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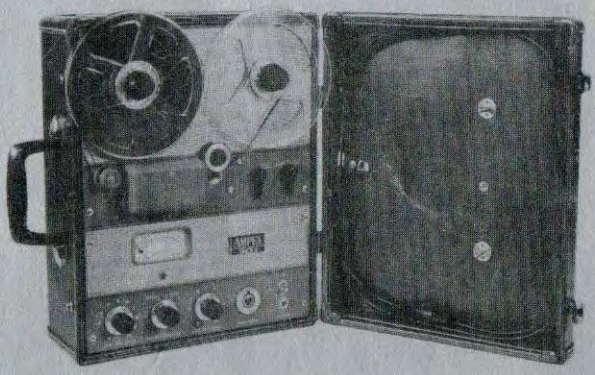
AMPEX

MODEL 601

Operation Maintenance Manual



AMPEX
CORPORATION
934 CHARTER STREET
REDWOOD CITY · CALIFORNIA

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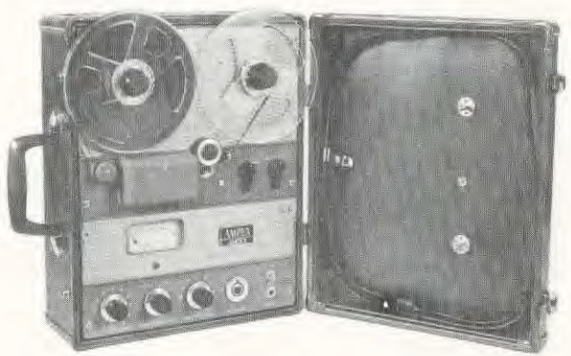

AMPEX
CORPORATION
934 CHARTER STREET
REDWOOD CITY · CALIFORNIA

3rd EDITION

OCTOBER 1958

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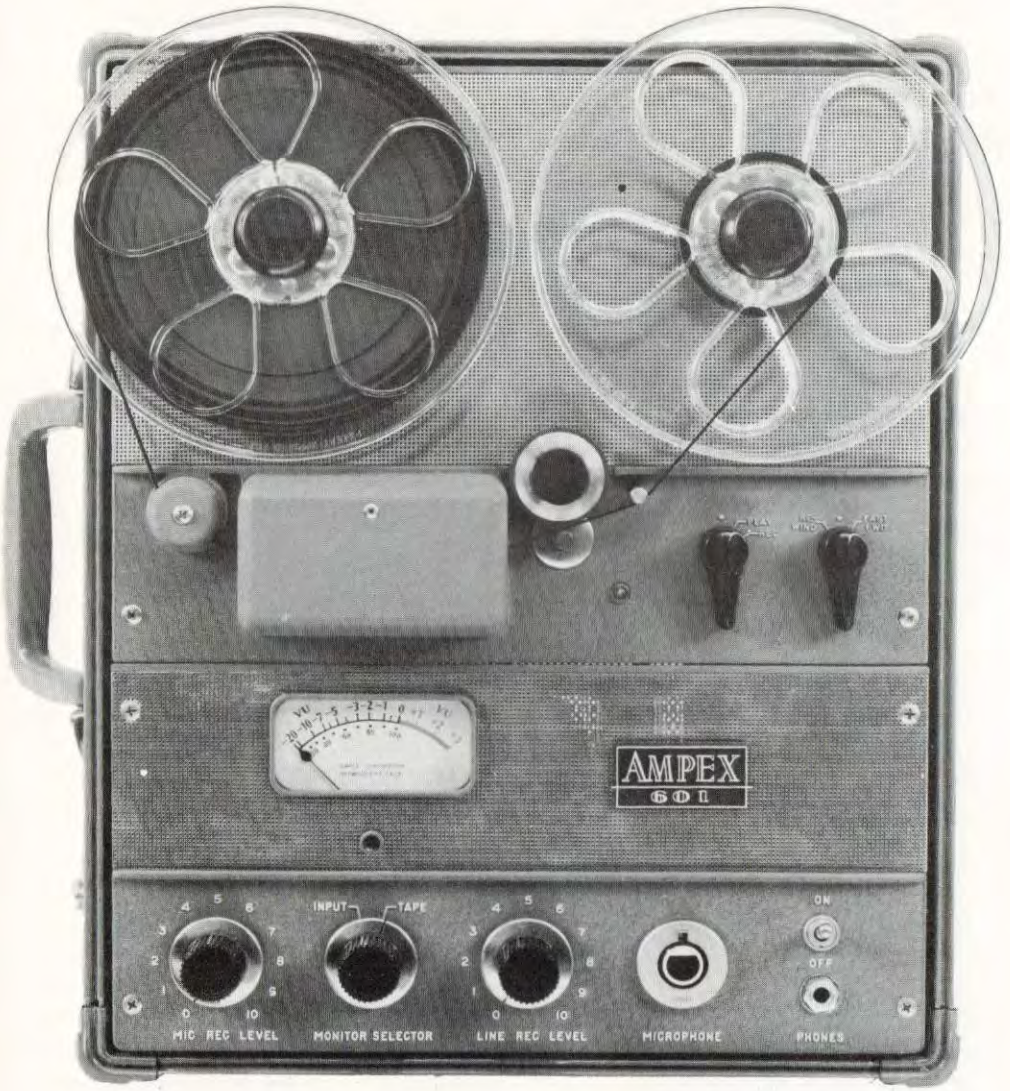


I. Description & Specifications

GENERAL

The AMPEX Model 601 is a lightweight, portable, magnetic tape recorder designed for professional use, and is available in any combination of these versions:

Power Input	117 volts, 50 or 60 cycles per second (cps)
Tape Speed	7½ or 3¾ inches per seconds (ips)
Head Assembly	full or half track

An accessory transformer (Catalog No. 17331-1) featuring convenient, quick plug-in change from high to low impedance microphone input is available for use with this model. The machine can be operated in the horizontal or vertical position. It is packaged in a durable, luggage-type, saddle-tan Samsonite case, or is obtainable uncased for custom installation.

TABLE 1-1

EQUIPMENT SUPPLIED

UNIT	TAPE SPEED (ips)	TRACK WIDTH	LINE FREQ (cps)	AMPEX CAT. NO.	DIMENSIONS (Ins.)
Complete Equipment (in carrying Case)	7-1/2	Half	60	7948-1	16-1/2x13-3/4x8.
	7-1/2	Full	60	7948-2	16-1/2x13-3/4x8.
	7-1/2	Half	50	7948-5	16-1/2x13-3/4x8.
	7-1/2	Full	50	7948-6	16-1/2x13-3/4x8.
	3-3/4	Half	60	7948-101	16-1/2x13-3/4x8.
	3-3/4	Full	60	7948-102	16-1/2x13-3/4x8.
	3-3/4	Half	50	7948-105	16-1/2x13-3/4x8.
	3-3/4	Full	50	7958-106	16-1/2x13-3/4x8.
Tape Transport	7-1/2	Half	60	6200-14	9-5/16x12-1/2x5.
	7-1/2	Full	60	6200-10	9-5/16x12-1/2x5.
	7-1/2	Half	50	6200-15	9-5/16x12-1/2x5.
	7-1/2	Full	50	6200-11	9-5/16x12-1/2x5.
	3-3/4	Half	60	6200-121	9-5/16x12-1/2x5.
	3-3/4	Full	60	6200-122	9-5/16x12-1/2x5.
	3-3/4	Half	50	6200-123	9-5/16x12-1/2x5.
	3-3/4	Full	50	6200-124	9-5/16x12-1/2x5.
Electronic Assembly	7-1/2			17416-1	6-1/8x12-1/2x5.
	3-3/4			17416-101	6-1/8x12-1/2x5.
Power Cord				CS-5	96.
Mating Connector, Microphone Input				PL-33P	
Miniature Phone Plug, Line Input				PL-450	
Mating Plug, Output				PL-445	

Notes:

1. All mating connectors are supplied without wiring as a convenience for diversified installation.
2. Hardware kits are available to facilitate maintenance. (See Sec-

Tape Width	¼ inch.
Reel Size	7 inch, RETMA reel (maximum).
Tape Speed	7½ ips, full track. 7½ ips, half track. 3¾ ips, full track. 3¾ ips, half track.
Playing Time	Full Track—32 minutes with 7 inch reel, 7½ ips, 1200 feet. Half Track—64 minutes with 7 inch reel, 7½ ips, 1200 feet.
Reproduce Timing Accuracy	±0.2%, or an accuracy of ±3.6 seconds in a 30-minute recording.
Flutter and Wow	7½ ips—Below 0.17% rms. 3¾ ips—Below 0.3% rms.
Starting Time	The tape attains full speed in less than one-fifth second in either the play or record mode.
Stopping Time	Less than one second.
Fast Forward Time	90 seconds for full 1200 foot reel.
Rewind Time	90 seconds for full 1200 foot reel.
Frequency Response	7½ ips—40 to 15,000 cps ±2 db 50 to 10,000 cps down no more than 4 db at 15,000 cps. 3¾ ips—±2 db 50 to 7500 cps.
Signal-to-Noise Ratio	Full Track—over 55 db below peak record level. Peak record level is defined as the point of 3% total rms harmonic distortion, measured while using a 400 cps tone; and peak record level includes bias, erase and reproduce amplifier noise. Half Track—50 db below peak record level.
Record Inputs	MICROPHONE: Accommodates any high impedance microphone, and can be quickly converted for a low impedance microphone with the plug-in accessory transformer (Catalog No. 17331-1). LINE: 0.5 volt required for normal program level.
Reproduce Output	1.23 volts rms into 600 ohms at program level.
Operating Controls	PLAY—REC: The play mode is selected by placing the switch in PLAY position. The record mode can be selected only by depressing the safety button at the same time the selector switch is placed in REC position. The safety button, a flat topped neon lamp, remains lighted while the machine is in the record mode. REWIND—FAST FWD: This selector switch is mechanically interlocked with the PLAY—REC switch.

Reproduce Output Operating Controls	MIC REC LEVEL, and LINE REC LEVEL are separate mixing controls. The MONITOR SELECTOR switch is used for monitoring as described in the following paragraphs; but it functions also as an operating control. In the PLAY mode, the MONITOR selector switch must be in the TAPE position in order to bring the reproduce head signal to the OUTPUT. A toggle ON—OFF switch, located on the control panel, turns power on or off. When placed in the ON position, this toggle switch will cause the capstan to rotate; but the tape will not move until one of the two operating switches is turned from its neutral position.
Miscellaneous	The MICROPHONE input, a three circuit connector, is conveniently located on the control panel. The PHONES output is a two circuit jack, located on the front panel. The LINE INPUT connector is a two circuit jack recessed into the right side of the equipment. The OUTPUT connector is a three circuit jack also recessed into the right side of the equipment. Mating connectors are supplied (see Table 1-1).
Monitoring	The MONITOR SELECTOR switch allows monitoring of program input, or reproduce output. A phone jack and illuminated v-u meter are on the front panel. When the TAPE position is selected, the reproduce output can be monitored. When the INPUT position is selected, the headphones and meter report program signal level.
Head Assembly	Separate erase, record, and reproduce heads are contained in a single housing.
Power Requirements	117 volts, 50 or 60 cps; 0.52 ampere, 61 watts.
Accessories	Maintenance Kit: 6392-1 Speed Conversion Kits to: 3¾ ips, 60 cps 7556-0 7½ ips, 60 cps 7556-1 3¾ ips, 50 cps 7556-2 7½ ips, 50 cps 7556-3

Conversion Kit to:	
50 cps operation, 7½ ips	9738
60 cps operation, 7½ ips	9739
50 cps operation, 3¾ ips	9740
60 cps operation, 3¾ ips	9741
Adaptor for rack mounting	9684-1
Spare parts kits for:	
7½ ips, 60 cps machine	9742-1
7½ ips, 50 cps machine	9742-2
3¾ ips, 60 cps machine	9742-3
3¾ ips, 50 cps machine	9742-4
Minor hardware Kits:	7802

See Section VI for a complete parts list.

II. Principles of Operation

Magnetic Tape

If a material capable of being magnetized is placed in the proximity of a magnetic field, the molecules of the material will be oriented according to the direction of the field. Any of several methods can be used to produce the magnetic field, but of most interest in magnetic recording is that field produced when a current flows through a coil of wire. The current may be derived from a transducer—for example, a microphone converting audio sound waves to electric current.

Magnetic recording tape consists of finely divided iron-oxide particles deposited upon a plastic backing. This tape is moved through a magnetic field in which the magnetizing force is alternating, and the iron oxide particles are aligned according to the instantaneous direction and magnitude of the field (See Fig. 2-1).

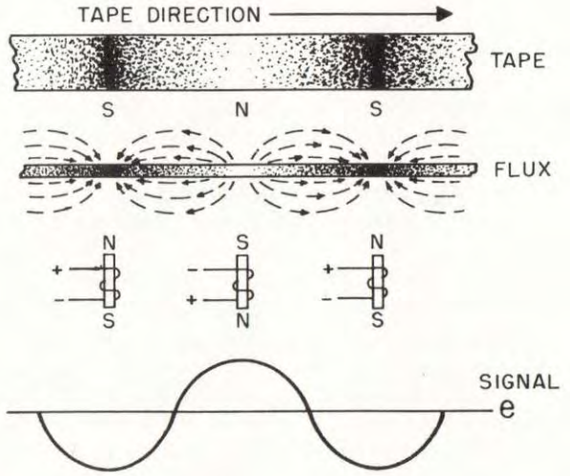


Fig. 2-1. *Tape Magnetization*

Magnetic Head

The magnetic field is produced in the gap of a recording head, over which the recording tape passes. The recording head is a ring-shaped electromagnet (See Fig. 2-2). It consists of an incomplete ring of highly permeable material inserted in a coil of wire. The discontinuity in the ring forms the gap, and the ring is the core of the electromagnet.

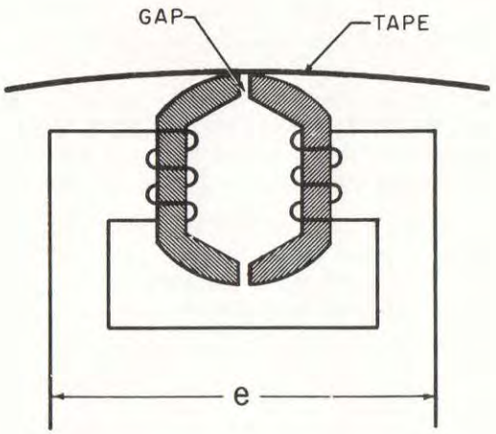


Fig. 2-2. Recording Head

Magnetization Curve

The magnetization curve of the iron oxide utilized as the recording medium is similar to that shown as the heavy line in Fig. 2-3. At points near the origin, the curve is extremely non-linear, and the signal recorded on the tape would not be directly proportional to the signal applied to the head. This would result in a high degree of distortion upon reproduction. This distortion is greatly reduced by the application of a high-frequency constant amplitude bias signal which is mixed with the signal being recorded. The frequency of this bias is generally selected to be five times the upper frequency limit of the recorder to prevent beating between the bias and harmonics of the recorded signal.

Bias

While the tape is in the recording gap, the bias causes the magnetization characteristics of the iron oxide to follow the dashed line loops shown in Fig. 2-3, known as the MINOR HYSTERESIS LOOPS. As the tape leaves the gap, the influence of the magnetic field created by the bias is reduced to zero, and the tape assumes a permanent magnetization, known as REMANENT INDUCTION, determined by the gap flux at the time the tape leaves the gap.

After the recording process, there exists on the tape a flux pattern which is proportional in magnitude and direction to the signal recorded on it. If the tape is then moved past the gap of a reproduce head—which is similar in construction to the record head—the magnetic flux of the moving tape will induce a voltage in the coil of the reproduce

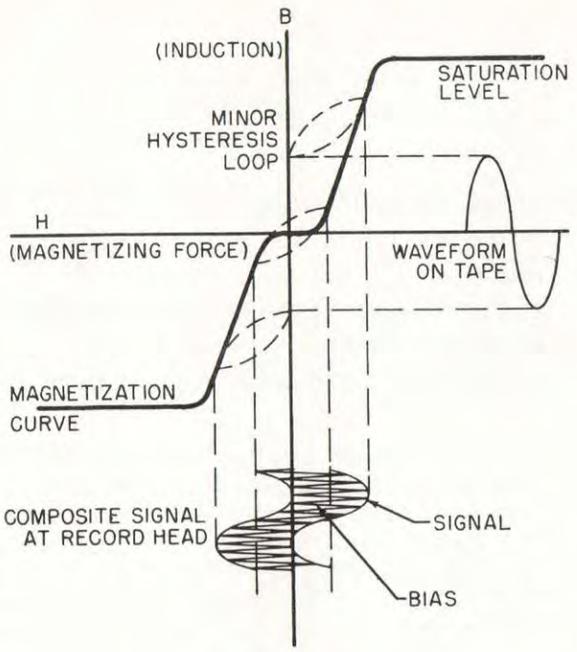


Fig. 2-3. Magnetization Curve

Induced Voltage in Head

head. This induced voltage is proportional to the number of turns of wire on the head, and the rate of change of flux, expressed in the following equation:

$$E = N\left(\frac{d\phi}{dt}\right)$$

Where E is the induced voltage
N is the number of turns of wire
$\frac{d\phi}{dt}$ is the rate of change of flux

It is desirable that the gap in the reproduce head be as small as possible, so that the gap will intercept less than one wave length of the signal on the tape at the highest frequency to be reproduced. However, as the gap is made smaller the induced voltage decreases, so there is a practical limit in decreasing the gap and still maintaining an adequate signal-to-noise ratio.

Induced Voltage in Head

The voltage induced across the head is computed by the following equation:

$$E = B_m V \sin \pi\omega/\lambda$$

Where E is the induced voltage
B is the maximum flux density of the recording material
V is the velocity of the tape over the head
ω is the gap width
λ is the wavelength of the signal on the tape.

From this expression it can be seen that the voltage across the coil increases directly as the velocity increases and as the wave-length decreases (frequency increases). If the tape velocity and gap width are assumed to be constant, the output voltage from the head is directly proportional to the frequency, as long as the wave length on the tape is large compared to the gap width. This results in an output vs. frequency characteristic such as shown in curve A of Fig. 2-4. The voltage does not continue to rise indefinitely. As electrical losses in the core material increase, and as the wave-length on the tape approaches the same dimensions as the reproduce head gap, the actual output resembles curve B of Fig. 2-4.

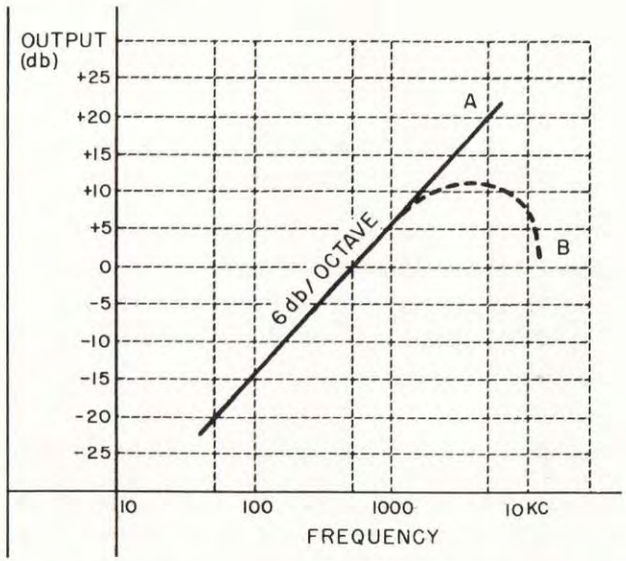


Fig. 2-4. Output vs. Frequency

Frequency Response

In order to provide an overall frequency response that is flat (see Fig. 2-5) an equalization circuit consisting of a series resistance and capacitance is inserted in one of the early stages of the reproduce amplifier. This equalizer has a high-frequency droop characteristic (curve B, Fig. 2-5) which is the inverse of the reproduce head characteristic (curve A, Fig. 2-5). In order to extend the high-frequency response, additional equalization is included in the record amplifier in the form of a high-frequency boost circuit, designed to compensate for the droop in reproduce head characteristics caused by head core losses, gap losses and recording losses.

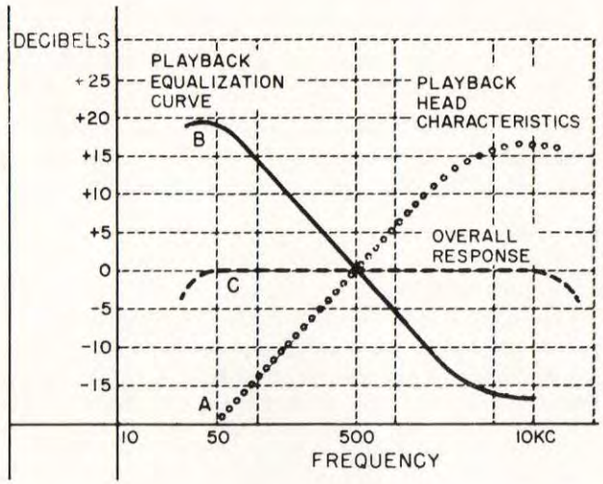


Fig. 2-5. Achieving Flat Response

III. Installation and Operation

GENERAL

This machine can be operated in either the horizontal or vertical position. In the carrying case, installation consists only of making up and connecting the required cables (See "Connector" in this section). For studio installations, an adaptor (Catalog No. 9684-1) is available which permits mounting in a standard 19-inch relay rack.

POWER

The power requirements are 117 volt a-c, 50 or 60 cps, 0.52 ampere, 61 watts. A name plate on the bottom of the case adjacent to the aperture for OUTPUT, LINE INPUT and 117 v. a-c indicates the proper line frequency.

LINE INPUT

The line input is an unbalanced bridging input of 100,000 ohms. Any unit connected to the LINE INPUT connector should deliver a signal of at least 0.5 volt when recording from consolettes, mixers or other tape recorders.

MICROPHONE INPUT

The recorder is wired for a high impedance microphone, but provision for internal mounting of an accessory plug-in transformer immediately changes the machine for use with low impedance microphones. To make this conversion, remove the four screws on the panel of the electronics assembly. The panel and assembly can then be removed.

A. High Impedance—a dummy plug J107P shown on the schematic diagram (Fig. 5.3) must be plugged into socket J106S for high impedance operation.

B. Low Impedance — remove the dummy plug J107P. Accessory transformer AMPEX catalog number 17331-1 (shown as T103 on schematic diagram Fig. 5.3) is then plugged into J106S for impedance in the range of 150 ohms to 250 ohms.

C. 30 ohm to 50 ohm — Install transformer T103 as shown on the schematic diagram (Fig. 5.3) by plugging the transformer into socket J106, and removing the jumper as shown in Note 7 on the schematic.

REPRODUCE OUTPUT

The output of the machine should be connected to a unit having 600 ohms input impedance. In a situation wherein the recorder will work into a high impedance line, physically terminate the OUTPUT connector with a 600 ohm resistor and bridge this resistor with the high impedance circuit. A three circuit OUTPUT plug is supplied. A two circuit plug can be used, and will work; but it automatically makes an unbalanced line. If an AMPEX amplifier loudspeaker is used plug it into the MONITOR jack only.

INTERCONNECTING

Regardless of application observe the requirements under "Line Input" and "Reproduce Output" when interconnecting the machine with any other piece of equipment.

CONNECTORS

A power cable and matching plugs for the MICROPHONE (J101S), LINE INPUT (J102S), and OUTPUT (J104S) connectors are supplied with the equipment.

Shielded, low-capacity cable is recommended for making up input and output cables. Make such cables as short as possible for interconnecting units in audio systems. Refer to the schematic diagram (Fig. 5.3), to determine correct pin connection for all plugs.

STUDIO INSTALLATION

The reproduce head cable is double shielded, insuring against r-f pickup. Cable capacity and length have been minimized to avoid high frequency loss. In general, mount the electronic assembly and tape transport no more than one foot apart. If the reproduce head cable is lengthened for greater separation of the components, high frequency response will be affected. In the event an installation absolutely demands lengthening this cable, a very low capacity type (RG-62/U) is indicated, plus the addition of an outer shield. High frequency losses cannot be kept to a minimum if the cable length exceeds three feet.

Space requirements for custom installation are given in the accompanying illustration (Fig. 3-1). Allow sufficient clearance at the right side of the electronics chassis for easy access to LINE INPUT and OUTPUT connectors. If desired, these connectors can be brought to a patch panel mounted at some more convenient point in the installation to provide ready accessibility.

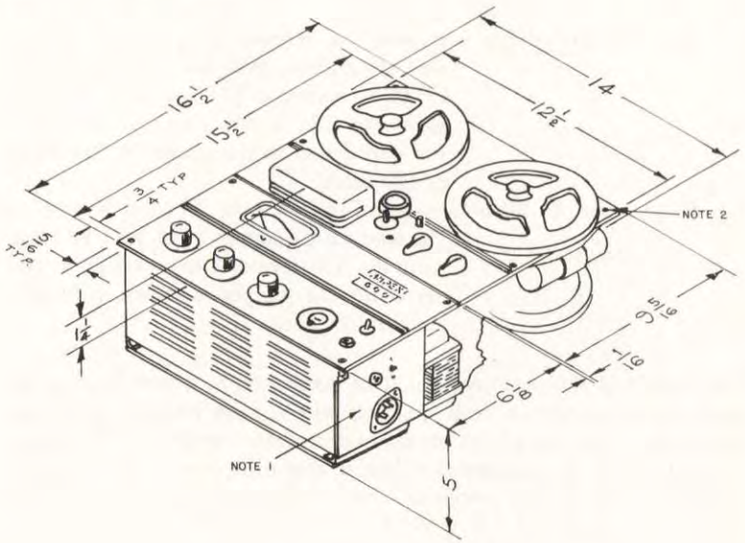


Fig. 3-1. Space Requirements

The tape threading path described below is the same for all modes of operation; but special attention is called to the notes dealing with half track heads.

Step 1: Place a reel of tape on the left-hand turntable, and an empty reel on the right-hand turntable, making certain that the pins around the base of each spindle engage corresponding slots on the reel hubs.

Step 2: Press a reel hold-down knob in place on each spindle.

Step 3: Thread the tape as indicated in the frontispiece. Make sure the oxide or dull surface is against the heads.

Step 4: Anchor the tape in the slot on the empty reel hub if desired, but a full tape turn counterclockwise around the reel hub is usually sufficient.

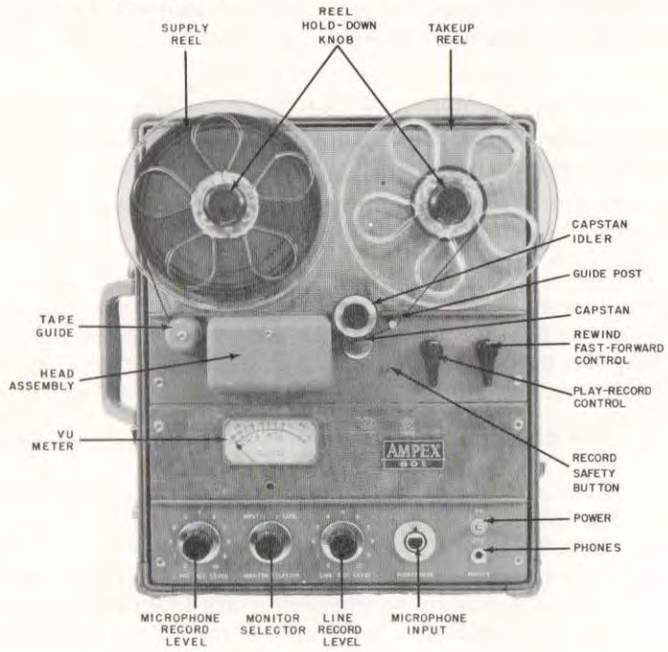


Fig. 3-2. Tape Threading and Nomenclature

NOTE

Because machines using half track heads record or reproduce only half the tape width, the tape supply must be so oriented that the half to be recorded is farthest from the tape transport surface. After the entire tape has been wound onto the take-up reel from a recording run, for instance, the take-up reel must be turned over and the second half recorded—or indentified for a later run. For example:

RECORDING HALF TRACK

Step 1: Thread a tape as directed under "Tape Threading."
Step 2: Set the machine as indicated in "Recording," immediately following.
Step 3: The entire tape must be reeled onto the take-up reel, regardless of whether or not the recording is completed. FAST—FWD can be used if program material does not use the entire tape.
Step 4: Remove the take-up reel from the machine and turn it over.
Step 5: Remove the turntable reel which is now free of tape.
Step 6: Place the take-up reel on the turntable side.

Reversing the take-up reel after a recording run, places the tape in the only position for proper threading from the turntable side; and also orients the still unrecorded half of the tape so that it is farthest from the tape transport. If the tape had been rewound, the second run would have erased the previous recording.

REPRODUCING HALF TRACK

Refer to the steps in "Reproduce," following. The half track tape will reproduce correctly only if oriented so that the half of the tape desired is farthest from the tape transport surface.

In reproduce mode, after the entire tape has been reeled onto the take-up reel, reverse the reel and place it on the turntable side.

RECORDING

Previously recorded tapes are erased automatically as new recordings are made, eliminating the need for an erasure run because the tapes first pass over the erase head whenever the machine is recording; but for the finest recording, it is recommended that the tapes be tank erased.

Step 1: Connect the program source equipment (microphone, mixers, etc.) to the appropriate input.
Step 2: Place the MONITOR SELECTOR switch on the INPUT function.
Step 3: Place the ON-OFF toggle in the ON position.
Step 4: Adjust either the MIC REC LEVEL or the LINE REC LEVEL control, depending on whether the MICROPHONE input or the LINE INPUT is being used, so that on the most intense volume peaks of the program to be recorded, the v-u meter needle swings to approximately zero on the v-u scale. It is unnecessary to start the tape motion in order to set the program level. If only one input is being used, turn the other REC LEVEL to zero.
Step 5: Place the PLAY-REC control in the REC position by depressing the safety button at the same time the record position is selected. The transparent plastic button glows while the machine is in the record mode. This record safety feature prevents accidental erasure of previously recorded tapes. When returning to the PLAY or the neutral position at the dot, the safety button is not used.

While recording, a continuous comparison of the incoming program and the reproduction on the tape can be effected by turning the MONITOR SELECTOR switch back and forth between the INPUT and TAPE positions and observing the v-u meter, or using headphones.

RECORDING

To stop recording, return the PLAY—REC control to neutral, marked by a dot.

REPRODUCING

Step 1: Thread a previously recorded tape on the machine.
Step 2: Place the ON—OFF toggle in the ON position.
Step 3: Place the PLAY—REC control in the PLAY position.
Step 4: Place the MONITOR SELECTOR switch in the TAPE position.
Step 5: Adjust the reproduce level through the volume control of the program source.

If there is no output, check the MONITOR SELECTOR switch position. When the machine is in the play mode, the MONITOR SELECTOR switch must be in the TAPE position. OUTPUT can be monitored with the headphones plugged into the jack on the front panel.

REWIND AND FAST FORWARD

To rewind or move tape forward rapidly, place REWIND—FAST FWD switch in the position desired. The tape moves at 800 feet per minute in either direction, and can be shuttled back and forth between REWIND and FAST FWD positions without waiting for the tape to decelerate or stop. Thus, cueing and editing can be accomplished at high speed with no danger of tape breakage.

The REWIND—FAST FWD and PLAY—REC controls are mechanically interlocked, making impossible the switching of either control unless the other is in neutral. This safety feature guards against tape breakage which would occur if the machine were switched directly from either of the high speed modes to PLAY or REC position.

CAUTION

Always return REWIND—FAST FWD control to neutral position, *and wait til tape motion stops* before switching to PLAY or REC. Placing selector controls on PLAY or REC while tape is in motion will cause stretched or broken tape.

ERASE

To erase a previously recorded tape when no new reproduction is desired, turn both of the REC LEVEL controls to zero and run the tape in the record mode.

MIXING

Because microphone and line recording channels are independent, each governed by its own level control, simultaneous recording from two sources can be made without an external mixer.

For example, singing, voice announcements or instrumental accompaniment can be dubbed into a program being recorded from a consolette or other tape recorder. To effect this, connect the program source equipment to the LINE INPUT connector and a microphone to the MICROPHONE connector. Adjust both the MICROPHONE REC LEVEL and LINE REC LEVEL controls for desired balance between the two programs.

SYNTHETIC REVERBERATION

Special effects, similar to those obtained through the use of an echo chamber can be created easily.

Connect a microphone and set the program level as usual; then connect the OUTPUT connector to the LINE INPUT connector, turn the MONITOR SELECTOR switch to TAPE, and start recording. The reverberation decay rate, which is the time required for the echo to die away, can be varied with the LINE REC LEVEL control. The Control value chosen will depend entirely on the effect desired. If the control is set too high, continuous oscillation will result, and the v-u meter needle will swing to maximum and remain there. If this happens, adjust to a lower setting.

IV. Tape Transport Assembly

GENERAL

The tape transport mechanism incorporates a single-speed synchronous motor and a system of pulleys, belts, and clutches to drive the capstan and the 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. (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, Fig. 4-4, and in the parts list at the end of this manual. For greatest facility in following the discussion below, it is suggested that Fig. 4-4 be opened fully for ready reference.

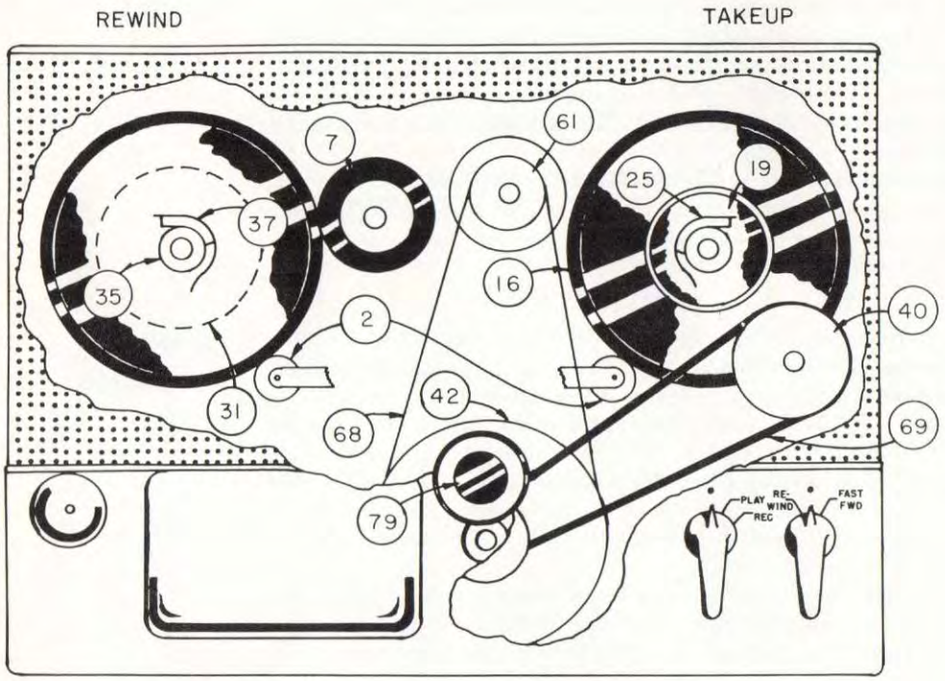
STANDBY OPERATION

Power is applied to the drivemotor (63) when the POWER switch on the front panel of the electronic assembly is turned to the ON position. The capstan (42) begins to rotate immediately, being driven by a nylon belt (68) which runs 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 condition.
Since the capstan is in motion when the machine is in the standby condition, the tape will accelerate to full play speed almost instantly when the PLAY switch is operated, thus producing a wow-free start.

PLAY MODE

When the PLAY control is energized the following mechanical sequence occurs:

1) The play takeup pulley (40) and belt (69) are brought to bear on the play takeup clutch (19).
2) The shock relief brake roller (2) on the play takeup side is released from the fast forward clutch tire (16).
3) 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 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 (2) on the rewind side remains engaged against the rewind clutch tire (31), and slippage occurs between the clutch and disc assembly (30). 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.



(2) 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
(61) MOTOR PULLEY
(68) NYLON DRIVE BELT
(69) TAKEUP BELT
(79) CAPSTAN IDLER

Fig. 4-1. Mechanical Operation Simplified

REWIND MODE

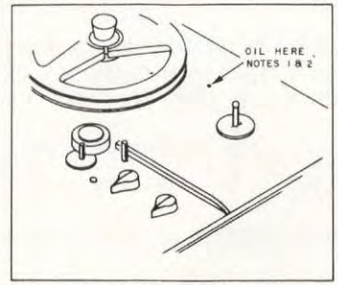
The REWIND-FAST FORWARD control cannot be operated unless the PLAY control is in neutral. When the REWIND-FAST FORWARD control is turned to REWIND:

1) Both shock relief brake rollers (2) are released.
2) The rewind idler (7) is clamped between the motor pulley (61) and the rewind clutch tire (31) and the rewind turntable is driven.
3) Holdback tension is provided by the holdback brake (25) on the takeup assembly as tape is pulled from the takeup turntable.

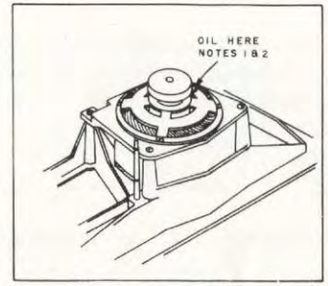
FAST FORWARD MODE

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

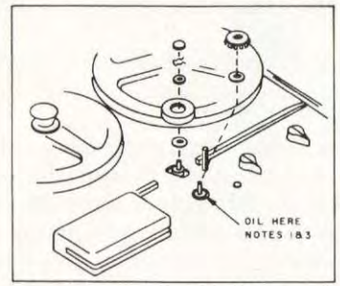
1) Both shock relief brake rollers (2) are released.
2) The rubber-tired fast forward clutch (16) is brought to bear on the motor pulley (61) and drives the takeup turntable.
3) Holdback tension is produced by the holdback brake (37) on the rewind assembly.



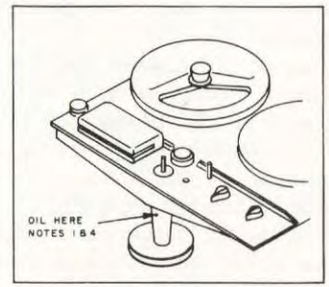
DRIVEMOTOR (UPPER BEARING)



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.

Fig. 4-2. Routine Lubrication

ROUTINE MAINTENANCE

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

Cleaning

Cleanliness of all parts of the tape drive mechanism is required for consistent optimum performance. Most tape manufacturers lubricate their tapes; this lubricant will gradually form a coating on the head assembly and the idler wheels and may cause loss of positive drive at the capstan. Therefore, periodic cleaning of both the head assembly and all parts of the tape drive mechanism is particularly important. The recommended agent for cleaning Ampex Head Assemblies is a mixture of Xylene and 0.1% Aerosol. This agent is available in 2 oz. bottles. (Ampex Catalog No. FP-7.) To clean any head assembly simply wind a clean, lintless cloth on a swab-stick and moisten with this mixture. Swab the heads periodically to remove all dirt and oxide which may have accumulated from the tape. Clean all parts except the head assembly with a clean, lintless cloth moistened with denatured alcohol.

CAUTION

Do not use any other solvents as there are some which may damage the adhesive used to hold the head laminations together.

Lubrication

The recommended standard lubricant for the four places which require periodic lubrication (motor and capstan) is Caloil No. OC-11. This lubricant is available from AMPEX as *Stock No. TO-9* (½ oz. oiler) or *FP-5* (4 oz.)

NOTE

The proper lubricant is available from AMPEX as *Stock No. TO-9* (½ oz. oiler) or *FP-5* (4 oz.).

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. For access to the lower oil hole, 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-bottom 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—no more.*

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

Mechanical Troubleshooting

It may be said in general, that most of the difficulties that will normally be encountered in the Model 601 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. Correction of these difficulties will usually 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. The measurement of these torques will frequently provide a rapid means for isolating the source of mechanical troubles.

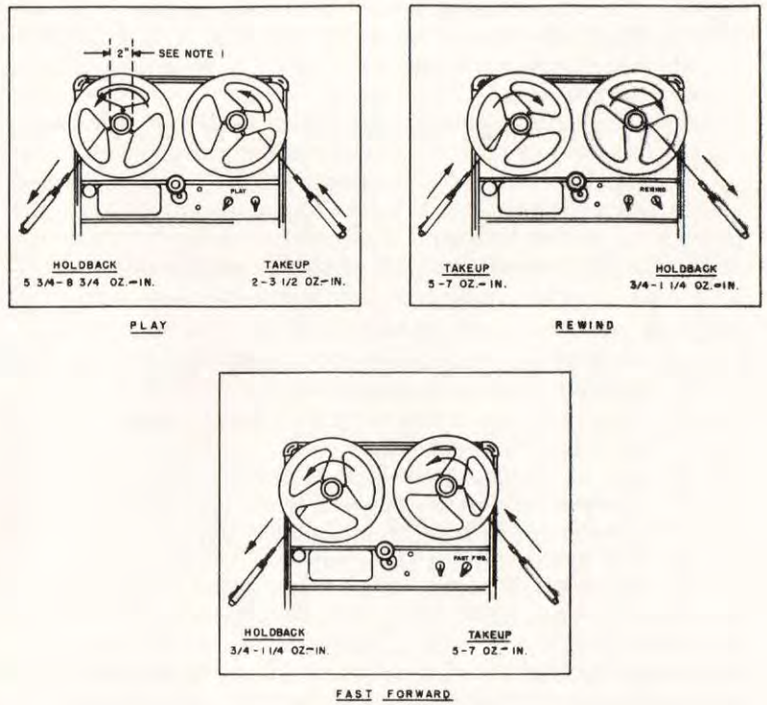


Fig. 4-3. Tape Tension Measurements

Torques and Tape Tension

The measurement of torques on the Model 601 requires the following equipment:

1) A light-movement spring scale (e.g. Post-A-Let, 0 to 8 oz., Exact Weight Scale Co., Columbus, Ohio.
2) A measuring hub. A standard RETMA 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 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).

Takeup Tension

Step 1: Place the measuring hub on the driven turntable.

Step 2: 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.

Step 3: 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. Normal torques are as follows:

Fast Forward	5 to 7	oz-in.
Rewind	5 to 7	oz-in.
Play	2 to 3½	oz-in.

Holdback Tension

Step 1: Place the measuring hub on the turntable from which the tape is pulled in the mode in operation.

Step 2: Wind the string on fully in the direction of normal tape wrap, and attach the spring scale.

Step 3: Start the machine in the oppropriate 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:

Fast Forward	¾ to 1¼	oz-in.
Rewind	¾ to 1¼	oz-in.
Play	5¾ to 8¾	oz-in.

These values listed above for both takeup and holdback tensions 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 or 12 hours of operation.

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, discussed in the previous section, may lead directly to the source of trouble. Possible causes of flutter and wow are suggested in the following check list.

Malfunctions in Play Mode

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. 4-4, which should serve as a guide for any necessary disassembly and reassembly.

Malfunctions in Rewind or Fast Forward Mode

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. The first step is to make a quick check of rewind or fast forward takeup and holdback tensions as described previously. The malfunctions discussed below apply to either mode, the turntables, associated components, and tape directions being opposite of each other.

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 of brake malfunctions produced primarily by tampering or misassembly, or contamination due to careless oiling or accumulation of dirt.

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:

1) 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. 7802) is available through your dealer.
2) 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 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 subsections. 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 do not fall out. It will generally be found easiest to re-install the sub-plate after servicing, if the PLAY control is energized.

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 (60) against a nylon

Drivemotor Thrust

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:

Step 1: 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.

Step 2: Insert the set-screw, and tighten down until it is felt to bottom on the thrust disc.

Step 3: Grasp the capstan flywheel (42) between the thumb and index finger.

Step 4: 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 usually occur when the set-screw has been backed off approximately ¼ of a turn. At this point, end play should be in the required range.

Step 5: 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 (78) to the perforated metal grille) should be .125 in., ±.008 in. This height is determined by the replacement of lamicoid washers betwen the bottom of the turntable pivot (24 or 36) and the hairpin retainer on the shaft through the pivot. Difficulties in tape tracking 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 (18), and a bakelite clutch (19) which is spring-loaded to the disc. When the machine is in the play mode, 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 gauge because of the physical arrangement can be set quite accurately by the following indirect method:

Step 1: Insert a removable .015 in. 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 (24) and oilite bushing (21).

Step 2: Assemble the conical spring (20), the bakelite clutch (19), and the felt-lined aluminum disc (18) (in that order) on the turntable shaft (29).

Step 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.

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

Step 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 in. clearance.

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 (16) 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.

TABLE 4-1
Troubleshooting PLAY Model Malfunctions

Trouble	Probable Cause
EXCESSIVE OR ERRATIC HOLDBACK TENSION	1. Contaminated rewind clutch felt (30). 2. Contaminated rewind clutch tire (31). 3. Rewind clutch spring (32) too stiff. This actually indicates tampering or carelessness in reasembly. It is advisable to replace the spring rather than to attempt makeshift readjustment.
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 sub-paragraph 8.4 below for adjustment procedure. 3. Takeup clutch spring (20) too stiff.
DRIVEMOTOR OUT OF SYNCHRONISM	1. Line voltage below 105 volts a-c. 2. Excessive play takeup tension. See trouble above. 3. Nylon drive belt (68) tension excessive. See sub-paragraph 8.1 below. 4. Belt tensioning idler (55) dragging. 5. Drivemotor thrust misadjusted. See subparagraph 8.2 below. 6. Defective drivemotor starting capacitor. 7. Dry bearings in drivemotor (63), capstan (42), or capstan idler (79). See lubrication instructions. 8. Defective drivemotor (63).

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 does not restore the tire to normal, the idler must be replaced.
DEFECTIVE OR IMPROPERLY INSTALLED NYLON DRIVE BELT (68)	1. Belt spliced improperly. 2. Belt installed with splice joint toward pulley. 3. Belt worn because misaligned motor pulley (61) causes the belt to track against one of the capstan pulley flanges (42).
REWIND IDLER (7) NOT DISENGAGING FROM MOTOR PULLEY (61)	1. Contaminated rewind idler guide (8).
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 subparagraph 8.4 below.

TABLE 4-2

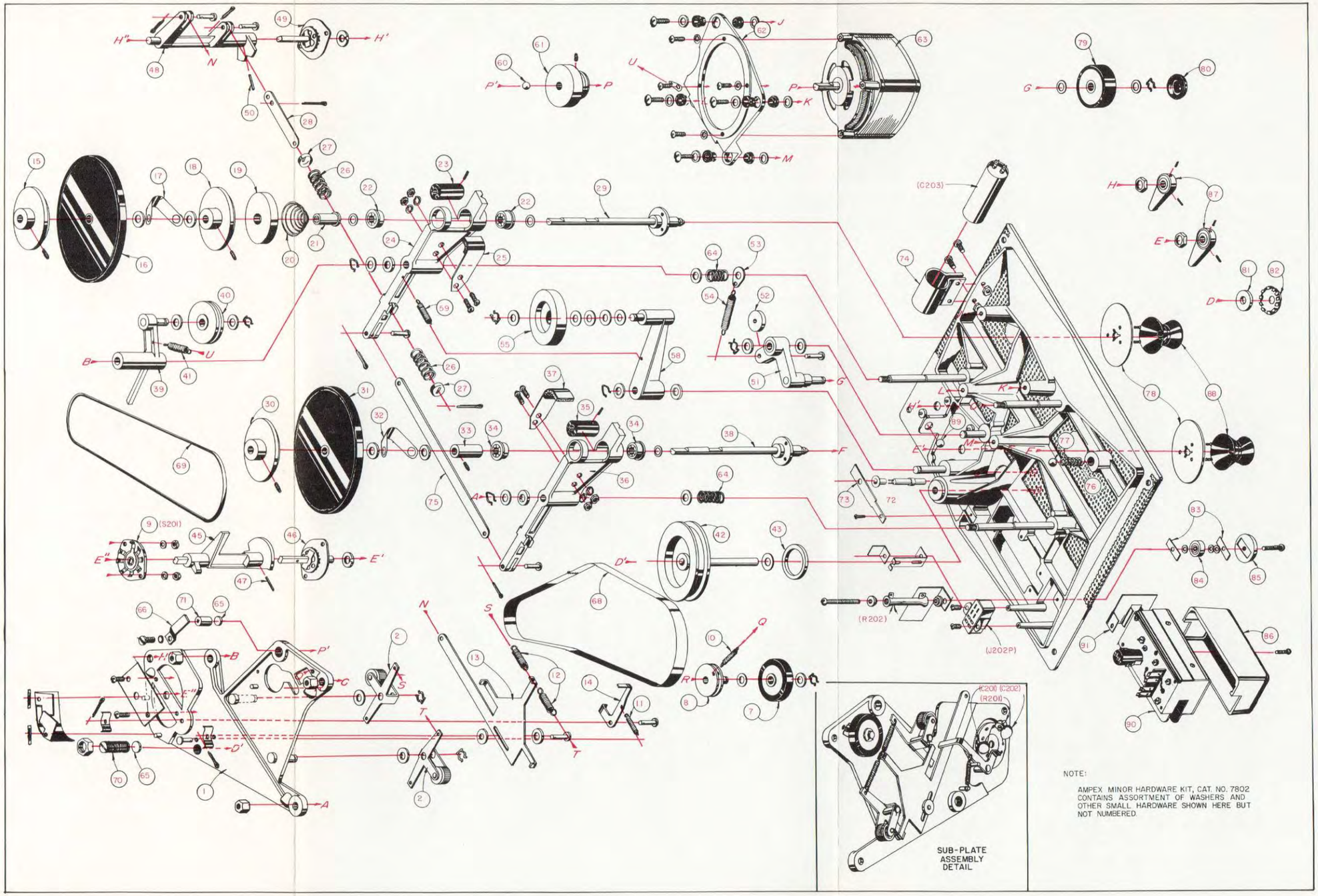
Troubleshooting REWIND and FAST FORWARD Mode Malfunctions

Trouble	Probable Cause
TAKEUP TENSION LOW	Clutch leaf spring (17 and 32) too weak, usually caused by tampering. Replace. Never attempt to increase rewind takeup tension to offset other problems.
EXCESSIVE HOLDBACK TENSION	1. Contaminated holdback wipes (25 or 37). 2. Bakelite drum (23 or 35) on which wipe operates has been roughened.
BRAKE SHOCK RELIEF ROLLER (2) NOT RELEASING FROM FAST FORWARD CLUTCH (16)	Evidence of bent or misassembled parts. Check exploded view, Fig. 4-4.
REWIND IDLER (7) NOT ENGAGING MOTOR PULLEY (61) BIND IN REWIND IDLER BEARING (PART OF 7)	Bind in idler guide (8) caused by contamination.
MALFUNCTIONING TURNTABLE PIVOTS (24 or 36)	Bind in turntable centering detent (77).

TABLE 4-3

Troubleshooting Starting, Stopping, and Shuttling Malfunctions

Trouble	Probable Cause
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 is 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).
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).



NOTE:

AMPEX MINOR HARDWARE KIT, CAT. NO. 7802 CONTAINS ASSORTMENT OF WASHERS AND OTHER SMALL HARDWARE SHOWN HERE BUT NOT NUMBERED.

V. Electronic Assembly

GENERAL

The electronic assembly consists of a record channel, a reproduce channel, a bias and erase oscillator, and a power supply, mounted on a single chassis.

RECORD CHANNEL

The record channel consists of a two-stage microphone preamplifier V101 and V102A and a three-stage amplifier, V102B, V103A, V103B (Fig. 5.3).

When dummy plug J107P is inserted in receptacle J106S in the microphone preamplifier, the microphone input matches a high impedance microphone. A plug-in transformer, available as accessory equipment, will provide the proper match for a low impedance microphone.

The MICROPHONE input J101S and LINE INPUT J102S have separate controls R106 and R125 respectively. Both inputs can be used simultaneously. Mixing takes place 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 can be switched to the output amplifier 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 *only* when switch S201 on the tape transport is in the REC position.

REPRODUCE CHANNE

The reproduce channel consists of a two-stage reproduce amplifier, V104, V105 and a two-stage output amplifier V106A and V106B.
The signal from the reproduce head appears at connector P101P. Reproduce equalization is provided by C116 and R130. Level is adjusted by potentiometer R137.

The reproduce signal is fed to the output amplifier through the MONITOR SELECTOR switch *when it is in tape position.* The output amplifier consists of one voltage amplification stage V106A, and a cathode follower output stage V106B, which is transformer-coupled to OUTPUT connector J104S. A v-u meter and resistor shunt this connector.

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 both grids of the oscillator is adjusted to eliminate any asymmetry in wave form. Lack of wave symmetry would introduce a d-c current in the record head, causing permanent magnetization and a resultant distorted signal. Bias level is adjusted by trimmer C113. The oscillator, dependent on plate voltage, operates only when switch S201 is in the REC position.

BIAS AND ERASE OSCILLATOR

The d-c plate supply consists of a full wave rectifier V108, and a capacitor-input L-C filter. A 6.3 volt secondary winding on the power transformer furnishes a-c power to all heaters. Potentiometer R150 HUM BAL is adjusted for minimum hum.

ELECTRONIC ALIGNMENT

Alignment consists in making all necessary adjustments 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 completely aligned at the factory, and no adjustments should be necessary. The overall performance checks outlined in Section 3 will generally serve to determine if realignment is necessary at any time.

Alignment can be accomplished without removing the electronic assembly from the case. If desired the electronic assembly can be withdrawn by removing the four screws on the front panel. Stand the case in a vertical position and pull the electronic assembly forward. The interconnecting cables between the electronic assembly and the tape transport are sufficiently long for access to all adjustments while the units are connected.

ALIGNMENT AND TEST EQUIPMENT REQUIREMENTS

The following equipment is required for proper alignment and testing:

A. *Audio Oscillator*—Hewlett-Packard Model 200C or equivalent.
B. *Vacuum Tube Voltmeter*—Hewlett-Packard Model 400C or equivalent.
C. *Ampex Alignment Tape*—Catalog No. 5563. This tape is recorded at 7½ ips 10 db below normal operating level as defined in Section 3. The tape contains voice announcements of the following tone sequence: reproduce head alignment tone, reference tone for reproduce level adjustment, tone series for reproduce response check.
D. *Ampex Head Demagnetizer*—Catalog No. 704.
E. *High Impedance Headphones*
F. *Small Screwdriver*

Head Demagnetization

Demagnetize the record and reproduce heads before 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

Step 1: Remove both the head cover and the mu metal shield over the head assembly.
Step 2: Place the ON—OFF switch in the OFF position.
Step 3: Cover the tips of the demagnetizer with scotch tape or masking tape. This prevents scratching the heads. Plug the demagnetizer into a source of 117-volt a-c power.
Step 4: The head sequence from left to right when facing the machine, is erase head, record head, reproduce head. Bring the tips of the demagnetizer into contact with the record head stack. The 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*. Slow withdrawal is required for thorough demagnetization.

Demagnetization Procedure

Step 5: Repeat step 4 on the reproduce head. It is not necessary to demagnetize the erase head.
Step 6: Replace the head shield, but do not replace the head cover if alignment will follow.

Reproduce Channel Alignment

The following steps constitute the complete alignment of the reproduce channel.

A. Reproduce Head Azimuth Adjustment
B. Reproduce Level Setting
C. Reproduce Response Check
D. Reproduce Equalization
E. Hum Balance Adjustment

Reproduce Head Azimuth Adjustment

Step 1: Thread the alignment tape on the machine. Terminate the OUTPUT connector with a 600 ohm resistor and connect the vtvm across this load. Plug a set of high impedance head phones into the phones jack so that voice announcements on the tape can be heard. If not already done, remove the head assembly cover, but not the mu metal shield beneath it. Place the MONITOR SELECTOR switch in TAPE position, and start the machine in the reproduce mode. The head alignment tone will be announced first.
Step 2: Insert a small screwdriver through the access hole nearest the right hand edge of the head shield, and adjust the azimuth screw for maximum output observed on the vtvm. *If the head is far out of alignment, several minor peaks occurring on either side of a maximum may be observed.* Make certain that the maximum is clearly 15 to 20 db greater than any of these minor peaks.

Reproduce Level Setting

The next tone on the tape is for reproduce level setting. Adjust the REPRODUCE LEVEL (P.B. LEVEL) potentiometer R137 for a vtvm reading 10 db below normal operating level, which is approximately 0.4 volts rms.

Reproduce Response Check

The next series of tones is for the reproduce response check. Observe the response indicated on the vtvm, and check it against specifications. If reproduce response fails to meet specifications, the trouble may be a worn or otherwise faulty reproduce head, a partially erased alignment tape, due to head magnetization, or improper equalization of the reproduce amplifier. Equalization can be checked and adjusted as indicated below.

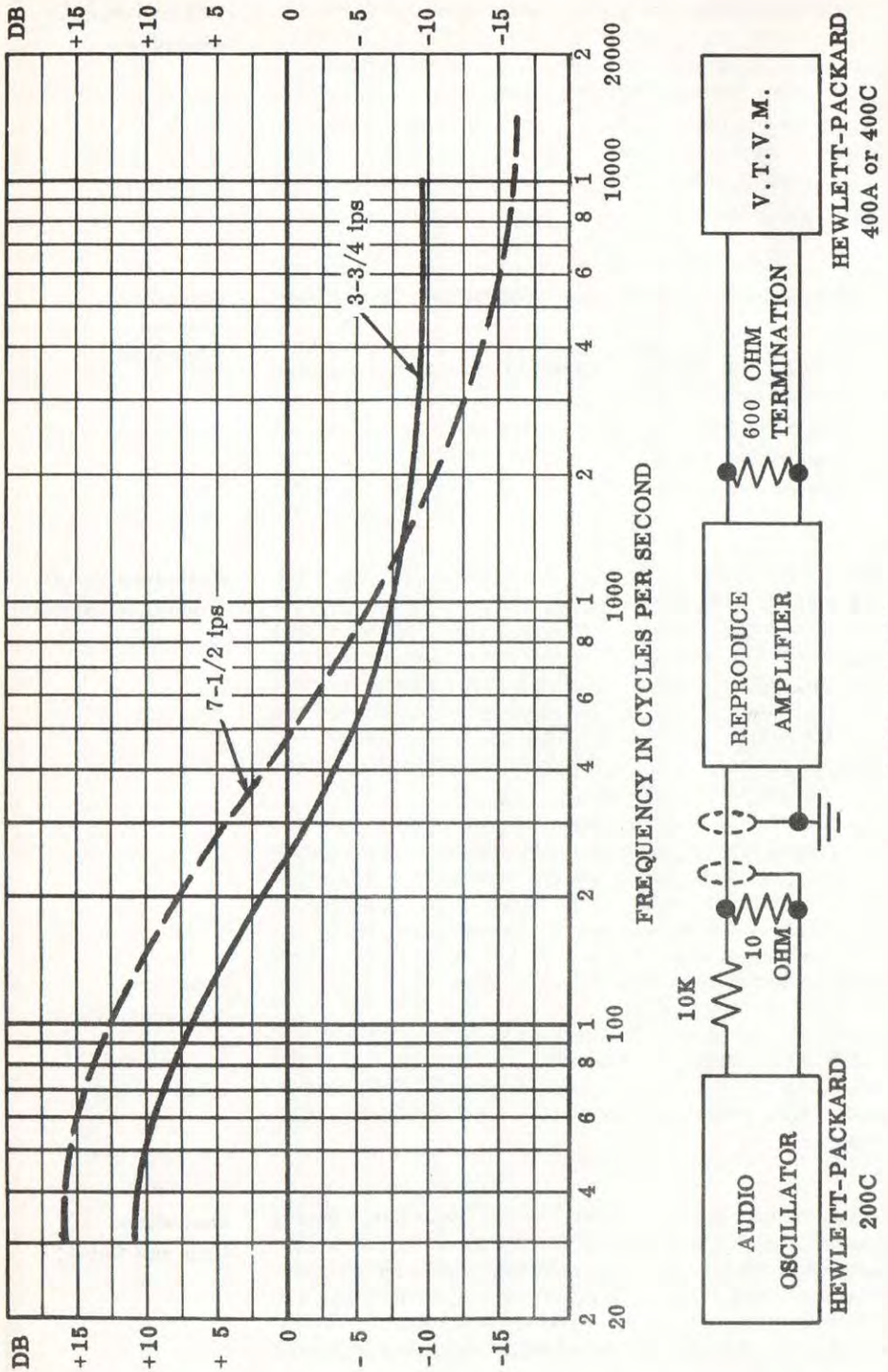


Fig. 5-1. Reproduce Amplifier Response

Reproduce Equalization

Reproduce equalization (P.B. EQUAL) is a bench procedure. The required test setup and the reproduce amplifier response curve are given in Fig. 5-1. Set the oscillator at 500 cps, 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 cps and adjust the reproduce equalizer R130 to set reproduce response on the curve at that point. Sweep the oscillator through the specified frequency range. Response should follow the curve within ±½ db. Be sure that the oscillator output remains constant over this range.

Equalization procedures are similar for all machines. The only difference in the procedures is in the audio oscillator settings for 3¾ ips operation. For 3¾ ips reproduce equalization, (P.B. EQUAL) 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 resistance R130 (P.B. EQUAL) to set reproduce response on curve at that point. Response should follow the curve within ±½ db.

Hum Balance Adjustment

After completing stetps A through D adjust the HUM BALANCE (HUM BAL) potentiometer R150 for minimum hum as seen on a vtvm connected across the OUTPUT with the MONITOR SELECTOR in TAPE position.

Record Channel Alignment

The steps in record channel alignment are as follows:

A. Bias Adjustment (BIAS).
B. Record Level Meter Calibration (REC. CAL).
C. Record Head Azimuth
D. Record Equalization & Response Adjustment (REC. EQUAL).
E. Noise Balance Adjustment (NOISE BAL).
F. Final Bias Adjustment (BIAS).

Bias Adjustment

Step 1: Thread a tape on the machine. Terminate the OUTPUT in 600 ohms and connect a vtvm across this load. Connect an audio oscillator set to 500 cycles to the LINE INPUT connector and start the machine in the record mode.

Step 2: Place the MONITOR SELECTOR in TAPE position and adjust the LINE REC LEVEL control for a normal operating level vtvm reading (1.23 volts, or plus 4 dbm).

Step 3: Adjust the BIAS trimmer to peak this output. Make this adjustment carefully because bias will affect the high frequency response.

3¾ ips—For bias adjustment, (BIAS) use procedure for 7½ ips machine but with the audio oscillator set at 250 cycles.

Record Level Meter Calibration

After peaking the bias as described in Step 3 above, and with the MONITOR SELECTOR still in TAPE position, readjust the LINE REC LEVEL control to bring the vtvm reading back to normal operating level. Switch the MONITOR SELECTOR to INPUT position and

Record Level Meter Calibration

adjust the REC. CAL potentiometer R114 until normal operating level is read on the vtvm. The v-u meter is now calibrated, and should read zero v-u ±½ db with the MONITOR SELECTOR switch placed on the INPUT or TAPE position.

Record Head Azimuth Adjustment

Step 1: Thread a tape on the machine. Terminate the OUTPUT in 600 ohms and connect a vtvm across this load. Connect an audio oscillator set at 250 cps to the LINE INPUT. Place the MONITOR SELECTOR switch on TAPE position. Start the machine in the record mode, and adjust the LINE REC LEVEL control for a vtvm reading 20 db below normal operating level.

NOTE

With the REC LEVEL controls at minimum, the bias pickup as measured on the vtvm should be 30 db below normal operating level. If difficulty is experienced because of bias, connect a wave trap in parallel with the 600 ohm terminating resistance. This trap can be a series LC circuit resonant at approximately 100 kc.

Step 2: Increase the oscillator setting to 10,000 cycles. Insert a small screwdriver through the access hole nearest the center of the head shield and adjust the record head azimuth screw for maximum output. Be sure to set at the correct peak as described under reproduce head azimuth adjustment step 2. (REC. EQUAL).

Record Equalization Adjustment (Alternate Procedure)

Step 1: Record equalization can be accomplished without disconnecting the electronic assembly from the tape transport. *The reproduce channel must be properly aligned and the record head in good condition.* If these requirements are satisfied, thread a tape on the machine. Terminate the OUTPUT in 600 ohms and connect the vtvm across this load. Set an audio oscillator to 250 cycles and connect it to the LINE INPUT connector. Place the MONITOR SELECTOR switch in TAPE position, and start the machine in the record mode.

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 REC. EQUAL 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 the specifications.

Step 2: The bench procedure for record equalization given in Step 3 below is independent of the reproduce 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.

Step 3: Disconnect the electronic assembly from the tape transport. Disconnect the a-c power plug. Connect a 1000-ohm 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 tube V102. Reconnect the a-c power and place the ON-OFF switch in the ON posi-

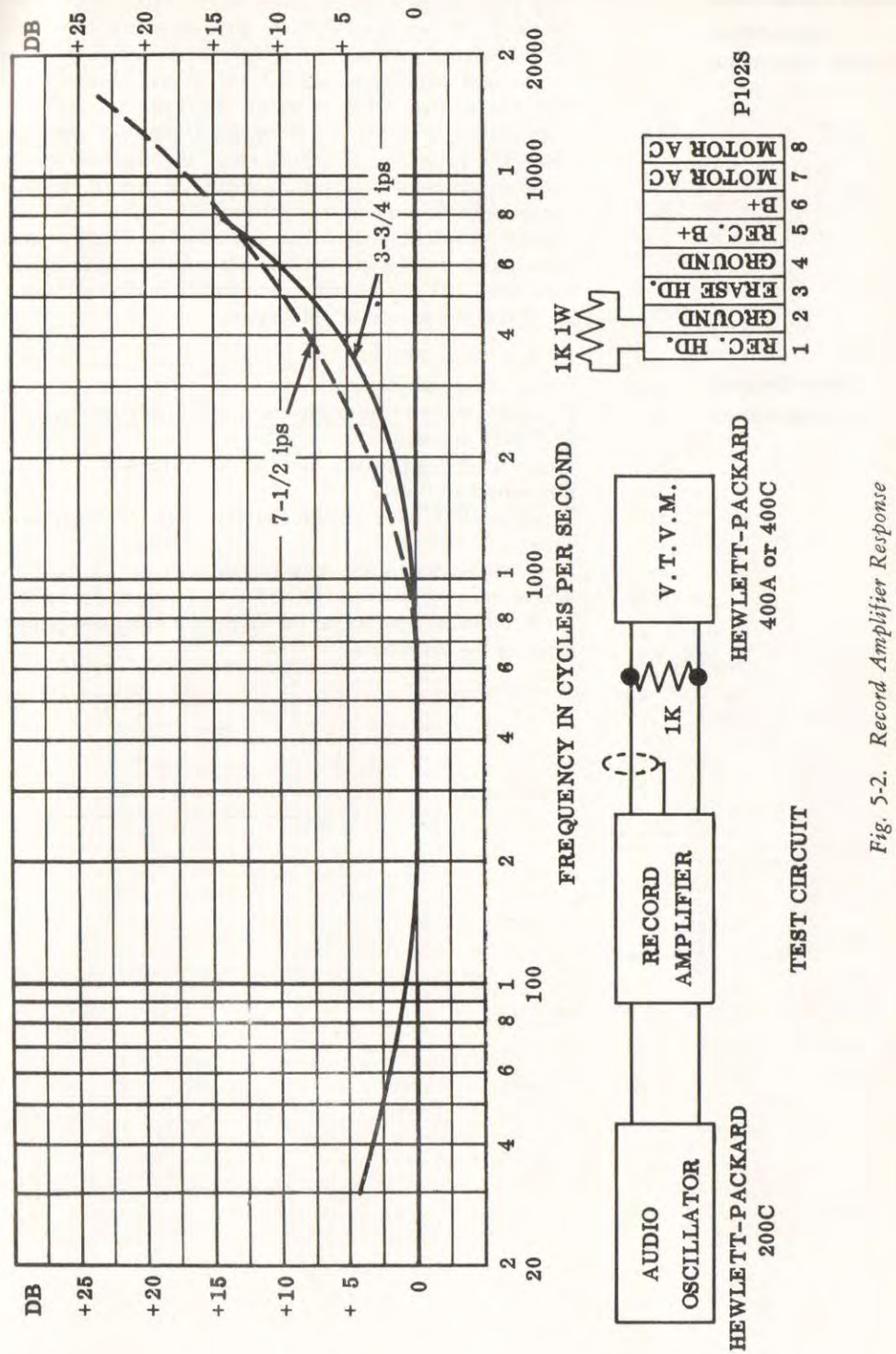


Fig. 5-2. Record Amplifier Response

Record Equalization Adjustment (Alternate Procedure)

tion. Connect an audio oscillator to the LINE INPUT connector J102S, set it to 250 cps and adjust the LINE REC LEVEL control for a vtvm reading of approximately .4 volts. Increase the oscillator setting to 8000 cps and adjust the REC. EQUAL 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.

3¾ ips—For REC. EQUAL use procedure outlined for record equalization on 7½ ips machine but with the REC. EQUAL capacitor C107 adjustment made with the audio oscillator set at 4000 cycles instead of 8000 cycles.

Noise Balance Adjustment

Step 1: Thread a tape on the machine.

Step 2: Connect a 0.1 mfd capacitor and a sensitive vtvm across the OUTPUT connector.

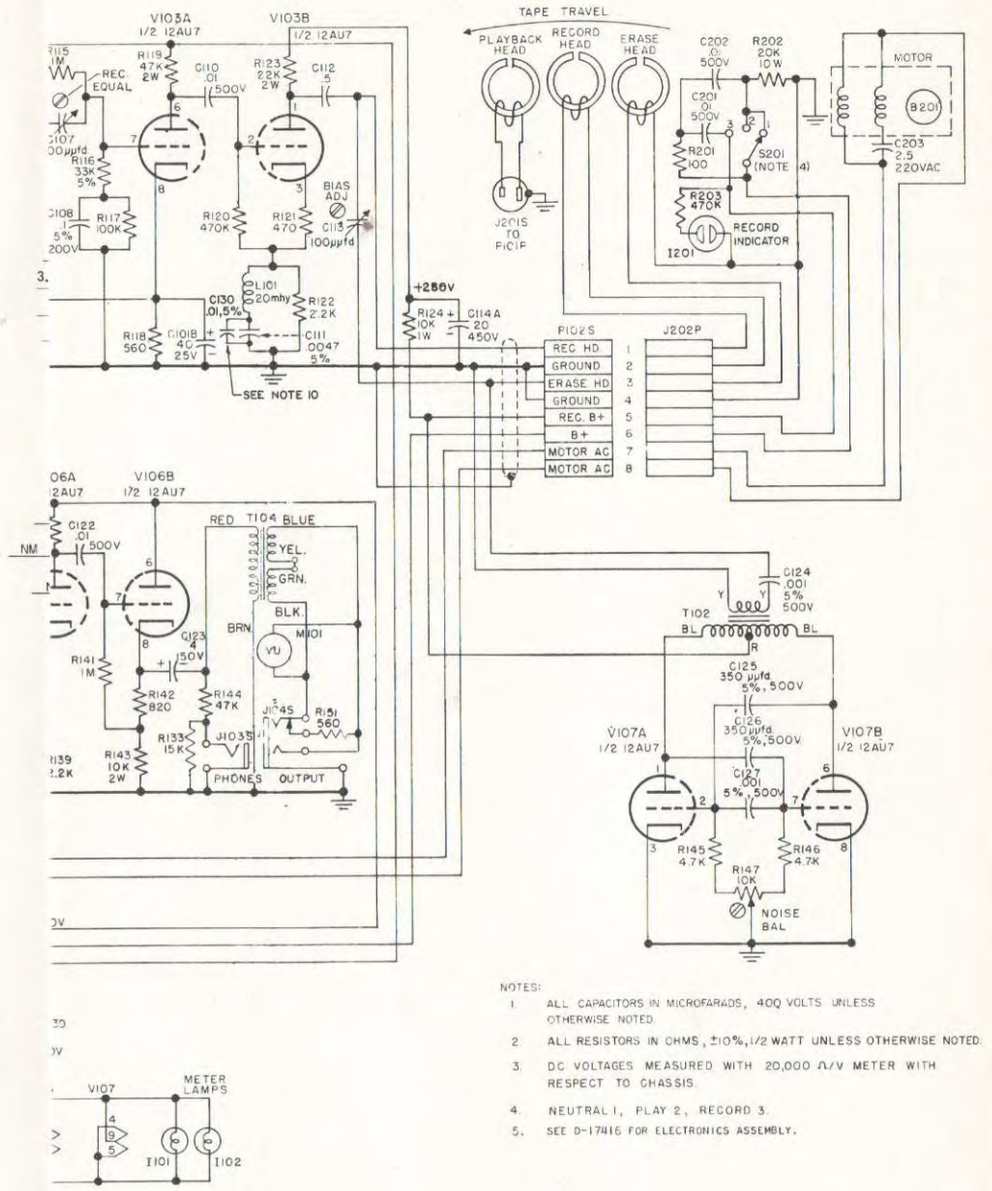
Step 3: Plug a set of head phones into the PHONES jack.

Step 4: Disconnect all inputs.

Step 5: Turn the LINE REC LEVEL and MIC REC LEVEL controls to zero.

Step 6: Start the machine in the record mode.

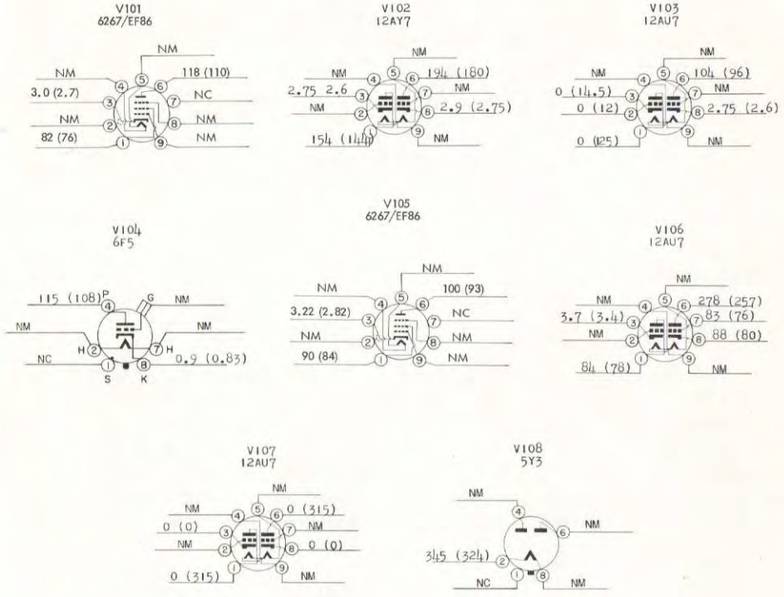
Step 7: Adjust the noise balance (NOISE BAL.) potentiometer R147 for a minimum reading on the vtvm or a minimum popping noise in the headphones.



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. SEE D-17416 FOR ELECTRONICS ASSEMBLY.

Fig. 5-3. Schematic



NOTES:

1. ALL READINGS MEASURED TO GROUND WITH 20,000 OHM PER VOLT METER.
2. INPUT VOLTAGE 117 VAC.
3. UPPER READINGS VOLTAGE, FIRST READING REPRODUCE MODE, SECOND READING RECORD MODE.
4. NM MEANS NOT MEASURED.
   NC MEANS NOT CONNECTED.

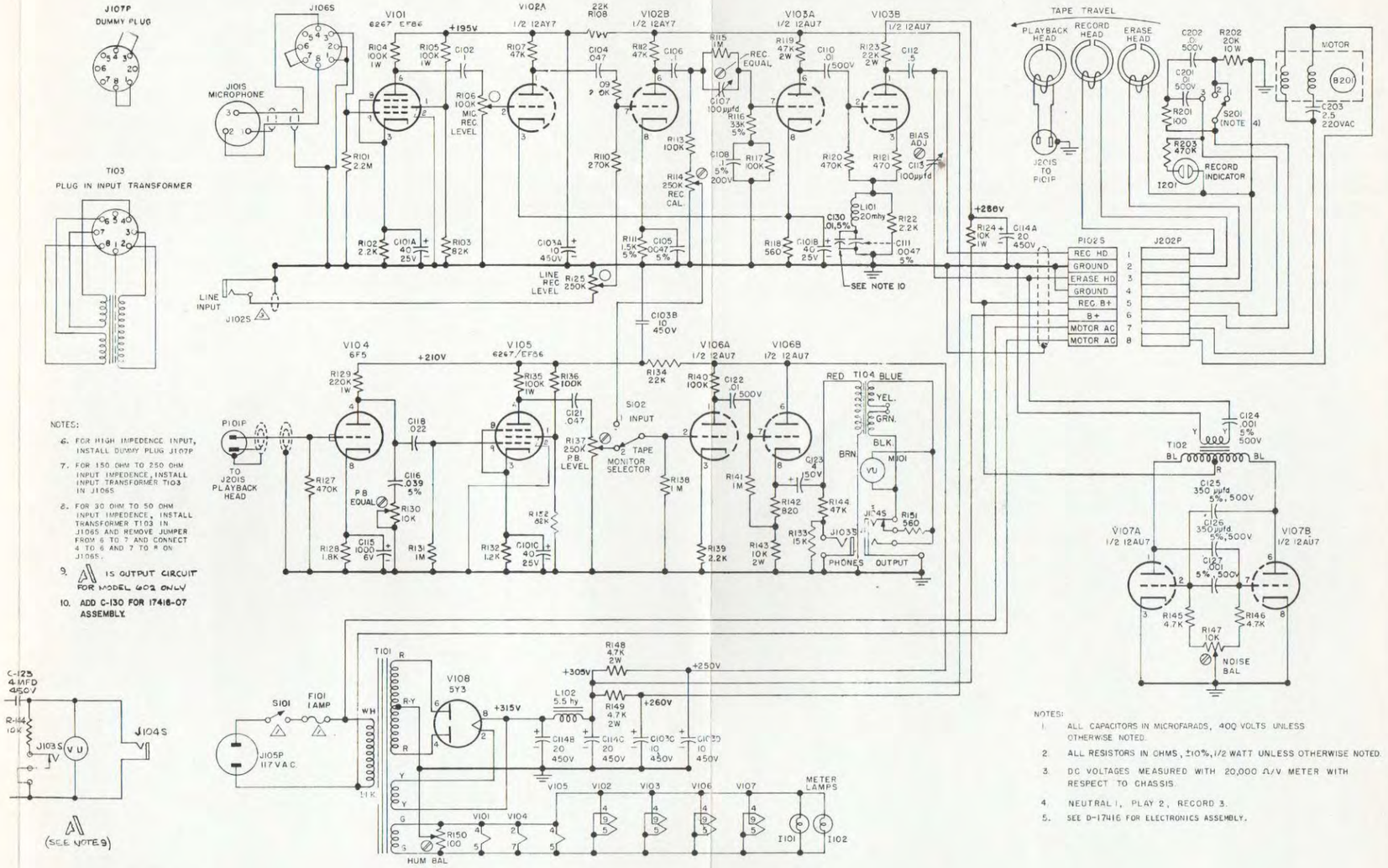


Fig. 5-3. Schematic

VI. Parts List

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

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

EXAMPLE:

Spring, Clutch "U". No. 6246, for Model 601. Serial No. 6D0042.

Reference Symbol	Description	Ampex Catalog Number	
	Tape Guide Assembly		
83	Bar, Tape Guide	6201	
85	Cap, Tape Guide	6202-1	
84	Ball Bearing	421-029	
	Machine Screw, Phillips Hd., 6-32 x 3/4	MS-24-6-12N	*
	Shim Washer, .149 ID x 5/16 OD x .025 thk, brass	PW-4B-25-149X	
	Shim Washer, .149 ID x 5/16 OD x .031 thk, brass	PW-4B-31-4	*
78			
78	Turntable	6205	
	Machine Screw, Flat Head, 4-40 x 1/4	MS-34-4-4N	*
79	Capstan Idler Assembly, with Oilite bearing	6211-1	
80	Cap, Capstan Idler	6203	
	Cambric Washer, .24 ID x 7/16 OD x .010 thk	9482	*
	Hairpin Retainer for 1/4" shaft	431-006	*
75	Link, Turntable Pivot	6221	
	Cotter Pin, 1/16 x 1/2"	401-005	*
	Clevis Pin, 1/8 x 11/32"	400-004	*
	Sub-Plate Assembly	6227-1	
10	Spring, Rewind Idler	6136	*
11	Spring, Release Lever	6215	*
1	Sub-Plate Casting	6275	
13	Slide Lever, Brake Actuator	6277	
14	Release Lever, Play Mode Brake	6278	
2	Brake Shock Relief Assembly	6279-1	

Reference Symbol	Description	Ampex Catalog Number	
	Rewind Idler Assembly	6284-1	
7	Idler Wheel with Oilite bearing	6285	
8	Guide Assembly	6288	
	Cambric Washer. .24 ID x 7/16 OD x .010 thk	9482-1	*
	Plastic Retaining Ring	430-095	*
12	Actuator Spring, 11/64 dia x 1" long	9368	*
	Spring Washer, Clevis Pin, 3/8 x 13/16	6314	*
9	Switch Deck Assembly	9064-1-C	
	Guard, Switch Top	9728	
	Lamicoid Washer, Side Lever, 1/8 ID x 5/8 ODx1/32 thk	6318	*
	Lockwasher, #4 Int. tooth	LW-2I-4C	
	Screw, #4-40 x 1/2"	MS-12-4-8C	
	Nut, #4-40 Hex	NU-1-4C	
	Cotter Pin, 1/16" x 1/2" long	401-005	*
	Clevis Pin, 1/8 x 15-32" long	400-007	*
	Clevis Pin, 1/8 x 21/32" long	400-010	
	Clevis Pin, 1/8 x 27/32" long	400-011	*
	Plain Washer, #10	PW-1-10C	*
	Hairpin Retainer for 3/16" shaft	431-002	*
	Resistor Barrier	9726	
	Switch Guard, side	9727	
	Capstan Idler Arm Assembly	6235-1	
53	Anchor	6224	
51	Arm Sub-Assembly	6236-1	
52	Roller	6237	
54	Spring, 21/64 x 1-27/64" long	6910	*
	Clevis Pin, 1/8 x 15/32" long	400-007	
	Motor Assembly		
	Felt Washer, 15/64 ID x 3/4 OD x 1/16" thk	6219	*
63	Motor	6239	
62	Mounting Plate	6240	
61	Pulley, 60 cps, 7-1/2 ips	6241-0	
	50 cps, 7-1/2 ips	6241-1	
	60 cps, 3-3/4 ips	6241-2	
	50 cps, 3-3/4 ips	6241-3	
	Screw, 8-32 x 3/8" long	MS-12-8-6C	*
	Sem Fastener, 8-32 x 3/8" long	SF-2X-8-6C	*
	Soldering Lug	SL-1	*
65	Thrust Disc, Nylon, .312 dia x 1/16" thk	6934	*
68	Drive Belt, Nylon, 60 cps, 7-1/2 ips	2871-3	
	50 cps, 7-1/2 ips	2871-6	
	60 cps, 3-3/4 ips	2871-7	
	50 cps, 3-3/4 ips	2871-14	
66	Spring, Motor Thrust, 5/16 x 1-7/8" long	7531	*
71	Plunger, Motor Thrust	7532	
	Spacer, Motor Mounting, 1/4 OD x .531 long	7582	*

Reference Symbol	Description	Ampex Catalog Number	
	Rubber Shockmount	7922	
60	Ball, 1/4" dia.	420-006	*
	Motor Mount Washer, C.R.S. 13/64 ID x 5/8 OD	2431	*
	Motor Mount Screw, Binder Hd., 10-24 x 7/8" long	MS-12-10-14C	*
	Socket Hd. Set Screw, 8-32 x 1/8 long, cup point	SS-2-8-2Y	
	Takeup Arm Assembly	6242-1	
20	Spring, Conical, 1" dia. x 31/32" long	6137	*
26	Control Spring, 17/32 x 13/16" long	6218	*
	Thrust Washer, .015 spring steel, 1/4 ID x 3/8 OD	6223-1	*
24	Pivot Arm	6243	
29	Hub, with Shaft	6244	
17	Spring, Clutch "U"	6246	
19	Clutch, Play Takeup	6247	
18	Disc Assembly, with small felt	6248-1	
15	Disc Assembly, with large felt	6248-2	
16	Clutch Assembly, fast forward, with Oilite bearing	6251	
28	Link, Turntable Control	6253	
27	Washer, Spring Retaining, Cup	6254	
23	Collar, Drum	6293	
25	Brake Assembly, Holdback		
	Use Replacement Holdback Brake Assembly Kit (Each ket contains two Brake Assemblies)	7974	
	Lamicoid Washer, 1/4 ID x 1/32" thk	186-1	*
21	Oilite Bearing	422-004	
22	Ball Bearing	421-019	
	Cotter Pin, 1/16 x 1/2" long	401-005	*
	#4 Lockwasher, int. teeth	LW-21-4C	*
	Binding Hd. Machine Screw, 4-40 x 5/16" long	MS-12-4-5C	*
	Hex Nut, 4-40	NU-1-4C	*
	Socket Hd. Set Screw, 6-32 x 1/8" long	SS-2-6-2Y	*
	Spring, Turntable Height 11/32 x 9/32" long	6217	*
	Rewind Arm Assembly	6255-1	
	Thrust Washer, .015 spring steel, 1/4 ID x 3/8 OD	6223-1	*
36	Pivot Arm	6243	
38	Hub, with shaft	6244	
32	Spring, Clutch "U"	6246	
30	Disc Assembly, with large felt	6248-2	
31	Clutch Assembly, rewind, with Oilite bearing	6251	
35	Collar, "Drum"	6293	
33	Collar, Spacer	6316	
37	Holdback Brake Assembly		
	Use Replacement Holdback Brake Assembly Kit (Each kit contains two #6320-1 Brake Assemblies)	7974	
	Lamicoid Washer, 1/4 ID x 1/32" thk	186-1	

* Items marked with the asterisk (*) are included in Kit #7802.

Reference Symbol	Description	Ampex Catalog Number	
34	Ball Bearing	421-019	
	#4 Lockwasher, Int. teeth	LW-2I-4C	*
	Binder Hd. Machine Screw, 4-40 x 5/16" long	MS-12-4-5C	*
	Hex Nut, 4-40	NU-1-4C	*
	Socket Hd. Set Screw, 6-32 x 1/8" long	SS-2-6-2Y	*
	Socket Hd. Set Screw, 8-32 x 3/16" long	SS-2-8-3Y	*
64	Turntable Height Spring, 11/32 x 9/32" long	6217	
	Play Control Arm Assembly	6256-1	
45	Actuator, Play	6257	
46	Switch Mechanism	6261	
47	Roll Pin, 3/32 x 5/8" long	406-002	
	Rewind/Fast Forward Control Assembly	6259-1	
48	Actuator, Rewind/Fast Forward	6258	
49	Switch Mechanism	6261	
50	Roll Pin, 3/32 x 5/8" long	406-002	
	Ball, 5/16" dia.	420-004	
55/58	Belt Tensioning Idler Arm Assembly	6263-1	
59	Spring, 11/64 dia. x 15/16" long	6216	*
	Play Takeup Arm Assembly	6267-1	
41	Spring	6138	
40	Pulley Assembly, with Oilite bearing	6268	
39	Arm Assembly	6270	
	Cambric Washer, .24 ID x 7/16 OD x .010 thk	9482	*
	Lamicoid Washer, 1/4 ID x 1/32" thk	186-1	*
	Hairpin Retainer for 1/4" shaft	431-006	*
69	Takeup Belt, Rubber "O" Ring	432-010	
	Top Plate Assembly	6439-1	
	Leaf Spring	6234	
	Sem Screw	SF-2X-6-4C	
	Neon Bulb	LA-14	
	Brass Grommet	GR-40	
	Tape Guide Post	7456	
	Top Plate Casting, with grill & Oilite bearing	9065-1	
C203	Motor Capacitor, Electrolytic, 2.5 mfd, 220V	CO-327	
	Kep Nut, 8-32	KP-1-8C	*
	Capacitor Mounting Screw, Binder Hd., 8-32 x 5/8"	MS-12-8-10C	*
	Tube Socket, Contact, min.	TL-35	
	Spring, Jones Plug Retainer	16340-1	
	Head Cable Harness Assembly	9068-1	
J202D	Jones Plug	PL-8P	
R202	Resistor, 20 K ohm	043-080	
	Solder Lug	SL-3	

Reference Symbol	Description	Ampex Catalog Number	
42	Capstan Assembly, with flywheel, shaft & ball	9353-1	
81	Dust Seal, felt, 15/64 ID x 3/4 OD x 1/16" thk	6219	*
43	Felt Washer, 13/16 ID x 1-1/8 OD x 3/32" thk	6262	*
82	Cap, Dust Shield	6273	
65	Thrust Dist, Nylon, .312 dia. x 1/16" thk	6934	*
	Cambric Washer, .24 ID x 7/16 OD x .010 thk	9482	*
70	Special Set Screw, Capstan Thrust, 3/8-27 x 1-1/8"	MS-32-27-1125	*
	Hex Jam Nut, 3/8-27	NU-16-616C	*
90	Head Assembly, half track	6206-20	
	full track	6206-10	
86	Cover, Head Assembly	6207-1	
91	Tape Guide, Head	6208-1	
	Shield, Head Assembly	6213	
	Phillips Oval Hd. Machine Screw, 4-40 x 1-3/4"	MS-26B-4-28N	*
	Sem Fastener, 6-32 x 1/4", int. teeth	SF-2I-6-4C	*
	Sem Fastener, 4-40 x 1/4", int. teeth	SG-2I-4-4C	*
	Cork Washer, 1/8 ID x 21/32 OD x 3/32" thk	6283	*
88	Reel Hold Down Knob	6319	
76	Detent Spring, Rewind Arm	6911	*
	7" Plastic Reel	7798-2	
77/89	Steel Ball, 5/16" dia.	420-004	*
	Leaf Spring, Rewind Control	17512	
	Power Cable	CS-5	
	Bar Knob, with set screw	KN-7	
	Tab. Belt Tension	17286-1	
	Lamicoid Washer, 5/16 ID x 1/32 thk	186-0	*
	Lamicoid Washer, 1/4 ID x 1/32 thk	186-1	*
	Lamicoid Washer, 1/4 ID x 1/64 thk	186-2	
	Lamicoid Washer, 5/16 ID x 1/64 thk	186-3	*
	Lamicoid Washer, 1/4 ID x 1/16 thk	186-4	*
	PORTABLE CASE ASSEMBLY, Saddle Tan	9417-4	
	Rubber Shockmount Nut, Top Plate	6937-1	
	Plastic Foot 3/8 in. long	7666	
	5/8 in. long	BU-3	
	Mounting Hardware for Plastic Foot:		
	6-32 Kep Nut	KP-1-6	
	6-32 x 1/2 Binding Head Machine Screw	MS-12-6-8 or	
	6-32 x 5/8 Binding Head Machine Screw	MS-12-6-10 or	
	6-32 x 3/4 Binding Head Machine Screw	MS-12-6-12 or	
	6-32 x 7/8 Binding Head Machine Screw	MS-12-6-14	
	No. 6 Plain Steel Washer	PW-1-6	
	Hinge Leaf, no pin	HI-6	
	Hinge Leaf, with fixed pin	HI-6-1	

Reference Symbol	Description	Ampex Catalog Number
	Latch, Fastener	LO-16
	Catch, Fastener	LO-17
	No. 8 Oval Phillips Sheet Metal Screw, type Z	MS-21-8-10N
	8-32 x 1/2 Oval Phillips Machine Screw	MS-26-8-8N
	Tinnerman Nut, Electronics	SN-3U-8Z-1
	Handle	HA-7
	Handle-mounting, Cap, brass	CA-21
	Mounting rail, right hand	7528-1
	Mounting rail, left hand	7528-2
C101	CAPACITOR, electrolytic: 3x40 uf, 252; Mallory WP 520.	CO-328
C102	CAPACITOR, tubular: .1 ufd 400 v; C-D No. ST4P1	CO-294
C103	CAPACITOR, electrolytic: 4x10 ufd 450v; Mallory FP-434	CO-68
C104	CAPACITOR: .047 ufd 400 v; C-D ST4S47	CO-347
C105, C111, C121	CAPACITOR, tubular: .0047 ufd 400 v ± 5%; C-D ST4D47	CO-334
C106	CAPACITOR, tubular: .1 ufd 400v; C-D ST4P1	CO-294
C107, C113	CAPACITOR, trimmer: 100 uuf; El Menco 302 type 30	CO-92
C108	CAPACITOR; .1 ufd 200v ± 5%; C-D ST2P1	CO-335
C110, C122	CAPACITOR, ceramic disc: .01 ufd; Centralab DD103	CO-338
C112	CAPACITOR, tubular: .5 ufd 400v; Sangamo 300 405	CO-330
C114	CAPACITOR, electrolytic: 3x20 ufd 450v; Mallory 376.5	CO-236
C115	CAPACITOR, electrolytic: 1000 ufd 6v; Spraque TVA-1104	CO-329
C116	CAPACITOR, paper: .039 ufd 400v 5%	CO-523
C118	CAPACITOR, paper: .022 ufd 400v; C-D ST4S22	CO-380
C123	CAPACITOR, electrolytic: 4 ufd 150v	CO-53
C124, C127	CAPACITOR, mica: .001 ufd 500v ± 5%; Sangamo KR-1210	CO-6
C125, C126	CAPACITOR, mica: 350 uuf 500v ± 5%; Sangamo KR	CO-140
F101	FUSE: 1 ampere 250v; Littlefuse 312001	070-003
	FUSE HOLDER, with Hardware	FE-5
J101S	CONNECTOR: microphone input, 3 contact shielded; Cannon XL-3-13N	PL-320S
J102S	JACK: Miniature phone, 2-conductor; Switchcraft 41	JA-28
J103S	JACK: phone; Switchcraft 11	JA-21
J104S	JACK: output phone; 3 conductor	JA 33
J105P	CONNECTOR, miniature: power 2 contact; GE 2711	PL-319P
J107P	PLUG, octal: dummy plug assembly	17420-1
	CONNECTOR, tape transport connector: Jones S-308-cct	PL-69S
	CONNECTOR: reproduce head cable; Jones P-302-cct-L	PL-338P
L101	CHOKE, r-f: 20 mhy; Miller 691	CH-8
L102	CHOKE, 5.5 hy: Merit C-2975	CH-62

Reference Symbol	Description	Ampex Catalog Number
M101	V-U Meter	6351
	METER, glass	PS-4
	RETAINING RING: self locking	430-039
R101	RESISTOR, composition: 2.2 megohm 1/2 watt	041-086
R102, R122, R139	RESISTOR, composition: 2,200 ohm 1/2 watt A-B EB-2221	041-052
R103	RESISTOR, carbon film: 82,000 ohm 1/2 watt 350v; Sternog type A-1	042-014
R104, R105, R135	RESISTOR, carbon film: 100,000 ohm 1 watt 500v; Stemog type A-2	042-011
R106	POTENTIOMETER, audio taper: 100,000 ohm; A-B JA1041 SD3056	044-015
R107	RESISTOR, carbon film: 47,000 ohm, 1/2 watt 350v; Stemog type A-1	042-013
R108, R123, R134	RESISTOR, composition: 22,000 ohm, 1/2 watt; A-B EB-2231	041-064
R109, R110	RESISTOR, composition: 270,000 ohm, 1/2 watt; A-B EB-2741	041-077
R111	RESISTOR, composition: 1,500 ohm 1/2 watt ± 5%	041-008
R112, R144	RESISTOR, composition: 47,000 ohm 1/2 watt; A-B EB-4731	041-068
R113, R117, R140	RESISTOR; 100,000 ohm 1/2 watt; A-B EB-1041	041-072
R114, R125, R137	POTENTIOMETER, audio taper: 250,000 ohm; Centralab BA-011-1224	044-042
R115, R131, R138, R141	RESISTOR, composition: 1 megohm 1/2 watt; A-B EB-1051	041-031
R116	RESISTOR, composition: 33,000 ohm 1/2 watt ± 5%	041-017
R118	RESISTOR, composition: 560 ohm 1/2 watt; A-B EB-3311	041-045
R119	RESISTOR, composition: 47,000 ohm 2 watt; A-B EB-4731	041-220
R120, R127	RESISTOR, composition: 470,000 ohm 1/2 watt; A-B EB-4741	041-080
R121	RESISTOR, composition: 470 ohm 1/2 watt; A-B EB-4711	041-044
R124	RESISTOR, composition: 10,000 ohm 1 watt; A-B EB-1031	041-158
R128,	RESISTOR, composition: 1,800 ohm 1/2 watt	041-051
R129	RESISTOR, carbon film: 220,000 ohm 1 watt 500v; Stemog type A-2	042-012
R130	POTENTIOMETER, audio taper: 10,000 ohm; IRC type Q	044-039
R132	RESISTOR, composition: 1.2 K ± 10%, 1/2 watt	041-049
R133	RESISTOR: 15,000 ohm 1/2 watt	041-062
R136	RESISTOR: 330,000 ohm 1/2 watt	041-078
R142	RESISTOR, composition: 820 ohm 1/2 watt; A-B EB-8211	041-047
R143	RESISTOR: 10,000 ohm 2 watt	041-213
R145, R146, R148, R149	RESISTOR, composition: 4,700 ohm 1/2 watt; A-B EB-4721	041-056
R147	POTENTIOMETER, linear taper: 10,000 ohm; IRC type Q	044-050

Reference Symbol	Description	Ampex Catalog Number
R150	POTENTIOMETER, linear taper: 100 ohm; Mallory type C-P	044-095
R151	RESISTOR: Composition 560 ohm 1/2 watt 10%	041-045
R152	RESISTOR, composition: 82 K, ± 10%, 1/2 watt	041-246
S101	SWITCH, SPST toggle: 3 amp 250v; C-H 8280 K15	SW-74
S102	SWITCH, SPDT wafer: non-shorting: Oak 59016-23	SW-66
T101	TRANSFORMER: power	6298
T102	TRANSFORMER: bias and erase	6352
T104	TRANSFORMER: output	17419-1
V101, V105	VACUUM TUBE: 6267/EF86	012-028
V102	VACUUM TUBE: 12AY7	012-043
V103, V106, V107	VACUUM TUBE: 12AU7	012-023
V104	VACUUM TUBE: 6F5	012-042
V108	VACUUM TUBE: 5Y3GT	012-013
	TUBE SHIELD	SD-13
	SHIELD, choke	9188-1
	Special Adjusting Screw with Retainer Sleeve	BO-4-4
	Tinnerman Cable Clamp for 6-32 Screw Plastic Cable Clamp	CL-72
	Knob, 1-1/2 in. dia. skirt	KN-14
	No. 12 Lockwasher, Internal Teeth	LW-2I-12C
	3/8 Lockwasher, Internal Teeth	LW-2I-616C
	3/8 Lockwasher, Internal Teeth, Fine	LW-6I-616C
	1/2 Lockwasher, Internal Teeth, Fine	LW-6I-816C
	6-32 x 1 in. Long Bind Head Brass Machine Screw	MS-12B-6-16C
	No. 12 Plain Brass Washer	PW-1B-12C
	Fibre Washer, 3/8 ID x 5/8 OD x 1/32 in. thick	PW-3-5
	Pan Head Sem Fastener, 6-32 x 3/8 in. long	SF-2I-6-6C
	"J" type Tinnerman Nut for 6-32 screw	SN-3J-632-1
	Flat Latch Type Tinnerman Nut for 6Z screw	SN-3L-6Z-1
	3-lug Tie Point	TS-5-4
	2-lug Terminal Strip	TS-5-3
	2-lug Terminal Strip, Right Lug Grounded	TS-6-1
	Washer, Condenser insulating	6094-1
	Bottom Plate	6399-1

ACCESSORIES

Head Demagnetizer	704
Amplifier-Speaker Model 620:	
In portable Samsonite Case, saddle tan	9419-2
In "Brunette" Furniture Cabinet	7950-1
In "Blonde" Furniture Cabinet	7950-2

Reference Symbol	Description	Ampex Catalog Number
	601-620 Interconnecting Cable Assembly, 8 ft.	9411-1
	601-620 Interconnecting Cable Assembly, 20 ft.	9411-2
	Adaptor for Rack Mounting	9684-1
	Plug-in Low Impedance Microphone Input Transformer	17331-1

Tape Speed Conversion Kits

For field application, includes pulley, belt, standard alignment tape for new speed, and complete installation and alignment instructions for converting from 7-1/2 in/sec. to 3-3/4 or vice versa.

FOR 60 CYCLE MACHINES	
Change from 7-1/2 ips to 3-3/4 ips,	7556-0
Change from 3-3/4 ips to 7-1/2 ips,	7556-1
FOR 50 CYCLE MACHINES	
Change from 7-1/2 ips to 3-3/4 ips,	7556-2
Change from 3-3/4 ips to 7-1/2 ips,	7556-3

Power Frequency Conversion Kits:

For converting 7-1/2 ips machine from operation on 60 cps current to operation on 50 cps current	9738
For converting 7-1/2 ips machine from operation on 50 cps current to operation on 60 cps current	9739
For converting 3-3/4 ips machine from operation on 60 cps current to operation on 50 cps current	9740
For converting 3-3/4 ips machine from operation on 50 cps current to operation on 60 cps current	9741

Each kit contains the appropriate pulley, belt and mounting instructions.

Can of Oil, Caloil Turbine #11, 4 oz.	FP-5
1/2 oz.	TO-9
Alignment Tape, 7-1/2 ips	5563
3-3/4 ips	6000

Spare Parts Kit for 7-1/2 ips 60 cps Machines 9742-1

Contains following parts:

1	Drive Belt	2871-3
1	Capstan Idler	6211
1	Spring	6246
1	Felt Clutch Lining (Rewind)	6250
1	Felt Clutch Lining (Takeup)	6250-1
1	Rewind Idler	6284
2	Reel Hold Down Knob	6319

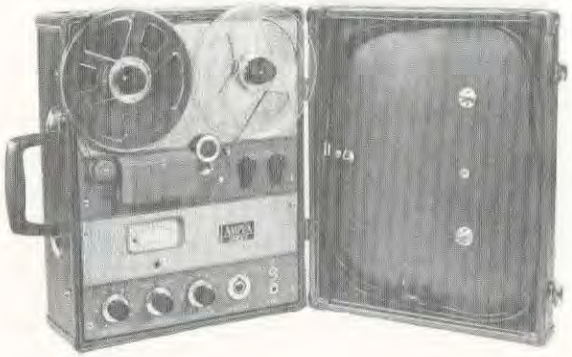
Reference Symbol	Description	Ampex Catalog Number
4	Rubber Shockmount	6937
1	Filter Capacitor - 1000 Mfd., 6 Volts	CO-329
1	Fuse - 1 amp.	070-003
1	Takeup Belt	432-010
1	Potentiometer - 100K	044-015
1	5Y3GT Vacuum Tube	012-013
1	12AU7 Vacuum Tube	012-023
1	5879 Vacuum Tube	012-028
1	6F5 Vacuum Tube	012-042
1	12AY7 Vacuum Tube	012-043
Spare Parts Kit for 7-1/2 ips 50 cps Machine		9742-2
Contents same as 9742-1 except for belt		2871-6
Spare Parts Kit for 3-3/4 ips 60 cps Machine		9742-3
Contents same as 9742-1 except for belt		2871-7
Spare Parts Kit for 3-3/4 50 cps Machine		9742-4
Contents same as 9742-1 except for belt		2871-14
Maintenance Kit Contains following parts:		6392
Quantity		
2	Control Spring	6218
2	Spring Clutch "U"	6246
2	Nylon Thrust Disc	6934
4	Rubber Shock Mount	6937
6	Cotter Pin (1/16"x 1/2" N.P.)	401-006
2	Clevis Pin (1/8 dia. x 15/32)	400-007
2	Clevis Pin (1/8 dia. x 19/32)	400-010
2	Clevis Pin (1/8 dia. x 25/32)	400-016
1	Oil Can (1/2 oz.)	TO-9
4	Self Threading Screw (Electronics Chassis)	MS-21-8-8N
4	Phillips Head Screw (Top Plate Assembly)	MS-26-8-8N
2	Hairpin Retainer (For 3/16" Shaft)	431-002
2	Hairpin Retainer (For 1/4" Shaft)	431-006
2	Hairpin Retainer (For 7/32" Shaft)	431-004
2	Self-Locking Nut ("J" Tinnerman for 6/32" Screw)	SN-3J-623-1
1	Phillips Driver (2-3/4" Overall)	TO-7
1	Flat-Bladed Screwdriver (3-1/2" Overall)	TO-8
1	Allen Wrench (1/16" across flat x 1-3/4" Arm)	TO-5
1	Allen Wrench (5/64" across flat x 1-3/8" Arm)	TO-6
Minor Hardware Kit		7802
Contains 250 small parts normally used in servicing.		
Hold-back Brakes Replacement Kit		7974-1
Contains two Holdback Brake Assemblies #6320-1.		

TM 1001

Operation Maintenance Manual

AMPEX

MODEL 601



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CORPORATION
934 CHARTER STREET
REDWOOD CITY · CALIFORNIA

TM 1001

Operation Maintenance Manual

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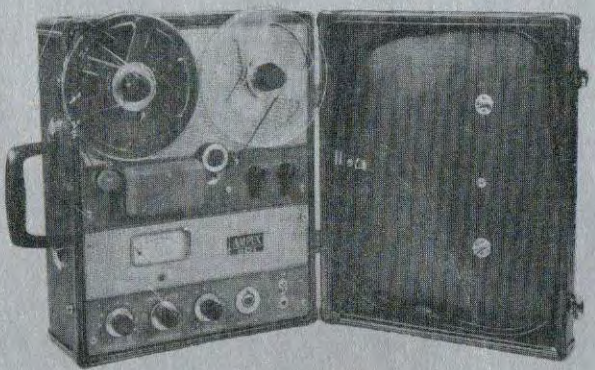
MODEL 601



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