AMPEX

MODEL 307-2

OPERATION AND MAINTENANCE MANUAL

MODEL 307-2 and 307-2A

DUAL TRACK MAGNETIC TAPE RECORDER

The Ampex Models 307-2 and 307-2A are dual track three speed tape recorders which allow the recording and playing of two channels simultaneously. Their overall performance and operation are similar to that of the Model 307.

The Model 307-2 differs from a Model 307 in the following manner:

1. The frequency response specification for each track is as follows:

   15 inch per second ±3 db 300 to 15,000 cycles.

   30 inch per second ±3 db 300 to 35,000 cycles.

   60 inch per second ±3 db 300 to 70,000 cycles.

2. A Dual Track Meter Control Panel, catalog number 3340, is available at extra cost. It is identical to two standard catalog number 1884 meter panels with the exception that the output (Line-Cue) switches have been eliminated. See Figure 13.

3. Special head assemblies have been incorporated. In place of the 307 record head, an assembly consisting of two heads of multi-channel design has been made in which one head is stacked above the other, with the two gaps in line. One of these heads covers the upper portion of the tape, the other head covers the lower portion. A similar assembly has been incorporated in place of the 307 playback head. Thus it is possible to record, playback, and monitor two channels simultaneously. The 307-2 head assembly includes the standard 307 erase head. In the 307-2A, a roller is substituted for the erase head. This roller serves to move the peak of high frequency flutter to a point higher in the frequency spectrum than that at which it normally occurs with the 307-2 head.

4. A catalog number 1885 Electronic Chassis (Figures 6 and 8) is supplied for the upper track (track #1). This assembly incorporates the standard erase and bias oscillator. A catalog number 1885-1 Electronic Chassis (Figures 6A and 8) is supplied for the lower track (track #2). This assembly is identical to the upper track Electronic Chassis except the

erase and bias oscillator has been replaced with a bias buffer amplifier. The input of the buffer amplifier (the connectors labeled BIAS) receives the bias signal through a Bias Interconnecting Cable connected to Erase Head Connector on the upper track Electronic Chassis. The buffer amplifier amplifies the bias signal to provide the bias current for the lower track record head. Refer to Figure 12 for the cable connections.

5. The Installation and Operation Procedures for each track of the Model 307-2 are identical to that of the Model 307. The head cables of the upper track are color coded red. The fuse ratings in this machine have been increased to accommodate the extra Electronic Chassis. F801 and F802 have been increased to 8 amperes and F803 to 5 amperes.

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SECTION I

SPECIFICATIONS FOR MODEL 307

The AMPEX Model 307 is a three speed tape recorder with two speeds immediately available at the speed change switch. It is designed primarily to be used for recording telemetering channels up to 70 KC. However, it is well suited for recording of all types of data covering a frequency range of 100 to 100,000 cycles.

Tape Speed: 30 inches per second and 60 inches per second, OR 15 inches per second and 30 inches per second. The change from 30" to 60" or from 15" to 30" is effected by a single control. The change from a 15"-30" machine to a 30"-60" machine can be easily made in the field with no additional parts required but does require a change of the equalization settings.

Frequency Response:

At 60 inches ± 3 db	200 to 80,000 cycles. Down no more than 10 db at 100 and 100,000 cycles.
At 30 inches ± 3 db	200 to 40,000 cycles. Down no more than 10 db at 100 and 50,000 cycles.
At 15 inches ± 3 db	200 to 20,000 cycles. Down no more than 10 db at 100 and 30,000 cycles.

Signal-to-Noise Ratio: The signal-to-noise ratio is the ratio of tape saturation level to the total unweighted playback noise when erasing a signal of peak recording level and in the absence of new signal. Thus bias and erase noise are included, as well as playback amplifier noise. The overall signal-to-noise ratio is 55 db below tape saturation when measuring all frequencies in the specified pass band. The noise is essentially uniformly distributed across the spectrum so that use of band pass filters improves the signal-to-noise ratio accordingly.

Tape saturation is approximately 20 db above the recommended operating level, the point of 1% total harmonic distortion as measured on any frequency in the pass band.

Starting Time: Approximately 10 seconds for stable motion with slow start (60"/Sec.). With fast start (15" and 30") 1/10 second. The change from fast start to slow start is made by switch underneath the top plate. The fast start cannot be used at 60 inches per second.

Stopping Time: Approximately 4 inches of tape passes through the head housing after the Stop button is depressed.

Flutter and Wow: Well under 0.1% r.m.s., measuring all flutter components from 0 to 300 cycles, using a tone of 3,000 cycles.

Rewind Time: One minute for full 10-1/2 inch diameter reel.

Controls: Start, Stop, and Record are relay controlled. The relays are operated by push buttons on the top plate. A receptacle is provided to allow connection of Start, Stop, and Record switches from a remoted location to operate these functions.

Normal Play, Fast Forward, and Rewind are on a selector switch. Rapid shuttling back and forth is made possible by instantly changing from one mode of operation to the other without stopping in between.

Complete Plug-In Head Assembly: Double Mu-metal shield cans on playback head, equivalent shielding on record head, matching self-aligned covers on hinged gate. Drop-in tape threading.

Record Amplifier: 100,000 ohms unbalanced input. Adjusted for input of 1.23 volts r.m.s. (+4 d.b.m.) for normal record operating level.

Playback Amplifiers: Cathode follower output. Adjusted for 1.23 volts r.m.s. into 600 ohm load for normal operating level on the tape. (Can be set for outputs up to 4 volts.)

Harmonic Distortion: Less than 1% r.m.s. total harmonic distortion at normal operating level.

Dimensions: Mechanical unit on 24-1/2" panel for standard rack mounting; electronic unit on 12-1/4" panel for standard rack mounting.

Mounting: Console, Portable Case, and Rack Mount.

Meter Control Panel: (Available at extra cost.) 10,000 ohm 20 step control will adjust record level for inputs above .5 volts r.m.s. (reduces input impedance of machine from 100,000 ohms to 10,000 ohms unbalanced). Output step control will adjust level up to 3.75 volts r.m.s. (+14 d.b.m.) into 600 ohm termination unbalanced. The power level meter connected to the output meters output voltage while recording or playing back. Meter calibration is accurate to over 100 KC. Output Key connects playback amplifier to dummy load or external line. Telephone jack provides monitor of input or output voltage by means of monitor-transfer key. The monitor key also transfers output connection and meter to either ouput or input of machine.

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 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. 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.

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

7. 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 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.)

8. 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. If this adhesive is not removed, the first layer may stick and cause the end to break off at the finish of rewind.

9. 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. When shipped as a Model 307, it is factory adjusted for speeds of 30 inches per second and 60 inches per second unless ordered for 15"-30" operation. Model 306 machines are shipped for 15"-30" operation and should be operated at the 30 inch speed only. NO FURTHER ALIGNMENT SHOULD BE NECESSARY.

SECTION 3

OPERATION

3.1 Tape Threading

Thread 1/4-inch tape as shown in Figure 5. 1/2 and 1-inch tapes should be threaded as shown in Figure 5A. Be sure the tape has dull, oxide-coated side against the heads.

All new factory-wound reels should be unwound and inspected by running through at Fast Forward. New tapes are usually looped to the hubs in such manner that, at the end of a record or playback period, the tape does not come free of the reel. The Takeup Tension Arm is then held in position, preventing the Safety Switch from opening. In turn, the Capstan Idler does not disengage from the capstan, which eventually results in a flat being worn on the Capstan Idler Wheel. (Any adhesive material accumulation on the reel hub may also keep the tape from coming free at the end of the reel, and should be removed with denatured alcohol.)

Reel Hold-Down Knobs, Catalog #9093 are furnished for use with 1/4 inch and 1/2-inch tapes. Hold-Down Nuts, Catalog #5881, are provided for use with 1-inch tape.

The reel hold-down nuts should be tightened on each reel spindle. A centering adaptor is locked on each spindle to center the NARTB style hub.

The #9093 Knob has a simple, positive action. It is slipped on the turntable shaft with the concave side facing outward, and is pressed down firmly so that the reel locating disc is engaged in the center of the reel. A spring loaded collet within the knob engages the turntable shaft. The Knob is self-centering, as the knob base is mechanically coupled to the reel locating disc through a loading spring.

The Hold Down Knob must be taken off the shaft in order for the reels to be removed. To release the Knob, press the level forward. This action releases the collet, and the Knob can then be pulled off the shaft. The reel should be held in position as the Knob is being removed, so that it will not slip off.

The machine is now ready for operation.

3.2 Power

Power to the tape transport and electronic assemblies is supplied through the Power Switch, S801. (In units having a Power Distribution Panel, an additional power switch located on this panel, must be turned on.)

3.3 Tape Motion (See Figure 5)

The tape motion is controlled by two pushbuttons and a selector switch on top of the tape transport, and one switch on the tape transport connector panel.

1. Fast-Start/Slow-Start

   The Fast-Slow Start Switch (S806, Figure 1) on the tape transport connector panel should be placed in the FAST START position when operating at speeds below 60 ips. The capstan drive motor will then operate at all times when the tape is threaded.

   For 60 ips operation, set in the SLOW START position. The capstan drive motor will then operate only after the START button is pressed.

2. Playback and Record
   Tape motion during recording or playback is the same.

   a. Place the Selector Switch in the PLAY position.

   b. Press the START button. This will start the tape into motion at the speed selected by the Speed Switch (Section 3.5 - see below).

3. Stop

   Pressing the STOP button stops all tape motion (and shuts off recording by removing power from the last stage in the record amplifier).

4. Fast Forward

   a. Set the Selector Switch in the FAST FWD position.

   b. Press the START button.

5. Rewind

a. Set the Selector Switch in REWIND.

b. Press the START button.

When editing or cueing the tape, the selector switch allows changing from fast forward to rewind, and vice-versa, without stopping and then pressing the START button.

NOTE: In either fast forward or rewind on machines using 1/4-inch tape, it is desirable to remove the tape from direct contact with the heads by opening the Head Assembly Gate.

3.4 Recording and Playback (Reproducing)

Connect input and output circuits to the machine, as shown in Figs. 10 and 12.

MACHINE WITHOUT METER CONTROL PANEL.

Connect 1.23 Volt (+4 dbm) line to input receptacle J2601S on electronics chassis. The Record Level Control (R2601) 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 -20VU to +8VU by readjusting the Record Level Control. The Playback Level Control (R2714) has been adjusted at the factory to give an output of 1.23 Volt RMS (+4 dbm) into a 600 OHM load at receptacle J2703P from tapes recorded at the recommended operating level.

MACHINE WITH METER CONTROL PANEL.

The meter control panel is connected to the electronics chassis as designated in Fig. 12. With the Record Level Control on the meter control panel (R2501) set at 10, connect a 1.23 Volt RMS (+4 dbm)line to J2501S on the rear of the meter panel. With the Monitor Switch on the "in" position the meter will read"O". The Vernier Control (R2502) in the front of the meter panel has been set at the factory so that the "O" reading indicates proper tape level.

With the machine in operation (see SECTION 3.3), change the Monitor key to the "out" position and set the Playback Level Control on the meter control panel (R2503) at 10. The meter will read "O" indicating that the output is 1.23 Volt RMS (+4 dbm) at receptacle J2502P. The Output Switch connects the output of the machine either to J2502P (Line Position) or to a dummy load (Cue Position).

Input variations from -6VU to +14VU may be recorded at proper tape level by adjusting the Record Level Control on the Meter Panel. On playback any tape recorded off level by a voltage ratio of 3 to 1 (10 db) may be reproduced on level by adjusting the Playback Level Control on the Meter Panel.

When monitoring the output of the Playback Amplifiers during the record process, level variations may be observed while viewing the wave on an oscilloscope. These are caused by beating between the carrier reproduced from the tape and the carrier coupled from the record head. These variations will not occur during subsequent playback.

Refer to Section 5 for electronic alignment procedure.

3.5 Speed Change

Tape speed can be changed in two ways; with the TAPE SPEED switch, and with the addition or removal of a capstan bushing adaptor. The TAPE SPEED switch sets either high or low capstan drive motor speed. The capstan adaptor increases the effective diameter of the capstan, thereby increasing the tape speed for a given motor speed.

The various speeds determined by the position of the TAPE SPEED switch and the capstan adaptor are given on the following page.

Each time, after adding or removing the capstan adaptor, the following must be observed:

1. Adjust the capstan idler pressure as indicated in Section 4.1.3.

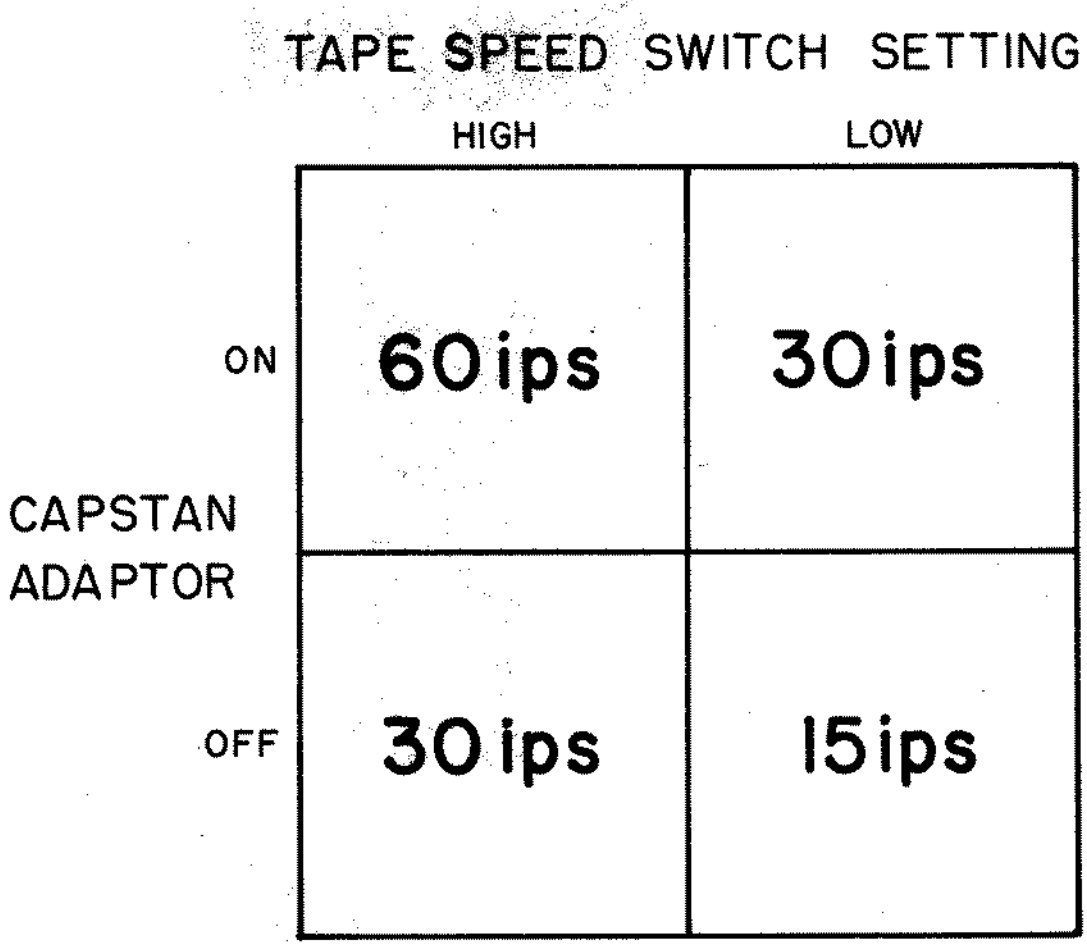
2. On some special machines, a large capstan idler is provided for use with the capstan while the smaller idler is provided for use with the adaptor. Use the correct one.

3. The SLOW/FAST START switch setting must be checked. See Section 3.3.

A. Installing the Capstan Adaptor

Remove the Allen cap screw from the capstan shaft. Attach capstan bushing adaptor. FOLLOW INSTRUCTIONS AND PRECAUTIONS CAREFULLY, as capstan adaptor must be handled very carefully to maintain wow-free performance. In order to minimize tape speed variations, the runout of the capstan must be extremely low. Therefore, the capstan adaptor has a very close, precision fit. It must be treated carefully and kept scrupulously clean.

TAPE SPEED


TAPE SPEED SWITCH SETTING
HIGH
LOW
CAPSTAN ADAPTOR
ON
OFF
60ips
30ips
30ips
15ips

(1) Make sure capstan shaft and the inside of the adaptor are clean.

(2) Place adaptor over the capstan.

(3) Push adaptor down gently, being careful to keep it in alignment. Because of the precision fit, the adaptor will not go over the capstan if it is the slightest bit cocked.

(4) When the adaptor has been started on and is in good alignment, as evidenced by lack of wobble when the capstan is rotated, give the adaptor a rap with the palm of the hand, and it will seat properly.

DO NOT TRY TO DRIVE ADAPTOR ON IF DIFFICULTY IS EXPERIENCED.

If the adaptor is properly aligned with the capstan, it will go on readily. In case of difficulty, a slight smear of lubrication on the capstan shaft will help.

(5) Secure adaptor in place with the 10-32 Allen screw and wrench provided.

B. Removing the Capstan Adaptor

Remove the Allen cap screw from the capstan bushing adaptor. In its place insert the capstan bushing extractor screw. Running this down with the wrench provided forces the capstan bushing adaptor off the capstan shaft. Wipe the capstan free of any lubrication. Insert the short Allen cap screw (found in the container with the extractor screw) in the capstan shaft. Restore the bushing, long cap screw, extractor screw and wrench in a safe place for the future use.

SECTION 4

TAPE TRANSPORT AND HEAD ASSEMBLY

4. 1 TAPE TRANSPORT

The Tape Transport Mechanism consists of the following major assemblies:

A. Capstan Drive Motor (B501)

This is an hysteresis synchronous motor. This motor is mounted on a hinge moved by a solenoid. The solenoid causes the motor and the capstan flywheel to engage. The hinge is positioned by the Drive Motor Return Spring B (Figure 1) when the solenoid is deenergized. A stronger return spring is required for rack mounted machines than for console or portable units. See Section 6 Parts List.

When power is applied and the tape threaded (and S806 is in Fast Start), 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 capstan speed as described in INSTALLATION.

B. Takeup and Rewind Assemblies

Each of these assemblies consists of an induction motor (B701 and B601), a turntable mounted directly on the motor shaft, a brake housing assembly and a flange for mounting the entire unit. These units are not interchangeable, the brake housing on one being the reverse of that on the other. The brakes are solenoid-operated and are released when the Brake Solenoids (K701 and K601) are energized.

The torque of the 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. See adjustments below.

The mechanical brakes on the rewind and takeup motors ordinarily require no adjustments. (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.) 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. See under adjustments below. However, unless tampered with, the adjustment should be permanent until such time as the brake bands wear out.

C. Capstan Assembly

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 Figure 2. The upper bearing on the shaft is a precision bronze sleeve bearing which maintains true running of the capstan.

D. Capstan Idler Assembly

This assembly consists of a swivel-mounted arm and a rubber-tired idler wheel. The action of the Capstan Idler Arm is controlled by the Capstan Solenoid (K501). When the Capstan Solenoid is energized, (it is energized in the Play or Record Modes only) the movement of the arm forces the idler wheel against the Capstan, which then drives the tape at a constant speed.

E. Reel Idler Assembly

This assembly consists of a pulley, a spring-pivot-mounted arm, a tape guide, and a flywheel. The reel idler assembly serves to smooth out transient speed variations in the tape system.

The reel idler is shown in Figure 1 at G, and in Figure 3. 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 reel idler introducing a measurable flutter and wow.

F. Rotary Tape Guides (Figure 5A).

Machines using 1/2 and 1-inch tape have a rotary guide which aids proper tape tracking.

G. Takeup Tension Arm Assembly

This assembly consists of a spring-pivot-mounted arm, a tape guide, and a tape guide hook. A Drivelock pin in the arm shaft actuates the Safety Switch (S501) which stops the machine if the tape breaks or runs off either reel.

H. Control Circuit

The control circuit contains all switches and relays which control the operation of the tape transport in all modes.

4.1.1 THE TAPE TENSION SYSTEM

The purpose of the Tape Tension System is to provide proper tape tension in all modes of operation. The principles of the system can best be understood by studying the operation of the takeup and rewind motor assemblies.

The Takeup and Rewind Motors are so connected that when power is applied with no tape threaded, the turntables, fixed to their shafts, will rotate in opposite directions. The Tape Supply Turntable, fixed to the Rewind Motor shaft, will rotate clockwise. The Tape Takeup Turntable, fixed to the Takeup Motor shaft, will rotate counterclockwise.

The torque of the motors in the Play mode is adjusted to exactly counteract each other by resistors R801 and R803, the tension adjusting resistors in series with each motor. In Fast Forward, the torque of the Rewind Motor is greatly reduced by insertion of additional resistance (R801, R802, R803) in series with it. In Rewind, these resistors are inserted in series with the Takeup Motor. The basic operation of the tape tension system is illustrated in Figures A, B, and C on the following page.

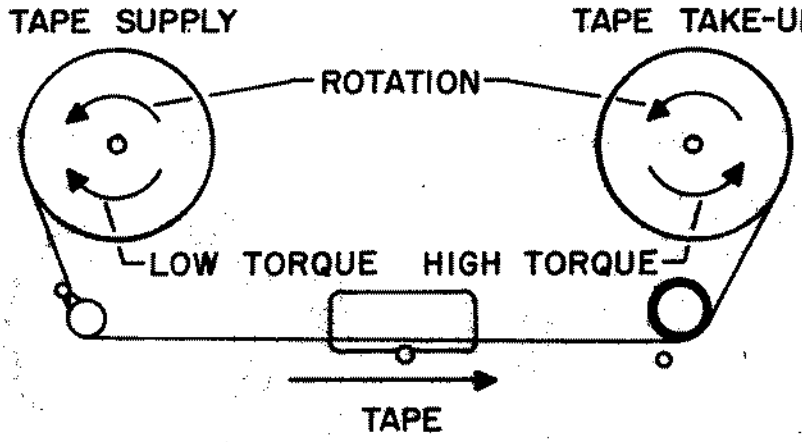


FIGURE A - FAST FORWARD

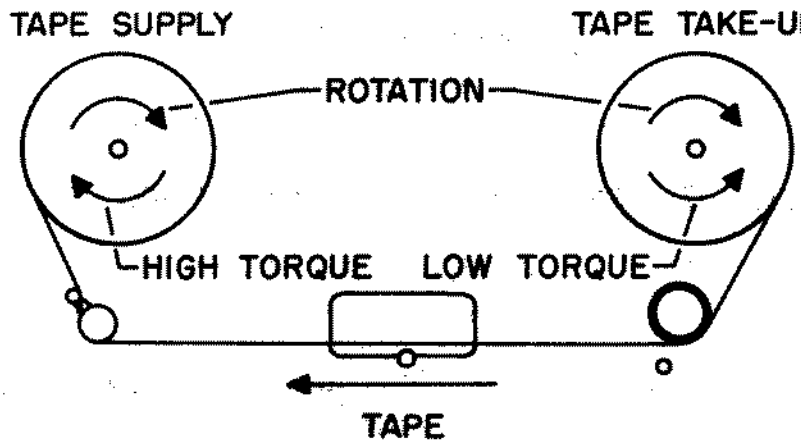


FIGURE B - REWIND

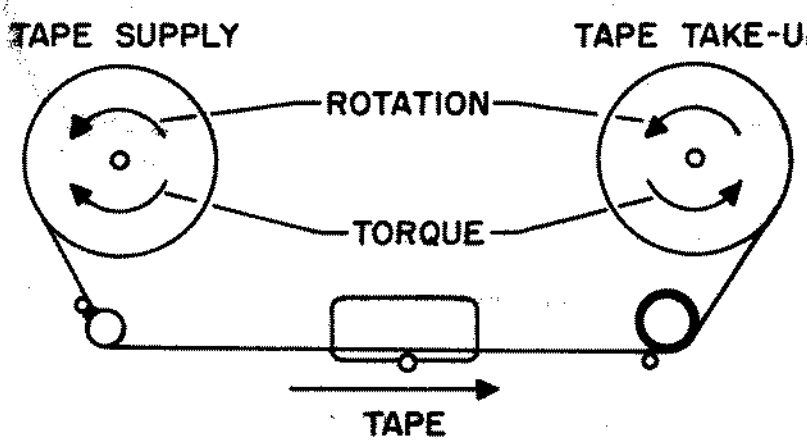


FIGURE C - PLAY OR RECORD

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TAPE TENSION SYSTEM

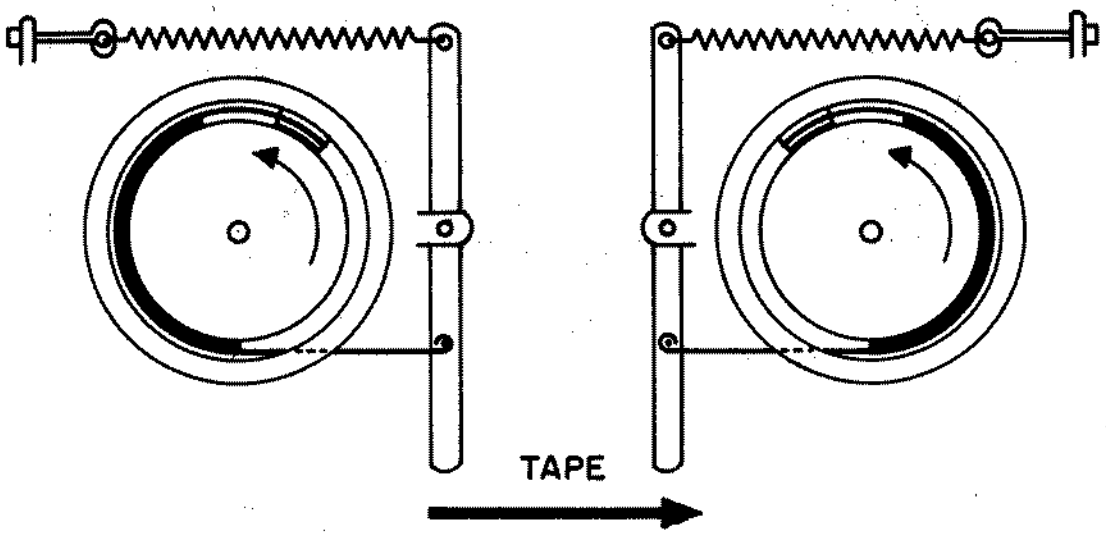


FIGURE D - FAST FORWARD, PLAY & RECORD

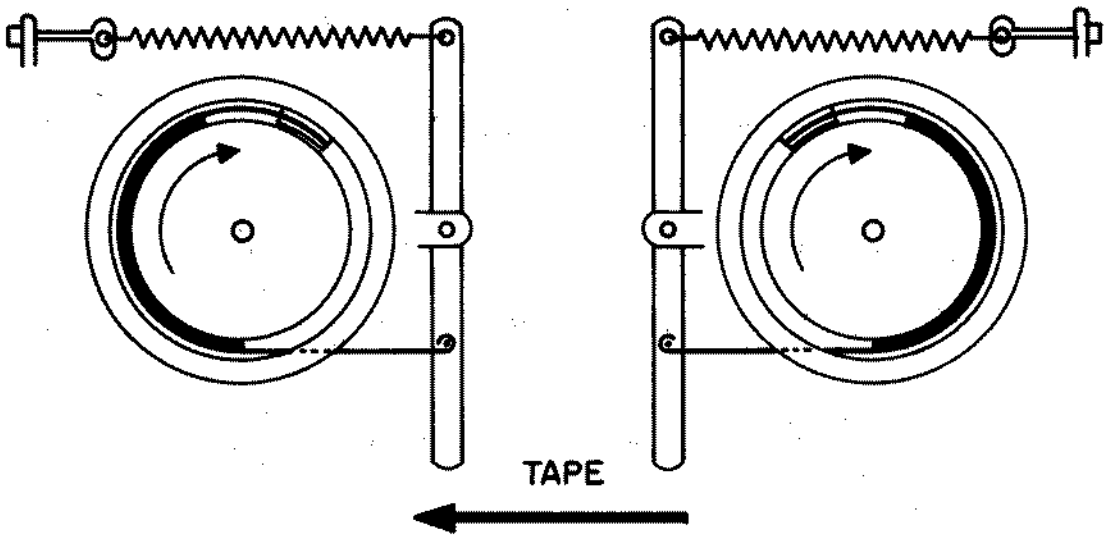


FIGURE E - REWIND

C-6152 350 6-13-53

BRAKE OPERATION

In the Fast Forward mode (Figure A), the Takeup Motor operates at full torque, the Rewind Motor at reduced torque, and the tape is simply pulled from the Tape Supply Reel. Since the torque of the Tape Supply Turntable motor (i.e., the Rewind Motor) is applied in the opposite direction to the table's rotation, the tape is held under continuous tension as it is pulled from the reel.

In the Rewind mode, the operation just described is exactly reversed, as shown in Figure B.

In the Play or Record modes, both motors operate at reduced torque and are effectively isolated from each other by the Tape Drive Capstan and the Capstan Idler between which the tape is clamped, (Figure C). From the point of view of the Tape Supply Turntable, the capstan and idler action exerts sufficient pull on the tape to overcome the opposing torque of the Rewind Motor, which constitutes the hold back tension. From the point of view of the Tape Takeup Turntable, the capstan and idler action is feeding the tape to it. The tape is held under tension here, simply by virtue of the fact that the takeup rate exceeds the feed rate. (A tape loop will be thrown on the right side of the capstan whenever any malfunction causes the feed rate to exceed the takeup rate).

In the event that such a tape loop is thrown, or the tape breaks, the Takeup Tension Arm will actuate the Safety Switch (S501) and stop the machine.

The Reel Idler Assembly (and rotary tape guide) serves to guide the tape and smooth out any transients in the tension system.

4.1.2 BRAKE OPERATION

Smooth brake operation is of primary importance in maintaining proper tape tension while stopping the tape. Since the holdback tension, supplied by the trailing turntable motor torque, is lost as soon as the STOP button is pressed, the maintenance of tape tension then becomes a function of brake operation. The fundamental design consideration in the brake system is that the braking force acting on the turntable from which the tape is being pulled (the trailing turntable) in any of the modes of operation must always exceed the braking force acting on the turntable taking up the tape (the leading turntable) in order to prevent the throwing of tape loops.

Refer to the Takeup Brake Assembly as shown in Figure 1. One end of the brake band is fixed to the brake housing. The other end is linked to the brake lever and is free to move. When the brake

solenoid is deenergized, the brake tension spring acting on the brake lever draws the brake band against the brake drum.

If the brake drum is rotating clockwise (as viewed in Figure 1) when the brake band is applied, the frictional force will cause the band to wrap itself more tightly around the brake drum, the linked end of the band moving to the left. Braking force will be increased (i.e., the brake is self-energizing). If the drum is rotating counterclockwise, the process is reversed. There will be a tendency for the band to pull away from the drum, decreasing the braking force (i. e., the brake is self-relieved). The ratio of the braking force in one direction to the braking force in the other is called the brake differential. The brake differential on this machine is approximately two to one.

The action of the braking system in the various modes of operation is illustrated in Figures E and F. In terms of the discussion above, note that in all modes, the greater braking force always acts on the trailing turntable. A portion of this increased braking force is exerted on the leading turntable through the tape. Thus the tape remains under tension as the system is brought to a stop.

4.1.3 ADJUSTMENTS

The mechanical assembly is shipped from the factory with all adjustments set for correct performance. It should not be necessary to change any adjustment before putting the machine into service, unless shipping damage has occurred. In the course of wear in normal service, or in the event of component failure and replacement of parts, some readjustments may be necessary. The recommended procedures for making such adjustments are detailed below. The locations of all adjustment points are shown in the figures at the rear of this book.

1 - Take up and Rewind Tension

Takeup and rewind tensions are adjusted by the slides on resistors R801 and R803. The torque of both the rewind and takeup motors must be adjusted to six ounces at NARTB Reel hub diameter. This is done as follows:

A. Place an empty 10-1/2 inch NARTB reel on the Tape Supply Turntable.

B. Take a piece of string about thirty inches long, and tie a small loop at each end.

C. Attach one loop to the tape anchor on the reel hub, and the other loop to a spring scale (0 to 18 oz. preferred).

D. Hold the Safety Switch closed by taping the Takeup Tension Arm in the switch-on position with a piece of scotch tape or masking tape.

E. Press the START button and read the pull as the string is wound onto the hub. It is advisable to "follow" the string in slowly, taking the reading while the turntable is in steady motion. (The static pull of the turntable may produce a reading slightly higher than the steady motion reading). NOTE: Most spring scales, when held horizontally, will show a zero reading different from the normal scale zero. Allowance for this error should be made when taking readings.

F. Adjust R801 for a six-ounce scale reading. (10-12 ounces for 1/2 and 1 inch tape transports)

G. Repeat the entire procedure on the Takeup Turntable, adjusting R803 for six ounces. (10-12 ounces for 1/2 and 1-inch tape transports).

2 - Brake Tension

Brake tension is adjusted with no power applied to the machine. Adjustments are made at the two points H shown in Figure 1. The procedure is as follows:

A. Place an empty 10-1/2 inch NARTB reel on the Tape Supply Turntable.

B. Tie a loop at each end of a piece of string about thirty inches long.

C. Attach one loop to the tape anchor on the reel hub. Wind the string on by turning the reel clockwise by hand.

D. Attach the loop in the free end of the string to a spring scale, and pull. (The turntable will rotate counter-clockwise). Take a reading only when the turntable is in steady motion, as the force required to overcome the static friction will produce an excessively high initial reading.

E. Adjust the rewind motor brake for a reading of approximately 14 ounces.

F. Now wind the string on the hub by rotating the reel counterclockwise; pull, and take a reading. (The turntable will rotate clockwise). The reading should be approximately 7 ounces.

G. Repeat the entire process on the takeup turntable, this time adjusting for approximately 14 ounces when the table is rotating clockwise and approximately 7 ounces counterclockwise.

3 - Capstan Idler Pressure

The Capstan Idler is forced against the Capstan by the action of the Capstan Solenoid (K501). Idler pressure is supplied by the Capstan Idler Pressure Spring, and is adjusted by a lock nut on the Capstan Solenoid spade bolt. (See F, Figure 1.) Little or no pressure is supplied by the spring if the Capstan Solenoid is not bottomed. Tightening the lock nut increases idler pressure until a point is reached where the solenoid will not bottom. At this point, idler pressure drops to a value which is inadequate to permit the Capstan to drive the tape, and slippage will occur unless the nut is backed off. Excessive pressure should also be avoided as it throws an unnecessary load on the upper sleeve bearing of the Drive Motor. The recommended procedure for adjusting idler pressure is as follows:

A. Hold the safety switch on by taping the Takeup Tension Arm in the switch-on position with a piece of scotch tape or masking tape.

B. Press the START button, and check to see that the Capstan Solenoid is bottomed. (The Capstan Idler can be pushed off the Capstan easily by pushing on the idler arm, if the solenoid is not bottomed). If necessary, back off the lock nut until the solenoid does bottom. (See NOTE below).

C. Readjust the lock nut until the Capstan Idler is just touching the Capstan when the solenoid is bottomed (the point at which one finger held lightly on the capstan idler hub will keep it from rotating).

D. Tighten the lock nut 2-1/4 turns.

E. Press the STOP button, then press the START button and check to be sure that the solenoid will bottom after the last adjustment. If not, then either the solenoid or linkage is defective.

If properly adjusted as outlined above, sufficient capstan idler pressure exists under all operating conditions to prevent tape slippage, unless the idler or the Capstan should become contaminated with oil or foreign matter.

NOTE: In the course of normal operation in the play or record modes, the temperature of the Capstan Solenoid will rise, and its DC resistance will increase. Therefore, the minimum line voltage required to bottom the solenoid when it is hot will be greater than that required when it is cold. If the machine is operating on unusually low line voltage, sometimes encountered in areas where regulation is poor, the solenoid may fail to bottom after it has reached normal operating temperature. It is advisable, therefore, to allow the machine to operate in the Play mode for about half an hour before making any necessary solenoid adjustments. This will allow the widest margin of safety with respect to line voltage variations. (The solenoid is factory-adjusted to bottom at 90 line volts cold and 105 line volts hot).

4.1.4 PRECAUTIONS

A. 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 Takeup 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.

B. 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. CAUTION: on tape transports 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.

C. 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 tape lubrication. 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". The "squeaking" sometimes occurs at the slow speed when using the small reels. For this reason, the capstan idler should be cleaned with denatured alcohol at least once each week.

D. Dummy Plugs

When a Model 375 or remote controls are not used, two dummy plugs must be inserted into the appropriate sockets. 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.

4.2 HEAD ASSEMBLY

4.2.1 Single and Dual Track Head Assemblies

On single and dual track head assemblies, the head housing is a die cast assembly which contains the record and playback head stacks and a rotating idler wheel. The heads are respectively record and playback from left to right, when facing the machine. No erase head is provided as erase is not needed with Ampex FM recording. A full-track erase head replaces the idler on direct recorders.

Both the record and playback head stacks on dual track machines have the heads stacked one above the other, with the gaps in line within $\pm$ 0.001 inches. The cables associated with the upper track are color coded red.

The housing gate holds the head shield covers and the tape-lifting fingers. The tape-lifting fingers remove the tape from the heads when the gate is open. The gate should never be allowed to spring shut but should be closed gently.

4.2.2 Multi-Track Head Assemblies

Three and four-track head assemblies have one record head stack and one playback head stack. The heads are stacked similarly to the dual track machines described above.

Head assemblies of five or more tracks contain two record head stacks and two playback head stacks. The odd numbered heads are in one stack and the even heads in the other. They are staggered so that the tracks appear on the tape in numerical order, starting from the top.

The head assembly is mounted and properly positioned on the top plate by two 10-32 x 3/4" socket head cap screws. Two 6-32 x 3/8" flat socket head machine screws are used to mount the head cover. The head stacks have been properly aligned at the factory, and no effort should be made to change this adjustment. Proper tracking of the tape across the face of the heads is assured by the two tape guides which have been designed to center the tape properly on the head stacks.

4.2.3 Head Demagnetization

Occasionally, the heads may become permanently magnetized through an electrical fault in the amplifiers, improper use of

the machine, or by coming into contact with a magnetized object. Magnetized heads may cause an increase of 5 to 10 db in noise level, and may ruin good tapes by partially erasing high frequencies. The full dynamic range of the machine cannot be realized if the heads are magnetized.

Any phenomena that tend to put a large unbalanced pulse through the record head will magnetize it. If the following precautions are observed, no difficulty should be experienced.

A. Do not remove any tube from the record amplifier while the machine is recording.

B. Do not connect or disconnect input leads or head leads while recording.

C. When putting the machine in the Record mode, wait a half second between pushing the START and the RECORD buttons to allow motor and solenoid switching transients to die out before the Record Amplifier is connected to the Record Head.

D. Do not saturate the record amplifier with abnormally high input signals. See Input specifications.

E. Do not test continuity of the heads with an ohm-meter. Should the heads become magnetized, they can be demagnetized readily with an AMPEX Head Demagnetizer (Catalog #704). The following demagnetization procedure should be performed: Disconnect power from the machine. Plug the Demagnetizer into a 117-volt AC source. Bring the tips of the demagnetizer in close proximity to, but preferably not in contact with, the head stacks. Run the tips of the demagnetizer up and down the entire length of each stack (the tips should straddle the gap) three or four times. Remove the demagnetizer very slowly allowing the influence of its AC field to die off gradually. This operation need be performed only on the Record and Playback heads. In the event demagnetization is not effected, repeat the process several times.

4.3 ROUTINE MAINTENANCE

The routine maintenance program outlined below should be

carefully followed if proper performance is expected of the machine at all times. It is recommended that an Operation and Maintenance Log be kept.

4.3.1 CLEANING

The Capstan, the head faces and tape guides should be cleaned daily with denatured alcohol applied with a soft cloth. WARNING: DO NOT USE CARBON TETRACHLORIDE TO CLEAN HEADS. IT ACTS AS A SOLVENT ON THE PLIOBOND WHICH BINDS THE LAMINATIONS TOGETHER.

The capstan idler wheel should be cleaned weekly with denatured alcohol applied with a soft cloth. Great care must be taken to see that oil does not reach the rubber tire. Avoid, as much as possible, touching the tire with the fingers.

In general, failure to keep the idler wheel tire free of tape lubricant or any other oil by weekly cleaning will eventually result in loss of positive drive at the Capstan - particularly toward the end of a reel when holdback tension is highest. See 4.1.4. C, Tape Slippage.

4.3.2 LUBRICATION

The following parts of the Tape Transport Mechanism require lubrication every three months, or after every thousand hours of operation, whichever occurs first.

A. Capstan Drive Motor

The upper sleeve bearing of the Capstan Drive Motor should be lubricated with one of the following recommended oils or its equivalent:

Gulf Oil & Refining Company	- (Gulfcrest A)
Standard Oil Co. of Indiana	- (Stanoil #18 or #25)
Socony Vacuum Oil Co.	- Gargoyle DTE 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. OIL MAY GET ON EXPOSED RUBBER SURFACES.

B. 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.

C. 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.

SECTION V

ALIGNMENT

Alignment is the necessary adjustments required to have the electronics 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 and all the controls locked by the shaft locks. No further adjustments should be necessary except to correct any alterations occurring in shipment or as required by routine maintenance.

Alignment consists of the following steps:

A. Head Alignment
   1. Playback
   2. Record

B. Electronics Alignment
   1. Playback
      a. Playback Level
      b. Playback Equalization
   2. Record
      a. Erase Adjustment
      b. Record Bias Adjustment
      c. Record Level Adjustment
      d. Record Noise Balance
      e. Record Equalization
   3. Overall Frequency Response
   4. Overall Noise Measurement

The following equipment is required for complete alignment:

1. Standard Tape - Stock Number A-1994.

This is a tape recorded at 30 inches per second at the recommended operating level. Recorded on the tape are a 40 KC tone to check playback head azimuth alignment, a 1000 cycle tone to set playback level and a series of frequencies to provide a check on frequency response. The total distortion for any of the frequencies is approximately 1% RMS at this level. The high frequency output from the standard tape will slowly drop with continued usage - especially if the heads are slightly magnetized. Therefore, the following precautions are recommended:

(a) Always demagnetize the heads before running the standard tape with AMPEX head demagnetizer B-704.

(b) Record your own secondary standard tape and occasionally use the original to recalibrate it.

2. Test Equipment required:

(a) Audio oscillator with a range of at least 100 cycles to 100,000 cycles.
Example: Hewlett-Packard 200C.
(b) An AC Vacuum Tube Voltmeter accurate to 350,000 cycles.
Example: Hewlett-Packard 400C.
(c) Headphones.

WARNING.

The input tube in the playback amplifier is D.C. heated by returning the B supply through its heater. Fuse F2601 protects the input tube against abnormal heater surges. The Neon indicator A2601 will light in the event of failure of the playback input tube heater or the 1/4 ampere protective fuse F2601. SHOULD THIS HAPPEN, THE CAN OF THE FILTER CONDENSER (C2608) WILL BE AT A HIGH POTENTIAL WITH RESPECT TO GROUND AND FOR THIS REASON IS PAPER COVERED. C2608 SHOULD THEREFORE BE REPLACED ONLY WITH CONDENSERS HAVING AN INSULATED COVER. F2601 and A2601 are located on top of the electronics chassis. DO NOT REMOVE INPUT TUBE WITH POWER ON, as damage to C2609 may result, DO NOT REPLACE F2601 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 PLUGS.

There are two dummy plugs which must be inserted into the appropriate sockets in the electronic assembly for correct operation of the Recorder. One is a catalog No. 567 which is a Jones plug with pins 1 and 2 jumpered and pins 7 and 8 jumpered. The other is a No. 2254, an AN type connector with terminals A and B jumpered.

1. The No. 567 must be plugged into receptacle J2605S labeled "Remote Power" located on the top rear of the electronic chassis. It is removed when it is desired to supply power for a Meter Control Panel or a Mixer Preamplifier.

2. The No. 2254 plug must be inserted into receptacle J2702 labeled "Metering Plug" located on the top right of the electronics chassis. When the meter control panel is used the metering cable is plugged into this receptacle.

A. 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 single standard tape or secondary standard for aligning the heads of all machines. Head alignment is independent of tape speed; however, it is recommended that the heads be aligned at 30 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 requires no adjustment and should not be touched.

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 30 inches per second and adjusting the stop nut for the maximum output of the 40 KC tone (first tone that appears on the standard tape).

The record head azimuth is then aligned with the playback head by recording a 40,000 cycle signal from an audio oscillator on a blank tape and adjusting the record stop nut for maximum playback output.

Once the heads are aligned at 30 inches per second, speed may be changed to 15 inches per second or to 60 inches per second without affecting the alignment.

PARTS LIST - AMPEX TYPE 1882 TAPE TRANSPORT

REFERENCE NUMBER	DESCRIPTION	AMPEX CATALOG NUMBER 1/4-inch Tape Transport	1/2-inch Tape Transport	1-inch Tape Transport
A801	6-8 V. Panel Lamp - Bayonet Base	LA-5	LA-5	LA-5
A802	120 V. 6 Watt Lamp - Candelabra Screw	LA-6	LA-6	LA-6
A2001	120 V. 6 Watt Lamp - Candelabra Screw	LA-6	LA-6	LA-6
C501	When re-ordering motor capacitors,			
C601	include motor manufacturer's			
C701	name and motor number.			
C801	.1 MFD 600 V. Tubular Condenser	CO-33	CO-33	CO-33
C802	.1 MFD 600 V. Tubular Condenser	CO-33	CO-33	CO-33
C803	.1 MFD 600 V. Tubular Condenser	CO-33	CO-33	CO-33
C804	.1 MFD 600 V. Tubular Condenser	CO-33	CO-33	CO-33
C805	80 MFD 150 V. Electrolytic Condenser	CO-105	CO-105	CO-105
C806	80 MFD 150 V. Electrolytic Condenser	CO-105	CO-105	CO-105
C807	.1 MFD 600 V. Tubular Condenser	CO-33	CO-33	CO-33
C808	.1 MFD 600 V. Tubular Condenser	CO-33	CO-33	CO-33
C809	.1 MFD 600 V. Tubular Condenser	CO-33	CO-33	CO-33
F801	5 Amp. 250 V. Fuse	FU-5	FU-6	FU-6
F802	5 Amp. 250 V. Fuse	FU-5	FU-6	FU-6
F803	2 Amp. 250 V. Fuse	FU-2	FU-5	FU-5
J601P	Connector	PL-103P	PL-103P	PL-103P
J701P	Connector	PL-103P	PL-103P	PL-103P
J801P	Chassis Connector	PL-27P	PL-298P	PL-298P
J802S	Chassis Connector	PL-68S	PL-68S	PL-68S
J804S	Chassis Connector	PL-54S	PL-54S	PL-54S
J805S	Chassis Connector	PL-54S	PL-54S	PL-54S
J806S	Chassis Connector - Utility Outlet	PL-141S	PL-141S	PL-141S
J807S	Connector	PL-262S	PL-262S	PL-262S
J808S	Connector	PL-262S	PL-262S	PL-262S
K801	3 Pole Double Throw DC Relay	RL-26	RL-26	RL-26
K802	3 Pole Double Throw DC Relay	RL-26	RL-26	RL-26
K803	3 Pole Double Throw DC Relay	RL-26	RL-26	RL-26
R801	150 OHM 50 Watt Adjustable Resistor	RE-259	RE-259	RE-259
R802	500 OHM 50 Watt Adjustable Resistor	RE-221	RE-221	RE-221
R803	150 OHM 50 Watt Adjustable Resistor	RE-259	RE-259	RE-259
R804	10 OHM 5 Watt W.W. Resistor	RE-264	RE-264	RE-264
S501	Micro Switch	SW-2	SW-2	SW-2
S502	Dual DPDT Toggle Switch	SW-51	SW-51	SW-51
S503	Dual DPDT Toggle Switch	SW-51	SW-51	SW-51
S801	DPST Toggle Switch	SW-4	SW-4	SW-4

REFERENCE NUMBER	DESCRIPTION	AMPEX CATALOG NUMBER 1/4-inch Tape Transport	1/2-inch Tape Transport	1-inch Tape Transport
S802	6 Pole 3 Position Shorting Switch	SW-18	SW-18	SW-18
S803	Single Pole Pushbutton N.C. (Stop)	SW-35	SW-35	SW-35
S804	Single Pole Pushbutton N.O. (Record)	SW-34	SW-34	SW-34
S805	Double Pole Pushbutton N.O. (Start)	SW-12	SW-12	SW-12
S806	SPDT Toggle Switch	SW-28	SW-28	SW-28
S2001	Single Pole Pushbutton N.O. (Record)	SW-34	SW-34	SW-34
S2002	Double Pole Pushbutton N.O. (Start)	SW-12	SW-12	SW-12
S2003	Single Pole Pushbutton N.C. (Stop)	SW-35	SW-35	SW-35
SR801	Selenium Rectifier	SR-4	SR-4	SR-4
	Drive Assembly (Complete)	2327	2327-1	2327-2
	Capstan Assembly	1512	1512	1512-1
	Capstan Dust Cap	2326	2326	2326
	Capstan Felt Washer - Dust Seal	494	494	494
	Capstan Tru-Arc Retainer	RR-5-1	RR-5-1	RR-5-1
	Capstan Idler Assembly	500	500-1	500-2
	Capstan Idler Arm	372	372	372
	Capstan Idler Arm Bearing Housing	374	374	374
	Drive Motor Assembly-Complete with motor and pulley	1075	1075	1075
	Drive Motor Return Spring (Console & Portable)	1024	1024	1024
	Drive Motor Return Spring (Rack Mount only)	390	390	390
	Drive Motor Shield	1905	1905	1905
	Drive Solenoid - DC	670	670	670
	Felt Washer	PW-6-1/4 - 416-816		
	Drive Motor Pressure Adjusting Spring	389	389	389
	Capstan Solenoid	670	670	670
	Felt Washer	PW-6-1/8 - 416-816		
	Capstan Idler Return Spring	400	400	400
	Capstan Idler Adjusting Spring	676	676	676
	Tape Speed Switch Assembly (Including S501, S502, and S503)	364	364	364
	Takeup Assembly Complete	5704	5704-1	5704-1
	Takeup Motor Assembly-Complete with motor, flange, brakedrum and turntable.	6768	6768	6768
	Brake Housing	317	317	317
	Brake Band Assembly	328	2698	2698

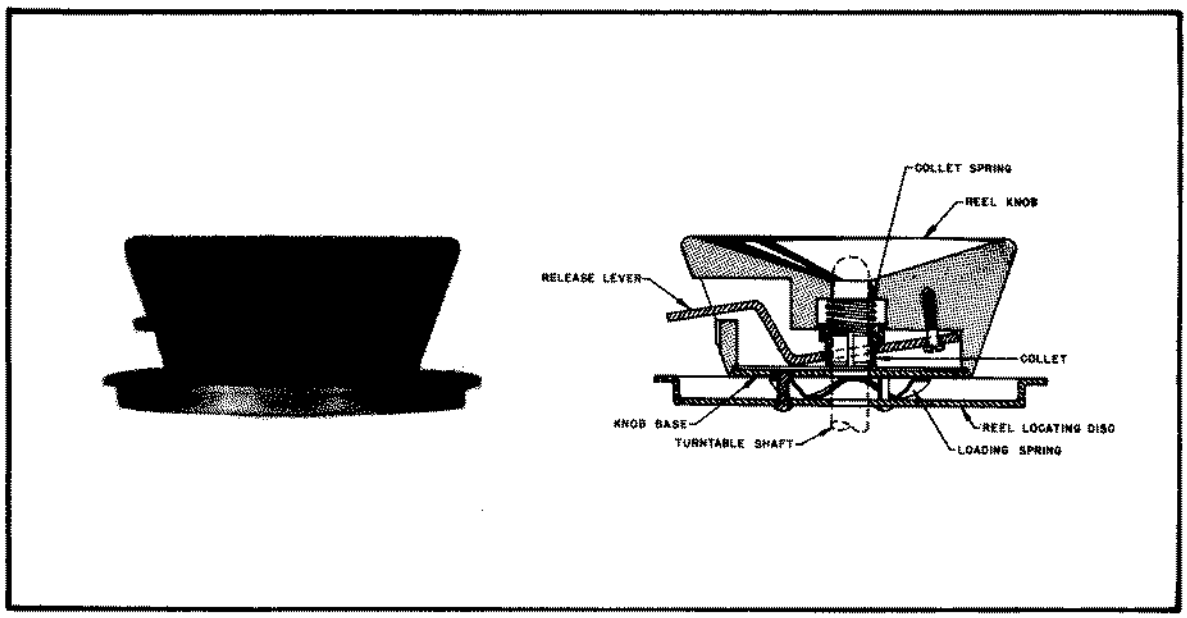
NOTE: ORDER PARTS BY AMPEX CATALOG NUMBER ONLY.

REFERENCE NUMBER	DESCRIPTION	AMPEX CATALOG NUMBER 1/4-inch Tape Transport	1/2-inch Tape Transport	1-inch Tape Transport
Brake Band Leaf		720-1&2	720-1&2	720-1&2
Brake Solenoid		337	337	337
Brake Adjusting Spring		322	322	322
Turntable Pad		958	958	958
Rewind Assembly Complete		5705	5705-1	5705-1
Rewind Motor Assembly-Complete with motor, flange, brake and turntable.		6768	6768	6768
Brake Housing		316	316	316
Brake Band Assembly		328	2698	2698
Brake Band Leaf		720-1&2	720-1&2	720-1&2
Brake Solenoid		337	337	337
Brake Adjusting Spring		322	322	322
Turntable Pad		958	958	958
Takeup Tension Arm Assembly		425	425-1	425-2
Tape Guide		675	675-1	1744
Tape Guide Hook		355	355	355
Takeup Tension Spring		422	422	422-1
Reel Idler Assembly		1123	1123-1	1123-2
Tape Guide		257	257-1	1747
Reel		539		
Reel Knob - Hold Down		9093	9093	5881
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	567	567
Record Pushbutton Guard		463	463	463
Start and Stop Pushbutton Guards		361	361	361
Speed Change Knob		KN-10	KN-10	KN-10
Mode Selector Lever Knob		KN-2	KN-2	KN-2
Fuse Holder		FE-1	FE-1	FE-1
Pilot Lamp Base - Amber		DL-6	DL-6	DL-6
Pilot Lamp Base - Red		DL-7	DL-7	DL-7
Cable Assembly - Record		2315		

DESCRIPTION	AMPEX CATALOG NUMBER 1/4-inch Tape Transport	1/2-inch Tape Transport	1-inch Tape Transport
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	575	575
Capstan Bushing Extractor Tool	TA-1514	TA-1514	TA-1514
3/16" Hex Key	TO-1	TO-1	TO-1
5/32" Hex Key	TO-2	TO-2	TO-2

#9093 REEL HOLD DOWN KNOB

All rack mounted Recorders require Hold Down Knobs on the turntable shafts to keep the reels from slipping off. For this purpose the #9093 Reel Hold Down Knob is supplied with rack mounted machines. This knob replaces the #4402 Knob.



The #9093 Knob has a simple, positive action. It is slipped on the turntable shaft with the concave side facing outward, and is pressed down firmly so that the reel locating disc is engaged in the center of the reel. A spring loaded collet within the knob engages the turntable shaft. The Knob is self-centering, as the knob base is mechanically coupled to the reel locating disc through a loading spring.

The Hold Down Knob must be taken off the shaft in order for the reels to be removed. To release the Knob, press the lever forward. This action releases the collet, and the Knob can then be pulled off the shaft. The reel should be held in position as the Knob is being removed, so that it will not slip off.

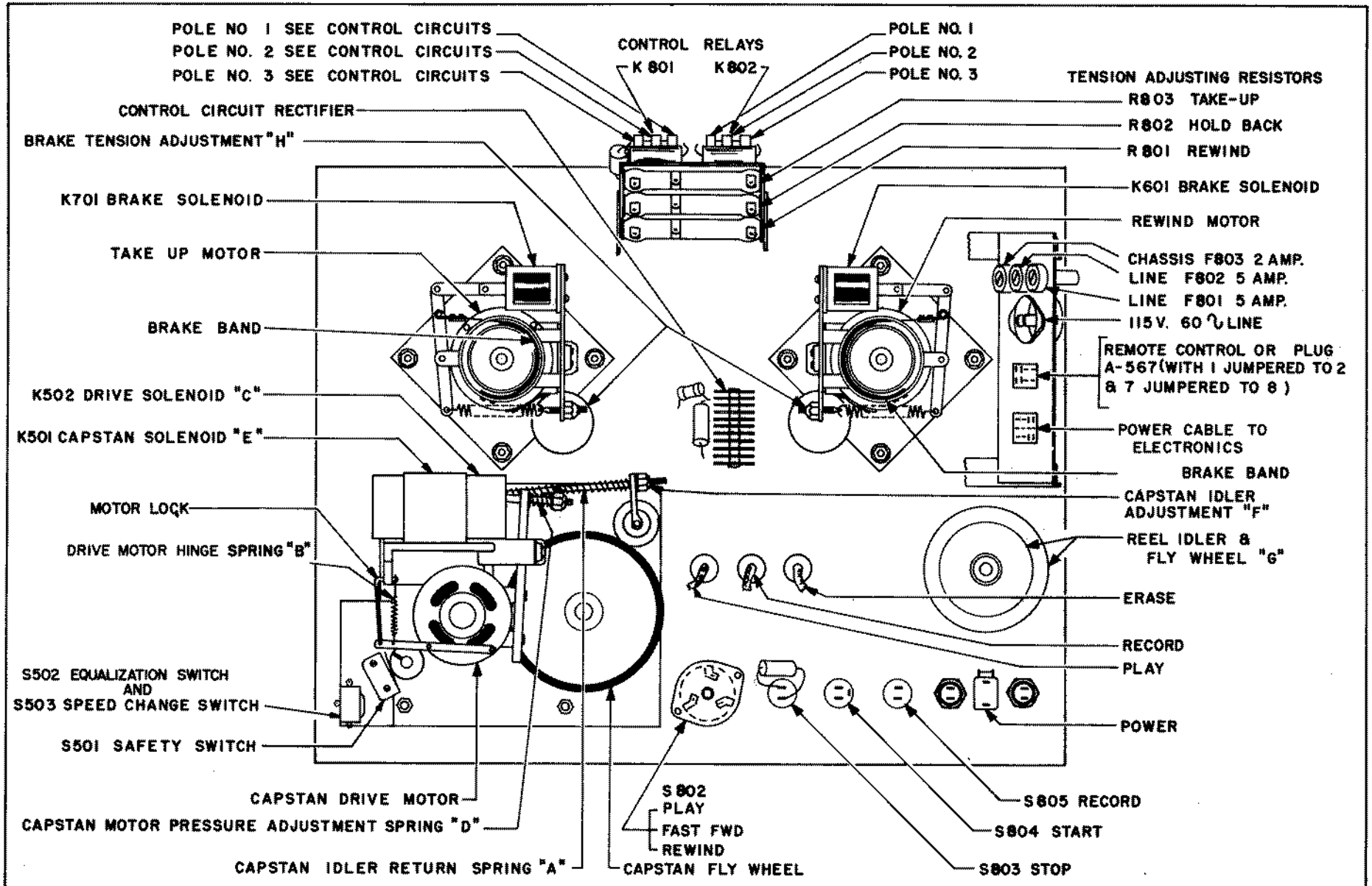
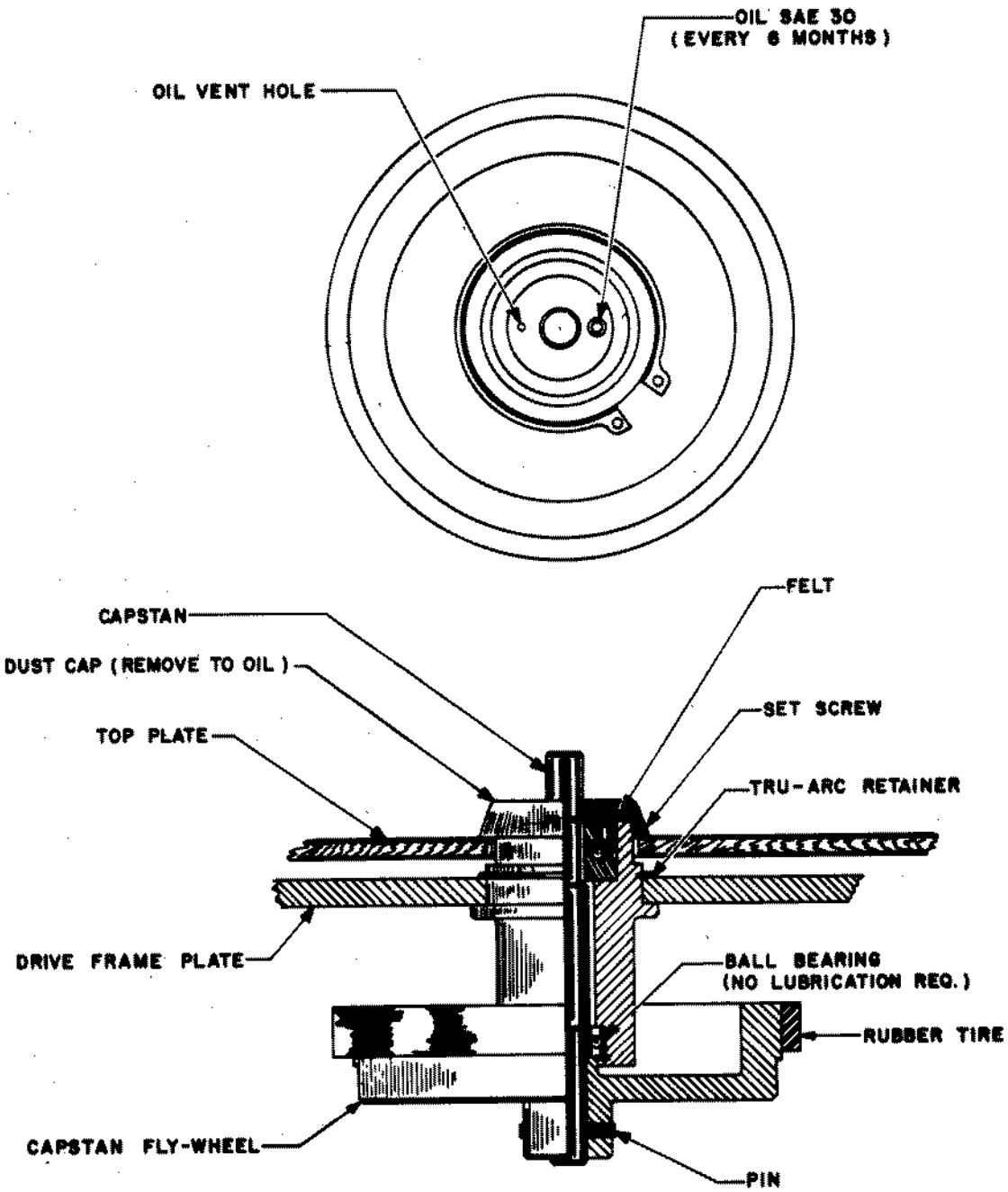


FIG. 1

TOP PLATE ASSEMBLY (BOTTOM VIEW)
MODEL 300
AMPEX ELECTRIC CORPORATION
REDWOOD CITY, CALIFORNIA

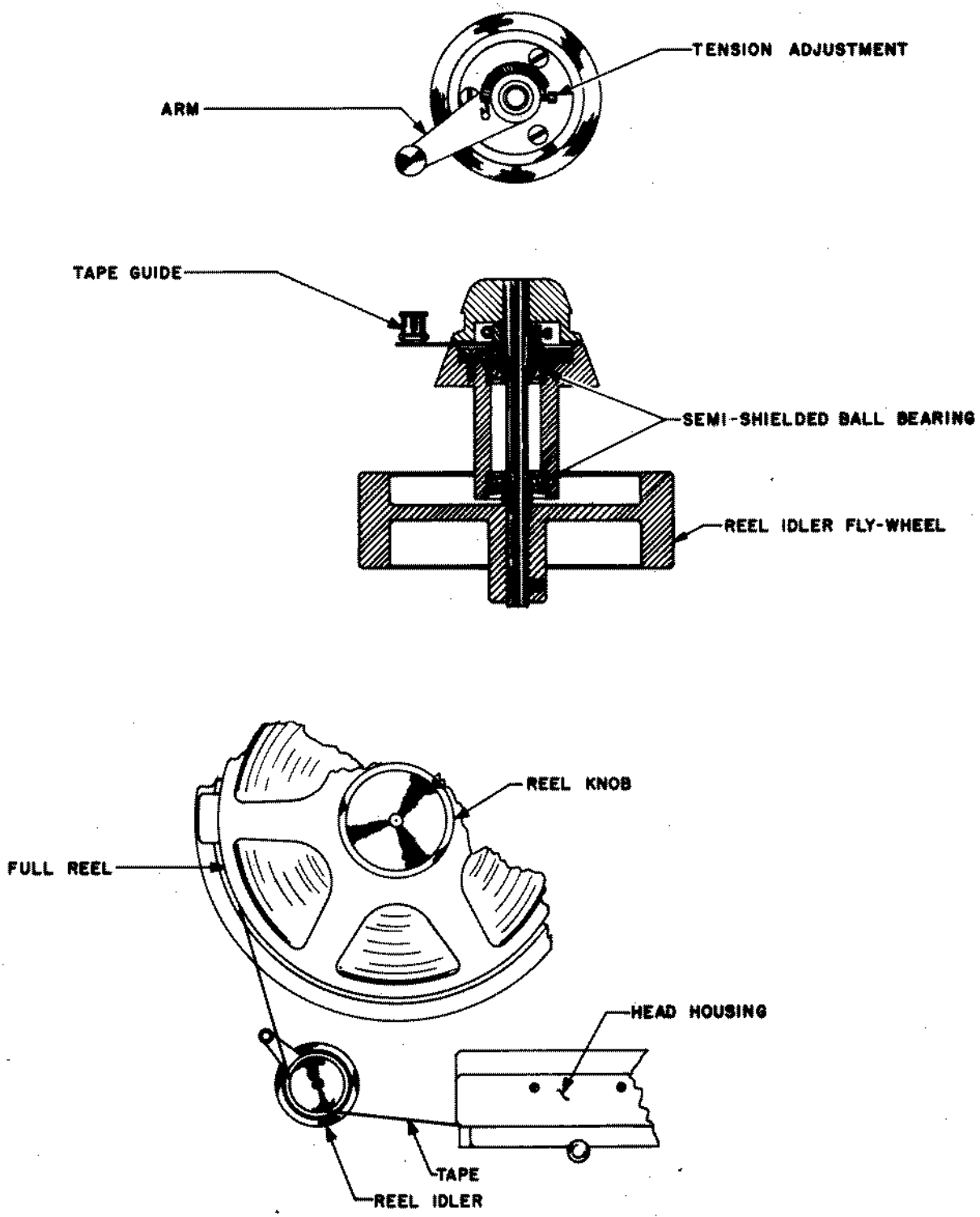
9-25-58



CAPSTAN ASSEMBLY
SERIES 300
AMPEX ELECTRIC CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 2

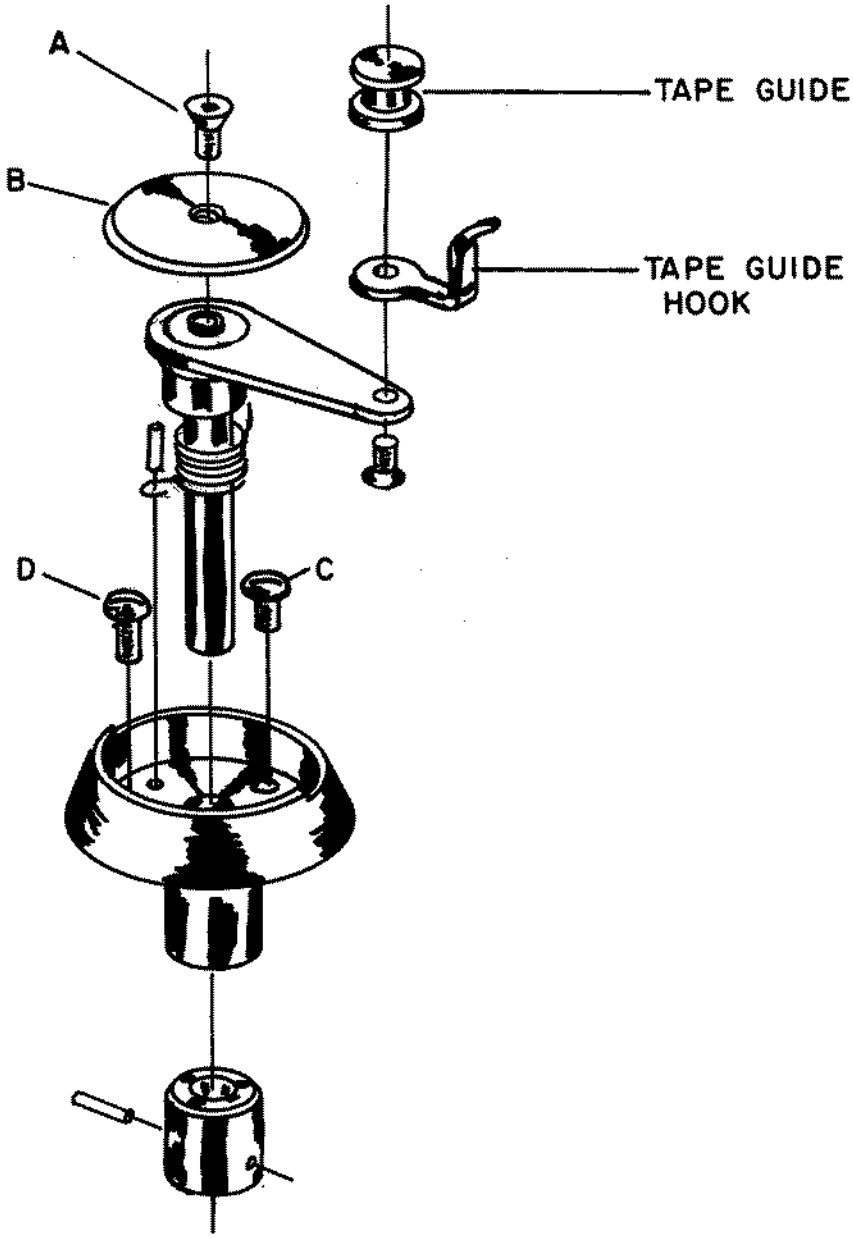
9-15-62



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

FIG. 3

8-18-52



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

B-5501 8-15-52

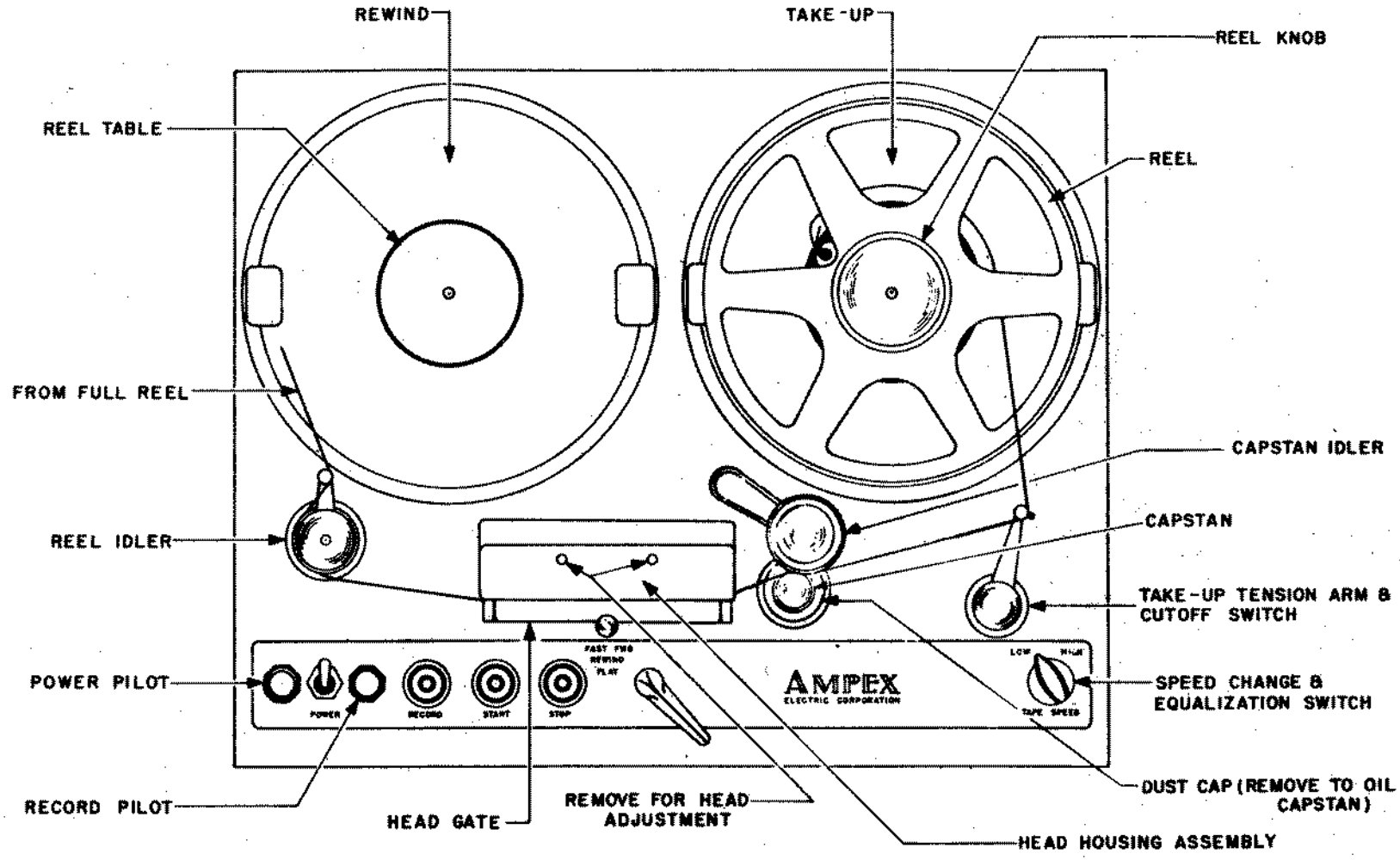


FIG 5

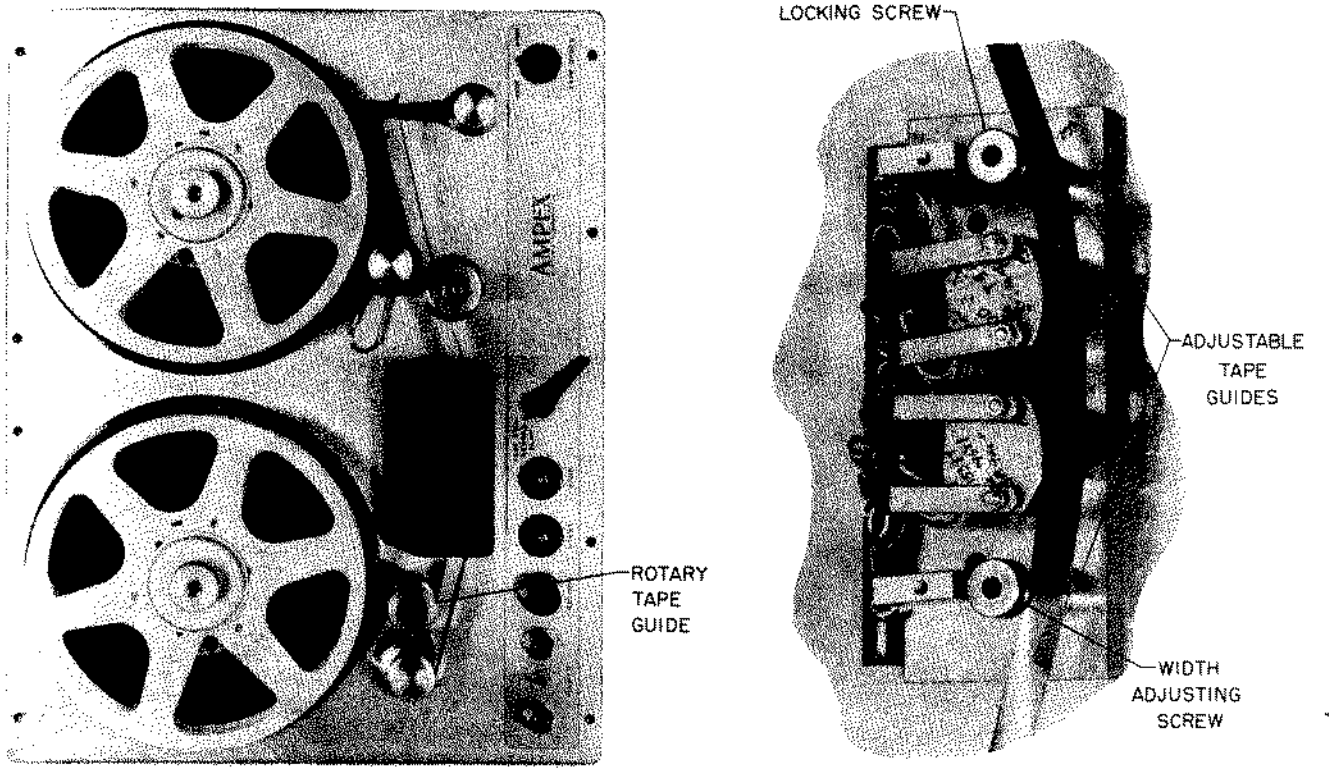
4-15-52

TOP PLATE ASSEMBLY (TOP VIEW)

SERIES 300

AMPEX ELECTRIC CORPORATION

REDWOOD CITY, CALIFORNIA



TAPE THREADING INSTRUCTIONS FOR 300 SERIES TOP PLATES USING WIDE TAPE

In order to provide proper tracking of the tape on all Ampex 300 Series recorders using wide tape, an additional rotary tape guide has been installed on the top plate and adjustable tape guides have been incorporated on the head assemblies.

The tape should be threaded as shown above. The two adjustable tape guides have been set at the factory to a width .002 inch greater than the normal tape width, and should require no further adjustment. However, in the event of variation in the width of tape, due to temperature and humidity conditions, or Manufacturer's tolerances, it may be necessary to make a slight adjustment on the two tape guides to compensate for this variation. This is necessary to maintain proper tracking of the tape across the face of the head stacks. This adjustment may be made by loosening the locking screws and very carefully turning the width adjusting screws. The adjustment should be made with the tape properly threaded on the machine as shown above, and with the tape flat against the face of the head stacks and guides. The lower edge of the tape should just barely be in contact with the lower shoulders on both tape guides, and both adjusting screws should then be set to provide approximately .002 inch clearance at the top edge of the tape. After the adjusting screws have been properly set, they should be locked in place by tightening both locking screws.

It is extremely important that this adjustment be made very carefully. If insufficient width is allowed, it will cause the edges of the tape to curl, and if the width is too wide, it may permit the tape to wander. In either case, improper tracking of the tape across the head stacks would result.

FIGURE 5A

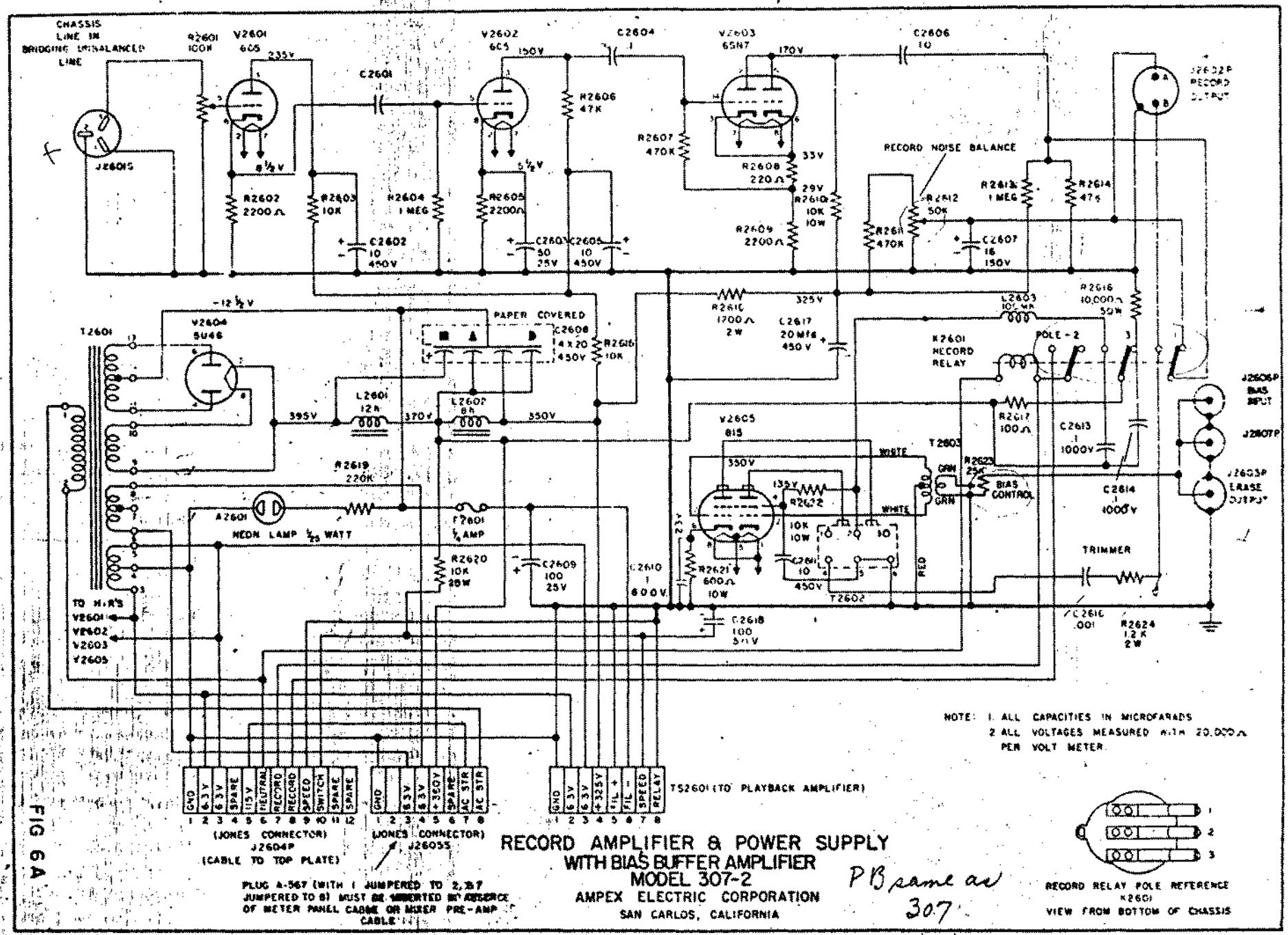


FIG 6A

RECORD AMPLIFIER & POWER SUPPLY
WITH BIAS BUFFER AMPLIFIER
MODEL 307-2
AMPEX ELECTRIC CORPORATION
SAN CARLOS, CALIFORNIA

PB same as 307.

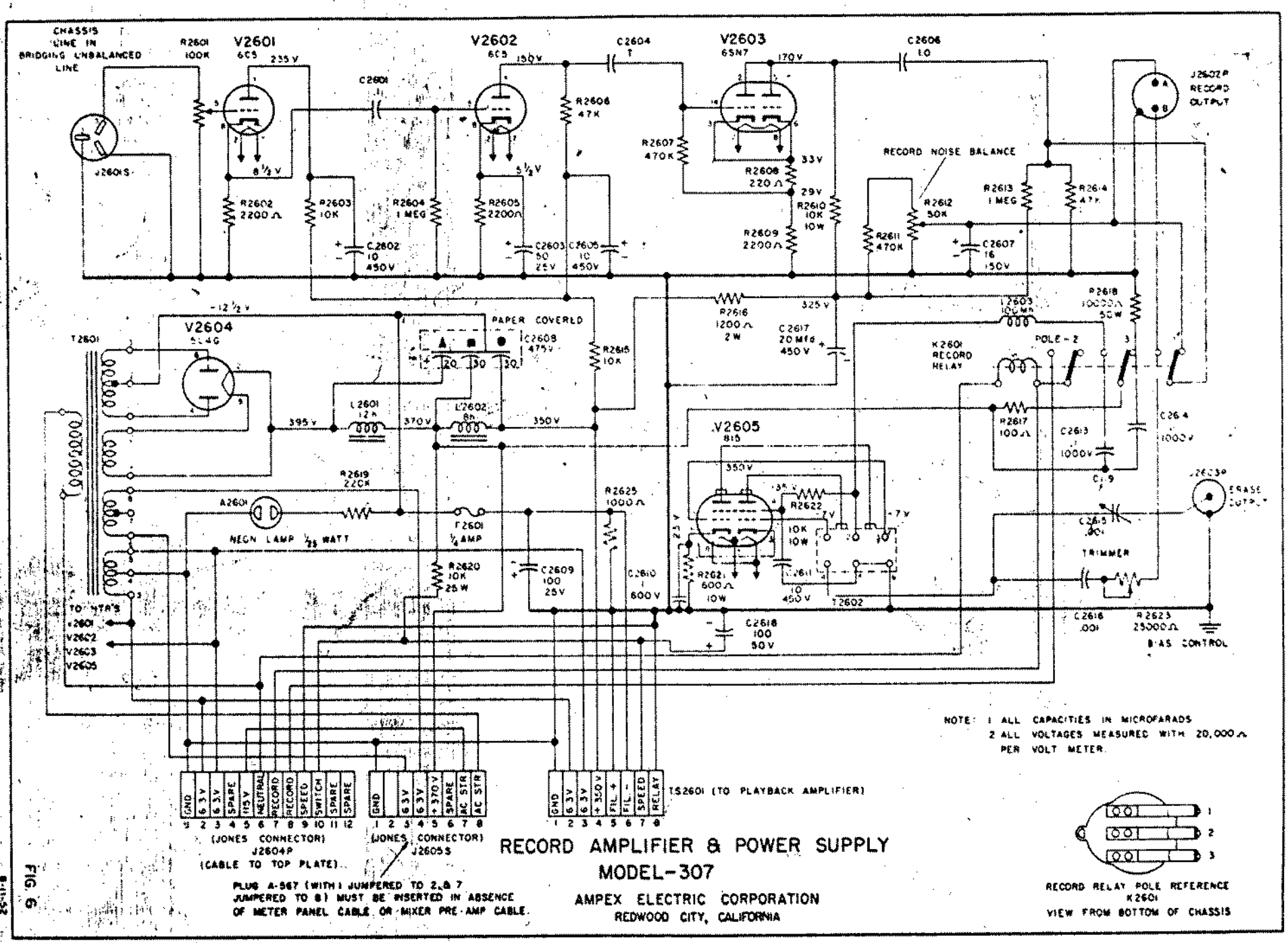


FIG 9

RECORD AMPLIFIER & POWER SUPPLY
MODEL-307

AMPEX ELECTRIC CORPORATION
REDWOOD CITY, CALIFORNIA

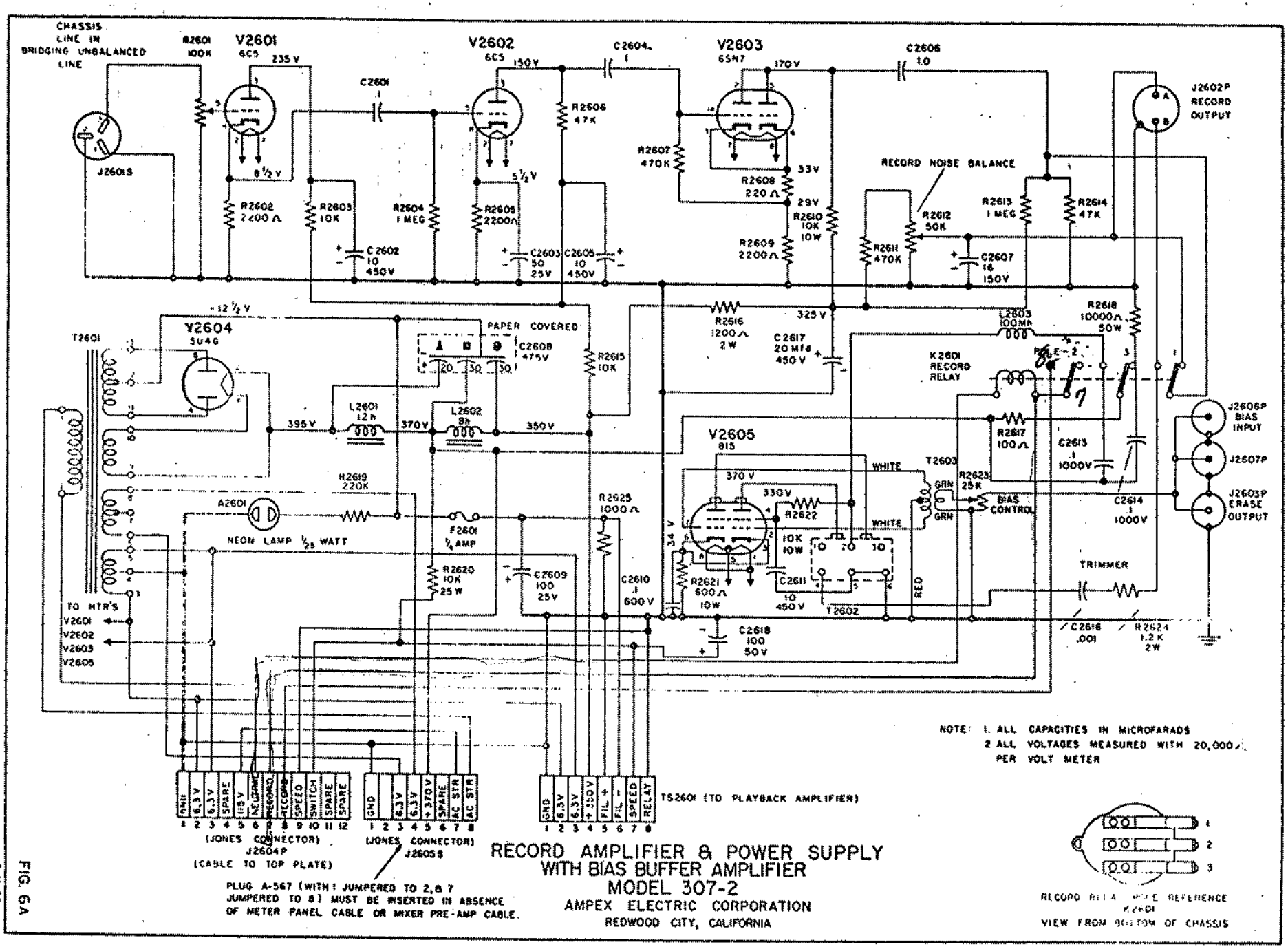


FIG. 6A

8-11-52

RECORD AMPLIFIER & POWER SUPPLY WITH BIAS BUFFER AMPLIFIER MODEL 307-2

AMPEX ELECTRIC CORPORATION

REDWOOD CITY, CALIFORNIA

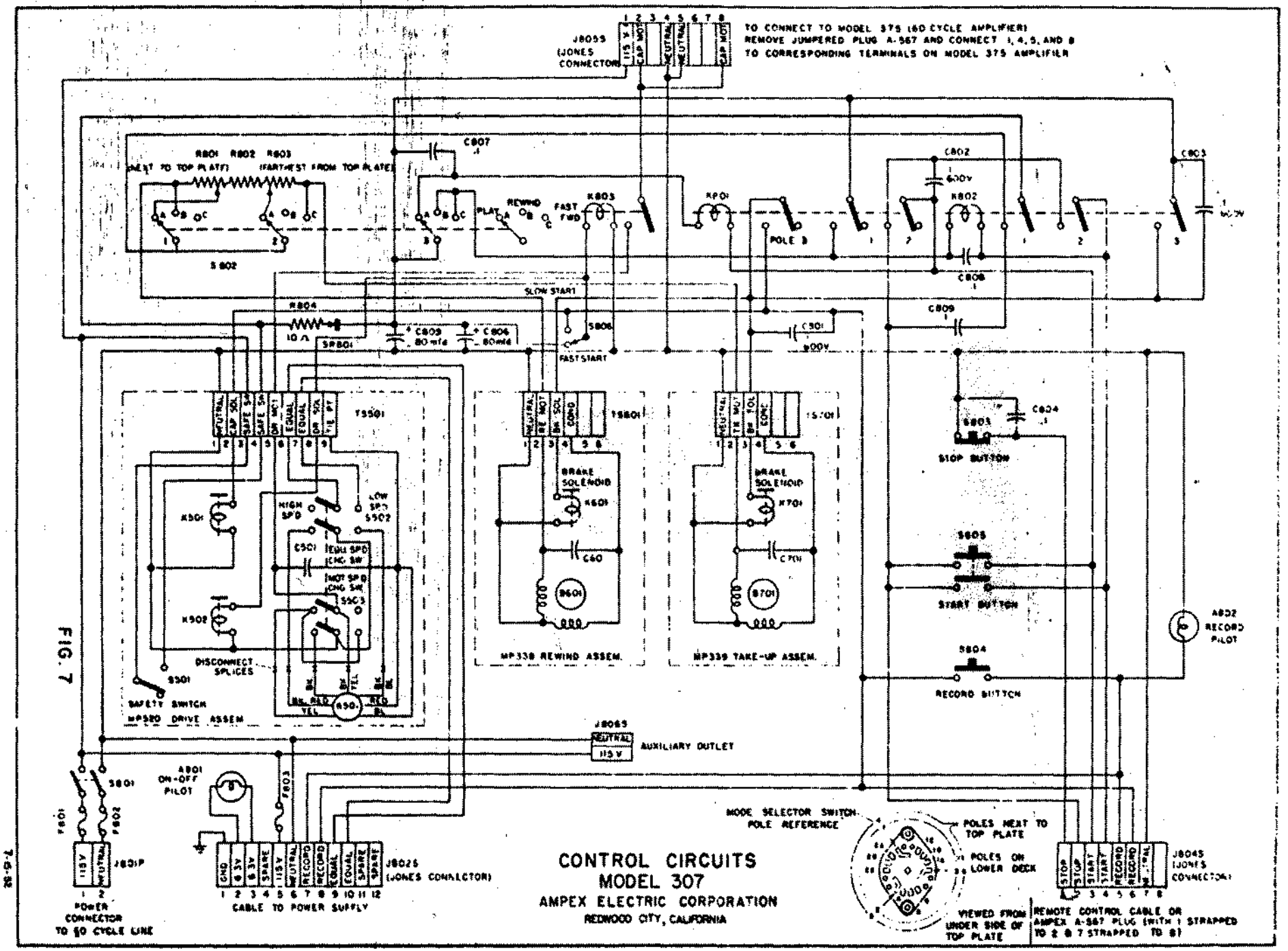
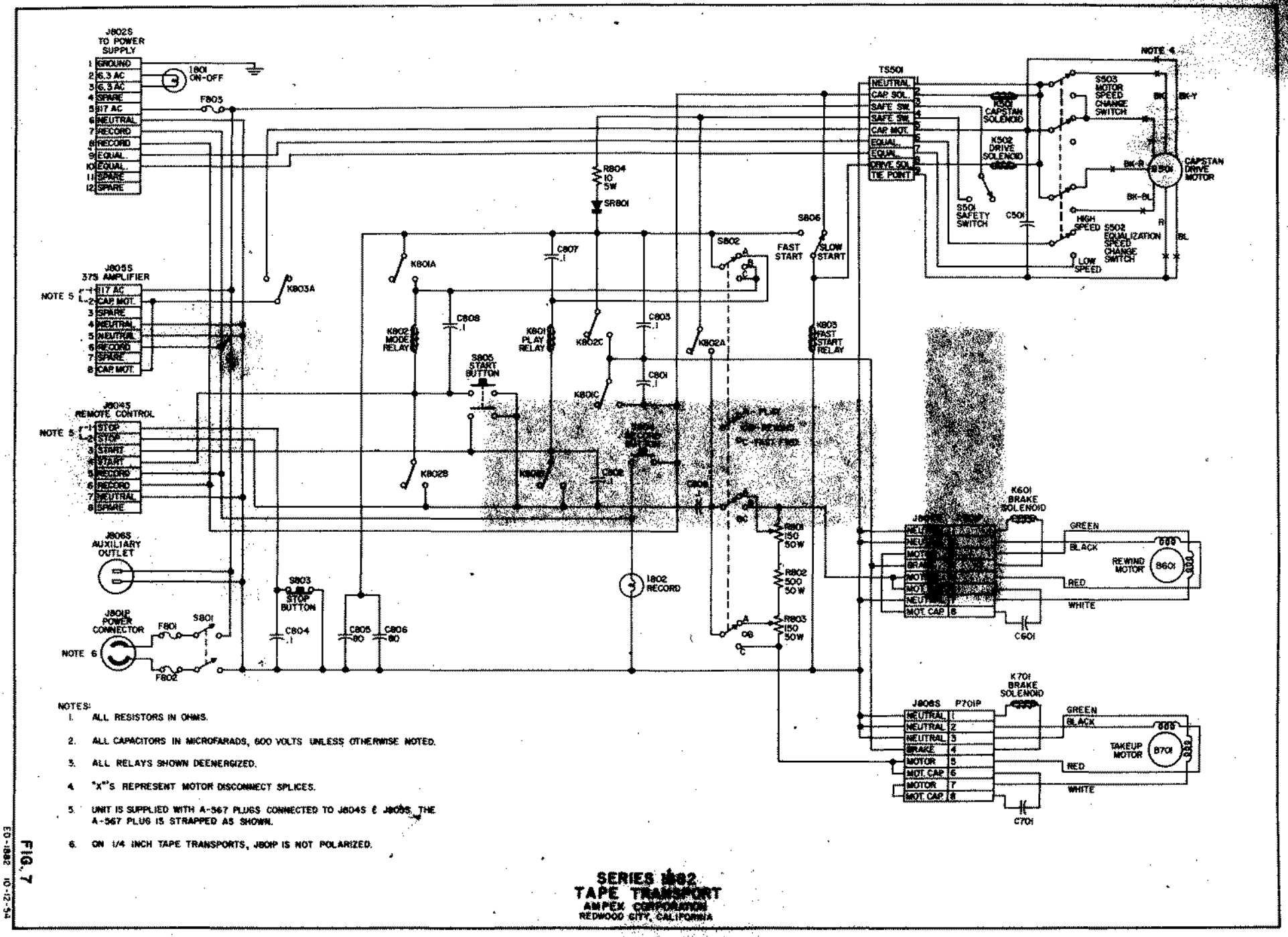

J8055 (JONES CONNECTOR)
TO CONNECT TO MODEL 375 (60 CYCLE AMPLIFIER) REMOVE JUMPERED PLUG A-567 AND CONNECT 1, 4, 5, AND 8 TO CORRESPONDING TERMINALS ON MODEL 375 AMPLIFIER
R801 R802 R803
(NEXT TO TOP PLATE)
(FARTHEST FROM TOP PLATE)
S 802
C807
REWIND
FAST FWD
K803
K901
POLE B
C802
600V
R802
C803
C808
SLOW START
R804
10 Ω
SR801
C809 80 mfd
C806 80 mfd
S806
FAST START
C801
600V
C809
C804
S803
STOP BUTTON
S805
START BUTTON
S804
RECORD BUTTON
A802 RECORD PILOT
T5501
T5801
T5701
K501
K502
HIGH SPD
LOW SPD S502
EQUI SPD (MC SW)
NOT SPD CNG SW
SSC3
DISCONNECT SPLICES
S501
SAFETY SWITCH
MP320 DRIVE ASSEM
BRAKE SOLENOID
K601
K701
C60
C701
B601
B701
MP338 REWIND ASSEM.
MP339 TAKE-UP ASSEM.
J8065
AUXILIARY OUTLET
A801 ON-OFF PILOT
S801
F801
F802
F803
J8031P
POWER CONNECTOR TO 60 CYCLE LINE
J8026 (JONES CONNECTOR)
CABLE TO POWER SUPPLY
MODE SELECTOR SWITCH POLE REFERENCE
POLES NEXT TO TOP PLATE
POLES ON LOWER DECK
VIEWED FROM UNDER SIDE OF TOP PLATE
J8045 (JONES CONNECTOR)
REMOTE CONTROL CABLE OR AMPEX A-587 PLUG (WITH 1 STRAPPED TO 2 & 7 STRAPPED TO 8)
CONTROL CIRCUITS
MODEL 307
AMPEX ELECTRIC CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 7



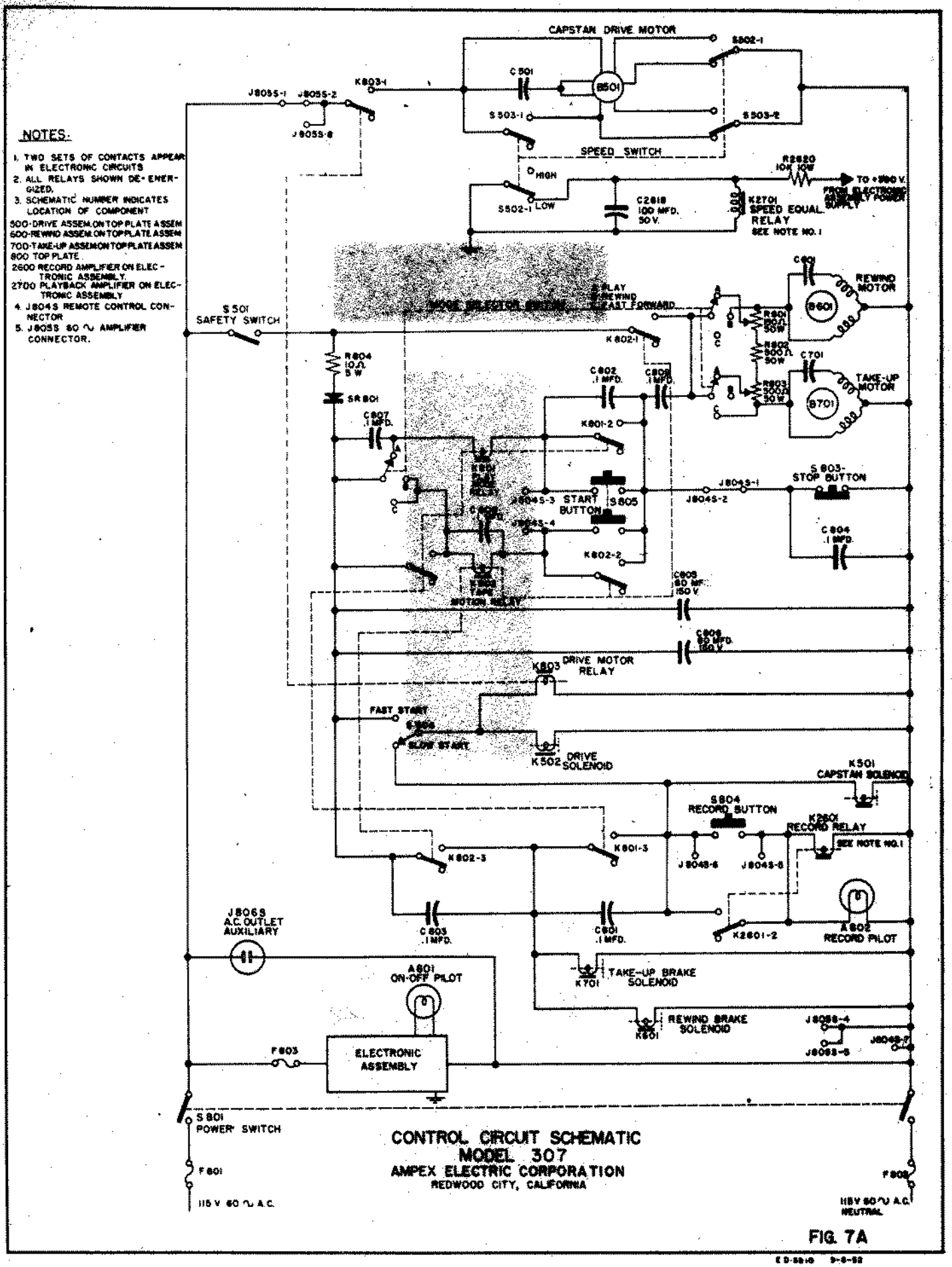
NOTES:

1. ALL RESISTORS IN OHMS.
2. ALL CAPACITORS IN MICROFARADS, 600 VOLTS UNLESS OTHERWISE NOTED.
3. ALL RELAYS SHOWN DEENERGIZED.
4. "X"'S REPRESENT MOTOR DISCONNECT SPLICES.
5. UNIT IS SUPPLIED WITH A-567 PLUGS CONNECTED TO J804S & J805S. THE A-567 PLUG IS STRAPPED AS SHOWN.
6. ON 1/4 INCH TAPE TRANSPORTS, J801P IS NOT POLARIZED.

FIG. 7

ED-1882 10-12-64

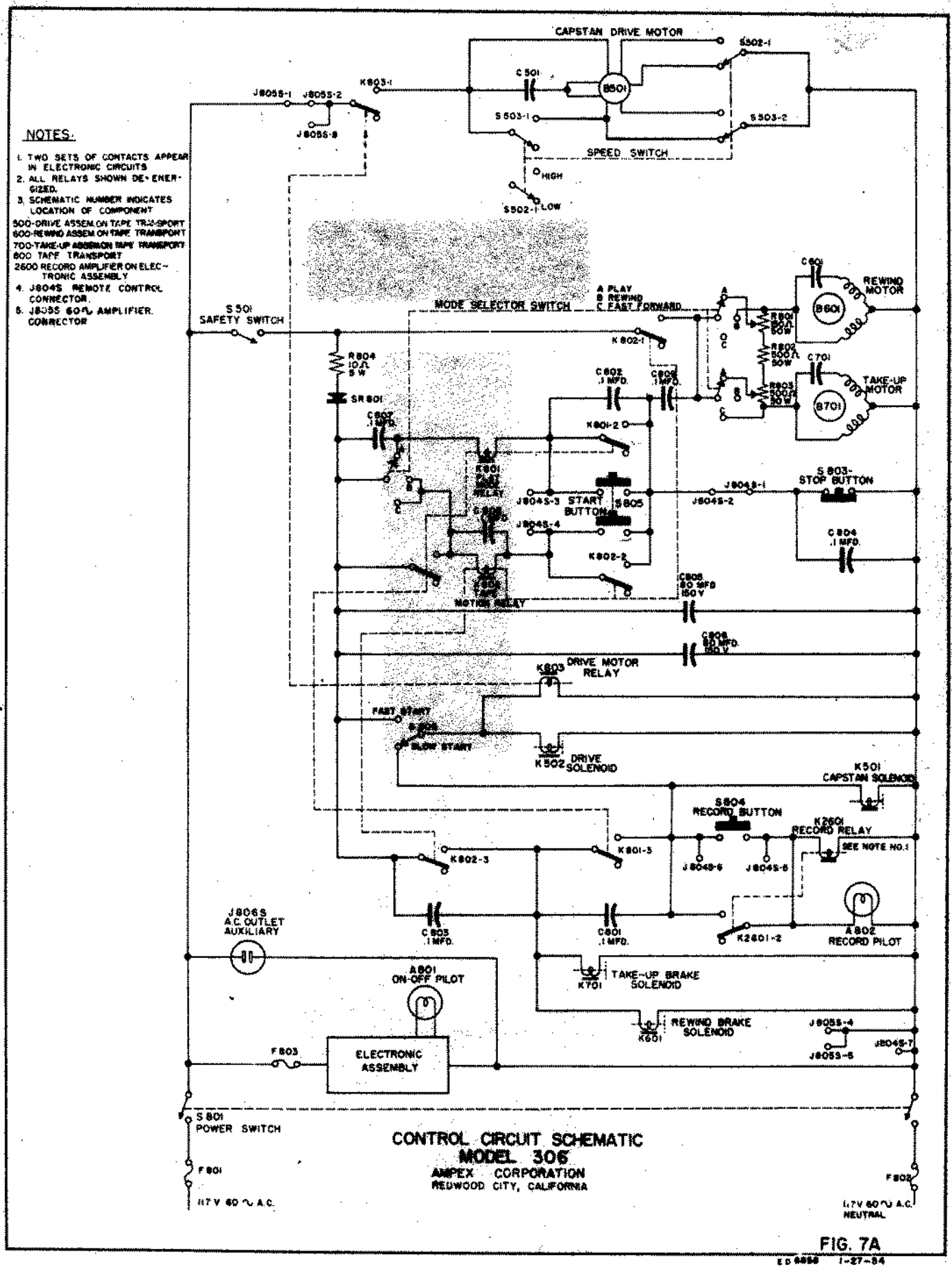
SERIES 1682
TAPE TRANSPORT
AMPEX CORPORATION
REDWOOD CITY, CALIFORNIA



CONTROL CIRCUIT SCHEMATIC
MODEL 307
AMPEX ELECTRIC CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 7A

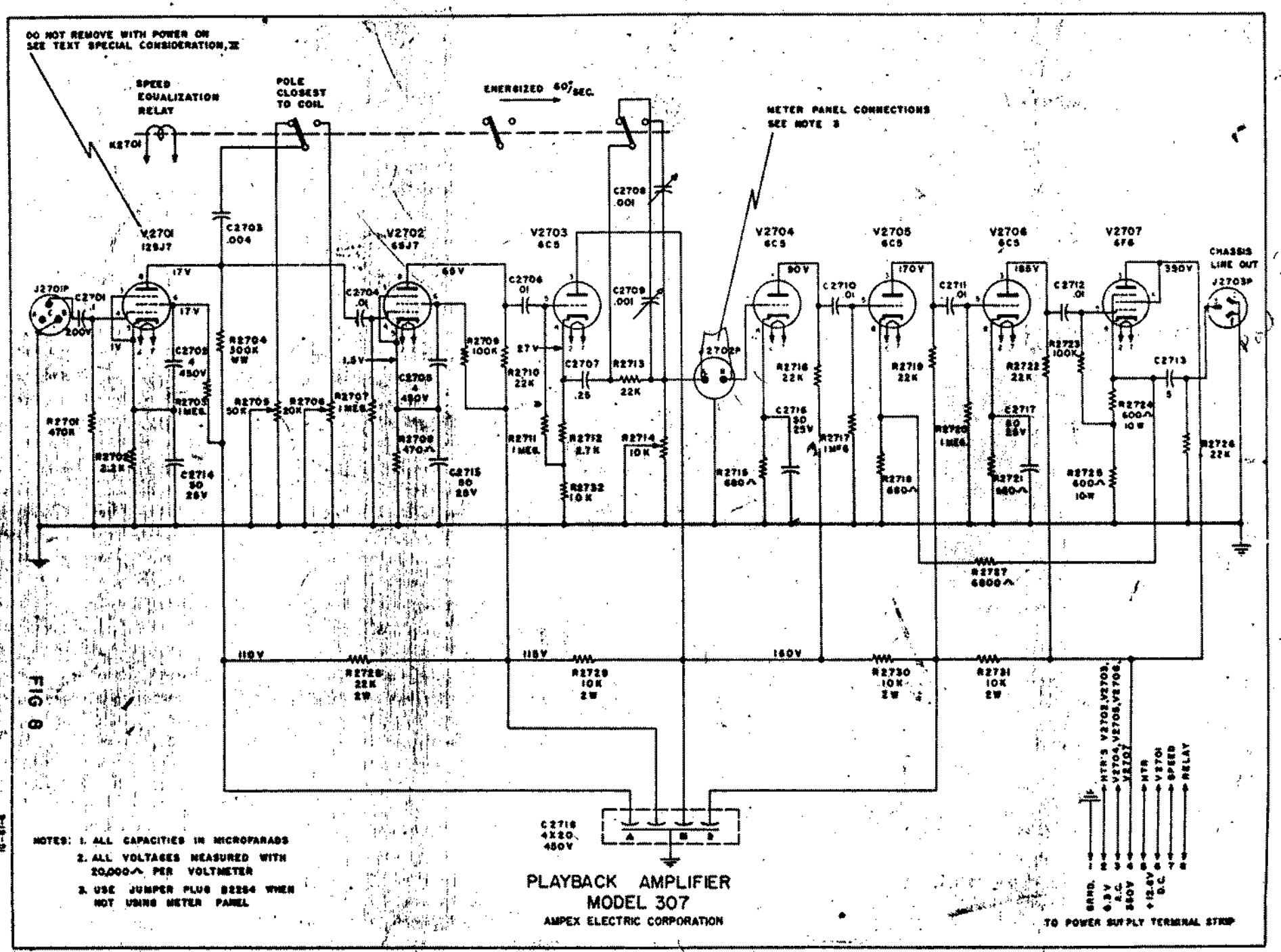
ED-5816 9-8-58



CONTROL CIRCUIT SCHEMATIC
MODEL 306
AMPEX CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 7A

ED 9858 1-27-64



NOTES: 1. ALL CAPACITIES IN MICROFARADS
2. ALL VOLTAGES MEASURED WITH 20,000Λ PER VOLTMETER
3. USE JUMPER PLUG 82284 WHEN NOT USING METER PANEL

FIG 8

PLAYBACK AMPLIFIER
MODEL 307
AMPEX ELECTRIC CORPORATION

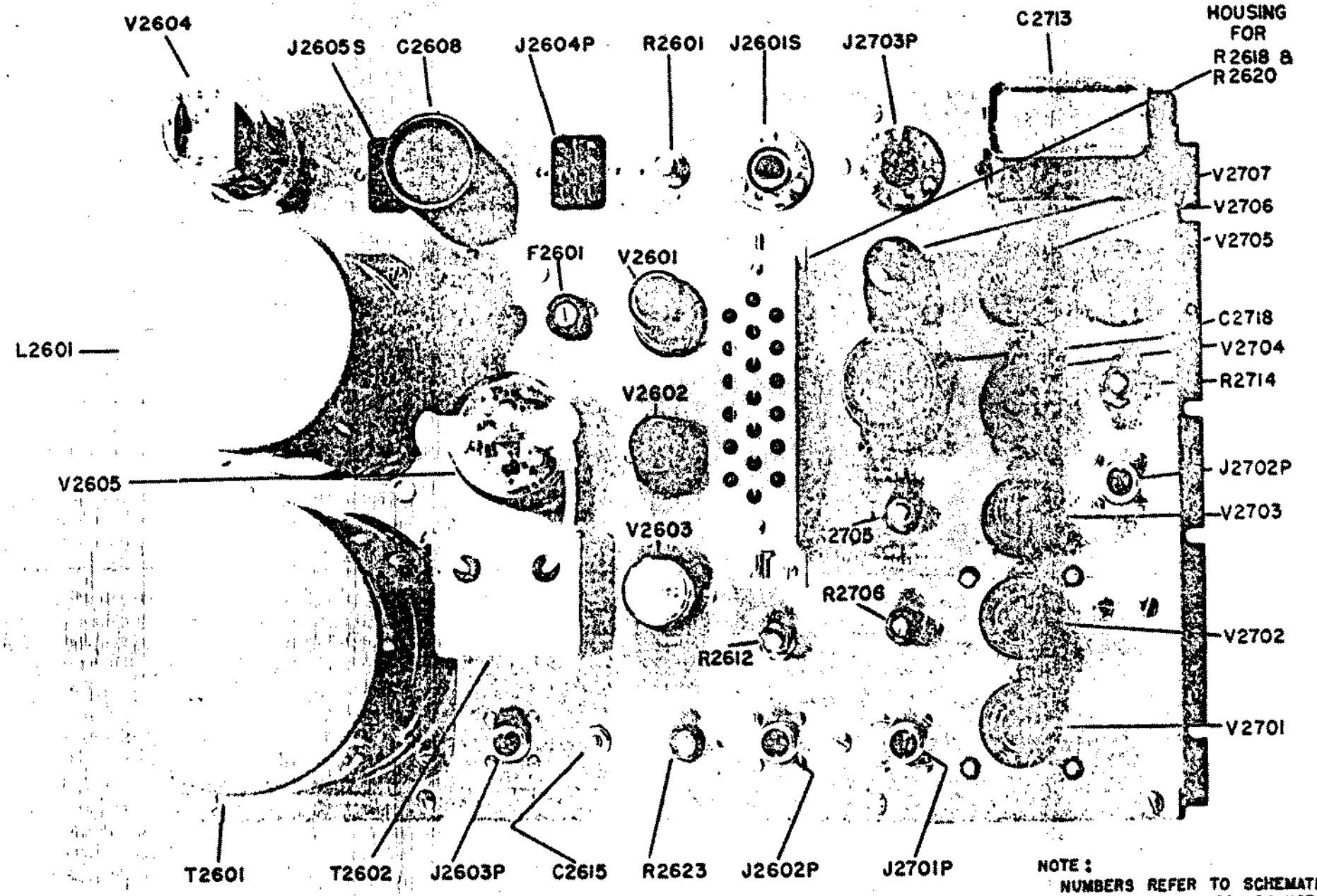


FIG. 9

ELECTRONIC CHASSIS - TOP VIEW
MODEL 307
AMPEX ELECTRIC CORPORATION

NOTE:
NUMBERS REFER TO SCHEMATIC REFERENCE NUMBERS. DO NOT FOR ORDERING. SEE PARTS LIC SECTION 6.

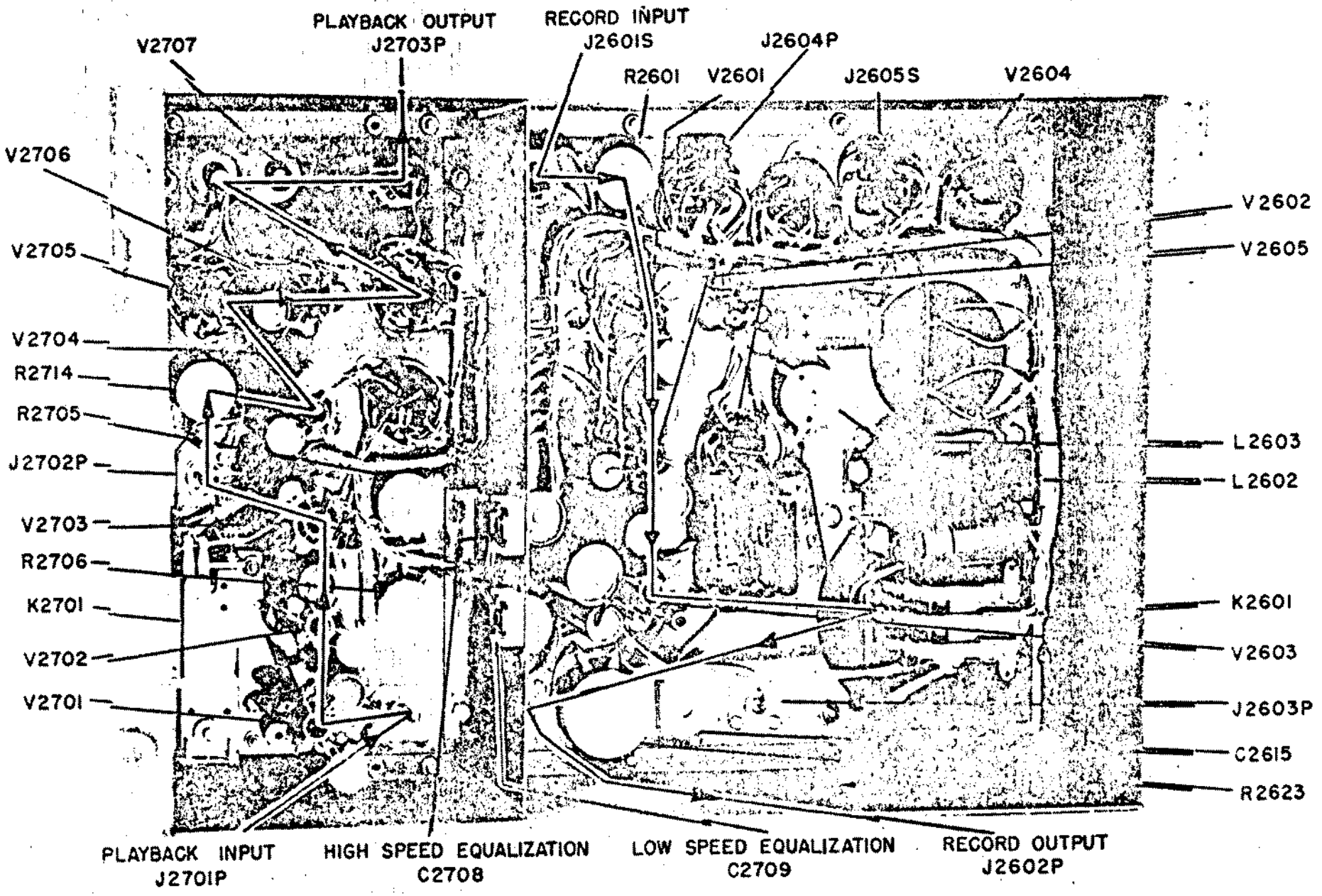
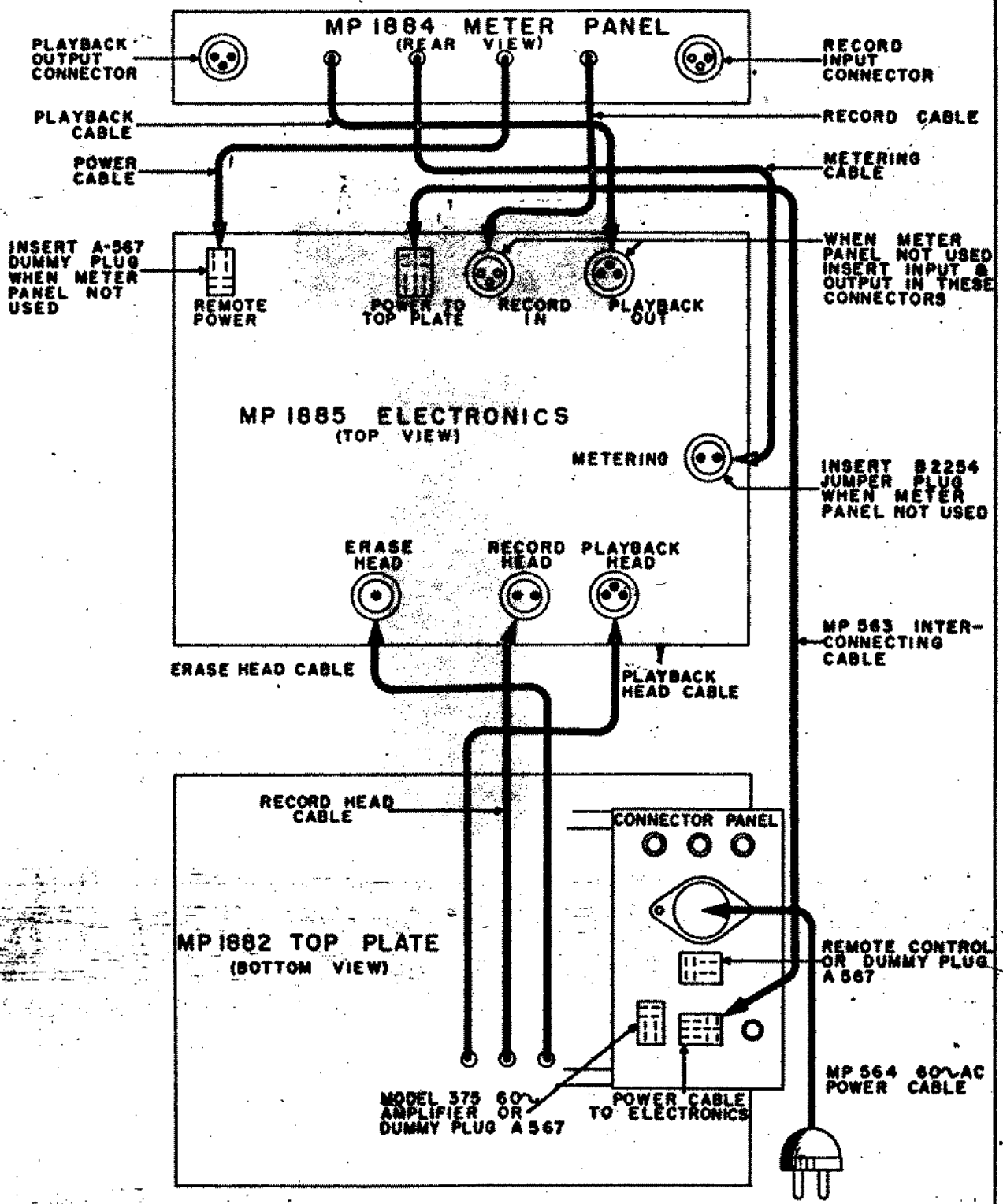


FIG. 11

ELECTRONICS CHASSIS - BOTTOM VIEW
MODEL 307
AMPEX ELECTRIC CORPORATION
REDWOOD CITY, CALIFORNIA

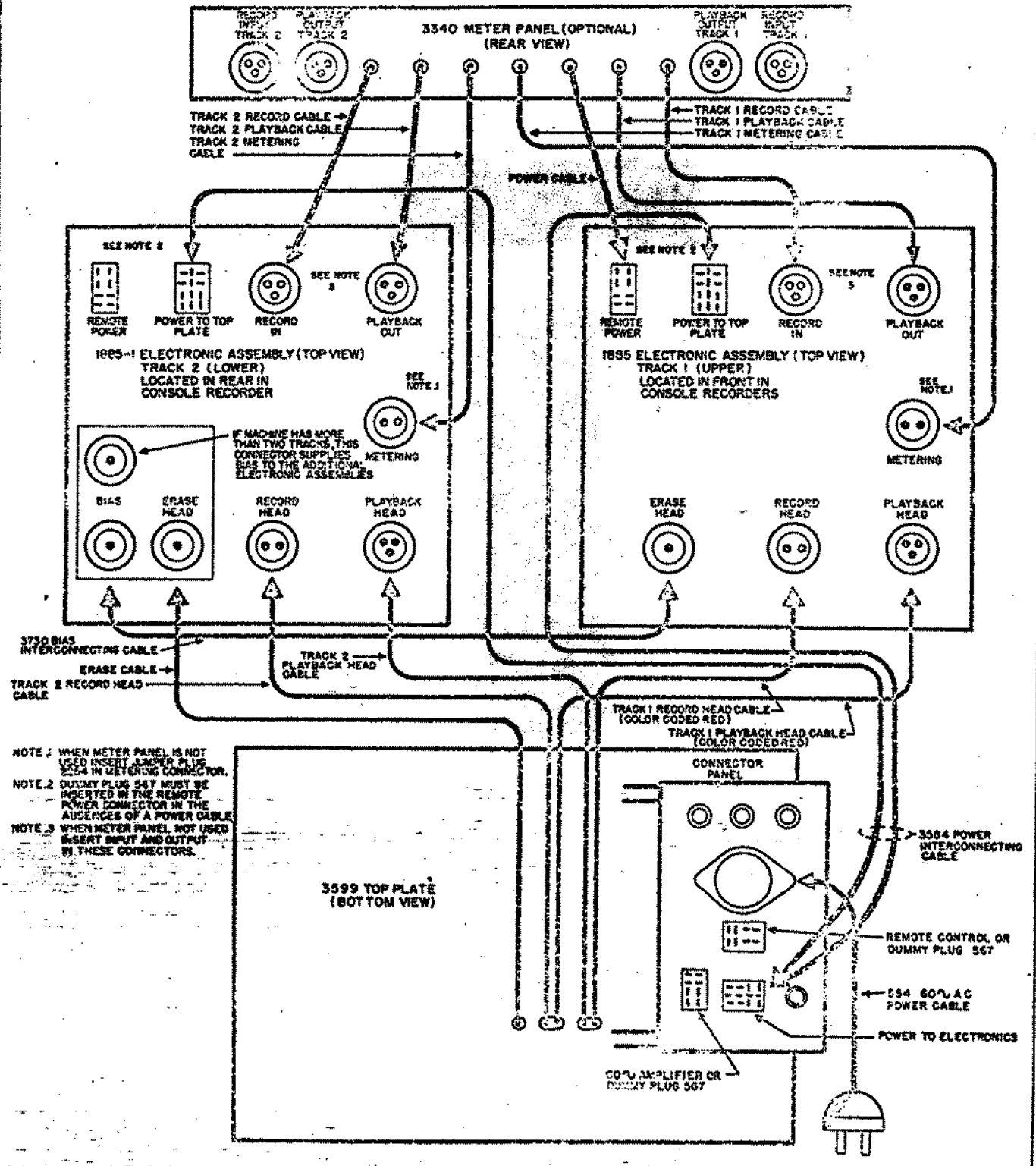
NOTE:
NUMBERS REFER TO SCHEMATIC REFERE
NUMBERS. DO NOT USE FOR ORDERIN



INTER UNIT CONNECTION DIAGRAM
MODEL 307

AMPEX ELECTRIC CORP.
REDWOOD CITY, CALIF.

FIG. 12



INTER UNIT CONNECTION DIAGRAM
MODEL 307-2
AMPEX ELECTRIC CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 12

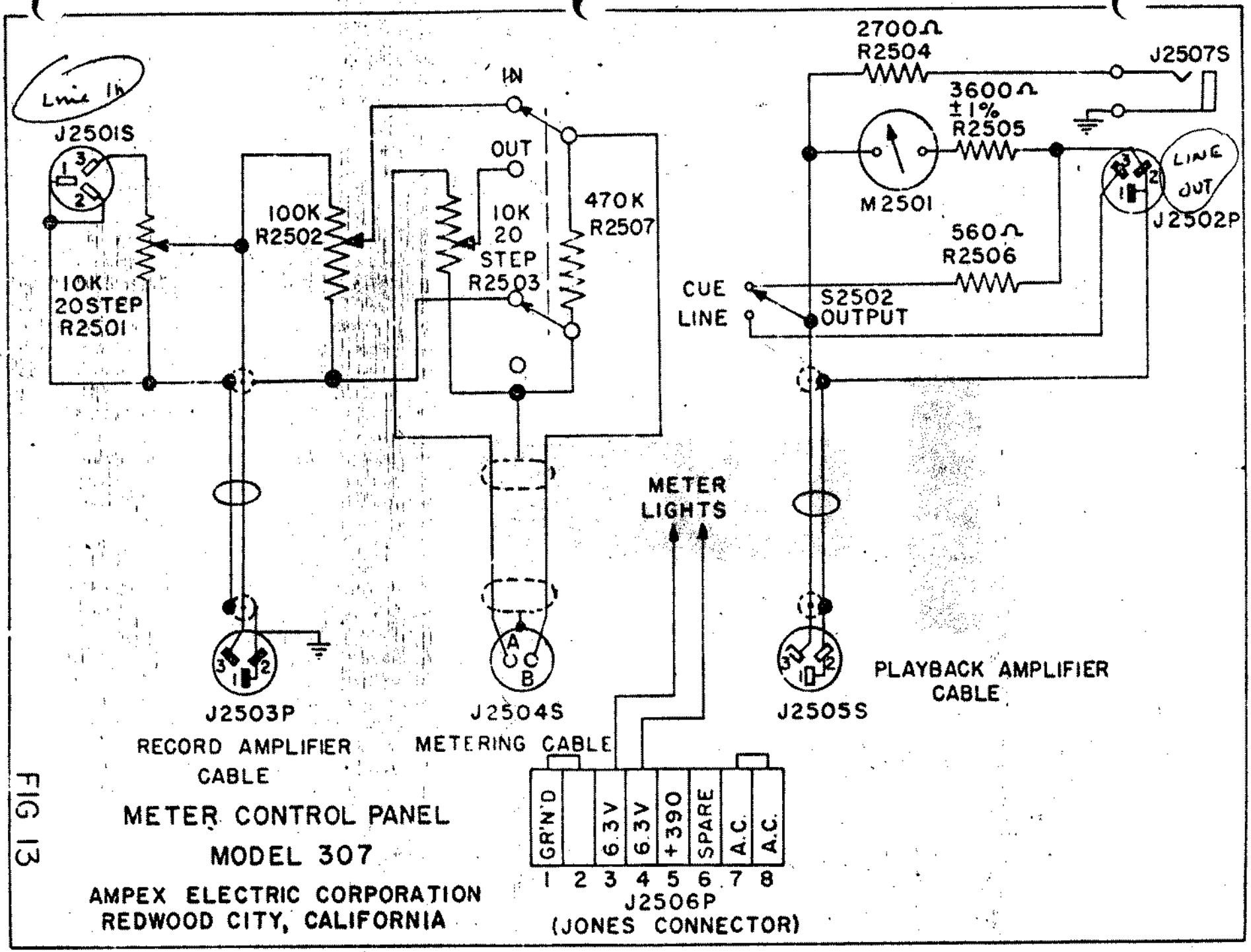
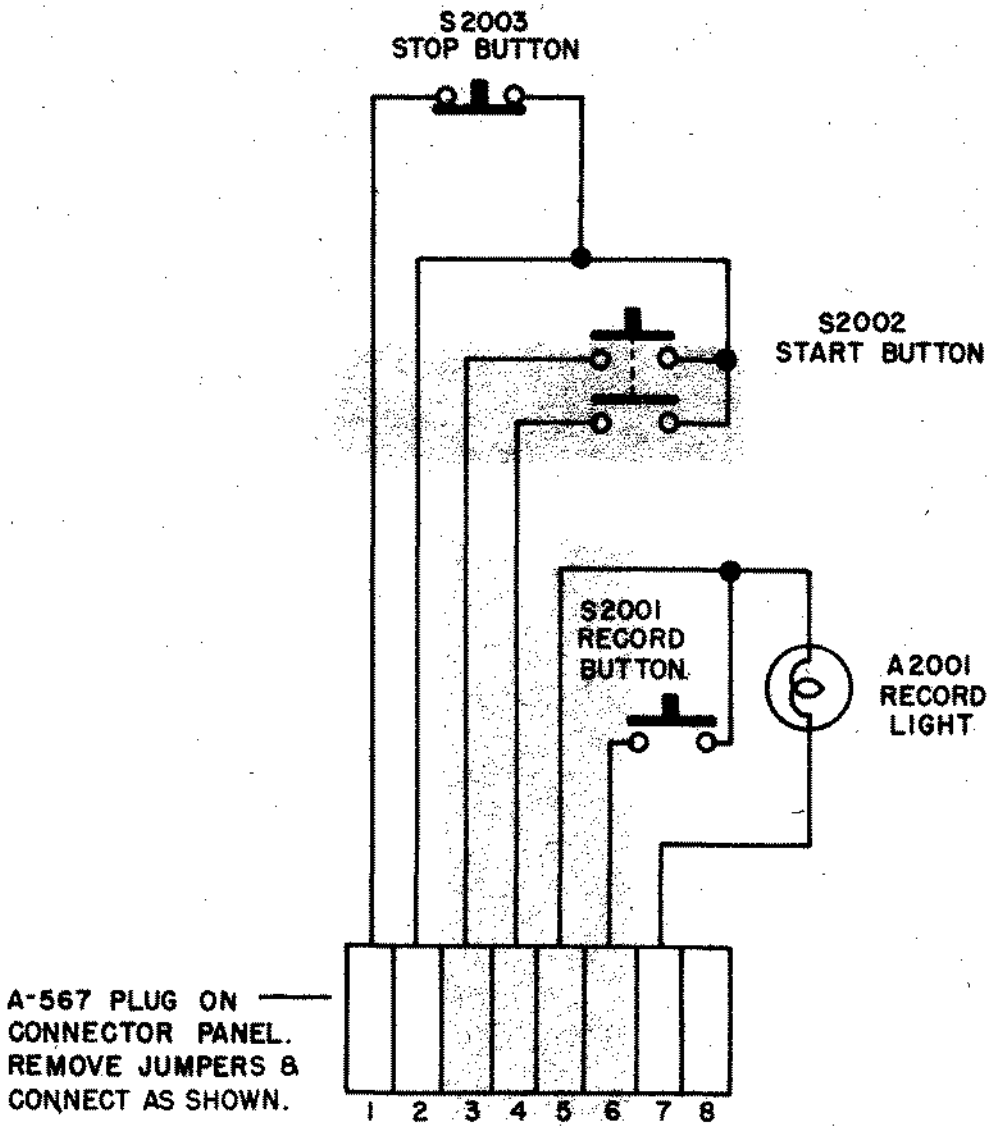


FIG 13

METER CONTROL PANEL

MODEL 307

AMPEX ELECTRIC CORPORATION
REDWOOD CITY, CALIFORNIA

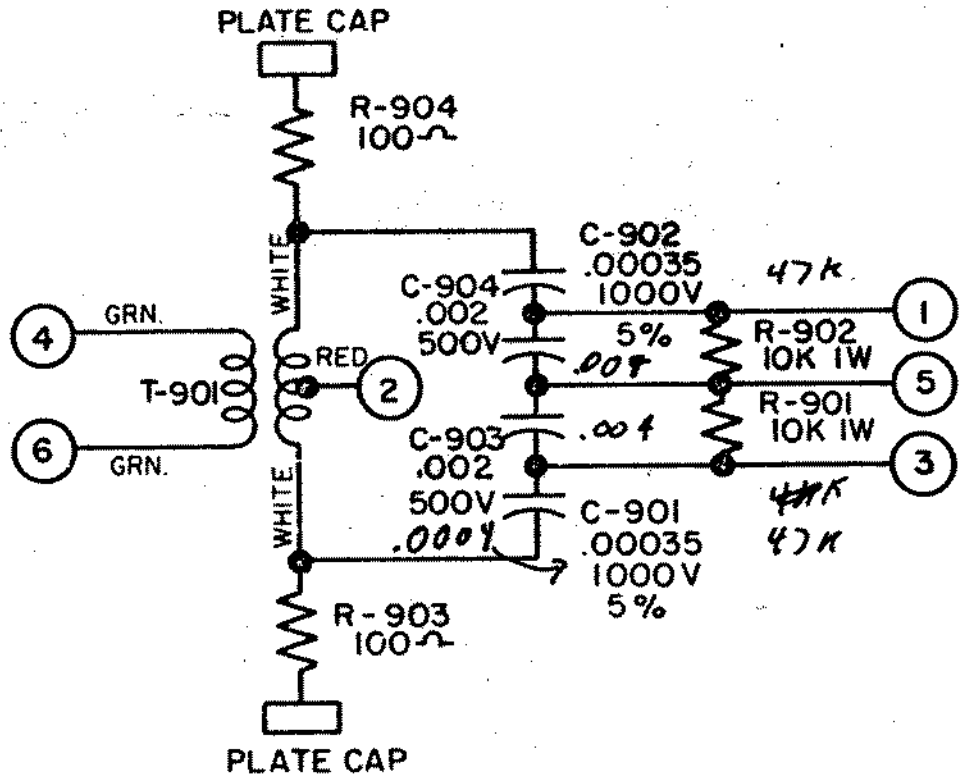


A2001	120 VOLT, 6 WATT LAMP
S2001	SNAP ACTION PUSH BUTTON SWITCH, NORMALLY OPEN. 1 AMP. 115 V.
S2002	DOUBLE MAKE SNAP ACTION PUSH BUTTON SWITCH, NORMALLY OPEN. 1 AMP. 115 V.
S2003	SNAP ACTION PUSH BUTTON SWITCH, NORMALLY CLOSED. 1 AMP. 115 V.

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

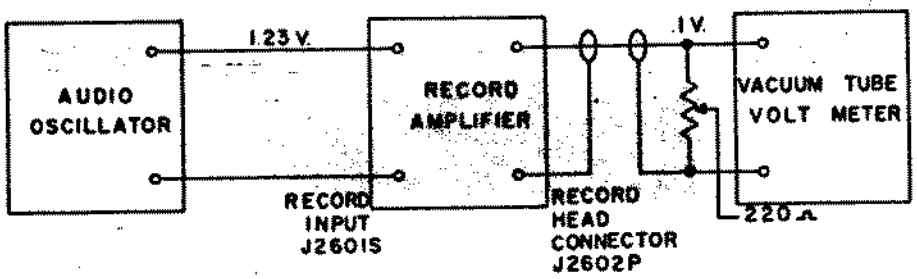
FIG. 14

B-5502 8-15-52



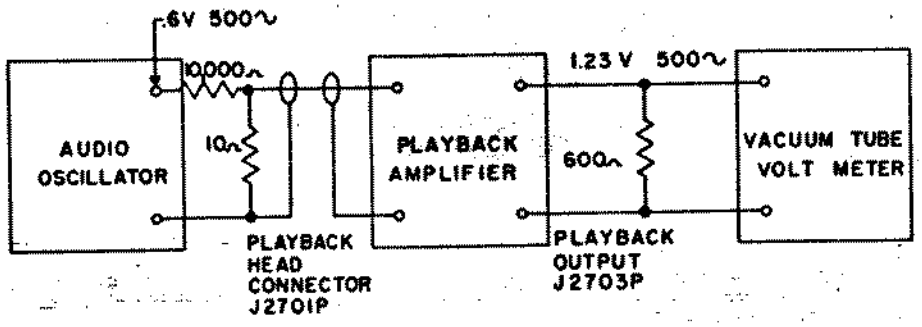
OSCILLATOR COIL ASSEMBLY
MODEL 307
AMPEX ELECTRIC CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 15



BLOCK DIAGRAM FOR CHECKING RECORD AMPLIFIER

NOTE: DISCONNECT BIAS OSCILLATOR PLATE CAPS OF RECORD AMPLIFIER.



BLOCK DIAGRAM FOR EQUALIZATION OF PLAYBACK AMPLIFIER

BLOCK DIAGRAM FOR TEST MODEL 307

AMPEX ELECTRIC CORPORATION
REDWOOD CITY, CALIF.

FIG. 16

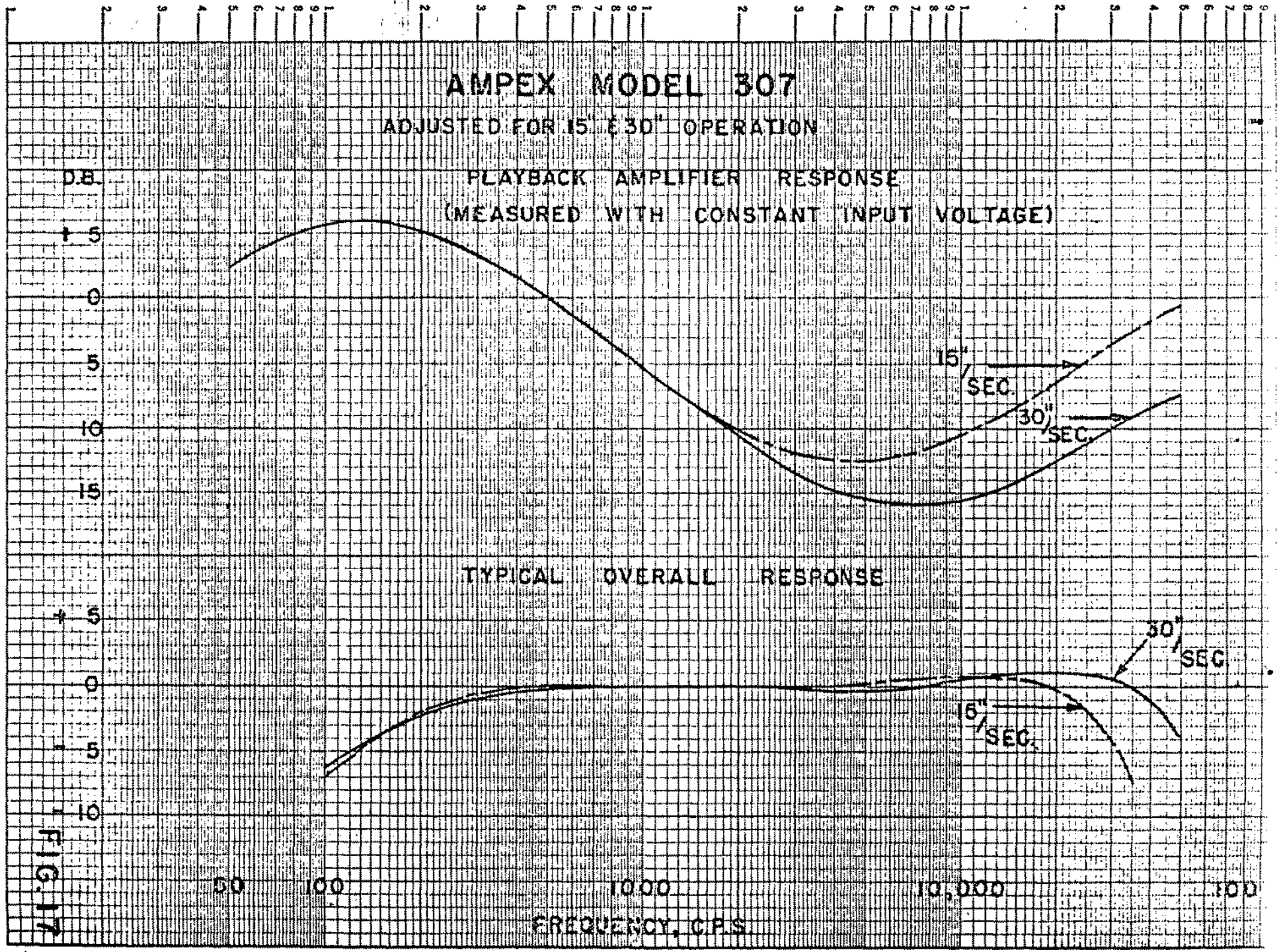

AMPEX MODEL 307
ADJUSTED FOR 15" & 30" OPERATION
PLAYBACK AMPLIFIER RESPONSE
(MEASURED WITH CONSTANT INPUT VOLTAGE)
DB
+ 5
0
- 5
- 10
- 15
15" / SEC.
30" / SEC.
TYPICAL OVERALL RESPONSE
+ 5
0
- 5
- 10
30" / SEC.
15" / SEC.
50
100
1000
10,000
100
FREQUENCY, C.P.S.

FIG. 17

8-15-52

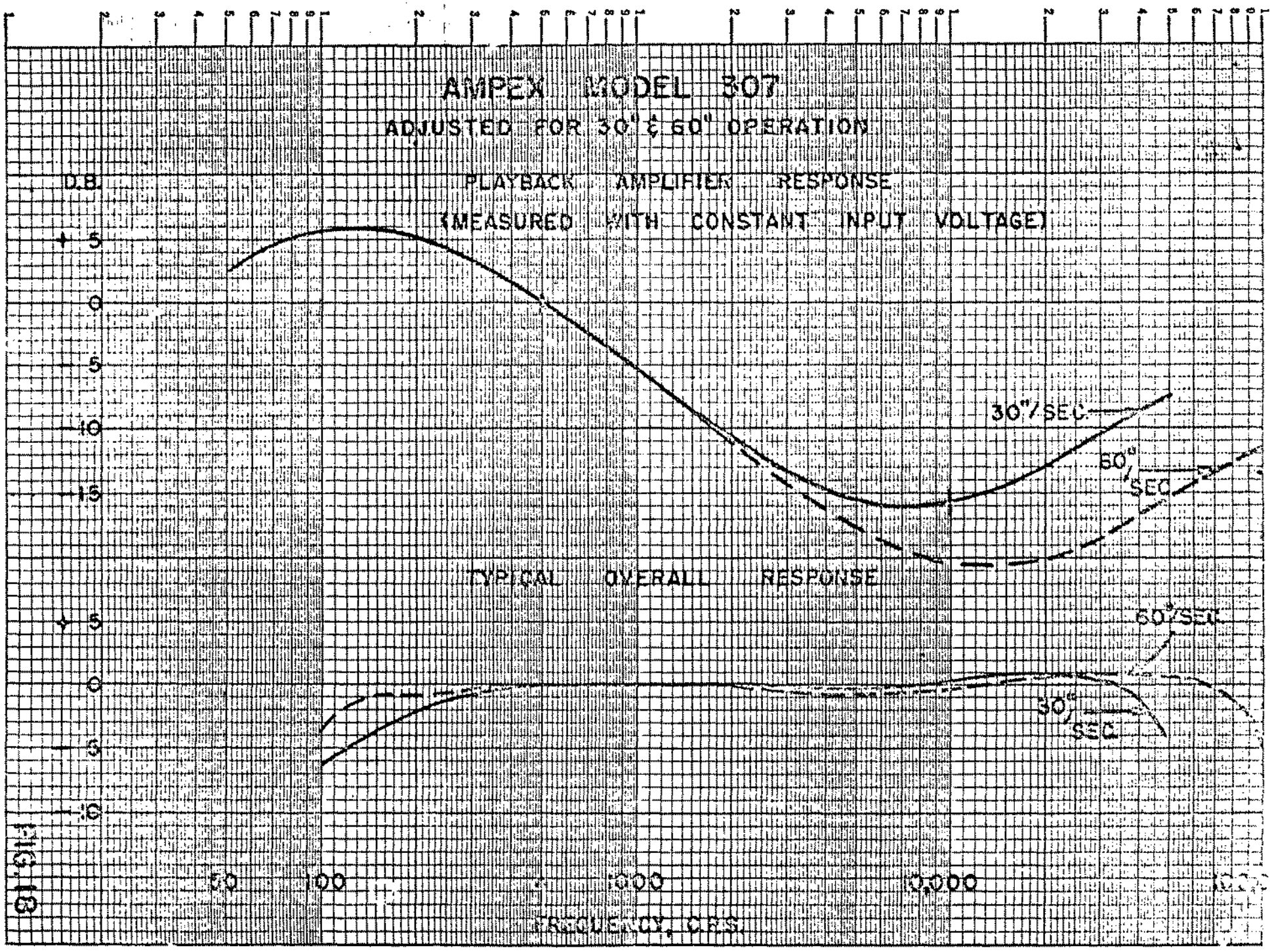

AMPEX MODEL 307
ADJUSTED FOR 30" & 60" OPERATION
PLAYBACK AMPLIFIER RESPONSE
(MEASURED WITH CONSTANT INPUT VOLTAGE)
D.B.
+5
0
-5
-10
-15
30"/SEC.
60"/SEC.
TYPICAL OVERALL RESPONSE
+5
0
-5
-10
60"/SEC.
30"/SEC.
50
100
1000
10,000
FREQUENCY, C.P.S.

Fig. 18

8-15-52