

# MODEL 300

RECORDER-REPRODUCER

AMPEX

CORPORATION

AUDIO DIVISION

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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

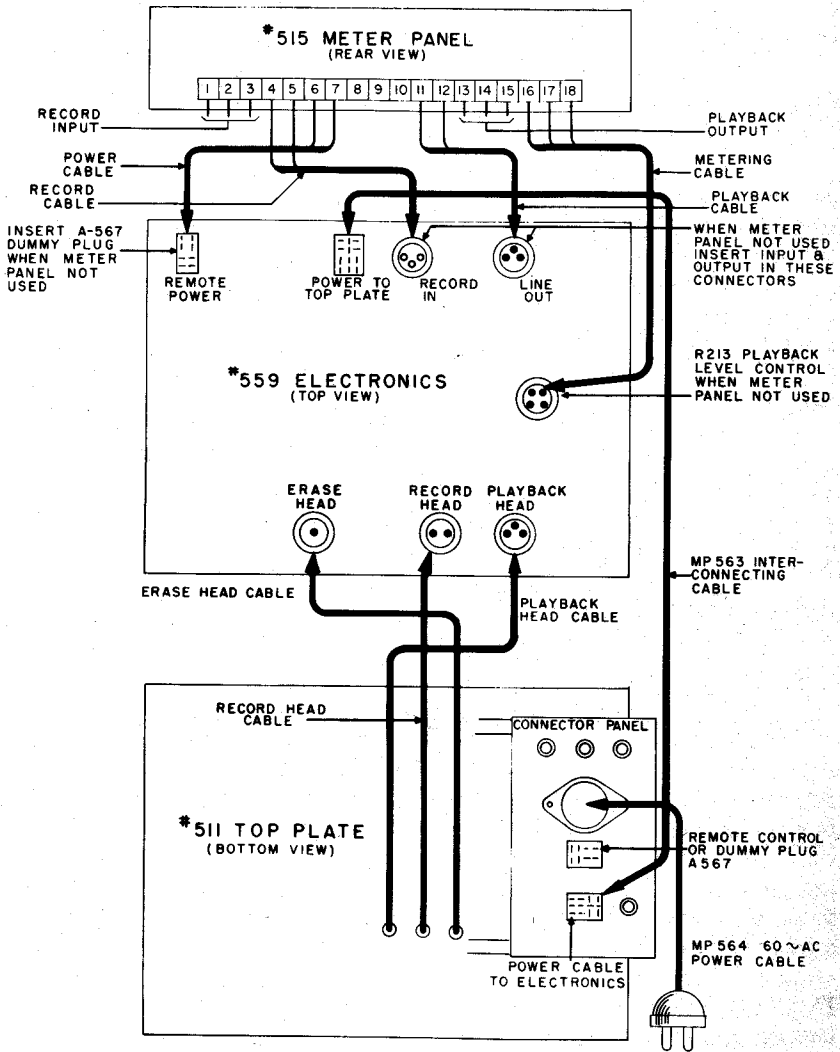


Fig. 1 Interunit Connection Diagram

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.

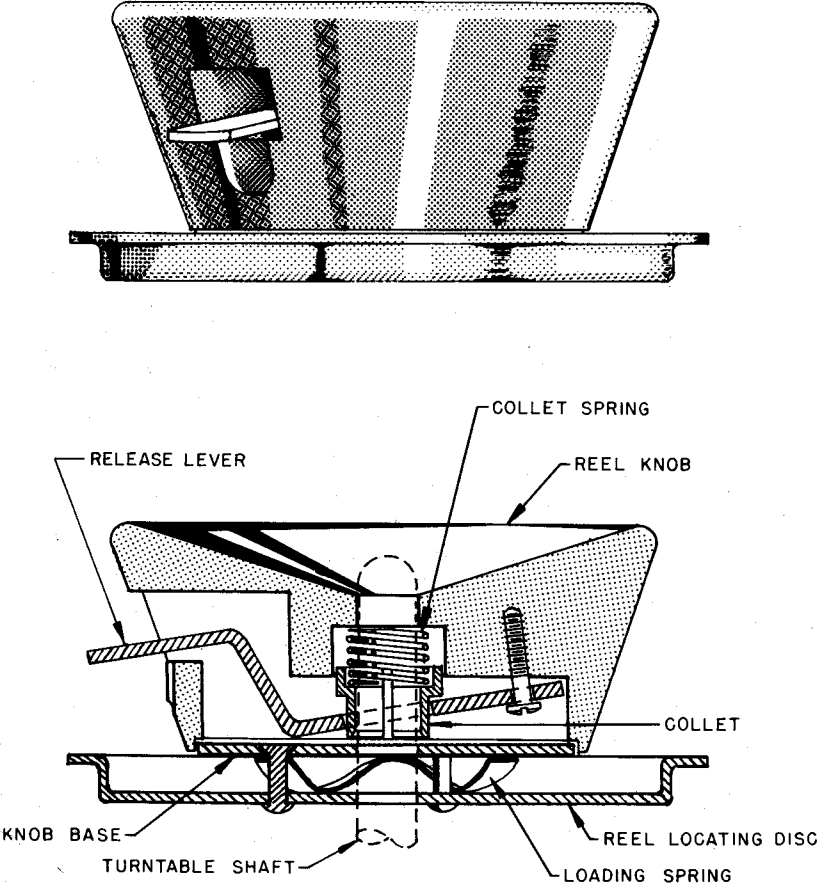


Fig. 2 Reel Holddown Knob

# 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.

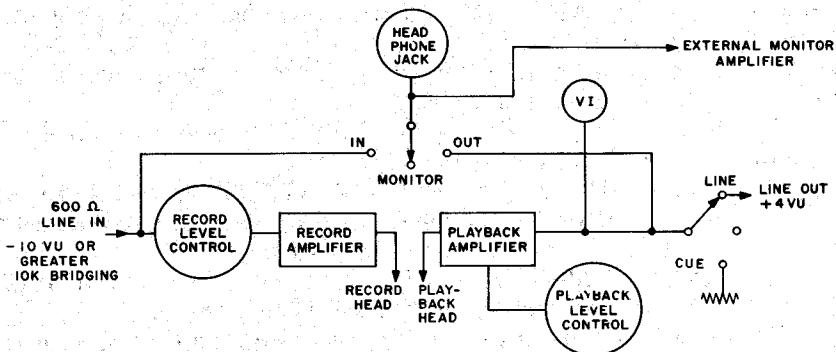
**MACHINE WITH INPUT METER CONTROL PANEL.** See Figure 3. Connect an input signal (balanced or unbalanced) to terminals 1, 2 and 3 of the Meter Panel. For unbalanced operation terminal 2 should be the ground side of the line. The input signal must be greater than -10 V.U. Set the meter panel playback 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.

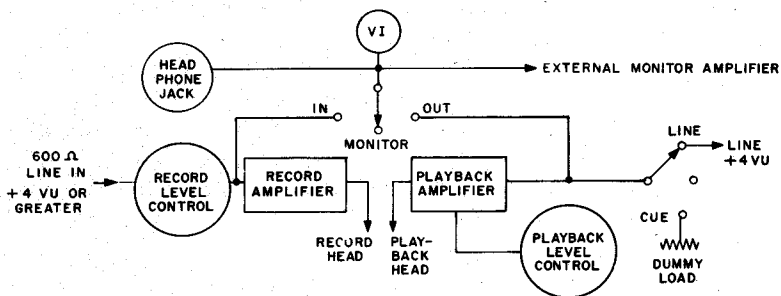
### B. *Mechanical:*

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

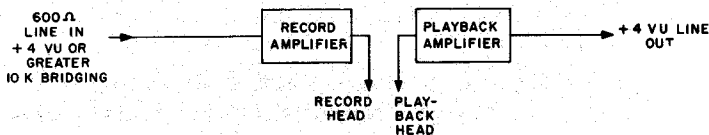




(A) LAYOUT FOR BRIDGING METER CONTROL PANEL



(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  $\frac{1}{2}$  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.

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

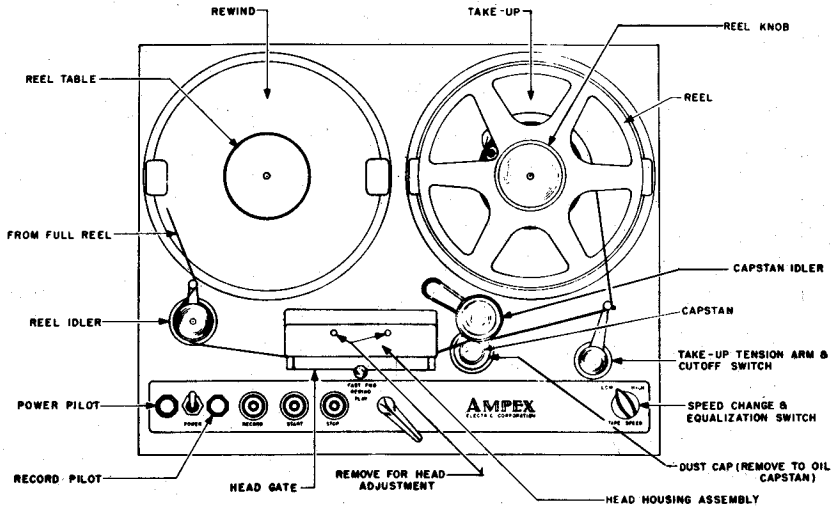


Fig. 4 Top View, Tape Transport

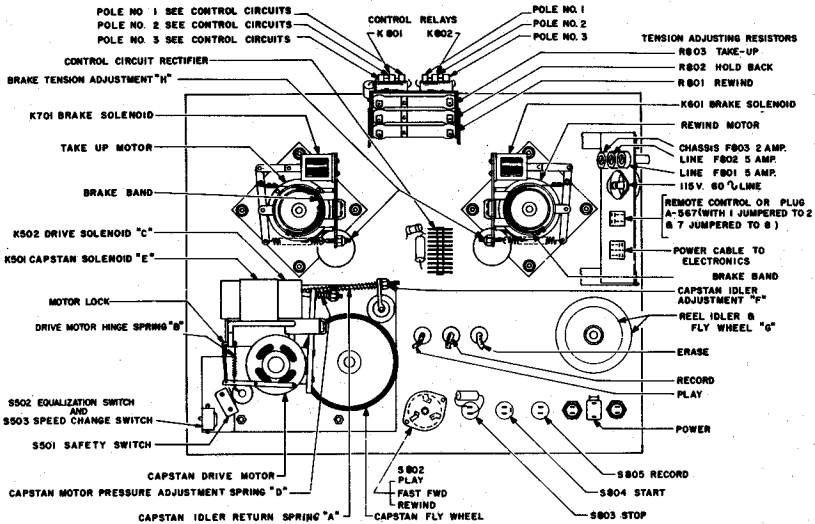


Fig. 5 Bottom View, Tape Transport

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.**

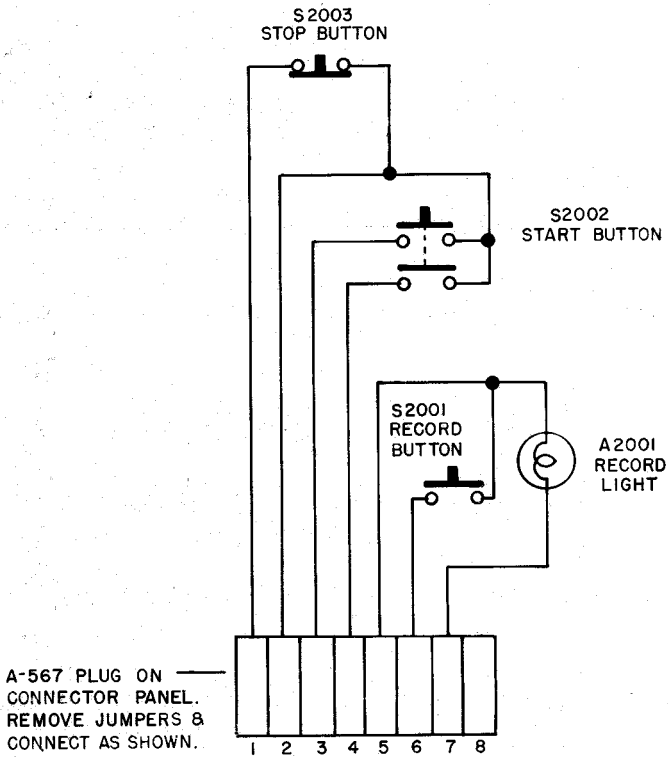


Fig. 6 Remote Control Circuit

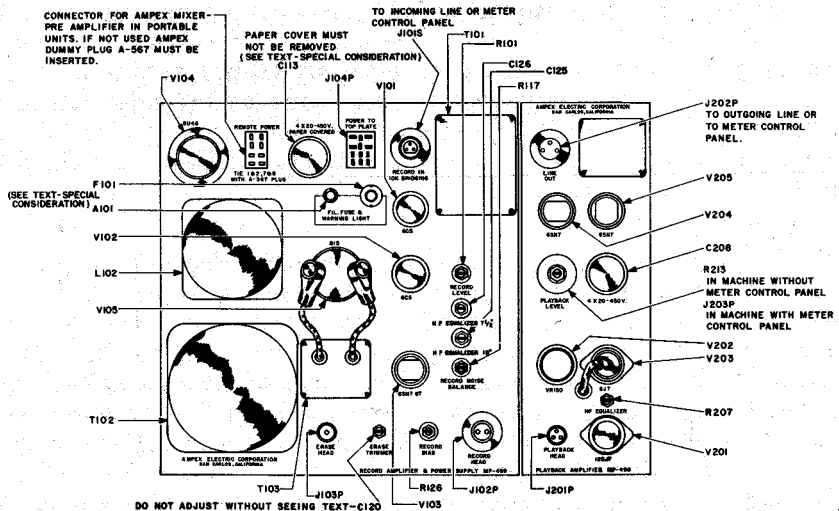


Fig. 7 Electronics Chassis

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.

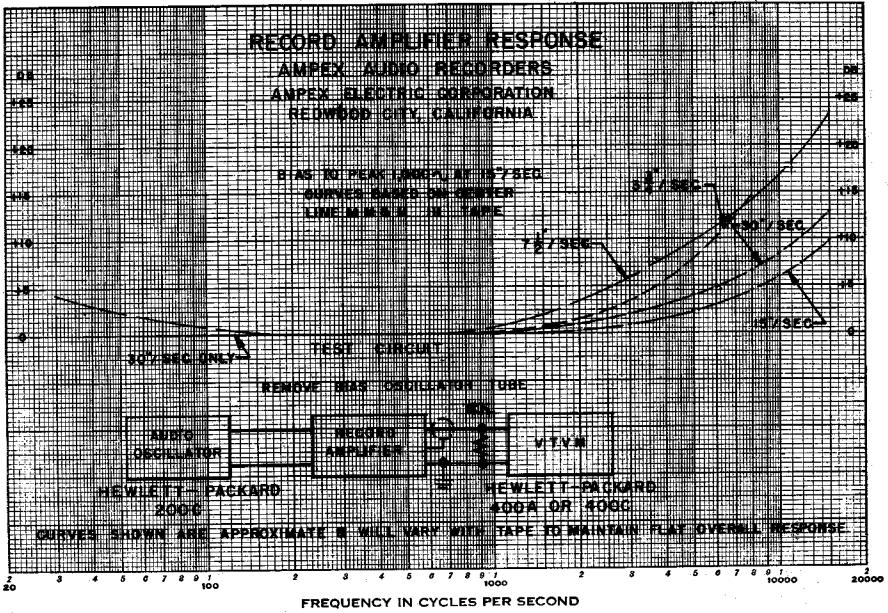
#### *Without Meter Panel.*

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.

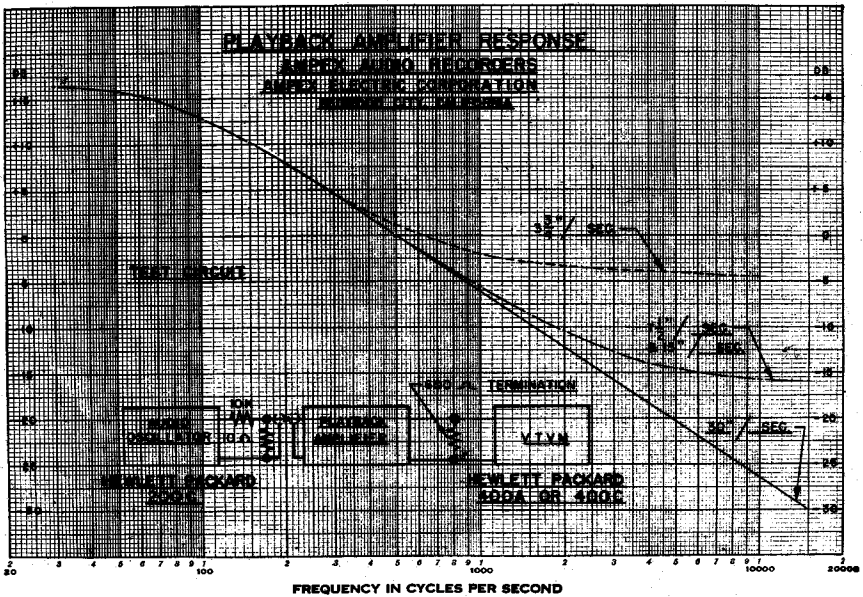
#### *With Meter Panel.*

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

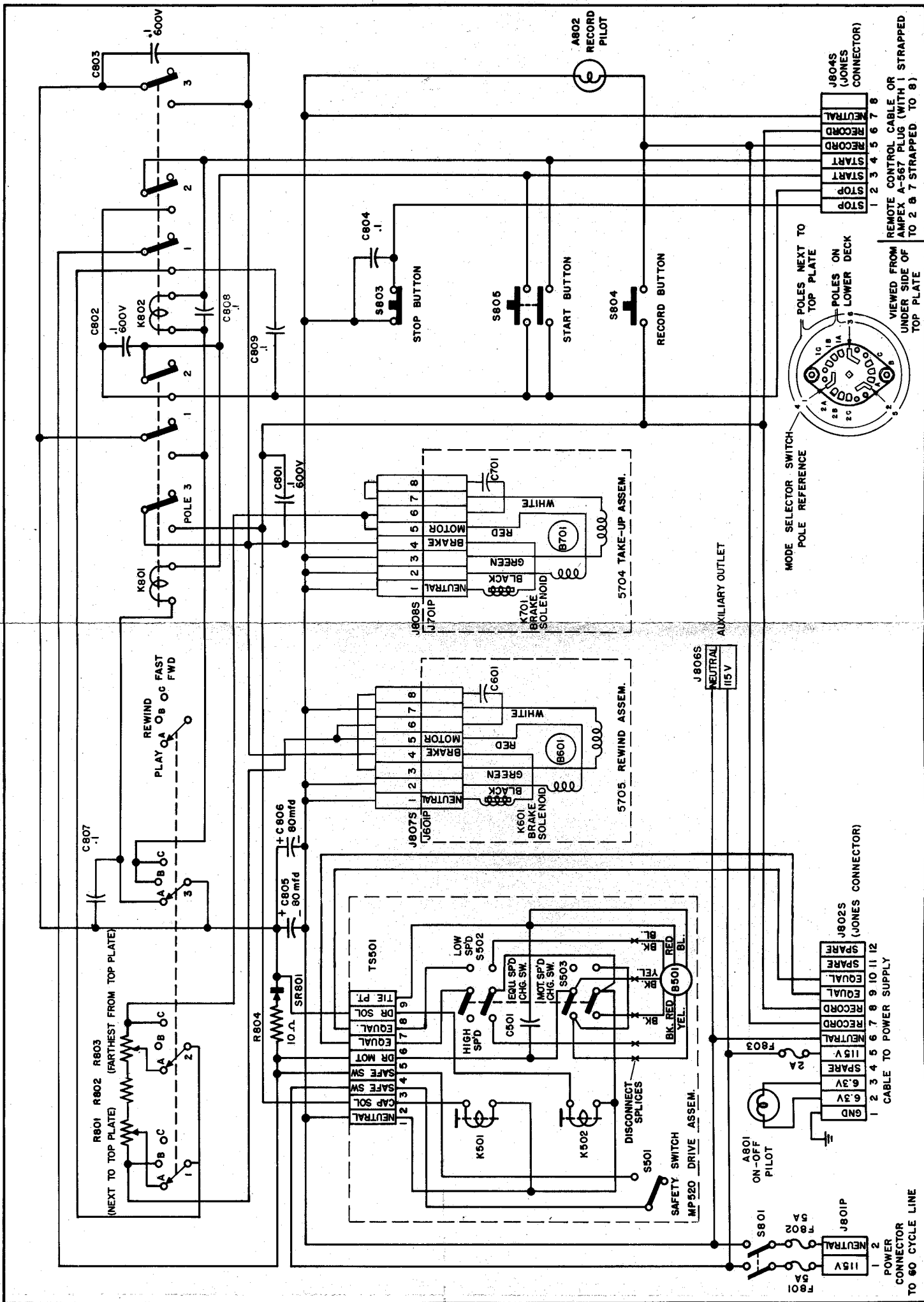
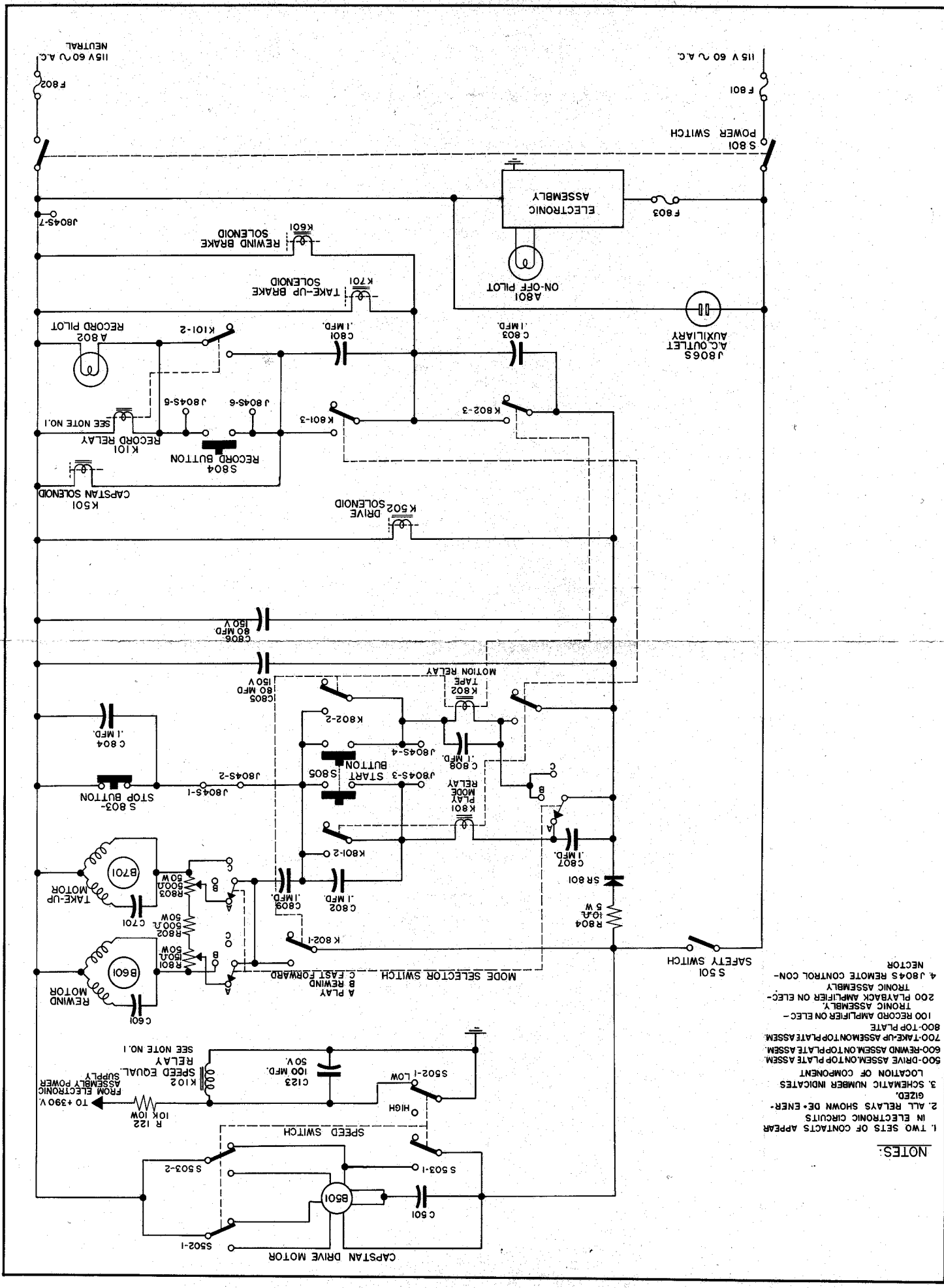


Fig. 10 Schematic Diagram, Tape Transport



- 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



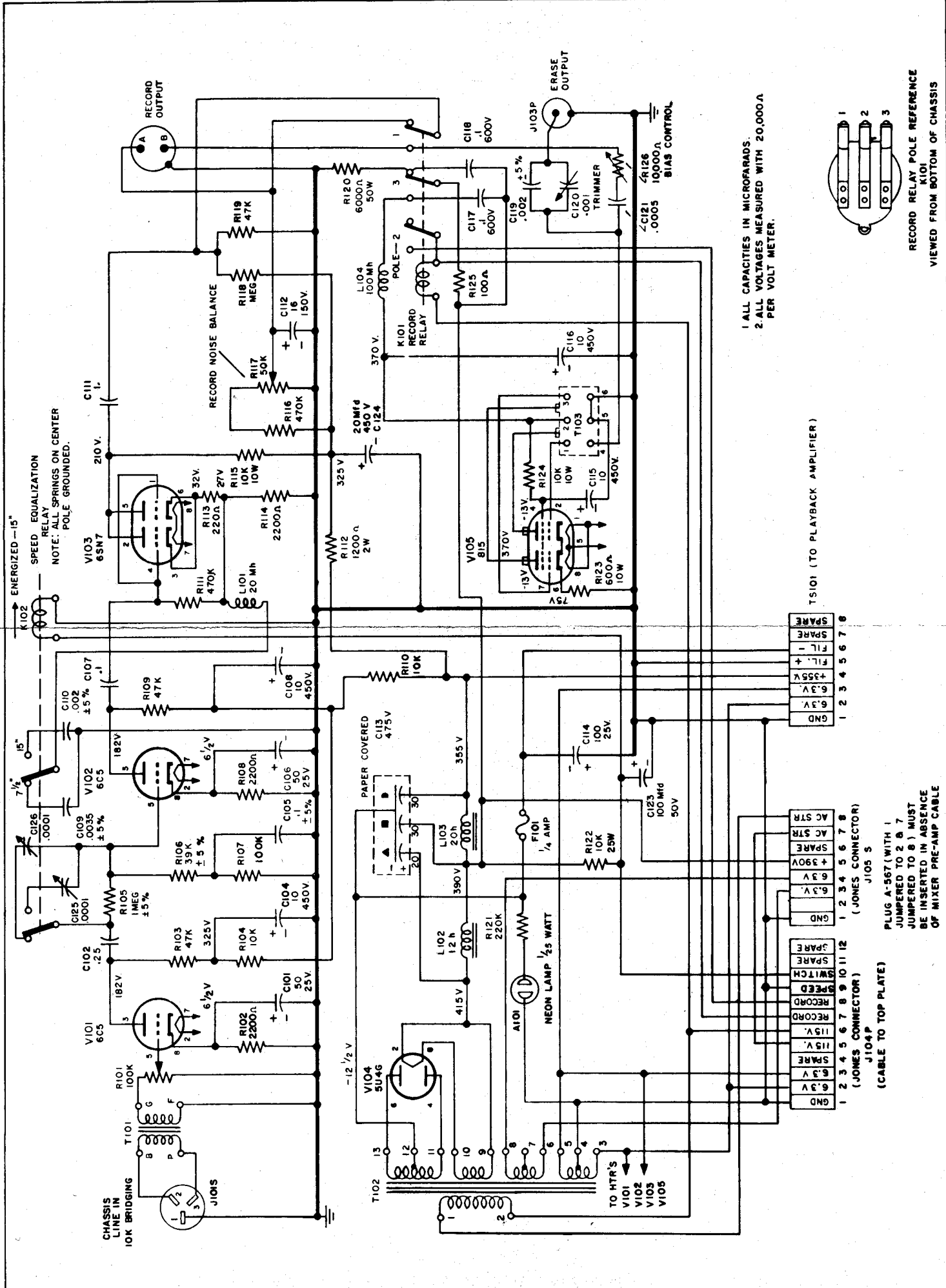
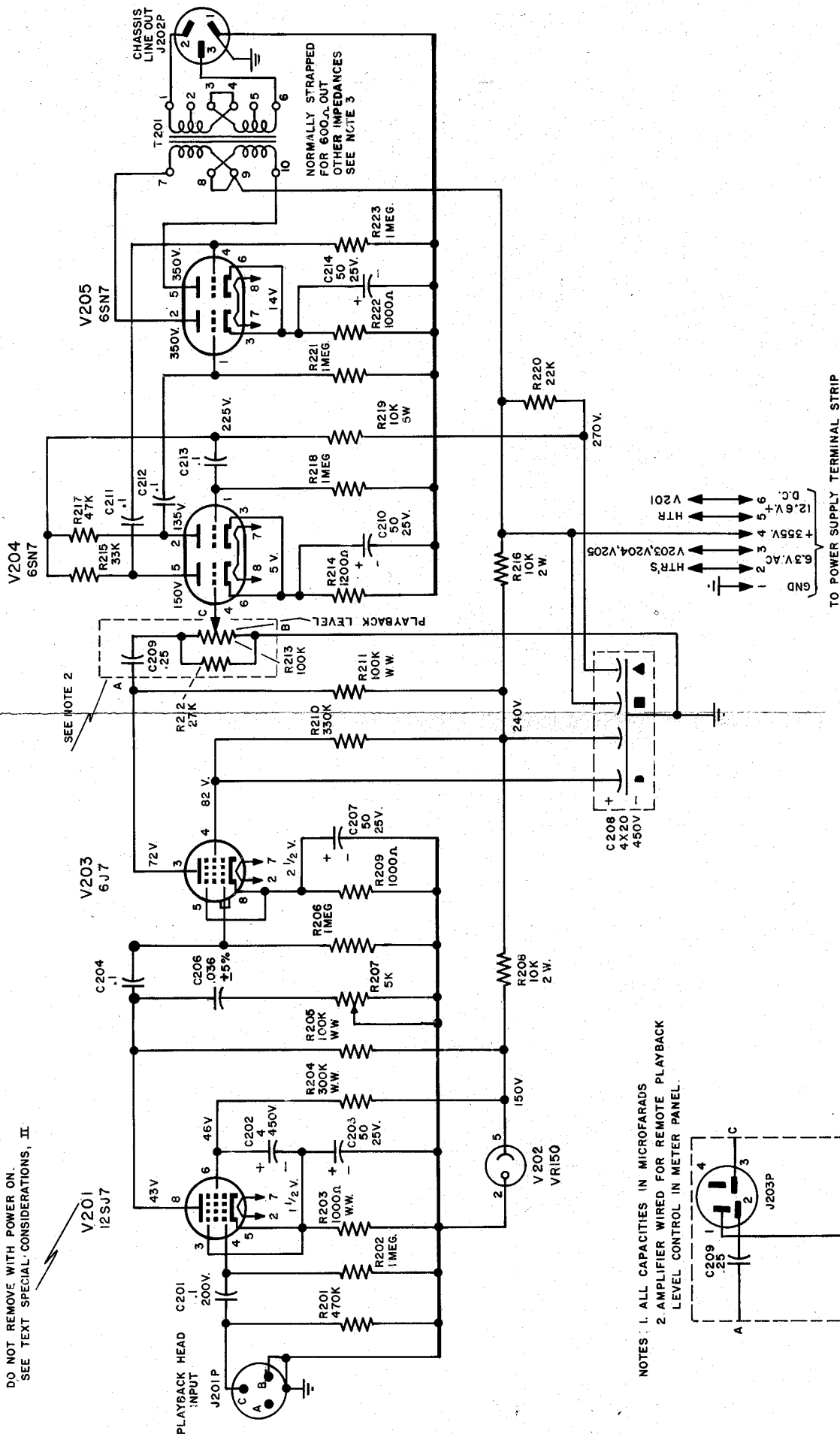
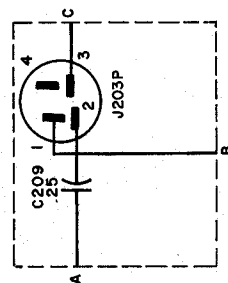


Fig. 12 Schematic Diagram, Record Amplifier and Power Supply

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

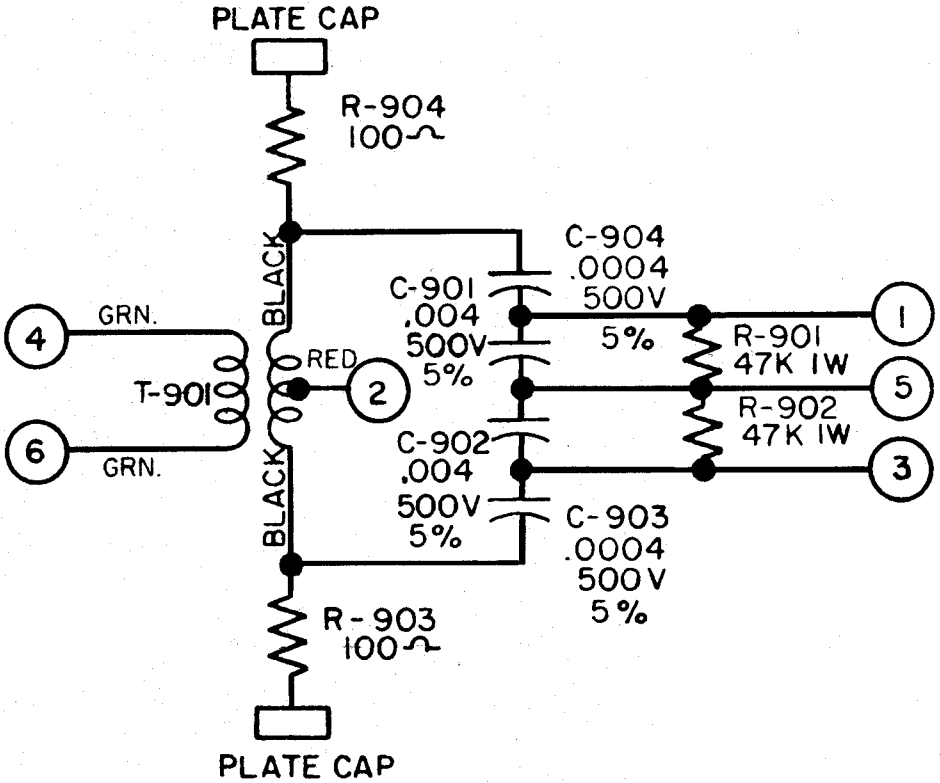
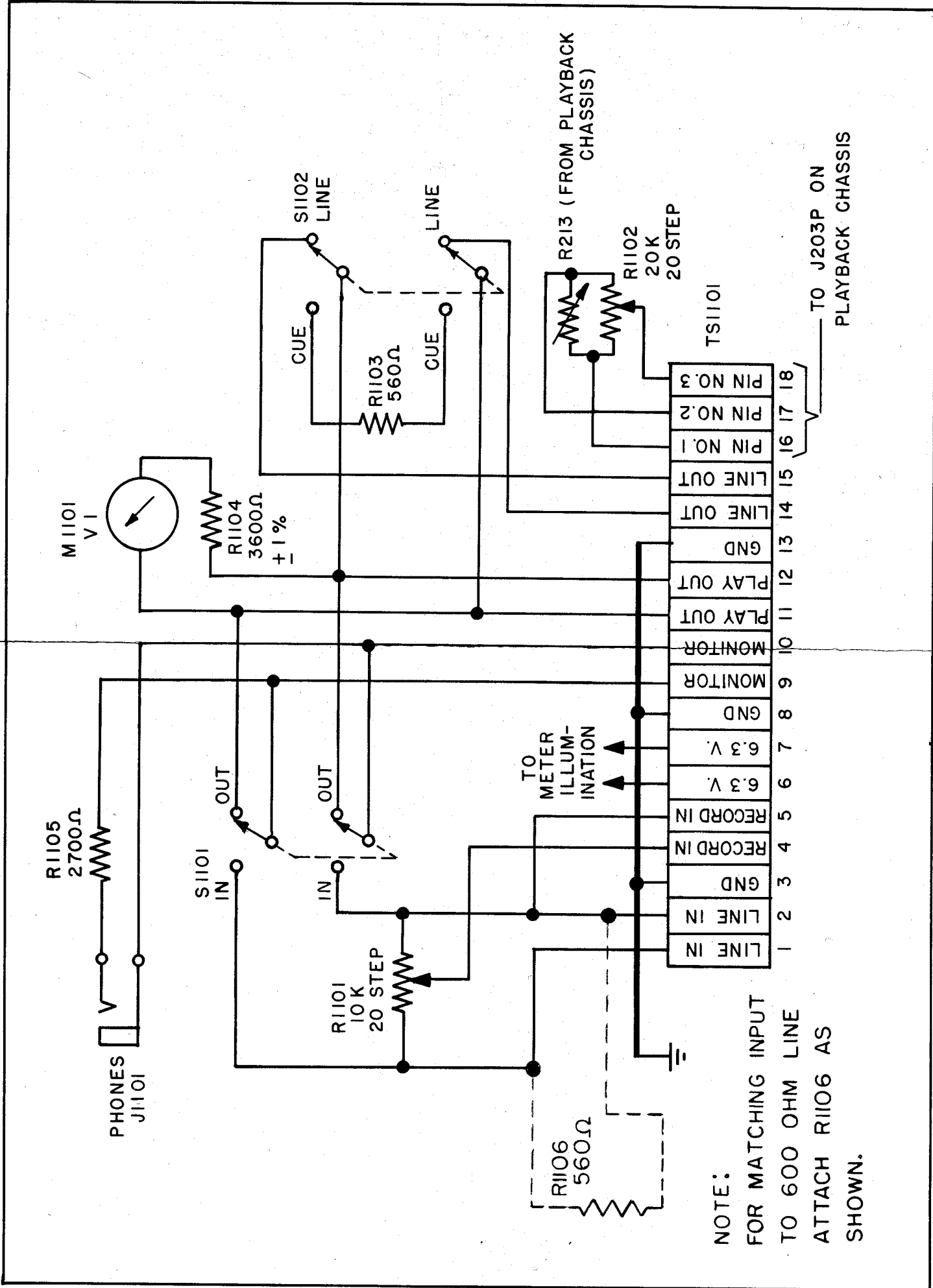


Fig. 14 Schematic Diagram, Oscillator Coil



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

Fig. 15 Schematic Diagram, Meter Control Panel