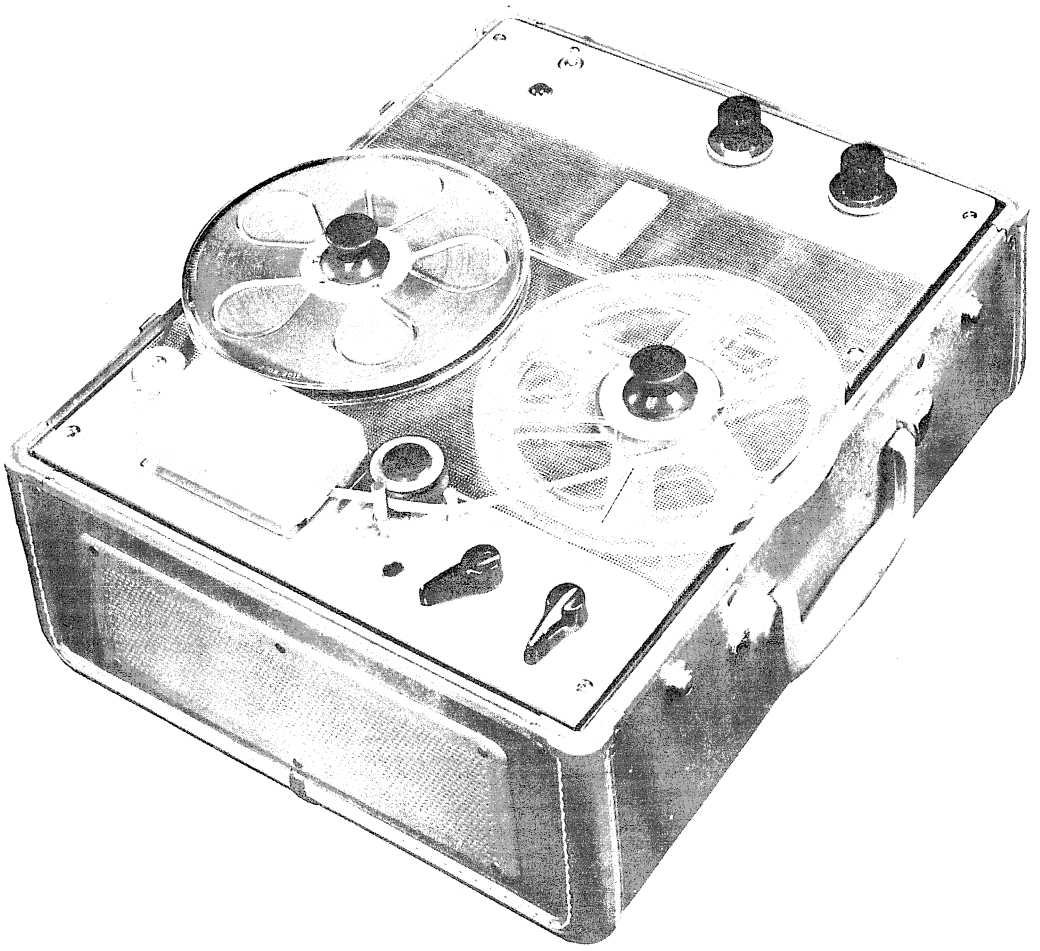


GENERAL INFORMATION

The Ampex Model 612 Tape Phonograph is a tape playback machine which has been especially designed for the stereophonic reproduction of recorded magnetic tapes. The Model 612 is also capable of playing back both the conventional half track and full track recorded tapes.

The Model 612 is composed of a tape transport mechanism (with head assembly) and an electronic assembly. The transport mechanism handles 7 inch or smaller reels and operates at a tape speed of 7 1/2 inches per second. The head assembly contains a half track head for playing back both half and full track tapes and an "in-line" stereo head for reproducing two channel stereophonic tapes. Two identical but separate preamplifier channels are provided in the electronic assembly. When reproducing stereo tape, each of the channels picks up its original signal from a separate channel on the tape, amplifies it and feeds it to a separate output. The output of each channel may be fed to any high quality amplifier (and speaker) having an input impedance of 10,000 ohms or greater. Two Ampex Model 620 Amplifier Speaker units are suitable for this use.

MANUFACTURED by:
AMPEX CORPORATION
934 CHARTER STREET
REDWOOD CITY, CALIFORNIA

This material compiled and published by

HOWARD W. SAMS & CO., INC., INDIANAPOLIS, INDIANA

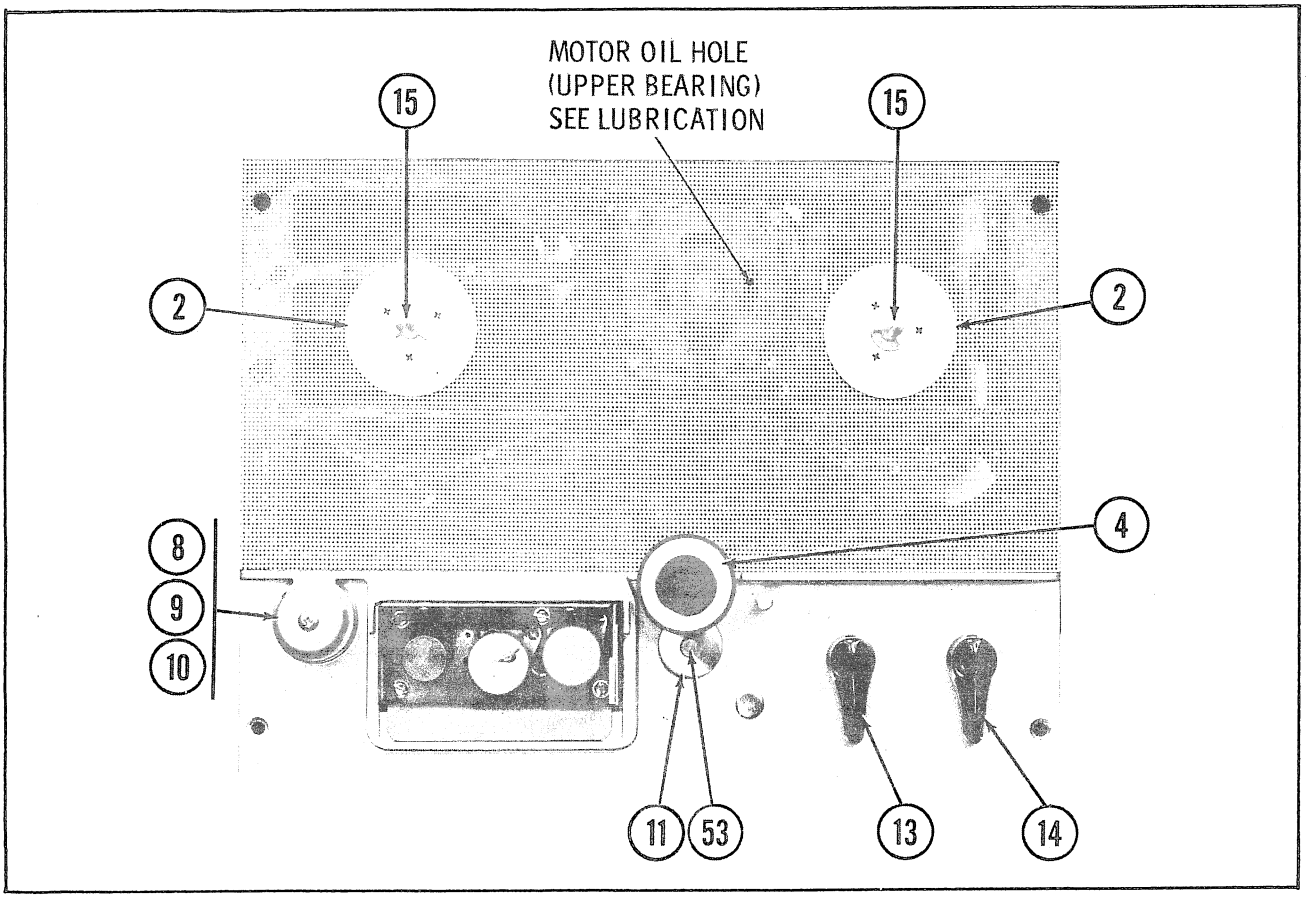


FIGURE 1

SPECIFICATIONS

Tape Speed-

7 1/2 inches per second.

Reel Size-

7 inch RTMA reel maximum.

Frequency Response-

40 to 15,000 cycles per second. The Model 612 is a reproducer only and frequency response must be relative to a standard. Will play back the Ampex standard tape (Stock No. 5563) within ± 2 db.

Signal To Noise Ratio-

50 db below a signal recorded at the level of 3% harmonic distortion (peak record level).

Flutter And Wow-

Below 0.25%.

Starting Time-

Tape accelerates to full speed in less than one second.

Stopping Time-

Less than one second when stopping from play mode.

Playing Time-

32 minutes for 7 inch 1200 foot reel.
48 minutes for 7 inch 1800 foot reel.

Fast Forward Or Rewind Time-

90 seconds for full 1200 foot reel.

Playback Timing Accuracy-

± 0.2% (± 3.6 seconds in a 30 minute recording).

Operating Modes-

Play, Fast Forward and Rewind.

Output-

1.25 volts RMS into a load of 10,000 ohms or greater (normal operating level).

Head Assembly-

Half track playback head for playback of half track and full track tapes. Dual track (in line) playback head for playback of two channel stereophonic tapes.

Power Requirements-

117 volts AC, 50 or 60 cycles. 0.45 amperes, 53 watts.

Dimensions-

Tape Transport:	9 5/16" x 12 1/2" x 5".
Electronic Assembly:	6 1/8" x 12 1/2" x 5".
Portable Case:	16 1/2" x 13 3/4" x 8".
Furniture Cabinet:	17 1/2" x 15" x 9".

Weight-

28 pounds (with portable case).

INSTALLATION AND OPERATION

A power cable and two plugs (for connecting to Left and Right outputs) are supplied with the Model 612. Output cables, of sufficient length to connect to the separate amplifier-speaker systems, should be made with well shielded, low capacity cable. Output cables of the proper type are supplied with the Model 620 Amplifier-Speaker.

The input impedance of the two power amplifiers used with the Model 612 should be 10,000 ohms or higher.

Two amplifier-speaker systems must be used for stereophonic reproduction. One speaker must be placed to the left on one wall of the room and the other placed on the right. The input of the amplifier driving the speaker on the left must be connected to the Left output receptacle on the Model 612 and the amplifier driving the speaker on the right must be connected to the Right output receptacle.

Both amplifier-speaker systems will be used when playing single channel tapes (both full-track and half track) but the results will not be stereophonic. If desired, one amplifier-speaker can be disconnected, at the proper output on the Model 612, when playing single channel tapes.

1. After all connections have been completed, place a recorded tape on the supply reel turntable and an empty reel on the take-up reel turntable. Make certain that the turntable guides engage the drive slots on the reels.

2. Press a reel hold down knob (1) in place on each spindle.

3. Thread the tape as shown on Front Page.

(a) Around the left side of the tape guide.

(b) Through the head assembly (dull side of tape facing inward toward heads).

(c) Between the capstan and the capstan idler.

(d) In front of the guide post.

(e) And take a full turn counter clockwise around the hub of the empty reel.

It is not necessary to anchor the tape in the slot on the reel hub.

4. Make certain that the Play and Rewind - Fast Forward controls are in the neutral position and then place the Power switch in the On position.

5. Turn on both external amplifiers and allow them to warm up.

6. If stereophonic tape is to be played, turn the selector control to stereo. The selector control is turned to single for all other tapes.

7. Turn the play control to the play position. This starts the tape in motion.

The tape can be stopped at any time by turning the play control to its neutral position.

8. Set the volume control on the Model 612 to about 8 on its scale and adjust the volume controls on both amplifiers for the desired output levels.

The amplifier-speaker systems must be balanced and phased properly for satisfactory results.

9. To rewind the tape or move it rapidly in the forward direction, stop the tape and then place the rewind - fast forward control in the appropriate position.

The rewind - fast forward control and the play control are mechanically interlocked so that it is impossible to turn one of them unless the other is in neutral. This safety feature eliminates the possibility of tape breakage which would almost invariably occur if the machine were switched directly from either of the high speed modes to play.

To quickly locate a particular portion of the tape, the rewind - fast forward control may be shuttled between rewind and fast forward without stopping between.

The volume control should be turned down to mute the system while the tape is running in the rewind or fast forward mode.

TAPE TRANSPORT ASSEMBLY

The Model 612 tape transport mechanism utilizes a single - speed synchronous motor and a system of pulleys, belts and clutches to drive the capstan and turntables. Three modes of tape motion (play, rewind and fast forward) are determined by two controls located on the top panel of the tape transport assembly. (The neutral position of each control is marked by a dot).

Standby Operation-

Power is applied to the drive motor (59) when the power switch is turned to ON. The capstan (53) begins to rotate immediately, being driven by a nylon belt (58) which runs between the motor pulley (61) and the capstan flywheel (53). A second belt (54) running in a groove in the capstan flywheel drives the play takeup pulley (55). The shock relief brake rollers (73) are engaged against the rubber-tired fast forward and rewind clutches (30) and (48). Both turntables are motionless and the machine is in standby condition.

Since the capstan is in motion when the machine is in the standby condition, the tape will accelerate to full speed almost instantly when the play control is operated, thus producing a wow-free start.

Play Mode-

When the play control is turned to play the following mechanical sequence occurs:

1. The play takeup pulley (55) and belt (54) are brought to bear on the play takeup clutch (27).

2. The shock relief brake roller (73) on the play takeup side is released from the fast forward clutch tire (30).

3. The capstan idler (4) engages the capstan (53), which drives the tape, pulling it from the tape supply turntable (i.e. the rewind turntable) and feeding it to the takeup turntable, which now begins to rotate. It is especially important to understand that when the machine is operating normally in the play mode, in which the tape is clamped against the capstan by the capstan idler, the turntables are effectively isolated from each other. The takeup turntable, as its name implies, does nothing more than take up the tape fed to it by the capstan. It does not pull the tape from the tape supply turntable.

4. The shock relief brake roller (73) on the rewind side remains engaged against the rewind clutch tire (48) and slippage occurs between the clutch and the disc assembly (49). The friction produced in this slippage and the friction produced by the rewind holdback brake (44) operating on the bakelite drum (45) provide the required holdback tension.

Rewind Mode-

The rewind - fast forward control cannot be operated unless the play control is in neutral. When the rewind - fast forward control is turned to rewind:

1. Both shock relief brake rollers (73) are released.

2. The rewind idler (63) is clamped between the motor pulley (61) and the rewind clutch tire (48) and the rewind turntable is driven.

3. Holdback tension is provided by the holdback brake (23) on the takeup assembly as tape is pulled from the takeup turntable.

Fast Forward Mode-

When the rewind - fast forward control is turned to fast forward:

1. Both shock relief brake rollers (73) are released.

2. The rubber-tired fast forward clutch (30) is brought to bear on the motor pulley (61) and drives the takeup turntable.

3. Holdback tension is produced by the holdback brake (44) on the rewind assembly.

ROUTINE MAINTENANCE

Routine Maintenance of the tape transport mechanism consists primarily of periodic cleaning and lubrication.

Cleaning-

All surfaces that come in contact with the tape (tape guide, heads, capstan and capstan idler) should be cleaned regularly with ethyl alcohol applied with a soft, lint-free cloth. Particular attention should be given to cleaning the capstan idler and the capstan, both of which tend to pick up the lubricant with which most tape is impregnated. Failure to remove these accumulations may lead to slippage, flutter and wow.

Lubrication-

The following lubricants are recommended (available as part of Maintenance Kit, Stock No. 6392):

West of the Rockies - Cal. Oil OC, Turbine No. 11.
East of the Rockies - Gulfcrest A, Gulf Oil Co.

The upper and lower bearings of the drive motor should be lubricated after every 500 hours of operation. The upper oil hole of the motor is accessible through a hole in the tape transport grille slightly above and to the left of the takeup turntable (See Fig. 1). For access to the lower oil hole, located in the side of the motor end bell, remove the tape transport from the case.

Four or five drops of one of the recommended lubricants is sufficient. Care should be taken to avoid over-oiling or spills. Any such excess should be wiped away with a solvent.

The capstan may require oiling about once for every four oilings of the drive motor. For access to the upper bearing, the capstan idler (4) must first be removed. Remove the rubber cap on the idler. Remove the hair pin retainer and lift the idler off its shaft, taking care not to lose the washers associated with it. The aluminum plug-button over the capstan shaft may now be pried off and the felt washer beneath it removed to expose the upper capstan bearing. Use as much of one of the recommended lubricants as the bearing will accept, wipe away any excess, and reassemble.

CAUTION: Do not oil the felt washer which serves only as a dust protector and to keep oil from working its way up the capstan.

For access to the lower bearing, remove the tape transport from the case. The oil hole is located in the front of the capstan bearing housing. Use exactly four drops of oil - no more.

Do not oil any other parts of the tape transport mechanism. All other bearings and moving parts are lubricated for life.

MECHANICAL TROUBLE SHOOTING

Most of the difficulties encountered in the Model 612 tape transport mechanism will be traceable to contamination of belts, pulleys, bearings and other friction surfaces, whether due to carelessness in routine lubrication or to the gradual accumulation of dirt and other foreign material to be expected over a reasonable period of time. Correction of these difficulties will usually be a matter of careful disassembly and cleaning, rather than readjustments of the mechanism. The normal torques (and hence, tape tension) in this mechanism are fixed within strict design specifications and are not adjustable. The measurement of these torques will frequently provide a rapid means for isolating the sources of mechanical troubles.

Torques And Tape Tension-

The measurement of torques on the Model 612 requires the following equipment:

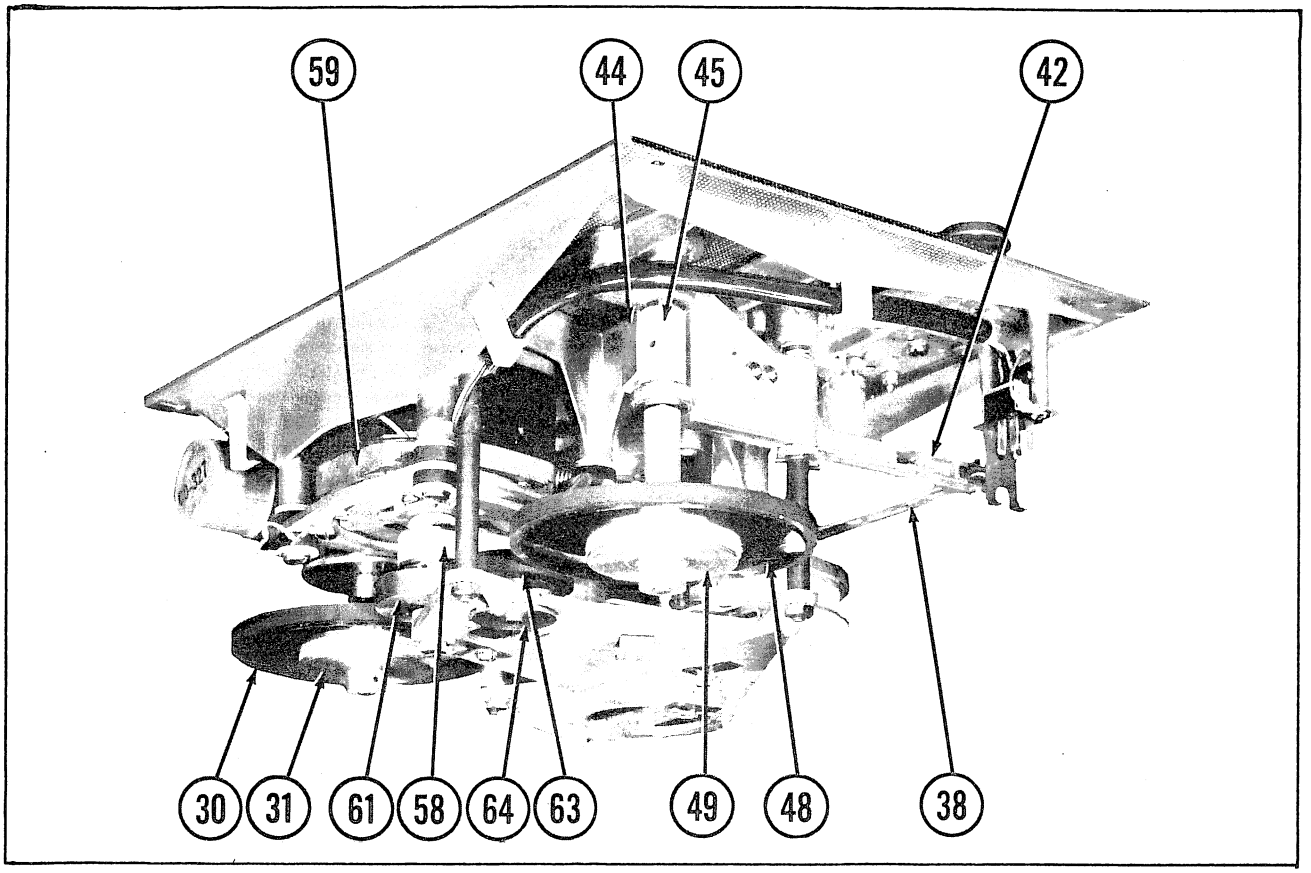


FIGURE 2

1. A light-movement spring scale (Post-A-Let 0-8 oz., Exact Weight Scale Co., Columbus, Ohio).

2. A measuring hub. A standard RTMA plastic reel may be used. If the hub diameter is exactly 2 inches, the spring scale will read directly in ounce-inches. Reels with smaller hubs can be brought up to 2-inch diameter by winding on sufficient tape. If a reel of greater than 2-inch hub diameter is used, multiply the spring scale reading by the hub radius to obtain the ounce-inch reading.

3. A piece of string, approximately 30 inches long, with a small loop tied in one end.

Torques measured on the driven turntable in any mode (i.e. the turntable on which the tape is being wound) are a measure of takeup tension. Torques measured on the turntable from which the tape is pulled in any mode are a measure of holdback tension.

To measure takeup tension, place the measuring hub on the driven turntable. Wind a few turns of string around the hub in the direction of normal tape wrap and attach the spring scale to the loop at the end. Start the machine in the appropriate mode as the string is wound on the hub, allow the scale to move in with it, taking the reading while the scale is in motion. Normal takeup torques are as follows:

Fast Forward---------- 5 to 7 oz. in.
Rewind---------- 5 to 7 oz. in.
Play---------- 2 to 3 1/2 oz. in.

To measure holdback tension, place the measuring hub on the turntable from which the tape is pulled in the mode in operation. Wind the string on fully in the direction of normal tape wrap and attach the spring scale. Start the machine in the appropriate mode and pull the scale slowly in the direction in which the tape is normally pulled from this reel, taking the reading while the scale is in steady motion. Normal holdback torques are as follows:

Fast Forward---------- 3/4 to 1 1/4 oz. in.
Rewind---------- 3/4 to 1 1/4 oz. in.
Play---------- 5 3/4 to 8 3/4 oz. in.

Malfunctions In Play Mode-

Nearly all malfunctions in the play mode will be reflected as flutter and wow in excess of specifications. A quick check of takeup and holdback tensions may lead directly to the source of trouble.

The word contaminated, as used here, may indicate either the presence of oil where it is not wanted or accumulations of dirt and other foreign matter on pulleys and belts. In either case carbon tetrachloride is recommended as the cleaning agent. After cleaning a contaminated part, clean any other part with which it normally comes into contact whether or not that part shows any immediate evidence of contamination.

1. Excessive or erratic holdback tension.

A. Contaminated rewind clutch felt (49).

B. Contaminated rewind clutch tire (48).

C. Rewind clutch spring (47) too stiff. This usually indicates tampering or carelessness in re-

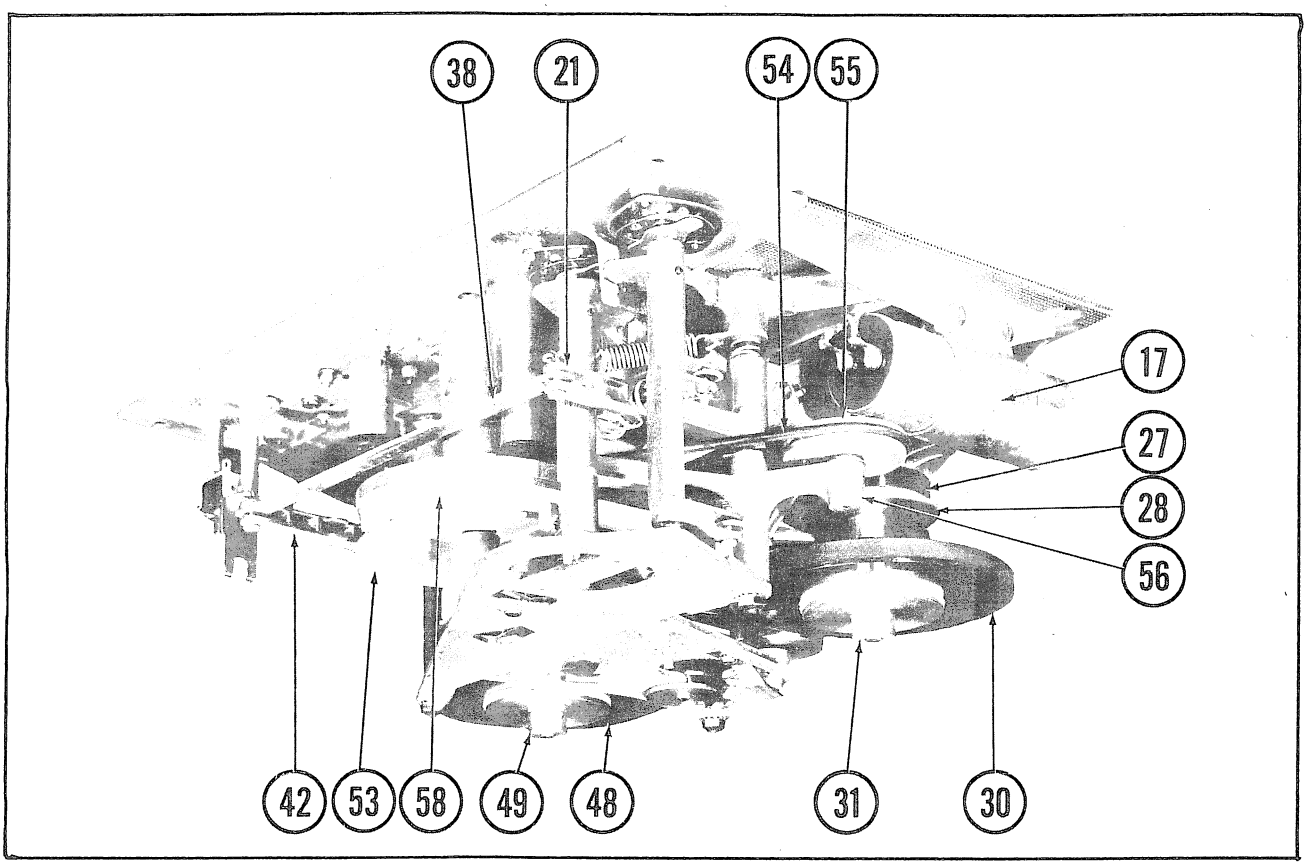


FIGURE 3

assembly. It is advisable to replace the spring rather than to attempt makeshift adjustment.

2. Excessive takeup tension.

A. Contaminated play takeup clutch felt (28).

B. Oilite bearing (25) bottoming on aluminum clutch disc (28). Minimum clearance should be .015". (See "Turntable Height Adjustment" for adjustment procedure).

C. Takeup clutch spring (29) too stiff. It is advisable to replace the spring rather than attempt re-adjustment.

3. Drive motor out of synchronism.

A. Line voltage below 105 volts AC.

B. Excessive play takeup tension. (See "2").

C. Nylon drive belt (58) tension excessive. (See "Drive Motor Centering").

D. Belt tensioning idler (37) dragging.

E. Drivemotor thrust misadjusted. (See "Drivemotor Thrust").

F. Defective drivemotor starting capacitor.

G. Dry bearings in drivemotor (59), capstan (53) or capstan idler (4). (See "Lubrication").

H. Defective drivemotor (59).

4. Flat or dented capstan idler tire.

A. If the capstan idler (4) is left engaged over an extended period when the machine is not operating, the idler tire may become dented. If running the machine in the play mode for several hours does not restore the tire to normal, the idler must be replaced.

5. Defective or improperly installed nylon drive belt (58).

A. Belt spliced improperly.

B. Belt installed with splice joint toward pulley.

C. Belt worn because misaligned motor pulley (61) causes the belt to track against one of the capstan pulley flanges (53).

6. Rewind idler (63) not disengaging from motor pulley (61).

7. Reels misaligned with respect to tape guides.

A. This will usually cause tape scrape which may or may not be audible but will generally appear as flutter. (See "Turntable Height").

Malfunctions In Rewind Or Fast Forward Modes-

Rewind and fast forward malfunctions will usually be reflected as an apparent loss of power in those modes, loose tape wind, erratic tape motion or slippage and possibly no rewind or fast forward at all. Make a quick check of rewind or fast forward torques as described under "Torques and Tape Tension". The malfunctions discussed below apply to either mode, the turntables, associated components and tape directions being opposite to each other.

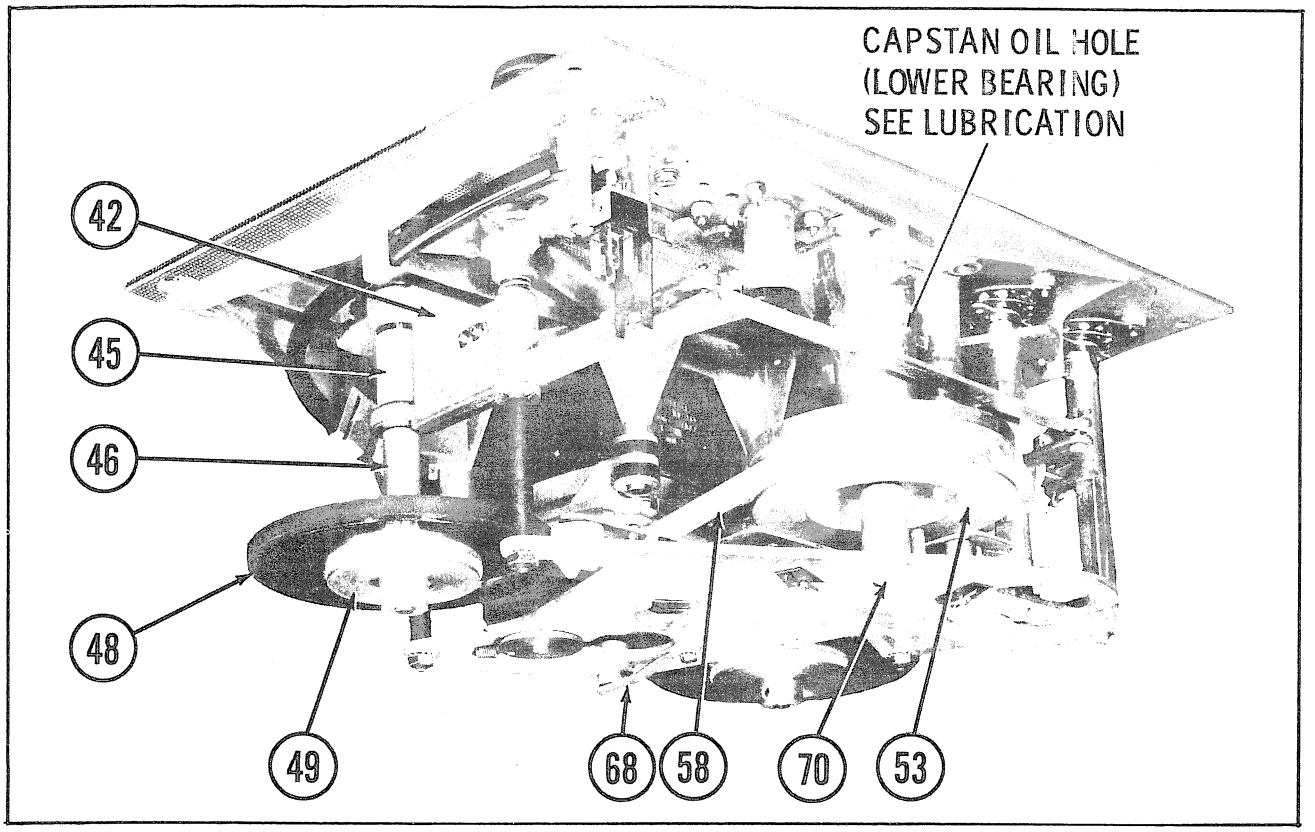


FIGURE 4

1. Takeup tension low.

A. Clutch leaf spring (29 or 47) too weak. Usually caused by tampering. Replace. Never attempt to increase rewind or takeup tension to offset other problems.

2. Excessive holdback tension.

A. Contaminated holdback wipes (23 or 44).

B. Bakelite drum (24 or 45) on which wipe operates has been roughened.

3. Brake shock relief roller (73) not releasing from fast forward clutch (30).

A. Evidence of bent or misassembled parts. (Check "Exploded View").

4. Contaminated clutch tire (30 or 48).

5. Rewind idler (63) not engaging motor pulley (61).

A. Bind in idler guide (64) due to contamination.

6. Malfunctioning turntable pivots (21 or 42).

A. Bind in turntable centering detent (41).

7. Bind in rewind idler bearing (63).

Starting, Stopping And Shuttling Malfunctions-

Starting, stopping and shuttling malfunctions will be evidenced by the throwing of tape loops and, in extreme cases, by tape breakage. These troubles are usually associated with low takeup tension or brake malfunctions produced primarily by tampering or misassembly, or due to careless oiling or accumulation of dirt.

1. Tape loop thrown on starting in play mode. (low play takeup tension).

A. Play takeup belt (54) contaminated.

B. Nylon drive belt (58) contaminated. If either the play takeup belt (54) or the nylon drive belt (58) is contaminated with oil, an over oiled motor or capstan is indicated. Clean all affected parts thoroughly with carbon tetrachloride.

C. Slippage between play takeup belt (54) and clutch (27) due either to weak play takeup arm spring (57) or bind in play takeup pulley bearing (55).

D. Bind in turntable shaft bearings (22 or 43) due to contamination. Clean and lubricate with two or three drops of medium weight oil.

E. Play takeup brake release (76) inoperative due to bind, weak or unattached spring (75) causing shock relief roller (73) to drag on fast forward clutch tire (30).

2. Tape loop thrown on stopping or shuttling.

A. One or both brake shock relief assemblies (73) binding.

B. One or both brake shock relief springs (74) off. End loops on these springs must be fully closed to prevent their becoming disconnected.

C. Bind in turntable centering detent (41).

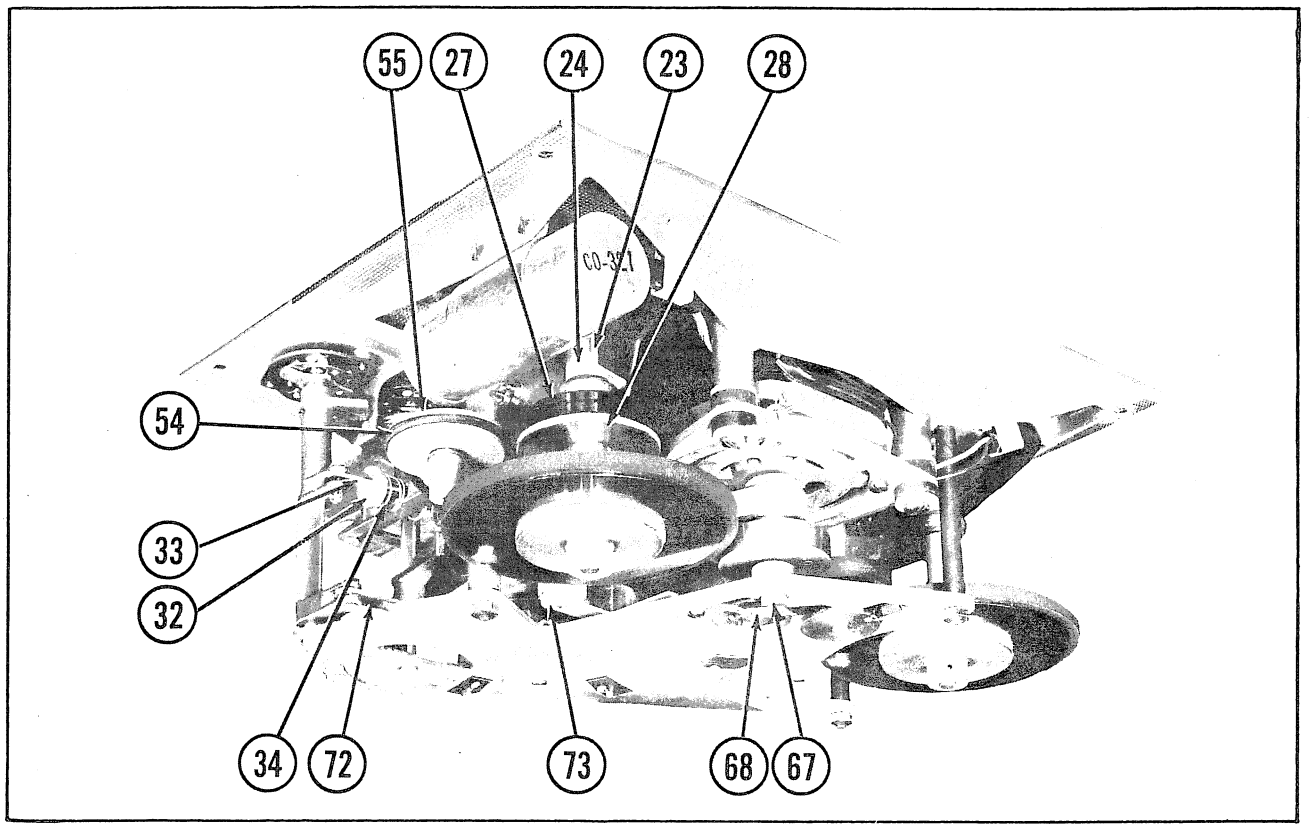


FIGURE 5

ADJUSTMENTS

The following section covers some adjustments, critical clearances and alignment which must be maintained in reassembling parts of the tape transport mechanism that may have been disassembled for servicing. Two general precautions should be observed in any required disassembly:

1. Always note the number, type and location of washers in an assembly very carefully. Should washers, retainers or other small hardward be lost or damaged in servicing, a kit containing an assortment of such hardware (Ampex Cat. No. 6392) is available through your Ampex dealer.

2. To remove the sub-plate (69), a preliminary to any further disassembly of parts under the top plate casting, remove only the three elastic stop-nuts that hold it and the clevis pin that links the slide lever (72) to the lower yoke of the rewind-fast forward actuator. It is unnecessary to remove the adjustment screw (70) for the capstan thrust. If the setting of this screw is changed, it must be carefully readjusted as described in the following sub-sections. The thrust disc (71) above this screw, being coated with grease, will usually stay in place when the sub-plate is removed. It is advisable, however, to be sure that it does not fall out. It will be easier to reinstall the sub-plate, after servicing, if the play control is placed in the "Play" position.

Drivemotor Centering-

The tape transport incorporates rubber shock mounts on the screws retaining the motor mounting plate to the top plate casting. These shock mounts provide automatic centering of the drivemotor and no adjustments are necessary.

Drivemotor Thrust-

The drivemotor thrust is a hardened steel ball (62) against a nylon disc (66). End thrust is regulated by a spring leaf acting against a thrust plunger. If drivemotor end play is present, replace the spring leaf.

NOTE: End play is present if the motor does not remain under spring tension.

Capstan Thrust-

The capstan thrust is a hardened steel ball against nylon disc (71). The capstan thrust is adjusted by set-screw (70). End play of .010" to .015" is required and obtained as follows:

1. Coat the nylon thrust disc (71) liberally with wheel bearing grease and drop it through the threaded hole in the sub-plate (69) over the capstan shaft.

2. Insert the set-screw (70) and tighten down until it is felt to bottom on the thrust disc (71). Grasp the capstan flywheel (53) between the thumb and index finger. While maintaining a slight downward pressure on the head of the set-screw with the screwdriver (to simulate the pressure that will later be applied by the locking screw) start backing the screw off slowly and work the capstan flywheel up and down until an audible click at the ends of its travel indicates the presence of end play. This will occur when the set-screw has been backed off approximately 1/4 of a turn. At this point, end play should be in the required range.

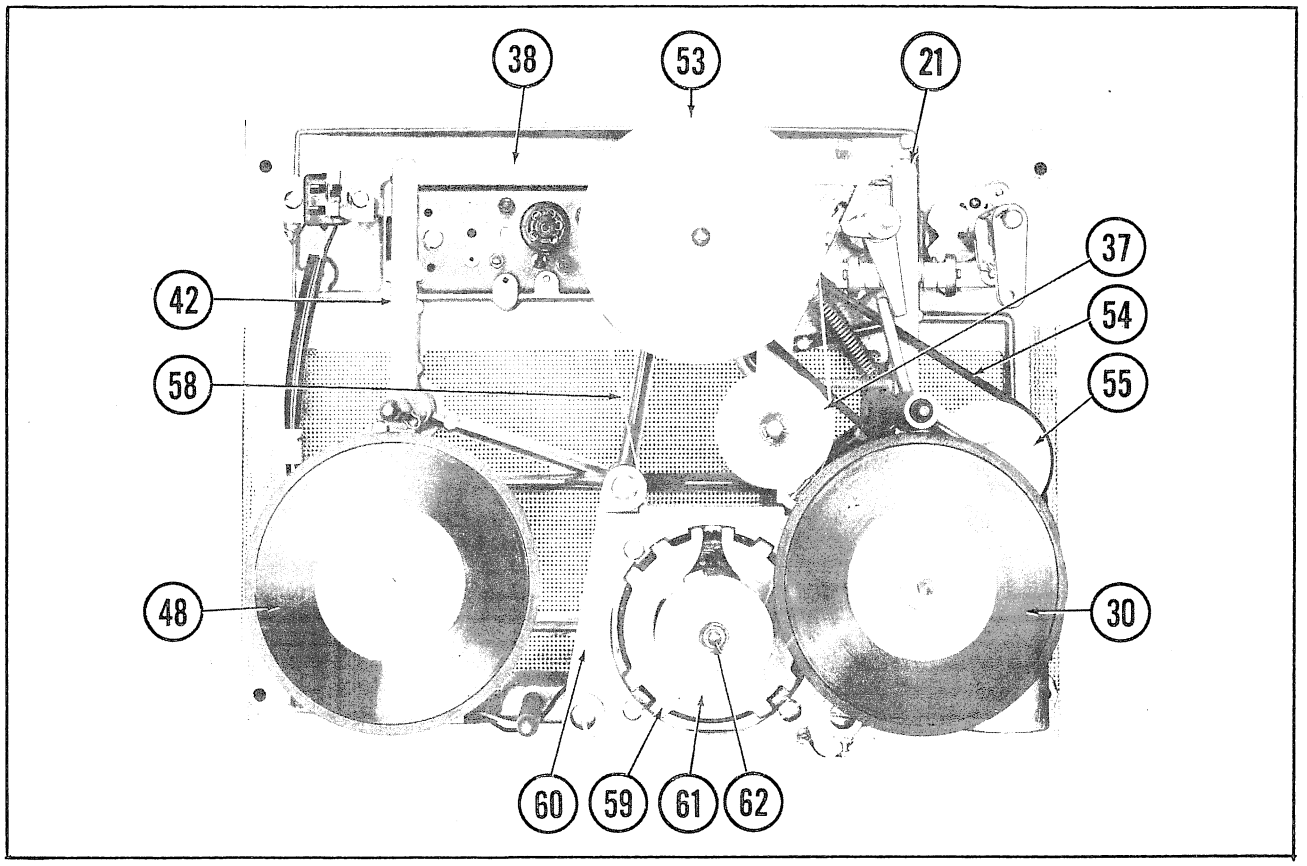


FIGURE 6

3. Tighten the locking nut on the set screw, then recheck end play.

Turntable Height-

Turntable height (the distance measured from the top surface of the turntable (2) to the perforated metal grille) should be .125" ± .008". This height is determined by the placement of lamicoid washers between the bottom of the turntable pivot (21 or 42) and the hair pin retainer on the shaft through the pivot. Difficulties with tape tracking that are traced to improper turntable height may be corrected by increasing or decreasing the number or thickness of these washers.

Play Takeup Clutch-

The play takeup clutch assembly consists of a felt-lined aluminum disc (28) and a bakelite clutch (27) which is spring-loaded to the disc. When the machine is in the play mode the clutch is driven by the rubber belt (54) on the play takeup pulley (55). Location of the felt-lined aluminum disc is critical, a clearance of .015" being required between the end of the oilite bearing (25) which goes through the bakelite clutch (27) and the bottom of the aluminum disc (28). This clearance, which cannot be measured directly with a gauge because of the physical arrangement, can be set quite accurately by the following indirect method:

1. Insert a removable .015" shim or feeler gauge between the thrust washer that rides on the inner race of the lower ball bearing (22) of the takeup turntable pivot (21) and oilite bushing (25).

2. Assemble the conical spring (26), the bakelite clutch (27) and the felt-lined aluminum disc (28) (in that order) on the turntable shaft (15).

3. Guide the end of the oilite bushing through the hole in the center of the bakelite clutch and press the aluminum disc down until it bottoms firmly on the end of the bushing.

4. Holding the disc in place, tighten the set screw in its hub.

5. Remove the shim or gauge. The expansion of the conical spring will then force the oilite bushing back off the aluminum disc, thus creating the required .015" clearance.

Rewind And Fast Forward Clutch Alignment-

The rubber-tired bakelite rewind (48) and fast forward clutch (30) must line up with the shock relief brake assemblies (73) so that the rollers engage the full width of the tires. In addition, the rewind clutch (48) should be aligned for full-width contact with the rewind idler (63) and the fast forward clutch (30) for full width contact with the motor pulley (61).

Capstan Speed-

The capstan speed will not vary, since the capstan is driven by a non-slipping nylon belt and synchronous motor. No adjustment of the capstan speed will be necessary. If it is desired to check the capstan speed, use a pre-recorded 5000 cycle tape (that has been recorded on a machine of known accuracy) and an electronic frequency counter.

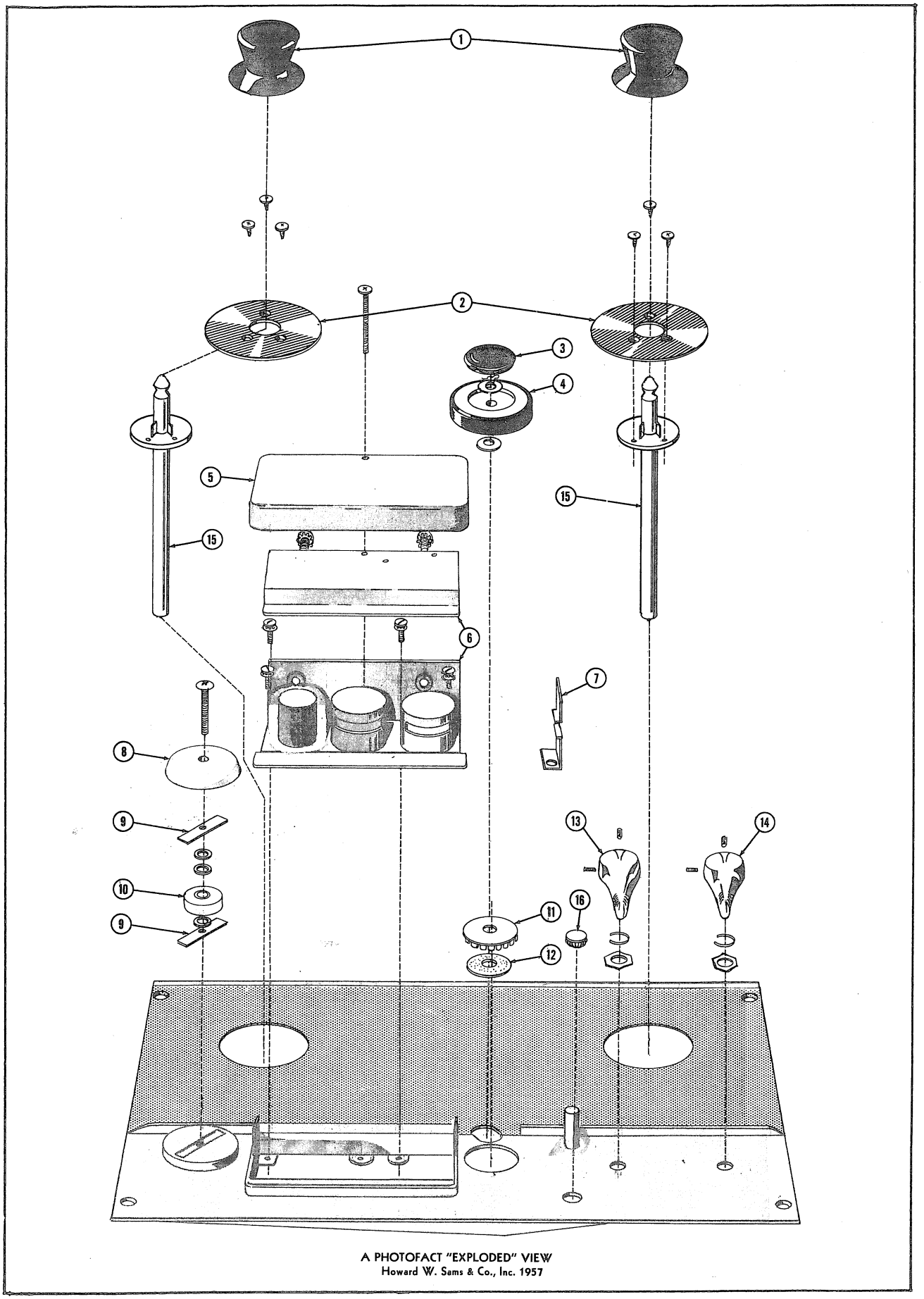


FIGURE 7A. EXPLODED VIEW OF PARTS ABOVE BASEPLATE.

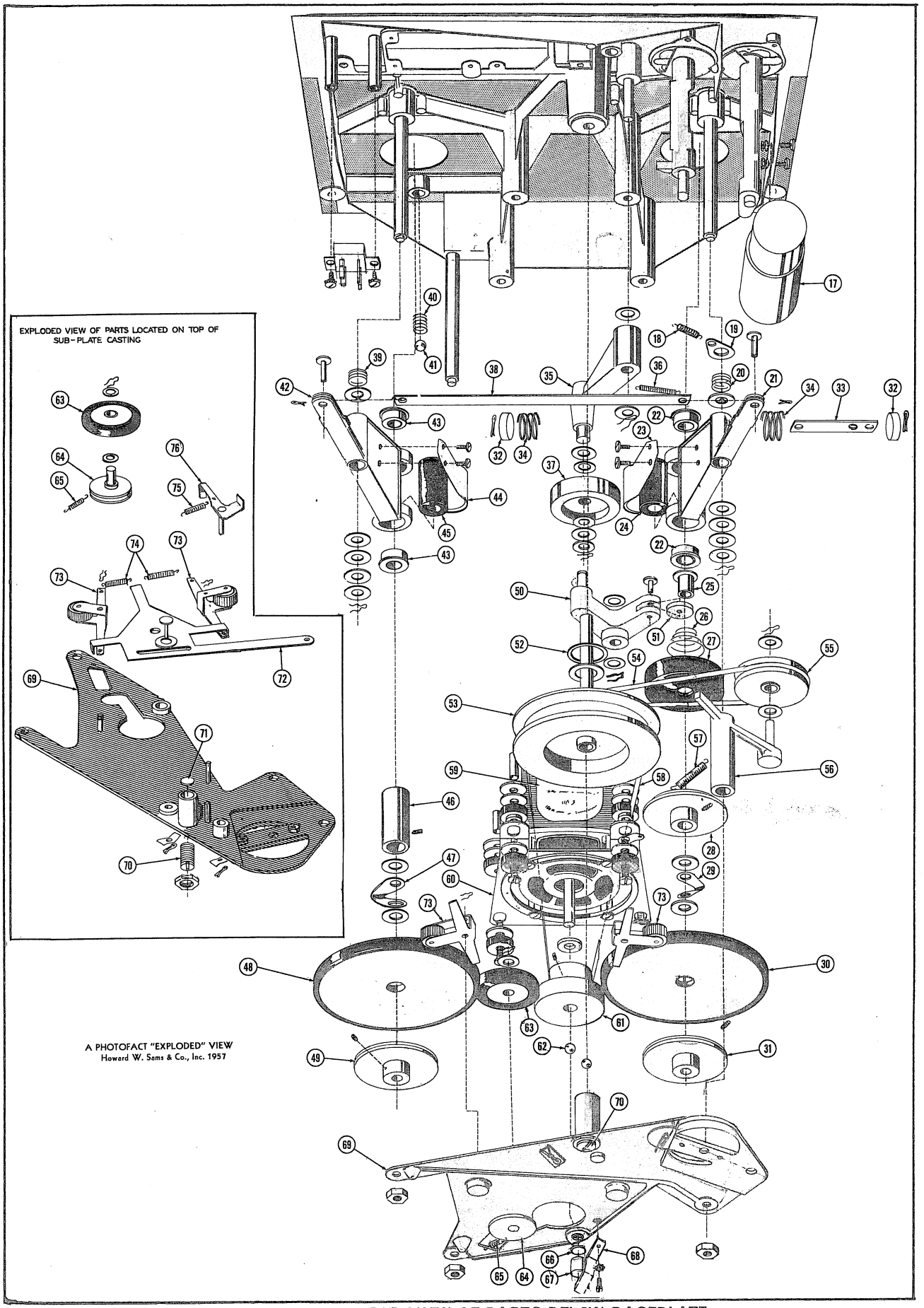


FIGURE 7B. EXPLODED VIEW OF PARTS BELOW BASEPLATE.

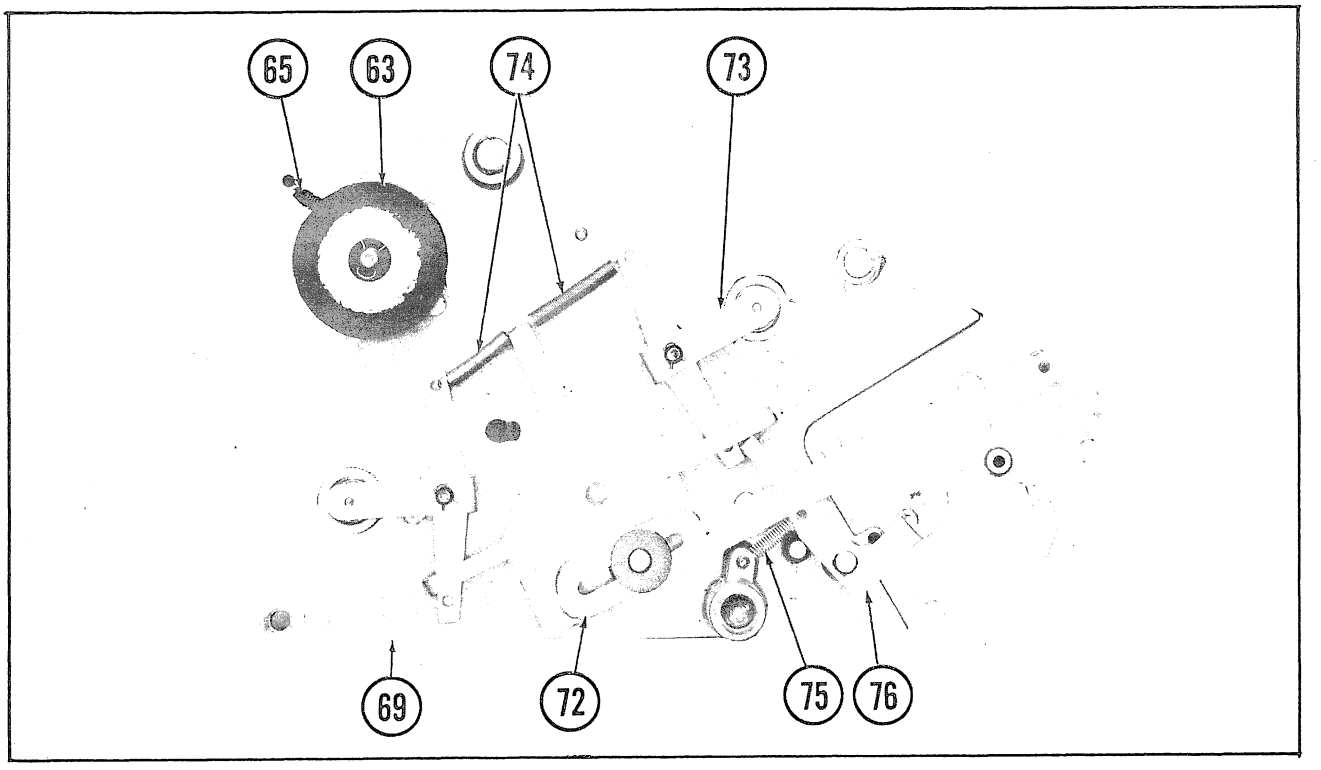


FIGURE 8

cations, the trouble may be a worn, dirty or otherwise faulty head, a partially erased alignment tape (due to head magnetization) or improper equalization of the playback amplifier.

2. Repeat the procedure of Step 1 at the Right output.

3. Repeat Step 1 with the selector control in the single position.

Playback Equalization-

1. Playback equalization is a bench procedure. Set up the test equipment as shown in Fig. 9. Headphones are not necessary.

2. Set the selector control on Stereo.

3. Terminate the Left output as shown in Fig. 9.

4. Connect the oscillator to pin 1 and 2 of the head cable connector. Pin 1 is ground.

5. Set the oscillator at 500 cycles and adjust its output for a VTVM reading 10 db below normal operating level (approximately 0.4 volts RMS) to establish a reference.

6. Increase the oscillator frequency to 8,000 cycles and adjust channel 1 equalization screwdriver adjustment to set response on the curve in Fig. 9 at that point.

7. Sweep the oscillator through the frequency range shown in the curve. Make certain that the output from the oscillator remains constant over this range. Response should follow the curve within $\pm$ 1/2 db. Channel No. 1 is then properly equalized.

8. Terminate the Right output as shown in Fig. 9.

9. Connect the oscillator to pins 3 and 4 of the head cable connector. Pin 3 is ground.

10. Complete Steps 5, 6 & 7, this time adjusting channel 2.

Equalization screwdriver adjustment to set the response on the curve in Fig. 9. Channel No. 2 is then properly equalized.

Hum Balance Adjustment-

1. After completing the foregoing adjustments as necessary, disconnect the oscillator and its external connections and re-connect the head cable and tape transport power cable.

2. Leave the selector control on Stereo and the external connections on the Right output.

3. With the power on but with no tape running, read the output on the VTVM and set the Hum Balance channel 2 screwdriver adjustment for minimum output.

NOTE: For most accurate setting of these controls the tape transport and electronic assembly should be either in the case or arranged in their proper respective positions on the bench. Strong external electric and magnetic fields can seriously influence the hum balance settings. Care should be taken to insure that these are minimized. A good check is to move the units around while observing the meter. If the hum balance is position-sensitive it is an indication of the influence of stray fields.

4. When the minimum balance is set, listen with headphones to the output of the VTVM and if possible observe with an oscilloscope. In this way, noisy or microphonic tubes can be detected.

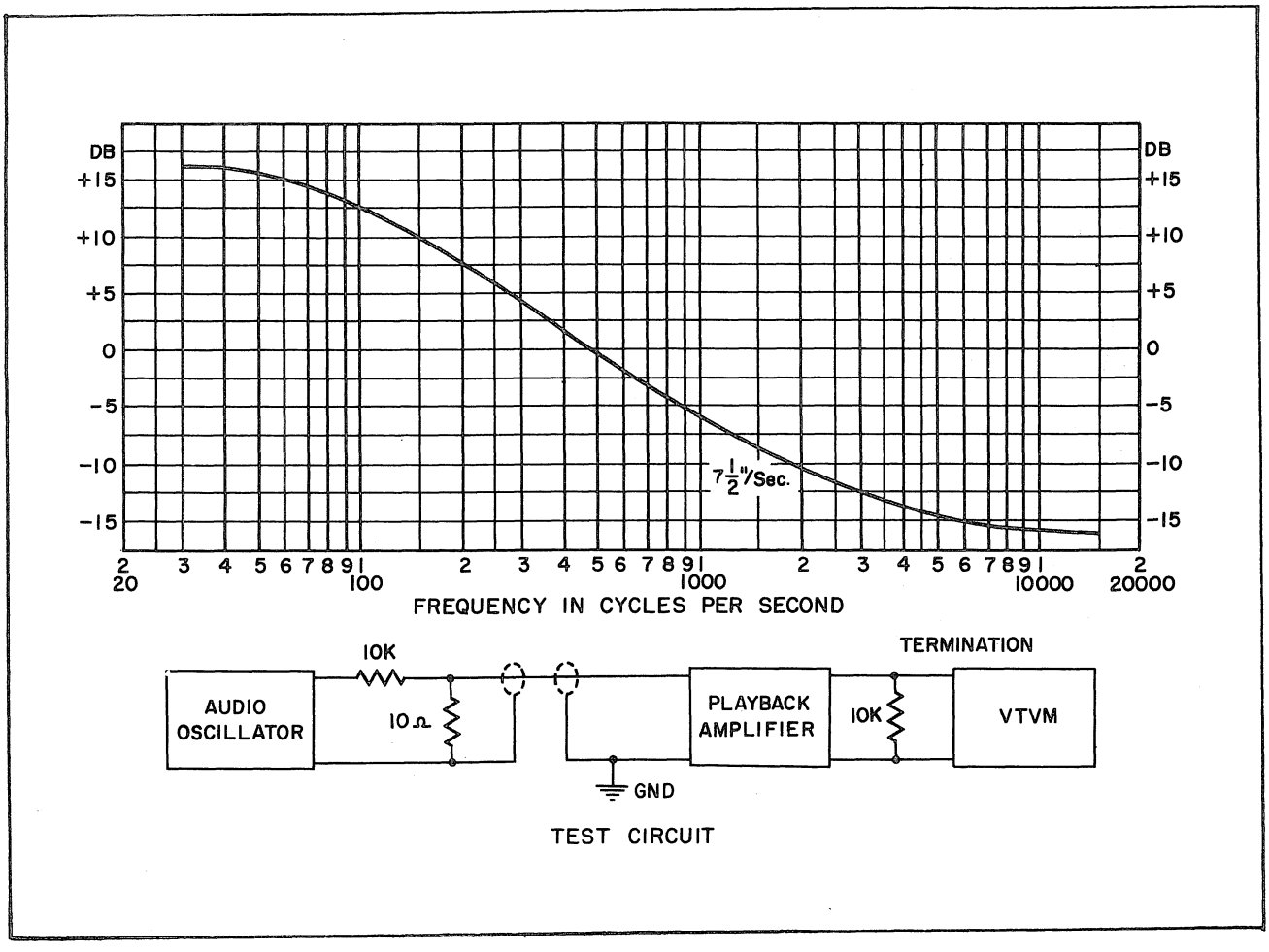


FIGURE 9

5. Move the 10,000 ohm resistor and VTVM to the Left output.

6. With power on but with no tape running, read the output on the VTVM and set the Hum Balance Channel 1 screwdriver adjustment for minimum output.

7. Repeat Step 4.

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	AF Amplifier	6F5	
V2	AF Amplifier	5879	
V3	AF Amplifier - Cathode Follower	12AU7	
V4	AF Amplifier	6F5	
V5	AF Amplifier	5879	
V6	AF Amplifier - Cathode Follower	12AU7	
V7	Rectifier	5Y3GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	AMPEX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	20	450	CO-65	AFH4-14	D0130	FP444	TMQ-12	Q-040	TVL-4763
B	▲20	450							
C	■20	450							
D	▲20	450							
C2	250	3	CO-508 Note #1	PRS6V250	BRH6025		TD-250-6	MTH-0625	TVA-1102
C3	50	25	CO-60	PRS25V50	BR502	TC29	TD-50-25	FM-0250	TVA-1206
C4	4	450	CO-54	PRS450V4	BR445	TC70	TD-4-450	FM-4504	TVA-1702
C5	250	3	CO-508 Note #2	PRS6V250	BRH6025	TC50025	TD-250-6	MTH-0625	TVA-1102
C6	4	450	CO-54	PRS450V4	BR445	TC70	TD-4-450	FM-4504	TVA-1702

Note #1. Chassis prior to Serial Number 5F0100 use 1000MFD in this application (Part No. CO-329).
Note #2. Not used in chassis prior to Serial Number 5F0100.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	AMPEX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C7	.047	400	CO-333							
C8	.022	400	CO-380	BPD-02	DD-203	CUB4S22	817-02	GEM-4122	4TM-S22	
C9	.047	400	CO-347	BPD-05	DF-503	CUB4S47		GEM-4147	4TM-S47	
C10	.047	400	CO-347	BPD-05	DF-503	CUB4S47		GEM-4147	4TM-S47	
C11	.047	400	CO-333							
C12	.022	400	CO-380	BPD-02	DD-203	CUB4S22	817-02	GEM-4122	4TM-S22	
C13	.047	400	CO-347	BPD-05	DF-503	CUB4S47		GEM-4147	4TM-S47	
C14	10000		CO-338	BPD-01	DD-103	K082	811-01	DC511	5HK-S1	

CONTROLS

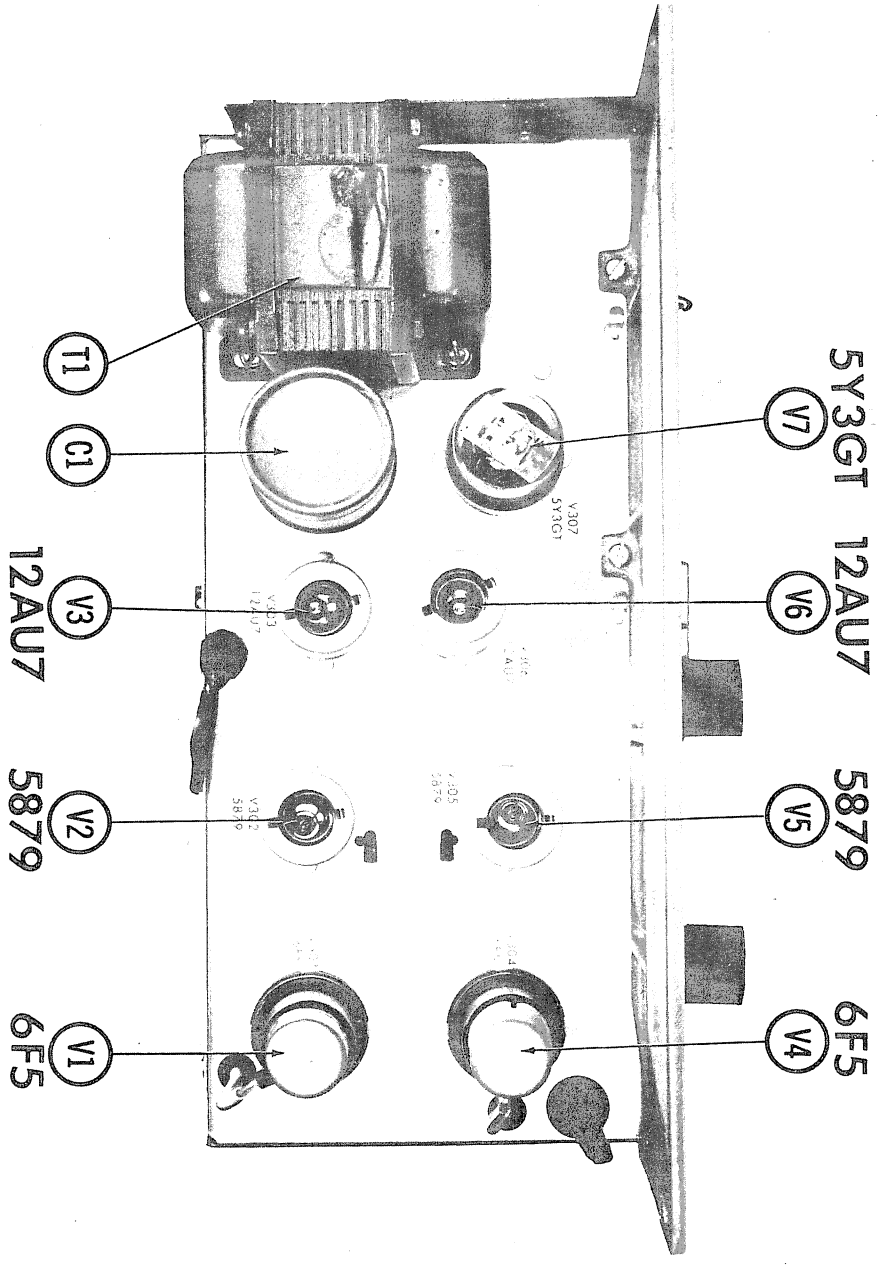
ITEM No.	RATING RESIST-ANCE	RATING WATTS	AMPEX PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	250K	½	6254316	BB-103	AD47-250K-Z	Q13-130		Volume
B	250K	½				M13-130		Volume
C					FKS-1/4	Not Req.		Shaft (Attach to R1A)
R2A	10K	½	RE616	AB-15	A47-10K-Z	Q13-116	U18	Equalization Channel 2
B				AK-1	FKS-1/4	SQ	Not Req.	Shaft (Attach to R2A)
R3A	10K	½	RE616	AB-15	A47-10K-Z	Q13-116	U18	Equalization Channel 1
B				AK-1	FKS-1/4	SQ	Not Req.	Shaft (Attach to R3A)
R4A	250K	½	RE614	AB-51	A47-250K-Z	Q13-130	U44	Level Balance
B				AK-1	FKS-1/4	SQ	Not Req.	Shaft (Attach to R4A)
R5A	100Ω	2www	RE618		A43100	WPK100	R100L	Hum Balance Channel 2
B					FKS-1/4	Not Req.	Not Req.	Shaft (Attach to R5A)
R6A	100Ω	2www	RE618		A43100	WPK100	R100L	Hum Balance Channel 1
B					FKS-1/4	Not Req.	Not Req.	Shaft (Attach to R6A)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	AMPEX PART No.	IRC PART No.	NOTES
R7	330K	1	RE-427	BTS-330K	
R8	220K		RE-762		
R9	2200Ω		RE-369	BTS-2200	Note #1.
R10	1Meg		RE-290	BTS-1Meg	
R11	100K	1	RE-761		
R12	100K	1	RE-761		
R13	82K		RE-764	BTS-82K	
R14	1000Ω		RE-448	BTS-1000	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AMPEX PART No.	IRC PART No.	
R15	47K		RE-299	BTS-47K	
R16	1500Ω		RE-332	BTS-1500	
R17	15K		RE-304	BTS-15K	
R18	1500Ω		RE-332	BTS-1500	
R19	47K		RE-299	BTS-47K	
R20	330K		RE-427	BTS-330K	
R21	220K	1	RE-762		
R22	2200Ω		RE-369	BTS-2200	Note #2
R23	1Meg		RE-290	BTS-1Meg	
R24	100K	1	RE-761		
R25	100K	1	RE-761		

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AMPEX PART No.	IRC PART No.	
R26	82K		RE-764	BTS-82K	
R27	270K		RE-297	BTS-270K	
R28	47K		RE-299	BTS-47K	
R29	1500Ω		RE-332	BTS-1500	
R30	1Meg		RE-290	BTS-1Meg	
R31	15K		RE-304	BTS-15K	
R32	1500Ω		RE-332	BTS-1500	
R33	47K		RE-299	BTS-47K	
R34	10K		RE-453	BTS-10K	
R35	2700Ω	2	RE-161	BTB-2700	
R36	2700Ω	2	RE-161	BTB-2700	

Note #1. A 1000Ω @ $\frac{1}{2}$ W Resistor Used In Some Versions (Part # RE-448)
Note #2. Not Used In Chassis Prior To Serial Number 5F0100.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	AMPEX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .30A	520VCT @ .017A	5V @2A	6.3V @.9A SEC 4 6.3V @.8A	7753					

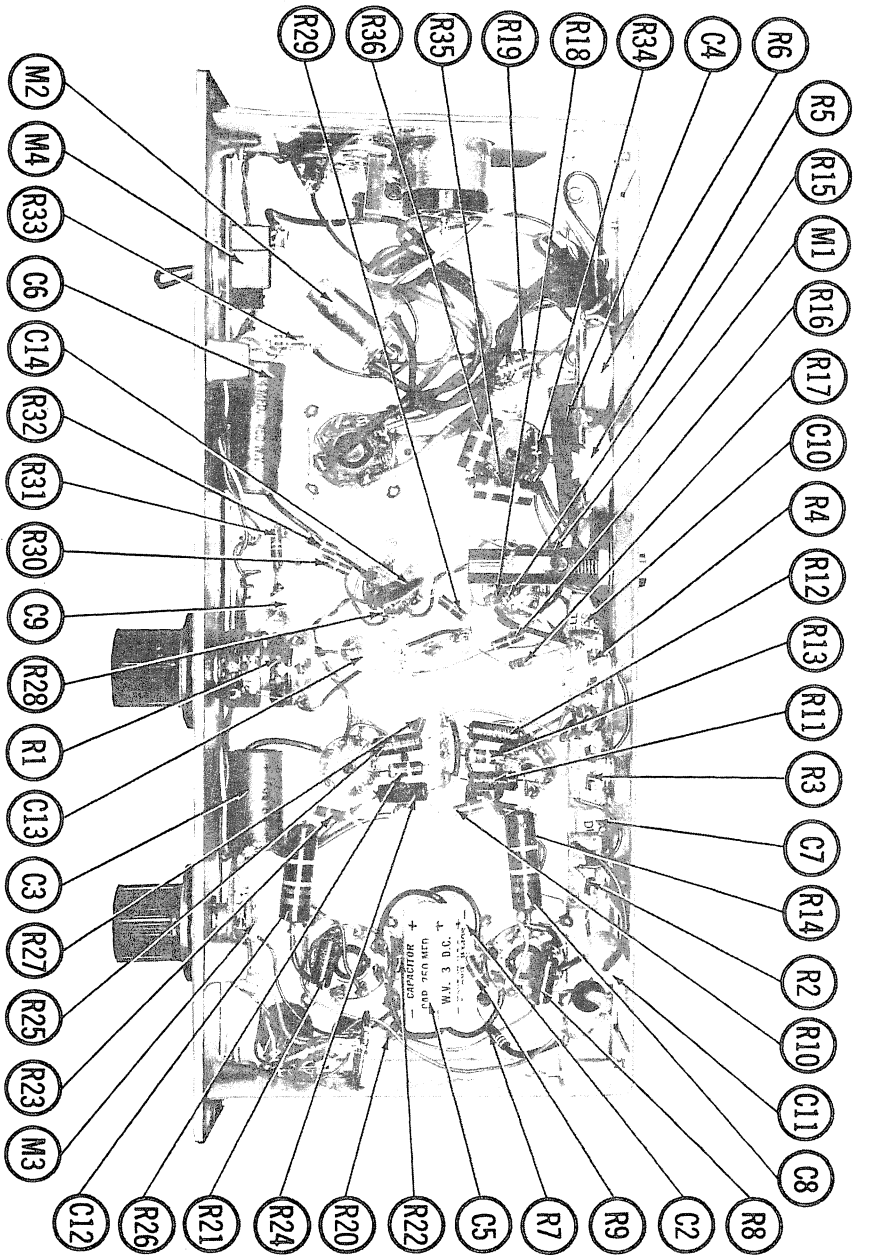
FUSES

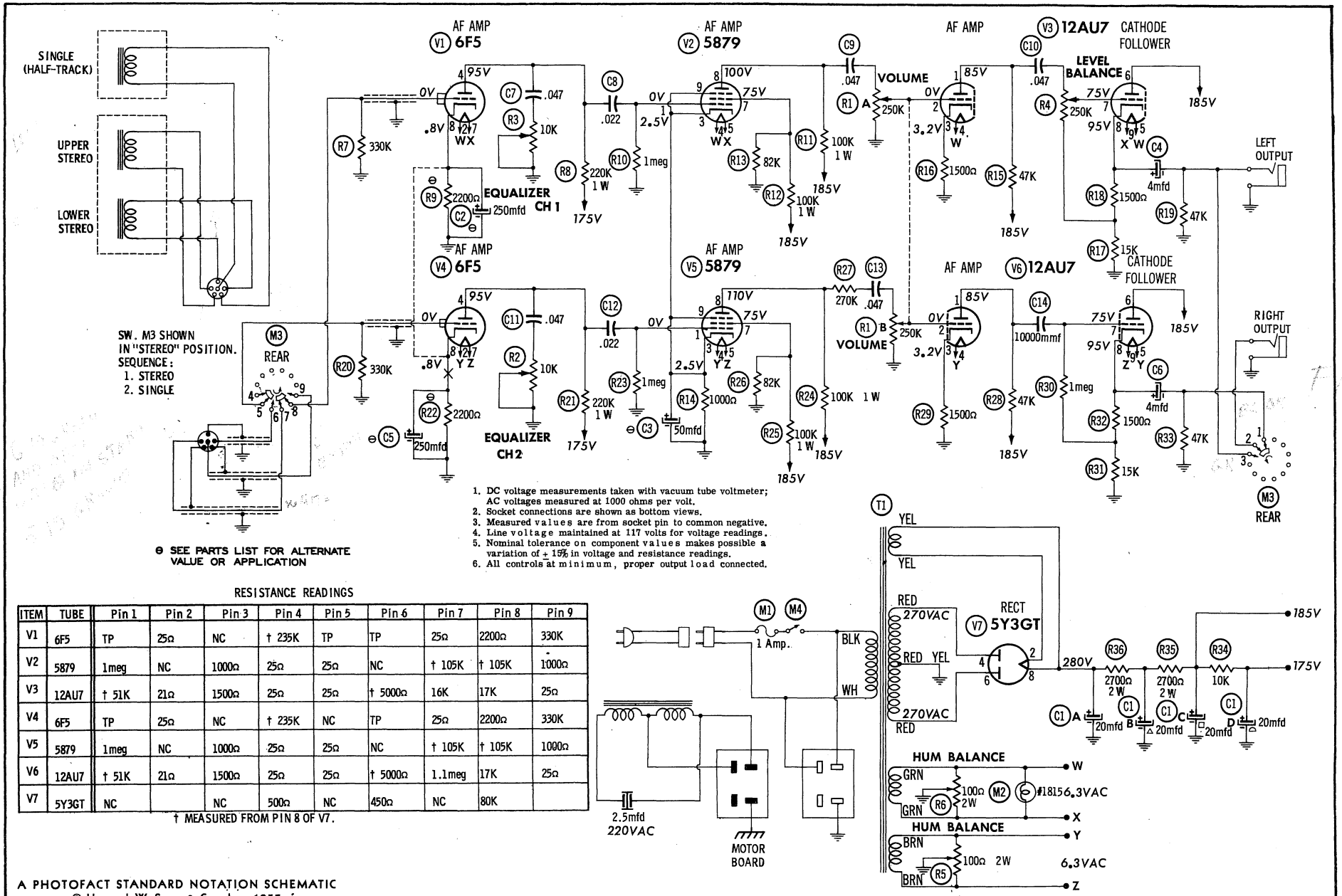
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			AMPEX PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	1A 250V	FU-1	FE-5	312001. (3AG 1A)	341001	AGC 1	HKP

MISCELLANEOUS

ITEM No.	PART NAME	AMPEX PART No.	NOTES
M2	Pilot Light		#1815
M3	Switch	7756-2	Selector (3PDT Rotary, Wafer Type)
M4	Switch	SW-74	On-Off (Power) Toggle Type
	Knob	KN-14	2 Used (Selector & Volume)

CHASSIS—BOTTOM VIEW





RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6F5	TP	25Ω	NC	† 235K	TP	TP	25Ω	2200Ω	330K
V2	5879	1meg	NC	1000Ω	25Ω	25Ω	NC	† 105K	† 105K	1000Ω
V3	12AU7	† 51K	21Ω	1500Ω	25Ω	25Ω	† 5000Ω	16K	17K	25Ω
V4	6F5	TP	25Ω	NC	† 235K	NC	TP	25Ω	2200Ω	330K
V5	5879	1meg	NC	1000Ω	25Ω	25Ω	NC	† 105K	† 105K	1000Ω
V6	12AU7	† 51K	21Ω	1500Ω	25Ω	25Ω	† 5000Ω	1.1meg	17K	25Ω
V7	5Y3GT	NC		NC	500Ω	NC	450Ω	NC	80K	

† MEASURED FROM PIN 8 OF V7.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	6319	Reel Hold Down Knob
2	6205	Turntable
3	6203	Cap — Capstan Idler
4	6211-1	Capstan Idler (with oilite bearing)
5	6207-2	Cover — Head Assembly
6	12031-1	Head Assembly (1/2 track and 2 channel playback)
7	6208-1	Tape Guide (Head)
8	6202-2	Cap, Tape Guide
9	6201	Bar, Tape Guide
10	BC-8	Ball Bearing, Tape Guide
11	6273	Cap, Dust Shield, Capstan
12	6219	Dust Seal, Capstan, Felt
13	KN-7	Play Knob
14	KN-7	Rewind — Fast Forward Knob
15	6244-1	Hub (with shaft)
16	PB2-5/16	Plug Button
17	BR-20	Capacitor Bracket
18	6910	Spring, Capstan Idler Arm
19	6224	Anchor
20	6217	Turntable Height Spring, Takeup
21	6243	Pivot Arm, Takeup
22	BC-34	Ball Bearing
23	6320-1	Holdback Brake Assembly
24	6293	Collar, "Drum"
25	BB-13	Oilite Bearing
26	6137	Spring, Conical
27	6247	Clutch, Play Takeup
28	6248-1	Disc Assembly (with small felt)
29	6246	Spring, Clutch "U"
30	6251-1	Clutch Assembly, Fast Forward (with oilite bearing)
31	6248-2	Disc Assembly (with large felt)
32	6254	Washer, Spring Retaining, Cup
33	6253	Link, Turntable Control
34	6218	Spring Control
35	6264-1	Idler Arm Assembly
36	6216	Spring, Idler Arm
37	9066-1	Idler Pulley Assembly (with oilite bearing)
38	6221	Link, Turntable Pivot
39	6217	Turntable Height Spring, Rewind
40	6911	Spring, Detent, Rewind Arm
41	BC-21S	Steel Ball, 5/16", Detent, Rewind Arm
42	6243	Rewind Pivot Arm
43	BC-34	Ball Bearing
44	6320-1	Holdback Brake Assembly
45	6293	Collar, "Drum"
46	6316	Collar, Spacer
47	6246	Spring, Clutch "U"
48	6251-1	Clutch Assembly, Rewind (with oilite bearing)
49	6248-2	Disc Assembly (with large felt)
50	6236-1	Capstan Arm Sub-Assembly
51	6237	Roller, Capstan Arm Sub-Assembly
52	6262	Felt Washer, Capstan
53	9353-1	Capstan Assembly, With Flywheel, Shaft & Ball
54	OR-10	Takeup Belt, Rubber "O" Ring
55	6268-1	Pulley Assembly, Play Takeup Arm (with oilite bearing)
56	6270-1	Arm Assembly, Takeup
57	6138	Spring, Takeup
58	2871-3	Drive Belt, Nylon, 60 CPS
	2871-6	Drive Belt, Nylon, 50 CPS
59	6239	Motor
60	6240	Motor Mounting Plate
61	6241-0	Motor Pulley, 60 CPS
	6241-1	Motor Pulley, 50 CPS
62	BC-155	Ball 1/4", Motor Thrust
63	6285-1	Idler Wheel (with oilite bearing)
64	6288-1	Guide Assembly, Idler
65	6136	Spring, Rewind, Idler
66	6934	Thrust Disc, Nylon
67	7532	Plunger, Motor Thrust
68	7531	Spring, Motor Thrust
69	6275	Sub-Plate Casting
70	MS-32-27-1125	Special Set Screw, Capstan Thrust
	NU-16-616C	Hex Jam Nut, Capstan Thrust, 3/8"-27
71	6934	Thrust Disc, Nylon
72	6277	Slide Lever, Brake Actuator
73	6279-1	Brake Shock Relief Ass'y.
74	9368	Spring, Actuator
75	6215	Spring, Release Lever
76	6278	Release Lever, Play Mode Brake