

Western Electric

130B AMPLIFIER



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Western Electric

130B AMPLIFIER

The 130B Amplifier is comprised of two identical, electrically separate, three stage amplifiers mounted on a common chassis. These amplifiers are for use as main amplifiers in high quality audio frequency amplifying channels for Speech Input or Sound Systems. Each amplifier is arranged for its own high impedance interstage gain control which is intended as master gain control for its channel. The amplifier is designed for operation from an external power supply source.

Typical Electrical Characteristics for each Amplifier Unit

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

Distortion—Less than .5% 50 to 7500 cycles at normal program level.

Output Noise — (Main output) — Output noise is a function of the power supply. Operated from the Western Electric 20 Type Rectifier, the output noise is approximately as follows:

Gain	51 db	61 db	71 db	81 db
Noise Level (unweighted)	—64 dbm	—60 dbm	—50 dbm	—40 dbm
Signal to Noise Ratio with Normal +24 dbm output	88 db	84 db	74 db	64 db

Gain—Approximately 81 db maximum.

Gain Control—Requires two (one for each amplifier channel) 100,000 ohm potentiometers (not furnished) mounted externally. This is a high impedance interstage gain control requiring low capacity cables for each amplifier. These cables are not furnished.

Operates From—150 ohms—as furnished, but may be reconnected to operate from 600 ohms.

Operates Into—Main output 600 ohms.

Monitor output 40 ohms (approximately).

Output Power—Main Output.

Normal—0.25 watt (+24 dbm).

Maximum—0.6 watt (+28 dbm) with approximately 1 per cent harmonic distortion.

Monitor output 20 db less than main output. (Isolation between main and monitor outputs is 20 db).

Power Supply for complete amplifier (2 amplifier units)

Filament—6.3 Volts, 3.6 Amperes, total.

Plate—275 Volts, 71 ma, dc total.

(Each amplifier channel can be supplied from a separate source if desired, the power requirement of each channel being $\frac{1}{2}$ the above total.)

(Filament and plate supply may be obtained from the 18A, 18B or 20B Rectifiers.)

Equipment Characteristics

Panel Size — Approximately 12 by $10\frac{5}{16}$ inches. The apparatus extends approximately 5 inches from the front and $2\frac{1}{4}$ inches from the rear of the panel.

Weight—Approximately 19 pounds.

Mounting—Designed primarily for use in 25B Speech Input Equipment. The 190 type Mounting Plate may also be used for mounting one 130B Amplifier on standard 19" relay rack type frames.

INSTALLATION

Mounting

The 130B Amplifier is designed primarily for mounting in the 25B Speech Input Equipment. Figure 3 shows the outline dimensions of the panel on which the amplifier apparatus is mounted. Apparatus and vacuum tubes on the panel extend about 5" from the outside surface. Apparatus on the other side extends about 2¼ inches.

As mounted in the 25B Speech Input Equipment, the amplifier chassis is mounted on 8 rubber vibration mounts (U. S. Rubber Co. A-301 Cylindrical rubber mounts) using the 8 (0.180") holes along edges of the panel (see Figure 3). In addition to providing isolation from shock and vibration, these mounts insulate the amplifier chassis electrically from the cabinet. This permits this, and other associated amplifiers and circuits all to be grounded at a single point in the system, which is desirable to control noise and cross talk. Care should be used to see that this insulation is not made ineffective by contact between the chassis and the cabinet or other mounting.

Suitable mounting brackets or frameworks are necessary for other applications of the 130B Amplifier, or the 190 type Mounting Plate may be used. Mounting precautions as indicated above should be observed; other precautions are discussed below.

Avoid exposure to magnetic fields which might induce noise in the equipment. When equipment such as 18 or 20 type Rectifiers or amplifiers with self-contained a-c power supplies are mounted on the same bay, they should be separated by at least 10 inches from the 130B Amplifier. Where possible, it is desirable to orient both the amplifier and a-c operated equipment to give maximum separation between the input transformers of the 130B Amplifier and the power transformer of the a-c operated equipment. The 42A Shield (not furnished) can be added over the input transformers of the 130B Amplifier, if necessary, to reduce hum pickup under very severe exposure conditions.

External Connections

Terminals 1 to 8 inclusive located on Terminal Strip TS1.

Terminals 9 to 16 inclusive located on Terminal Strip TS2.

Terminals 17 to 19 inclusive located on Terminal Strip TS3.

Terminals 20 to 27 inclusive located on Terminal Strip TS4.

Terminals 28 to 35 inclusive located on Terminal Strip TS5.

Terminals 36 to 38 inclusive located on Terminal Strip TS6.

Terminal Numbers

1	Plate Supply —275 Volts d-c for Amplifier A; also Plate Current Meter—negative—for Amplifier A
2	Plate Supply +275 Volts d-c for Amplifier A
3 and 4	600 ohm output to line for Amplifier A
5 and 6	600 ohm output to monitor, Amplifier A
7	Plate Current Meter positive, third stage, Amplifier A
8	Plate Current Meter positive, second stage, Amplifier A
9	Plate Current Meter positive, first stage, Amplifier A
10, 11 and 12	Spare—can be connected to supplement Terminal 13
13	Terminal for connection of shields of shielded leads
14 and 16	150 ohm input Amplifier A (see below for 600 ohm input connections).
15	Spare
17 and 18	6.3 Volt a-c or d-c Filament supply, Amplifier A
19	Ground (see system grounding).

Terminal Numbers	External Connections
20	Plate Supply —275 Volts d-c for Amplifier B; also Plate Current Meter—negative—for Amplifier B
21	Plate Supply +275 Volts d-c for Amplifier B
22 and 23	600 ohm output to line for Amplifier B
24 and 25	600 ohm output to monitor, Amplifier B
26	Plate Current Meter positive, third stage, Amplifier B
27	Plate Current Meter positive, second stage, Amplifier B
28	Plate Current Meter positive, first stage, Amplifier B
29, 30 and 31	Spare—can be connected to supplement Terminal 32
32	Terminal for connection of shields of shielded leads
33 and 35	150 ohm input, Amplifier B (See below for 600 ohm input.)
34	Spare
36 and 37	6.3 Volt a-c or d-c Filament supply, Amplifier B
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 all except the shield for the output lead should be grounded at the amplifier end only. This grounding should be by connection to the amplifier chassis or to Terminals 13 or 1 for Amplifier A or Terminal 32 or 20 for Amplifier B. The shields for the output leads should be grounded only at the input of the succeeding amplifier or repeating coil. Grounds for each circuit group supplied from a common power supply source should be made at a single point.

Gain Control Connections

The 130B Amplifier is furnished without gain controls and the circuit between the plate of the first amplifier stage and the grid of the second amplifier stage is left open.

A 100,000 ohm potentiometer should be used connected as follows for each channel of the amplifier.

Amplifier Terminals	Connect to Terminals
Input to Potentiometer (Ter. "IN" & "C")	Marked "P" & "C" respectively.
Output of Potentiometer (Ter. "OUT" & "C")	Marked "G" & "C" respectively.

On the underside of the chassis, the letter "P" is marked adjacent to one terminal of condenser C4 in each amplifier channel. The grid connection of the second stage tube is wired to an unused terminal on its vacuum tube socket. The chassis next to this terminal is marked with the letter "G" in each of the two channels. The common or ground side of the circuit may be picked up at any convenient circuit element, such as at resistances on the resistance mounting strip; two points, one at the end of resistance R3 and at one end of resistance R5 are marked with the letter "C" to denote circuit points to which external connections to the potentiometer may be made.

This part of the circuit is high impedance and the length of cables, i.e., the distance the potentiometer may be from the amplifier, is limited by the capacity of the cables. To avoid excessive loss at frequencies up to as high as 15,000 cycles per second the following type and lengths of cable will be found satisfactory.

Type of Cable	Maximum Recommended Cable Length or Distance
RG62/U	10 feet

In the 10 foot length, this cable has a capacity of about 140 mmfd.

Two holes equipped with rubber grommets are provided in each section of the chassis of the amplifier for bringing in these cables from the top through the chassis.

Input Connections (and change to 600 ohms input)

The amplifier is normally supplied for use in the 25B Speech Input Equipment with the two windings of the input transformers con-

nected in parallel for a 150 ohm input. By changing these connections a 600 ohm input may be obtained as indicated below:

Transformer Leads	Terminal Connection for 150 ohm input (Normal)		Terminal Connection for 600 ohm input	
	Amp. A	Amp. B	Amp. A	Amp. B
Red	14	33	14	33
Red-White	16	35	15	34
Blue	14	33	15	34
Blue-White	16	35	16	35
Black (electrostatic shield,	14	33	(See below)	(See below)

As normally supplied (for use in 25B Speech Input Equipment) it will be noted that the electrostatic shield is connected to one side of the input for an unbalanced input, terminal 14 (or 33) being the grounded side.

For the 600 ohm termination the input may be operated either unbalanced, or balanced and in the latter case either with a mid-point ground or with the input ungrounded. For a mid-point ground the "black" lead from the input transformer should be connected to terminal 15 in Amplifier A and terminal 34 in Amplifier B, and these terminals grounded. For an unbalanced input the ground points may be terminals 14 and 33 respectively. For ungrounded input the black lead should be

connected to terminal 13 for channel A (or terminal 32 for channel B).

Plate Current Measuring Circuits

The plate currents of the vacuum tubes can be measured by wiring terminals 7, 8, 9, 26, 27 and 28 to an external selector switch which is connected to the positive terminal of the plate current meter. The negative terminal of the meter should be connected to terminals 1 and 20. (Terminals 1 and 20 should not be connected together if Amplifier A is supplied from a plate power source different from that supplying Amplifier B.) Suitable meters which may be used for this purpose are listed below.

Meter	Full Scale	Normal Reading When Used with 130B Amplifier	Actual Current through meter
KS-9872	150%	100%	0.133 ma
KS-10,003	0.2 ma	0.133	0.133
Milliammeter with series resistance*	0.2 ma	0.133 ma	0.133 ma

*Series resistance such that total of meter and resistance is 1000 ohms.

The actual vacuum tube cathode currents corresponding to the above readings are as follows:

Tube Amplifier A	Amplifier B	Normal Cathode Current Per Tube
V1A	V1B	1.95 milliamperes
V2A	V2B	0.60 "
V3A	V3B	33.00 "

The above currents are average values and variations of the order of ± 15% may be expected among tubes without such a departure indicating unsatisfactory tubes. The signifi-

cant indication is any appreciable change in the tube current from previous original readings.

Vacuum Tubes

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. The flexible grid leads should be attached to the tube caps, and the tube shields should be placed over the tubes. A Western Electric 349A Vacuum Tube should be inserted in each of the third 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 counterclockwise.

Operation

After the power is applied, a period of approximately one minute should be allowed for the vacuum tube cathodes to reach their operating temperatures. The vacuum tube plate currents may then be measured and checked with the above normal readings.

Associated Parts

The following vacuum tubes are required for the operation of this amplifier and must be ordered separately.

- ✓ 2—RCA 1603 Vacuum Tubes
- 2—Western Electric 348A Vacuum Tubes
- 2—Western Electric 349A Vacuum Tubes

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

- First Stage—6C6 or 77 for RCA 1603
- ✓ Second Stage—6J7 or RCA 1620 for 348A
- ✓ Third Stage—6F6 for 349A

The following accessory equipment is recommended for use with this amplifier:

- 2—100,000 ohm Potentiometers (Western Electric BA-73987-3 or BA-73987-4).
- 4—lengths of RG62/U Coaxial Cable, as required up to 10 feet max. each for potentiometer connections.
- 1—KS-10003 Meter or KS-9872 (for measuring plate currents of vacuum tubes).
- 1—190 type Mounting Plate.

Maintenance

If replacement parts are required for the 130B Amplifier they may be procured through the nearest distributor. Lists of all replaceable parts of the amplifier are packed with each amplifier:

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 & TERM 1.
 2. POINTS MARKED P, G & C ARE CONNECTION POINTS FOR EXTERNAL 100,000 OHM GAIN CONTROL, AS FOLLOWS:
 POT. INPUT P & C - POT. OUTPUT G & C.

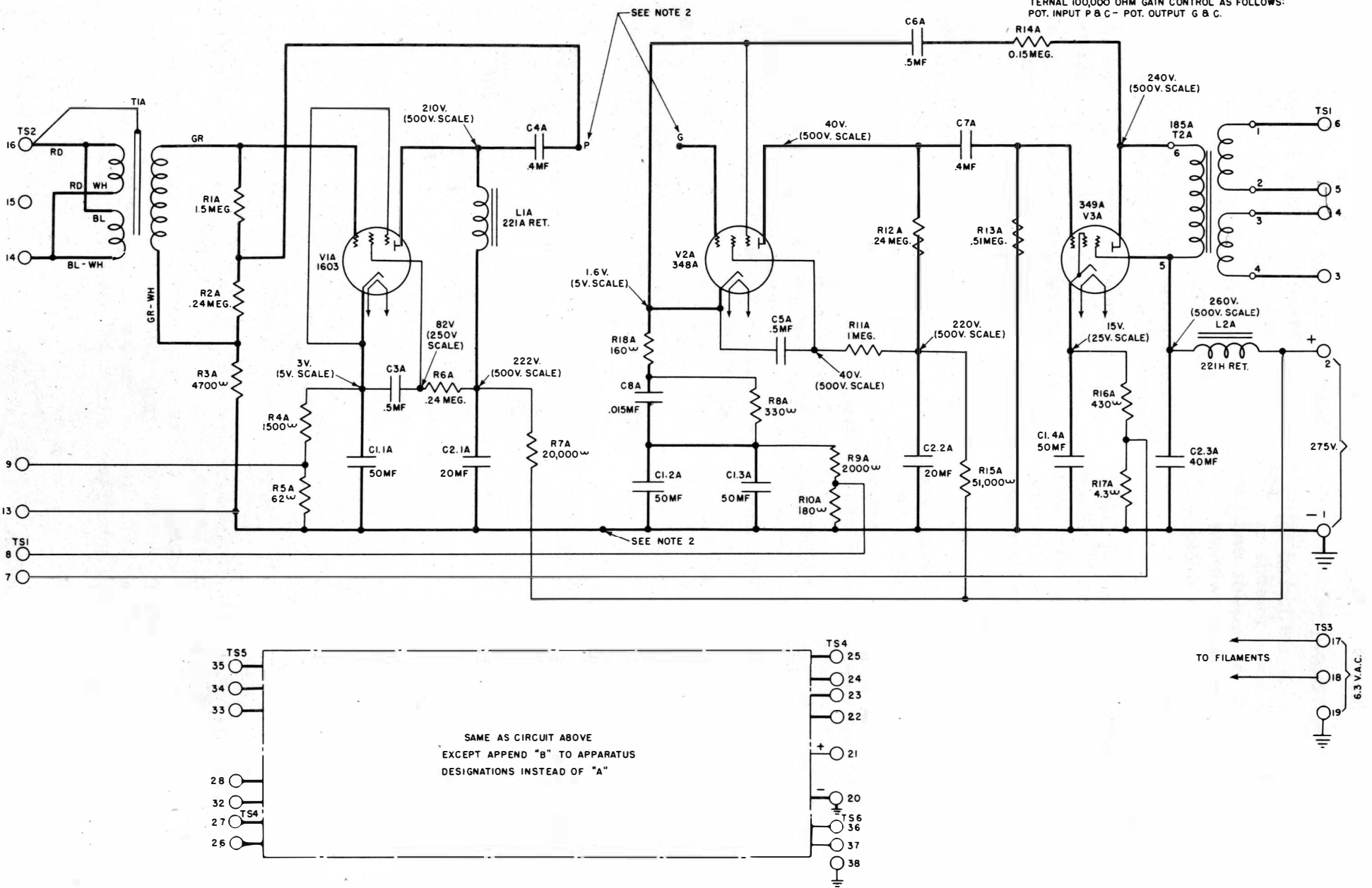


Fig. 1—Schematic

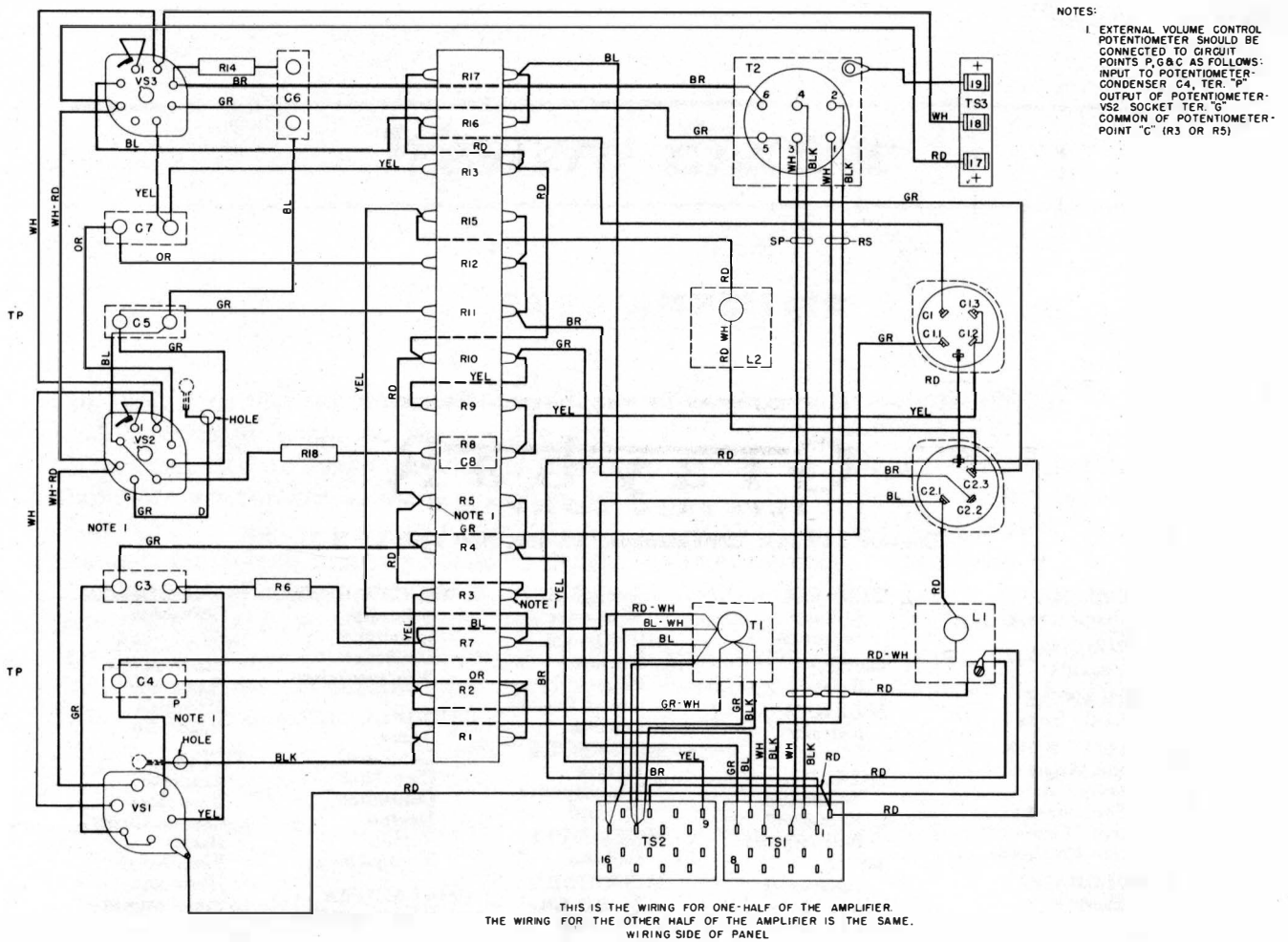


Fig. 2—Wiring Diagram

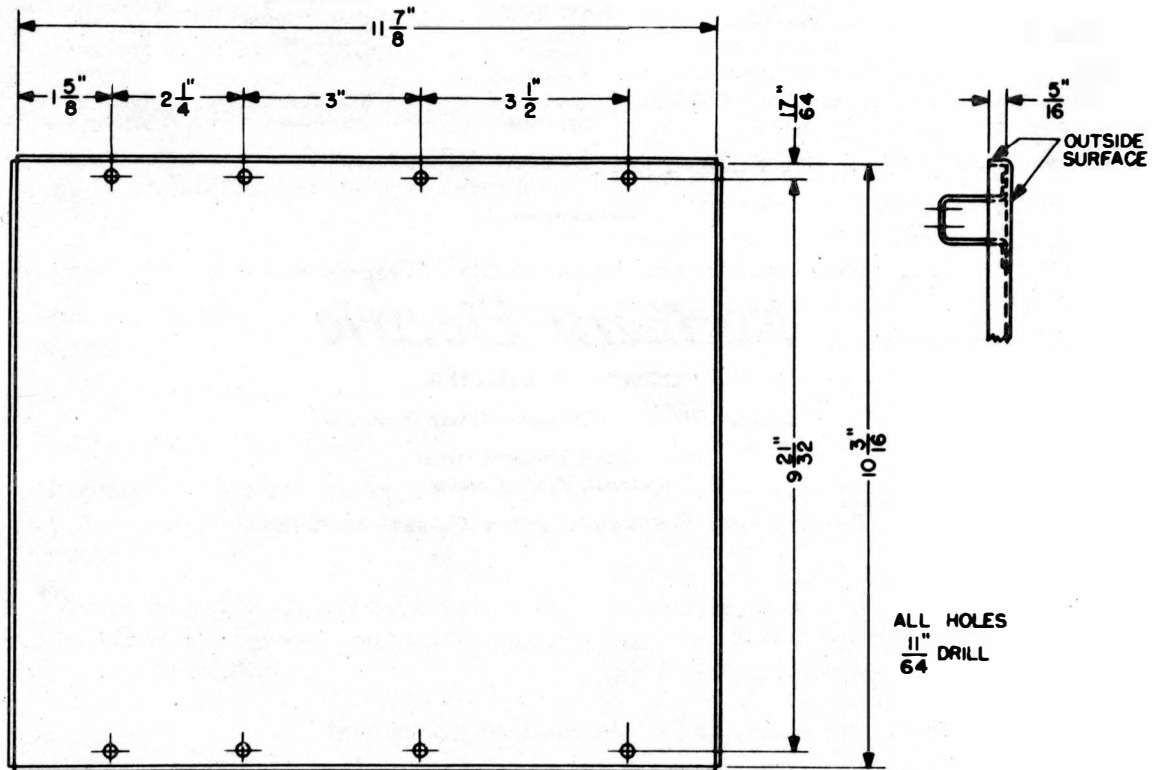


Fig. 3—Mounting Dimensions

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