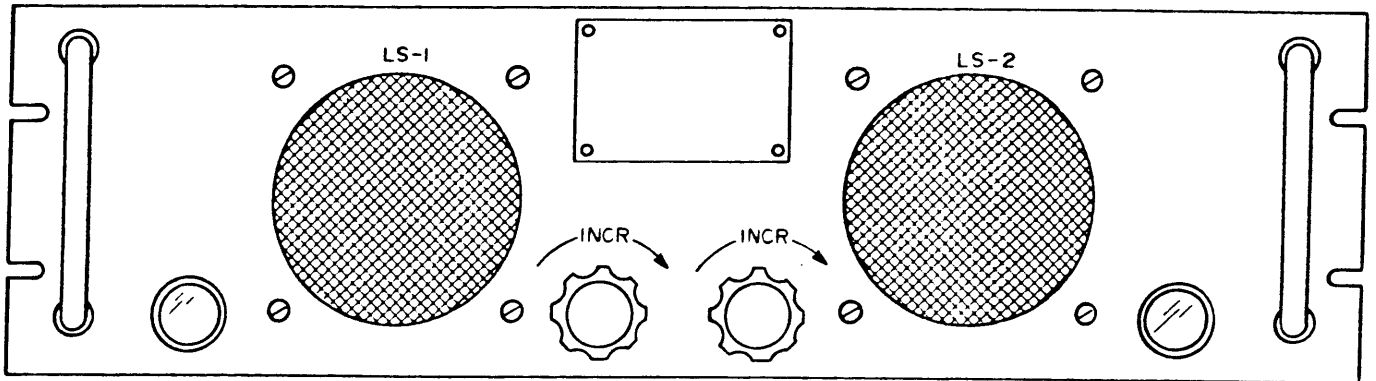
### Options:

/A	Activity/standby Indicator
/B	600-ohm Balanced Input
	Note: Standard for BSP-7 Series
/J	Audio Input Jack

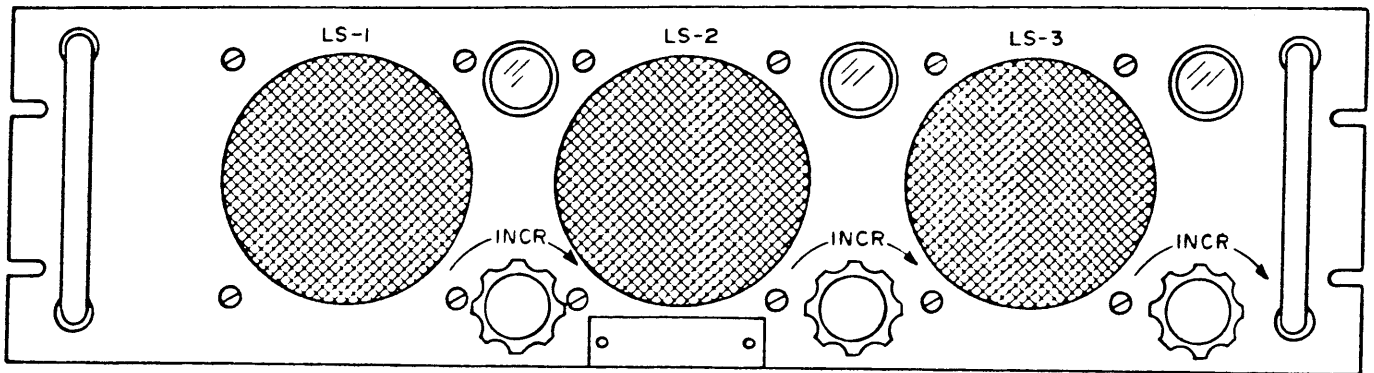
**When ordering, specify both model and option. Example: BSP-1/AJ**



A. MODEL BSP-1



B. MODEL BSP-2



C. MODEL BSP-3

Figure 1.1 - Outline Drawing, BSP Series

## Section 2 - Installation

---

### 2.1 Initial Inspection

#### 2.1.1 General

Every BSP undergoes a thorough testing and calibration prior to shipment. Upon receipt of the unit, check the packing case and its contents for obvious damage. Unpack the equipment carefully to reduce the risk of damage and to avoid misplacing any parts shipped as loose items. See Table 2.1 for a list of the loose items.

#### 2.1.2 Damage By Carrier

With respect to equipment damage for which the carrier is liable, TMC will assist in describing methods of repair as well as furnishing replacement parts.

### 2.2 Electrical Installation

#### 2.2.1 Primary Power

The BSP is wired at the factory for a 115VAC, 48 to 400Hz power source. Optionally, the BSP may be wired for 230VAC, which will be noted by a decal on the rear panel adjacent to the input power connector. Certain wiring changes are required to adapt a unit to 230-volt operation. In addition, a ratings change from 1/10 amperes to 1/16 amperes in the front-panel line fuses is required.

#### 2.2.2 External Connections

The following external connections must be made to the AMC after it has been installed in an equipment rack:

**Power** - Connect primary power to the unit by plugging the supplied power cable assembly into POWER INPUT connector J1 on the rear panel. Ensure that the plug lines up properly with the socket using the keyway as a guide. A jumper cable is connected from jack J2 of the assembly to which primary power is routed, and connected to J1 of the adjacent assembly for those BSP models with multiple speakers.

**Outputs** - Connect the outputs of the BSP to the associated receivers via the terminal board TB1 on the rear panel of each amplifier assembly. The audio input circuit is unbalanced (excepting on 600-ohm units) with terminal 3 above ground and terminal 2 provided for a shield ground.

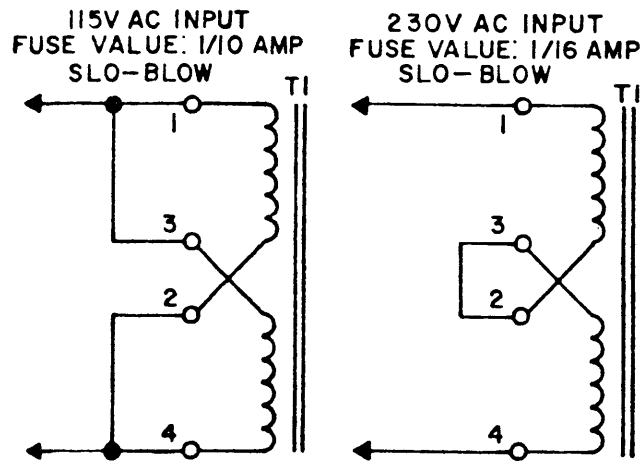


Figure 2.1 - Power Supply Changeover Connections

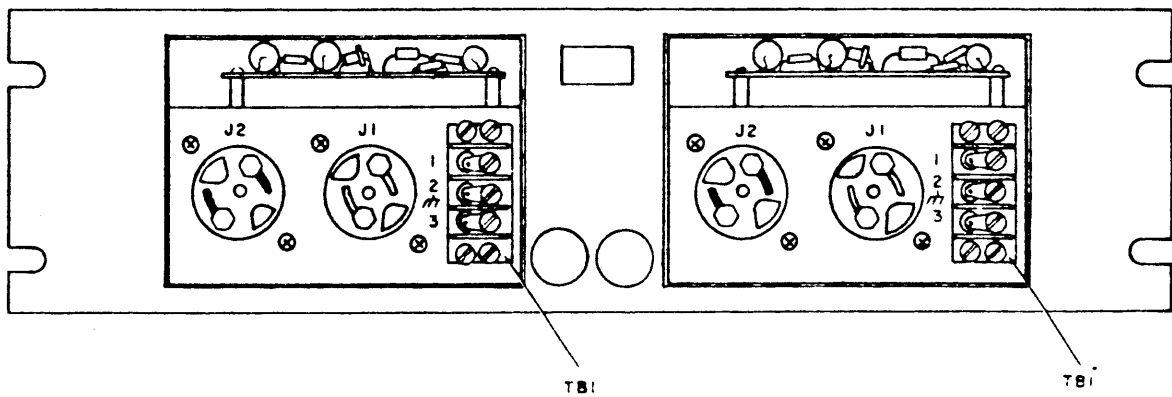


Figure 2.2 - Rear Panel Connections

### **2.2.3 Clearance Requirements**

The BSP equipment should be located in such a way that sufficient clearance is obtained at the rear of the unit for making all audio and power connections. The front panel controls should also be within easy reach of an operator. The solid state design of the BSP reduces heat problems, allowing "stacking" of BSP units, one above the other, in the same rack. To reduce the effects of prolonged heat in confined spaces, the equipment cabinet should be fitted for forced air cooling or the speaker panels should be separated vertically by sufficient space to allow dissipation of the heat into the operating area.

## **2.3 Performance Check**

### **2.3.1 General**

When the appropriate audio and power connections have been made to the BSP, turn the front-panel rotary switch to the ON position (right). The BSP is ready for immediate use. No further checks are required.

**Table 2.1 - Loose Items Supplied**

Power Cable Assembly	1 each
Technical Manual	1 each

# Section 3 - Operation

---

**3.1 General**

**3.1.1 Controls**

The only operating controls are the volume controls (marked INCR) on the front panel. With these controls, the individual audio levels can be adjusted to a comfortable level. The BSP-1 has one control, the BSP-2 has two and the BSP-3 has three.

**3.1.2 Procedures**

After connecting the communication receivers and power supply, and turning on the INCR switch, no further operating procedures are required. The BSP is now fully operational without further adjustment.

**Table 3.1 Controls and Indicators**

Power/Audio ON/OFF switch	Controls primary power application and audio level
FUSE holder/indicator 1F1,1F2	Indicates failure of fuse by illumination of the fuseholder.



## **Section 4 - Principles of Operation**

---

### **4.1 General**

The BSP comprises one or more assemblies, each assembly consisting of the following: power supply, volume control, amplifier and loudspeaker. The following description is for one assembly only.

### **4.2 Circuit Description**

The input line voltage is applied to a step-down transformer T1. The stepped-down secondary output voltage is rectified, filtered and then 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 keeps a potential separation between Q3 and Q4.

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

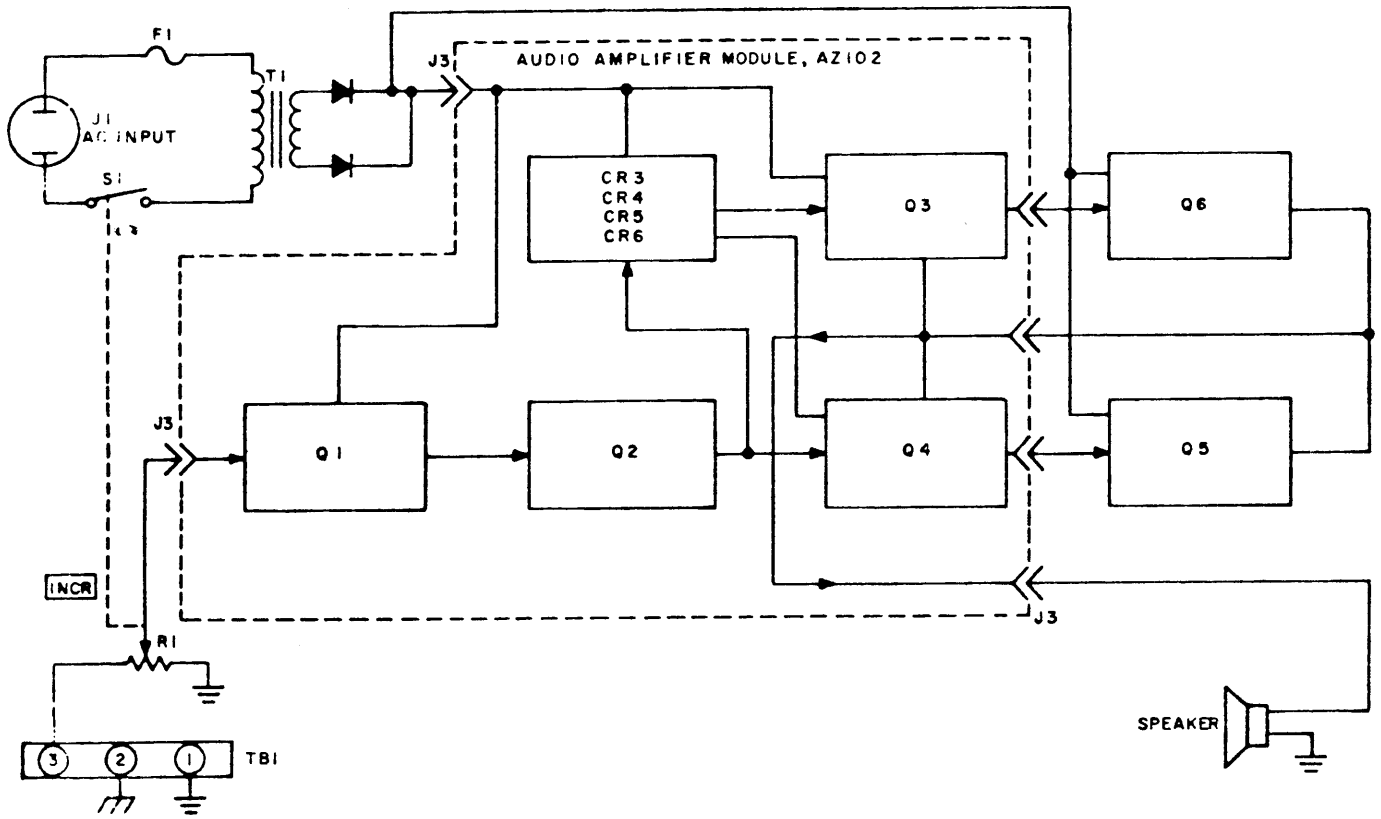


Figure 4.1 - Block Diagram

## Section 5 - Maintenance

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### 5.1 General

The amplifier subassembly is installed as a unit and should a malfunction occur, the entire subassembly can be replaced. On the first indication of trouble, check the line fuses, volume control and loudspeaker before replacing the amplifier subassembly. First check the volume control for an open or short circuit. Next, examine the speaker for a broken cone or loose connections. A continuity check of the voice coil (disconnected from terminals 8 and 9 of J3) will reveal whether it is open or short-circuited.

### 5.2 Preventive Maintenance

#### 5.2.1 General Cleaning Methods

Preventive maintenance for the BSP consists of routine functions such as visual inspection and cleaning. Periodic cleaning is recommended as dust may build up on components, reducing the efficiency of the coupler unit and possibly causing circuit failure. To facilitate cleaning the unit, use a vacuum cleaner or a low-pressure filtered compressed-air supply.

#### 5.2.2 Visual Check and Adjustment

A simple visual check of the unit when it is opened up for servicing or cleaning with often reveal potential trouble spots and thereby reduce downtime due to component failure. Signs of trouble may be found in discoloration, warped printed circuit boards and damaged wiring or cables. Any deteriorating component should be replaced immediately. All hardware should be checked for tightness during preventive maintenance inspections.

### 5.3 Troubleshooting

The gain of the amplifier subassembly can be measured using the following test set-up. Refer to Figure 7.1.

- Connect an audio signal generator to terminals 1 and 2 on TB1. Connect a VTVM to pins 8 and 9 of J3. Turn the volume control (INCR) fully counterclockwise.
- Set output of the signal generator for a -6dBm at 1000Hz (1kHz). Adjust the INCR control for a gain of 36dB +/-3dB (1 watt) on the VTVM.
- Check the frequency response between 200Hz and 7000Hz. It should not drop more than 3dB.
- Set the output of the signal generator for a -6dBm output at 400Hz. Adjust the INCR control for a gain of 35dB +/-3dB on the VTVM.
- Connect a distortion meter to pins 8 and 9 of J3. The distortion should not exceed two percent (2%).

## **5.4 Repair**

### **5.4.1 General Method**

Repair work generally consists of replacing the defective component. The following cautions should be observed:

- Make sure the replacement component is an exact duplicate of the defective one. This is particularly important in the amplifier modules.
- Place any new component in the same location as the component it replaces. The dressing of any wire runs should not be altered.
- Observe standard practice when replacing semiconductor components by using a low-wattage soldering iron and appropriate heat-sink tools.
- Avoid damage to the printed circuit wiring when handling or repairing amplifier and regulator modules.

## Section 6 - Parts Lists

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<b>IMPORTANT NOTE</b>
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Reference designations are 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 and are normally indexed sequentially; omitted numbers are noted on the diagrams. Sockets associated with a particular plug-in device - such as transistor, integrated circuit, 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. When ordering replacement parts, specify the TMC part number. The model number of the equipment is useful but not essential since TMC utilizes identical parts that are common to many different types of equipment.

REF SYM	DESCRIPTION	TMC PART NO.
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
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

REF SYM	DESCRIPTION	TMC PART NO.
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, ±10%; 1/2 watt.	RC20GF332K
R3	RESISTOR, FIXED, COMPOSITION: 150,000 ohms, ±10%; 1/2 watt.	RC20GF154K
R4	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, ±10%; 1/2 watt.	RC20GF472K
R5	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%; 1/2 watt.	RC20GF473K
R6	RESISTOR, FIXED, COMPOSITION: 1,500 ohms, ±10%; 1/2 watt.	RC20GF152K
R7	Same as R6.	
R8	RESISTOR, FIXED, COMPOSITION: 6,800 ohms, ±10%; 1/2 watt.	RC20GF682K
R9	RESISTOR, FIXED, COMPOSITION: 120,000 ohms, ±10%; 1/2 watt.	RC20GF124K
R10	RESISTOR, FIXED, COMPOSITION: 18,000 ohms, ±10%; 1/2 watt.	RC20GF183K
R11	RESISTOR, FIXED, COMPOSITION: 390 ohms, ±10%; 1/2 watt.	RC20GF391K
R12	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, ±5%; 1/2 watt.	RC20GF102J
R13	RESISTOR, FIXED, COMPOSITION: 220 ohms, ±5%; 1/2 watt.	RC20GF221J
R14	Same as R12.	
R15	RESISTOR, FIXED, COMPOSITION: 22 ohms, ±10%; 1/2 watt.	RC20GF220K
R16	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ±10%; 1/2 watt.	RC20GF683K
R17	RESISTOR, FIXED, COMPOSITION: 4.7 ohms, ±10%; 1/2 watt.	RC20GF4R7K
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

## BRIDGING SPEAKER PANEL, BSP

REF SYM	DESCRIPTION	TMC PART NO.
AR101	AMPLIFIER, BRIDGING: power input 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 $\pm 2$ db 200 cps to 7,000 cps; power input 115/230 VAC, $\pm 10\%$ ; 60 cps; approx. 8 watts at full output. (SEE SEPARATE PARTS LIST FOR BREAKDOWN)	AZ102
AR102	Same as AR101.	
AR103	Same as AR101.	
DS101	Non-replaceable item. Part of XF101.	
DS102	Non-replaceable item. Part of XF102.	
DS103	Non-replaceable item. Part of XF103.	
F101	FUSE, CARTRIDGE: 1/10 amp; time lag; 1-1/4" long x 1/4" dia.; slow blow. (For 115 V operation.)	FU102-.1
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.)	
F103	Same as F101. (For 115 V operation.)	
F103	Same as F101. (For 230 V operation.)	
LS101	LOUDSPEAKER, PERMANENT MAGNET: 4 inch; voice coil impedance 45-50 ohms; power rated at 2.0 watts; 4-1/8" square x 1-3/8" deep.	LS-102
LS102	Same as LS101.	
LS103	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	Same as P101. Part of W102.	
P104	Same as P102. Part of W102.	
P105	CONNECTOR, PLUG, ELECTRICAL: twist lock type; 3 male contacts, straight type. Part of W103.	PL218
P106	Same as P102. Part of W103.	



**PARTS LIST (CONT)**

BRIDGING SPEAKER PANEL, BSP

REF SYM	DESCRIPTION	TMC PART NO.
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 S101.	RV4NBYS503A
R102	Same as R101. Consists of switch, symbol S102.	
R103	Same as R101. Consists of switch, symbol S103.	
R104	Non-replaceable item. Part of XF101.	
R105	Non-replaceable item. Part of XF102.	
R106	Non-replaceable item. Part of XF103.	
S101	See R101.	
S102	See R102.	
S103	See R103.	
W101	CABLE ASSEMBLY, POWER, ELECTRICAL: consists of 12" length of 2 conductor insulated wire; 2 connectors, P101, P102.	CA884-4
W102	Same as W101. Consists of P103, P104.	
W103	CABLE ASSEMBLY, POWER, ELECTRICAL: consists of 1' retracted length of 2 conductor insulated wire; 2 connectors, P105, P106. (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 lamp resistor, clear octagonal lens; 100-250 V, 20 amps; consists of DS101, R104.	FH104-2
XF102	Same as XF101. Consists of DS102, R105.	
XF103	Same as XF101. Consists of DS103, R106.	

## **Section 7 - Schematic Diagrams**

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**Figure 7.1**

**Overall Interconnect Diagram**

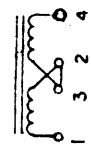
**Figure 7.2**

**Schematic Diagram, Standby/Activity Indicator**

**Figure 7.3**

**Schematic Diagram, Amplifier Module**





T1 PRIMARY CONNECTION FOR 230V OPERATION

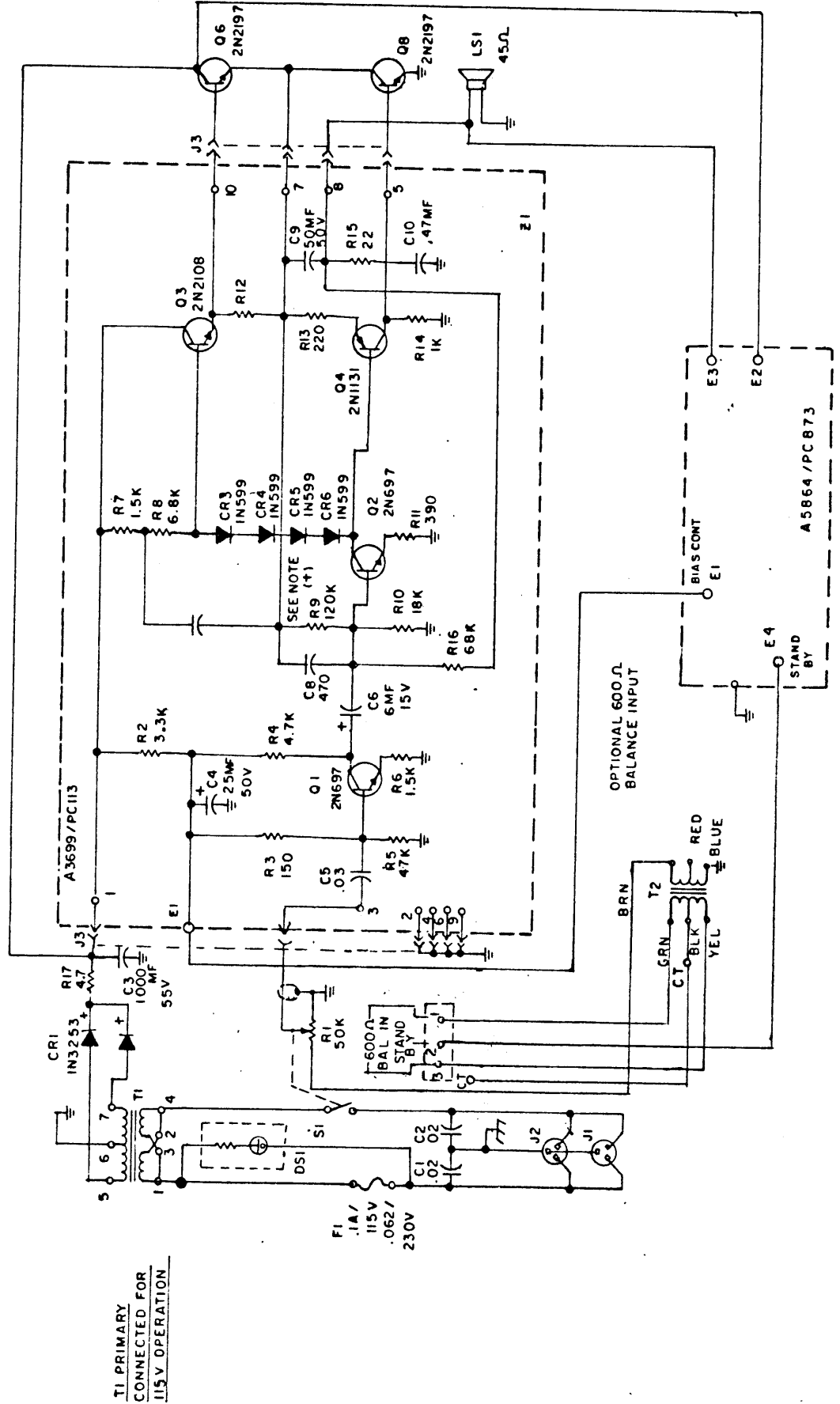


Figure 7.3 - Schematic Diagram, Amplifier Module