AMPEX

MODEL 600

MAINTENANCE MANUAL

TABLE OF CONTENTS

SECTION I

DESCRIPTION AND SPECIFICATIONS

The AMPEX Model 600 is a lightweight portable magnetic tape recorder designed to meet the needs of both professional and non-professional users in remote pickups, custom home installations, and studio applications.

The AMPEX 600 is available in various combinations of operating conditions as listed below:

Power Input . . . . . 117 volts, 50 or 60 cycles.
Tape Speed . . . . . 7-1/2 or 3-3/4 inches per second.
Head Assembly . . . . . full-track or half-track.
Electronics Input . . . . . high or low impedance.

Sections I through VI of this manual are concerned primarily with the basic version of the Model 600; a 7-1/2 ips, full track, high impedance input portable recorder to be used with 117 v, 50 or 60 cps power. Additional notes and information on standard variations of this basic machine are given in the supplement, Section VII, which also covers accessory equipment for machines in this series. It is suggested that service personnel refer to the appropriate parts of Section VII as a preliminary to the operation and servicing of machines other than the basic version.

The complete basic equipment, as shipped from the factory, includes the following:

	Item	Ampex Cat. No.
(1)	Tape Transport (7-1/2 in/sec, full track)	6200
(1)	Electronic Assembly	6350
(1)	Carrying Case (with hardware)	9417
(1)	Power Cord	CS-2
(1)	7-inch RTMA Plastic Reel	RD-4
(2)	Reel Hold-Down Knobs	6319
(1)	Microphone Plug	PL-33P
(1)	Phone Plug	PL-324P
(1)	RTMA Pin Plug	PL-323P
(1)	Operator's Guide	

The performance specifications and physical characteristics of the "basic" machine are as follows:

TAPE SPEED

7-1/2 in/sec, full track

REEL SIZE

7 in. RTMA reel maximum

FREQUENCY RESPONSE

40 to 15,000 cycles/sec
± 2 db 50 to 10,000 cycles/sec
down no more than 4 db at 15 Kc

SIGNAL TO NOISE RATIO

Over 55 db below Peak Record Level (defined as 3% total rms harmonic distortion when measured on 400 cycle tone; noise includes bias, erase, and playback amplifier noise).

FLUTTER AND WOW

Below 0.25%

STARTING TIME

Instantaneous - (tape accelerates to full play-record speed in less than one second)

STOPPING TIME

Less than one second

PLAYING TIME

32 minutes with 7 in. reel (1200 feet)

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-Record: Selector Switch (safety button must be pressed when going from Play to Record)

Fast Forward-Rewind: Selector Switch (interlocked with Play-Record Switch)

LEVEL CONTROLS

Separate Mixing Controls: Microphone Record Level, and Line Record Level

RECORD INPUTS

Microphone: Accommodates any high impedance microphone (may be modified for low impedance microphone by adding accessory transformer).

Line: 0.5 volt required for program level (1% distortion)

PLAYBACK OUTPUT

1.25 Volts into 10,000 ohms at program level

MONITORING

Phone jack and illuminated VU meter. Either program input or playback output may be monitored while recording, depending on position of Monitor Selector switch. (A-B)

HEAD ASSEMBLY

Separate erase, record, and playback heads contained in a single housing.

POWER REQUIREMENTS

117 volts, 50 or 60 cycles; .52 amperes, 61 watts (power line frequency is indicated on serial number plate on side of case).

DIMENSIONS

Tape Transport:	9-5/16" x 12-1/2" x 5"
Electronics:	6-1/8" x 12-1/2" x 5"
Overall Size, Including Case:	16-1/2" x 13-3/4" x 8"

WEIGHT

26 pounds, including case

ACCESSORIES

Low impedance Microphone Transformer Kit: Catalog No. 9359

SECTION II

INSTALLATION AND OPERATION

2.1 General

The Model 600 may be operated in either the horizontal or the vertical position. If the machine is left in its carrying case, "installation" consists only of making up and connecting the required cables, discussed in Section 2.2. For studio installations, an adaptor (Cat. No. 9684) designed to permit mounting of the Model 600 in a standard 19-inch relay rack may be used. Critical dimensions and clearances, and some suggestions for use in planning custom home installation with the Model 600 are given in Section 2.3.

2.2 Input, Output, and Power Cables

A power cable and matching plugs for the MICROPHONE, LINE INPUT, and OUTPUT connectors are supplied with the machine.

Shielded, low-capacity cable is recommended for making up input and output cables. It is considered good practice to make such cables as short as is consistent with convenience in interconnecting units in any audio system. Refer to the schematic diagram, Fig. 6.1, to determine the correct pin connections for all plugs.

IMPORTANT

> The Model 600, as shipped from the factory is wired for use with a high impedance microphone. Provision has been made for internal mounting of a microphone transformer to convert the machine for use with low impedance microphones. Installation instructions for this transformer (available in Ampex Kit, Cat. No. 9359) are given in the Supplement at the end of this manual.

2.3 Custom Installation

The playback head cable on the "600" is double-shielded to insure against RF pickup. Cable capacity and length have been

minimized to avoid high frequency loss. It is therefore impossible to mount the electronic assembly and the tape transport more than about a foot apart.

If the playback head cable is lengthened to permit greater separation of the units, the frequency response specification indicated in Section I may not be met. Should an installation absolutely demand lengthening of the cable, it is suggested that a very low-capacity type (e.g. RG/62U) be used, and that an outer shield be added. Under no circumstances should cable length exceed 3 feet if high frequency losses are to be kept to a minimum.

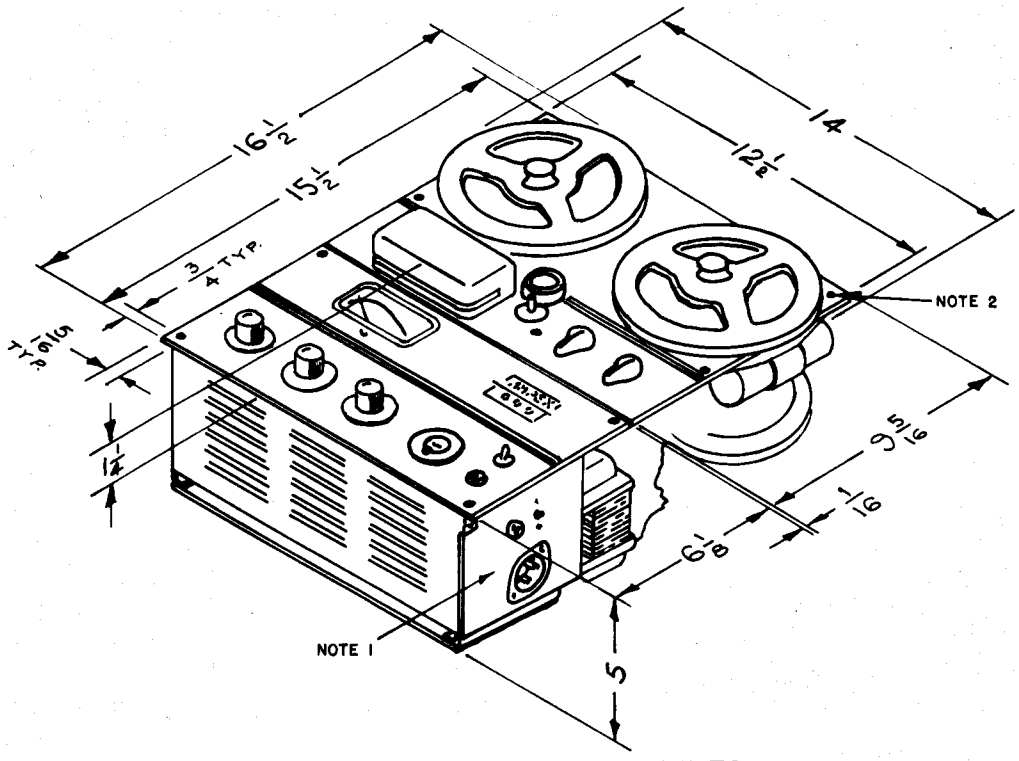
Space requirements and some suggested layouts for custom installation are given in Fig. 2.1. Be sure to allow sufficient clearance at the right side of the electronics chassis to permit easy access to the LINE INPUT and the OUTPUT connectors. If desired, these connectors may be brought out to a patch panel mounted at some convenient point in the installation so that they will always be readily accessible.

The diversity of home music systems now in use makes it impossible to lay down any hard and fast rules for incorporating a Model 600 in them. In general, however, most of these systems are equipped with a sufficient number and variety of input and output connectors to permit great flexibility in interconnection. Wherever a "600" is inserted in an existing system, the MONITOR SELECTOR should be turned to INPUT, when not recording, in order to permit any units preceding the "600" to play straight through.

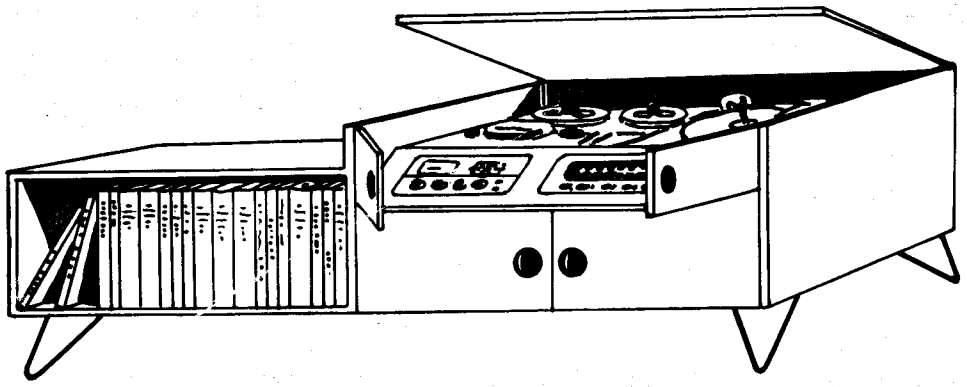
2.4 Impedance Matching, Signal Levels, and Equalization

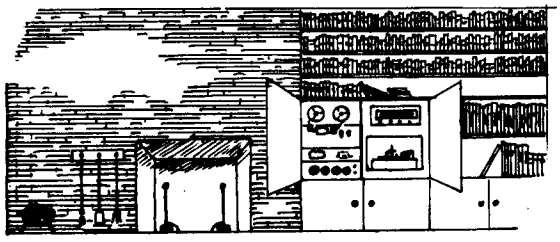
Regardless of the particular application in which the Model 600 is to be used, the following general requirements and observations should serve as a guide in interconnecting the machine with any other piece of equipment:

A. The unit to which the 600 is to be connected for playback should have an input impedance of 10,000 ohms or more. If the machine is to work into a 600-ohm studio line, a bridging transformer or some other impedance-matching device will be required.



SPACE AND CLEARANCE REQUIREMENTS





NOTE:

1. ALLOW CLEARANCE FOR ACCESS TO CONNECTORS.
2. INSERT RUBBER SHOCK MOUNTS UNDER MOUNTING HOLES OF MECHANICAL ASSEMBLY

CUSTOM INSTALLATION
MODEL 600
AMPEX CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 2.1

TM-9 10-20-54

B. Any unit to be connected to the LINE INPUT should deliver a signal of at least 0.5 volt. The LINE INPUT is used in recording from tuners, phonographs, or other tape recorders.

C. Phonographs with crystal pickups may be connected directly to the LINE INPUT when copying disc recordings. For phonographs with variable reluctance or other low-level pickups, the output of the phonograph preamplifiers should be used. Regardless of the type of pickup, the phonograph should be properly equalized s as recommended by its manufacturer to produce a flat program input to the Model 600.

D, If a tuner to be used in making recordings has more than one output, use the one marked DETECTOR. This output precedes any tone controls or other frequency compensating circuitry in the tuner, and provides an essentially flat program. If the tuner has only one output, and has integral tone controls, these controls should be set for flat response when making tapes.

2.5 Tape Threading (NOTE: See Supplement B - Special Note)

The tape threading path described below is the same for all modes of operation. See Fig. 2.2.

A. Place a reel of tape on the left-hand turntable, and an empty reel on the right-hand turntable. Be sure that the pins around the base of each spindle engage the corresponding slots on the reel hubs.

B. Press a Reel Hold-Down knob in place on each spindle.

C. Thread the tape as indicated in Fig. 2.2; (a) around the left side of the tape guide; (b) through the head assembly (dull side of the tape facing inward toward the heads); (c)

between the capstan and the capstan idler: (d) infront of the guide post, and; (e) take a full turn counterclockwise around the hub of the empty reel. It is not necessary to anchor the tape in the slot on the reel hub.

2.6 To Record

A. Thread a reel of tape on the machine. It is not necessary to erase previously recorded tapes before re-using them. Any previous program on the tape will be erased as the new program is recorded.

B. Turn the POWER switch on.

C. Turn the MONITOR SELECTOR to INPUT.

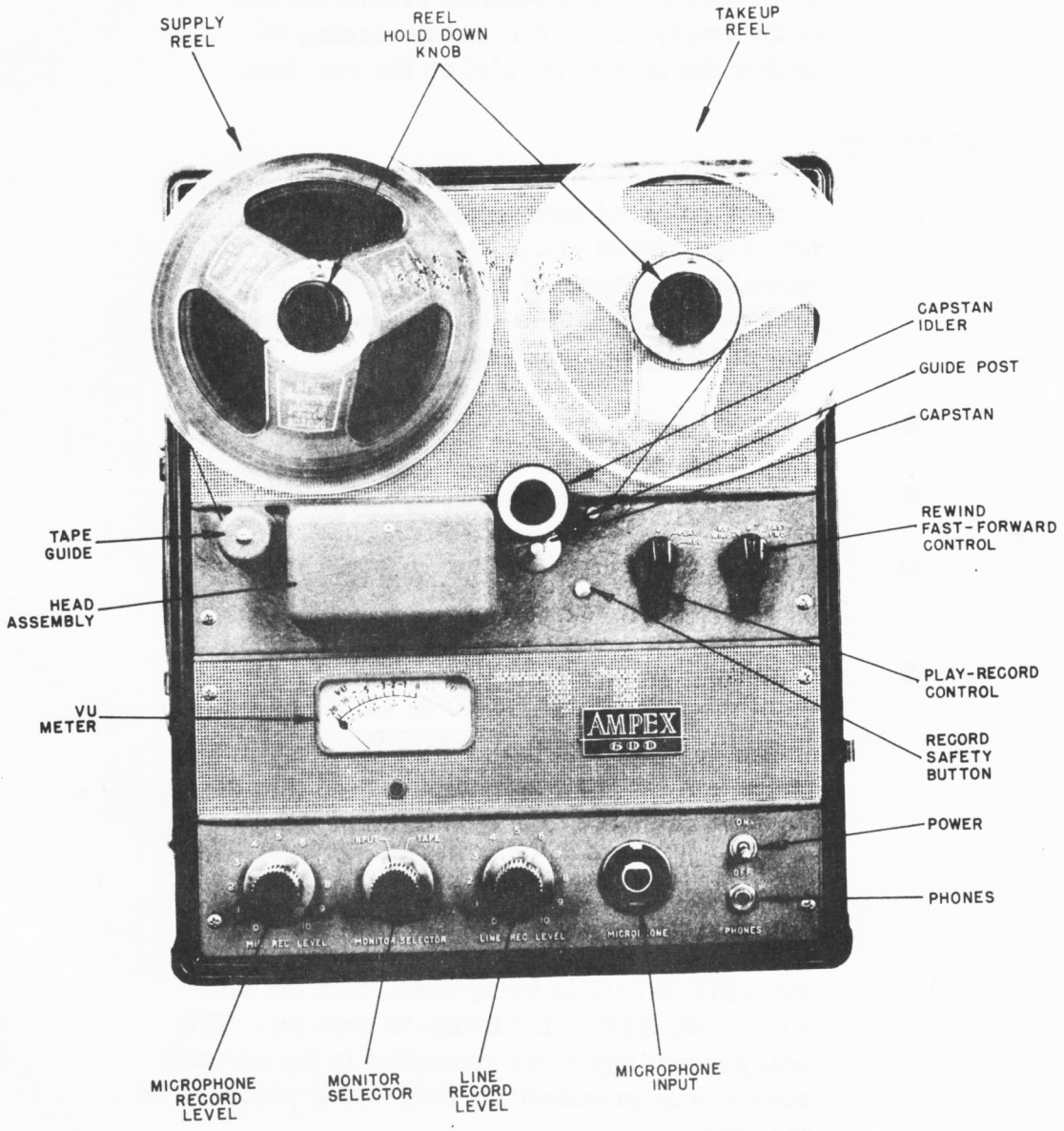
D. Connect microphone, tuner, phonograph or other program source to the appropriate input.

E. Adjust either the MICROPHONE RECORD LEVEL or the LINE RECORD LEVEL control (depending on whether the MICROPHONE input or the LINE INPUT is being used) so that on the most intense peaks of volume of the program to be recorded, the panel meter swings up to approximately zero (0) on the VU scale. Note that it is unnecessary to put the tape in motion in order to set program level. If only the LINE INPUT is being used, turn the MICROPHONE RECORD LEVEL to zero (0). This will prevent any noise generated in the un-used microphone preamplifier from being recorded on the tape.

F. Turn the RECORD-PLAYBACK control to RECORD.

IMPORTANT

This control cannot be put in the RECORD position unless the RECORD SAFETY button near its lower left side is held down while the control



OPERATING NOMENCLATURE
MODEL 600
AMPEX CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 2.2

TM-18 11-29-54

is turned. This safety feature prevents accidental erasure of previously recorded tapes. It is not necessary to hold the RECORD SAFETY button down in order to return from the RECORD position to PLAYBACK or neutral (marked by a dot).

The machine is now recording. A continuous comparison of the incoming program and the program off the tape may be made while recording by turning the MONITOR SELECTOR back and forth between INPUT and TAPE and observing the VU meter or using headphones.

To stop recording, return the RECORD-PLAYBACK control to neutral (marked by a dot).

2.7 To Play Back

A. Thread a previously recorded tape on the machine.

B. Turn the POWER switch ON.

C. Turn the RECORD-PLAYBACK control to PLAYBACK.

D. Turn the MONITOR SELECTOR to TAPE.

E. Adjust playback volume by using the volume control of the radio, tuner, amplifier, or sound system being used.

IMPORTANT

If the Model 600 ever fails to play back a tape, always check to see that the MONITOR SELECTOR is set on TAPE (Step D), before looking for trouble elsewhere. When the machine is in the Play mode, there will be no signal at the OUTPUT connector if the MONITOR SELECTOR is on INPUT.

2.8 Rewind and Fast Forward

A. The recorder may be placed in the REWIND or FAST FORWARD mode by turning the REWIND-FAST FORWARD control to the appropriate position.

IMPORTANT

The REWIND-FAST FORWARD control and the PLAY-RECORD 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 or RECORD.

B. The tape may be shuttled back and forth between FAST-FORWARD and REWIND without waiting for the tape to slow down or stop before changing its direction. Cueing and editing may be done at high speed with no danger of tape breakage.

CAUTION

To avoid tape stretch or breakage, never attempt to put the machine in the PLAY or RECORD modes while the tape is in motion. (e.g. to go from FAST-FORWARD to PLAY, turn the REWIND-FAST FORWARD control to neutral, and wait until the tape stops before switching to PLAY.)

2.9 Erase

A. To erase a previously recorded tape without recording a new program on it, turn both of the record level controls to 0 (zero), and run the tape through in the RECORD mode.

2.10 Mixing

Since the microphone and line recording channels of the Model 600 are independent, and each has its own level control, it is possible

to record simultaneously from two sources without using an external mixer.

For example, singing, voice announcements or instrumental accompaniment may be dubbed in on a program being recorded from a radio, tuner or phonograph. To do this, simply connect the radio, tuner or phonograph to the LINE INPUT connector. Connect a microphone, and adjust both the MICROPHONE RECORD LEVEL and LINE RECORD LEVEL controls for the desired balance between the two programs, and record.

2.11 Synthetic Reverberation

Special effects, somewhat similar to those that may be obtained through the use of an "echo chamber", may be created easily on the Model 600.

Connect a microphone and set program level as usual; then connect OUTPUT to LINE INPUT, turn the MONITOR SELECTOR to TAPE, and start recording. The reverberation decay rate (i.e. the time required for the "echo" to die away) can be varied with the LINE RECORD LEVEL control. The control setting chosen will depend entirely on the effect desired. If the control is set too high, continuous oscillation will occur (indicated on the VU meter by the needle swinging up to maximum and staying there). If this happens, back off to a lower setting.

SECTION III

OVERALL PERFORMANCE CHECKS

3.1 General Notes and Definitions

All Ampex recorders are correctly aligned and adjusted at the factory just before shipment, and will readily meet the specifications given in Section I provided no shipping damage has occurred. Whenever there is any doubt concerning the performance of the Model 600, the applicable overall performance checks should be made as a preliminary to making any necessary readjustments.

The following is a list of definitions of output levels referred to in performance checking and alignment procedures on the Model 600.

A. Normal Operating Level

Approximately 1.25 Volts RMS into 10,000 ohms. This is the point at which the maximum total harmonic distortion is 1% at 400 cycles.

B. Peak Recording Level

The 3% distortion point per NARTB standards. The level at which 3% distortion occurs may vary considerably, depending on the characteristics of the tape used. For the purposes of this Manual, Peak Recording Level is defined as 6 db above Normal Operating Level.

C. Standard Tape Level

10 db below Normal Operating Level. Ampex Alignment Tapes are recorded at this level.

3.2 Overall Frequency Response Measurement

Due to the nature of the pre-emphasis in the record amplifier, tape saturation will occur at high frequencies unless the response check is made 20 db below Normal Operating Level.

The procedure is as follows:

A. Thread a tape on the machine.

B. Connect an audio oscillator to LINE INPUT and set the oscillator to 1,000 cps.

C. Terminate the OUTPUT in a 10,000 ohm resistor and connect a sensitive A.C. VTVM across this load

D. Turn the machine on. Turn the MONITOR SELECTOR to INPUT, and adjust the LINE REC LEVEL control for a VTVM reading 20 db below Normal Operating Level. (i.e., approximately 0.13 Volts RMS)

E. Turn the MONITOR SELECTOR to TAPE and start the machine in the record mode.

F. Sweep the oscillator slowly through the specified response range and observe the response on the VTVM. If the response fails to meet specifications, check the output of the oscillator over the range before attempting the alignment procedures given in Section V.

3.3 Overall Noise Measurement

The procedure for measuring overall wide band noise is derived from the NARTB signal-to-noise definition, given in Specifications.

A. Thread a tape on the machine.

B. Connect an audio oscillator to LINE INPUT and set the oscillator to 400 cps.

C. Terminate the OUTPUT in a 10,000 ohm resistor and connect a sensitive VTVM across this load.

D. Turn the machine on. Turn the MONITOR SELECTOR to INPUT, and adjust the LINE REC LEVEL control for a VTVM reading 6 db above Normal Operating Level. (i.e., approximately 2.5 Volts RMS)

E. Start the machine in the record mode, and record a substantial length of tape.

F. Rewind the tape. Disconnect the oscillator. Turn the LINE REC LEVEL Aand MIC REC LEVEL controls to zero.

G. Put the machine in the record mode, thus erasing the previously recorded signal, then rewind the tape.

H. Turn the MONITOR SELECTOR to TAPE, and start the machine in the play mode. The noise signal read on the VTVM (for full-track machines) should not be greater than .004 Volts RMS (i.e., fully 55 db below Peak Recording Level.)

3.4 Overall Distortion

Overall distortion can be measured by connecting any standard distortion measurement apparatus having an input impedance of 10,000 ohms or greater across the OUTPUT (terminated in 10,000 ohms) and recording a 500 cycle signal from an audio oscillator at either Normal Operating Level or Peak Recording Level. Readings from a wave analyzer or selective frequency distortion meter will be more accurate at low distortion levels than those from a null type instrument. Fundamental null type meters measure noise as well as distortion. Noise should therefore be checked before making distortion measurements with this type of instrument.

Distortion readings may vary with the type of tape used. Overall distortion should not exceed 1% at Normal Operating Level and 3% at Peak Recording Level. (It is advisable to check the distortion in the output of the oscillator used for measurement. A reading of .2% or .3% is satisfactory.)

3.5 Flutter and Wow

Flutter and Wow are produced by periodic irregularities in tape speed, and appear as cyclic frequency deviations in recording or reproducing. They can be measured by means of any standard flutter

bridge connected across the correctly terminated machine output. Flutter at 7 1/2 ips tape speed on the Model 600 should not exceed 0.25%.

NOTE: Slow amplitude variations in output level may be noted in the course of measurement. These are entirely due to tape coating variations and do not constitute flutter.

SECTION IV

TAPE TRANSPORT ASSEMBLY

4.1 General

The Model 600 tape transport mechanism utilizes a single-speed synchronous motor and a system of pulleys, belts, and clutches to drive the capstan and the turntables. Four modes of tape motion, (Play, Record, Rewind, and Fast Forward) are determined by two three-position controls located on the lower right side of the top plate. (The neutral position for each control is marked by a dot).

The bracketed numbers in this section refer to parts shown in Fig. 4.1, 6.2 and in the parts list at the end of this manual. For greatest facility in following the discussion below, it is suggested that Fig. 6.2 be opened out fully for ready reference.

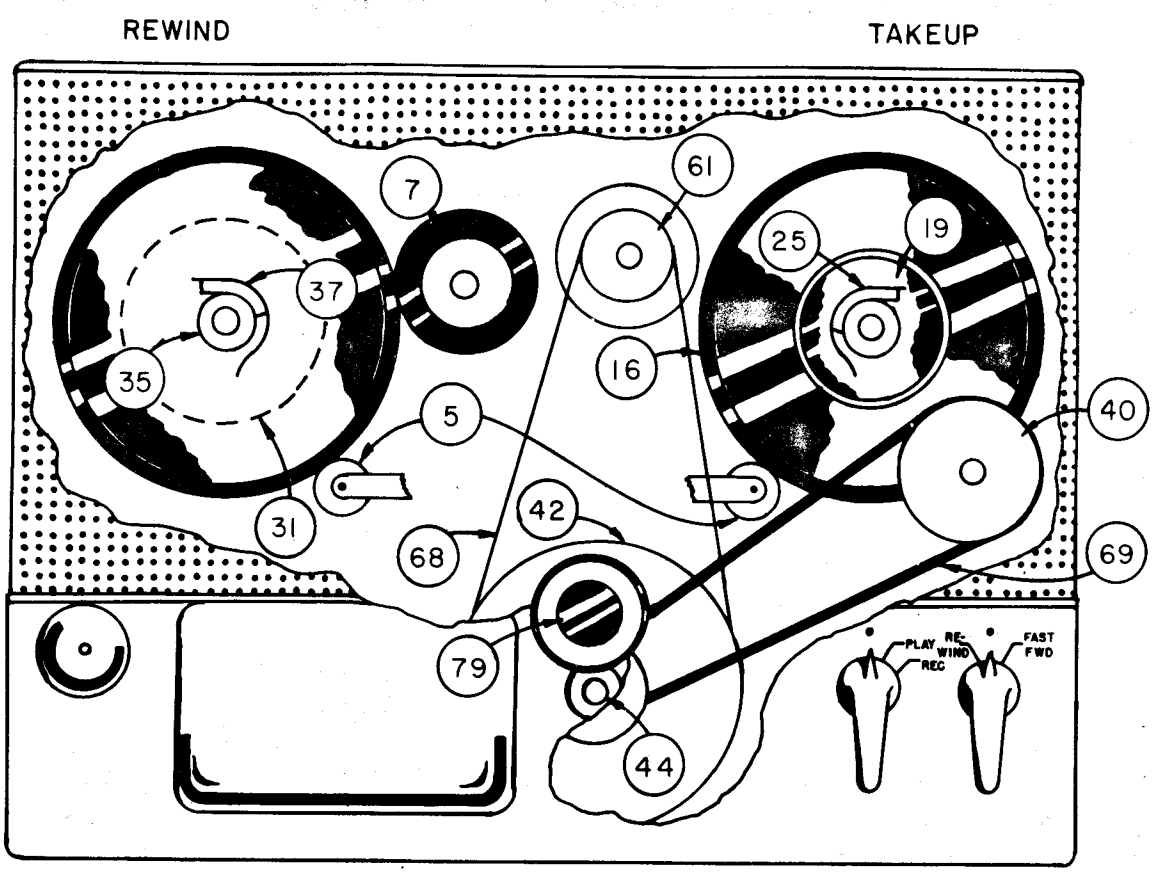
4.2 Standby Operation

Power is applied to the drivemotor (63) when the power switch on the front panel of the Electronic Assembly is turned ON. The capstan (42) begins to rotate immediately, being driven by a nylon belt (68) running between the motor pulley (61) and the capstan flywheel. A second belt (69) running in a groove in the capstan flywheel drives the play takeup pulley (40). The shock relief brake rollers (2) are engaged against the rubber-tired fast forward and rewind clutches (16 and 31). Both turntables are motionless, and the machine is in standby.

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

4.3 Play and Record Modes

When the PLAY-RECORD control is turned to PLAY,



(5) SHOCK RELIEF BRAKE
(7) REWIND IDLER
(16) FAST FORWARD CLUTCH
(19) PLAY TAKEUP CLUTCH
(25) HOLDBACK BRAKE
(31) REWIND CLUTCH
(35) HOLDBACK BRAKE DRUM
(37) HOLDBACK BRAKE
(40) PLAY TAKEUP PULLEY
(42) CAPSTAN FLYWHEEL
(44) CAPSTAN
(61) MOTOR PULLEY
(68) NYLON DRIVE BELT
(69) TAKEUP BELT
(79) CAPSTAN IDLER

MECHANICAL OPERATION – SIMPLIFIED
MODEL 600

AMPEX CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 4.1

the following mechanical sequence occurs:

A. The play takeup pulley (40) and belt (69) are brought to bear on the play takeup clutch (19).

B. The shock relief brake roller (2) on the play takeup side is released from the fast forward clutch tire (16).

C. The capstan idler (79) engages the capstan (42), 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 or record modes, the two modes 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.

D. The shock relief brake roller (2) on the rewind side remains engaged against the rewind clutch tire (31), and slippage between the clutch and disc assembly (30) occurs. The friction produced in this slippage, and the friction produced by the rewind holdback brake (37) operating on the bakelite drum (35) provide the required holdback tension.

E. A wafer switch (S201, Figs. 6.1 and 6.2) coupled to the end of the play actuator (45), interrupts power to the last stage of the record amplifier, and to the bias and erase oscillator, thus disabling them while the machine is in play.

The operation of the machine in the record mode is exactly as described for the play mode, except that wafer switch (S201) at the end of the play actuator (45) is closed, and the record ampli-

fier and the bias and erase oscillator are operative. A mechanical interlock (73) between the PLAY and RECORD positions of the PLAY-RECORD control must be opened by depressing the RECORD SAFETY BUTTON (72) before the control will go into the RECORD position.

4.4 Rewind Mode

The REWIND-FAST FORWARD control cannot be operated unless the PLAY-RECORD control is in neutral. When the REWIND-FAST FORWARD control is turned to REWIND:

A. Both shock relief brake rollers (2) are released.

B. The rewind idler (7) is clamped between the motor pulley (61) and the rewind clutch tire (31) and the rewind turntable is driven.

C. Holdback tension is provided by the holdback brake (25) on the takeup assembly as tape is pulled from the takeup turntable.

4.5 Fast Forward Mode

When the REWIND-FAST FORWARD control is turned to FAST-FORWARD:

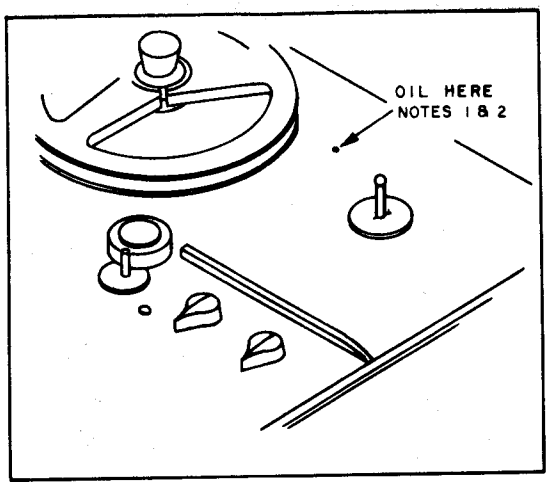
A. Both shock relief brake rollers (2) are released.

B. The rubber-tired fast forward clutch (16) is brought to bear on the motor pulley (61), and drives the takeup turntable.

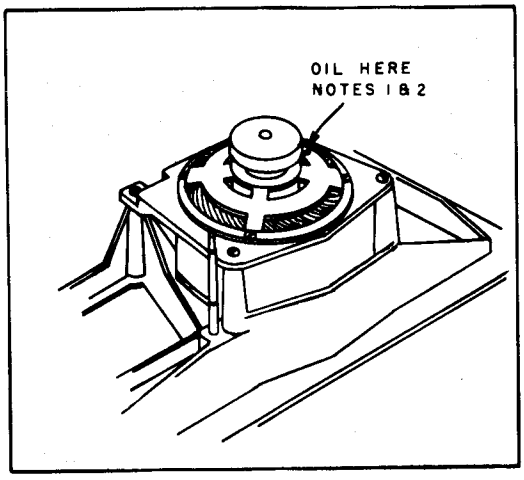
C. Holdback tension is produced by the holdback brake (37) on the rewind assembly.

4.6 Routine Maintenance

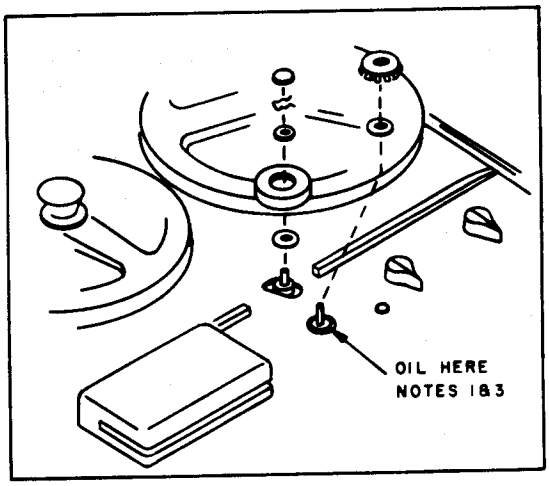
Routine maintenance of the tape transport mechanism consists primarily of periodic cleaning and lubrication.



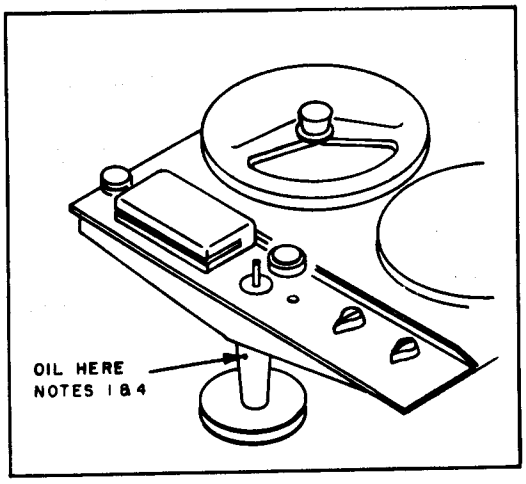
DRIVEMOTOR (UPPER BEARING)



DRIVEMOTOR (LOWER BEARING)



CAPSTAN BEARING (UPPER)



CAPSTAN BEARING (LOWER)

NOTES:

1. RECOMMENDED LUBRICANTS: CAL OIL OC, TURBINE #11, OR GULFCREST A.
2. FOUR OR FIVE DROPS OF OIL.
3. AS MUCH OIL AS THE BEARING WILL ACCEPT. WIPE AWAY EXCESS. DO NOT SATURATE FELT WASHER TO OIL THIS BEARING.
4. EXACTLY FOUR DROPS.

ROUTINE LUBRICATION
MODEL 600
AMPEX CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 4.2

TM-6 5-13-54

4.6.1 Cleaning

All surfaces that come in contact with the tape (tape guide, heads, capstan, 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 will tend to pick up the lubricant with which most tape is impregnated. Failure to remove these accumulations may lead to tape slippage, flutter and wow.

4.6.2 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.

NOTE
The proper lubricant is available from AMPEX as Stock No. TO-9 (1/2 pz. oiler) or FP-5 (4 oz.).

The upper and lower bearings of the drive motor should be lubricated about 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. For access to the lower oil hold, located in the side of the motor end bell, remove the tape transport from the case (See Fig. 4.2).

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 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 must first be removed (See Fig. 4.2). Remove the rubber cap on the idler. Remove the hairpin 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 bearing housing as shown in Fig. 4.2. Use exactly four drops of oil--nomore.

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

4.7 Mechanical Trouble Shooting

It may be said in general, that most of the difficulties that will normally be encountered in the Model 600 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 length of time. Correctinn of these difficulties will uusually be a matter of careful disassembly and cleaning, rather than readjustment of the mechanism. The normal torques (and hence, tape tension) in this mechanism are, in fact, fixed within strict design specifications, and are not adjustable. Since the measurement of these torques will frequently provide a rapid means for isolating the source of mechanical troubles, their values and the procedures for measuring them are given in the section immediately following.

4.7.1 Torques and Tape Tension

The measurement of torques on the Model 600 requires the following equipment:

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

B. 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 by the hub radius to obtain the ounce/inch reading.

C. A piece of string, approximately 30 inches long, with a small loop tied at 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. (See Fig. 4.3)

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 and, 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.

To measure holdback tension, place the measuring hub on the turntable from which the tape is pulled in the mode in question. 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 tape is normally pulled from this reel, taking the reading while the scale is in steady motion.

Normal torques are as follows:

Takeup

Fast Forward	5 to 7 oz/in
Rewind	5 to 7 oz/in
Playback/Record	2 to 3-1/2 oz/in

Holdback

Fast Forward	3/4 to 1-1/4 oz/in
Rewind	3/4 to 1-1/4 oz/in
Playback/Record	5-3/4 to 8-3/4 oz/in

These values may be close to the lower limit when the machine is new, and will usually move up toward the upper limit after the first 10 to 12 hours of operation.

4.7.2 Malfunctions in Record and Playback Modes

Nearly all malfunctions in the record and playback modes will

be reflected as fultter and wow in excess of specifications. A quick check of takeup and holdback tensions, discussed in the previous section, may lead directly to the source of trouble. Possible causes of flutter and wow are suggested under A through G in the following check list.

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 belt. 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. Bracketed numbers refer to parts shown in the exploded view of the Mechanical Assembly, Fig. 6.2, which should serve as a guide for any necessary disassembly and reassembly.

A. Excessive or Erratic Holdback Tension

1. Contaminated rewind clutch felt (30)

2. Contamined rewind clutch tire (31)

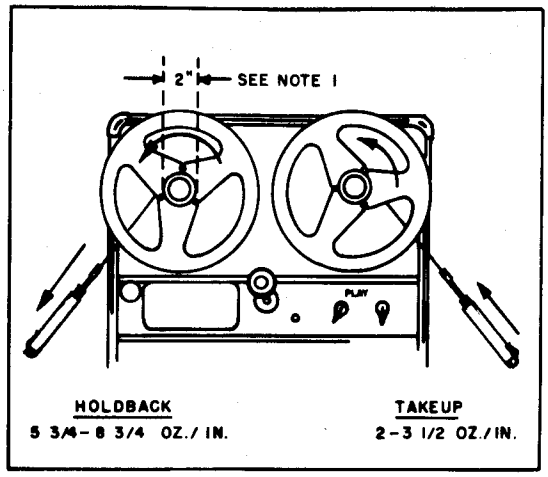
3. Rewind clutch spring (32) too stiff. This usually indicates tampering or carelessness in reassembly. It is advisable to replace the spring rather than to attempt makeshift readjustment.

B. Excessive Takeup Tension

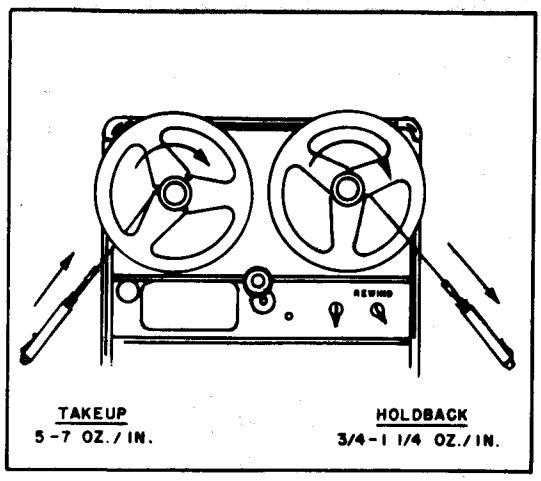
1. Contaminated play takeup clutch felt (18)

2. Oilite bearing (21) bottoming on aluminum clutch disc (18). Minimum clearance should be .015". See 4.8.4 for adjustment procedure.

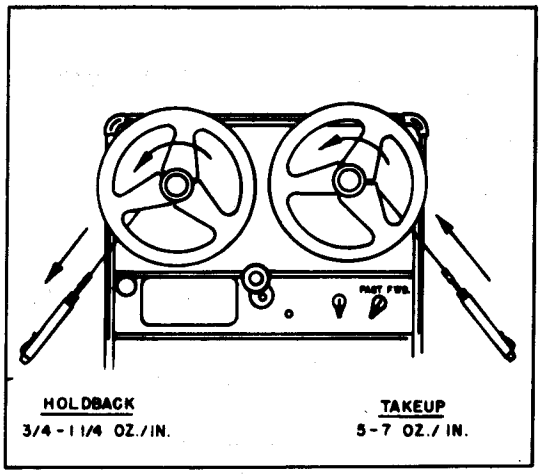
3. Takeup clutch spring too stiff (20). See comment under A3 above.



PLAY OR RECORD



REWIND



FAST FORWARD

NOTES:

1. IF REEL HUB DIAMETER IS LARGER OR SMALLER THAN 2 INCHES, MULTIPLY SPRING SCALE READING BY HUB RADIUS TO OBTAIN OZ./IN. READING.
2. PULL SCALE WITH STEADY MOTION WHEN MEASURING HOLDBACK TENSIONS. ALLOW SCALE TO MOVE IN TOWARD REEL WHEN MEASURING TAKEUP TENSIONS. TAKE ALL READINGS WHILE SCALE IS IN MOTION.

TAPE TENSION MEASUREMENTS
MODEL 600

AMPEX CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 4.3

TM-7 5-11-54

C. Drivemotor Out of Synchronism

1. Line voltage below 105 V AC.

2. Excessive play takeup tension, See B.

3. Nylon drive belt (68) tension excessive. See 4.8.1

4. Belt tensioning idler (55) dragging.

5. Drivemotor thrust misadjusted. See 4.8.2

6. Defective drivemotor starting capacitor.

7. Dry bearings in drivemotor (63), capstan (42), or capstan idler (79). See 4.6.2.

8. Defective drivemotor (63).

D. Flatted or Dented Capstan Idler Tire

1. If the capstan idler (79) 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 doesn't restore the tire to normal, the idler must be replaced.

E. Defective or Improperly Installed Nylon Drive Belt (68)

1. Belt spliced improperly

2. Belt installed with splice joint toward pulley

3. Belt worn due to misaligned motor pulley (61) causing it to track against one of the capstan pulley flanges (42)

F. Rewind Idler (7) Not Disengaging from Motor Pulley (61)

1. Contaminated rewind idler guide (8)

G. Reels Misaligned with Respect to Tape Guides

1. This will usually cause tape scrape which may or may not be audible but will generally appear as flutter. See 4.8.4.

4.7.3 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 takeup and holdback per instructions in 4.7.1. The malfunctions discussed below apply to either mode, the turntables, associated components, and tape directions being opposite of each other.

A. Takeup Tension Low

1. Clutch leaf spring (17 or 32) too weak. Usually caused by tampering. Replace. Never attempt to increase rewind takeup tension to offset other problems.

B. Excessive Holdback Tension

1. Contaminated holdback wipes (25 or 37).

2. Bakelite drum (23 or 35) on which wipe operates has been roughened.

C. Brake Shock Relief Roller (5) not Releasing from Fast Forward Clutch (16)

1. Evidence of bent or misassembled parts. Check exploded view, Fig. 6.2.

D. Contaminated Clutch Tire (16 or 31)

E. Rewind Idler (7) Not Engaging Motor Pulley (61)

1. Bind in idler guide (8) due to contamination.

F. Malfunctioning Turntable Pivots (24 or 36)

1. Bind in turntable centering detent (77)

G. Bind in Rewind Idler Bearing (part of 7)

4.7.4 Starting, Stopping and Shuttling Malfunctions

Starting, stopping, and shuttling malfunctions will be reflected in 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 contamination due to careless oiling or accumulation of dirt.

A. Tape Loop Thrown on Starting in Play Mode (Low Play Takeup Tension)

1. Play takeup belt (69) contaminated.

2. Nylon drive belt (68) contaminated. If either the play takeup belt or the nylon drive belt are contaminated with oil, an overoiled motor or capstan is indicated. Clean all affected parts thoroughly with carbon tetrachloride.

3. Slippage between play takeup belt (69) and clutch (19) due either to weak play takeup arm spring (41) or bind in play takeup pulley bearing (part of 40).

4. Bind in turntable shaft bearings (22 or 24) due to contamination. Clean and lubricate with two or three drops of medium weight oil.

5. Play takeup brake release (14) inoperative due to bind, weak or unattached spring (11) causing shock relief roller (2) to drag on fast forward clutch tire (16).

B. Tape Loop Thrown on Stopping or Shuttling

1. One or both brake shock relief actuators (2) binding.

2. One or both brake shock relief springs (12) off. End loops on these springs must be fully closed to prevent their becoming disconnected.

3. Bind in turntable centering detent (77).

4.8 Assembly and Construction Notes

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:

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

B. To remove the sub-plate (1), 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 (13) to the lower yoke of the rewind/fast forward actuator (48). It is unnecessary to remove the adjustment screws (70 and 71) for the capstan thrust and the motor thrust. If the settings of these screws are changed, they must be carefully readjusted as described in the following sub-sections. The thrust discs (65) beneath these screws being coated with grease, will usually stay in place when the sub-plate is removed. It is advisable, however, to be sure that they don't fall out. It will generally be found easiest to reinstall the sub-plate, after servicing, if the PLAY/RECORD control is turned to PLAY.

4.8.1 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.

4.8.2 Drivemotor Thrust

The drivemotor thrust is a hardened steel ball (60) against a nylon disc (65). 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.

4.8.3 Capstan Thrust

The capstan thrust is a hardened steel ball (42) against a nylon disc (65). The capstan thrust is adjusted by a set-screw (70). End play of .010 in. to .015 in. is required, and is obtained as follows:

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

B. Insert the set-screw, and tighten down until it is felt to bottom on the thrust disc. Grasp the capstan flywheel (42) between the thumb and index finger. While maintaining a slight downward p 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 usually 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.

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

4.8.4 Turntable Height

Turntable height (the distance measured from the top surface of the turntable (78) to the perforated metal grille) should be .125 in. ±.008 in. This height is determined by the placement of lamicoid washers between the bottom of the turntable pivot (24 or 36) and the hairpin 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.

4.8.5 Play Takeup Clutch

The play takeup clutch assembly consists of a felt-lined aluminum disc, (18) and a bakelite clutch (19) which is spring-loaded to the disc. When the machine is in the play mode, as described in Section 4.3, the clutch is driven by the rubber belt (69) on the play takeup pulley (40). Location of the felt-lined aluminum disc is critical, a clearance of .015 in. being required between the end of the oilite bearing (21) which goes through the bakelite clutch, (19) and the bottom of the aluminum disc (18). This clearance, which cannot be measured directly with a guage because of the physical setup, can be set quite accurately by the following indirect method:

A. Insert a removable .015 in. shim or feeler guage between the thrust washer that rides on the inner race of the lower ball bearing (22) of the takeup turntable pivot (24) and oilite bushing (21).

B. Assemble the conical spring, (20) the bakelite clutch, (19) and the felt-lined aluminum disc (18) (in that order) on the turntable shaft (29).

C. 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.

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

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

4.8.6 Rewind and Fast Forward Clutch Alignment

The rubber-tired bakelite rewind (31) and fast forward clutches must line up with the shock relief brake rollers (5) so that the rollers engage the full width of the tires. In addition, the rewind clutch (31) should be aligned for full-width contact with the rewind idler, (7) and the fast forward clutch (13) for full width contact with the motor pulley (61).

4.8.7 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.

SECTION V

ELECTRONIC ASSEMBLY

5.1 General

The Electronic Assembly consists of a Record Channel, a Playback Channel, a Bias and Erase Oscillator, and a Power Supply, mounted on a single chassis. Refer to the schematic, Fig. 6.1 in following the discussion below.

5.2 Record Channel

The Record Channel consists of a two-stage microphone preamplifier (V101 and V102A) and a three-stage amplifier, (V102B, V103A, V103B).

The MICROPHONE input (J101S) and LINE INPUT (J102S) each have their own level controls (R106 and R125 respectively). Both inputs may be used simultaneously, mixing being accomplished in the first stage of the record amplifier, (V102B). Signals in the Record Channel are picked off the RECORD CALIBRATION potentiometer (R114) at the output of this stage, and may be switched to the output amplifier (discussed later) through the MONITOR SELECTOR switch (S102), for monitoring.

Record equalization, accomplished in the grid circuit of V103A and the cathode circuit of V103B, is adjusted by trimmer C107. Plate voltage is supplied to the last stage of the record amplifier, (V103B) when, and only when the switch (S201), mounted on the Mechanical Assembly sub-plate at the end of the Play Control Arm, is in the RECORD position.

5.3 Playback Channel

The Playback Channel consists of a two-stage playback amplifier, (V104, V105) and a two-stage output amplifier, (V106A, V106B).

The signal from the Playback Head appears at connector J103P. Playback equalization is provided by C116 and R130. Playback level is adjusted by potentiometer R137.

The playback signal is fed to the output amplifier through contact 2 of the MONITOR SELECTOR switch. The output amplifier consists of one stage of voltage amplification (V106A), and a cathode follower output stage (V106B). The OUTPUT connector (J103S) is shunted by a VU meter and a monitoring jack (J104S, PHONES) for high impedance headpones.

5.4 Bias and Erase Oscillator

The Bias and Erase Oscillator is an LC push-pull oscillator operating at approximately 100 kc. The NOISE BALANCE potentiometer (R147) common to the grids of the oscillator is adjusted to eliminate any assymetry in the waveform,which would result in a DC component in the Record Head current, thus tending to magnetize it permanently and cause distortion of the recorded signal. Bias level is adjust by trimmer C113. Note, in Fig. 6.1, that S201 disables this oscillator in the play mode.

5.5 Power Supply

The DC plate supply consists of a full wave rectifier (V108), and a capacitor-input LC filter. A 6.3 volt secondary winding on the power transformer furnishes AC power to all heaters. Potentiometer R150 is adjusted for minimum hum.

5.6 Electronic Alignment

Alignment consists of making all adjustments necessary for proper electronic performance. A recorder "out of alignment" may be characterized by poor frequency response, high noise, low output, high distortion, or a combination of these faults. All Ampex recorders are correctly aligned at the factory, and it should not be necessary to realign a machine upon arrival. The overall performance checks outlined in Section III will generally serve to determine whether or not realignment is necessary at any time.

To set up for alignment, remove the four screws that hold the Electronic Assembly in the case. Stand the case up, and pull the Electronic Assembly forward. The interconnecting cables between the Electronic Assembly and Tape Transport Mechanism are long enough to permit access to all adjustments on the Electronic Assembly with the two units connected.

5.6.1 Alignment and Test Equipment Requirements

The following list covers the minimum equipment requirements for proper alignment and testing.

A. Audio Oscillator - Hewlett-Packard Model 200 C or equivalent.

B. Vacuum Tube Voltmeter - Hewlett-Packard Model 400C or equivalent.

C. Ampex Alignment Tape - Catalog No. 5563 for all 7 1/2 ips machines made by Ampex. This tape is recorded at 7 1/2 ips 10 db below Normal Operating Level as defined in Section III. The tape contains voice announcements of the following tone sequence: playback head alignment tone, reference tone for playback level adjustment, tone series for playback response check.

D. Ampex Head Demagnetizer - Catalog No. 704

E. High Impedance Headphones

F. Small Screwdriver

5.6.2 Head Demagnetization

It is always advisable to demagnetize the record and playback heads as a preliminary to aligning the machine. (The erase head requires no demagnetization.) Magnetized heads will generally produce an increase of 5 to 10 db in noise level, distortion of the recorded signal, and will gradually erase the high frequencies on any tape passed over them. Demagnetization procedure is as follows:

A. Remove both the head cover and the mu metal shield over the head assembly.

B. Turn the power switch of the machine off. Plug the demagnetizer into any source of 117-Volt AC power.

C. The heads, from left to right when facing the machine, are: Erase Head, Record Head, Playback Head. Bring the tips of the demagnetizer as close as possible to, but preferably not into contact with the Record Head stack. (Tips should straddle the gap in the center of the stack.) Run the tips slowly up and down the stack several times, and then withdraw the demagnetizer very slowly. This slow withdrawal is required if thorough demagnetization is to be achieved.

D. Repeat Step C on the Playback Head. It is unnecessary to demagnetize the Erase Head.

E. Replace the head shield, but do not replace the head cover if complete alignment, including head azimuth adjustment, is to be undertaken.

5.6.3 Playback Channel Alignment

The following steps constitute the complete alignment of the Playback Channel.

A. Playback Head Azimuth Adjustment

B. Playback Level Setting

C. Playback Response Check

D. Playback Equalization

E. Hum Balance Adjustment

A. Playback Head Azimuth Adjustment

1. Thread the alignment tape on the machine. Terminate the OUTPUT in 10,000 ohms, and connect a VTVM across this load. Plug in a pair of high impedance headphones so that voice announcements on the tape may be heard. Remove the head assembly cover, but not the mu metal shield beneath it. Turn the MONITOR SELECTOR to TAPE, and start the machine in the playback mode. The head alignment tone will be the first one announced.

2. Insert a small screwdriver through the access hole nearest the right hand edge of the head shield, and adjust the azimuth screw for mazimum output as seen on the VTVM. If the head is very far out of alignment, several of the minor peaks which occur on either side of the maximum may be observed. The maximum, however, is clearly 15 to 20 db greater than any of these.

B. Playback Level Setting

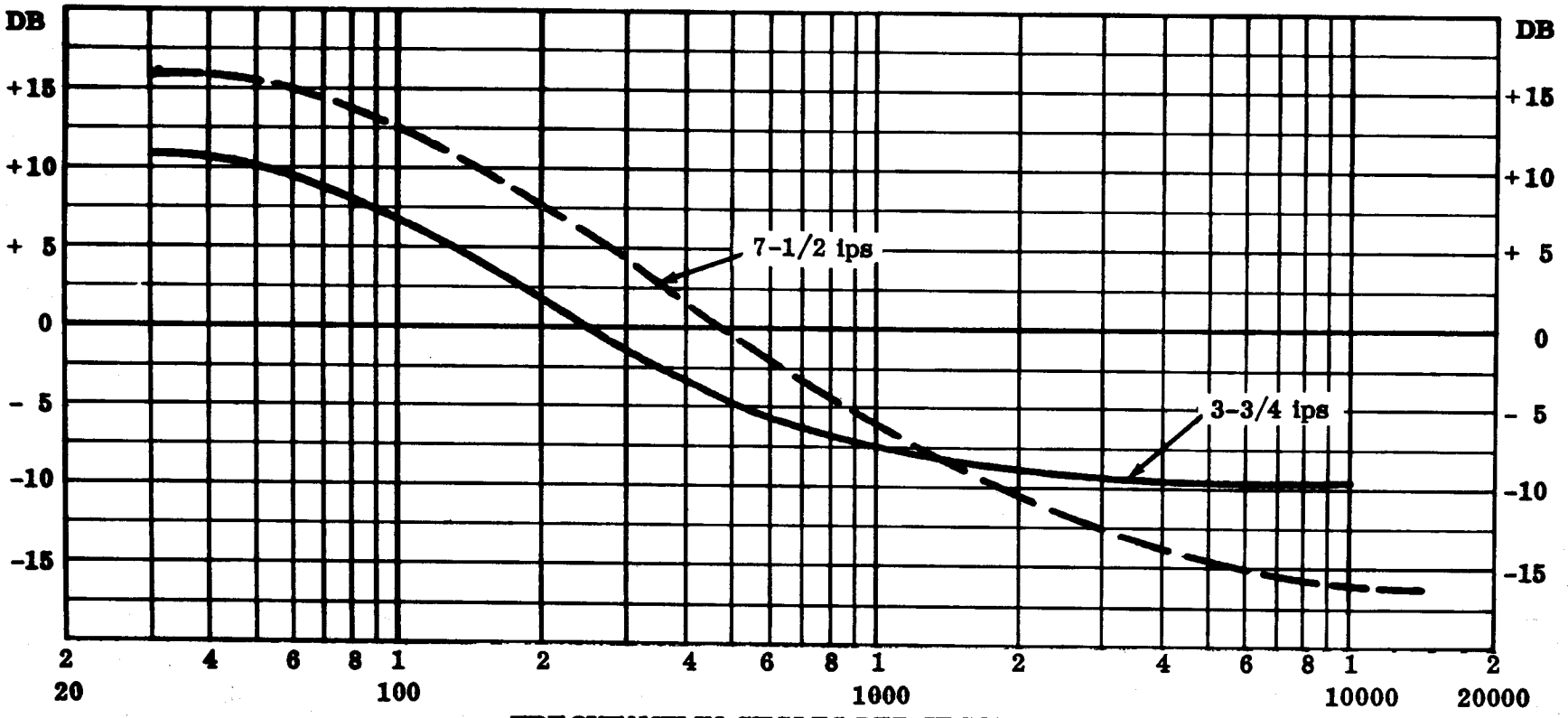
1. The next tone on the tape is for playback level setting. Adjust the PLAYBACK LEVEL potentiometer (R137) for a VTVM reading 10 db below Normal Operating Level, (i.e., approximately 0.4 Volts RMS).

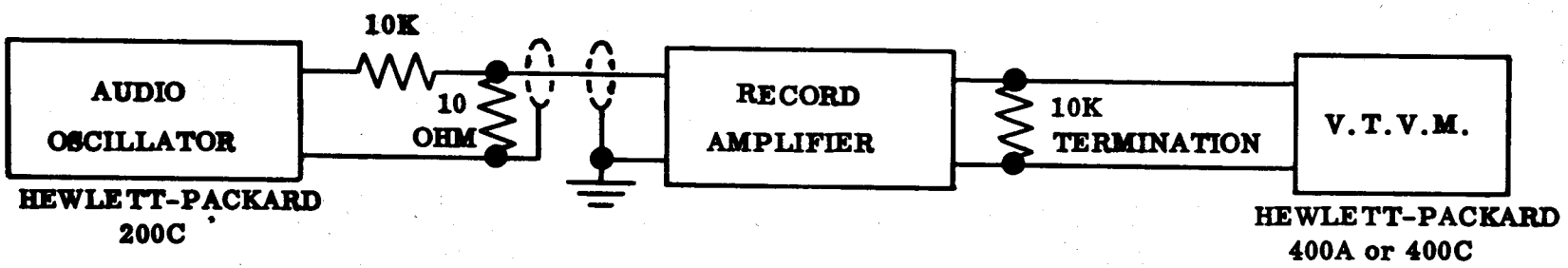
C. Playback Response Check

1. The next series of tones is for playback response checking. Observe the response indicated on the VTVM, and check it against Specifications. If playback response fails to meet specifications, the trouble may be a worn or otherwise faulty Playback Head, a partially erased alignment tape (due to head magnetization), or improper equalization of the playback amplifier. Equalization may be checked and adjusted as indicated in Step D.

D. Playback Equalization

1. Playback equalization is a bench procedure. The required test set-up and the playback amplifier response curve are given in Fig. 5.1. 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. Increase the oscillator frequency to 8000 cycles and adjust the PLAYBACK EQUALIZER (R130) to set playback response on curve at





TEST CIRCUIT

FIG. 5.1. PLAYBACK AMPLIFIER RESPONSE

that point. Sweep the oscillator through the specified frequency range. Response should follow the curve within ± 1/2 db. Be sure that the oscillator output remains constant over this range.

E. Hum Balance Adjustment

1. After completing Steps A through D as necessary adjust the HUM BALANCE potentiometer (R150) for minimum hum as seen on a VTVM connected across the OUTPUT. (MONITOR SELECTOR should be on TAPE.)

5.6.4 Record Channel Alignment

The steps in Record Channel Alignment are as follows:

A. Bias Adjustment

B. Record Level Meter Calibration

C. Record Head Azimuth

D. Record Equalization & Response Adjustment

E. Noise Balance Adjustment

F. Final Bias Adjustment

A. Bias Adjustment

1. Thread a tape on the machine. Terminate the OUTPUT in 10,000 ohms and connect a VTVM across this load. Connect an audio oscillator set to 500 cycles to the LINE INPUT, and start the machine in the record mode.

2. Turn the MONITOR SELECTOR to TAPE, and adjust the LINE REC LEVEL control for a Normal Operating Level reading on the VTVM.

3. Adjust the BIAS trimmer to peak this output.

B. Record Level Meter Calibration

1. After peaking the bias as described in Step A-3 above, and with the MONITOR SELECTOR set on TAPE, readjust the LINE REC LEVEL control to bring the VTVM reading back to Normal Operating Level. Turn the MONITOR SELECTOR to TAPE and adjust the RECORD CALIBRATION potentiometer (R114) to bring the VTVM reading to Normal Operating Level. The VU meter is now calibrated, and should read zero (0) VU ± 1/2 db with the MONITOR SELECTOR in either the INPUT or the TAPE position.

C. Record Head Azimuth Adjustment

1. Thread a tape on the machine. Terminate the OUTPUT in 10,000 ohms and connect a VTVM across this load. Connect an audio oscillator set at 250 cps to the LINE INPUT. Turn the MONITOR SELECTOR to TAPE, start the machine in the record mode, and adjust the LINE REC LEVEL control for a VTVM reading 20 db below Normal Operating Level.

2. Increase the oscillator setting to 10,000 cycles. Insert a small screwdriver through the access hole nearest to the center of the head shield and adjust the Record Head Azimuth screw for maximum output. (Be sure to set for the correct peak as indicated in 5.6.3 Step A.)

D. Record Equalization Adjustment

1. Record equalization can be accomplished without disconnecting the Electronic Assembly from the Mechanical Assembly provided that the Playback Channel is properly aligned and that the Record Head is in good condition. If these conditions are satisfied,

thread a tape on the machine. Terminate the OUTPUT in 10,000 ohms and connect a VTVM across this load. Set an audio oscillator to 250 cycles and connect it to the LINE INPUT. Turn the MONITOR SELECTOR to TAPE, and start the machine in the record mode.

NOTE

With the REC LEVEL control at minimum, the bias pickup as measured on the VTVM should be less than 30 db below Normal Operating Level. If difficulty is experienced in removing bias to this level connect a bias trap in parallel with the 10,000 ohm terminating resistance. This trap can be a series LC circuit resonant at approximately 100 kc.

Adjust the LINE REC LEVEL control for a VTVM reading 20 db below Normal Operating Level. Increase the oscillator setting to 8000 cps and adjust the RECORD EQUALIZATION capacitor (C107) for a VTVM reading 20 db below Normal Operating Level. Frequency response can now be checked by sweeping the oscillator through the range given in Specifications.

2. The bench procedure for record equalization given in Step 3 below is independent of the playback amplifier and is therefore preferred to the procedure outlined in Step 1 above. The record response curve and test setup are shown in Fig. 5.2.

3. Disconnect the Electronic Assembly from the Mechanical Assembly. Disconnect the AC power plug. Connect a 1000-ohm 1 watt 1% resistor between pins 1 and 2 of the Jones Plug P102S and connect a - VTVM across this load. Strap pins 5 and 6 of P102S together. Remove the Bias and Erase Oscillator (V102). Reconnect the AC power and turn the equipment ON. Connect an audio oscillator to the LINE INPUT (J102S), set it to 250 cps and adjust the LINE REC LEVEL control for a VTVM reading 20 db below Normal Operating Level. Increase the oscillator setting to 8000 cps and adjust the RECORD EQUALIZATION capacitor (C107) to set the response on curve at this point (as shown in Fig. 5.2.) Now sweep the oscillator slowly through the specified frequency range and check to see that response follows the curve throughout. Be sure the oscillator output remains constant over the range.

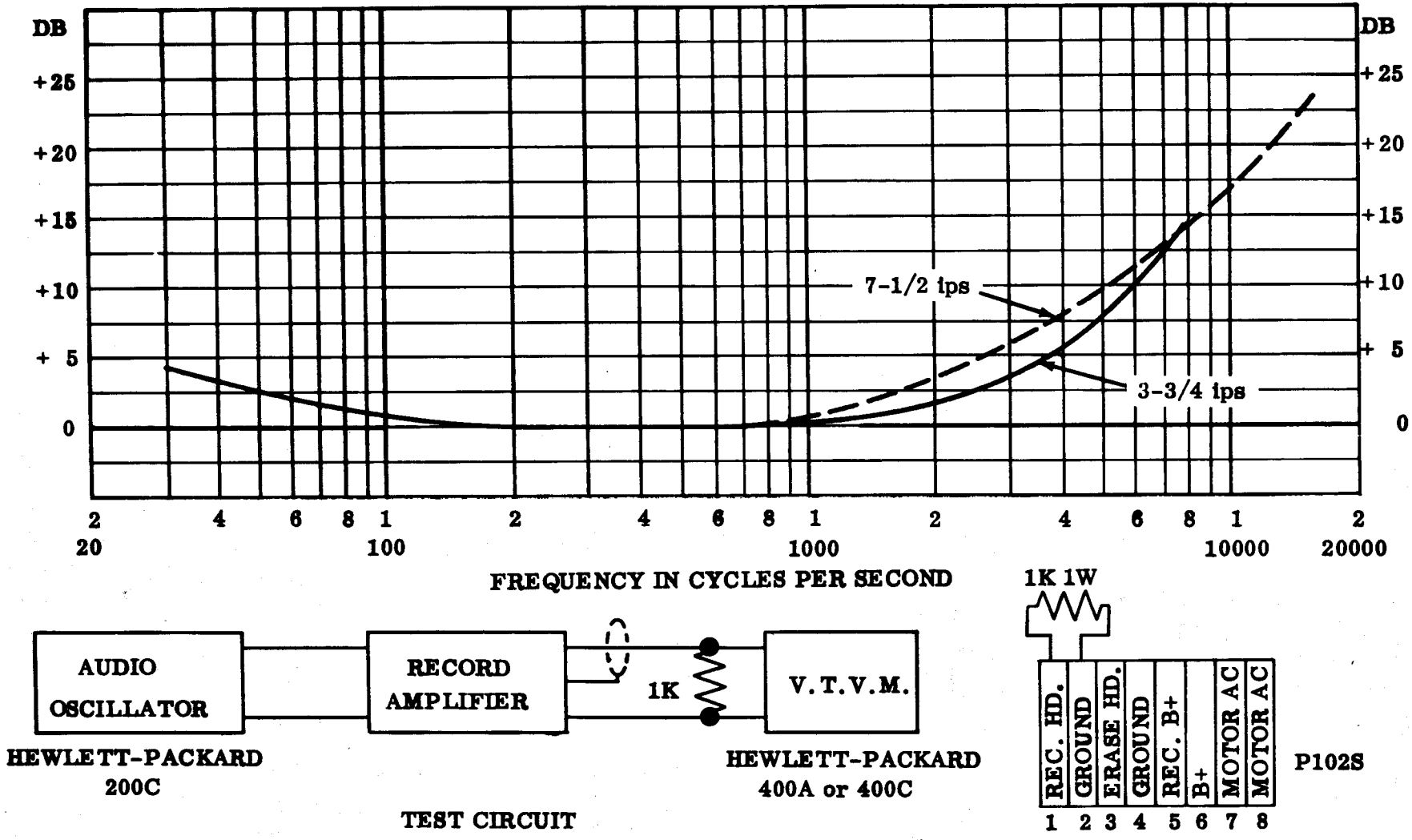


FIG. 5.2. RECORD AMPLIFIER RESPONSE

E. Noise Balance Adjustment

1. Thread a tape on the machine. Connect a 0.1 MFD capacitor and a sensitive VTVM across the OUTPUT, and plug in a pair of headphones. Disconnect all inputs, turn LINE REC LEVEL and MIC REC LEVEL controls to zero, and start the machine in the record mode. Adjust the NOISE BALANCE potentiometer (R147) for a minimum reading on the VTVM or minimum "popping" noise in the headphones.

F. Final Bias Adjustment

1. Before reassembling the machine, re-check the bias adjustment discussed in Step A.

SECTION VI

MODEL 600 PARTS LIST

The following parts list provides all information necessary for ordering Ampex Model 600 replacement parts. Always use Ampex Stock Numbers when ordering parts. To expedite processing, always include the following information in placing parts orders:

A. Model Number
B. Serial Number
C. Ampex Stock Number of Part
D. Part Description

EXAMPLE:

Spring, Clutch "U", #4270068-10, for Model 600, Serial No. 54E451

Pricing information or orders should be handled through your local Ampex Professional Audio Distributor. (Your local Ampex Professional Audio Distributor is listed in the yellow pages of your telephone directory.)

TAPE TRANSPORT SUB-ASSEMBLIES

REF.	DESCRIPTION	DISCONTINUED AMPEX STOCK NUMBER	NEW AMPEX STOCK NO.
10	Spring, Rewind Idler	6136	4270058-10
11	Spring, Release Lever	6215	4270059-10
1	Sub-Plate Casting	6275	4330190-10
13	Slide Lever, Brake Actuator	6277	4230060-10
14	Release Lever, Play Mode Brake	6278	4230061-10
2	Brake Shock Relief Assembly	6279-1	4040160-10
	Rewind Idler Assembly	6284-1	4030033-10
7	Idler Sub-Assembly (Idler with Oilite bearing)	6285-1	4040161-10
8	Gu Guide Assembly	6288-1	4040162-10
9	Switch Deck Assembly	9064-1	05-0037-01
C201	Disc Capacitor, .01 mfd, 500V	CO-338	030-002
C202	Disc Capacitor, .01 mfd, 500V (Centralab DD103)	CO-338	030-002
R201	Resistor, 100 ohm, ½W (A-B EB-1001)	RE-444	041-038
12	Spring, 11/64 dia x 1 long	9368	4270061-10
	Switch Guard	9728	4260061-10
	Capstan Idler Arm Assembly	6235	4030027-10
53	Anchor	6224	4230062-10
51	Arm Sub-Assembly	6236-1	4040158-10
52	Roller	6237	4250049-10
54	Spring, 21/64 dia x 1-27/64 long	6910	4270074-10
	Motor Assembly 7 1/2 IPS, 60 CPS	6238-1	4590004-20
	7 1/2 IPS, 50 CPS	6238-2	4590004-20
	3 3/4 IPS, 60 CPS	6238-3	4590004-20
	3 3/4 IPS, 50 CPS	6238-4	4590004-20
62	Mounting Plate	6240	4330042-10
61	Pulley 7 1/2 IPS, 60 CPS	6241-0	4250068-10
	7 1/2 IPS, 50 CPS	6241-1	4250068-20
	3 3/4 IPS, 60 CPS	6241-2	4250068-30
	3 3/4 IPS, 50 CPS	6241-3	4250068-40
	Takeup Arm Assembly	6242-1	4030028-10
20	Spring, Conical, 1 in. dia x 31/32 in long	6137	4270069-10
26	Spring, Control, 17/32 dia. x 13/16 in. lg.	6218	4270063-10
24	Pivot, Arm	6243	4230067-10
29	Hub (with shaft)	6244-1	4040184-10
17	Spring, Clutch "U"	6246	4270068-10
19	Clutch, Play Takeup	6247	4250044-10
15	Disc Assembly (with large felt)	6248-2	4040165-20
	Disc, Clutch	6249	Use Above Assy.
	Felt Lining, large	6250	Use Above Assy.
18	Disc Assembly (with small felt)	6248-1	4040165-10
	Disc, Clutch	6249	Use Above Assy.
	Felt Lining, Small	6250-1	Use Above Assy.

TAPE TRANSPORT SUB-ASSEMBLIES, Cont'd

REF.	DESCRIPTION	DISCONTINUED AMPEX STOCK NUMBER	NEW AMPEX STOCK NO.
16	Clutch Assembly (fast forward with Oilite bearing)	6251-1	4040166-10
28	Link, Turntable Control	6253	4230068-10
27	Washer, Spring Retaining, Cup	6254	4440072-10
23	Collar, "Drum"	6293	4220054-20
25	Holdback Brake Assembly	6320-1	4040167-10
21	Oilite Bearing	BB-13	422-004
22	Ball Bearing	BC-34	421-019
	Rewind Arm Assembly	6255-1	4030029-01
36	Pivot, Arm	6243	4230067-10
38	Hub (with shaft)	6244-1	4040184-10
32	Spring, Clutch "U"	6246	4270068-10
30	Disc Assembly (with large felt)	6248-2	4040165-20
	Disc, Clutch	6249	Use Above Assy.
	Felt Lining, Large	6250	Use Above Assy.
31	Clutch Assembly (Rewind with Oilite Bearing)	6251-1	4040166-10
35	Collar, "Drum"	6293	4220054-20
33	Collar, Spacer	6316	4220055-10
37	Holdback Brake Assembly	6320-1	4040167-10
34	Ball Bearing	BC-34	421-019
	Play Control Arm Assembly	6256-1	4030176-20
45	Actuator, Play	6257	4230064-10
46	Switch Mechanism	6261	4620035-20
47	Roll Pin, 3/32 x 5/8 in.	RP-3/32-10	406-002
	Rewind/Fast-Forward Control Arm Assy.	6259-1	4030177-10
48	Actuator, Rewind/Fast-Forward	6258-1	4230065-10
49	Switch Mechanism	6261	4620035-20
50	Roll Pin, 3/32 x 5/8 in.	RP-3/32-10	406-002
	Belt Tensioning Idler Arm Assembly	6263-1	4030032-10
59	Spring, 11/64 dia x 15/16 long	6216	4270072-10
58	Arm Assembly	6264-1	4040168-10
55	Pulley Assembly (with Oilite Bearing)	9066-1	4040169-10
	Play Takeup Arm Assembly	6267-1	4030025-10
41	Spring	6138	4270070-10
40	Pulley Assembly (with Oilite Bearing)	6268-1	4040174-10
39	Arm Assembly	6270-1	4040598-10
	Top Plate Assembly		REF.
72	Record Safety Button	6233	Use 4850036-01
73	Leaf Spring	6234	4270056-10
	Tape Guide Post	7456	4210005-10
C203	Electrolytic Capacitor, 2.5 mfd, 220V	CO-327	035-121

TAPE TRANSPORT SUB-ASSEMBLIES, Cont'd

REF.	DESCRIPTION		DISCONTINUED AMPEX STOCK NUMBER	NEW AMPEX STOCK NO.
	Head Cable Harness Assembly			REF.
J202P	Chassis Connector, 8 contact, male		PL-8P	147-006
R202	Wirewound Resistor, 20,000 ohm, 10W		RE-407	043-080
	TAPE TRANSPORT ASSEMBLY PARTS			
68	Drive Belt, Nylon	7 1/2 IPS, 60 CPS	2871-3	4310007-10
		7 1/2 IPS, 50 CPS	2871-6	4310007-20
		3 3/4 IPS, 60 CPS	2871-7	4310007-30
		3 3/4 IPS, 50 CPS	2871-14	4310007-40
83	Bar, Tape Guide		6201	21-0069
85	Cap, Tape Guide		6202-1	4290099-10
80	Cap, Capstan Idler		6203	4290098-10
78	Turntable		6205	4250040-10
90	Head Assembly	Full Track	6206-10	02-0101-10
		Half Track	6206-20	02-0101-20
86	Cover, Head Assembly		6207	4290429-10
91	Tape Guide, Head		6208-1	33-0041-01
79	Capstan Idler (with Oilite Bearing)		6211-1	4030024-10
	Shield, Head Assembly		6213	4290092-10
64	Turntable Height Spring		6217	4270062-10
81	Dust Seal, Capstan, felt, 15/64 ID x 3/4 OD x 1/16 in.		6219	4280024-10
75	Link, Turntable Pivot		6221	4230066-10
43	Felt Washer, Capstan		6262	4440068-01
82	Cap, Dust Shield, Capstan		6273	4100027-10
88	Reel Hold Down Knob		6319	4130028-10
76	Detent Spring (Rewind Arm)		6911	4270071-10
65	Thrust Disc		6934	4250041-10
66	.031 Beryllium Copper Spring 5/16 dia x 1 7/8 in.		7531	4270065-10
71	Plunger, Motor Thrust		7532	4200021-10
	Spacer Motor Mounting		7582	22-0053-01
	Rubber Bushing, Motor Mounting		7922	4130029-01
42	Capstan Assembly (flywheel, shaft & ball)		9353-1	4040157-10
	Shield, Resistor		9726	4170087-10
	Shield, Record Switch, side		9727	4170088-01
84	Ball Bearing, Tape Guide (Fafnir 34KDD)		BC-8	421-009
60	Steel Ball, 1/4 in. dia.		BC-15S	420-006
77	Steel Ball, 5/16 in. dia.		BC-21S	420-004
89	Steel Ball, 5/16 in. dia.		BC-21S	420-004
87	Bar Knob		KN-7	230-007
70	Set Screw, Capstan Thrust		MS-32-27-1125	477-120
69	Takeup Belt, Rubber "O" Ring		OR-10	432-010
	Brass Shim Washer .149 ID x 5/16 OD x .025 in. thick		PW-4B-25-149X	501-062

CASE ASSEMBLY PARTS

REF.	DESCRIPTION	DISCONTINUED AMPEX STOCK NUMBER	NEW AMPEX STOCK NO.
	Rubber Shockmount Nut, Top Plate	6937	4130003-10
	Vinyl Bezel	7664	4110064-10
	Plastic Foot, 3/8 in. long	7666	4150108-10
	5/8 in. long	BU-3	250-005
	Mounting Hardware for Plastic Foot:		
	6-32 Kep Nut	KP-1-6	496-002
	6-32 x 1/2 Binding Head Machine Screw	MS-12-6-8 or	471-496
	6-32 x 5/8 Binding Head Machine Screw	MS-12-6-10 or	471-497
	6-32 x 3/4 Binding Head Machine Screw	MS-12-6-12 or	471-498
	6-32 x 7/8 Binding Head Machine Screw	MS-12-6-14	471-499
	No. 6 Plain Steel Washer	PW-1-6	501-009
	Touch-up Paint, Colorado Red, 4 oz.	FP-3	087-003
	Hinge	HI-6	092-004
	Latch, Fastener	LO-16	311-017
	Catch, Fastener	LO-17	311-018
	No. 8 Oval Phillips Sheet Metal Screw, Type Z	MS-21-8-8	476-035
	8-32 x 1/2 Oval Phillips Machine Screw	MS-26-8-8	471-608
	Tinnerman Nut, Electronics	SN-3U-8Z	497-011
	Handle	HA-7	089-004
	Handle-mounting, Cap (Brass)	CA-21	162-014

ELECTRONIC ASSEMBLIES

C101 A, B, C	3 x 40 mfd 25V Electrolytic Capacitor (Mallory WP520)	CO-328	031-084
C102	.1 mfd 400V Tubular Capacitor (C-D No. ST4P1)	CO-294	035-069
C103 A, B, C, D	4 x 10 mfd 450V Electrolytic Capacitor (Mallory FP-434)	CO-68	031-077
C104	.047 mfd 400V Capacitor (C-D ST4S47)	CO-347	035-057
C105	.0047 mfd 400V Capacitor ±5% (C-D ST4D47)	CO-334	035-026
C106	.1 mfd 400V Tubular Capacitor (C-D ST4P1)	CO-294	035-069
C107	100 mmf Trimmer Capacitor (El Menco 302 Type 30)	CO-92	038-002
C108	.1 mfd 200V Capacitor ±5% (C-D ST2P1)	CO-335	035-065
C110	.01 mfd 500V Ceramic Disc Capacitor (Centralab DD103)	CO-338	030-002
C111	.0047 mfd 400V Capacitor ±5% (C-D ST4D47)	CO-334	035-026
C112	.5 mfd 400V Tubular Capacitor (Sangamo 300 405)	CO-330	035-110
C113	100 mmf Trimmer Capacitor (El Menco 302 Type 30)	CO-92	038-002
C114 A, B, C	3 x 20 mfd 450V Electrolytic Capacitor (Mallory 376.5)	CO-236	031-080
C115	1000 mfd 6V Electrolytic Capacitor (Sprague TVA-1104)	CO-329	031-038

REF.	DESCRIPTION	DISCONTINUED AMPEX STOCK NUMBER	NEW AMPEX STOCK NO.
C116	.047 mfd 400V Capacitor ±5% (C-D ST4S47)	CO-333	035-056
C118	.022 mfd 400V Paper Capacitor (C-D ST4S22)	CO-380	035-047
C121	.047 mfd 400V Capacitor (C-D ST4S47)	CO-347	035-057
C122	.01 mfd 500V Ceramic Disc Capacitor (Centralab DD103)	CO-338	030-002
C123	4 mfd 450V Electrolytic Capacitor (C-D BR-445)	CO-54	031-009
C124	.001 mfd 500V Mica Capacitor ±5% (Sangamo KR-1210)	CO-6	034-068
C125	350 mmf 500V Mica Capacitor ±5% (Sangamo KR)	CO-140	034-054
C126	350 mmf 500V Mica Capacitor ±5% (Sangamo KR)	CO-140	034-054
C127	.001 mfd 500V Mica Capacitor ±5% (Sangamo KR-1210)	CO-6	034-068
F101	Fuse, 1 amp, 250V (Littlefuse 312001)	FU-1	070-003
J101S	3 Contact Shielded Connector (Cannon XL-3-13N)	PL-320S	146-022
J102S	Pin Jack (Cinch No. 8171)	JA-14	148-010
J103S	Phone Jack (Phones)(Switchcraft 12A)	JA-2	148-002
J104S	Phone Jack (output) (Switchcraft 11)	JA-21	148-015
J105P	Miniature Power Connector, 2 contact (G. E. 2711)	PL-319P	147-020
L101	RF Choke, 20 mh (Miller 691)	CH-8	051-018
L102	Choke, 5.5 hy (Merit C-2975)	CH-62	541-028
M101	VU Meter	6351	4140003-10
	NOTE: All Resistors ±10% Unless Otherwise Specified		
R101	2.2 Megohm 1/2W Composition Resistor	RE-434	041-086
R102	2,200 Ohm 1/2W Composition Resistor (A-B EB-2221)	RE-369	041-052
R103	82,000 Ohm 1/2W 350V Carbon Film Resistor (Stemag Type A-1)	RE-764	042-014
R104	100,000 Ohm 1 W 500V Carbon Film Resistor (Stemag Type A-2)	RE-761	042-011
R105	100,000 Ohm 1W 500V Carbon Film Resistor (Stemag Type A-2)	RE-761	042-011
R106	100,000 Ohm Audio Taper Potentiometer (A-B JA-1041 SD3056)	RE-584	044-015
R107	47,000 Ohm 1/2W 350V Carbon Film Resistor (Stemag Type A-1)	RE-763	042-013
R108	22,000 Ohm 1/2W Composition Resistor (A-B EB-2231)	RE-298	041-064
R109	270,000 Ohm 1/2W Composition Resistor (A-B EB-2741)	RE-297	041-077
R110	270,000 Ohm 1/2W Composition Resistor (A-B EB-2741)	RE-297	041-077
R111	1,500 Ohm 1/2W Composition Resistor ±5%	RE-619	041-008
R112	47,000 Ohm 1/2W Composition Resistor (A-B EB-4731)	RE-299	041-068

REF.	DESCRIPTION	DISCONTINUED AMPEX STOCK NUMBER	NEW AMPEX STOCK NO.
R113	270,000 Ohm 1/2W Composition Resistor (A-B EB-2741)	RE-297	041-077
R114	250,000 Ohm Audio Taper Potentiometer (Centralab BA-011-1224)	RE-229	044-042
R115	1 Megohm 1/2W Composition Resistor (A-B EB-1051)	RE-290	041-031
R116	33,000 Ohm 1/2W Composition Resistor ±5%	RE-620	041-017
R117	100,000 Ohm 1/2W Composition Resistor (A-B EB-1041)	RE-300	041-072
R118	560 Ohm 1/2W Composition Resistor (A-B EB-3311)	RE-446	041-045
R119	47,000 Ohm 2W Composition Resistor (A-B HB-4731)	RE-175	041-220
R120	470,000 Ohm 1/2W Composition Resistor (A-B EB-4741)	RE-302	041-080
R121	470 Ohm 1/2W Composition Resistor (A-B EB-4711)	RE-333	041-044
R122	2,200 Ohm 1/2W Composition Resistor (A-B EB-2221)	RE-369	041-052
R123	22,000 Ohm 2W Composition Resistor (A-B HB-2231)	RE-171	041-216
R124	10,000 Ohm 1W Composition Resistor (A-B GB-1031)	RE-15	041-158
R125	250,000 Ohm Audio Taper Potentiometer (Centralab BA-011-1224)	RE-229	044-042
R127	470,000 Ohm 1/2W Composition Resistor (A-B EB-4741)	RE-302	041-080
R128	1,800 Ohm 1/2W Composition Resistor	RE-492	041-051
R129	220,000 Ohm 1W 500V Carbon Film Resistor (Stemag Type A-2)	RE-762	042-012
R130	10,000 Ohm Audio Taper Potentiometer (IRC Type Q)	RE-616	044-039
R131	1 Megohm 1/2W Composition Resistor (A-B EB-1051)	RE-290	041-031
R132	2,200 Ohm 1/2W Composition Resistor (A-B EB-2221)	RE-369	041-052
R133	82,000 Ohm 1/2W 350V Carbon Film Resistor (Stemag Type A-1)	RE-764	042-014
R134	22,000 Ohm 1/2W Composition Resistor (A-B EB-2231)	RE-298	041-064
R135	100,000 Ohm 1W 500V Carbon Film Resistor (Stemag Type A-2)	RE-761	042-011
R136	100,000 Ohm 1W 500V Carbon Film Resistor (Stemag Type A-2)	RE-761	042-011
R137	250,000 Ohm Audio Taper Potentiometer (Centralab BA-011-1224)	RE-229	044-042
R138	1 Megohm 1/2W Composition Resistor (A-B EB-1051)	RE-290	041-031

ELECTRONIC ASSEMBLIES, Cont'd

REF.	DESCRIPTION	DISCONTINUED AMPEX STOCK NUMBER	NEW AMPEX STOCK NO.
R139	1,500 Ohm 1/2W Composition Resistor (A-B EB-1521)	RE-332	041-050
R140	47,000 Ohm 1/2W Composition Resistor (A-B EB-4731)	RE-299	041-068
R141	1 Megohm 1/2W Composition Resistor (A-B EB-1051)	RE-290	041-031
R142	820 Ohm 1/2W Composition Resistor (A-B EB-8211)	RE-370	041-047
R143	4,700 Ohm 1/2W Composition Resistor (A-B EB-4721)	RE-352	041-056
R144	10,000 Ohm 1/2W Composition Resistor (A-B EB-1031)	RE-453	041-060
R145	4,700 Ohm 1/2W Composition Resistor (A-B EB-4721)	RE-352	041-056
R146	4,700 Ohm 1/2W Composition Resistor (A-B EB-4721)	RE-352	041-056
R147	10,000 Ohm Linear Taper Potentiometer (IRC Type Q)	RE-617	044-050
R148	4,700 Ohm 2W Composition Resistor (A-B HB-4721)	RE-164	041-209
R149	4,700 Ohm 2W Composition Resistor (A-B HB-4721)	RE-164	041-209
R150	100 Ohm Linear Taper Potentiometer (Mallory Type C-P)	RE-618	044-084
S101	SPST Toggle Switch, 3 Amp, 250V (C-H 8280 K15)	SW-74	120-028
S102	SPDT Wafer Switch, Non-shorting (Oak 59016-23)	SW-66	122-016
T101	Power Transformer	6298	58-0017-01
T102	Bias & Erase Transformer	6352	4580144-10
V101	5879 Vacuum Tube	TU-35	012-028
V102	12AY7 Vacuum Tube	TU-63	012-043
V103	12AU7 Vacuum Tube	TU-28	012-023
V104	6F5 Vacuum Tube	TU-62	012-042
V105	5879n Vacuum Tube	TU-35	012-028
V106	12AU7 Vacuum Tube	TU-28	012-023
V107	12AU7 Vacuum Tube	TU-28	012-023
V108	5Y3GT Vacuum Tube	TU-14	012-013
	Shield, Choke	9188	60-0029-01
	Special Adjusting Screw with Retainer Sleeve	BO-4-4	474-010
	Metal Cap	CA-3	162-002
	Tinnerman Cable Clamp for 6-32 Screw	CL-72	302-034
	No. 6 Bind Head Sheet Metal Screw, Type Z, 3/8 in. long	DS-2-6-6	476-022

REF.	DESCRIPTION	DISCONTINUED AMPEX STOCK NUMBER	NEW AMPEX STOCK NO.
	Fuse Holder, Extractor Post Type	FE-5	085-003
	Neoprene Grommet, 3/8 ID x 11/16 OD for 1/2 in. hole	GR-35	260-013
	Knob, 1 1/2 in. dia skirt	KN-14	230-013
	No. 12 Lockwasher, Internal Teeth	LW-21-12	502-059
	3/8 Lockwasher, Internal Teeth	LW-21-616	502-077
	3/8 Lockwasher, Internal Teeth, Fine	LW-61-616	502-063
	1/2 Lockwasher, Internal Teeth, Fine	LW-61-816	502-064
	6-32 x 1 in. Long Bind Head Brass Machine Screw	MS-12B-6-16N	471-580
	Meter Glass	PS-4	098-002
	No. 12 Plain Brass Washer	PW-1B-12	501-036
	Fibre Washer, 3/8 ID x 5/8 OD x 1/32 in. thick	PW-3-5	503-006
	Tube Shield	SD-13	160-012
	Pan Head Sem Fastener, 6-32 x 3/8 in. lg.	SF-21-6-6	475-016
	"J" Type Tinnerman Nut for 6-32 Screw	SN-3J-632-1	497-002
	Flat Latch Type Tinnerman Nut for 6Z Screw	SN-3L-6Z-1	497-007
	8-32 x 3/8 in. long Socket Head Set Screw	SS-2-8-6	477-043
	3 - Lug Terminal Strip, Center Lug Grounded	TS-5-1	180-021
	2 - Lug Terminal Strip	TS-5-3	180-023
	2 - Lug Terminal Strip, Right Lug Grounded	TS-6-1	180-025
	1 - Lug Terminal Strip, Right Hand	TS-6-2	180-026

ACCESSORIES

DESCRIPTION	DISCONTINUED AMPEX STOCK NUMBER	NEW AMPEX STOCK NO.
Alignment Tape 7 1/2 IPS	5563	1-31321-01
3 3/4 IPS	6000	1-31331-01
Low Impedance Output Transformer	6300	4580139-10
Speed Conversion Kit to 3 3/4 IPS (60 CPS)	7556	4850094-05
Speed Conversion Kit to 7 1/2 IPS (60 CPS)	7556-1	4850094-07
Speed Conversion Kit to 3 3/4 IPS (50 CPS)	7556-2	4850094-06
Speed Conversion Kit to 7 1/2 IPS (50 CPS)	7556-3	4850094-08
Minor Hardware Kit	7802	4010897-01
Power Cable	CS-5	084-002
Microphone Plug	PL-33P	145-009
RTMA Plub, Line Input	PL-323P	149-002
Phone Plug, Output	PL-324P	149-003
Can of Oil, Caloil Turbine No. 11, 4 oz.	FP-5	087-005
1/2 oz.	TO-9	360-009
Portable Amplifier-Speaker	Model 620	Discontinued*

*The Ampex Model 622 Amplifier-Speaker is compatible with the Model 600 equipment. The part number of this speaker is 01-0622-01.

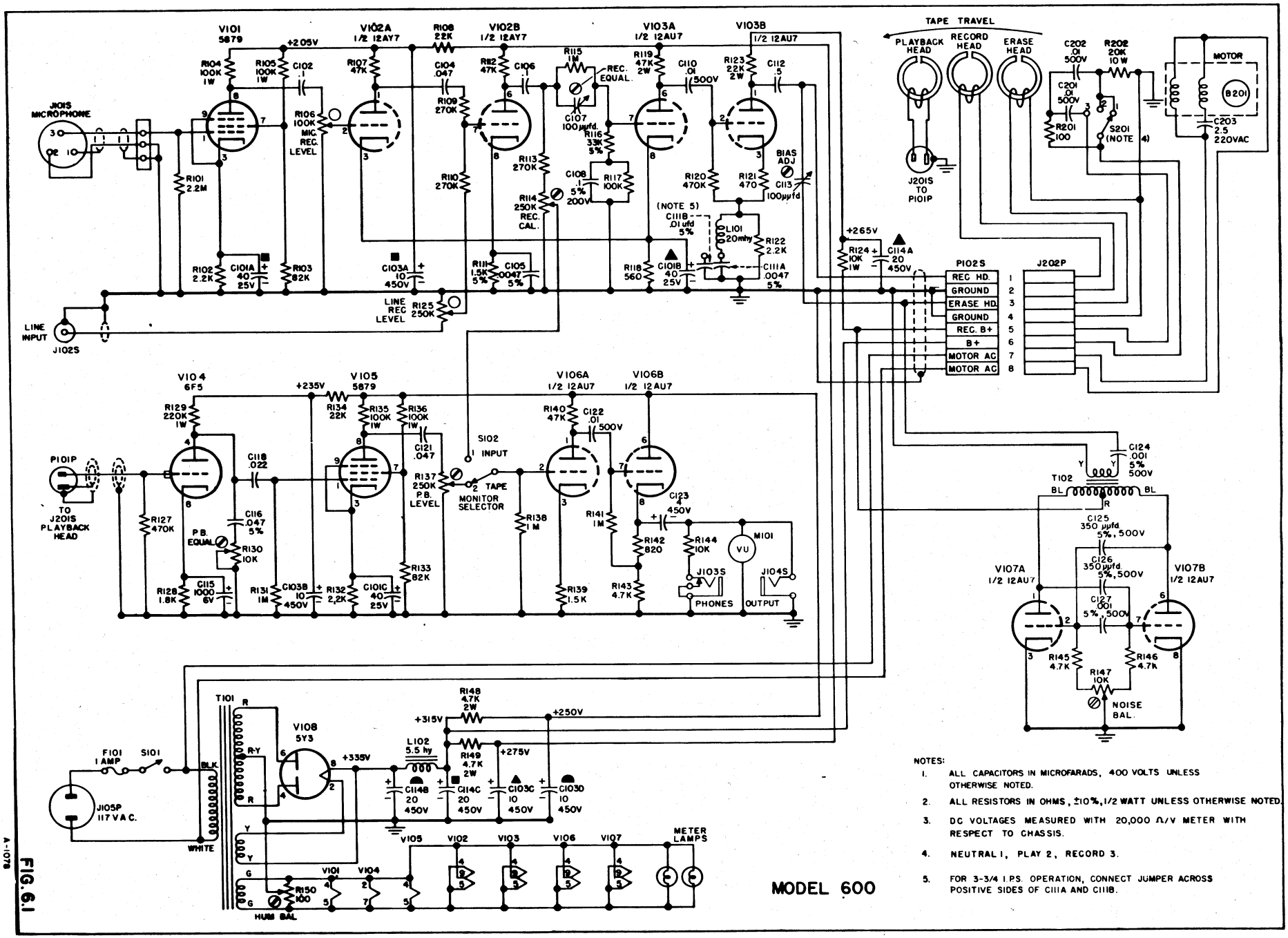
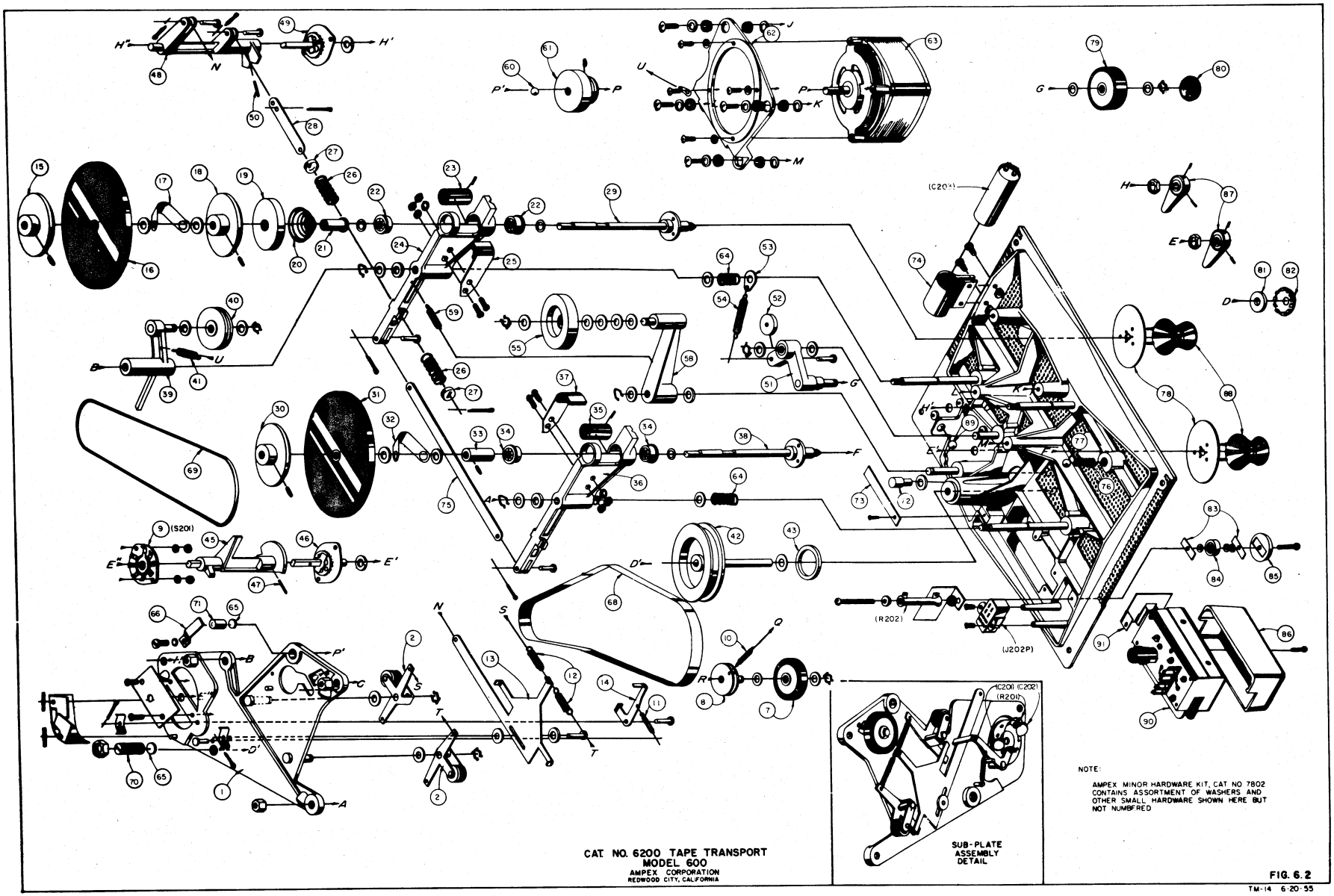

V101 5879
V102A 1/2 12AY7
V102B 1/2 12AY7
V103A 1/2 12AU7
V103B 1/2 12AU7
+205V
R104 100K 1W
R105 100K 1W
C102 .1
R106 100K MIC. REC. LEVEL
R107 47K
R108 22K
C104 .047
R109 270K
R110 270K
R112 47K
C106
R113 270K
R114 250K REC. CAL.
R115 1M
REC. EQUAL.
C107 100 μμfd.
R116 33K 5%
C108 .1 5% 200V
R117 100K
R119 47K 2W
C110 .01 500V
R120 470K
R123 22K 2W
C112 .5
R121 470
BIAS ADJ
C113 100 μμfd
J101S MICROPHONE
R101 2.2M
R102 2.2K
C101A 40 25V
R103 82K
C103A 10 450V
LINE REC LEVEL R125 250K
R111 1.5K 5%
C105 .0047 5%
C101B 40 25V
(NOTE 5)
C111B .01 μfd 5%
L101 20 mhy
R122 2.2K
C111A .0047 5%
+265V
R124 10K 1W
C114A 20 450V
LINE INPUT J102S
TAPE TRAVEL
PLAYBACK HEAD
RECORD HEAD
ERASE HEAD
J201S TO P101P
C202 .01 500V
R202 20K 10 W
C201 .01 500V
R201 100
S201 (NOTE 4)
MOTOR
B201
C203 2.5 220VAC
P102S
J202P
REC HD. 1
GROUND 2
ERASE HD. 3
GROUND 4
REC. B+ 5
B+ 6
MOTOR AC 7
MOTOR AC 8
V104 6F5
V105 5879
+235V
R129 220K 1W
R134 22K
R135 100K 1W
R136 100K 1W
C121 .047
S102 1 INPUT 2 TAPE MONITOR SELECTOR
R137 250K P.B. LEVEL
C118 .022
P101P
TO J201S PLAYBACK HEAD
R127 470K
C116 .047 5%
P.B. EQUAL
R130 10K
C115 1000 6V
R128 1.8K
R131 1M
C103B 10 450V
R132 2.2K
C101C 40 25V
R133 82K
R138 1M
V106A 1/2 12AU7
V106B 1/2 12AU7
R140 47K
C122 .01 500V
R141 1M
R142 820
C123 4 450V
R144 10K
M101 VU
J103S PHONES
J104S OUTPUT
R139 1.5K
R143 4.7K
C124 .001 5% 500V
T102
BL
R
C125 350 μμfd 5%, 500V
C126 350 μμfd 5%, 500V
C127 .001 5% 500V
V107A 1/2 12AU7
V107B 1/2 12AU7
R145 4.7K
R146 4.7K
R147 10K
NOISE BAL.
T101
F101 1 AMP
S101
J105P 117 V A.C.
BLK
WHITE
R-Y
Y
G
HUM BAL R150 100
V108 5Y3
+335V
R148 4.7K 2W
+315V
+250V
L102 5.5 hy
R149 4.7K 2W
+275V
C114B 20 450V
C114C 20 450V
C103C 10 450V
C103D 10 450V
V105 V102 V103 V106 V107
METER LAMPS
V101 V104
MODEL 600
NOTES:
1. ALL CAPACITORS IN MICROFARADS, 400 VOLTS UNLESS OTHERWISE NOTED.
2. ALL RESISTORS IN OHMS, ±10%, 1/2 WATT UNLESS OTHERWISE NOTED.
3. DC VOLTAGES MEASURED WITH 20,000 Ω/V METER WITH RESPECT TO CHASSIS.
4. NEUTRAL 1, PLAY 2, RECORD 3.
5. FOR 3-3/4 I.P.S. OPERATION, CONNECT JUMPER ACROSS POSITIVE SIDES OF C111A AND C111B.

FIG. 6.1

A-1078



CAT NO. 6200 TAPE TRANSPORT
MODEL 600
AMPEX CORPORATION
REDWOOD CITY, CALIFORNIA

SUB-PLATE
ASSEMBLY
DETAIL

FIG. 6.2

TM-14 6-20-55

SECTION VII

SUPPLEMENT

This supplement is designed to furnish information on accessories to the Model 600. Individual instruction sheets or pamphlets on accessories that may be developed in the future will be packaged with the accessories, and should be added to this section to keep the manual up to date.

In keeping with Ampex's policy of continuous design improvement, this section also contains Engineering Notes on design changes made subsequent to the initial manufacture of a machine. All such changes are referred to the serial number of the first machine in which they are made.

A - Microphone Transformer Kit - Cat. No. 9359
Installation Instructions

The accompanying sketches cover the details of installation. It is suggested that the sketches and the instructions below be followed exactly for best results.

A. Remove electronic assembly from case.

B. Remove bottom plate from chassis.

C. Carefully unsolder all connections on the triple tie point mounted on one of the screws that holds the small plate covering the microphone transformer cut-out.

D. Remove and discard the tie-point and the cover plate.

E. To facilitate making connections to the microphone transformer terminals, the 1000 MFD electrolytic condenser mounted to the side of the chassis near the cut-out should be moved aside temporarily by removing its mounting screw and pulling the condenser back out of the way carefully. It is unnecessary to disconnect its leads.

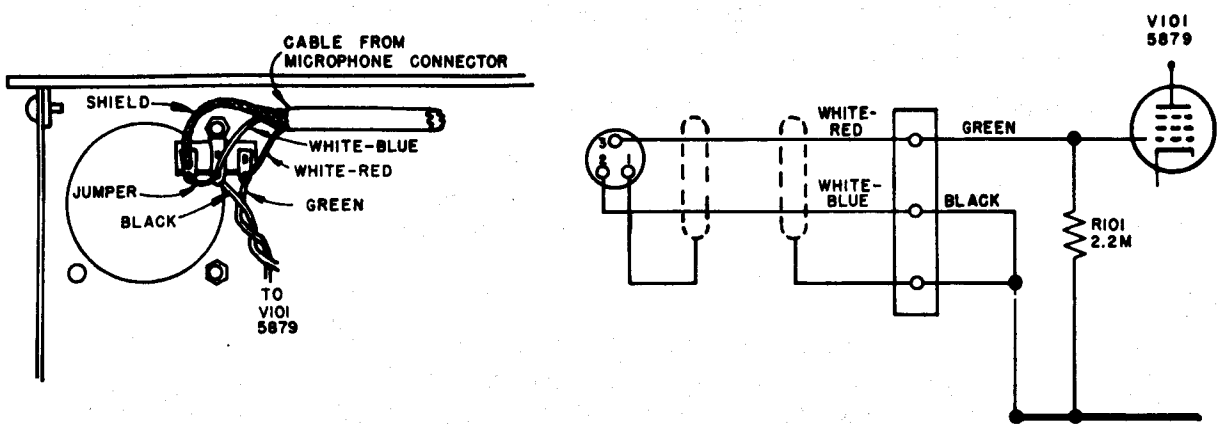
F. Mount the transformer on the chassis with the hardware provided, orienting its terminals as shown in the sketch, and install ground lug under one mounting screw as indicated.

G. Connect the wires removed from the triple tie point to the transformer terminals as shown in the sketch, and strap the transformer for the desired primary impedance per NOTE 1.

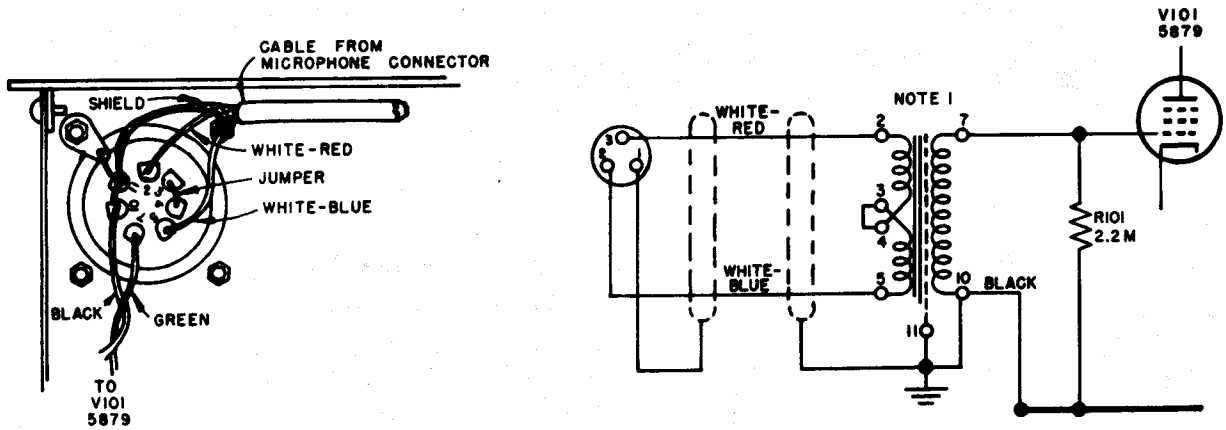
H. Restore the electrolytic condenser to its original position. Replace the bottom plate, and install the unit in the case.

IMPORTANT

The UTC A-11 microphone transformer is approximately equivalent to the transformer supplied in this kit, and mounts on the same centers. If the A-11 transformer is used, consult UTC's instructions on strapping.



BEFORE



AFTER

NOTES:

1. SHOWN STRAPPED FOR 150 TO 250 OHM NOMINAL MICROPHONE IMPEDANCE. FOR 30 TO 50 OHMS, STRAP 2 TO 3 AND 4 TO 5; CONNECT TO 2 AND 5.
2. IF UTC A-11 TRANSFORMER IS USED, CONSULT UTC STRAPPING INSTRUCTIONS.

MICROPHONE TRANSFORMER INSTALLATION
MODEL 600

AMPEX CORPORATION
REDWOOD CITY, CALIFORNIA

FIG. 7.1

TM-16 5-20-54

B. Specifications and Maintenance Procedures for 3-3/4 ips and Half-track Model 600 Machines.

Operation and maintenance procedures for the Model 600, which are described in the standard maintenance manual, are written for a "basic" machine, which is a 7-1/2 ips, full track, 117 v 50 or 60 cycle recorder. Specifications and maintenance procedures for other versions of the Model 1600 will vary as shown below:

(1) NOTE

Since half track machines record or play back half the width of the tape, the tape supply reel should always be oriented so that the half to be recorded or played back is uppermost (i.e. farthest from the surface of the top plate). Failure to turn the reel over to record the second half of the tape will result in erasure of the previously recorded program.

(1) The size of the drive motor pulley and belt will change depending upon line frequency used and tape speed desired. Stock numbers for the different pulleys and belts are shown in the standard combined parts list.

(2) Specifications for the 7-1/2 ips half-track machine are the same as for the "basic" machine with the following exception:

SIGNAL TO NOISE RATIO: Over 50 db below Peak Record Level.

(3) Specifications for the 3-3/4 ips machines are the same as for the "basic" machine with the following exceptions:

FREQUENCY RESPONSE: ±2 db 50 to 7500 cycles/sec

FLUTTER AND WOW: Below 0.3 percent

SIGNAL TO NOISE RATIO:- Over 50 db below Peak Record Level - for both half-track and full-track machines.

(4) Equalization and Bias adjustment procedures are similar for all Model 600 machines. The only difference in the procedures is in the Audio Oscillator settings for 3-3/4 ips operation.

For Playback Equalization, connect a test set-up as shown in Fig. 5.1. Set the oscillator at 250 cycles, and adjust its output for a VTVM reading 10 db below Normal Operating Level. Increase the oscillator frequency to 4000 cycles and adjust the PLAYBACK EQUALIZER (R130) to set playback response on curve at that point. Response should follow the curve within ±1/2 db.

For Bias Adjustment, use procedure outlined for bias adjustment on the "basic" machine but with the audio oscillator set at 250 cycles.

For Record Equalization, use procedure outlined for record equalization on the "basic" machine but with the RECORD EQUALIZATION capacitor (C107) adjustment made with the audio oscillator set at 4000 cycles instead of 8000 cycles.