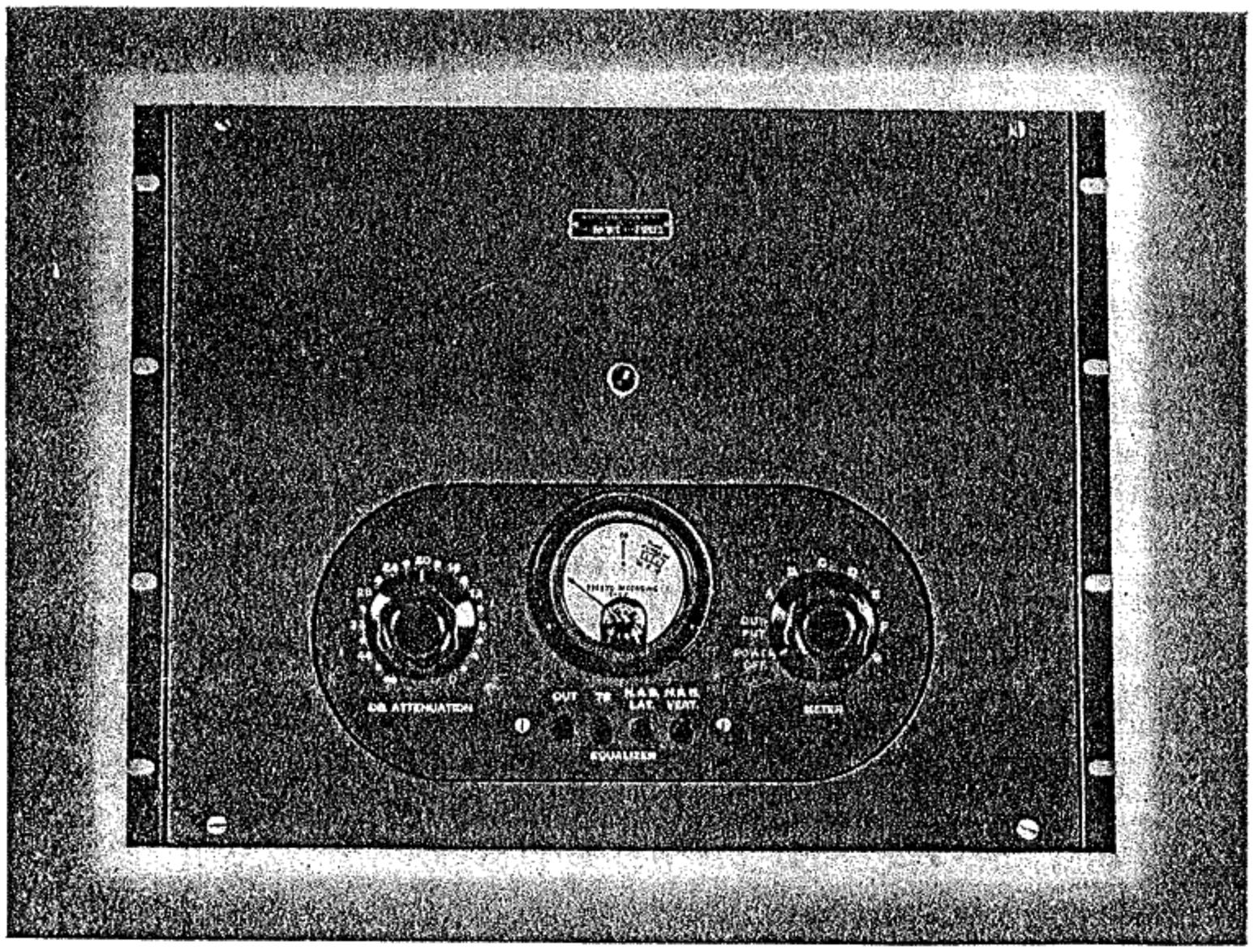
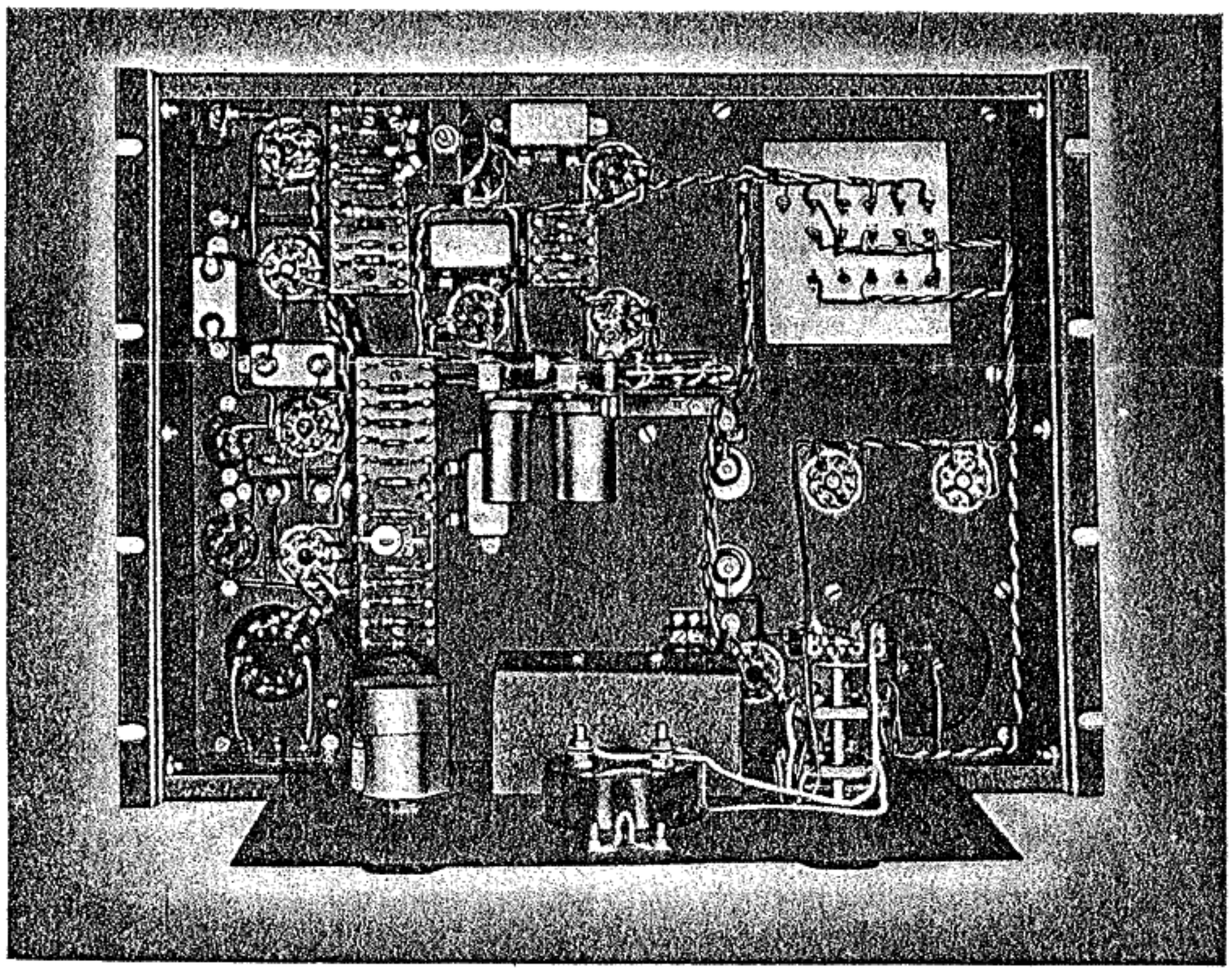
Operating Instructions
for the
PRESTO 92-A
AMPLIFIER

PRESTO RECORDING CORPORATION

NEW YORK, N. Y. PARAMUS, N. J.



92-A Amplifier.



92-A Amplifier, panel removed.

INTRODUCTION

The 92-A Amplifier is a power amplifier designed especially for disc recording. Its excellent frequency response, negligible distortion, power reserve and low effective output impedance make it ideal for recording under present day stringent quality requirements. The electrical and mechanical design has been carried out with the recording engineers' problems in view: expense has been made secondary to performance, ease of operation and reliability.

SPECIFICATIONS

Frequency Response:

Four response curves are provided:

1. Flat within 1 db 20 — 17,000 cps.
2. 78 rpm provides a gradual rise above 1000 cps to a maximum of approximately 10 db at 10,000 cycles, conforming with the modern practice of using some pre-emphasis in making 78 rpm recording for the home phonograph field.
3. NAB Lateral. Follows the standard NAB pre-emphasis curve for lateral transcriptions within ± 1 db above 500 cycles. The response below 500 cycles is obtained by the design of the Presto 1-D cutter. The low frequency response is taken care of in the design of the recording head and its associated coupling network.
4. NAB Vertical Corresponds approximately to the standard NAB curve for vertically recorded transcriptions. Provides the same amount of equalization at 10,000 cycles as the lateral but with a more gradual rise in the middle high frequencies.

Input Impedance:

Standard Unit is arranged to work from line impedance of 500, 200, 50 ohms through use of a tapped transformer primary. Amplifier is normally connected at the factory for 500 ohms. An interchangeable transformer is available with a nominal 15,000 ohm impedance for bridging across a line.

Gain:

Line input 83 db. Bridging input 68 db.

Output Impedance:

Two tapped windings are provided to permit operation into nominal impedance of 500, 250, 15, 6 ohms. Only one output winding may be loaded at one time to deliver maximum power output. At average power outputs up to about ten watts, any winding may be operated into a widely varying load impedance without any change in response or amplitude distortion.

Distortion:

Less than 1½% R.M.S. harmonic distortion at 50 watts (+47 dbm) into rated load impedance at any frequency between 50 and 5000 cycles. Less than 3% for any frequency between 30 and 10,000 cycles. At normal recording levels distortion is less than 0.3% at any frequency. Intermodulation distortion is negligible.

Noise:

—30 dbm maximum. Signal to noise ratio at normal recording level is 60 db.

Power Requirements:

Draws 190 watts from a 115 volt 50/60 line. Taps on power transformer primary permit operation at line voltages from 100 to 130.

DESCRIPTION

The type 92-A amplifier contains four stages of amplification, resistance coupled, divided into two sections of two stages; each section includes a stabilized feedback loop.

The output section is a two stage push-pull amplifier. The output stage has four transmitting type beam pentode tubes operated in push-pull parallel. These tubes were chosen for their high efficiency, ruggedness and long life. They are operated in a class A condition up to about a 40 watt power output where the operation becomes class AB1. The output stage is fed from push-pull pentodes. A portion of the output voltage is taken from the plates of the final stage and introduced into the cathodes of the preceeding stage providing 25 db of stabilized feedback. There are no blocking capacitors in the feedback loop. These were omitted to avoid frequency discrimination in the feedback at very low frequencies. This direct path puts a bias on the 6SJ7 cathode of approximately 17 volts. To bring this stage to its correct operating point a positive voltage is applied to the grids to effect a net bias of 2 volts. The effective output impedance of the amplifier is made very low by the feedback, it being actually less than would be obtained using triode output tubes.

The input section is made up of two triode stages. The second stage tube is a dual triode, the extra section being used as a phase inverter, coupling the single ended first amplifier section to the push-pull output section. Voltage is fed back from the plate of the second stage to the cathode of the first stage. The desired equalization curves are obtained by bypassing part of the feedback voltage in the cathode circuit. The capacitors for the three equalizer curves are selected by 4-position push button switch.

The amplifier gain is controlled by a potentiometer across the secondary of the input transformer. This control is a step type potentiometer, twenty steps, 2 db per step with the last few steps tapered to infinite attenuation in the last step. This control has detents which stop the control exactly at the center of each step and is not intended for "riding gain" but to fix the gain to the average level of the source.

The first stage heater is operated from a separate winding with a positive bias of approximately 70 volts to ground to eliminate any hum introduced in the input circuit due to heater cathode leakage.

The "meter" selector switch connects the meter to any amplifier tube for checking its current or to the 500 ohm output winding through a rectifier to measure the output voltage. The calibration in the output position is made so that at the 0 db mark on the meter scale, the output voltage is 24.5 volts. (+30.8 dbm) which is the proper level for the Presto 1D 500 ohm head. The damping of the meter makes it unsuitable for monitoring a complex signal and the position is intended to be used only for setting the gain through the recording channel using a steady state signal in the neighborhood of 1000 cycles. Due to the high efficiency of the output transformer, the voltage may be checked on the 500 ohm winding to set the correct recording level for a Presto 1D 15 ohm cutting head operating out of the 15 ohm winding.

The power supply has a conventional choke input filter. Two rectifier tubes are used to provide better regulation and longer life. Both power transformer primary and rectifier outputs are fused. The power switch is mounted on and operated by the meter selector switch.

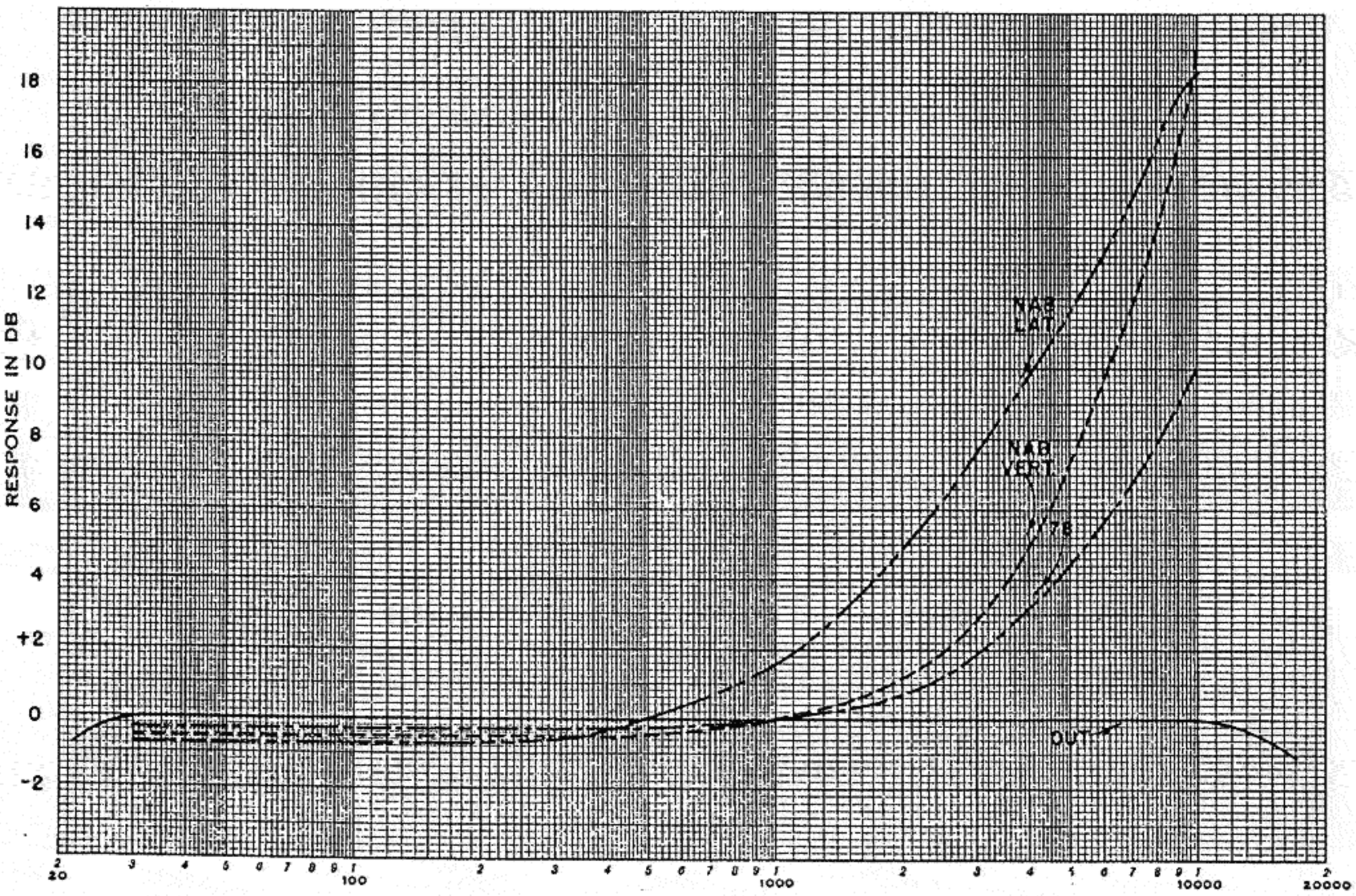


Figure 1. Frequency response of the 92-A Amplifier.

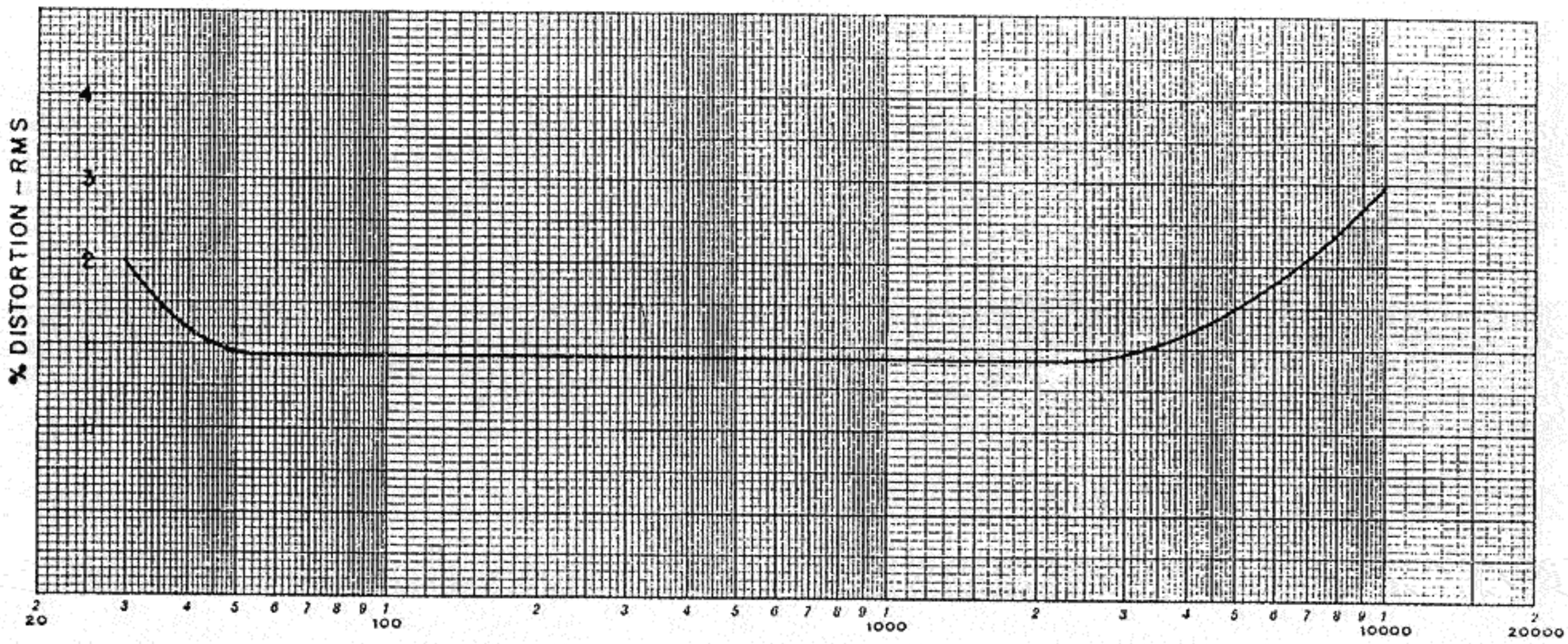


Figure 2. Distortion vs. Frequency of the 92-A Amplifier.

INSTALLATION

The 92-A amplifier will mount in any standard relay rack with 17 5/8" between the vertical mounting angles. Earlier models used heavier mounting brackets which required a greater clearance. Lighter gauge brackets will be furnished upon request. When installing, the amplifier should be placed with adequate heat dissipation in mind, and also the effect of the power frequency field. Both the power transformer and choke have a considerable external field. The unit should not be mounted closely to any low level equipment or wiring. The power transformer is normally connected to the 115 volt tap at the factory. If the line voltage at the place of installation averages higher or lower, the tap should be moved to the one which is within ±5% of the voltage at the locality. Access to the winding is had by removing the four thumb screws holding the front cover. Removing the cover will disclose the transformer terminal board in the upper right hand corner.

Input and output connections are made to terminal strips at the rear of the chassis. Avoid coupling between the input and output. Use shielded wire for external connections. The 500 and 15 ohm output windings are brought out to the terminal strip. To change the connections to 250 or 6 ohm taps remove the two thumb nuts and cover on the output transformer at the rear of the chassis.

WARNING! DO NOT MAKE ANY CONNECTIONS WITH POWER ON. — HIGH VOLTAGE!

Provisions are made for connecting a preamplifier to the 92-A power supply. The 6.3 volts drain should not exceed 1.5 amperes. If the drain on the 300 volt supply is more than 10 milliamperes it must be taken from C14 with a separate voltage dropping resistor and decoupling capacitor, in order not to exceed the current rating of the VR150 tube.

After mounting and connecting the amplifier make certain all the tubes are placed firmly in their proper sockets and the output tube plate caps are on before turning on the power.

SERVICE AND MAINTENANCE

A daily check should be made of the tube currents by means of the meter and switch on the control panel. With the line voltage set to the voltage of the tap used on the power transformer, all tube currents should fall within the scale segment marked 10-0-10 on the meter. The metering gives an indication of the emission of the tubes showing when replacement is necessary, also shows the DC balance of the push-pull stages and helps to localize defective components.

A control R20 is found on the upper side of the chassis. This control is used to balance out the power frequency ripple in the output section. This may be accomplished by removing the 6SN76T tube and adjusting for a minimum hum output. This noise should be less than —40 dbm. It may be necessary to use an amplifier or noise meter due to the low level (less than .009 volts across a 500 ohm load). This control should not be used to force a D.C. balance between the 6SJ7 tubes.

The step type gain control need only be cleaned every six months to a year using a pure light mineral oil and lint free cloth. NEVER USE AN ABRASIVE.

If during the daily check on tube currents, the current in one side of the push-pull parallel output stage increases beyond normal with no signal applied, excessive grid current is indicated and the defective tube should be replaced. The grid voltage due to grid current measured with a high resistance voltmeter from the grid of the 807 tubes to ground should not exceed one volt.

The rectifier used in the output position of the meter switch is a copper oxide type and if subjected to an

extreme over-voltage its internal resistance may change permanently, enough to affect the meter calibration. This may be checked by terminating the 500 ohm output in a 500 ohm 10 watt resistance. When the meter reads "0db" with a steady state signal in the neighborhood of 1000 cycles the voltage across the 500 ohm load should be between 23 and 26, making the calibration +23 db ±0.5 db above 6 mw in 500 ohms. Any correction necessary may be made by readjusting the potentiometer mounted on the meter switch.

SYSTEM PLANNING

The engineer making a layout for any recording installation should consider these factors:

1. Operating level at the output of all amplifiers in the system. At least 10 db reserve power should be available to take care of peaks. 15 db should be allowed for an excellent system.

2. The signal to noise ratio at normal operating level should be at least 55 db. This is about the best overall figure that may be practically maintained in any type recording due to limitations in the recording medium and the machines used to record and reproduce. This signal to noise ratio can be held with properly designed equipment for signal levels down to —67 dbm. For levels below this it would be uneconomical and inconvenient to achieve the same ratio, as it would be necessary to resort to complete battery operation and selection of special tubes. Fortunately, normal signal levels in practice are far enough above this threshold noise to permit high quality.

3. The input levels expected should be listed, taking into account all sources. Sufficient gain must be provided to raise the signal to correct recording level. Any losses due to equalizers, mixers, etc., must be allowed for. The design of the particular equalizers or mixers must be considered in choosing their position in the system with regard to their operating levels, insertion losses and terminating impedance requirements. In general the maximum overall gain should be about 120 db with all gain controls on full.

4. Enough variable gain controls should be included in the system to keep all amplifiers working at the output level which will give optimum signal to noise and power reserve. These controls should be arranged so that under normal conditions some range of adjustment in both directions is possible. For mixers, enough attenuation must be left in the control beyond the normal operating point to permit a smooth "fading out" of the signal.

A listing of all Presto amplifiers is given to assist the engineer in choosing the amplifiers best suited for his needs. The response of all amplifiers is good enough to permit any combination to be made with an overall response within 1 db from 40 to 12,000 cycles. Overall distortion less than 0.5% at operating levels.

Presto 92-A Amplifier

Gain: 83 db/, Line input; 50/200/500 ohms, 68 db bridging input 15,000 ohms.
Output: 500/250/15/6 ohms.
Max. Output: +47 dbm.
Operating Output: +30.8 dbm (correct recording level for Presto 1D recording head).
Noise: —30 dbm.
Max. Input Level: —22 dbm for line input and —7 dbm for bridging input at recording level output.
Min. Input Level: —52 dbm for line input and —37 dbm for bridging input at recording level output.
Gain Control: Step type across secondary of input transformer.
Power Supply: Self contained, 190 watts from 100-130v 50/60 cycle.
Service: Operate one or more recording heads or loud speakers.

Presto 89-A Amplifier

Gain: 90 db Line input 50/200/500 ohms.
Output: 500/250/50 ohms.
Max. output: +44 dbm.
Normal Operating Output: +30.8 dbm. (Correct recording level Presto 1D head.)
Noise: —27 dbm max.
Max. Input Level: — 2 dbm (for normal output operating level).
Min. Input Level: —69 dbm (for normal output operating level).
Gain Control: Composition potentiometer across secondary of input transformer.
Power Supply: Self Contained. 120 watts 100-130 volts 50/60 cycle.
Service: Operate one or more recording heads or loud speakers.

Presto 41-A Peak Limiting Amplifier

Gain: 60 db Line input 50/200/500 ohms.
Output: 500/250/50 ohms.
Max. Output: +20 dbm (limiting point).
Normal Operating Output: +14 dbm.
Noise: —55 dbm.
Normal Input: —46 dbm.
Gain Control: None.
Power Supply: Self Contained, regulated: 70 watts 100-130 volts, 50/60 cycle.
Service: Peak Limiter, Booster or line amplifier.

39-A and B Preamplifier

Gain: 43 db.
Input Impedances: 50/200/500 ohms.
Output Impedances: 50/200/500 ohms.
Max. Input Level: —47 db.
Max. Output: +8 dbm (0 dbm = 0.001 watt).
Noise: —77 dbm at max. gain.
Gain Controls: Step type, 2 db per step.
Power Supply Required: 22 mils at 250 volts; 6.3 volts at 1.2 amps.
Mixing: Low level, after preamp stage.
Service: 3 channel mixer preamplifier with high level mixing.

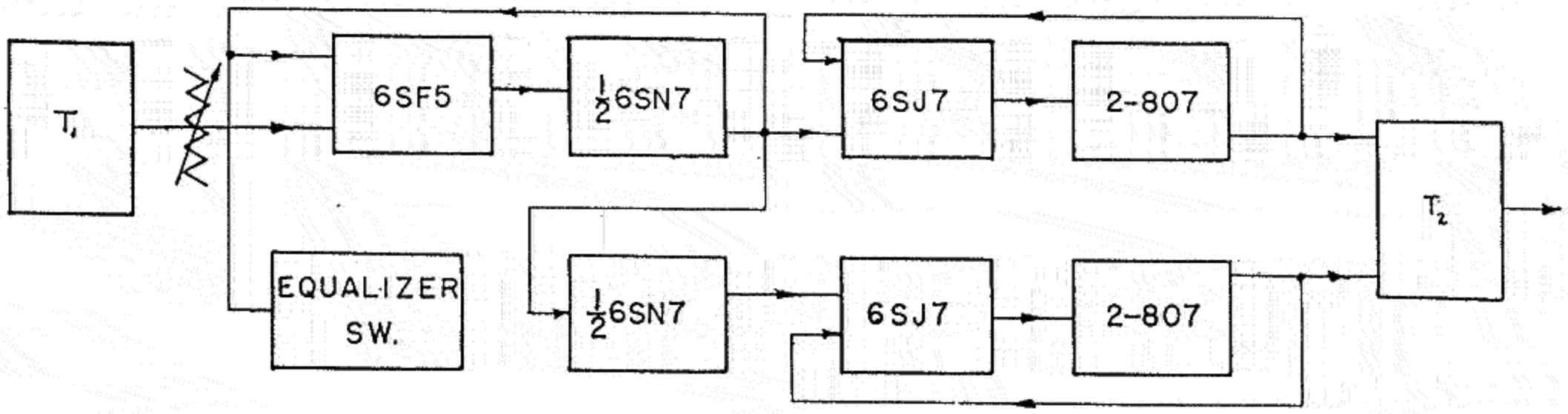
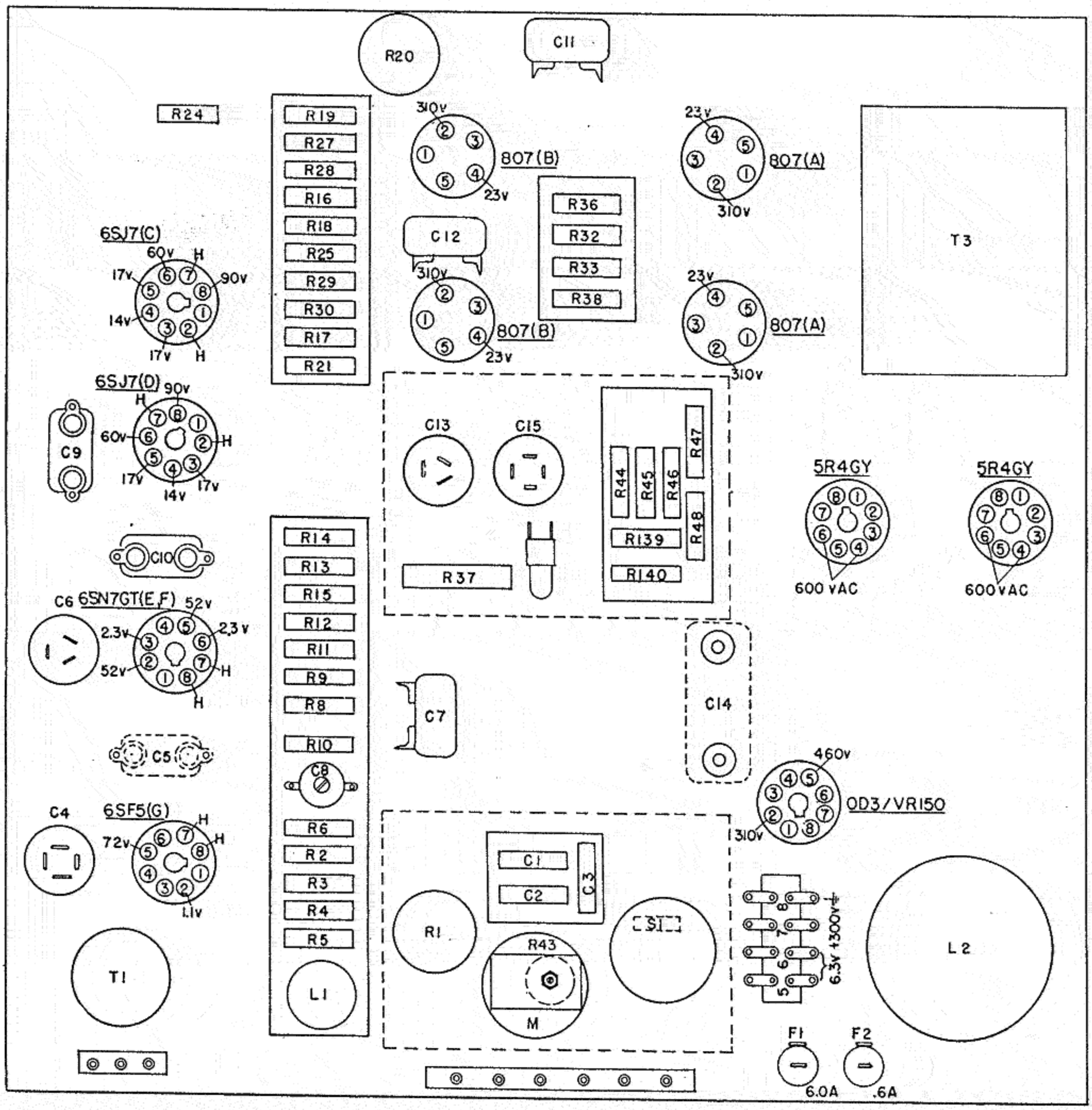


Figure 3. Block diagram of the 92-A Amplifier.



ALL VOLTAGES MEASURED TO GROUND WITH 20,000 OHM PER VOLT METER

Figure 4. Parts Layout of the 92-A Amplifier.

OUTPUT	
IMP.	TAPS
6	10 & 11
15	9 & 12
250	6 & 7
500	5 & 8

INPUT TRANSFORMER CONNECTIONS FOR 50/200/500~ IMPEDANCE

NOTE –
RESISTORS ARE IN OHMS UNLESS NOTED.
CONDENSORS ARE IN MICROFARADS.

PRESTO RECORDING CORP	
SCHEMATIC 92-A AMPLIFIER	
DRAWN E. COLE.	SCALE ~
CHECKED	
APPROVED	

NOTE: VOLTAGE MEASUREMENTS ... DIFFERENCES FOUND ...

928-500

OUTPUT	
IMP.	TAPS
6	10 8 11
15	9 8 12
250	6 8 7
500	5 8 8

INPUT TRANSFORMER CONNECTIONS FOR 50/200/500~ IMPEDANCE

TUBE SOCKET LAYOUT

NOTE-
RESISTORS ARE IN OHMS UNLESS NOTED.
CAPACITORS ARE IN MICROFARADS.
K=1000 OHMS ; M = MEGOHMS

ALL VOLTAGES MEASURED TO GROUND WITH 20,000 OHM/VOLT METER.

TERMINALS ②,④ & ⑤ TO RADIUS COMPENSATOR

PRESTO RECORDING CORP	
SCHEMATIC 92-B AMPLIFIER	
DRAWN E. COLE	SCALE ~
CHECKED	928-500
APPROVED	