

AMPEX

MODEL 300

**OPERATION AND  
MAINTENANCE MANUAL**

MODEL 300

INSTRUCTION MANUAL  
FOR  
AMPEX MODEL 300 RECORDER

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## 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  $\pm 2$  db 30 - 15,000 cycles.  
At 7.5 inches  $\pm 2$  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  $\pm 3.6$  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  $\pm 4$  VU in balanced or unbalanced.

**PLAYBACK AMPLIFIER:** Adjusted for  $\pm 4$  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  $\pm 8$  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  $\pm 4$  VU output.

Output key (line or cue).

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

## SECTION II

### INSTALLATION

1. Open packing case carefully and save it. In the event of possible shipping damage, the case may be needed for return shipment.

2. Examine electronics chassis and see that any chassis that are shock mounted float freely on their rubber cushions.

3. If the equipment is to be Rack mounted, install in the rack so that the head cables will reach the electronic unit without being extended in length. Do not lengthen the head cables for any reason whatsoever, because increased cable capacity will cause undesirable resonance with the heads.

4. Install all cables as shown in Fig. 12.

5. Unpack and install the 12SJ7 tube in its socket. WARNING! BE VERY CAREFUL WITH THE 12SJ7 TUBE AS IT IS HAND SELECTED FOR LOW NOISE AND MAY BE DAMAGED BY CARELESS HANDLING. See SECTION IV Page 7 before turning on power.

6. Release capstan drive motor shipping lock. This is the spring catch which holds the motor away from the rubber-tired flywheel. The retaining ring should be broken off and the lock removed from the motor bracket. Do not make any adjustments on the drive system at this time. No adjustments need be made unless damage has occurred during shipping. NOTE: Whenever recorder is transported, be sure to lock motor, or capstan tire may be damaged beyond repair.

7. Connect input and output circuits to the machine. See ELECTRONIC OPERATION.

8. Connect power cord to 115 V., 60 cycles A.C. only.

9. The capstan speed should be checked with the stick-on stroboscope provided. Before checking, let drive unit run for at least five minutes to warm up lubricant in the capstan assembly. If the lubricant is stiff, the additional drag will cause greater compression of the rubber tire and the capstan will therefore run slightly slow until warmed up. Place stroboscope on capstan shaft with the sticky side down and view rotating shaft under 60 cycle light. If the speed is not correct the spokes will appear to rotate. Slight speed changes can be realized by change in capstan drive motor pressure. This adjustment is at spring D, Fig. 1 on the motor solenoid draw bar. If the adjustment is in the proper range, increasing pressure will slow the capstan, decreasing pressure will speed the capstan. Adjust for no rotation of the stroboscope spokes. (If drive motor pressure is too light, increasing pressure will speed the capstan. In this range the tire pressure is inadequate for stable operation, and the pressure should be increased until increase in pressure reduces capstan speed.)

10. Load the left hand reel holder with tape and thread as shown in fig. 5. Be sure the tape used has the oxide-coated side toward the rear of the machine; i. e., toward the head faces. Be sure to remove any adhesive that may have been used to seal the end of the tape. If this adhesive is not removed, the first layer may stick and cause a break in the tape.

11. A reel hold-down or editing knob should be placed on each reel spindle. Editing knobs, catalog #1917, are furnished with console and portable recorders, while hold-down knobs, catalog #4402, are furnished with rack models.

The #4402 reel hold-down knob works in the following manner. A removable pin in the bottom surface of the knob engages a corresponding hole in the turntable. A collet grips the turntable shaft when the top of the knob is rotated. Two spring loaded balls hold the reel to the turntable. A pin in the side of the knob drives the reel. The knob should be positioned on the NARTB reels so that the removable pin engages one of the turntable holes and approximately two thirds of the ball is exposed above the reel. The knob should not be pushed down all the way, but should stick up above the turntable. Once the knob is positioned correctly, the NARTB reels may be removed without removing the knobs. When using the knob with the small RMA reels, unscrew the removable pin. The knob is used only to prevent the reel from falling off the turntable, since three pins in the turntable drive and center the reel. Lock the knob to the shaft, avoiding excess pressure on the reel which could distort the reel flanges.

The machine is now ready for operation. NO FURTHER ALIGNMENT SHOULD BE NECESSARY

## SECTION III OPERATION

### A. Electrical:

With reference to Fig. 10 and 11, connect input and output circuits to machine. Turn on Power Switch. Mechanical operation is explained in Section III-B.

MACHINE WITHOUT METER CONTROL PANEL. Connect a  $\pm 4$  V. U. line (balanced or unbalanced) to the input receptacle J101S on the Electronic Chassis. The Record Level Control R101 has been adjusted at the factory to give the recommended tape level with this input. It is possible to record at proper tape level with inputs of -30 V. U. to  $\pm 10$  V. U. by readjusting the Record Level Control. The Playback Level Control R213 has been adjusted at the factory to give an output of  $\pm 4$  V. U. into a 600 ohm load from tapes recorded at the recommended operating level.

MACHINE WITH BRIDGING INPUT METER CONTROL PANEL. See Figure 12. Connect an input signal (balanced or unbalanced) to terminals 1, 2 and 3 of the Meter Panel. For unbalanced operation terminal 2 should be the ground side of the line. The input signal must be greater than -10 V. U. Set the Meter Panel Playback Step Control R1102 to 14. Record a signal and adjust the Meter Panel Record Step Control R1101 so the V. U. Meter reads "0". This indicates a  $\pm 4$  V. U. output signal into 600 ohms, since the meter is always connected across the Playback Output. The Playback Vernier Control R213 has been set at the factory so that "0" meter reading indicates the recommended tape level with the Meter Panel Playback Step Control set at 14. On playback, any tape recorded off level by a voltage ratio of 5 to 1 (14 db) may be reproduced at  $\pm 4$  V. U. by adjusting the Meter Panel Playback Level Control.

MACHINE WITH MATCHING INPUT METER CONTROL PANEL. See Fig. 13. Connect an input signal to the meter panel as described above. The input signal must be  $\pm 4$  V. U. or greater. Place the Monitor Switch in the "In" position. This transfers the V. U. Meter to the output side of the Meter Panel Record Step Control R1001. Adjust this control so the meter reads "0". The Record Control on the Electronics Chassis R101 has been adjusted at the factory so that "0" meter reading indicates the recommended tape level. Therefore, it is possible to adjust the record level before the tape is set in motion.

When the program level is properly set, start the tape in motion in the record mode of operation. To monitor the playback output place the Monitor Switch in the "Out" position. With the Meter Panel Playback Step Control R1002 set at 14 the V. U. Meter will read "0". This indicates a  $\pm 4$  V. U. output into 600 ohms. On playback, any tape recorder off level by a voltage ratio of 5 to 1 (14 db) may be reproduced at  $\pm 4$  V. U. by adjusting the Playback Level Control on the Meter Panel.

With input signals less than  $\pm 4$  V. U. the V. U. Meter monitoring the record input signal will not read "0". Therefore, it is necessary to set the record level with tape in motion and the V. U. Meter connected across the playback output (Monitor Switch in "Out" position). Set the Meter Panel Playback Control R1002 to 14.

Increase the gain in the record amplifier by adjusting the Record Control on the Electronic Chassis R101 until the meter reads "0". This will indicate the recommended tape level only when the Playback Control R1002 is set at 14. NOTE: This calibration will be lost if the playback Vernier Control R213 is changed.

B. Mechanical:

When the machine is ready to operate, turn on the power switch, see Fig. 5. This turns on the amplifiers and control circuits. The capstan drive will also start if the tape has been threaded, as the takeup tension arm operates a switch which shuts the motors off when the tape runs out. Pushing the Start button will now start the tape moving according to the mode selected on the Play, Rewind, Fast Forward control. In the Play position the tape will be reproduced at the output terminals. Pushing the Record button will permit an input to the machine to be recorded on the tape with almost simultaneous playback of the new program. A 1/2 second time interval should be observed between pressing the Start button and pressing the Record button to avoid switching transients magnetizing the record head. Pushing the Stop button will stop the machine and turn off the recording amplifier; therefore, one must always push the Start and Record buttons, in that order, to record. The mode selector switch allows transfer from Play to Rewind or Fast Forward without pushing the Start button when switching. This helps greatly in editing and segueing. However, when going from Rewind to Play, the machine shuts off and the Start button must be used to restart the tape motion.

If, when the tape is running in Play, it is desired to accelerate or slow the tape, it may be done as follows:

TO SLOW THE TAPE: Hold the Start button down and push the Stop button for the length of time desired. Upon releasing the Stop button the tape is again up to speed.

TO ACCELERATE THE TAPE: Move the selector to the Fast Forward position. Return to Play when desired.

These two motions are useful when cueing, segueing or synchronizing programs. This can only be accomplished by reason of the rapid start feature incorporated in this machine.



## SECTION IV

### OPERATING PRECAUTIONS AND MAINTENANCE

#### A. Mechanical Assemblies:

The drive system employs three motors. Two induction motors with solenoid operated brakes are used for takeup and rewind. These motors are shown in Fig. 7 and require no service attention! The torque of these two motors is adjusted at the factory by means of resistors R801, R802 and R803, and should be left alone unless shipping damage to the resistors has occurred. Both motors are adjusted for a tension of 5 to 6 ounces pull on the reel hub in Play. On top plates for 1/2 inch or 1 inch wide tape these tensions are increased to 10 to 16 ounces. R802 is adjusted for the maximum hold-back tension during Fast Forward and Rewind which will still allow the tape to accelerate when starting with a full reel.

The third motor is the synchronous motor used for capstan drive. This motor is mounted on a hinge which is moved by a solenoid to engage the motor and the capstan flywheel. The hinge is positioned by the Drive Motor Return Spring "B" when the solenoid is deenergized. A stronger return spring is required for rack mounted machines than for console or portable units. See Section VI Parts List.

When the machine is turned on and the tape threaded into position, the solenoid "C" pulls the motor into engagement with the capstan flywheel tire and drives it. The pressure between the motor and flywheel is adjustable at spring "D" and is adjusted to give synchronous speed as described in INSTALLATION.

The capstan shaft has a permanently lubricated ball bearing at the bottom end to take the flywheel load and to maintain a minimum of friction, see Fig. 2. The upper bearing on the shaft is a precision bronze sleeve bearing which permits absolutely true running of the capstan.

The mechanism of the capstan idler is operated by solenoid "E" in Fig. 1 and is returned by spring "A". Capstan idler pressure is set so that it will deform or break the tape if the tape is stopped with the hand while the machine is running. This pressure is adjusted at point "F" in Fig. 1.

The reel idler is shown in Fig. 1 at "G". This shaft has two single shielded ball bearings. Factory lubrication is for the life of the bearings. Should these bearings require servicing or replacement the complete reel idler assembly should be exchanged for a factory reconditioned unit. The extremely low pulley run-out of this assembly is achieved by a final finish cut being taken while running on its own bearings after final assembly. Under no circumstances should the shaft be removed from the assembly, since in all probability the relationship of parts will be lost. This may result in the introduction of the reel idler period into the measurable flutter and wow components of the machine.

The mechanical brakes on the rewind and takeup motors ordinarily require no adjustments. Should trouble occur which appears to be due to faulty braking,

the tension may be adjusted. The only adjustment on the brakes is performed by adjusting tension at "H" in Fig. 1. If machine throws a loop of tape on stopping, the trailing reel brake tension is too low, or if it breaks the tape the tension is too high. However, unless tampered with, the adjustment should be permanent until such time as the brake bands wear out.

CLEANING: Daily attention should be given to the cleaning of the following:

- (1) Capstan Shaft
- (2) Head Faces
- (3) Tape Guides

Clean all surfaces of the above with carbon tetrachloride applied with a soft cloth.

Weekly attention should be given to the cleaning of the capstan idler wheel. It should be cleaned with ethyl alcohol. Great care must be taken to see that oil does not reach the capstan idler tire. Oil will not only contribute to tape slippage but will also ruin the tire.

LUBRICATION: Every 3 months or 1000 hours.

1. Drive Motor: The drive motor uses a sleeve bearing and should be lubricated every three months or 1000 hours, whichever occurs first, with one of the following oils:

Gulf Oil & Refining Company . . . . . Gulfcrest "A"

Standard Oil Co. of Indiana . . . . . Stanoil #18 or #25

Sacony Vacuum Oil Co. . . . . Gargoyle D, T. E. Light

The motor should be lubricated with a pump-type oil can. To reach the upper bearing in the console model, use a flexible spout or else attach a piece of spaghetti to the end of the spout. In the portable model, the upper bearing is most conveniently reached by unbolting and lifting the top plate. The top plate should be tipped up by raising the righthand end, as viewed when facing the front of the machine. The plate need only be lifted a few inches to expose the bearing to be lubricated. CAUTION - DO NOT OVER-LUBRICATE SUCH THAT OIL MAY GET ON EXPOSED RUBBER SURFACES.

2. Capstan Idler: The capstan idler should be lubricated with a drop of S.A.E. 30 oil on all bearing surfaces. WARNING - under no condition should oil

be allowed to come in contact with the rubber surfaces of the capstan idler or the capstan flywheel.

3. Capstan: The upper bearing of the capstan should be lubricated with S.A.E. 30 motor oil every 3 months. To oil: Loosen set screw in dust cap surrounding the capstan shaft just below the tape contact point. Push the rubber idler wheel away from the shaft just enough to allow the cap to be removed. This exposes a felt washer which covers the oil hole. Remove this washer and oil through the larger of the two holes exposed. Fill until no more oil will enter! Replace as disassembled.

#### PRECAUTIONS:

REELS. In order for the brakes to work properly, the same size reel must always be placed on both turntables. In using the small RMA 5- or 7-inch reels, abnormal hold-back tensions will occur at the end of the reel due to the small hub diameter. This may cause trouble due to slippage at the capstan idler. If the small type reels are to be used exclusively, an additional 150 ohm, 50 watt resistor should be inserted in series with each of the resistors (R801 and R803), which are in series with the Rewind and Tapeup motors respectively. The machine will not meet specifications for flutter and wow when using the 5- or 7-inch RMA reels because of the discontinuity of the hubs on these reels.

BRAKES. In order to avoid the tightening action which occurs when brake bands become glazed, the brake bands have been treated with graphite. With the graphited brake bands, the proper tension as measured on the NAB reel hub in the unwinding or energizing direction is 14 oz. Should the brakes exhibit a tendency to tighten up or grab, they should be retreated with graphite. A mixture in the proportions of one level tablespoon of graphite to one 8 oz. cup of carbon tetrachloride can be applied to the felt of the brakebands with an oil can. After graphiting, the motors should be run 10 minutes with the brakes on to wear in the graphite. This may be accomplished by disconnecting the brake solenoids temporarily. On top plates for 1/2 inch and 1 inch wide tape, asbestos brake linings are used to increase the braking tensions. Graphite should not be used on these linings.

TAPE SLIPPAGE. The tape will slow down near the end of the program, if the capstan idler pressure is not great enough. This, of course, will become worse at the end of the reel where the hold-back tension is highest. The condition is further exaggerated if a small RMA type reel is used, in which case the hold-back tension is even higher.

Effective capstan idler driving force is reduced as the capstan idler gradually picks up the lubrication with which Minnesota Mining and Manufacturing Company type 111 tape is treated. This lubrication is quite important, as it reduces flutter and head wear, permits more uniform head contact and therefore less high frequency amplitude variation, and any tendency for the tape to "squeak". This "squeaking" sometimes occurs at the slow speed when using the small reels

and is very objectionable. For this reason, the capstan idler should be cleaned with ethyl alcohol at least once each week.

To test for proper capstan idler pressure, hold the tape while the machine is running in the Play position. The idler pressure should be sufficient to deform or break the tape. The pressure can be increased by the adjustment at Point "F" in Fig. 1.

SPEED. If the machine has been subjected to severe cold the drive should be allowed to warm up for 5 minutes to reach stability. This is especially true at the high tape speed.

CAPSTAN MAGNETIZATION. The capstan may become magnetized by contact with a magnetized tool. Should this occur it may be demagnetized with an A. C. solenoid placed over the shaft and slowly pulled away.

DUMMY PLUGS. Two dummy plugs must be inserted into the appropriate sockets in the top plate for correct operation of the recorder. These plugs are catalog No. 567, 8 pin Jones plugs, with pins 1 and 2 jumpered and pins 7 and 8 jumpered.

1. One No. 567 must be plugged into receptacle J804S, labeled "Remote Control", located on the connector panel underneath the top plate. It is removed only when remote control is desired and the remote control cable must be plugged into the receptacle.
2. The other No. 567 must be plugged into receptacle J805S, labeled "Cable to Model 375 60 Cycle Amplifier", located on the connector panel underneath the top plate. When the Model 375 is used with the recorder, the input-output cable from the 375 is plugged into this receptacle. NOTE: The Model 300 and 301 do not incorporate the 60 cycle amplifier connector; therefore, the second dummy plug is not required. If the Model 375 is to be used with these models, it should be wired to the capstan motor terminal strip as explained in the Model 375 Instruction Book.

## SECTION IV

### OPERATING PRECAUTIONS AND MAINTENANCE

#### B. Head Assembly.

The head housing, See Fig. 5., is a die cast assembly which contains the three heads used in the recording process. The heads are respectively erase, record, and playback as viewed from left to right when facing the machine. The gate on the housing holds the playback and record shield covers and the tape-lifting fingers. The function of the tape-lifting fingers is to remove the tape from the heads when the gate is open during Rewind or Fast Forward operation. This reduces head wear considerably. The tape may leave a deposit on the heads if allowed to contact them at high speeds. Such a deposit will seriously impair the performance of the machine and should be guarded against by always opening the gate on Fast Forward and Rewind. If a deposit is left, it may be easily removed with carbon tetrachloride on a soft rag. Never use metal of any kind to touch the head surfaces. The gate should never be allowed to spring shut, but should be closed gently.

### HEAD MAGNETIZATION.

Occasionally the heads may become magnetized through an electrical fault in the amplifiers, improper use of the machine, or by the heads coming in contact with a magnetized object. This will result in an increase of noise level from 5 to 10 db. It is especially important that the heads be free of magnetization if you are to realize the dynamic range of type 111 tape. It should be remembered that any phenomena that tends to put an unbalanced pulse through the record head will magnetize it. Such pulses can appear in the form of signal or power line pulses. If the following precautions are observed, no difficulty should be experienced;

1. Do not remove any tube from the record amplifier while the machine is recording.
2. Do not connect or disconnect input leads or head leads while recording.
3. Do not depress the Record button until after depressing the Start button. In other words, allow the transient caused by switching the motors and solenoids to die out before the record head is connected. A one-half second pause is sufficient.
4. Do not saturate the record amplifier with an abnormally high input signal. Such a signal would be 10 db. greater than tape saturation and 30 db. greater than normal operating level.
5. Do not test continuity in the heads with an ohm meter.

### HEAD DEMAGNETIZATION.

Should the heads become magnetized, they can be demagnetized with an AMPEX head demagnetizer (stock number B-704). In the event that time does not permit the owner of the machine to wait for delivery of a demagnetizer, he may make one as follows: Cut a piece of transformer lamination to a 1/4" x 2" size. Wrap the strip of metal with suitable insulating material and wind approximately 400 turns of No. 36 wire and attach a 4' length of 2 connector cord. Bend the iron strip into a "U" shape and bring the ends of the "U" to a spacing of 1/4". Connect to a 6 volt source of A.C., open the gate on the head housing and bring the ends of the "U" in contact with the 2 poles on the magnetized head. Remove the demagnetizer very slowly, allowing the A.C. field to die off gradually. Repeat this operation on record and playback heads only, as the erase head will demagnetize itself. In the event demagnetization is not effected, repeat the process several times.

## SECTION IV

### OPERATING PRECAUTIONS AND MAINTENANCE

#### C. Electronics Assemblies.

##### WARNING.

The input tube in the playback amplifier is D.C. heated by returning the B supply through its heater. Fuse F101 protects the input tube against abnormal heater surges. The Neon indicator A101 will light in the event of failure of the playback input tube heater or the 1/4 ampere protective fuse F101. SHOULD THIS HAPPEN, THE CAN OF THE FILTER CONDENSER (C113) WILL BE AT A HIGH POTENTIAL WITH RESPECT TO GROUND AND FOR THIS REASON IS PAPER COVERED. C113 SHOULD THEREFORE BE REPLACED ONLY WITH CONDENSERS HAVING AN INSULATED COVER. F101 and A101 are located on top of the electronics chassis. DO NOT REMOVE INPUT TUBE WITH POWER ON, as damage to C114 may result. DO NOT REPLACE F101 WHILE NEON BULB IS LIGHTED, or the new fuse will blow. Therefore, to replace the input tube or the fuse, always turn power off and wait for neon to stop glowing.

##### DUMMY PLUG.

A Connector J 105S, labeled "Remote Power" is incorporated in the Electronic Assembly to feed filament and B supply current to auxiliary equipment. A #567 Dummy Plug (a Jones plug with pins 1 and 2 jumpered and pins 7 and 8 jumpered) must be inserted in this connector for the proper operation of the machine. It is removed only when it is desired to feed power to a Meter Control Panel or a Mixer-Preamplifier.

##### METER CONTROL PANEL.

The Meter Control Panel is designed for balanced input and output. If it is desired to operate unbalanced, the following terminals on the Meter Panel should be used as the ground side of the line.

Terminal 2 on the Line In connections.  
Terminal 10 on the Monitor Connections.  
Terminal 15 on the Line Out connections.

SECTION V  
ELECTRONIC ALIGNMENT

Alignment is the necessary adjustments required to have the Electronic Assembly of the tape recorder perform properly. A machine "out of alignment" may be characterized by poor frequency response, high noise, low output, or high distortion. It should not be necessary to align the recorder when it comes to you from the factory. The procedures described on the following pages have been performed at the factory prior to shipment. Further adjustments are not required except as found necessary in routine maintenance.

Alignment consists of the following steps:

I Overall Performance Check

1. Frequency Response
2. Noise Measurement
3. Distortion
4. Flutter and Wow

II Head Alignment

III Playback Alignment

IV Record Alignment

1. Record Bias and Level Adjustment
2. Record Equalization
3. Record Noise Balance

V Erase Adjustment

Standard alignment tape #4494 is available for alignment purposes. It contains a 15 Kc. tone for head azimuth check, a reference tone for level adjustment and a series of tones for a playback response check. It is recorded at 15 inch tape speed, 10 db below recommended operating level. **IMPORTANT!** Before playing the standard tape, demagnetize the heads with the Ampex Head Demagnetizer #704. Magnetized heads will cause a partial erasure of the high frequencies on the standard tape.

I. OVERALL PERFORMANCE CHECK

The following procedure is recommended for checking the performance of this recorder at the time of installation and as necessary thereafter.

1. Overall Frequency Response:

Thread a new reel of tape on the machine. The equalization curves for this machine have been established by use of Minnesota Mining and Manufacturing



Company type 111 tape, construction 5RBA or later. Slight deviations in performance can be expected when using tapes of other manufacture.

a. 7-1/2 Inch Response:

DUE TO THE NATURE OF THE PRE-EMPHASIS IN THE RECORD CIRCUIT, TAPE SATURATION WILL OCCUR AT THE HIGH FREQUENCIES UNLESS THE RESPONSE CHECK IS MADE AT LEAST 20 DB BELOW NORMAL OPERATING LEVEL.

Therefore, check the response with a sensitive meter such as a Hewlett-Packard 400C connected to the output. In absence of a sensitive meter, a standard V. U. Meter, preceded by a flat amplifier with at least 20 db gain can be used. Response will be within the limits indicated in Section I Specifications.

b. 15 Inch Response (30 Inch Response Model 301 Only)

Make the response check approximately 10 db below operating level to avoid saturation effects. The response will fall within the limits indicated in Section I Specifications.

2. Overall Noise Measurement:

Overall wide band noise should be measured with a vacuum tube voltmeter such as Hewlett-Packard 400C while playing back a tape that has been previously erased on the machine. First erase a tape with the input to the record amplifier shorted. Rewind and play this tape back. This will prevent the inaudible bias frequency leakage from entering into the noise measurement, thus producing a false reading. The wide band noise should be below the figures listed in Section I Specifications.

3. Distortion:

Overall distortion may be measured by connecting any standard distortion measurement apparatus across the output. The readings from a wave analyzer or selective frequency distortion meter will be more accurate at lower distortion levels. Distortion readings are somewhat dependent on tape. Readings of 1% are normal at operating levels while reading of 3% are normal at 6 db above operating level.

4. Flutter and Wow:

Flutter or wow is the change of speed over a short time interval in a periodic manner. It can be measured by means of a standard flutter bridge such as A. K. Tatum (Beverly Hills, California) Model 2-A Flutter Meter. Variations in amplitude as indicated on level measurements do not constitute flutter and are entirely due to tape coating variations. Readings will be well under the figures indicated in Section I, Specifications.

## II. HEAD ALIGNMENT:

The high frequency response of the recorder depends on the correct head alignment. If tapes are to be interchangeable from one machine to another the heads of all machines must have the same azimuth setting. This is accomplished by using a Standard Tape (Catalog #4494) for aligning the heads of all machines. Head alignment is independent of tape speed; however, it is recommended that the heads be aligned at 15 inches per second since the standard tape is recorded at this speed.

Remove the top cover from the Head Housing by removing the two screws from the top and pulling cover gently back and up. Looking at the Head Housing from the front the three heads from left to right are: Erase, Record and Playback.

The azimuth angle of the erase head is not adjustable.

The Record and Playback Heads should be aligned only after reading and fully understanding the procedure under PLAYBACK AND RECORD CIRCUIT ALIGNMENT.

The actual physical alignment of the Record and Playback Heads consists of placing a 1/4" spintite socket wrench on the left hand elastic stop nut in each head and adjusting back and forth until the proper azimuth angle is arrived at.

First adjust the Playback Head azimuth by playing the standard tape at 15 inches per second and adjusting the stop nut for the maximum output of the 15 kc tone (first tone that appears on the standard tape).

The Record Head azimuth is then aligned with the Playback Head by recording a 15,000 cycle signal from an audio oscillator on a blank tape and adjusting the record stop nut for maximum playback output.

## III. ALIGNMENT OF PLAYBACK CIRCUITS:

1. Thread an audio standard tape on the machine. Terminate the output with a 600 ohm external termination or set the Line Out Switch on the Meter Panel to the "cue" position. Connect an external V. U. Meter across the output or set the Monitor Switch on the Meter Panel to the "Out" position. Connect an amplifier and loudspeaker or a pair of headphones to the output of the machine or to the phone jack on the Meter Panel so the voice announcements on the standard tape can be heard.

2. Set the machine into the Play mode of operation at the 15 inch per second tape speed. If the machine is equipped with a Meter Panel, set the Meter Panel Playback Step Control on 4.

3. The first tone on the tape should be used to adjust the playback head azimuth as described under Head Alignment.

4. The second tone on the standard tape is used to adjust the playback level.

Without Meter Panel.

Adjust the Playback Level Control on the Electronic Assembly R213 so the output is -6 dbm (.388 volts RMS) since standard tape level is 10 db lower than operative level.

With Meter Panel.

With the Meter Panel Playback Control set at 4, adjust the vernier control on the Meter Panel (R213) so the Meter reads "0" ( $\pm 4$  dbm output). Reposition the Meter Panel Playback Control to 14, since the standard tape level is 10 db below operating level.

5. Playback Equalization: The Playback Amplifier is factory equalized by means of the High Frequency Playback Equalizer (R207), in accordance with the standard voltage curve shown in Figure 17. The recommended method for adjusting the Playback Amplifier response is to connect an audio oscillator and vacuum tube voltmeter to the Playback Amplifier as shown in Figure 17. Adjust the Playback Equalizer (R207) to give the frequency response of the standard 50 microsecond curve. Deviation from this curve is not recommended. Check the playback level setting with a standard tape if any change is made in the Equalizer. NOTE: Fixed Equalization is employed for the 30 inch tape speed on the Model 301.

The above will properly align the playback circuit for operation at both speeds.

The 15 inch standard tape will play back within  $\pm 2$  db to 15,000 cycles when the Playback Amplifier is adjusted to the standard curve. Failure for the standard tape to play back within these tolerances after the Playback Amplifier has been aligned indicates one of the following:

- a. Trouble in the Head Assembly, such as worn heads.
- b. A faulty Standard Tape which has been partially erased at the high frequencies by passing over magnetized heads, etc.

An overall frequency response check will isolate the trouble. Good overall response indicates a faulty Standard Tape. Poor overall response indicates one of the following:

- a. Faulty Heads.

- b. Tape deficiency.
- c. Record or Playback Amplifier improperly equalized.
- d. Incorrect bias.

Alignment of the Record circuits as described in the next sub-section will further aid in isolating trouble.

#### IV. ALIGNMENT OF RECORD CIRCUITS:

Record alignment should be attempted only after the playback has been properly aligned.

Perform the following operations in the sequence indicated:

##### 1. Record Bias and Level Adjustment

The record bias current is factory adjusted for optimum overall response and low frequency distortion. However, the optimum value of bias current will vary with different types of tape. The record equalization characteristics on this equipment have been determined for peak bias at 1000 cycles at 15 inch per second tape speed. Peak bias means that the bias current is adjusted so that the 1000 cycle signal is recorded at its maximum level. Adjust the bias in the following manner:

- a. Thread a blank tape on the machine. Terminate the playback output with a 600 ohm termination or set the Line Out Switch on the Meter Panel to the "cue" position. Connect an external V.U. Meter across the output or set the Monitor Switch on the Meter Panel to the "Out" position.
- b. Connect an audio oscillator to the input of the Record Amplifier or to the Meter Panel if the machine is so equipped. Set the oscillator at  $\pm 4$  dbm (1.23 volts RMS) 1000 cycles.
- c. On machines with a Bridging Meter Panel, set the Meter Panel Record Step Control to 14. On machines with a Matching Meter Panel, set the Record Level Control to "0". The Playback Step Control on either style of Meter Panel should be set at 14.
- d. Start the tape in the Record mode of operation at 15 inch per second tape speed. Make a preliminary record level set by adjusting the Record Control in the Electronic Chassis (R101) so the playback Output is approximately  $\pm 4$  dbm (1.23 volts RMS).
- e. Adjust the Bias Control (R126) for the maximum playback output of the 1000 cycle tone.
- f. Reset the audio oscillator to 250 cycles  $\pm 4$  dbm (1.23 volts RMS).

## HEAD MAGNETIZATION.

Occasionally the heads may become magnetized through an electrical fault in the amplifiers, improper use of the machine, or by the heads coming in contact with a magnetized object. This will result in an increase of noise level from 5 to 10 db. It is especially important that the heads be free of magnetization if you are to realize the dynamic range of type 111 tape. It should be remembered that any phenomena that tends to put an unbalanced pulse through the record head will magnetize it. Such pulses can appear in the form of signal or power line pulses. If the following precautions are observed, no difficulty should be experienced:

1. Do not remove any tube from the record amplifier while the machine is recording.
2. Do not connect or disconnect input leads or head leads while recording.
3. Do not depress the Record button until after depressing the Start button. In other words, allow the transient caused by switching the motors and solenoids to die out before the record head is connected. A one-half second pause is sufficient.
4. Do not saturate the record amplifier with an abnormally high input signal. Such a signal would be 10 db. greater than tape saturation and 30 db. greater than normal operating level.
5. Do not test continuity in the heads with an ohm meter.

## HEAD DEMAGNETIZATION.

Should the heads become magnetized, they can be demagnetized with an AMPEX head demagnetizer (stock number B-704). In the event that time does not permit the owner of the machine to wait for delivery of a demagnetizer, he may make one as follows: Cut a piece of transformer lamination to a 1/4" x 2" size. Wrap the strip of metal with suitable insulating material and wind approximately 400 turns of No. 36 wire and attach a 4' length of 2 connector cord. Bend the iron strip into a "U" shape and bring the ends of the "U" to a spacing of 1/4". Connect to a 6 volt source of A.C., open the gate on the head housing and bring the ends of the "U" in contact with the 2 poles on the magnetized head. Remove the demagnetizer very slowly, allowing the A.C. field to die off gradually. Repeat this operation on record and playback heads only, as the erase head will demagnetize itself. In the event demagnetization is not effected, repeat the process several times.

should not be touched unless all heads have been thoroughly demagnetized with an Ampex Head Demagnetizer or equivalent. If noise of a crackling nature is still found to exist in the output of the machine, connect a 1 MFD condenser across the output and adjust the Noise Balance Control, (R126), for minimum record noise as read on a sensitive meter or heard in a loudspeaker connected to the machine output through a power amplifier.

#### V. ERASE ADJUSTMENT:

It should not be necessary to make this adjustment except at rare intervals because of the high degree of stability of the oscillator circuits. Do not make this adjustment unless the erase head will not erase the previous program. Do not readjust erase to attempt to eliminate crackling tape noise, as the erase current does not produce crackling even if out of adjustment. If adjustment is indicated, the following procedure must be taken:

- a. Pull out the Erase Cable from the Record Chassis plug (J103P).
- b. Make an adapter plug by inserting a 10 ohm resistor in series with the ground side of the erase cable.
- c. Insert adapter in J103P, insert cable in adapter.
- d. Place a vacuum tube voltmeter such as Hewlett-Packard 400A or 400C across the 10 ohm resistor. Set on 3 volt scale. Full scale will read 300 Ma. erase current.
- e. Loosen the Erase Trimmer C120 for minimum capacity and slowly increase the capacity (counterclockwise rotation from top of chassis) until the meter reads 150 to 180 Ma. Higher currents will produce unnecessary heating of the head.
- f. NOTE: Align the record circuit as described under Record Alignment after making this adjustment, since a change in erase current will produce a change in bias current.

MODEL 300 ELECTRONIC ASSEMBLY - CATALOG #559  
 MODEL 301 ELECTRONIC ASSEMBLY - CATALOG #1094

Schematic Ref. No.	Description	Ampex Stock Number
A101	Neon Lamp 1/25 Watt	LA-4
C101	50 MFD 25 V. Electrolytic Condenser	CO-60
C102	.25 MFD 600 V. Tubular Condenser	CO-35
C104	10 MFD 450 V. Electrolytic Condenser	CO-55
C105	.1 MFD 600 V. Tubular Condenser 5%	CO-34
C106	50 MFD 25 V. Electrolytic Condenser	CO-60
C107	.1 MFD 600 V. Tubular Condenser	CO-33
C108	10 MFD 450 V. Electrolytic Condenser	CO-55
C109	.0035 MFD 500 V. Mica Condenser 5%	CO-10
C110	.002 MFD 500 V. Mica Condenser 5%	CO-7
C111	1. MFD 400 V. Metalized Paper Condenser	CO-47
C112	16 MFD 150 V. Electrolytic Condenser	CO-56
C113	20/30/30 MFD 475 V. Electrolytic Condenser	CO-244
C114	100 MFD 25 V. Electrolytic Condenser	CO-104
C115	10 MFD 450 V. Electrolytic Condenser	CO-55
C116	10 MFD 450 V. Electrolytic Condenser	CO-55
C117	.1 MFD 1000 V. Tubular Condenser	CO-95
C118	.1 MFD 1000 V. Tubular Condenser	CO-95
C119	.002 MFD 500 V. Mica Condenser 5%	CO-7
C120	.001 MFD Mica Trimmer Condenser	CO-91
C121	.0005 MFD 500 V. Mica Condenser 5%	CO-5
C123	100 MFD 50 V. Electrolytic Condenser	CO-63
C124	20 MFD 450 V. Electrolytic Condenser	CO-57
C125	.0001 MFD Padder Condenser	CO-92
C126	.0001 MFD Padder Condenser	CO-92
C201	.1 MFD 200 V. Metalized Paper Condenser	CO-97
C202	4 MFD 450 V. Electrolytic Condenser	CO-54
C203	50 MFD 25 V. Electrolytic Condenser	CO-60
C204	.1 MFD 600 V. Tubular Condenser	CO-33
C206	.036 MFD 150 V. Tubular Condenser 5%	CO-111
C207	50 MFD 25 V. Electrolytic Condenser	CO-60
C208	4 x 20 MFD 450 V. Electrolytic Condenser	CO-65
C209	.25 MFD 600 V. Tubular Condenser	CO-35
C210	50 MFD 25 V. Electrolytic Condenser	CO-60
C211	.1 MFD 600 V. Tubular Condenser	CO-33
C212	.1 MFD 600 V. Tubular Condenser	CO-33
C213	.1 MFD 600 V. Tubular Condenser	CO-33
C214	50 MFD 25 V. Electrolytic Condenser	CO-60
C901	.004 MFD 500 V. Mica Condenser 5%	CO-11
C902	.004 MFD 500 V. Mica Condenser 5%	CO-11
C903	.0004 MFD 500 V. Mica Condenser 5%	CO-89
C904	.0004 MFD 500 V. Mica Condenser 5%	CO-89

NOTE: ORDER PARTS BY AMPEX CATALOG NUMBER ONLY!

Schematic Ref. No.	Description	Ampex Stock Number
F101	1/4 Amp Fast Blowing Fuse	FU-4
J101S	Chassis Connector	PL-58S
J102P	Chassis Connector	PL-61P
J103P	Chassis Connector	PL-62P
J104P	Chassis Connector	PL-13P
J105S	Chassis Connector	PL-54S
J201P	Chassis Connector	PL-59P
J202P	Chassis Connector	PL-4P
J203P	Chassis Connector (Meter Panel Only)	PL-26P
K101	3 Pole Double Throw DC Relay	RL-26
K102	3 Pole Double Throw DC Relay	RL-2
K201	3 Pole Double Throw DC Relay (Model 301 Only)	RL-2
L101	20 Millihenry Choke	CH-8
L102	12 Henry Choke	3479
L103	20 Henry Choke	3480
L104	100 Millihenry Choke	CH-15
R101	100,000 Ohm Carbon Potentiometer	RE-227
R102	2200 Ohm 1 Watt Composition Resistor	RE-7
R103	47,000 Ohm 1 Watt Composition Resistor	RE-22
R104	10,000 Ohm 1 Watt Composition Resistor	RE-15
R105	1 Megohm 1 Watt Composition Resistor	RE-32
R106	39,000 Ohm 1 Watt Composition Resistor 5%	RE-44
R107	100,000 Ohm 1 Watt Composition Resistor	RE-26
R108	2200 Ohm 1 Watt Composition Resistor	RE-7
R109	47,000 Ohm 1 Watt Composition Resistor	RE-22
R110	10,000 Ohm 1 Watt Composition Resistor	RE-15
R111	470,000 Ohm 1 Watt Composition Resistor	RE-31
R112	1200 Ohm 2 Watt Composition Resistor	RE-158
R113	220 Ohm 1 Watt Composition Resistor	RE-1
R114	2200 Ohm 1 Watt Composition Resistor	RE-7
R115	10,000 Ohm 10 Watt W. W. Resistor	RE-90
R116	470,000 Ohm 1 Watt Composition Resistor	RE-31
R117	50,000 Ohm Carbon Potentiometer	RE-226
R118	1 Megohm 1 Watt Composition Resistor	RE-32
R119	47,000 Ohm 1 Watt Composition Resistor	RE-22
R120	6000 Ohm 40 Watt W. W. Resistor	RE-244
R121	220,000 Ohm 1 Watt Composition Resistor	RE-28
R122	10,000 Ohm 25 Watt W. W. Resistor	RE-122
R123	600 Ohm 10 Watt W. W. Resistor	RE-73
R124	10,000 Ohm 10 Watt W. W. Resistor	RE-90
R125	100 Ohm 1 Watt Composition Resistor	RE-260
R126	10,000 Ohm W. W. Potentiometer	RE-255
R201	470,000 Ohm 1 Watt Composition Resistor	RE-47
R202	1 Megohm 1 Watt Composition Resistor	RE-32

NOTE: ORDER PARTS BY AMPEX CATALOG NUMBER ONLY!

MODEL 300 & 301 SECTION VI - Page 3

9-15-52



Schematic Ref. No.	Description	Ampex Stock Number
R203	1000 Ohm 1/2 Watt W. W. Resistor 1%	RE-49
R204	300,000 Ohm 1/2 Watt W. W. Resistor 1%	RE-52
R205	100,000 Ohm 1/2 Watt W. W. Resistor 1%	RE-51
R206	1 Megohm 1 Watt Composition Resistor	RE-32
R207	5000 Ohm Carbon Potentiometer	RE273
R208	10,000 Ohm 2 Watt Composition Resistor	RE-168
R209	1000 Ohm 1 Watt Composition Resistor	RE-5
R210	330,000 Ohm 1 Watt Composition Resistor	RE-306
R211	100,000 Ohm 1/2 Watt W. W. Resistor 1%	RE-51
R212	27,000 Ohm 1 Watt Composition Resistor	RE-19
R213	100,000 Ohm Carbon Potentiometer	RE-227
R214	1200 Ohm 1 Watt Composition Resistor	RE-261
R215	33,000 Ohm 1 Watt Composition Resistor	RE-20
R216	10,000 Ohm 2 Watt Composition Resistor	RE-168
R217	47,000 Ohm 1 Watt Composition Resistor	RE-22
R218	1 Megohm 1 Watt Composition Resistor	RE-32
R219	10,000 Ohm 5 Watt W. W. Resistor	RE-262
R220	22,000 Ohm 1 Watt Composition Resistor	RE-171
R221	1 Megohm 1 Watt Composition Resistor	RE-32
R222	1000 Ohm 1 Watt Composition Resistor	RE-5
R223	1 Megohm 1 Watt Composition Resistor	RE-32
R901	47,000 Ohm 1 Watt Composition Resistor	RE-22
R902	47,000 Ohm 1 Watt Composition Resistor	RE-22
R903	100 Ohm 1 Watt Composition Resistor	RE-260
R904	100 Ohm 1 Watt Composition Resistor	RE-260
T101	Input Transformer	3478
T102	Power Transformer	3477
T103	Oscillator Coil Assembly	512
T201	Output Transformer	1154
TS101	Terminal Strip - 8 Terminals	TS-2-8
T901	Torroidal Coil	1011
V101	6C5 (Recommended) or 6J5 Vacuum Tube	TU-3
V102	6C5 (Recommended) or 6J5 Vacuum Tube	TU-3
V103	6SN7 Vacuum Tube	TU-13
V104	5U4G Vacuum Tube	TU-1
V105	815 Vacuum Tube	TU-16
V201	12SJ7 Vacuum Tube - Factory Selected	TU-12
V202	VR-150 Vacuum Tube	TU-2
V203	6J7 Vacuum Tube	TU-15
V204	6SN7 Vacuum Tube	TU-13
V205	6SN7 Vacuum Tube	TU-13
	Tube Shield Assembly V101	644
	Dummy Plug (Power)	567
	Millen Shaft Lock	SM-1
	Octal Sockets	SO-1
	Octal Sockets -Shock Mounted (V201 & V202)	SO-11
	Condenser Socket	SO-9

TOP PLATE ASSEMBLY MODEL 300 CATALOG #511  
 TOP PLATE ASSEMBLY MODEL 301 CATALOG #1122

Schematic Ref. No.	Description	Amplex Stock Number
A801	6-8 V. Panel Lamp - Bayonet Base	LA-5
A802	120 V. 6 Watt Lamp - Candelabra Screw	LA-6
C501	5 MFD 330 V. A. C. Capacitor	CO-80
C601	3.75 MFD 330 V. AC Capacitor	CO-86
C701	3.75 MFD 330 V. AC Capacitor	CO-86
C801	.1 MFD 600 V. Tubular Condenser	CO-33
C802	.1 MFD 600 V. Tubular Condenser	CO-33
C803	.1 MFD 600 V. Tubular Condenser	CO-33
C804	.1 MFD 600 V. Tubular Condenser	CO-33
C805	80 MFD 150 V. Electrolytic Condenser	CO-105
C806	80 MFD 150 V. Electrolytic Condenser	CO-105
C807	.1 MFD 600 V. Tubular Condenser	CO-33
C808	.1 MFD 600 V. Tubular Condenser	CO-33
C809	.1 MFD 600 V. Tubular Condenser	CO-33
F801	5 Amp 250 V. Fuse	FU-5
F802	5 Amp 250 V. Fuse	FU-5
F803	2 Amp 250 V. Fuse	FU-2
J801P	Chassis Connector	PL-27P
J802S	Chassis Connector	PL-68S
J804S	Chassis Connector	PL-54S
J806S	Chassis Connector - Utility Outlet	PL-141S
K801	3 Pole Double Throw DC Relay	RL-26
K802	3 Pole Double Throw DC Relay	RL-26
R801	150 Ohm 50 Watt Adjustable Resistor	RE-259
R802	500 Ohm 50 Watt Adjustable Resistor	RE-221
R803	150 Ohm 50 Watt Adjustable Resistor	RE-259
R804	10 Ohm 5 Watt W. W. Resistor	RE-264
S501	Micro Switch	SW-2
S502	Dual DPDT Toggle Switch	SW-51
S503	Dual DPDT Toggle Switch	SW-51
S801	DPST Toggle Switch	SW-4
S802	6 Pole 3 Position Shorting Switch	SW-18
S803	Single Pole Pushbutton N. C. (Stop)	SW-35
S804	Single Pole Pushbutton N. O. (Record)	SW-34
S805	Double Pole Pushbutton N. O. (Start)	SW-12
SR801	Selenium Rectifier	SR-4
TS501	Terminal Strip - 9 Terminals	TS-1-9
TS601	Terminal Strip - 6 Terminals	TS-1-6
TS701	Terminal Strip - 6 Terminals	TS-1-6
TS801	Terminal Strip - 4 Terminals	TS-2-4

NOTE: ORDER PARTS BY AMPEX CATALOG NUMBER ONLY!

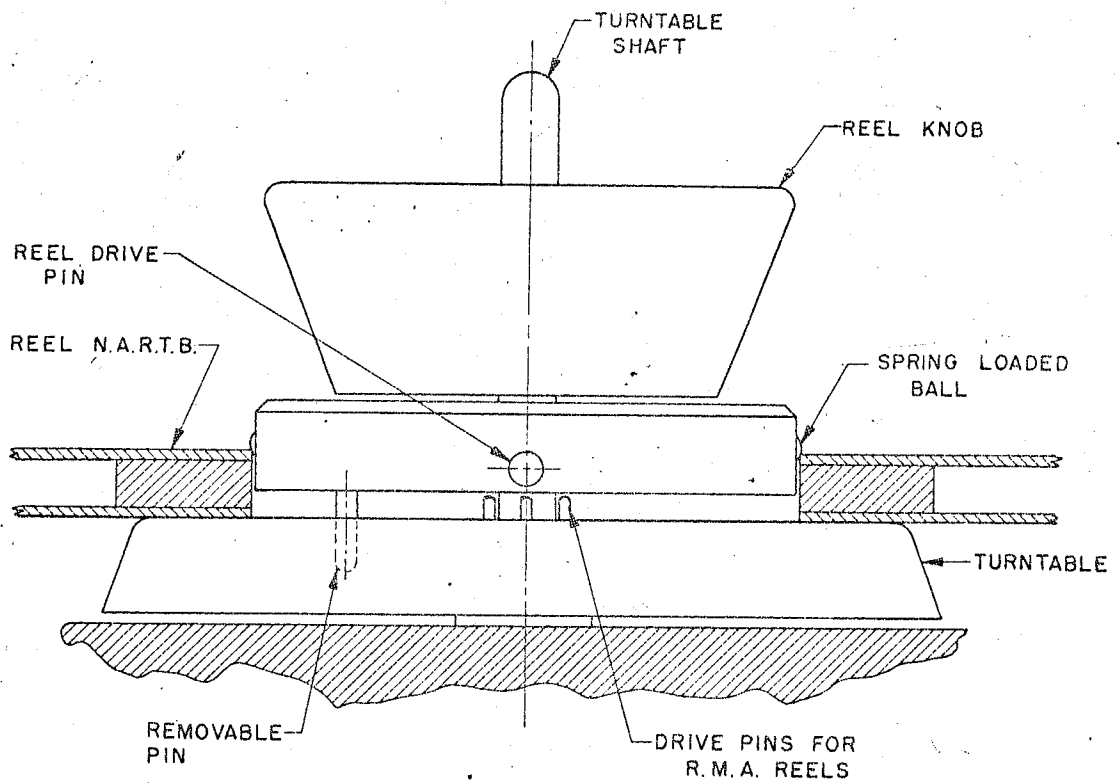
Reference Number	Description	Ampex Catalog Number
	Drive Assembly Model 300	520
	Drive Assembly Model 301	630
	Capstan Assembly	366
	Capstan Dust Cap	362
	Capstan Felt Washer - Dust Seal	494
	Capstan Truarc Retainer	RR-5-1
	Capstan Idler Assembly	500
	Capstan Idler Arm	372
	Capstan Idler Arm Bearing Housing	374
B501	Drive Motor Assembly - Model 300	1030
B501	Drive Motor Assembly - Model 301	1075
	Drive Motor Return Spring(Console and portable)	1024
	Drive Motor Return Spring (Rack Mount Only)	390
	Drive Motor Shield	1905
K502	Drive Solenoid	670
	Felt Washer	PW-6-1/4-416-816
	Drive Motor Pressure Adjusting Spring	389
K501	Capstan Solenoid	670
	Felt Washer	PW-6-1/8-416-816
	Capstan Idler Return Spring	400
	Capstan Idler Adjusting Spring	676
	Tape Speed Switch Assembly (incl. S501, S502, S503)	364
	Takeup Assembly (Complete)	339
	Takeup Motor Assembly-Complete with motor, Flange, Brake Drum & Turntable	2458
	Brake Housing	317
	Brake Band Assembly	328
	Brake Band Leaf	720-1 & 2
K701	Brake Solenoid	337
	Brake Adjusting Spring	322
	Turntable Pad	958
	Rewind Assembly	338
	Rewind Motor Assembly-Complete with Motor, Flange, Brake Drum & Turntable	2458
	Brake Housing	316
	Brake Band Assembly	328
	Brake Band Leaf	720-1 & 2
K601	Brake Solenoid	337
	Brake Adjusting Spring	322
	Turntable Pad	958
	Takeup Tension Arm Assembly	425
	Tape Guide Hook	355
	Tape Guide	675

Reference Number	Description	Ampex Catalog Number
	Takeup Tension Spring	422
	Reel Idler Assembly	354-0-(22.10)
	Tape Guide	257
	Head Assembly - Console	475-1
	Head Assembly - Rack & Suitcase	475-2
	Gate Pins	DR-2-3-10
	Gate Spring	438
	Dummy Plug - Remote Control	567
	Record Pushbutton Guard	463
	Start and Stop Bushbutton Guards	361
	Speed Change Knob	KN-10
	Mode Selector Lever Knob	KN-2
	Fuse Holder	FE-1
	On-Off Pilot Lamp Base - Amber	DL-6
	Record Pilot Lamp Base - Red	DL-7
	WESTON PANEL CO METER CONTROL PANEL	
	Meter Control Panel-Matching-Weston Meter	515-3
	Meter Control Panel-Matching-Burlington Meter	515-4
	Meter Control Panel -Bridging-Weston Meter	515-1
	Meter Control Panel-Bridging-Burlington Meter	515-2
	Input Cable Assembly	569
	Cable Connector	PL-33P
	Output Cable Assembly	568
	Cable Connector	PL-1S
	Level Control Cable Assembly	570
	Cable Connector	FL-34S
	Panel Lamp Cable Assembly	625
	Cable Connector	PL-24P
J1001S	Phone Jack - Open Circuit	JA-3
J1101S	Phone Jack - Open Circuit	JA-3
M1001	VU Meter - Burlington	ME-2
M1001	VU Meter - Weston	ME-4
M1101	VU Meter - Burlington	ME-2
M1101	VU Meter - Weston	ME-4
R1001	600 Ohm T-Pad Mixer Control	RE-236
R1002	20,000 Ohm 20 Step Potentiometer	RE-235
R1003	560 Ohm 1 Watt Composition Resistor	RE-3
R1004	3600 Ohm 1/2 Watt W. W. Resistor 1%	RE-269
R1005	2700 Ohm 1 Watt Composition Resistor	RE-8
R1006	560 Ohm 1 Watt Composition Resistor	RE-3
R1101	10,000 Ohm 20 Step Potentiometer	RE-234
R1102	20,000 Ohm 20 Step Potentiometer	RE-235
R1103	560 Ohm 1 Watt Composition Resistor	RE-3

Reference Number	Description	Ampex Catalog Number
R1104	3600 Ohm 1/2 Watt W. W. Resistor 1%	RE-269
R1105	2700 Ohm 1 Watt Composition Resistor	RE-8
S1001	DPDT Lever Switch	SW-20
S1002	DPDT Lever Switch	SW-20
S1101	DPDT Lever Switch	SW-20
S1102	DPDT Lever Switch	SW-20
TS1001	Terminal Strip - 18 Terminals	TS-1-18
TS1101	Terminal Strip - 18 Terminals	TS-1-18

#### MISCELLANEOUS

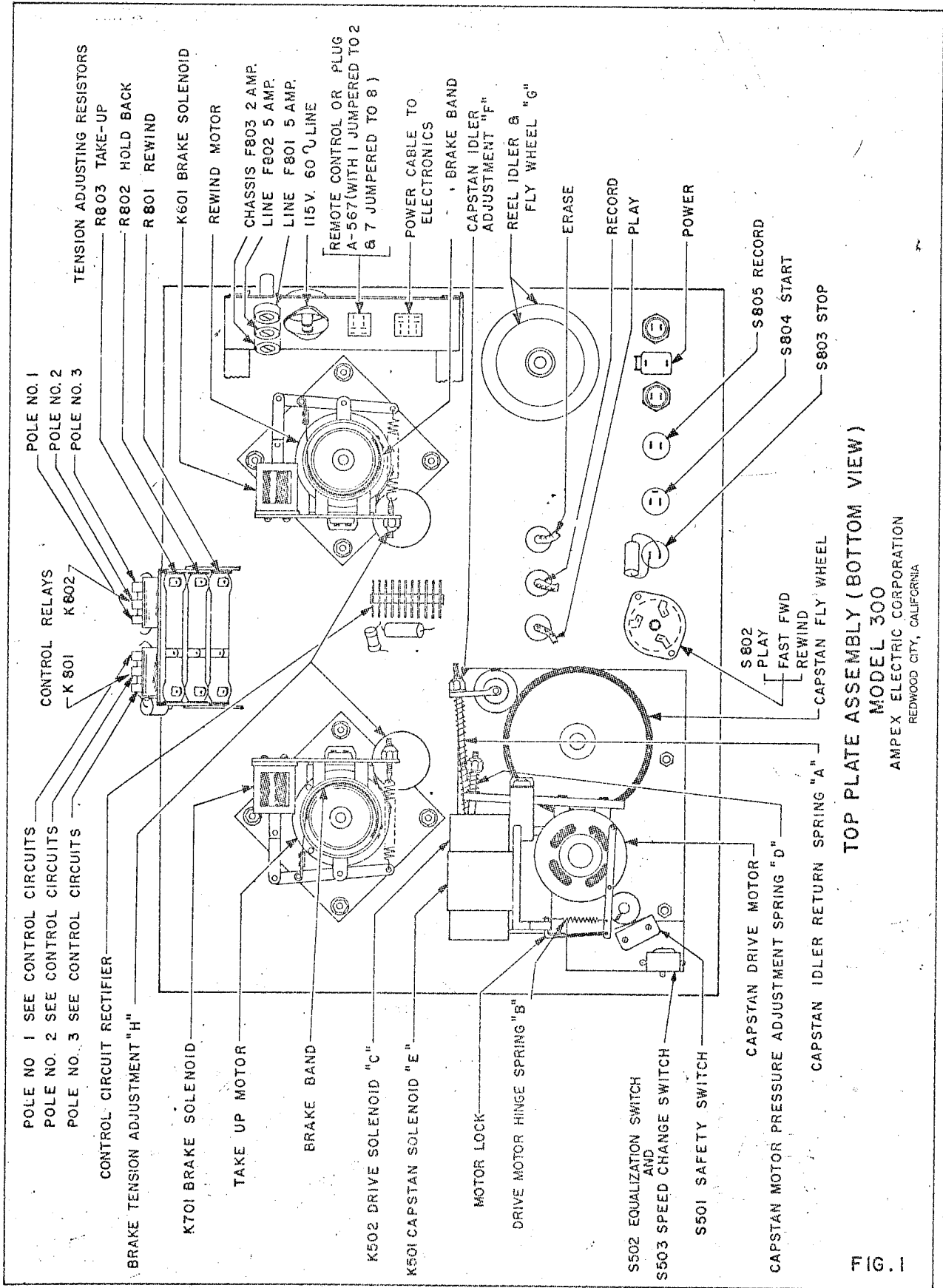
A2001	Remote Record Lamp Base - Red	DL-7
	120V. 6 W att Lamp Candelabra Screw	LA-6
S2001	Single Pole Pushbutton-Normally Open	SW-34
S2002	Double Pole Pushbutton - Normally Open	SW-12
S2003	Single Pole Pushbutton - Normally Closed	SW-35
	NARTB 10 1/2 inch Reel	539
	Reel Knob - Editing (Console & Suitcase)	1917
	Reel Knob - Hold Down (Rack)	4402
	AC Power Cable	564
	Interconnecting Cable (Console)	563-2
	Interconnecting Cable (Rack & Suitcase)	563-1
	Fan Assembly for Console Cabinet	2695
	Air Filter	AF-1
	15"/Sec. Strobosticker	575
	15"/Sec. Standard Alignment Tape	4494
	Head Demagnetizer	704



CAUTION:- DO NOT PUSH KNOB ALL THE WAY DOWN TO THE TURNTABLE OR SPRING LOADED BALLS WILL NOT HOLD REEL IN PLACE.

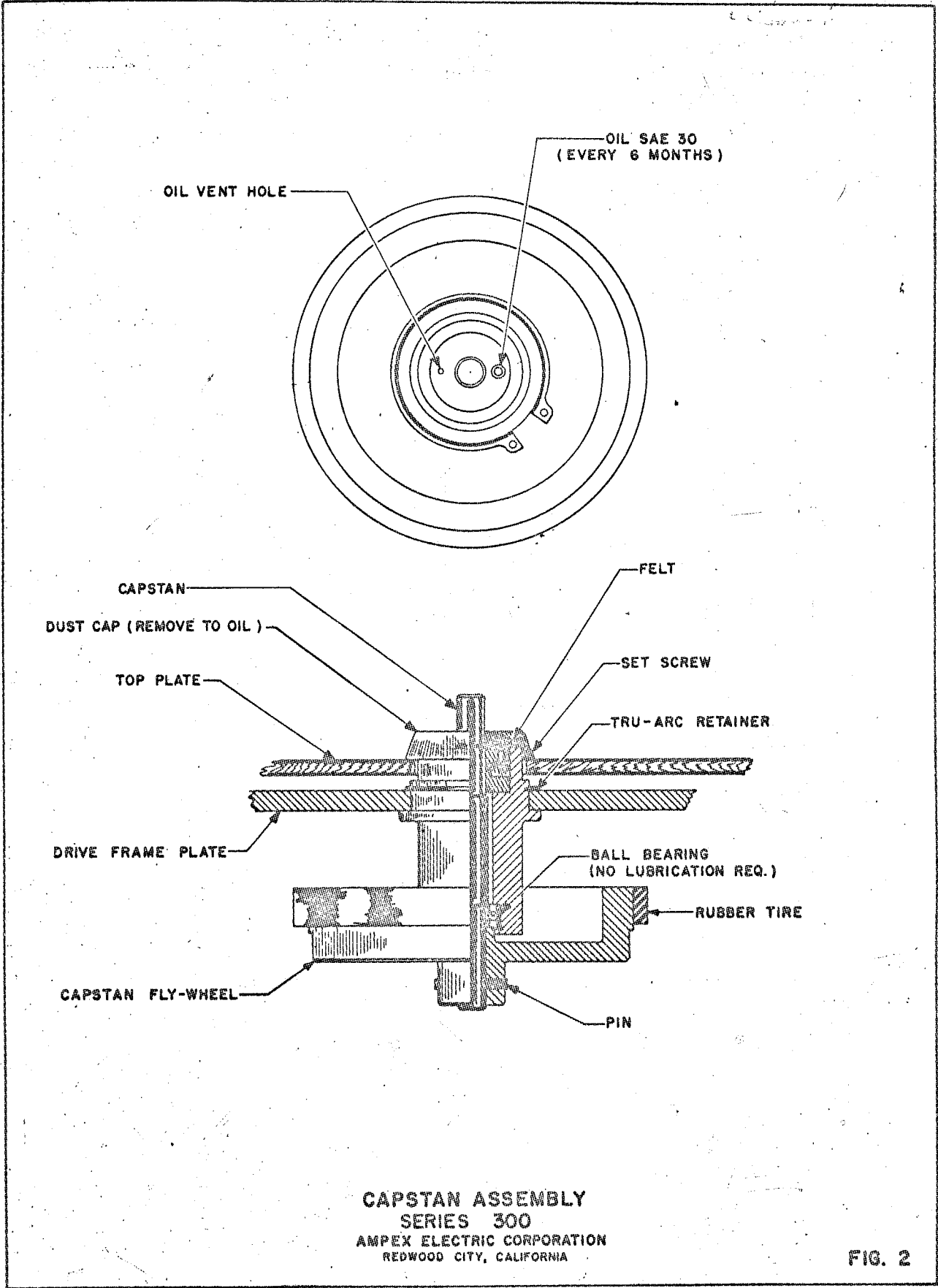
REEL HOLD-DOWN KNOB  
 AMPEX ELECTRIC CORPORATION  
 REDWOOD CITY, CALIFORNIA.

FIG. 0



TOP PLATE ASSEMBLY (BOTTOM VIEW)

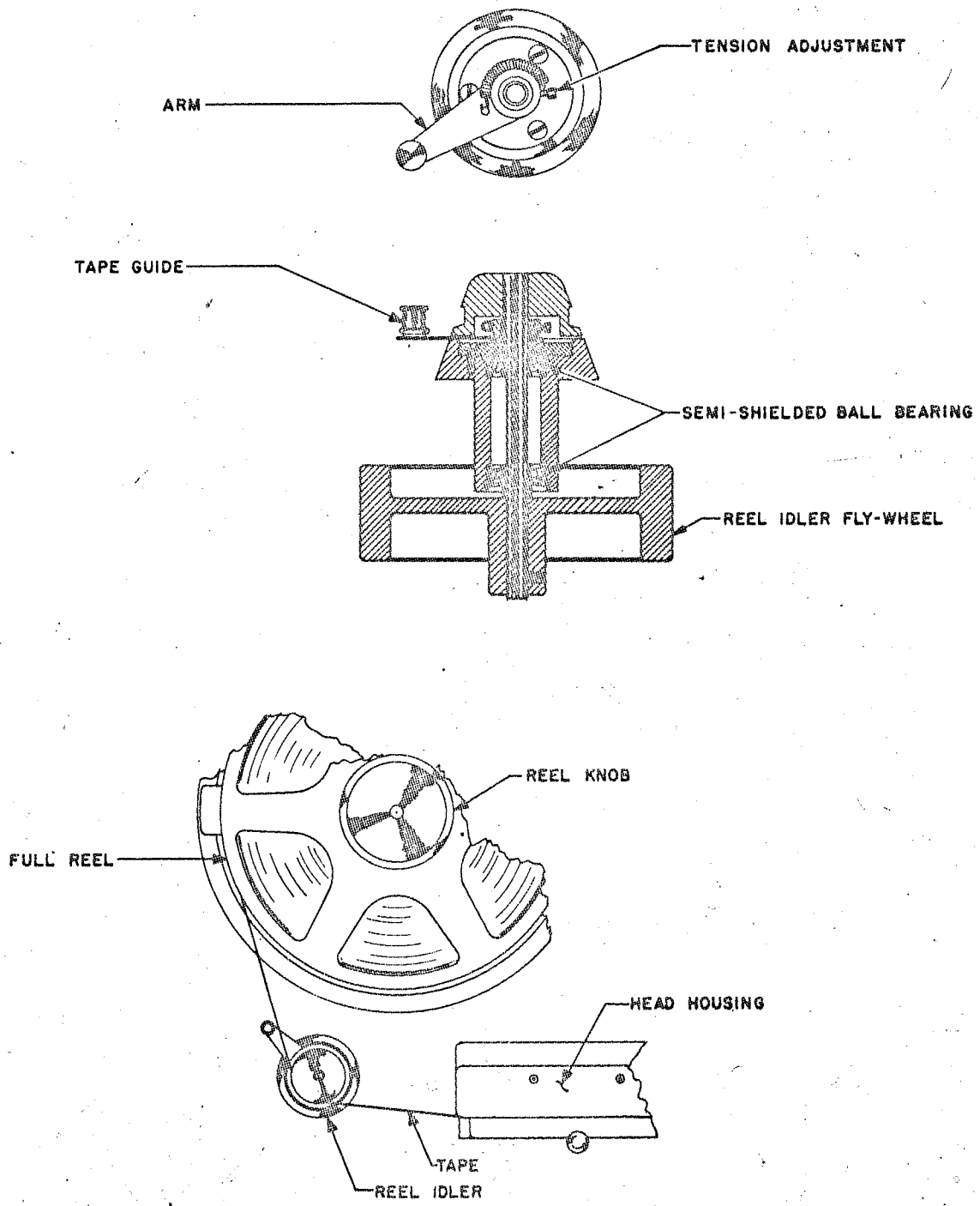
MODEL 300  
AMPEX ELECTRIC CORPORATION  
REDWOOD CITY, CALIFORNIA



**CAPSTAN ASSEMBLY**  
**SERIES 300**  
 AMPEX ELECTRIC CORPORATION  
 REDWOOD CITY, CALIFORNIA

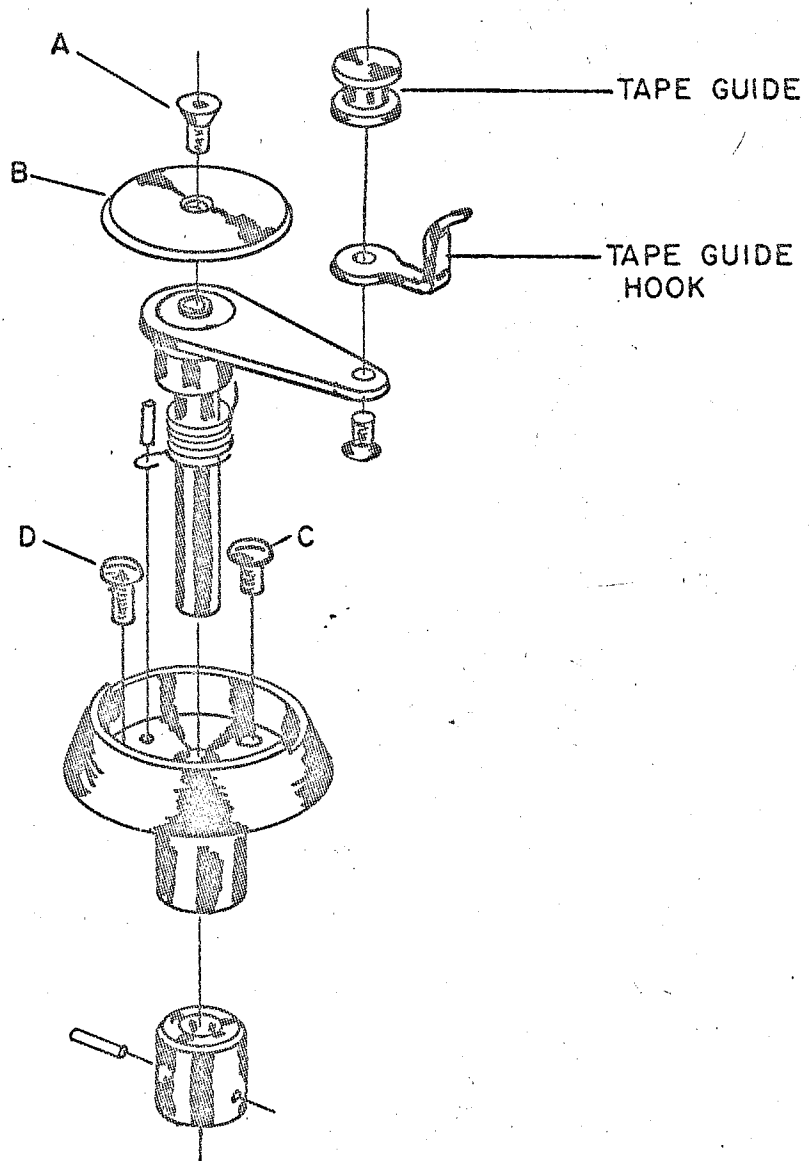
**FIG. 2**





REEL IDLER ASSEMBLY  
 SERIES 300  
 AMPEX ELECTRIC CORPORATION  
 REDWOOD CITY, CALIFORNIA

FIG. 3



TO REMOVE ASSEMBLY FROM TOP PLATE REMOVE  
SCREW A, DISC B & SCREWS C & D. LIFT OUT.

DO NOT OIL ASSEMBLY.

TAKE-UP TENSION ARM ASSEMBLY

SERIES 300

AMPEX ELECTRIC CORPORATION

REDWOOD CITY, CALIFORNIA

FIG. 4

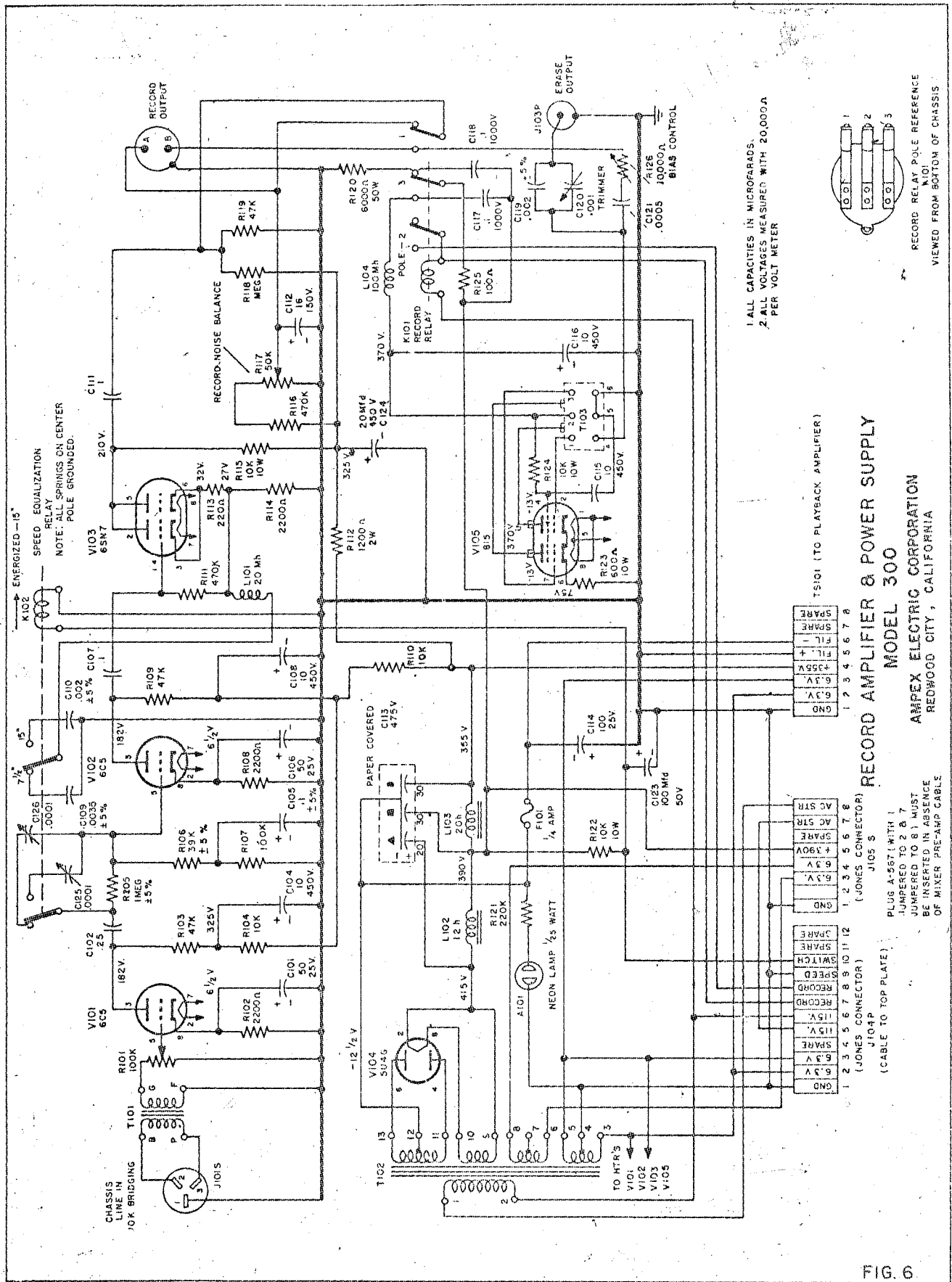


FIG. 6

**MODEL 300**  
**RECORD AMPLIFIER & POWER SUPPLY**  
**AMPEX ELECTRIC CORPORATION**  
**REDWOOD CITY, CALIFORNIA**

SPARE	1
SPARE	2
SPARE	3
SPARE	4
SPARE	5
SPARE	6
SPARE	7
SPARE	8
SPARE	9
SPARE	10
SPARE	11
SPARE	12
SPARE	13
SPARE	14
SPARE	15
SPARE	16
SPARE	17
SPARE	18
SPARE	19
SPARE	20
SPARE	21
SPARE	22
SPARE	23
SPARE	24
SPARE	25
SPARE	26
SPARE	27
SPARE	28
SPARE	29
SPARE	30

AC STR	1
AC STR	2
SPARE	3
SPARE	4
SPARE	5
SPARE	6
SPARE	7
SPARE	8
SPARE	9
SPARE	10
SPARE	11
SPARE	12
SPARE	13
SPARE	14
SPARE	15
SPARE	16
SPARE	17
SPARE	18
SPARE	19
SPARE	20
SPARE	21
SPARE	22
SPARE	23
SPARE	24
SPARE	25
SPARE	26
SPARE	27
SPARE	28
SPARE	29
SPARE	30

AC STR	1
AC STR	2
SPARE	3
SPARE	4
SPARE	5
SPARE	6
SPARE	7
SPARE	8
SPARE	9
SPARE	10
SPARE	11
SPARE	12
SPARE	13
SPARE	14
SPARE	15
SPARE	16
SPARE	17
SPARE	18
SPARE	19
SPARE	20
SPARE	21
SPARE	22
SPARE	23
SPARE	24
SPARE	25
SPARE	26
SPARE	27
SPARE	28
SPARE	29
SPARE	30

PLUS A-55T (WITH I)  
JUMPERED TO 2 & 7  
BE INSERTED IN ABSENCE  
OF MIXER PRE-AMP CABLE

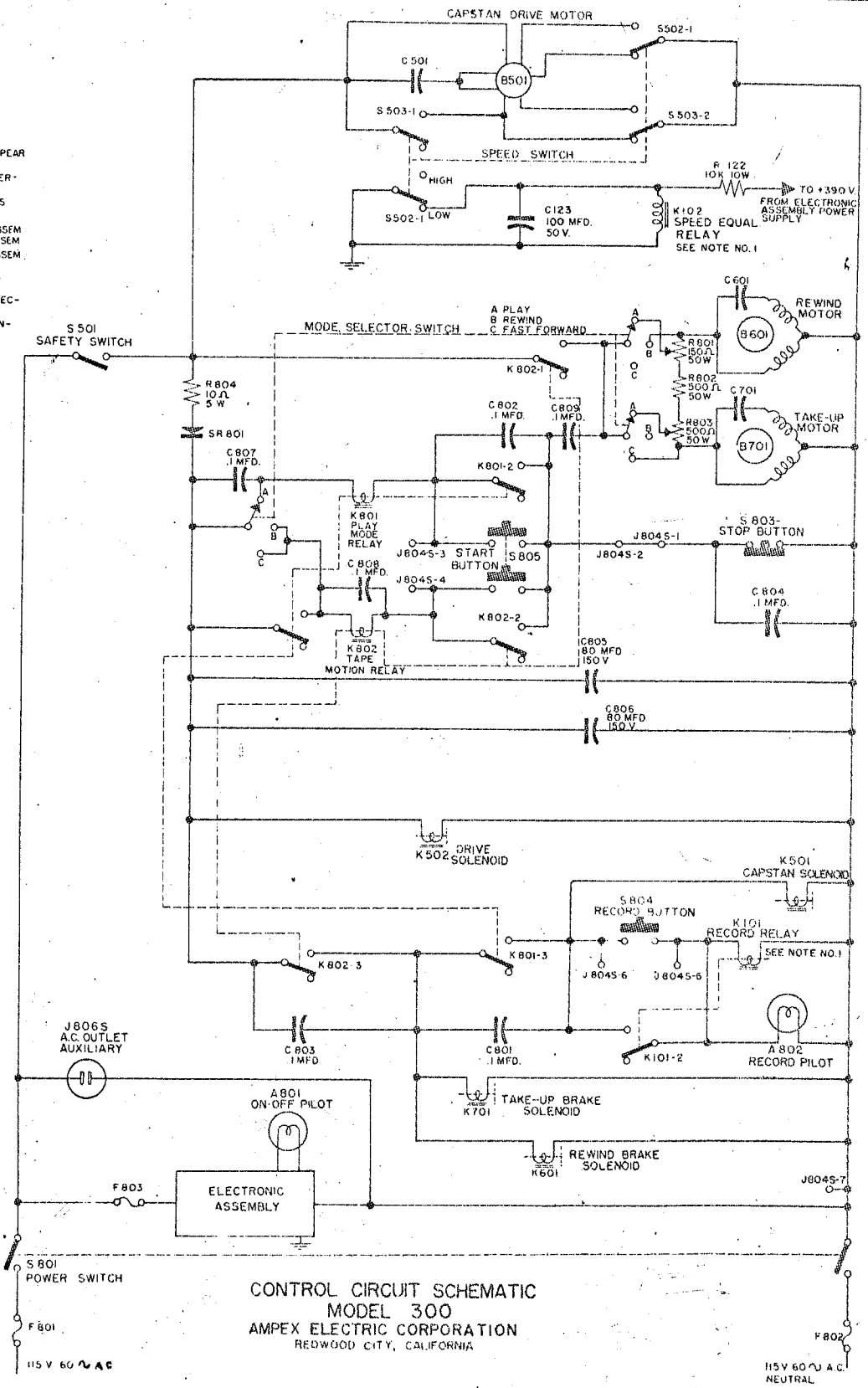
(CABLE TO TOP PLATE)  
J104P  
(JONES CONNECTOR)

J105S  
(JONES CONNECTOR)



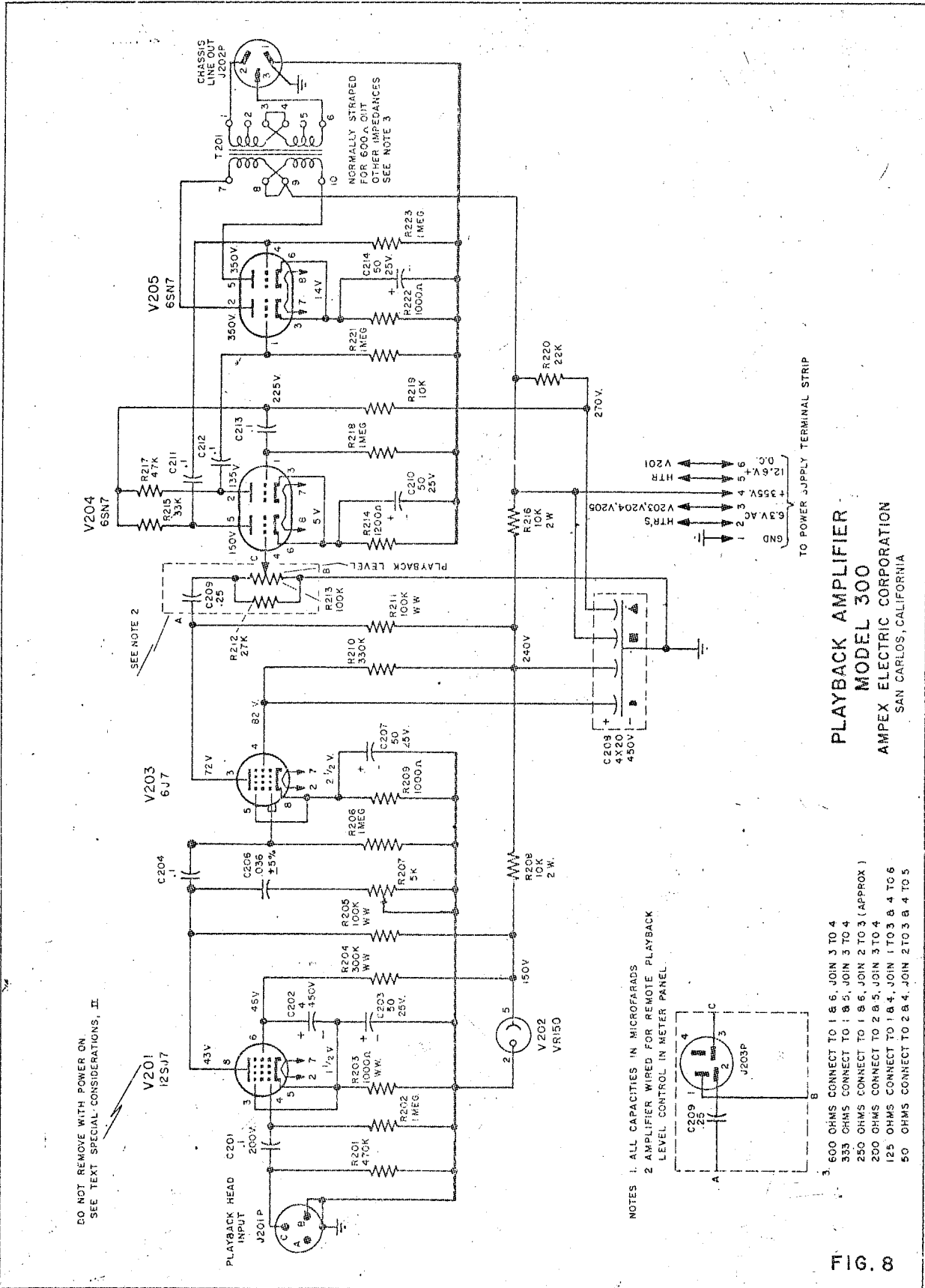
**NOTES:**

1. TWO SETS OF CONTACTS APPEAR IN ELECTRONIC CIRCUITS
2. ALL RELAYS SHOWN DE-ENERGIZED.
3. SCHEMATIC NUMBER INDICATES LOCATION OF COMPONENT
- 500-DRIVE ASSEM.ON TOP PLATE ASSEM
- 600-REWIND ASSEM.ON TOP PLATE ASSEM
- 700 TAKE-UP ASSEM.ON TOP PLATE ASSEM
- 800 TOP PLATE
- 100 RECORD AMPLIFIER ON ELEC-TRONIC ASSEMBLY
- 200 PLAYBACK AMPLIFIER ON ELEC-TRONIC ASSEMBLY
- 4 J8045 REMOTE CONTROL CON-NECTOR



**CONTROL CIRCUIT SCHEMATIC  
MODEL 300  
AMPX ELECTRIC CORPORATION  
REDWOOD CITY, CALIFORNIA**

**FIG. 7A**



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

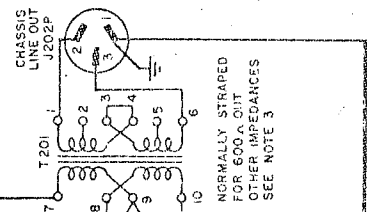
V201  
12SJ7

V203  
6J7

V205  
6SN7

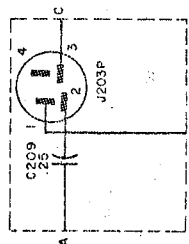
V204  
6SN7

SEE NOTE 2

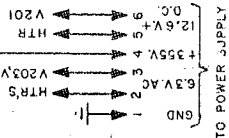


NORMALLY STRAPPED  
FOR 600Ω OUT  
OTHER IMPEDANCES  
SEE NOTE 3

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

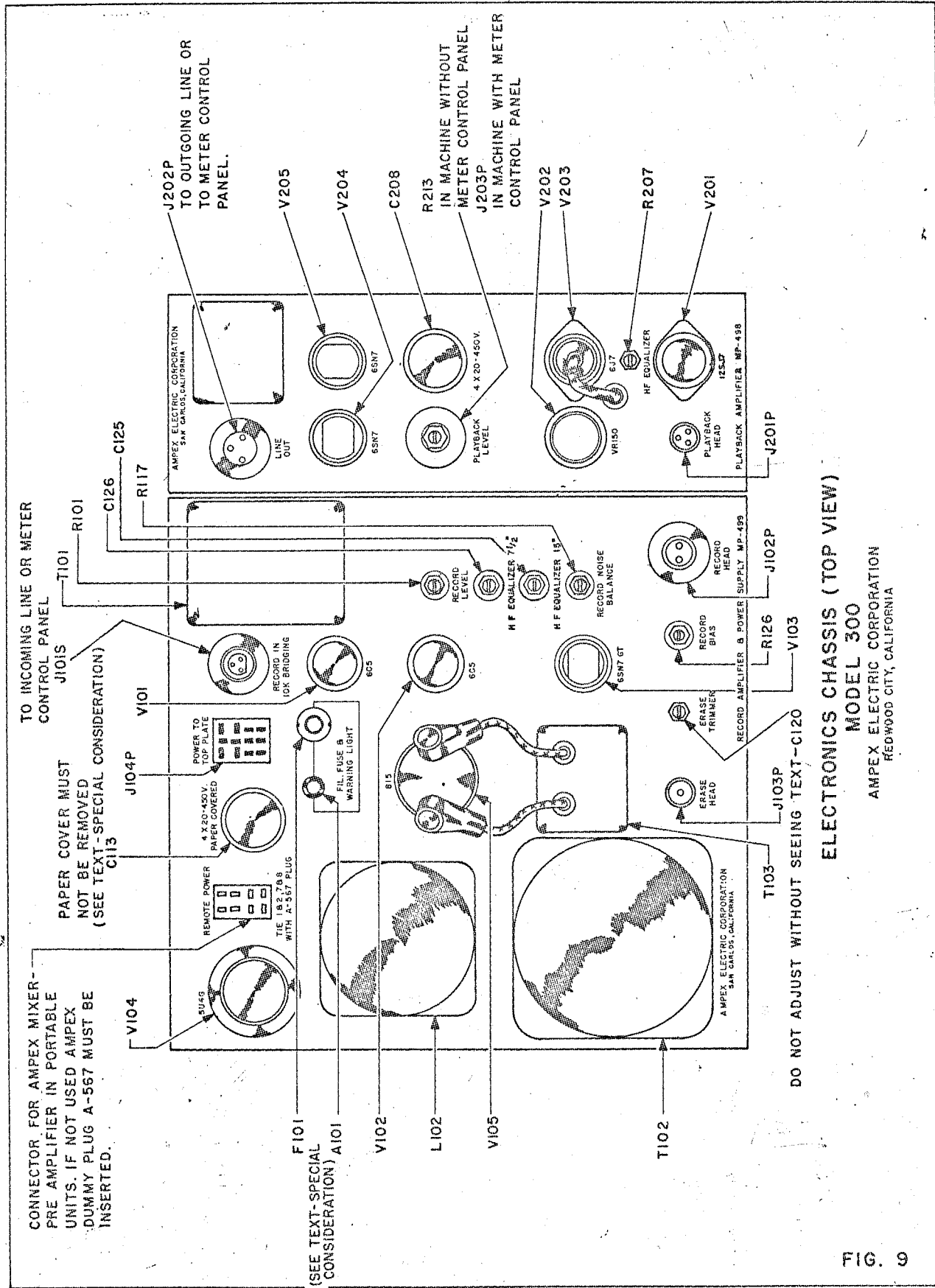


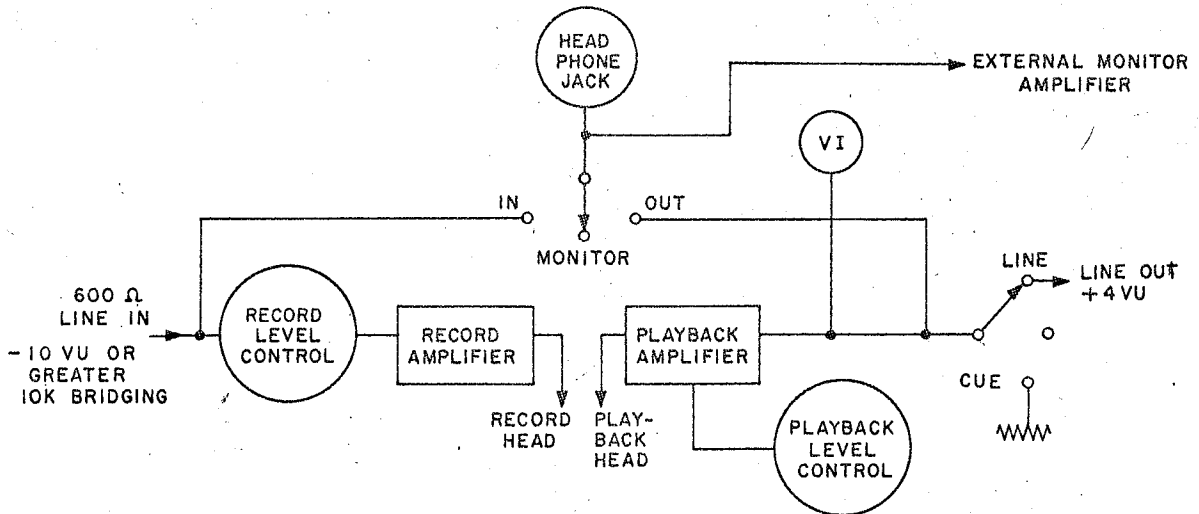
3. 600 OHMS CONNECT TO 1 & 6, JOIN 3 TO 4
- 500 OHMS CONNECT TO 1 & 5, JOIN 3 TO 4
- 250 OHMS CONNECT TO 1 & 6, JOIN 2 TO 3 (APPROX)
- 200 OHMS CONNECT TO 2 & 5, JOIN 3 TO 4
- 125 OHMS CONNECT TO 1 & 4, JOIN 1 TO 3 & 4 TO 6
- 50 OHMS CONNECT TO 2 & 4, JOIN 2 TO 3 & 4 TO 5



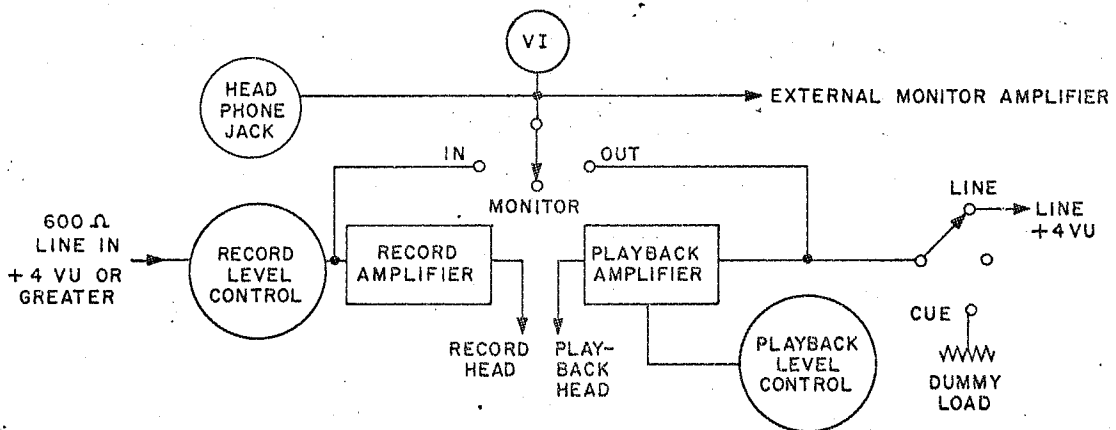
**PLAYBACK AMPLIFIER  
MODEL 300**  
AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

FIG. 8

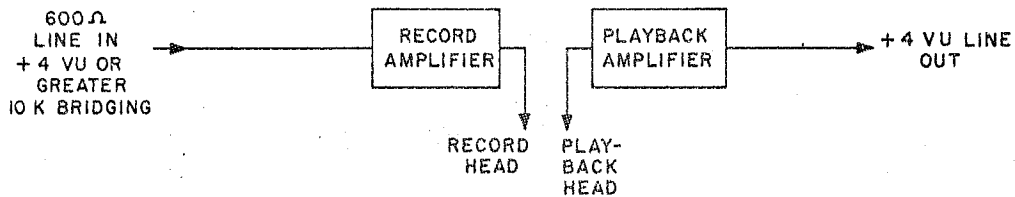




(A) LAYOUT FOR BRIDGING METER CONTROL PANEL



(B) LAYOUT FOR MATCHING METER CONTROL PANEL



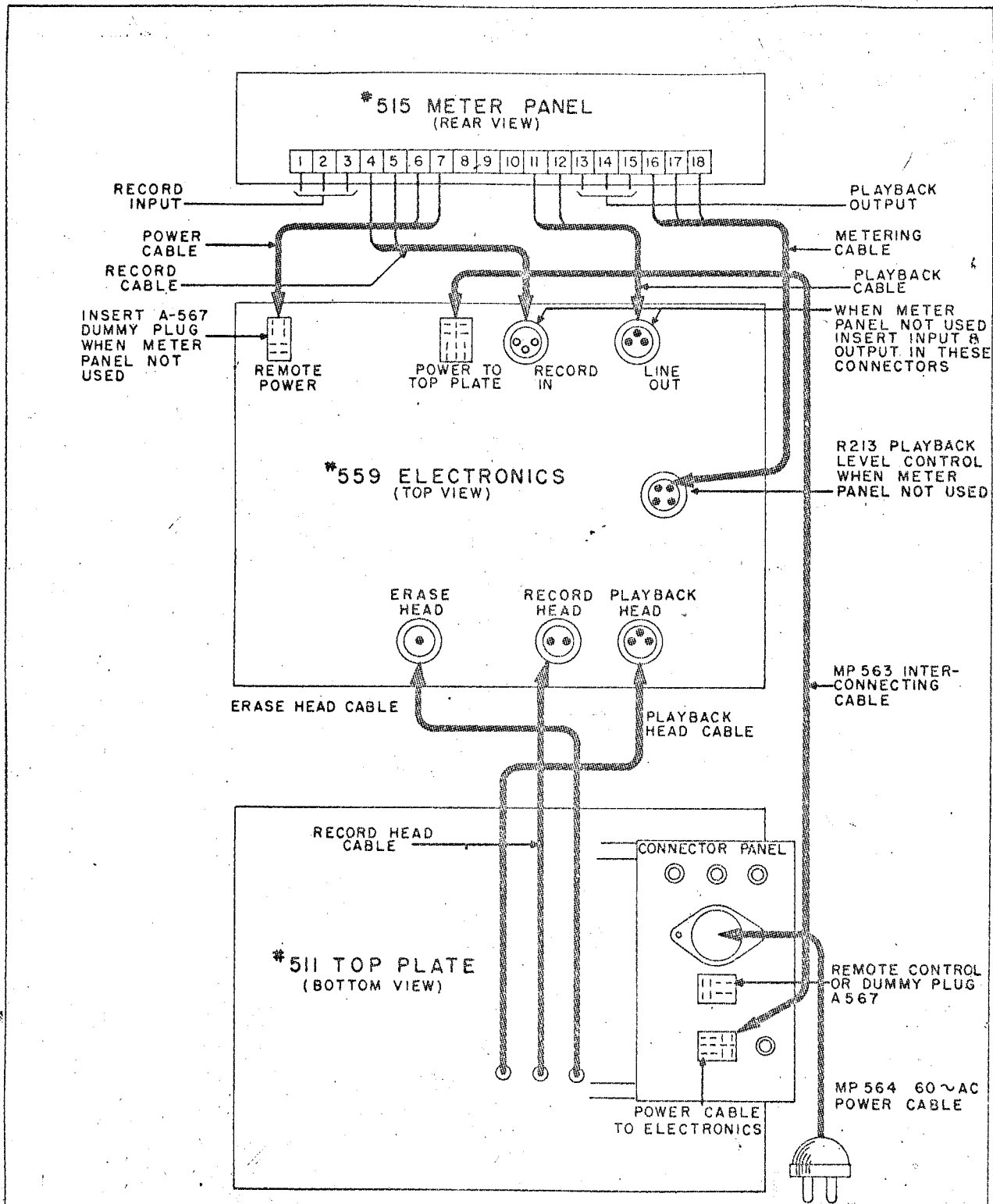
(C) LAYOUT OF ELECTRONICS WITHOUT METER CONTROL PANEL

NOTE: 1. SCREW DRIVER GAIN SETS ON RECORD & PLAYBACK AMPLIFIER CHASSIS WILL ADJUST FOR INPUT LEVELS OF -20 VU TO +8VU & OUTPUT LEVELS FROM 0 TO +8VU.  
 2. ALL ABOVE UNITS MOUNTED ON METER CONTROL PANEL ARE ENCLOSED IN CIRCLE.

RECOMMENDED LAYOUTS  
 MODEL 300

AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA





INTER UNIT CONNECTION DIAGRAM  
 MODEL 300  
 AMPEX ELECTRIC CORP.  
 REDWOOD CITY, CALIF.

FIG. II

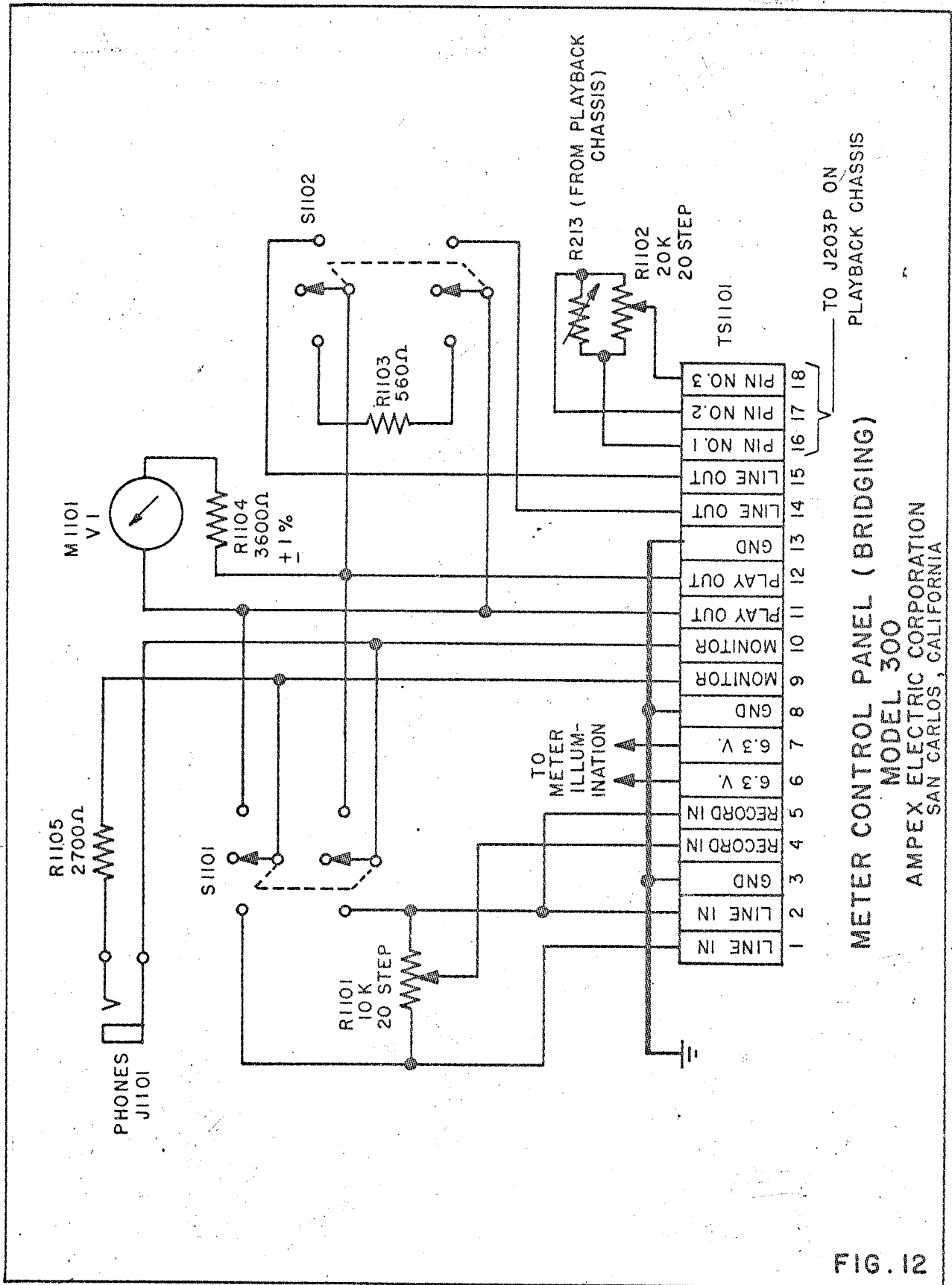


FIG. 12

METER CONTROL PANEL (BRIDGING)

MODEL 300

AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

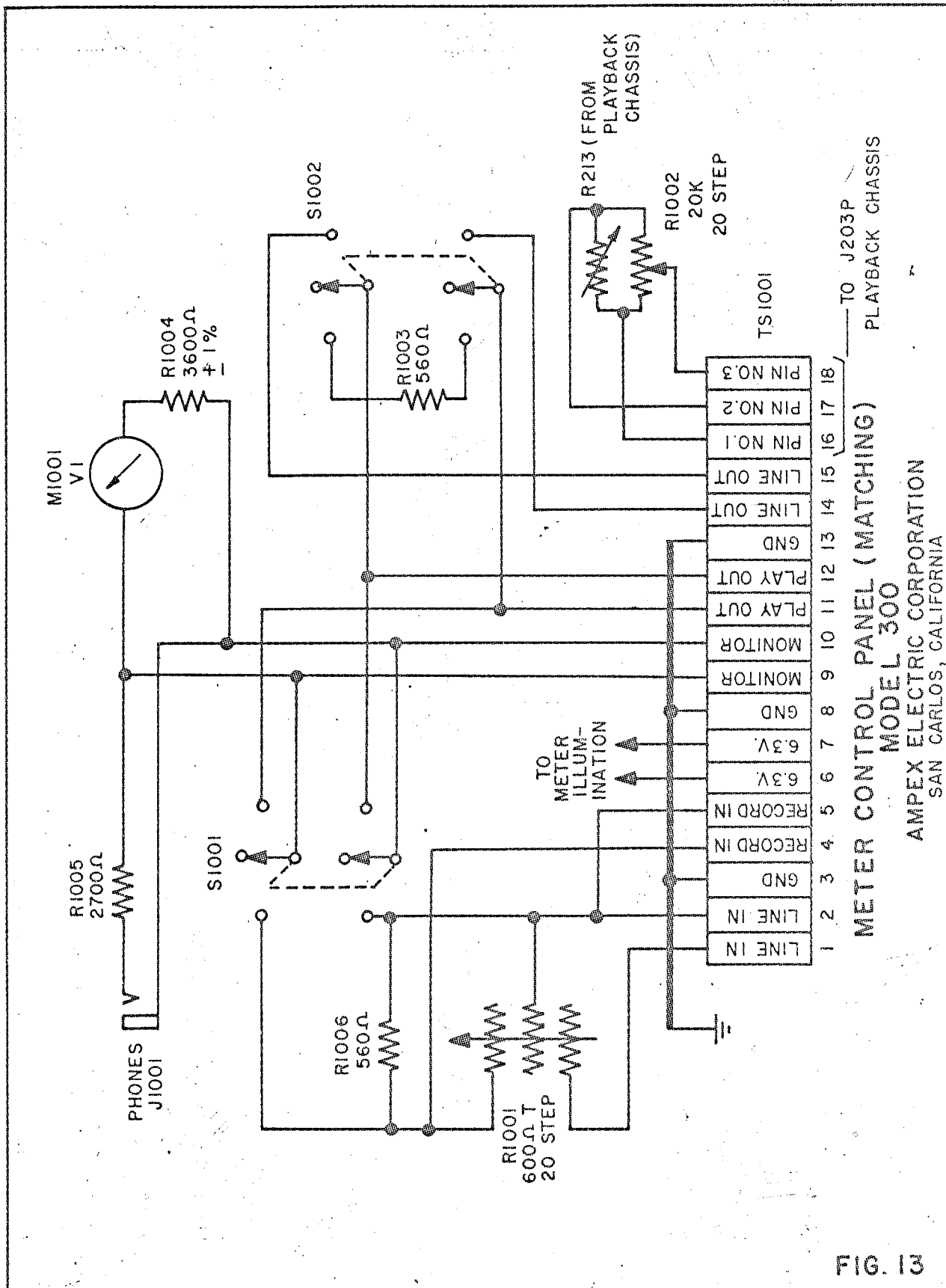
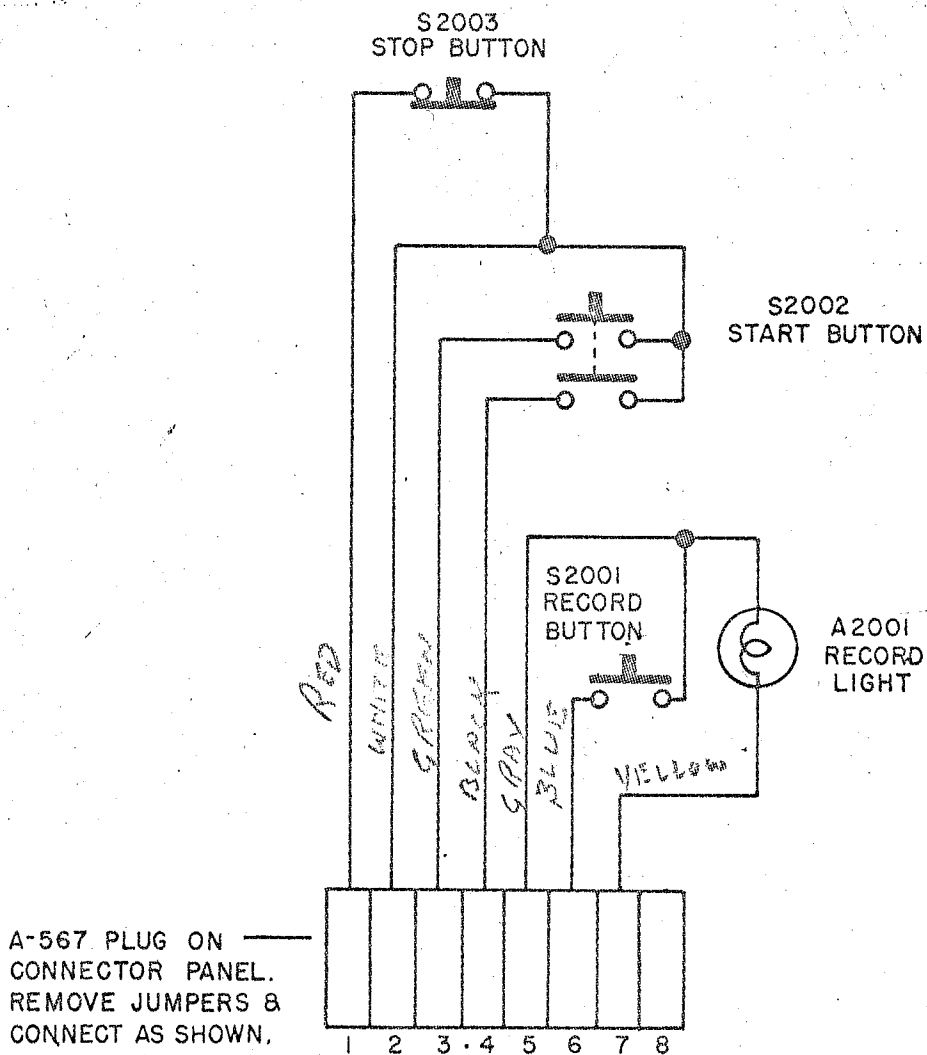


FIG. 13

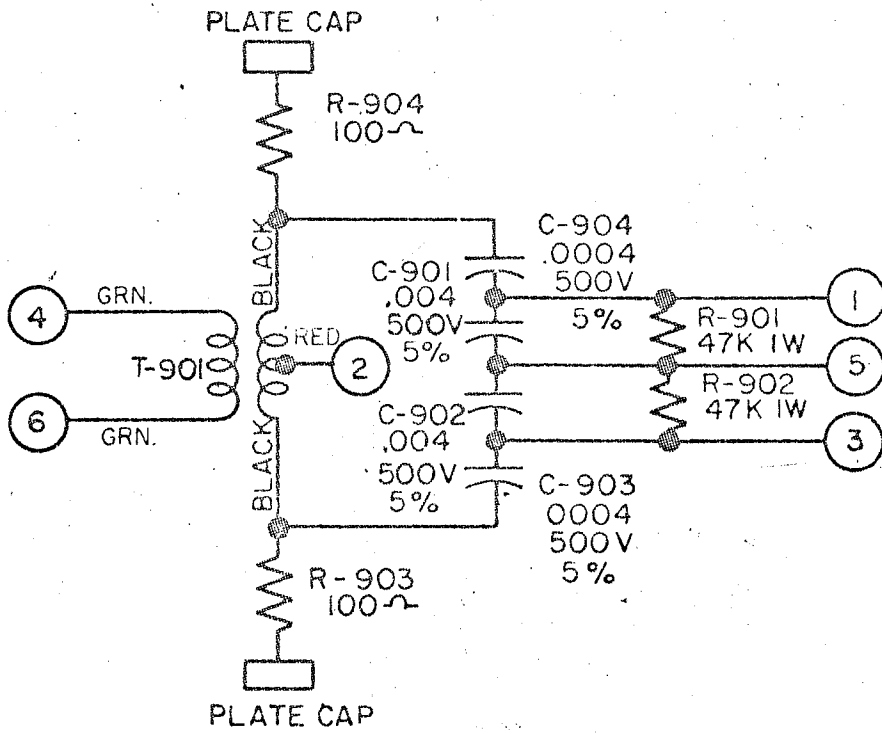
METER CONTROL PANEL (MATCHING)  
 MODEL 300  
 AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA



- A2001 120 VOLT, 6 WATT LAMP
- S2001 SNAP ACTION PUSH BUTTON SWITCH, NORMALLY OPEN. 1 AMP. 115 V.
- S2002 DOUBLE MAKE SNAP ACTION PUSH BUTTON SWITCH, NORMALLY OPEN. 1 AMP. 115 V.
- S2003 SNAP ACTION PUSH BUTTON SWITCH, NORMALLY CLOSED. 1 AMP. 115 V.

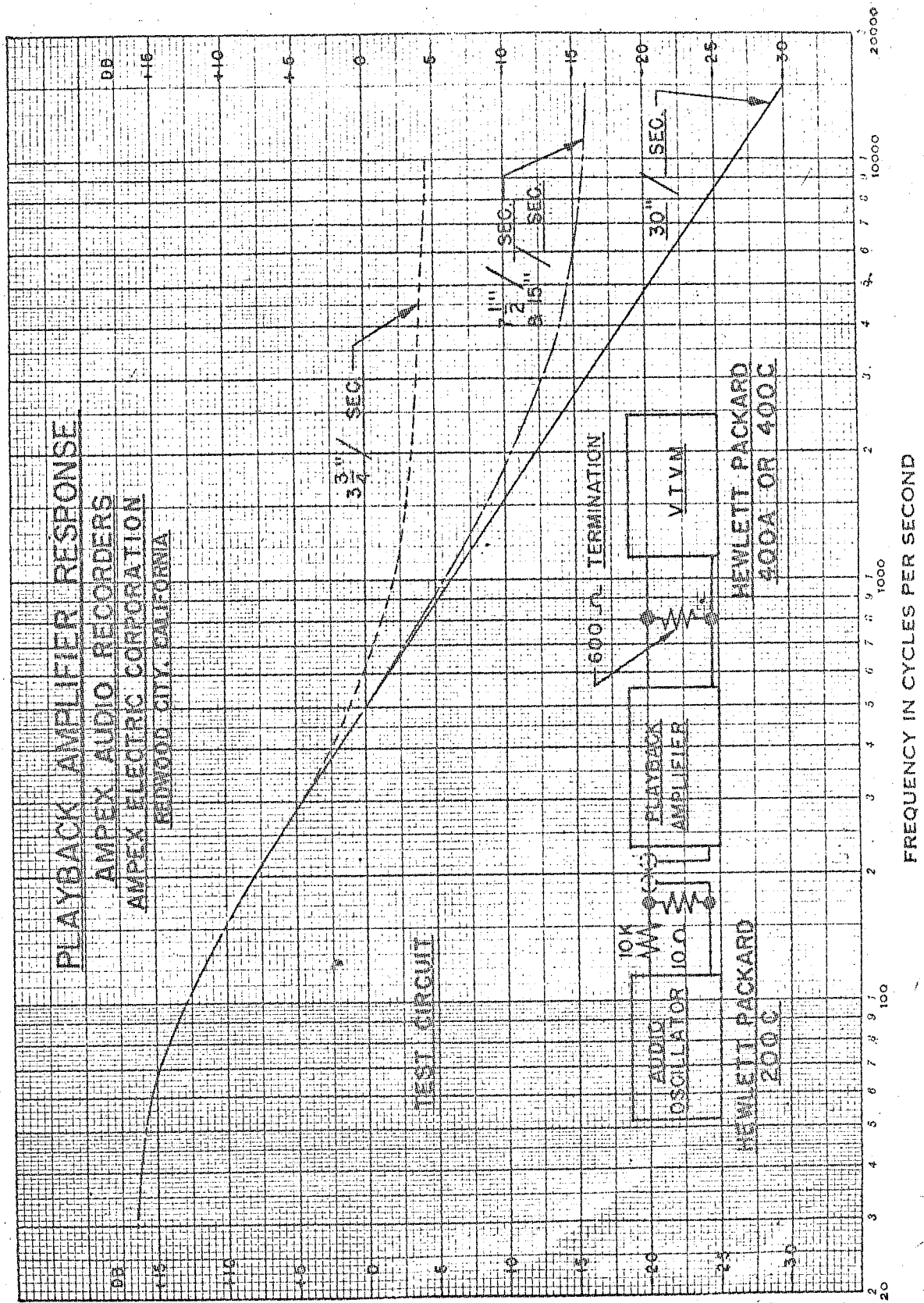
REMOTE CONTROL CIRCUIT  
 SERIES 300  
 AMPEX ELECTRIC CORPORATION  
 REDWOOD CITY, CALIF.

FIG. 14



OSCILLATOR COIL ASSEMBLY  
 MODEL 300  
 AMPEX ELECTRIC CORPORATION  
 REDWOOD CITY, CALIFORNIA

FIG. 15



9-5-52

FIG. 17

# MODEL 300

RECORDER-REPRODUCER

AMPEX

CORPORATION

AUDIO DIVISION

934 CHARTER STREET, REDWOOD CITY, CALIFORNIA

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# SECTION I

## SPECIFICATIONS

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  $\pm 2$  db 30 — 15,000 cycles.

At 7.5 inches  $\pm 2$  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  $\pm 3.6$  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 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  $\pm 4$  VU in balanced or unbalanced.

**PLAYBACK AMPLIFIER:** Adjusted for  $\pm 4$  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 $\frac{1}{2}$ " panel and Electronic unit on 12 $\frac{1}{4}$ " 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 $\frac{1}{4}$ " 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  $\pm 8$  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  $\pm 4$  VU output.

Output key (line or cue).

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

# SECTION II

## INSTALLATION

1. Open packing case carefully and save it. In the event of possible shipping damage, the case may be needed for return shipment.

2. Examine electronics chassis and see that any chassis that are shock mounted float freely on their rubber cushions.

3. If the equipment is to be rack mounted, install in the rack so that the head cables will reach the electronic unit without being extended in length. Do not lengthen the head cables for any reason whatsoever, because increased cable capacity will cause undesirable resonance with the heads.

4. Install all cables as shown in Fig. 1.

5. Unpack and install the 12SJ7 tube in its socket. *Warning! Be very careful with the 12SJ7 tube as it is hand selected for low noise and may be damaged by careless handling.* See Section IV Page 14 before turning on power.

6. Release capstan drive motor shipping lock. This is the spring catch which holds the motor away from the rubber-tired flywheel. The retaining ring should be broken off and the lock removed from the motor bracket. Do not make any adjustments on the drive system at this time. No adjustments need be made unless damage has occurred during shipping. NOTE: Whenever recorder is transported, be sure to lock motor, or capstan tire may be damaged beyond repair.

7. Connect input and output circuits to the machine. See ELEC-TRONIC OPERATION.

8. Connect power cord to 115v 60 cys ac only.

9. The capstan speed should be checked with the stick-on stroboscope provided. Before checking, let drive unit run for at least five minutes to warm up lubricant in the capstan assembly. If the lubricant is stiff, the additional drag will cause greater compression of the rubber tire and the capstan will therefore run slightly slow until warmed up. Place stroboscope on capstan shaft with the sticky side down and view rotating shaft under 60 cps light. If the speed is not correct the spokes will appear to rotate. Slight speed changes can be realized by change in capstan drive motor pressure. This adjustment is at spring D, Fig. 5, on the motor solenoid draw bar. If the adjustment is in the proper range, increasing pressure will slow the capstan, decreasing pressure will speed the capstan. Adjust for no rotation of the stroboscope spokes. (If drive motor pressure is too light, increasing pressure will speed the capstan. In this range the tire pressure is inadequate for stable operation, and the pressure should be increased until increase in pressure reduces capstan speed.)

10. Load the left hand reel holder with tape and thread as shown in Fig. 4. Be sure the tape used has the oxide-coated side toward the rear of the machine; i. e., toward the head faces. Be sure to remove any adhesive that may have been used to seal the end of the tape. If

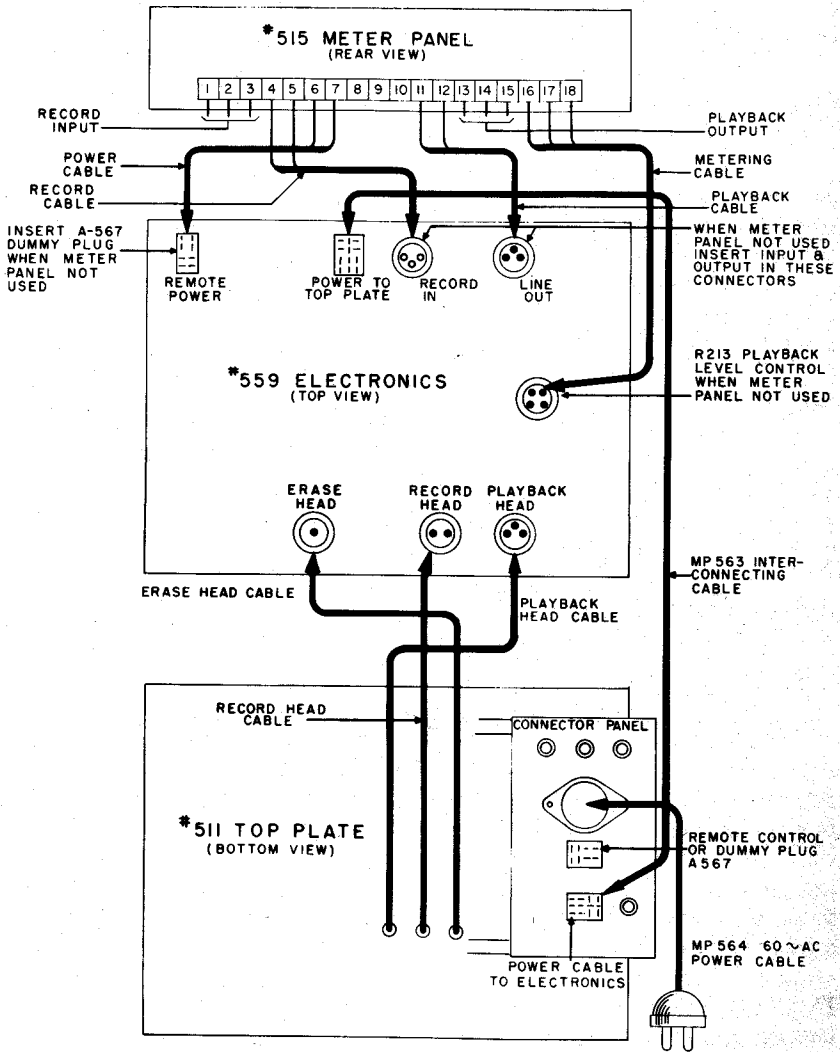
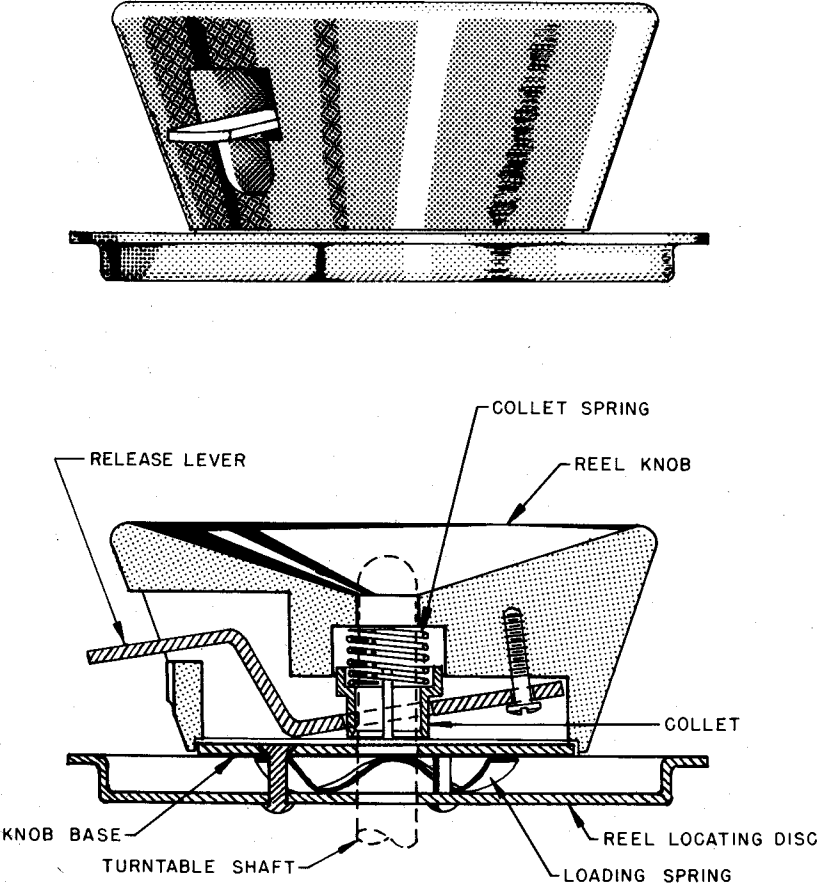


Fig. 1 Interunit Connection Diagram

this adhesive is not removed, the first layer may stick and cause a break in the tape.

11. A reel hold-down or editing knob should be placed on each reel spindle. Editing knobs, catalog No. 1917, are furnished with console and portable recorders, while hold-down knobs, catalog No. 9093, are furnished with rack models (See Fig. 2).

The Machine is now ready for operation. NO FURTHER ALIGNMENT SHOULD BE NECESSARY.



*Fig. 2 Reel Holddown Knob*

# SECTION III

## OPERATION

### A. *Electrical:*

With reference to Figs. 1 and 3, connect input and output circuits to machine. Turn on POWER Switch. Mechanical operation is explained below.

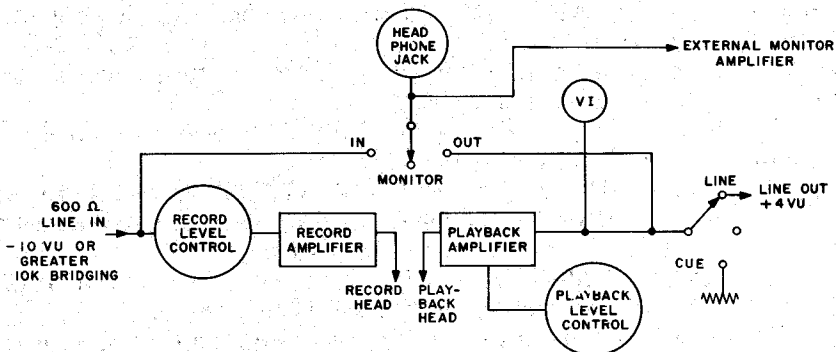
**MACHINE WITHOUT METER CONTROL PANEL.** Connect a +4 V.U. line (balanced or unbalanced) to the input receptacle J101S on the Electronic Chassis. The record level control R101 has been adjusted at the factory to give the recommended tape level with this input. It is possible to record at proper tape level with inputs of -30 V.U. to +10 V.U. by readjusting the record level control. The playback level control R213 has been adjusted at the factory to give an output of +4 V.U. into a 600 ohm load from tapes recorded at the recommended operating level.

**MACHINE WITH INPUT METER CONTROL PANEL.** See Figure 3. Connect an input signal (balanced or unbalanced) to terminals 1, 2 and 3 of the Meter Panel. For unbalanced operation terminal 2 should be the ground side of the line. The input signal must be greater than -10 V.U. Set the meter panel playback step control R1102 to 14. Record a signal and adjust the meter panel record step control R1101 so the V.U. meter reads "0". This indicates a +4 V.U. output signal into 600 ohms, since the meter is always connected across the Playback Output. The playback vernier control R213 has been set at the factory so that "0" meter reading indicates the recommended tape level with the meter panel playback step control set at 14. On playback, any tape recorded off level by a voltage ratio of 5 to 1 (14 db) may be reproduced at + V.U. by adjusting the meter panel playback level control.

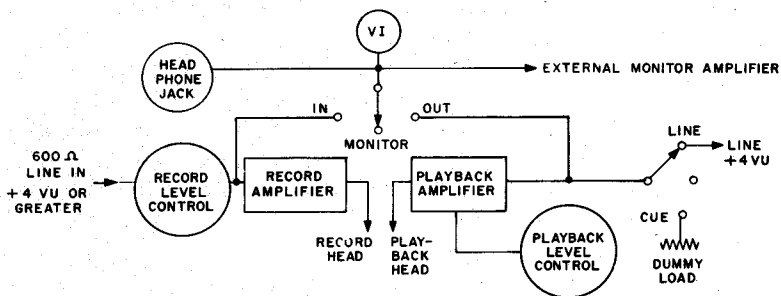
Figure 15 indicates the method for connecting the meter panel to achieve either bridging or matching condition.

### B. *Mechanical:*

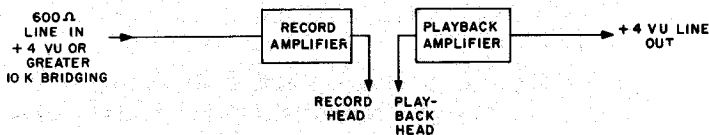
When the machine is ready to operate, turn on the power switch, see Fig. 4. This turns on the amplifiers and control circuits. The capstan drive will also start if the tape has been threaded, as the takeup tension arm operates a switch which shuts the motors off when the tape runs out. Pushing the Start button will now start the tape moving according to the mode selected on the Play, Rewind, Fast Forward control. In the Play position the tape will be reproduced at the output terminals. Pushing the Record button will permit an input to the machine to be recorded on the tape with almost simultaneous playback of the new program. A 1/2 second time interval should be observed between pressing the Start button and pressing the RECORD button to avoid switching transients magnetizing the record head. Pushing the STOP button will stop the machine and turn off the recording amplifier; therefore, one must always push the START and



(A) LAYOUT FOR BRIDGING METER CONTROL PANEL



(B) LAYOUT FOR MATCHING METER CONTROL PANEL



(C) LAYOUT OF ELECTRONICS WITHOUT METER CONTROL PANEL

- NOTE: 1. SCREW DRIVER GAIN SETS ON RECORD & PLAYBACK AMPLIFIER CHASSIS WILL ADJUST FOR INPUT LEVELS OF -20 VU TO +8VU & OUTPUT LEVELS FROM 0 TO +8VU.  
 2. ALL ABOVE UNITS MOUNTED ON METER CONTROL PANEL ARE ENCLOSED IN CIRCLE.

RECOMMENDED LAYOUTS  
 MODEL 300  
 AMPEX ELECTRIC CORPORATION

Fig. 3 Recommended Layouts

RECORD buttons, in that order, to record. The mode selector switch allows transfer from PLAY to REWIND or FAST FORWARD without pushing the START button when switching. This helps greatly in editing and segueing. However, when going from REWIND to PLAY, the machine shuts off and the START button must be used to restart the tape motion.

If, when the tape is running in PLAY, it is desired to accelerate or slow the tape, it may be done as follows:

**TO SLOW THE TAPE:** Hold the START button down and push the STOP button for the length of time desired. Upon releasing the STOP button the tape is again up to speed.

**TO ACCELERATE THE TAPE:** Move the selector to the FAST FORWARD position. Return to PLAY when desired.

These two motions are useful when cueing, editing or synchronizing programs. This can only be accomplished by reason of the rapid start feature incorporated in this machine.



# SECTION IV

## OPERATING PRECAUTIONS AND MAINTENANCE

### A. *Mechanical Assemblies:*

The drive system employs three motors. Two induction motors with solenoid operated brakes are used for takeup and rewind. These motors are shown in Fig. 5 and require no service attention! The torque of these two motors is adjusted at the factory by means of resistors R801, R802 and R 803, and should be left alone unless shipping damage to the resistors has occurred. Both motors are adjusted for a tension of 5 to 6 ounces pull on the reel hub in Play. On top plates for ½ inch or 1 inch wide tape these tensions are increased to 10 to 16 ounces. R802 is adjusted for the maximum hold-back tension during Fast Forward and Rewind which will still allow the tape to accelerate when starting with a full reel.

The third motor is the synchronous motor used for capstan drive. This motor is mounted on a hinge which is moved by a solenoid to engage the motor and the capstan flywheel. The hinge is positioned by the Drive Motor Return Spring "B" when the solenoid is deenergized. A stronger return spring is required for rack mounted machines than for console or portable units.

When the machine is turned on and the tape threaded into position, the solenoid "C" pulls the motor into engagement with the capstan flywheel tire and drives it. The pressure between the motor and flywheel is adjustable at spring "D" and is adjusted to give synchronous speed as described in INSTALLATION.

The capstan shaft has a permanently lubricated ball bearing at the bottom end to take the flywheel load and to maintain a minimum of friction. The upper bearing on the shaft is a precision bronze sleeve bearing which permits absolutely true running of the capstan.

The mechanism of the capstan idler is operated by solenoid "E" in Fig. 5 and is returned by Spring "A." Capstan idler pressure is set so that it will deform or break the tape if the tape is stopped with the hand while the machine is running. This pressure is adjusted at point "F" in Fig. 5.

The reel idler is shown in Fig. 5 at "G." This shaft has two single shielded ball bearings. Factory lubrication is for the life of the bearings. Should these bearings require servicing or replacement the complete reel idler assembly should be exchanged for a factory reconditioned unit. The extremely low pulley run-out of this assembly is achieved by a final finish cut being taken while running on its own bearings after final assembly. Under no circumstances should the shaft be removed from the assembly, since in all probability the relationship of parts will be lost. This may result in the introduction of

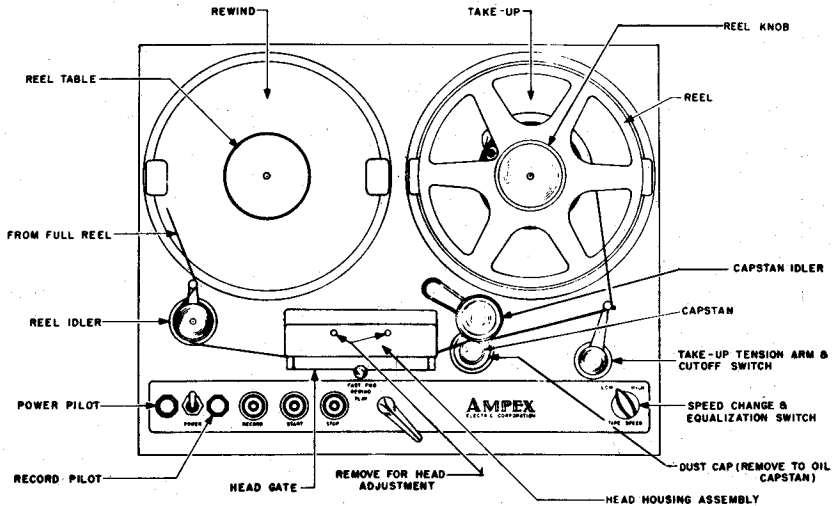


Fig. 4 Top View, Tape Transport

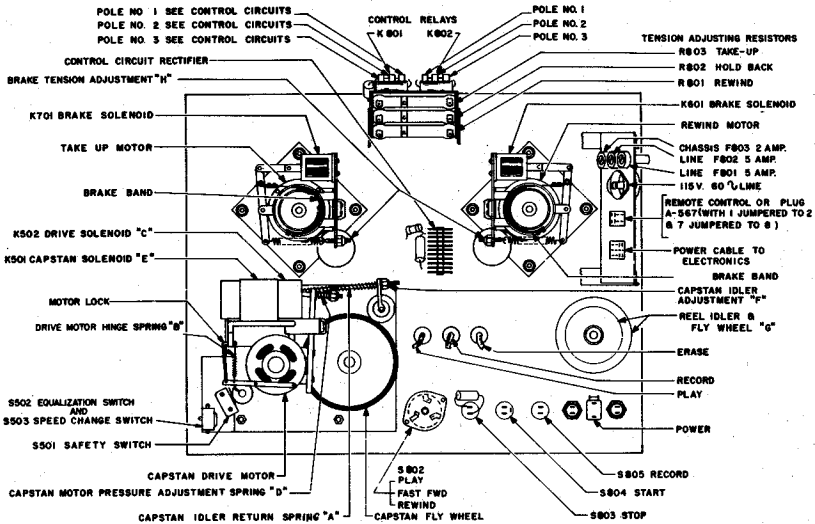


Fig. 5 Bottom View, Tape Transport

the reel idler period into the measurable flutter and wow components of the machine.

The mechanical brakes on the rewind and takeup motors ordinarily require no adjustments. Should trouble occur which appears to be due to faulty braking, the tensions may be adjusted. The only adjustment on the brakes is performed by adjusting tension at "H" in Fig. 5. If machine throws a loop of tape on stopping, the trailing reel brake tension is too low, or if it breaks the tape the tension is too high. However, unless tampered with, the adjustment should be permanent until such time as the brake bands wear out.

**CLEANING:** Daily attention should be given to the cleaning of the following:

- (1) Capstan Shaft
- (2) Head Faces
- (3) Tape Guides

Clean all surfaces of the above with alcohol applied with a soft cloth.

Weekly attention should be given to the cleaning of the capstan idler wheel. It should be cleaned with alcohol. Great care must be taken to see that oil does not reach the capstan idler tire. Oil will not only contribute to tape slippage but will also ruin the tire.

**LUBRICATION:** Every 3 months or 1000 hours.

1. Drive Motor: The drive motor uses a sleeve bearing and should be lubricated every three months or 1000 hours, whichever occurs first, with one of the following oils:

Gulf Oil & Refining Company.....	Gulcrest "A"
Standard Oil Co. of Indiana.....	Stanoil No. 18 or No. 25
Sacony Vacuum Oil Co.....	Gargoyle D.T.E. Light

The motor should be lubricated with a pump-type oil can. To reach the upper bearing in the console model, use a flexible spout or else attach a piece of spaghetti to the end of the spout. In the portable model, the upper bearing is most conveniently reached by unbolting and lifting the top plate. The top plate should be tipped up by raising the righthand end, as viewed when facing the front of the machine. The plate need only be lifted a few inches to expose the bearing to be lubricated. **CAUTION — DO NOT OVER-LUBRICATE SUCH THAT OIL MAY GET ON EXPOSED RUBBER SURFACES.**

2. Capstan Idler: The capstan idler should be lubricated with a drop of S.A.E. 30 oil on all bearing surfaces. **WARNING —** under no condition should oil be allowed to come in contact with the rubber surfaces of the capstan idler or the capstan flywheel.

3. Capstan: The upper bearing of the capstan should be lubricated with S.A.E. 30 motor oil every 3 months. To oil: Loosen set screw in dust cap surrounding the capstan shaft just below the tape contact point. Push the rubber idler wheel away from the shaft just enough to allow the cap to be removed. This exposes a felt washer which covers the oil hole. Remove this washer and oil through the larger of the two holes exposed. Fill until no more oil will enter! Replace as disassembled.

## PRECAUTIONS

**REELS.** In order for the brakes to work properly, the same size reel must always be placed on both turntables. In using the small RMA 5- or 7-inch reels, abnormal hold-back tensions will occur at the end of the reel due to the small hub diameter. This may cause trouble due to slippage at the capstan idler. If the small type reels are to be used exclusively, an additional 150 ohm, 50 watt resistor should be inserted in series with each of the resistors (R801 and R803), which are in series with the Rewind and Tapeup motors respectively. The machine will not meet specifications for flutter and wow when using the 5- or 7-inch RMA reels because of the discontinuity of the hubs on these reels.

**BRAKES.** In order to avoid the tightening action which occurs when brake bands become glazed, the brake bands have been treated with graphite. With the graphited brake bands, the proper tension as measured on the NAB reel hub in the unwinding or energizing direction is 14 oz. Should the brakes exhibit a tendency to tighten up or grab, they should be retreated with graphite. A mixture in the proportions of one level tablespoon of graphite to one 8 oz. cup of alcohol can be applied to the felt of the brakebands with an oil can. After graphiting, the motors should be run 10 minutes with the brakes on to wear in the graphite. This may be accomplished by disconnecting the brake solenoids temporarily. On top plates for  $\frac{1}{2}$  inch and 1 inch wide tape, asbestos brake linings are used to increase the braking tensions. Graphite should not be used on these linings.

**TAPE SLIPPAGE.** The tape will slow down near the end of the program if the capstan idler pressure is not great enough. This, of course, will become worse at the end of the reel where the hold-back tension is highest. The condition is further exaggerated if a small RMA type reel is used, in which case the hold-back tension is even higher.

Effective capstan idler driving force is reduced as the capstan idler gradually picks up the lubrication with which recording tape is treated. This lubrication is quite important, as it reduces flutter and head wear, permits more uniform head contact and therefore less high frequency amplitude variation, and any tendency for the tape to "squeak". This "squeaking" sometimes occurs at the slow speed when using the small reels and is very objectionable. For this reason, the capstan idler should be cleaned with ethyl alcohol at least once each week.

To test for proper capstan idler pressure, hold the tape while the machine is running in the Play position. The idler pressure should be sufficient to deform or break the tape. The pressure can be increased by the adjustment at Point "F" in Fig. 5.

**SPEED.** If the machine has been subjected to severe cold the drive should be allowed to warm up for 5 minutes to reach stability. This is especially true at the high tape speed.

**CAPSTAN MAGNETIZATION.** The capstan may become magnetized by contact with a magnetized tool. Should this occur it may be demagnetized with an A.C. solenoid placed over the shaft and slowly pulled away.

**DUMMY PLUGS.** Two dummy plugs must be inserted into the appropriate sockets in the top plate for correct operation of the recorder. These plugs are catalog No. 567, 8 pin Jones plugs, with pins 1 and 2 jumpered and pins 7 and 8 jumpered.

1. One No. 567 must be plugged into receptacle J804S, labeled "Remote Control", located on the connector panel underneath the top plate. It is removed only when remote control is desired and the remote control cable must be plugged into the receptacle.
2. The other No. 567 must be plugged into receptacle J805S, labeled "Cable to Model 375 60 Cycle Amplifier", located on the connector panel underneath the top plate. When the Model 375 is used with the recorder, the input-output cable from the 375 is plugged into this receptacle. NOTE: The Model 300 and 301 do not incorporate the 60 cycle amplifier connector; therefore, the second dummy plug is not required. If the Model 375 is to be used with these models, it should be wired to the capstan motor terminal strip as explained in the Model 375 Instruction Book.

*B. Head Assembly:*

The head housing, see Fig. 4, is a die cast assembly which contains the three heads used in the recording process. The heads are respectively erase, record, and playback as viewed from left to right when facing the machine. The gate on the housing holds the playback and record shield covers and the tape-lifting fingers. The function of the tape-lifting fingers is to remove the tape from the heads when the gate is open during REWIND or FAST FORWARD operation. This reduces head wear considerably. The tape may leave a deposit on the heads if allowed to contact them at high speeds. Such a deposit will seriously impair the performance of the machine and should be guarded against by always opening the gate on FAST FORWARD and REWIND. If a deposit is left, it may be easily removed with alcohol on a soft rag. Never use metal of any kind to touch the head surfaces. The gates should never be allowed to spring shut, but should be closed gently.

**HEAD MAGNETIZATION.**

Occasionally the heads may become magnetized through an electrical fault in the amplifiers, improper use of the machine, or by the heads coming in contact with a magnetized object. This will result in an increase of noise level from 5 to 10 db. It is especially important that the heads be free of magnetization if you are to realize the dynamic range of type 111 tape. It should be remembered that any phenomena that tends to put an unbalanced pulse through the record head will magnetize it. Such pulses can appear in the form of signals or power line pulses. If the following precautions are observed, no difficulty should be experienced:

1. Do not remove any tube from the record amplifier while the machine is recording.
2. Do not connect or disconnect input leads or head leads while recording.

3. Do not depress the Record button until after depressing the Start button. In other words, allow the transient caused by switching the motors and solenoids to die out before the record head is connected. A one-half second pause is sufficient.
4. Do not saturate the record amplifier with an abnormally high input signal. Such a signal would be 10 db. greater than tape saturation and 30 db. greater than normal operating level.
5. Do not test continuity in the heads with an ohm meter.

#### HEAD DEMAGNETIZATION.

Should the heads become magnetized, they can be demagnetized with an AMPEX head demagnetizer (stock number B-704). In the event that time does not permit the owner of the machine to wait for delivery of a demagnetizer, he may make one as follows: Cut a piece of transformer lamination to a  $\frac{1}{4}$ "x2" size. Wrap the strip of metal with suitable insulating material and wind approximately 400 turns of No. 36 wire and attach a 4' length of 2 connector cord. Bend the iron strip into a "U" shape and bring the ends of the "U" to a spacing of  $\frac{1}{4}$ ". Connect to a 6 volt source of A.C., open the gate on the head housing and bring the ends of the "U" in contact with the 2 poles on the magnetized head. Remove the demagnetizer very slowly, allowing the A.C. field to die off gradually. Repeat this operation on record and playback heads only, as the erase head will demagnetize itself. In the event demagnetization is not effected, repeat the process several times.

#### C. *Electronic Assemblies.*

##### WARNING

The input tube in the playback amplifier is D.C. heated by returning the B+ supply through its heater. Fuse F101 protects the input tube against abnormal heater surges. The Neon indicator A101 will light in the event of failure of the playback input tube heater or the  $\frac{1}{4}$  ampere protective fuse F101. SHOULD THIS HAPPEN, THE CAN OF THE FILTER CONDENSER (C113) WILL BE AT A HIGH POTENTIAL WITH RESPECT TO GROUND AND FOR THIS REASON IS PAPER COVERED. C113 SHOULD THEREFORE BE REPLACED ONLY WITH CONDENSERS HAVING AN INSULATED COVER. F101 and A101 are located on top of the electronics chassis. DO NOT REMOVE INPUT TUBE WITH POWER ON, as damage to C114 may result. DO NOT REPLACE F101 WHILE NEON BULB IS LIGHTED, or the new fuse will blow. Therefore, to replace the input tube or the fuse, always turn power off and wait for neon to stop glowing.

##### DUMMY PLUG.

A Connector J105S, labeled "Remote Power" is incorporated in the Electronic Assembly to feed filament and B+ supply current to auxiliary equipment. A No. 567 Dummy Plug (a Jones plug with pins 1 and 2 jumpered and pins 7 and 8 jumpered) must be inserted in this connector for the proper operation of the machine. It is removed only when it is desired to feed power to a Meter Control Panel or a Mixer-Preamplifier.

## METER CONTROL PANEL.

The Meter Control Panel is designed for balanced input and output. If it is desired to operate unbalanced, the following terminals on the Meter Panel should be used as the ground side of the line.

Terminal 2 on the Line In connections.

Terminal 10 on the Monitor connections.

Terminal 15 on the Line Out connections.

# SECTION V

## ELECTRONIC ALIGNMENT

Alignment is the necessary adjustments required to have the Electronic Assembly of the tape recorder perform properly. A machine "out of alignment" may be characterized by poor frequency response, high noise, low output, or high distortion. It should not be necessary to align the recorder when it comes to you from the factory. The procedures described on the following pages have been performed at the factory prior to shipment. Further adjustments are not required except as found necessary in routine maintenance.

Alignment consists of the following steps:

- I Overall Performance Check
  - 1. Frequency Response
  - 2. Noise Measurement
  - 3. Distortion
  - 4. Flutter and Wow
- II Head Alignment
- III Playback Alignment
- IV Record Alignment
  - 1. Record Bias and Level Adjustment
  - 2. Record Equalization
  - 3. Record Noise Balance
- V Erase Adjustment

Standard alignment tape No. 4494 is available for alignment purposes. It contains a 15 Kc. tone for head azimuth check, a reference tone for level adjustment and a series of tones for a playback response check. It is recorded at 15 inch tape speed, 10 db below recommended operating level. **IMPORTANT!** Before playing the standard tape, demagnetize the heads with the Ampex Head Demagnetizer No. 704. Magnetized heads will cause a partial erasure of the high frequencies on the standard tape.

### 1. OVERALL PERFORMANCE CHECK

The following procedure is recommended for checking the performance of this recorder at the time of installation and as necessary thereafter.

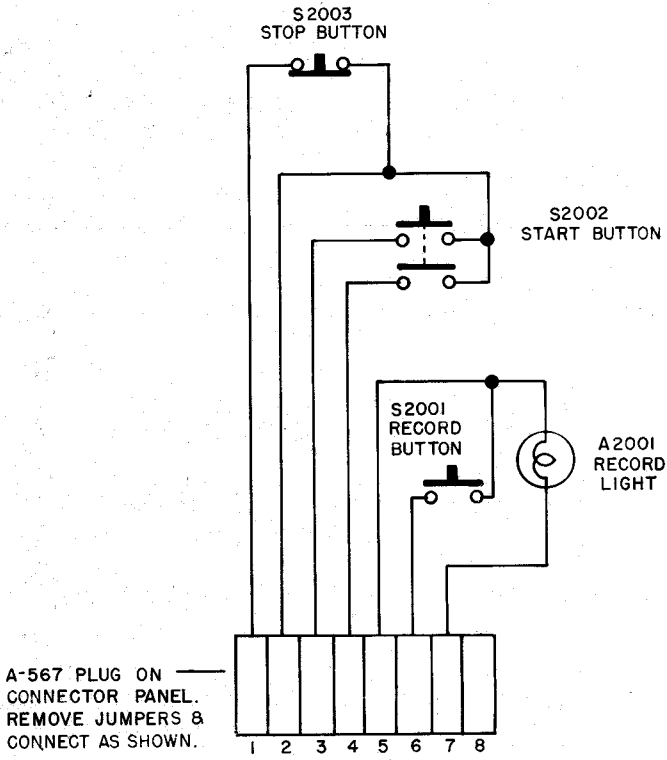
#### 1. Overall Frequency Response:

Thread a new reel of tape on the machine. The equalization curves for this machine have been established by use of high quality professional recording tape.

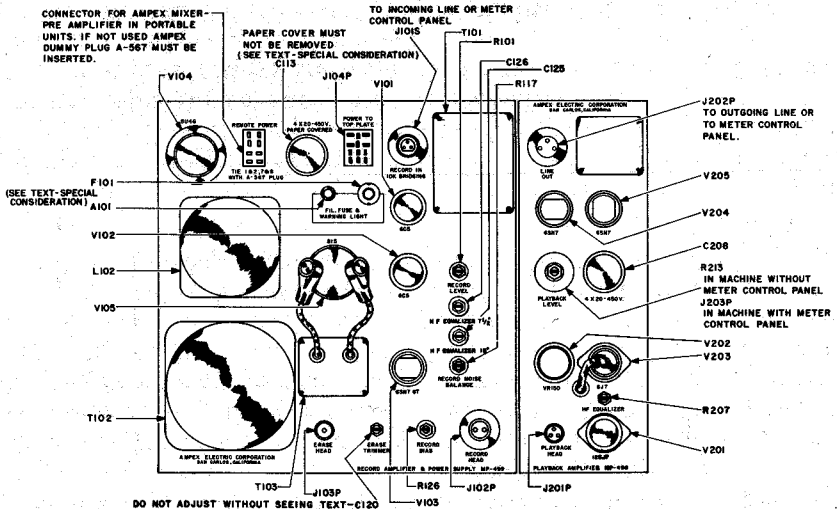
##### a. 7½ Inch Response:

**DUE TO THE NATURE OF THE PRE-EMPHASIS IN THE RECORD CIRCUIT, TAPE SATURATION WILL OCCUR AT THE HIGH FREQUENCIES UNLESS THE RESPONSE CHECK IS MADE AT LEAST 20 DB BELOW NORMAL OPERATING LEVEL.**





**Fig. 6 Remote Control Circuit**



**Fig. 7 Electronics Chassis**

Therefore, check the response with a sensitive meter such as a Hewlett-Packard 400C connected to the output. In absence of a sensitive meter, a standard V.U. Meter, preceded by a flat amplifier with at least 20 db gain can be used. Response will be within the limits indicated in Section I Specifications.

b. 15 Inch Response (30 Inch Response Model 301 only)

Make the response check approximately 10 db below operating level to avoid saturation effects. The response will fall within the limits indicated in Section I Specifications.

2. *Overall Noise Measurement:*

Overall wide band noise should be measured with a vacuum tube volt-meter such as Hewlett-Packard 400C while playing back a tape that has been previously erased on the machine. First erase a tape with the input to the record amplifier shorted. Rewind and play this tape back. This will prevent the inaudible bias frequency leakage from entering into the noise measurement, thus producing a false reading. The wide band noise should be below the figures listed in Section I Specifications.

3. *Distortion:*

Overall distortion may be measured by connecting any standard distortion measurement apparatus across the output. The readings from a wave analyzer or selective frequency distortion meter will be more accurate at lower distortion levels. Distortion readings are somewhat dependent on tape. Readings of 1% are normal at operating levels while reading of 3% are normal at 6 db above operating level.

4. *Flutter and Wow:*

Flutter or wow is the change of speed over a short time interval in a periodic manner. It can be measured by means of a standard flutter bridge such as A.K. Tatum (Beverly Hills, California) Model 2-A Flutter Meter. Variations in amplitude as indicated on level measurements do not constitute flutter and are entirely due to tape coating variations. Readings will be well under the figures indicated in Section I, Specifications.

## II. HEAD ALIGNMENT:

The high frequency response of the recorder depends on the correct head alignment. If tapes are to be interchangeable from one machine to another the heads of all machines must have the same azimuth setting. This is accomplished by using a Standard Tape (Catalog No. 4494) for aligning the heads of all machines. Head alignment is independent of tape speed, however, it is recommended that the heads be aligned at 15 inches per second since the standard tape is recorded at this speed.

Remove the top cover from the Head Housing by removing the two screws from the top and pulling cover gently back and up. Looking at the Head Housing from the front the three heads, from left to right are: Erase, Record and Playback.

The azimuth angle of the erase head is not adjustable. The Record and Playback Heads should be aligned only after reading and fully understanding the procedure under PLAYBACK AND RECORD CIRCUIT ALIGNMENT. The actual physical alignment of the Record and Playback Heads consists of placing a  $\frac{1}{4}$  inch spintite socket wrench on the left hand elastic stop nut in each head and adjusting back and forth until the proper azimuth angle is arrived at. First adjust the Playback Head azimuth by playing the standard tape at 15 inches per second and adjusting the stop nut for the maximum output of the 15 kc tone (first tone that appears on the standard tape). The Record Head azimuth is then aligned with the Playback Head by recording a 15,000 cycle signal from an audio oscillator on a blank tape and adjusting the record stop nut for maximum playback output.

### III. ALIGNMENT OF PLAYBACK CIRCUITS:

1. Thread an audio standard tape on the machine. Terminate the output with a 600 ohm external termination or set the Line Out Switch on the Meter Panel to the "cue" position. Connect an external V.U. Meter across the output or set the Monitor Switch on the Meter Panel to the "Out" position. Connect an amplifier and loudspeaker or a pair of headphones to the output of the machine or to the phone jack on the Meter Panel so the voice announcements on the standard tape can be heard.

2. Set the machine into the Play mode of operation at the 15 inch per second tape speed. If the machine is equipped with a Meter Panel, set the Meter Panel Playback Step Control on 4.

3. The first tone on the tape should be used to adjust the playback head azimuth as described under Head Alignment.

4. The second tone on the standard tape is used to adjust the playback level.

#### *Without Meter Panel.*

Adjust the Playback Level Control on the Electronic Assembly R213 so the output is -6 dbm (.388 volts RMS) since standard tape level is 10 db lower than operative level.

#### *With Meter Panel.*

With the Meter Panel Playback Control set at 4, adjust the vernier control on the Meter Panel (R213) so the Meter reads "0" ( $\pm 4$  dbm output). Reposition the Meter Panel Playback Control to 14, since the standard tape level is 10 db below operating level.

5. *Playback Equalization:* The Playback Amplifier is factory equalized by means of the High Frequency Playback Equalizer (R207), in accordance with the standard voltage curve shown in Fig. 8. The recommended method for adjusting the Playback Amplifier response is to connect an audio oscillator and vacuum tube voltmeter to the Playback Amplifier as shown in Fig. 8. Adjust the Playback Equalizer (R207) to give the frequency response of the standard 50 microsecond curve. Deviation from this curve is not recommended. Check the playback level setting with a standard tape if any change

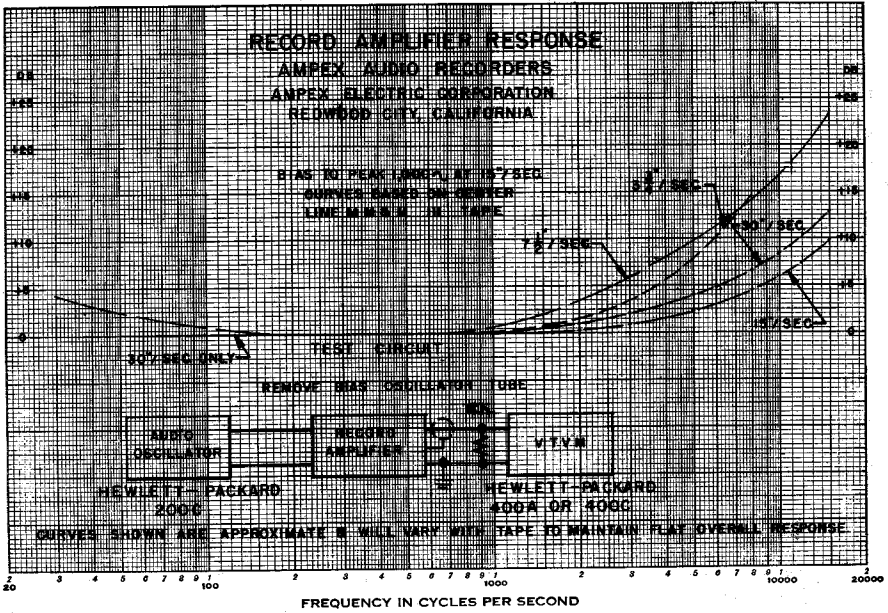


Fig. 8 Record Amplifier Response

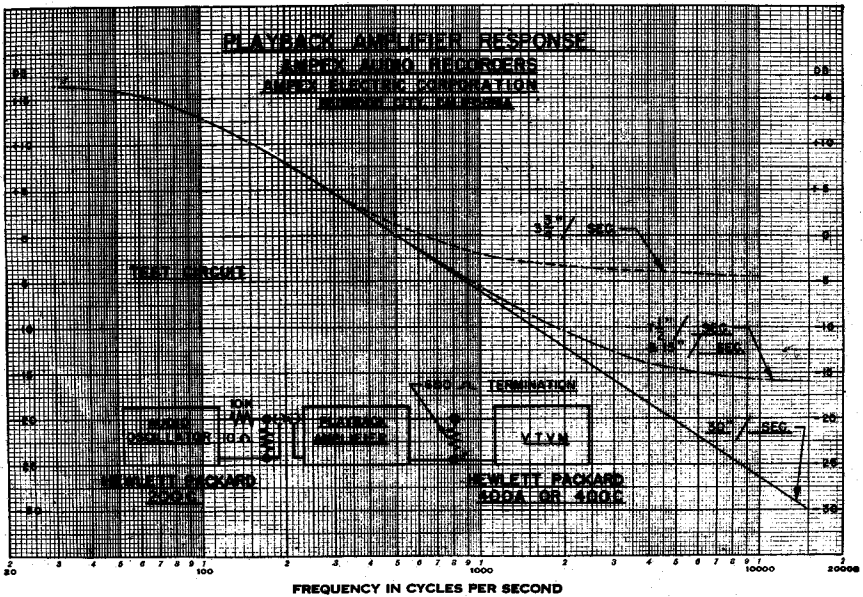


Fig. 9 Playback Amplifier Response

is made in the Equalizer. NOTE: Fixed Equalization is employed for the 30 inch tape speed on the Model 301.

The above will properly align the playback circuit for operation at both speeds. The 15 inch standard tape will play back within  $\pm 2$  db to 15,000 cycles when the Playback Amplifier is adjusted to the standard curve. Failure for the standard tape to play back within these tolerances after the Playback Amplifier has been aligned indicates one of the following:

- a. Trouble in the Head Assembly, such as worn heads.
- b. A faulty Standard Tape which has been partially erased at the high frequencies by passing over magnetized heads, etc.

An overall frequency response check will isolate the trouble. Good overall response indicates a faulty Standard Tape. Poor overall response indicates one of the following:

- a. Faulty Heads.
- b. Tape deficiency.
- c. Record or Playback Amplifier improperly equalized.
- d. Incorrect bias.

Alignment of the Record circuits as described in the next subsection will further aid in isolating trouble.

#### IV. ALIGNMENT OF RECORD CIRCUITS:

Record alignment should be attempted only after the playback has been properly aligned. Perform the following operations in the sequence indicated:

##### 1. *Record Bias and Level Adjustment*

The record bias current is factory adjusted for optimum overall response and low frequency distortion. However, the optimum value of bias current will vary with different types of tape. The record equalization characteristics on this equipment have been determined for peak bias at 1000 cycles at 15 inch per second tape speed. Peak bias means that the bias current is adjusted so that the 1000 cycle signal is recorded at its maximum level. Adjust the bias in the following manner:

- a. Thread a blank tape on the machine. Terminate the playback output with a 600 ohm termination or set the Line Out Switch on the Meter Panel to the "cue" position. Connect an external V.U. Meter across the output or set the Monitor Switch on the Meter Panel to the "Out" position.
- b. Connect an audio oscillator to the input of the Record Amplifier or to the Meter Panel if the machine is so equipped. Set the oscillator at  $\pm 4$  dbm (1.23 volts RMS) 1000 cycles.
- c. On machines with a Bridging Meter Panel, set the Meter Panel Record Step Control to 14. On machines with a Matching Meter Panel, set the Record Level Control to "0". The Playback Step Control on either style of Meter Panel should be set at 14.

- d. Start the tape in the Record mode of operation at 15 inch per second tape speed. Make a preliminary record level set by adjusting the Record Control in the Electronic Chassis (R101) so the playback Output is approximately  $\pm 4$  dbm. (1.23 volts RMS).
- e. Adjust the Bias Control (R126) for the maximum playback output of the 1000 cycle tone.
- f. Reset the audio oscillator to 250 cycles  $\pm 4$  dbm. (1.23 volts RMS). Re-adjust the record control on the Electronic Chassis so the playback output is  $\pm 4$  dbm (1.23 volts RMS).

## 2. Record Equalization

The record equalization circuits have been factory adjusted to the curves shown in Fig. 9. These curves have been found to produce flat overall response, when recording on high quality professional recording tapes. Badly worn tapes may produce loss in high frequency response and should not be used. The adjustment procedure for flat overall response on any tape is as follows:

- a. Set up the machine as described under Record Bias and Level Adjustment in the record mode of operation at the 15 inch tape speed.
- b. Reset the audio oscillator to 15,000 cycles and adjust the record head azimuth as described under Head Alignment.  
NOTE: All frequency checks at the 15 inch speed should be made 10 db below operating level to avoid saturation effects caused by the high frequency preemphasis. On machines equipped with Meter Panels, the Meter Panel Playback Control should be set at 4 during response checks to permit the runs to be made on the sensitive range of the V.U. Meter.
- c. Sweep the oscillator across the frequency range and adjust the Record 15 inch High Frequency Equalizer for flat response within the specifications of the machine.
- d. Change the tape speed to  $7\frac{1}{2}$  inches. Response check at this speed should be made 20 to 24 db below operating level to avoid tape saturation effects. Therefore, a sensitive meter or flat amplifier and V.U. meter should be used as described under Performance Check. Sweep the oscillator across the frequency range and adjust the Record  $7\frac{1}{2}$  inch High Frequency Equalizer for flat response within the specifications of the machine. NOTE: The second tape speed on the Model 301 is 30 inches per second. At this speed, response runs should be made 10 db below operating level and the 30 inch High Frequency Equalizer set for flat response.

## 3. Record Noise Balance

A noise balance control is provided to eliminate excessive low frequency noise and null second harmonic distortion. The noise balance should not be touched unless all heads have been thoroughly demagnetized with an Ampex Head Demagnetizer or equivalent. If noise of a crackling nature is still found to exist in the output of the

machine, connect a 1 MFD condenser across the output and adjust the Noise Balance Control, (R126), for minimum record noise as read on a sensitive meter or heard in a loudspeaker connected to the machine output through a power amplifier.

#### V. ERASE ADJUSTMENT:

It should not be necessary to make this adjustment except at rare intervals because of the high degree of stability of the oscillator circuits. Do not make this adjustment unless the erase head will not erase the previous program. Do not readjust erase to attempt to eliminate crackling tape noise, as the erase current does not produce crackling even if out of adjustment. If adjustment is indicated, the following procedure must be taken:

- a. Pull out the Erase Cable from the Record Chassis plug (J103P).
- b. Make an adapter plug by inserting a 10 ohm resistor in series with the ground side of the erase cable.
- c. Insert adapter in J103P, insert cable in adapter.
- d. Place a vacuum tube voltmeter such as Hewlett-Packard 400A or 400C across the 10 ohm resistor. Set on 3 volt scale. Full scale will read 300 Ma. erase current.
- e. Loosen the Erase Trimmer C120 for minimum capacity and slowly increase the capacity (counter clockwise rotation from top of chassis) until the meter reads 150 to 180 Ma. Higher currents will produce unnecessary heating of the head.
- f. NOTE: Align the record circuit as described under Record Alignment after making this adjustment, since a change in erase current will produce a change in bias current.

# SECTION VI

## PARTS LIST

The purpose of this Parts List is to aid the owner of an Ampex Recorder in ordering replacement parts. If it is used by you in ordering parts, it will aid Ampex in providing fast and efficient service.

The following Parts List contains the majority of the components in the Recorder. It lists the Schematic Reference number, a Description of the Part and the Ampex Stock Number.

The Schematic Reference Number refers to the number, such as C801, that appears next to the part on the circuit diagram.

Some replacement parts may not be duplicates of those used on original equipment but will be directly interchangeable with the original. For example: The relay bearing the Schematic Reference Number K801 was originally a 3 Pole Single Throw Relay. The replacement is a 3 Pole Double Throw Relay.

The Description column gives a brief description of the part—not enough information for ordering in itself, however—always use the Ampex Stock Number in addition.

The Ampex Stock Number is the exact designation of all parts used in Ampex equipment. For example, a 0.1 MFD 600 V. Tabular Condenser of certain physical dimensions will always bear the Ampex Stock Number CO-33. **THIS IS THE NUMBER YOU SHOULD USE WHEN ORDERING REPLACEMENT PARTS.** The Schematic Reference Number should NOT be used for ordering purposes as it will vary with different machine types.

The following information should be included when ordering parts:

Machine Type  
Machine Serial Number  
Ampex Stock Number  
Description of Material

Example: 4 - CO-33 Condenser for Model 300 No. 180

1 - B-1075 Drive Motor for Model 301 No. 2000

**ALWAYS INCLUDE THE AMPEX STOCK NUMBER**



MODEL 301 ELECTRONIC ASSEMBLY — CATALOG NO. 1094

Schematic Ref. No.	DESCRIPTION	Ampex Stock Number
A101	Neon Lamp 1/25 Watt	060-001
C101	50 $\mu$ f 25 V. Electrolytic Capacitor	031-030
C102	.25 $\mu$ f 600 V. Tubular Capacitor	035-097
C104	10 $\mu$ f 450 V. Electrolytic Capacitor	031-007
C105	.1 $\mu$ f 600 V. Tubular Capacitor 5%	035-073
C106	50 $\mu$ f 25 V. Electrolytic Capacitor	031-030
C107	.1 $\mu$ f 600 V. Tubular Capacitor	035-074
C108	10 $\mu$ f 450 V. Electrolytic Capacitor	031-007
C109	.0035 $\mu$ f 500 V. Mica Capacitor 5%	034-079
C110	.002 $\mu$ f 500 V. Mica Capacitor 5%	034-074
C111	1. $\mu$ f 400 V. Metalized Paper Capacitor	033-010
C112	16 $\mu$ f 150 V. Electrolytic Capacitor	031-018
C113	20/30/30/ $\mu$ f 475 V. Electrolytic Capacitor	031-082
C114	100 $\mu$ f 25 V. Electrolytic Capacitor	031-029
C115	10 $\mu$ f 450 V. Electrolytic Capacitor	031-007
C116	10 $\mu$ f 450 V. Electrolytic Capacitor	031-007
C117	.1 $\mu$ f 1000 V. Tubular Capacitor	035-139
C118	.1 $\mu$ f 1000 V. Tubular Capacitor	035-139
C119	.002 $\mu$ f 500 V. Mica Capacitor 5%	034-074
C120	.001 $\mu$ f Mica Trimmer Capacitor	038-003
C121	.0005 $\mu$ f 500 V. Mica Capacitor 5%	034-063
C123	100 $\mu$ f 50 V. Electrolytic Capacitor	031-090
C124	20 $\mu$ f 450 V. Electrolytic Capacitor	031-006
C125	.0001 $\mu$ f Padder Capacitor	038-002
C126	.0001 $\mu$ f Padder Capacitor	038-002
C201	.1 $\mu$ f 200 V. Metalized Paper Capacitor	033-003
C202	4 $\mu$ f 450 V. Electrolytic Capacitor	031-009
C203	50 $\mu$ f 25 V. Electrolytic Capacitor	031-030
C204	.1 $\mu$ f 600 V. Tubular Capacitor	035-074
C206	.036 $\mu$ f 150 V. Tubular Capacitor 5%	035-100
C207	50 $\mu$ f 25 V. Electrolytic Capacitor	031-030
C208	4 x 20 $\mu$ f V. Electrolytic Capacitor	031-073
C209	.25 $\mu$ f 600 V. Tubular Capacitor	035-097
C210	50 $\mu$ f 25 V. Electrolytic Capacitor	031-030
C211	.1 $\mu$ f 600 V. Tubular Capacitor	035-074
C212	.1 $\mu$ f 600 V. Tubular Capacitor	035-074
C213	.1 $\mu$ f 600 V. Tubular Capacitor	035-074
C214	50 $\mu$ f 25 V. Electrolytic Capacitor	031-030
C901	.004 $\mu$ f 500 V. Mica Capacitor 5%	034-081
C902	.004 $\mu$ f 500 V. Mica Capacitor 5%	034-081
C903	.0004 $\mu$ f 500 V. Mica Capacitor 5%	034-058
C904	.0004 $\mu$ f 500 V. Mica Capacitor 5%	034-058
F101	1/4 Amp Fast Blowing Fuse	070-006
J101S	Chassis Connector	146-007
J102P	Chassis Connector	143-009
J103P	Chassis Connector	143-010
J104P	Chassis Connector	147-008
J105S	Chassis Connector	146-003
J201P	Chassis Connector	143-008
J202P	Chassis Connector	147-004
J203P	Chassis Connector (Meter Panel Only)	147-009
K101	3 Pole Double Throw DC Relay	020-006
K102	3 Pole Double Throw DC Relay	020-001
K201	3 Pole Double Throw DC Relay (Model 301 Only)	020-001
L101	20 Millihenry Choke	051-018
L102	12 Henry Choke	3479
L103	20 Henry Choke	3480
L104	100 Millihenry Choke	051-020
R101	100,000 Ohm Carbon Potentiometer	044-038
R102	2200 Ohm 1 Watt Composition Resistor	041-150
R103	47,000 Ohm 1 Watt Composition Resistor	041-166
R104	10,000 Ohm 1 Watt Composition Resistor	041-158
R105	1 Megohm 1 Watt Composition Resistor	041-182

Schematic Ref. No.	DESCRIPTION	Ampex Stock Number
R106	39,000 Ohm 1 Watt Composition Resistor 5%	041-114
R107	100,000 Ohm 1 Watt Composition Resistor	041-170
R108	2200 Ohm 1 Watt Composition Resistor	041-150
R109	47,000 Ohm 1 Watt Composition Resistor	041-166
R110	10,000 Ohm 1 Watt Composition Resistor	041-158
R111	470,000 Ohm 1 Watt Composition Resistor	041-178
R112	1200 Ohm 2 Watt Composition Resistor	041-203
R113	220 Ohm 1 Watt Composition Resistor	041-130
R114	2200 Ohm 1 Watt Composition Resistor	041-150
R115	10,000 Ohm 10 Watt W. W. Resistor	043-128
R116	470,000 Ohm 1 Watt Composition Resistor	041-178
R117	50,000 Ohm Carbon Potentiometer	044-051
R118	1 Megohm 1 Watt Composition Resistor	041-182
R119	47,000 Ohm 1 Watt Composition Resistor	041-166
R120	6000 Ohm 40 Watt W. W. Resistor	043-017
R121	220,000 Ohm 1 Watt Composition Resistor	041-174
R122	10,000 Ohm 25 Watt W. W. Resistor	043-074
R123	600 Ohm 10 Watt W. W. Resistor	043-108
R124	10,000 Ohm 10 Watt W. W. Resistor	043-128
R125	100 Ohm 1 Watt Composition Resistor	041-137
R126	10,000 Ohm W. W. Potentiometer	044-024
R201	470,000 Ohm 1 Watt Composition Resistor	041-124
R202	1 Megohm 1 Watt Composition Resistor	041-182
R203	1000 Ohm 1/2 Watt W. W. Resistor 1%	043-193
R204	300,000 Ohm 1/2 Watt W. W. Resistor 1%	043-192
R205	100,000 Ohm 1/2 Watt W. W. Resistor 1%	043-190
R206	1 Megohm 1 att Composition Resistor	041-182
R207	5000 Ohm Carbon Potentiometer	044-046
R208	10,000 Ohm 2 Watt Composition Resistor	041-213
R209	1000 Ohm 1 Watt Composition Resistor	041-146
R210	330,000 Ohm 1 Watt Composition Resistor	041-176
R211	100,000 Ohm 1/2 Watt W. W. Resistor 1%	043-190
R212	27,000 Ohm 1 Watt Composition Resistor	041-163
R213	100,000 Ohm Carbon Potentiometer	044-038
R214	1200 Ohm 1 Watt Composition Resistor	041-147
R215	33,000 Ohm 1 Watt Composition Resistor	041-164
R216	10,000 Ohm 2 Watt Composition Resistor	041-213
R217	47,000 Ohm 1 Watt Composition Resistor	041-166
R218	1 Megohm 1 Watt Composition Resistor	041-182
R219	10,000 Ohm 5 Watt W. W. Resistor	043-158
R220	22,000 Ohm 1 Watt Composition Resistor	041-216
R221	1 Megohm 1 Watt Composition Resistor	041-182
R222	1000 Ohm 1 Watt Composition Resistor	041-146
R223	1 Megohm 1 Watt Composition Resistor	041-182
R901	47,000 Ohm 1 Watt Composition Resistor	041-166
R902	47,000 Ohm 1 Watt Composition Resistor	041-166
R903	100 Ohm 1 Watt Composition Resistor	041-137
R904	100 Ohm 1 Watt Composition Resistor	041-137
T101	Input Transformer	3478
T102	Power Transformer	3477
T103	Oscillator Coil Assembly	512
T201	Output Transformer	1154
TS101	Terminal Strip — 8 Terminals	180-016
T901	Torroidal Coil	1011
V101	6C5 (Recommended) or 6J5 Vacuum Tube	012-002
V102	6C5 (Recommended) or 6J5 Vacuum Tube	012-002
V103	6SN7 Vacuum Tube	012-012
V104	5U4G Vacuum Tube	012-001
V105	815 Vacuum Tube	012-015
V201	12SJ7 Vacuum Tube — Factory Selected	012-011
V202	VR-150 Vacuum Tube	011-001
V203	6J7 Vacuum Tube	012-014
V204	6SN7 Vacuum Tube	012-012
V205	6SN7 Vacuum Tube	012-012

Schematic Ref. No.	DESCRIPTION	Ampex Stock Number
	Tube Shield Assembly V101.....	644
	Dummy Plug (Power).....	567
	Millen Shaft Lock.....	498-014
	Octal Sockets.....	150-001
	Octal Sockets — Shock Mounted (V201 & V202).....	150-008
	Condenser Socket.....	150-006
	TAPE TRANSPORT — CATALOG NO. 7784	
A801	6-8 V. Panel Lamp — Bayonet Base.....	060-001
A802	120 V. 6 Watt Lamp — Candelabra Screw.....	060-006
C501	When re-ordering motor capacitors,	
C601	include motor manufacturer's	
C701	name and motor number.	
C801	.1 $\mu$ f 600 V. Tubular Capacitor.....	035-074
C802	.1 $\mu$ f 600 V. Tubular Capacitor.....	035-074
C803	.1 $\mu$ f 600 V. Tubular Capacitor.....	035-074
C804	.1 $\mu$ f 600 V. Tubular Capacitor.....	035-074
C805	80 $\mu$ f 150 V. Electrolytic Capacitor.....	031-016
C806	80 $\mu$ f 150 V. Electrolytic Capacitor.....	031-016
C807	.1 $\mu$ f 600 V. Tubular Capacitor.....	035-074
C808	.1 $\mu$ f 600 V. Tubular Capacitor.....	035-074
C809	.1 $\mu$ f 600 V. Tubular Capacitor.....	035-074
F801	5 Amp. 250 V. Fuse.....	070-007
F802	5 Amp. 250 V. Fuse.....	070-007
F803	5 Amp. 250 V. Fuse.....	070-016
J601P	Connector.....	145-013
J701P	Connector.....	145-013
J801P	Chassis Connector.....	147-010
J802S	Chassis Connector.....	146-009
J804S	Chassis Connector.....	146-003
J805S	Chassis Connector.....	146-003
J806S	Chassis Connector — Utility Outlet.....	146-014
J807S	Connector.....	144-019
J808S	Connector.....	144-019
K801	3 Pole Double Throw DC Relay.....	020-006
K802	3 Pole Double Throw DC Relay.....	020-006
K803	3 Pole Double Throw DC Relay.....	020-006
R801	150 Ohm 50 Watt Adjustable Resistor.....	040-011
R802	150 Ohm 50 Watt Adjustable Resistor.....	040-014
R803	150 Ohm 50 Watt Adjustable Resistor.....	040-011
R804	10 Ohm 5 Watt W. Resistor.....	043-156
S501	Micro Switch.....	120-001
S502	Dual DPDT Toggle Switch.....	122-014
S503	Dual DPDT Toggle Switch.....	122-014
S801	DPST Toggle Switch.....	120-003
S802	6 Pole 3 Position Shorting Switch.....	122-010
S803	Single Pole Pushbutton N.C. (Stop).....	120-014
S804	Single Pole Pushbutton N.O. (Record).....	120-013
S805	Double Pole Pushbutton N.O. (Start).....	120-006
S806	SPDT Toggle Switch.....	120-011
SR801	Selenium Rectifier.....	582-001
	Drive Assembly (Complete).....	2327
	Capstan Assembly.....	7518-1
	Capstan Dust Cap.....	2326-3
	Capstan Felt Washer — Dust Seal.....	494
	Capstan Tru-Arc Retainer.....	430-050
	Capstan Idler Assembly.....	500
	Capstan Idler Arm.....	372
	Capstan Idler Arm Bearing Housing.....	374
	Rotary Tape Guide.....	
	Drive Motor Assembly — Complete with motor and pulley.....	7990-2
	Drive Motor Return Spring (Console & Portable).....	1024
	Drive Motor Return Spring (Rack Mount Only).....	7814
	Drive Motor Shield.....	1905
	Drive Solenoid — DC.....	670

Schematic Ref. No.	DESCRIPTION	Ampex Stock Number
	Felt Washer .....	503-015
	Drive Motor Pressure Adjusting Spring.....	389
	Capstan Solenoid .....	670
	Felt Washer .....	503-015
	Capstan Idler Return Spring.....	400
	Capstan Idler Adjusting Spring.....	676
	Tape Speed Switch Assembly (Including S501, S502 and S503) .....	364
	Takeup Assembly Complete.....	5704
	Takeup Motor Assembly — Complete with motor, flange, brakedrum and turntable.....	6768
	Brake Assembly .....	17327-1
	Brake Band Assembly .....	17612-1
	Brake Solenoid .....	337
	Brake Adjusting Spring.....	322
	Turntable Pad.....	958
	Rewind Assembly Complete.....	5705
	Rewind Motor Assembly — Complete with motor, flange, brake and turntable.....	6768
	Brake Assembly .....	17327-2
	Brake Band Assembly.....	17612-2
	Brake Band Leaf .....	720-1&2
	Brake Solenoid .....	337
	Brake Adjusting Spring.....	322
	Turntable Pad.....	958
	Takeup Tension Arm Assembly.....	425
	Tape Guide .....	675
	Tape Guide Hook.....	355
	Takeup Tension Spring.....	422
	Reel Idler Assembly .....	1123
	Tape Guide .....	257
	Reel .....	539
	Reel Knob — Hold Down .....	9093
	AC Power Cable.....	564
	Interconnecting Cable (Single Track) Console.....	563-2
	Interconnecting Cable (Single Track) Rack & Suitcase.....	563-1
	Interconnecting Cable (Dual Track) Console.....	3584-1
	Interconnecting Cable (Dual Track) Rack & Suitcase.....	3584
	Dummy Plug (Remote Control or 60 Cycle Amplifier).....	567
	Record Pushbutton Guard.....	463
	Start and Stop Pushbutton Guards.....	361
	Speed Change Knob.....	230-010
	Mode Selector Lever Knob.....	230-002
	Fuse Holder.....	085-001
	Pilot Lamp Base — Amber.....	132-005
	Pilot Lamp Base — Red.....	132-006
	Cable Assembly — Record.....	2315
	Pilot Lamp Base — Red.....	132-006
	Cable Assembly — Record.....	2315
	Cable Assembly — Playback.....	2316
	Cable Assembly — Metering.....	2314
	Cable Assembly — Panel Lamp.....	625
	12 Bar — Strobosticker — to be used for checking speed at the lower speed (30" for 30" — 60" machine and 15" for 15" — 30" machine.....	575
	Capstan Bushing Extractor Tool.....	TA-1514
	3/16" Hex Key.....	360-001
	5/32" Hex Key.....	360-002

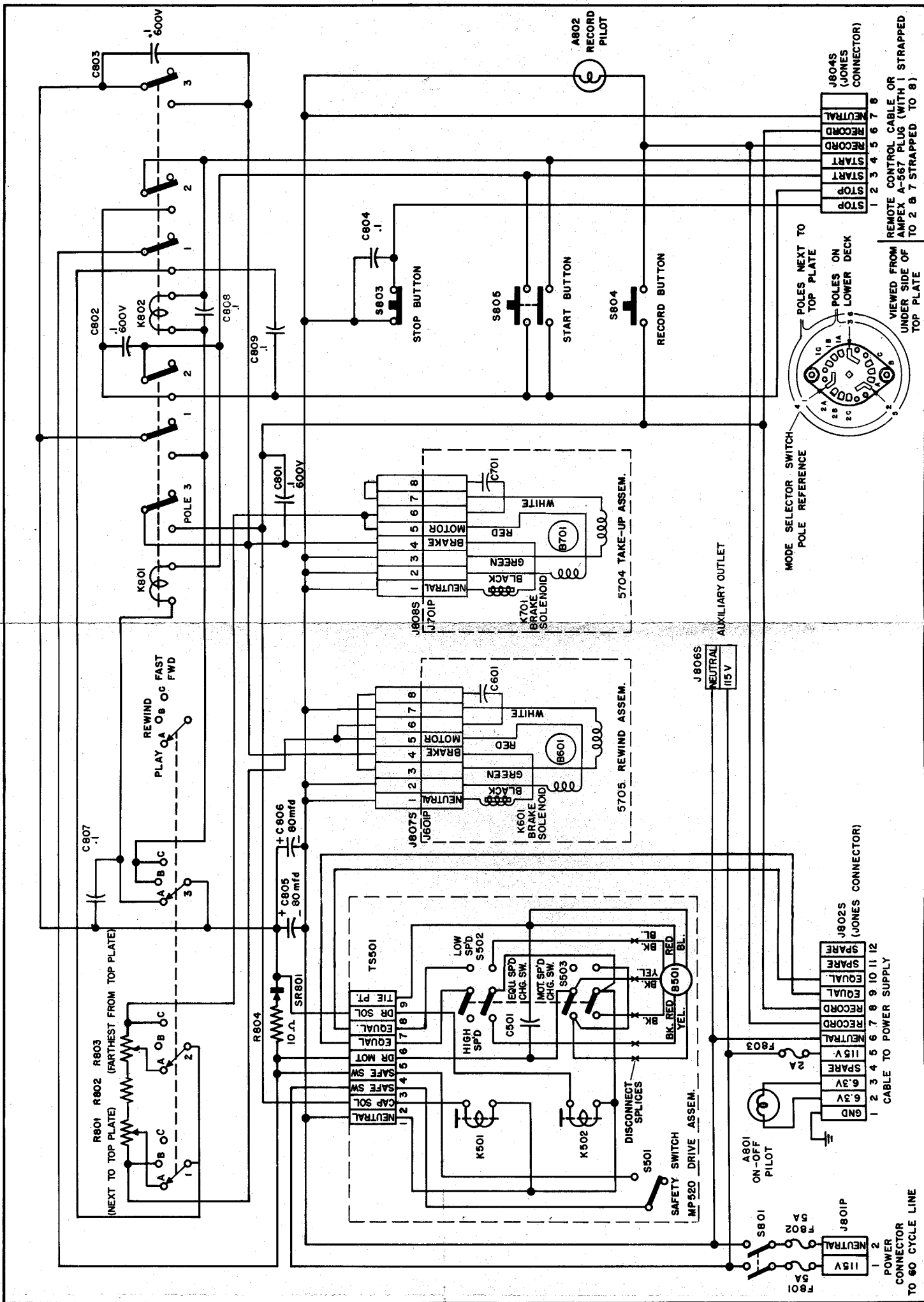
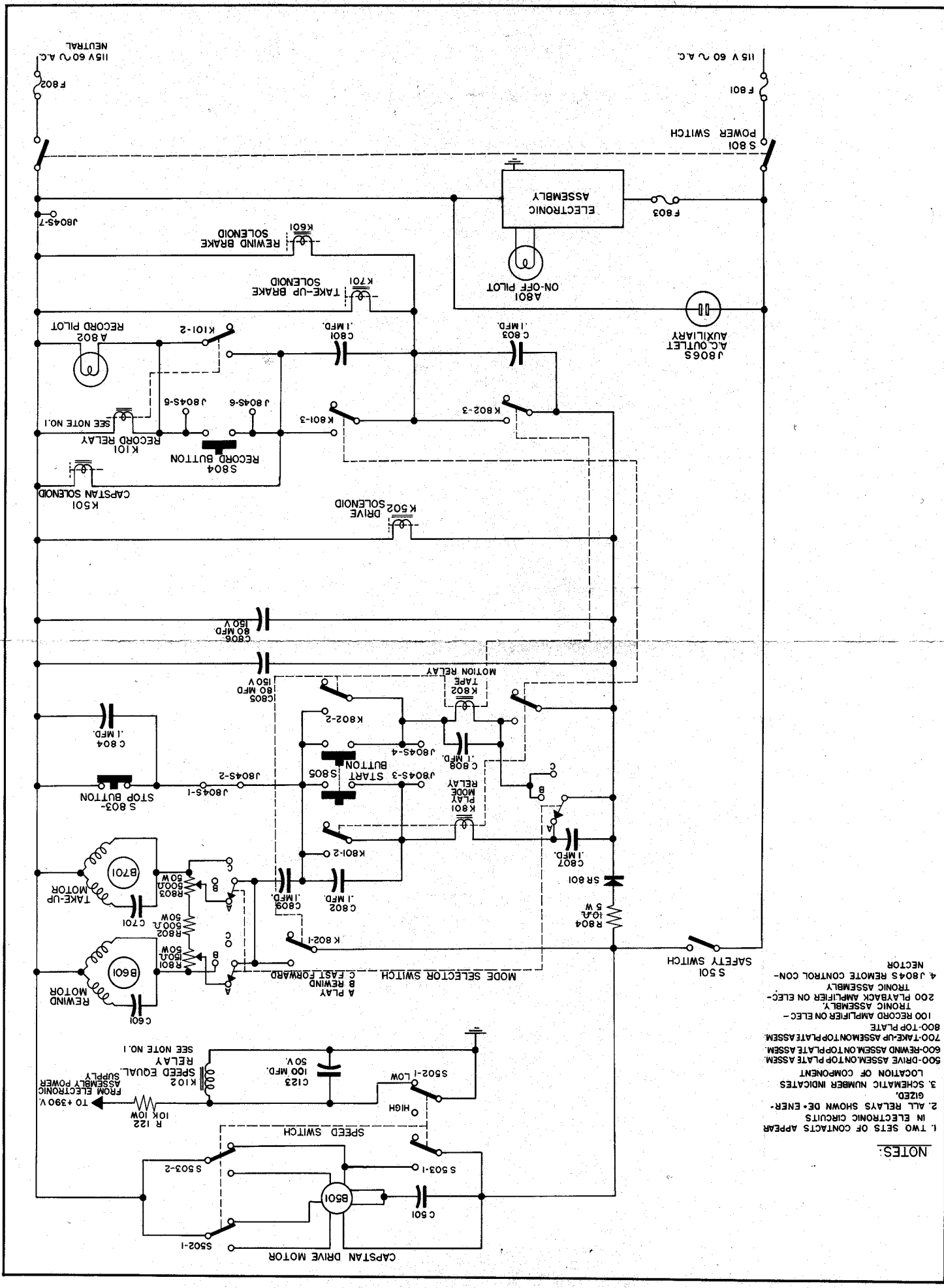


Fig. 10 Schematic Diagram, Tape Transport



- NOTES:
1. TWO SETS OF CONTACTS APPEAR IN ELECTRONIC CIRCUITS
  2. ALL RELAYS SHOWN DE-ENERGIZED.
  3. SCHEMATIC NUMBER INDICATES LOCATION OF COMPONENT
  - 500-DRIVE ASSEMBLY ON TOP PLATE ASSEM.
  - 600-REWIND ASSEM. ON TOP PLATE ASSEM.
  - 700-TAKE-UP ASSEM. ON TOP PLATE ASSEM.
  - 800-TOP PLATE
  - 100-RECORD AMPLIFIER ON ELEC-TRONIC ASSEMBLY
  - 200-PLAYBACK AMPLIFIER ON ELEC-TRONIC ASSEMBLY
  - 4 J804S REMOTE CONTROL CON-NECTOR

Fig. 11 Schematic Diagram, Control Circuit

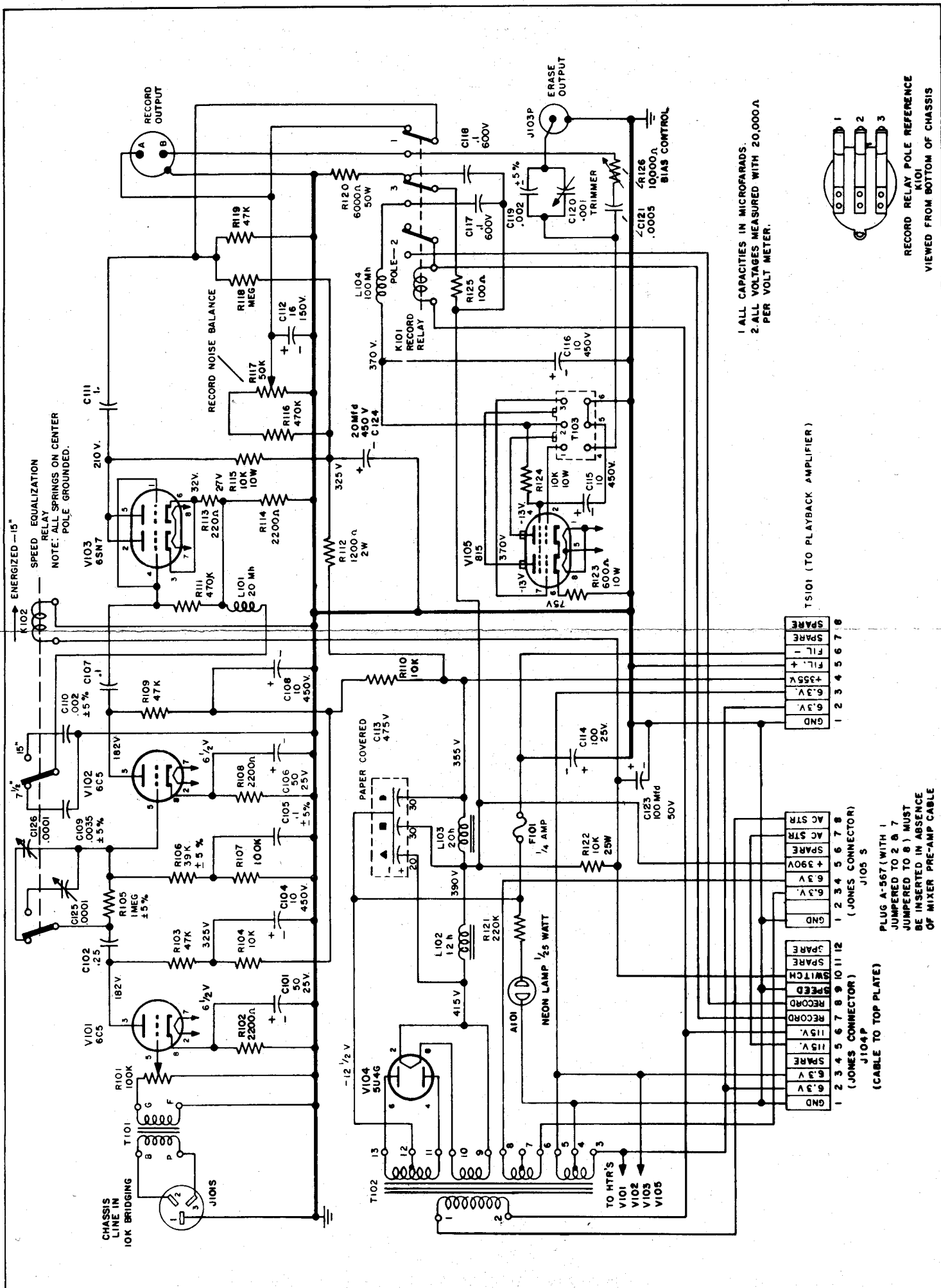
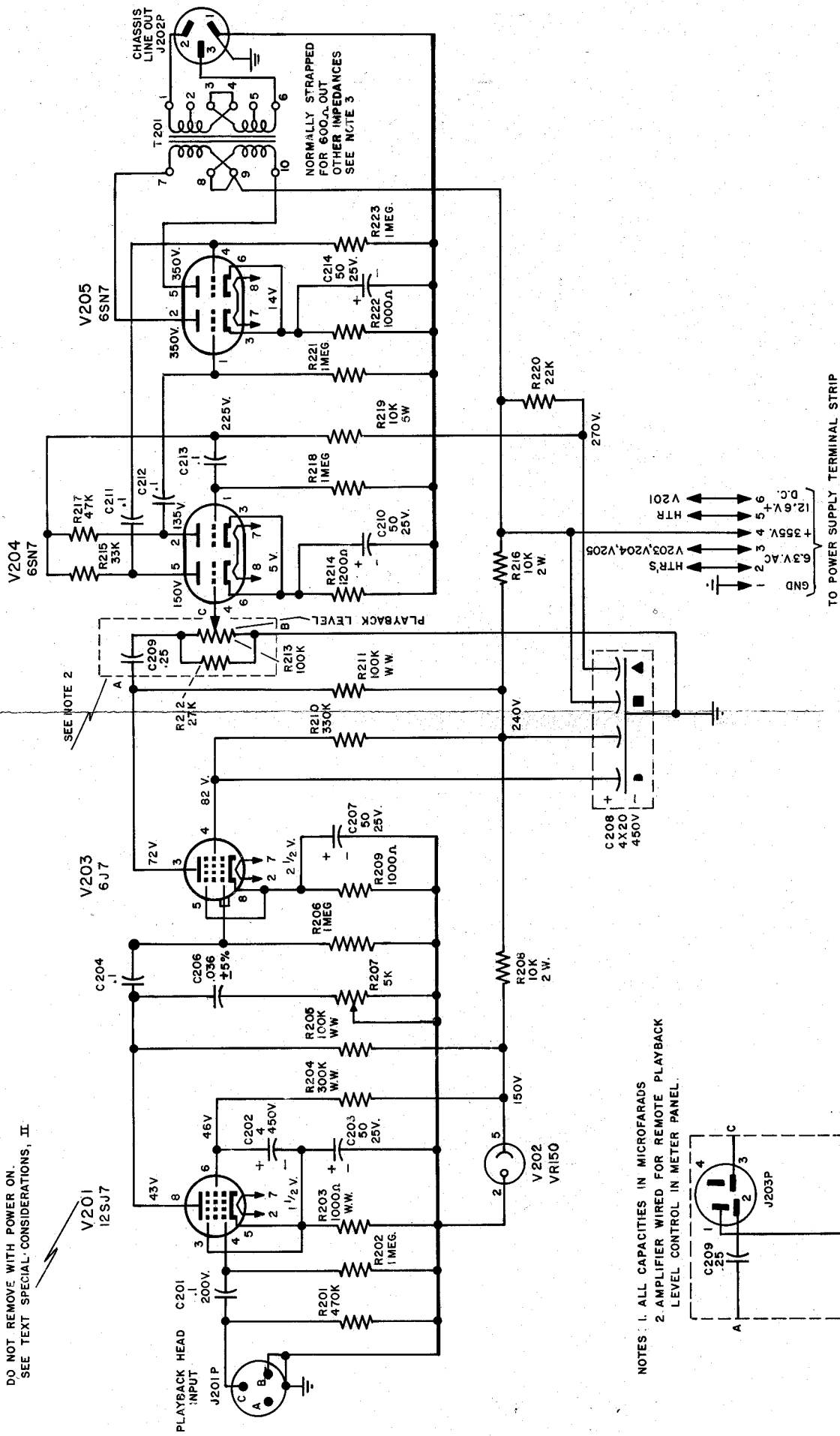


Fig. 12 Schematic Diagram, Record Amplifier and Power Supply

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



- 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

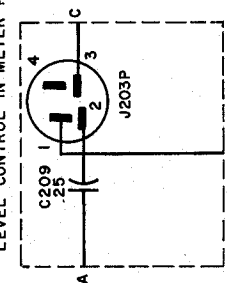


Fig. 13 Schematic Diagram, Playback Amplifier



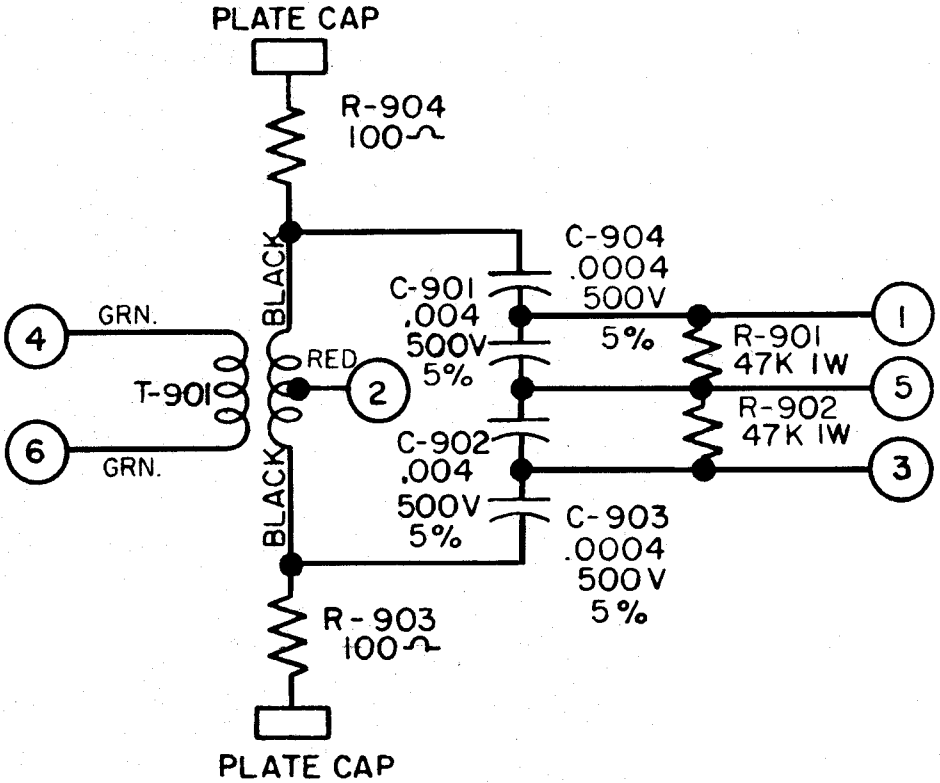
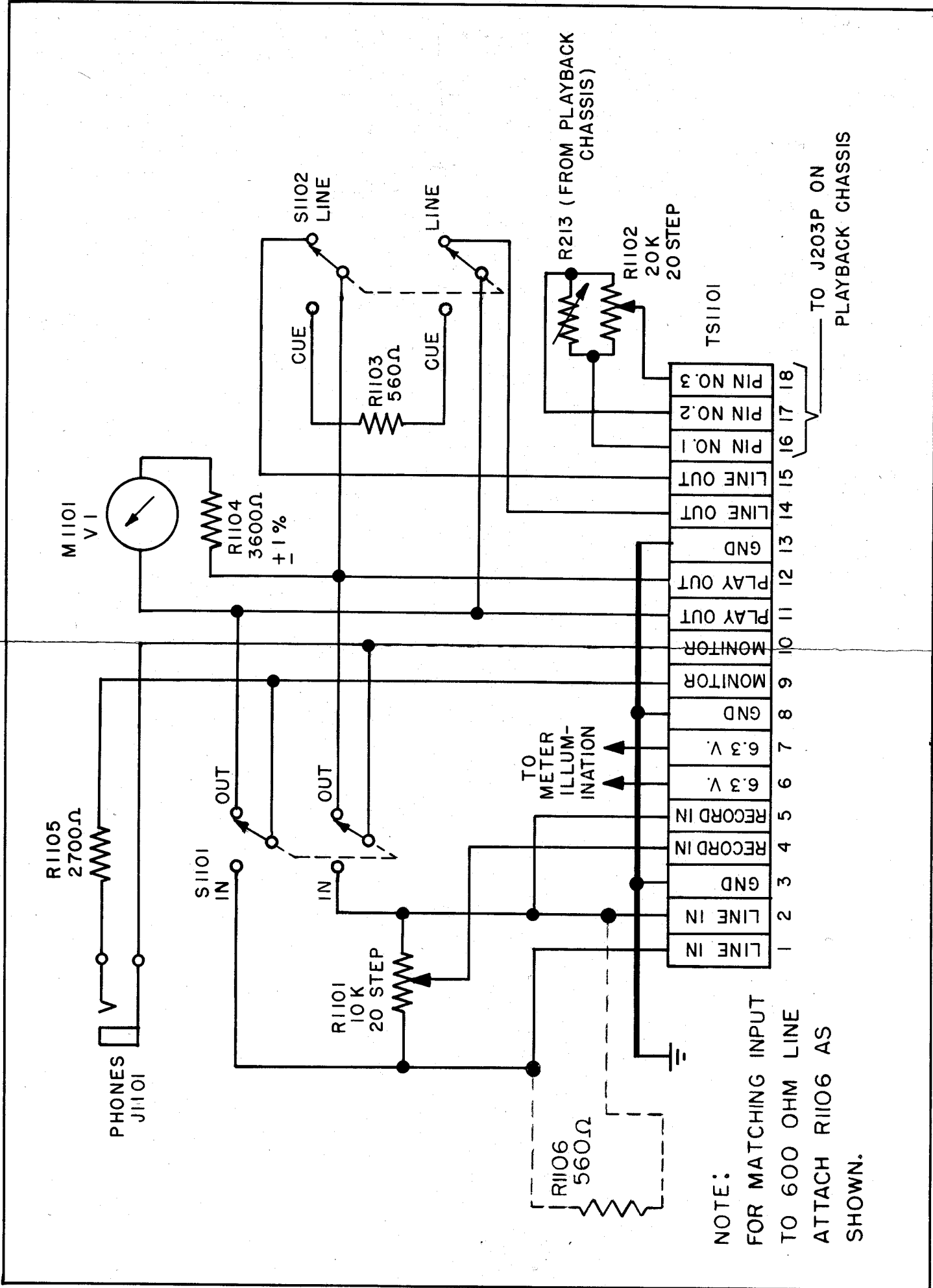


Fig. 14 Schematic Diagram, Oscillator Coil



NOTE:  
 FOR MATCHING INPUT  
 TO 600 OHM LINE  
 ATTACH R1106 AS  
 SHOWN.

Fig. 15 Schematic Diagram, Meter Control Panel

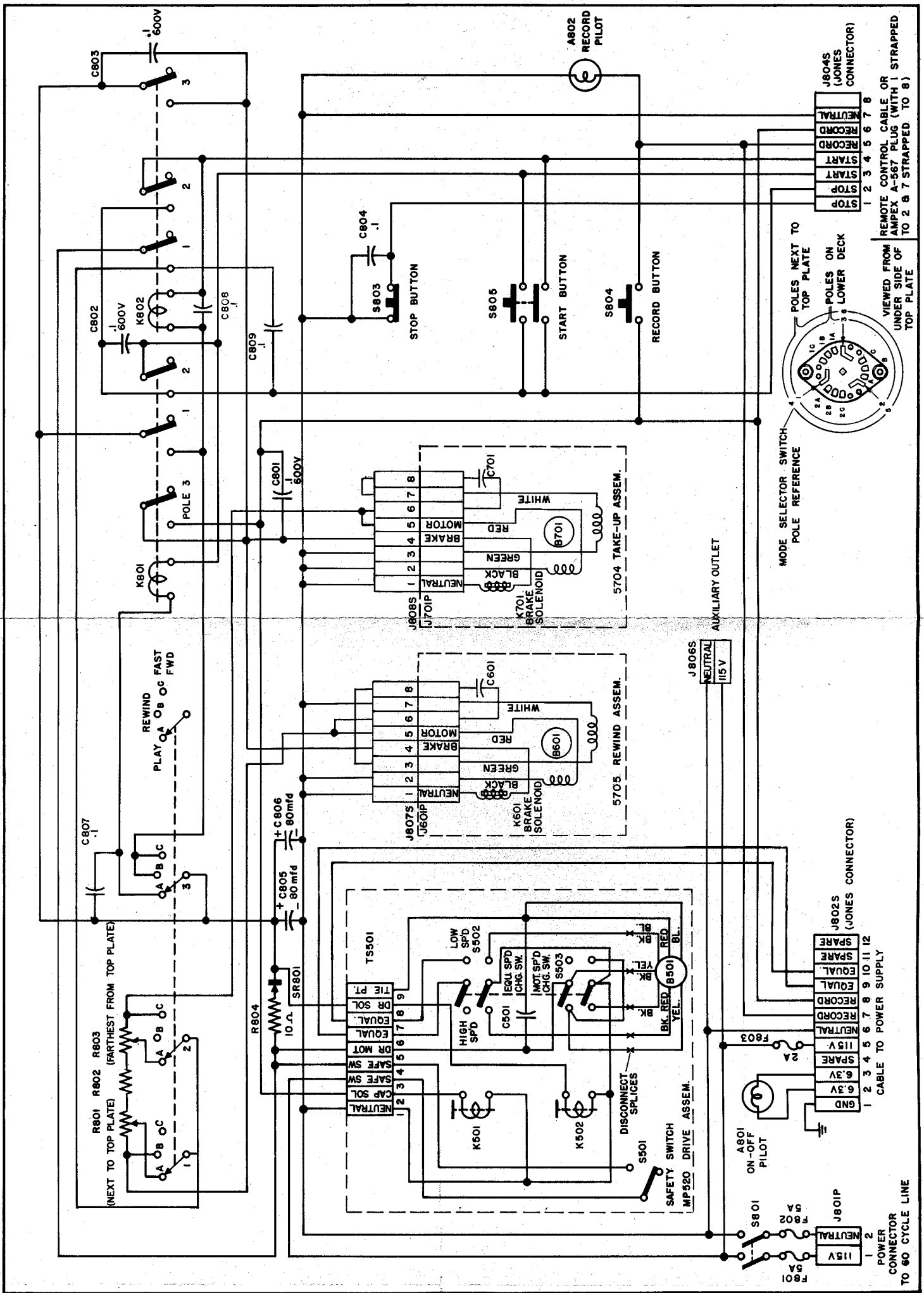
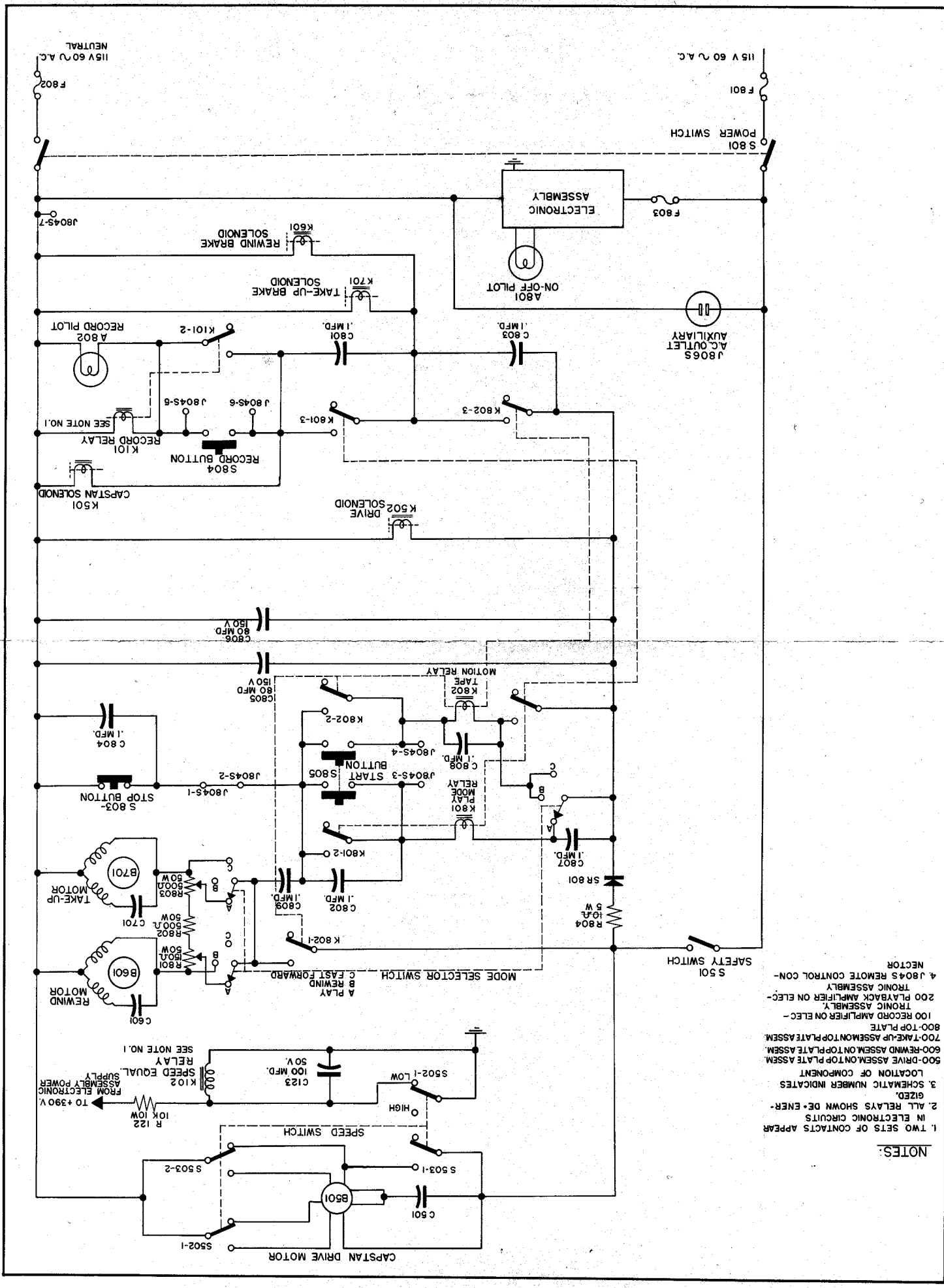


Fig. 10 Schematic Diagram, Tape Transport



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  - 200-PLAYBACK AMPLIFIER ON ELEC-TRONIC ASSEMBLY
  - 4 J804S REMOTE CONTROL CON-NECTOR

Fig. 11 Schematic Diagram, Control Circuit

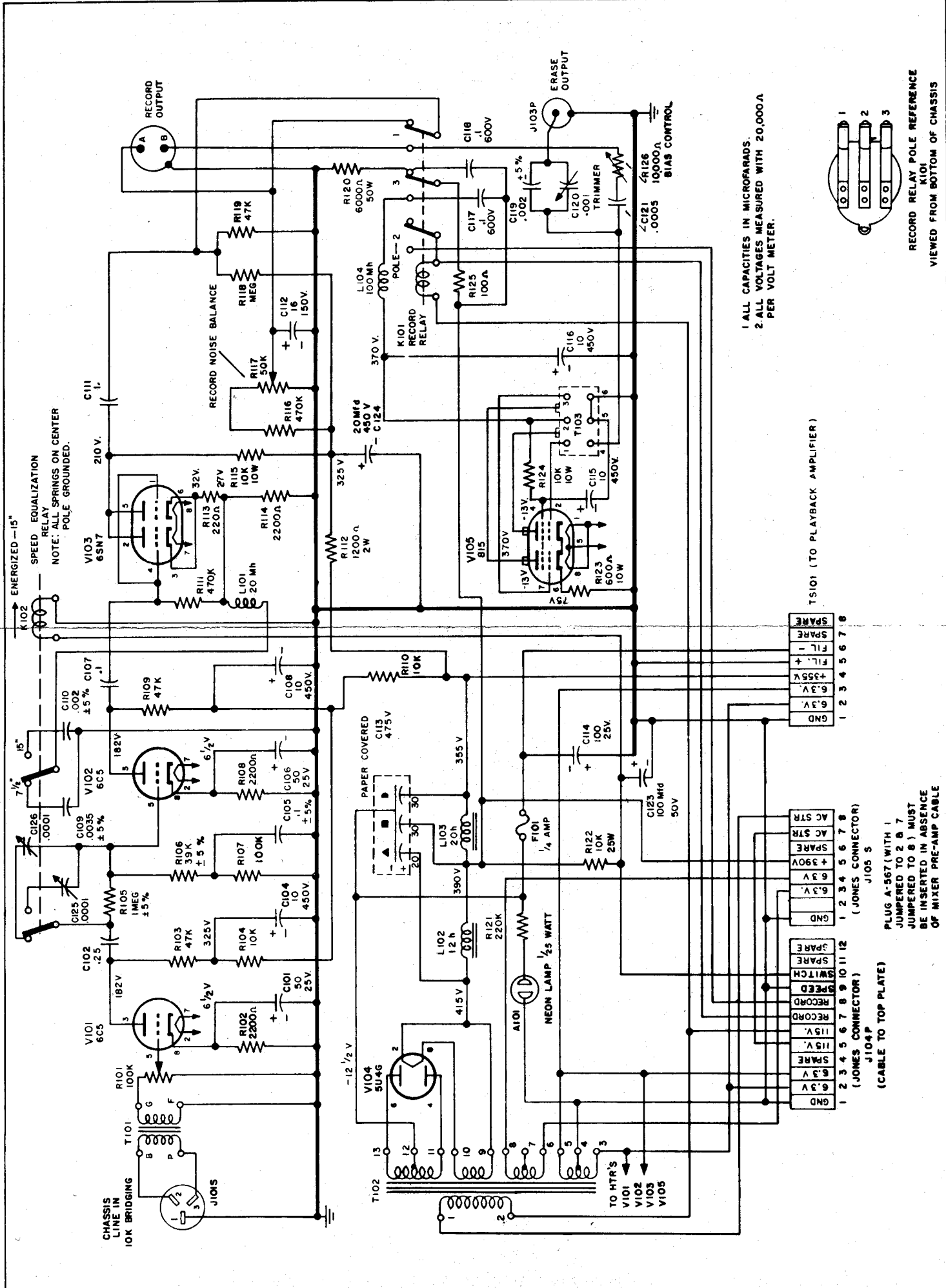


Fig. 12 Schematic Diagram, Record Amplifier and Power Supply

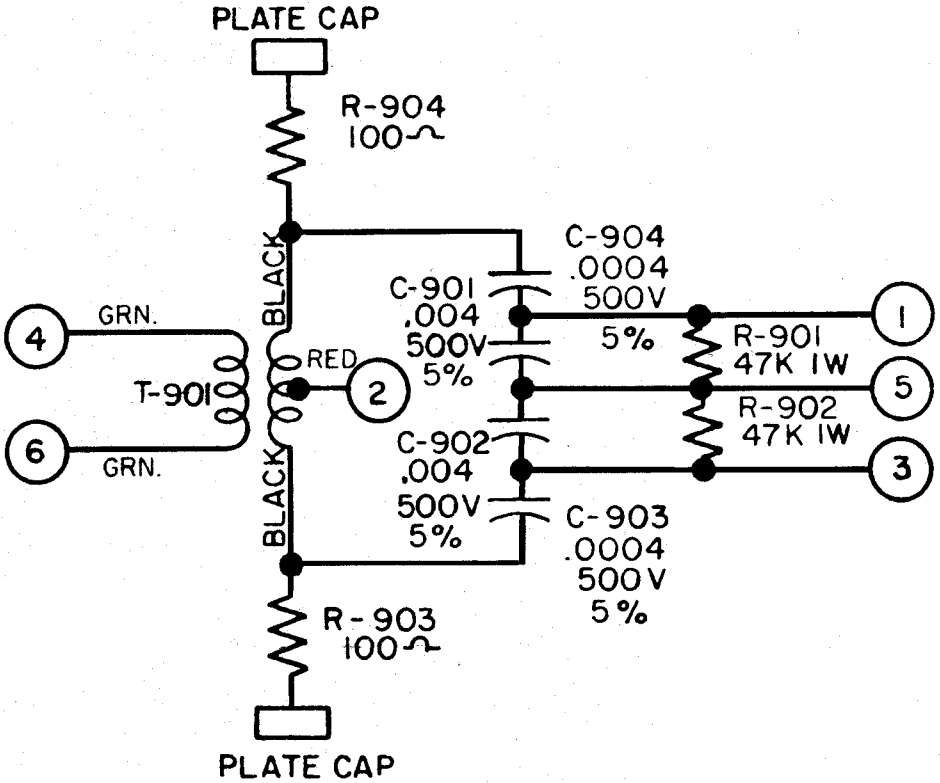
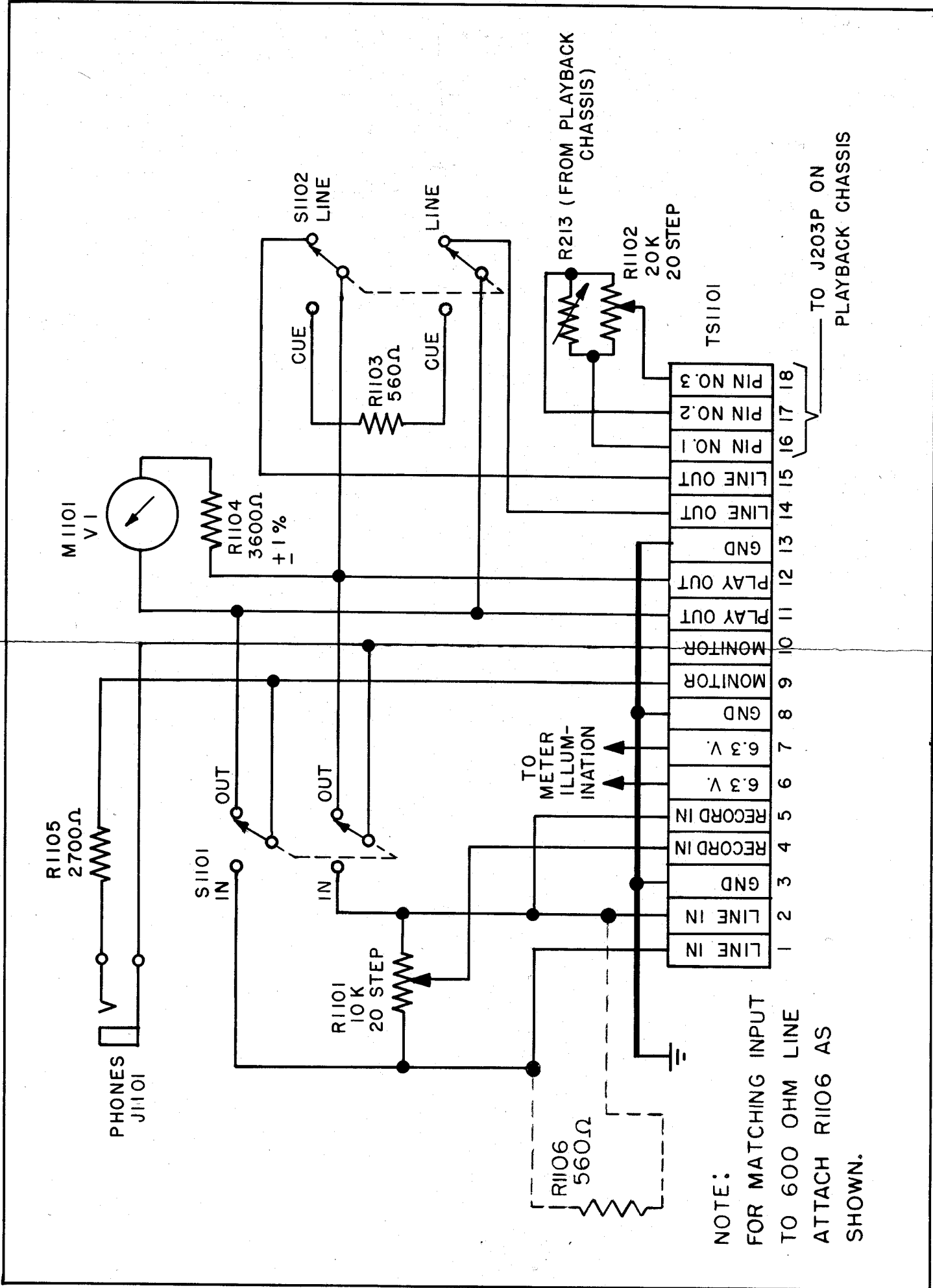
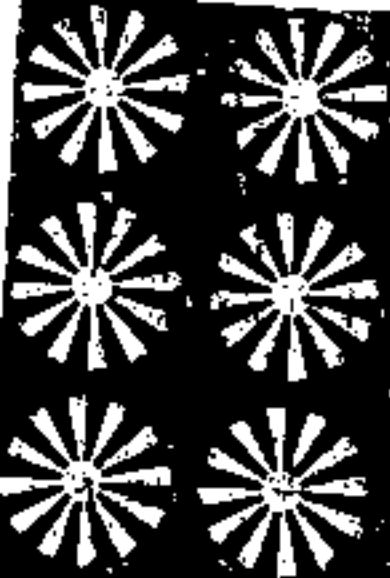


Fig. 14 Schematic Diagram, Oscillator Coil

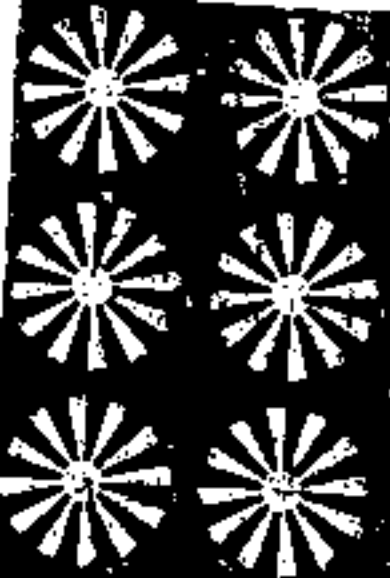


NOTE:  
 FOR MATCHING INPUT  
 TO 600 OHM LINE  
 ATTACH R1106 AS  
 SHOWN.

Fig. 15 Schematic Diagram, Meter Control Panel







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AMPEX ELECTRIC CORPORATION

HOWARD AVENUE AT LAUREL • SAN CARLOS, CALIFORNIA

22 August 1949

Gentlemen:

Enclosed is SERVICE BULLETIN No. 1 for the AMPEX Model 300 Magnetic Tape Recorder. This is the first in a series of bulletins which we will publish to keep you informed of the latest advances in the art of magnetic recording, and to provide all information possible to keep your Model 300 operating in first class condition.

These will not alone give detailed information of any mechanical or electronic modifications which we have found advisable in models already released, but will also, in so far as possible, review uses and applications for the equipment which are outside of its normal employment.

If at any time you should encounter any operating problems or difficulties with your AMPEX equipment, we would greatly appreciate your calling it to our attention. If the problem is of such a nature as to be of general interest to other Model 300 users, it will be discussed in future service bulletins.

Sincerely yours

AMPEX ELECTRIC CORPORATION

President

AMPoniatoff:fj

SERVICE BULLETIN, NO. 1, MODEL 300

1. Head Magnetization. In order to realize the full dynamic range of type 111 tape, it is extremely important that the heads be free of magnetization. 111 tape is very sensitive to the slightest amount of magnetization on the record head, so that unless care is exercised it is very easy to raise the noise level 5 to 10 db. The Model 300 has been designed so that with normal and proper usage, the heads will not become magnetized. However, it must be remembered that any phenomena which tends to put an unbalanced pulse through the record head will magnetize it. Such pulses can be caused by appearing in the form of signal or by causing a pulse in the power supply voltage. If the following precautions are taken, no difficulty should be experienced with record head magnetization.

a. DO NOT DEPRESS THE RECORD BUTTON UNTIL AFTER DEPRESSING THE START BUTTON. In other words, allow the transient caused by switching the motors and solenoids to die out before the record head is connected. A one-half second pause is sufficient.

b. Do not pull any tubes in the record amplifier, or connect head leads or input leads, while the machine is in the Record position. In some cases it has been found wise not to start or stop recording while there is a saturating signal fed into the record amplifier.

c. Do not switch speeds while recording. (No harm is done by changing speeds while playing back.)

In the event that the head does become magnetized, follow the procedure outlined in the Instruction Book under HEAD DEMAGNETIZATION. If a head is powerfully magnetized, as when tested with an ohmmeter, the demagnetizing process may have to be repeated several times. AMPEX will soon have available a simple demagnetizer that connects to any 115 v. A.C. line.

2. Erase. In all production machines, C119 has been changed to .003 mfd. for proper erase current. The erase current is adjusted to 200 to 210 m.a. instead of the 250 m.a. originally stated in the Instruction Book. Actually, 180 m.a. will erase peak recording level within specifications. In checking erase, always check with both record and erase heads connected, as the bias on the record head provides part of the erase.

3. Reels. It has been found in some isolated cases that when the tape is allowed to run all the way out at the end of a fast wind, a section over a foot long will be broken off the end. Upon investigation, this was found to be due to the sharp edges on the slot opening of the reel hub through which the tape is threaded. The sharp edges apparently provided high friction and did not allow the end of the tape to run out freely. When these sharp edges were filed off, the breakage no longer occurred. This information is being forwarded to the N A B Sub-Committee for the standardization of reels.

Difficulty has also been experienced with the reels not being properly centered. When inserting the hold-down knob, the knob should be pushed down with one hand, and the reel held with the other hand. As the hold-down comes into contact with the reel, agitate the reel slightly with the other hand to make sure that the hold-down moves into the exact center of the opening, then push the knob down firmly. The hold-down knob is being re-designed so as to prevent the possibility of locking the reel off-center.

4. Threading. In threading the tape, be sure to remove any adhesive that may have been used to seal the end. If this adhesive is not removed, the first layer may stick and cause the end to break off at the end of Rewind.

AMPEX ELECTRIC CORPORATION

MJS:fj

14 September 1949

Gentlemen:

Enclosed is AMPEX Service Bulletin No. 1A.

It will be our policy to send out Service Bulletins covering any information concerned with the performance or maintenance of the Model 300 recorder. All bulletins which will be of interest to all machine owners will have consecutive numbers. Those bulletins which are of interest only to service personnel and distributors will have a letter following the number, as the one enclosed. Thus if the next bulletin were for service personnel only, it would be numbered 1B. If it were for general distribution, it would become number 2.

Sincerely yours

AMPEX ELECTRIC CORPORATION

*A.M. Poniatoff*  
President

AMPoniatoff:fj

SERVICE BULLETIN NO. 1A, MODEL 300

1. Solenoids. Some difficulty has been experienced with the humming or buzzing of the solenoid which operates the capstan idler, K501. Investigation of the cause of this noise has disclosed that if the linkage has not been adjusted properly, the force required of the solenoid will be greatly increased and therefore cause it to hum.

Looking at the drive assembly from the bottom, the linkage of the capstan idler solenoid can be seen. The link rod A passes through a hole in the arm B that it operates, and there is a rubber washer (C) and adjusting nut (D) on the end. When the solenoid is operated, the rod pulls the rubber washer against the arm to operate it. When the solenoid is seated, the angle E between the rod and the arm should be less than  $90^{\circ}$ . If this is so, the effective contact point of the washer is on the outside. If the angle between the rod and the arm is greater than  $90^{\circ}$  when the solenoid is seated, the contact point of the washer on the arm is on the inside, effectively reducing the moment arm by a considerable amount, and therefore requiring much greater force to be exerted by the solenoid.

The importance of maintaining the above angle E below  $90^{\circ}$  was only recently discovered, and it is possible that some machines have been shipped in which this angle might be too great. While no machines have been shipped with noisy solenoids, it is possible that if the above adjustment is not proper the solenoids may become noisy in use. Should this be the case, the adjustment can be corrected as follows:

It will be noted that the capstan idler arm shaft F is connected to the operating shaft G below through a U-shaped torque link H. If the bottom (or shorter) arm of this link H is bent in a clockwise direction (when looking at the link from the bottom or short arm end), this will effectively reduce the angle E. In order to bend this arm, it is necessary to remove link H and hold it in a vice. The link can be removed by forcing off the spring-lock washers which position the lower arm (I and J) and which attach the return spring at the top (K). The proper value for the angle E is approximately  $85^{\circ}$ , or when the arm B is perpendicular to the plane of the solenoid base plate.

If the angle E is changed, it will be necessary to re-set the capstan idler adjustment D. This adjustment is set so that when the capstan idler just touches the capstan, the solenoid is  $1/8$  inch shy of seating. A simple way of making this setting is to place a piece of material  $1/8$  inch thick between the solenoid armature and body and clamp the armature down on it. Then tighten the nut D until the capstan idler just touches the capstan.

It may also be necessary to reset the capstan idler solenoid

Stop L. This stop should be set so that at no time during fast winding does the tape touch the capstan idler.

2. Playback Amplifier. It has been found that some of the early machines were shipped with ground wires connected to pin number 1 of the input stage and the following stage that were of insufficient strength and length to allow the tube socket to flex without breaking. Unfortunately, several of these wires have opened up in the field. The result is an excessive amount of hum pickup in the first stage of the amplifier.

To replace this broken connection, unscrew the Playback Amplifier from the chassis frame. When the Playback Amplifier is lifted up, the ground connections are readily accessible.

3. Brakes. The brakes have been adjusted to work properly with the standard NAB double flanged reel. If small RMA reels or hubs only are used, the brakes will not necessarily stop without slack forming when fast winding onto the small reel or hub. This is because with normal brake settings, the inertia of the reel that is taking up the tape serves to tension the tape, and if the brakes are set tight enough to stop a small reel without slack, the tension on the tape will be excessive when using the regular reel.

4. Cabinet. The four feet of the console cabinet are adjustable, so that the cabinet may be leveled on any floor by merely screwing the feet to the proper position.

AMPEX ELECTRIC CORPORATION

MJStolaroff:fj



# INDEX of SECTIONS, CIRCUITS and DRAWINGS

## Section I

1. Specifications
2. Unpacking and Installing

## Section II

1. Mechanical Operation
2. Electronic Operation

## Section III

1. Electronics Alignment
2. Electronics Special Considerations

## Section IV

1. Head Housing
2. Head Alignment
3. Head Demagnetization

## Section V

Drive System

FIGURE 1—Top Plate — Bottom View

FIGURE 2—Capstan Assembly

FIGURE 3—Reel Idler Assembly

FIGURE 4—Take-up Tension Arm

FIGURE 5—Top Plate — Top View

FIGURE 6—Record Amplifier and Power Supply Schematic

FIGURE 7—Top Plate Control Circuits

FIGURE 8—Playback Amplifier Schematic

FIGURE 9—Electronics — Chassis Top View

FIGURE 10—Recommended Layouts:

(a) Bridging with Meter Control Panel

(b) Matching with Meter Control Panel

(c) Bridging or Matching without Meter Control Panel

FIGURE 11—Inter-Unit Connection Diagram

FIGURE 12—Meter Control Panel Schematic (Bridging)

FIGURE 13—Meter Control Panel Schematic (Matching)

## SPECIFICATIONS FOR MODEL 300

All performance characteristics of the Model 300 Magnetic Tape Recorder equal or exceed the standards recommended by the NAB Subcommittee on Magnetic Recording.

**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,  $\pm 2$  db. 50 — 15,000 cycles.  
At 7.5 inches,  $\pm 2$  db. 50 — 7,500 cycles.

**Signal-to-Noise Ratio:** Over 60 db., as defined by the proposed NAB standards. By 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 r.m.s. 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% r.m.s., measuring all flutter components from 0 to 300 cycles, using a tone of 3,000 cycles. At 7.5 inches, under 0.2%.

**Separate record and playback heads** and amplifiers for simultaneous monitoring of the tape.

**Playback Timing Accuracy:** 0.2%.

**Playing Time:** 33 minutes at 15 inch speed on proposed standard NAB reel, 66 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 NAB reel.

**Controls:** Start, Stop and Record are push-button, 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.

**Record Amplifier:** Bridging input, normally set up for + 4 V.U. in.

**Playback Amplifier:** Normally + 4 V.U. output. Will deliver 20 d.b.m. without exceeding 1% total harmonic distortion at any frequency from 30-15,000 cycles.

**Dimensions:** Mechanical unit on 24 $\frac{1}{2}$ " panel for standard rack mounting. Electronic unit on 12 $\frac{1}{4}$ " panel for standard rack mounting.

**Mounting:** Rack, Console, or Portable Cases.

**Meter Control Panel** available at extra cost with features outlined below:

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

Output step control will adjust level up to +8 V.U. regardless of tape level — 600 ohm or 150 ohm balanced or unbalanced line.

V.U. meter will meter playback output while recording or playing back.

Output key (line or cue).

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

# UNPACKING AND INSTALLING

1. Open packing case carefully and save it. In the event of possible shipping damage the case may be needed for return shipment.
2. Examine electronics chassis and see that the rubber mountings have not been damaged. A properly mounted chassis floats freely on the rubber cushions.
3. Unpack the interconnecting cables and install. The twelve conductor cable connects the mechanical and electronic units. See Fig. 1 and Fig. 9 for location of plugs.
4. Unpack the tubes and install them in their respective sockets. **WARNING! BE VERY CAREFUL WITH THE 12SJ7 TUBE AS IT IS HAND SELECTED FOR LOW NOISE AND MAY BE DAMAGED BY CARELESS HANDLING.** See ELECTRONICS SPECIAL CONSIDERATIONS, II, before turning on power.
5. Release capstan drive motor shipping binding. This is the wire which holds the motor away from the rubber-tired flywheel. Do not make any adjustments on the drive system at this time. No adjustments need be made unless damage has occurred during shipping.
6. Connect input and output circuits to the machine. See ELECTRONICS OPERATION.
7. Connect power cord to 115 V., 60 cycles A.C. only.
8. The capstan speed should be checked with the stick-on stroboscope provided. Place stroboscope on capstan shaft with sticky side down and view rotating shaft under 60 cycle light. If the speed is not correct the spokes will appear to rotate. Slight speed changes can be realized by change in capstan drive motor pressure. This adjustment is at spring D, Fig. 1 on the motor solenoid draw bar. Increasing pressure will slow the capstan, decreasing pressure will speed the capstan. Adjust for no rotation of the stroboscope spokes.
9. Load the left hand reel holder with tape and thread as shown in Fig. 5. Be sure the tape used has the oxide-coated side toward the rear of the machine; i.e., toward the head faces.
10. A reel hold-down or editing knob should be placed on each reel spindle and pushed down firmly. To remove the hold-down, raise the tongue on the side of the knob with the finger and lift off. Do not touch the tongue when placing the hold-down on.

The machine is now ready to operate.

## MECHANICAL OPERATION

When the machine is ready to operate, turn on the power switch, see Fig. 5. This turns on the amplifiers and control circuits. The capstan drive will also start if the tape has been threaded, as the takeup tension arm operates a switch which shuts the motors off when the tape runs out. Pushing the Start button will now start the tape moving according to the mode selected on the Play, Rewind, Fast Forward control. In the Play position the tape will be reproduced at the output terminals. Pushing the Record button will permit an input to the machine to be recorded on the tape with almost simultaneous playback of the new program. Pushing the Stop button will stop the machine and turn off the recording amplifier; therefore, one must always push the Start and Record buttons, in that order, to record. The mode selector switch allows transfer from Play to Rewind or Fast Forward without pushing the Start button when switching. This helps greatly in editing and segueing. However, when going from Rewind to Play, the machine shuts off and the Start button must be used to restart the tape motion.

If, when the tape is running in Play, it is desired to accelerate or slow the tape it may be done as follows:

**To Slow the Tape:** Hold the Start button down and push the Stop button for the length of time desired. Upon releasing the Stop button the tape is again up to speed.

**To Accelerate the Tape:** Move the selector to the Fast Forward position. Return to Play when desired.

These two motions are useful when cueing, segueing or synchronizing programs. This can only be accomplished by reason of the rapid start feature incorporated in this machine.

# ELECTRONIC OPERATION

(WHEN SET UP AS IN ELECTRONIC ALIGNMENT)

## I. Machine Without Meter Control Panel:

A. Feed machine with  $+ 4$  V.U., machine output  $+ 4$  V.U., see Fig. 10C.

## II. Machine With Bridging Input Meter Control Panel:

A. See Fig. 10A.

B. Level is set by adjusting Playback Level step control to 14, and adjusting Record Level step control until output level meter reads  $+ 4$  V.U. operating level.

C. Input level must be greater than  $-10$  V.U.

D. On Playback, any tape from any machine can be played back at  $+ 4$  V.U. by adjusting Playback step control.

## III. Machine With Matching Input Meter Control Panel:

A. See Fig. 10B.

B. For inputs equal or greater than  $+ 4$  V.U.:

Adjust Record Level step control for program level on meter switched to input or for program level on meter switched to output of playback with playback set as in II.

C. For inputs less than  $+ 4$  V.U.:

Adjust R101 with Record step control wide open and meter on playback as in II.

# ELECTRONIC ALIGNMENT

The following alignment procedure has been executed at the factory prior to shipping. No further adjustments should be necessary unless alterations occur in shipment or as required by routine maintenance.

A standard tape is available for alignment purposes and contains the following frequency run recorded at 15" per second:

1 Kc for level adjustment (recorded 10 db. below recommended operating point).	
15 Kc	6400 cycles
14 "	3200 "
13 "	1600 "
12 "	800 "
11 "	400 "
10 "	200 "
9 "	100 "
8 "	70 "
	50 "

## I. (A) Alignment of Playback Circuits on Machines Without Meter Control Panel— Must Be Performed in Order Indicated:\*

1. Thread standard tape on machine.
2. Connect 600 ohms termination on output with your program VI meter across termination.
3. Turn on A.C. power.
4. Set machine in PLAY position and 15 inch speed and push Start button.
5. Adjust output of 1 Kc. tone with Playback gain control R213 to read operating level on your meter.
6. Align playback head (see HEAD ALIGNMENT) on 15 Kc. tone for maximum output.
7. Adjust Playback HF Equalizer C205 for flat overall response ( $\pm 2$  db. 50 cycles to 15,000 cycles).
8. Set playback level 10 db. lower because standard tape level is 10 db. below operating level.

## (B) Playback Electronic Alignment With Bridging or Matching Meter Control Panel:

1. Thread standard tape on machine.
2. Turn on A.C. power.
3. Set Playback Level control to 4. (This allows you to make frequency runs at operating level on meter instead of  $-10$  d.b.)
4. Start tape.
5. Adjust R213 (now on panel) so panel VI reads 0 on 1 Kc. test tone.
6. Align playback head gap on 15 Kc. tone. (See HEAD ALIGNMENT.)
7. Adjust Playback Equalizer (C205) for flat response.
8. Set Playback Level control at 14. (This drops amplifier gain 10 db. for normal operation.)

## II. Alignment of Record Circuits (After Playback Alignment) — With or Without Meter Control Panel:

### 1. PRELIMINARY

#### A. Units without Meter Control Panel:

Connect monitor amplifier, 600 ohms termination, and meter on output of Playback.

#### B. Units with Meter Control Panel:

Connect monitor amplifier and termination to Meter Control Panel Line Out terminals, and set Line Cue switch on line.

A. & B. Place blank reel of M.M.M. 111 tape on machine and set into operation on the 15 inch per second Record position.

\*NOTE: All step controls located on Meter Control Panel.

## 2. NOISE TEST:

Detach record cable from Record Amplifier. Place a 1 microfarad condenser across 600 ohm output termination on playback amplifier. This is to remove 70 Kc. components from noise measurements. Noise should read 40 db. below standard tape level (50 db. below operating level). If noise is too high and is crackling in nature, demagnetize heads — especially playback head (see HEAD DEMAGNETIZATION). Noise can be measured by using a Hewlett-Packard noise and distortion analyzer, VTVM type 400 A, or any approved method. (If noise with machine standing is higher than above, check input tube of Playback Amplifier.)

## 3. ERASE ADJUSTMENT:

It should not be necessary to make this adjustment except at rare intervals because of the high degree of stability of the oscillator circuits. Do not make this adjustment unless erase head will not erase previous program. Do not readjust erase to attempt to eliminate crackling tape noise, as the erase current does not produce crackling even if out of adjustment. If adjustment is indicated, the following procedure must be taken:

- A. Pull out Erase Cable from Record Chassis plug (J103P).
- B. Make adapter plug by inserting 10 ohm resistor in series with ground side of erase cable.
- C. Insert adapter in J103P, insert cable into adapter.
- D. Place VTVM such as Hewlett-Packard 400A across 10-ohm resistor. Set on 3 volt scale. Full scale will read 300 Ma. record current.
- E. Loosen Erase Trimmer C120 for minimum capacity and slowly increase capacity until meter indicates 200 Ma. erase current. The erase is now properly adjusted.

## 4. BIAS ADJUSTMENT:

- A. Plug in record head.
- B. Remove 1 microfarad condenser from output.
- C. Connect audio oscillator to input of machine. Turn oscillator on and set to 1 Kc.
- D. Set record level so that it reads approximately standard tape level.
- E. Turn Bias Control (R126) fully counter-clockwise. Then turn in a clockwise direction slowly (increasing bias), until the 1 Kc. tone is recorded at its highest level. Increase further until 1 Kc. drops 2 db. in level. This is the correct bias adjustment.

## 5. RECORD NOISE ADJUSTMENT (D.C. BALANCE):

- A. Replace 1 microfarad condenser across 600 ohm termination on playback output.
- B. Remove audio oscillator from input and short record input terminals.
- C. Adjust Noise Balance control (R117) until crackling disappears. If noise is not at least 40 db. below standard tape level (50 db. below operating level), demagnetize playback head and record head.

## 6. RECORD EQUALIZER:

- A. Remove 1 microfarad condenser from playback output.
- B. Reconnect audio oscillator to input of Record Amplifier.
- C. Adjust Record Level (R101) so that standard tape level is effected on output of playback amplifier. This is the level at which all frequency response measurements should be made in order to prevent tape saturation.
- D. Set oscillator at 15 Kc. and align record head for maximum output. (See HEAD ALIGNMENT.)
- E. In order that frequency runs not be made on the insensitive range of the VI meter, playback gain may be raised 10 db. and returned to normal after run as in I.
- F. Sweep the oscillator across audio spectrum and adjust Record H.F. Equalizer C103 on Record Chassis for flat response ( $\pm 2$  db., 50 - 15,000 cycles) as read on playback output.

## 7. RECORD LEVEL ADJUSTMENT:

In all cases, connect audio oscillator to the input of the machine and adjust level to +4 V.U. program level at 1 Kc. On machines with a Meter Control Panel, the input of the machine is at the Line In terminals on the Meter Control Panel terminal strip.

### A. *Units without Meter Control Panel:*

With machine running at 15 inch speed in Record, set Record Level control (R101) so that correct operating level is read on playback.

### B. *Units with matching Meter Control Panel:*

Same as A. with Record Level step control wide open.

### C. *Units with bridging Meter Control Panel:*

Same as A. with Record Level step control set at 14. When adjusted in this manner, proper record level can be obtained from a -10 V.U. line by turning the Record Level step control on the Meter Control Panel wide open.



# ELECTRONICS SPECIAL CONSIDERATIONS

**I.** Do not remove any tube from the Record Amplifier while the machine is recording, as the record head may become magnetized. Should this occur it will be necessary to demagnetize same.

**II. Warning!** The input tube in the playback amplifier is D.C. heated by returning the B supply through its heater. F101 (fuse) is selected to protect the input tube against abnormal heater surges. A101 (Neon indicator) will light in the event of failure of the playback input tube heater or the  $\frac{1}{4}$  ampere protective fuse F101. **SHOULD THIS HAPPEN, THE CAN OF THE INPUT CONDENSER C113 WILL BE AT A HIGH POTENTIAL WITH RESPECT TO GROUND AND FOR THIS REASON IS PAPER COVERED. C113 SHOULD THEREFORE BE REPLACED ONLY WITH CONDENSERS HAVING INSULATED COVER.** F101 and A101 are located on top of Record Amplifier and Power Supply Chassis. **DO NOT REMOVE INPUT TUBE WITH POWER ON**, as damage to C114 may result. **DO NOT REPLACE F101 WHILE NEON BULB IS LIGHTED**, or fuse will blow.

## **III. Setting of Bleeder Resistor R120:**

The current through the high voltage supply is 145 Ma.

During Playback, pole 3 of Record relay K101 transfers the B supply from the Erase oscillator circuit to bleeder resistor R120 (located on underside of Record Amplifier and Power Supply Chassis), which should be adjusted to maintain the same current in playback as when recording.

## **IV. Dummy Plugs:**

There are two plugs type A567 which have pins 1 and 2 jumpered and also pins 7 and 8 jumpered. These plugs must be used in order for the machine to operate properly. The first must be plugged in the Remote Control Socket located on the Power Outlet Panel underneath the top plate (Fig. 1). The second plugs in socket J105S located on the top rear of the Record and Power Supply Chassis, which is clearly marked in Fig. 9. The latter of these plugs is to be removed only in the event of connection to this power supply of the AMPEX mixer pre-amplifier used on the portable model. The former is to be removed only in the event that a remote control cable is used, and then this in turn must be left in the socket.

## **V. Playback Cable:**

Do not attempt to lengthen or change playback cable for any reason because cable capacity is used to resonate the playback head. Serious frequency discrimination will occur if this is disregarded.

**VI.** When disconnecting any solenoid or motor, observe polarity of the leads, as all leads have been arranged so as to produce the minimum hum fields.

## HEAD HOUSING

The head housing, see Fig. 5, is a die cast assembly which contains the three heads used in the recording process. The heads are respectively erase, record and playback as viewed from left to right when facing the machine. The gate on the housing holds the playback and record shield covers and the tape-lifting fingers. The function of the tape-lifting fingers is to remove the tape from the heads when the gate is open during Rewind or Fast Forward operation. This reduces head wear considerably. The tape may leave a deposit on the heads if allowed to contact them at high speeds. Such a deposit will seriously impair the performance of the machine and should be guarded against by always opening the gate on Fast Forward and Rewind. If a deposit is left, it may be easily removed with carbon tetrachloride on a soft rag. Never use metal of any kind to touch the head surfaces.

## HEAD ALIGNMENT

Remove the top cover from the head housing by removing the two screws from the top of same, and pulling cover gently back and up.

Looking at the head housing from the front, the three heads from left to right are: erase, record and playback.

The azimuth angle of the erase head requires no adjustment, and should not be touched.

The record and playback heads should be aligned only after reading and fully understanding the procedure under ELECTRONICS ALIGNMENT.

The actual physical alignment of the record and playback heads consists of placing a  $\frac{1}{4}$ " spintite socket wrench on the left hand elastic stop nut in each head and adjusting back and forth until the proper azimuth angle is arrived at. This is accomplished by first playing the standard tape and adjusting the playback head until maximum response is obtained on the 15,000 cycle tone. The record head is then aligned with the playback head by recording 15,000 cycles on a blank tape, and adjusting the record head for maximum playback output.

## HEAD DEMAGNETIZATION

Occasionally the heads become magnetized through some electrical fault which may occur in the amplifiers or by coming into physical contact with a magnetized object. In order to demagnetize these heads completely in such events, a demagnetizer should be used. A demagnetizer suitable for this purpose is manufactured by AMPEX as an accessory item. In the event, however, that time does not permit the owner of the machine to wait for delivery of a demagnetizer, he may make one as follows: Cut a piece of transformer lamination to a  $\frac{1}{4}$ " x 2" size. Wrap the strip of metal with suitable insulating material and wind approximately 400 turns of No. 36 wire and attach a 4' length of 2 connector cord. Bend the iron strip into a "U" shape and bring the ends of the "U" to a spacing of  $\frac{1}{4}$ ". Connect to a 6 volt source of A.C., open the gate on the head housing and bring the ends of the "U" in contact with the 2 poles on the magnetized head. Remove the demagnetizer very slowly, allowing the A.C. field to die off gradually. Repeat this operation on record and playback heads only, as the erase head will demagnetize itself. In the event demagnetization is not effected, repeat the process more carefully.

The capstan may become magnetized by contact with a magnetized tool. Should this occur it may be demagnetized with an A.C. solenoid placed over the shaft and slowly pulled away.

# DRIVE SYSTEM

The drive system employs three motors. Two induction motors with solenoid operated brakes are used for take-up and rewind. These motors are shown in Fig. 7 and require no service attention! The torque of these two motors is adjusted at the factory by means of resistors R401, R402 and R403 and should be left alone unless shipping damage to the resistors has occurred. Both motors are adjusted for a tension of 5 to 6 ounces pull on the reel hub in Play. R402 is adjusted for the maximum hold-back tension during Fast Forward and Rewind which will still allow the tape to accelerate when starting with a full reel.

The third motor is the synchronous motor used for capstan drive. If this motor has oil cups it is a sleeve bearing type and requires S.A.E. 30 oil at three month intervals. If motor is a sealed ball bearing motor, no service is required. This motor is mounted on a ball bearing hinge which is moved by a solenoid to engage the motor and the capstan flywheel. The motor is pulled away from the flywheel by spring "A" in Fig. 1. In the rack mounted position the additional spring "B" must be attached.

When the machine is turned on and the tape threaded into position, the solenoid "C" pulls the motor into engagement with the capstan flywheel tire and drives it. The pressure between the motor and flywheel is adjustable at spring "D" and is adjusted to give synchronous speed as described in INSTALLATION.

The capstan shaft has a permanently lubricated ball bearing at the bottom end to take the flywheel load and to maintain a minimum of friction, see Fig. 2. The upper bearing on the shaft is a precision bronze sleeve bearing which permits absolutely true running of the capstan. This bearing must be oiled with S.A.E. 30 motor oil. This should be done every six months, more frequently if desired. To oil: Loosen set screw in dust cap surrounding the capstan shaft just below the tape contact point. Push the rubber idler wheel away from the shaft just enough to allow the cap to be removed. This exposes a felt and neoprene washer which cover the oil hole. Remove these washers and oil through the larger of the two holes exposed. Fill until no more oil will enter! Replace as disassembled.

The mechanism of the capstan idler is operated by solenoid "E" in Fig. 1. Capstan idler pressure is set so that it will just deform the tape if the tape is stopped with the hand while the machine is running. This pressure is adjusted at point "F" in Fig. 1. A drop of oil on all bearing surfaces of this mechanism at six month intervals is recommended, but not essential. **WARNING!** Under no conditions should any oil be allowed to come in contact with the rubber surfaces of the capstan idler and flywheel.

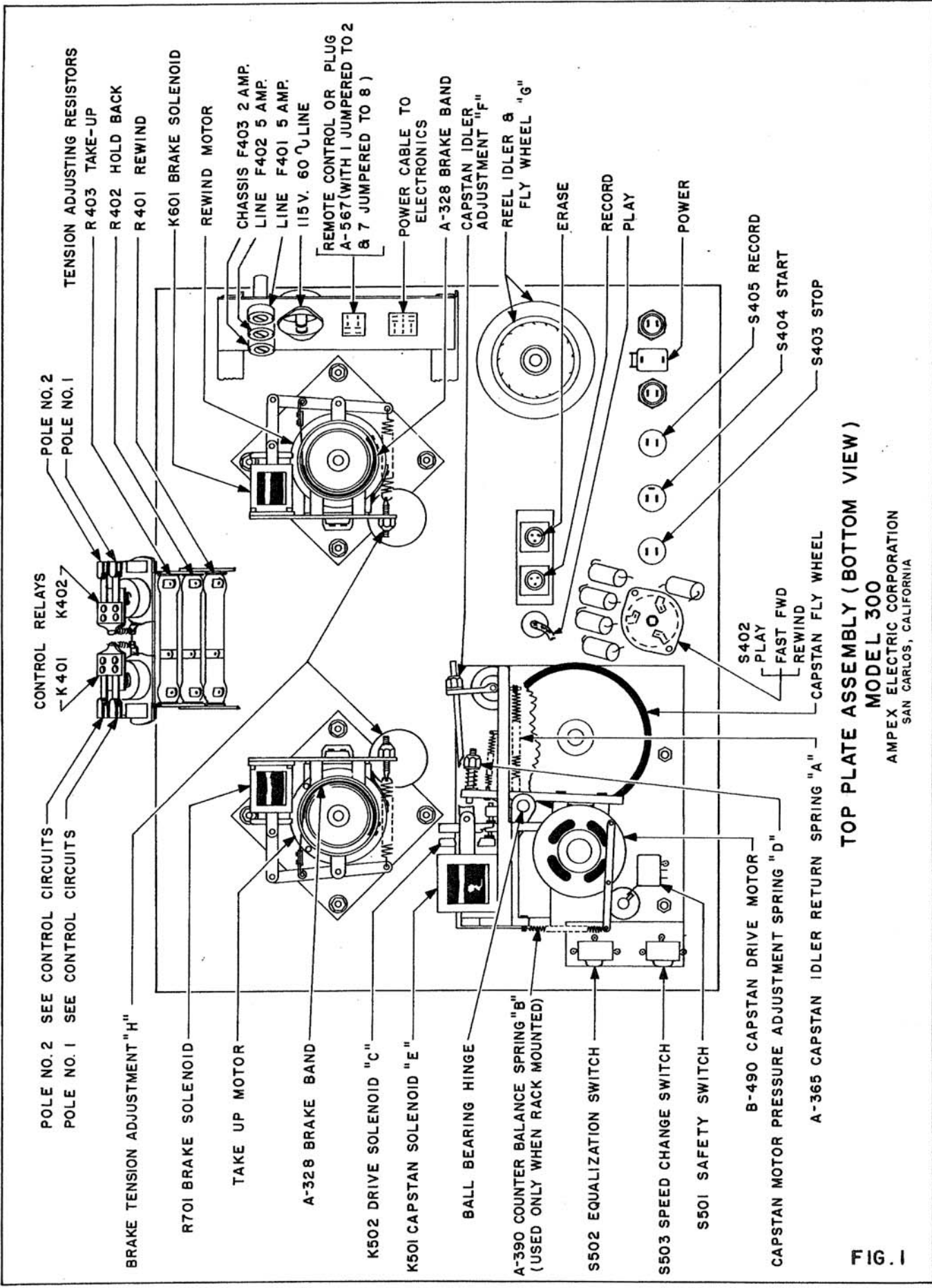
The reel idler is shown in Fig. 1 at "G". This shaft has two single shielded ball bearings which are lubricated at the factory and should not need oil more frequently than twice a year. If more frequent oiling seems advisable they may be oiled as follows: Remove fan and flywheel by loosening set screws in each respectively. Remove spanner nut holding bearing housing in top plate and remove housing. The shaft may now be pulled out of the housing allowing oil to be applied to the bearings. Apply one drop of Lubriplate No. 4 to each bearing. The top bearing is oiled by dropping the oil through the hole in the lower bearing while holding the housing upside down. The lower bearing may be oiled in a reverse manner. Reassemble, being sure to leave very slight freedom between lower bearing and flywheel so the bearings do not bind. For positioning, see Fig. 3.

The mechanical brakes on the rewind and takeup motors ordinarily require *no* adjustments. Should trouble occur which appears to be due to faulty braking, the tension may be adjusted. The only adjustment on the brakes is performed by adjusting tension at "H" in Fig. 1. If machine throws a loop of tape on stopping, the trailing reel brake tension is too low, or if it breaks the tape the tension is too high. However, unless tampered with, the adjustment should be permanent until such time as the brake bands wear out.

Daily attention should be given to cleaning of the following:

1. Capstan shaft
2. Head faces
3. Tape guides

Clean all surfaces of the above with carbon tetrachloride applied with a soft cloth.



POLE NO. 2 SEE CONTROL CIRCUITS  
 POLE NO. 1 SEE CONTROL CIRCUITS

CONTROL RELAYS  
 K 401  
 K 402

TENSION ADJUSTING RESISTORS  
 R 403 TAKE-UP  
 R 402 HOLD BACK  
 R 401 REWIND

POLE NO. 2  
 POLE NO. 1

BRAKE TENSION ADJUSTMENT "H"  
 R701 BRAKE SOLENOID

TAKE UP MOTOR

A-328 BRAKE BAND

K502 DRIVE SOLENOID "C"

K501 CAPSTAN SOLENOID "E"

BALL BEARING HINGE

A-390 COUNTER BALANCE SPRING "B"  
 (USED ONLY WHEN RACK MOUNTED)

S502 EQUALIZATION SWITCH

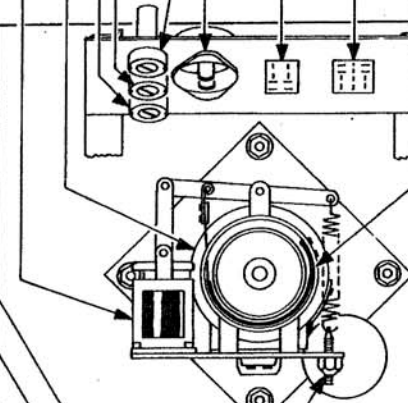
S503 SPEED CHANGE SWITCH

S501 SAFETY SWITCH

B-490 CAPSTAN DRIVE MOTOR

CAPSTAN MOTOR PRESSURE ADJUSTMENT SPRING "D"

A-365 CAPSTAN IDLER RETURN SPRING "A"



CHASSIS F403 2 AMP.  
 LINE F402 5 AMP.  
 LINE F401 5 AMP.  
 115V. 60 Hz LINE

REMOTE CONTROL OR PLUG  
 A-567 (WITH 1 JUMPERED TO 2  
 & 7 JUMPERED TO 8)

POWER CABLE TO  
 ELECTRONICS

A-328 BRAKE BAND

CAPSTAN IDLER  
 ADJUSTMENT "F"

REEL IDLER &  
 FLY WHEEL "G"

ERASE

RECORD

PLAY

POWER

S405 RECORD

S404 START

S403 STOP

S402  
 PLAY  
 FAST FWD  
 REWIND

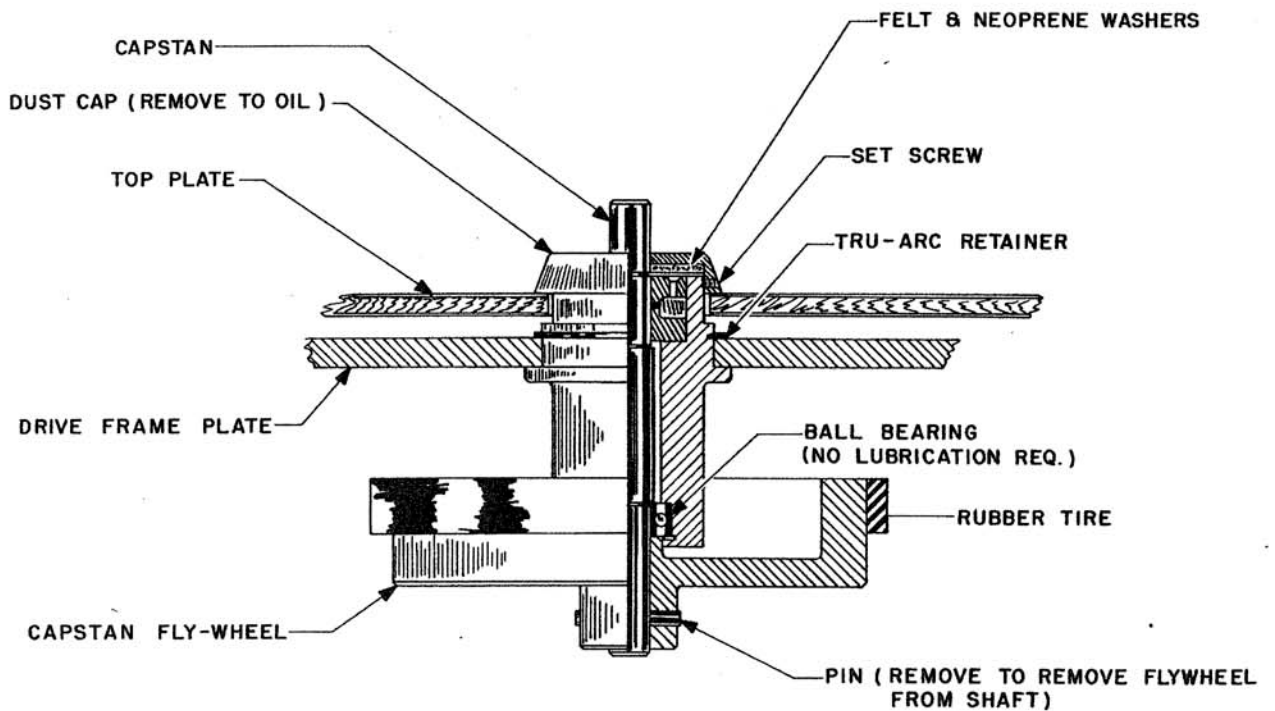
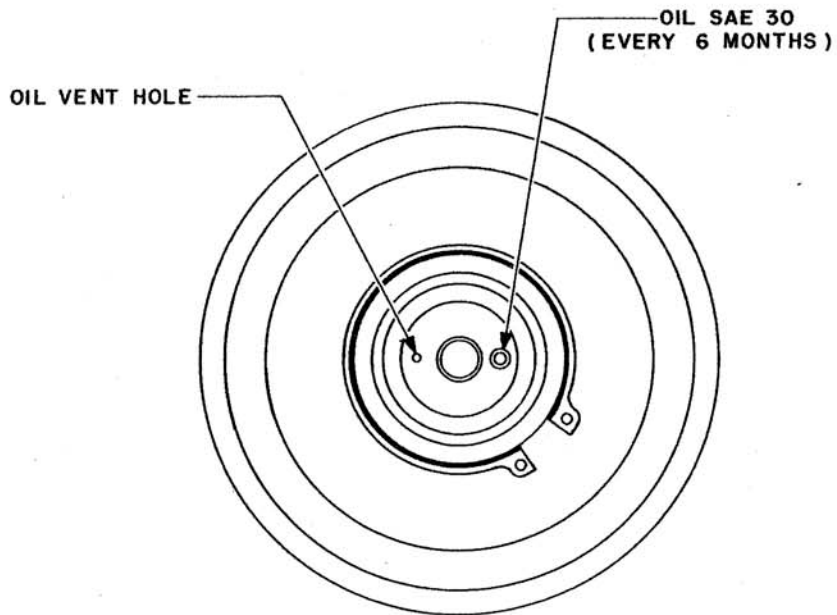
CAPSTAN FLY WHEEL

TOP PLATE ASSEMBLY (BOTTOM VIEW)

MODEL 300

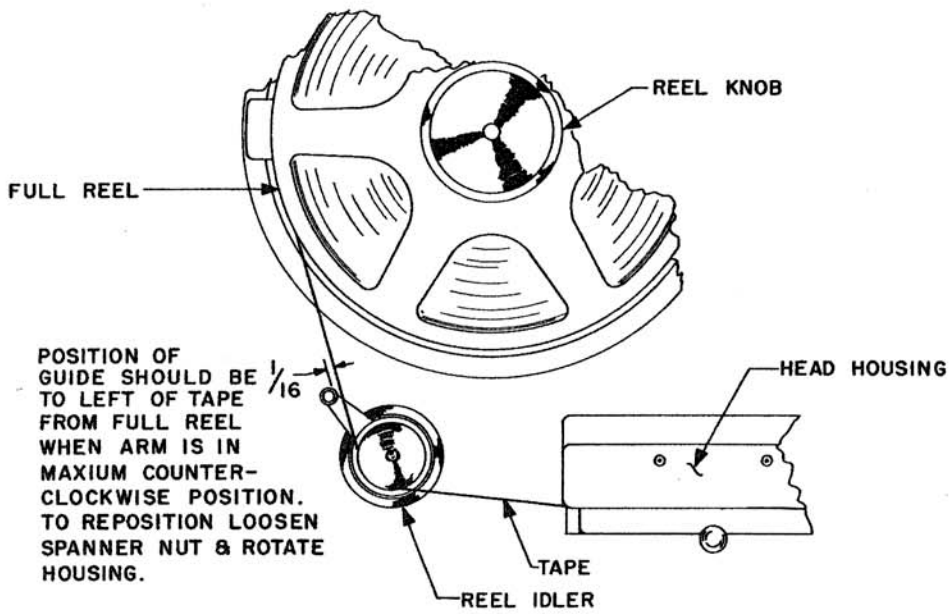
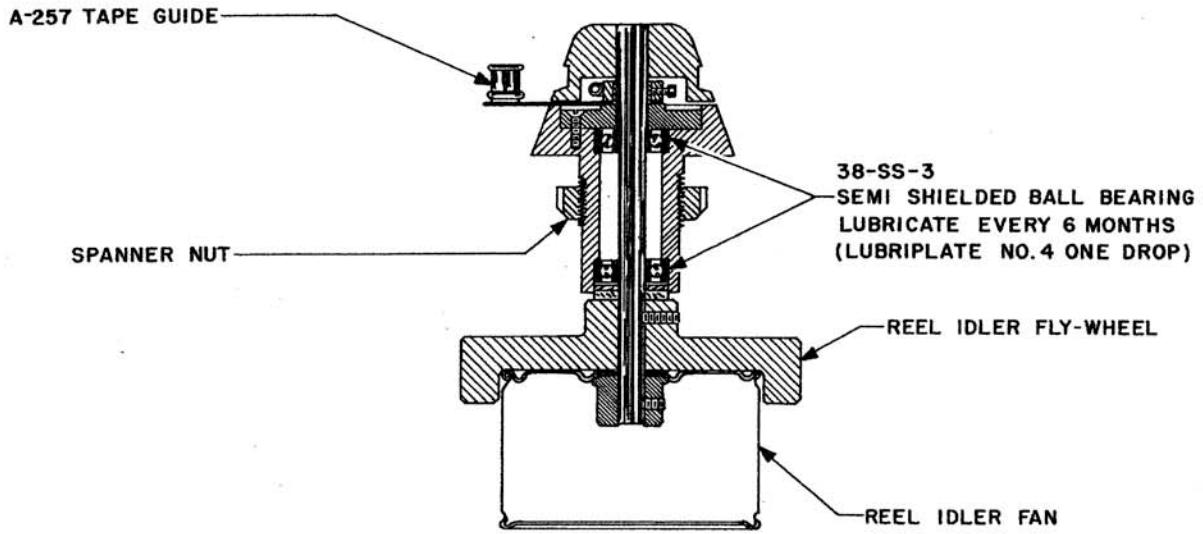
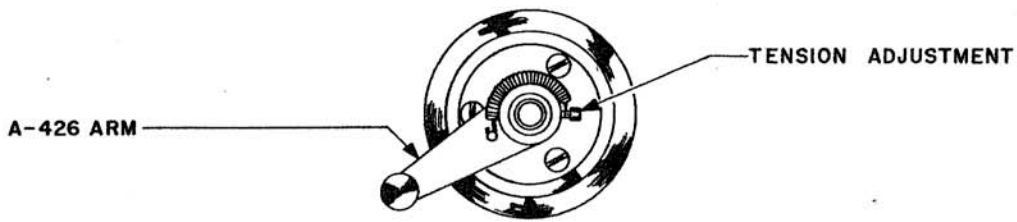
AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA

FIG. 1



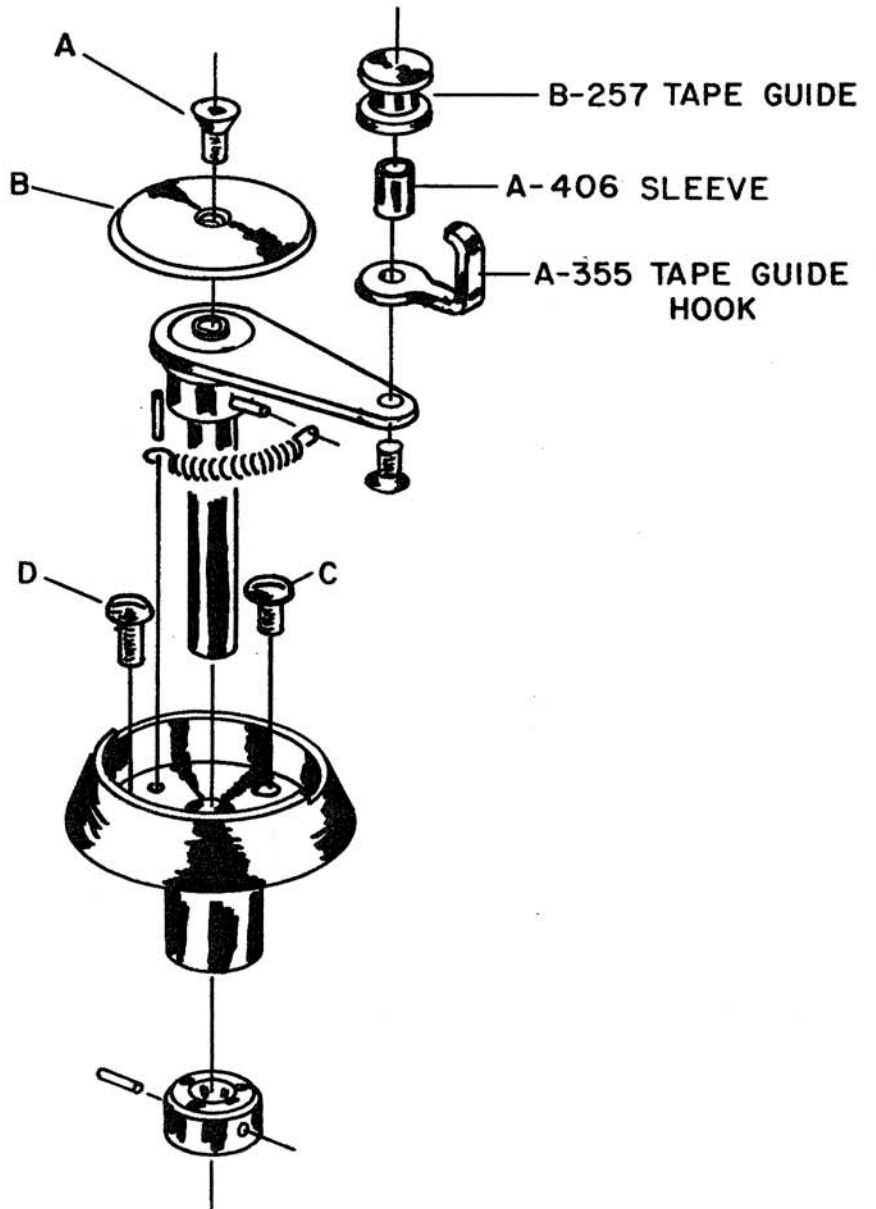
C-366  
 CAPSTAN ASSEMBLY  
 MODEL 300  
 AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA

FIG. 2



**MP-354**  
**REEL IDLER ASSEMBLY**  
**MODEL 300**  
 AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA



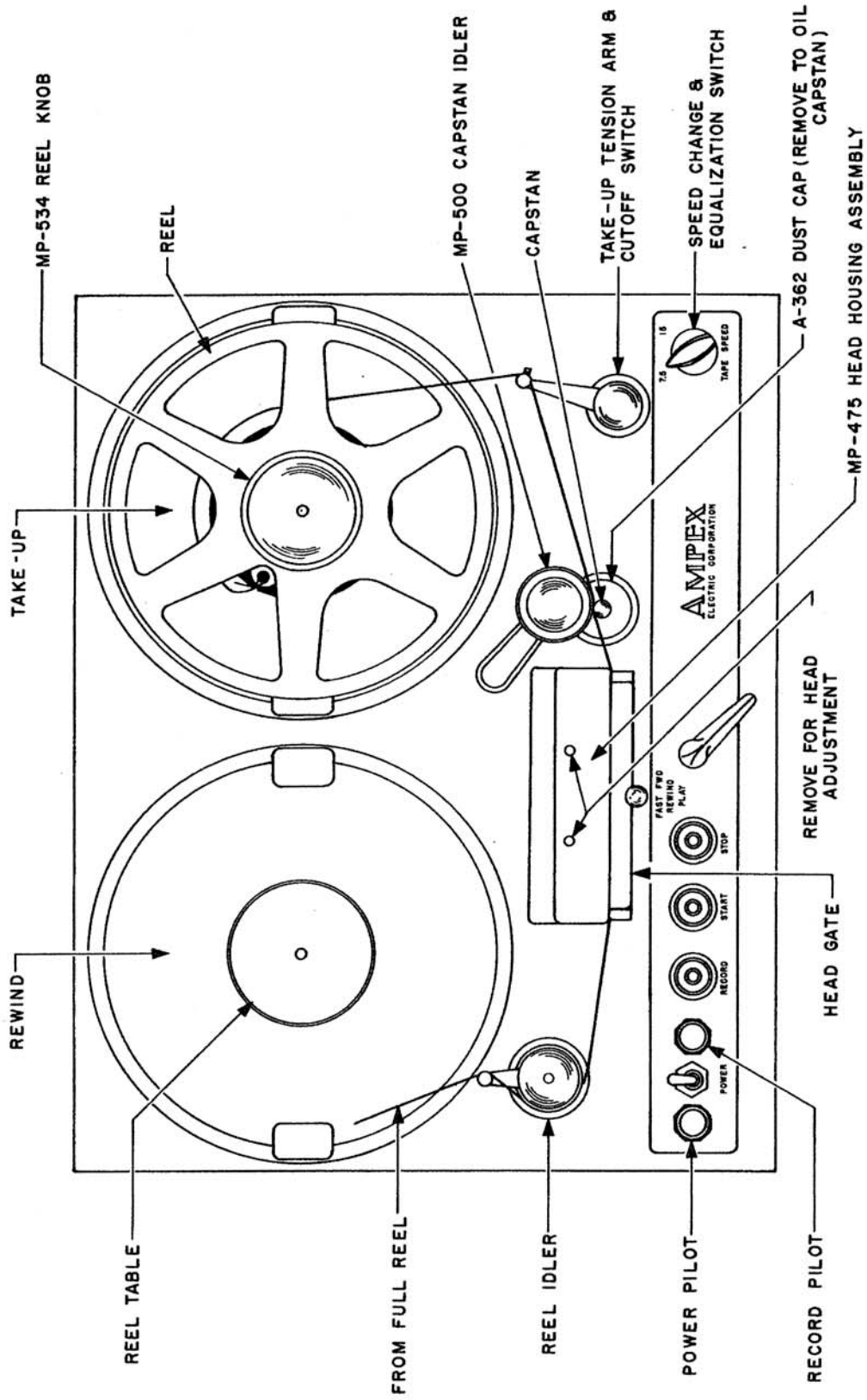


TO REMOVE ASSEMBLY FROM TOP PLATE REMOVE  
SCREW A, DISC B & SCREWS C & D. LIFT OUT.

DO NOT OIL ASSEMBLY

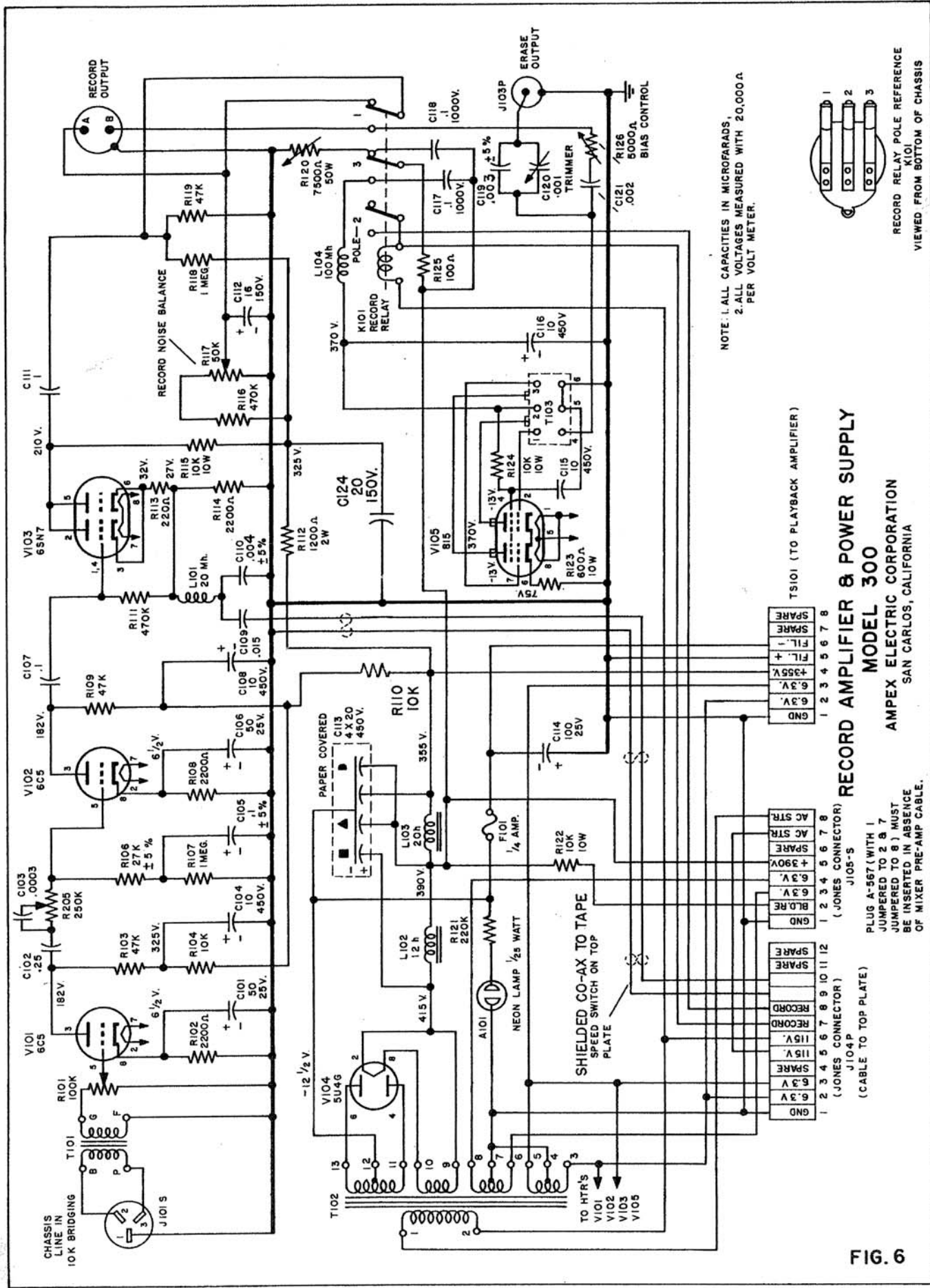
MP-425  
TAKE-UP TENSION ARM ASSEMBLY  
MODEL 300  
AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

FIG. 4

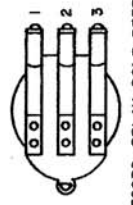


**MP-511**  
**TOP PLATE ASSEMBLY (TOP VIEW)**  
**MODEL 300**  
 AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA

**FIG. 5**



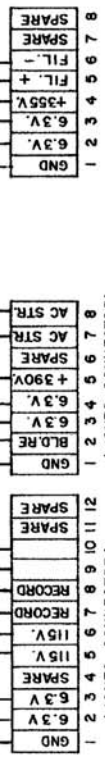
NOTE: 1. ALL CAPACITIES IN MICROFARADS.  
 2. ALL VOLTAGES MEASURED WITH 20,000 Ω PER VOLT METER.



RECORD RELAY POLE REFERENCE  
 VIEWED FROM BOTTOM OF CHASSIS

### RECORD AMPLIFIER & POWER SUPPLY MODEL 300

AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA



PLUG A-567 (WITH 1 JUMPERED TO 2 & 7 JUMPERED TO 8) MUST BE INSERTED IN ABSENCE OF MIXER PRE-AMP CABLE.

FIG. 6

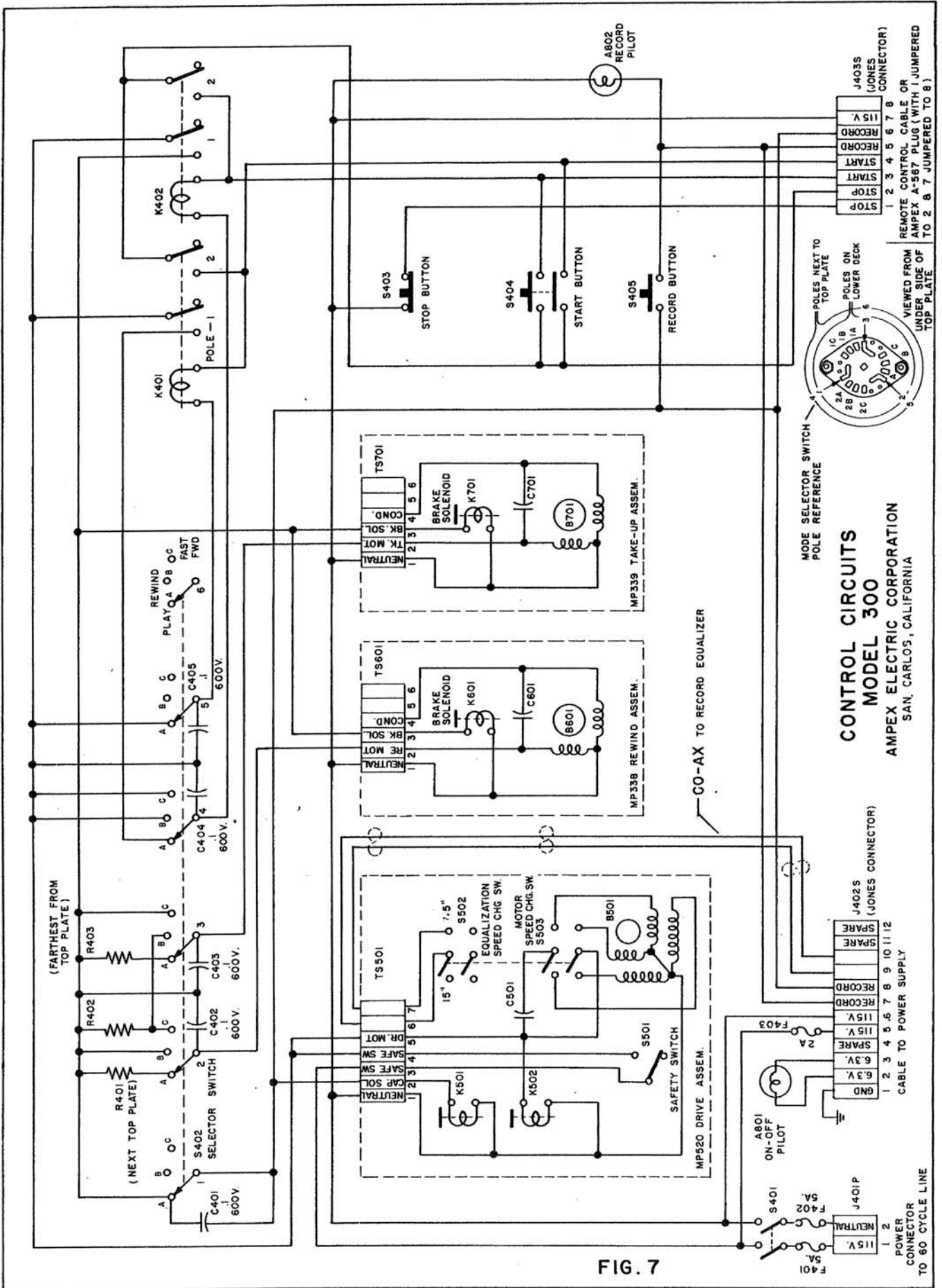
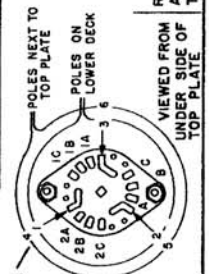


FIG. 7

**CONTROL CIRCUITS  
MODEL 300**

AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA



J402S (JONES CONNECTOR)  
SPARE  
SPARE  
RECORD  
RECORD  
RECORD  
115V  
115V  
SPARE  
6.3V  
6.3V  
GND

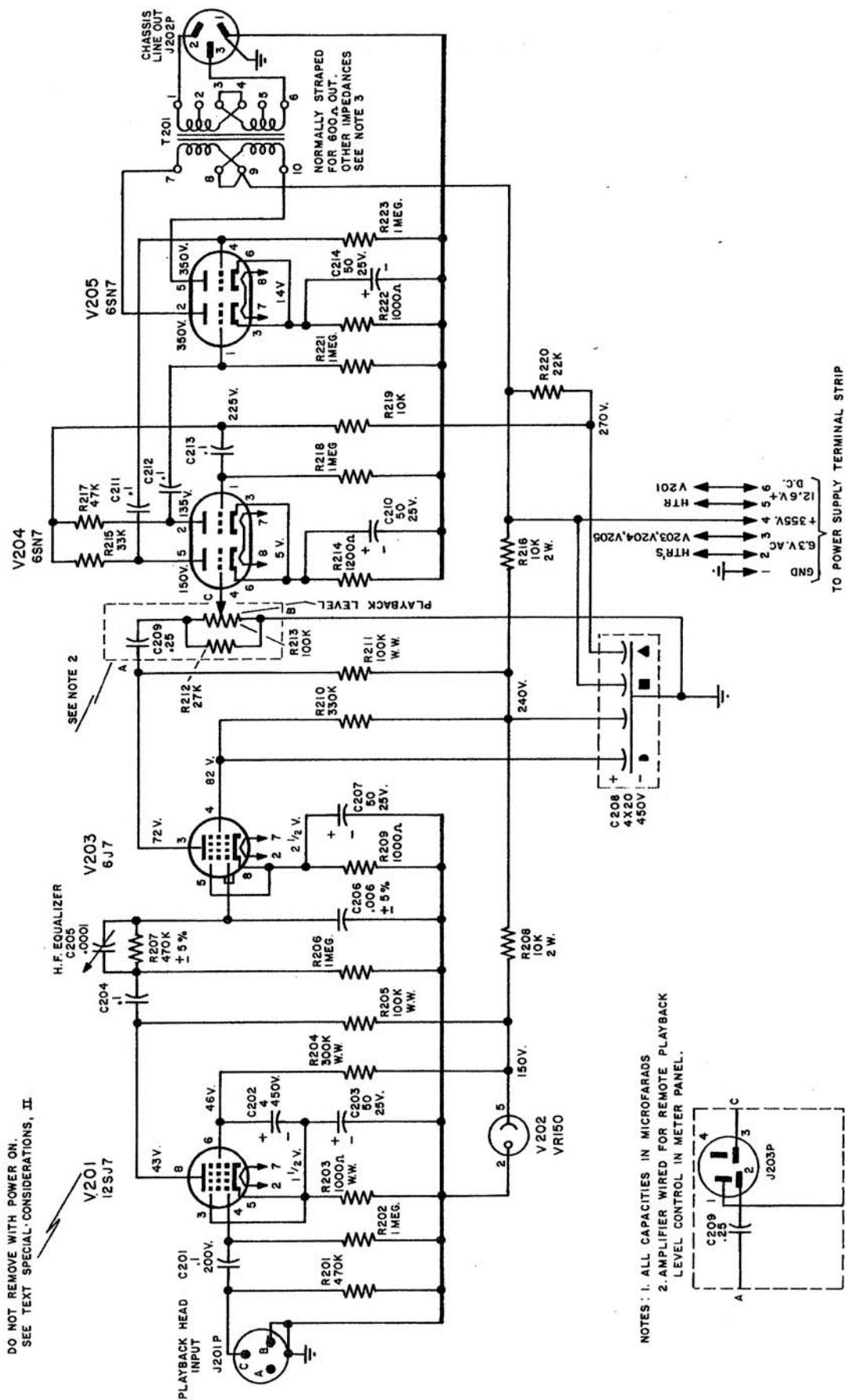
CABLE TO POWER SUPPLY  
1 2 3 4 5 6 7 8 9 10 11 12

J401P  
NEUTRAL  
115V  
F401  
5A  
F402  
5A  
S401

POWER CONNECTOR TO 60 CYCLE LINE

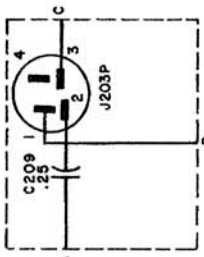
CO-AX TO RECORD EQUALIZER

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



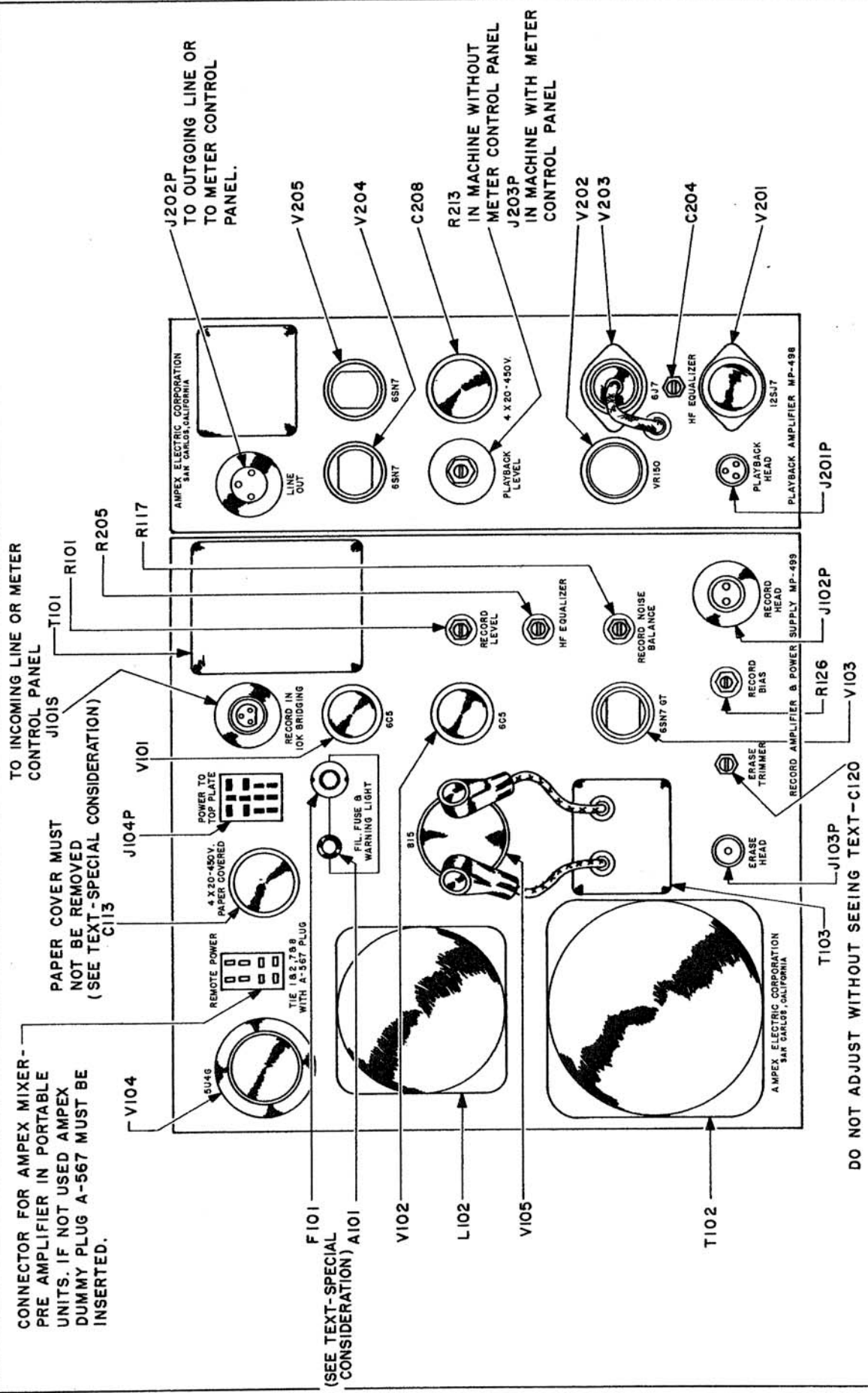
**PLAYBACK AMPLIFIER  
MODEL 300**  
AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

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



**ELECTRONICS CHASSIS (TOP VIEW)**  
**MODEL 300**  
 AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA

DO NOT ADJUST WITHOUT SEEING TEXT-C120

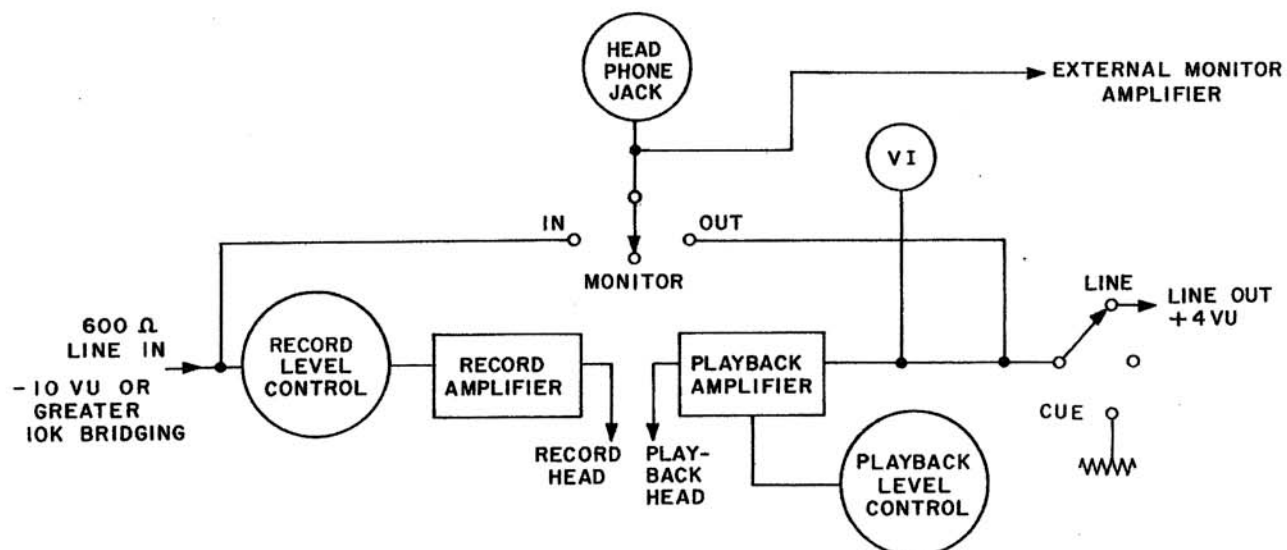
CONNECTOR FOR AMPEX MIXER-  
PRE AMPLIFIER IN PORTABLE  
UNITS. IF NOT USED AMPEX  
DUMMY PLUG A-567 MUST BE  
INSERTED.

PAPER COVER MUST  
NOT BE REMOVED  
(SEE TEXT-SPECIAL CONSIDERATION)  
C113

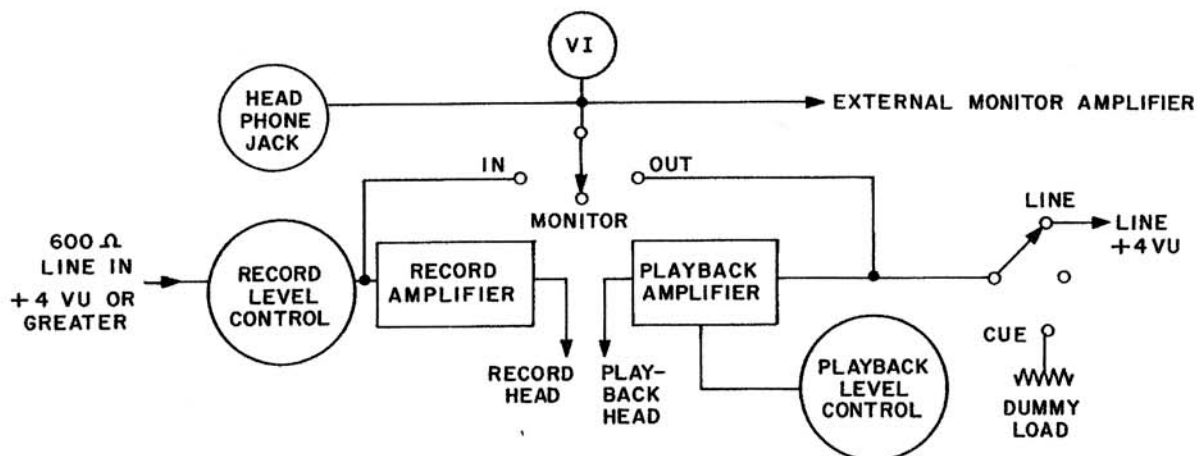
REMOTE POWER  
TIE 18, 17, 16  
WITH A-567 PLUG

POWER TO  
TOP PLATE  
PAPER COVERED

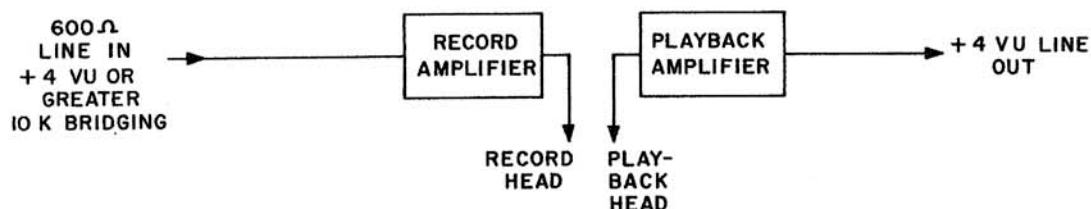
(SEE TEXT-SPECIAL  
CONSIDERATION) A101



(A) LAYOUT FOR BRIDGING METER CONTROL PANEL



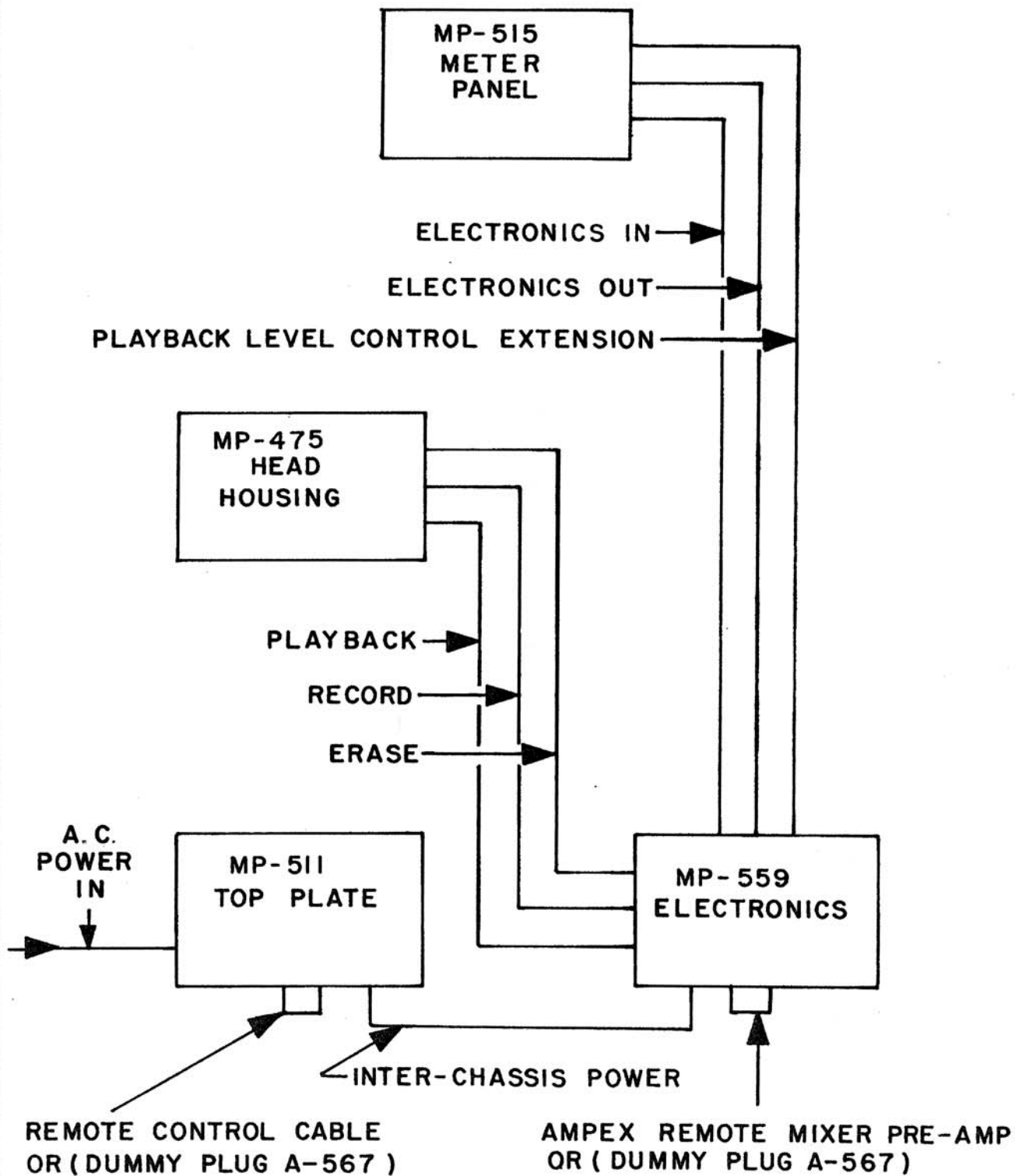
(B) LAYOUT FOR MATCHING METER CONTROL PANEL



(C) LAYOUT OF ELECTRONICS WITHOUT METER CONTROL PANEL

NOTE: 1. SCREW DRIVER GAIN SETS ON RECORD & PLAYBACK AMPLIFIER CHASSIS WILL ADJUST FOR INPUT LEVELS OF -20 VU TO +8VU & OUTPUT LEVELS FROM 0 TO +8VU.  
 2. ALL ABOVE UNITS MOUNTED ON METER CONTROL PANEL ARE ENCLOSED IN CIRCLE.

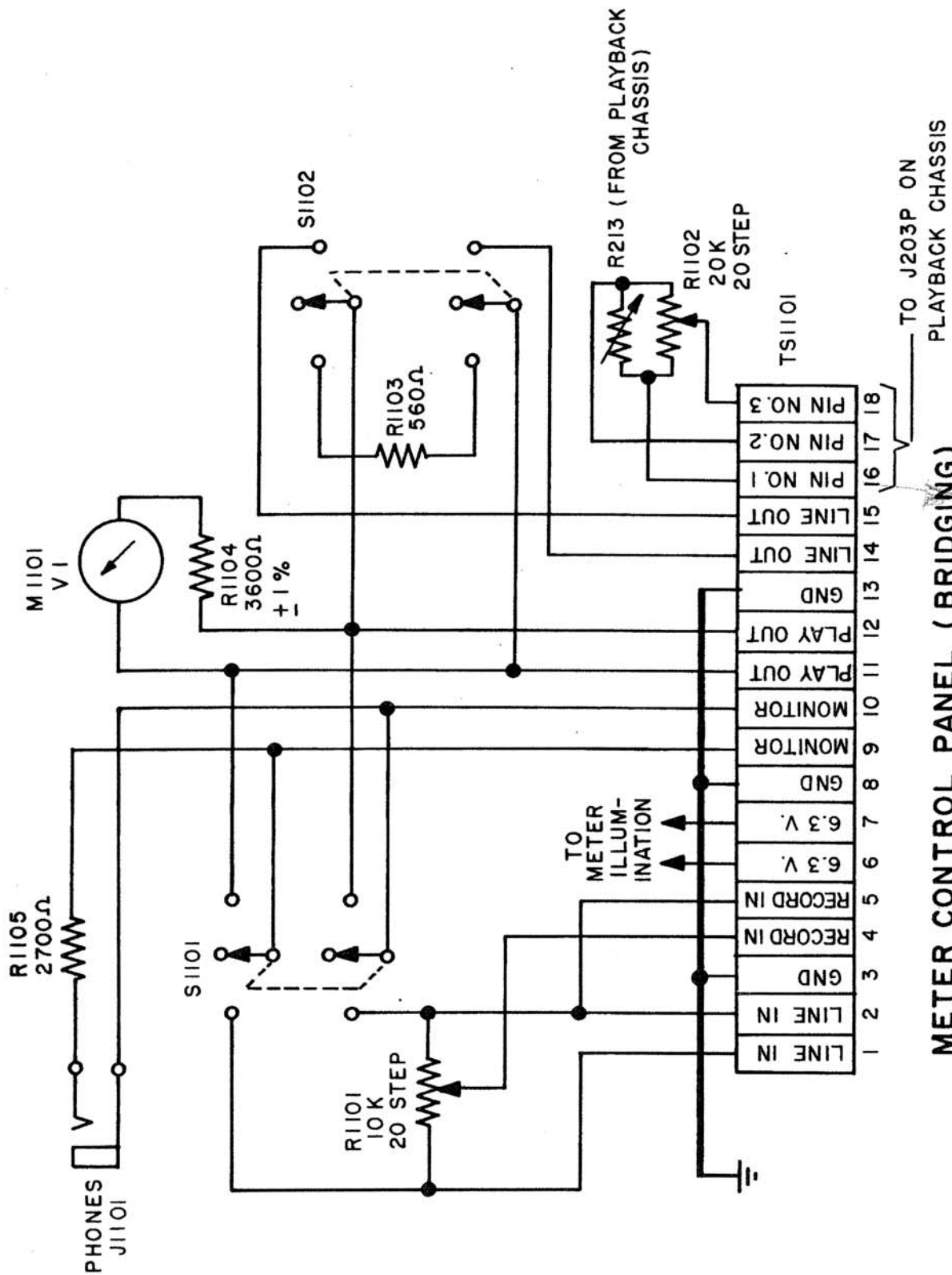
RECOMMENDED LAYOUTS  
 MODEL 300  
 AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA



**INTER UNIT CONNECTION DIAGRAM  
MODEL 300**

AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

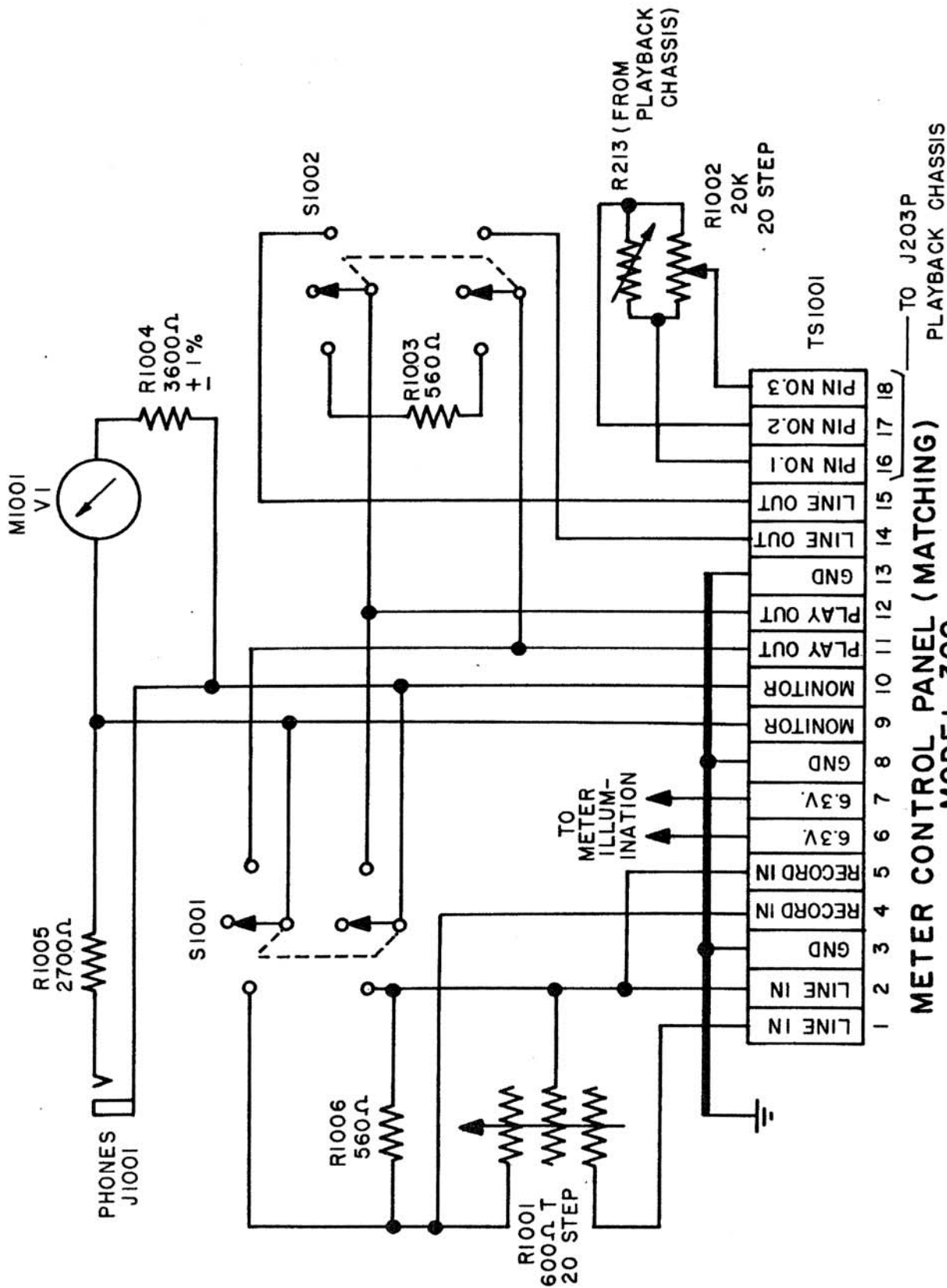




**METER CONTROL PANEL (BRIDGING)**  
**MODEL 300**

AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

FIG. 12



**METER CONTROL PANEL (MATCHING)**  
**MODEL 300**  
 AMPLEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA

FIG. 13

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AMPEX ELECTRIC CORPORATION

HOWARD AVENUE AT LAUREL • SAN CARLOS, CALIFORNIA

22 August 1949

Gentlemen:

Enclosed is SERVICE BULLETIN No. 1 for the AMPEX Model 300 Magnetic Tape Recorder. This is the first in a series of bulletins which we will publish to keep you informed of the latest advances in the art of magnetic recording, and to provide all information possible to keep your Model 300 operating in first class condition.

These will not alone give detailed information of any mechanical or electronic modifications which we have found advisable in models already released, but will also, in so far as possible, review uses and applications for the equipment which are outside of its normal employment.

If at any time you should encounter any operating problems or difficulties with your AMPEX equipment, we would greatly appreciate your calling it to our attention. If the problem is of such a nature as to be of general interest to other Model 300 users, it will be discussed in future service bulletins.

Sincerely yours

AMPEX ELECTRIC CORPORATION

President

AMPoniatoff:fj

SERVICE BULLETIN, NO. 1, MODEL 300

1. Head Magnetization. In order to realize the full dynamic range of type 111 tape, it is extremely important that the heads be free of magnetization. 111 tape is very sensitive to the slightest amount of magnetization on the record head, so that unless care is exercised it is very easy to raise the noise level 5 to 10 db. The Model 300 has been designed so that with normal and proper usage, the heads will not become magnetized. However, it must be remembered that any phenomena which tends to put an unbalanced pulse through the record head will magnetize it. Such pulses can be caused by appearing in the form of signal or by causing a pulse in the power supply voltage. If the following precautions are taken, no difficulty should be experienced with record head magnetization.

a. DO NOT DEPRESS THE RECORD BUTTON UNTIL AFTER DEPRESSING THE START BUTTON. In other words, allow the transient caused by switching the motors and solenoids to die out before the record head is connected. A one-half second pause is sufficient.

b. Do not pull any tubes in the record amplifier, or connect head leads or input leads, while the machine is in the Record position. In some cases it has been found wise not to start or stop recording while there is a saturating signal fed into the record amplifier.

c. Do not switch speeds while recording. (No harm is done by changing speeds while playing back.)

In the event that the head does become magnetized, follow the procedure outlined in the Instruction Book under HEAD DEMAGNETIZATION. If a head is powerfully magnetized, as when tested with an ohmmeter, the demagnetizing process may have to be repeated several times. AMPEX will soon have available a simple demagnetizer that connects to any 115 v. A.C. line.

2. Erase. In all production machines, C119 has been changed to .003 mfd. for proper erase current. The erase current is adjusted to 200 to 210 m.a. instead of the 250 m.a. originally stated in the Instruction Book. Actually, 180 m.a. will erase peak recording level within specifications. In checking erase, always check with both record and erase heads connected, as the bias on the record head provides part of the erase.

3. Reels. It has been found in some isolated cases that when the tape is allowed to run all the way out at the end of a fast wind, a section over a foot long will be broken off the end. Upon investigation, this was found to be due to the sharp edges on the slot opening of the reel hub through which the tape is threaded. The sharp edges apparently provided high friction and did not allow the end of the tape to run out freely. When these sharp edges were filed off, the breakage no longer occurred. This information is being forwarded to the N A B Sub-Committee for the standardization of reels.

Difficulty has also been experienced with the reels not being properly centered. When inserting the hold-down knob, the knob should be pushed down with one hand, and the reel held with the other hand. As the hold-down comes into contact with the reel, agitate the reel slightly with the other hand to make sure that the hold-down moves into the exact center of the opening, then push the knob down firmly. The hold-down knob is being re-designed so as to prevent the possibility of locking the reel off-center.

4. Threading. In threading the tape, be sure to remove any adhesive that may have been used to seal the end. If this adhesive is not removed, the first layer may stick and cause the end to break off at the end of Rewind.

AMPEX ELECTRIC CORPORATION

MJS:fj

14 September 1949

Gentlemen:

Enclosed is AMPEX Service Bulletin No. 1A.

It will be our policy to send out Service Bulletins covering any information concerned with the performance or maintenance of the Model 300 recorder. All bulletins which will be of interest to all machine owners will have consecutive numbers. Those bulletins which are of interest only to service personnel and distributors will have a letter following the number, as the one enclosed. Thus if the next bulletin were for service personnel only, it would be numbered 1B. If it were for general distribution, it would become number 2.

Sincerely yours

AMPEX ELECTRIC CORPORATION

*A.M. Poniatoff*  
President

AMPoniatoff:fj

SERVICE BULLETIN NO. 1A, MODEL 300

1. Solenoids. Some difficulty has been experienced with the humming or buzzing of the solenoid which operates the capstan idler, K501. Investigation of the cause of this noise has disclosed that if the linkage has not been adjusted properly, the force required of the solenoid will be greatly increased and therefore cause it to hum.

Looking at the drive assembly from the bottom, the linkage of the capstan idler solenoid can be seen. The link rod A passes through a hole in the arm B that it operates, and there is a rubber washer (C) and adjusting nut (D) on the end. When the solenoid is operated, the rod pulls the rubber washer against the arm to operate it. When the solenoid is seated, the angle E between the rod and the arm should be less than 90°. If this is so, the effective contact point of the washer is on the outside. If the angle between the rod and the arm is greater than 90° when the solenoid is seated, the contact point of the washer on the arm is on the inside, effectively reducing the moment arm by a considerable amount, and therefore requiring much greater force to be exerted by the solenoid.

The importance of maintaining the above angle E below 90° was only recently discovered, and it is possible that some machines have been shipped in which this angle might be too great. While no machines have been shipped with noisy solenoids, it is possible that if the above adjustment is not proper the solenoids may become noisy in use. Should this be the case, the adjustment can be corrected as follows:

It will be noted that the capstan idler arm shaft F is connected to the operating shaft G below through a U-shaped torque link H. If the bottom (or shorter) arm of this link H is bent in a clockwise direction (when looking at the link from the bottom or short arm end), this will effectively reduce the angle E. In order to bend this arm, it is necessary to remove link H and hold it in a vice. The link can be removed by forcing off the spring-lock washers which position the lower arm (I and J) and which attach the return spring at the top (K). The proper value for the angle E is approximately 85°, or when the arm B is perpendicular to the plane of the solenoid base plate.

If the angle E is changed, it will be necessary to re-set the capstan idler adjustment D. This adjustment is set so that when the capstan idler just touches the capstan, the solenoid is 1/8 inch shy of seating. A simple way of making this setting is to place a piece of material 1/8 inch thick between the solenoid armature and body and clamp the armature down on it. Then tighten the nut D until the capstan idler just touches the capstan.

It may also be necessary to reset the capstan idler solenoid



Stop L. This stop should be set so that at no time during fast winding does the tape touch the capstan idler.

2. Playback Amplifier. It has been found that some of the early machines were shipped with ground wires connected to pin number 1 of the input stage and the following stage that were of insufficient strength and length to allow the tube socket to flex without breaking. Unfortunately, several of these wires have opened up in the field. The result is an excessive amount of hum pickup in the first stage of the amplifier.

To replace this broken connection, unscrew the Playback Amplifier from the chassis frame. When the Playback Amplifier is lifted up, the ground connections are readily accessible.

3. Brakes. The brakes have been adjusted to work properly with the standard NAB double flanged reel. If small RMA reels or hubs only are used, the brakes will not necessarily stop without slack forming when fast winding onto the small reel or hub. This is because with normal brake settings, the inertia of the reel that is taking up the tape serves to tension the tape, and if the brakes are set tight enough to stop a small reel without slack, the tension on the tape will be excessive when using the regular reel.

4. Cabinet. The four feet of the console cabinet are adjustable, so that the cabinet may be leveled on any floor by merely screwing the feet to the proper position.

AMPEX ELECTRIC CORPORATION

MJStolaroff:fj

# INDEX of SECTIONS, CIRCUITS and DRAWINGS

## Section I

1. Specifications
2. Unpacking and Installing

## Section II

1. Mechanical Operation
2. Electronic Operation

## Section III

1. Electronics Alignment
2. Electronics Special Considerations

## Section IV

1. Head Housing
2. Head Alignment
3. Head Demagnetization

## Section V

Drive System

FIGURE 1—Top Plate — Bottom View

FIGURE 2—Capstan Assembly

FIGURE 3—Reel Idler Assembly

FIGURE 4—Take-up Tension Arm

FIGURE 5—Top Plate — Top View

FIGURE 6—Record Amplifier and Power Supply Schematic

FIGURE 7—Top Plate Control Circuits

FIGURE 8—Playback Amplifier Schematic

FIGURE 9—Electronics — Chassis Top View

FIGURE 10—Recommended Layouts:

(a) Bridging with Meter Control Panel

(b) Matching with Meter Control Panel

(c) Bridging or Matching without Meter Control Panel

FIGURE 11—Inter-Unit Connection Diagram

FIGURE 12—Meter Control Panel Schematic (Bridging)

FIGURE 13—Meter Control Panel Schematic (Matching)

## SPECIFICATIONS FOR MODEL 300

All performance characteristics of the Model 300 Magnetic Tape Recorder equal or exceed the standards recommended by the NAB Subcommittee on Magnetic Recording.

**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,  $\pm 2$  db. 50 — 15,000 cycles.  
At 7.5 inches,  $\pm 2$  db. 50 — 7,500 cycles.

**Signal-to-Noise Ratio:** Over 60 db., as defined by the proposed NAB standards. By 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 r.m.s. 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% r.m.s., measuring all flutter components from 0 to 300 cycles, using a tone of 3,000 cycles. At 7.5 inches, under 0.2%.

**Separate record and playback heads** and amplifiers for simultaneous monitoring of the tape.

**Playback Timing Accuracy:** 0.2%.

**Playing Time:** 33 minutes at 15 inch speed on proposed standard NAB reel, 66 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 NAB reel.

**Controls:** Start, Stop and Record are push-button, 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.

**Record Amplifier:** Bridging input, normally set up for + 4 V.U. in.

**Playback Amplifier:** Normally + 4 V.U. output. Will deliver 20 d.b.m. without exceeding 1% total harmonic distortion at any frequency from 30-15,000 cycles.

**Dimensions:** Mechanical unit on 24 $\frac{1}{2}$ " panel for standard rack mounting. Electronic unit on 12 $\frac{1}{4}$ " panel for standard rack mounting.

**Mounting:** Rack, Console, or Portable Cases.

**Meter Control Panel** available at extra cost with features outlined below:

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

Output step control will adjust level up to +8 V.U. regardless of tape level — 600 ohm or 150 ohm balanced or unbalanced line.

V.U. meter will meter playback output while recording or playing back.

Output key (line or cue).

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

## UNPACKING AND INSTALLING

1. Open packing case carefully and save it. In the event of possible shipping damage the case may be needed for return shipment.
2. Examine electronics chassis and see that the rubber mountings have not been damaged. A properly mounted chassis floats freely on the rubber cushions.
3. Unpack the interconnecting cables and install. The twelve conductor cable connects the mechanical and electronic units. See Fig. 1 and Fig. 9 for location of plugs.
4. Unpack the tubes and install them in their respective sockets. **WARNING! BE VERY CAREFUL WITH THE 12SJ7 TUBE AS IT IS HAND SELECTED FOR LOW NOISE AND MAY BE DAMAGED BY CARELESS HANDLING.** See ELECTRONICS SPECIAL CONSIDERATIONS, II, before turning on power.
5. Release capstan drive motor shipping binding. This is the wire which holds the motor away from the rubber-tired flywheel. Do not make any adjustments on the drive system at this time. No adjustments need be made unless damage has occurred during shipping.
6. Connect input and output circuits to the machine. See ELECTRONICS OPERATION.
7. Connect power cord to 115 V., 60 cycles A.C. only.
8. The capstan speed should be checked with the stick-on stroboscope provided. Place stroboscope on capstan shaft with sticky side down and view rotating shaft under 60 cycle light. If the speed is not correct the spokes will appear to rotate. Slight speed changes can be realized by change in capstan drive motor pressure. This adjustment is at spring D, Fig. 1 on the motor solenoid draw bar. Increasing pressure will slow the capstan, decreasing pressure will speed the capstan. Adjust for no rotation of the stroboscope spokes.
9. Load the left hand reel holder with tape and thread as shown in Fig. 5. Be sure the tape used has the oxide-coated side toward the rear of the machine; i.e., toward the head faces.
10. A reel hold-down or editing knob should be placed on each reel spindle and pushed down firmly. To remove the hold-down, raise the tongue on the side of the knob with the finger and lift off. Do not touch the tongue when placing the hold-down on.

The machine is now ready to operate.

## MECHANICAL OPERATION

When the machine is ready to operate, turn on the power switch, see Fig. 5. This turns on the amplifiers and control circuits. The capstan drive will also start if the tape has been threaded, as the takeup tension arm operates a switch which shuts the motors off when the tape runs out. Pushing the Start button will now start the tape moving according to the mode selected on the Play, Rewind, Fast Forward control. In the Play position the tape will be reproduced at the output terminals. Pushing the Record button will permit an input to the machine to be recorded on the tape with almost simultaneous playback of the new program. Pushing the Stop button will stop the machine and turn off the recording amplifier; therefore, one must always push the Start and Record buttons, in that order, to record. The mode selector switch allows transfer from Play to Rewind or Fast Forward without pushing the Start button when switching. This helps greatly in editing and segueing. However, when going from Rewind to Play, the machine shuts off and the Start button must be used to restart the tape motion.

If, when the tape is running in Play, it is desired to accelerate or slow the tape it may be done as follows:

**To Slow the Tape:** Hold the Start button down and push the Stop button for the length of time desired. Upon releasing the Stop button the tape is again up to speed.

**To Accelerate the Tape:** Move the selector to the Fast Forward position. Return to Play when desired.

These two motions are useful when cueing, segueing or synchronizing programs. This can only be accomplished by reason of the rapid start feature incorporated in this machine.

# ELECTRONIC OPERATION

(WHEN SET UP AS IN ELECTRONIC ALIGNMENT)

## I. Machine Without Meter Control Panel:

A. Feed machine with  $+ 4$  V.U., machine output  $+ 4$  V.U., see Fig. 10C.

## II. Machine With Bridging Input Meter Control Panel:

A. See Fig. 10A.

B. Level is set by adjusting Playback Level step control to 14, and adjusting Record Level step control until output level meter reads  $+ 4$  V.U. operating level.

C. Input level must be greater than  $-10$  V.U.

D. On Playback, any tape from any machine can be played back at  $+ 4$  V.U. by adjusting Playback step control.

## III. Machine With Matching Input Meter Control Panel:

A. See Fig. 10B.

B. For inputs equal or greater than  $+ 4$  V.U.:

Adjust Record Level step control for program level on meter switched to input or for program level on meter switched to output of playback with playback set as in II.

C. For inputs less than  $+ 4$  V.U.:

Adjust R101 with Record step control wide open and meter on playback as in II.

# ELECTRONIC ALIGNMENT

The following alignment procedure has been executed at the factory prior to shipping. No further adjustments should be necessary unless alterations occur in shipment or as required by routine maintenance.

A standard tape is available for alignment purposes and contains the following frequency run recorded at 15" per second:

1 Kc for level adjustment (recorded 10 db. below recommended operating point).	
15 Kc	6400 cycles
14 "	3200 "
13 "	1600 "
12 "	800 "
11 "	400 "
10 "	200 "
9 "	100 "
8 "	70 "
	50 "

## I. (A) Alignment of Playback Circuits on Machines Without Meter Control Panel— Must Be Performed in Order Indicated:\*

1. Thread standard tape on machine.
2. Connect 600 ohms termination on output with your program VI meter across termination.
3. Turn on A.C. power.
4. Set machine in PLAY position and 15 inch speed and push Start button.
5. Adjust output of 1 Kc. tone with Playback gain control R213 to read operating level on your meter.
6. Align playback head (see HEAD ALIGNMENT) on 15 Kc. tone for maximum output.
7. Adjust Playback HF Equalizer C205 for flat overall response ( $\pm 2$  db. 50 cycles to 15,000 cycles).
8. Set playback level 10 db. lower because standard tape level is 10 db. below operating level.

## (B) Playback Electronic Alignment With Bridging or Matching Meter Control Panel:

1. Thread standard tape on machine.
2. Turn on A.C. power.
3. Set Playback Level control to 4. (This allows you to make frequency runs at operating level on meter instead of  $-10$  d.b.)
4. Start tape.
5. Adjust R213 (now on panel) so panel VI reads 0 on 1 Kc. test tone.
6. Align playback head gap on 15 Kc. tone. (See HEAD ALIGNMENT.)
7. Adjust Playback Equalizer (C205) for flat response.
8. Set Playback Level control at 14. (This drops amplifier gain 10 db. for normal operation.)

## II. Alignment of Record Circuits (After Playback Alignment) — With or Without Meter Control Panel:

### 1. PRELIMINARY

#### A. Units without Meter Control Panel:

Connect monitor amplifier, 600 ohms termination, and meter on output of Playback.

#### B. Units with Meter Control Panel:

Connect monitor amplifier and termination to Meter Control Panel Line Out terminals, and set Line Cue switch on line.

A. & B. Place blank reel of M.M.M. 111 tape on machine and set into operation on the 15 inch per second Record position.

\*NOTE: All step controls located on Meter Control Panel.

## 2. NOISE TEST:

Detach record cable from Record Amplifier. Place a 1 microfarad condenser across 600 ohm output termination on playback amplifier. This is to remove 70 Kc. components from noise measurements. Noise should read 40 db. below standard tape level (50 db. below operating level). If noise is too high and is crackling in nature, demagnetize heads — especially playback head (see HEAD DEMAGNETIZATION). Noise can be measured by using a Hewlett-Packard noise and distortion analyzer, VTVM type 400 A, or any approved method. (If noise with machine standing is higher than above, check input tube of Playback Amplifier.)

## 3. ERASE ADJUSTMENT:

It should not be necessary to make this adjustment except at rare intervals because of the high degree of stability of the oscillator circuits. Do not make this adjustment unless erase head will not erase previous program. Do not readjust erase to attempt to eliminate crackling tape noise, as the erase current does not produce crackling even if out of adjustment. If adjustment is indicated, the following procedure must be taken:

A. Pull out Erase Cable from Record Chassis plug (J103P).

B. Make adapter plug by inserting 10 ohm resistor in series with ground side of erase cable.

C. Insert adapter in J103P, insert cable into adapter.

D. Place VTVM such as Hewlett-Packard 400A across 10-ohm resistor. Set on 3 volt scale. Full scale will read 300 Ma. record current.

E. Loosen Erase Trimmer C120 for minimum capacity and slowly increase capacity until meter indicates 200 Ma. erase current. The erase is now properly adjusted.

## 4. BIAS ADJUSTMENT:

A. Plug in record head.

B. Remove 1 microfarad condenser from output.

C. Connect audio oscillator to input of machine. Turn oscillator on and set to 1 Kc.

D. Set record level so that it reads approximately standard tape level.

E. Turn Bias Control (R126) fully counter-clockwise. Then turn in a clockwise direction slowly (increasing bias), until the 1 Kc. tone is recorded at its highest level. Increase further until 1 Kc. drops 2 db. in level. This is the correct bias adjustment.

## 5. RECORD NOISE ADJUSTMENT (D.C. BALANCE):

A. Replace 1 microfarad condenser across 600 ohm termination on playback output.

B. Remove audio oscillator from input and short record input terminals.

C. Adjust Noise Balance control (R117) until crackling disappears. If noise is not at least 40 db. below standard tape level (50 db. below operating level), demagnetize playback head and record head.

## 6. RECORD EQUALIZER:

A. Remove 1 microfarad condenser from playback output.

B. Reconnect audio oscillator to input of Record Amplifier.

C. Adjust Record Level (R101) so that standard tape level is effected on output of playback amplifier. This is the level at which all frequency response measurements should be made in order to prevent tape saturation.

D. Set oscillator at 15 Kc. and align record head for maximum output. (See HEAD ALIGNMENT.)

E. In order that frequency runs not be made on the insensitive range of the VI meter, playback gain may be raised 10 db. and returned to normal after run as in I.

F. Sweep the oscillator across audio spectrum and adjust Record H.F. Equalizer C103 on Record Chassis for flat response ( $\pm 2$  db., 50 - 15,000 cycles) as read on playback output.



## 7. RECORD LEVEL ADJUSTMENT:

In all cases, connect audio oscillator to the input of the machine and adjust level to +4 V.U. program level at 1 Kc. On machines with a Meter Control Panel, the input of the machine is at the Line In terminals on the Meter Control Panel terminal strip.

### A. *Units without Meter Control Panel:*

With machine running at 15 inch speed in Record, set Record Level control (R101) so that correct operating level is read on playback.

### B. *Units with matching Meter Control Panel:*

Same as A. with Record Level step control wide open.

### C. *Units with bridging Meter Control Panel:*

Same as A. with Record Level step control set at 14. When adjusted in this manner, proper record level can be obtained from a -10 V.U. line by turning the Record Level step control on the Meter Control Panel wide open.

## ELECTRONICS SPECIAL CONSIDERATIONS

**I.** Do not remove any tube from the Record Amplifier while the machine is recording, as the record head may become magnetized. Should this occur it will be necessary to demagnetize same.

**II. Warning!** The input tube in the playback amplifier is D.C. heated by returning the B supply through its heater. F101 (fuse) is selected to protect the input tube against abnormal heater surges. A101 (Neon indicator) will light in the event of failure of the playback input tube heater or the  $\frac{1}{4}$  ampere protective fuse F101. **SHOULD THIS HAPPEN, THE CAN OF THE INPUT CONDENSER C113 WILL BE AT A HIGH POTENTIAL WITH RESPECT TO GROUND AND FOR THIS REASON IS PAPER COVERED. C113 SHOULD THEREFORE BE REPLACED ONLY WITH CONDENSERS HAVING INSULATED COVER.** F101 and A101 are located on top of Record Amplifier and Power Supply Chassis. **DO NOT REMOVE INPUT TUBE WITH POWER ON,** as damage to C114 may result. **DO NOT REPLACE F101 WHILE NEON BULB IS LIGHTED,** or fuse will blow.

### **III. Setting of Bleeder Resistor R120:**

The current through the high voltage supply is 145 Ma.

During Playback, pole 3 of Record relay K101 transfers the B supply from the Erase oscillator circuit to bleeder resistor R120 (located on underside of Record Amplifier and Power Supply Chassis), which should be adjusted to maintain the same current in playback as when recording.

### **IV. Dummy Plugs:**

There are two plugs type A567 which have pins 1 and 2 jumpered and also pins 7 and 8 jumpered. These plugs must be used in order for the machine to operate properly. The first must be plugged in the Remote Control Socket located on the Power Outlet Panel underneath the top plate (Fig. 1). The second plugs in socket J105S located on the top rear of the Record and Power Supply Chassis, which is clearly marked in Fig. 9. The latter of these plugs is to be removed only in the event of connection to this power supply of the AMPEX mixer pre-amplifier used on the portable model. The former is to be removed only in the event that a remote control cable is used, and then this in turn must be left in the socket.

### **V. Playback Cable:**

Do not attempt to lengthen or change playback cable for any reason because cable capacity is used to resonate the playback head. Serious frequency discrimination will occur if this is disregarded.

**VI.** When disconnecting any solenoid or motor, observe polarity of the leads, as all leads have been arranged so as to produce the minimum hum fields.

## HEAD HOUSING

The head housing, see Fig. 5, is a die cast assembly which contains the three heads used in the recording process. The heads are respectively erase, record and playback as viewed from left to right when facing the machine. The gate on the housing holds the playback and record shield covers and the tape-lifting fingers. The function of the tape-lifting fingers is to remove the tape from the heads when the gate is open during Rewind or Fast Forward operation. This reduces head wear considerably. The tape may leave a deposit on the heads if allowed to contact them at high speeds. Such a deposit will seriously impair the performance of the machine and should be guarded against by always opening the gate on Fast Forward and Rewind. If a deposit is left, it may be easily removed with carbon tetrachloride on a soft rag. Never use metal of any kind to touch the head surfaces.

## HEAD ALIGNMENT

Remove the top cover from the head housing by removing the two screws from the top of same, and pulling cover gently back and up.

Looking at the head housing from the front, the three heads from left to right are: erase, record and playback.

The azimuth angle of the erase head requires no adjustment, and should not be touched.

The record and playback heads should be aligned only after reading and fully understanding the procedure under ELECTRONICS ALIGNMENT.

The actual physical alignment of the record and playback heads consists of placing a  $\frac{1}{4}$ " spintite socket wrench on the left hand elastic stop nut in each head and adjusting back and forth until the proper azimuth angle is arrived at. This is accomplished by first playing the standard tape and adjusting the playback head until maximum response is obtained on the 15,000 cycle tone. The record head is then aligned with the playback head by recording 15,000 cycles on a blank tape, and adjusting the record head for maximum playback output.

## HEAD DEMAGNETIZATION

Occasionally the heads become magnetized through some electrical fault which may occur in the amplifiers or by coming into physical contact with a magnetized object. In order to demagnetize these heads completely in such events, a demagnetizer should be used. A demagnetizer suitable for this purpose is manufactured by AMPEX as an accessory item. In the event, however, that time does not permit the owner of the machine to wait for delivery of a demagnetizer, he may make one as follows: Cut a piece of transformer lamination to a  $\frac{1}{4}$ " x 2" size. Wrap the strip of metal with suitable insulating material and wind approximately 400 turns of No. 36 wire and attach a 4' length of 2 connector cord. Bend the iron strip into a "U" shape and bring the ends of the "U" to a spacing of  $\frac{1}{4}$ ". Connect to a 6 volt source of A.C., open the gate on the head housing and bring the ends of the "U" in contact with the 2 poles on the magnetized head. Remove the demagnetizer very slowly, allowing the A.C. field to die off gradually. Repeat this operation on record and playback heads only, as the erase head will demagnetize itself. In the event demagnetization is not effected, repeat the process more carefully.

The capstan may become magnetized by contact with a magnetized tool. Should this occur it may be demagnetized with an A.C. solenoid placed over the shaft and slowly pulled away.

## DRIVE SYSTEM

The drive system employs three motors. Two induction motors with solenoid operated brakes are used for take-up and rewind. These motors are shown in Fig. 7 and require no service attention! The torque of these two motors is adjusted at the factory by means of resistors R401, R402 and R403 and should be left alone unless shipping damage to the resistors has occurred. Both motors are adjusted for a tension of 5 to 6 ounces pull on the reel hub in Play. R402 is adjusted for the maximum hold-back tension during Fast Forward and Rewind which will still allow the tape to accelerate when starting with a full reel.

The third motor is the synchronous motor used for capstan drive. If this motor has oil cups it is a sleeve bearing type and requires S.A.E. 30 oil at three month intervals. If motor is a sealed ball bearing motor, no service is required. This motor is mounted on a ball bearing hinge which is moved by a solenoid to engage the motor and the capstan flywheel. The motor is pulled away from the flywheel by spring "A" in Fig. 1. In the rack mounted position the additional spring "B" must be attached.

When the machine is turned on and the tape threaded into position, the solenoid "C" pulls the motor into engagement with the capstan flywheel tire and drives it. The pressure between the motor and flywheel is adjustable at spring "D" and is adjusted to give synchronous speed as described in INSTALLATION.

The capstan shaft has a permanently lubricated ball bearing at the bottom end to take the flywheel load and to maintain a minimum of friction, see Fig. 2. The upper bearing on the shaft is a precision bronze sleeve bearing which permits absolutely true running of the capstan. This bearing must be oiled with S.A.E. 30 motor oil. This should be done every six months, more frequently if desired. To oil: Loosen set screw in dust cap surrounding the capstan shaft just below the tape contact point. Push the rubber idler wheel away from the shaft just enough to allow the cap to be removed. This exposes a felt and neoprene washer which cover the oil hole. Remove these washers and oil through the larger of the two holes exposed. Fill until no more oil will enter! Replace as disassembled.

The mechanism of the capstan idler is operated by solenoid "E" in Fig. 1. Capstan idler pressure is set so that it will just deform the tape if the tape is stopped with the hand while the machine is running. This pressure is adjusted at point "F" in Fig. 1. A drop of oil on all bearing surfaces of this mechanism at six month intervals is recommended, but not essential. **WARNING!** Under no conditions should any oil be allowed to come in contact with the rubber surfaces of the capstan idler and flywheel.

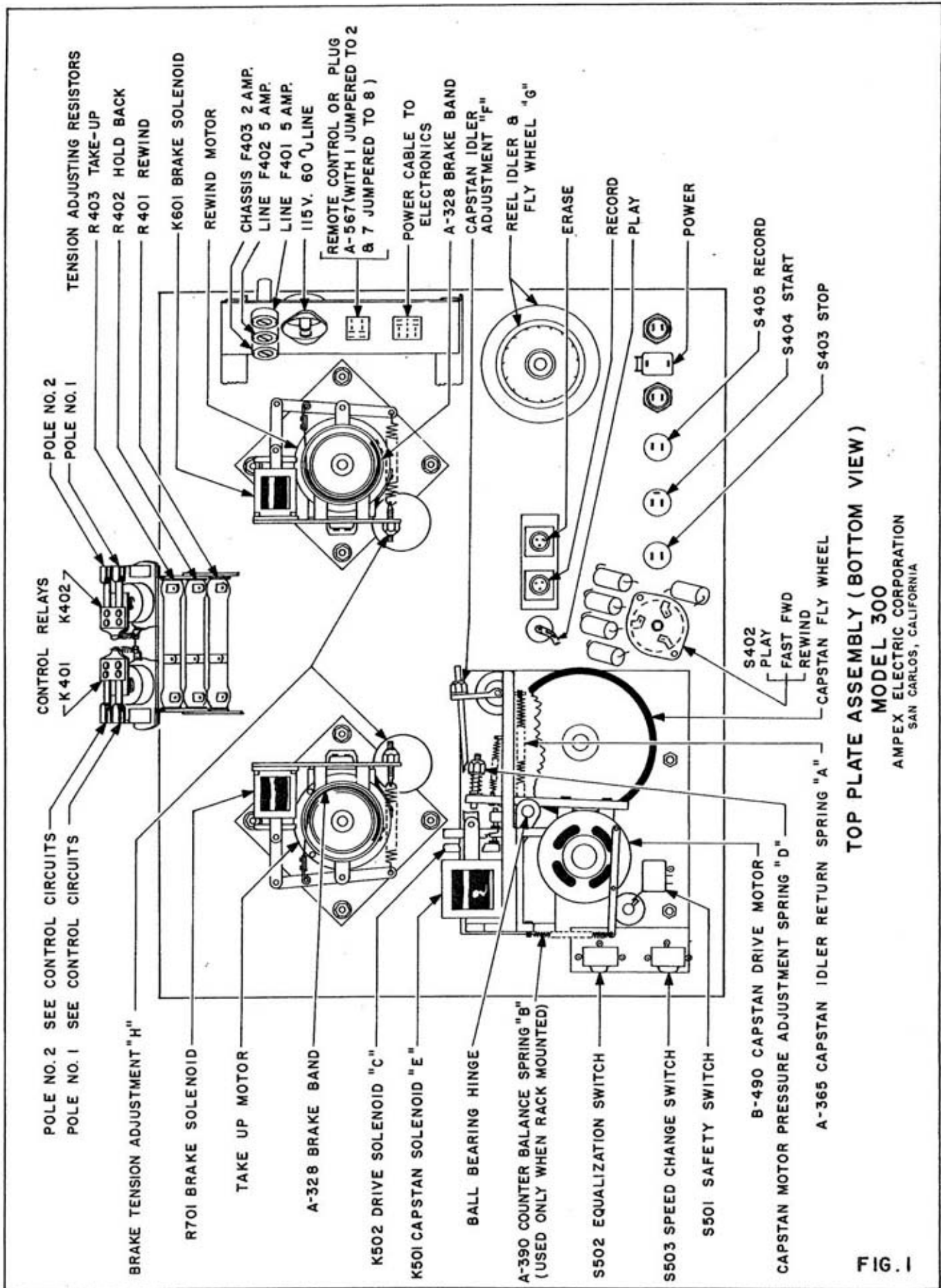
The reel idler is shown in Fig. 1 at "G". This shaft has two single shielded ball bearings which are lubricated at the factory and should not need oil more frequently than twice a year. If more frequent oiling seems advisable they may be oiled as follows: Remove fan and flywheel by loosening set screws in each respectively. Remove spanner nut holding bearing housing in top plate and remove housing. The shaft may now be pulled out of the housing allowing oil to be applied to the bearings. Apply one drop of Lubriplate No. 4 to each bearing. The top bearing is oiled by dropping the oil through the hole in the lower bearing while holding the housing upside down. The lower bearing may be oiled in a reverse manner. Reassemble, being sure to leave very slight freedom between lower bearing and flywheel so the bearings do not bind. For positioning, see Fig. 3.

The mechanical brakes on the rewind and takeup motors ordinarily require *no* adjustments. Should trouble occur which appears to be due to faulty braking, the tension may be adjusted. The only adjustment on the brakes is performed by adjusting tension at "H" in Fig. 1. If machine throws a loop of tape on stopping, the trailing reel brake tension is too low, or if it breaks the tape the tension is too high. However, unless tampered with, the adjustment should be permanent until such time as the brake bands wear out.

Daily attention should be given to cleaning of the following:

1. Capstan shaft
2. Head faces
3. Tape guides

Clean all surfaces of the above with carbon tetrachloride applied with a soft cloth.



POLE NO. 2 SEE CONTROL CIRCUITS  
 POLE NO. 1 SEE CONTROL CIRCUITS  
 CONTROL RELAYS  
 K 401  
 K 402  
 POLE NO. 2  
 POLE NO. 1

TENSION ADJUSTING RESISTORS  
 R 403 TAKE-UP  
 R 402 HOLD BACK  
 R 401 REWIND

POLE NO. 2  
 POLE NO. 1  
 BRAKE TENSION ADJUSTMENT "H"

K601 BRAKE SOLENOID  
 REWIND MOTOR

CHASSIS F403 2 AMP.  
 LINE F402 5 AMP.  
 LINE F401 5 AMP.  
 115V. 60 $\phi$ LINE

REMOTE CONTROL OR PLUG  
 A-567 (WITH 1 JUMPERED TO 2  
 & 7 JUMPERED TO 8)

POWER CABLE TO  
 ELECTRONICS

A-328 BRAKE BAND  
 CAPSTAN IDLER  
 ADJUSTMENT "F"

REEL IDLER &  
 FLY WHEEL "G"

ERASE

RECORD  
 PLAY

POWER

S405 RECORD  
 S404 START  
 S403 STOP

POLE NO. 2  
 POLE NO. 1

R701 BRAKE SOLENOID

TAKE UP MOTOR

A-328 BRAKE BAND

K502 DRIVE SOLENOID "C"

K501 CAPSTAN SOLENOID "E"

BALL BEARING HINGE

A-390 COUNTER BALANCE SPRING "B"  
 (USED ONLY WHEN RACK MOUNTED)

S502 EQUALIZATION SWITCH

S503 SPEED CHANGE SWITCH

S501 SAFETY SWITCH

B-490 CAPSTAN DRIVE MOTOR

CAPSTAN MOTOR PRESSURE ADJUSTMENT SPRING "D"

A-365 CAPSTAN IDLER RETURN SPRING "A"

S402  
 PLAY  
 FAST FWD  
 REWIND

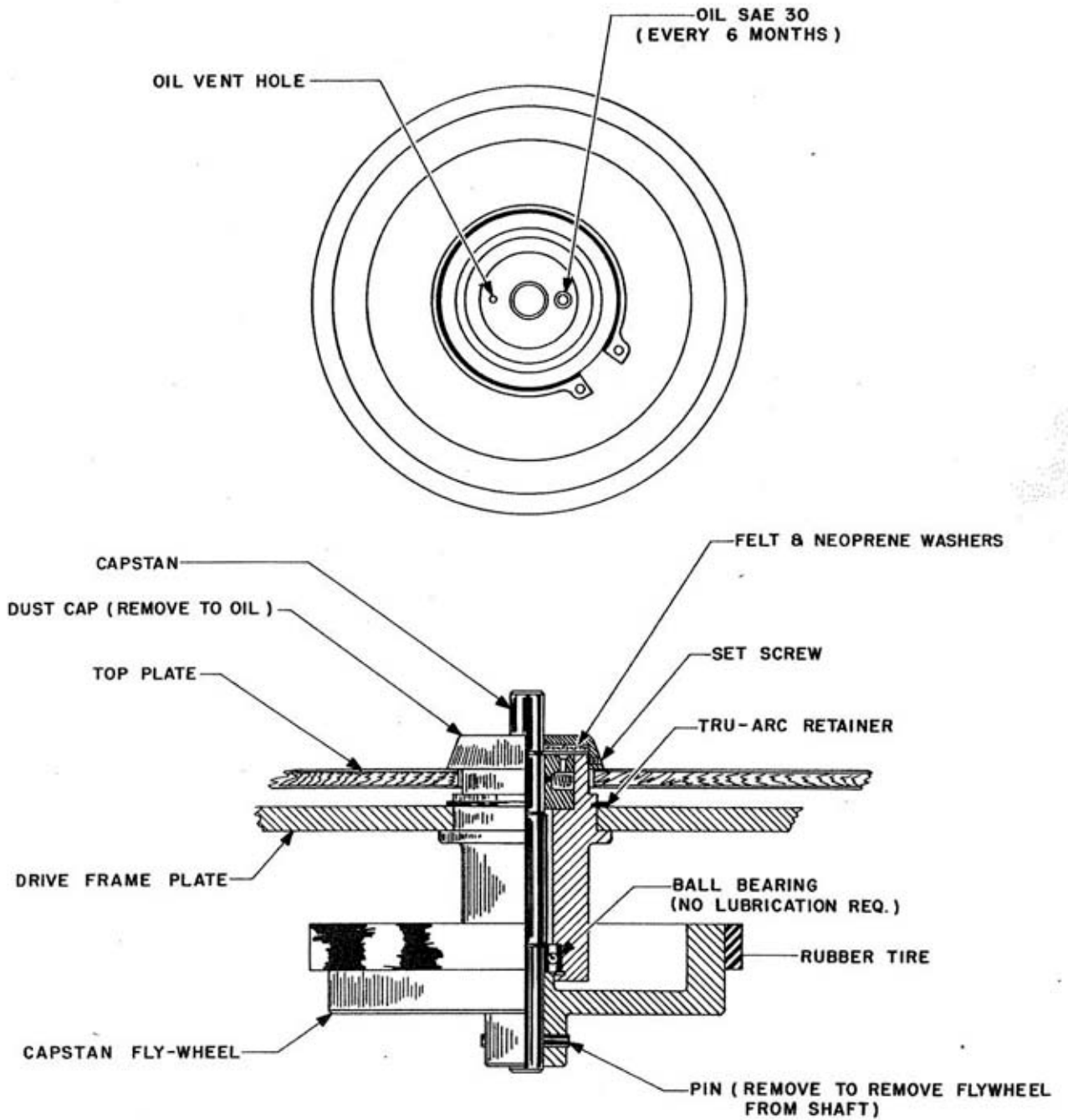
CAPSTAN FLY WHEEL

TOP PLATE ASSEMBLY (BOTTOM VIEW)

MODEL 300

AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA

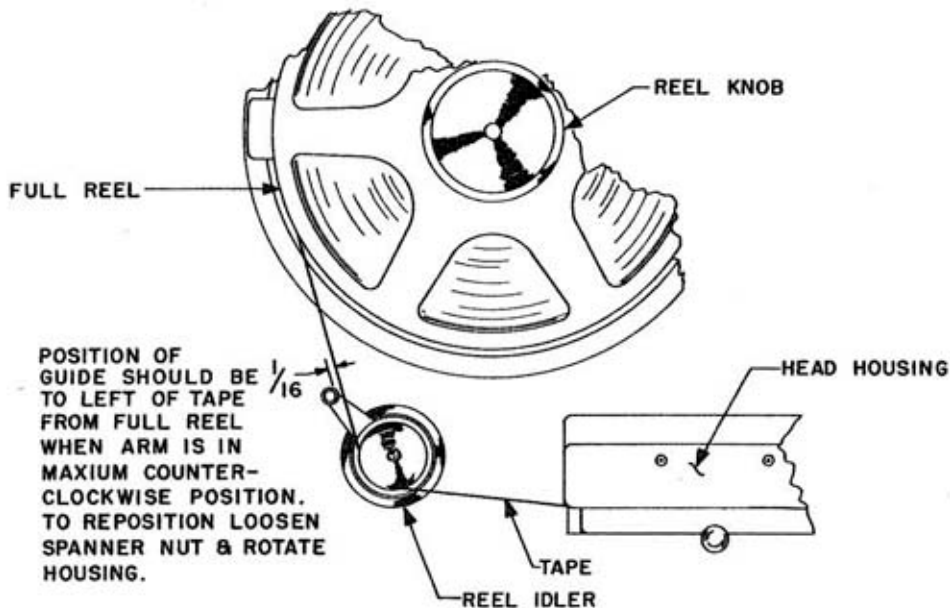
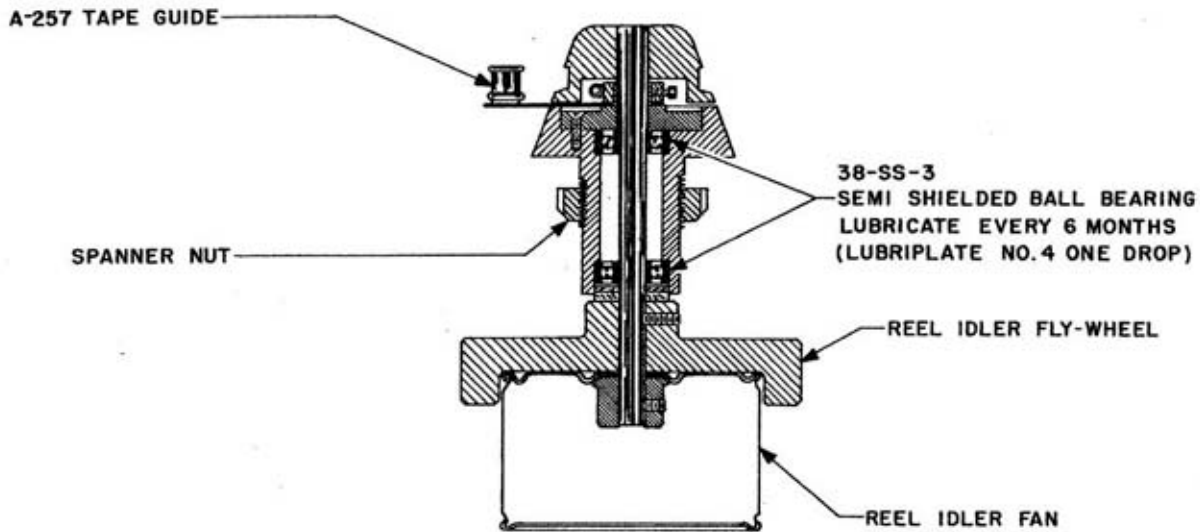
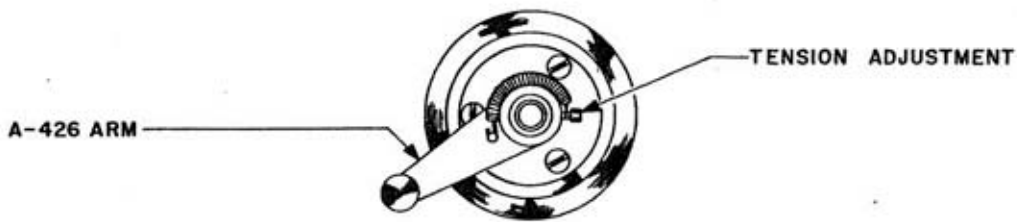
FIG. 1



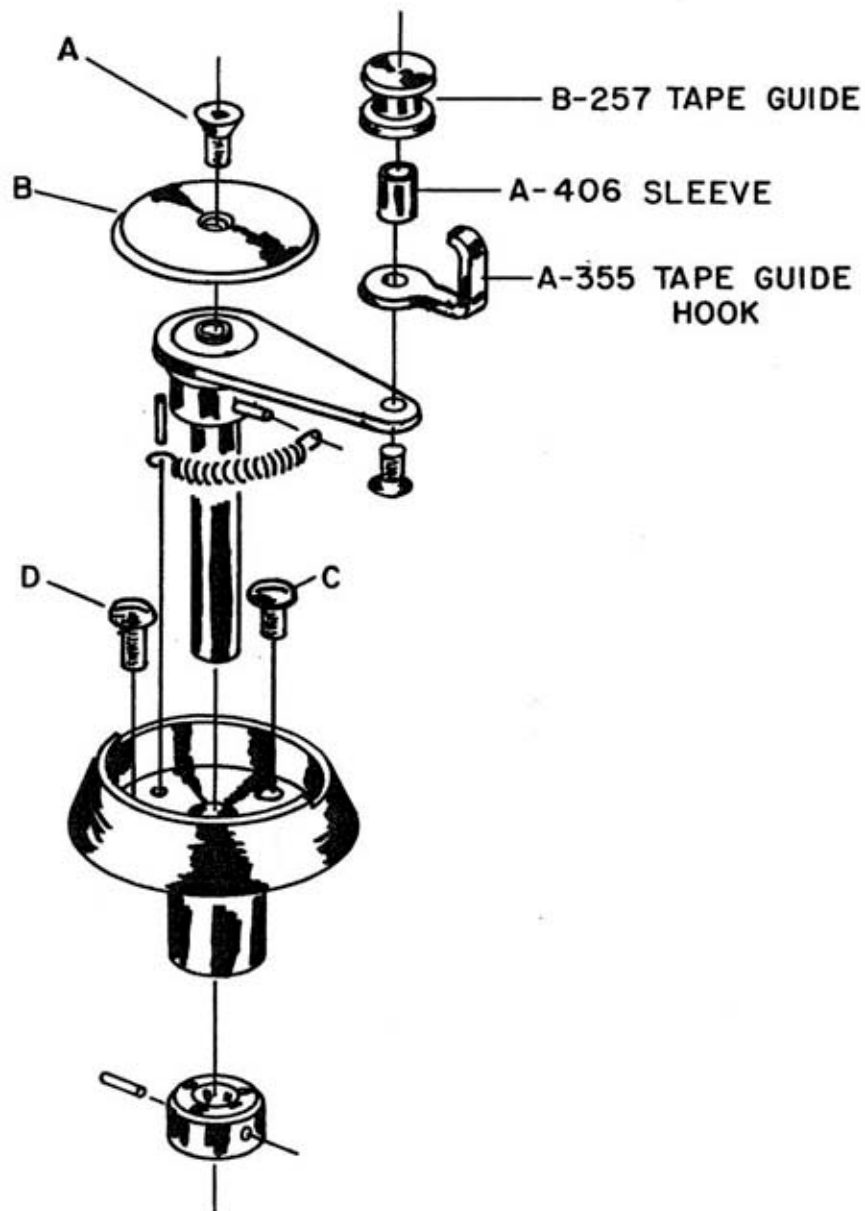
C-366  
 CAPSTAN ASSEMBLY  
 MODEL 300  
 AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA

FIG. 2





**MP-354  
REEL IDLER ASSEMBLY  
MODEL 300**  
AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

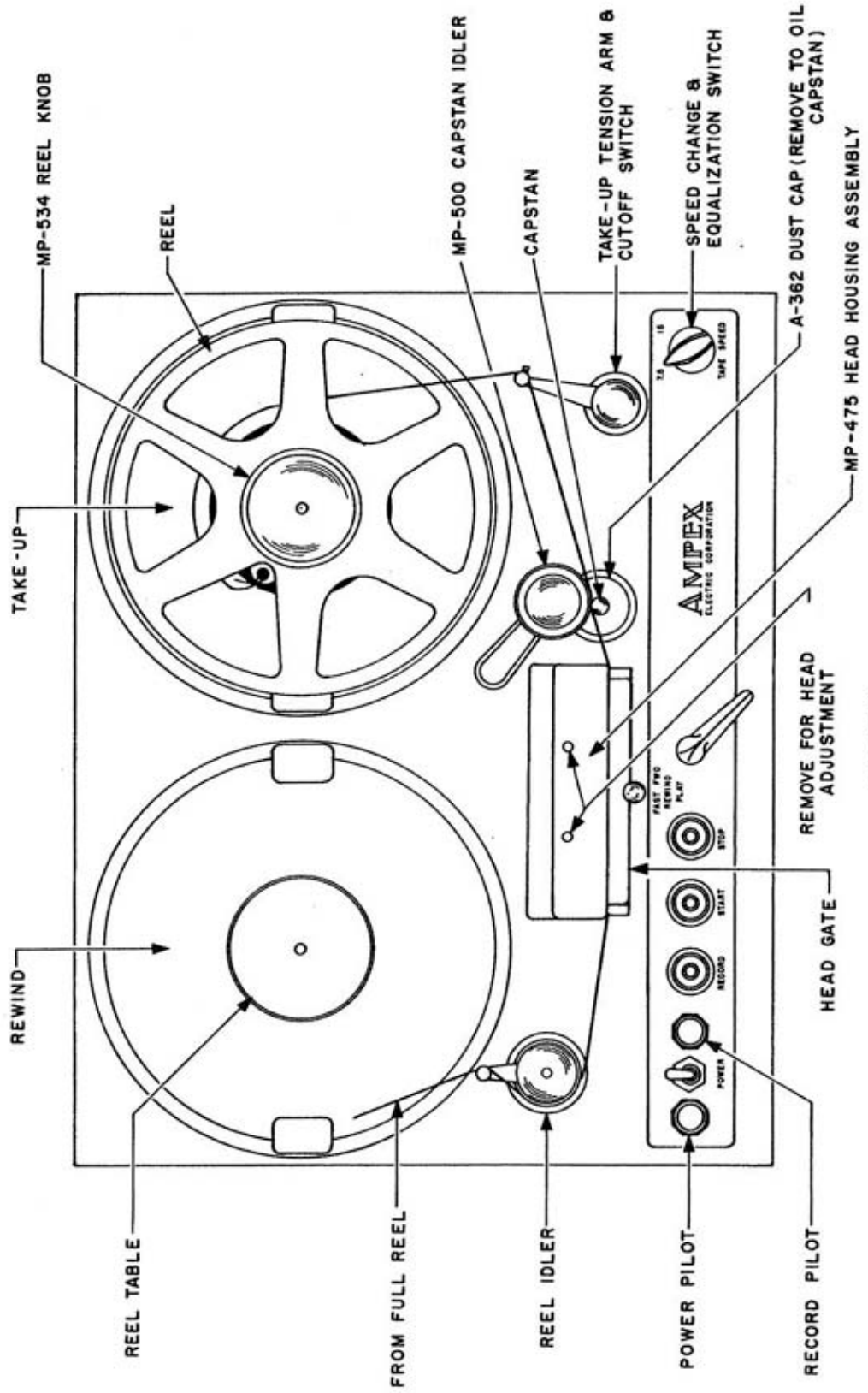


TO REMOVE ASSEMBLY FROM TOP PLATE REMOVE  
SCREW A, DISC B & SCREWS C & D. LIFT OUT.

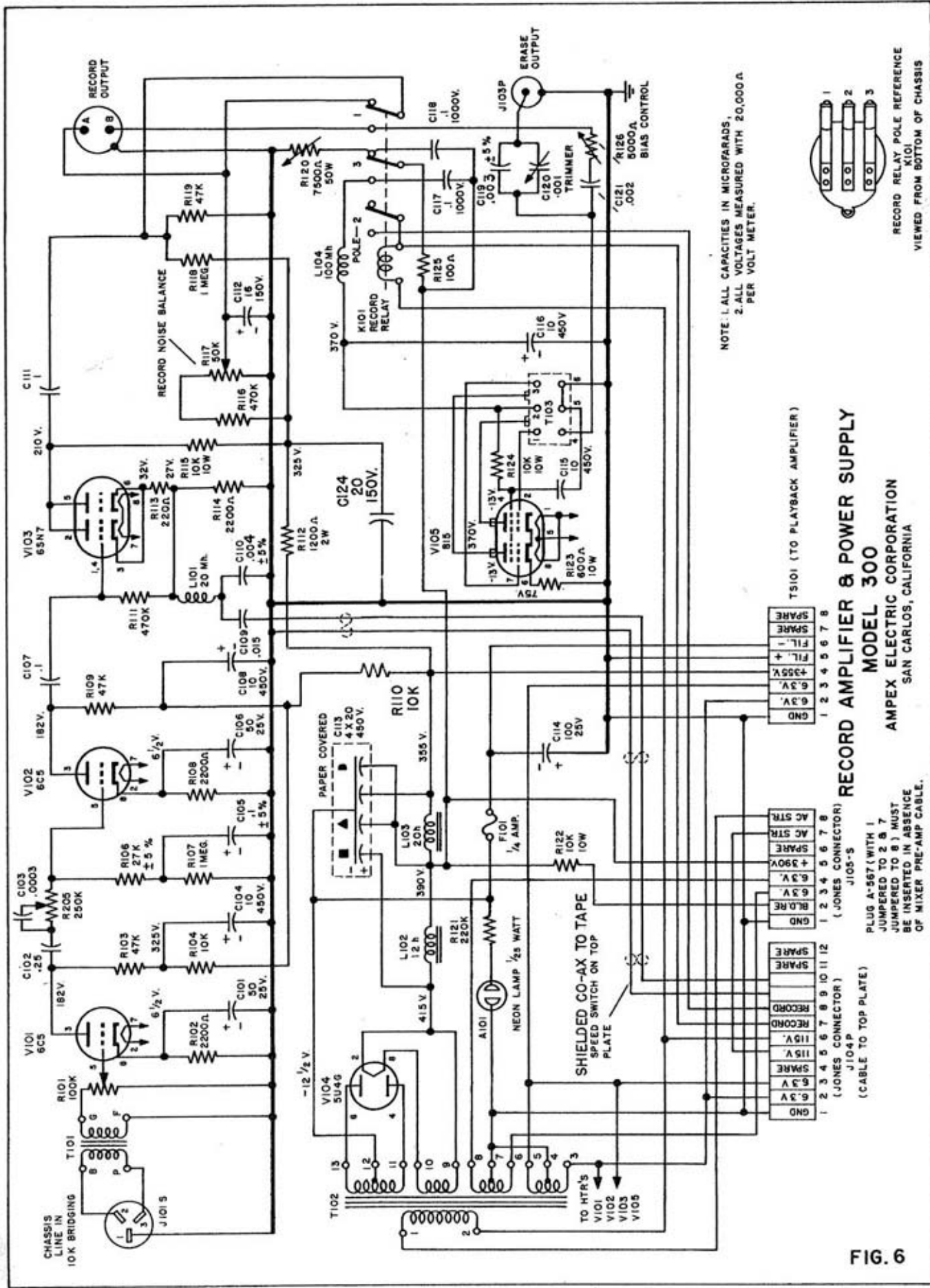
DO NOT OIL ASSEMBLY

MP-425  
TAKE-UP TENSION ARM ASSEMBLY  
MODEL 300  
AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

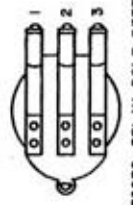
FIG. 4



MP-511  
 TOP PLATE ASSEMBLY (TOP VIEW)  
 MODEL 300  
 AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA



NOTE: 1. ALL CAPACITIES IN MICROFARADS.  
 2. ALL VOLTAGES MEASURED WITH 20,000 Ω PER VOLT METER.



RECORD RELAY POLE REFERENCE  
 K101  
 VIEWED FROM BOTTOM OF CHASSIS

### RECORD AMPLIFIER & POWER SUPPLY MODEL 300

AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA

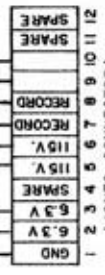
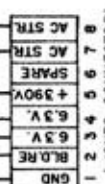
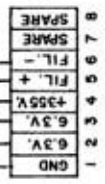


FIG. 6

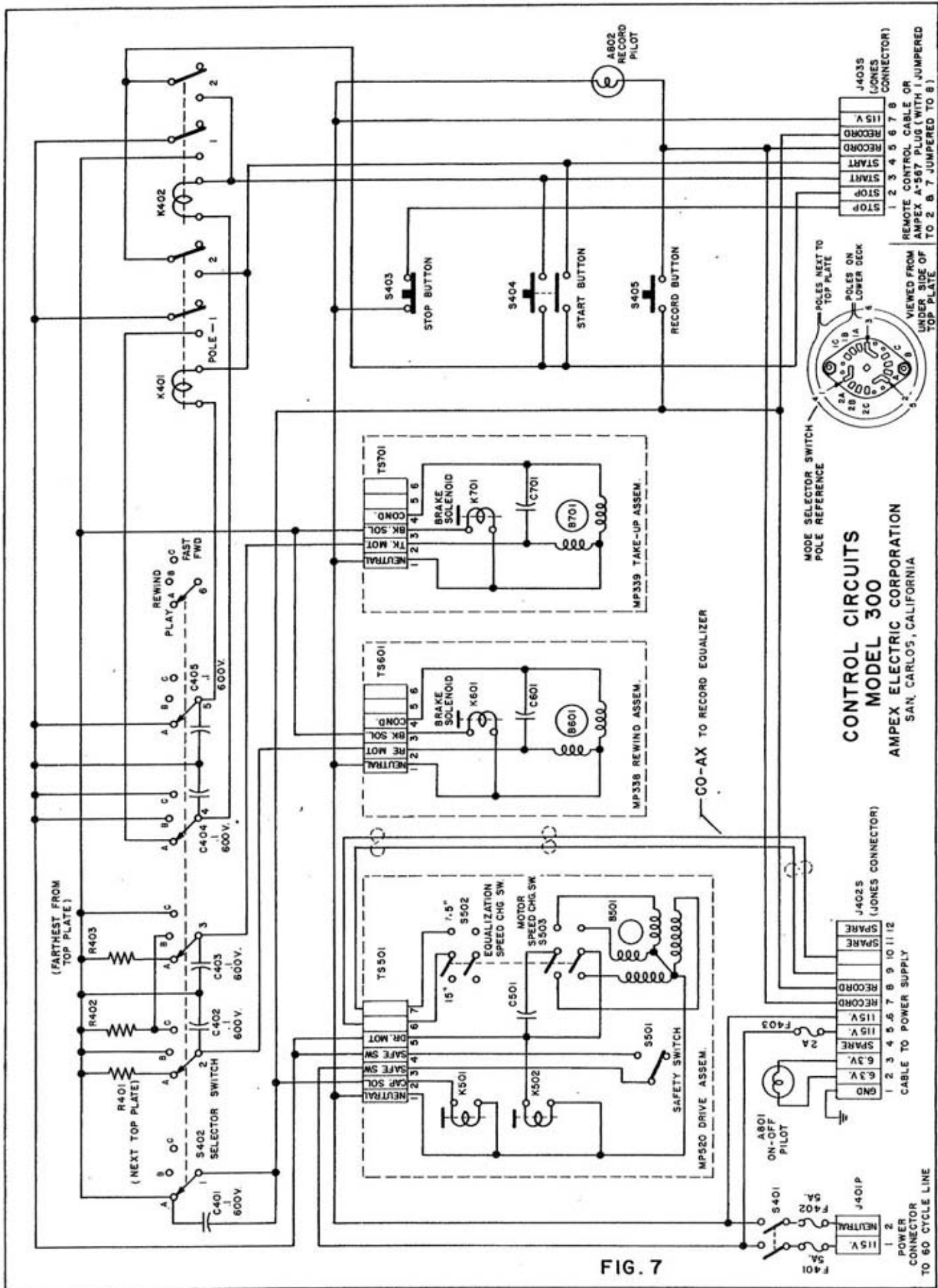
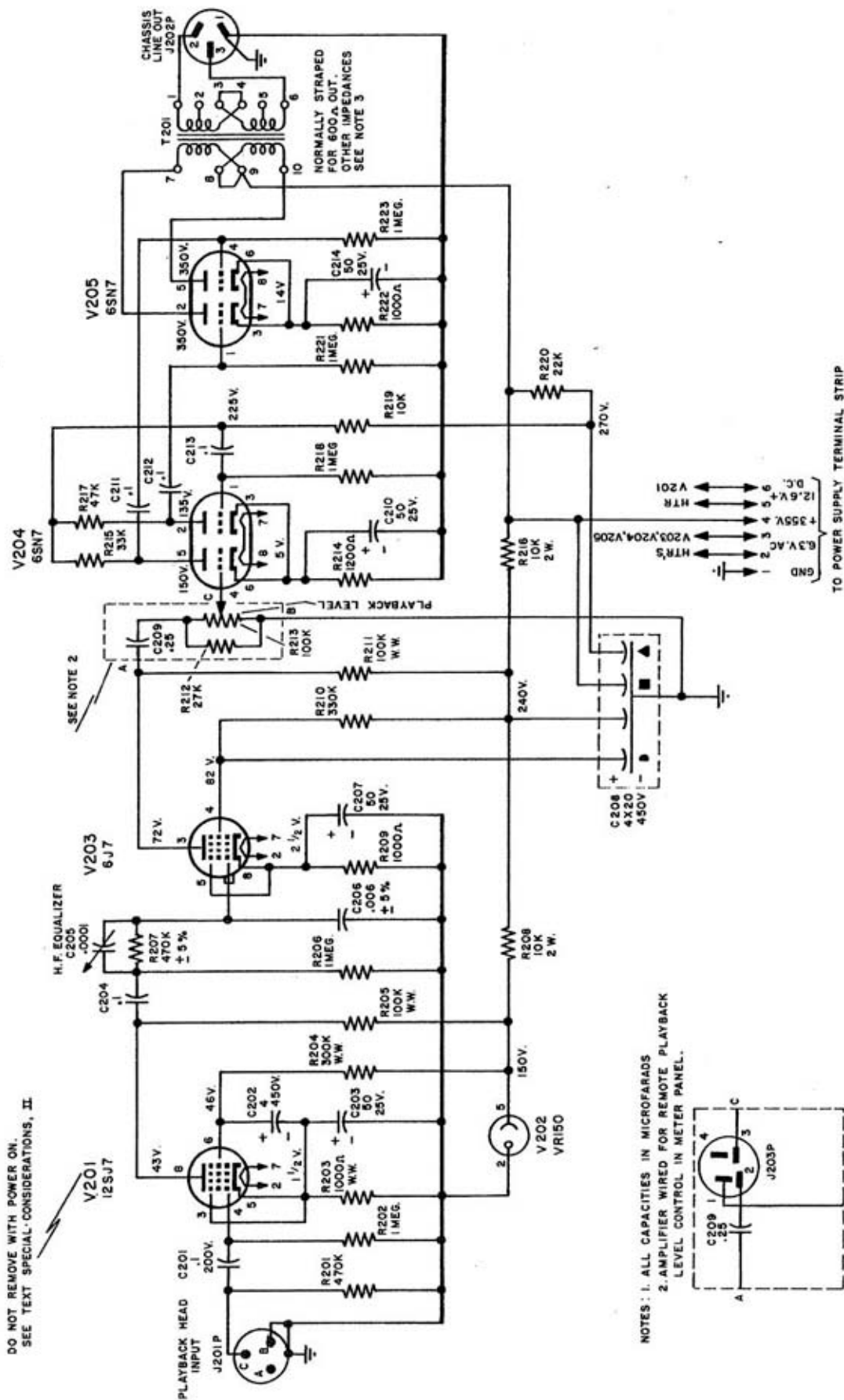


FIG. 7

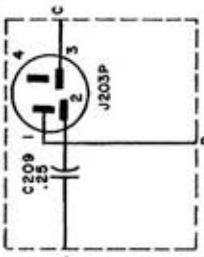
**CONTROL CIRCUITS  
MODEL 300**  
AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

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



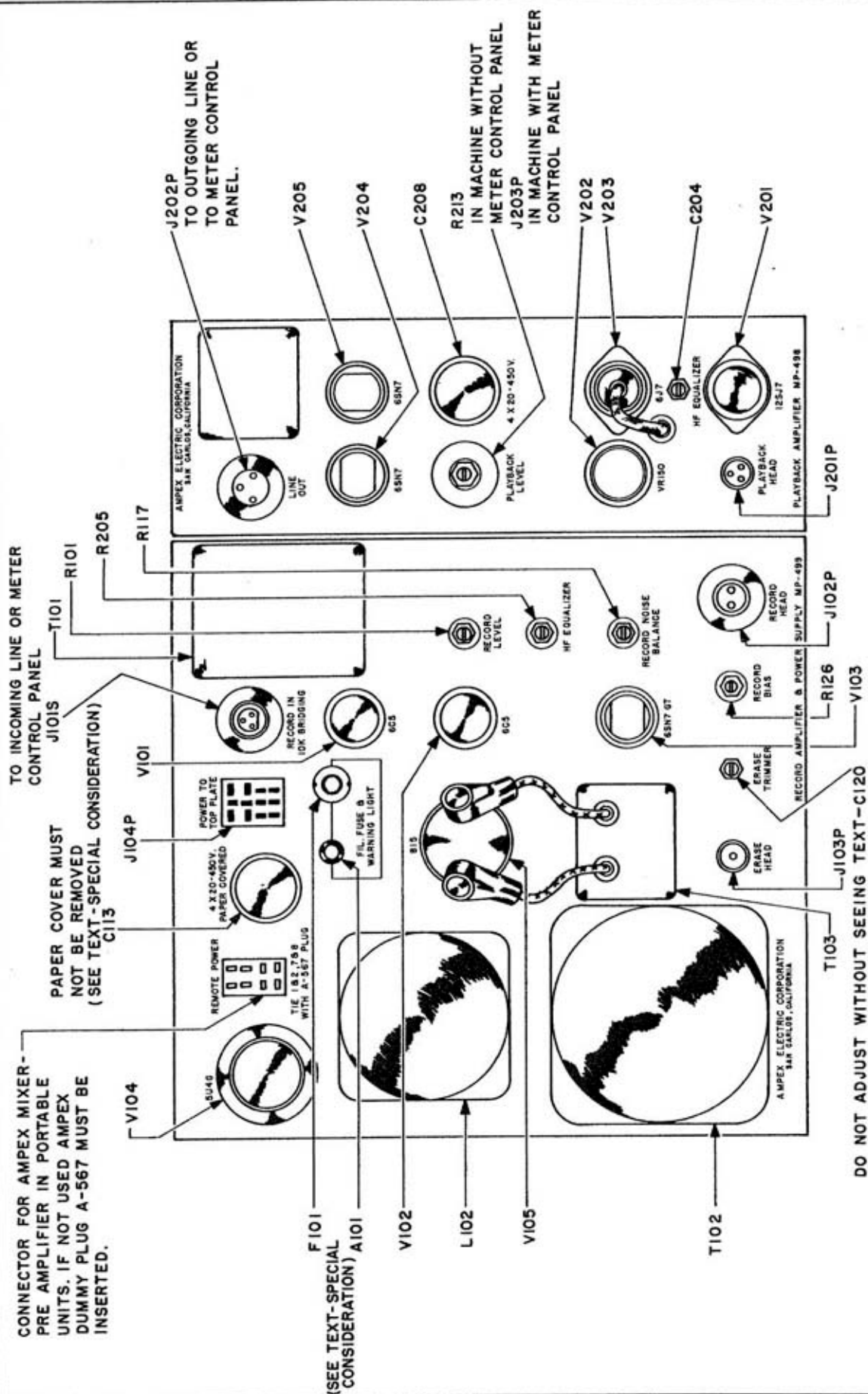
**PLAYBACK AMPLIFIER  
MODEL 300**  
AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

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 : TO 3 & 4 TO 6
- 50 OHMS CONNECT TO 2 & 4, JOIN 2 TO 3 & 4 TO 5

FIG. 8



CONNECTOR FOR AMPEX MIXER-  
PRE AMPLIFIER IN PORTABLE  
UNITS. IF NOT USED AMPEX  
DUMMY PLUG A-567 MUST BE  
INSERTED.

TO INCOMING LINE OR METER  
CONTROL PANEL  
J101S

PAPER COVER MUST  
NOT BE REMOVED  
(SEE TEXT-SPECIAL CONSIDERATION)  
C13

POWER TO  
TOP PLATE  
4 X 20-450V.  
PAPER COVERED

REMOTE POWER  
TIE 181,758  
WITH A-567 PLUG

FIL. FUSE &  
WARNING LIGHT

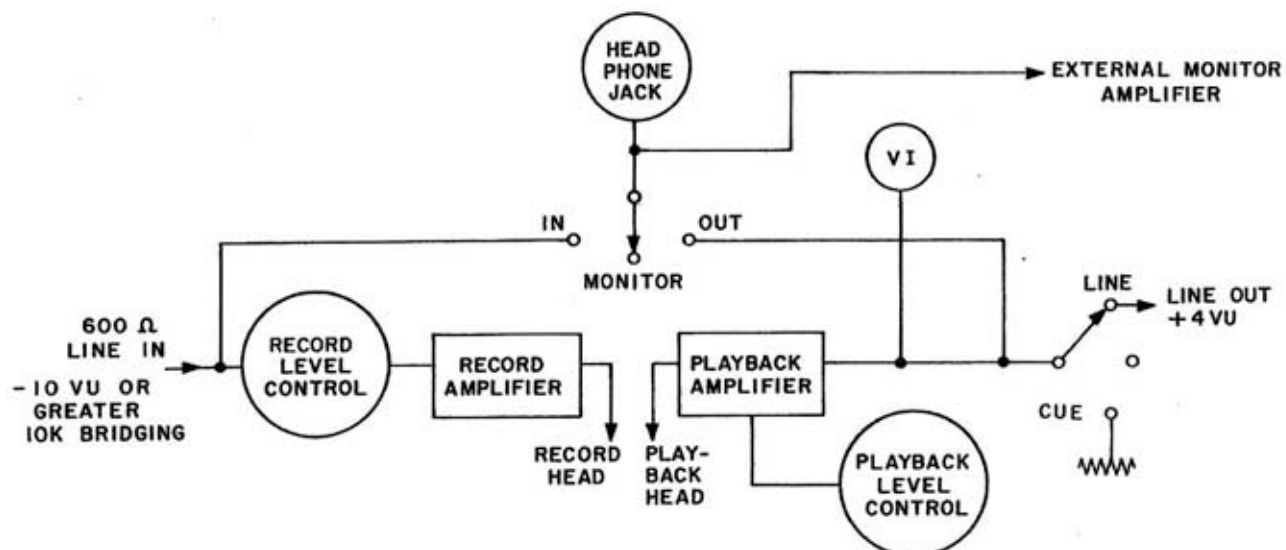
TO OUTGOING LINE OR  
TO METER CONTROL  
PANEL.  
J202P

IN MACHINE WITHOUT  
METER CONTROL PANEL  
J203P

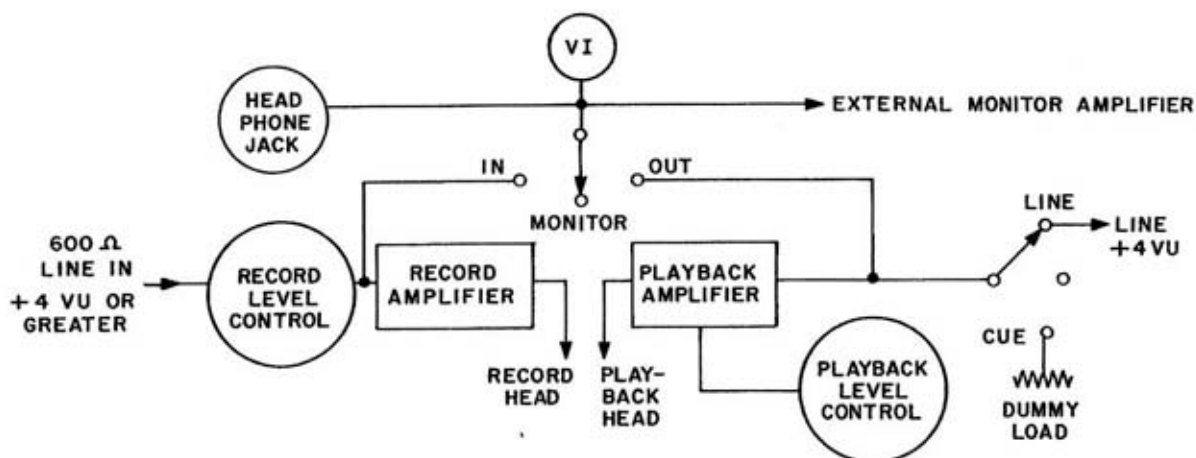
IN MACHINE WITH METER  
CONTROL PANEL

DO NOT ADJUST WITHOUT SEEING TEXT-C120

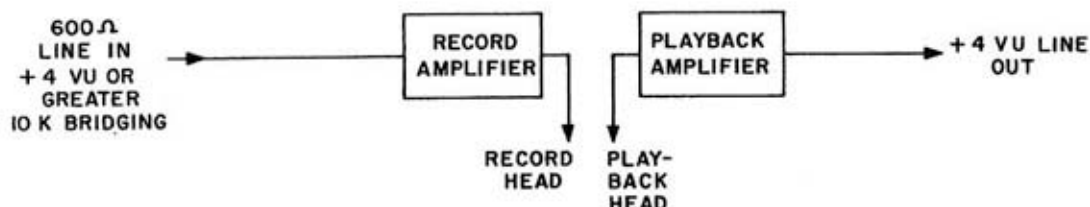
**ELECTRONICS CHASSIS (TOP VIEW)**  
**MODEL 300**  
AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA



(A) LAYOUT FOR BRIDGING METER CONTROL PANEL



(B) LAYOUT FOR MATCHING METER CONTROL PANEL

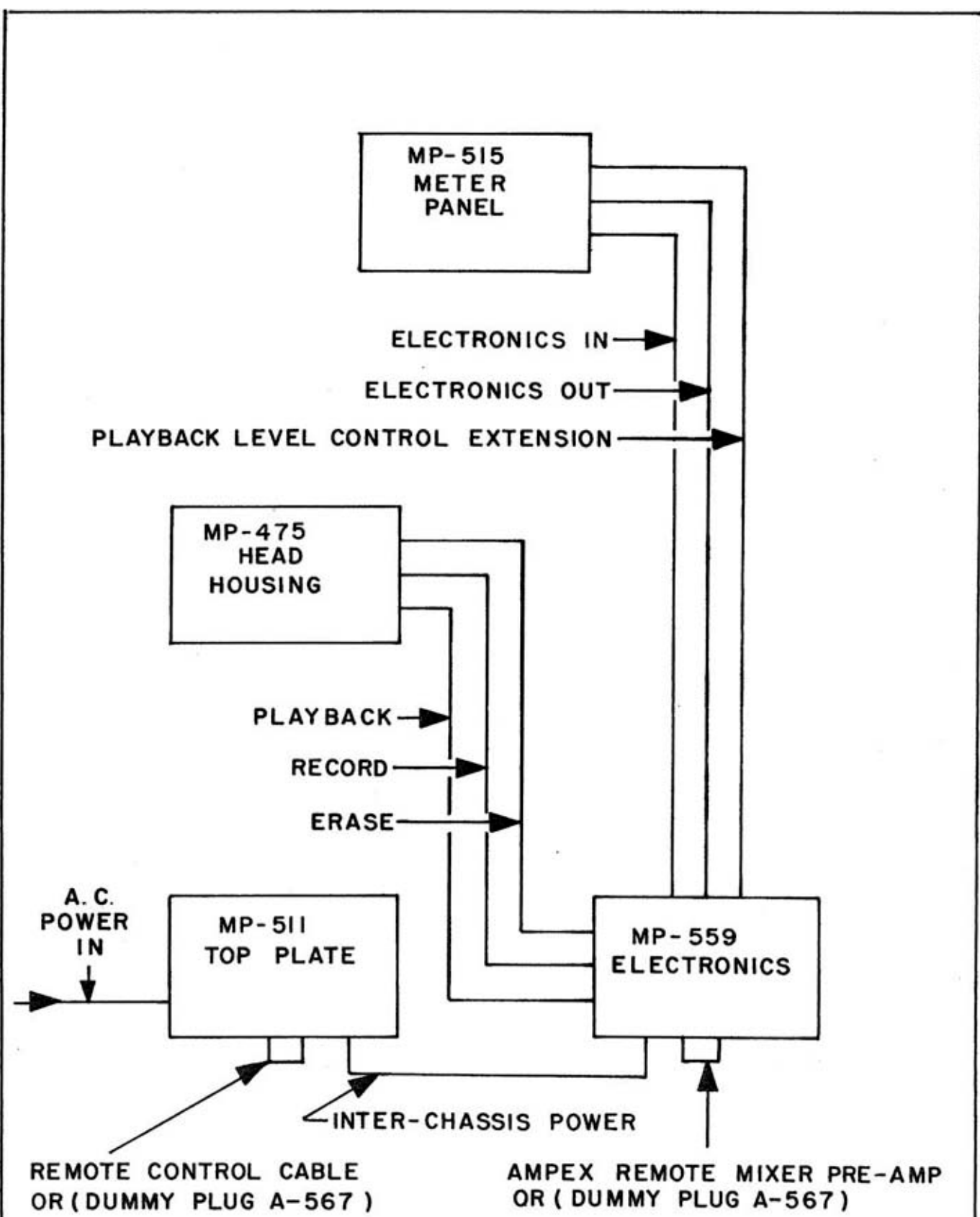


(C) LAYOUT OF ELECTRONICS WITHOUT METER CONTROL PANEL

NOTE: 1. SCREW DRIVER GAIN SETS ON RECORD & PLAYBACK AMPLIFIER CHASSIS WILL ADJUST FOR INPUT LEVELS OF -20 VU TO +8VU & OUTPUT LEVELS FROM 0 TO +8VU.  
 2. ALL ABOVE UNITS MOUNTED ON METER CONTROL PANEL ARE ENCLOSED IN CIRCLE.

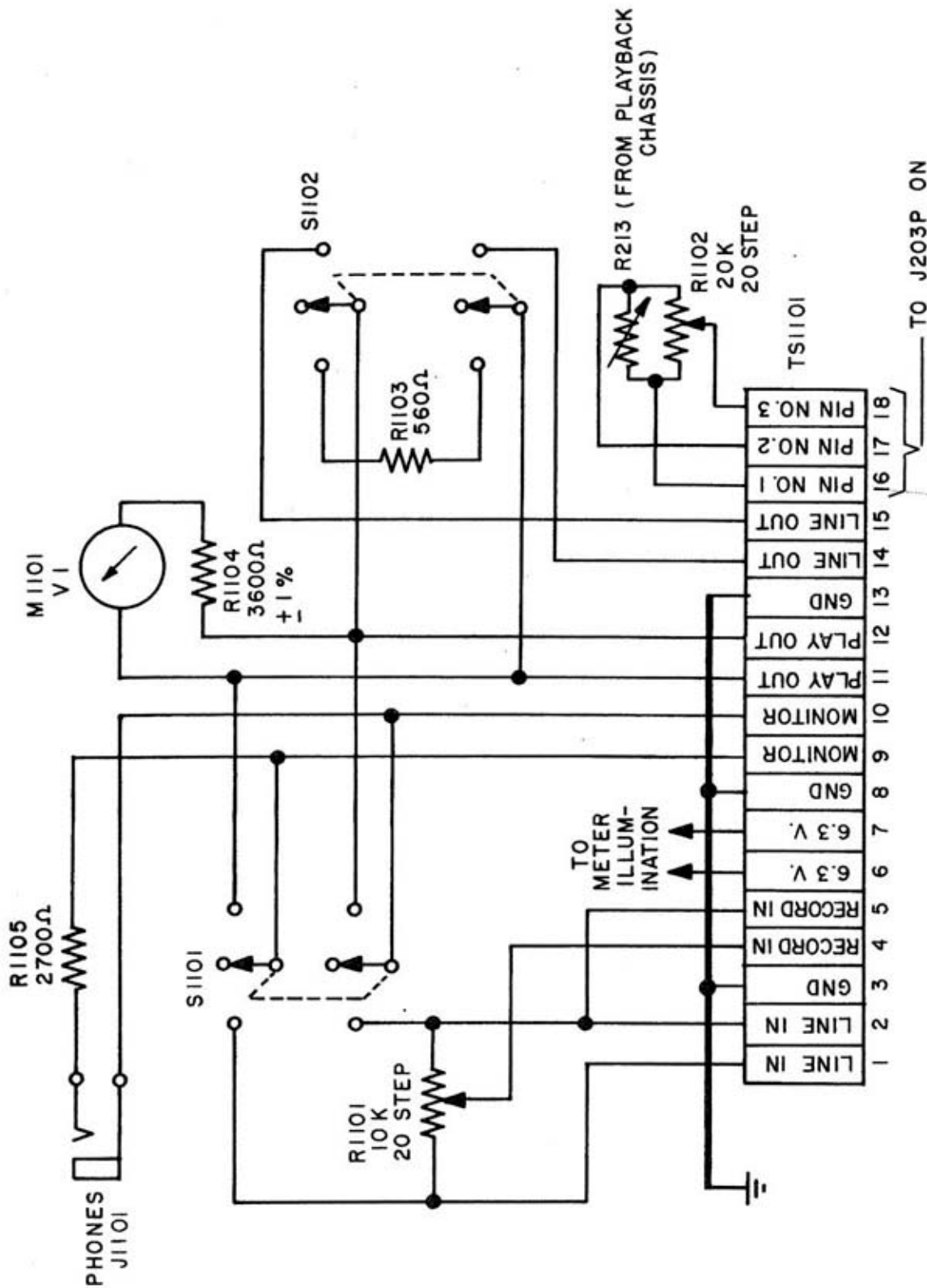
RECOMMENDED LAYOUTS  
 MODEL 300  
 AMPEX ELECTRIC CORPORATION  
 SAN CARLOS, CALIFORNIA





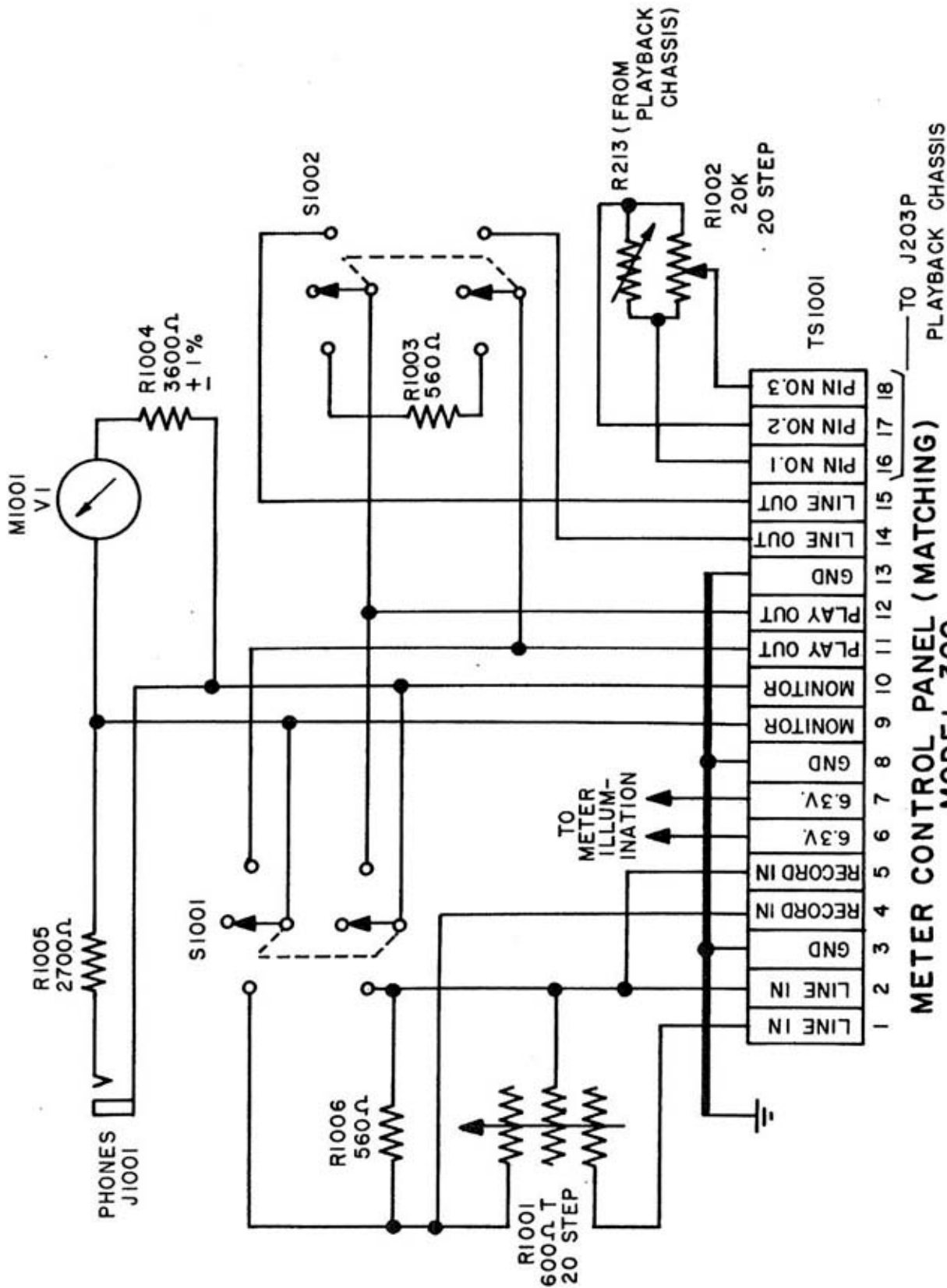
INTER UNIT CONNECTION DIAGRAM  
MODEL 300

AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA



**METER CONTROL PANEL (BRIDGING)**  
**MODEL 300**

AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA



**METER CONTROL PANEL (MATCHING)  
MODEL 300**  
AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

FIG. 13

# AMPEX

## CORPORATION

934 CHARTER ST. • EMERSON 8-1471  
170X REDWOOD CITY CAL 47  
CABLE ADDRESS: AMPEX, REDWOOD CITY  
REDWOOD CITY, CALIFORNIA

MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 23 March 1953

MODEL: 300

BULLETIN NO: 1

PAGE NO: 1

1. Head Magnetization. In order to realize the full dynamic range of type 111 tape, it is extremely important that the heads be free of magnetization. 111 tape is very sensitive to the slightest amount of magnetization on the record head, so that unless care is exercised it is very easy to raise the noise level 5 to 10 db. The Model 300 has been designed so that with normal and proper usage, the heads will not become magnetized. However, it must be remembered that any phenomena which tends to put an unbalanced pulse through the record head will magnetize it. Such pulses can be caused by appearing in the form of signal or by causing a pulse in the power supply voltage. If the following precautions are taken, no difficulty should be experienced with record head magnetization.

a. DO NOT DEPRESS THE RECORD BUTTON UNTIL AFTER DEPRESSING THE START BUTTON. In other words, allow the transient caused by switching the motors and solenoids to die out before the record head is connected. A one-half second pause is sufficient.

b. Do not pull any tubes in the record amplifier, or connect head leads or input leads, while the machine is in the Record position. In some cases it has been found wise not to start or stop recording while there is a saturating signal fed into the record amplifier.

c. Do not switch speeds while recording. (No harm is done by changing speeds while playing back.)

In the event that the head does become magnetized, follow the procedure outlined in the Instruction Book under HEAD MAGNETIZATION. If a head is powerfully magnetized, as when tested with an ohmmeter, the demagnetizing process may have to be repeated several times. AMPEX has available a simple demagnetizer that connects to any 115 V. A.C. line. Order by AMPEX Cat. #704.

The magnetization of the record head which occurs when the Speed Change Switch is operated while recording can be eliminated by placing a 100,000 ohm resistor across terminals 9 and 10 on the back of connector J104P in the Record amplifier. See fig. 6 of the Instruction Book.

Magnetization of the record head can also occur when a sufficiently high signal is present to saturate the record amplifier. Magnetization is even worse if the recorder is started or stopped under this condition. Such a signal is 10 db greater than that necessary to saturate the tape, and 30 db above the normal operating point. Care should be taken to avoid such intense signals. Note that this applies only for levels that are far in excess of the normal operating levels.

# AMPEX

## CORPORATION

934 CHARTER ST. - EMERSON 8-1471  
7WX REDWOOD CITY CAL 41  
CABLE ADDRESS: AMPEX, REDWOOD CITY  
REDWOOD CITY, CALIFORNIA

MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 2  
PAGE NO: 1

1. Erase Adjustments For proper erase current the erase trimmer is adjusted to provide 200 to 210 m. a. instead of the 250 m. a. originally stated in the Instruction Book. Actually, 180 m. a. will erase peak recording level within specifications. In checking erase, always check with both record and erase heads connected, as the bias on the record head provides part of the erase.

# AMPEX

## CORPORATION

934 CHARTER ST. - EMERSON 8-1471  
7WX REDWOOD CITY CAL 41  
CABLE ADDRESS: AMPEX, REDWOOD CITY  
REDWOOD CITY, CALIFORNIA

MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 2  
PAGE NO: 1

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# AMPEX

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934 CHARTER ST. • EMERSON 8-1471  
7WX REDWOOD CITY CAL 41  
CABLE ADDRESS: AMPEX, REDWOOD CITY  
REDWOOD CITY, CALIFORNIA

MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 3  
PAGE NO: 1

1. Reels. It has been found in some isolated cases that when the tape is allowed to run all the way out at the end of a fast wind, a section over a foot long will be broken off the end. Upon investigation, this was found to be due to the sharp edges on the slot opening of the reel hub through which the tape is threaded. The sharp edges apparently provided high friction and did not allow the end of the tape to run out freely. When these sharp edges were filed off, the breakage no longer occurred. This information is being forwarded to the NARTB Sub-Committee for the standardization of reels.

Difficulty has also been experienced with the reels not being properly centered. When inserting the hold-down knob, the knob should be pushed down with one hand, and the reel held with the other hand. As the hold-down comes into contact with the reel, agitate the reel slightly with the other hand to make sure that the hold-down moves into the exact center of the opening, then push the knob down firmly. For use of the new Cat. #534-D and #4402 Hold Down Knobs, see Gen. Service Bulletin #2.

In order for the brakes to work properly, the same size reel must always be placed on both turntables. In using the small RMA 7 inch reels, abnormal hold-back tensions will occur at the end of the reel due to the small hub diameter. This may cause trouble due to slippage at the capstan idler (see item No. 8 below). If the small type reels are to be used exclusively, resistors R401 and R403, in series with the Rewind and Takeup motors respectively, should be increased to the maximum setting. See Service Bulletin #20 to add switch for both 7" and 10-1/2" reels. It is recommended that the smaller 5" reels not be used for recording or playback. (To play the 5" reels, external resistors would have to be added to R401 and R403 for proper tensions.)

2. Threading. In threading the tape, be sure to remove any adhesive that may have been used to seal the end. If this adhesive is not removed, the first layer may stick and cause the end to break off at the end of Rewind.

# AMPEX

CORPORATION

934 CHARTER ST. • EMERSON 8-1471  
7WX REDWOOD CITY CAL 41  
CABLE ADDRESS: AMPEX, REDWOOD CITY  
REDWOOD CITY, CALIFORNIA

MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 3  
PAGE NO: 1

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# AMPEX

CORPORATION

214 CHARTER ST. • EMERSON B-1471  
FWX REDWOOD CITY CAL 41  
CABLE ADDRESS: AMPEX, REDWOOD CITY  
REDWOOD CITY, CALIFORNIA

MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953

MODEL: 300

BULLETIN NO: 4

PAGE NO: 1

## ADJUSTMENT OF AC SOLENOIDS ON RECORDERS BELOW SER. NO. 500

Some difficulty has been experienced with the humming or buzzing of the solenoid which operates the capstan idler, E801. Investigation of the cause of this noise has disclosed that if the linkage has not been adjusted properly, the force required of the solenoid will be greatly increased and therefore cause it to hum.

Looking at the drive assembly from the bottom, the linkage of the capstan idler solenoid can be seen. The link rod A passes through a hole in the arm B that it operates, and there is a rubber washer (C) and adjusting nut (D) on the end. When the solenoid is operated, the rod pulls the rubber washer against the arm to operate it. When the solenoid is seated, the angle E between the rod and the arm should be less than  $90^\circ$ . If this is so, the effective contact point of the washer is on the outside. If the angle between the rod and the arm is greater than  $90^\circ$  when the solenoid is seated, the contact point of the washer on the arm is on the inside, effectively reducing the moment arm by a considerable amount, and therefore requiring much greater force to be exerted by the solenoid.

The importance of maintaining the above angle E below  $90^\circ$  was only recently discovered, and it is possible that some machines have been shipped in which this angle might be too great. While no machines have been shipped with noisy solenoids, it is possible that if the above adjustment is not proper the solenoids may become noisy in use. Should this be the case, the adjustment can be corrected as follows:

It will be noted that the capstan idler arm shaft F is connected to the operating shaft G below through a U-shaped torque link H. If the bottom (or shorter) arm of this link H is bent in a clockwise direction (when looking at the link from the bottom or short arm end), this will effectively reduce the angle E. In order to bend this arm, it is necessary to remove link H and hold it in a vice. The link can be removed by forcing off the spring-lock washers which position the lower arm (I and J) and which attach the return spring at the top (K). The proper value for the angle E is approximately  $85^\circ$ , or when the arm H is perpendicular to the plane of the solenoid base plate.

If the angle E is changed, it will be necessary to re-set the capstan idler adjustment D. This adjustment is set so that when the capstan idler just touches the capstan, the solenoid is  $1/8$  inch shy of seating. A simple way of making this setting is to place a piece of material  $1/8$  inch thick between the solenoid armature and body and clamp the armature down on it. Then tighten the nut D until the capstan idler just touches the capstan.

It may also be necessary to reset the capstan idler solenoid Stop L. This stop should be set so that at no time during fast winding does the tape touch the capstan idler.

# AMPEX

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MAGNETIC RECORDERS

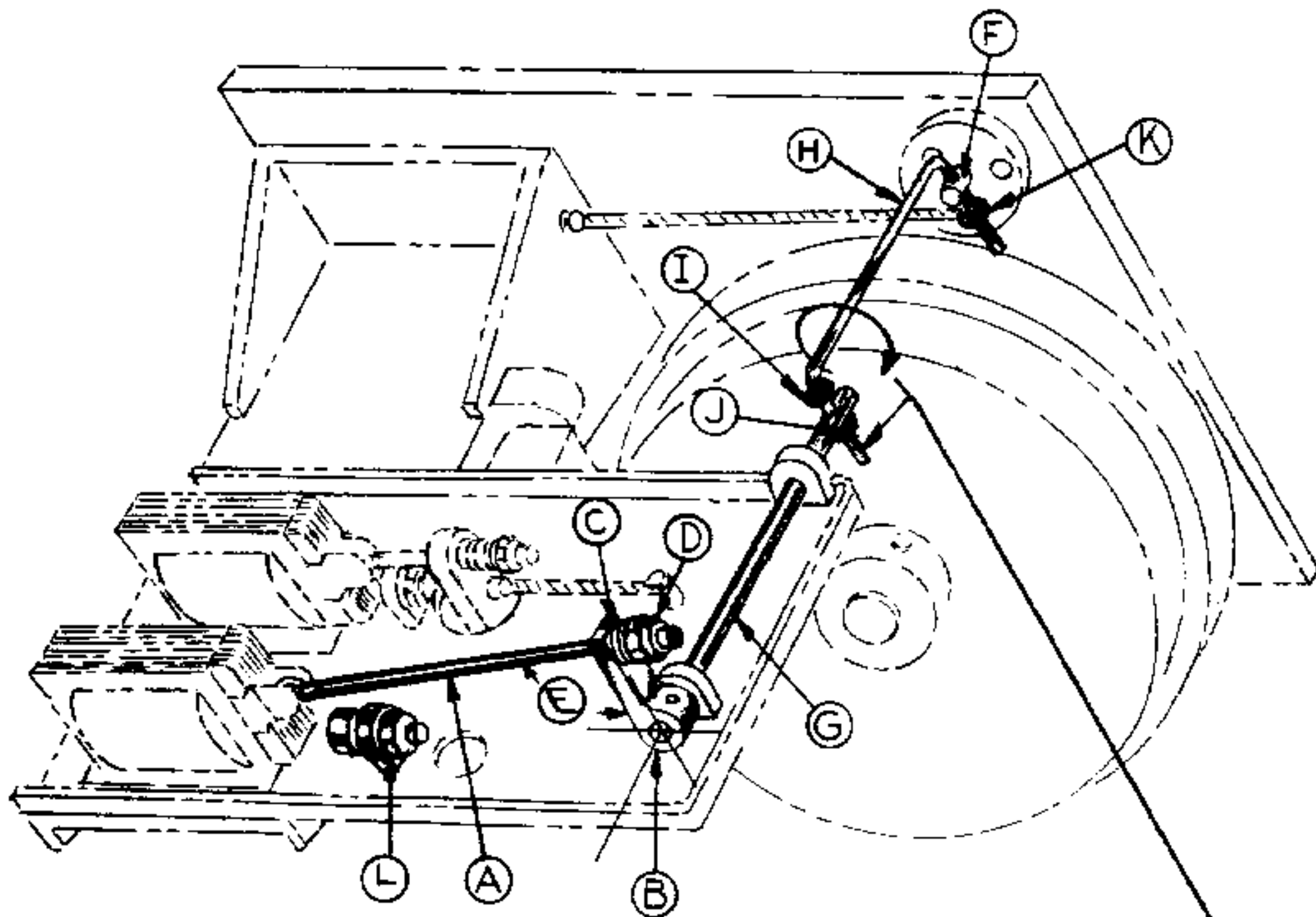
SERVICE BULLETIN

DATE: 20 March 1953

MODEL: 300

BULLETIN NO: 4

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TO REDUCE ANGLE E, BEND  
THIS ARM CLOCKWISE WITH  
RESPECT TO UPPER ARM. RESET  
ADJUSTING NUT D & L.

ANGLE E MUST BE LESS THAN 90° WHEN  
CAPSTAN SOLENOID IS SEATED.

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SERVICE BULLETIN

DATE: 20 March 1953

MODEL: 300

BULLETIN NO: 4

PAGE NO: 1

## ADJUSTMENT OF AC SOLENOIDS ON RECORDERS BELOW SER. NO. 500

Some difficulty has been experienced with the humming or buzzing of the solenoid which operates the capstan idler, E801. Investigation of the cause of this noise has disclosed that if the linkage has not been adjusted properly, the force required of the solenoid will be greatly increased and therefore cause it to hum.

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It may also be necessary to reset the capstan idler solenoid Stop L. This stop should be set so that at no time during fast winding does the tape touch the capstan idler.

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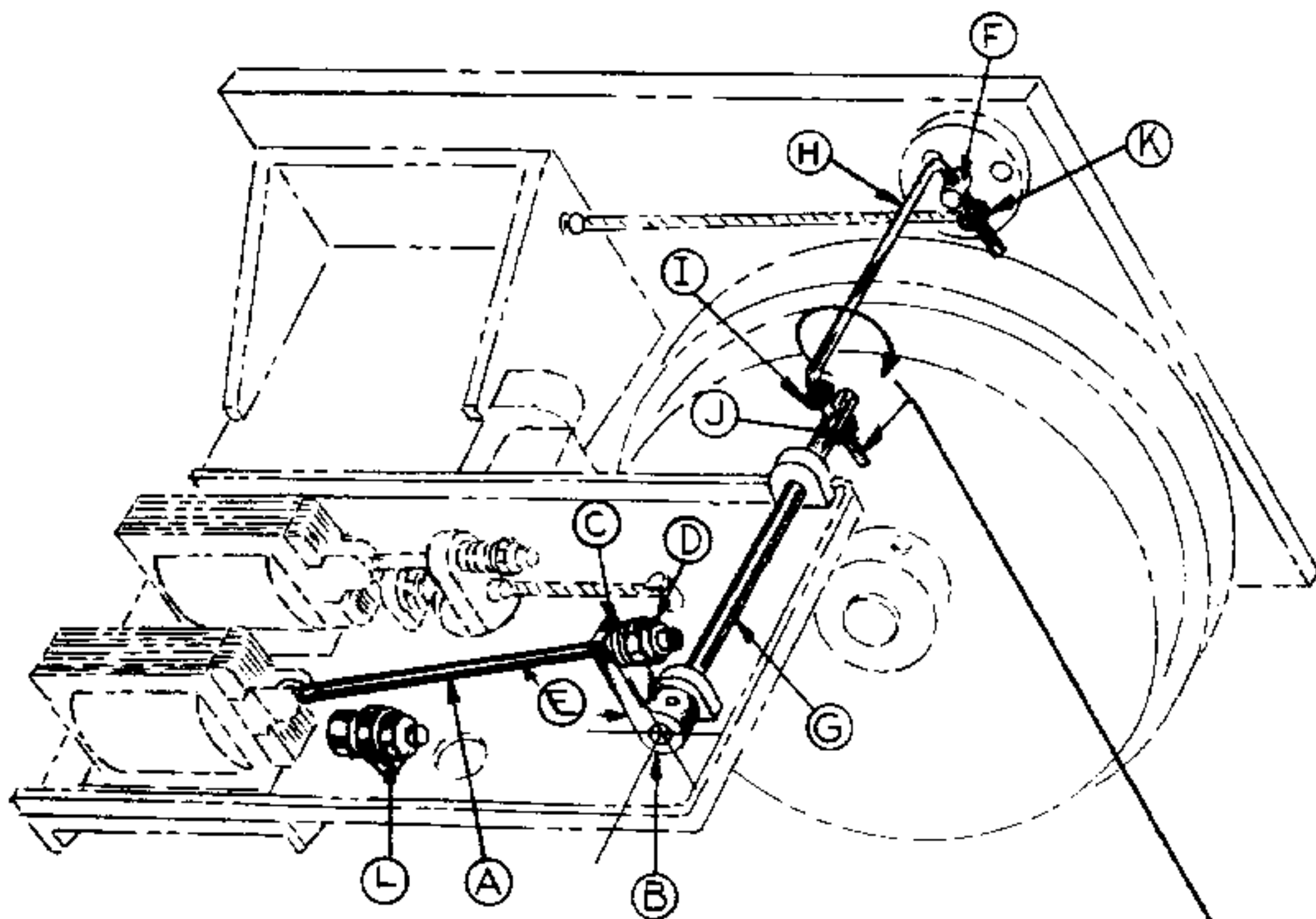
SERVICE BULLETIN

DATE: 20 March 1953

MODEL: 300

BULLETIN NO: 4

PAGE NO: 2



TO REDUCE ANGLE E, BEND  
THIS ARM CLOCKWISE WITH  
RESPECT TO UPPER ARM. RESET  
ADJUSTING NUT D & L.

ANGLE E MUST BE LESS THAN 90° WHEN  
CAPSTAN SOLENOID IS SEATED.

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**SERVICE BULLETIN**

DATE: 20 March 1953

MODEL: 300

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### MODEL 300 CONSOLE CABINET

1. The four feet of the console cabinet are adjustable, so that the cabinet may be leveled on any floor by merely screwing the feet to the proper position.

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SERVICE BULLETIN

DATE: 20 March 1953

MODEL: 300

BULLETIN NO: 6

PAGE NO: 1

### BRAKE ADJUSTMENTS AND BRAKE BAND REPLACEMENTS

1. Brake Bands. There have been several instances in which the brake bands have broken on machines that are in use. Investigation of the broken bands has revealed that the fracture has always occurred in the same place.

The brake bands have therefore been redesigned to relieve all possible strains at the point which the breakage has occurred. As may be seen in the enclosed sketch, two reinforcing leaves have been added to relieve the strain. The link, A-330, has been reversed. This causes band to rest more firmly against the housing and thereby prevents any tendency for the brake to drag. To install, simply follow the enclosed sketch. Adjustment of proper brakeband length is made at the point where the band is attached to the A-330 link. It will be noted that the band is slotted for this purpose. The band should be positioned so that when the solenoid is operated, the band is expanded firmly and uniformly against the inner wall of the housing, completely free of the brake drum. However, care must be taken so that the projecting portion of the band near the A-330 link bows only slightly. Excessive bending of the band at this point may be the cause of future failure, or in the case of A.C. solenoids, the cause of excessive audible noise.

After installation, the brake bands must be "run in" before brake settings will be stable. This is done by putting the machine in Rewind or fast Forward, as the case may be, and disconnecting the brake solenoid. Allow the motor to run at full speed for 10 minutes with the brakes on.

After allowing sufficient time for the brakes to return to room temperature, adjust the brakes to provide a tension of 14 oz. on the standard NAB reel hub, when pulled in the direction in which the tape unwinds.

Replacement bands should normally be stored in a compress, as the felt has a tendency to expand after a period of time, and may therefore rub when installed. If the felt has not been kept in a press, simply squeeze it in a vise before installing. The pressure of the brakes is sufficient to keep the felt compressed after installation.

2. Brakes. The brakes have been adjusted to work properly with the standard NAB double flanged reel. If small RMA reels or hubs only are used, the brakes will not necessarily stop without slack forming when fast winding onto the small reel or hub. This is because with normal brake settings, the inertia of the reel that is taking up the tape serves to tension the tape, and if the brakes are set tight enough to stop a small reel without slack, the tension on the tape will be excessive when using the regular reel.

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MODEL: 300  
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In order to avoid the tightening action which occurs when brake bands become glazed, the brake bands have been treated with graphite. With the graphited brake bands, the proper tension as measured on the NAB reel hub in the unwinding or energizing direction is 14 ozs. Should the brakes exhibit a tendency to tighten up or grab, they should be re-treated with graphite. (Some of the earlier machines had brake bands which were not graphited.) A mixture in the proportions of one level tablespoon of graphite to one 8 oz. cup of carbon tetrachloride can be applied to the felt of the brakebands with an oil can. After graphiting, the motors should be run 10 min. with the brakes on to wear in the graphite.



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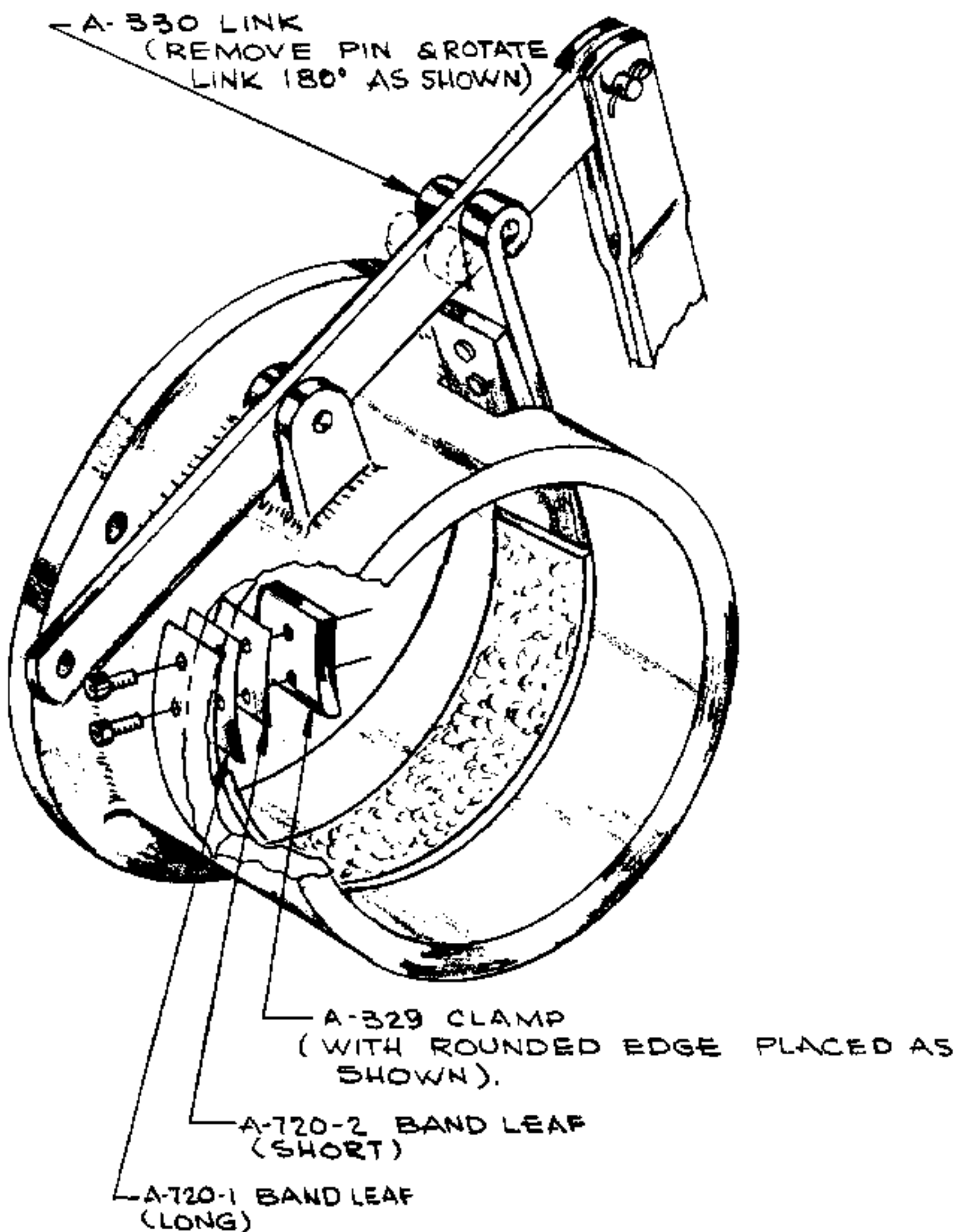
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SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
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### REINFORCEMENT OF BRAKE BANDS



DATE: 15 March 1957

MODEL: 300 Series

BULLETIN NO: 7-07

PAGE NO: 1 of 1

( Supersedes General Bulletin #9  
dated September 12, 1956 )**REPLACEMENT OF CAPSTAN ASSEMBLIES**

300 Series Tape Transport Mechanisms manufactured before November 1955 used the Ampex part number 366 and 1512 Series Capstan Assemblies. These assemblies were mounted on the frame plate with a Tru-Arc retaining ring #430-050.

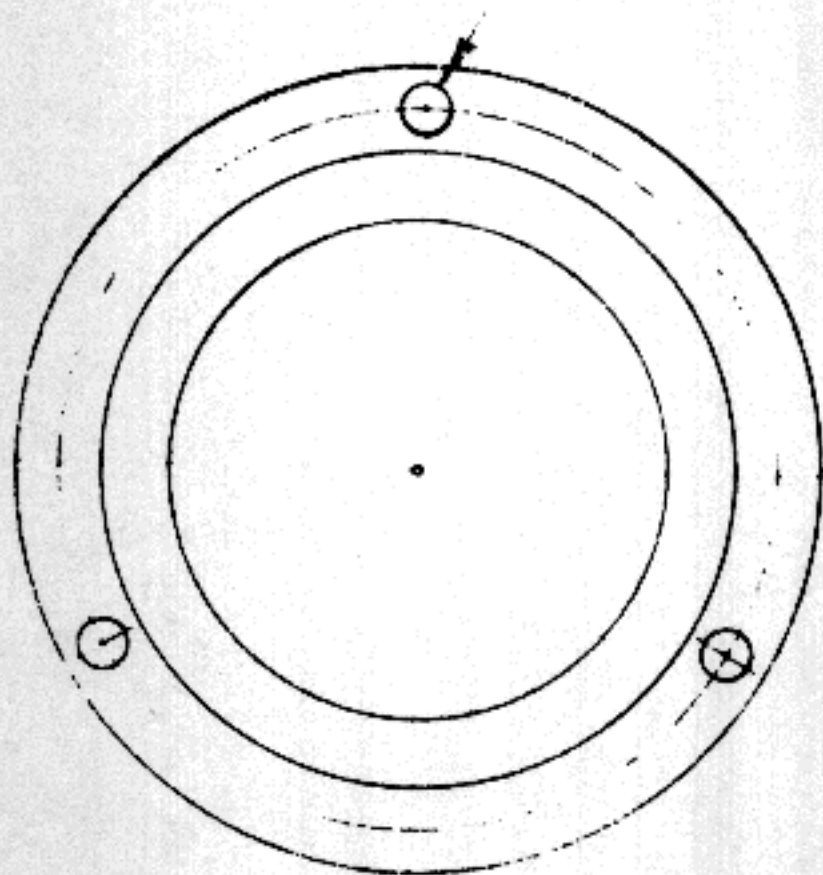
On Tape Transports manufactured after November 1955 the Capstan Assembly is mounted with a retaining collar on the frame plate by three 10-24 x 3/4" socket head cap screws #470-108 and three lockwashers #502-011.

When ordering replacement Capstan Assemblies, order 366 and 1512 Series for machines with Serial numbers 55K\_\_\_ or earlier, eg. 55J\_\_\_. For machines with Serial numbers higher than 55K, eg. 55L, order 7518 Series Capstan Assemblies.

If the later model Capstan Assembly is to be mounted on the older Tape Transport Mechanism, it will be necessary to drill and tap the frame plate for 10-24 screws. Three ( 3 ) holes on a 2.688 diameter.

The drawing shown below can be used as a template.

#10 Drill - 3 Holes on 2.688 Diameter



Tape Speed (ips)	Catalog Number of Capstan Assembly		Shaft Diameter, inches	Bushing Diameter, inches
	Retaining Ring Mount	Collar Mount		
3-3/4 - 7-1/2	366-4	7518-4	.237	---
7-1/2 - 15	366-1	7518-3	.475	---
15 - 30	366-1	7518-3	.475	---
3-3/4 - 7-1/2 - 15	2540-1	7518-6	.237	.481
7-1/2 - 15 - 30	1512-1	7518-1	.475	.959
15-30-60	1512-1	7518-1	.475	.959

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**SERVICE BULLETIN**

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 7  
PAGE NO: 1

1. Drive Motor Lubrication. The first Model 300 machines were equipped with ball bearing drive motors, which require no attention. Since that time sleeve bearing drive motors have become available, and have been used on all subsequent production. If your machine has a sleeve bearing drive motor, be sure to add the lubrication of this motor to the maintenance schedule.

See Service Bulletin #17 for proper lubrication instructions.

The motor should be lubricated with a pump-type oil can. To reach the upper bearing in the console model, the spout should have a bend in it less than three inches from the end. In the portable model, the upper bearing is most conveniently reached by unbolting and lifting the top-plate. The top-plate should be tipped up by raising the right-hand end, as viewed when facing the front of the machine. Use the hold-down knob on the takeup motor as a handle for lifting. The plate need only be lifted a few inches to expose the bearing to be lubricated.

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MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 8  
PAGE NO: 1

1. Capstan Oil Leakage. There is a tendency for oil to climb out of the capstan bearing housing during the first few weeks of operation. The capstan bearing has been thoroughly impregnated with oil so as to drive out any air inclusions, as the presence of air would tend to force oil out of the bearing housing when it becomes warm. The excess oil present climbs up the capstan when the machine is operated. Ordinarily, this oil is caught by the felt washer on top of the bearing housing. (The neoprene washer shown in fig. 2 of the instruction book was eliminated in production because it produced flutter.) If this washer becomes saturated with oil, which usually happens, then it will no longer behave as an effective seal. Therefore after the first week or so of operation, when most of the excess oil has had a chance to work out, the felt washer should be removed and washed out in carbon tetrachloride. Simply remove the capstan dust cap (see fig. 2, instruction book) to remove the felt washer. If this washer is kept reasonably dry, then no trouble should be experienced with oil creeping up the capstan.

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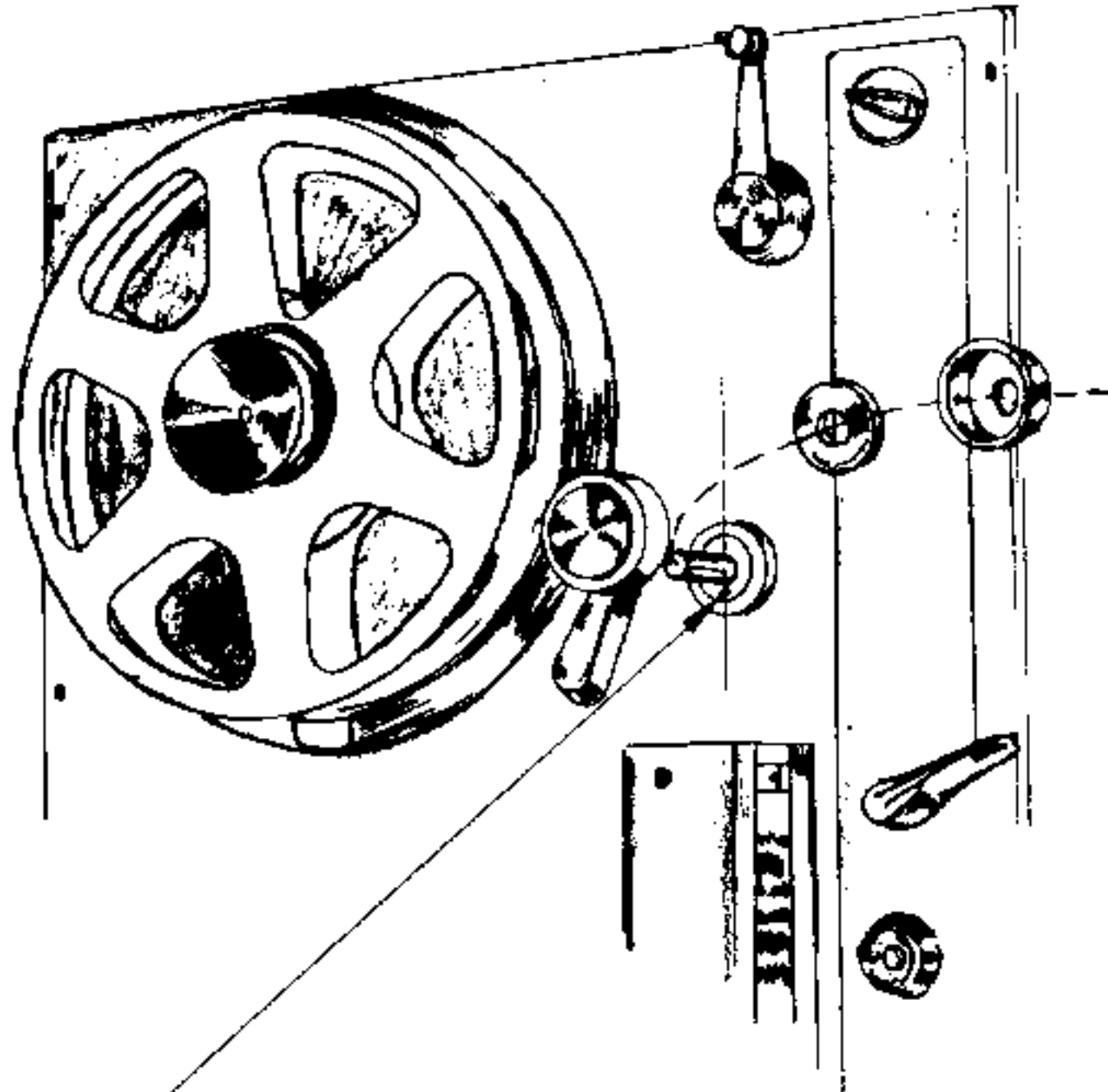
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SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 8  
PAGE NO: 2



REMOVE CAPSTAN DUST COVER  
& FELT WASHER AS SHOWN  
POSITION CAPSTAN ASSEM.  
SO THAT CENTER LINE BETWEEN  
BOTH HOLES IS VERTICAL WITH  
LARGE C'SK HOLE ON THE  
BOTTOM AS SHOWN. IF CAPSTAN  
SHOULD NEED POSITIONING SEE  
SVC. BULL. \*14  
TAP 6-32 N.C. IN LARGE C'SK HOLE  
INSERT 6-32 X 1/4 LG. FLAT HD. MACHINE  
SCREW.

PLUGGING OF CAPSTAN OIL  
HOLE ON RACK MOUNTED  
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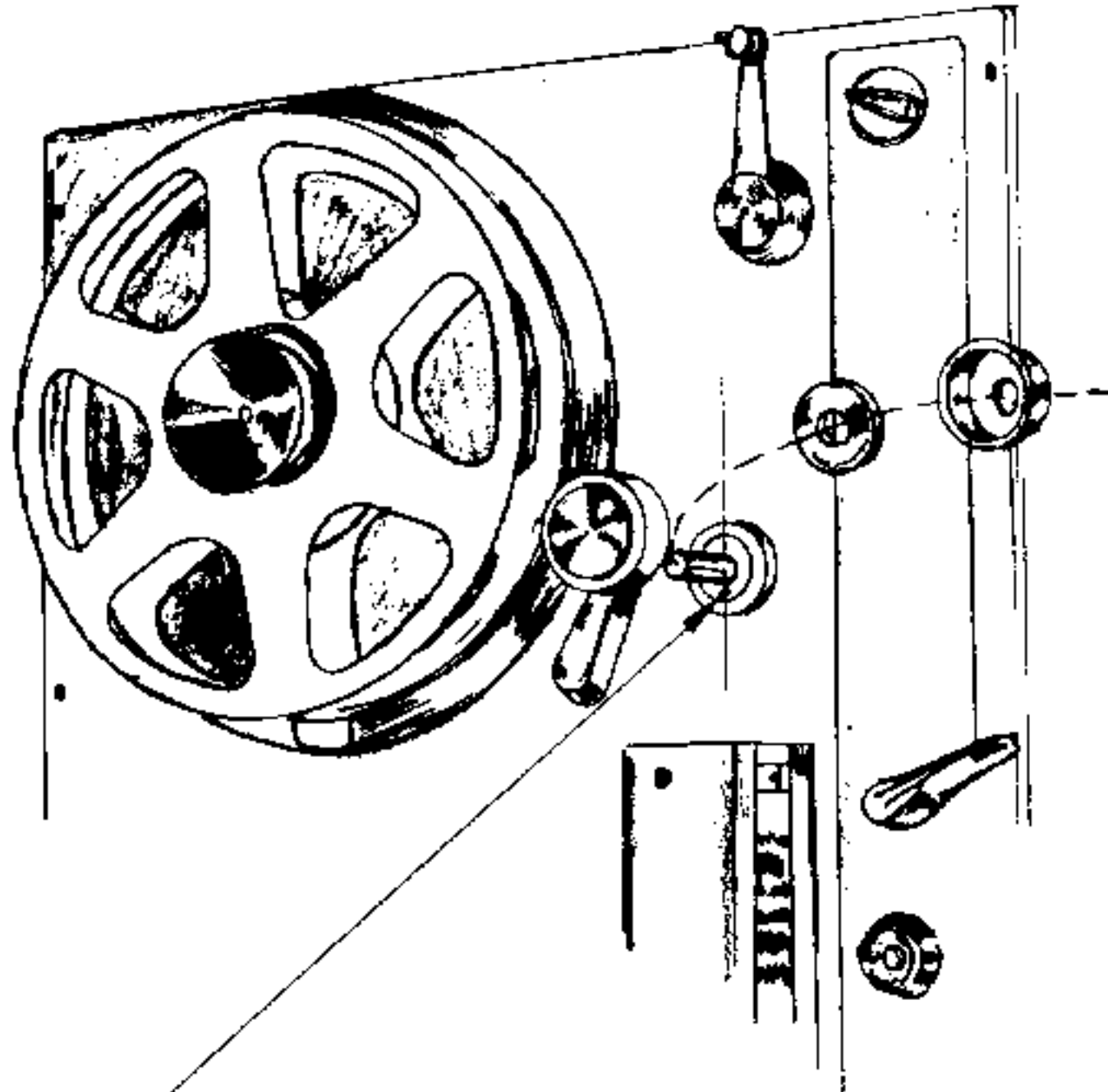
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MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 9  
PAGE NO: 1

1. Meter Control Panel. The Meter Control Panel was designed for balanced input and output. If it is desired to operate unbalanced, the following terminals on the Meter Control Panel should be used as the grounded side of the line:  
No. 2 on the Line In connections.  
No. 10 on the Monitor connections.  
No. 15 on the Line Out connections.

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MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 10  
PAGE NO: 1

1. Tape Slippage. Various users have reported that the tape slows down near the end of the program. This occurs if the capstan idler pressure is not great enough, and of course becomes worse at the end of the reel where the hold-back tension is highest. The condition is further exaggerated if a small RTLA type reel is used in which case the hold-back tension is even higher.

Effective capstan idler driving force is reduced as the capstan idler gradually picks up the lubrication with which Minnesota Mining and Manufacturing Company type 111 tape is treated. (This lubrication is quite important, as it reduces flutter and head wear, permits more uniform head contact and therefore less high frequency amplitude variation, and any tendency for the tape to "squeak". This "squeaking" sometimes occurs at the 7.5" speed when using the small reels and is very objectionable.) For this reason, the capstan idler should be cleaned with ethyl alcohol at least once each week. Also, great care must be taken to see that oil from the capstan does not reach the capstan idler. Not only will this contribute to slippage, but oil will ruin the capstan idler tire. Follow the instructions in Service Bulletin #8 to prevent oil leakage.

To test for proper capstan idler pressure, hold the tape while the machine is running in the Play position. The idler pressure should be sufficient to just deform the tape. The pressure can be increased as described in the instruction book. Care must be taken to avoid overloading the capstan idler solenoid if audible hum is to be avoided. Such hum has no effect on the performance of the recorder.

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SERVICE BULLETIN

DATE: 20 March 1953  
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BULLETIN NO: 11  
PAGE NO: 1

1. Bias Adjustment. As stated in the instruction book, paragraph 4, p.2, section III, the bias is set at a current at which the overall output at 1000 cycles is 2 db below the maximum. For serial numbers above 1605 see Service Bulletin #19 paragraph "B". The bias current is very uncritical as far as affecting distortion, once a certain minimum is exceeded. Above this minimum point, the output remains constant for the same distortion over a very wide range. The only effect of excessive bias current is to erase high frequencies. Actually, the optimum current for the bias setting is that which produces maximum sensitivity at 1000 cycles. The bias setting is specified to be much higher than this to insure that the current will always be well beyond the region of distortion. This setting is overly conservative, and if it is found that difficulty is ever encountered in obtaining sufficiently high record level at the high frequencies, greater high frequency output can be obtained by slightly reducing the bias current. Following the procedure outlined in the instruction book, any setting just beyond the peak to 2 db down is satisfactory.

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1. Bias Adjustment. As stated in the instruction book, paragraph 4, p.2, section III, the bias is set at a current at which the overall output at 1000 cycles is 2 db below the maximum. For serial numbers above 1605 see Service Bulletin #19 paragraph "B". The bias current is very uncritical as far as affecting distortion, once a certain minimum is exceeded. Above this minimum point, the output remains constant for the same distortion over a very wide range. The only effect of excessive bias current is to erase high frequencies. Actually, the optimum current for the bias setting is that which produces maximum sensitivity at 1000 cycles. The bias setting is specified to be much higher than this to insure that the current will always be well beyond the region of distortion. This setting is overly conservative, and if it is found that difficulty is ever encountered in obtaining sufficiently high record level at the high frequencies, greater high frequency output can be obtained by slightly reducing the bias current. Following the procedure outlined in the instruction book, any setting just beyond the peak to 2 db down is satisfactory.

# AMPEX

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MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 12  
PAGE NO: 1

### CYCLOHM DRIVE MOTORS

1. Capstan Motor. Failure of the capstan drive motor has been reported by several users of the Model 300 recorder. These failures have been described as a knocking noise which develops in the motor, sometimes accompanied by loss of torque.

Investigation of motors which have been returned to our factory have revealed a defect in the mechanical design. These motors have therefore been returned to the manufacturer who has redesigned the units to overcome these defects in all respects. All motors which have exhibited this mechanical failure in the field are being replaced with the redesigned motor.

To install the new motor, first remove the old unit by unsoldering the leads from the switch S-502 and removing the black lead from Terminal Strip. Remove the four mounting screws which fasten the motor to the hinged bracket.

Install the new motor and connect as shown in the accompanying illustration, being careful to follow the color code of the leads. Before tightening the four screws in the motor base, swing the motor pulley into contact with the rubber tire and check for alignment. (Motor and Capstan shafts should be approximately parallel) A slight amount of adjustment is available due to the clearance of the holes in the hinged bracket supporting the motor.



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MAGNETIC RECORDERS

SERVICE BULLETIN

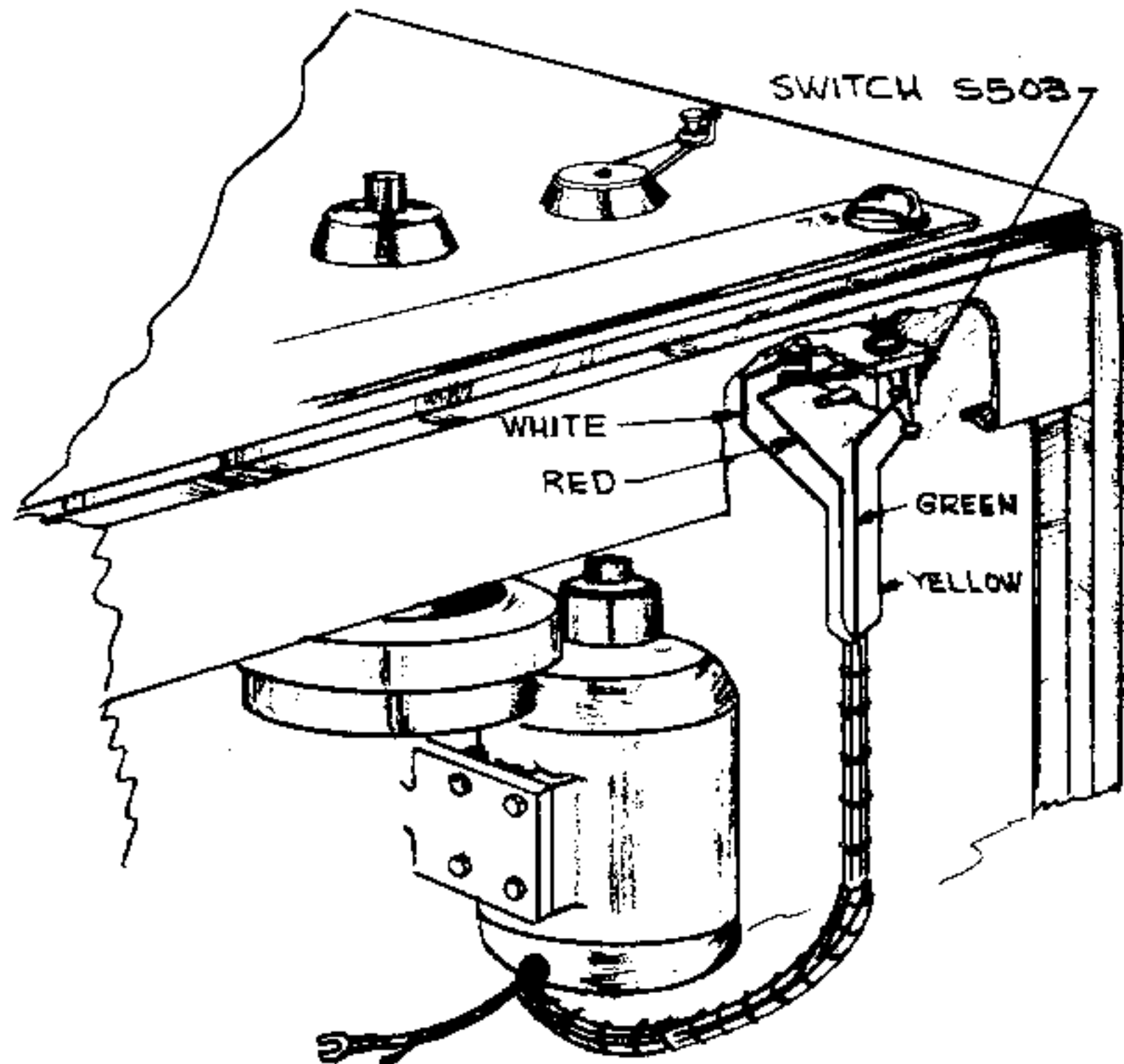
DATE: 20 March 1953

MODEL: 300

BULLETIN NO: 12

PAGE NO: 2

### DRIVE MOTOR REPLACEMENT



BLACK WIRE TO NO. 1  
TERMINAL ON DRIVE  
ASSEM. TERMINAL  
STRIP TS 501

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SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
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SERVICE BULLETIN

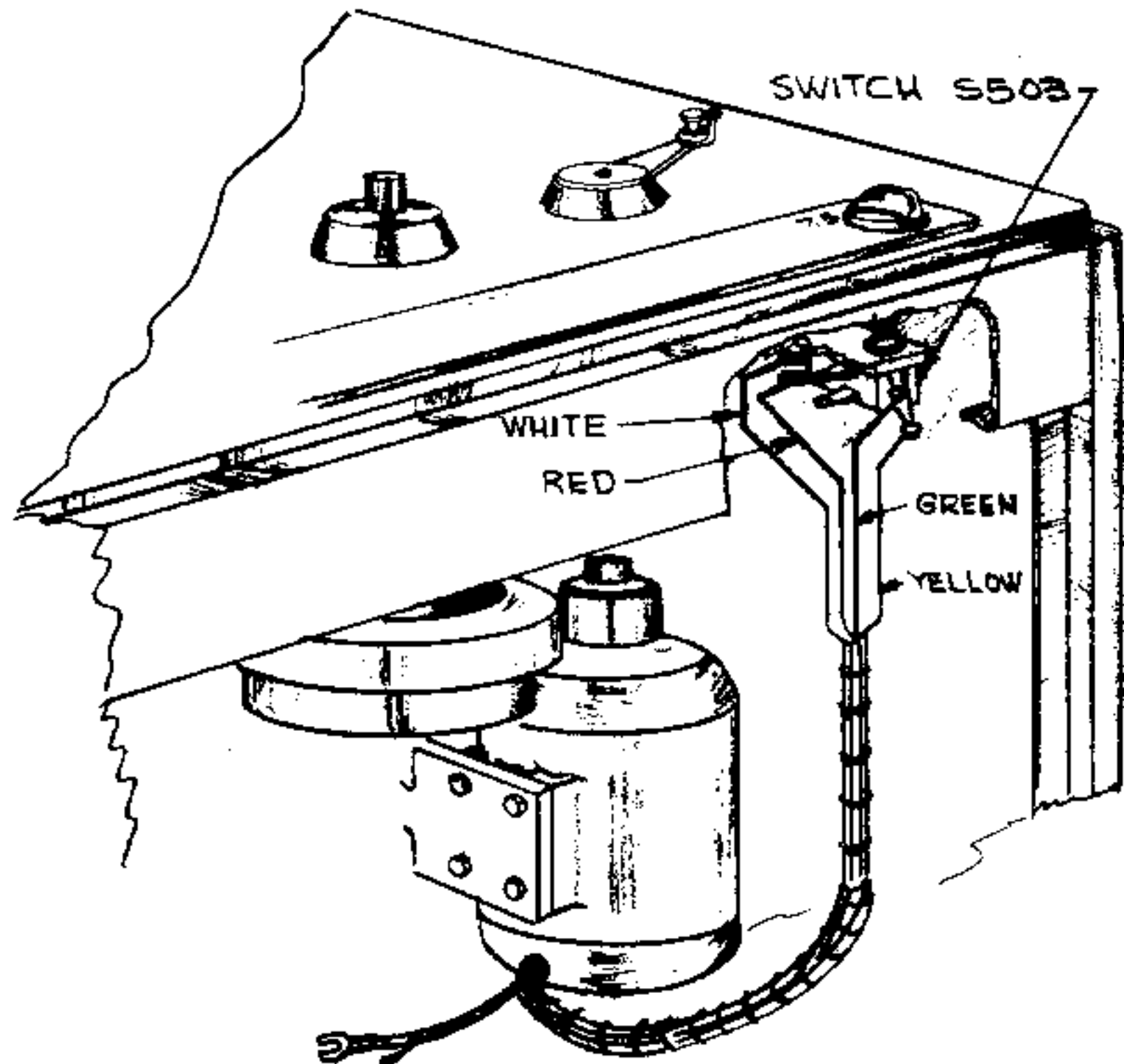
DATE: 20 March 1953

MODEL: 300

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### DRIVE MOTOR REPLACEMENT



BLACK WIRE TO NO. 1  
TERMINAL ON DRIVE  
ASSEM. TERMINAL  
STRIP TS 501

# AMPEX

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MAGNETIC RECORDERS

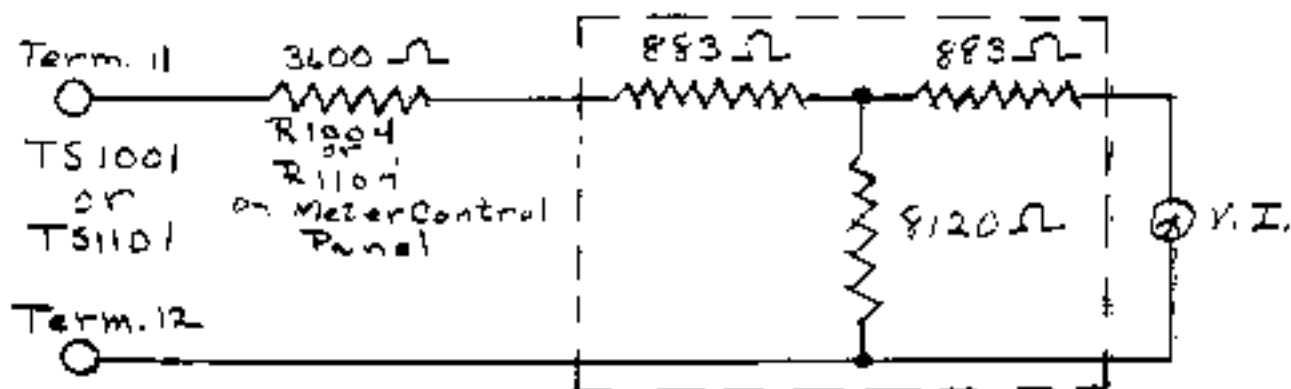
SERVICE BULLETIN

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DATE: 20 March 1953  
 MODEL: 300  
 BULLETIN NO: 13  
 PAGE NO: 1

1. Adjusting Levels. In the event that it is desired to operate the recorders at levels other than the recommended levels of  $\pm 1$  VU in and out, the procedure is as follows:

- I. A. To set new playback level on machines without Meter Control Panel (assuming machine has already been adjusted in accordance with the procedure outlined in the Instruction Book)
  - (1) Thread up and play standard tape.
  - (2) On playback of 1000 cycle tone, adjust playback gain control R213 so that output reads 10 db below new desired operating level, but not over 0 dbm.
- B. To set new playback level on machines with Meter Control Panel (matching or bridging)
  - (1) Thread up and play standard tape.
  - (2) Place playback level control at 11.
  - (3) Adjust R213 on Meter Control Panel so that 1000 cycle tone plays back at new desired operating level (not over  $\pm 10$  dbm)
  - (4) If new level is greater than  $\pm 4$  VU insert pad between playback output and VI meter on Meter Control Panel so that meter reads zero at new output level. If new output level is  $\pm 8$  VU then use pad as shown in Figure 1 below.



- (5) Set playback level control to 11, for normal operation.

II. A. Machines without Meter Control Panel:

- (1) Feed recorder with new desired operating level.
- (2) Adjust record level control R101 until operating level is obtained on playback.

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B. Machines with Meter Control Panel:

Record Level Step control on Meter Control Panel provides accommodation for various input levels. Adjust this control until output of playback is normal operating level.

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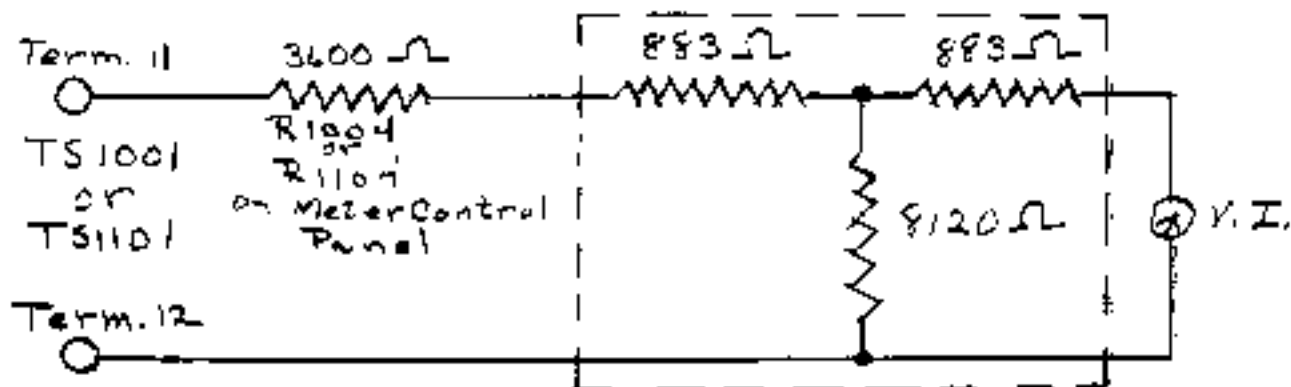
MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
 MODEL: 300  
 BULLETIN NO: 13  
 PAGE NO: 1

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  - (2) On playback of 1000 cycle tone, adjust playback gain control R213 so that output reads 10 db below new desired operating level, but not over 0 dbm.
- B. To set new playback level on machines with Meter Control Panel (matching or bridging)
  - (1) Thread up and play standard tape.
  - (2) Place playback level control at 11.
  - (3) Adjust R213 on Meter Control Panel so that 1000 cycle tone plays back at new desired operating level (not over  $\pm 10$  dbm)
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- (5) Set playback level control to 11 for normal operation.

II. A. Machines without Meter Control Panel:

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DATE: 20 March 1953

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B. Machines with Meter Control Panel:

Record Level Step control on Meter Control Panel provides accommodation for various input levels. Adjust this control until output of playback is normal operating level.

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SERVICE BULLETIN

DATE: 20 March 1953  
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### REPLACEMENT INSTRUCTIONS FOR REPLACING CYCLOHM DRIVE MOTOR OR ELECTRIC INDICATOR MOTOR WITH BODINE DRIVE MOTOR, SERIAL NOS. 113 TO 699

The Bodine Drive Motor which has been developed for the Model 300 runs at double the speed of the Cyclohm or Electric Indicator Drive Motor used on machines of Serial #113 to 699 and consequently uses a different size pulley. To install the Bodine Drive Motor therefore requires that a new hinge bracket be installed which will support the new motor in the proper position to engage the capstan flywheel. Also, since the windings on the Bodine Motor are different than on either the Cyclohm or Electric Indicator Motors, it must be connected in a different manner.

The procedure for making this replacement is as follows:

1. Remove retaining rings "A" on Capstan Idler link "B".
2. Remove Capstan Idler link "B".
3. Remove Capstan Idler arm from Top Plate.
4. Remove Capstan cap by loosening set screw "C".
5. Disconnect wiring harness from Drive Assembly terminal strip "D".
6. Remove Drive Assembly from machine by removing 4 elastic stop nuts "E" (only one shown).
7. Remove 4 screws "F" and drop solenoid mounting plate. Note that two screws are on the solenoid side and remainder on the opposite side of the plate.
8. Carefully remove drive lok pins "G". Be careful not to damage ears of casting.
9. Remove two bracket hinge pins "H".
10. Remove bearings from old brackets and install in new bracket.  
**CAUTION:** In removing bearings be careful not to injure bearing dust shield. Injury to this shield could lead to freezing of the bearing.
11. Install new bracket and motor by reversing foregoing procedure.
12. Re-assemble remainder of Drive Assembly and re-install on Top Plate.
13. Adjust solenoid adjusting nut "J" for proper speed. Since there is sometimes more than one point at which the proper speed is obtained, for stable operation, be sure nut is tightened to the point where further tightening reduces the Capstan speed.



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MAGNETIC RECORDERS

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DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 11  
PAGE NO: 2

14. The bumper should not determine the rest position of the motor. The bumper merely serves as an override bumper to damp out any motor oscillation that would cause it to bounce against tire after solenoid is de-energized. The rest position is determined by the motor spring versus the pressure of the drive solenoid spring adjustment. When properly adjusted the bumper should not quite touch motor while at rest except during shipment.
15. For modified wiring for Bodine Motor see attached wiring Diagram EA-1752.

### PARTS REQUIRED FOR CONVERSION OF AMPEX RECORDERS, MODELS 300, 301 AND 302 TO BODINE DRIVE MOTORS.

#### MODEL 300 - Serial No. 113 to 500

<u>Quantity</u>	<u>Description</u>	<u>Part No.</u>
1	Bodine Drive Motor Assembly	B-1030
1	Bracket, Hinge	B-1511
1	Capacitor *	CG-80
1	Shield, Bodine Drive Motor	B-1905
<u>Serial No. 501 to 600</u>		
1	Bodine Drive Motor Assembly	B-1030
1	Bracket, Hinge	B-1072
1	Shield, Bodine Drive Motor	B-1905

#### MODEL 301 AND 302 - Serial No. 113 to 500

1	Bodine Drive Motor Assembly	B-1075
1	Bracket, Hinge	B-1681
1	Capacitor	CG-80
1	Capstan Assembly	C-356
1	Shield, Bodine Drive Motor	B-1905

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MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
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<u>Quantity</u>	<u>Description</u>	<u>Part No.</u>
	<u>Serial No. 501 to 699</u>	
1	Bodine Drive Motor Assembly	B-1075
1	Bracket, Hinge	B-518-3
1	Capacitor	30-80
1	Capstan Assembly	C-366
1	Shield, Bodine Drive Motor	B-1905

Prices on Request

- \* Only required where original motor was manufactured by Electric Indicator. Cyclohm and Bodine Drive Motors use same capacitor.

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MAGNETIC RECORDERS

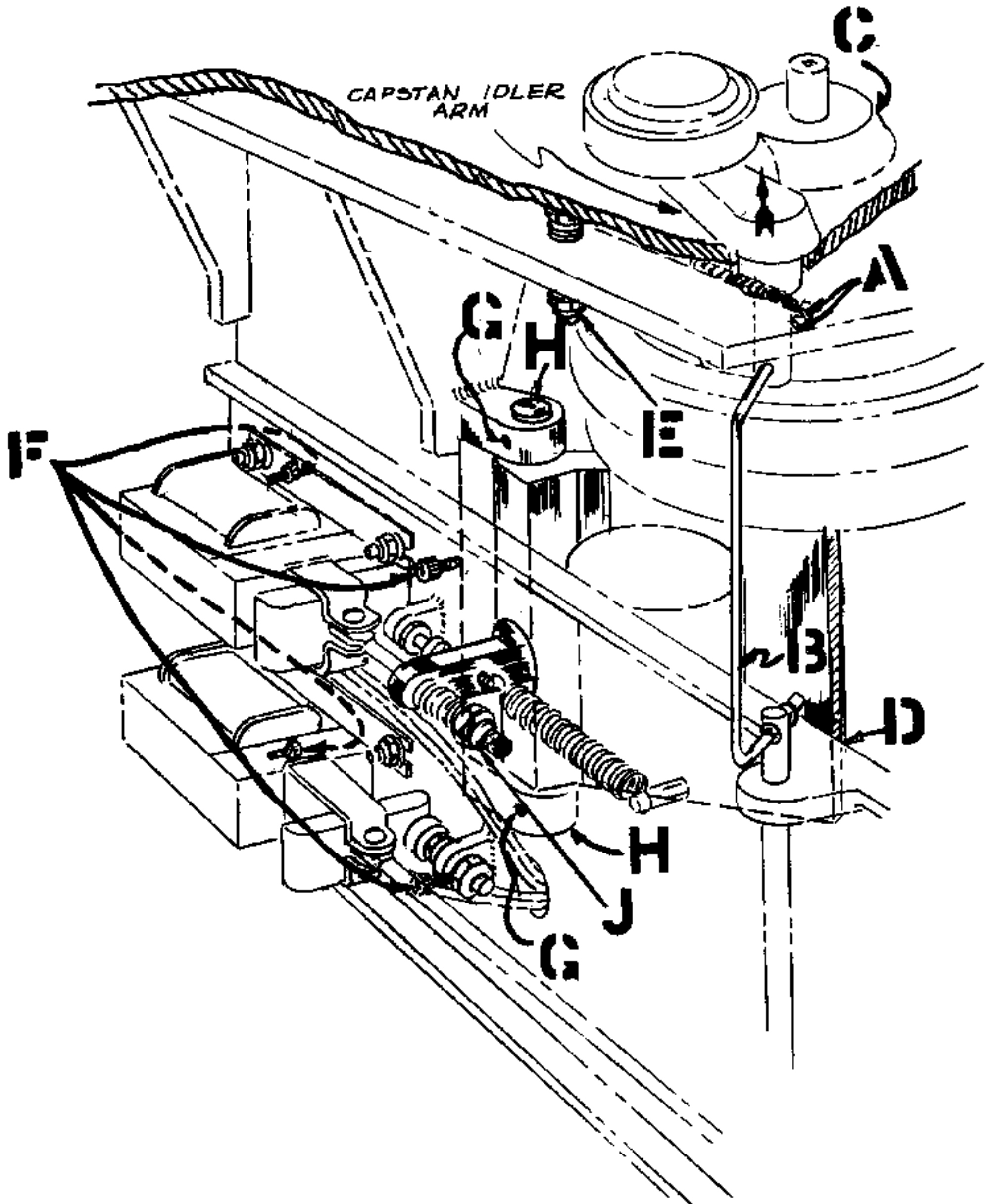
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MODEL: 300

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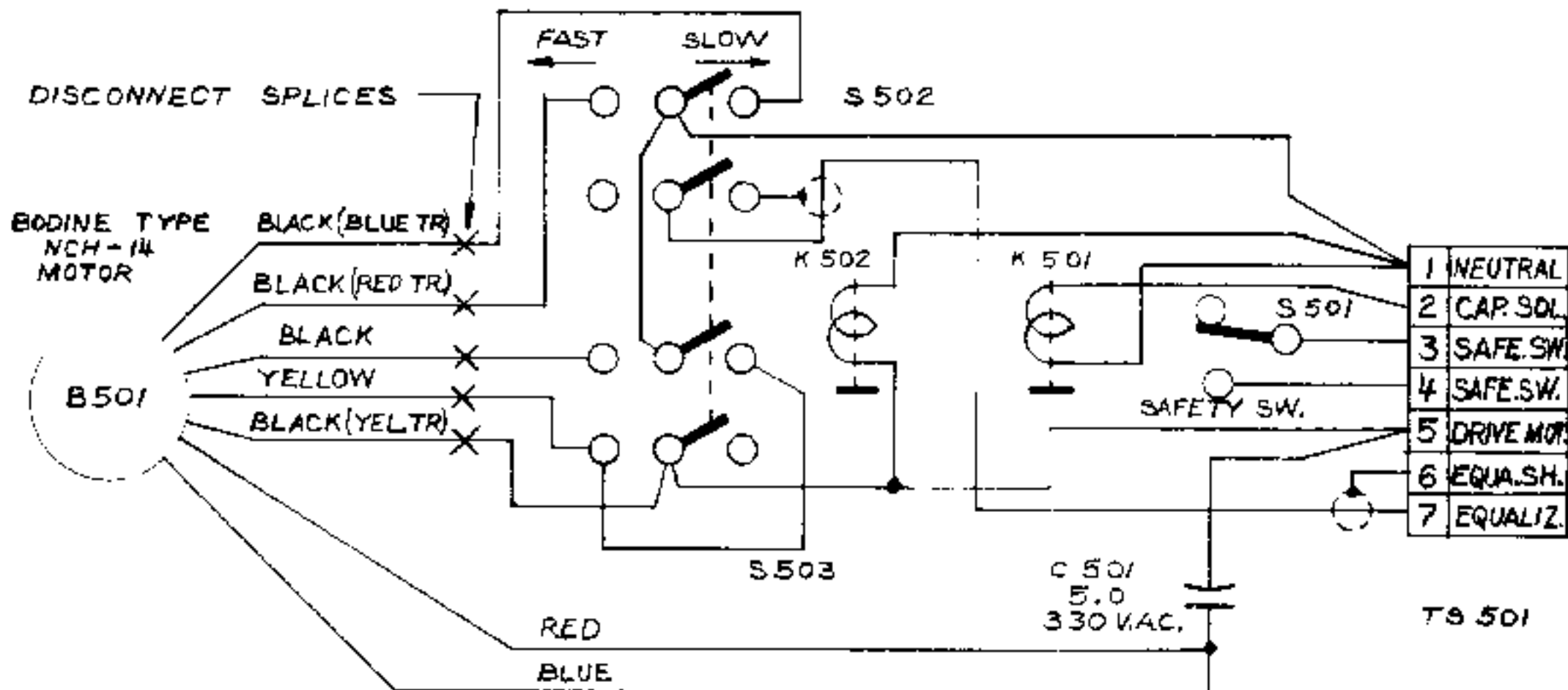
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### MAGNETIC RECORDERS

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DATE: 20 March 1953  
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BULLETIN NO: 14  
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ALLOW 8" LEAD LENGTH  
FROM MOTOR TO DIS-  
CONNECT SPLICES

# AMPEX

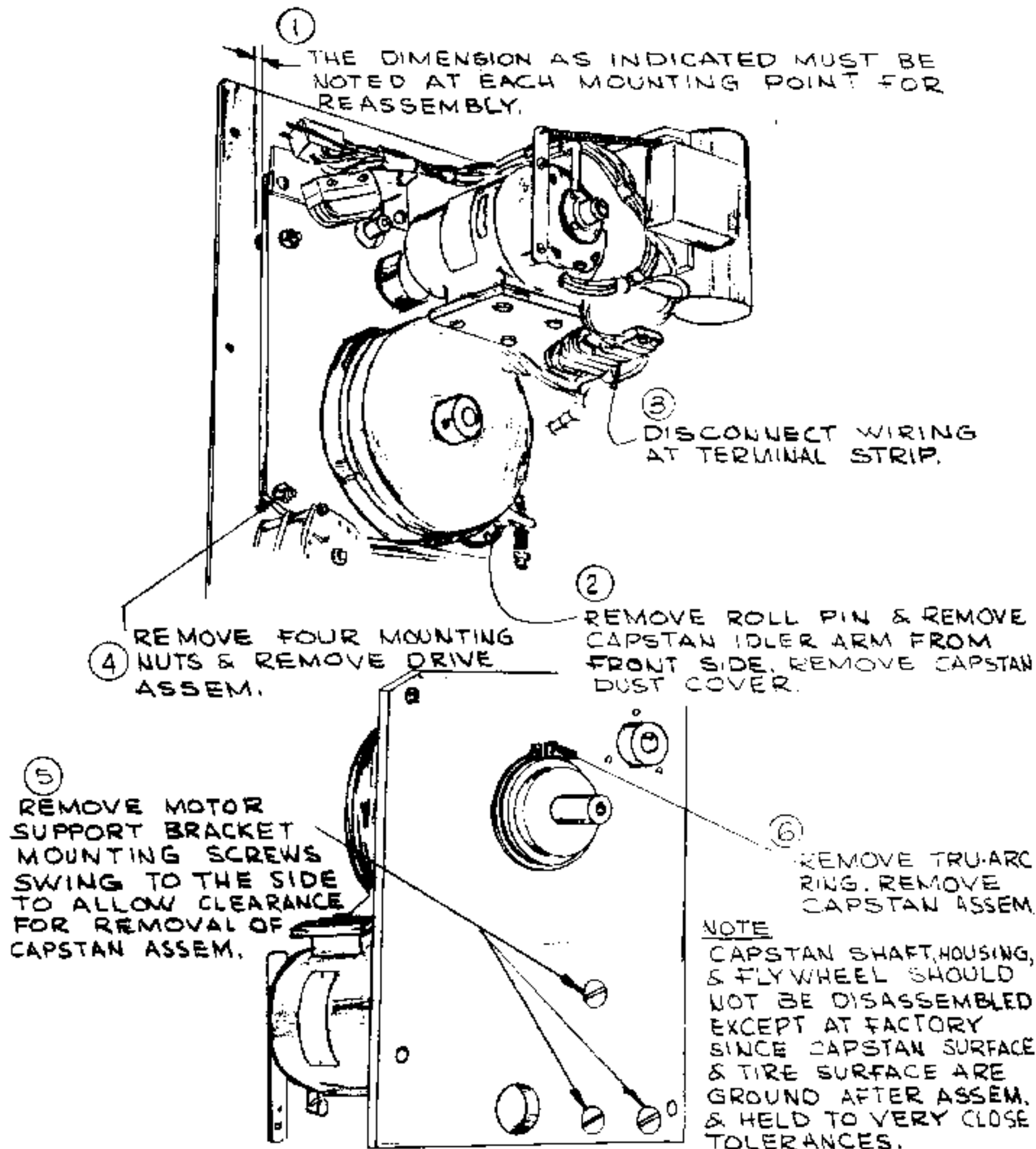
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NOTE. NUMBERED BALOONS INDICATE SEQUENCE OF DISASSEMBLY. REVERSE SEQUENCE FOR REASSEMBLY.

REMOVAL OF CAPSTAN ASSEM.

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MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 11  
PAGE NO: 1

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6. Remove Drive Assembly from machine by removing 4 elastic stop nuts "E" (only one shown).
7. Remove 4 screws "F" and drop solenoid mounting plate. Note that two screws are on the solenoid side and remainder on the opposite side of the plate.
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10. Remove bearings from old brackets and install in new bracket.  
**CAUTION:** In removing bearings be careful not to injure bearing dust shield. Injury to this shield could lead to freezing of the bearing.
11. Install new bracket and motor by reversing foregoing procedure.
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MAGNETIC RECORDERS

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DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 11  
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15. For modified wiring for Bodine Motor see attached wiring Diagram EA-1752.

PARTS REQUIRED FOR CONVERSION OF AMPEX RECORDERS,  
MODELS 300, 301 AND 302 TO BODINE DRIVE MOTOR.

MODEL 300 - Serial No. 113 to 500

<u>Quantity</u>	<u>Description</u>	<u>Part No.</u>
1	Bodine Drive Motor Assembly	B-1030
1	Bracket, Hinge	B-1511
1	Capacitor *	CG-80
1	Shield, Bodine Drive Motor	B-1905
<u>Serial No. 501 to 600</u>		
1	Bodine Drive Motor Assembly	B-1030
1	Bracket, Hinge	B-1072
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MODEL 301 AND 302 - Serial No. 113 to 500

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DATE: 20 March 1953  
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	<u>Serial No. 501 to 699</u>	
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1	Capstan Assembly	C-366
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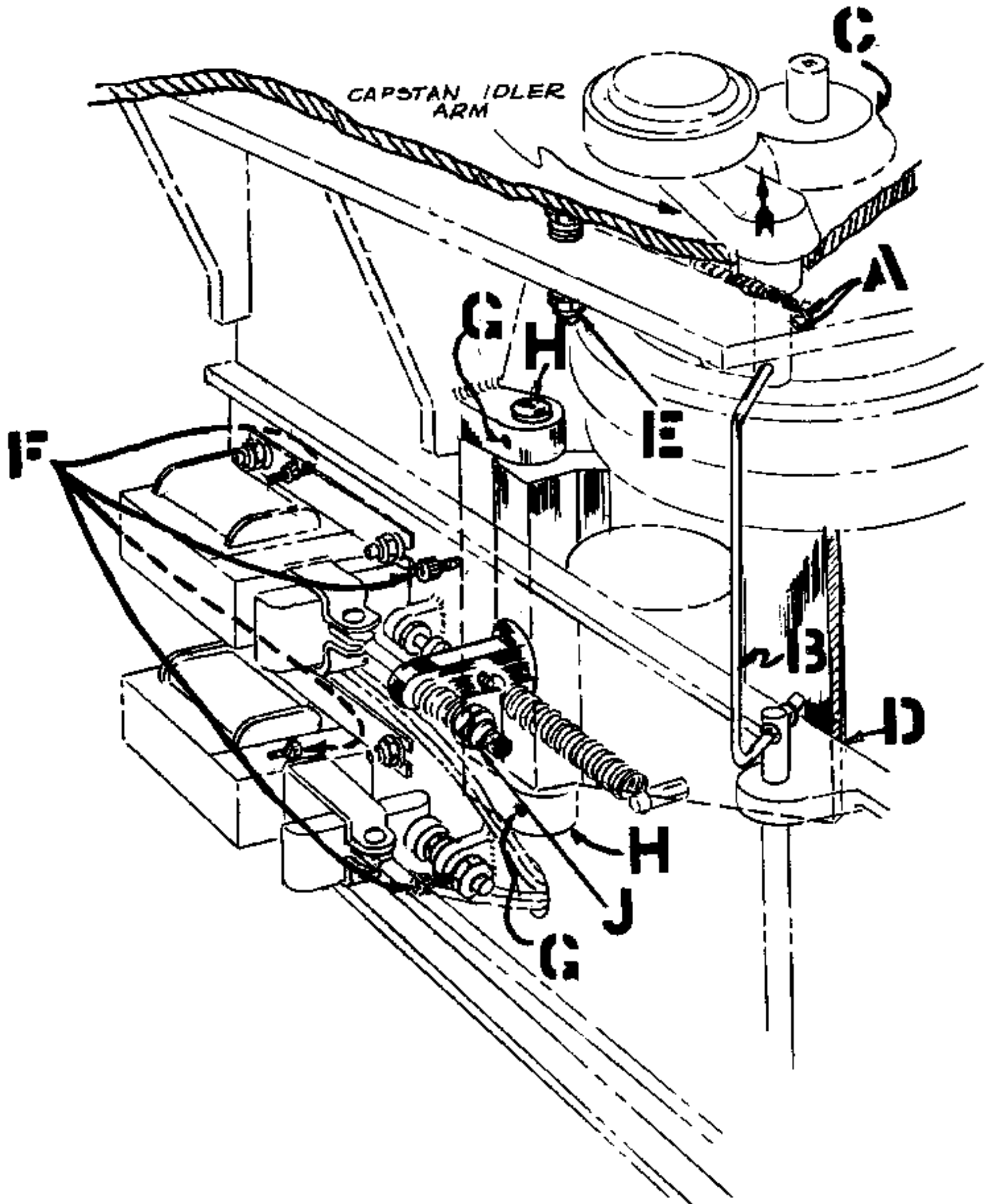
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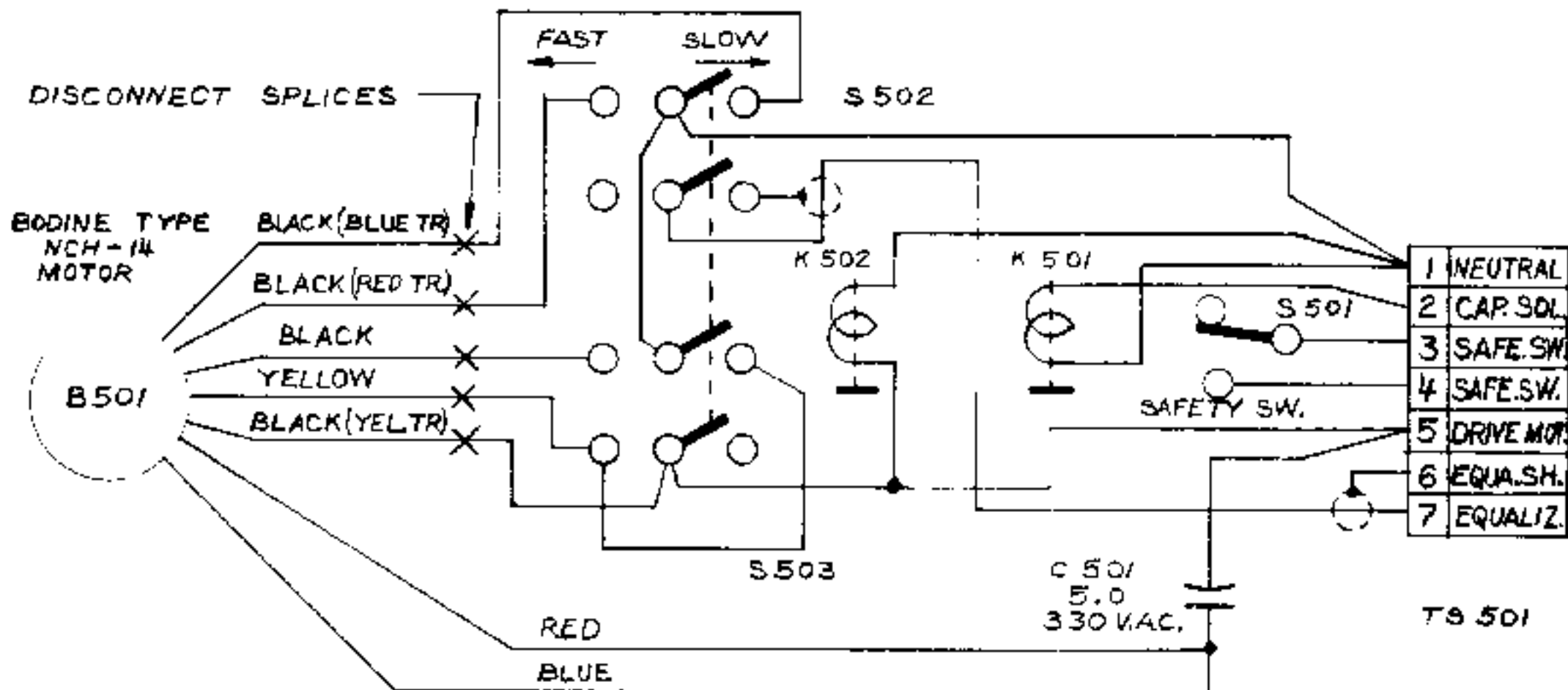
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### MAGNETIC RECORDERS

### SERVICE BULLETIN

DATE: 20 March 1953  
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ALLOW 8" LEAD LENGTH  
FROM MOTOR TO DIS-  
CONNECT SPLICES

# AMPEX

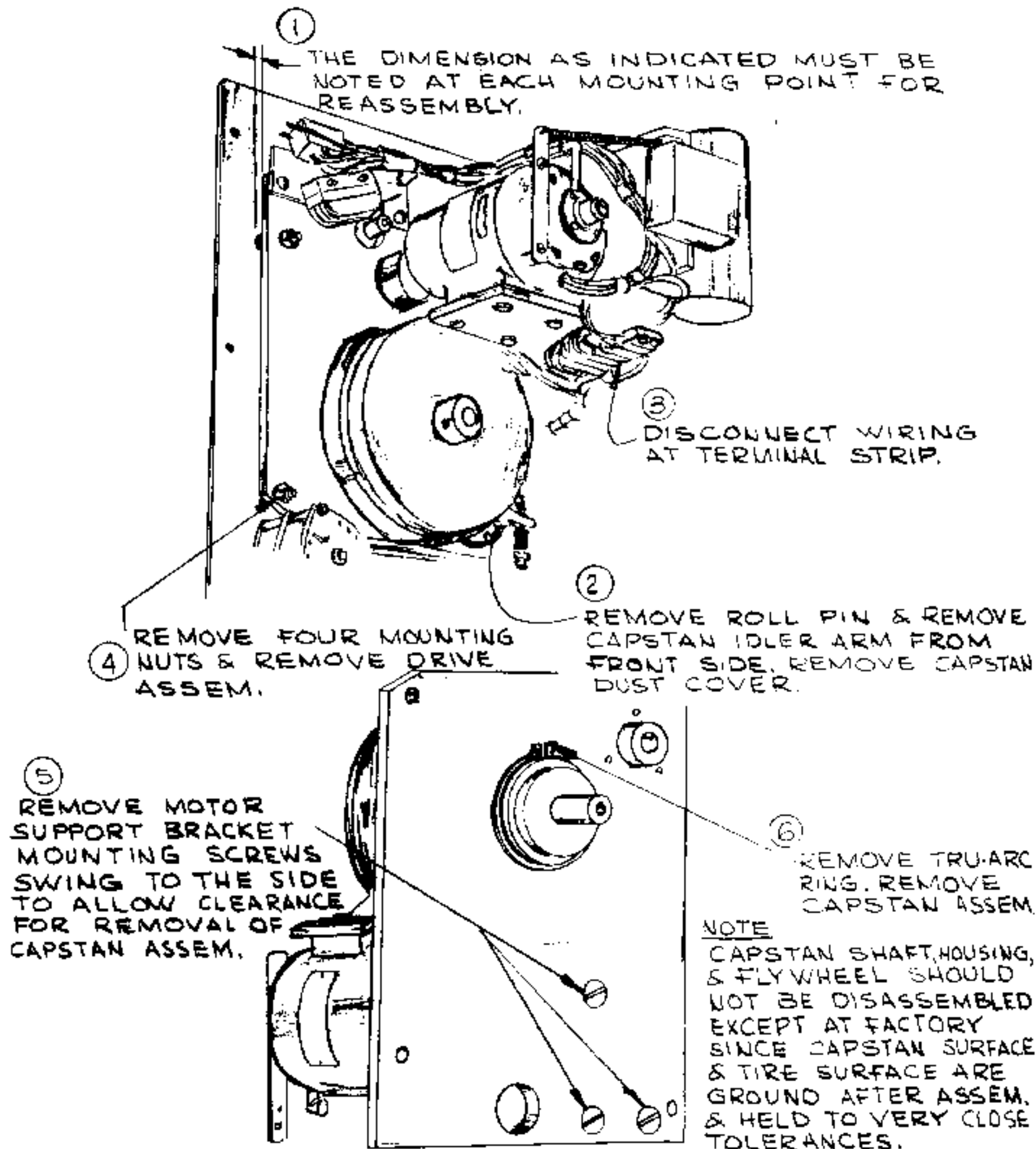
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NOTE. NUMBERED BALOONS INDICATE SEQUENCE OF DISASSEMBLY. REVERSE SEQUENCE FOR REASSEMBLY.

REMOVAL OF CAPSTAN ASSEM.

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DATE: 20 March 1953

MODEL: 300

BULLETIN NO. 15

PAGE NO. 1

### RECOMMENDED CHANGE IN FILTERING FOR THE TOP PLATE DC SUPPLY

There have been several instances in which failures of the DC voltage operating the relays and solenoids on the 300 recorders have occurred. Most of these failures are due to a gradual decrease in the capacity of the 80 mfd 150 volt filter condenser for this supply. This condenser, schematic reference C805, is located on the underside of the top plate next to the selenium rectifier.

To eliminate this problem, we have incorporated a second 80 mfd 150 volt condenser in parallel with C805.

It is recommended that this additional condenser be incorporated in all machines exhibiting this failure which fall in the serial number group 500 - 1900. This change has already been incorporated in machines with serial numbers higher than 1900.

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DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 16  
PAGE NO: 1

### COMPONENT CHANGES FOR VARIOUS SERIAL NUMBERS OF 300 SERIES RECORDERS

1. Models 300, 301, 302 below serial number 500 used various combinations of two pole and three pole top plate control relays K401 and K402. All can be replaced with three pole relays, catalog number RL-34.
2. Some Models 300, 301, and 302 below serial number 800 used a 7500 ohm, 50 watt adjustable resistor as R120 in the erase oscillator / B loading circuit. ~~RE-244~~, 6000 ohm, 40 watt resistor, will satisfactorily replace the early type.
3. Models 300, 301, 302 below serial number 300 (approximately) incorporate a spanner nut for mounting the reel idler. Catalog number 354 reel idler will not directly mount on these machines. Replacements for this group should be ordered as catalog number 354-F.
4. The following changes are effective at serial number 500:
  - a. Top plate control circuit revised to incorporate DC rather than AC relays and solenoids.
  - b. Head cable connections modified.
  - c. Takeup tension arm modified.
  - d. Safety switch modified.

These replacement components for recorders with serial numbers lower and higher than 500 are not interchangeable. Refer to the parts list for proper components.

5. Model 300's drive motors were changed from catalog number 641 Cyclohm, or catalog number 496 Electric Indicator, to catalog number 1030 Bodine motors. Models 301 and 302 drive motors were changed from catalog number 629 Electric Indicator, to catalog number 1075 Bodine.
6. The equalization components used in the playback amplifier were changed on Model 300's with serial numbers higher than 886. The correct components for recorders above and below this number can be identified from the parts list.
7. Model 300 record amplifiers with serial numbers higher than 801 incorporate a relay in the record amplifier allowing use of extended range head. Also added were condensers C123, C125, and C126. C109 and C110 were changed. C121 and R126 were changed.
8. The drive assembly mounting plate in all series 300 recorders was changed from a flat plate to a stiffening casting on machines with serial numbers above 1800.

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9. Second electrolytic condenser C806 added beginning with serial 1901.  
(In Model 307, added beginning serial 1801.)
10. Suppressor condensers C807, C808, and C809 added to suppress starting and stopping transients effective, serial 2501.
11. AC outlet for fan added beginning serial 2101.
12. Erase coupling condenser C119 changed to .002 mfd effective serial 2103.
13. Oscillator circuitry changed effective serial 1850.
14. Record and playback head gaps changed to 1 mil and  $\frac{1}{4}$  mil respectively, effective serial 1605.
15. Capstan diameter changed effective serial 2501.
16. Condenser C109 changed to .0035 mfd. C110 changed to .002 mfd effective serial 2912.

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CABLE ADDRESS: AMPEX, REDWOOD CITY  
REDWOOD CITY, CALIFORNIA

MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 16  
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### COMPONENT CHANGES FOR VARIOUS SERIAL NUMBERS OF 300 SERIES RECORDERS

1. Models 300, 301, 302 below serial number 500 used various combinations of two pole and three pole top plate control relays K401 and K402. All can be replaced with three pole relays, catalog number RL-34.
2. Some Models 300, 301, and 302 below serial number 800 used a 7500 ohm, 50 watt adjustable resistor as R120 in the erase oscillator / B loading circuit. ~~RC-244~~, 6000 ohm, 40 watt resistor, will satisfactorily replace the early type.
3. Models 300, 301, 302 below serial number 300 (approximately) incorporate a spanner nut for mounting the reel idler. Catalog number 354 reel idler will not directly mount on these machines. Replacements for this group should be ordered as catalog number 354-F.
4. The following changes are effective at serial number 500:
  - a. Top plate control circuit revised to incorporate DC rather than AC relays and solenoids.
  - b. Head cable connections modified.
  - c. Takeup tension arm modified.
  - d. Safety switch modified.

These replacement components for recorders with serial numbers lower and higher than 500 are not interchangeable. Refer to the parts list for proper components.

5. Model 300's drive motors were changed from catalog number 641 Cyclohm, or catalog number 496 Electric Indicator, to catalog number 1030 Bodine motors. Models 301 and 302 drive motors were changed from catalog number 629 Electric Indicator, to catalog number 1075 Bodine.
6. The equalization components used in the playback amplifier were changed on Model 300's with serial numbers higher than 886. The correct components for recorders above and below this number can be identified from the parts list.
7. Model 300 record amplifiers with serial numbers higher than 801 incorporate a relay in the record amplifier allowing use of extended range head. Also added were condensers C123, C125, and C126. C109 and C110 were changed. C121 and R126 were changed.
8. The drive assembly mounting plate in all series 300 recorders was changed from a flat plate to a stiffening casting on machines with serial numbers above 1800.

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9. Second electrolytic condenser C806 added beginning with serial 1901.  
(In Model 307, added beginning serial 1801.)
10. Suppressor condensers C807, C808, and C809 added to suppress starting and stopping transients effective, serial 2501.
11. AC outlet for fan added beginning serial 2101.
12. Erase coupling condenser C119 changed to .002 mfd effective serial 2103.
13. Oscillator circuitry changed effective serial 1850.
14. Record and playback head gaps changed to 1 mil and  $\frac{1}{4}$  mil respectively, effective serial 1605.
15. Capstan diameter changed effective serial 2501.
16. Condenser C109 changed to .0035 mfd. C110 changed to .002 mfd effective serial 2912.



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### DRIVE MOTOR LUBRICATION

It has been found that among the lubricants previously recommended for the drive motor in series 300 recorders are some that may be incompatible with the lubricant furnished in the motors by the manufacturer.

To correct this situation, we must recommend that only the following lubricants be used in the sleeve bearing type drive motors (motors manufactured by Bodine Electric Company and Cyclohm Motor Corp.)

Gulcrest "A" - Product of Gulf Oil and Refining Company  
Stanoil #18 or #25 - Product of Standard Oil Co. of Indiana  
Gargoyle D.T.E. Light - Product of Socony Vacuum Oil Co.

CAUTION: If any of the previously recommended lubricants have been used, the motor should be disassembled enough to wipe the motor shaft and the bearings clean before re-oiling.

The motor manufacturer further recommends that motors of this type in continuous use should be lubricated every 3 months or 300 to 500 hours, instead of every 6 months as previously recommended.

(The above information supercedes that in the Section entitled "Drive Motor Lubrication" in all Series 300 Instruction Books.)

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(The above information supercedes that in the Section entitled "Drive Motor Lubrication" in all Series 300 Instruction Books.)

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### 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  
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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  
RE-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  
RE-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%



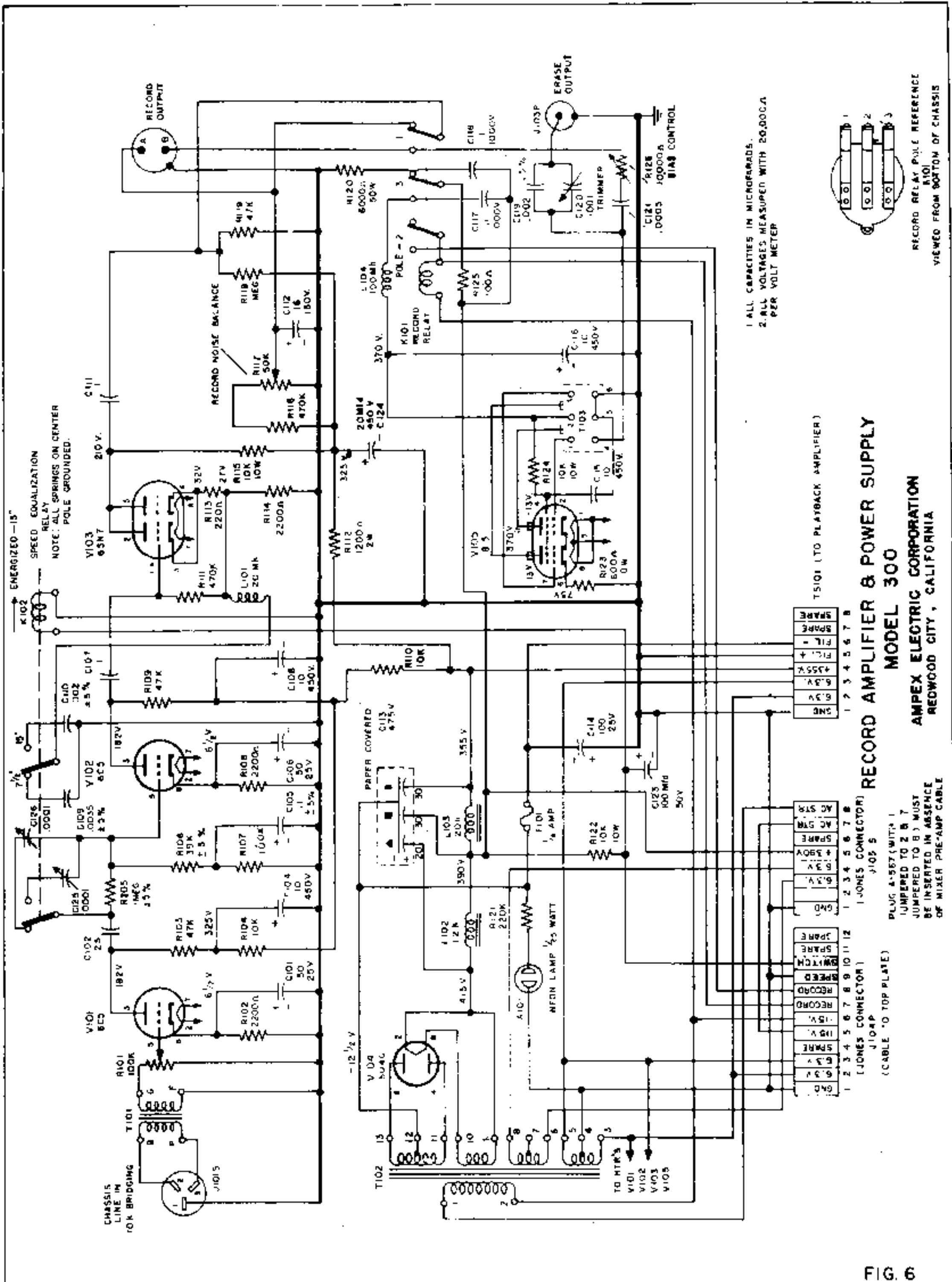
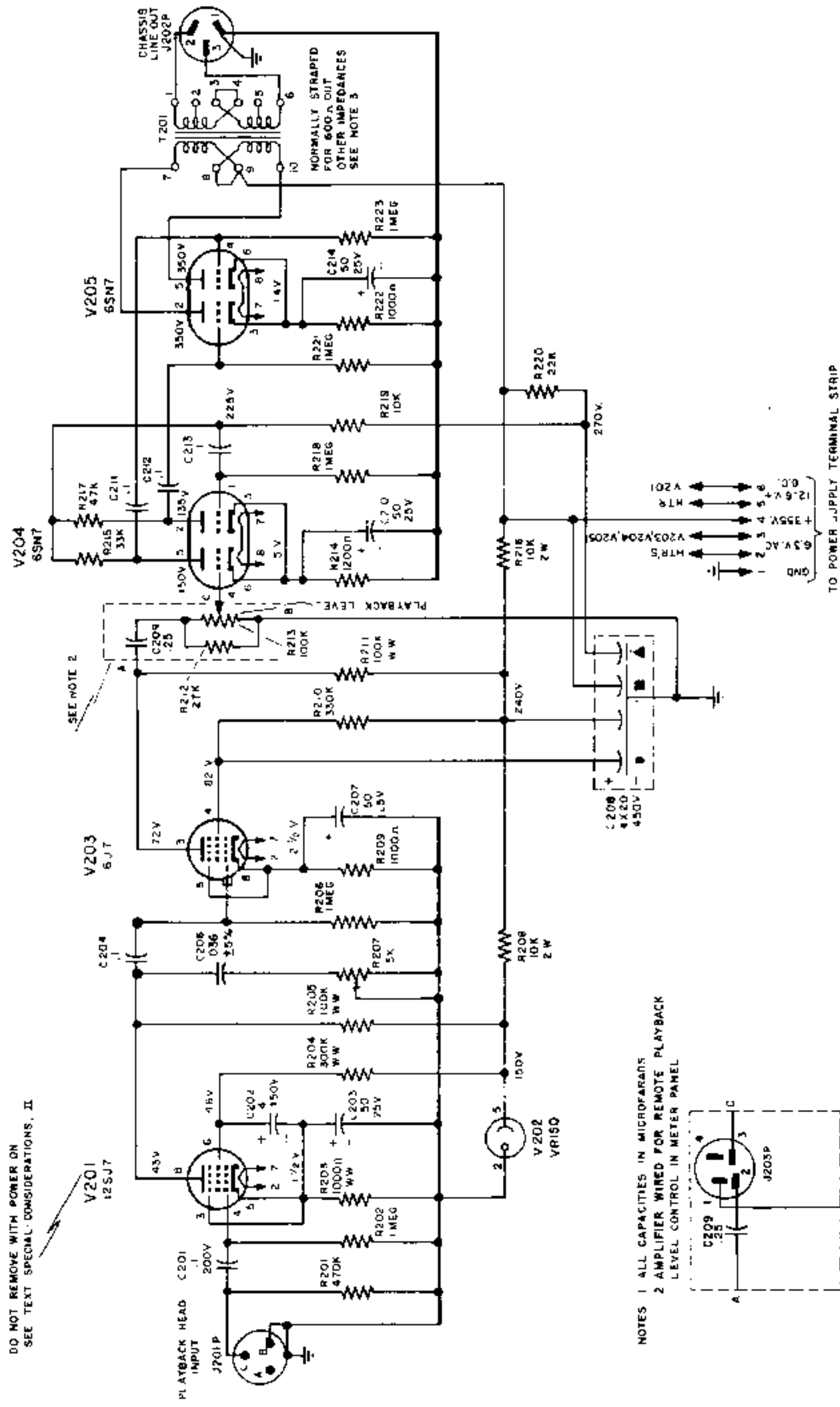


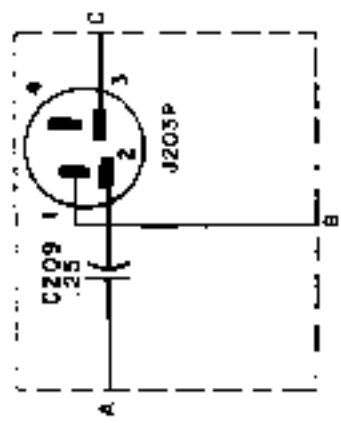
FIG. 6

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



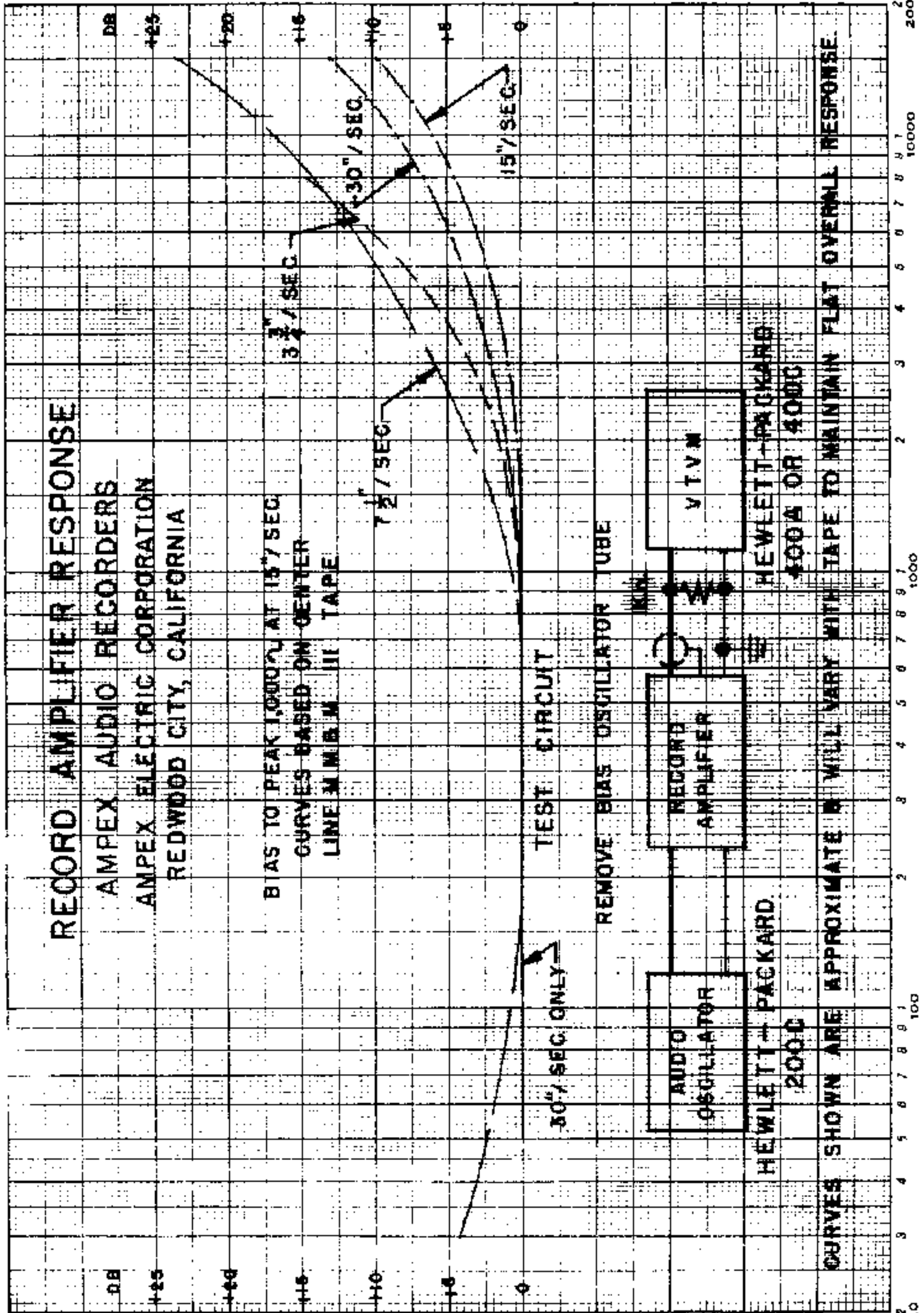
**PLAYBACK AMPLIFIER  
MODEL 300**  
AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

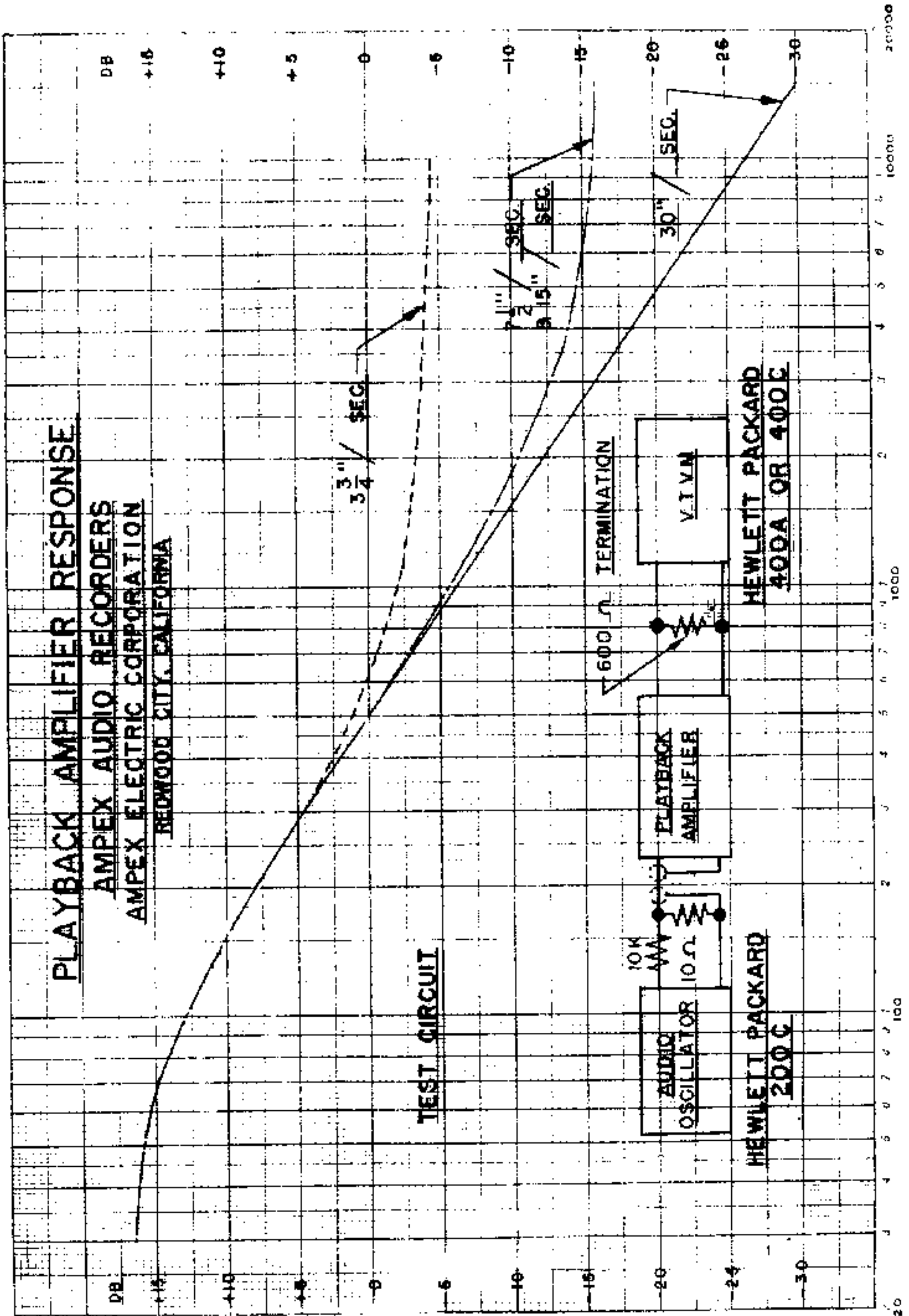
NOTES 1 ALL CAPACITIES IN MICROFARADS  
2 AMPLIFIER WIRED FOR REMOTE PLAYBACK  
LEVEL CONTROL IN METER PANEL



- 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  $\pm 2$  db 30 - 15,000 cycles.  
At 7.5 inches  $\pm 2$  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  $\pm 3.6$  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  $\pm 4$  VU in balanced or unbalanced.

**PLAYBACK AMPLIFIER:** Adjusted for  $\pm 4$  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  $\pm 8$  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  $\pm 4$  VU output.

Output key (line or cue).

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

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### 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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MAGNETIC RECORDERS

SERVICE BULLETIN

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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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REDWOOD CITY, CALIFORNIA

DATE:  
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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  
RE-255 10,000 Ohm 1/2 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  
RE-255 10,000 OHM 1/2 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

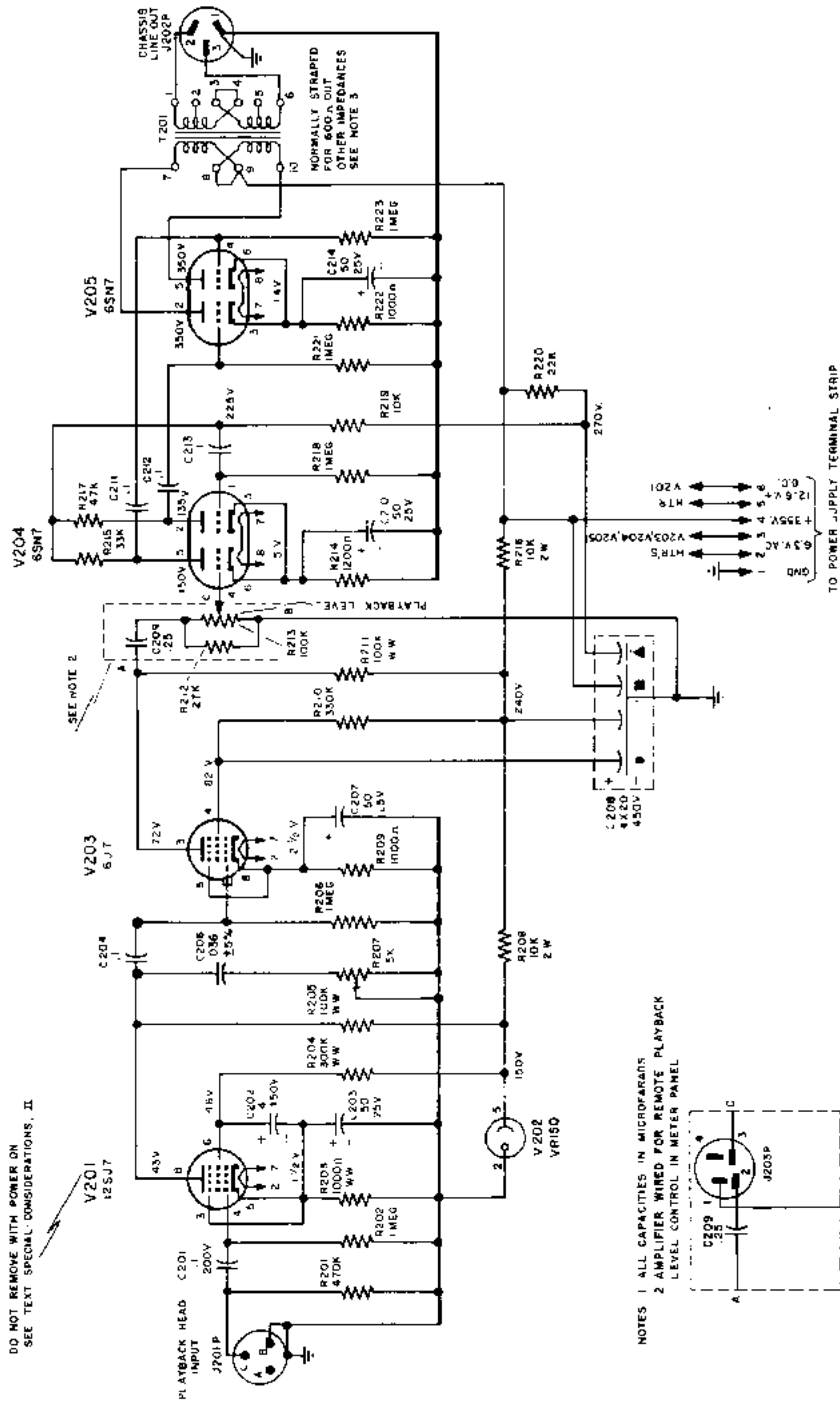
(2) CO-21 .002 MFD 500 V. Mica Condenser 5%  
PL-378 Plug, Erase Output (For Making Adapter for Measuring Erase Current)  
CO-10 .0035 MFD 500 V. Mica Condenser 5%  
475-1 Head Assembly - Console  
475-2 Head Assembly - Rack and Portable

## RECORDERS SERIAL #1605-2912

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

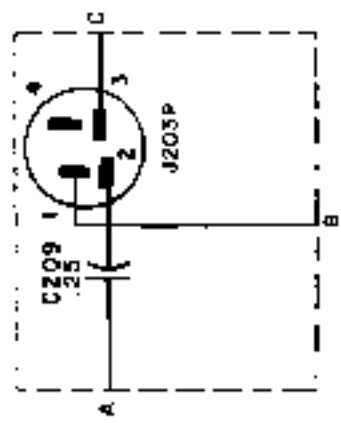


DO NOT REMOVE WITH POWER ON  
SEE TEXT SPECIAL CONSIDERATIONS, II



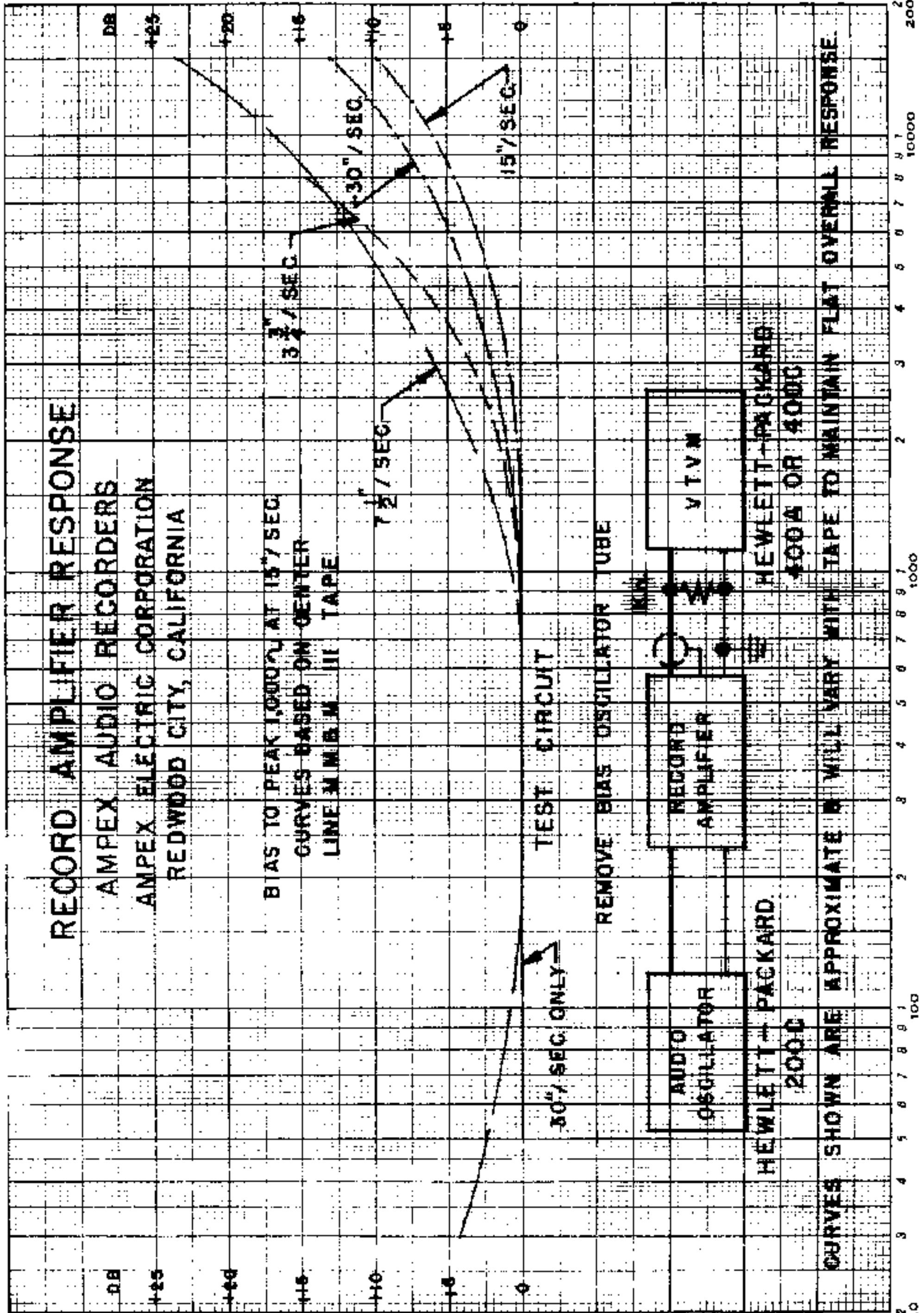
**PLAYBACK AMPLIFIER  
MODEL 300**  
AMPEX ELECTRIC CORPORATION  
SAN CARLOS, CALIFORNIA

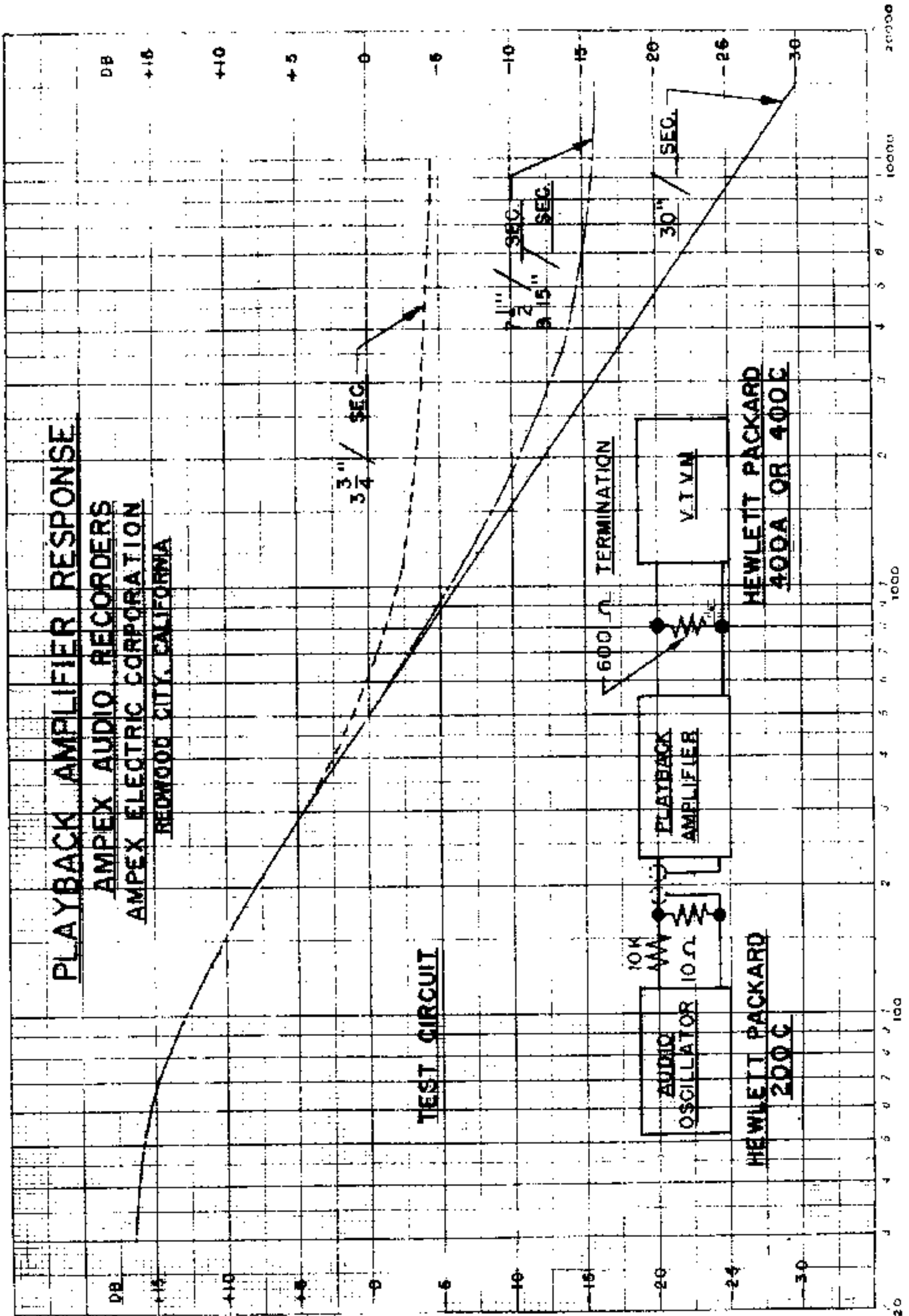
NOTES 1 ALL CAPACITIES IN MICROFARADS  
2 AMPLIFIER WIRED FOR REMOTE PLAYBACK  
LEVEL CONTROL IN METER PANEL



- 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  $\pm 2$  db 30 - 15,000 cycles.  
At 7.5 inches  $\pm 2$  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  $\pm 3.6$  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  $\pm 4$  VU in balanced or unbalanced.

**PLAYBACK AMPLIFIER:** Adjusted for  $\pm 4$  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  $\pm 8$  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  $\pm 4$  VU output.

Output key (line or cue).

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

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MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953

MODEL: 300

BULLETIN NO: 20

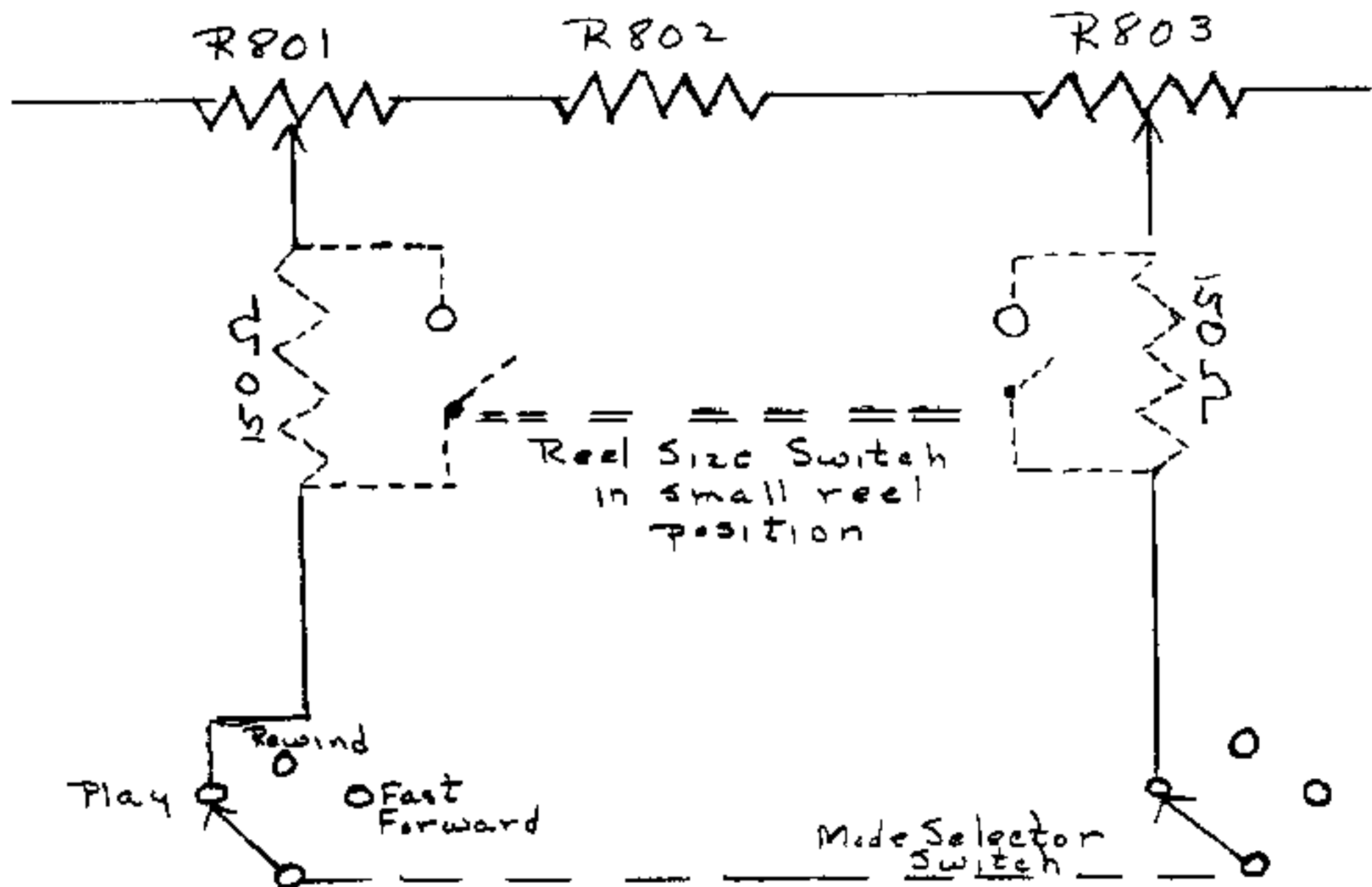
PAGE NO: 1

### USING 7" RTMA REELS

Although the 300 series recorders were designed to use 10 $\frac{1}{2}$ " NARTB reels, they will play 7" reels if the takeup and rewind torques are corrected. To make these corrections, the following parts are required:

- (2) 150 ohm 50 watt resistor, catalog #RE-131
- (1) Double Pole Single Throw Toggle Switch, Catalog SW-4

Center the toggle switch 1  $\frac{3}{4}$ " from the rear of the top plate. Wire according to diagram below:



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MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953

MODEL: 300

BULLETIN NO: 20

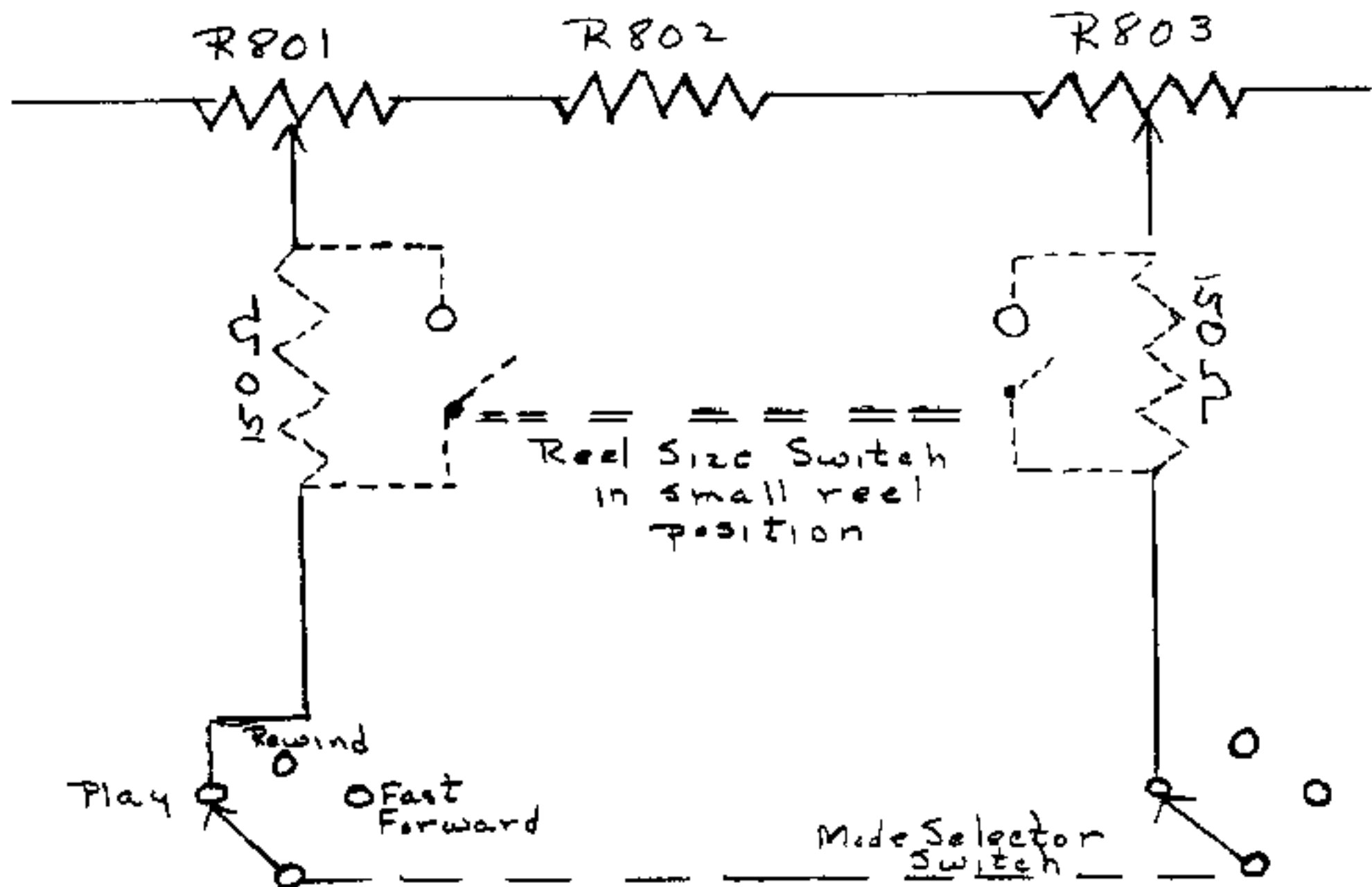
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CABLE ADDRESS: AMPEX, REDWOOD CITY  
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DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 21  
PAGE NO: 1

### ADAPTING TURNTABLES TO USE CATALOG #1917 EDITING KNOBS ON EARLY MACHINES

If it is desired to use the new editing knob assemblies, catalog #1917, with a Model 300 recorder which does not have the holes drilled in the turntable, the attached drawing will serve as a template diagram for drilling these holes.

When drilling these holes care should be taken that metal filings do not fall into the end-bell of the turntable motor. This can be accomplished by wrapping a cloth around the end-bell on the under side of the top plate while drilling.

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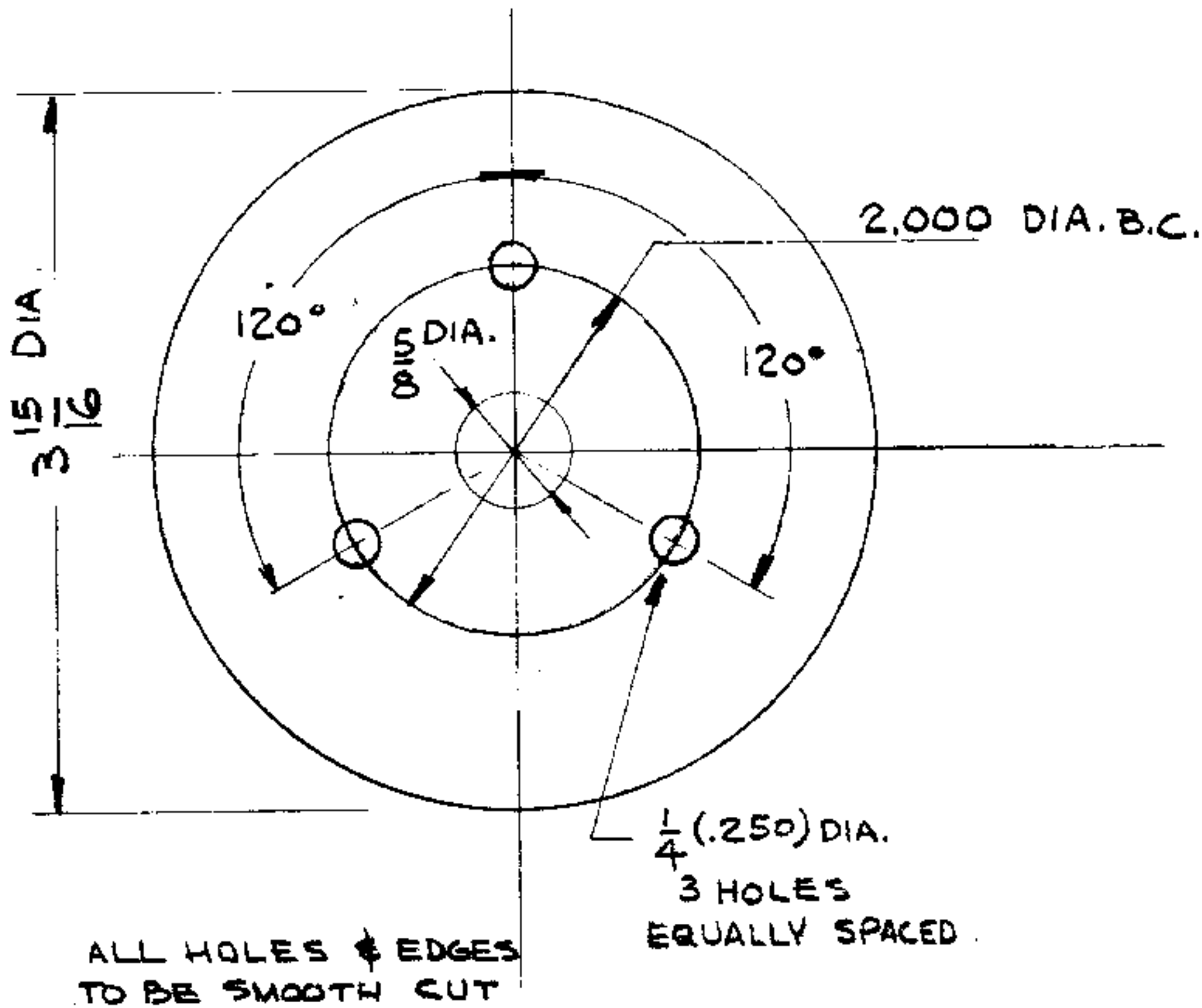
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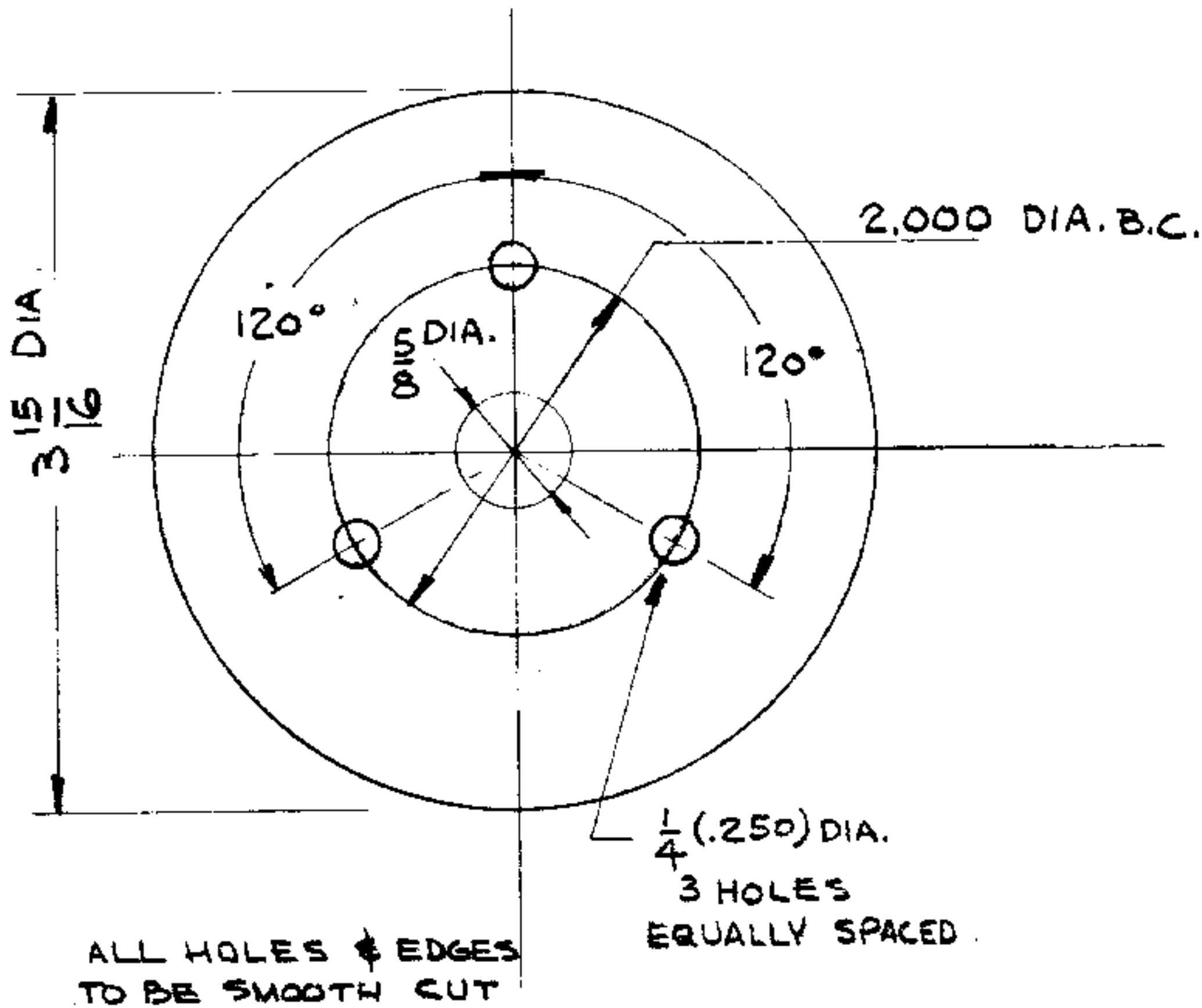
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MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 17 August 1954  
MODEL: 300  
BULLETIN NO: 22  
PAGE NO: 1

### INSTRUCTIONS FOR CONVERTING RACK MOUNTED SERIES 300 TOP PLATE TO CONSOLE MOUNTING

1. Remove the drive motor hinge spring "B" (Fig. 1 of instruction book) stretched between the bracket on the end bell of the drive motor and the motor locking hook extension on the drive motor mounting casting.
2. Install one end of a new #A 1024 console drive motor hinge spring in the bracket hole nearest the motor and the other end over the motor locking hook extension.
3. Remove disc "B" from the top of the takeup tension arm assembly. (Fig. 4 of instruction book) Decrease the coil spring tension by moving back 180 degrees the pin that the spring is hooked over.
4. Remove the compression type capstan idler return spring "A" (Fig. 1 of instruction book) and install a new #400 compression spring. Re-adjustment of the capstan idler adjustment nut "F" is performed as follows:
  - a. Back off the nut until the solenoid plunger can be manually bottomed and the nut clears the adjustment arm.
  - b. While holding the solenoid plunger in this position, re-tighten the nut until the capstan idler just touches the capstan.
  - c. From this setting the nut should be turned in an additional 2 to  $2\frac{1}{2}$  turns so that when the recorder is running in the play position without tape, the capstan idler tire is slightly deformed at the capstan and the idler cannot be stopped with the hand. (Made to slip against the capstan)

Springs needed for conversion:

Part No.	Description
1024	Drive Motor Hinge Spring (console)
400	Capstan Idler Return Spring (compression type)

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MAGNETIC RECORDERS

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DATE: 19 August 1954  
MODEL: 300  
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PAGE NO: 1

### INSTRUCTIONS FOR CONVERTING CONSOLE MOUNTED #300 TOP PLATE TO RACK MOUNTING

1. Add: Drive motor return spring (rack mount only). Hook spring from bracket on end bell of drive motor and extend to hook on the motor locking hook extension on drive motor mounting casting.
2. Remove disc "B" (Figure 4 of instruction book) on takeup tension arm assembly and twist coil spring an additional 180°. Transfer pin to hole on opposite side and hook end of spring.
3. The compression type capstan idler return spring "A" as shown in Figure 1 of the instruction book must be stretched so that the idler will clear the tape when the drive solenoid is in the de-energized position. This spring should be stretched without removing it from the link rod so that the setting of the capstan idler adjustment nut "F" will not have to be changed. Do not over-stretch the spring, however, as too much tension against the capstan idler arm will tend to prevent the idler from providing the proper "dig" when the drive solenoid is energized. If adjustment of the capstan idler adjustment nut "F" does become necessary, the following procedure should be followed:

Back off nut "F" until the solenoid plunger can be manually bottomed and the nut clears the adjustment arm.

While holding the solenoid plunger in this position, re-tighten nut "F" until the capstan idler just touches the capstan. Turn nut "F" in an additional 2 to 2½ turns so that when the recorder is running in the play position without tape, the capstan idler tire is slightly deformed at the capstan and the idler cannot be stopped with the hand. (Made to slip against the capstan).

4. Reel hold down knobs required:

Serial Nos. below 1600 - Use 534D  
Serial Nos. above 1600 - Use 4402

5. Head cables should be long enough if electronic chassis is mounted upside down.

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MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 19 August 1954  
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PROFESSIONAL PRODUCT

SERVICE BULLETIN

MAGNETIC RECORDERS

DATE: April 24, 1957  
MODEL: 300 Series  
BULLETIN NO: ~~26~~ 7-08  
PAGE NO: 1 of 4

### CONVERSION OF MODEL 300 TO 15-30 IPS

One of the standard modifications of the Model 300 is a conversion to run at 15 and 30 inches per second. The difference in speed is accomplished by changing the diameter of the motor pulley. A lower mass flywheel is required on the reel idler.

The electronic alterations consists of incorporating relays which operate from the Speed Change Switch. At the 30 ips speed, the relays operate to alter the equalization characteristics in accordance with the requirements of the higher speed.

The specifications are identical to those of the 7-1/2 - 15 ips machine except for speed and frequency response. The frequency response at the 30 inch speed is plus or minus 2 db, 50 to 15000 cycles.

### PARTS REQUIRED

251	Flywheel, Reel Idler
352	Spacer, Reel Idler
817	Bracket, Relay Mounting
1030-2	Motor Assembly, 15-30 ips, 60 cps
or 1030-4	Motor Assembly, 15-30 ips, 50 cps
3958-3	Bracket, Motor Mounting
020-001	Relay

### RECORD ELECTRONICS

Disconnect swinger of K102 and L101 and connect to ground.  
Remove C109.  
Remove C110.  
Place C110 between open end of L101 and ground.  
Connect high speed contact of K102 to C105 and R106.

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PROFESSIONAL PRODUCT

**SERVICE BULLETIN**

MAGNETIC RECORDERS

DATE:

April 24, 1957

MODEL:

300 Series

BULLETIN NO:

25

PAGE NO:

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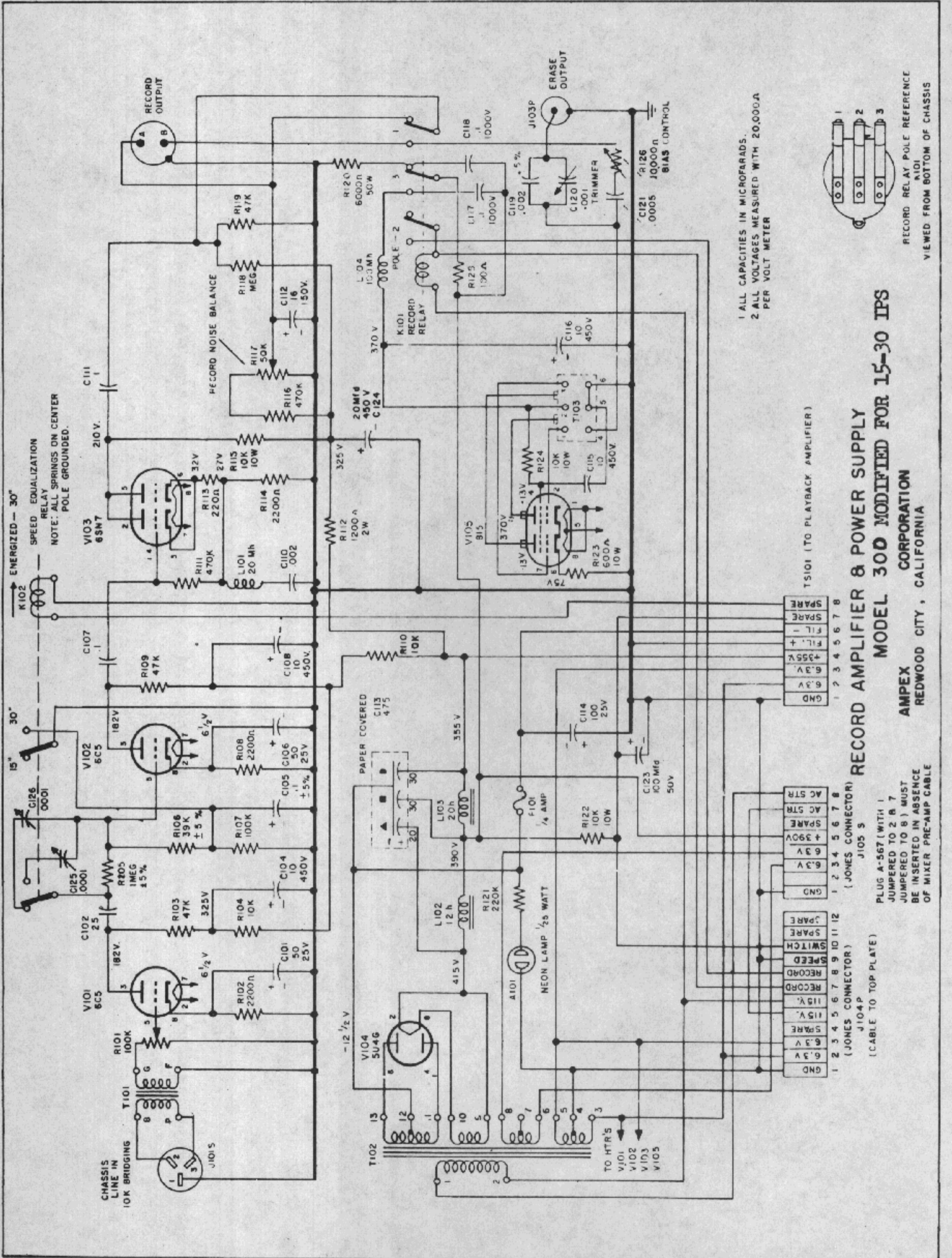
### PLAYBACK ELECTRONICS

Add Ampex #020-011 Relay, connecting coil to pins 7 and 8 of power supply terminal switch.

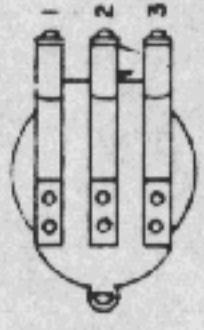
Connect normally open contact of relay to hot side of R205.

Connect swinger contact to ground.

Realign both electronics.



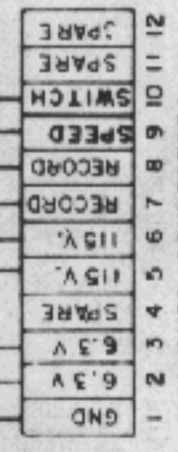
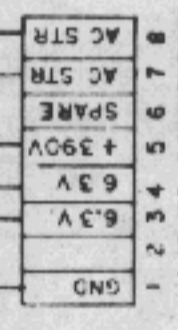
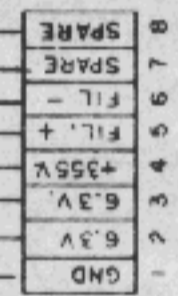
1 ALL CAPACITIES IN MICROFARADS.  
 2 ALL VOLTAGES MEASURED WITH 20,000Ω PER VOLT METER



RECORD RELAY POLE REFERENCE  
 VIEWED FROM BOTTOM OF CHASSIS

**RECORD AMPLIFIER & POWER SUPPLY  
 MODEL 300 MODIFIED FOR 15-30 IPS**

**AMPEX CORPORATION**  
 REDWOOD CITY, CALIFORNIA

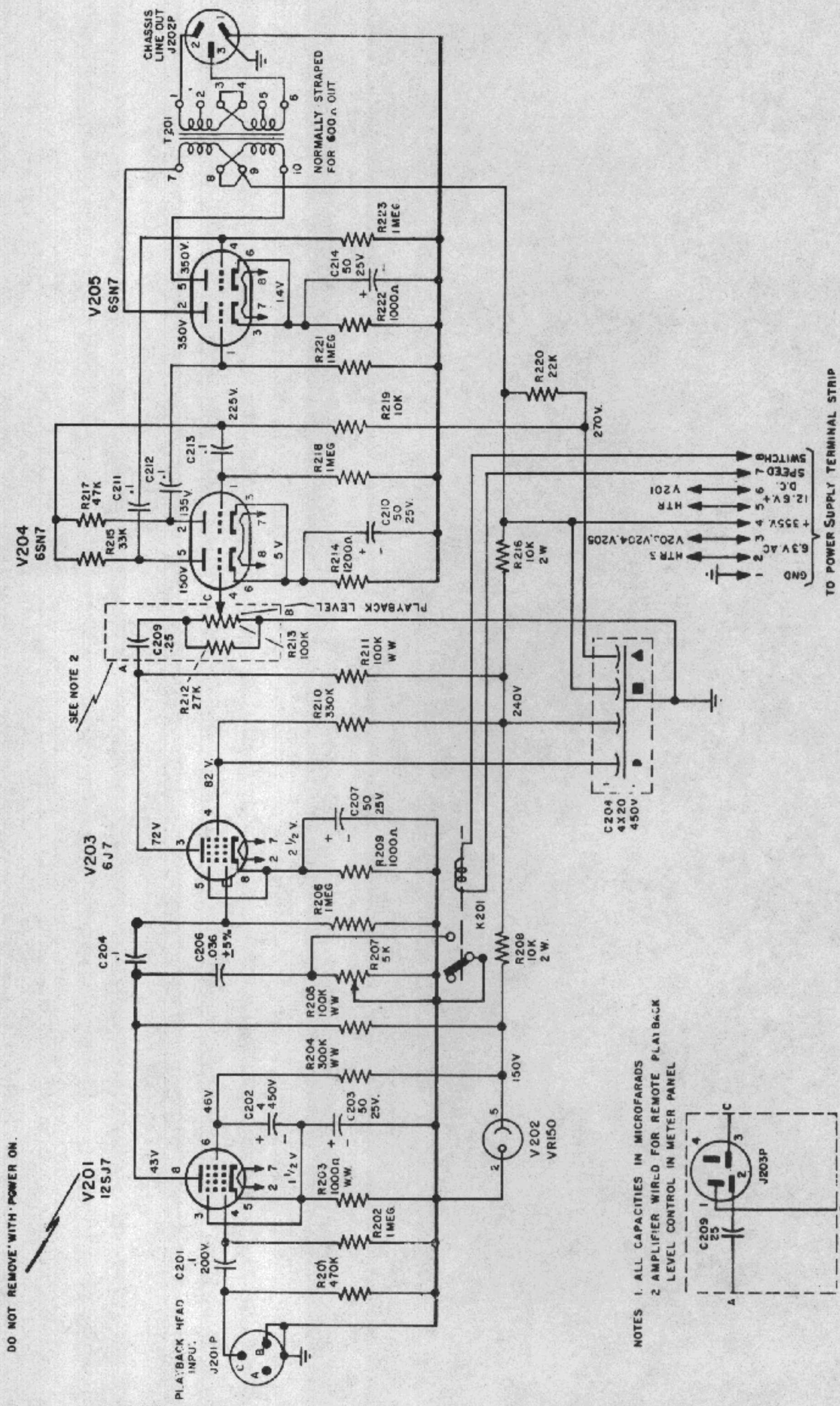


PLUG A-567 (WITH 1  
 JUMPERED TO 2 & 7  
 BE INSERTED IN ABSENCE  
 OF MIXER PRE-AMP CABLE

(CABLE TO TOP PLATE)  
 J104P (JONES CONNECTOR)

(JONES CONNECTOR)  
 J105 S

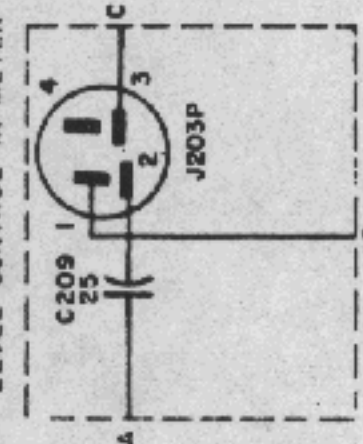
TS101 (TO PLAYBACK AMPLIFIER)



DO NOT REMOVE WITH POWER ON.

SEE NOTE 2

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



**PLAYBACK AMPLIFIER**  
**MODEL 300 MODIFIED FOR 15-30 IPS**  
**AMPEX CORPORATION**  
**REDWOOD CITY, CALIFORNIA**

TO POWER SUPPLY TERMINAL STRIP