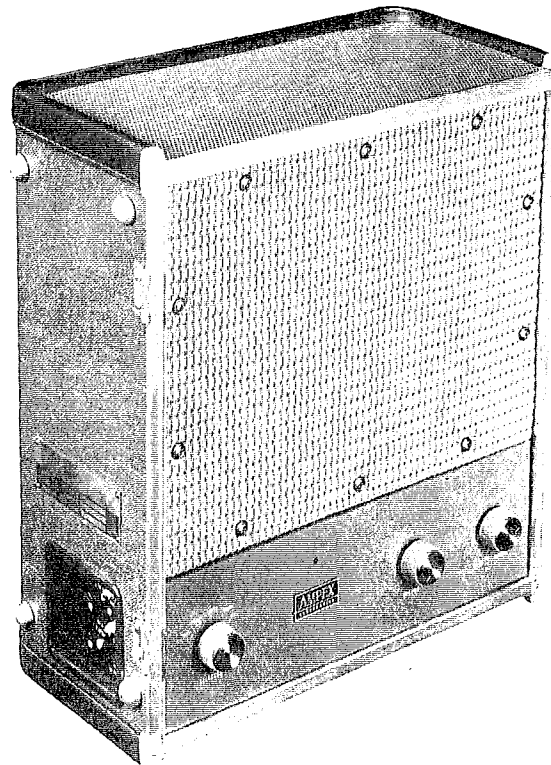
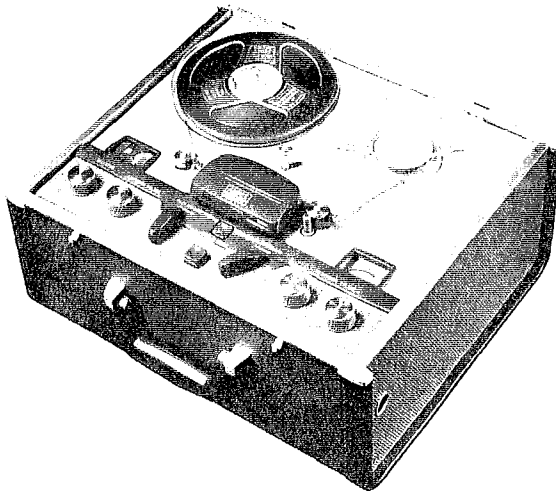


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TRADE MARK



AMPEX
MODELS A121, A122, A124, A621, A692



AMPEX
MODELS A121, A122, A124, A621, A692

GENERAL INFORMATION

The Ampex Models A121, A122 and A124 are designed for Stereophonic tapes. All models will record on a half track basis and reproduce half track or full track recordings.

Features on all models include two speed operation, a tape positioning indicator, a positive safety record button, a record level indicator, mixer-fader controls for the microphone and radio or phonograph, and separate erase, record, and reproduce magnetic heads. Fast winding in either the forward or reverse direction is activated by a single lever-type control.

Inputs are provided on all models so that the output of a radio tuner and/or a record changer may be either recorded or routed directly to the accessory amplifier/loudspeaker combination.

The stereophonic reproduce head on the A121, A122, and A124 models — is composed of two separate reproduce heads, one mounted above the other in one stack with gaps in line; complete electrical and magnetic isolation between the two heads prevents cross talk.

The Ampex Models A121, A122 and A124 can be used with amplifier/loudspeaker combinations A621 and A692. The Models A621 and A692 are covered in this manual.

The Ampex Models A121, A122 and A124 use 110-120 volt, 60 cycle, A-C power. (Recorders for use with 50 cycle A-C power are available).

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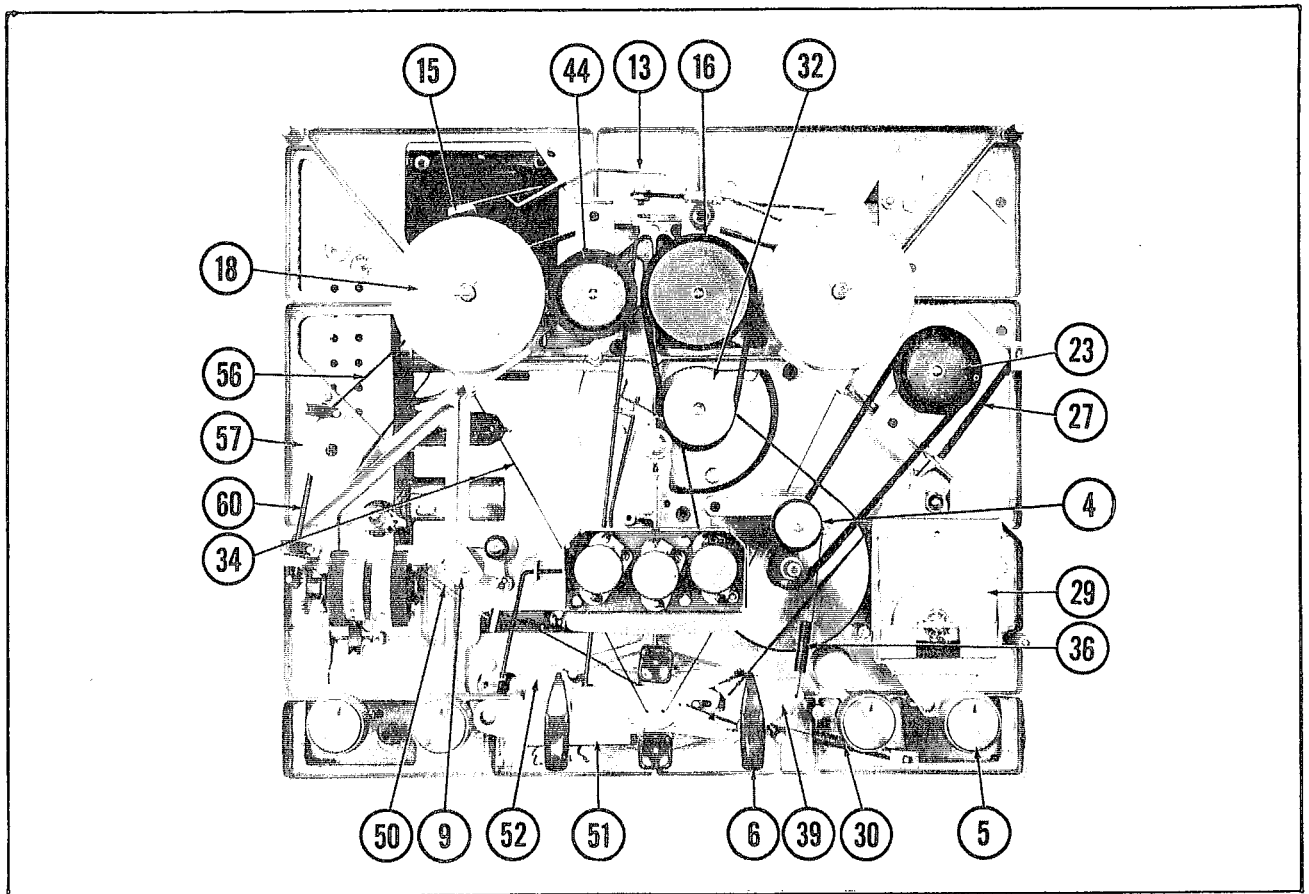


FIGURE 1

SPECIFICATIONS

Tape Width: 1/4 inch.

Tape Reels: 3, 4, 5, or 7 inch RETMA type.

Tape Speed: 7 1/2 and 3 3/4 ips (inches per second).

Frequency Response: 7 1/2 ips: 30 to 15,000 cps + 2 db 50 to 10,000 cps 3 3/4 ips: 30 to 7,500 cps + 2 db 50 to 5,000 cps.

Flutter And "Wow": 7 1/2 ips: Under 0.25% rms
3 3/4 ips: Under 0.3% rms.

Fast Winding Time: Less than 90 seconds for a full 1200 foot reel in either the rewind or forward direction.

Record Inputs: Microphone: High Impedance Input: Two high impedance line inputs (Thru and Rec.) are provided. An input of 0.75 volts rms is necessary for recording at program level.

Head Assemblies: A121, A122, A124: Half track erase, and half track record heads. In line stereophonic reproduce head.

Reproduce Output: Will deliver more than 0.75 volts rms (from tape recorded at program level) into a high impedance load of 100,000 ohms or more.

INSTALLATION AND OPERATION

Connecting Ampex Amplifier To Reproducer -

When Ampex microphone and amplifier - loud-

speaker combinations are used, all necessary interconnecting cables are provided. The interconnecting will consist simply of plugging the microphone cable into the microphone input receptacle, and the amplifier - loudspeaker cables(s) into the output connector(s). When the power cords are connected from the record/reproducer and the amplifier - loudspeaker combinations to a convenient power source, the equipment is ready for use.

Connecting Amplifier Other Than Ampex To Reproducer -

If accessory equipment other than Ampex is used it will be necessary for you to fabricate the interconnecting cables. Use the mating plugs provided and solder shielded cable to these plugs as illustrated in Fig. (2), following the recommendation of the manufacturer as to cable lengths.

NOTE: Use the shielded (metal shell) plug for the microphone cable.

Tape Threading -

1. 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 corresponding slots on the reel hub.

2. Thread the tape as shown on front page, and make a full turn counter-clockwise around the hub of the empty reel. It is not necessary to anchor the tape in the slot on the reel hub.

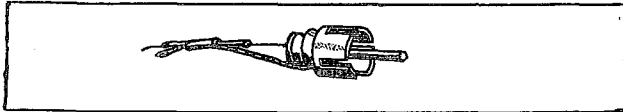


FIGURE 2. CONNECTING CABLE TO PIN JACK

To Record —

1. 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.

2. Turn the selector switch to the "Monitor" position.

3. Using the knurled drums, set the tape position indicator dials to 0.

4. Set the tape at which you wish to record by pushing the speed selector down for $3 \frac{3}{4}$ inches per second or pulling it up for $7 \frac{1}{2}$ inches per second.

5. Before starting to record use a test script or rehearsal music to set the microphone record level. Adjust the Recording Volume — Microphone control so that the meter needle deflects to the end of the black (Normal) portion of its scale on the signal peaks.

6. Hold down the Press to record pushbutton and simultaneously turn the Play or Record lever clockwise until it locks in position. You are now recording on the tape at the preset level. If necessary, readjust the Recording Volume — Microphone control.

7. To stop recording and tape motion, press the stop pushbutton.

To Play Back —

1. Thread a previously recorded tape on the machine.

2. Depending upon the model of your recorder/reproducer, and the type of tape to be reproduced, turn the selector switch to its Tape, Single, or Stereo position.

CAUTION: When reproducing recorded tapes, never touch the Press To Record pushbutton.

3. Select the tape speed at which the recording was made by pushing the speed selector down for $3 \frac{3}{4}$ inches per second or pulling it up for $7 \frac{1}{2}$ inches per second.

4. Turn the Listening Volume control to 7 on its dial.

5. Turn the Play Or Record lever in a clockwise direction until it locks in position.

6. Single Channel Tapes — Adjust the volume control on the associated power amplifiers(S) until the desired sound level is achieved.

7. Stereophonic Tapes — Balance the output of the power amplifiers and make subsequent volume adjustment at the Listening Volume control on the recorder/reproducer. For best results adjust the power amplifier volume so that it is not necessary to drop the Listening Volume control below 5 on its dial.

8. To stop the reproducing function and tape motion, press the Stop pushbutton.

Fast Rewind —

1. Turn the Fast Winding lever counter-clockwise until it locks in position.

2. To stop tape motion press Stop pushbutton.

Fast Forward —

1. Turn the Fast Winding lever clockwise until it locks in position.

2. To stop tape motion press Stop pushbutton.

Erasing —

1. To erase a previously recorded tape without recording a new program on it, turn Recording Volume to zero (0), and run the tape through in the "Record" mode.

TAPE TRANSPORT ASSEMBLY.

The tape transport mechanism incorporates a single-speed induction motor and a system of mechanical linkage, pulleys, and belts to drive the capstan and the turntables. Three modes of tape motion — Play or Record, Fast Winding Forward, and Fast Winding Reverse — are determined by two controls on the front panel of the transport.

Tape Motion —

Tape motion in the record or reproduce modes is controlled by the capstan idler (4) moving against the capstan (38) and the tape running between these two components; tape speed is determined solely by the rate of rotation of the capstan.

Standby Mode —

Power is applied to the drive motor whenever the Selector switch on the front panel is turned from its "Off" position. The capstan immediately starts to rotate, being driven by a belt between the drive motor pulley and the capstan flywheel (38). Capstan speed is determined by the speed selector, which simply positions the drive belt (33) at a point of small or large circumference on the drive motor pulley (32). A second belt (16) from the motor pulley drives a fast winding pulley, and a third belt (24) from the capstan flywheel (38) drives the takeup pulley; neither of these pulleys has any effect in standby as neither is mechanically engaged.

With the capstan in motion the tape will accelerate to full speed almost instantly when the Play Or Record control is operated. A fan mounted on the lower shaft of the drive motor provides forced draft cooling to all components whenever power is applied to the recorder/reproducer.

Play Or Record Mode —

When the Play Or Record control is operated the following mechanical actions occur in sequences.

1. The tape holdback moves against the tape guide, providing holdback tension for the tape.

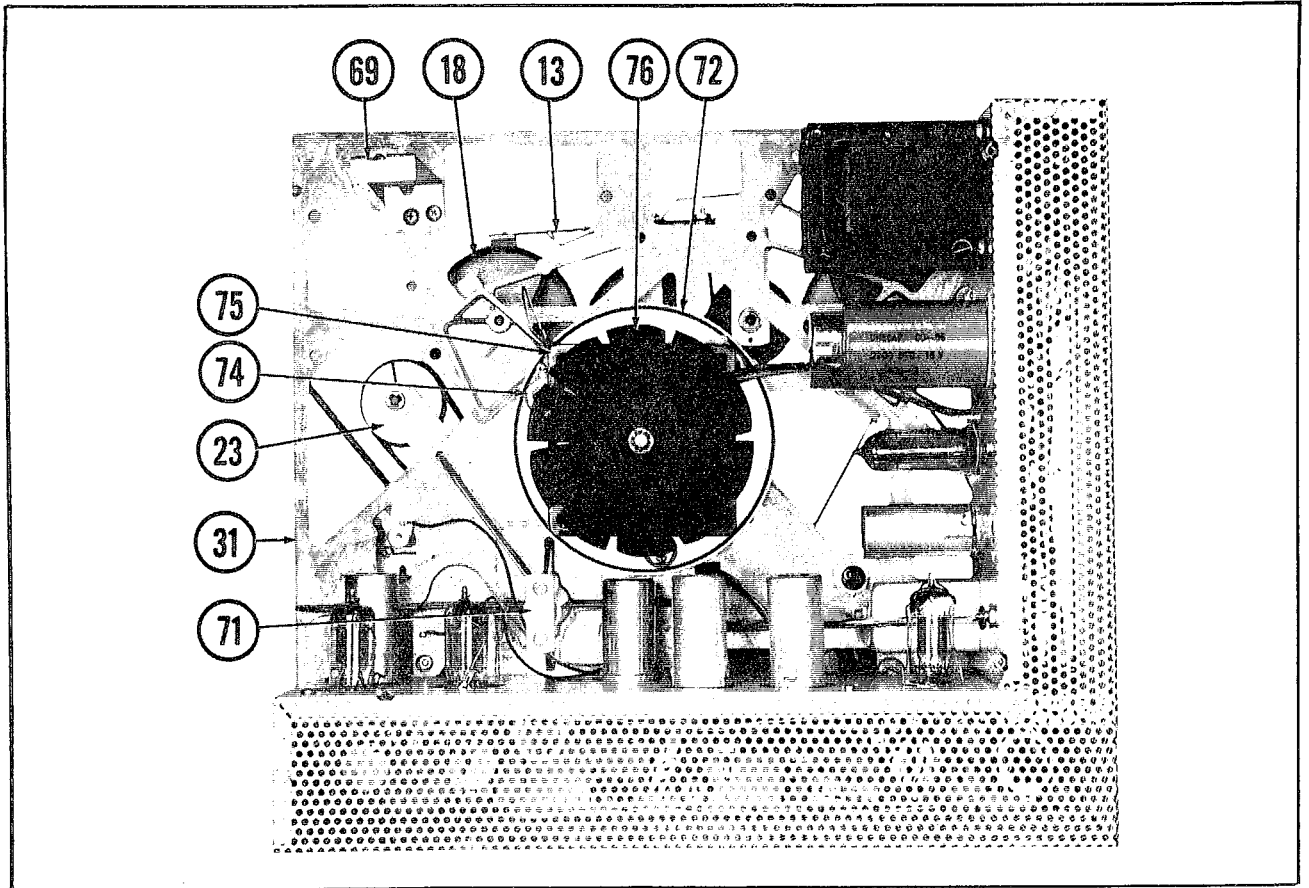


FIGURE 3

2. The rubber-tired takeup pulley moves against the takeup turntable, and starts rotation of the turntable.

3. The capstan idler moves against the capstan, placing the tape in motion at the speed selected.

4. The rewind and takeup brakes are pulled from contact with respective turntables.

The tape is thus pulled across the head assembly by the capstan, being held under tension by the tape holdback, and wound on the takeup reel.

When the stop button is pressed the tape holdback, capstan idler, and takeup pulley are released and spring action returns them to their standby positions. At the same time the self energizing brakes on both the rewind and takeup turntable are activated and the rewind brake applies braking force on its turntable, bringing it to a quick stop.

Fast Winding Forward -

When the Fast Winding control is moved in a clockwise rotation the following mechanical actions occur in sequence:

1. The fast winding brake engages the rewind turntable, providing holdback tension.

2. The fast winding pulley moves toward the takeup turntable, its rubber belt (16) engages the pulley and the turntable, thus providing drive for the turntable in a fast counterclockwise rotation.

3. The normal rewind and takeup brakes are pulled from contact with their respective turntables.

Tape is thus pulled from the rewind reel by the takeup reel, with holdback tension supplied by the fast winding brake at the rewind turntable.

When the stop button is pressed the fast winding pulley is released and returns to its standby position. The fast winding brake is deactivated; and the normal brakes are activated and braking force is again applied to the rewind turntable.

Fast Winding Reverse -

When the Fast Winding control is moved in a counterclockwise direction the following mechanical actions occur in sequence:

1. The fast winding brake (13) is applied to the takeup turntable, providing holdback tension.

2. The fast winding pulley is forced against a rubber tired idler (44) which in turn is forced against the rewind turntable (18). The belt (16) on the pulley; engaged between the pulley and the idler (44), drives the idler. The idler in turn drives the rewind turntable (18) in a clockwise direction.

3. The normal rewind and takeup brakes are pulled from contact with their respective turntables.

Thus tape is pulled from the takeup reel, by the rewind with holdback tension supplied by the fast winding brake (13).

When the "Stop" button is pressed the fast winding pulley is released and returns to its standby position. The fast winding brake is deactivated, and the normal brakes are activated. In this case braking force is applied to the takeup turntable.

Brake Operation --

The braking force is always applied to the trailing turntable (the turntable from which tape is being pulled), with the normal brakes in braking position only after the "Stop" button is pressed. In the play fast winding forward modes of tape motion, both turntables are rotating in a counterclockwise direction. While the controls are in their operating positions both turntable brakes are held from contact with their respective turntables, but when the "Stop" button is pressed, both are activated. The takeup brake in this instance supplies little or no braking force, as it is mechanically incapable of moving with the rotation of its turntable. However, the rewind brake can and does move with the rotation of its turntable, and as it does so it gradually increases the braking force applied until the turntable is brought to a stop. Brake movement is mechanically limited to prevent tape breakage which would occur if the stopping action were too sudden.

The action of the brakes in the fast winding reverse mode is exactly the opposite of that described in the foregoing paragraph. Now both turntables are rotating clockwise, and when the "Stop" button is pressed the brake on the takeup turntable can move with the direction of rotation and supply the braking action.

The fast winding brake is simply a holdback device which is mechanically held against the appropriate (trailing) turntable during actual tape motion in the fast winding modes. This ensures a tight wrap of the tape on the reel of the takeup turntable.

Tape Indicator Operation --

The tape position indicator is driven through a series of gears by a belt (56) from the rewind turntable. This belt runs from a pulley at the base of the turntable to a pulley that is directly coupled to one set of mating gears. These gears are mechanically linked through an extension arm to a second set of mating gears which in turn drive the indicator.

Two dials are provided -- one reading in units from 0 to 100 and one reading in hundreds of units from 0 to 20. The unit dial rotates whenever the supply turntable is rotating, but the hundreds units dial is locked by a spring loaded arm. As the units dial passes through its 95-0 indicator, the spring loaded arm is raised by a cam on the inner shaft of the units dial, allowing the hundreds dial to advance one space.

MAINTENANCE

Routine Cleaning --

1. Most tape manufacturers lubricate their tapes, and this lubricant (plus oxide) from the tape will gradually be deposited on the components in the tape threading path. Therefore those components must be cleaned occasionally to prevent both the loss of positive drive at the capstan and flutter and "Wow".

To clean the head assembly use a solution of Xylene and 0.1% Aerosol (Ampex Catalog No. FP-7). A cotton swab on a stick can be used to accomplish this cleaning.

CAUTION: Do not use any other solvent on the head assembly, as some will damage the material which binds the heads laminations together. Also do not use any metallic device which will mar the laminations.

2. Use a clean, lintless, cloth moistened with denatured alcohol to clean the capstan, capstan idler, and tape guides.

Demagnetizing The Heads --

The record and reproduce heads may occasionally acquire a degree of permanent magnetization, which will result in an increase of 5 to 10 db in noise level, distortion of any recorded signal, and a gradual erasure of high frequencies on any recorded tape which passes over them. These heads may be easily demagnetized through the use of an Ampex head demagnetizer, Catalog No. 704.

1. Remove the plastic head cover (by pressing in on each end to release the tab) and the metal shield which covers the head assembly.

2. Turn the Selector switch to its "Off" position.

3. Cover the tips of the demagnetizer with masking tape, transparent tape, etc. This will prevent scratching the heads. Latest versions of the demagnetizer are provided with the tips already covered.

4. Connect the demagnetizer to a source of 110-120 volt, a-c, power.

5. Bring the tips of the demagnetizer in contact with the record head so that the tips straddle the gap in the center of the head. Run the tips up and down the head several times, and then slowly withdraw the demagnetizer. The slow withdrawal is required for through demagnetization.

6. Repeat step 5 at the reproduce head.

ELECTRONIC ALIGNMENT

Equipment Required --

1. Ampex Standard Alignment Tape, Catalog No. 5563B.

2. AC Vacuum Tube Voltmeter able to indicate rms voltages of .004 or less.

3. Audio Oscillator with stable output from 50 cps to 10KC.

4. Blank tape.

Reproduce Circuit Preliminary Steps --

1. Remove the recorder/reproducer from the case or cabinet by carefully inverting the recorder, removing the holding screws, and lifting the case or cabinet off the mechanical assembly. Be sure the plastic head cover is removed before inverting the equipment.

2. Thread blank tape on the tape transport.

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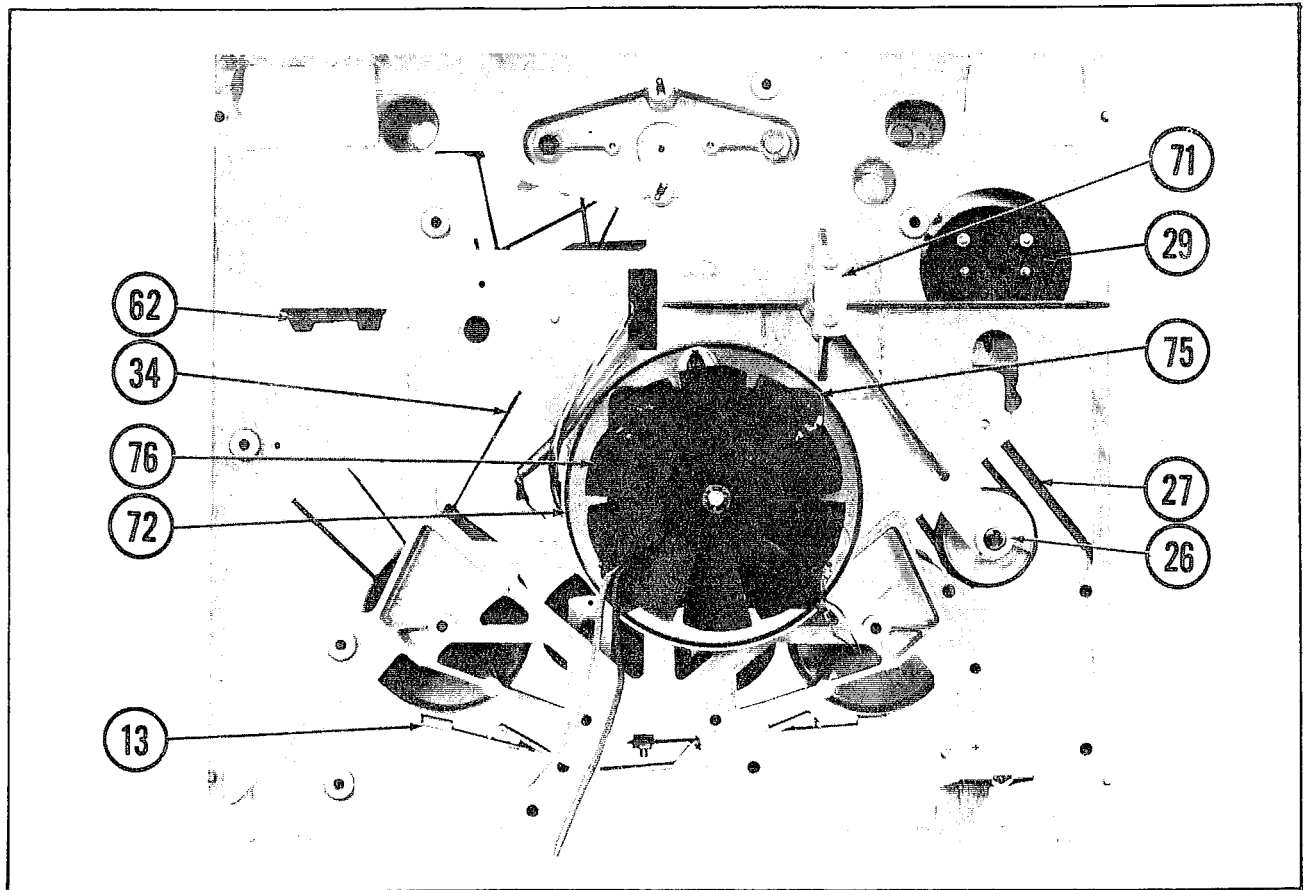


FIGURE 4

3. Connect the A-C power.
4. Place the selector switch in its tape position (Stereo position on stereophonic models).
5. Start tape motion.

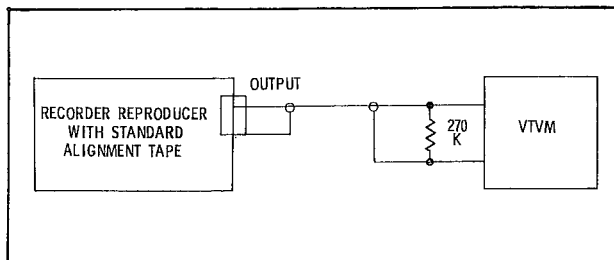


FIG. 5 CIRCUIT FOR ALIGNING REPRODUCE Head Height --

1. Visually inspect the position of the tape on the three heads (erase head, record head, and reproduce head from left to right when facing the machine) counting the head laminations which are visible above and below the tape. The number above should equal the number below.

2. If it is necessary to adjust the height of any head start with the screw immediately in front of that head and count the number of turns or fractions of a turn which are necessary to make the tape track in the middle of the head. If the front screw has to be turned more than 1/4 turn, adjust the screw immediately opposite it (in back of the head) the same amount and re-check the position of the tape.

3. Sight along the reproduce head (37) to the capstan (38). They should be parallel. If not, re-adjust the head height screws and recheck the head height. Then sight along the record head to the reproduce head and adjust the record head, if necessary to parallel the reproduce head. Finally check the erase head against the record head.

Reproduce Head Azimuth Alignment --

1. Thread the standard alignment tape on the tape transport.

2. Connect the VTVM to the Output jack (Left Output on stereophonic models). Connect a 270,000 ohm load across the VTVM.

3. Turn the Listening Volume control to its maximum (clockwise) position.

4. Start the standard tape in motion in the reproduce (Play) mode at a tape speed of 7.5 ips.

5. The first tone on the tape is a 10KC tone used for adjusting the azimuth of the reproduce head. Adjust the screw to the right of the reproduce head for a maximum indication on the VTVM. Note that if the head azimuth is out of alignment by a large amount several minor peaks will be observed on both sides of the maximum; however the proper setting is clearly 15 to 20 db higher.

Record Circuit Preliminary Steps --

1. Thread blank tape on the recorder reproducer.

2. Connect the audio oscillator to the Line In-Rec jack. Set the oscillator at an output level of from 1 to 2 volts at 10KC.

3. Connect the VTVM to the Left Output jack. This circuit can either be the one used in the reproduce circuit checks as shown in Fig. (7), or can employ a bias trap circuit to eliminate the 100KC bias signal picked up by the reproducer head during recording as shown in Fig. (8).

When alignment procedures differ (depending upon the circuit used) both are described. In general, it will be found that alignment is easier if the bias trap is employed.

4. Place the selector switch in its "Tape" position (Single position on Stereophonic Models).

5. Reproduce level must be set as in step 3 or step 7 of the reproduce circuit alignment (-12 db when reproducing the 250 cycle tone recorded at -10 db on a standard alignment tape). Maintain this setting throughout the procedure.

6. Place the speed selector in its 7 1/2 ips position.

7. Start the tape in motion in the record mode.

NOTE: If the height of the record head has not been checked and, if necessary, adjusted, do so before proceeding.

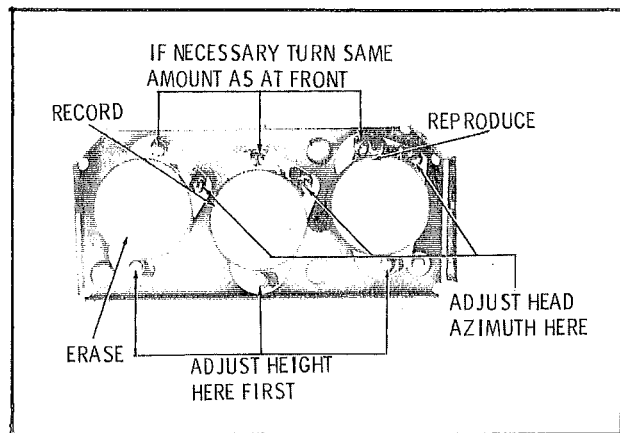


FIGURE 6 HEAD ADJUSTMENTS

Record Head Azimuth Alignment —

With bias trap connection to VTVM.

1. Set the audio oscillator frequency to 10KC.

2. Adjust the "Recording Volume Radio/Phono" control for an indication of -22 db (.062 volts rms) on the VTVM.

3. Adjust the record head azimuth screw for a maximum indication on the VTVM.

4. Stop tape motion.

Without Bias Trap Connection —

1. Place a .01 or .02 uf capacitor across the VTVM.

2. Set the audio oscillator frequency to 10KC.

3. Start the blank tape in motion at 7.5 ips in the record mode and adjust the "Recording Volume — Radio/Phono" control so that the needle of the "Record" meter on the recorder/reproducer falls on the letter "A" in the word "Normal" on its scale.

4. Adjust the record azimuth screw Fig. (7) for a maximum indication on the VTVM.

5. Stop tape motion and remove the capacitor installed in step 1.

Record Bias Adjustments —

1. Change the audio oscillator frequency to 500 cps.

2. Start the blank tape in motion at 7 1/2 ips in the record mode.

3. Adjust the "Recording Volume-Radio/Phono" control for an indication approximately -2 db (.62 volts rms) on the VTVM.

4. Adjust the bias control (see amplifier photos in the rear of this manual) for a maximum reading on the VTVM. It is not necessary to stop tape motion.

Record Meter Calibration —

1. Change the audio oscillator frequency to 250 cps.

2. If necessary, adjust the "Recording Volume — Radio/Phono" control for an indication of -2 db (.62 volts rms) on the VTVM.

3. Adjust the meter calibration control (see amplifiers photos in the rear of this manual) until the needle of the "Record Meter" on the record/reproducer rests on the line between the "Normal" (back) and High (gray) portions of its scale. Stop tape motion and remove the VTVM.

Checking Noise Balance —

1. Connect an amplifier/loudspeaker combination to the "Left Output" jack. Turn up amplifier volume control to full volume. Turn both "Recording Volume" controls to zero.

2. Start the blank tape in motion at 7.5 ips in the record mode.

3. Adjust the "Noise Balance" control (R5) for a minimum of popping or cracking as heard from the amplifier/loudspeaker.

4. Stop tape motion and remove the amplifier/loudspeaker connection.

Overall Response —

With bias trap connection to VTVM.

1. Change the audio oscillator frequency to 250 cycles.

2. Reconnect the VTVM to the "Left Output" jack.

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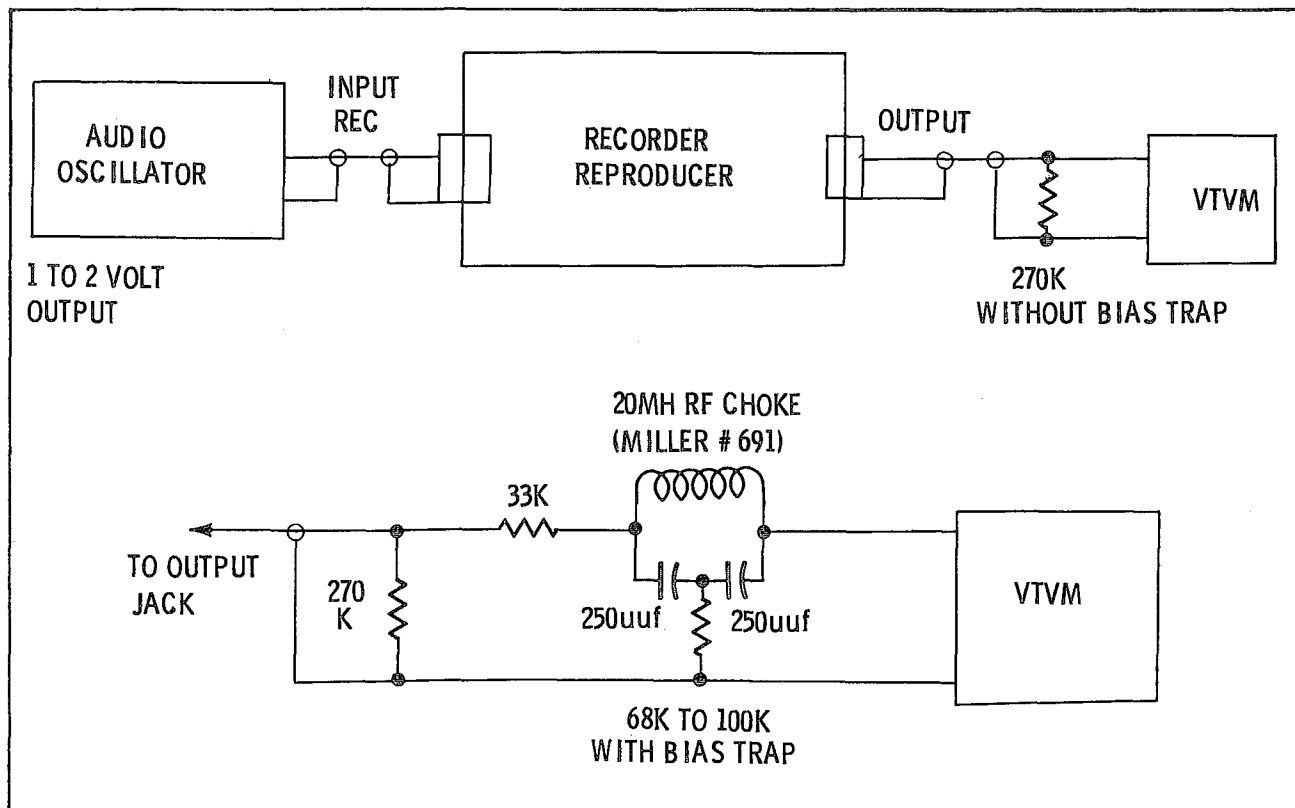


FIG. 7 OPTIONAL CIRCUITS FOR ALIGNING RECORD SECTION.

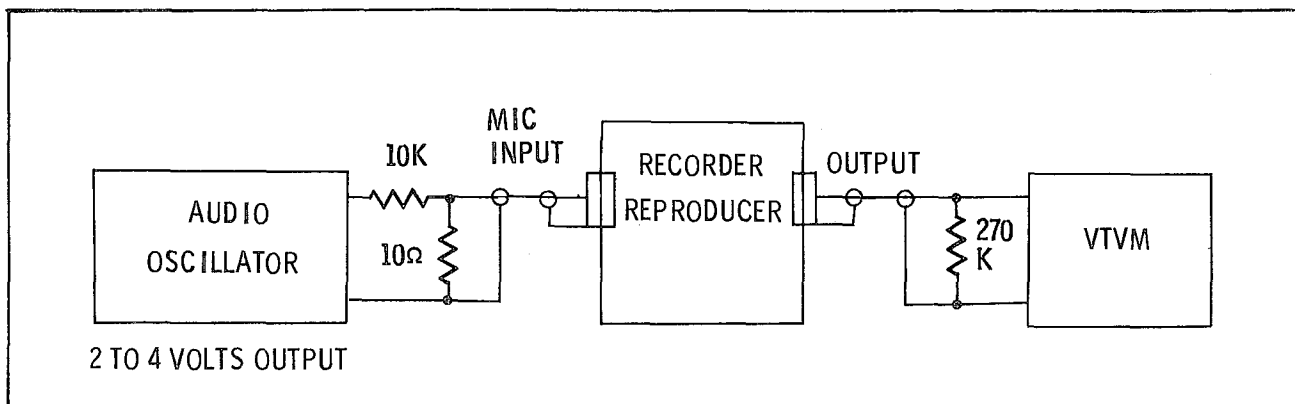


FIG. 8 CIRCUIT FOR CHECKING MICROPHONE PRE-AMPLIFIER.

3. Start the blank tape in motion at 7.5 ips in the record mode.

4. Adjust the "Recording Volume - Radio/Phono" control for a -22 db (.062 volts rms) indication on the VTVM. Maintain this setting.

NOTE: The overall response check must be made at this level (-20 db from normal operating level) to avoid tape saturation effect at high frequencies.

5. Vary the audio oscillator between 50 cps and 10KC noting the indications on the VTVM. Response should be within +2 db from the -22 db 250-cps reference level at frequencies from 50 cps to 5KC.

Without Bias Trap Connection To VTVM.

1. Connect the VTVM across the audio oscillator.

2. Set the audio oscillator for an output level of 5 volts rms at 250 - cps.

3. Start the blank tape in motion at 7.5 ips in the record mode and adjust the "Recording Volume - Radio/Phono" control so that the needle of the "Record Meter" on the recorder/reproducer falls on the line between the "Normal" (black) and High (gray) portions of its scale. Maintain this setting.

4. Reduce the oscillator output to a level of 0.5 volt rms (-4 db) as indicated on the VTVM. This corresponds to a -22 db output.

5. Vary the oscillator frequency between 50 cps and 10KC, recording each frequency for at least 10 seconds.

6. Stop the tape and rewind it to the start of the series of tones recorded in step 5.

7. Reconnect the VTVM to the "Left Output" jack, using the original circuit.

8. Start the tape in motion in the reproduce (playback) mode at 7.5 ips. Note the indications on the VTVM for each tone. Response should be ± 2 db from the -22 db, 250 cycle, reference level.

9. Stop tape motion and remove the audio oscillator.

NOTE: Overall response at the 3.75 ips tape speed can be checked using this procedure. Response should be ± 2 db from the -22 db, 250 cycle, reference level at frequencies from 50 cps to 5KC.

Overall Noise -

1. Turn both "Recording Volume" controls to their maximum counterclockwise position (minimum volume).

2. Start the tape in motion at 7.5 ips in the record mode and record a section of tape with no input signal. Note that the tape is actually being erased so that overall noise will include the erase signal.

3. Stop tape motion and rewind the tape to the start of the section recorded in step 2.

4. Start the tape in motion at 7.5 ips in the reproduce (playback) mode and reproduce the erase section, noting the indication on the VTVM. The reading should be -46 db (.004 volt rms) or under.

5. Stop tape motion.

NOTE: Overall noise at the 3.75 ips speed can also be checked by following the above procedures, except using the 3.75 ips speed. Noise should be -41 db (.004 volt rms) or under.

Final Steps -

1. Remove the VTVM from the recorder/ reproducer.

2. If the alignment check were normal, replace the recorder/reproducer in its case or cabinet by carefully inverting the recorder/reproducer and sliding the cabinet into position. If the alignment checks were not normal, proceed to Corrective Maintenance.

TAPE TRANSPORT PERFORMANCE CHECKS

The mechanical operation of the components of the tape transport is fixed within strict design specifications and there are no adjustments (this excludes the head assembly which is aligned during the electronic alignment procedure). However, a few simple checks should quickly determine that the transport is operating properly, or indicate that corrective maintenance is required.

Some of the performance checks outlined may be made using alternate methods, depending upon the test equipment available. For this reason the test equipment required is detailed at the start of each discussion.

Tape Speed -

Test Equipment - Electronic Frequency Counter

1. The most accurate method of measuring tape

speed is to reproduce a tape precisely recorded at a frequency between 3,000 and 4,000 cps, using an electronic frequency counter to determine the reproduce frequency. A standard flutter tape recorded at 3,000 cps is an example of this type of tape.) Note that a tape recorded on the recorder/reproducer itself, and then reproduced, will not determine that the tape is moving at the correct speed.

2. An alternate method may be used if an electronic frequency counter is not available. An approximate indication of tape speed may be obtained by timing (with a stop watch) the number of seconds it takes for a measured length of tape to pass a given point on the transport. Measure the tape in multiples of 7.5 inches and play for a run of at least 1 minute.

NOTE: Human error, plus the tendency of stop watches is common usage to jump or lag as they are started, makes this an inaccurate method.

Tape Tension -

Test Equipment - an accurate 0 to 8 ounce spring scale and a reel of blank tape.

1. Place a reel of blank tape on the supply turntable. Thread the tape between the tape holdback and guide, and over the head assembly, but not between the capstan and capstan idler.

2. Make a loop in the end of the tape by rolling it back over itself several times. Secure the loop with a piece of masking tape or some similar adhesive.

3. Place the hook on the spring scale through the loop, place the "Selector" switch in its "Monitor" position.

4. Turn the "Play" Or "Record" switch until it locks in its clockwise position.

5. Use the spring scale to pull the tape from the supply reel, noting the reading on the scale, which should be between 2 and 3 ounces while the tape is in steady motion. (See Trouble Chart).

Takeup Tension -

Test Equipment - An accurate 0 to 8 oz. spring scale. An empty tape reel with hub diameter of 2 inches. A length of string from 3 to 4 feet in length.

1. Place the empty reel on the takeup turntable.

2. Anchor the string on the reel and wrap it once or twice in a clockwise direction around the reel hub.

3. Tie a loop in the end of the string and place the hook on the string scale through the loop.

4. Place the Selector switch in its Monitor position. Turn the "Play" Or "Record" switch clockwise until it locks in position.

5. Let the spring scale follow slowly as the string is wound on the reel, taking the scale/reading. It should be approximately 3 ounce/inches. If not, see Trouble Chart.

NOTE: If the hub is 2 inches in diameter the spring scale will indicate directly in ounce/inches.

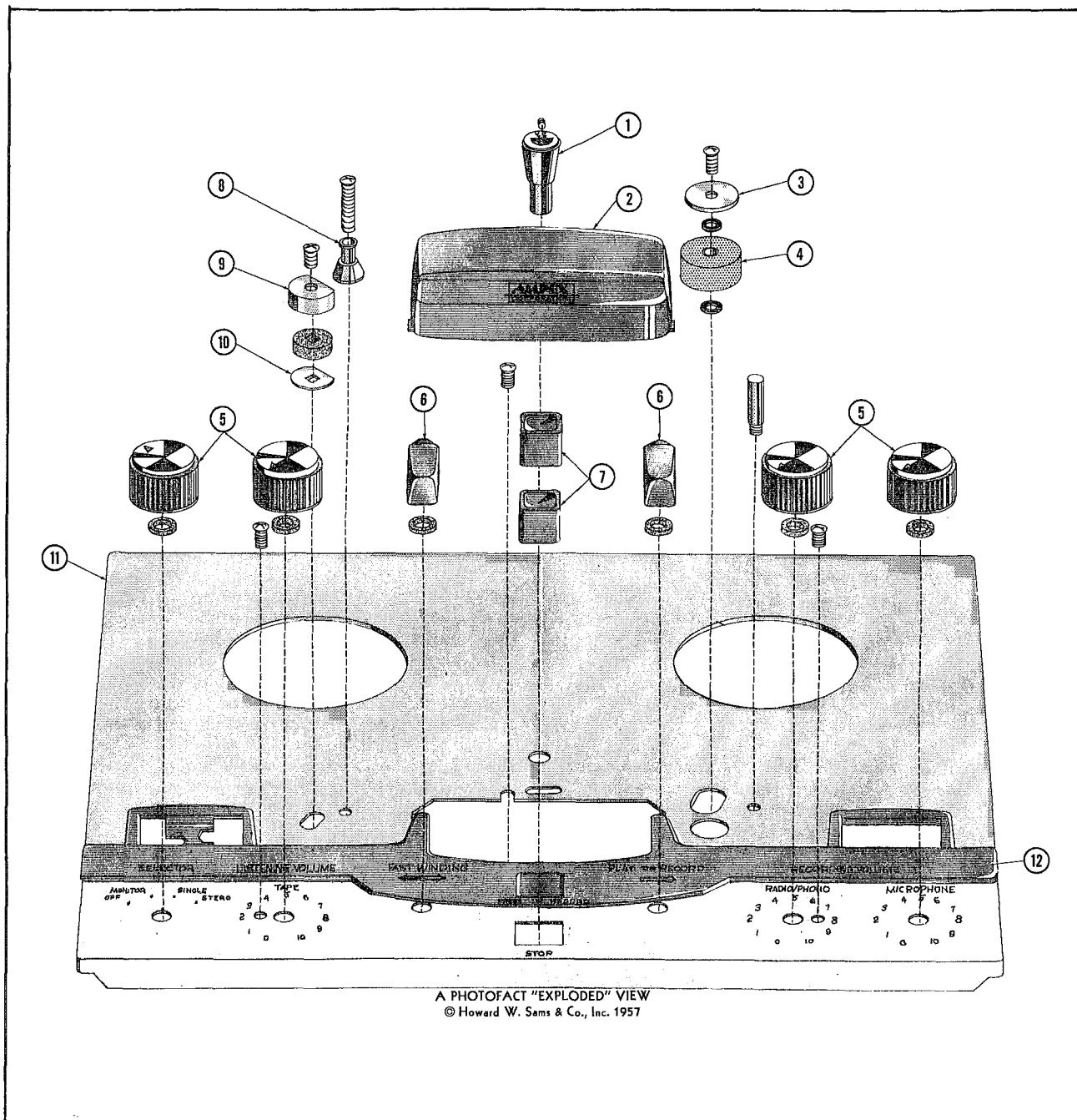
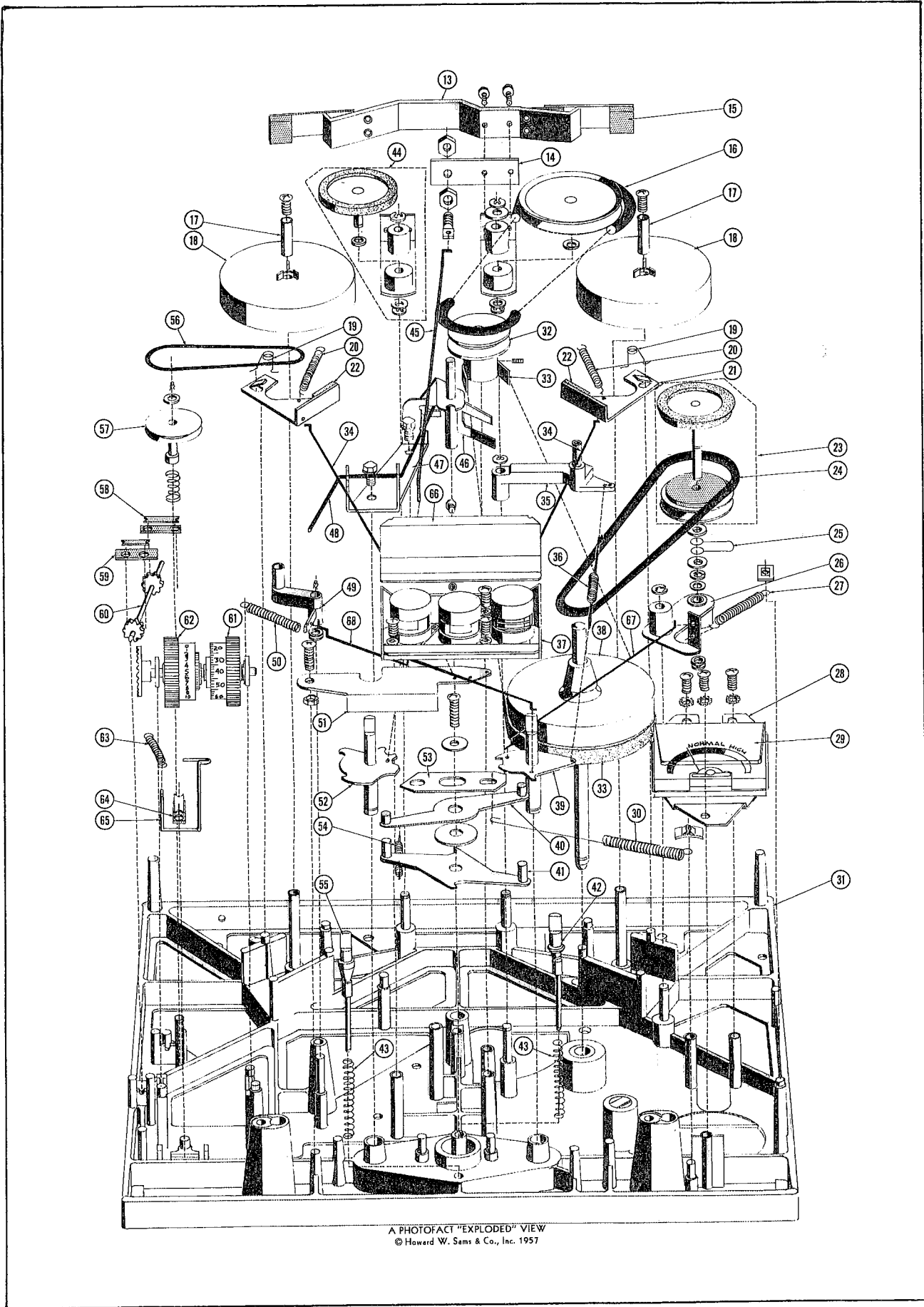


FIGURE 9A. EXPLODED VIEW OF PARTS ABOVE MAIN ESCUTCHEON.



A PHOTOFAC "EXPLODED" VIEW
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FIGURE 9B. EXPLODED VIEW OF PARTS ABOVE BASEPLATE.

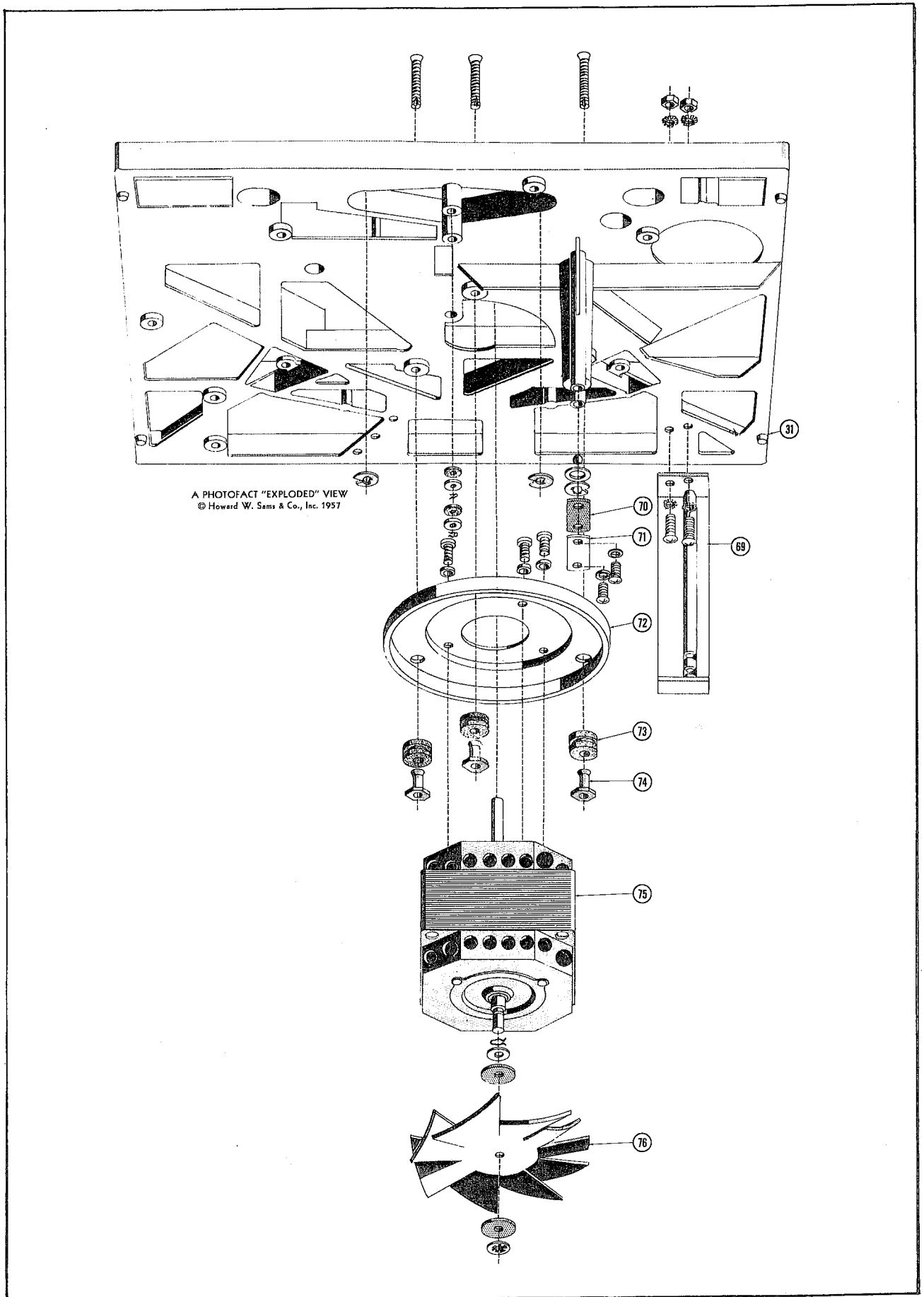


FIGURE 9C. EXPLODED VIEW OF PARTS BELOW BASEPLATE.

If the hub is smaller, wrap it with tape to the 2-inch diameter level. If it is large, multiply the spring scale reading by the radius of the hub to determine the ounce/inch reading.

Brake Tension —

Test Equipment — An accurate 0-8 oz. spring scale. The following procedure applies to both the supply and takeup turntable brakes. The brakes are applied only in the stopping position, so no manipulation of controls is necessary.

1. Remove the top cover (12) from the tape transport, and remove the rods (34) to the brake assembly.

2. Place the hook on the spring scale through the hole on the brake assembly, or put a string through the hole as a loop for the spring scale.

3. Using the spring scale pull the brake in a direction that will move the brake assembly directly away from the turntable. Scale reading should be from 5 to 8 ounces as the brake barely clears the turntable.

4. Repeat the procedure on the other turntable.

5. Replace the rods to the brake assemblies. Replace the top cover.

Capstan Idler Pressure —

Test equipment — Accurate spring scale capable of measuring up to 3 pounds.

1. Remove the top cover (12) from the tape transport.

2. Turn the "Play" Or "Record" switch clockwise until it locks in position.

3. There are two holes in the capstan idler arm (35), one of which is used. Place hook on the spring scale through the unused hole.

4. Using the spring scale, pull the capstan idler in a direction that will move it directly away from the capstan. Scale reading should be from 2 pounds to 2 pounds 13 ounces as the idler barely clears the capstan. If not, see Trouble Chart.

Flutter And "Wow" —

Test Equipment — Flutter Meter —

1. Flutter and "Wow" are produced by periodic irregularities in tape speed which appear as cycle frequency deviations in recording and reproducing. A standard flutter meter connected across the Output jack (Left Output on a stereophonic model) will indicate the flutter when the machine is in the reproduce mode.

2. Terminate the Output jack with a 270,000 ohm resistance. Follow the instructions furnished with the flutter meter to make this measurement.

MODELS A121, A122, A124, A621, A692
AMPEX

TROUBLE CHART

SYMPTOM	CHECK INDICATION	REMEDY
No rotation of capstan when selector switch turned to its "On" position.	Illuminating light of tape position indicator not lit; tube filaments not lite.	1. Power cable not connected. Connect power cable. Fuse defective; replace.
	Illuminating light of tape position indicator lit; tube filaments lit.	1. Drive motor belt jammed by changing speed selector when capstan is not rotating. Return speed selector to 3 3/4 ips position. If capstan starts then replace speed selector to desired position. 2. Drive motor belt broken; replace belt. 3. Drive motor defective; replace motor assembly.
Defective power supply.	No plate voltage; illuminating light of tape position indicator not lit; tube filaments not lit.	1. Power cable not connected; connect power cable. 2. Fuse defective; replace fuse. 3. Defective power transformer; replace transformer.
	No plate voltage; illuminating light of tape position indicator lit; tube filaments lit.	1. Tube V8 defective; replace tube.
No record meter indication when using microphone.	Meter illuminating light not lit.	1. Equipment not in record mode. 2. No power to equipment.
	Meter indication normal when recording from Input-Rec. jack.	1. Defective tube V4 or component in that stage. Replace faulty component.
	Meter indication not normal when recording from Input Rec. jack.	1. Defective tube V6 or V5, defective components in those stages, or defective record meter. Record a section of tape at approximately normal level. Reproduce it. If the recording seems normal it indicates a defective tube V6 or component in the stage or a defective record meter. 2. If the recording is not normal it indicates a defective tube V5 or component in that stage.
No recording function.	No record meter indication.	See above.
	Record meter indication normal.	1. Defective tube V5 or component in that stage. Replace defective part. 2. Record head defective. Replace head.
No reproduce function when playing tape known to be properly recorded. Tape motion normal.	Stereophonic reproduce models upper track only defective.	1. Defective tube V1 or defective component in that stage. Replace defective part. 2. Defective tube V2 or defective component in that stage. Replace defective part. 3. Defective head. Replace head.
	Lower track only defective.	1. Defective tube V3 or component in that stage. Replace defective part. 2. Defective tube V2 (second half) or component in that stage. Replace defective part. 3. Defective head, replace head.
	Both tracks defective.	1. Defective tube V2, replace tube.

TROUBLE CHART (CON'T.)

SYMPTOM	CHECK INDICATION	REMEDY
No erase function.	Distortion in recorded signal — no bias adjustment possible.	1. Defective tube V7 or components; replace defective part.
	No recorded signal — no bias adjustment possible.	1. Contacts on press to record switch M7 not making contact or dirty. Clean contacts, check that contacts make contact.
	Recorded signal normal — bias adjustment possible.	Defective erase head. Replace head assembly.
Tape speed not normal.	Low line voltage.	1. Line voltage must be at least .05 volts.
	Slipping drive belt (33).	1. Clean associated pulley surfaces, replace belt if necessary.
	Incorrect capstan idler pressure.	1. Replace capstan idler spring (36).
	Capstan bearing binding.	1. Replace capstan assembly (38).
	Defective drive motor (75).	1. Replace motor.
	Excessive tape holdback tension.	1. Check tape tension.
Wrong tape holdback tension.	Excessive tension.	1. Defective holdback spring. Replace spring. 2. Defective felt pad; replace felt pad. 3. Brake not releasing. Check mechanical linkage to brakes.
	Low tension.	1. Defective holdback spring; replace spring. 2. Defective felt pad; replace pad.
Insufficient braking force.	Tape loop thrown when stopping in any mode.	1. Brake worn; replace worn brake assembly (21). 2. Brake not free to move with direction of turntables. Reposition or replace wire spring (20) as necessary.
Wrong take tension.	Tape loop thrown when starting.	1. Takeup drive belt (24) slipping or broken. Clean pulley surfaces; replace belt if necessary. 2. Rubber tire on takeup idler slipping or worn. Clean tire and takeup turntable; replace idler if necessary. 3. Defective takeup clutch spring (25); replace spring. 4. Defective play takeup spring (27); replace spring.
Failure to meet frequency response specifications.	Poor high frequency response.	1. Poor contact-heads and tape; clean head. 2. Improper bias adjustment; adjust bias. 3. Improper head alignment; align head. 4. Incorrect holdback tension. Revolve or replace tape holdback (9A). Replace tape holdback spring (50). 5. Improper bias adjustment; adjust bias. 6. Improper head alignment; align head.

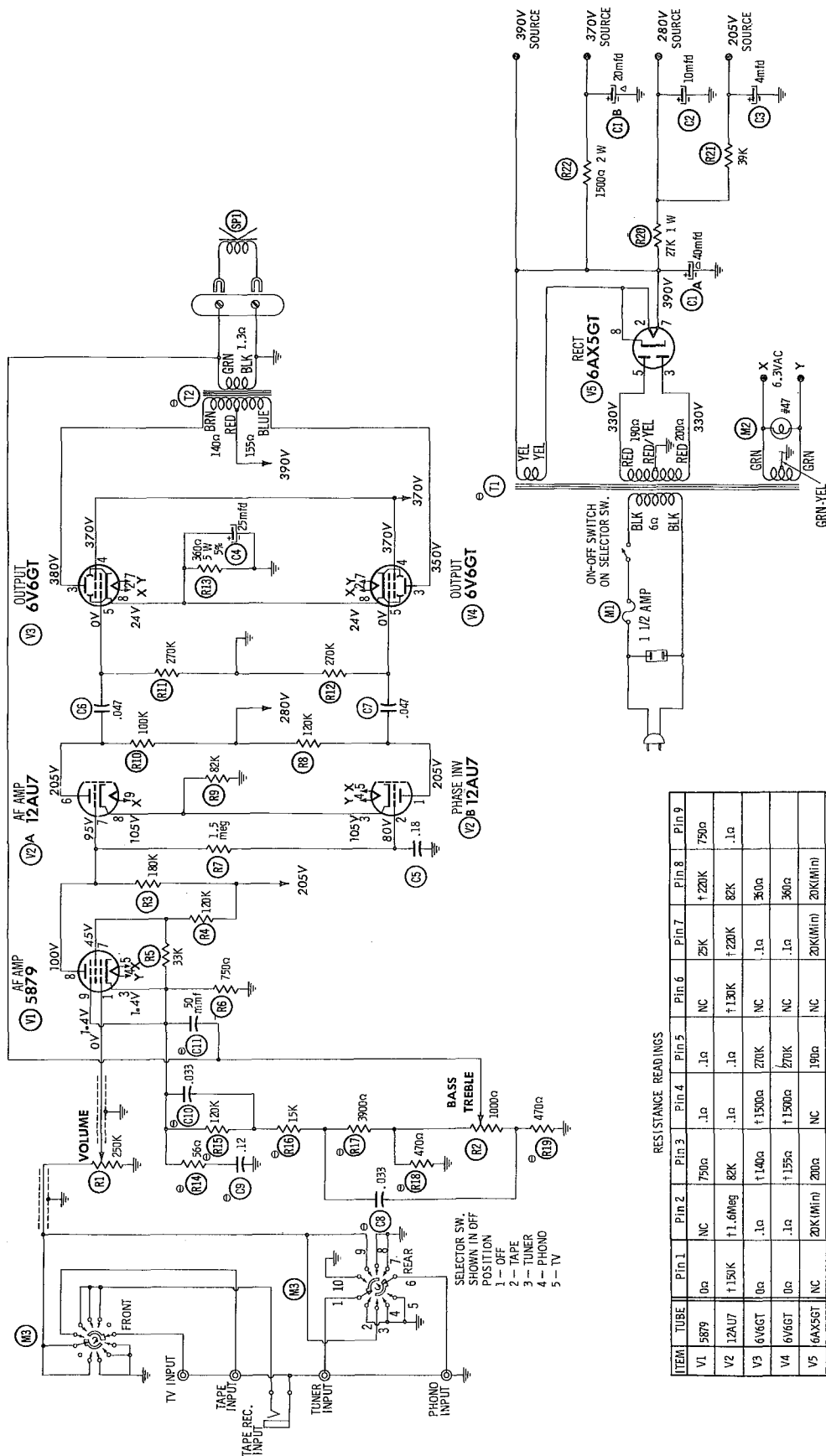
MODELS A121, A122, A124, A621, A692
AMP:EX

TROUBLE CHART (CON'T.)

		7. Recording at excessive level. Reduce record level. Check record meter calibration.
		8. Faulty reproduce amplifiers. Standard audio trouble shooting if indicated.
		9. Faulty record amplifier. Would be indicated if reproduce response is normal. Standard audio trouble shooting.
Failure to meet signal-to noise specifications.	Random background noise or "popping and cracking".	1. Magnetized heads. Demagnetize heads. 2. Noise balance not properly adjusted. Adjust noise balance.
	High 60-cycle hum which does not vary as the listening volume control setting is changed.	Filament-to-cathode leakage in V2. Replace tube.
	High 60-cycle hum which disappears when the listening volume control is turned to minimum (full counter-clockwise).	Hum pickup into V1 or V3. Replace tube. Check for external hum sources in close proximity to recorder/reproducer.
	High noise level in the low frequency range - either random or predominately 120 cycle or 30 cycle.	1. Motor vibration into microphonic tubes. Turn power off. Hold capstan to stall motor, and turn power on. If noise disappears vibration is causing. 2. Check that motor and subchassis shock mounts are free. 3. Replace V1 or V3.
	High amplitude motorboating.	1. Leads from pin 1 of V1 or V2 (or S1) too close to head leads, causing block oscillation. Correct lead dress. 2. Open head circuit. Replace head assembly.
	High frequency "ringing".	1. Microphonic tube, V1, V2, V3. Replace tube.
	"Crackling" or high frequency.	1. Noisy resistor - probably R6, R7, R8, R19, R20, or R21. Replace resistor.
	Noise reads high on VTVM not noticeable in speaker.	RF pickup from external source.
	Buzzing	RF pickup from television set. Move power cable and input cable. If the noise changes, TV is causing. Orient cables so noise disappears.
Failure to meet distortion specifications.		1. Magnetized heads, demagnetize heads. 2. Record bias improperly adjusted. Adjust record bias. 3. Recording at excessive level. Adjust record level.
Failure to meet flutter and wow specifications.	Flutter frequency approximately 21.36 cps at 7.5 ips.	1. Dirt on the components in the tape threading path. Clean thoroughly. 1. Flat or dented capstan idler tire (revolves at 142 rpm. Replace capstan idler tire (4).
	Flutter frequency approximately 5.7 cps at 7.5 ips.	1. Drive belt (moves at approximately 343 rpm). Replace defective belt. Check that belt is tracking properly.

AMPEX MODELS A121, A122, A124, A621, A692

CHEMICALS



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	5879	0Ω	NC	750Ω	.1Ω	NC	25K	+220K	750Ω	
V2	12AU7	+1.5K	+1.6Meg	82K	.1Ω	+1.3K	+220K	82K	.1Ω	
V3	6V6GT	0Ω	.1Ω	+1.40Ω	270K	NC	.1Ω	360Ω		
V4	6V6GT	0Ω	.1Ω	+1.55Ω	+1.50Ω	NC	.1Ω	360Ω		
V5	6AX5GT	NC	20K(1M)	20Ω	NC	190Ω	NC	20K(1M)	20K(1M)	

MEASUREMENTS TAKEN IN TAPE POSITION.
 † MEASURED FROM PIN 8 OF V5.
 * 6.3VAC MEASURED ACROSS FILAMENT
 NC NO CONNECTION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
 Howard W. Sams & Co., Inc. 1957

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA			Triad PART No.
	PRI.	SEC. 1	SEC. 2	AMPEX PART No.	Haldorson PART No.	Merit PART No.	
T1	117VAC ② .52A	60VCT ③ .066A	6.3VCT ④ 1.2A	B-9402 ①			

① Alternate part #H-1193.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA				NOTES
	PRI.	SEC.	AMPEX PART No.	Haldorson PART No.	Merit PART No.	Stancor PART No.	
T2	8300Ω	18Ω	B-9403 ①				① Alternate part #H-1194.

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		AMPEX PART No.	GUAM PART No.	
SF1	8" PM 18Ω	E-1235		

FUSES

ITEM No.	RATING	REPLACEMENT DATA			
		AMPEX PART No.	LITTELFUSE PART No.	BUSS PART No.	HOLDER
M1	1½A 250V	070-012	3120L.5 (3AG 1½A)	3B7001	AGC 1½ 4405

MISCELLANEOUS

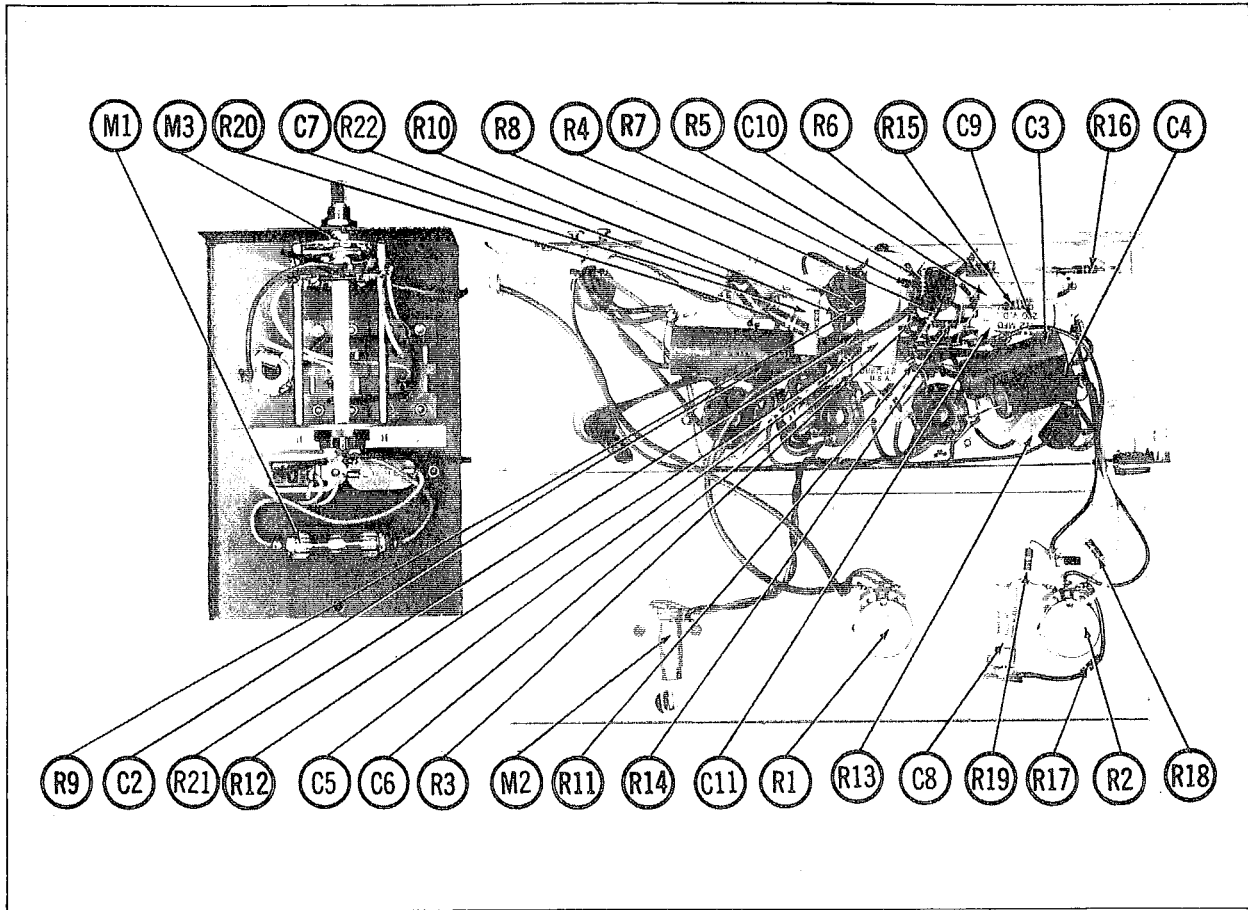
ITEM No.	PART NAME	AMPEX PART No.	NOTES
M2 M3	Pilot Light Switch	E-1270	Type #47 Function (Rotary wafer type)

CABINETS & CABINET PARTS

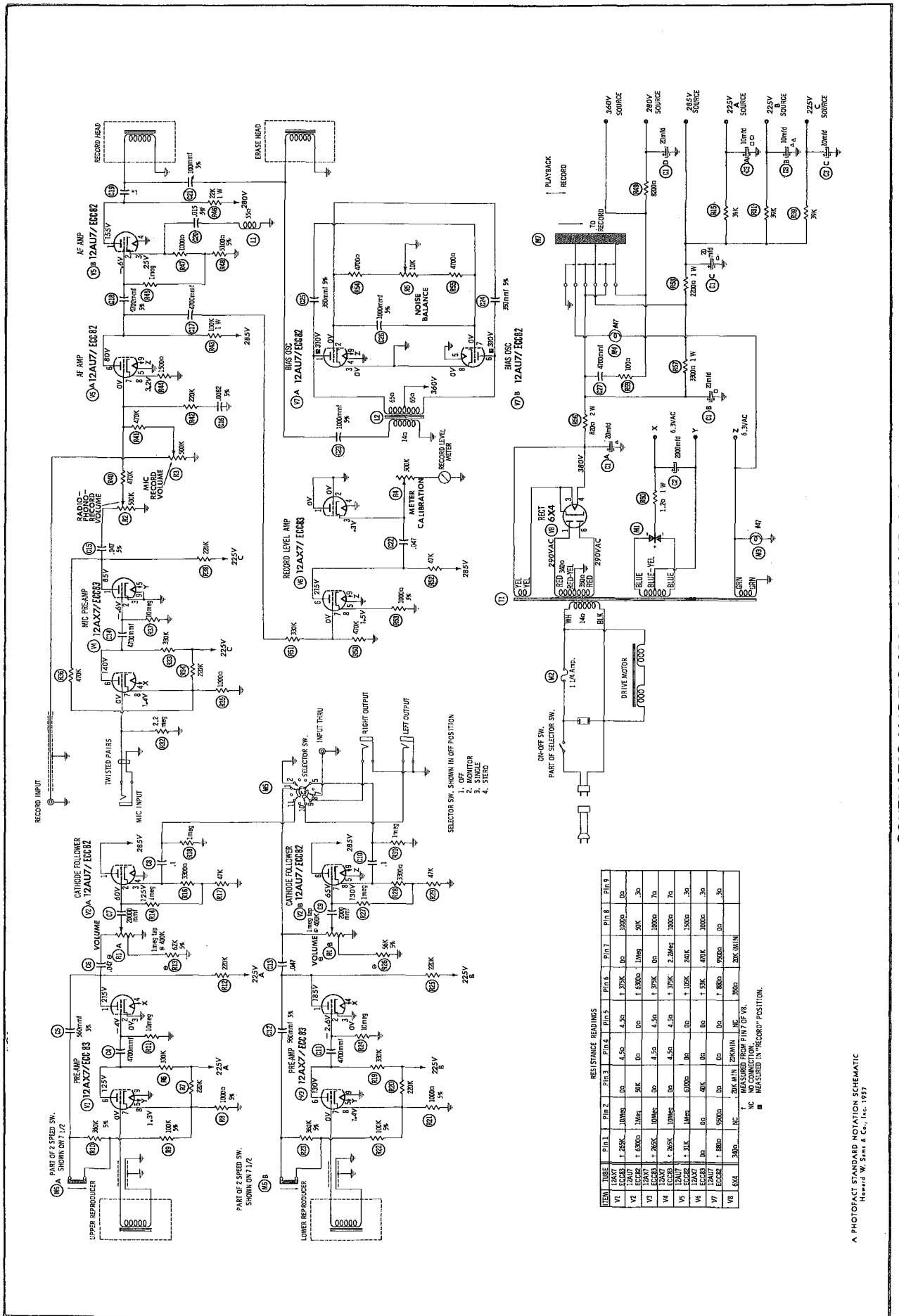
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob Cabinet	20902-1 H-1403	

CHASSIS—BOTTOM VIEW



AMPEX
MODELS A121, A122, A124, A621, A692



SCHEMATIC MODELS A121, A122 AND A124.

PARTS LIST AND DESCRIPTIONS TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Pre-amplifier	12AX7/ ECC83	
V2	Cathode Follower	12AU7/ ECC82	
V3	Pre-amplifier	12AX7/ ECC83	
V4	Mic. Pre-amplifier	12AX7/ ECC83	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP. VOLT.	REPLACEMENT DATA				SPRAGUE PART No.
		AMPEX PART No.	AEROVOX PART No.	CORNELL-DUBIER PART No.	MALLORY PART No.	
C1A	4 20	CO878	A FH4-14	DO130	FP444	Q-040
C1B	4 20					
C1C	4 20					
C1D	4 20					
C2	2000 15	CO86	A FH1-03	A0070	WP041	TMS-5
C3A	10 350	CO572		CO210	FP330.5	TMT-27
C3B	10 350					
C3C	10 350					

* Non Catalog Item.

FIXED CAPACITORS

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

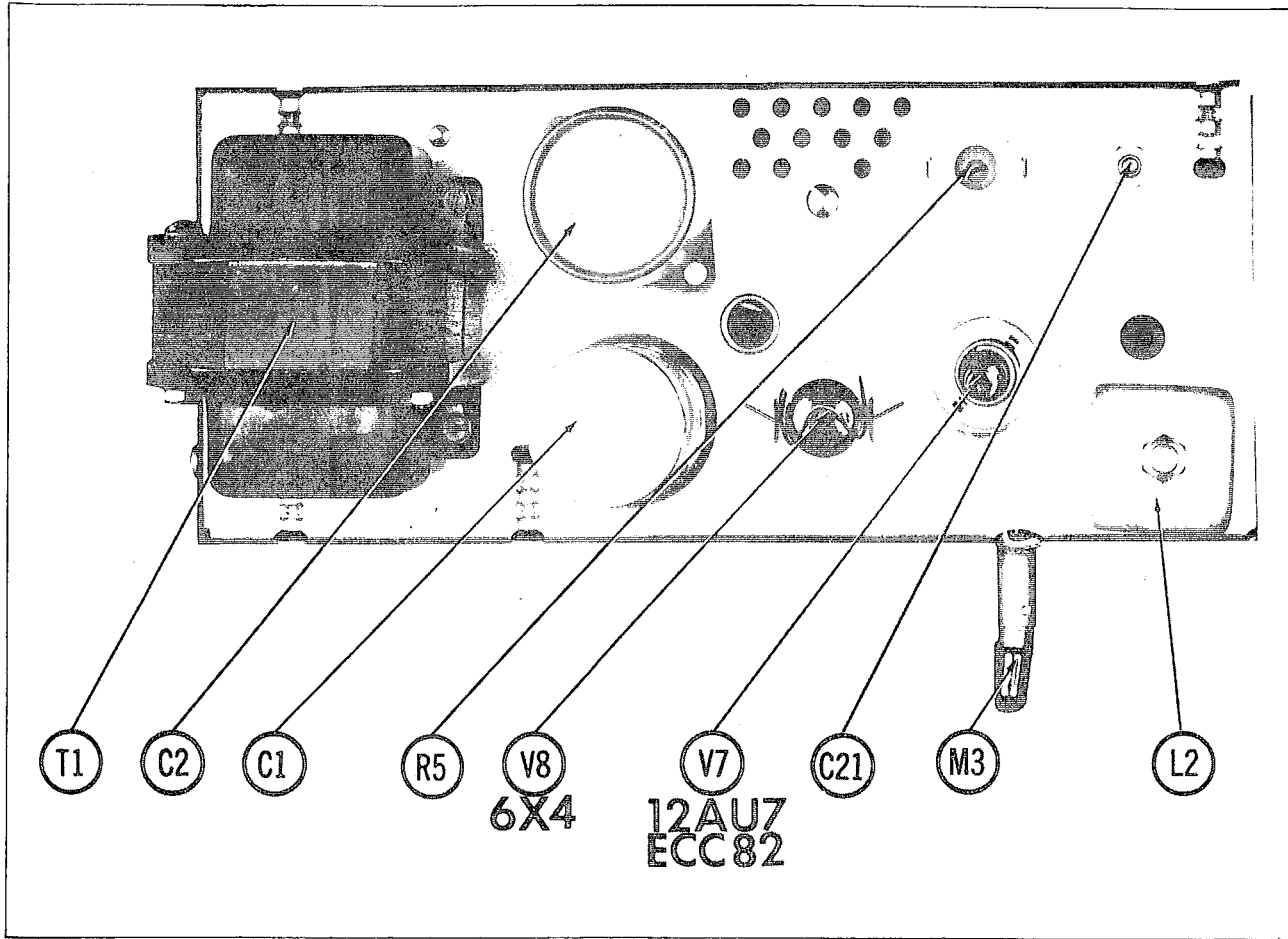
ITEM No.	RATING CAP. VOLT.	REPLACEMENT DATA						NOTES
		AMPEX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBIER PART No.	ERIC PART No.	MALLORY PART No.	
C4	4700	CO-577	BPD-0047	DD-472	IR5T56	ED-0047	UC-5247	5%
C5	560	CO-579	1464-00056	DF-503	CUB4S47		GEM-4147	
C6	.047	CO-574	P488N-047	DD-203	BYB6S2	ED-02	GEM-401	
C7	20000	CO-337	BPD-02	DF-104	CUB4P1	ED-02	GEM-401	
C8	.1	CO-294	P488N-1	DD-203	BYB6S2	ED-02	GEM-401	
C9	20000	CO-337	BPD-02	DF-104	CUB4P1	ED-02	GEM-401	
C10	.1	CO-294	P488N-1	DD-203	BYB6S2	ED-02	GEM-401	
C11	4700	CO-577	BPD-0047	DD-472	IR5T56	ED-0047	UC-5247	5%
C12	560	CO-579	1464-00056	DF-503	CUB4S47		GEM-4147	
C13	.047	CO-574	P488N-047	DD-203	BYB6S2	ED-02	GEM-401	
C14	4700	CO-577	BPD-0047	DD-472	IR5T56	ED-0047	UC-5247	5%
C15	.047	CO-574	P488N-047	DD-203	BYB6S2	ED-02	GEM-401	
C16	.047	CO-574	P488N-047	DD-203	BYB6S2	ED-02	GEM-401	
C17	4700	CO-577	BPD-0047	DD-472	IR5T56	ED-0047	UC-5247	5%
C18	4700	CO-577	BPD-0047	DD-472	IR5T56	ED-0047	UC-5247	5%
C19	.5	CO-576	P488N-5	DD-472	CUB4F5		GEM-405	
C20	.05	CO-576	P488N-5	DD-472	CUB4F5		GEM-405	
C21	100	CO-574	P488N-047	DF-503	CUB4S47		GEM-4147	
C22	.047	CO-574	P488N-047	DF-503	CUB4S47		GEM-4147	
C23	1000	CO-5	1464-001	DF-503	IR5D11		GEM-4147	
C24	350	CO-140		DF-503	IR5D11		GEM-4147	
C25	350	CO-140		DF-503	IR5D11		GEM-4147	
C26	1000	CO-6		DF-503	IR5D11		GEM-4147	
C27	4700	CO-577	BPD-0047	DD-472	IR5D11	ED-0047	UC-5247	5%

CONTROLS

ITEM No.	RATING RESISTANCE	WATTS	REPLACEMENT DATA			INSTALLATION NOTES
			AMPEX PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	
R1A	1Meg	1/2	20988-1		UE1708	Listening Volume Tap ③ 400K Note 1.
B	1Meg	1/2			U48	Listening Volume Tap ③ 400K
R2A	500K	1/2	044-106	B-60	Q13-133	Radio-Phono, Recording Volume
B	500K	1/2	044-106	Not Reg.	Not Reg.	Volume
R3A	500K	1/2	044-106	B-60	Q13-133	Microphone, Recording Volume
B	500K	1/2	044-106	Not Reg.	Not Reg.	Volume
R4	500K	1/2	044-107	AB-14	BI-116	Meter Calibration
R5A	10K	1/2	044-107	AB-14	SU-20	Noise Balance
B	10K	1/2	044-107	AK-1	TML-Kit	Noise Balance

Note 1. Alternate Part No. 044-106 500K used in this application in Models A111, A112, and A114 only.

CHASSIS—TOP VIEW



MODELS A121, A122, A124, A621, A692

AMPEX

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

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

ITEM No.	RATING		REPLACEMENT DATA		ITEM No.	NOTES	RATING		REPLACEMENT DATA		ITEM No.	NOTES
	OHMS	WATT	AMPEX PART No.	IRC PART No.			OHMS	WATT	AMPEX PART No.	IRC PART No.		
R6	330K		042-150	BTS-330K	R34	220K		041-076	BTS-220K			
R7	220K		041-076	BTS-220K	R35	1000Ω		041-048	BTS-1000			
R8	1000Ω	5%	042-151	BTS-1000	R36	470K		041-280	BTS-470K			
R9	100K	5%	041-023	BTS-100K	R37	10Meg		041-244	BTS-10Meg			
R10	350K	5%	041-260	BTS-350K	R38	220K		041-076	BTS-220K			
R11	10Meg		041-244	BTS-10Meg	R39	39K		041-067	BTS-39K			
R12	220K	5%	041-076	BTS-220K	R40	470K		041-080	BTS-470K			
R13	62K	5%			R41	470K		041-076	BTS-470K			
R14	1Meg		041-249	BTS-1Meg	R42	220K	1	041-170	BTS-220K			
R15	39K		041-067	BTS-39K	R43	100K		041-050	BTS-100K			
R16	3300Ω		041-054	BTS-3300	R44	1500Ω		041-249	BTS-1500			
R17	47K		041-250	BTS-47K	R45	1Meg		041-182	BTS-1Meg			
R18	1Meg		041-249	BTS-1Meg	R46	22K		041-182	BTS-22K			
R19	330K		041-150	BTS-330K	R47	1000Ω		041-048	BTS-1000			
R20	220K	5%	041-076	BTS-220K	R48	5000Ω	5%	041-001	BTS-5000			
R21	1000Ω	5%	042-151	BTS-1000	R49	8200Ω		041-080	BTS-8200			
R22	100K	5%	041-023	BTS-100K	R50	470K		041-076	BTS-470K			
R23	360K	5%	041-260	BTS-360K	R51	330K		041-280	BTS-330K			
R24	10Meg		041-244	BTS-10Meg	R52	47K		041-048	BTS-47K			
R25	220K	5%	041-076	BTS-220K	R53	1000Ω		041-048	BTS-1000			
R26	56K	5%			R54	4700Ω		041-086	BTS-4700			
R27	1Meg		041-249	BTS-1Meg	R55	4700Ω		041-201	BTS-4700			
R28	3300		041-054	BTS-3300	R56	8200Ω	2	041-182	BTS-8200			
R29	47K		041-250	BTS-47K	R57	3300Ω	1	041-182	BTS-3300			
R30	1Meg		041-249	BTS-1Meg	R58	2200Ω	1	041-180	BTS-2200			
R31	39K		041-067	BTS-39K	R59	100Ω		041-451	BTS-100			
R32	2.2Meg		041-252	BTS-2.2Meg	R60	1.2Ω	1	043-220	BTS-1.2			
R33	330K		041-076	BTS-330K								

Note 1. Resistors R13 and R26 are factory selected to match R1 tracking. Values range from 56K to 82K.

TRANSFORMER (POWER)

ITEM No.	RATING		REPLACEMENT DATA		REPLACEMENT DATA		Tried PART No.
	SEC. 1	SEC. 2	AMPEX PART No.	SEC. 3	Holderson PART No.	Merit PART No.	
T1	117VAC ①.32A	590VCT ②.015A	6.3V ③.0A 24VCT ④.450A	20933-1			

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA		NOTES
		AMPEX PART No.	MILLER PART No.	
L1	Tone Choke	CH-89	BC-505	7.5 Millihenries
L2	Bias Obs.	6352	660	

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA		NOTES
		AMPEX PART No.	FEDERAL INTERNATIONAL PART No.	
M1	.460	581-008	1017	604B

FUSES

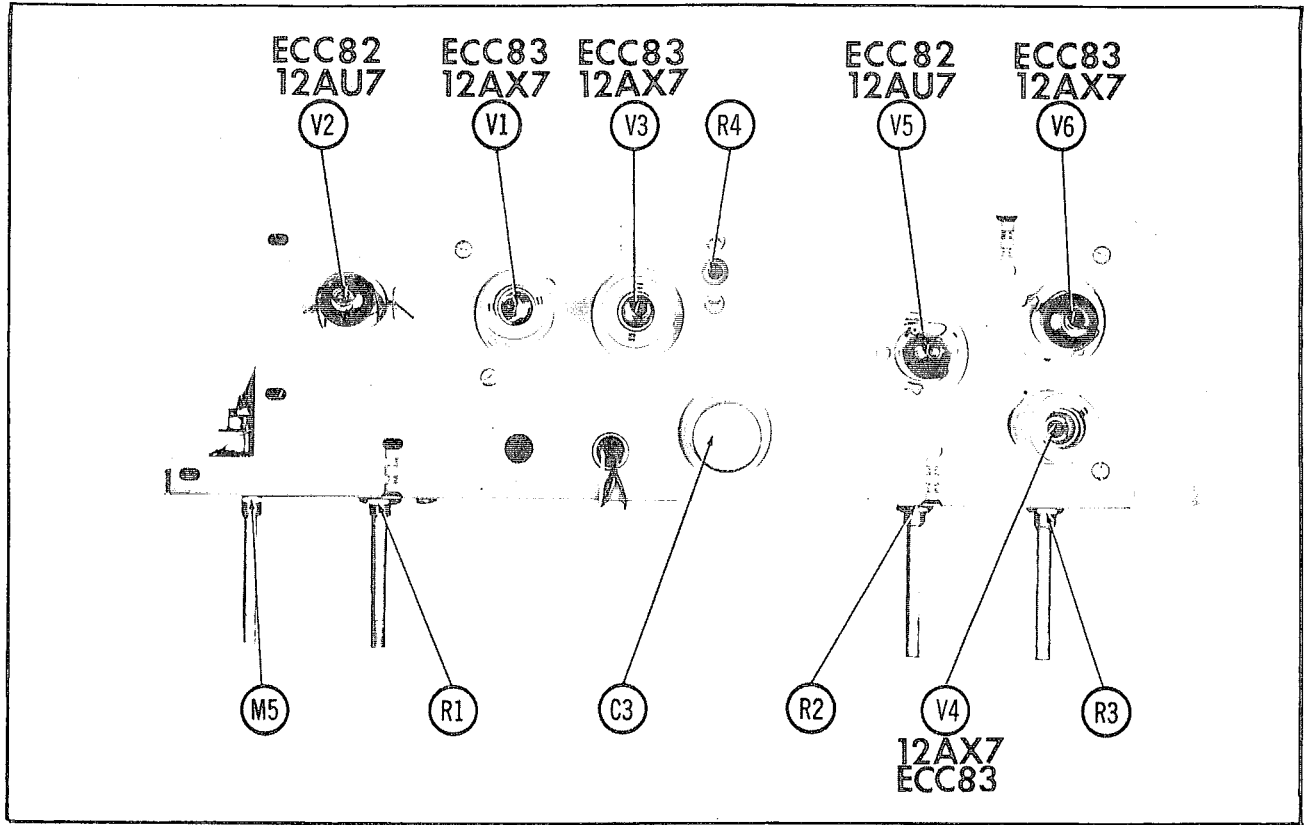
ITEM No.	TYPE	RATING	REPLACEMENT DATA		BUSS PART No.
			AMPEX PART No.	HOLDER	
M2	3AG	1 1/4 S/B	070-022	3181.25	357001
				MDL1 1/4	4405

CHASSIS - BOTTOM VIEW MISCELLANEOUS

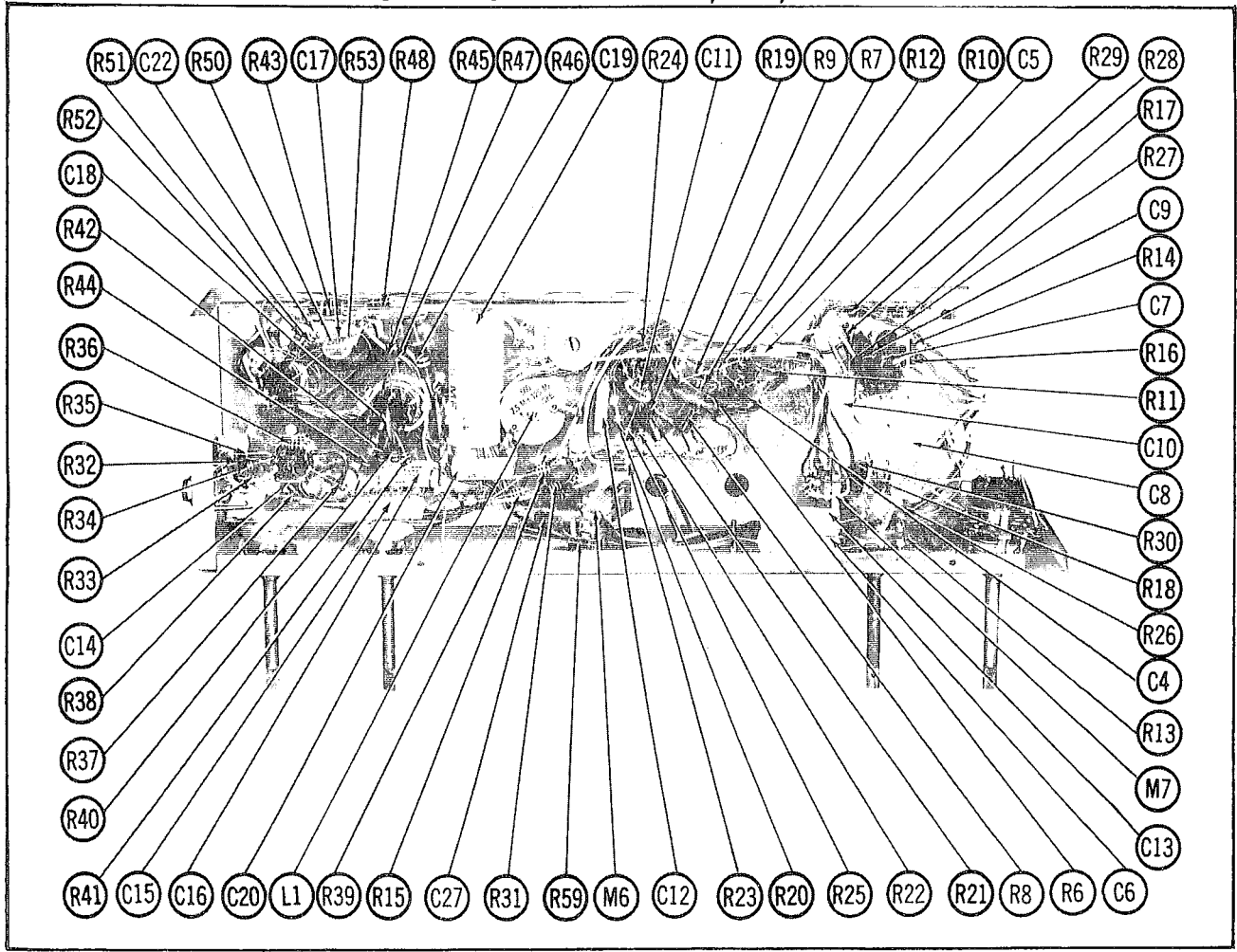
ITEM No.	PART NAME	AMPEX PART No.	NOTES
M3	Pick Light		
M4	Pick Light		
M5	Switch	#47	
M6	Speed Selector Relay		On-Off-Selector (Rotary, Wafer Type)
M7	Switch		Record - Playpack (Slide Type)

MODELS A121, A122, A124, A621, A692

AMPEX



TOP VIEW OF AMPLIFIER A121, A122, A124



BOTTOM VIEW OF AMPLIFIER A121, A122, A124

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	20960-1	Speed Control Button			Control
2	20896-1	Head Cover	41	20955-1	Arm Assembly, Lower Cam
3	20915-1	Capstan Idler Cover			Control
4	20825-1	Capstan Idler Assembly	42	20901-1	Cam, Shaft, Record
5	20902-1	Control Knob Assembly	43	21014-1	Spring, Shaft Return
6	20980-1	Control Bar Knob	44	20845-1	Idler Assembly, Rewind
7	20966-1	Pushbutton, Record and Stop	45	21023-1	Rod, Control, Fastwind
8	20920-1	Tape Guide	46	21027-1	Yoke Sub-Assembly, Dual
9	20844-1	Tape Holdback Cover			Speed: for 60 Cycle
10	20843-1	Tape Holdback Base		21027-2	Yoke Sub-Assembly, Dual
11	20947-2	Cover Assembly Models A121, A122, A124			Speed for 50 Cycle
12	20895-1	Escutcheon	47	21031-1	Detent Bracket
13	20847-1	Pulley Assembly, Fastwind	48	21029-1	Wire, Dual Speed Detent and
14	21077-1	Spring, Fastwind Mode			Equalization
15	21074-1	Pad, Fastwind Mode Holdback	49	20897-1	Arm, Holdback
		Brake	50	21013-1	Spring, Holdback Tension
16	432-014	"O" Ring, Fast Forward	51	20810-1	Brake Lever
17	20831-1	Cap Turntable Shaft	52	20953-1	Cam Assembly Fastwind
18	20821-1	Turntable Assembly	53	20812-1	Shuttle Interlock
19	20984-1	Brake Spring	54	21018-1	Spring, Scissors Return
20	21019-1	Brake De-energizing Spring	55	20900-1	Cam, Shaft Stop
21	20878-1	Brake Arm Assembly, Takeup	56	432-016	"O" Ring, Position Indicator
22	20892-1	Brake Lining	57	20937-1	Worm Pulley Assembly,
23	20876-1	Pulley Assembly, Takeup Clutch			Counter Drive
24	432-015	"O" Ring, Takeup	58	20940-1	Retainer Spring
25	20877-1	Spring, Takeup Clutch	59	20941-1	Retainer Spring Pad
26	20874-1	Play Takeup Assembly	60	20913-1	Jack Shaft Assembly, Counter
27	21015-1	Play Takeup Spring			Drive
28	20814-1	Meter Bracket	61	20931-1	Position Indicator Assembly
29	20957-1	Meter	62	20978-1	Gear Assembly, Counter
30	21012-1	Spring, Shuttle Return	63	21008-1	Spring, Position Indicator Latch
31	20862-1	Base Plate Sub Assembly	64	20940-1	Retainer Spring
32	20859-1	Pulley, Motor: for 60 cps.	65	20929-1	Escapement Latch
	20862-1	Pulley, Motor: for 50 cps	66	20945-1	Head Housing Cover
33	21057-1	Capstan Drive Belt	67	21021-1	Rod, Control, Play Takeup
34	21022-1	Control Brake Rod	68	21022-2	Rod, Control, Holdback Tension
35	20878-1	Capstan Idler Arm Assembly	69	21058-1	Bracket, Transport Mounting
36	21010-1	Capstan Idler Spring	70	20950-1	Retainer, Capstan Thrust,
37	20904-2	Head Assembly, Half Track			Nylon
		Erase, Half Track Record	71	20950-2	Retainer, Capstan Thrust,
		and Stereo Reproduce - Models			Steel
		A-121, A-122, A-124	72	20808-1	Mounting Plate, Motor Ass'y.
38	20819-1	Capstan Assembly	73	20982-1	Shockmount, Motor
39	20954-1	Cam Assembly, Play Control	74	21069-1	Sleeve Nut, Motor Shockmount
40	20856-1	Arm Assembly, Upper Cam	75	20872-1	Drive, Motor
			76	20993-1	Fan, Motor