2-STAGE VOLTAGE AMPLIFIER

DESCRIPTION

The 2-stage voltage amplifier is an 8 by 12" panel size packaged unit. It is used in most applications for amplifying a d-c signal voltage which controls the output of the power amplifier. The 2-stage amplifier is for medium gain, low power amplification, and is used in most tachometer regulated control systems.

The terminal boards on the back of the panel provide terminals for all external connections. These connections include amplifier input, amplifier output, damping signal feedback, and a-c power supply voltage.

OPERATION

Twin triode tubes 1Tu and 2TU make up the two stages of amplification, respectively. Each twin triode is connected push-pull and have separate a-c plate supply voltages connected in phase.

For an error signal such that point 1 is positive with respect to 2, the current from B to A in coupling transformer 2T will increase and the current from B to C will decrease. This gives a resultant flux change in the coupling transformer such that the induced voltage in the secondary winding will make F positive and D negative. This induced voltage increases the current flow through R8 and decreases the current through R9 of second stage tube 2TU. The resultant dc output voltage is 8 negative with respect to 10.

For an error signal such that 1 is negative with tespect to 2, all of the above conditions are reversed. The resultant dc output voltage is 8 positive with respect to 10.

Tube balance potentiometer "P2" is for balancing the amplifier and is set for zero output voltage when the input and anti-hunt signals are zero.

Resistor R11 and capacitor C7 form a minor feedback loop when 7 is connected to 8 and 2 to 10. This feedback reduces the amplifier gain but increases the amplifier response time. The characteristic of the system for which the amplifier is used will determine whether ther minor loop feedback is connected.

The anti-hunt feedback signal is connected either to 2 and 4 or 2 and 5. This damping feedback signal is a time rate feedback voltage that occurs only when there is a change in system conditions. The anti-hunt feedback acts to oppose any change thus preventing system instability.

TROUBLE SHOOTING

The following procedure is recommended for trouble shooting the voltage amplifier.

1. Replace tubes with new 5692's to determine if tubes are defective.
2. Measure transformer (1T) voltages and check with values shown on schematic diagram. These voltage should check withing approximately plus or minue 10% of the values shown.
3. Check panel for loose connections, shorted terminals, or damaged components.

PROCEDURE FOR TESTING

A multitest meter with 1000 ohms per volt a-c and 10,000 to 20,000 ohms per volt d-c should be used for taking voltage measurements. The unit can be left mounted or removed when testing.

1. Disconnect all external connections to the terminal boards except the 115 volt a-c supply voltage.
2. Connect multi-meter to the output terminals (8-10) of the amplifier. Set multi-meter on approximately 100 volt d-c scale. Set amplifier anti-hunt at zero, sensitivity at maximum, and adjust tube balance for zero amplifier output. (By varying the tube balance "P2", the output voltage swings positive and negative).
3. Apply a d-c voltage signal to the amplifier input of a magnitude between 0.1 to 0.5 volts. With point 1 positive with respect to point 2, the output voltage will be point 8 negative with respect to point 10. Check output voltage reading against value obtained from the amplifier characteristics curves for this value of input signal and for condition of with or without minor feedback loop closed.
4. Reverse the input voltage polarity. The output voltage should also reverse as is shown by the amplifier characteristic curves. Again compare output with cahracteristic curves.

If these points check within approximately plus or minus 20% of the values shown on the charcteristic curves, the amplifier should be all right.

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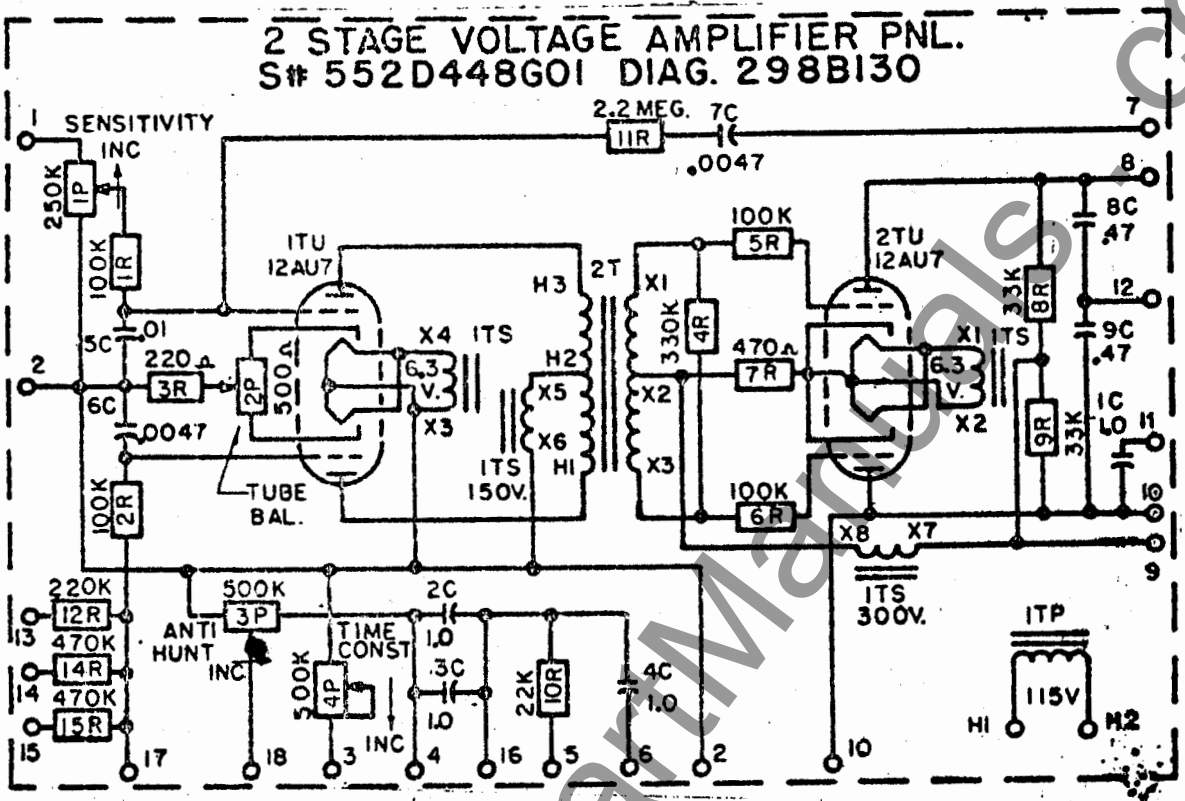
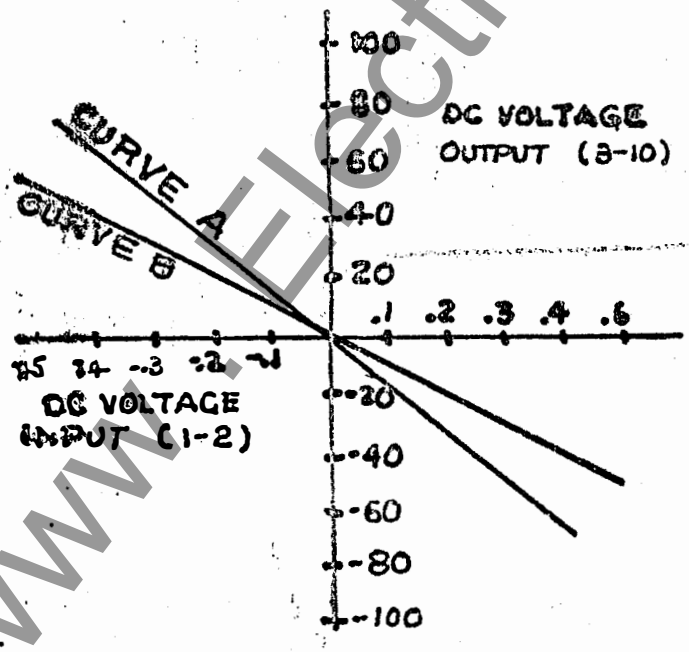


CHARACTERISTICS



CURVE A - MINOR LOOP FEEDBACK CIRCUIT OPEN (CIRCUIT AS ABOVE)

CURVE B - MINOR LOOP FEEDBACK CIRCUIT CLOSED (CONNECT 7 TO 8 AND 2 TO 10.)

AMPLIFIER DC OUTPUT VOLTAGE VS AMPLIFIER DC INPUT VOLTAGE FOR MAXIMUM SENSITIVITY