UNCLASSIFIED

NAVSHIPS 0967-105-8010

TECHNICAL MANUAL

for

AUDIO FREQUENCY AMPLIFIER AM-3729/SR

DEPARTMENT OF THE NAVY
BUREAU OF SHIPS

UNCLASSIFIED

Approved: 2 February 1966
Change 1: 11 September 1967

LIST OF EFFECTIVE PAGES

PAGE NUMBERS	CHANGE IN EFFECT	PAGE NUMBERS	CHANGE IN EFFECT
Title Page	Change 1	4-3 and 4-4	Change 1
ii	Change 1	4-5	Original
iii to v	Original	5-1 to 5-3	Original
1-0 to 1-3	Original	5-4	Change 1
2-1 to 2-4	Original	5-5	Original
3-1 to 3-3	Original	6-1	Change 1
4-1 and 4-2	Original		

RADIO ENGINEERING PRODUCTS, P.O. BOX 460, MONTREAL 29

CONTRACT: NObsr-93259

Errors found in this publication (other than obvious typographical errors), which have not been corrected by means of Temporary Corrections or Permanent Changes should be reported. Such report should include the complete title of the publication and the publication number (short title); identify the page and line or figure and location of the error; and be forwarded to the Electronics Publications Section of the Naval Ships Engineering Center.

All Navy requests for NAVSHIPS electronics publications listed in the current issue of NAVSANDA Publication 2002 "Requisitioning Guide and Index of Forms and Publications, Cognizance Symbol I", or in a subsequent issue of the Electronics Information Bulletin should be directed to the appropriate Forms and Publications Supply Point.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

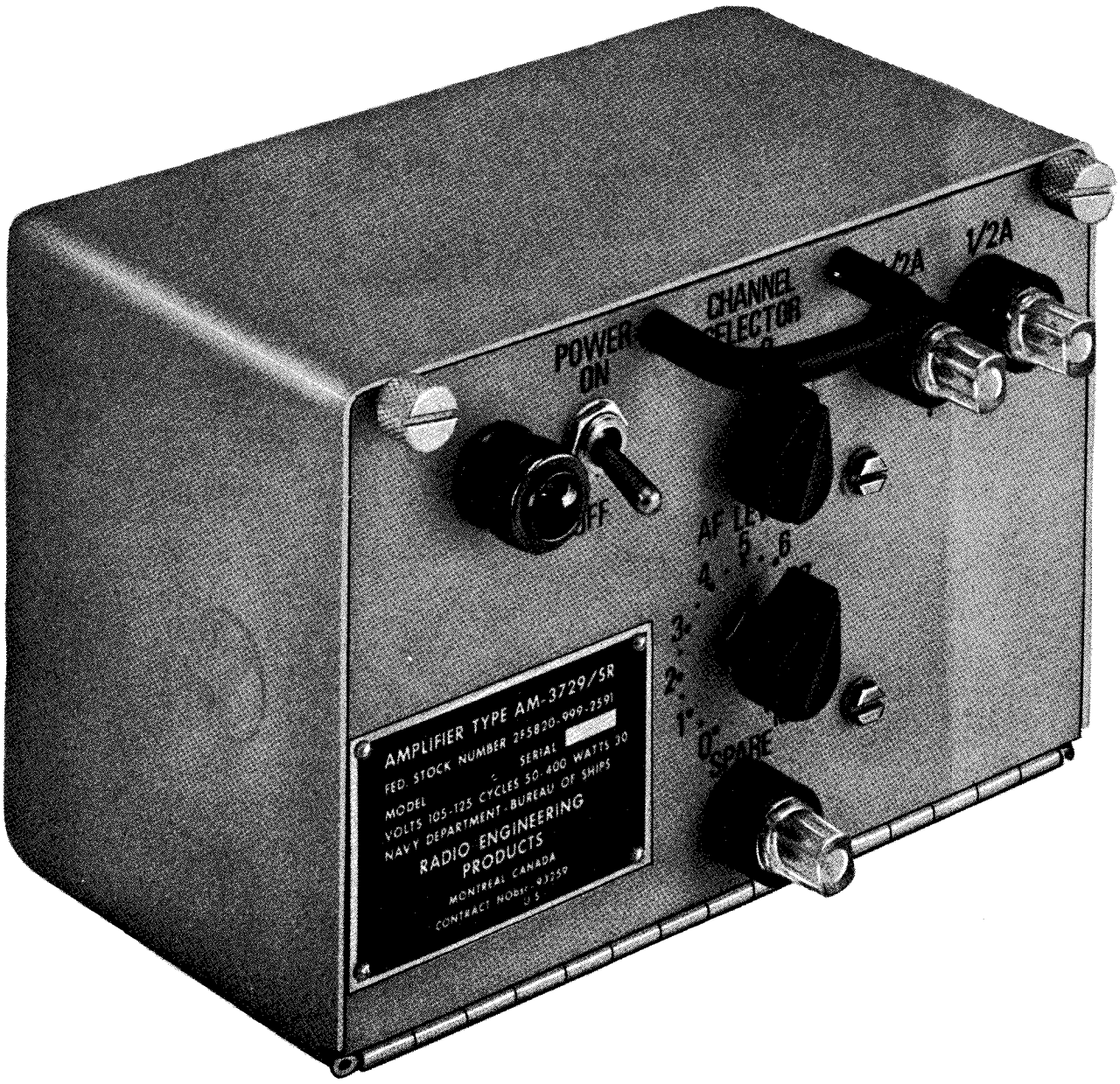


Figure 1-1. AM-3729/SR Amplifier

SECTION 1
GENERAL INFORMATION

1-1. SCOPE

This Technical Manual is in effect upon receipt. Extracts from this publication may be made to facilitate the preparation of other Department of Defense publications.

1-2. GENERAL DESCRIPTION

Amplifier, Audio Frequency, AM-3729/SR is for general use with Navy communication receivers, to operate loud speakers. It is a transistorized three-stage amplifier for audio frequencies. It has a push-pull output stage.

a. Controls. The three controls and a pilot lamp are mounted on the front panel. The controls are a POWER switch S1, an A.F. LEVEL control R2 having a range of 80 db, and a CHANNEL SELECTOR switch S2. The CHANNEL SELECTOR switch S2 selects either one of the two inputs. The pilot lamp DS1 has an adjustable shutter and a red lens.

b. Input. Input connections are provided for two 600-ohm balanced lines. The two-position CHANNEL SELECTOR switch S2 is used to select either line, and to terminate the other in 620 ohms. The primary of the input transformer is shielded and has a center tap available. Rated power output may be obtained with inputs of from 6 milliwatts to 2 watts.

c. Output. The maximum output of the amplifier is 10 watts into a 600-ohm load, with less than 2% distortion. The frequency response is flat to within 2 db from 200 to 4000 cycles per second (with respect to 1000 cps). The amplifier is regulated so that the output does not vary more than 2 db when the output load varies from 600 ohms to 300 ohms. The output winding of the output transformer is shielded and the center tap is brought out.

d. Power supply. Operation is from 50 to 60 cycles per second or from 400 cycles per second, single-phase ac. Variations of 10% in voltage and 5% in frequency are permissible. The primary winding of the power transformer is electrostatically shielded. The power supply is self-protecting against overvoltage or overload.

e. Assembly. The amplifier is enclosed in an aluminum cabinet with a front panel hinged at the bottom. The cabinet may be mounted by bolts through the top, bottom or back. A terminal strip is mounted inside the back, for terminating incoming wires. The front panel hinges forward and down to lock in a horizontal position. If desired the supports may be removed to let the chassis-panel assembly hang down and give access to the terminal strip inside the cabinet. The three modules plug into connectors on the chassis-panel assembly and fasten in position with nuts. A cable connected to the terminal strip inside the cabinet ends in a connector mating with a socket on the chassis-panel assembly, from which wires run to the three connectors of the modules and to the controls. The cabinet and front panel are finished with light grey enamel.

TABLE 1-1. EQUIPMENT SUPPLIED

QTY. PER EQUIP.	NOMENCLATURE		OVERALL DIMENSIONS (IN.)				WEIGHT (LB.)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH	VOLUME (CU. FT.)	
1	AF Amplifier	AM-3729/SR	5½	8	5⅞	.15	11¼
2	Instruction book	NAVSHIPS 0967-105-8010	10¾	8¼	—	—	¼

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

QTY. PER EQUIP.	NOMENCLATURE		REQUIRED USE	CHARACTERISTICS
	NAME	DESIGNATION		
1 or 2	Source of audio frequency such as Navy radio receiver	—	To supply a signal	Output impedance 600 ohms nominal Output power 6 milliwatts to 2 watts
1 or more	Loud speakers	—	Reproduction of sound	Input impedance 600 ohms nominal

1-3. QUICK REFERENCE DATA

Audio amplifier type AM-3729/SR
Federal stock number 2F5820-999-2591
Manufacturer ..... Radio Engineering Products
Contract NObsr-93259
Power supply ..... 105 to 125 volts
50 to 400 cps
30 watts
Input channels 2
Input level
(nominal 600 ohms) ..... 6 mw to 2 watts
Frequency range ..... 200 to 4000 cps
Output level (nominal 600 ohms) .. 10 watts max.
Level control range ..... 80 db
Dimensions ..... 5½ in. x 8 in. x 5⅞ in.
Cube ..... .15 cu. ft.
Weight ..... 11¼ lb.

SECTION 2
INSTALLATION

2-1. SITE SELECTION

The amplifier should be located where it will be most convenient for operation with the associated radio receivers and loud speakers, and for maintenance. Power should also be available (½ ampere, 115 volts, ac). The distance from the radio receivers and loud speakers is not critical and the location is not restricted as regards input and output cabling.

2-2. MOUNTING

The amplifier may be mounted by bolts through the top, back or bottom of the cabinet. Input, output and power circuits may be brought into the cabinet through holes in any of these areas where the clearance from the chassis is sufficient, preferably at the top or near the top, close to the terminals. Holes are drilled as required at the time of installation.

2-3. INSTALLATION PROCEDURE

a. Before drilling holes in the cabinet remove the chassis-panel assembly.

(1) Release the two fasteners at the top of the panel and swing it out of the cabinet.

(2) Disconnect the connector of the cabinet cable from the chassis.

(3) Disconnect the stays by removing the retaining rings from the studs. Remove the retaining ring from the hinge pin and pull out the pin.

b. Drill the required holes in the case. Four ¼″ mounting bolts should be used, spaced as far apart as possible in the indicated areas. A hole or holes for wires should be drilled as required.

c. Mount the case with the heads of the bolts inside.

d. Pass the required wires through the holes and connect them to terminal strip TB1.

CAUTION

Do not drop the retaining rings.
If lost, standard items per MS16633-4017 for the stays and per MS16633-4 for the hinge pin may be used.

e. Replace the chassis-panel assembly, hinge pin and stays and replace the retaining rings.

f. Connect the cable to the chassis connector.

g. Press the stays outward with the thumbs to release the latches.

h. Close and fasten the panel.

i. Complete all connections to the input source, the output load and the power source. Adjust the input source to provide a level between 6 milliwatts and 2 watts.

2-4. POWER CONNECTIONS

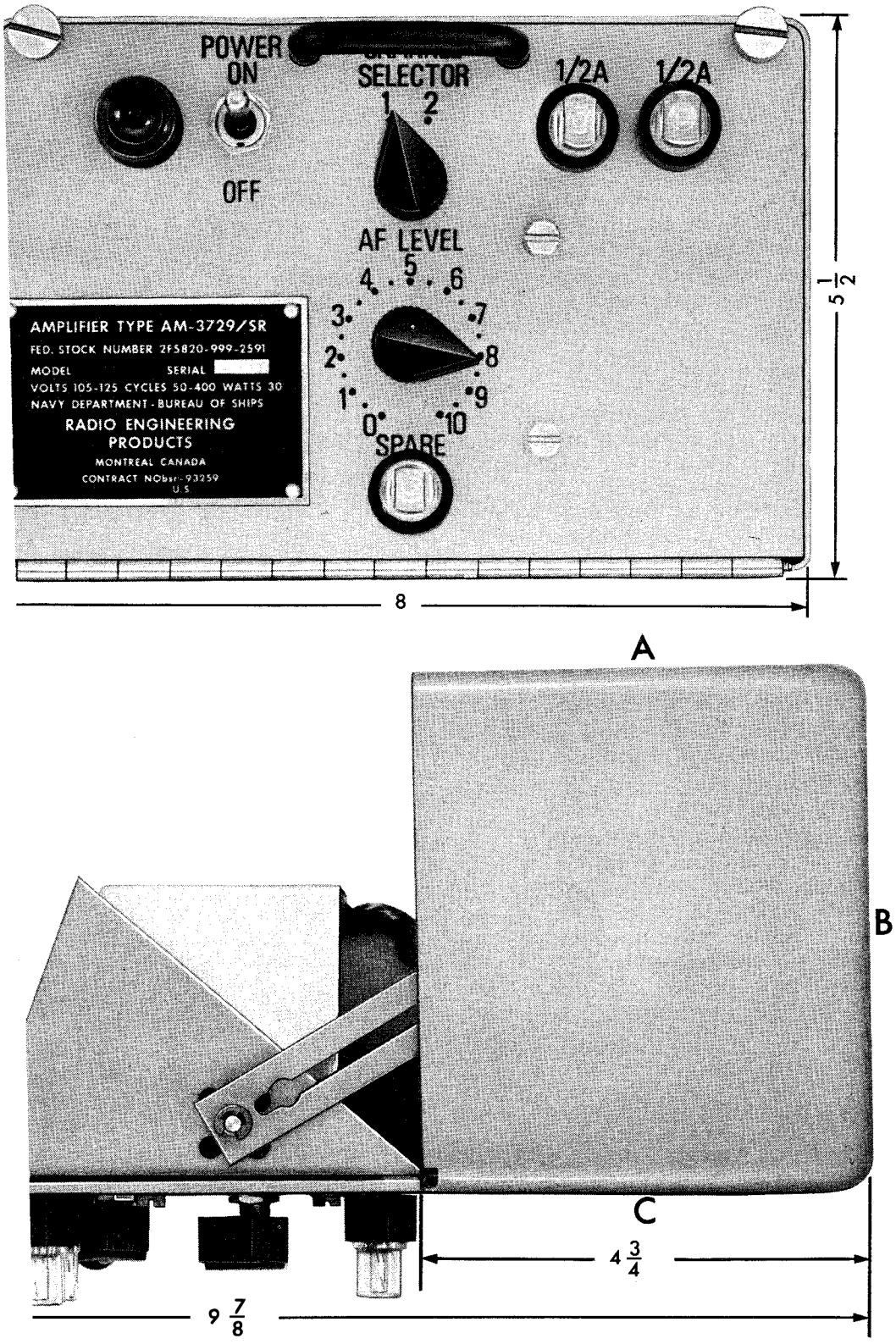
Measure the ac supply voltage. At J4, one wire should be on terminal 15 for 125 volts, on terminal 14 for 115 volts and on terminal 13 for 105 volts. The factory will connect to terminal 14.

2-5. INSTALLATION CHECK

a. Operate the POWER switch S1 to the ON position. The pilot lamp DS1 should light; turn the shutter housing counterclockwise to ensure that the shutter is open.

b. Operate both signal sources; turn the CHANNEL SELECTOR switch S2 to channel 1 and then to channel 2 noting whether each is reproducing normally.

c. Rotate the AF LEVEL control R2 noting whether the volume increases and decreases steadily.



Note: Holes may be drilled for mounting bolts and wire entrance in areas A, B or C. Avoid rivets, braces and wiring.

Figure 2-1. Dimensions and method of mounting.

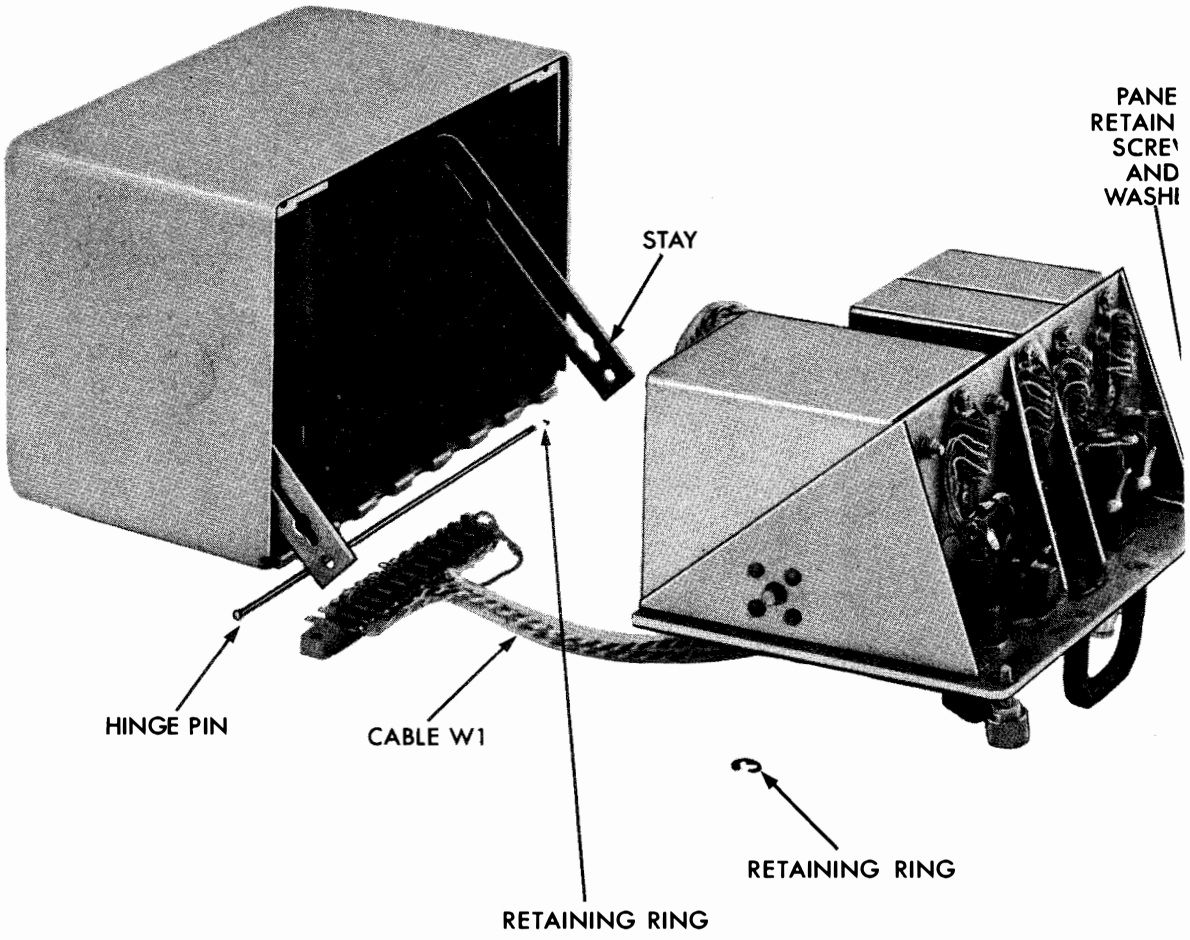


Figure 2-2. Amplifier removed from case.

SECTION 3
OPERATION

3-1. OPERATING PROCEDURE

a. Operating controls of the amplifier are shown in figure 3-1.

b. Operate the AF LEVEL control R2 to step 1. Turn the CHANNEL SELECTOR switch S2 to the desired channel. Operate the power switch S1 to the ON position. The pilot lamp DS1 indicates that the power is on. Rotate the shutter to adjust the brightness. Adjust the AF LEVEL control R2 for the desired level.

c. To shut down the amplifier, first turn the AF LEVEL control R2 to 1, then operate the POWER switch S1 to OFF.

3-2. OPERATOR'S MAINTENANCE

a. DAILY CHECK. To ensure proper operation, the amplifier should be given a daily operational check. Turn on the amplifier, supply input signal and check the output for quality and volume on both channels. Rotate the AF LEVEL control R2 to check for normal, quiet control of the amplifier output. Adjust the pilot lamp DS1 for the desired brightness by rotating the sutter.

b. PREVENTIVE MAINTENANCE. The periodic mechanical and electrical checks and maintenance procedure given in table 3-1 should be carefully followed in order to assure continuity of service at all times and the maintenance of the equipment at its peak performance.

c. EMERGENCY MAINTENANCE.

NOTICE TO OPERATORS

Operators shall not perform the following emergency maintenance procedures without proper authorization.

The only things which the operator should attempt to replace are the pilot lamp and the fuses.

(1) To replace the pilot lamp DS1 unscrew the lens shutter. Remove the lamp by pressing in and turning counterclockwise. Press in a new lamp and rotate clockwise until it locks. Screw on the lens shutter.

CAUTION

NEVER REPLACE A FUSE WITH ONE OF GREATER THAN ½ AMPERE RATING. IF A FUSE BURNS OUT IMMEDIATELY AFTER REPLACEMENT, DO NOT REPLACE IT A SECOND TIME UNTIL THE CAUSE HAS BEEN CORRECTED.

(2) When a fuse burns out the indicating lamp in the fuse holder lights up. To replace a fuse F1 or F2 turn the cap of the fuse holder counterclockwise to release the cap and fuse. Pull the fuse out of the cap and insert a new fuse. Press the fuse and cap into the fuse holder and turn clockwise to lock. Use the fuse from the SPARE fuse holder and replenish from stock.

TABLE 3-1. OPERATOR'S EMERGENCY MAINTENANCE CHART

TROUBLE SYMPTOM	PROBABLE CAUSE	CORRECTION
POWER switch S1 ON but pilot lamp does not light.	Pilot lamp DS1 burned out.	Replace the pilot lamp from spares (par. 3-2 c(1)).
	Fuse F1 or F2 blown.	Replace with spare fuse (par. 3-2 c(2)).
	AC power source not on.	Turn on power source or report power failure.
POWER switch S1 ON, pilot lamp lights, but no signal output or unsatisfactory output.	No input or unsatisfactory signal input.	Try the other channel; check unsatisfactory input source; check input connections on terminal strip.

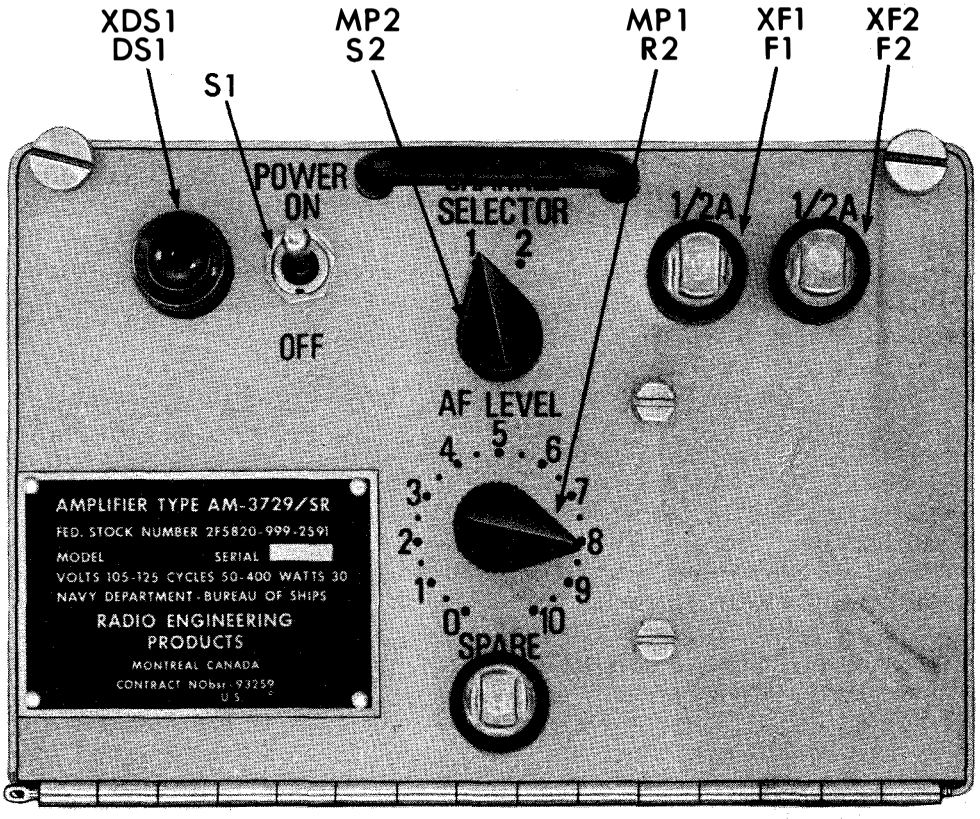


Figure 3-1. Operating panel.

SECTION 4
TROUBLE SHOOTING

4-1. METHOD

Trouble shooting involves recognition of the existence of a fault and then locating the cause of the fault in order that it may be corrected. When the cause is not obvious, start first with simple tests.

4-2. FUNCTIONAL DESCRIPTION

This is a transistorized amplifier with an input module, a power output module and a power supply module. The schematic is shown in Figure 5-3.

a. Inputs. The two af inputs come through the terminal strip TB1 inside the rear of the cabinet to the CHANNEL SELECTOR switch S2. When this switch is set for input 1 it connects this input to the amplifier, and terminates input 2 with 620 ohms. When set for input 2 it connects this input to the amplifier and terminates input 1 with 620 ohms.

b. Input module. From the CHANNEL SELECTOR switch S2, the input goes through terminals 1 and 9 of connector J2 to the input transformer in the input module. The transformer appears as a pure resistance. The output of the transformer from the input module goes through terminals 2 and 7 to the A.F. LEVEL control R2; it then goes to the interstage transformer through terminals 7 and 10 and to the first transistor amplifier. The output of the transistor goes through an interstage transformer to two transistors operating as a push-pull second stage amplifier.

c. Power output module. The output from the input module, terminals 8 and 15 of J2, is applied through terminals 1 and 9 of J3 of the power output module, is amplified by two transistors in push-pull and appears at the output winding of the output transformer terminals 8 and 15 and thence to the terminal board. The output transformer provides negative feedback for improvement of the amplifier characteristics, through terminals 2 and 10 of J3.

d. Power supply module. The ac input power comes through fuses F1 and F2 and through POWER switch S1 through terminals 9 and 14 of J4 to the power transformer. Three primary taps are provided, terminals 15, 14 and 13, for 125 volts, 115 volts and 105 volts respectively. The secondary of the transformer supplies a bridge rectifier whose dc output is filtered. Through terminal 3 of J4, —27 vdc is supplied to the power output module; through terminal 12 of J4, —25 vdc is supplied to the input and power output modules; through terminal 7 of J4, —17 vdc is supplied to the input module. The positive side of the rectifier output is grounded. The pilot lamp DS1 operates on 6.3 volts ac through terminals 4 and 5 of connector J4.

4-3. TESTING

a. The trouble shooting diagram is figure 4-2 and the test points are shown in figure 4-3. Perform the listening tests as indicated in figure 4-3, at points A to G, with the earphone. Note absence of signals, weak signals or distortion. Make dc voltage tests with multimeter AN/PSM-4 or equivalent, at points H, J, K and L to detect incorrect dc voltages to ground. Make resistance tests with the multimeter if it is necessary to check values of resistors R1, R2 or R3.

b. A normal amplifier will give full output with not more than 1.9 volts of audio power applied to the input. Full output is 77.5 volts of audio power across a 600-ohm output load.

4-4. TEST EQUIPMENT AND SPECIAL TOOLS

a. Test equipment. The following test equipment or equivalent may be required.

1. Earphone connected as shown in figure 4-3.
2. Multimeter AN/PSM-4.
3. Audio frequency (1000-cycle) oscillator AN/URM-127.
4. Vacuum-tube voltmeter AN/USM-16.
5. Transistor tester AN/USM-206.

b. Tools. No special tools are required but the following items should be at hand.

1. Pliers, long nose.
2. Screwdriver, small 6-inch.
3. Soldering iron, 25 watt or 100 watt.
4. Solder.

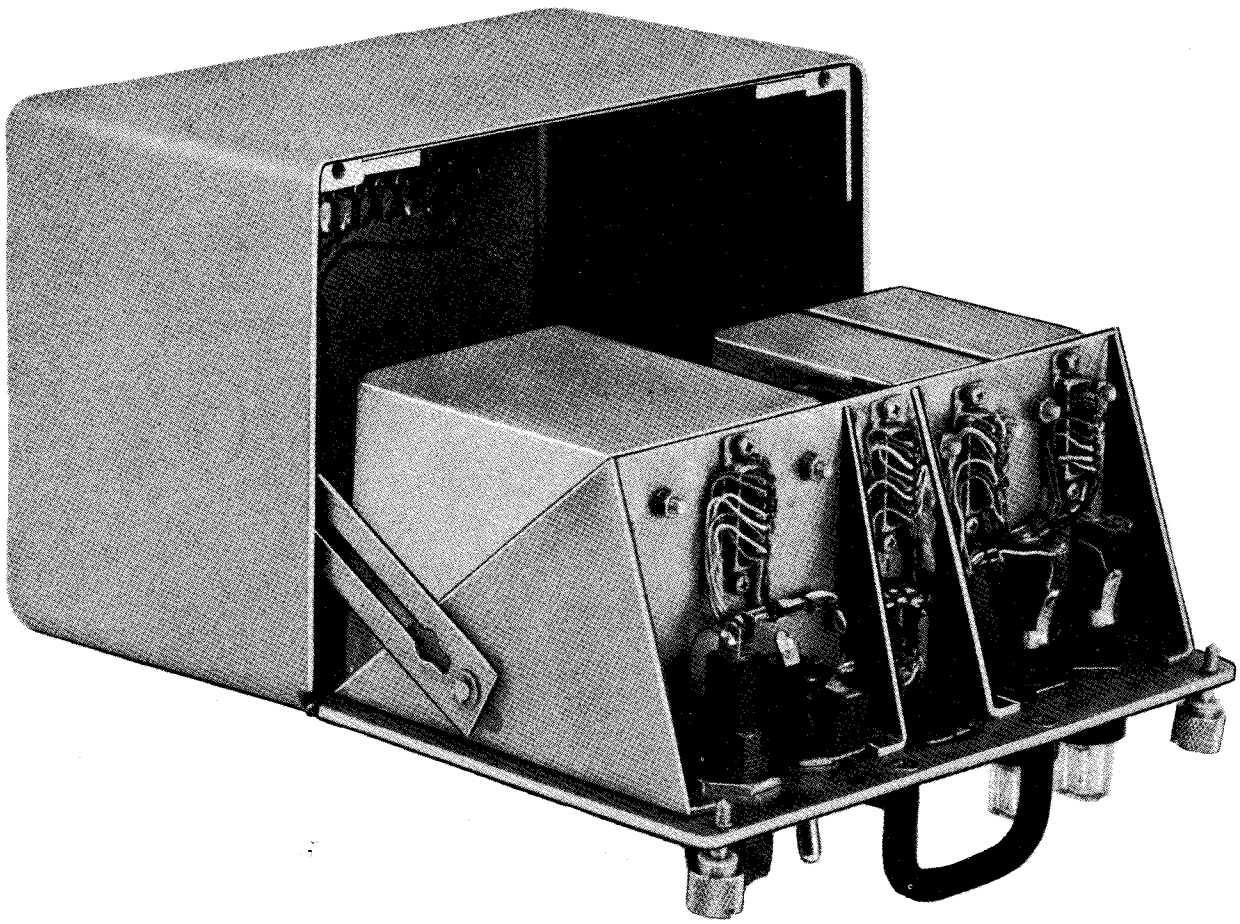


Figure 4-1. Amplifier open for maintenance.

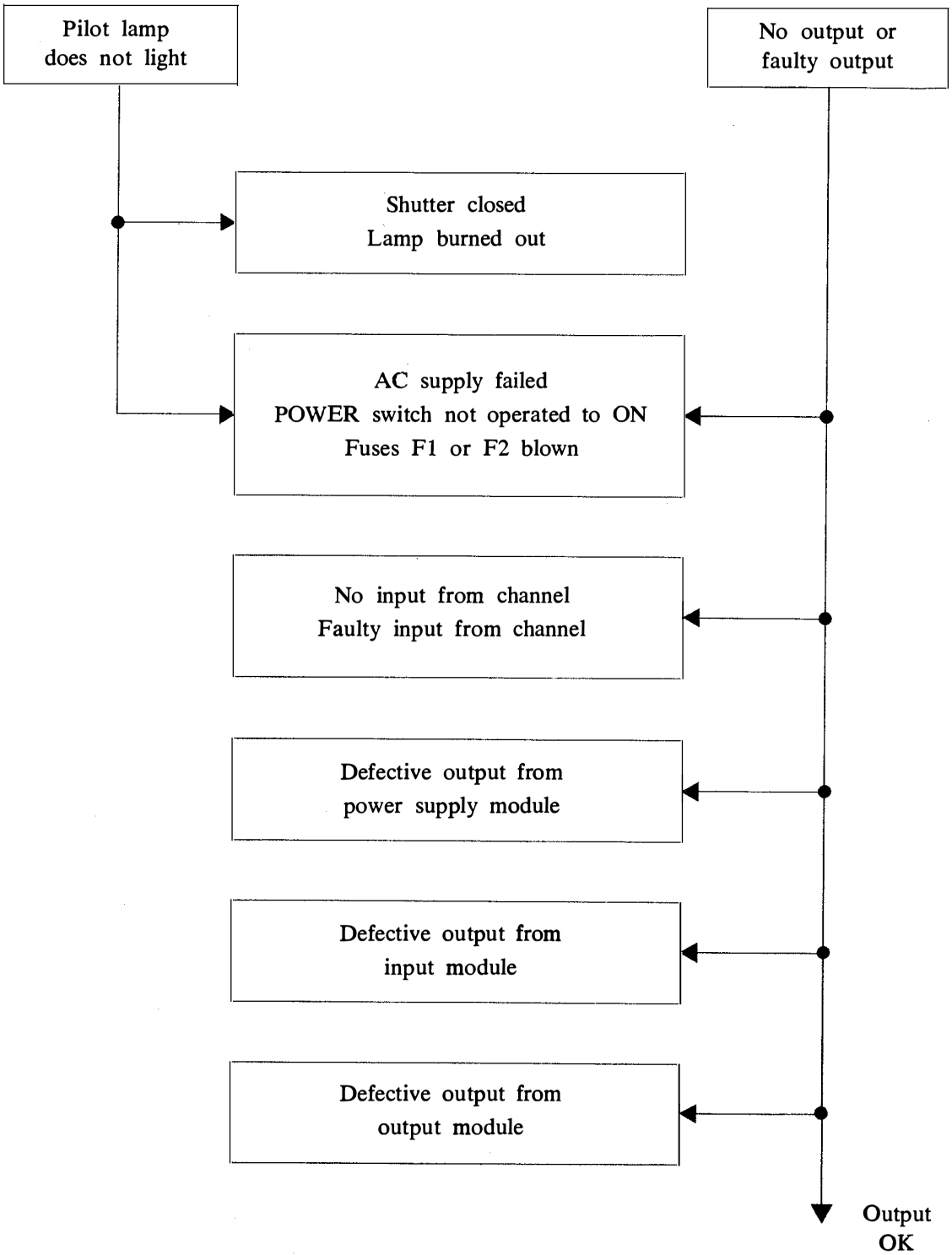


Figure 4-2. Trouble shooting diagram.

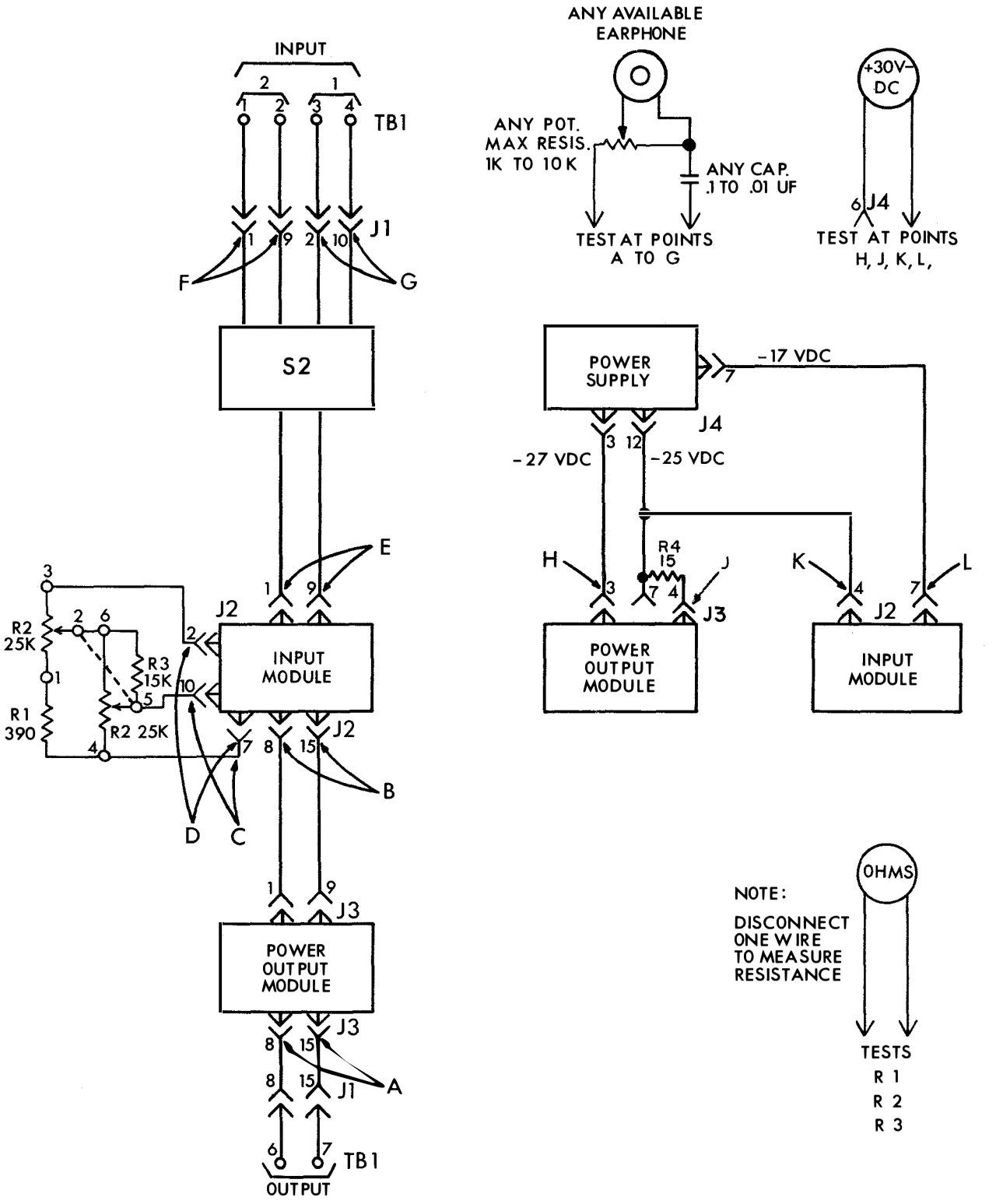


Figure 4-3. Test point diagram.

SECTION 5
MAINTENANCE

5-1. FAILURE, AND PERFORMANCE AND OPERATIONAL REPORTS

The Bureau of Ships no longer requires the submission of failure reports for all equipments. Failure Reports and Performance and Operational Reports are to be accomplished for designated equipments (refer to Electronics Installation and Maintenance Book, NAVSHIPS 900,000) only to the extent required by existing directives. All failures shall be reported for those equipments requiring the use of Failure Reports.

5-2. PREVENTIVE MAINTENANCE

a. Monthly. Visually inspect the equipment for excessive dirt or grease, broken or loose knobs or excessive corrosion. Do not open the panel unless external appearance indicates that the interior should be inspected or unless the equipment is not performing satisfactorily.

b. The location of parts is shown in figures 3-1, 5-1 and 5-2. The schematic and wiring diagrams are figures 5-3 and 5-4. Do not replace any major parts until sufficient testing has been done to prove that other parts or wiring are not at fault.

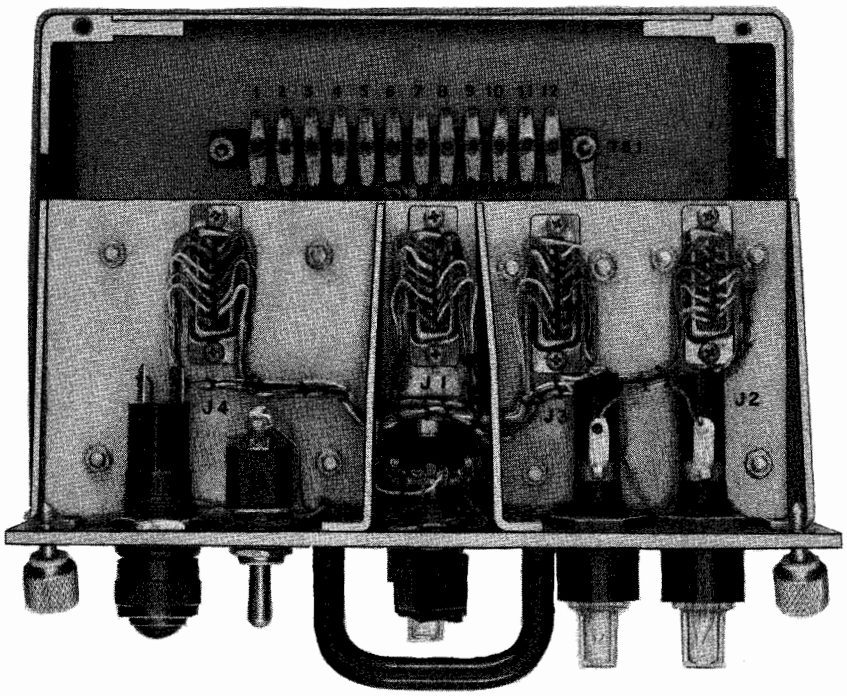


Figure 5-1. Front view.

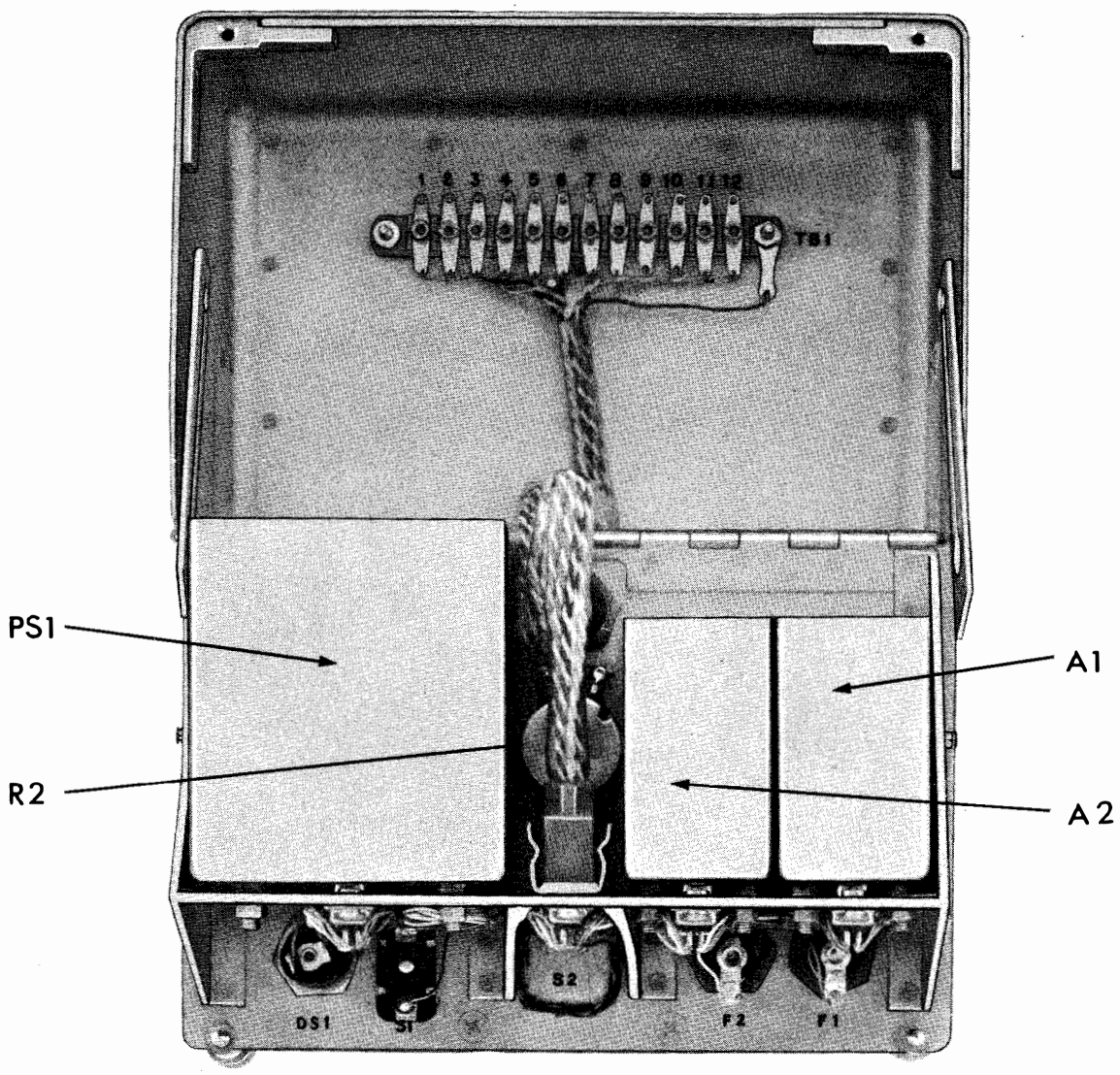


Figure 5-2. Inside rear view.

SECTION 6

MAINTENANCE PARTS LIST

TABLE 6-1. MAINTENANCE PARTS LIST

REF. DESIG.	NAME AND DESCRIPTION	USE
A-1*	MODULE, input: sealed network containing the first and second amplifier stages, per REP dwg F54421	
A2*	MODULE, power output: sealed network containing the third amplifier stage, per REP dwg F54422	
DS1	LAMP, incandescent: per MS15571-2	Pilot lamp
F1	FUSE, non-renewable glass: per MS90078	AC line
F2	Same as F1	AC line
J1	CONNECTOR, receptacle: 15 contacts, per REP dwg F54641	On chassis
J2	Same as J1	For module A1
J3	Same as J1	For module A2
J4	Same as J1	For module PS1
MP1	KNOB, pointer: per MS91528-1P2B	For S1
MP2	Same as MP1	For R2
PS1*	MODULE, power supply: sealed network containing rectifiers and filters; input 50-60 or 400 cps at 105, 115 or 125 volts, 26 watts; output: −17 vdc, −25 vdc, −27 vdc and 6.3 vac, per REP dwg F54420	
R1	RESISTOR, fixed: per MIL-R-11 type RC20GF391J	Level control
R2	RESISTOR, variable: composition type, two sections each 25,000 ohms, per REP dwg F54639	Level control
R3	RESISTOR, fixed: per MIL-R-11 type RC20GF153J	Level control
R4	RESISTOR, fixed: per MIL-R-11 type RC20GF150J	
S1	SWITCH, toggle: per MS35058-22	AC power
S2	SWITCH, rotary: per MIL-S-3786, type SR05N30B1MGC per REP dwg F54590	Channel selector
TB1	BOARD, terminal: per MIL-T-16784 type 25TB12	External wires
W1	CABLE ASSEMBLY: 11 wires with terminal lugs one end and a 15-contact plug other end, per REP dwg F54583	Connects TB1 to J1
XDS1	HOLDER, lamp: per MIL-L-3661 type LH75LC18RD	For DS1
XF1	HOLDER, fuse: per MIL-F-19207 type FHL17G	For F1
XF2	Same as XF1	For F2
	CLIP: per REP dwg F55426	For W2
	NUT: per REP dwg F55364	For A2
	PIN: per REP dwg F55010	For hinge
	RING: per MS16633-4	Pin retainer
	RING: per MS16633-4017	Stay retainer
	SCREW: per REP dwg F55222	Panel
	STAY: per REP dwg F55223	Support
	WASHER: per REP dwg F55237	Stay spring
	WASHER: per REP dwg F55382	Stay, teflon
	WASHER: per REP dwg F55388	Panel, screw
	WASHER: per REP dwg F55394	A1, A2, PS1
	WASHER: per REP dwg F55398	Panel screw

*Modules A1, A2 and PS1 are not repairable.

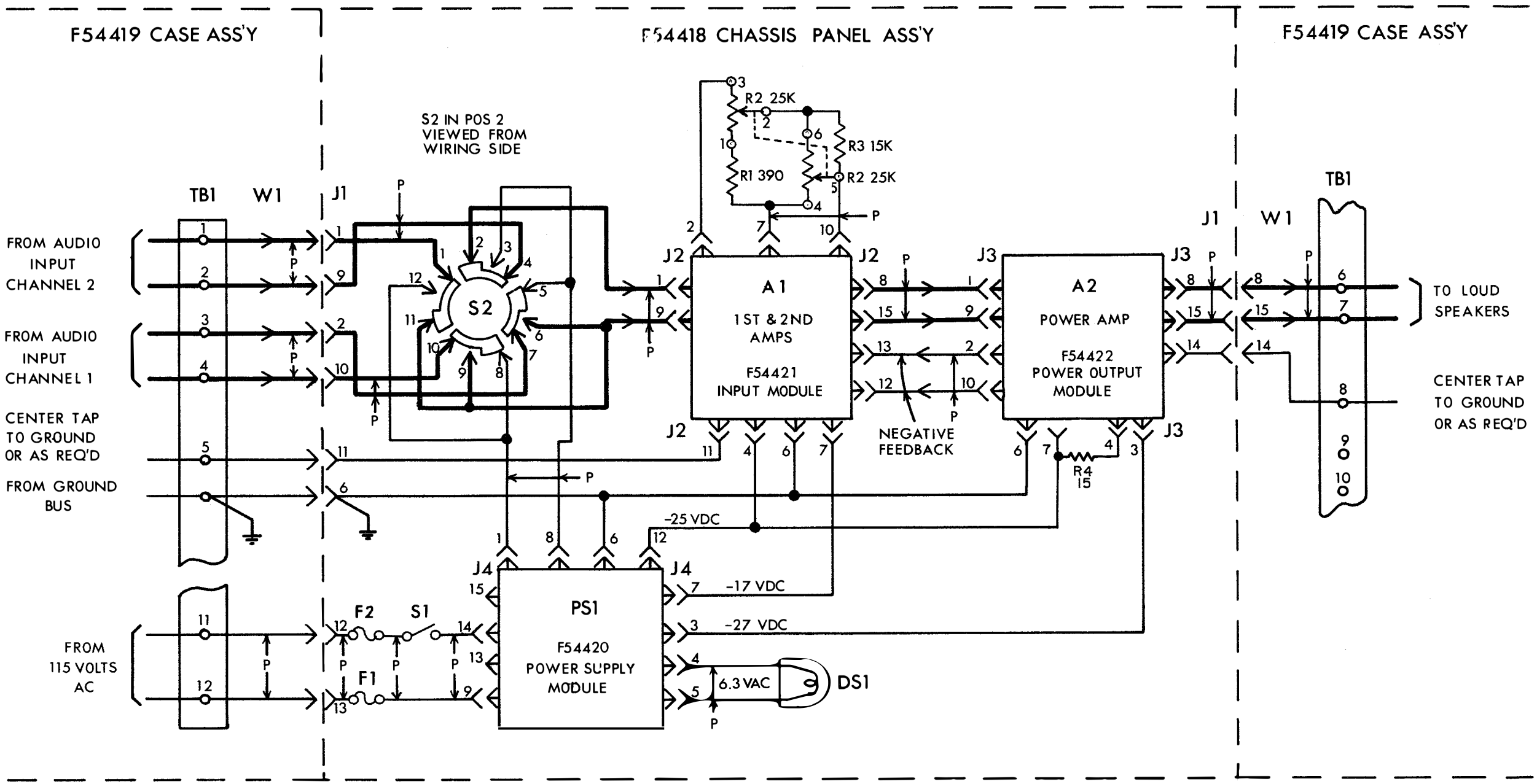


Figure 5-3. Amplifier AM-3729/SR, Schematic.

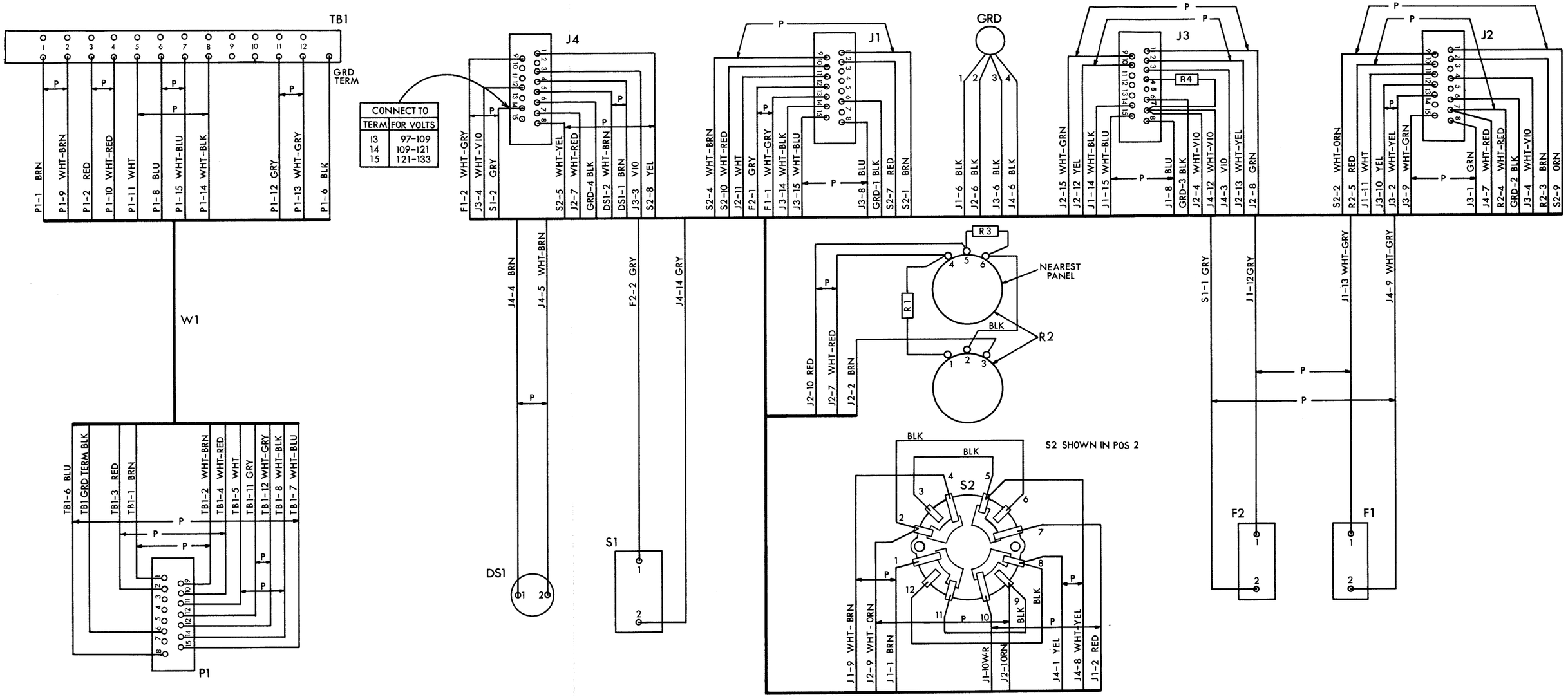


Figure 5-4. Wiring diagram.