

# Section 6

## Electronic Assemblies

### MASTER REPRODUCE AMPLIFIER

#### GENERAL

Two master reproduce amplifier assemblies are provided, each containing a seven stage, resistance-coupled amplifier and an unregulated power supply. These assemblies, which amplify the signal from the reproduce head, are identical. The alignment procedures are detailed in Section 2.

#### THEORY OF OPERATION

A magnetic flux pattern, proportional to the signal originally recorded, exists on the master duplicator tape. As this tape passes over the reproduce head a voltage is induced in the coil of the head by the moving magnetic flux.

The voltage in the reproduce head coil is introduced into the assembly at INPUT

connector J2701P, and is impressed on the grid of V2701, a conventional amplifier stage employing a 12SJ7 vacuum tube. From this tube, the signal passes to the grid of V2702, which uses a 12SJ7 vacuum tube, where it is amplified and fed to the grid of V2703. Stage V2703 uses a 6C5 vacuum tube connected as a cathode follower. Equalizing feedback circuits for the two available speeds are connected from the cathode of V2703 back to the cathode circuit of the first stage through the contacts of relay K2701. The signal is also fed to the grid of V2704 through level control R2714 which provides a means of controlling signal strength.

The next three stages (V2704, V2705, and V2706) all use 6C5 vacuum tubes as conventional resistance-coupled amplifiers which amplify the signal and deliver it to the grid of the cathode follower output stage V2707, which employs a 6F6 vacuum tube. Degen-

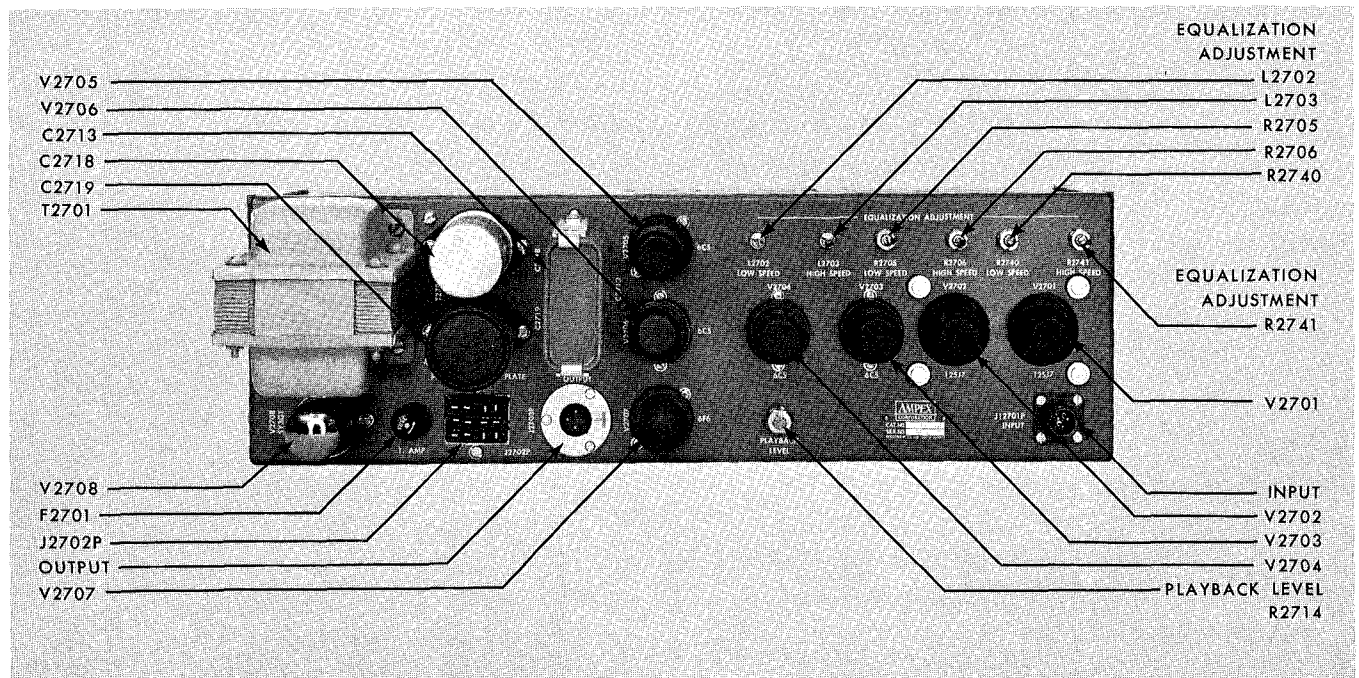


Figure 6-1

MASTER REPRODUCE ASSEMBLY PARTS LOCATION (EXTERIOR VIEW)

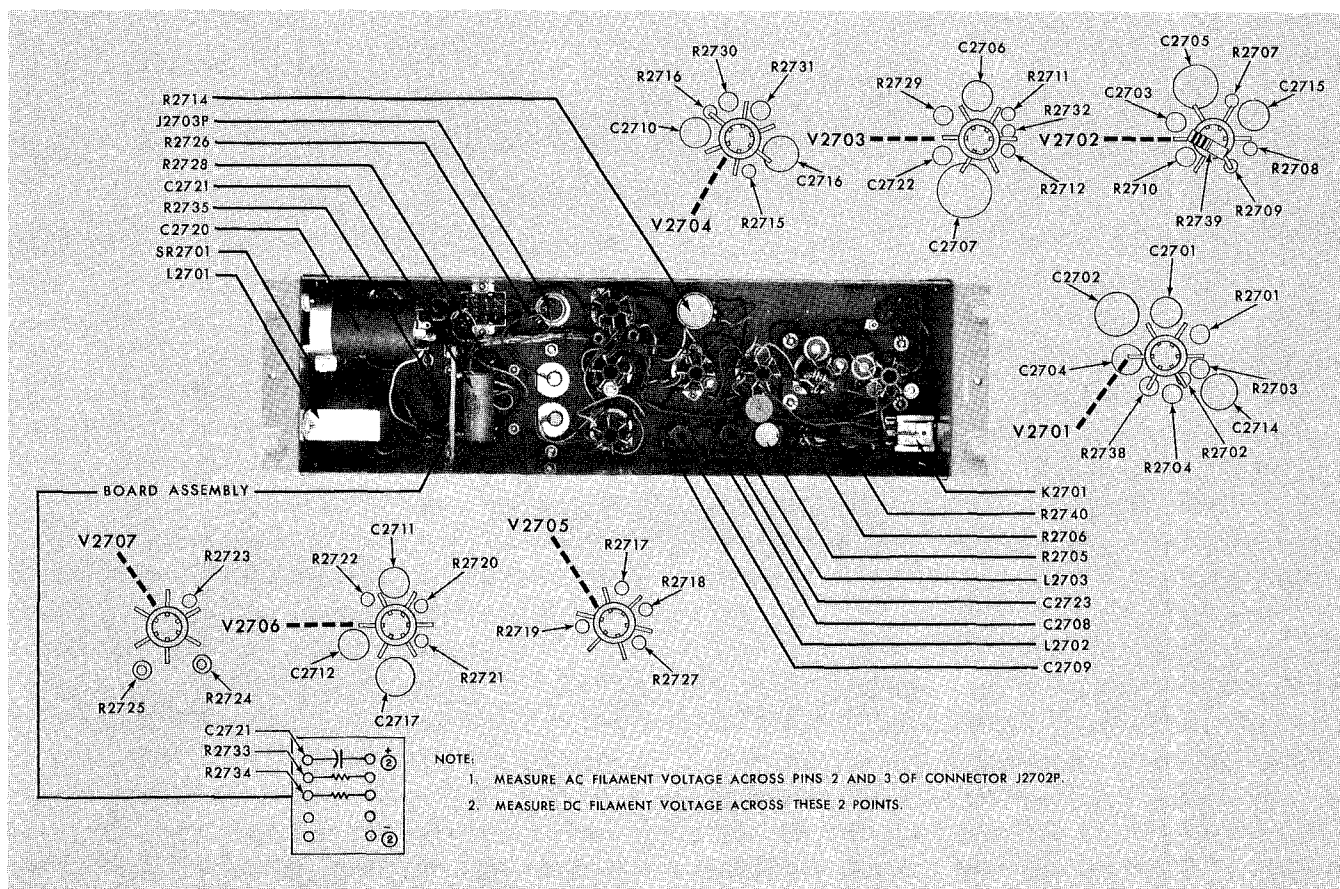


Figure 6-2 MASTER REPRODUCE PARTS LOCATION ( INTERIOR VIEW )

erative feedback is achieved through resistor R2727 connected from the output circuit back to the cathode circuit of V2705. The output signal is available across the 600-ohm OUTPUT connector J2703P.

Decoupling networks are provided by resistors R2728, R2729, R2730, and R2731 in conjunction with the four sections of capacitor C2719.

The high voltage d-c power supply uses a conventional full wave rectifier, employing a 5Y3GT vacuum tube. Unregulated plate voltage for all tubes in the amplifier, and actuating power for relay K2701, is provided. Filtering is accomplished by choke L2701, resistor R2734, and the three sections of capacitor C2718.

Full wave selenium rectifier SR2701 provides 12.6 vdc filtered by C2720 and R2735 -- for V2701 and V2702 filaments. A-c filament voltage for the balance of the amplifier tubes is provided by a 6.3 volt center-tapped winding of transformer T2701.

Actuation of relay K2701 is controlled by the position of the TAPE SPEED switch on the master tape transport. When this switch is in its HIGH position the relay is actuated whenever power is applied to the assembly, and its contacts select the high speed equalizing circuit. In its LOW position the TAPE SPEED switch shorts out the coil of K2701 through terminals 9 and 10 of J2702P; the relay is de-energized and its contacts select the low speed equalizing circuit.

## PREVENTIVE MAINTENANCE

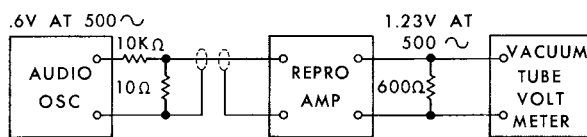
Once each month remove the assembly from the console or rack, disconnecting all cables. Visually inspect it for loose or broken connections, potting material leaking from capacitors or transformers, etc. Clean all dirt and dust from the chassis by using a vacuum cleaner or air blower. Clean the relay contacts by using clean bond paper or a burnishing tool (Western Electric Part No. ) between the normally closed contacts and pulling it back and forth several times; then manually actuate the relay and follow the procedure on the normally open contacts. Reinstall the assembly in the system. Check the tubes.

### CAUTION

Never remove any tube, connector plug, or fuse while power is applied to the assembly. To do so may magnetize reproduce heads or record heads if they are energized. Use Ampex Catalog Number 704-00 head demagnetizer to demagnetize heads.

## CORRECTIVE MAINTENANCE

When trouble shooting procedures have isolated a system malfunction to one of the master reproduce amplifiers, the following corrective maintenance schedule should aid the operator in quickly determining the faulty part. Corrective maintenance should be performed as a bench operation.



EQUALIZATION ADJUSTMENT SET-UP

Figure 6-3

## TEST SET-UP, REPRODUCE AMPLIFIER

## WARNING

DURING THE FOLLOWING PROCEDURES DANGEROUS VOLTAGES EXIST AT MANY POINTS ON THE UNDER SIDE OF THE CHASSIS. ONLY QUALIFIED PERSONNEL, ACCUSTOMED TO WORKING WITH LIVE CIRCUITS, SHOULD ATTEMPT THIS WORK.

- Step 1: Check that power is applied and that fuse F2701 is not faulty.
- Step 2: Disconnect power and remove the assembly from the console or rack.
- Step 3: Connect 117 volts 60 cps power to pins 5 and 6 of POWER FROM TOP PLATE connector J2702P. The safest way to accomplish this is to fabricate a test cable using a power plug at one end and a matching receptacle for the 12-contact Jones plug at the other end. A single pole single throw switch, activates the speed equalization relay and should be connected to pins 9 and 10 of the J2702P connector.
- Step 4: Allow sufficient time for the power supply to reach operating potential. The filaments of tube V2708 should light, and the other tubes gradually become warm. Disconnect the power and replace any tube which does not react in this manner. Also, relay K2701 should energize when the single pole single throw switch is open; if it does not it is an indication of a malfunction in the high voltage power, see Step 5.
- Step 5: If tube filaments light (or tubes become warm), but the relay does not actuate, disconnect the

power and replace tube V2708. If neither of these actions occur, recheck fuse F2701 and transformer T2701 after disconnecting power.

Step 6: Check the a-c filament voltage with an a-c voltmeter at the terminal board as indicated in Fig. 6-1. This reading should be 6.3 volts, a-c,  $\pm 0.2$  volt.

Step 7: Check the d-c filament voltage with a d-c voltmeter at the terminal board as indicated in Fig. 6-1. This reading should be 12.5 volts, d-c,  $\pm 1$  volt.

Step 8: Check the high voltage at the power supply filter capacitor, using a d-c voltmeter set to safely read voltages up to 425 volts. These readings should be 400 volts  $\pm 10$  volts, at the triangle, square, and half-moon terminals on the capacitor respectively. These readings should be made to any convenient circuit ground. Low readings might indicate a leaky filter capacitor, an excessive drain in the supply, or a poor 5Y3GT tube. High readings might indicate that portions of the circuit were not drawing sufficient current.

Step 9: Check the plate voltages of all amplifier tubes using a d-c voltmeter.

V2701 pin 8 -- 65 volts  $\pm 5$  volts  
V2702 pin 8 -- 80 volts  $\pm 5$  volts  
V2703 pin 3 -- 135 volts  $\pm 10$  volts  
V2704 pin 3 -- 75 volts  $\pm 5$  volts  
V2705 pin 3 - 150 volts  $\pm 10$  volts  
V2706 pin 3 - 185 volts  $\pm 10$  volts

V2707 pin 3 - 315 volts  $\pm 10$  volts

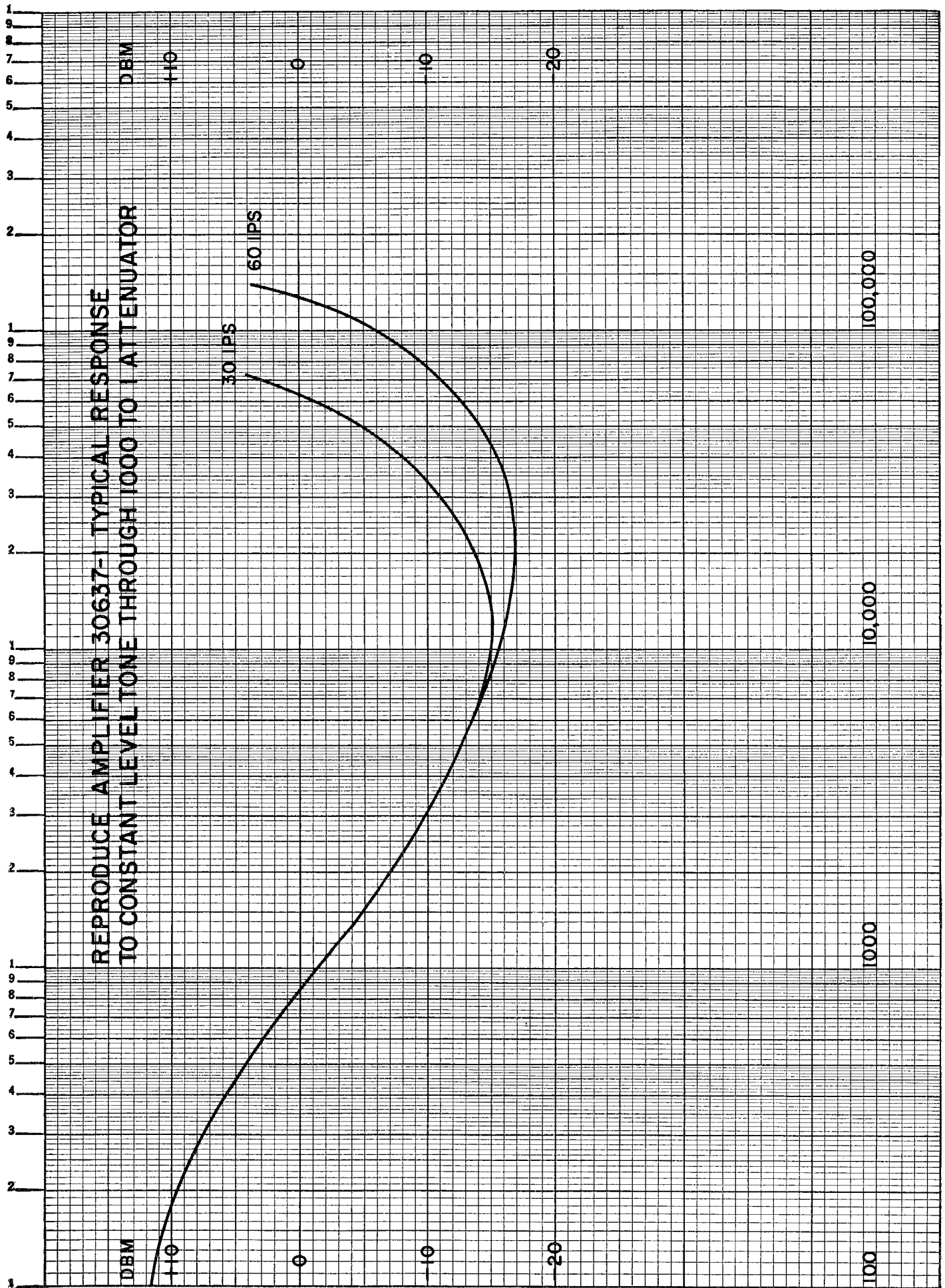
Low voltages might indicate a gassy tube, a shorted or leaky bypass or decoupling capacitor, excessive resistance in the plate lead, or insufficient resistance in the cathode lead. High voltage readings would normally indicate a poor tube or excessive cathode lead resistance.

Step 10: If the frequency response or gain of the amplifier is abnormal, check for dirty contacts of relay K2701. Clean by using burnishing tool or regular piece of bond paper.

Step 11: Hum or microphonics may be noticed above the bias level at the output of the amplifier, when connected to the head assembly (cover closed). Low frequency hum may be recorded as low frequency background noise. This will be noticeable when duplicated tapes are reproduced in the REWIND or FAST FORWARD modes of operation. If these troubles occur two remedies may improve this situation.

- A. Try selected 12SJ7 and 6C5 amplifier tubes for minimum hum and microphonics.
- B. Check the ground circuit of input capacitor filter C2718. The red/yellow high voltage center tap lead should connect to this capacitor.

Step 12: Follow normal audio amplifier trouble shooting techniques using a signal generator to trace the trouble to the malfunctioning stage.



MASTER REPRODUCE EQUALIZATION CURVE

Figure 6.4

REPRODUCE ELECTRONICS  
FOR  
3200-D  
CATALOG NUMBER 30637

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
C2701	CAPACITOR, paper: tubular; .100000 mfd ±20%; 200 vdcw; Sprague Part No. 67P10402	035-135
C2702	CAPACITOR, electrolytic: tubular; -10 +50%; 85° C; 4 mfd; 450 vdcw: Sangamo Part No. MT-4504	031-009
C2703	CAPACITOR, paper: tubular; 85° C; .022 mfd ±10%; 200 vdcw: MIL-C-25A: CPO5A3EC223K	035-043
C2704	CAPACITOR, paper: tubular; 85° C; .047 mfd ±10%; 400 vdcw; MIL-C-25:CPO5A3EE473K	035-057
C2705	Same as C2702	031-009
C2706	Same as C2704	035-057
C2707	CAPACITOR, paper: tubular; .25 mfd -10 +20%; 600 vdcw: Sprague Part No. 109P	035-097
C2708	CAPACITOR, mica: axial; .0006 mfd ±2%; 1000 vdcw: Elmenco Part No. Type VCM20	034-065
C2709	CAPACITOR, mica: axial; .0005 mfd ±20%; 500 vdcw: Elmenco Part No. CM20C501G	034-062
C2710	Same as C2704	035-057
C2711	Same as C2704	035-057
C2712	Same as C2704	035-057
C2713	CAPACITOR, paper: rectangular; .5 mfd -0 +10%; 40° C; 330 vac/600 vdc rating; 600 vdcw: General Electric Part No. 23F875G103	036-017

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
C2714	CAPACITOR, electrolytic: tubular; 50 mfd -10 +250%; 85° C; 6 vdcw: Sprague Part No. TVA1100	031-123
C2715	Same as C2714	031-123
C2716	Same as C2714	031-123
C2717	Same as C2714	031-123
C2718	CAPACITOR, electrolytic: twist tab; 20-30-30 mfd. -10 +50%; 85° C; 475 vdcw: Sprague: Type DFP	031-082
C2719	CAPACITOR, electrolytic: twist tab; 20-20-20-20 mfd. -10 +50%; 85° C; 450 vdcw: Cornell Dubilier: UPT222245	031-073
C2720	CAPACITOR, electrolytic: twist tab; 2000 mfd. -10 +250%; 85° C; 15 vdcw: Sprague Part No. Type DFP	031-085
C2721	CAPACITOR, electrolytic: tubular; 8 mfd. -10 +100%; 85° C; 350 vdcw: Sprague Part No. Type DEE	031-011
C2722	Same as C2703	035-043
F2701	FUSE, cartridge: Slow blow; 125 volt; 1 amp: Littelfuse Part No. 313001	070-004
J2701P	CONNECTOR, receptacle: male; 3 contact; MS3102A-10S-3P	143-008
J2702P	CONNECTOR, receptacle: male; 730 volt rms; 10 amp contacts; 12 contacts: Jones Part No. P-312-AB	147-008
J2703P	CONNECTOR, receptacle: male; 3 contact: Cannon Part No. XL-3-14	147-004
K2701	RELAY: 3PDT; 115 volt dc coil; 10K ohm	5760-00

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<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
L2701	FILTER CHOKE: 8-10 Henry; 80 ma. dc 250 ohm resistance	1155-00
L2702	COIL, variable: inductor, 2.0-14 mh. R. A. M. Part No. 201R15	051-011
L2703	COIL, variable: inductor; .44-3.1 mh. R. A. M. Part No. 201R13A	051-012
R2701	RESISTOR, fixed: axial; carbon; .47 meg ohm; 1%; 1 watt: Electra Part No. Type DC-1	042-061
R2702	RESISTOR, fixed: axial; carbon; 68 ohms; 1%; 1 watt: Electra Part No. Type DC-1	042-164
R2703	RESISTOR, fixed: axial; carbon; 680 ohm; 1%; 1 watt: Electra Part No. DC-1	042-025
R2704	RESISTOR, fixed: axial; carbon; .1 meg ohm; 10%; 1 watt: MIL-R-11A:RC32GF104K	041-170
R2705	RESISTOR, variable: carbon; 5,000 ohm; 20%; 1/2 watt: Chicago Telephone Supply Part No. Type 65 (TPR D)	044-073
R2706	RESISTOR, variable: carbon; 2,000 ohm; 20%; 1/2 watt: Chicago Telephone Supply Part No. type 65 (TPR D)	044-072
R2707	RESISTOR, fixed: carbon; 1 meg ohm; 10%; 1 watt: MIL-R-11A:RC32GF105K	041-182
R2708	RESISTOR, fixed: carbon; axial; 680 ohms; 10%; 1 watt: MIL-R-11A:RC32GF681K	041-143
R2709	Same as R2704	041-170
R2710	RESISTOR, fixed: axial; carbon; 22K ohms; 1%; 1 watt: Electra Part No. Type DC-1	042-045
R2711	Same as R2707	041-182
R2712	RESISTOR, fixed: carbon; axial; 2700 ohms; 10%; 1 watt: MIL-R-11A:RC32GF272K	041-151

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<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
R2714	RESISTOR, variable: carbon; .1 meg ohm; 10%; 2 watts: Allen Bradley Part No. JA1041, SD3056	044-015
R2715	Same as R2708	041-143
R2716	RESISTOR, fixed: carbon; axial; 15K ohms; 10%; 1/2 watt: MIL-R-11A:RC20GF153K	041-162
R2717	Same as R2707	041-182
R2718	Same as R2708	041-143
R2719	Same as R2716	041-162
R2720	Same as R2707	041-182
R2721	Same as R2708	041-143
R2722	Same as R2716	041-162
R2723	Same as R2704	041-170
R2724	RESISTOR, fixed: wirewound; 600 ohms; 5%; 10 watts: Tru-ohm Part No. Type FRL-10	043-108
R2725	Same as R2724	043-108
R2726	Same as R2716	041-162
R2727	RESISTOR, fixed: carbon; axial; 6.8K ohms; 10%; 1 watt: MIL-R-11A:RC32GF682K	041-156
R2728	RESISTOR, fixed: carbon; axial; 6.8K ohms; 10%; 2 watts: MIL-R-11A:RC42GF682K	041-211
R2729	RESISTOR, fixed: carbon; axial; 10K ohms; 10%; 2 watts: MIL-R-11A:RC42GF103K	041-213
R2730	Same as R2728	041-211
R2731	Same as R2729	041-213
R2732	RESISTOR, fixed: carbon; axial; 10K ohms; 10%; 1 watt: MIL-R-11A:RC32GF103K	041-158

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
R2733	RESISTOR, fixed: wirewound; 25K ohms; 5%; 10 watts: Tru-ohm Part No. Type FRL-10	043-134
R2734	RESISTOR, fixed: wirewound; 12.5K ohms; 5%; 10 watts: Tru-Ohm Part No. Type FRL-10	043-114
R2735	RESISTOR, fixed: carbon; axial; 4.7 ohms; 10%; 1 watt; Ohmite Part No.	041-091
R2736	RESISTOR, fixed: axial; carbon; 18K ohms; 1%; 1 watt: Electra Part No. Type DC-1	042-043
R2737	RESISTOR, fixed: axial; carbon; 27K ohms; 1%; 1 watt: Electra Part No. Type DC-1	042-046
R2738	Same as R2704	035-057
R2739	RESISTOR, fixed: carbon; axial; 330 ohms; 10%; 1 watt: MIL-R-11A:RC32GF331K	041-139
R2740	RESISTOR, variable: carbon; 500 ohms; 20%; 1/2 watt: Chicago Telephone Supply Part No. Type 65 (TPR D)	044-071
R2741	Same as R2740	044-071
SR2701	RECTIFIER, selenium: single phase; centertap; max. in 26 vac rms; max. out 1.2 amp dc; General Electric Part No. 6RS5WH5	581-001
T2701	TRANSFORMER, power: primary 115 volts; 50/60 cycle; secondary No. 1, 22 volts rms; center tapped at 750 ma dc.; secondary No. 2, 690 volts rms, center tapped at 60 ma. dc.; secondary No. 3, 6.3 volts center tapped at 2 amps ac.; secondary No. 4, 5 volts at 2 amps ac.	3953-00
V2701	TUBE, electron: 12SJ7; octal base: R. C. A. Part No.	012-087
V2702	Same as V2701	012-087

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
V2703	TUBE, electron: 6C5; octal base: R.C.A. and General Electric Part No.	012-002
V2704	Same as V2703	012-002
V2705	Same as V2703	012-002
V2706	Same as V2703	012-002
V2707	TUBE, electron: 6F6; octal base: R.C.A. and General Electric Part No.	012-007
V2708	TUBE, electron: 5Y3GT; octal base: R.C.A., Raytheon, Sylvania, Tungsol or General Electric Part Nos.	012-013
	OCTAL TURRET SOCKET	1208-00
	OCTAL SOCKET	2317-00
	FUSE EXTRACTOR POST: Littelfuse Part No. 342003	085-001
	NUT, shaftlock: 3/8-32; For 1/4 inch shaft w/7/16 hex locking nut: Millen Part No. 10061	498-014
	CLAMP, capacitor mounting: 1-1/2 inch dia.; vertical mounting: Cornell Dubilier Part No.	301-008
	SHOCKMOUNT, Barrymount (orange): Barry Part No. 275-1	350-003
	PIN, clevis: flat head; 3/16 inch dia; 21/32 inches long: MS20392	400-013
	PIN, cotter; extended prong; mitre end; 1/16 inch dia.; 1/2 inch long: ASA Part No.	401-005

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.

## MASTER RECORD AMPLIFIER

### GENERAL

One master record amplifier assembly is provided, consisting of a power supply, two record amplifiers, two pre-emphasis equalizer bracket assemblies and two VU output meters mounted on an 8-3/4 by 19-inch rack mounting chassis.

### THEORY OF OPERATION

The schematic diagram of the record assembly is shown as a foldout. The two record amplifiers are identical and the following circuit description for channel one also applies to channel two. An input signal from the master reproduce amplifier is introduced

at J401S which is terminated in a 560 ohm resistor R401 and a four position pre-emphasis equalizer assembly mounted on switch S401. This equalizer section provides the pre-emphasis necessary for making either 3-3/4 or 7-1/2 ips copies of 15 ips or 7-1/2 ips masters. Additional fixed pre-emphasis in the record amplifier compensates for certain losses present in the recording process. The control switch S401 is located on the record amplifier panel and is labeled RECORD EQUALIZATION - SPEED RATIO. This label acts as an operational check list indicating the speed relationship between master and slave tape transports, and the normal speeds of the master and duplicate tapes.

When the desired speed ratios and appropriate equalization have been selected,

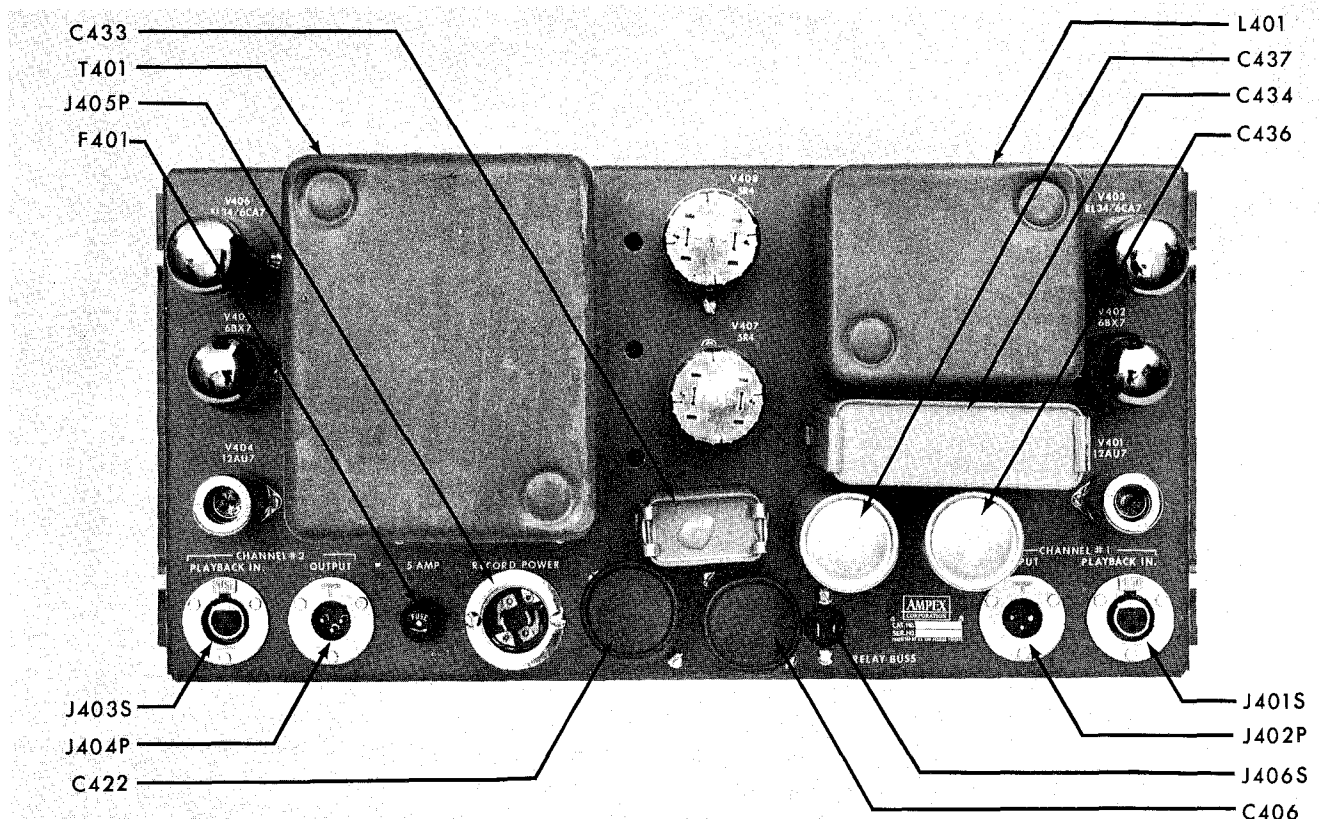
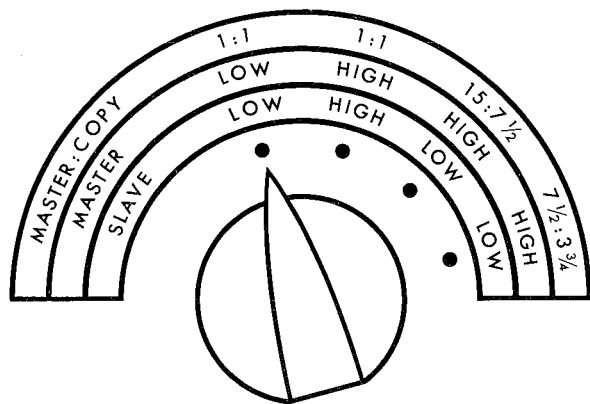


Figure 6-5  
MASTER RECORD ASSEMBLY PARTS LOCATION (EXTERIOR VIEW)



RECORD EQUALIZATION  
SPEED RATIO

Figure 6-6 RECORD EQUALIZATION

the signal is impressed on the 600 ohm twenty step attenuator, a 2 db per step gain control. The output of this attenuator feeds the 20,000 ohm potentiometer R403, providing a means to calibrate the gain of the four record amplifier channels. Control R403 is a screwdriver adjustment on the front panel below the vu meter, and should be set near the high side (maximum output).

The first four stages are resistance-coupled amplifiers, comprising V401 (12AU7) and V402 (6BX7GT). The EL34/6CA7 output tube is cathode follower V403. Two feedback loops are provided in the amplifier to compensate for certain losses within the system. Partial equalization is accomplished in the feedback loop from the grid of V402A to the cathode of V401A by the bypass capacitor C407. The other compensation network is contained in the feedback loop from the output of V403 to the cathode of V402A by R417 and C411. The cathode follower stage V403 provides a low impedance driving source for the slave heads which are fed from the output connector J402P through the slave switching panels. A VU meter (M401) is shunted across the amplifier output.

The output of the record amplifier is normally short circuited by relay K402.

This relay is energized when the system has been started by the record start button on the master control panel. The function of the relay is to short the slave record heads whenever the system is not actually recording, thus preventing transient power on and power off signals from magnetizing the slave record heads or damaging the output meter.

Plate power is supplied by parallel full wave rectifiers, vacuum tubes, V407 and V408, the filtering consisting of capacitor C433, inductance L401 and capacitor C434. Two isolation filters, inductance L402 and capacitor C437, inductance L403 and capacitor C436, feed respective record channels.

Two separate filament windings are used. One winding supplies 6.3 vac to V401, V402, V404, V405 and meter illumination. This winding is balanced to ground return by R463 and R465. The second winding provides 6.3 vac to the output tubes V403 and V406. This winding is balanced to a dc voltage somewhat above ground potential to prevent excessive potential between the cathode and the filament of the output tubes.

A 47,000 ohm resistor, R471, is used to limit the output voltage of the power supply until the tubes have warmed up. The thermal time delay relay K401, short circuits this resistor fifteen seconds after power is applied.

#### PREVENTIVE MAINTENANCE

Routine dusting and cleaning of the chassis can be scheduled as required by operating conditions. Tubes should be checked for emission and gain once a month. Overall response measurements can be made according to the diagram in Figure 6-5. Noise level of the entire system can be measured at the record current jacks of the slave switch panel and will indicate noisy tubes etc. The attenuator contacts may be cleaned if they be-

come noisy. Alcohol applied with a lint free cloth is usually sufficient. Clock oil or Daven attenuator oil can be used to lubricate the contacts. The amount of oil that will remain on the head of a pin is usually adequate if distributed uniformly over the contacts.

## CORRECTIVE MAINTENANCE

Typical operating voltages are indicated on the schematic diagram (Fig. 6-6) for audio channel No. 1; similar voltages exist at corresponding points for audio channel No. 2.

### 1) Gain Measurement

Step 1: Terminate the output of one of the record amplifier channels (J402P or J404P) in 600 ohms and connect an a-c vtm across this load.

Step 2: Connect an audio oscillator to the input of the amplifier being tested.

Step 3: Set the oscillator level at 1.23 volts (+4 dbm) at 500 cycles.

Step 4: Set the GAIN of the amplifier being tested to 40 on the engraved scale (maximum position).

Step 5: Turn the vernier gain control R445 or R446 (screwdriver adjustment) full clockwise. Output level reading on the vtm should be 29 volts  $\pm 2$  volts rms.

Step 6: Back off the step attenuator GAIN

control until the meter reads zero VU, or between zero and +2 VU.

Step 7: Using the vernier adjustment, set the level to exactly zero VU. Output voltage on the vtm should now read 6.9 volts rms ( $\pm 0.5$  volt rms).

### 2) Signal to Noise Ratio

Step 1: Short the input.

Step 2: Set the gain controls to normal operating level.

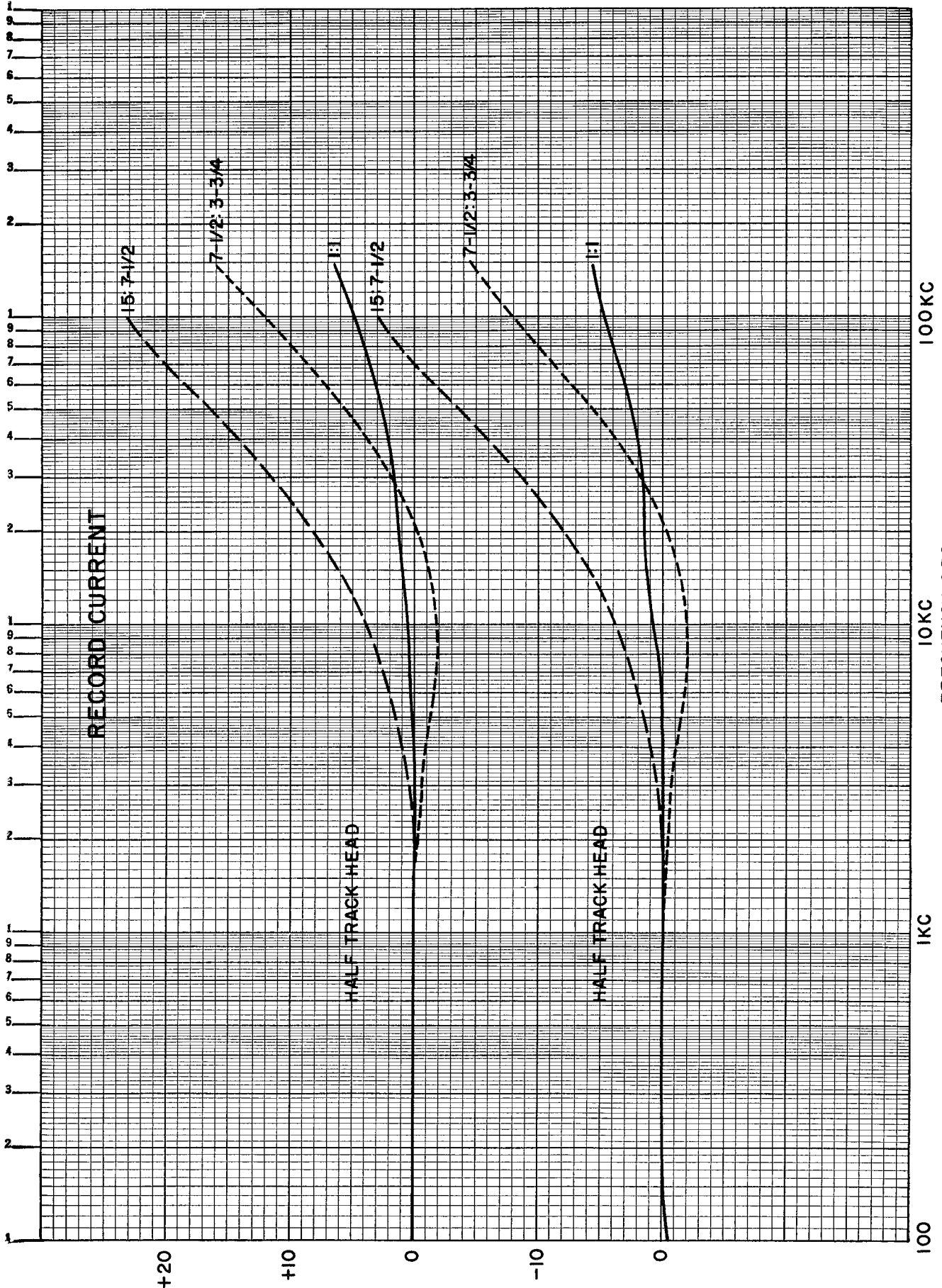
Step 3: Terminate the output in 600 ohms. The signal-to-noise ratio should be 60 db with respect to 6.9 volts rms output (+19 dbm).

### 3) Overall Frequency Response

Make this measurement at the RECORD CURRENT jack of one of the slave switch panels by plugging in an a-c vtm such as the Hewlett-Packard 400C or its equivalent. Set input level at -6 dbm (0.39 volt rms). Record current should correspond within  $\pm 1$  db of the values shown in figure 6-5.

### 4) Distortion Measurement

Use the same set up described in Steps 1 and 2 of the Gain Measurement. Connect a distortion meter to the output circuit. Harmonic distortion should be less than 0.5% to 500 cps with 6.6 volts output into the 600 ohm termination.



MASTER RECORD EQUALIZATION CURVE

Figure 6-8

RECORD AMPLIFIER  
FOR  
3200-D  
CATALOG NUMBER 30639

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
* C401	CAPACITOR, mica: axial; .002 mfd; 1%; 500 vdcw: Elmenco Part No. CM20C202F	034-071
* C403	CAPACITOR, mica: axial; .00068 mfd; 5%; 500 vdcw: MIL-C-5A:CM25D681J	034-013
* C404	CAPACITOR, paper: tubular; .020 mfd; 5%; 600 vdcw: Sprague Part No. 109P	035-102
* C405	CAPACITOR, paper: tubular; .047 mfd; 10%; 400 vdcw; Goodall El Part No. 663-UW	035-214
* C406	CAPACITOR, electrolytic: twist tab; 20-30-30 mfd; -10 +50%; 85° C; 475 vdcw: Sprague Part No. Type DFP	031-082
* C407	CAPACITOR, mica: axial; .0033 mfd; 5%; 500 vdcw: MIL-C-5A:CM30D332J	034-023
* C408	CAPACITOR, paper: tubular; .10 mfd; 10%; 400 vdcw: Goodall El Part No. 663-UW	035-215
* C409	CAPACITOR, electrolytic: tubular; 50 mfd; -10 +250%; 85° C; 25 vdcw: Cornell Dubilier Part No. BRM-502	031-030
* C410	CAPACITOR, paper: tubular; .10 mfd; 20%; 600 vdcw: Sprague Part No. 73P10406	035-140
* C411	Same as C401	034-071
* C412	Same as C410	035-140
* C413	CAPACITOR, electrolytic: tubular; 50 mfd; -10 +150%; 85° C; 50 vdcw; Sprague Part No. Type DEE	031-024

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.



<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
*C414	CAPACITOR, paper: tubular; .220 mfd; 20%; 400 vdcw; Sprague Part No. 96P22404S4	035-085
*C415	CAPACITOR, paper: rectangular; 2.0 mfd; -10 +50%; 85° C; 600 vdcw: Cornell Dubilier Part No. DYR6200	036-004
*C416	CAPACITOR, mica: axial; .000750 mfd.; 5%; 300 vdcw: MIL-C-5A:CM20D751J	034-014
*C417	Same as C401	034-071
*C418	Same as C404	035-102
*C420	Same as C403	034-013
*C421	Same as C405	035-214
*C422	Same as C406	031-082
*C423	Same as C407	034-023
*C424	Same as C408	035-215
*C425	Same as C409	031-030
*C426	Same as C410	035-140
*C427	Same as C401	034-071
*C428	Same as C410	035-140
*C429	Same as C413	031-024
*C430	Same as C414	035-085
*C431	Same as C415	035-004
*C432	Same as C416	034-014
*C433	CAPACITOR, paper: rectangular; 2 mfd; -10 +20%; 1000 vdcw: Sprague Part No. 0030-34	036-033

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
* C434	CAPACITOR, paper: rectangular; 10 mfd; 10%; 85° C; 600 vdcw: Cornell Dubilier Part No. TJH6100; Painted gray; Color 1640 Per Fed TT-C-695	036-012
* C435	Same as C408	035-215
* C436	CAPACITOR, electrolytic: threaded neck; 16 mfd; -10 +50%; 600 vdcw: Sprague Part No. AP-16	031-100
* C437	Same as C436	031-100
* C438	CAPACITOR, mica: axial; .0015 mfd; 5%; 500 vdcw: Elmenco Part No. CM20E152J	034-103
* C439	CAPACITOR, mica: axial; .002 mfd; 5%; 500 vdcw: Elmenco Part No. CM20E202J	034-072
* C441	CAPACITOR, paper: tubular; .056 mfd; 5%; 125° C; 200 vdcw: Sprague Part No. 65P56352	035-202
* C442	Same as C438	034-103
* C443	Same as C439	034-072
* C445	Same as C441	035-202
* C446	CAPACITOR, paper: tubular; .0033 mfd; 10%; 85° C; 400 vdcw: MIL-C-25: CPO5A1EE332K	035-171
* C447	Same as C446	035-171
* F401	FUSE, cartridge: 5 amperes; 250 volt; Fastblow: Littelfuse Part No. 312005	070-007
* J401S	CONNECTOR, receptacle: female; 3 contact: Cannon Part No. XL-3-13	146-007
* J402P	CONNECTOR, receptacle: male; 3 contact: Cannon Part No. XL-3-14	147-004
* J403S	Same as J401S	146-007

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
* J404P	Same as J402P	147-004
* J405P	CONNECTOR, plug: male; 8 contact; 730 volts rms; 10 amp contacts: Jones Part No. P-308-CCT-L	147-013
* K401	RELAY: 15 second time delay; 6.3 volt heater octal base; 3 amp contacts rating: Amperite Part No. 6N015	020-071
K402	RELAY: 3 PDT; 115 volt dc coil; 10 amp contacts; Philtrol Part No. 33QA	020-006
* L401	CHOKER, filter: 300 ma dc; 90 ohms with an inductance of 6.5 henrys: U.T.C. Part No. H75	541-012
* L402	CHOKER, filter: 160 ma dc; 165 ohms with an inductance of 6 henrys: Triad Part No. C12X	541-013
* L403	Same as L402	541-013
* L404	COIL, rf choke: 2.5 mh: Miller Part No. 640	051-024
* L405	Same as L404	051-024
* M401	METER, vu: frosted lamps; 6.3 volts; .3 amperes; 4 inch	30667-01
* M402	Same as M401	30667-01
* R401	<i>e</i> RESISTOR, fixed: axial; carbon; 560 ohms; 1%; 1 watt: Electra Part No. Type DC-1	042-024
* R402	<i>e</i> RESISTOR, fixed: axial; carbon; 8.2K ohms; 1%; 1 watt: Electra Part No. Type DC-1	042-040
* R403	<i>e</i> RESISTOR, variable: carbon; 20K ohms; 20%; 1/4 watt: Centralab Part No. MOD 3 (TPR C1)	044-036
* R404	<i>e</i> RESISTOR, fixed: carbon; axial; 33K ohms; 10%; 2 watts: MIL-R-11A:RC42GF333K	041-218

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
* R405	RESISTOR, fixed: axial; carbon; 820 ohms; 1%; 1 watt: Electra Part No. Type DC-1	042-027
* R406	RESISTOR, fixed: carbon; axial; 8.2K; 10%; 1 watt: MIL-R-11A:RC32GF822K	041-157
R407	RESISTOR, fixed: carbon; 1 meg ohm; 10%; 1/2 watt: MIL-R-11A:RC20GF105K	041-031
R408	RESISTOR, fixed: carbon; axial; 22K ohms; 10%; 2 watts; MIL-R-11A:RC42GF223K	041-216
R409	RESISTOR, fixed: carbon; axial; 1.2K ohms; 10%; 1/2 watt: MIL-R-11A:RC20GF122K	041-049
R410	RESISTOR, fixed: carbon; axial; 56K ohms; 1%; 1/2 watt: Electra Part No. Type DC-1/2	042-108
R411	RESISTOR, fixed: carbon; axial; 4.7K ohms; 10%; 2 watts: MIL-R-11A:RC42GF472K	041-209
R412	Same as R407	041-031
R413	RESISTOR, fixed: wirewound; 30K ohms; 5%; 5 watts: Dalohm Part No. Type RS-5	043-245
R414	RESISTOR, fixed: axial; carbon; 1.8K ohms; 1%; 1 watt: Electra Part No. Type DC-1	042-111
R415	RESISTOR, fixed: wirewound; radial leads; 4K ohms; 5%; 5 watts: Tru-Ohm Part No. Type FRL-5	043-169
R416	RESISTOR, fixed: carbon; axial; .47 meg ohms; 10%; 1 watt: MIL-R-11A:RC32GF474K	041-178
R417	RESISTOR, fixed: axial; carbon; 15K ohms; 1%; 1/2 watt: Electra Part No. Type DC-1/2	042-082
R418	RESISTOR, fixed: wirewound; axial; 20K ohms; 5%; 5 watts; Dalohm Part No. Type RS-5	043-244

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.

<u>REF. NO.</u>		<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
R419	e	RESISTOR, fixed: carbon; axial; 2.7K ohms; 10%; 1 watt: MIL-R-11A:RC32GF272K	041-151
R420	e	RESISTOR, fixed: carbon; axial; .1 meg ohm; 10%; 1 watt: MIL-R-11A:RC32GF104K	041-170
R423	e	RESISTOR, fixed: wirewound; radial leads; 200 ohms; 5%; 5 watts: Tru-Ohm Part No. Type FRL-5	043-162
R424	e	RESISTOR, fixed: wirewound; lug; 2K ohms; 5%; 50 watts; Tru-Ohm Part No. Type FR-50	043-012
R425	e	RESISTOR, fixed: axial; carbon; 22K ohms; 1%; 1 watt; Electra Part No. Type DC-1	042-045
R428	e	RESISTOR, fixed: axial; carbon; 39K ohms; 1%; 1 watt: Electra Part No. Type DC-1	042-048
R430	e	Same as R405	042-027
R431	e	RESISTOR, fixed: axial; carbon; 1.2K ohms; 1%; 1 watt: Electra Part No. Type DC-1	042-029
* R432	e	Same as R401	042-024
* R433	e	Same as R402	042-040
* R435	e	Same as R405	042-027
R436	e	Same as R431	042-029
* R437	e	Same as R403	044-036
* R438	e	Same as R404	041-218
R439	e	Same as R405	042-027
* R440	e	Same as R406	041-157
R441	e	Same as R407	041-031
R442	e	Same as R408	041-216
R443	e	Same as R409	041-049

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.

<u>REF. NO.</u>		<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
R444	<i>e</i>	Same as R410	042-108
R445	<i>e</i>	Same as R411	041-209
R446	<i>e</i>	Same as R407	041-031
R447	<i>e</i>	Same as R413	043-245
R448	<i>e</i>	Same as R414	042-111
R449	<i>e</i>	Same as R415	043-169
R450	<i>e</i>	Same as R416	041-178
R451	<i>e</i>	Same as R417	042-082
R452	<i>e</i>	Same as R418	043-244
R453	<i>e</i>	Same as R419	041-151
R454	<i>e</i>	Same as R420	041-170
R457	<i>e</i>	Same as R423	043-162
R458	<i>e</i>	Same as R424	043-012
R459	<i>e</i>	Same as R425	042-045
R462	<i>e</i>	Same as R428	042-048
R463	<i>e</i>	RESISTOR, fixed: carbon; axial; 100 ohms; 10%; 1/2 watt: MIL-R-11A:RC20GF101K	041-038
R464	<i>e</i>	Same as R463	041-038
R465	<i>e</i>	Same as R463	041-038
R466	<i>e</i>	Same as R463	041-038
R467	<i>e</i>	RESISTOR, fixed: carbon; axial; .15 meg ohm; 10%; 2 watts: MIL-R-11A:RC42GF154K	041-226
R468	<i>e</i>	RESISTOR, fixed: carbon; axial; 68K ohms; 10%; 1 watt: MIL-R-11A:RC32GF683K	041-168

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
R469	<i>e</i> RESISTOR, fixed: carbon; axial; .22 meg ohm; 10%; 2 watts: MIL-R-11A:RC42GF224K	041-228
R470	<i>e</i> Same as R469	041-228
R471	<i>r</i> RESISTOR, fixed: carbon; axial; 47K ohms; 10%; 1 watt: MIL-R-11A:RC32GF473K	041-166
R472	<i>e</i> RESISTOR, fixed: axial; carbon; 270 ohms; 1%; 1/2 watt: Electra Part No. Type DC-1/2	042-169
R473	<i>e</i> Same as R472	042-169
S401	SWITCH, rotary: 3 pole, 5 position; 1 section non-shorting; ceramic: Centralab Part No. PA2007	122-031
S402	Same as S401	122-031
R401	TRANSFORMER, power: primary; 115 volts, 50/60 cycles; secondary-1st 460 volts, center tapped at 320 ma dc.; 2nd, 600 volts, center tapped at 300 ma dc.; 3rd 6.3 volts 8 amps; 4th, 6.3 volts-4 amps; 5th, 5 volts 6 amps.	560-011
V401	TUBE, electron: 5Y3GT; octal base: RCA Part No.	012-013
V402	TUBE, electron: 6BX7; cotal base: General Electric Part No.	012-083
V403	TUBE, electron: 6CA7: Amperex Part No. EL34/6CA7	012-113
V404	Same as V401	012-012
V405	Same as V402	012-083
V406	Same as V403	012-113
V407	TUBE, electron: 5R4GYA; octal base: General Electric Part No.	012-063

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
V408	Same as V407	012-063
	OCTAL TUBE SOCKET, modified turret	1208-00 -4 PLS
	RELAY, plate adaptor	5608-00
	ATTENUATOR, variable carbon potentiometer: 20 step; 2.3 DB/STEP; tapered to infinity on last steps: Hycor Part No. Type 100	045-013
	SOCKET, Noval turret: 9 pin: Vector Part No. 8-N-9TU	150-004 -2 PLS
	SOCKET, capacitor; for twist - prong electrolytics: Cinch Part No. 54A11897 or 2CT	150-006
	SOCKET, octal: 1 inch dia. chassis hole 1-1/2 inch mounting centers: Methode Part No. SMJ-257-140	150-012
	BASE, tubeshield: 9 pin min. sockets (noval) WNP per JAN S-28A; Elco Corp. Part No. 179	160-006
	SHIELD, tube: noval; WNP, per JAN S-28A: Elco Corp. Part No. 191	160-008
	KNOB: 1-3/4 inch skirt; 1-3/8 inch wide Harry Davies Part No. 4107-E	230-004
	KNOB: 1-1/4 inch skirt; raised pointer For 1/4 inch shaft: Rogan Bros. Part No. RB-31	230-010

When ordering replacement parts always include the following information: Equipment Type; Equipment Serial Number; Ampex Part or Catalog Number; and Description of Part. DO NOT simply use the schematic reference number.



# MASTER BIAS OSCILLATOR

## GENERAL

The bias oscillator assembly provides the high frequency a-c bias current required to record on the linear portion of the tape characteristic. It consists of an oscillator, an amplifier stage, and a regulated d-c power supply. The bias oscillator assembly will supply sufficient current to operate twenty record head channels.

## OSCILLATOR CIRCUIT DESCRIPTION

The oscillator section (V501) employs a 5687 vacuum tube connected as a push-pull colpitts oscillator. Nominal oscillation

frequency of this circuit is 350 kc; the absolute frequency is not critical. The output of the oscillator is fed to the grids of two 6L6 vacuum tubes, V502 and V503, connected as a push-pull amplifier. In the plate circuit of this stage is a tuned circuit, resonant at the oscillator frequency. This circuit is tuned to resonance by variable capacitor C507, across which is connected a 680 pf capacitor (C508). If resonance cannot be achieved in the mid-range of C507 (with bias cables connected to the slave heads) it may be necessary to change the value of the padding capacitor. Use a silver mica capacitor rated at 1000 vdcw; if C507 is close to its maximum capacity increase the value of the paralleled capacitor, and if C507 is close to

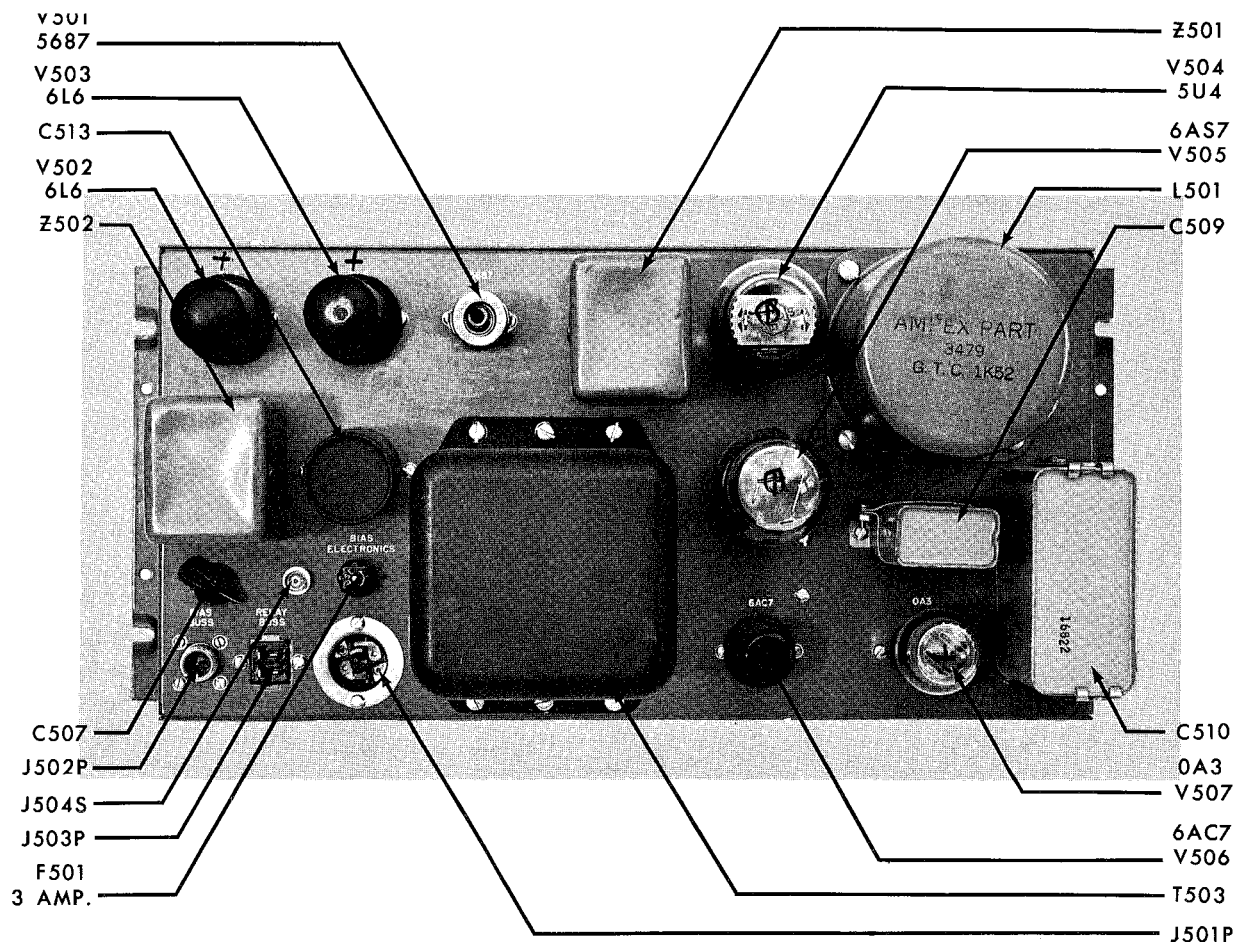
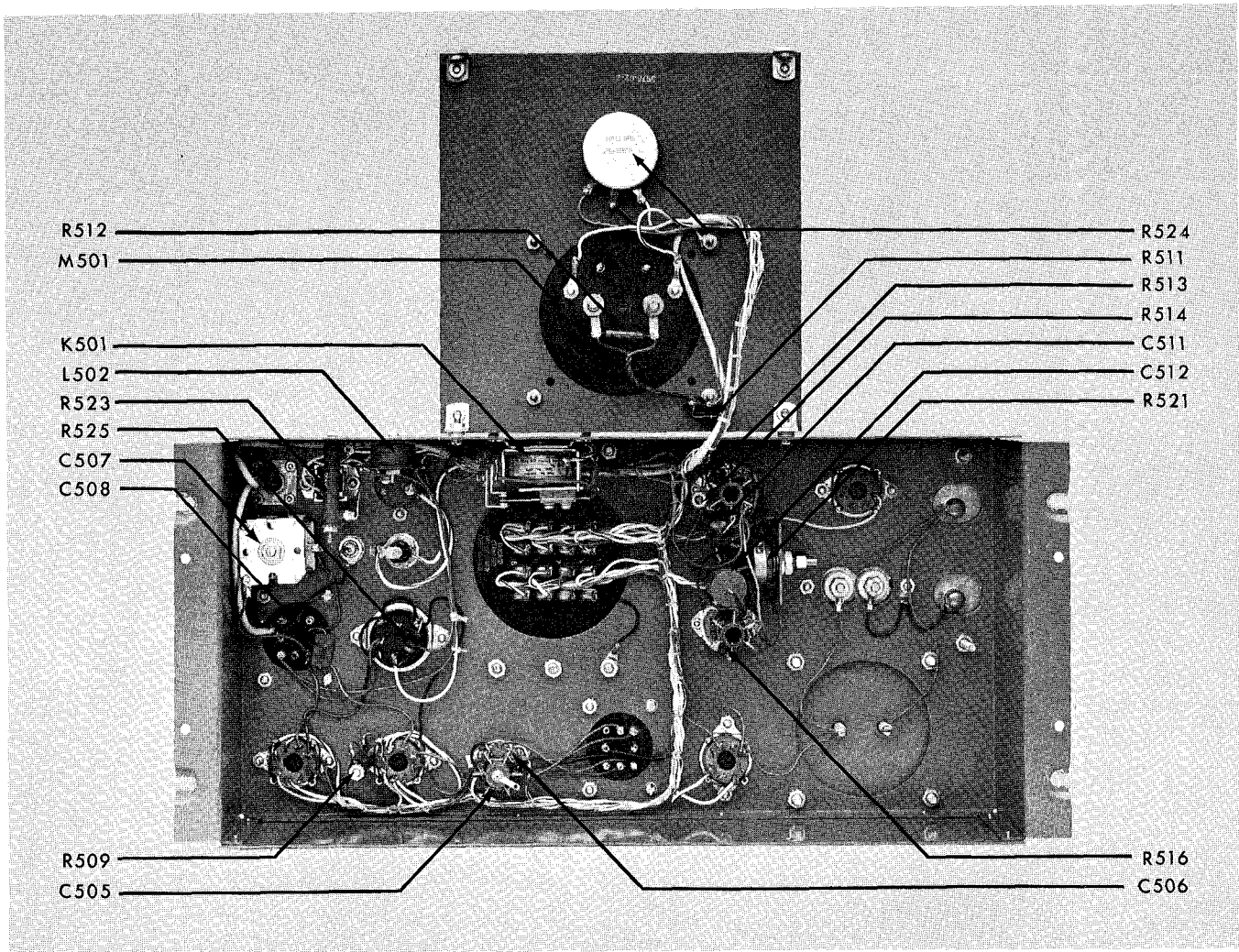


Figure 6-10 MASTER BIAS OSCILLATOR PARTS LOCATION (EXTERIOR VIEW)



**Figure 6-11 MASTER BIAS OSCILLATOR PARTS LOCATION (INTERIOR VIEW)**

its minimum capacity decrease the value of the paralleled capacitor.

The power supply uses a 5U4G vacuum tube as a full wave rectifier (V504), and a conventional regulating circuit consisting of a 6AS7 vacuum tube (V505), a 6AC7 vacuum tube (V506), and a VR75 vacuum tube (V507).

Filament voltage for V501 (5687) is provided by a single 6.3 volt a-c secondary winding of transformer T503; a second winding provides 6.3 volts a-c for the filament of tube V505 (6AS7); a third winding provides 6.3 volts a-c for the filament of tube V506 (6AC7) and meter illumination lamp I501;

a fourth winding provides 6.3 volts a-c for the filaments of the two 6L6's (V502 and V503).

#### PREVENTIVE MAINTENANCE

Remove the assembly from the console or rack, disconnecting all cables. Visually inspect it for loose or broken connections, potting material leaking from capacitors or transformers, etc. Clean the relay contacts with a burnishing tool between the normally closed contacts by pulling it back and forth several times. Clean all dirt and dust from the chassis by using a vacuum cleaner or air blower, and reinstall the assembly in the sys-

MASTER BIAS OSCILLATOR (3200-D)  
CATALOG NO. 30638-01

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
C505	CAPACITOR, mica: axial; .002 mfd; 5%; 500 vdcw: Elmenco Part No. CM20E202J	034-072
C506	Same as C505	034-072
C507	CAPACITOR, variable: 1200 volts ac; 7.5-100 mmfd; air gap of .030; 180° effective rota- tion: Hammerlund Part No. HFA-100-B	038-010
C508	CAPACITOR, mica: axial; 680 mmfd; 5%; 1000 vdcw: Elmenco Part No. VCM-2013-681J	034-152
C509	CAPACITOR, paper: rectangular; .2 mfd; 10%; 85° C; 600 vdcw: Cornell Dubilier Part No. TJU6020 Paint gray, color 1640 Per Fed. TT-C-595	036-013
C510	CAPACITOR, paper: rectangular; 10 mfd; -10 +20%; 85° C; 600 vdcw: Sprague Part No. CP70B1EF106V	036-022
C511	CAPACITOR, paper: tubular; .10 mfd; -10 +20%; 85° C; 600 vdcw: Sprague Part No. 109P10496	035-074
C512	CAPACITOR, paper: tubular; .25 mfd; -15 +40%; 85° C; twist-tab; Sprague Part No. Type DFP	035-097
F501	FUSE, cartridge: Fast blow; 250 volts; 3 amps: Littelfuse Part No. 312003	070-001
J501P	CONNECTOR, receptacle: male; 250 volts; 10 amps; twist-lock; 2 contacts: Hubbell Part No. 7466	147-013
J502P	CONNECTOR, receptacle: male; 1 contact; MS3102A-10S-2P	143-010
J503P	CONNECTOR, receptacle: male; 730 volts rms; 10 amps; 4 contacts: Jones Part No. P-304-AB	147-036

When ordering replacement parts, always include the following information: Ampex type; equipment serial number; Ampex part or catalog number; and description of part. DO NOT SIMPLY USE THE SCHEMATIC REFERENCE NUMBER.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
J504S	CONNECTOR, receptacle: female; 1 contact: UG-1094/U	142-026
K501	RELAY: 115 dc coil; 4000 ohm; 10 amp contacts; DPDT: Advance Part No. PC2C115VD	020-014
L501	CHOKER: 12 Henrys; 150 ma dc; 120 ohm dc re- sistance: UTC-CG-100.	3479-00
L502	COIL, R. F. Choke: 20 mh.; Miller Part No. 691	051-018
M501	METER, vu: frosted lamps; 6.3 volts; 3 amp	30667-01
R505	<i>2</i> RESISTOR, fixed: carbon; axial; 2.2K ohms; 10%; 1/2 watt: MIL-R-11A:RC20GF222K	041-052
R506	<i>2</i> RESISTOR, fixed: axial; carbon; .27 meg ohm; 1%; 1/2 watt: Electra Part No. Type DC-1/2	042-098
R507	<i>2</i> Same as R506	042-098
R508	<i>2</i> RESISTOR, fixed: carbon; axial; 47 ohms; 10%; 1/2 watt: MIL-R-11A:RC20GF470K	041-034
R509	<del><i>2</i></del> <i>2</i> RESISTOR, fixed: wirewound; radial leads; 125 ohms; 5%; 10 watts: Tru-Ohm Part No. Type FRL-10	043-100
R510	<i>2</i> Same as R508	041-034
R511	<i>2</i> Same as R506	042-098
R512	RESISTOR, fixed: axial; carbon; 10K ohms; 1%; 1/2 watt: Electra Part No. Type DC-1/2	042-081
R513	RESISTOR, fixed: wirewound; radial leads; 15K ohms; 5%; 10 watts: Tru-Ohm Part No. Type FRL-10	043-131
R514	RESISTOR, fixed: wirewound; radial leads; 7.5K ohms; 5%; 10 watts: Tru-Ohm Part No. Type FRL-10	043-125

When ordering replacement parts, always include the following information: Ampex type; equipment serial number; Ampex part or catalog number; and description of part. DO NOT SIMPLY USE THE SCHEMATIC REFERENCE NUMBER.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
R515	RESISTOR, fixed: carbon; axial; 56 ohms; 10%; 1/2 watt: MIL-R-11A:RC20GF560K	041-035
R516	Same as R515	041-035
R517	<i>2</i> RESISTOR, fixed: carbon; axial; 1 meg ohm; 10%; 1/2 watt: MIL-R-11A:RC20GF105K	041-031
R518	RESISTOR, fixed: carbon; axial; 2.7K ohms; 10%; 1/2 watt: MIL-R-11A:RC20GF272K	041-053
R519	Same as R518	041-053
R520	<i>2</i> RESISTOR, fixed: carbon; axial; .1 meg ohm; 10%; 1 watt: MIL-R-11A:RC32GF104K	141-170
R521	RESISTOR, variable: carbon; 25K ohms; 10%; 2 watts: Allen Bradley Part No. JU2531, SD3056	044-002
R522	RESISTOR, fixed: carbon; axial; 27K ohms; 10%; 1 watt: MIL-R-11A:RC32GF273K	041-163
R523	RESISTOR, fixed: wirewound; radial leads; 5K ohms; 5%; 10 watts: Tru-Ohm Part No. Type FRL-10	043-122
R524	RESISTOR, variable: wirewound; 50K ohms; 10%; 4 watts: Mallory Part No. M50MPK (TPR 4)	044-085
R525	RESISTOR, fixed: carbon; axial; 2K ohms; 5%; 2 watts: MIL-R-11A:RC42GF202J	041-231
R526	RESISTOR, fixed: carbon; axial; 12K ohms; 10%; 1/2 watt: MIL-R-11A:RC20GF123K	041-061
R527	RESISTOR, fixed: carbon; axial; 47K ohms; 10%; 1/2 watt: MIL-R-11A:RC20GF473K	041-068
T503	TRANSFORMER; power: 440 volts ac; 60 cycles; 6.3 volts at 3 amps; 6.3 volts at 7.5 amps; 5 volts at 3 amps: CTC Part No. PSC-165	560-006

When ordering replacement parts, always include the following information: Ampex type; equipment serial number; Ampex part or catalog number; and description of part. DO NOT SIMPLY USE THE SCHEMATIC REFERENCE NUMBER.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
V501	TUBE, electron: 5687; miniature; 9 pin; Tungsol Part No.	012-031
V502	TUBE, electron: 6L6; octal base: R. C. A. Part No.	021-005
V503	Same as V502	012-005
V504	TUBE, electron: 5U4G; octal base: R.C.A. Part No.	012-001
V505	TUBE, electron: 6AS7G; octal base: R.C.A. Part No.	012-016
V506	TUBE, electron: 6AC7; octal base: R.C.A. Part No.	012-003
V507	TUBE, voltage regulator: OA3; 75 volts dc; octal base: R.C.A. Part No.	011-003
	TURRET, octal modified socket	1208-00
	OUTPUT TANK ASSEMBLY	17796-01
	TOROID, output tank assembly	16392-01
	TURRET SOCKET, noval: 9 pin Vector Part No. 8-N-9TU	150-004
	SOCKET, capacitor: For twist-prong electro- lytics, Cinch Part No. 54A11897 or 2CT	150-006
	SOCKET, octal: 1 inch dia. chassis hole; 1-1/2 inch mounting centers: Methode Part No. SMJ-257-140	150-012
	KNOB, black skirt: 1-3/4 inch skirt; 1-3/8 inch wide: Harry Davies Part No. 4107-E	230-004
	KNOB, raised pointer: 1-1/4 inch dia. skirt for 1/4-inch shaft: Rogan Bros. Part No. RB-31	230-010

When ordering replacement parts, always include the following information: Ampex type; equipment serial number; Ampex part or catalog number; and description of part. DO NOT SIMPLY USE THE SCHEMATIC REFERENCE NUMBER.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
	TUBE SHIELD, base: 9 pin; miniature; noval; WNP, per JAN S-28A: Elco Corp. Part No. 179	160-006
	TUBE SHIELD, noval: 1-15/16 inches high; fits 160-006; WNP, per JAN S-28A: Elco Corp. Part No. 191	160-008
	NUT, shaft lock: For 1/4 inch shaft; 3/8-32; Millen Part No. 10061	498-014
	OSCILLATOR COIL ASSEMBLY	17795-01
	COVER, oscillator coil	806-01
	TRANSFORMER, toroidal: 3.5 mh	16393-01
	CAPACITOR, mica: axial; .002 mfd; 5%; 500 vdcw: MIL-C-5A:CM30E202J	034-022
	CAPACITOR, mica: axial; .0003 mfd.; 1%; 500 vdcw: Elmenco Part No. CM20D301F	034-151
	RESISTOR, fixed: carbon; axial; 100 ohms; 10%; 1 watt: MIL-R-11A:RC32GF101K	041-137
	RESISTOR, fixed: carbon; axial; 10K ohms; 10%; 1 watt: MIL-R-11A:RC32GF103K	041-158

When ordering replacement parts, always include the following information: Ampex type; equipment serial number; Ampex part or catalog number; and description of part. DO NOT SIMPLY USE THE SCHEMATIC REFERENCE NUMBER.

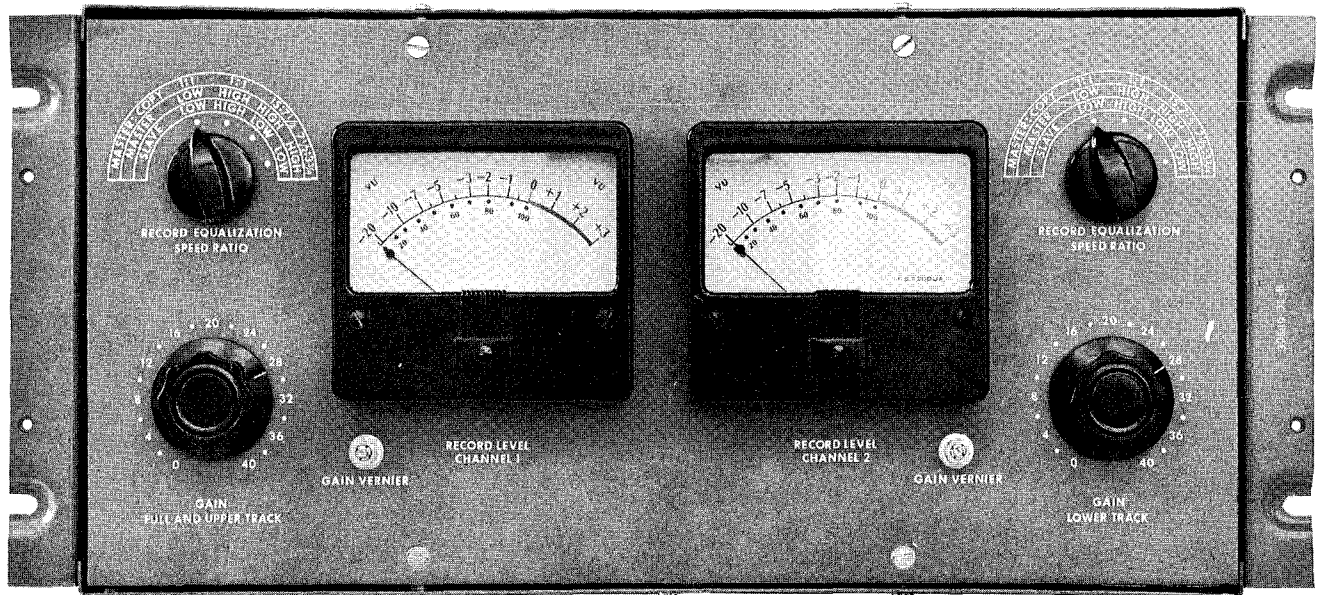


Figure 6-9

RECORD AMPLIFIER (FRONT VIEW)



tem. Check the tubes.

#### CORRECTIVE MAINTENANCE

If it becomes necessary to adjust the bias oscillator, proceed as follows:

- Step 1: Adjust the B+ voltage on the master bias oscillator to 300 volts d-c measured at the relay side of r-f choke L502. This voltage is adjusted by a slotted shaft control behind the front panel ( see Figure 6-10 ).
- Step 2: Tune capacitor C507 for maximum output as seen on the bias panel meter. Maximum output should occur between 350 and 380 kc.
- Step 3: If desired, check the oscillator frequency by Lissajous pattern.
- Step 4: Connect a 250-ohm 50-watt resistor across the master bias oscillator output. Set the BIAS LEVEL control to maximum. The voltage across the resistor should be 64 volts rms.
- Step 5: Disconnect the 250 ohm load and reconnect the bias oscillator out-

put to the slave units.

Step 6: Reset the BIAS LEVEL control so that the bias output meter reads zero VU.

Step 7: If the output of the bias oscillator cannot be peaked by adjusting capacitor C507, it may be necessary to change the value of the 680 pf fixed mica capacitor (C508).

Step 8: If the Bias Oscillator output meter does not indicate +2VU when the output control is maximum, check and adjust B+ voltage as described in Step 1. Check tubes. Check bias currents at the jacks of the slave head switch panel; if they have been maladjusted the load on the bias oscillator may be excessive. This can be checked by operating the slave head switches. If everything appears to be normal, check the value of resistor R511, that is connected in series with the output meter. This 270 K, 1%, resistor is shunted by a 500K, 1%, 1/2 watt resistor (R528), to make the meter reading adequate for long cables and the maximum number of heads being used.

## SLAVE SWITCH PANEL

### THEORY OF OPERATION

Bias current from the master bias oscillator is fed to the heads through bias INPUT receptacle J309, capacitors C301, C302, and C303; variable resistors R302, R305, and R308; head switches S301, S302, and S303; receptacles J301, J302, and J303. The bias cable is a specially fabricated low capacity cable.

Record current is fed to the heads as follows: INPUT receptacle J307P feeds the UPPER TRACK head through variable resistor

R310, fixed resistor R301, head switch S301, and receptacle J301P; FULL TRACK head through R311, R304, S302, and J302P. INPUT receptacle J308P feeds the LOWER TRACK head through variable resistor R312, fixed resistor R307, head switch S303, and receptacle J303P.

The return path of each head to circuit ground continues through the 10-ohm resistors R303, R309, and respective record current jacks J304S, J305S, and J306S.

An a-c vtvm can be used to measure the record and bias currents. To measure bias

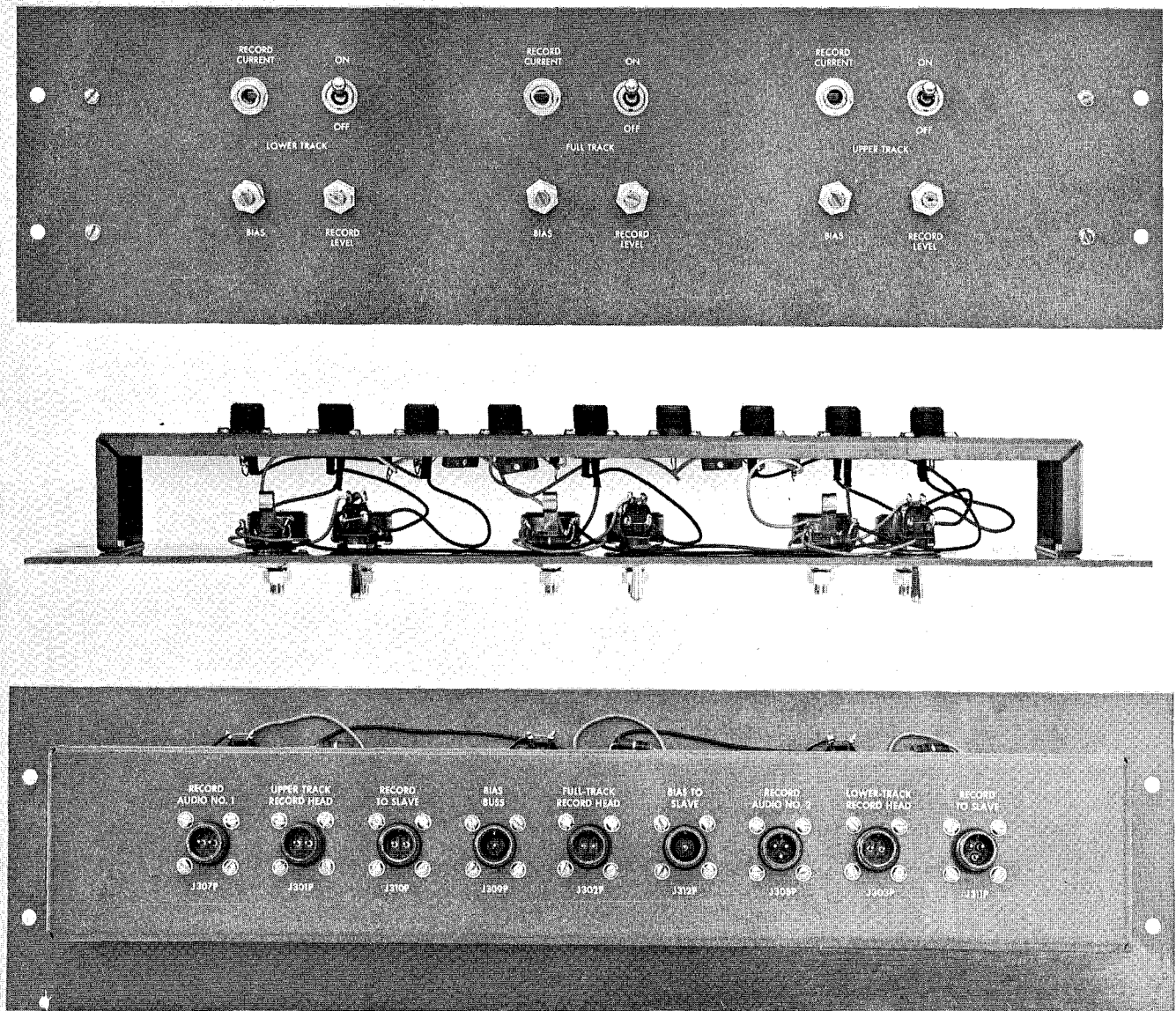


Figure 6-12

SLAVE SWITCH PANEL ASSEMBLY

current, connect the vtvm to the appropriate head current jack J304S, J305S, or J306S. Turn the level controls of the record amplifiers to zero and energize the bias oscillator, by pressing the RECORD button on the master control panel. Set the bias oscillator vu meter to read zero. Energize the appropriate head switch S301, S302, or S303. The reading on the vtvm should be approximately -18 dbm (which corresponds to 10 milliamperes of bias current). To measure record current, connect the vtvm to the appropriate head current jack (J304S, J305S, or J306S) and disconnect the bias relay plug (P503S) from the rear of the master bias oscillator. Connect an oscillator to INPUT

jack J401S or J403S to the appropriate record amplifier. Set the oscillator at a frequency of 2000 cycles with an output of +4 dbm. Set the record amplifier LEVEL CONTROL to provide 0 vu level on the record amplifier meter. The vtvm reading should be approximately -42 dbm (which corresponds to 0.62 milliamperes of record current).

#### MAINTENANCE

If troubleshooting is required, refer to the slave switch panel schematic diagram foldout, and use a continuity meter.

SLAVE HEAD SWITCHING PANEL FOR 3200-D  
CATALOG NUMBER 5997

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
C301	CAPACITOR, mica: axial; .001 mfd; 10%; 500 vdcw: MIL-C-5A:CM25D102K	034-019
C302	Same as C301	034-019
C303	Same as C301	034-019
J301P	CONNECTOR, receptacle: male; 2 contacts: MS3102A-10SL-4P	143-009
J302P	Same as J301P	143-009
J303P	Same as J301P	143-009
J304S	JACK, open circuit type jack; 2 conductor: Switchcraft Part No. C-11	148-003
J305S	Same as J304S	148-003
J306S	Same as J304S	148-003
J307P	Same as J301P	143-009
J308P	CONNECTOR, receptacle: male; 3 contacts: MS3102A-10S-3P	143-008
J309P	CONNECTOR, receptacle: male; 1 contact: MS3102A-10S-2P	143-010
J310P	Same as J301P	143-009
J311P	Same as J308P	143-008
J312P	Same as J309P	143-010
R301	RESISTOR, fixed: carbon; axial; 4.7K; 10%; 1/2 watt: MIL-R-11A:RC20GF472K	041-056
R302	RESISTOR, variable: carbon; 10K ohms; 10%; 2 watts: Allen Bradley Part No. JU1031, SD3056	044-003

When ordering replacement parts, always include the following information: Ampex type; equipment serial number; Ampex part or catalog number; and description of part. DO NOT SIMPLY USE THE SCHEMATIC REFERENCE NUMBER.

<u>REF. NO.</u>	<u>PART DESCRIPTION</u>	<u>AMPEX PART NO.</u>
R303	RESISTOR, fixed: carbon; axial; 10 ohms; 5%; 1 watt: MIL-R-11A:RC32GF100J	041-095
R304	Same as R301	041-056
R305	Same as R302	044-003
R306	Same as R303	041-095
R307	Same as R301	041-056
R308	Same as R302	044-003
R309	Same as R303	041-095
R310	RESISTOR, variable: carbon; 25K ohms; 10%; 2 watts: Allen Bradley Part No JU2531, SD3056	044-002
R311	Same as R310	044-002
R312	Same as R310	044-002
S301	SWITCH, toggle: 6 amp, 125 volts; 3 amp, 250 volts; DPDT: Arrow H and H Part No. 81027-CB	120-004
S302	Same as S301	120-004
S303	Same as S301	120-004
	PANEL, front	5986-00
	NUT, shaftlock: 3/8-32; for 1/4-inch shaft; Millen Part No. 10061	498-014

When ordering replacement parts, always include the following information: Ampex type; equipment serial number; Ampex part or catalog number; and description of part. DO NOT SIMPLY USE THE SCHEMATIC REFERENCE NUMBER.

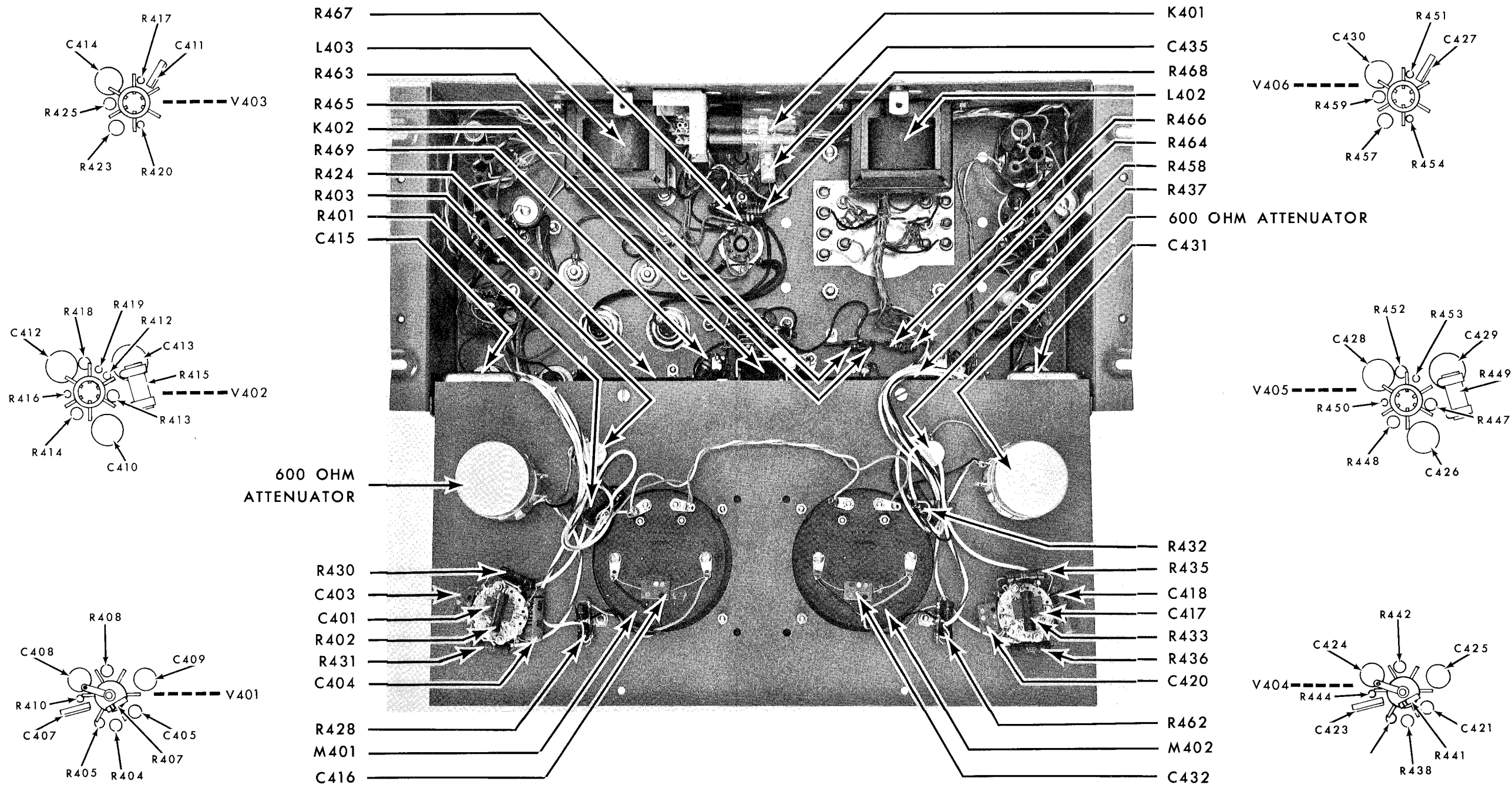
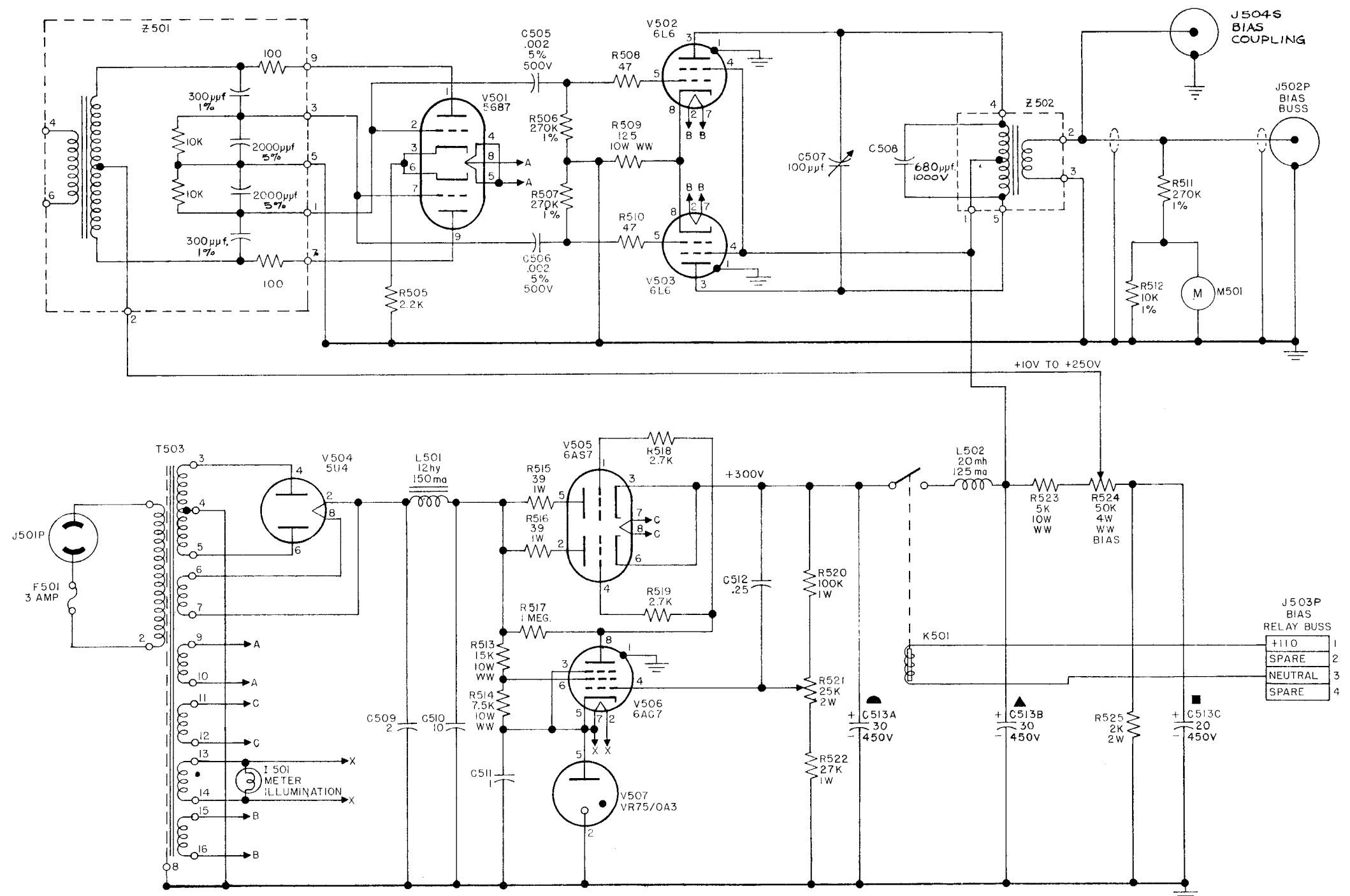


Figure 6-7

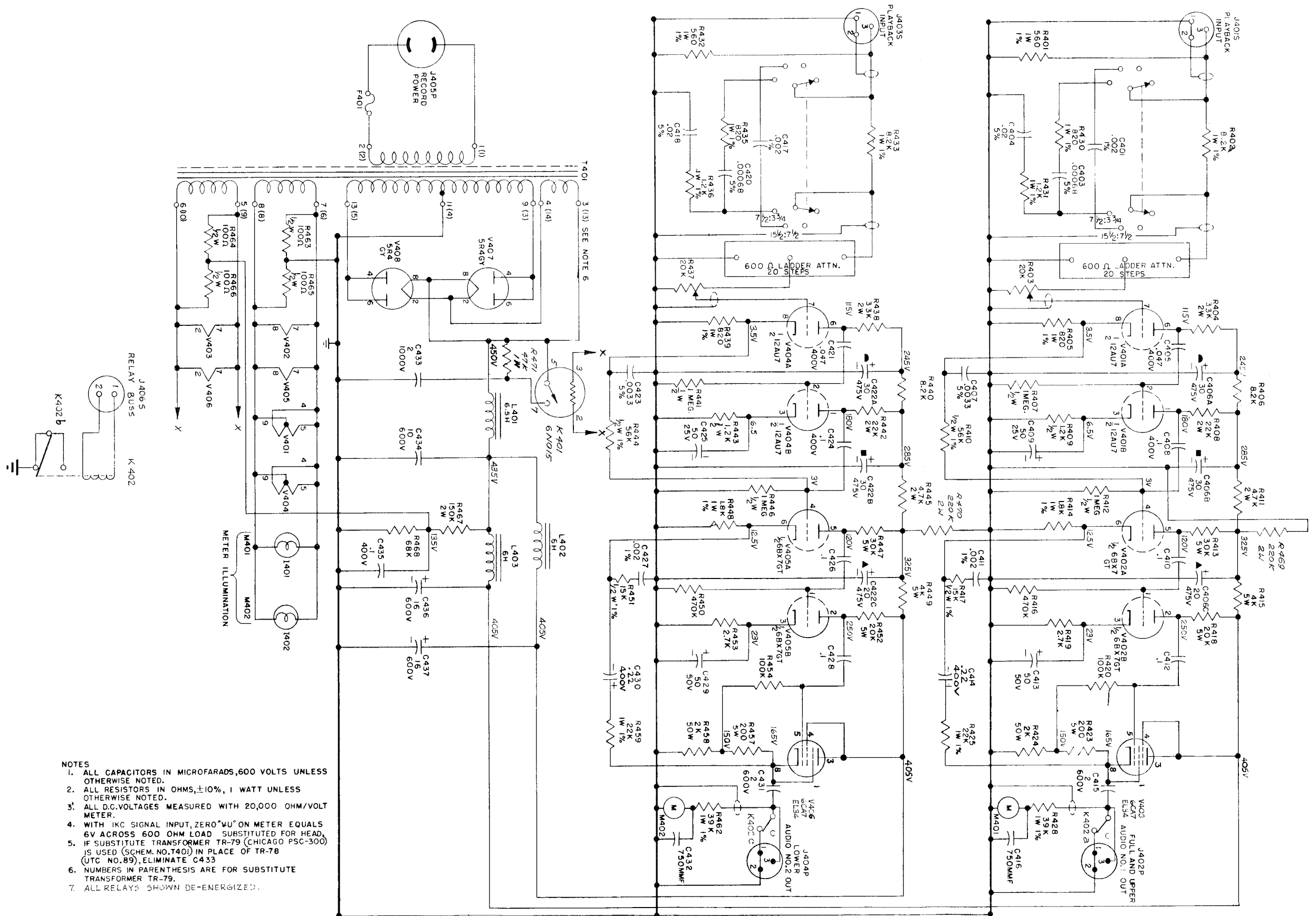
MASTER RECORD ASSEMBLY PARTS LOCATION (FOLDOUT OF INTERIOR VIEW)

SCHEMATIC DIAGRAM  
 MASTER BIAS OSCILLATOR  
 MODEL 3200-D TAPE DUPLICATOR SYSTEM  
 CATALOG NUMBER 30638-01  
 D-30641



- NOTES:
- 1 ALL RESISTORS IN OHMS, ±10%, 1/2 WATT UNLESS OTHERWISE NOTED
  - 2 ALL CAPACITORS IN MICROFARADS, 600 VOLTS UNLESS OTHERWISE NOTED
  - 3 ALL RELAYS SHOWN DEENERGIZED
  - 4 VALUE OF C-508 MAY VARY.

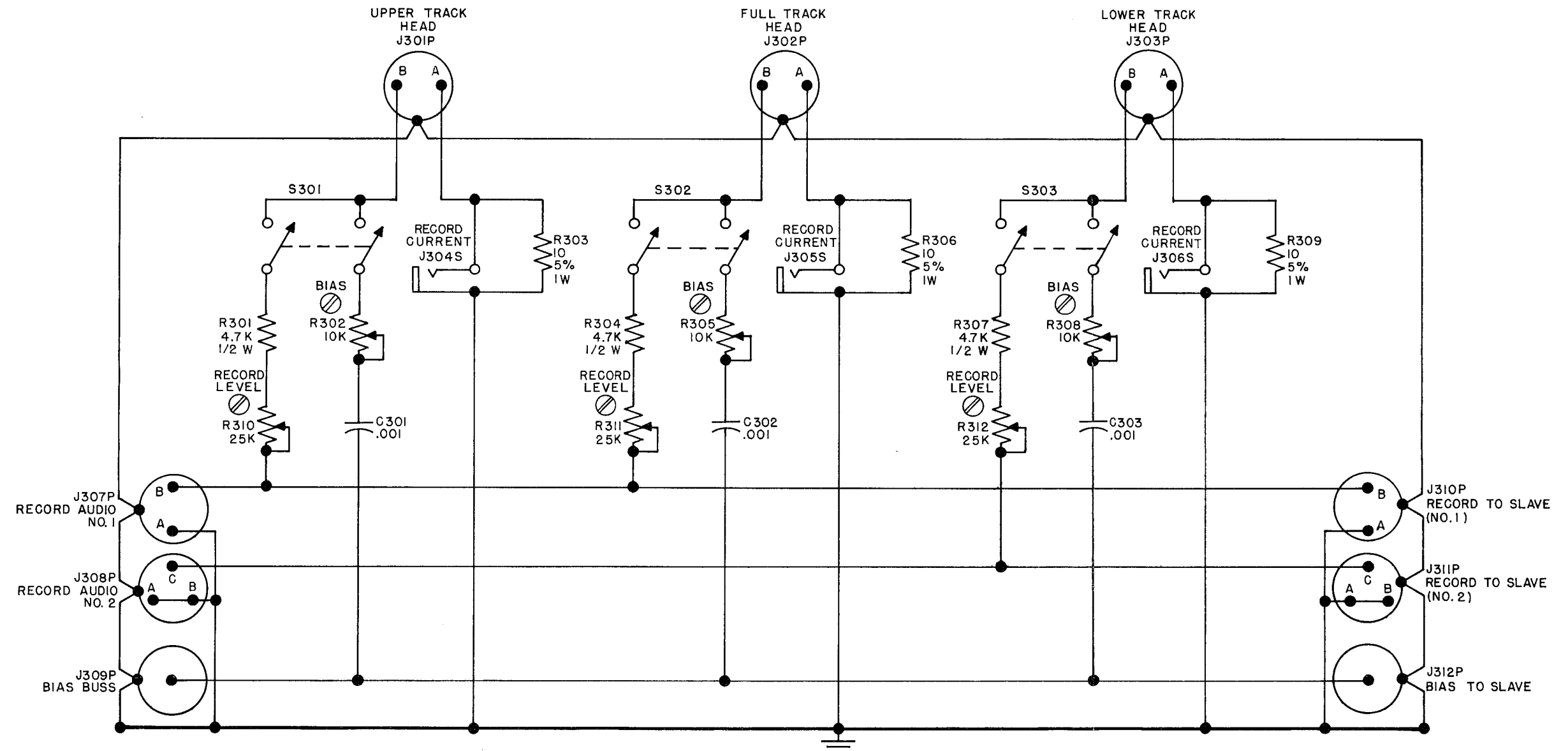
SCHEMATIC DIAGRAM  
 MASTER RECORD AMPLIFIER  
 MODEL 3200-D TAPE DUPLICATOR SYSTEM  
 CATALOG NUMBER 30639-01  
 D-30857



- NOTES
1. ALL CAPACITORS IN MICROFARADS, 600 VOLTS UNLESS OTHERWISE NOTED.
  2. ALL RESISTORS IN OHMS, ±10%, 1 WATT UNLESS OTHERWISE NOTED.
  3. ALL D.C. VOLTAGES MEASURED WITH 20,000 OHM/VOLT METER.
  4. WITH 1KC SIGNAL INPUT, ZERO "VU" ON METER EQUALS 6V ACROSS 600 OHM LOAD. SUBSTITUTED FOR HEAD, IF SUBSTITUTE TRANSFORMER TR-79 (CHICAGO PSC-300) IS USED (SCHEM. NO. T401) IN PLACE OF TR-78 (UTC NO. 89), ELIMINATE C433.
  5. NUMBERS IN PARENTHESIS ARE FOR SUBSTITUTE TRANSFORMER TR-79.
  6. NUMBERS IN PARENTHESIS ARE FOR SUBSTITUTE TRANSFORMER TR-79.
  7. ALL RELAYS SHOWN DE-ENERGIZED.



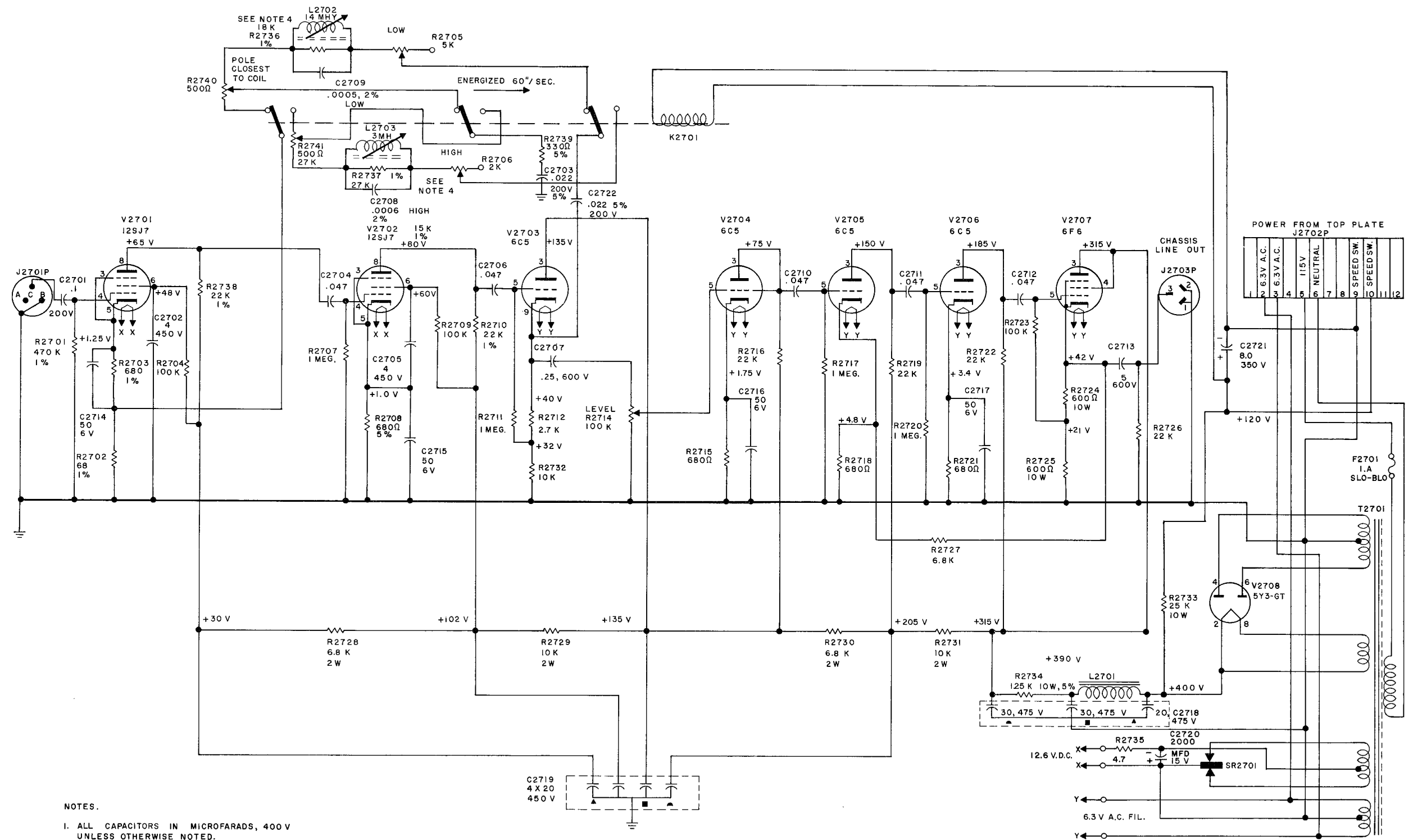
SCHEMATIC DIAGRAM  
 SLAVE HEAD SWITCH PANEL  
 MODEL 3200-D TAPE DUPLICATOR SYSTEM  
 CATALOG NUMBER 5997.01  
 EC 5997



NOTES:

1. ALL RESISTORS IN OHMS,  $\pm 10\%$ , 2 WATT UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS IN MICROFARADS, 500 VOLTS UNLESS OTHERWISE NOTED.

SCHEMATIC DIAGRAM  
REPRODUCE AMPLIFIER  
MODEL 3200-D TAPE DUPLICATOR SYSTEM  
CATALOG NUMBER 30637-01  
D-30640



- NOTES.
1. ALL CAPACITORS IN MICROFARADS, 400 V UNLESS OTHERWISE NOTED.
  2. ALL VOLTAGES MEASURED WITH 20,000Ω PER VOLTMETER.
  3. ALL RESISTORS IN OHMS: ±10%, 1 WATT UNLESS OTHERWISE NOTED.
  4. VALUES OF R2736 & R2737 MAY VARY.