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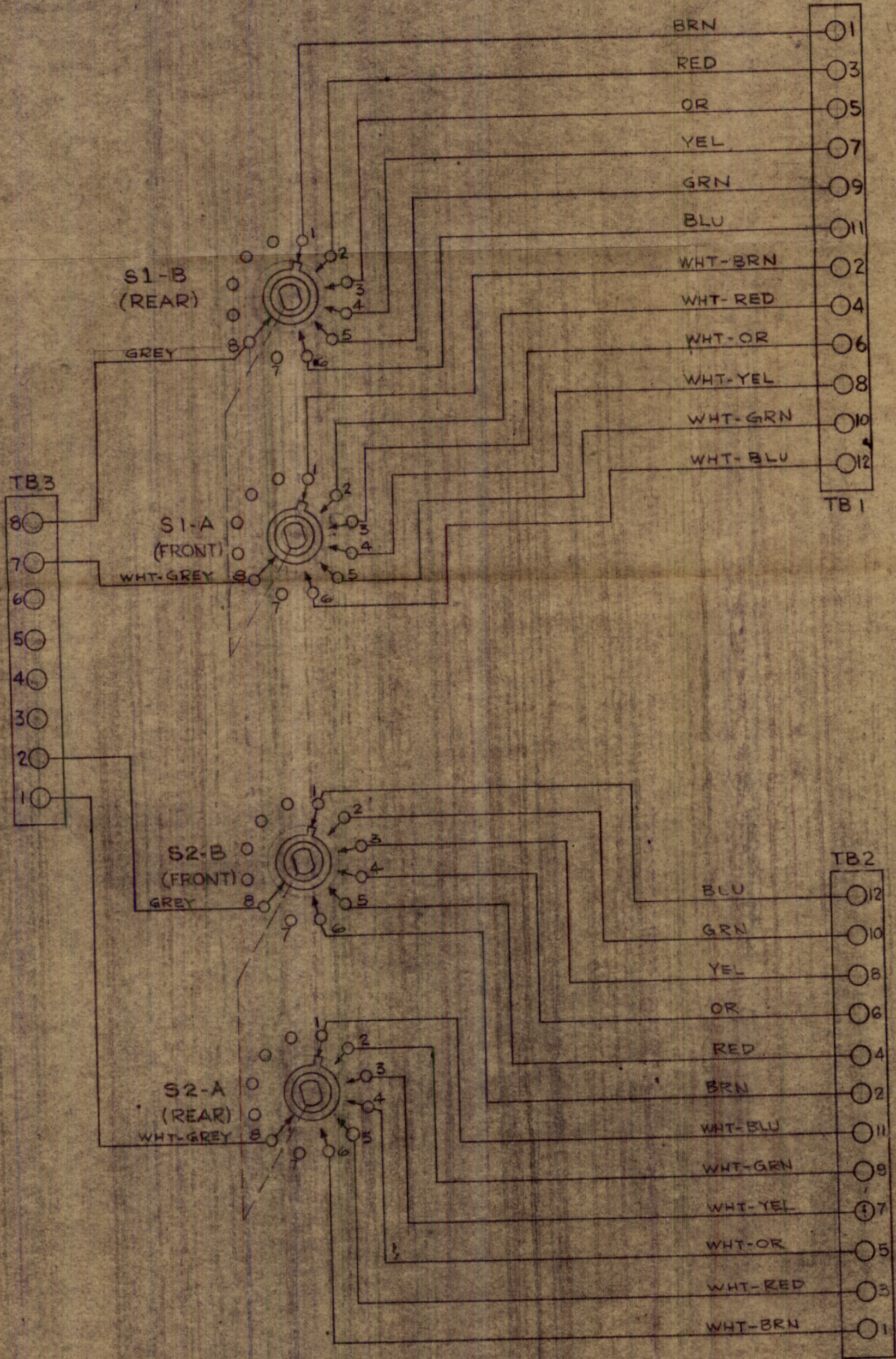
UNCLASSIFIED

TECHNICAL INFORMATION
FOR
DIVERSITY RECEIVER
MODEL DDR-9A

Prelim TM B SP-2



THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N.Y. OTTAWA, ONTARIO



NOTE:
 SWITCHES ARE SHOWN IN
 EXTREME COUNTER CLOCKWISE
 POSITION.

NOTES

QTY/UNIT	MODE
SCALE	CO
THE CONTENTS OF THIS DR OF THE TECHNICAL MATERI REPRODUCTION IN WHOLE	

4

3

2

1

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	E.M.N. NO.	DRAFT	CHKD	APPD
D7,F7,D4	A	SI-A, SZ-B WERE "REAR", TB2 Nds WERE REVERSED (TOP-BOTTOM)	4-30-63	8925	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
B,C,D5	B	COLOR CODING ON SZ REVISED	5-21-63	8032	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>

H

G

F

E

D

C

B

A

CK-622

B

REQ'D.	ITEM	PART NUMBER	DESCRIPTION	SYMBOL
STRUMER LIST OF MATERIAL				
MATERIAL		THE TECHNICAL MATERIEL CORP. MAMARONECK, NEW YORK		
FINISH		TITLE SCHEMATIC DIAGRAM SDP-1		
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES		DRAWN TRAMIREZ	DATE 2/18/63	FINAL APPROVAL <i>[Signature]</i>
		CHECKED <i>[Signature]</i>	DATE 3-9-63	
		ELECT. DES. <i>[Signature]</i>	DATE 3-7-63	CK-622
		MECH. DES. <i>[Signature]</i>	DATE 5-1-63	B
			SHEET	REV. LTR.

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DECIMALS
X ± .05
XX ± .01
XXX ± .005

FRACTIONS
± 1/64
ANGLES
± 0° 30'

TOLERANCES

QTY./UNIT
SCALE

MODEL USED ON
CODE

ASS'Y. NO.

SDP-1

PRELIMINARY
TECHNICAL MANUAL
For
BRIDGING SPEAKER PANEL
MODEL BSP-2

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FIGURE 1-1. BRIDGING SPEAKER PANEL BSP 2

SECTION I
GENERAL INFORMATION

1-1. DESCRIPTION OF EQUIPMENT.

The BSP-2 Loudspeaker Panel, which consists of a dual amplifier-speaker assembly, finds application when it is desired to monitor both single and dual channel receiver operation. Employing 12 transistors and six diodes, the amplifier subassemblies deliver four watts to each speaker. Both amplifier subassemblies and speakers are mounted on a standard 19-inch rack panel. Dual front panel volume controls can independently vary the audio output levels. A self-contained power supply provides all necessary biasing voltages.

1-2. ELECTRICAL AND MECHANICAL CHARACTERISTICS.

Input Impedance -----	10,000 ohms
Speaker Impedance-----	3.2 ohms
Power Gain-----	36 db (1 watt output for -6 db input)
Power Capability-----	4 watts
Frequency Response-----	200 to 70000 cps \pm 3 db
Hum Level-----	(-40)db at 1 watt
Distortion-----	2% at 1 watt at 400 cps
Input Power-----	115/230v ac, 50/60 cps
Dimensions-----	5 1/4" X 19" X 6 1/2"
Speaker Size-----	4 inch
Weight-----	7 1/2 lbs.

1-3. TRANSISTOR AND DIODE COMPLEMENT.

Table 1-1 lists the transistors and diodes found in the BSP-2.

TABLE 1-1. - TRANSISTOR AND DIODE COMPLEMENT

Amount	Reference Symbol	Type	Function
2	Q1	2N591	Emitter Follower
2	Q2	2N408	Amplifier
4	Q3, Q4	2N408	Driver
4	Q5, Q6	2N301	Power Amplifier
4	CR1, CR2	1N3253	Rectifier
2	CR3	1N270	Clamp

SECTION 2
INSTALLATION

2-1. INITIAL INSPECTION.

Each BSP-2 Unit has been calibrated at the factory prior to shipment. Upon arrival at the operating site, inspect the packing case and contents for possible damage. 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. INSTALLATION.

The BSP-2 is designed for both cabinet and rack installation. On rack installation, no covers are used and the unit is bolted to the rack by screws located on the front panel.

2-3. POWER REQUIREMENTS AND DISTRIBUTION.

The unit is designed for 115 or 230 volts, single phase, 50/60 cycles at 100 watts. Unless specifically ordered for 230-volt operation, the unit is shipped wired for 115-volt operation. Wiring changes necessary to change the unit to 230-volt operation are shown in figure 2-1. With 230-volt operation, change F101 (located at the rear of the equipment) from 1 ampere to 0.5 ampere.

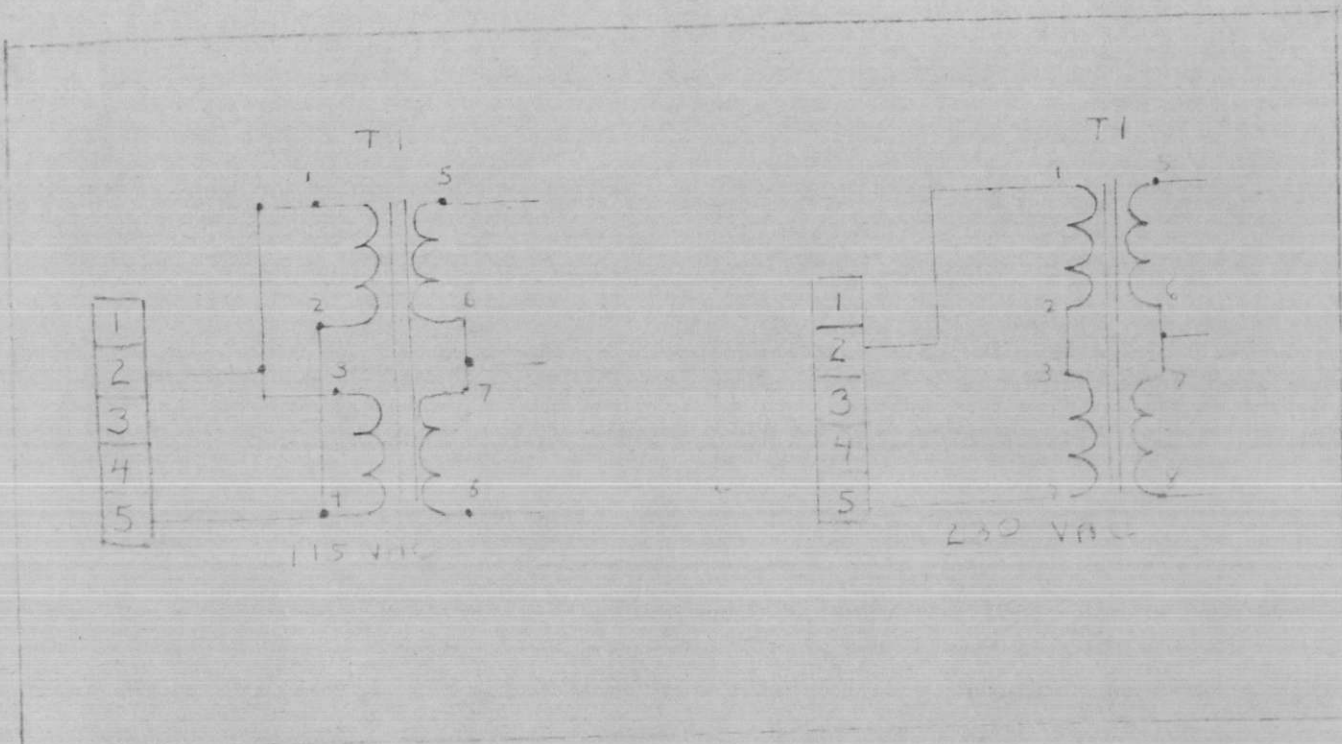


FIGURE 2-1. WIRING CHANGES FOR 230-VOLT OPERATION

2-4 ELECTRICAL CONNECTIONS

Before making connections to the audio modules, the top protective cover on each module must be removed. To do this, loosen the screw standoff found in each of the four legs holding a module to the front panel. Then pull off cover.

The input power cable is connected to terminals 2 and 3 on terminal board T1 found at either module. Input signal connections are tied to terminals 6 and 8 at T2 at each module. Figures 2-2 and 2-3 show top and bottom views of the modules with covers removed.

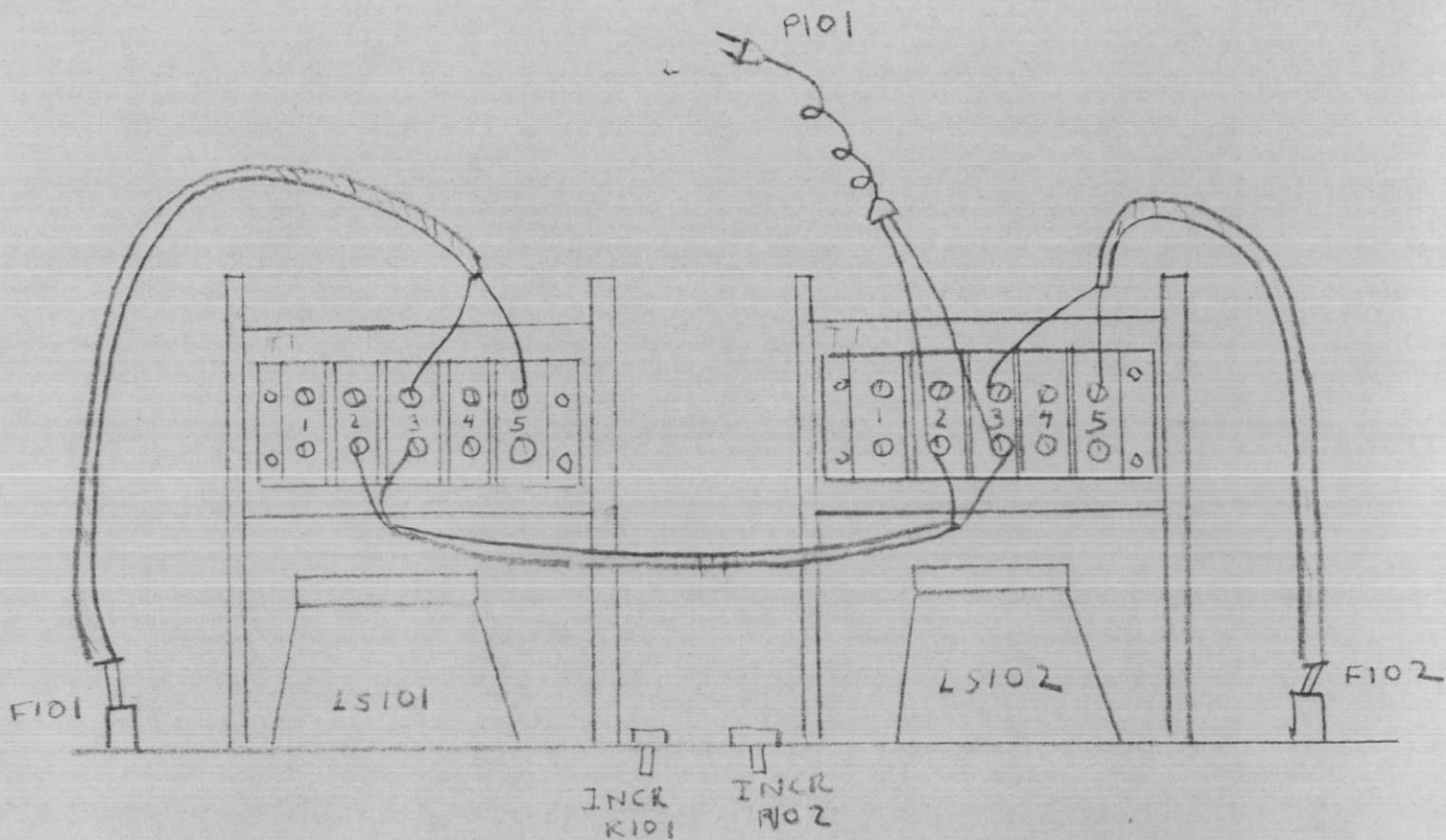


FIGURE 2-2 BSP-2, TOP VIEW SHOWING CONNECTIONS

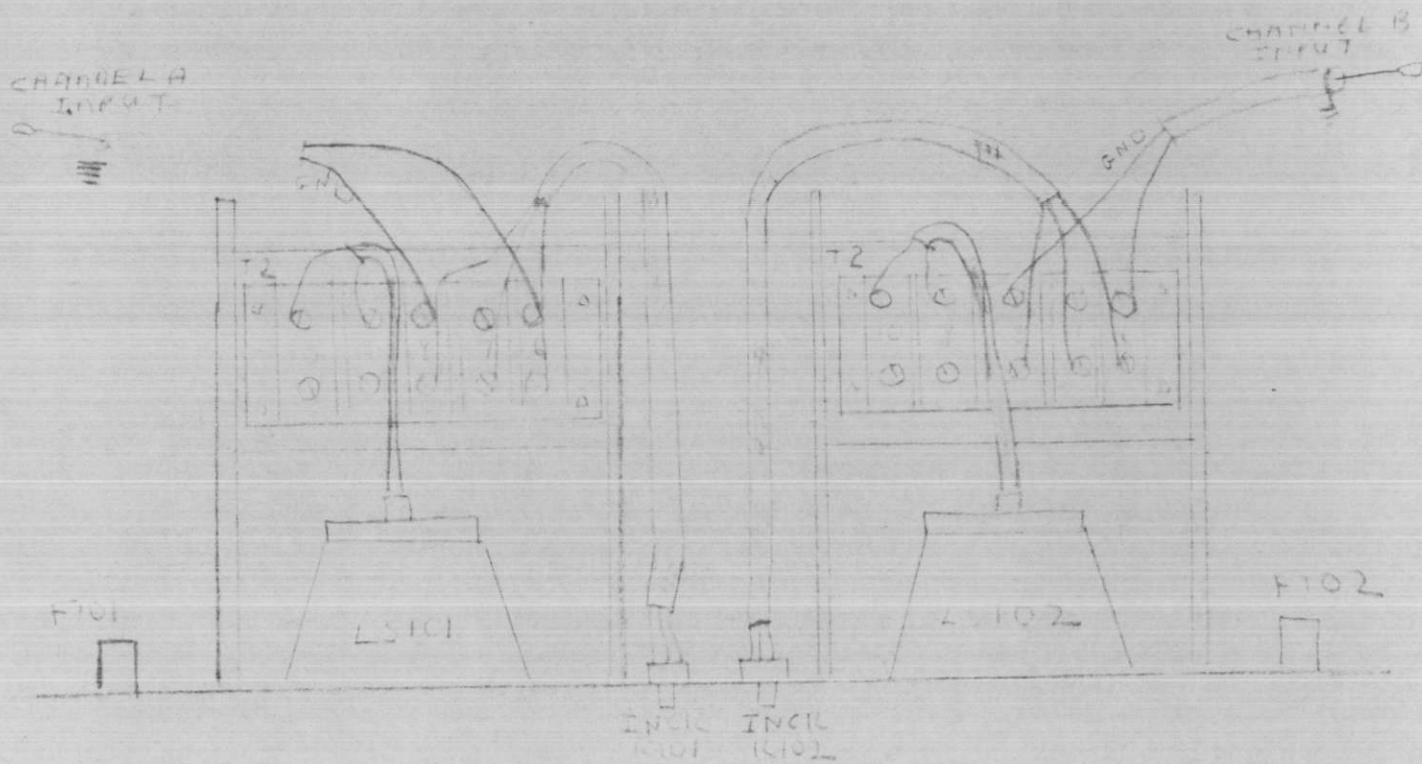


FIGURE 2-3 BSP-2, BOTTOM VIEW SHOWING CONNECTIONS

SECTION 3
OPERATOR'S SECTION

3-1. CONTROLS AND OPERATION. (See figure 3-1)

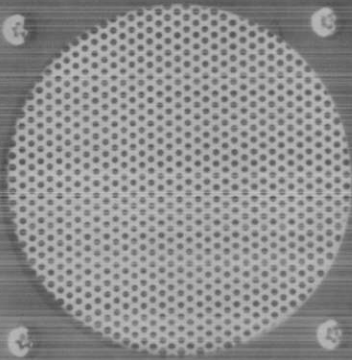
The only operating controls are the dual-channel volume controls marked INCR on the front panel. With these controls, the individual audio levels can be adjusted to a suitable level.

3-2. OPERATOR'S MAINTENANCE.

The only operator's maintenance required on this unit is to change the fuses when necessary. These fuses, inscribed 3/8 AMP/115 V LINE, are located on the front panel. The unit should be checked for dust and grease on a routine basis.

LS101

LS-1



3/8 AMP

115 V LINE

F101



INCR

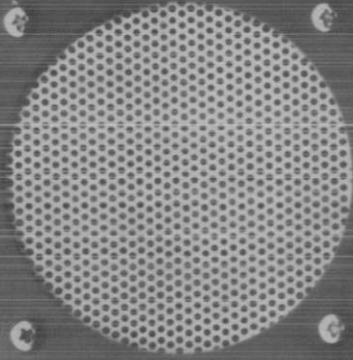
INCR

INCR
R101

INCR
R102

LS102

LS-2



3/8 AMP

115 V LINE

F102

FIGURE 3-1 FRONT PANEL CONTROLS

SECTION 4
TROUBLESHOOTING

4-1. FUNCTIONAL DESCRIPTION AND TROUBLESHOOTING OF UNIT.

a. FUNCTIONAL DESCRIPTION. (See figure 4-1)

The BSP-2 Speaker Panel is basically composed of two audio and amplifier assemblies (AZ101 and AZ102) along with two loudspeakers (LS101 and LS102) and volume controls (R101 and R102). A-c source voltage for the BSP-2 is coupled to the amplifier subassemblies through P101.

The dual audio inputs are coupled to the subassemblies through the front panel volume controls. Within an amplifier subassembly, the audio input is coupled to amplifier Q2 through emitter follower Q1. Q1, serving as an impedance matching device, matches the 600-ohm input impedance to the amplifier input impedance. From Q2, the signals are split and fed to drivers Q3 and Q4; Q3 and Q4 are paraphase amplifiers providing amplified audio outputs 180 degrees out of phase. These paraphase signals are coupled to power amplifiers Q5 and Q6. The combined outputs from this stage are coupled through TB2 to the loudspeaker. The amplifier will produce a maximum of four watts at the output.

b. TEST DATA (See figure 4-2)

The amplifier subassemblies are considered parts and, should any malfunction occur in them, the entire subassembly should be replaced. On the first indication of trouble, check fuses F101 and F102. A faulty volume control or loudspeaker can also cause trouble. Check R101 and R102 for open or short circuits. Next

check the speakers for broken cones or loose connections. A resistance check of the voice coil (disconnected from terminals 9 and 10 on TB2) will reveal whether its open or short-circuited.

The gain of an amplifier subassembly can be determined in the following manner:

(1) Connect an audio signal generator to terminals 6 and 8 on TB2. Turn INCR control fully counterclockwise.

(2) Set generator for a -6 dbm at 1000 cps. Adjust INCR control for a 1 watt output. The gain should be $36 \text{ db} \pm 3 \text{ db}$.

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

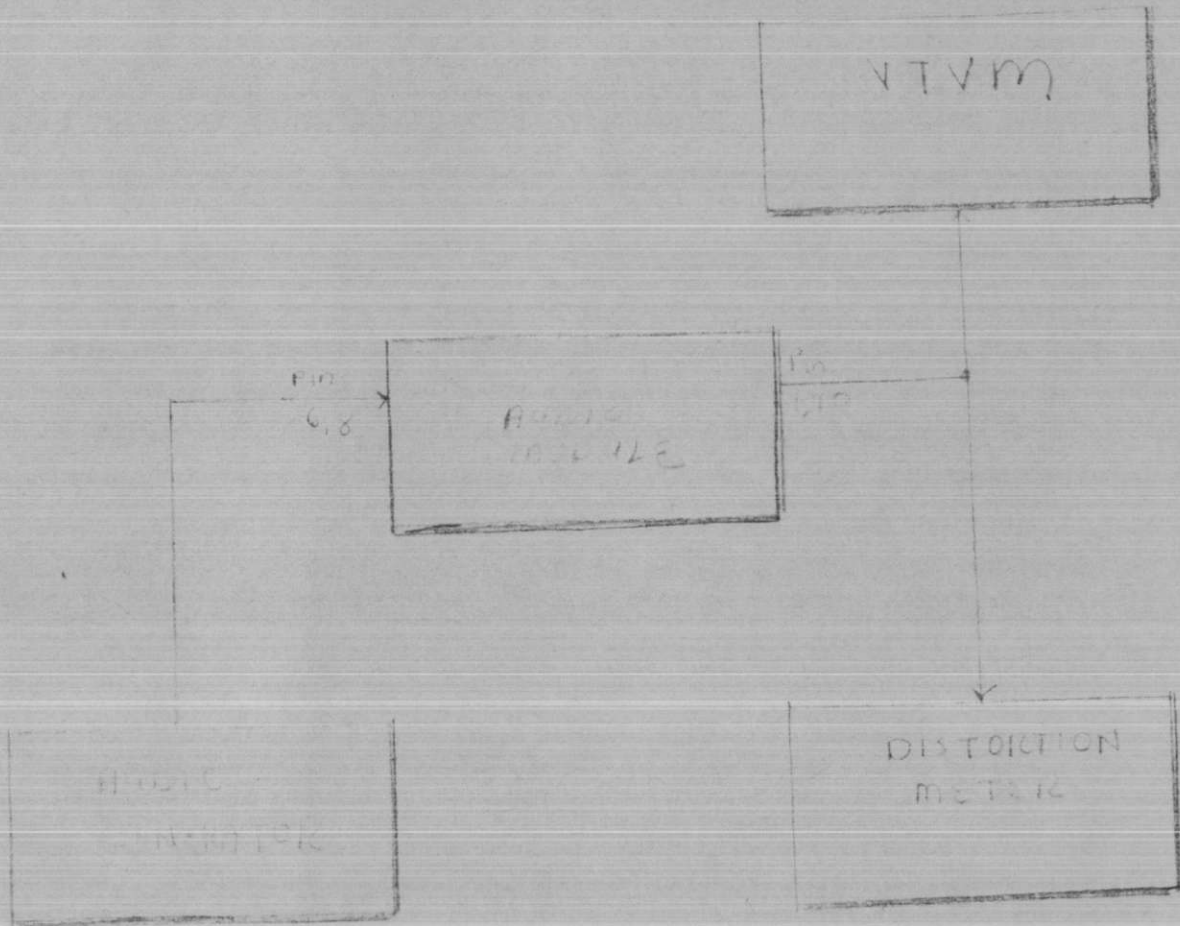
(4) Set audio generator for a -6 dbm output at 400 cps. Adjust INCR control for a 1 watt output.

(5) Connect a distortion meter to the output. The distortion should not exceed two percent.

4-2 CIRCUIT ANALYSIS OF AMPLIFIER SUBASSEMBLIES (See figures 4-1, 8-1)

Although the amplifier subassemblies should be treated as "black boxes," inasmuch as they should not be tampered with, a circuit analysis of these subassemblies are given in the next few paragraphs. Should a malfunction occur within a subassembly, replace it with another subassembly.

The 115-vac input is coupled through TB1 to voltage dropping transformer T1. From here the 115-vac is rectified through diodes CR1 and CR2. Filter capacitor C7 "flattens" the pulsating d-c output, which is coupled to the transistors in the unit.



TEST EQUIPMENT DESIRED

Ballantine Model 314 VTVM

Hewlett Packard Model 200AB Audio Generator

B and W Model 400 Distortion Meter

FIGURE 4-2. TEST SET-UP

The audio input signal is coupled to the base of emitter follower Q1 through C4 and R7. R6, in the emitter circuit of Q1, acts as the load from which the output is taken. Q1, itself, is an impedance matching device in that it allows connection of a relatively low impedance input (600 ohms) to the relatively high amplifier input impedance. The output from Q1 is coupled to the base of amplifier Q2. Amplified through Q2, the audio signal is coupled to the base circuits of drivers Q3 and Q4. Capacitor C3 in the collector-base circuit of Q2 stabilizes the operation of Q2 through degenerative feedback. Diode CR3 keeps a potential separation between Q2 and Q3.

Q3, a p-n-p transistor, and its paraphase component, Q4 (a n-p-n transistor), are connected as emitter followers supplying drive currents for power amplifiers Q5 and Q6. The 2N301 power transistors comprising the power stage are connected in a push-pull arrangement. The output from this configuration is coupled through terminal 10 to the external loudspeaker.

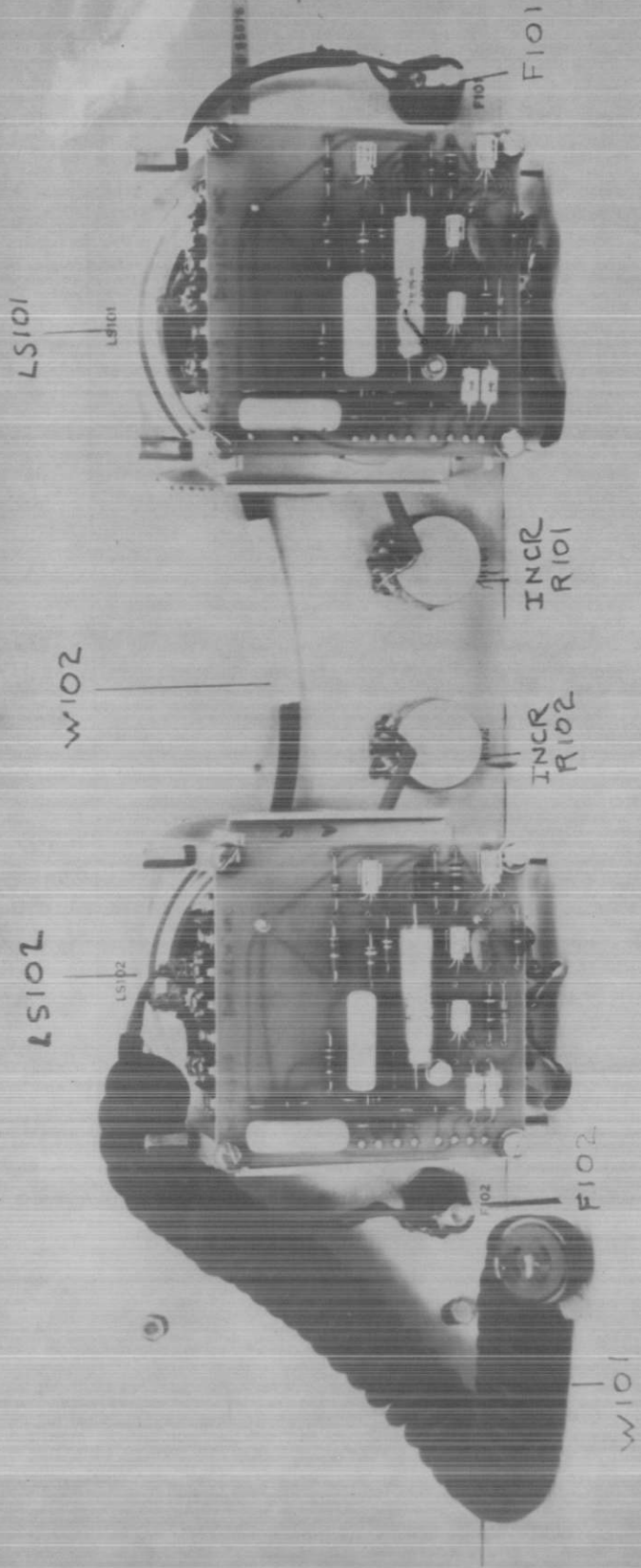


FIGURE 4-3 BSP-2, REAR VIEW

SECTION 5

MAINTENANCE

5-1. INTRODUCTION.

Maintenance may be divided into two categories: operator's and preventive. The operator's maintenance, normally that which is carried out by the operator as he works with the equipment, is in **SECTION 3** of this manual. Preventive maintenance procedures are given in this section.

It is recommended that any necessary maintenance be done by a competent maintenance technician familiar with troubleshooting techniques. If the trouble cannot be corrected by following the procedures in this section and **SECTION 4**, it is recommended that the unit be returned to the Technical Materiel Corporation for servicing.

5-2. PREVENTIVE MAINTENANCE.

In order to prevent failure of the equipment due to corrosion, tube failure, dust or other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to. At periodic intervals (at least every six months) the equipment should be removed from the rack for cleaning and inspection. All accessible covers should be removed and the wiring and all components inspected for dirt, corrosion, charring, discoloring, or grease. Dust may be removed with a soft brush. Remove dirt or grease from electrical parts with trichlorethylene. Remove dirt or grease from other parts with any good drycleaning fluid.

WARNING

When using trichlorethylene, make certain that adequate ventilation exists. Avoid prolonged contact with skin.

SECTION 6
PARTS LIST

6-1. 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. The number differentiates between parts of the same generic group. Parts of the same first major unit are numbered from 1 to 199; parts of the second 201 to 299, 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 F7 is designated XF7. 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.

Column 3 indicates how the part is used within a major component. Column 4 lists each Technical Materiel Corporation part number.

REF. SYM.	ITEM NAME AND DESCRIPTION	ITEM FUNCTIONS	TMC PART NO.
AR101	AMPLIFIER, AUDIO FREQUENCY: 115 volts ac, 60 cps.		AL-100
AR102	Same as AR101		
DS101	Non-replaceable item; part of symbol XF101.		
DS102	Non-replaceable item; part of symbol XF102.		
F101	FUSE, CARTRIDGE: 250 volts, 3/8 amp; 1 1/4" long by 1/4" dia; slow blowing.		FR-102-375
F102	Same as F101.		
LS101	LOUDSPEAKER, PERMANENT MAGNET: 3.2 ohms impedance; 4.5 watts; 4 3/16" OD.		LS-101
LS102	Same as LS101.		
P101	CONNECTOR, PLUG, ELECTRICAL: twist lock type 2 male contacts, straight type.		PL-171
R101	RESISTOR, VARIABLE COMPOSITION: 25000 ohms, 10%; 2 watt.		RVA-RN251B
R102	Same as R101		
R103	Non-replaceable item; part of symbol XF101.		
R104	Non-replaceable item; part of symbol XF102.		
W101	CABLE ASSEMBLY, POWER ELECTRICAL: consists of, 1' retracted length of 2 conductor insulated wire; 1 connector, symbol no. P101; 2 terminal lugs.		CA-575-2
W102	CABLE ASSEMBLY, POWER ELECTRICAL: consists of 2 terminal lugs; 1w inches of 2 size 14 AWG conductors.		CA-576-2-13.00

ITEM NAME AND DESCRIPTION

ITEM FUNCTIONS

TMC
PART NO.

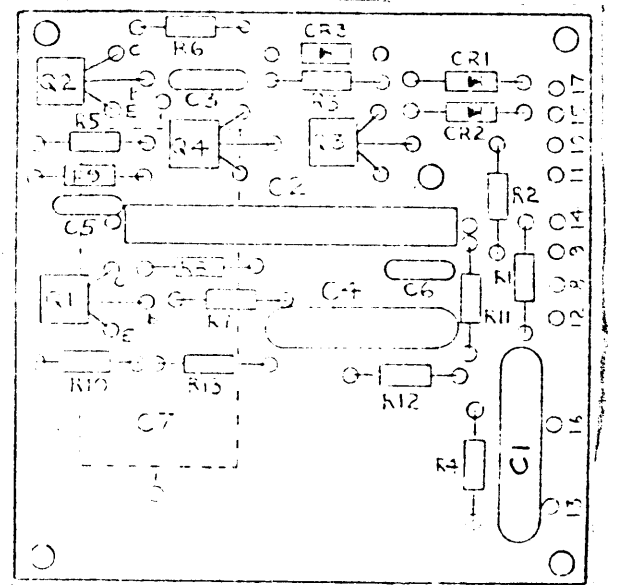
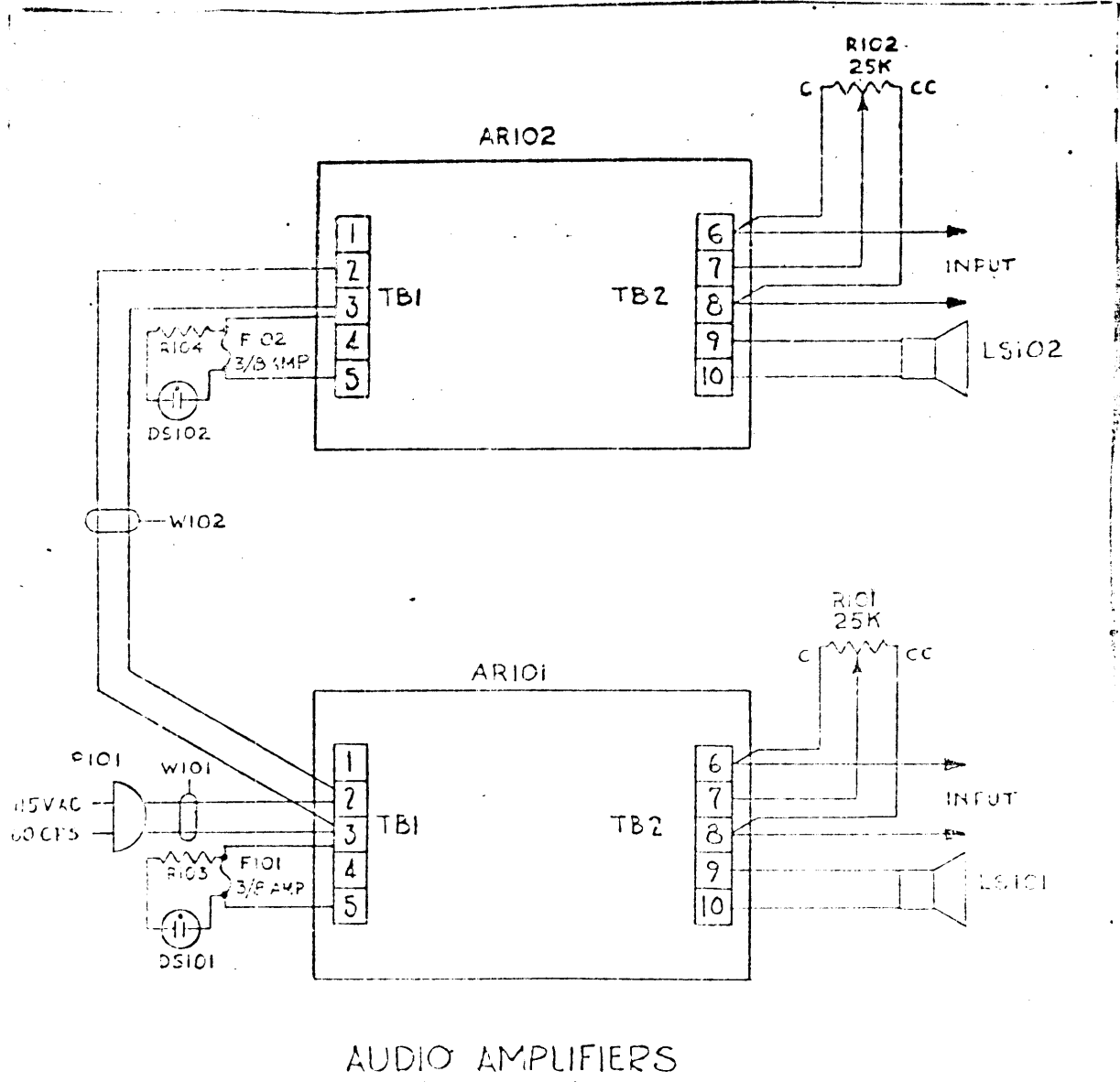
101

FUSEHOLDER: extractor post type; for 1/4" x 1 1/4" fuse; w/neon indicator lamp and 220k ohm resistor, clear octagonal lens; 100-250 volts, 20 amps; consists of symbols DS101 and R103.

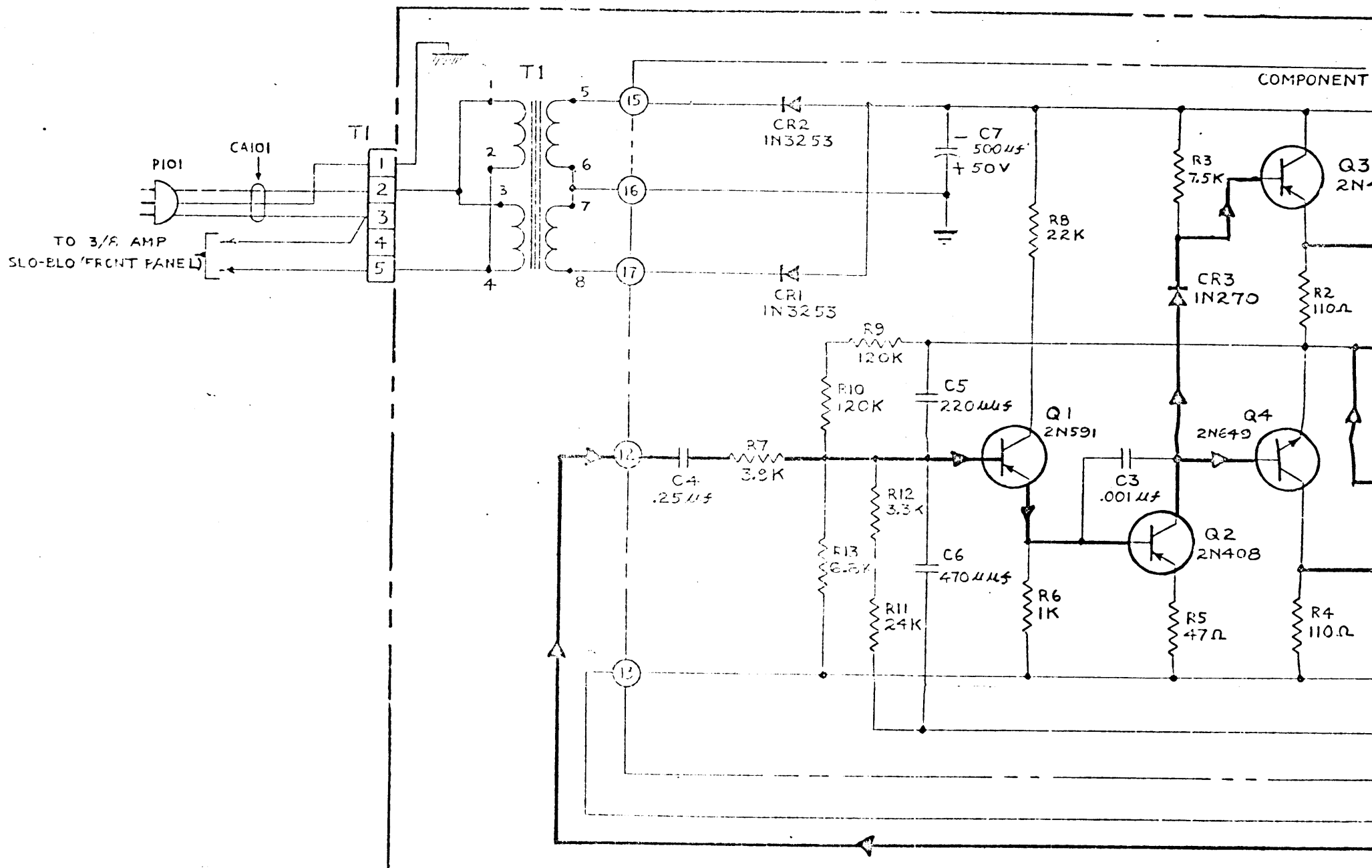
11-104-2

102

Same as XF 101; uses symbols DS102 and R104.



AR101 OR AR102



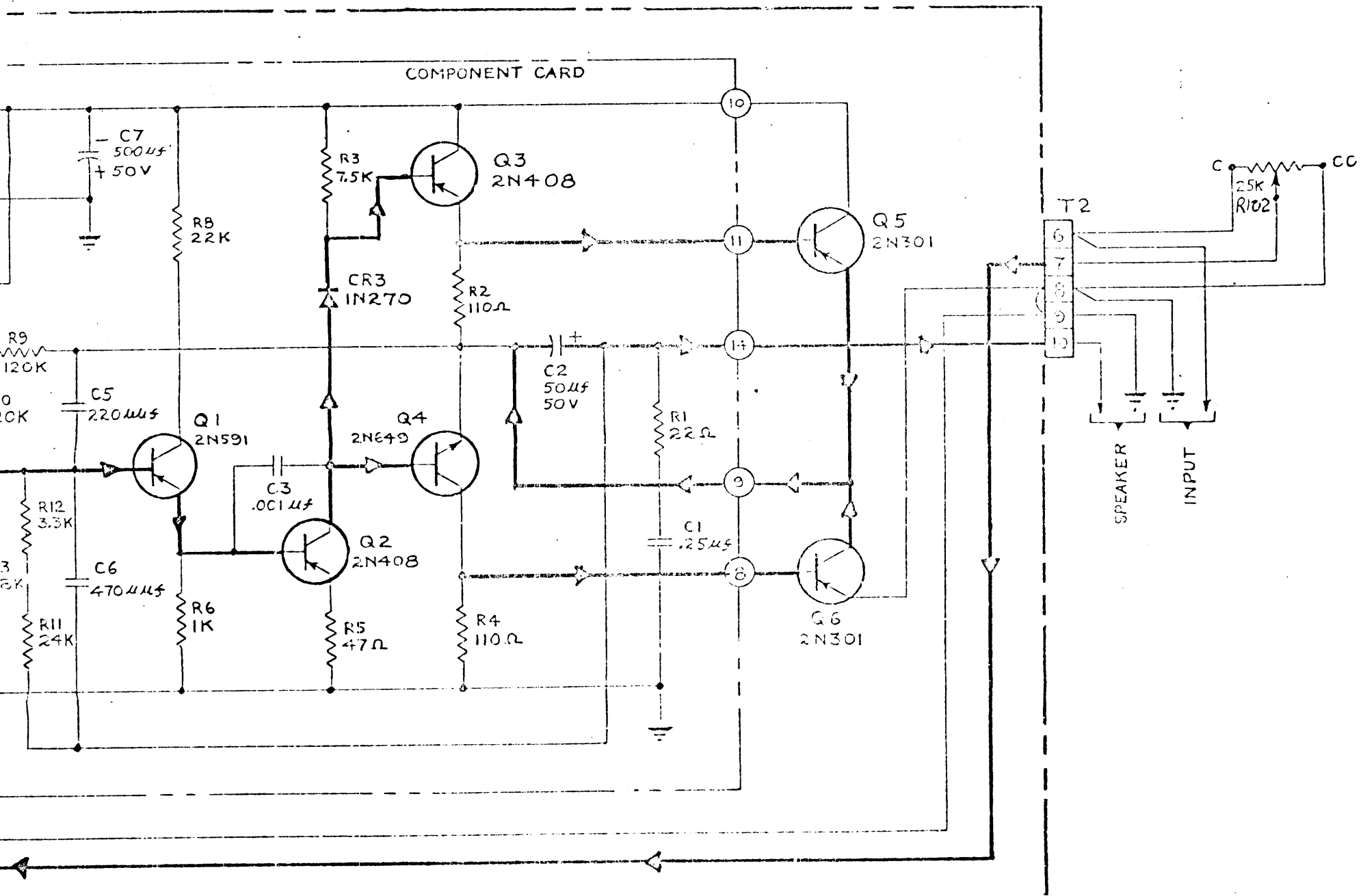
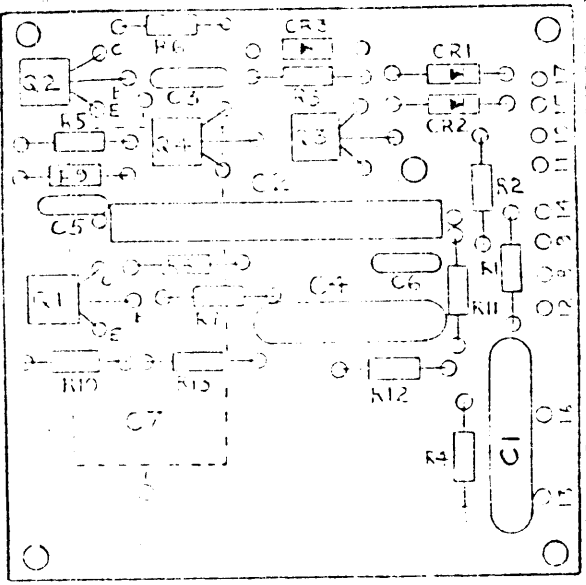


FIGURE 7-1. BSP-2. SCHEMATIC DIAGRAM

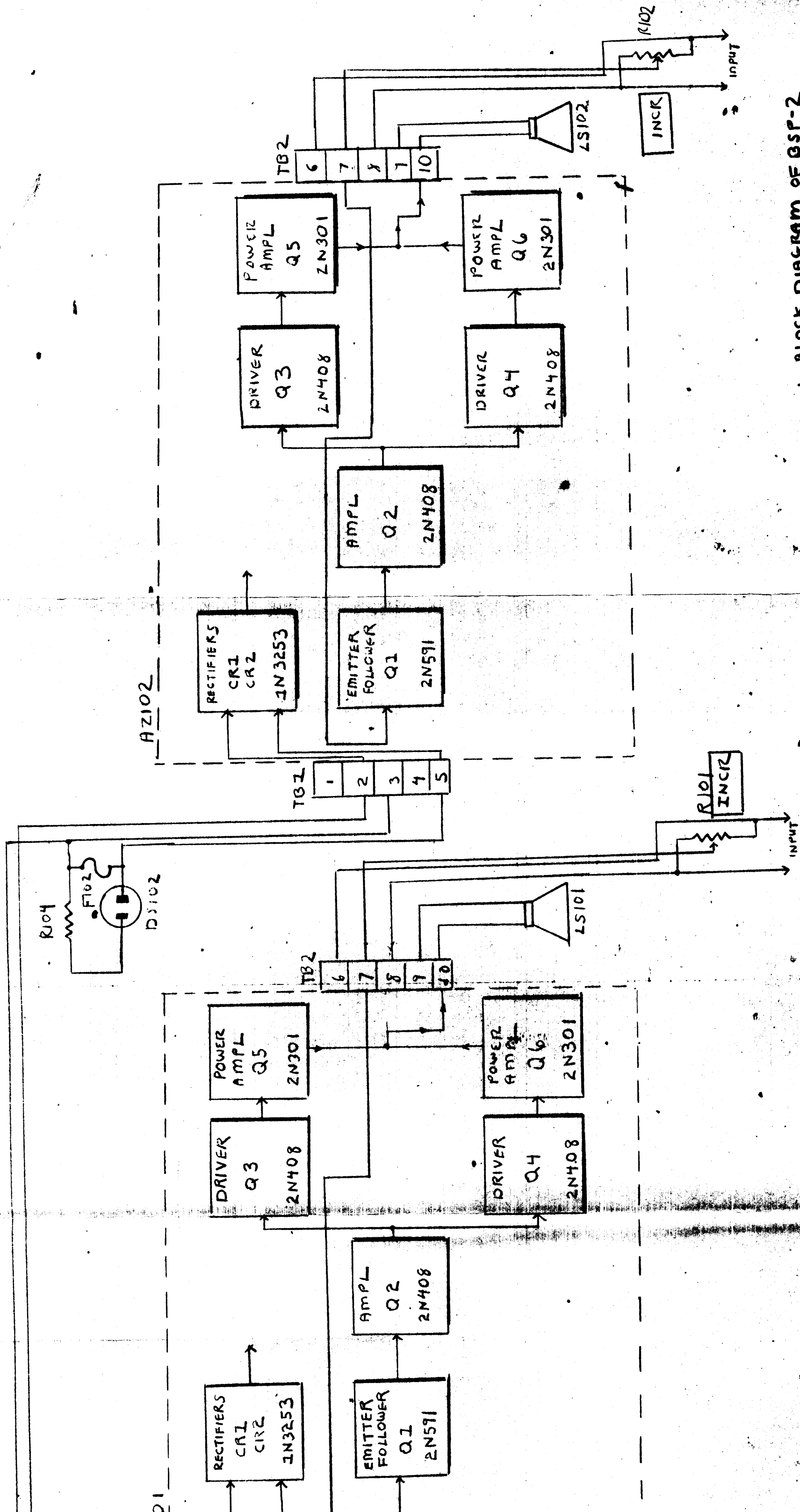


FIGURE 4-1. BLOCK DIAGRAM OF GSP-2

