

AMPEX

CORPORATION

934 CHARTER ST. • EMERSON 8-1471
TWX REDWOOD CITY CAL 41
CABLE ADDRESS: AMPEX, REDWOOD CITY
REDWOOD CITY, CALIFORNIA

MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: (reprinted June 9, 1964)
MODEL: 300
BULLETIN NO: 19
PAGE NO: 1

ELECTRONIC CIRCUIT MODERNIZATION

A. During the several years that the Model 300 has been in production a number of improvements have been made in the quality of recording tape. This has necessitated various production changes in this model in order to take full advantage of the improved characteristics of the newer tapes. Throughout all these changes, however, the "tape characteristic" has been retained. "Tape characteristic" is the term used to describe the actual signal that is recorded on the tape; for example, an inefficient record head would have to have an entirely different equalization curve in order to record the same actual signal on the tape than would a head having very efficient record characteristics. Both heads however would record exactly the same actual signal on the tape even though the equalization curves for the two heads were different. This explains how even though our record curves have changed in later models from those used in earlier models, the actual signal recorded on the tape has been kept constant. The same principal holds true in the case of playback heads and for this reason the later type heads require a slightly different equalization curve than did those in earlier models. In accordance with the above a tape recorded on an early model machine will play back on a later model machine almost identically with a tape both recorded and played back on the later model machine.

B. These newer tapes now require that the current production Model 300 be biased to peak at 1,000 cycles in order to operate at the lowest distortion level and to reduce high frequency saturation effects.

C. Because of "B" above, the record equalization has been changed slightly to very closely maintain the established "tape characteristic".

D. Biasing as in "B" above, also provides extended range 7 1/2" performance with the use of the new head assembly and the extended range 7 1/2" equalizer.

E. Again, it should be stressed that even though the equalization and bias adjustments have been changed, the net result is that the previously established "tape characteristic" has been maintained and that at the 15" tape speed there is still complete interchangeability of tapes between the earlier machines and the current production models.

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F. If the earlier Model 300 recorders are to be converted to take full advantage of the improved performance possible with present tapes and also to have extended range $7\frac{1}{2}$ " response, the following changes in the record and playback electronics will have to be made depending upon the serial number category of the recorder:

SERIALS 100 through 175

1. The playback equalization circuitry in the grid stage of V203 must be changed to that circuitry shown on the attached playback amplifier diagram. Discard the old R207, 470,000 ohm resistor. The new R207 is a 5,000 ohm potentiometer, Ampex Catalog #RE-273. Discard the old C206, a .006 condenser and substitute the new C206, a .036 condenser, Ampex Catalog #CO-111. Rewire these parts in accordance with the playback amplifier schematic attached.

(Refer to record amplifier diagram for the following steps)

2. In the record amplifier, R106 must be changed to a 39,000 ohm $\pm 5\%$ 1 watt resistor. This resistor is Catalog #RE-44.
3. Condenser C123, a 100 mfd 50 volt condenser, Catalog #CO-63, must be added as shown on diagram.
4. Relay K102, Catalog #RL-2, should be added as shown. On J104P jumper terminals 1 and 9. Lead from R122 to terminal 2 on J105 should be reconnected to terminal 10 on J104P. Disconnect lead to terminal 10 on J104P from C109 (for this change compare new schematic with schematic furnished with original instruction book.)
5. Wire lead from bottom side of L101 to one outside rotor contact of J102. Connect to stator contacts of this section of the relay the new C109, Catalog #CO-10, and C110, Catalog #CO-21, condensers as shown.
6. Connect rotor of other outside relay section to the point between C102 and R105. Add the new trimmers C125 and C126, both bearing Catalog #CO-92, to stator contacts of this section as shown on attached diagram.

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7. Replace R105 with a 1 megohm resistor, Catalog #RE-32.
8. Center pole of relay K102 is not used. Ground both stator contacts and rotor so that this pole will act as an isolation shield between the other two poles.
9. Replace C121 with a .005 mfd 500 volt Mica condenser, Catalog #CO-5.
10. Replace R126 with 10,000 ohm potentiometer, Catalog #RE-255.
11. Replace head assembly with later type having 1 mil record head gap and 1/4 mil playback head gap. Machines manufactured prior to serial number 1605 were supplied with a record head having a 2 mil gap and a playback head having a 1/2 mil gap. The later type head makes possible response at the 7 1/2" tape speed to 15,000 cycles.
12. Replace C119 with .002 mfd 500 volt Mica condenser, Catalog #CO-21.
13. When installing new head assembly, the erase current should be reduced from 250 ma to 150-175 ma by means of erase trimmer C120. Erase current can be determined by inserting a 10 ohm resistor in series with a ground lead of the erase head and measuring the voltage drop across the resistor. This measurement can be facilitated by ordering an adaptor plug, Catalog #PL-37S.
14. C109 becomes a .0035 mfd 500 volt Mica condenser, Catalog #CO-10.
15. C110 becomes a .002 mfd 500 volt Mica condenser, Catalog #CO-21.

SERIALS 176 through 885

1. Make all changes outlined for serial number category "100 through 175" excepting step 2.

SERIALS 886 through 890

1. Make all changes outlined for serial number category "100 through 175" excepting steps 1 and 2.

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SERIALS 891 through 1604

1. Perform only steps 11 through 15 outlined in serial number category "100 through 175".

SERIALS 1605 through 2912

1. Perform only steps 14 and 15 outlined in serial number category "100 through 175".

GENERAL

After having made all the necessary above changes the record bias should be set. Feed a 1,000 cycle tone into the recorder input and while recording adjust the bias control to peak playback output as read on the VU meter. Realign the heads, both record and playback, by means of the Ampex standard alignment tape, Catalog #4494, and then re-equalize both the record and playback amplifiers to the attached set of curves using equipment set up as shown. Finally, check for overall flat response. The recorder should now meet the specifications shown on the attached specification sheets.

Enclosures

- Fig. 6 - 9-3-52 - Record Amplifier & Power Supply
- Fig. 8 - 1-2-51 - Playback Amplifier
- Fig. 16- 9-5-52 - Record Amplifier Response Curves
- Fig. 17- 9-5-52 - Playback Amplifier Response Curves
- Service Bulletin #19 - Parts List - 9-26-52
- Specification Section 1 Page 1 - 2-29-52
- Specifications Section 1 Page 2 - 2-29-52

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ELECTRONIC COMPONENTS NECESSARY TO MAKE EQUALIZATION CHANGES IN MODEL 300

Recorders Serial #100-175

RE-44	39,000 ohm 1 watt Composition Resistor 5%
CO-111	.036 mfd 150 v Tubular Condenser 5%
RE-273	5000 ohm Carbon Potentiometer
CO-63	100 mfd 50 v Electrolytic Condenser
RL-2	3 Pole Double Throw DC Relay
CO-10	.0035 mfd 500 v Mica Condenser 5%
(2) CO-21	.002 mfd 500 v Mica Condenser 5%
(2) CO-92	.0001 mfd Padder Condenser
RE-32	1 Megohm 1 watt Composition Resistor
CO-5	.0005 mfd 500 v Mica Condenser
RE-255	10,000 ohm Wirewound Potentiometer
PL-37S	Plug, Erase Output (for making Adapter for measuring Erase current)
475-1AC	Head Assembly - Console
475-2AC	Head Assembly - Rack and Portable

Recorders Serial #176-500

CO-111	.036 mfd 150 v Tubular Condenser 5%
RE-273	5000 ohm Carbon Potentiometer
CO-63	100 mfd 50 v Electrolytic Condenser
RL-2	3 Pole Double Throw DC Relay
CO-10	.0035 mfd 500 v Mica Condenser 5%
(2) CO-21	.002 mfd 500 v Mica Condenser 5%
(2) CO-92	.0001 mfd Padder Condenser
RE-32	1 Megohm 1 watt Composition Resistor
CO-5	.0005 mfd 500 v Mica Condenser
RE-255	10,000 ohm Wirewound Potentiometer
PL-37S	Plug, Erase Output (for making Adapter for measuring Erase current)
475-1AC	Head Assembly - Console
475-2AC	Head Assembly - Rack and Portable

Recorders Serial #501-885

CO-111	.036 mfd 150 v Tubular Condenser 5%
RE-273	5000 Ohm Carbon Potentiometer

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CO-63 100 MFD 50 V. Electrolytic Condenser
RL-2 3 Pole Double Throw DC Relay
CO-10 .0035 MFD 500 V. Mica Condenser 5%
(2) CO-21 .002 MFD 500 V. Mica Condenser 5%
(2) CO-92 .0001 MFD Padder Condenser
RE-32 1 Megohm 1 Watt Composition Resistor
CO-5 .0005 MFD 500 V. Mica Condenser
ER-255 10,000 Ohm 10 W. Potentiometer
PL-378 Plug, Erase Output (For Making Adapter for Measuring Erase Current)
475-1 Head Assembly - Console
475-2 Head Assembly - Rack and Portable.

RECORDERS SERIAL #886-890

CO-63 100 MFD 50 V. Electrolytic Condenser
RL-2 3 Pole Double Throw DC Relay
CO-10 .0035 MFD 500 V. Mica Condenser 5%
(2) CO-21 .002 MFD 500 V. Mica Condenser 5%
(2) CO-92 .0001 MFD Padder Condenser
RE-32 1 Megohm 1 Watt Composition Resistor
CO-5 .0005 MFD 500 V. Mica Condenser
ER-255 10,000 OHM 10 W. Potentiometer
PL-378 Plug, Erase Output (For Making Adapter for Measuring Erase Current)
475-1 Head Assembly - Console
475-2 Head Assembly - Rack and Portable

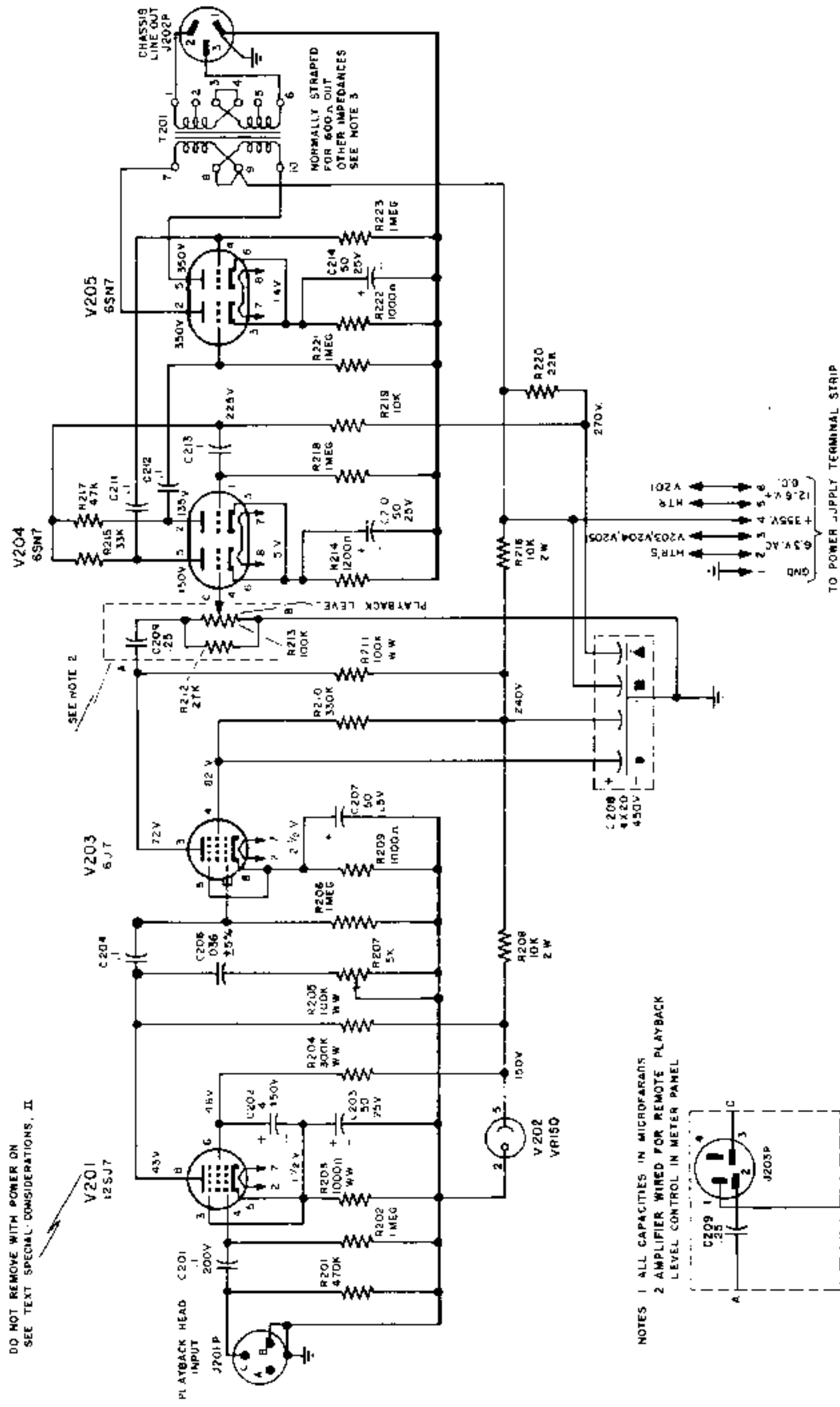
RECORDERS SERIAL #891-1604

(2) CO-21 .002 MFD 500 V. Mica Condenser 5%
PL-378 Plug, Erase Output (For Making Adapter for Measuring Erase Current)
CO-10 .0035 MFD 500 V. Mica Condenser 5%
475-1 Head Assembly - Console
475-2 Head Assembly - Rack and Portable

RECORDERS SERIAL #1605-2912

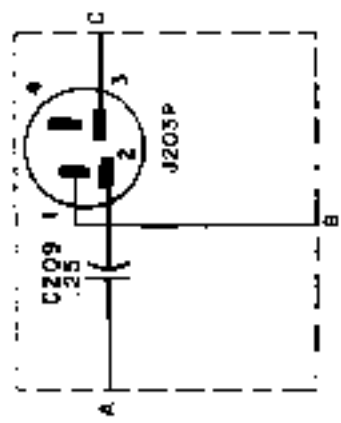
CO-10 .0035 MFD 500 V. Mica Condenser 5%
CO-21 .002 MFD 500 V. Mica Condenser 5%

DO NOT REMOVE WITH POWER ON
SEE TEXT SPECIAL CONSIDERATIONS, II



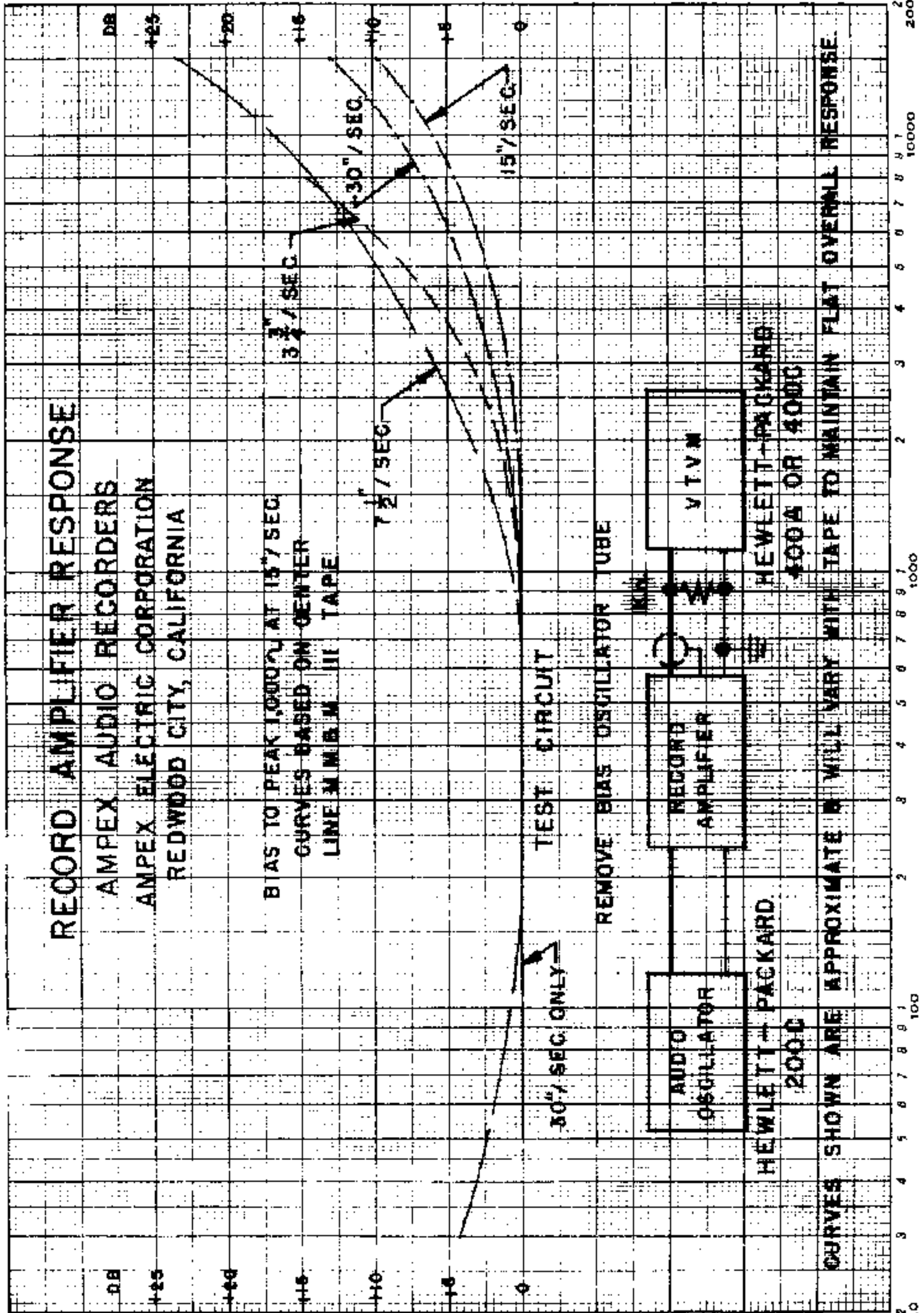
**PLAYBACK AMPLIFIER
MODEL 300**
AMPEX ELECTRIC CORPORATION
SAN CARLOS, CALIFORNIA

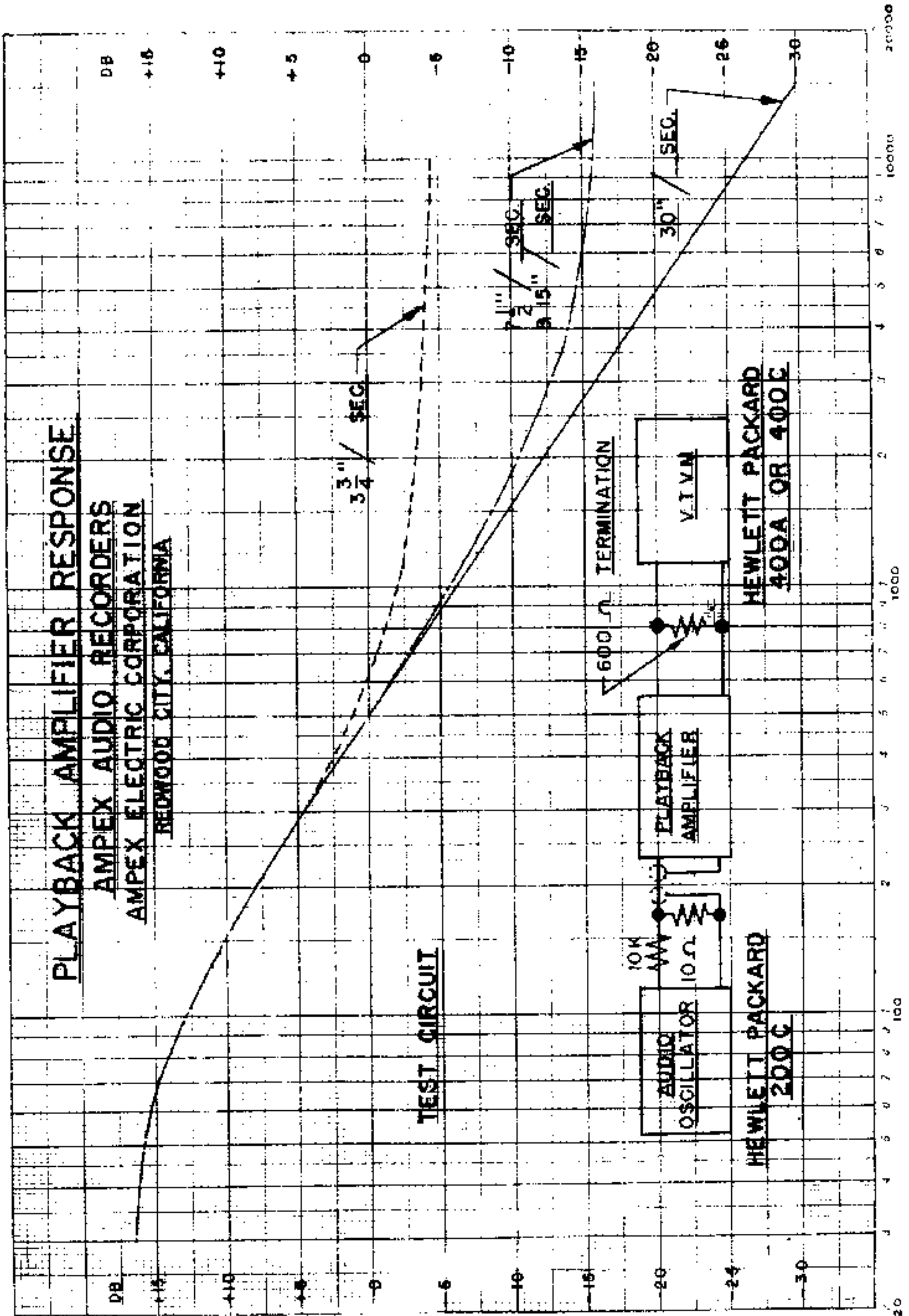
NOTES 1 ALL CAPACITIES IN MICROFARADS
2 AMPLIFIER WIRED FOR REMOTE PLAYBACK
LEVEL CONTROL IN METER PANEL



- 3 600 OHMS CONNECT TO 1 & 6, JOIN 3 TO 4
- 333 OHMS CONNECT TO 1 & 5, JOIN 3 TO 4
- 250 OHMS CONNECT TO 1 & 6, JOIN 2 TO 3 (APPROX ?)
- 200 OHMS CONNECT TO 2 & 5, JOIN 3 TO 4
- 125 OHMS CONNECT TO 1 & 4, JOIN 1 TO 3 & 4 TO 6
- 50 OHMS CONNECT TO 2 & 4, JOIN 2 TO 3 & 4 TO 5

FIG. 8





9-5-52

FIG. 17

SECTION I
SPECIFICATIONS FOR MODEL 300

All performance characteristics of the Model 300 Magnetic Tape Recorder equal or exceed the standards of the NARTB (National Association of Radio & Television Broadcasters). All Ampex audio recorders produce a tape frequency characteristic which has been accepted as standard by the NARTB.

TAPE SPEED: 15 inches per second and 7.5 inches per second, with speed change effected by a single control. The same control also provides the necessary equalization change to compensate for the change in speed.

FREQUENCY RESPONSE: At 15 inches ± 2 db 30 - 15,000 cycles.
At 7.5 inches ± 2 db 40 - 10,000 cycles.
Down no more than 4 db at 15,000 cycles.

SIGNAL-TO-NOISE: Over 70 db unweighted noise to maximum recording level. Over 60 db, as defined by NARTB standards. By NARTB definition, the signal-to-noise ratio is the ratio of peak recording level to the total unweighted playback noise when erasing a signal of peak recording level and in the absence of a new signal. Thus bias and erase noise are included, as well as playback amplifier noise. All frequencies between 50 and 15,000 cycles are measured. The peak recording level is defined as that level at which the overall (input to output) total rms harmonic distortion does not exceed 3% when measured on a 400 cycle tone.

STARTING TIME: Instantaneous. (When starting in the Normal Play mode of operation, the tape is up to full speed in less than 1/10 second.)

STOPPING TIME: When playing at 15 inches per second, tape moves less than 2 inches after depressing Stop button.

FLUTTER AND WOW: At 15 inches per second, well under 0.1% rms, measuring all flutter components from 0 to 300 cycles, using a tone of 3,000 cycles. At 7.5 inches, under 0.2%.

PLAYBACK TIMING ACCURACY: 0.2% or ± 3.6 seconds for a 30 minute recording.

PLAYING TIME: 32 minutes at 15 inch speed on standard NARTB reel, 64 minutes at 7.5 inch speed. The Model 300 will also accommodate the standard RMA reel in various thicknesses.

REWIND TIME: One minute for the full NARTB reel. (2400 feet)

CONTROLS: Start, Stop and Record are pushbutton, relay operated and may be remote controlled. Normal Play, Fast Forward, and Rewind on a selector switch, with rapid shuttling back and forth made possible by instantly changing from one mode of operation to the other without stopping in between.

COMPLETE PLUG-IN HEAD HOUSING: Double mumetal shield cans on playback head, equivalent shielding on record head, matching self-aligned covers on hinged gate. Drop-in threading.

SIMULTANEOUS MONITORING: Independent record and playback systems allow the tape to be monitored while recording.

RECORD AMPLIFIER: 10,000 ohms bridging input, normally set up for ± 4 VU in balanced or unbalanced.

PLAYBACK AMPLIFIER: Adjusted for ± 4 VU output, 600 ohms or 150 ohms balanced or unbalanced. Will deliver 20 dbm without exceeding 1% total harmonic distortion at any frequency from 30-15,000 cycles.

DIMENSIONS: Mechanical unit on 24-1/2" panel and Electronic unit on 12-1/4" panel. For standard rack, console or two case portable mounting.

SHIPPING WEIGHTS AND MOUNTING: Console 270 pounds, Portable Case 175 pounds, Rack 140 pounds.

POWER INPUT REQUIRED: 3 amperes, 115 volts, 60 cycles. (Available on special order for 50 cycles.)

METER CONTROL PANEL available at extra cost with features outlined below:

Mounted on 5-1/4" panel for rack, console, or portable case mounting.

Bridge Input step control will adjust record level for any input greater than -20 VU, 10,000 ohm bridging, any balanced or unbalanced line.

Output Step control will adjust level up to ± 8 VU regardless of tape level - - 600 ohm or 150 ohm balanced or unbalanced line.

VU meter will meter playback output while recording or playing back. Calibrated for ± 4 VU output.

Output key (line or cue).

Phone Jack with input-output key (A-B Key).