

Western Electric

129A
AMPLIFIER



Instruction Bulletin No. 1097P

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DESCRIPTION

Type

Four identical, electrically separate two-stage fixed-gain amplifiers mounted on a common chassis. They are intended for use as pre-mixing or low level amplifiers in high quality Audio Frequency Amplifying Channels for Speech Input or Sound Systems. The amplifier is designed for operation from an external power supply source (Pre-amplifiers A and B, common source; pre-amplifiers C and D, common source; all can be common).

Typical Electrical Characteristics for Each of the Four Amplifier Elements

Gain—Approximately 40 db.

Operates from—30, 250 or 600 Ohms.

Operates into—600 Ohm Load.

Output Power—Normal—.01 Watt (+ 10 dbm*)

—Maximum—.038 Watt (+16 dbm*) with approximately
1% total harmonic distortion.

Output Noise—82 dbm* Unweighted.

—87 dbm* Weighted.

Frequency Characteristic—Flat within ± 1 db over the range 30 to 15,000 cycles.

Power Supply Required for Complete Amplifier—(four Pre-amplifiers)

Filament—6.3 Volts 3.2 Ampere.

Plate—275 Volts, 30 ma.dc. (Pre-amplifiers A and B can be supplied from one source while C and D are supplied from another—1.6 amp. filament and 15 milli-amps plate required for each half of amplifier.)

(Filament and plate supply may be obtained from 18A or 20A Rectifier.)

* (Ref.—.001 Watt)

Equipment Characteristics

Panel Size—Approximately $17\frac{7}{8}$ inches by $10\frac{5}{16}$ inches. The apparatus extends approximately $4\frac{1}{2}$ inches from the front and $2\frac{1}{4}$ inches from the rear of the panel.

Weight—Approximately $20\frac{1}{4}$ pounds.

Mounting—Designed for mounting on a special 177 Type Mounting Plate. Flexible rubber mountings are furnished. One 129A Amplifier may be mounted on one plate, requiring $10\frac{1}{2}$ inches of vertical space on standard 19-inch racks or bay cabinets. A Special 296 type panel is required as a face mat for the Mounting Plate.

INSTALLATION

Mounting

Mounting dimensions are shown in Fig. 3. One amplifier can be mounted on a Special Mounting Plate which requires $10\frac{1}{2}$ inches of relay rack or equipment cabinet space. If a cabinet is used, it must have an inside depth of at least 8 inches. A blank front mat is required for use with this mounting plate. Flexible rubber mountings, nuts and washers are supplied with the amplifier for fastening it to the mounting plate.

Mounting Precautions

The amplifier chassis is insulated electrically from the mounting plate by the flexible rubber mountings which aid in controlling circuit grounding. Care should be used to avoid rendering this insulation ineffective by contact between chassis and mounting.

Avoid exposure to magnetic fields which might induce noise in the equipment.

When equipment such as 18A or 20A Rectifiers or amplifiers with self-contained a-c power supplies are mounted on the same bay with 129 Amplifiers it is desirable to have maximum separation (10 inch minimum) between the input transformers of the 129A Amplifier and the power transformer of the a-c operated equipment.

Hum caused by pick-up in the input transformers can often be reduced by loosening the clamping ring and rotating the transformers to the position of minimum hum. To avoid damaging the leads the transformers should not be rotated more than 180 degrees in either direction from their original positions.

External Connections:

Terminals	1 to 8 inclusive	located on Terminal Strip	TS 1
"	9 to 16	" " " "	TS 2
"	17 to 19	" " " "	TS 3
"	20 to 27	" " " "	TS 4
"	28 to 35	" " " "	TS 5
"	36 to 38	" " " "	TS 6

Terminal Numbers

External Connections

1 and 2	30 Ohm Input, Preamplifier #A
2 and 3	250 Ohm Input, Preamplifier #A
1 and 3	600 Ohm Input, Preamplifier #A
4	Plate Current Meter positive, First Stage, Preamplifier A
5	Plate Current Meter positive, Second Stage, Preamplifier A
6 and 7	600 Ohm Output, Preamplifier A
8	Plate supply +275 Volts d-c, Preamplifiers A and B
9	Plate supply -275 Volts d-c—for Preamplifiers A and B; also Plate Current Meter Negative for Preamplifiers A and B
10 and 11	600 Ohm Output, Preamplifier B
12	Plate Current Meter positive, First Stage, Preamplifier B
13	Plate Current Meter positive, Second Stage, Preamplifier B
14 and 15	30 Ohm Input, Preamplifier B
15 and 16	250 Ohm Input, Preamplifier B
14 and 16	600 Ohm Input, Preamplifier B
17 and 18	6.3 Volts a-c or d-c Filament supply, Preamplifiers A and B
19	Ground (See System Grounding)
20 and 21	30 Ohm Input, Preamplifier C
21 and 22	250 Ohm Input, Preamplifier C
20 and 22	600 Ohm Input, Preamplifier C
23	Plate Current Meter positive, First Stage, Preamplifier C
24	Plate Current Meter positive, Second Stage, Preamplifier C
25 and 26	600 Ohm Output, Preamplifier C
27	Plate Supply +275 Volts d-c, Preamplifiers C and D
28	Plate Supply -275 Volts d-c; for Preamplifiers C and D, also Plate Current Meter Negative for Preamplifiers C and D
29 and 30	600 Output, Preamplifier D
31	Plate Current Meter positive, First Stage, Preamplifier D
32	Plate Current Meter positive, Second Stage, Preamplifier D
33 and 34	30 Ohm Input, Preamplifier D

34 and 35	250 Ohm Input, Preamplifier D
33 and 35	600 Ohm Input, Preamplifier D
36 and 37	6.3 Volts a-c or d-c filament supply, Preamplifiers C and D
38	Ground (See System Grounding)

All electrical connections to the amplifier should be made with shielded twisted pair copper wire with insulation over the shields and all joints should be securely soldered with rosin flux solder. The shields should be electrically continuous and should be grounded at the amplifier end *only*. This grounding should be by connection to the amplifier chassis, or to terminal 9 for preamplifiers A and B or terminal 28 for preamplifiers C and D. The shields for the output leads should be grounded only at the input of the succeeding amplifier or repeating coil.

The amplifier chassis is insulated from its mounting and hence from the cabinet or rack by the flexible rubber supports and care should be used in all wiring to avoid shorting out this insulation by uninsulated shields or other connections. Ground to the audio ground for each circuit group supplied from a common power supply source should be made at a single point as covered under system grounding.

System and Power Source Grounding

The chassis, the shielding, and the negative side of the plate supply should be grounded by connecting terminal 19 or 38 to the audio ground lug on the rack or bay cabinet. When several amplifiers obtain plate power from a common source, the ground should be applied at only one point in each system supplied from each source. The center tap of the transformer filament winding should also be grounded to the audio ground.

It is sometimes desirable to operate these amplifier elements with one side of the outputs grounded. In all cases where the outputs are grounded, terminals 6, 10, 25 and 29 should be chosen as required for connection to the ground side of the circuit.

Plate Current Measuring Circuits

The plate currents of the vacuum tubes may be measured by wiring terminals 4, 5, 12, 13, 23, 24, 31 and 32 to an external selector switch which is connected to the positive terminal of a plate current meter. The negative terminal of the meter should be connected to terminals 9 and 28. Terminals 9 and 28 should not be connected together if preamplifier A and B are supplied from a plate power source different from that supplying preamplifiers C and D.

The KS8475 Meter is recommended for making these measurements, the normal indication for all tubes being the 100% Mark (Approx. 2/3 full Scale). If the KS8475 Meter is not available, the KS10003 Meter, or a 0.2 Milliammeter with a series resistor of such value that the total resistance of meter and resistor is 1000 ohms can be used. With either of these two Alternative Arrangements the normal indication through the Meter Circuit for each tube is approximately 0.133 Milliampere which corresponds to a cathode current of approximately .68 Milliampere for each of the first stage tubes and 6.8 Milliampere for each of the second stage tubes. Steady values differing by $\pm 10\%$ to $\pm 15\%$ from these current values can often be tolerated without the tubes being considered unsatisfactory for service.

After these connections have been made the tube shields should be removed and an RCA 1603 Vacuum Tube should be inserted in each of the first stage sockets and a Western Electric 348A Vacuum Tube should be inserted in each of the second stage sockets.

WARNING: The tube shields are locked to the panel by screw threads at the bottom of the shields and can only be removed without damage by rotating the shields counter-clockwise.

The flexible grid leads should be attached to the tube caps and the tube shields should be replaced over the tubes.

OPERATION

A period of approximately one minute should be allowed for the vacuum tube cathodes to reach their operating temperatures after the power is applied. The vacuum tube plate currents may then be measured and should be 0.68 ± 0.1 milliamperes for each of the first stages, and 6.8 ± 1.0 milliamperes for each of the second stages. If the KS8475 Meter is used for these measurements an indication at the 100% mark is normal for each tube and readings between the 85% and 115% marks are probably satisfactory.

The frequency response of each of the amplifier elements is essentially flat over the range from 30 to 15,000 cycles except for a slight droop of approximately 0.5 db at the low end for any normal input impedance, and approximately 1.3 db at the high end when operated from 600 ohms. The high end response for the 600 ohm input can be made essentially flat by disconnecting condenser:

C8A for Preamplifier A

C9A for Preamplifier B

C8B for Preamplifier C

C9B for Preamplifier D

Associated Parts

The following vacuum tubes required for operation must be specified separately on the order:

4—RCA 1603 Vacuum Tube

4—Western Electric 348A Vacuum Tube

In an emergency, if these tubes are not available, the following may be used:

6C6 or 77 in place of RCA 1603

6J7 or RCA 1620 in place of 348A

The following accessory equipment is recommended:

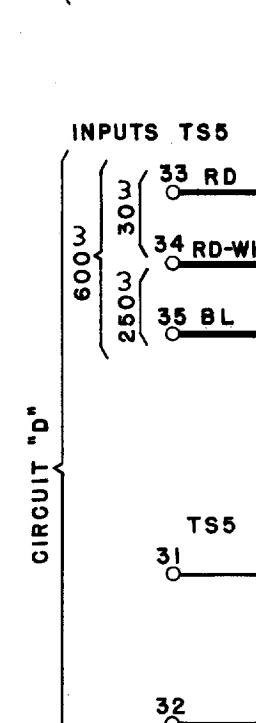
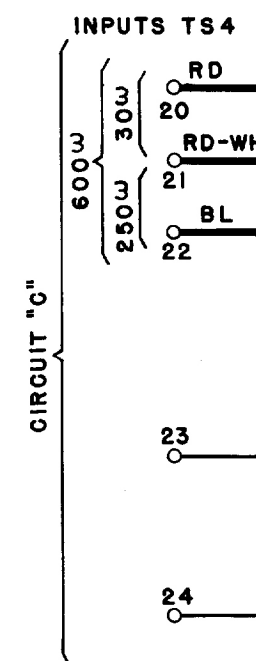
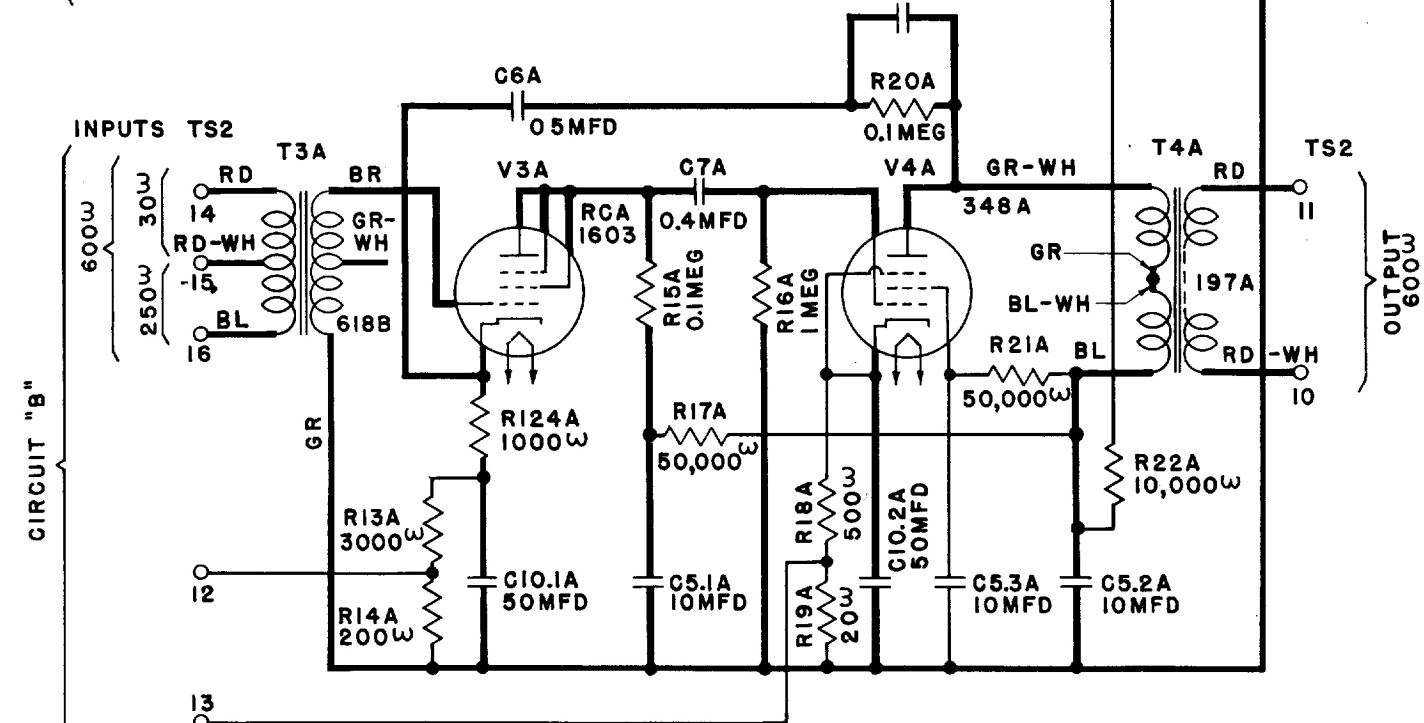
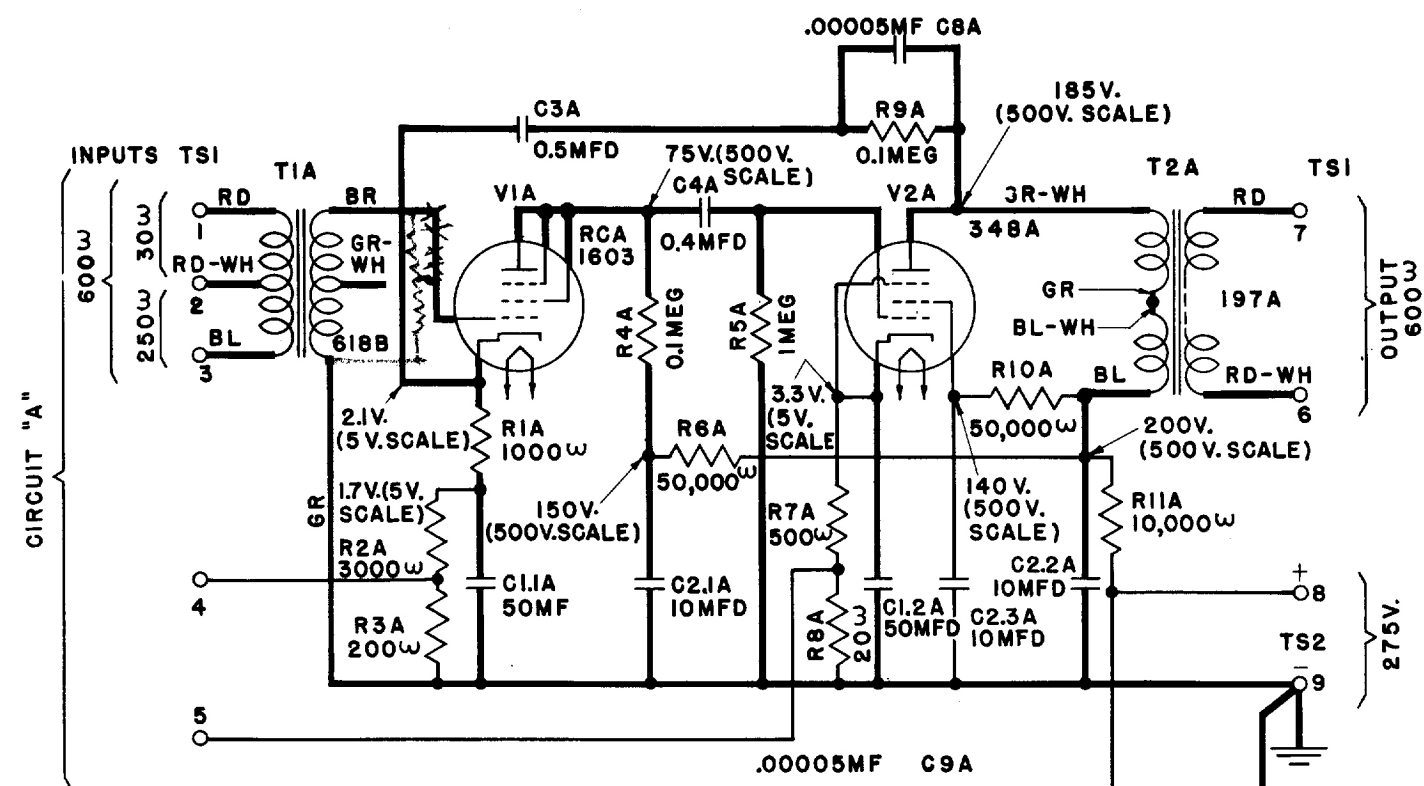
KS-10003 Meter (for measuring plate currents of vacuum tubes)

Western Electric Special 177 Type Mounting Plate (one mounts one 129A Amplifiers)

Western Electric Special 296 Type Panel (blank mat for Mounting Plate)

Replacement Parts

If replacement parts are required for the 129A Amplifier they may be procured through the nearest distributor.



SAME AS CIRCUITS "A" & "B"
EXCEPT APPEND "B" TO APPARATUS
DESIGNATIONS INSTEAD OF "A"

NOTES:

1. THE VOLTAGES SHOWN ARE TYPICAL AVERAGE VALUES OBTAINED USING A VOLTMETER WITH A RESISTANCE OF 1000 OHMS PER VOLT. VOLTAGES ARE MEASURED BETWEEN POINT SHOWN AND TERMINAL 9.

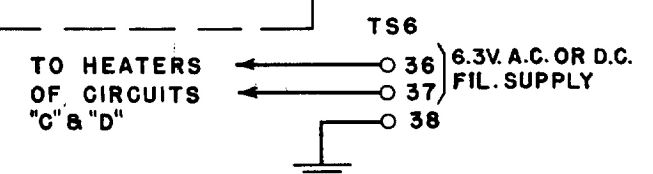
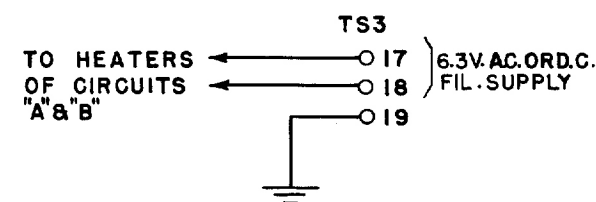
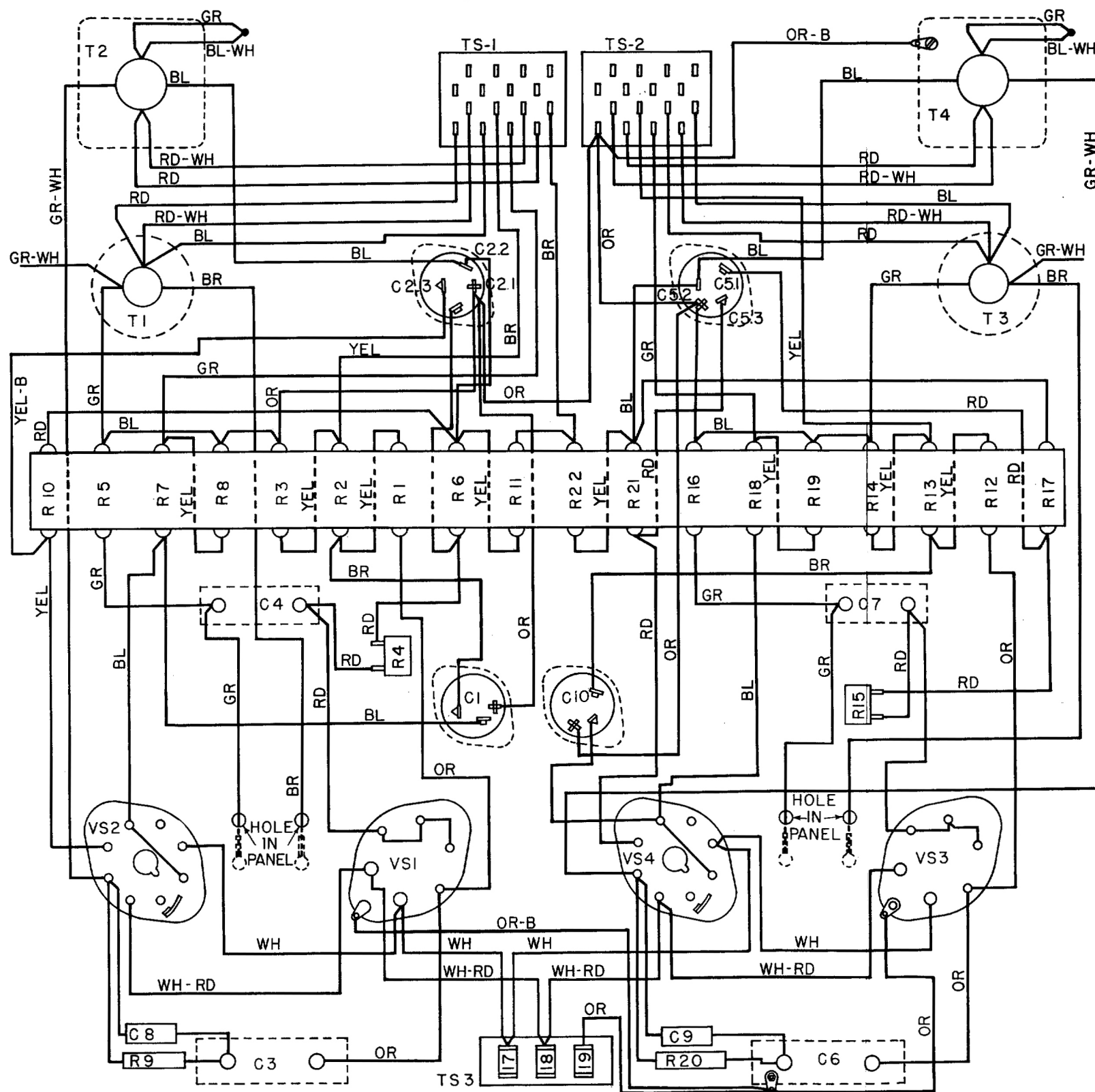


Fig. 1--Schematic



WIRING VIEW
THIS IS ONE-HALF OF THE PANEL WIRING DIAGRAM.
THE WIRING FOR THE OTHER HALF OF THE PANEL
IS THE SAME.

Fig. 2--Wiring Diagram

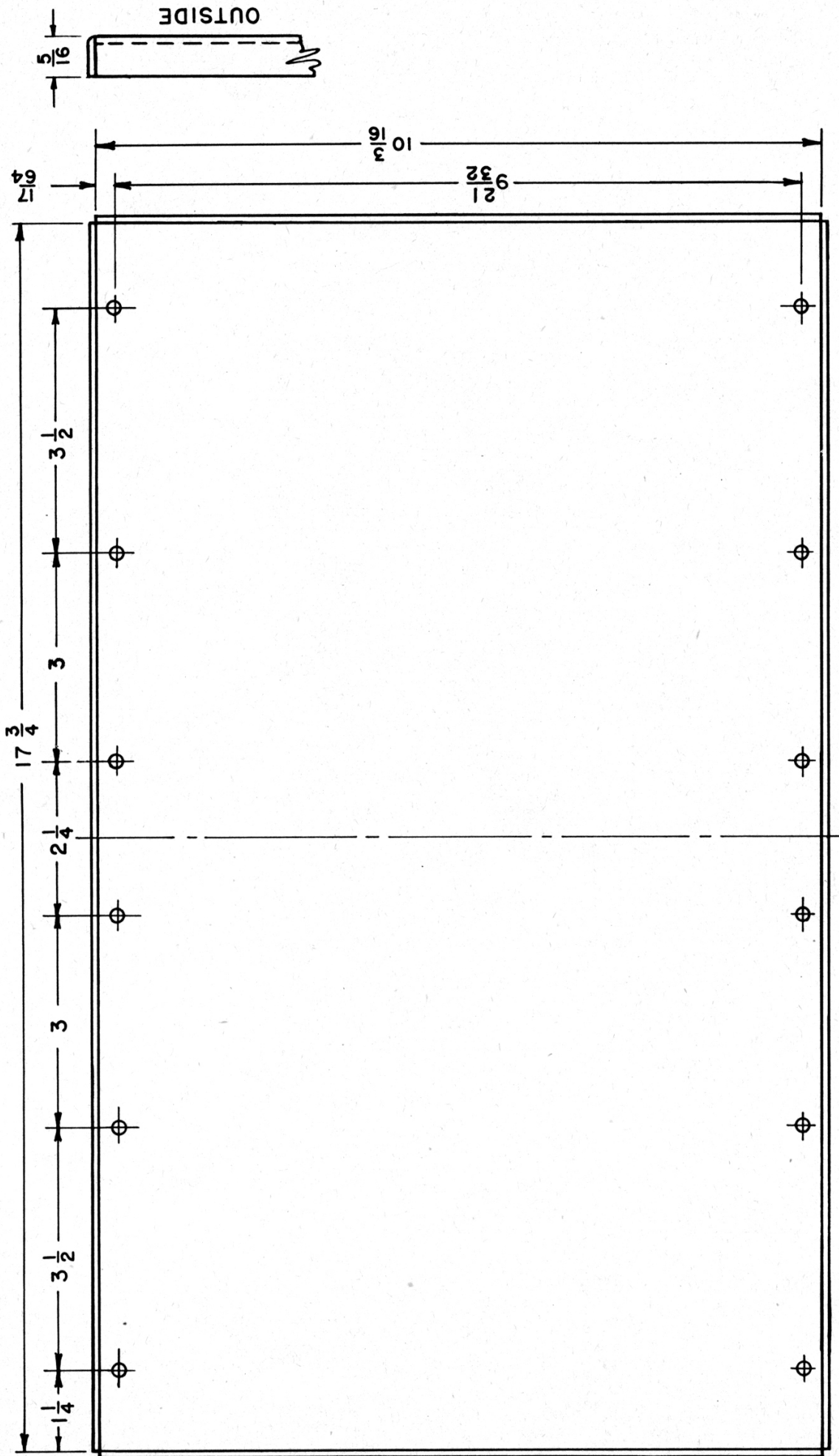


Fig. 3 Mounting Dimensions

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ARSENAL OF COMMUNICATIONS EQUIPMENT

