

# AMPEX

## CORPORATION

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

MAGNETIC RECORDERS

SERVICE BULLETIN

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

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

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DATE: 20 March 1953  
MODEL: 300  
BULLETIN NO: 3  
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1. Reels. It has been found in some isolated cases that when the tape is allowed to run all the way out at the end of a fast wind, a section over a foot long will be broken off the end. Upon investigation, this was found to be due to the sharp edges on the slot opening of the reel hub through which the tape is threaded. The sharp edges apparently provided high friction and did not allow the end of the tape to run out freely. When these sharp edges were filed off, the breakage no longer occurred. This information is being forwarded to the NARTB Sub-Committee for the standardization of reels.

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

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

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

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SERVICE BULLETIN

DATE: 20 March 1953

MODEL: 300

BULLETIN NO: 4

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

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

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

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

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

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

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

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MAGNETIC RECORDERS

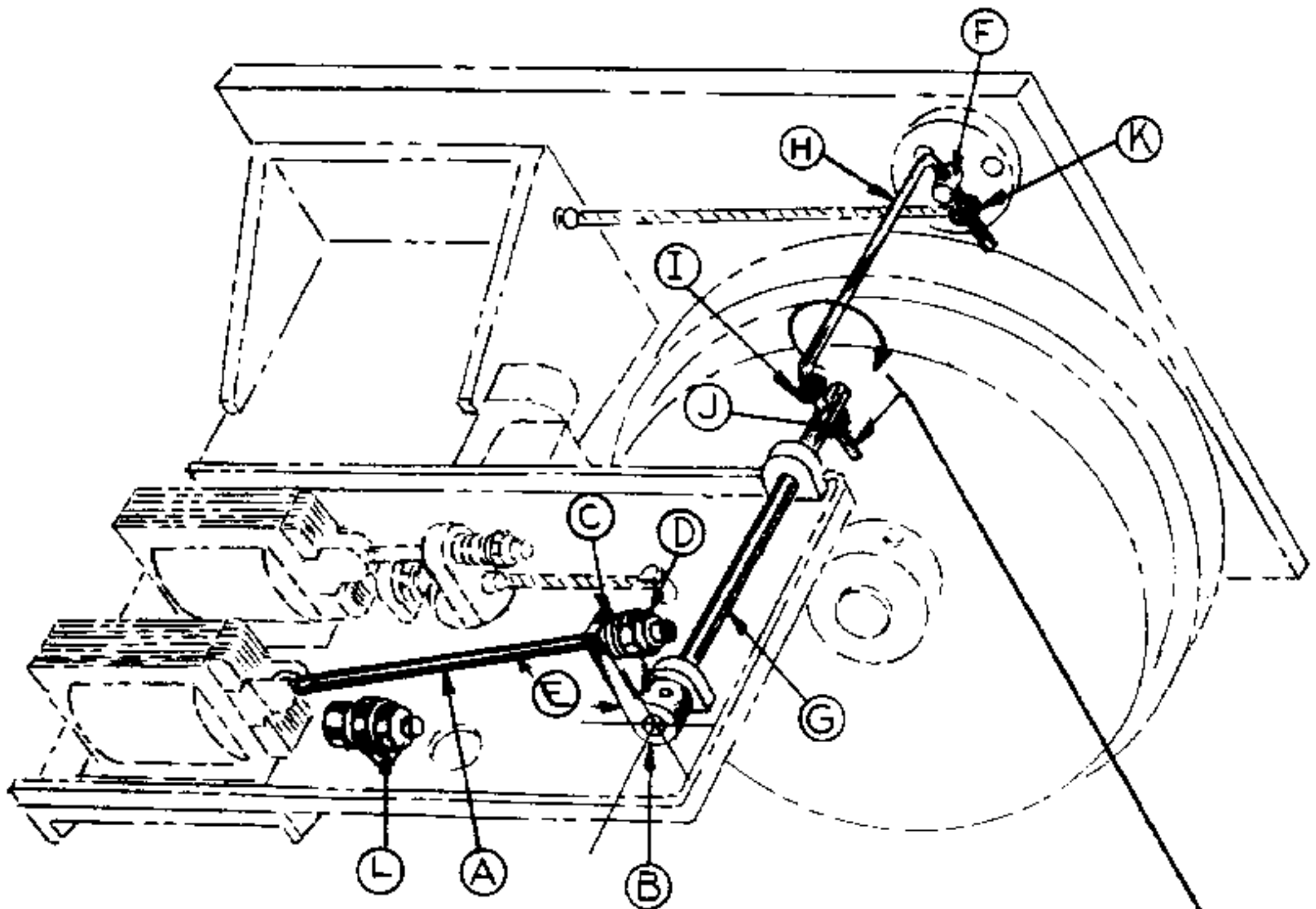
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TO REDUCE ANGLE E, BEND THIS ARM CLOCKWISE WITH RESPECT TO UPPER ARM. RESET ADJUSTING NUT D & L.

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

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**SERVICE BULLETIN**

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MODEL: 300

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### MODEL 300 CONSOLE CABINET

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

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DATE: 20 March 1953  
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1. Drive Motor Lubrication. The first Model 300 machines were equipped with ball bearing drive motors, which require no attention. Since that time sleeve bearing drive motors have become available, and have been used on all subsequent production. If your machine has a sleeve bearing drive motor, be sure to add the lubrication of this motor to the maintenance schedule.

See Service Bulletin #17 for proper lubrication instructions.

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

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DATE: 20 March 1953  
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1. Capstan Oil Leakage. There is a tendency for oil to climb out of the capstan bearing housing during the first few weeks of operation. The capstan bearing has been thoroughly impregnated with oil so as to drive out any air inclusions, as the presence of air would tend to force oil out of the bearing housing when it becomes warm. The excess oil present climbs up the capstan when the machine is operated. Ordinarily, this oil is caught by the felt washer on top of the bearing housing. (The neoprene washer shown in fig. 2 of the instruction book was eliminated in production because it produced flutter.) If this washer becomes saturated with oil, which usually happens, then it will no longer behave as an effective seal. Therefore after the first week or so of operation, when most of the excess oil has had a chance to work out, the felt washer should be removed and washed out in carbon tetrachloride. Simply remove the capstan dust cap (see fig. 2, instruction book) to remove the felt washer. If this washer is kept reasonably dry, then no trouble should be experienced with oil creeping up the capstan.

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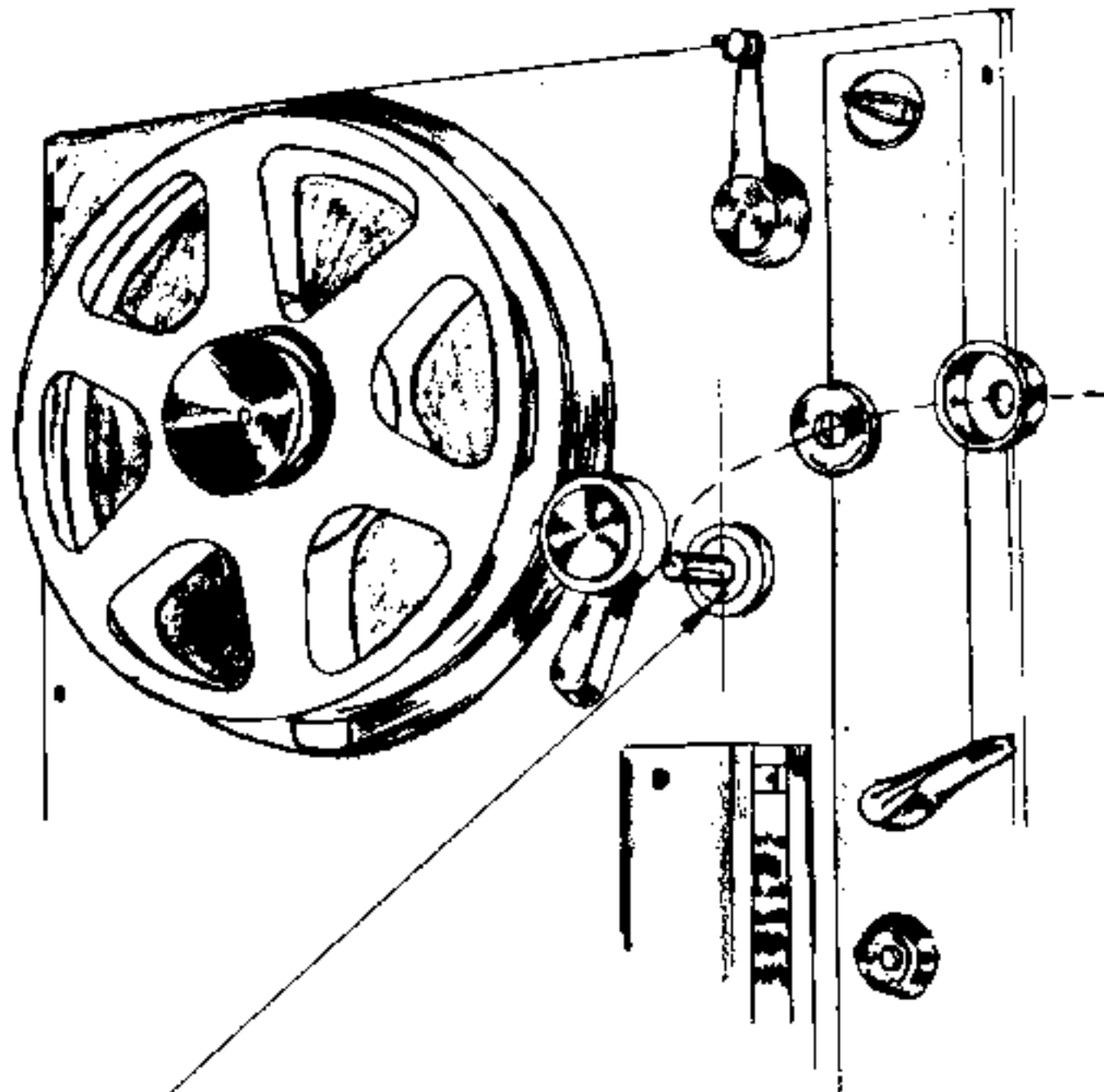
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REMOVE CAPSTAN DUST COVER  
& FELT WASHER AS SHOWN  
POSITION CAPSTAN ASSEM.  
SO THAT CENTER LINE BETWEEN  
BOTH HOLES IS VERTICAL WITH  
LARGE C'SK HOLE ON THE  
BOTTOM AS SHOWN. IF CAPSTAN  
SHOULD NEED POSITIONING SEE  
SVC. BULL. \*14  
TAP 6-32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

PLUGGING OF CAPSTAN OIL  
HOLE ON RACK MOUNTED  
UNITS



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

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DATE: 20 March 1953  
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1. Tape Slippage. Various users have reported that the tape slows down near the end of the program. This occurs if the capstan idler pressure is not great enough, and of course becomes worse at the end of the reel where the hold-back tension is highest. The condition is further exaggerated if a small RTLA type reel is used in which case the hold-back tension is even higher.

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

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

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

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### CYCLOHM DRIVE MOTORS

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

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

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

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

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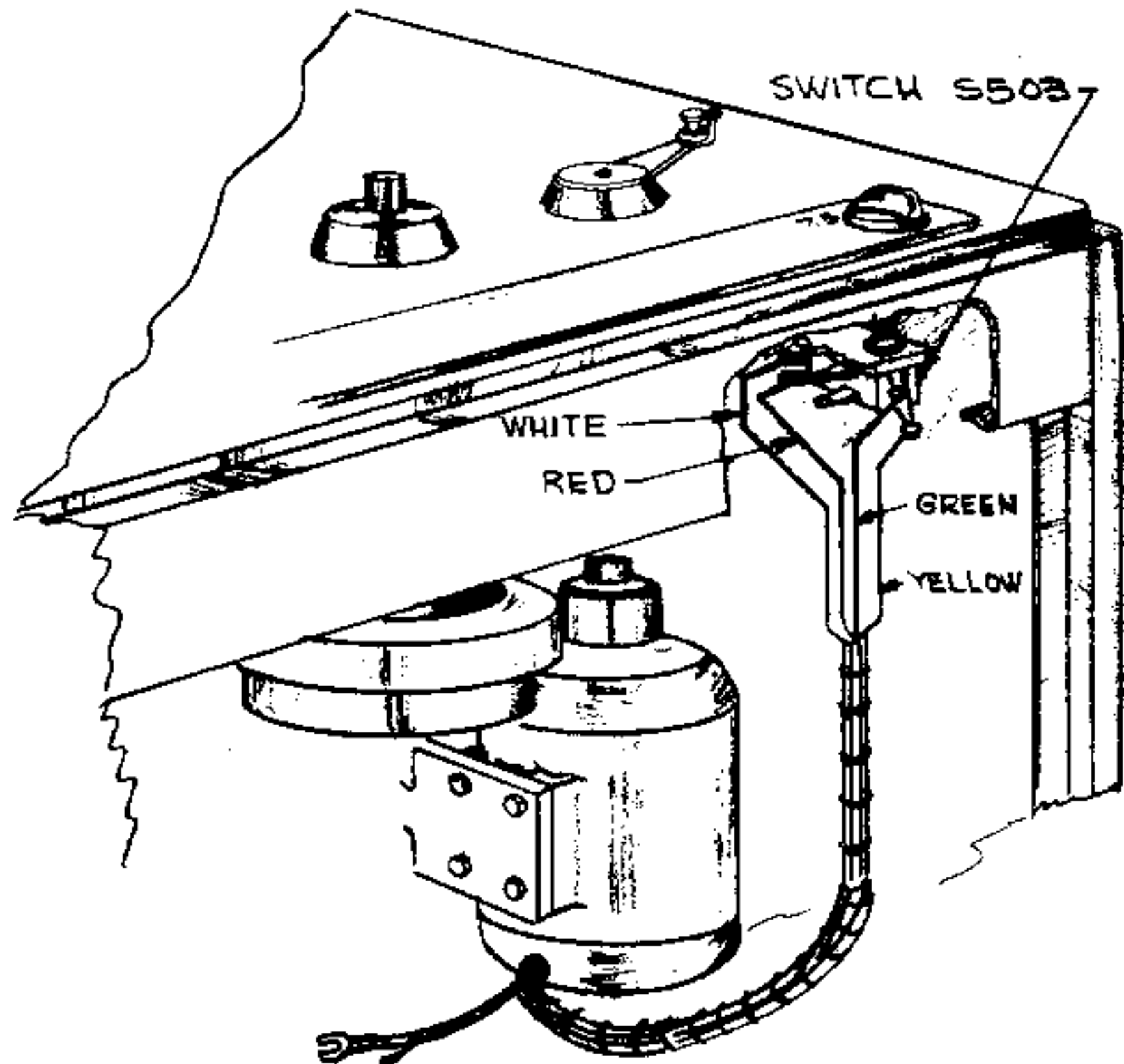
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### DRIVE MOTOR REPLACEMENT



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

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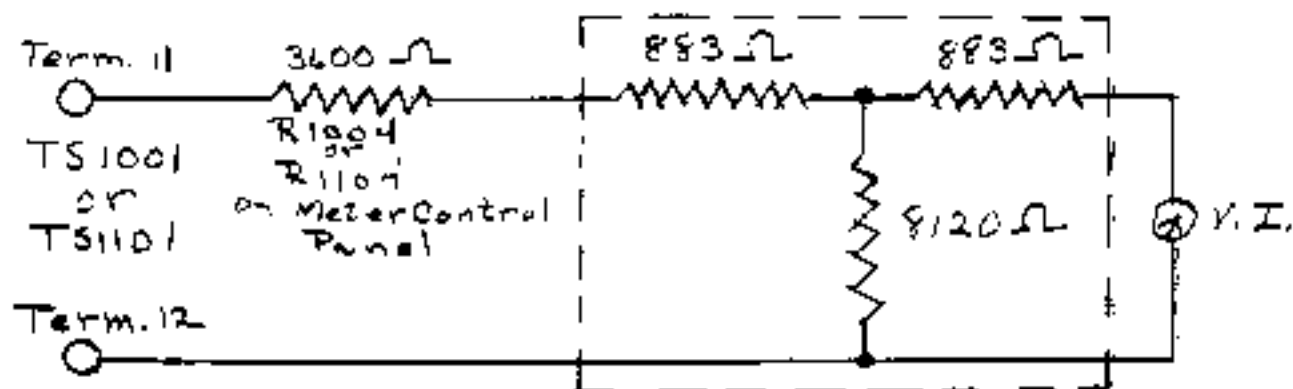
MAGNETIC RECORDERS

SERVICE BULLETIN

DATE: 20 March 1953  
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1. Adjusting Levels. In the event that it is desired to operate the recorders at levels other than the recommended levels of  $\pm 1$  VU in and out, the procedure is as follows:

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



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

II. A. Machines without Meter Control Panel:

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

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B. Machines with Meter Control Panel:

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

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

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

The procedure for making this replacement is as follows:

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



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

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

MODEL 300 - Serial No. 113 to 500

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

MODEL 301 AND 302 - Serial No. 113 to 500

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

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

Prices on Request

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

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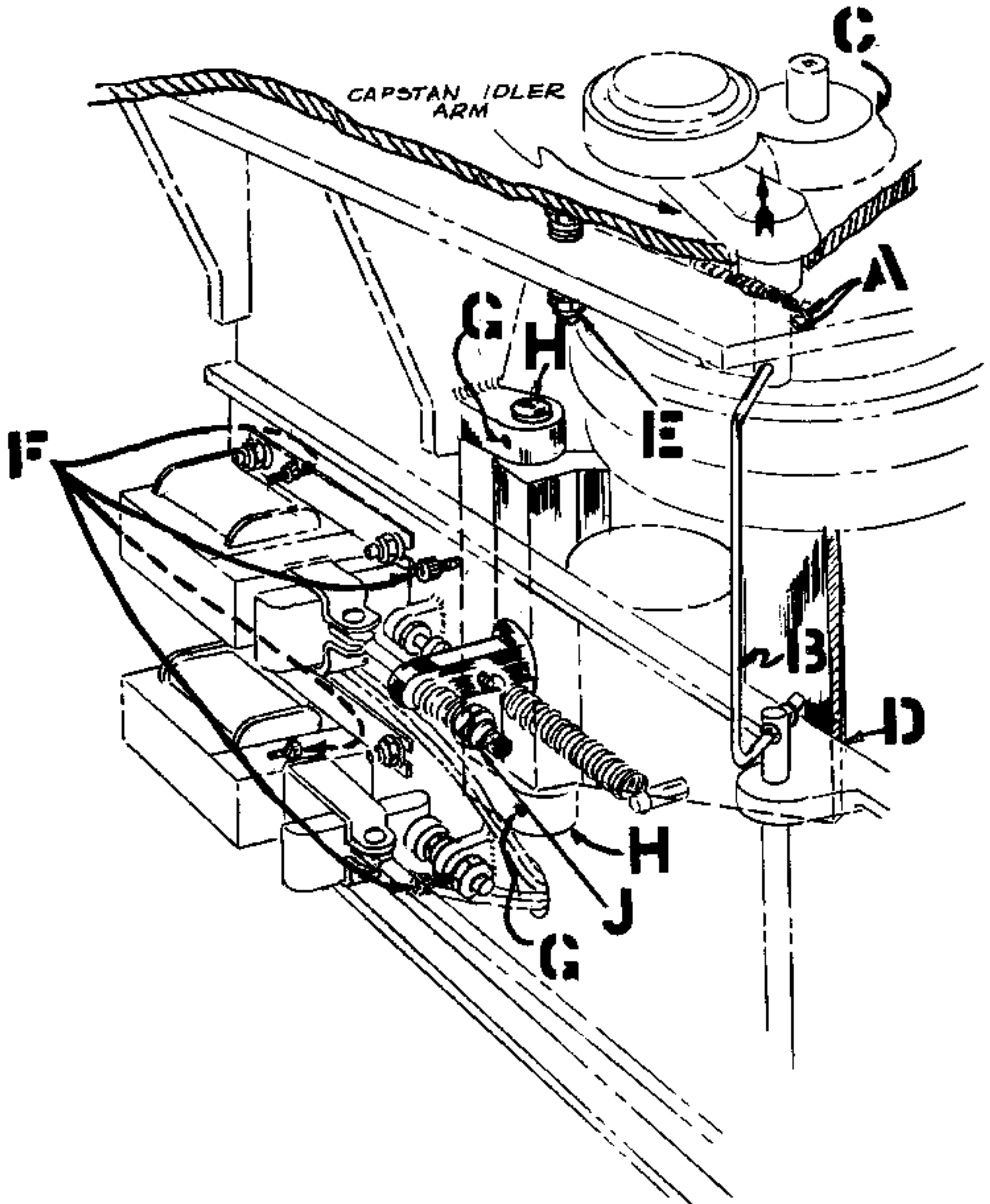
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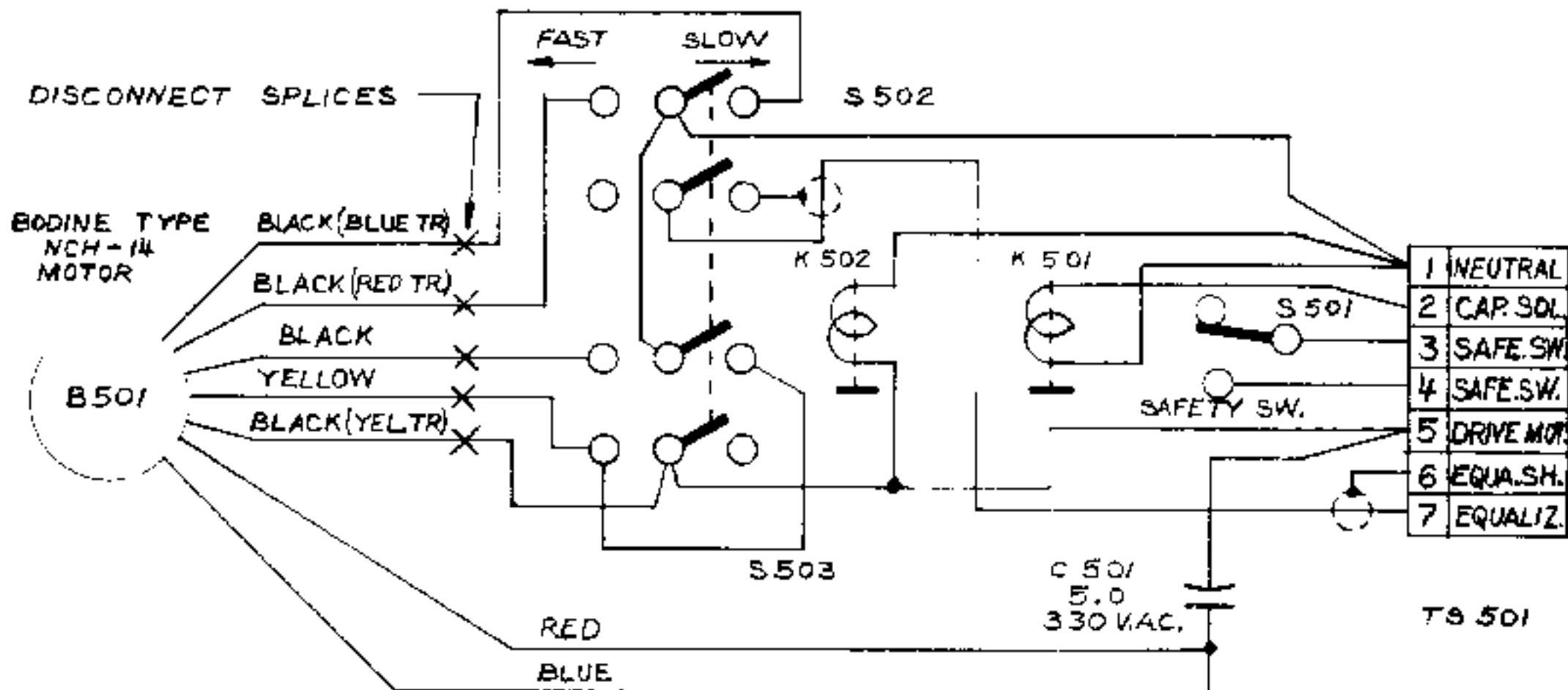
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ALLOW 8" LEAD LENGTH  
FROM MOTOR TO DIS-  
CONNECT SPLICES

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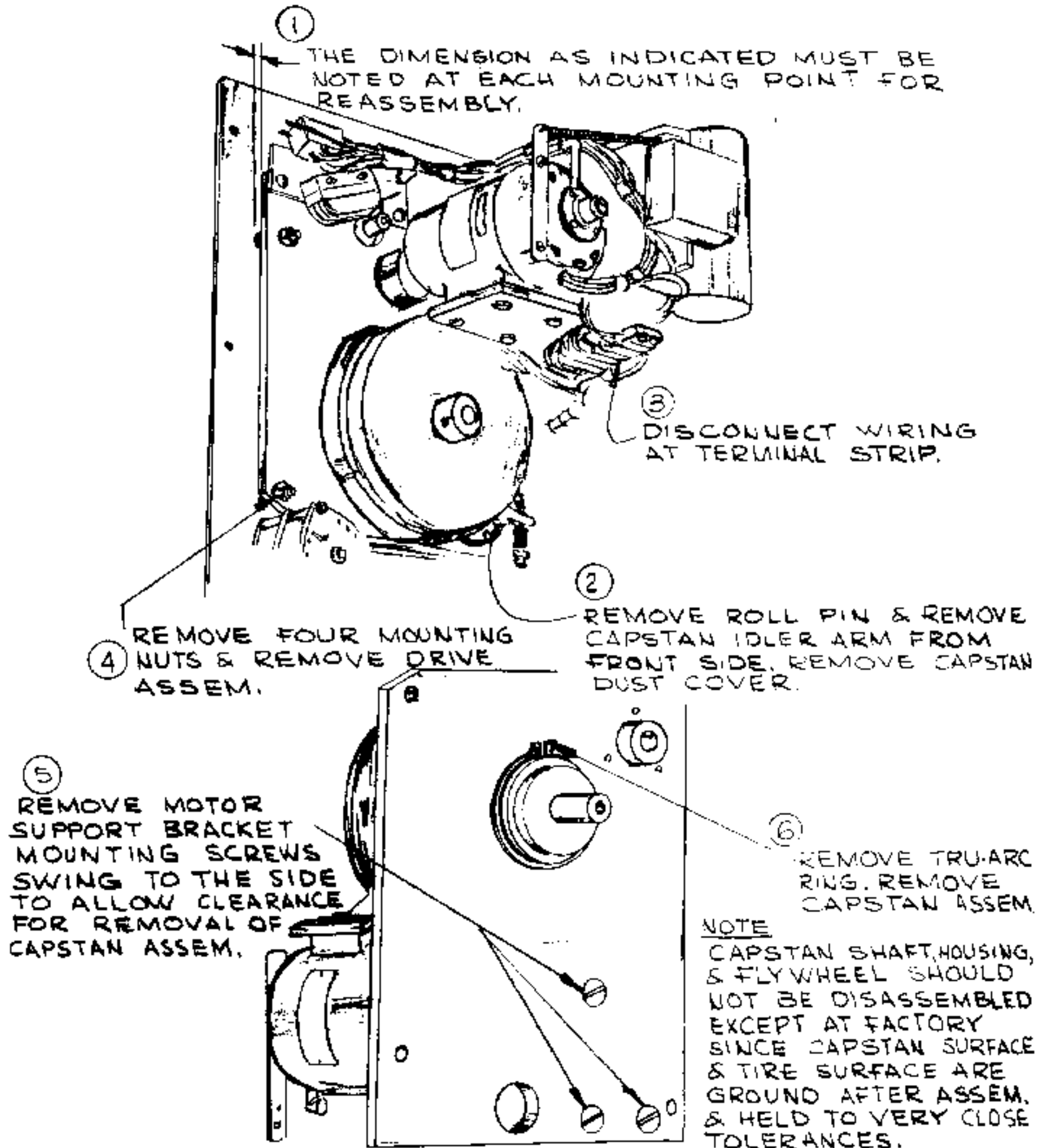
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NOTE. NUMBERED BALOONS INDICATE SEQUENCE OF DISASSEMBLY. REVERSE SEQUENCE FOR REASSEMBLY.

REMOVAL OF CAPSTAN ASSEM.

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

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

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

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

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

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MAGNETIC RECORDERS

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### DRIVE MOTOR LUBRICATION

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

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

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

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

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

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



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### ELECTRONIC CIRCUIT MODERNIZATION

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

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

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

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

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

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

### SERIALS 100 through 175

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

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

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

### SERIALS 176 through 885

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

### SERIALS 886 through 890

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

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### SERIALS 891 through 1604

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

### SERIALS 1605 through 2912

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

### GENERAL

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

#### Enclosures

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

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### ELECTRONIC COMPONENTS NECESSARY TO MAKE EQUALIZATION CHANGES IN MODEL 300

#### Recorders Serial #100-175

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

#### Recorders Serial #176-500

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

#### Recorders Serial #501-885

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

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

### RECORDERS SERIAL #886-890

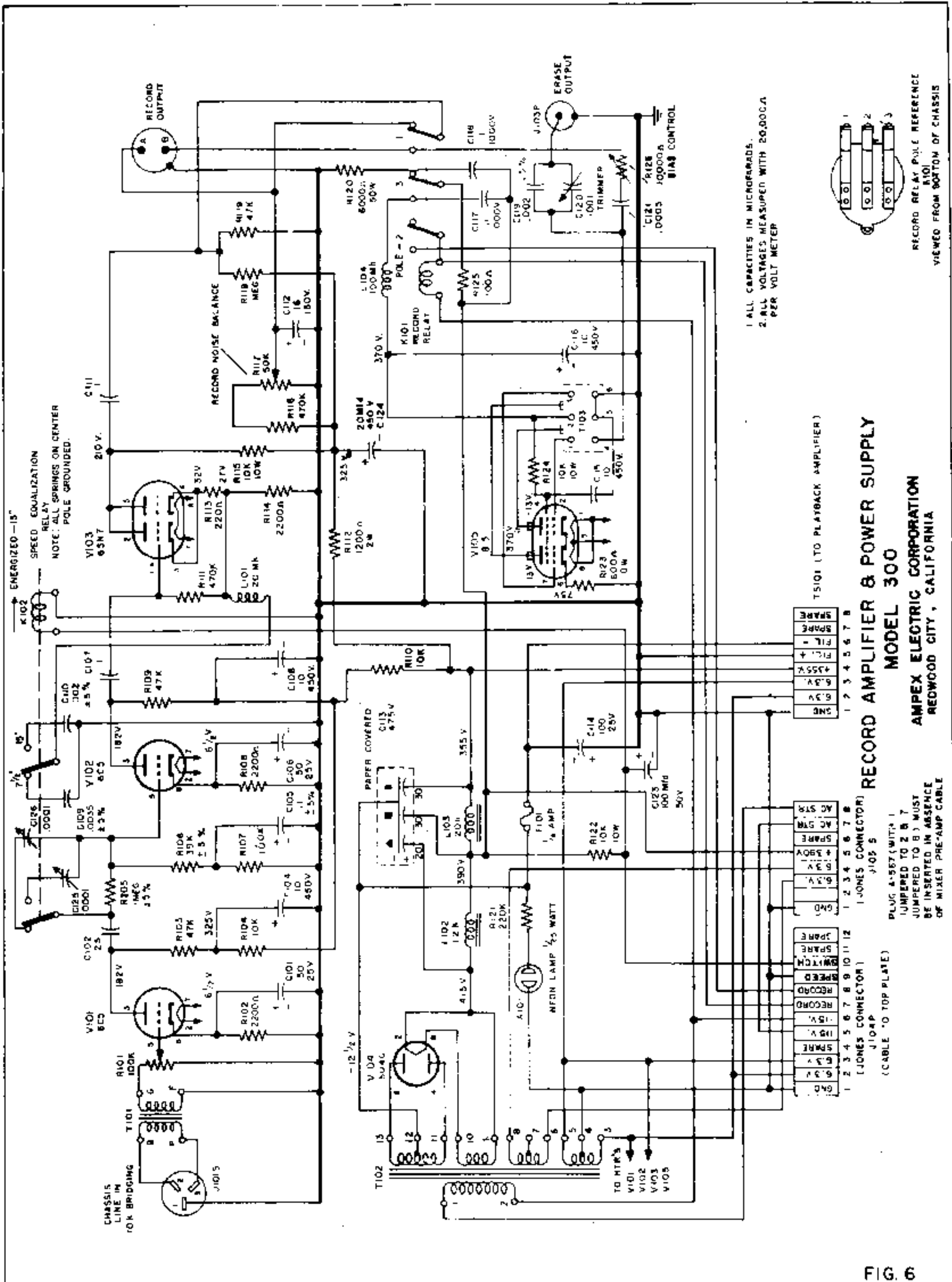
CO-63 100 MFD 50 V. Electrolytic Condenser  
RL-2 3 Pole Double Throw DC Relay  
CO-10 .0035 MFD 500 V. Mica Condenser 5%  
(2) CO-21 .002 MFD 500 V. Mica Condenser 5%  
(2) CO-92 .0001 MFD Padder Condenser  
RE-32 1 Megohm 1 Watt Composition Resistor  
CO-5 .0005 MFD 500 V. Mica Condenser  
ER-255 10,000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

### RECORDERS SERIAL #891-1604

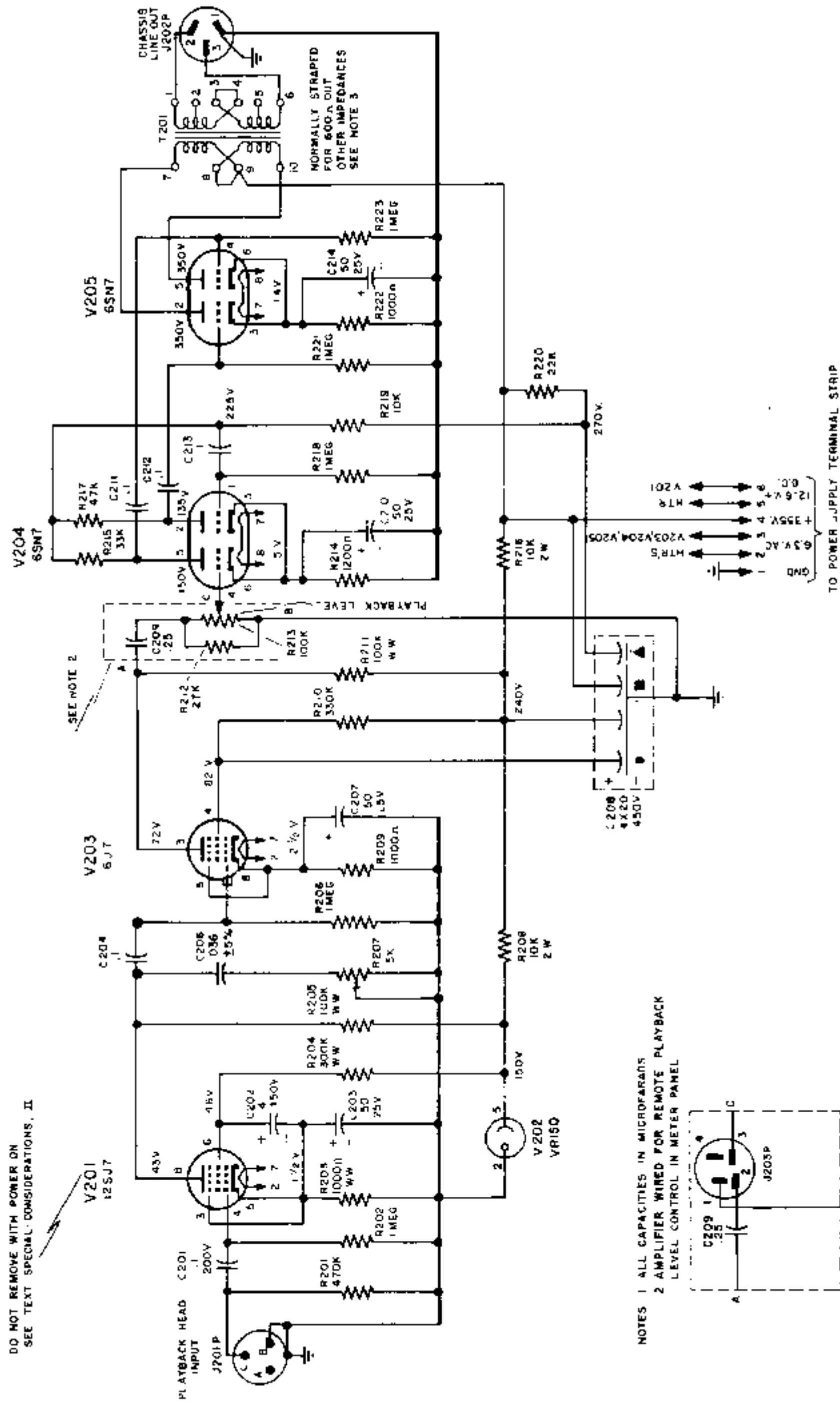
(2) CO-21 .002 MFD 500 V. Mica Condenser 5%  
PL-378 Plug, Erase Output (For Making Adapter for Measuring Erase Current)  
CO-10 .0035 MFD 500 V. Mica Condenser 5%  
475-1 Head Assembly - Console  
475-2 Head Assembly - Rack and Portable

### RECORDERS SERIAL #1605-2912

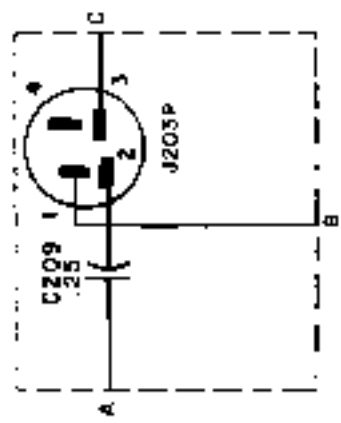
CO-10 .0035 MFD 500 V. Mica Condenser 5%  
CO-21 .002 MFD 500 V. Mica Condenser 5%



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



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

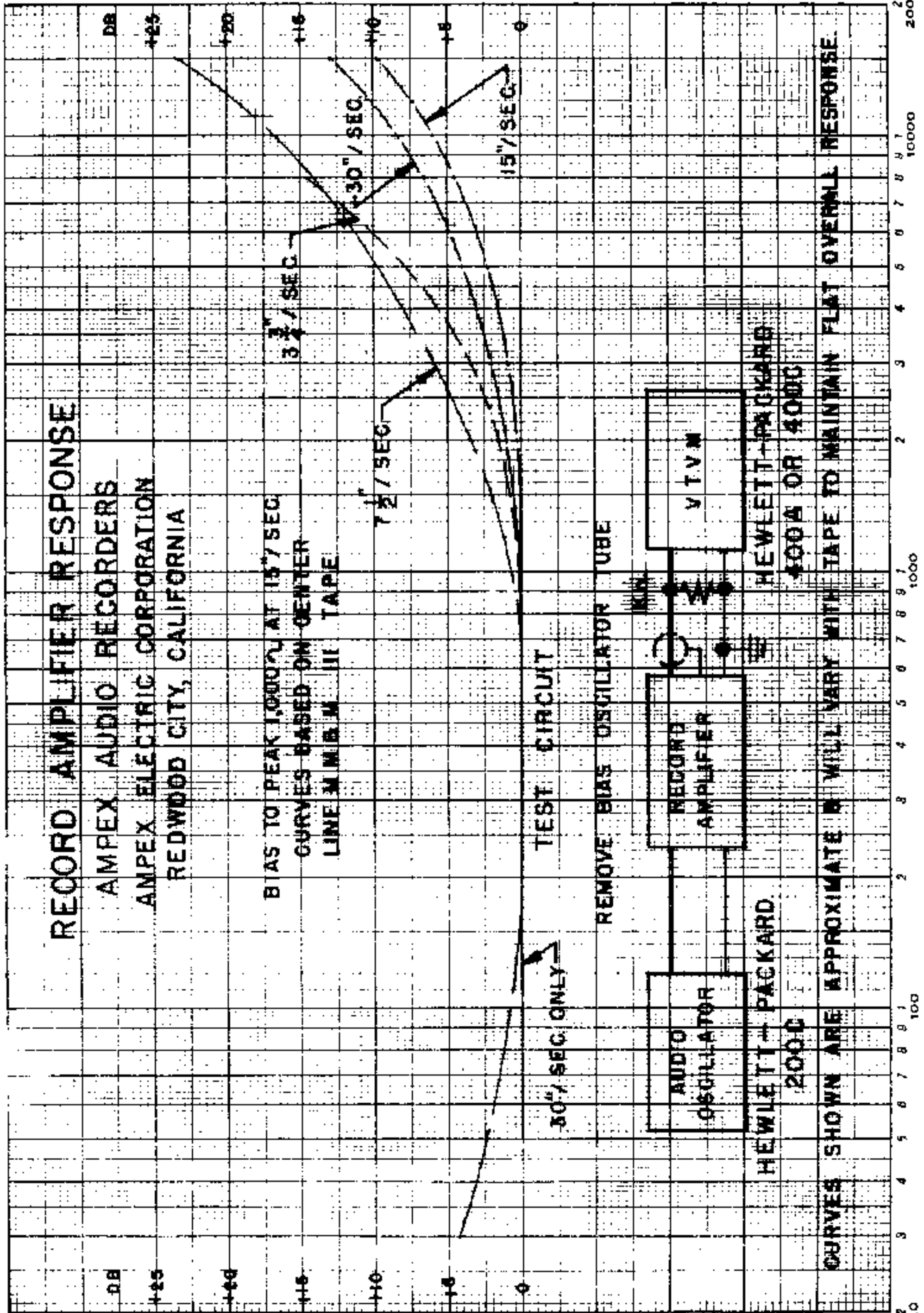


- 3 600 OHMS CONNECT TO 1 & 6, JOIN 3 TO 4
- 335 OHMS CONNECT TO 1 & 5, JOIN 3 TO 4
- 250 OHMS CONNECT TO 1 & 6, JOIN 2 TO 3 (APPROX ?)
- 200 OHMS CONNECT TO 2 & 5, JOIN 3 TO 4
- 125 OHMS CONNECT TO 1 & 4, JOIN 1 TO 3 & 4 TO 6
- 50 OHMS CONNECT TO 2 & 4, JOIN 2 TO 3 & 4 TO 5

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

FIG. 8



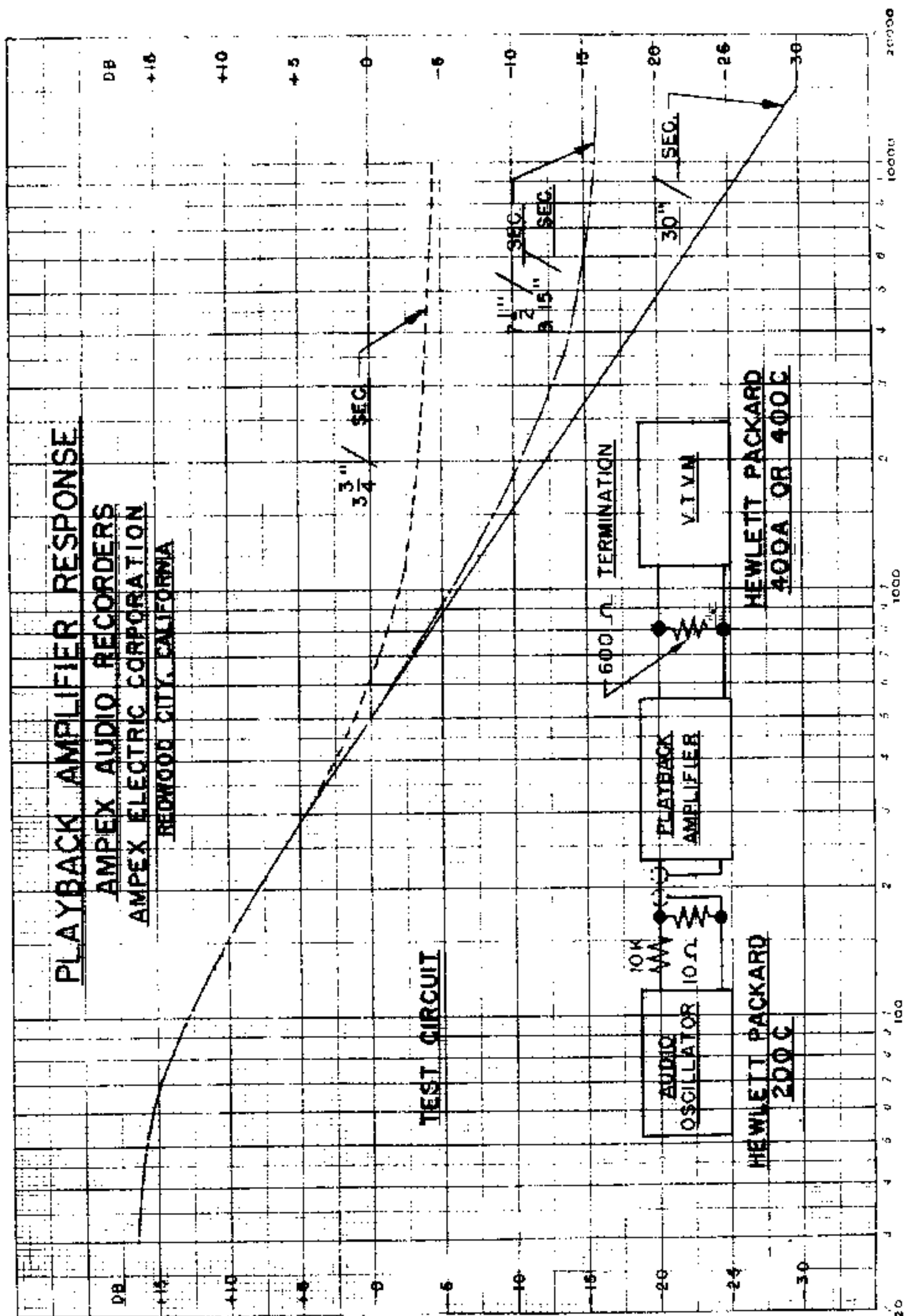


DWG. A-4478

11-20-52

FIG. 16

FREQUENCY IN CYCLES PER SECOND



9-5-52

FIG. 17

SECTION I  
SPECIFICATIONS FOR MODEL 300

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

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

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

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

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

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

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

**PLAYBACK TIMING ACCURACY:** 0.2% or  $\pm 3.6$  seconds for a 30 minute recording.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

VU meter will meter playback output while recording or playing back. Calibrated for  $\pm 4$  VU output.

Output key (line or cue).

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

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MAGNETIC RECORDERS

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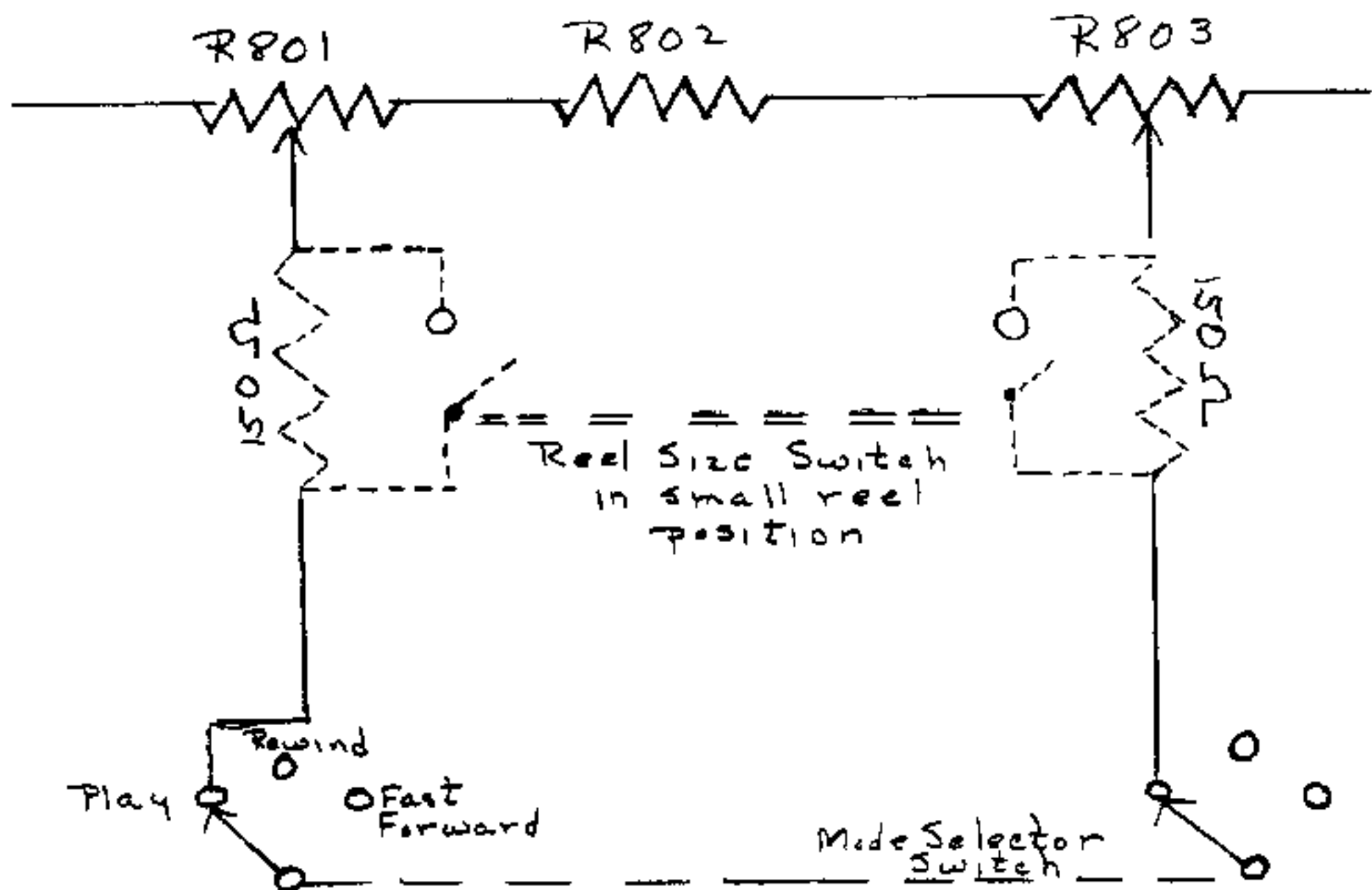
PAGE NO: 1

### USING 7" RTMA REELS

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

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

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



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

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

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

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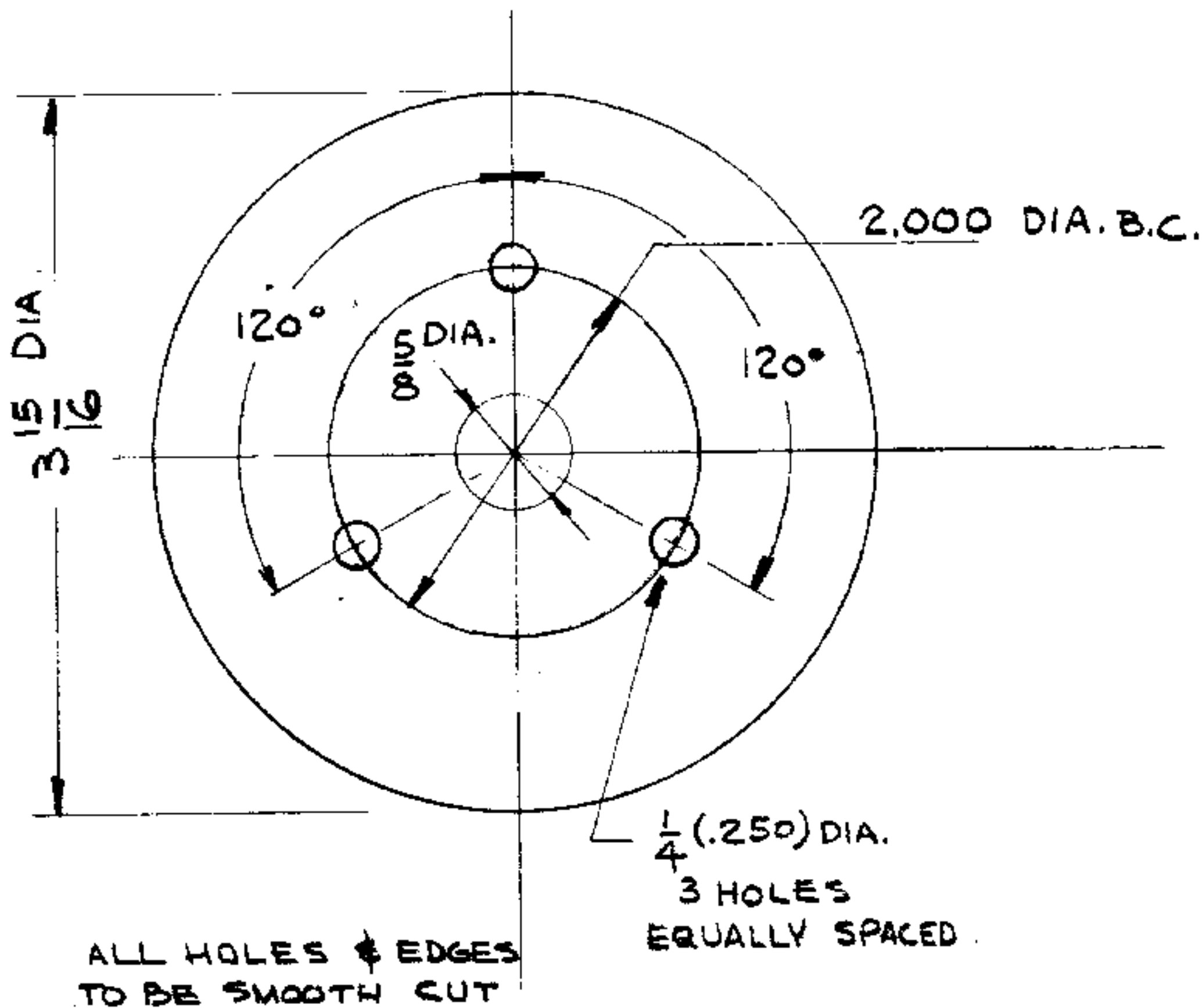
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SERVICE BULLETIN

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

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

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

Springs needed for conversion:

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



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SERVICE BULLETIN

DATE: 19 August 1954  
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### INSTRUCTIONS FOR CONVERTING CONSOLE MOUNTED #300 TOP PLATE TO RACK MOUNTING

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

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

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

4. Reel hold down knobs required:

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

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