

Western Electric

129A AMPLIFIER



Instruction Bulletin No. 1097, Issue 1

Western Electric

129A AMPLIFIER

Description

The 129A Amplifier is comprised of four identical, electrically separate two-stage fixed-gain amplifiers mounted on a common chassis. They are intended for use as premixing 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 (Preamplifiers A and B, common source; preamplifiers C and D, common source; all can be common).

Typical Electrical Characteristics for Each of the Four Amplifier Channels:

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

Output Noise—

82 dbm Unweighted } When operated from
87 dbm Weighted } 18 or 20 type
Rectifiers.

Gain—Approximately 41 db.

Output Power—

Normal—.01 watt (+ 10 dbm)

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

Operates from—30, 250 or 600 ohms.

Operates into—600 ohm load.

Power Supply Required for Complete Amplifier—(four preamplifiers):

Filament—6.3 volts 3.2 amperes.

Plate—275 volts, 30 ma.d.c. (Preamplifiers A and B can be supplied from one source while C and D are supplied from another—1.6 amp. filament and 15 milliamps plate required for each half of amplifier.)

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

Equipment Characteristics:

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

Weight—Approximately 20 1/4 pounds.

Mounting—Designed for use in the 25 type Speech Input Equipments. The 129A Amplifier can also be mounted on a 190 type Mounting Plate for installation on 19" relay rack type frames in cabinet enclosures, where a front mat is not required.

Installation

Mounting:

The 129A Amplifier is designed primarily for mounting in the 25A or 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 inches from the outside surface, with wiring on the other side (apparatus on this side extends about 2 1/4 inches from the panel).

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As mounted in the 25 type Speech Input Equipment, the amplifier chassis is mounted on 12 rubber vibration mounts (U. S. Rubber Co. A-301 Cylindrical Mounts) using the 12 (0.180") holes along edges of the panel. 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 crosstalk. 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, such as the 190 type Mounting Plate, are necessary for other applications of the 129A Amplifier. Such brackets may be attached by means of the 6 holes (0.180") along opposite edges of the amplifier. 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 near 129 Amplifiers it is desirable to have maximum sep-

aration (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:

Locations:

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	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 used for connection to the ground side of the circuit.

Frequency Response Equalization:

The frequency response of the amplifier is uniform within 1 db over the range of 30 to 15,000 cycles per second. Working from 600 ohms, no equalization is required, but when operating from 30 ohms, adjustment of the values of a condenser which shunts the 100,000 ohm feedback resistor from the plate of the second stage to the cathode of the first stage is required for uniform response.

As normally supplied this condenser is adjusted during manufacture to give uniform response when the amplifier is operated from a 30 ohm input. Accordingly this condenser may have various values over the range of 0 to about 90 mmfd depending upon how much equalization has been required.

For operation from 600 ohms, equalization is not required and this condenser should be disconnected. This condenser in the 4 amplifier channels is designated as follows:

- C8A for Channel A
- C9A for Channel B
- C8B for Channel C
- C9B for Channel D

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.

Suitable meters which may be used for this purpose are listed below:

Meter	Full Scale	Normal Reading when Used With 129A Amplifier	Actual Meter Current
KS-9872	150%	100%	0.133 ma
KS-10,003	0.2 ma	0.133 ma	0.133 ma
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 meter readings are as follows :

Tube	Normal Current Per Tube
1st stage of each Channel (V1)	0.68 milliamperere
2nd stage of each Channel (V2)	6.8 milliamperere

The above currents are average values and variations of the order of $\pm 15\%$ may be expected among tubes without such a departure indicating unsatisfactory tubes. The significant indication is any appreciable change in the tube currents from previous readings.

Vacuum Tubes:

After 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 checked with the above normal readings.

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 or KS-9872 Meter (for measuring plate currents of vacuum tubes).
190 type Mounting Plate.

Replacement Parts:

If replacement parts are required for the 129A Amplifier they may be procured through the nearest distributor. Lists of all replaceable parts of the amplifier are packed with each amplifier.

In the case of replacement of condenser C8A, C8B, C9A or C9B, the same value as supplied in the amplifier should be ordered. A different value of this condenser may be required if the input transformer T1A, T1B, T3A or T3B is replaced, in which case the discussion under "Frequency Response" in this bulletin should be referred to.

NOTE: When the 129A Amplifier is used as a component of the 25B Speech Input Equipment, the filament center tap is connected at the 20B Rectifier to a point approximately 60 volts above ground; therefore the filament should not be grounded for this application.

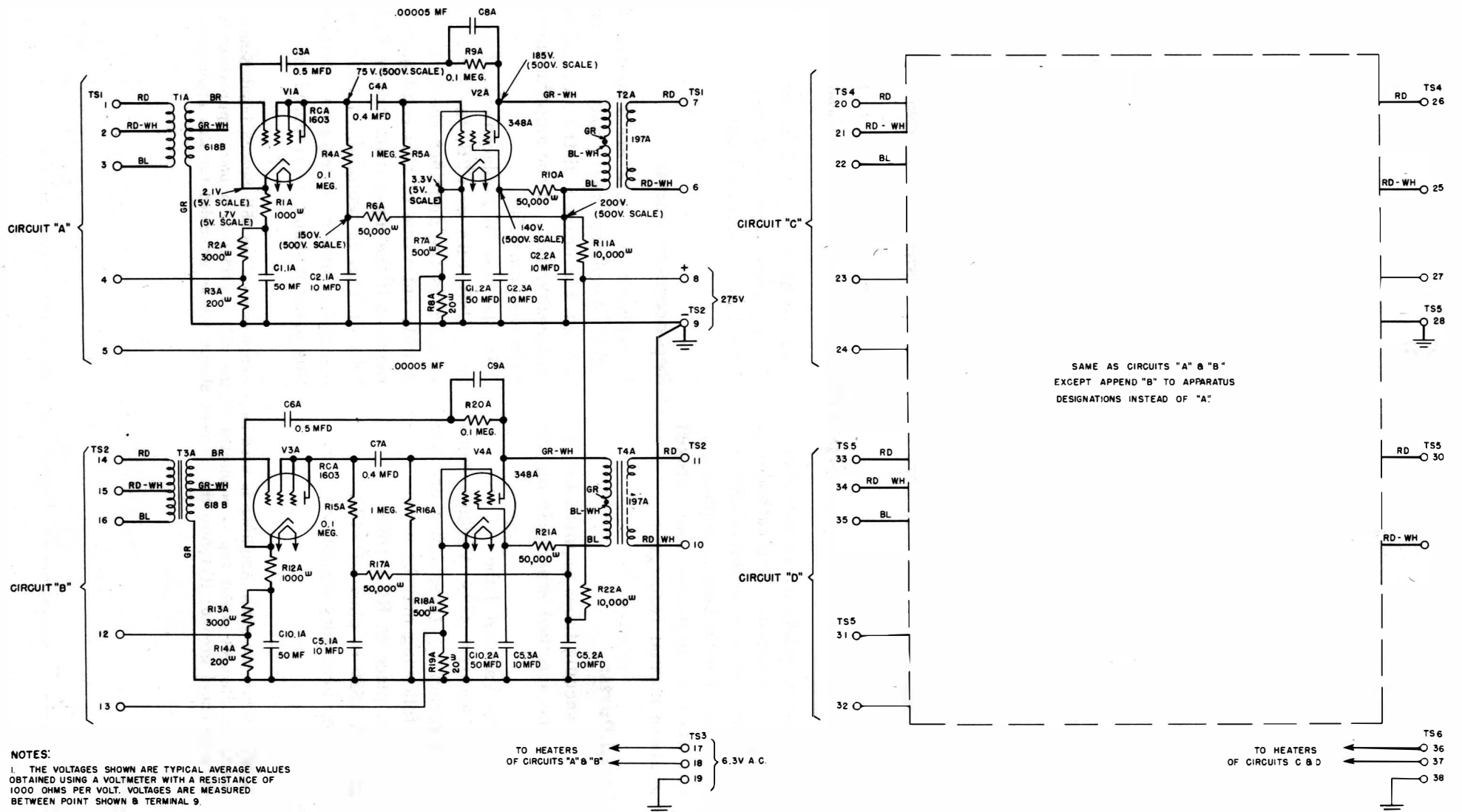
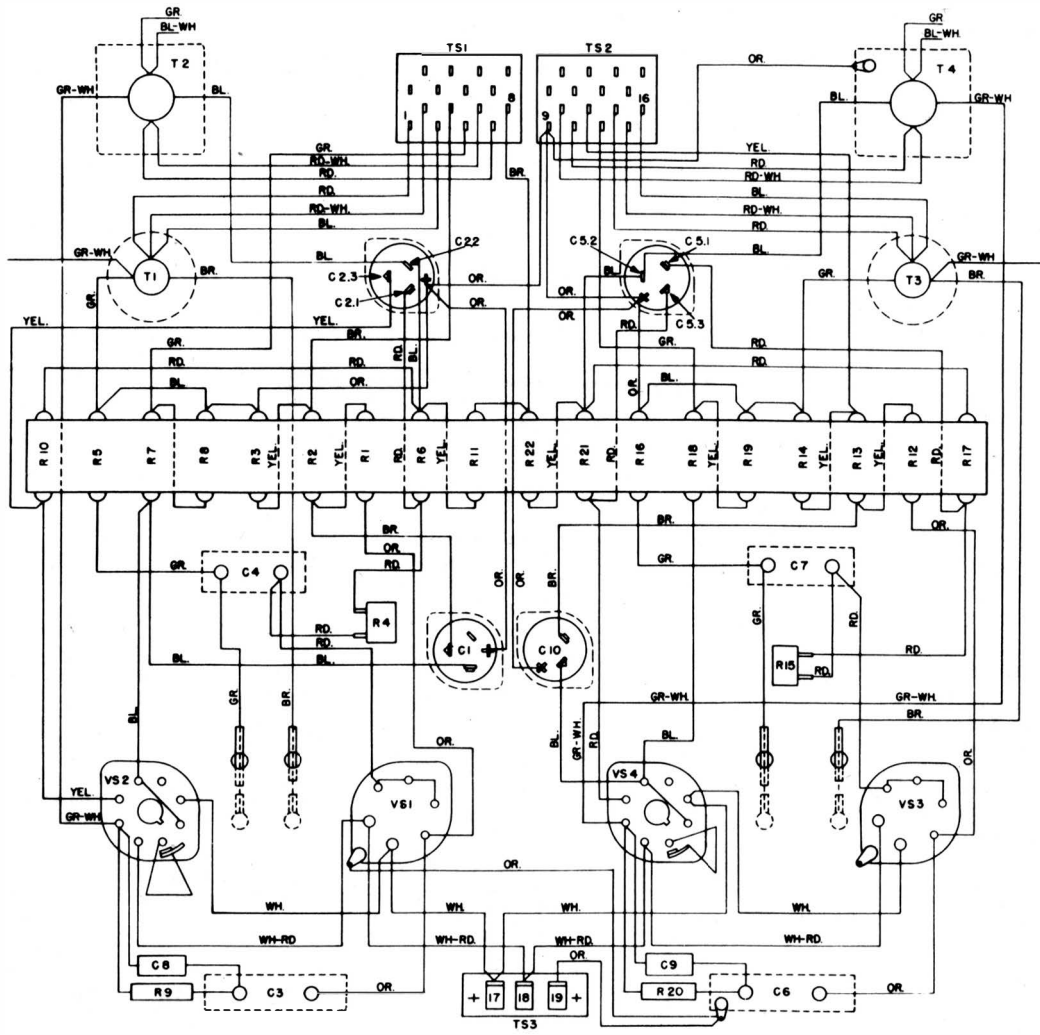


FIG. 1 — Schematic



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

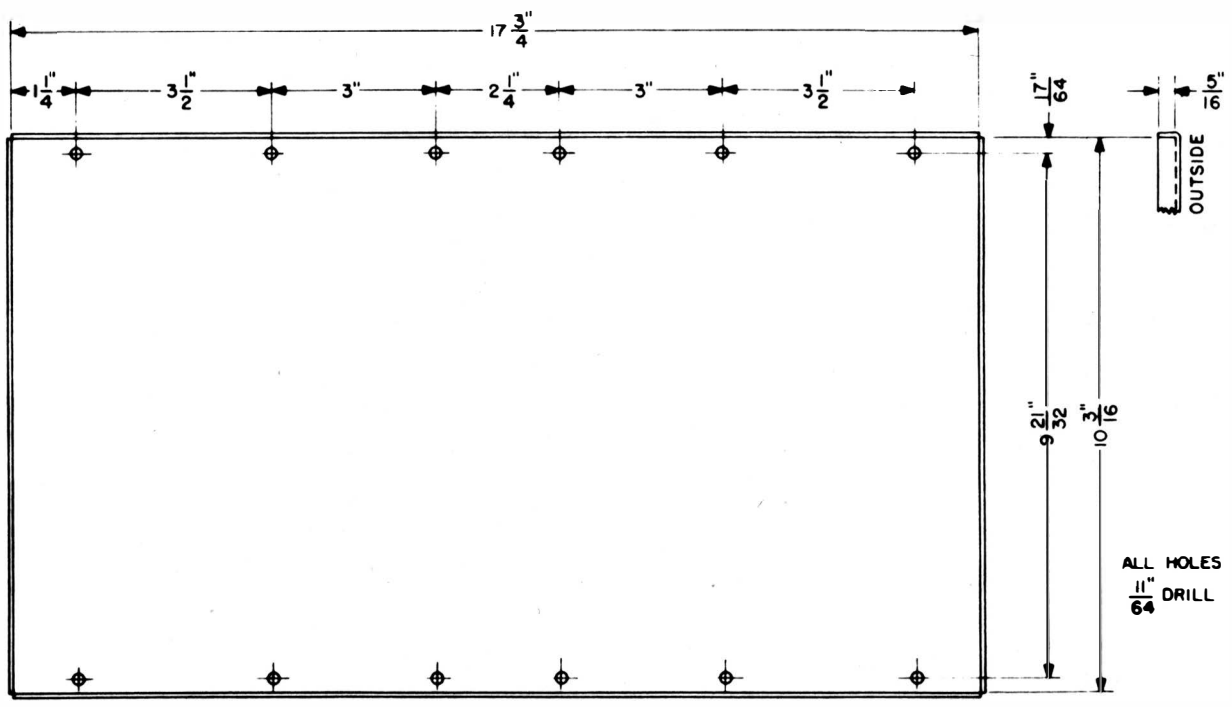


FIG. 3 — Chassis Detail

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