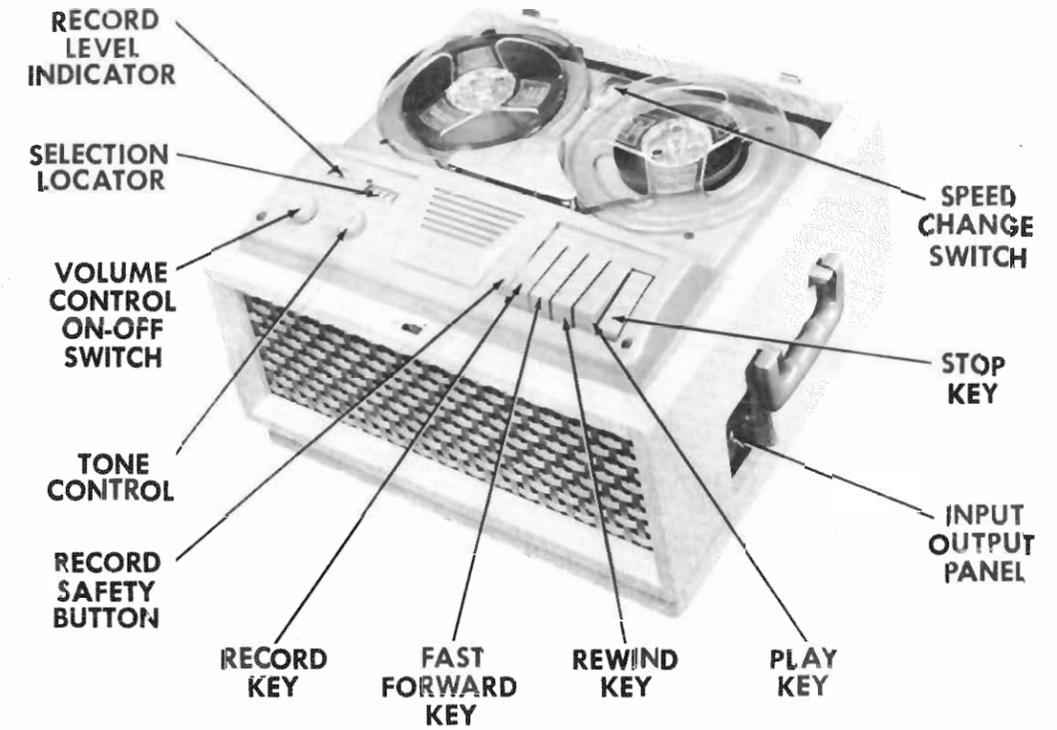




AMPRO  
MODELS 757, 757-A



AMPRO  
MODELS 757, 757-A

Figure 1  
GENERAL INFORMATION

Ampro Models 757 and 757-A Tape Recorders are mechanically and electrically alike. Model 757-A is mounted in an extremely rugged case designed to protect the unit against rough handling encountered in heavy duty operation and Model 757 is housed in a leatherette covered case of suitable construction for home use.

Both models are of the dual track type, permitting two separate tracks of material to be recorded on a reel of tape and played back with no loss of frequency response or quality. Recordings can be made from a radio, television receiver, or phonograph, in addition to those made directly from the microphone. Recordings can be played back through the self-contained speaker or an external speaker may be used through use of the "Ext. Speaker" jack.

Models 757 and 757-A have two tape speeds, 3 3/4 and 7 1/2 inches per second. Changing speeds is accomplished by sliding the "Speed Change Switch" to the desired position, either 3.75 or 7.50.

These recorders are designed to operate on 60 cycle, 105-120 volts, A. C. supply only.

**CAUTION:** Before connecting recorder to line supply be absolutely certain that it agrees with the above specifications.

**Manufactured by:**

Ampro Corporation  
2835 North Western Avenue  
Chicago 18, Illinois

*This material compiled and published by*

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

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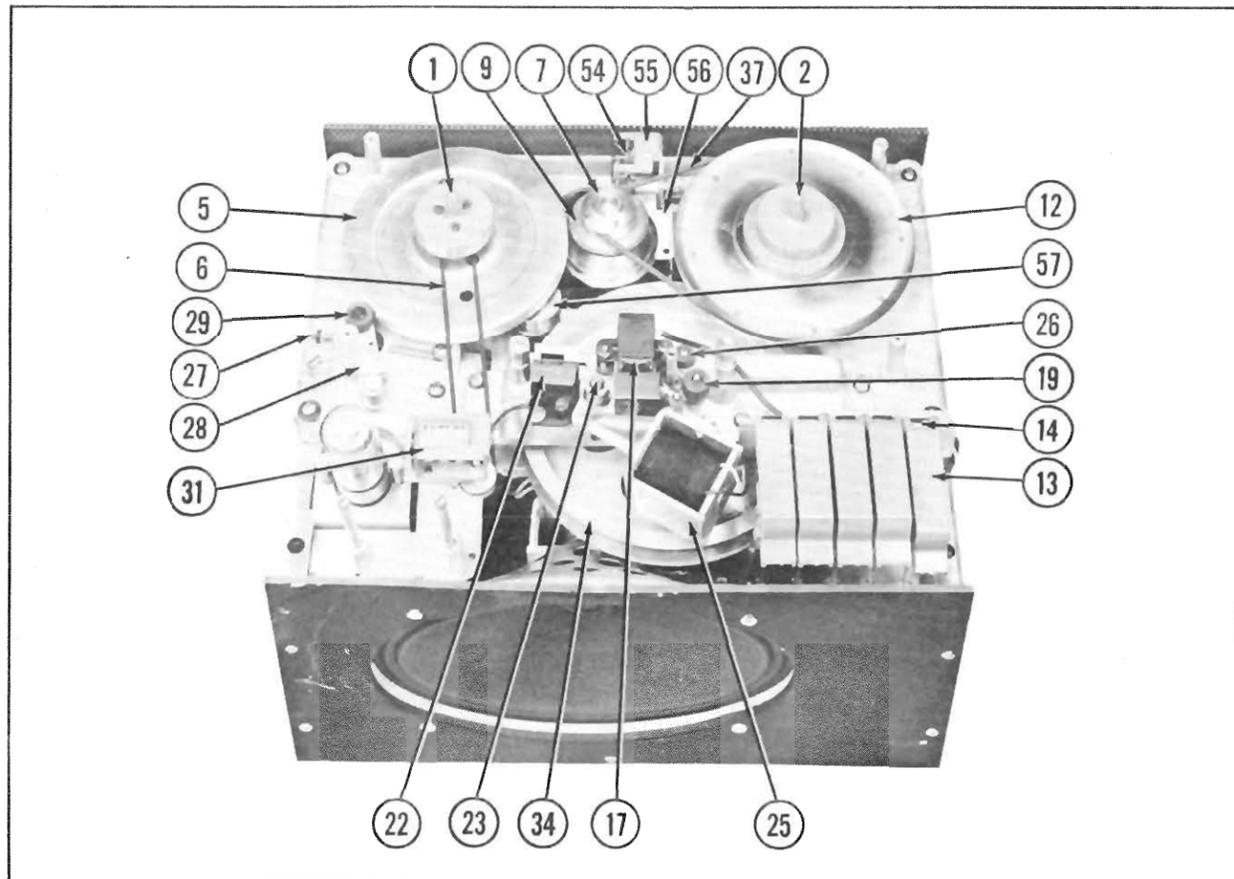


Figure 2

**SPECIFICATIONS**

- Weight-  
32 Lbs.
- Size-  
16 1/2 x 15 1/2 x 10 1/2 inches.
- Reel Size-  
Up to 7 inches.
- Tracks-  
Dual.
- Track Selection-  
Manual Turnover.
- Tape Speed-  
Model 757 - 3 3/4 and 7 1/2 I. P. S.  
Model 757-A -
- Recording Time-  
3 3/4" Speed - 2 hours(1 hour each track).  
7 1/2" Speed - 1 hour(1/2 hour each track).
- Amplifier Tube Complement-  
5879, 12AX7, 6AQ5, 6C4, 6E5.
- Bias Frequency-  
48KC ± 10KC.
- Frequency Response-  
3 3/4" Speed - 50 to 8500 cps.  
7 1/2" Speed - 40 to 13000 cps.

Controls-  
2 knobs, 5 piano-type keys.

**CONTROL FUNCTIONS**

Record Key- Tape starts instantly when this key is depressed. Key will not operate unless "Record Safety Button" is slid to left. Erase is automatic when "Record Key" is depressed, thus eliminating previous recordings on the tape.

Fast Forward Key- (Tape moves left to right.) Accelerated spindle speed quickly brings tape to desired index position for accurate editing or cueing.

Rewind Key- (Tape moves right to left.) Fast rewind integrated to selection locator. Even tension while rewinding prevents spillage of tape.

Play Key- Tape starts instantly. Provides for both visual and audio cueing.

Stop Key- Stops tape motion instantly. Stop key is interlocked with all other keys, requiring full stop of winding mechanism between functions. You must always return to "Stop" before pressing any of the other keys.

**OPERATING INSTRUCTIONS**

1. With the "On - Off Volume Control" in the "Off" position (extreme counterclockwise), insert the power cord plug into a convenient wall receptacle of the proper rating.

**MECHANICAL PARTS LIST**

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	75103-1	Rewind Reel Support	31	75608	Selection Locator
2	75943-X	Take-up Reel Spindle Assembly	32	75257	Main Drive Pulley
3	75601-3	Head Trim Cover (Model 757-A uses Part #75601-4 in this application)	33	75613	Flywheel Drive Belt
			34	75977	Flywheel Assembly
4	75965	Front and Rear Cover Assembly	35	75940-X	Record Mechanism Assembly
5	75915	Rewind Wheel Assembly	36	75106	Main Frame
6	75615	Counter Drive Belt	37	75616	Takeup Drive Belt
7	75266	Rewind Spindle Drive Pulley	38	16219	Spindle Clutch Washer-Felt
8	16211	Felt Washer	39	75918-X	Brake Solenoid Assembly
9	75912	Rewind Driver Assembly	40	75219	Brake Solenoid Plunger
10	75339	Spring Washer	41	75926	Brake Operating Bar Assembly
11	75636-1	Speed Change Knob	42	75933	Take-up Reel Brake Arm Assy.
12	75916	Fast Forward Pulley Assembly	43	141026	Take-up Brake Adj. Screw - #6-32 x 3/4"
13	75602	Operating Keys	44	141026	Operating Bar Stop Screw - #6-32 x 3/4"
14	75500	Operating Key Springs	45	75911	Spindle Solenoid Plunger Assy.
15	75326	Sol. and Key Mtg. Bracket		16212	"O" Ring Tire for Item 45
16		#6-40 Head Adjusting Nut	46	75919	Spindle Solenoid Assembly
17	75702	Play-Record Head	47	141056	Solenoid Jam Nut -#5/16-24
18	75905	Pressure Pad Arm Assembly	48	75241	Take-up Adj. Screw
19	75908	Pinch Roller Assembly	49	75918-X	Rewind Solenoid Assembly
20	75909	Pinch Roller Arm	50	75703	Drive Motor
21	75501	Pinch Roller Arm Spring	51	131342	Motor Fan
22	75925	Erase Head Assembly	52	75327	Motor Mounting Plate
23	75212	Pinch Roller Arm Pivot	53	75252	Rewind Solenoid Plunger
24	75218	Pinch Solenoid Plunger	54	75969	Control Lever and Shaft Assy.
25	75918-1-X	Pinch Solenoid Assembly	55	75970	Shifter Mtg. Bracket
26	75226	Pinch Roller Arm Stop	56	75966-X	Shifter Lever and Tab Assy.
27	141078	Rewind Brake Adj. Screw #6-32 x 1/2"	57	75988	Idler Pulley Assy.
28	75934-X	Rewind Brake Lever Assembly	58	75514	Take-up Lever Spring
29	75927	Rewind Brake Arm Assembly	59	75976	Pulley and Takeup Assy.
30		Brake Spring Anchor Bracket			

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## ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1	18797	5879, AF Amp.	R5	17965	Resistor, 56K@1/2 W.
V2	18497	12AX7, Mic. Pre-Amp. & A. F. Amp.	R6	17959	Resistor, 220K@1/2 W.
V3	18701	6AQ5, Output	R7	18583	Resistor, 22K@1/2 W.
V4	18985	6E5, Record Level Ind.	R8	17099	Resistor, 680K@1/2 W.
V5	18978	6C4, Bias Osc.	R9	18474	Resistor, 470K@1/2 W.
C1	18491	Elect. Cap. 80MFD. @150V.	R10	18466	Resistor, 3.3K@1/2 W.
C2	18491	Elect. Cap. 80MFD. @150V.	R11	18468	Resistor, 270K@1/2 W.
C3A	18981	Elect. Cap. 80MFD. @150V.	R12	18470	Resistor, 100K@1/2 W.
C3B		Elect. Cap. 40MFD. @250V.	R13	18466	Resistor, 3.3K@1/2 W.
C3C		Elect. Cap. 40MFD. @250V.	R14	18474	Resistor, 470K@1/2 W.
C4	18486	Elect. Cap. 25MFD. @15V.	R15	18474	Resistor, 470K@1/2 W.
C5	18486	Elect. Cap. 25MFD. @15V.	R16	18719	Resistor, 220@1 W.
C6A	17111	Elect. Cap. 10MFD. @200V.	R17	17959	Resistor, 220K@1/2 W.
C6B		Elect. Cap. 4MFD. @200V.	R18	17558	Resistor, 1Meg. @1/2 W.
C7	18830	Cap., Ceramic, 100MMF	R19	17959	Resistor, 220K@1/2 W.
C8	18579	Cap., Molded Paper, .02MFD @150V.	R20	17965	Resistor, 56K@1/2 W.
C9	17110	Cap. Ceramic, 300MMF.	R21	18470	Resistor, 5.6K@1/2 W.
C10	18487	Cap. Ceramic, 10000MMF.	R22	17555	Resistor, 47K@1/2 W.
C11	17107	Cap., Ceramic, 20000MMF.	R23	18771	Resistor, 33@2 W.
C12	17107	Cap., Ceramic, 20000MMF.	R24	18610	Resistor, 560@1/2 W.
C13	17119	Cap., Ceramic, 33MMF.	R25	18470	Resistor, 5.6K@1/2 W.
C14	18487	Cap., Ceramic, 10000MMF.	R26	18582	Resistor, 2.7K@1/2 W.
C15	17110	Cap., Ceramic, 300MMF.	R27	17127	Resistor, 56@1/2 W.
C16	17751	Cap., Molded Paper, .05MFD. @400V.	R28	18610	Resistor, 560@1/2 W.
C17	18493	Cap., Ceramic, 100MMF.	R29	18472	Resistor, 2.2K@1/2W.
C18	17126	Cap., Ceramic, 200MMF.	R30	17558	Resistor, 1 Meg. @1/2 W.
C19	18867	Cap., Mica, 4000MMF.	R31	17555	Resistor, 47K@1/2 W.
C20	18487	Cap., Ceramic, 10000MMF	R32	18474	Resistor, 470K@1/2 W.
C21	18488	Cap., Ceramic, 5000MMF.	R33	18718	Resistor, 3@5 W.
C22	17107	Cap., Ceramic, 20000 MMF.	R34	17553	Resistor, 10K@1/2 W.
C23	17109	Cap. Molded Paper, .2MFD. @150V.	R35	18472	Resistor, 2.2K@1/2 W.
C24	17109	Cap., Molded Paper, .2MFD. @150V.	R36A	75709	Resistor, 500@5 W. (Terminals 1 & 2)
C2E	17129	Cap., Molded Paper, .01MFD. @200V.	R36B		Resistor, 15@5W. (Terminals 3 & 4)
C2F	17110	Cap., Ceramic, 300MMF.	R37	75710	Resistor, 2K@10W.
C2G	17108	Cap., Molded Paper, .1MFD. @150V.	T1	75708	Filament Transformer, 6.3V.
C2H	17107	Cap., Ceramic, 20000MMF.	T2	18989	Output Transformer
C2I	17109	Cap., Molded Paper, .2MFD. @150V.	L1	17100	Oscillator Coil
C3C	18487	Cap., Ceramic, 10,000MMF.	SP1	75603	Speaker
R1	18986	Volume Control & Switch Assy. 500K	M1	17091	Selenium Rect. -MA250
R2	18975	Tone Control, 5K	M2A	17103	Selenium Rect. -MA65
R3	18465	Resistor, 2.2Meg. @1/2 W.	M2B	17103	Selenium Rect. -MA65
R4	17553	Resistor, 10K@1/2 W.	M3	17084	Remote Control Jack
			M4	17085	Mic. Jack
			M5	17083	Radio-Phono Jack
			M6	18597	Ext. Speaker Jack
			M7	75704	Push-Button Switch
			M8	18982	14 Prong Connector Socket
			M9	18979	14 Prong Connector Plug

Threading The Tape-

1. Place a reel of tape on the left hand (supply) spindle so that the reel will turn counterclockwise when tape is pulled from the reel.

2. Place an empty reel on the right hand (take-up) spindle.

NOTE: When placing reels on spindles, be sure they are firmly seated on the reel-locking fins to insure positive motion of tape.

3. Unreel about two feet of tape and guide it through the recording slot. Glossy side of tape (Type "A" wind) must face outside of reel. (Dull side in.)

4. Feed the loose end of the tape up into the empty reel on the right hand spindle. Thread the tape into one of the slots in the outer surface of the hub. Hold the loose end between the fingers and slowly rotate this reel counterclockwise until all slack is taken up between reels.

To Record-

1. Connect microphone or any other type of input.

2. Switch on recorder by turning the "On-Off Volume Control" clockwise.

3. After waiting 30 to 60 seconds for the amplifier to warm up, slide "Record Safety Button" to the left and depress the "Record Key".

4. Adjust the "Volume Control" so that the "Recording Level Indicator" almost closes on loudest sounds (peak output). At the start of the recording set the "Selection Locator" at zero.

Selection Locator-

This odometer-type indicator registers "000" to "999" and will save much guess-work when trying to locate a desired portion of a pre-recorded tape. The reading of the indicator may be noted as the recording is being made so that reference to any given part on the tape may be made very rapidly. When a recorded tape has been so logged or referenced, always "zero" the indicator before starting to play the recording.

To Play Recordings-

1. With the "Stop Key" depressed, thread the tape as outlined under the heading "Threading The Tape".

2. Depress the "Play Key" and adjust the "Volume" and "Tone" controls for most pleasing reproduction.

3. Depress the "Stop Key" when finished.

Dual Track Recording-

Models 757 and 757-A are designed so that only 1/2 the tape width is recorded at a time, thereby resulting in two track recording. This two track operation is accomplished in the following manner:

1. After a reel of tape has been recorded; i.e. all the tape wound onto the right hand reel, depress the "Stop Key".

2. Remove the reels from the recorder, turning the full reel over and placing it on the left spindle.

3. Properly thread the tape and proceed with the recording.

4. After the second track has been recorded the first track of recording is ready to be played, without rewinding; by reversing the reels as described in Step #2 above.

To Edit And Splice Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings which are to be edited should be limited to one track only.

1. The tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements may be inserted between selections, etc. Unused sections of tape can be spliced together for re-use.

2. Cut diagonally with an overlap so ends will line up. (Cutting tape on a diagonal will eliminate detection of splice on recording.)

3. Align both ends of tape, uncoated or glossy side up.

4. Cover aligned ends with splicing tape. Press firmly, exerting pressure, to secure ends evenly and securely.

5. Trim off excess splicing tape. Cut into recording tape backing very slightly to eliminate possibility of a sticky splice.

Fast Forward And Fast Rewind-

High-speed forward or rewind can be obtained by pressing the desired key. These functions are used primarily in locating a desired portion of a recording in a few seconds.

NOTE: The "Stop Key" must always be depressed before changing functions.

To Use An External Speaker-

Any size speaker of the permanent magnet type, having a 3 to 8 ohm voice coil, may be used by connecting the alligator clips of the radio-phono cord across the voice coil terminals on the external speaker and then inserting the radio-phono cord plug into the receptacle marked "Ext. Speaker".

DESCRIPTION OF TAPE DRIVE MECHANISM

Primary Drive- The motor pulley (32) and driver unit (7 and 9) are mounted on the shaft of drive motor (50) and drives the flywheel and capstan assembly (34) by means of drive belt (33). The motor is controlled by the switch on the volume control.

Takeup Drive- The takeup belt (37) drives the takeup pulley (12) which in turn drives takeup spindle (2)

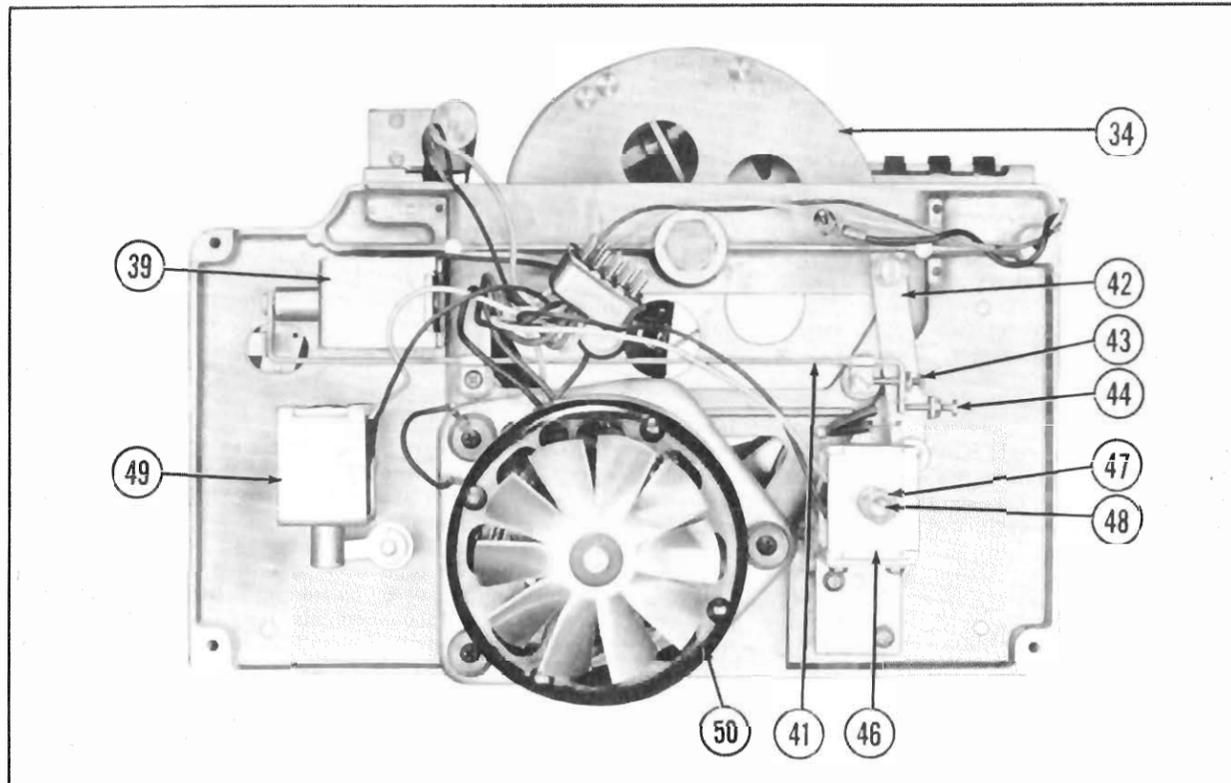


Figure 3

through action of takeup clutch (38). When any key except "Stop" is depressed the brake solenoid (39) is energized thereby releasing the takeup brake (42) and the feed spindle brake (29). When "Play" or "Rewind" is depressed the forward solenoid (46) is partially energized thereby pulling downward on the takeup spindle (2) and causing the spindle to be driven through the takeup clutch. When the "Fast Forward" key is depressed the forward solenoid (46) is fully energized thereby pulling downward on the takeup spindle (2) with sufficient force to virtually lock the spindle clutch producing a direct drive between the takeup pulley (12) and takeup spindle (2).

**Rewind Drive-** When either the "Record", "Fast Forward" or "Play" key is depressed the brake (29) is released and the feed spindle (1) is driven by the tape. Rotation of this spindle drives the counter assembly (31) by means of belt (6). When the "Rewind" key is depressed the rewind solenoid (49) is energized thereby swinging the feed spindle (1) toward the motor shaft causing the drum (5) to come in contact with the tire on the rewind driver (9). The rewind driver is driven through a clutch disc located between the driver and the flywheel drive pulley.

**Pinch Roller-** The pinch roller (19) is mounted on the pinch roller arm (20) which is pivoted on an eccentric stud (23). When either the "Play" or "Record" key is depressed the pinch roller solenoid (25) is energized thereby swinging the pinch roller over against the capstan. The head pad (18) is pivoted on the pinch roller arm so that, when the pinch roller presses the tape against the capstan, the head pad presses the tape against the head.

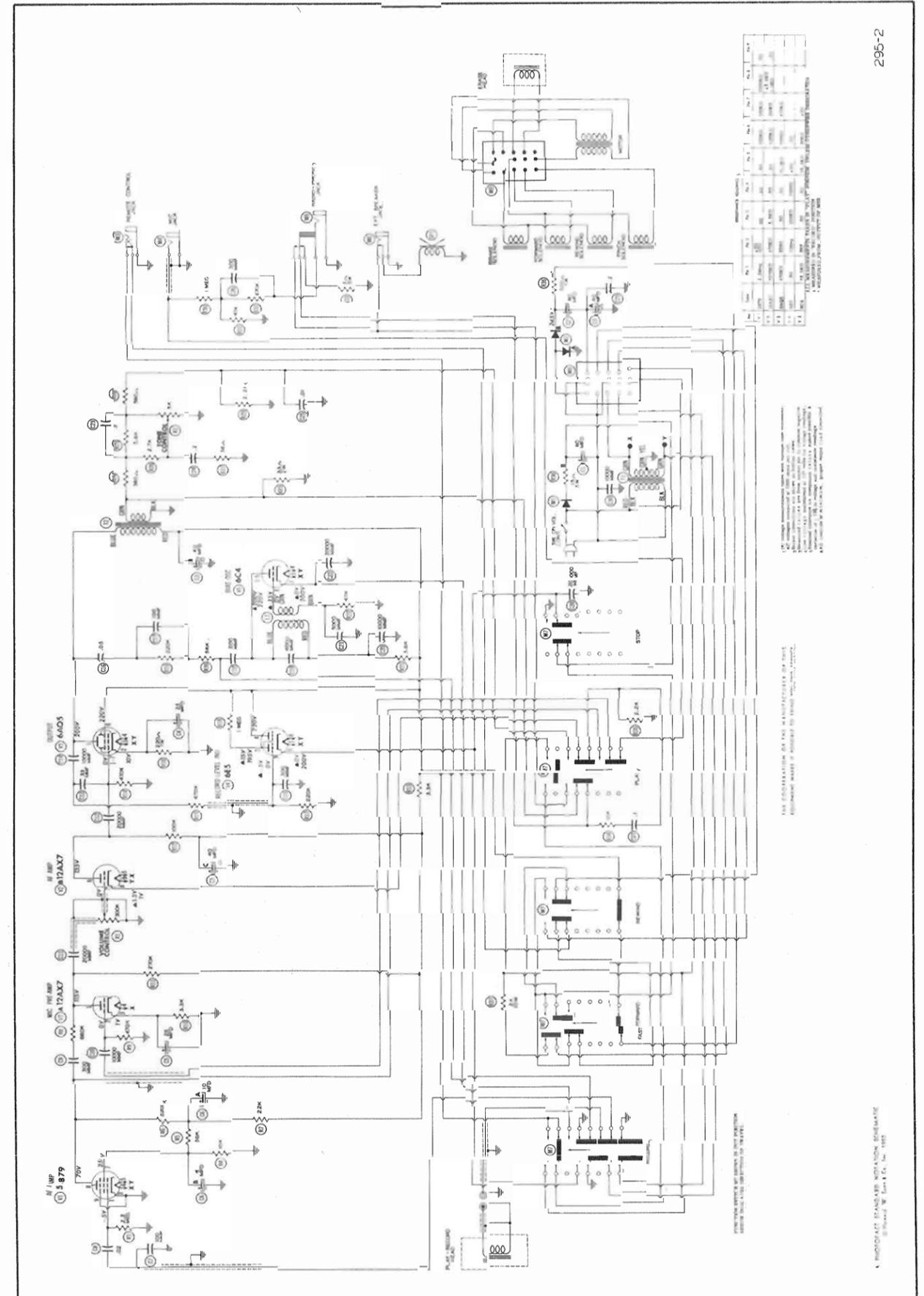
#### DISASSEMBLY INSTRUCTIONS

##### Removal of Panels-

1. Remove "Volume" and "Tone" control knobs. If knobs stick use a knob puller or slip the folded edge of a thin cloth under the edge of a knob and use the cloth as a puller.
2. Depress "Stop" key; then push record lock to the left and depress "Record" key. Loosen set screw in right-hand side of record lock knob and remove knob.
3. Remove the two screws at the front (operating side) corners of the plastic control panel.
4. Remove the four flat pan head screws which hold the metal panel in place.
5. Lift off the control panels.

##### Removal From Case-

1. Take off panels as described under "Removal of Panels".
2. If recorder is equipped with shipping locks, copper plated brackets located between the front corners of the cast mechanism plate and the sides of the case (these were not used on early production recorders), loosen the screws which hold the locks in place and remove the locks.
3. Place the recorder on its side and remove the six screws and finish washers from the bottom of the case. Slide the unit out of the case.



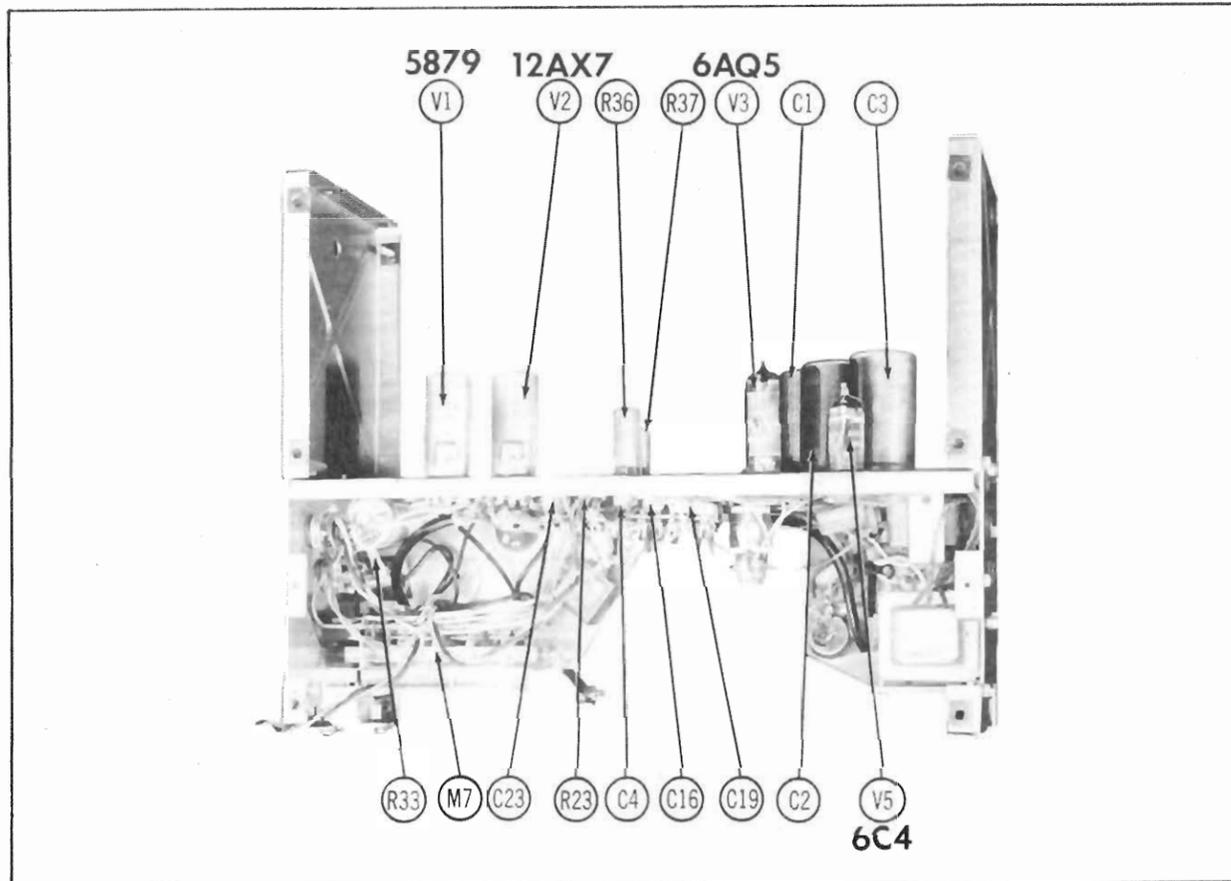


Figure 5

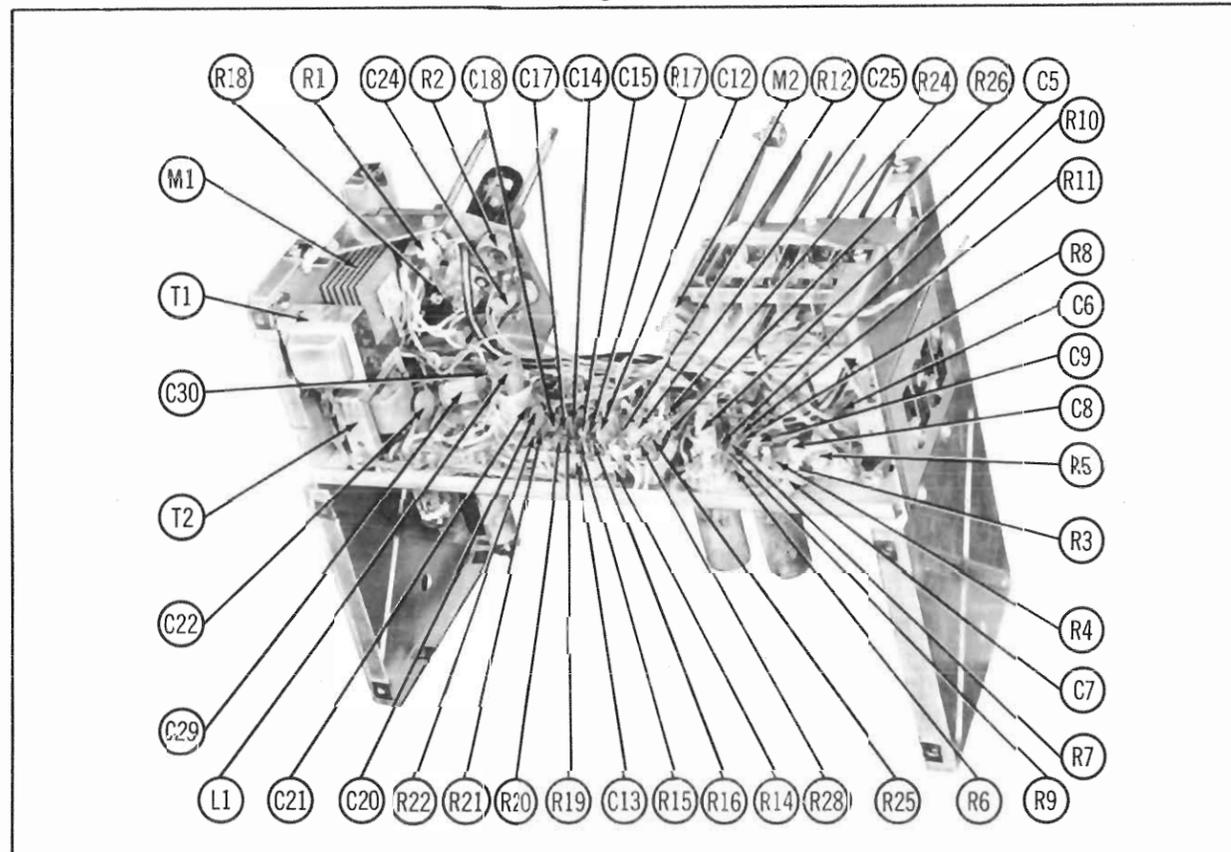


Figure 6

NOTE: Be careful not to damage the felt pad located between the speaker baffle and the case.

Removal Of Tape Drive Mechanism From Amp. Chassis-

1. Take out the four screws (located at corners of casting) which hold the drive unit to the chassis. Lift up the drive unit and disconnect the 14 contact motor and solenoid plug and the single contact head plug. Lift the drive unit out of the chassis.

MECHANICAL ADJUSTMENTS

Brakes-

Proper operation of brakes is essential to good tape handling. Improper adjustment can be expected to lead to either tape spilling or tape breakage, therefore, it is essential that brake adjustments be made in the sequence, manner and in the amounts specified. The adjustments are as follows:

1. Loosen the rewind brake adjusting screw (27) enough to prevent the ear on actuating arm (28) from moving the arm upon which the brake roller is mounted, even though the brake solenoid plunger is pushed in as far as it will go.
2. With the brake solenoid plunger pressed in as far as possible (apply pressure to end of plunger, not to operating bar, adjust the operating bar stop screw (44) to 1/16" clearance between the end of the screw and the stop stud.
3. With the plunger depressed, as described above, adjust the rewind brake adjusting screw (27) to produce a clearance 0.020 to 0.025" between the brake roller and the spindle drum (5).
4. Release the brake solenoid plunger, then adjust the takeup brake roller adjusting screw (43) to produce a clearance of 0.020" between the end of the screw and the operating bar (41).
5. Thread the recorder with tape and check operation of the feed spindle brake as direction is changed from "Fast Forward" to "Stop" to "Rewind". If the brake slips on the drum, loosen the retaining screw for the brake spring anchor bracket (30) and rotate the bracket in order to increase the pressure of the brake roller on the drum.

Forward Solenoid-

Loosen the locknut (47) and adjust screw (48) to produce a tape tension of approximately 2 oz. at the start of a 7" reel-tension at the end of a 7" reel should be approximately 1/2 oz. when operating in "Record" or "Play" position. When "Fast Forward" is in use the takeup spindle should be virtually locked to the takeup pulley. In "Rewind", the spindle may revolve slowly when loaded with an empty 7" reel. Should it be necessary to remove the solenoid, it must be located with respect to the end of the spindle when reassembling. Remove adjusting screw (48) and the spring, plunger and disk, then insert a depth gauge through the hole for the adjusting screw and locate the solenoid (vertically) so that the distance from the end of the spindle to the end of the bushing is 1.835".

Rewind Drive Clutch-

Locate the main drive pulley (32) so that the rewind drive tire (9) is above the bottom edge of the feed spindle drum (5). Place a 0.040" feeler gauge between the top surface of the rewind drive disc (9) and the takeup drive pulley (7) - (just under the edge of the pulley). Press down on the takeup drive pulley until it touches the gauge, then tighten the set screws in the takeup drive pulley.

Pinch Roller Adjustments-

Improper adjustment of the pinch roller (19) usually produces one of the following troubles:

1. "Monkey Chatter" effects due to excessive tape velocity.
2. "Woofy" effects due to low tape velocity.
3. Sluggish operation of pinch roller arm when switching from "Play" or "Record" to "Stop" or vice-versa.
4. "Wows".

If the pinch roller (19) is not pressing the tape firmly against the capstan (34), either condition 1 or 2 will occur (depending upon the amount of tape on the takeup reel and the takeup tension of the unit under test).

If the pinch roller (19) is pressed too firmly against the capstan (34), operation of the pinch roller arm will be sluggish.

NOTE: Sticking of the plunger of the pinch roller solenoid can also cause sluggish operation; this condition can also cause "wows".

In order to insure proper adjustment of the pinch roller mechanism proceed as follows:

1. Loosen the retaining screw for the stop cam (26) and turn cam to the position allowing minimum travel of the pinch roller arm (20).
2. Loosen the retaining screws for the pinch solenoid (25) so that the solenoid can be moved on the bracket.
3. Energize the pinch solenoid by depressing either the "Play" or "Record" key.
4. Press down on the plunger of the pinch solenoid (25), in order to make sure that the plunger is seated, then move the solenoid in order to bring the end of the pinch roller arm (20) in contact with the stop cam (26).

NOTE: If the pinch roller (19) binds on the capstan (34) it will be necessary to rotate the pinch roller arm pivot stud (23). Before rotating the stud, loosen its lock screw which is located on front of the recording mechanism assembly (35).

5. Tighten the pinch solenoid (25) mounting screws. Check to make sure that the plunger slips freely in the solenoid.

6. Thread the recorder with tape and depress the "Play" key.

7. Rotate the pivot stud (23) until the pinch roller holds the tape against the capstan with just enough pressure to feed the tape when the take-up reel is stopped and also prevent the take-up reel from pulling the tape through the capstan and pinch roller. (Excessive take-up tension can aggravate this condition.)

8. Tighten the pressure arm pivot stud lock screw.

9. Remove the tape, then depress the "Play" key. Loosen the stop cam (26) retaining screw and rotate the cam slightly. If the pinch roller arm moves toward the cam, this indicates that the solenoid plunger is not seating on its stop. Should this condition be encountered, loosen the pinch solenoid (25) mounting screws and move the solenoid toward the plunger link in order to bring the plunger in contact with the stop.

10. Reset the stop cam.

11. Recheck the operation of the pinch roller with tape.

#### Belt Replacement-

The selection locator drive belt (6) and takeup belt (37) can be lifted off of the pulleys and replaced. Should it be necessary to replace the main drive belt (33), remove the takeup belt (37), then remove the 4 screws located at the ends of the recording mechanism assembly (35) and lift off the assembly. Install the new belt and replace the assembly.

#### ELECTRICAL TESTS AND ADJUSTMENTS

#### Bias Current-

Disconnect the shield of the recording head cable at the terminal strip directly behind the head. Insert a non-inductive resistor (not over 10 ohms) between the cable shield and the terminal and connect a VTVM across the resistor (keep lead length as short as possible). Depress the "Record" key. The voltage across the resistor should indicate a bias current of 0.6 to 0.8 milliamperes.

#### Record Current-

Using the same setup as indicated above, remove the oscillator tube (V5), then connect an audio oscillator to the mike jack. Set the oscillator to 1000 C.P.S. and adjust the recorder "Volume" control so that the level indicator eye just closes (be sure to keep the output of the oscillator low enough so that the recorder "Volume" control is advanced more than half-way. This will avoid any danger of overloading the input section of (V2). The voltage across the resistor should indicate a record current of 0.06 to 0.08 milliamperes.

#### Solenoids-

1. Many factors enter into the design of a solenoid, however, after the design is completed most of these factors are fixed and are of no concern to the serviceman. The serviceman is concerned with the following factors which effect performance:

- (a) Current.
  - (b) Shorted turns.
  - (c) Mechanical forces resisting the pull of the plunger.
  - (d) Friction in the path of the plunger.
2. Testing- The following procedures are recommended.

(a) Current- open either lead of the solenoid under test and insert a D.C. milliammeter, adjust applied line voltage to produce 125 volts across the coil. The current should be 40-49 milliamperes.

(b) Pull test- With a D.C. voltage of 120 volts across the coil and the plunger withdrawn 1/8" (lifted 1/8" off the stop) the pull should be 1 lb. minimum.

(c) Mechanical forces resisting pull of the plunger- check for binding of mechanical parts.

(d) Friction in path of plunger - remove plunger and examine inside of the bobbin.

**NOTE:** Some trouble was encountered in early units from the adhesive used in the bobbin having crept out onto the inner surface of the bobbin. This has been corrected but if encountered in early units remove by scraping. There should be approximately .005" clearance between the bobbin and plunger, if any binding is noted or clearance is inadequate, increase the ID of the bobbin by sanding with #00 sandpaper wrapped around a dowel. Warning! If inside of bobbin is sanded, blow out any dust before inserting plunger. Any difficulty of this nature can be expected to have been restricted to early production models only.

#### Head Orientation And Azimuth-

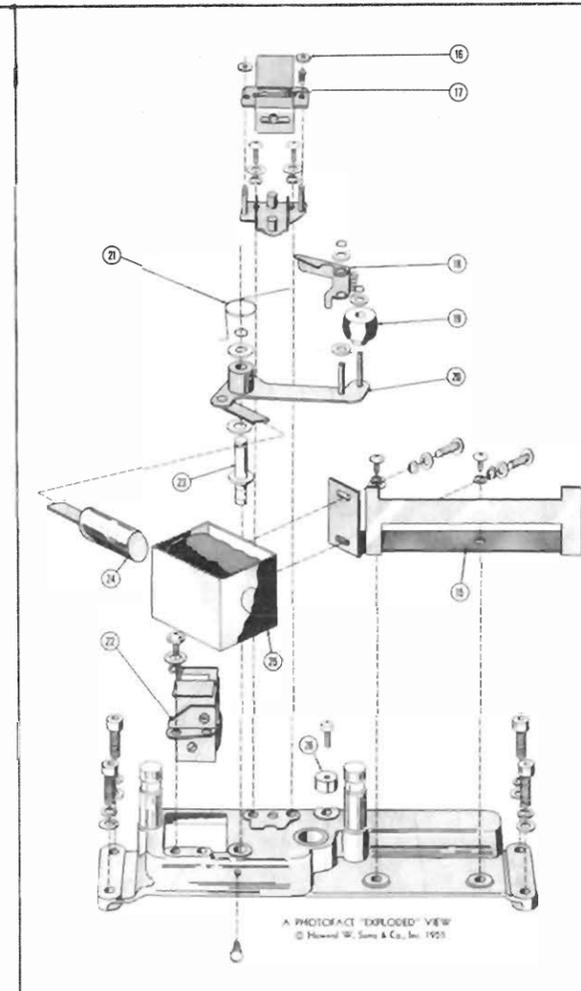
Remove the recorder head assembly and loosen the head retaining nut (located on the threaded bushing through which the head cable passes) enough so that the head can be rotated slightly on the mounting bracket. Install the head assembly and thread the recorder with 1 mil azimuth tape. Connect an output meter across the speaker. Depress the "Play" key and make a rough azimuth adjustment by rotating the adjustment nut (16). Rotate the record head to obtain maximum output. Remove the head assembly and tighten the head adjusting nut. Replace the head and rotate adjusting nut (16) to obtain maximum output. Warning! Watch out for a false peak-due to the short wave length it is possible to obtain a low peak when the ends of the head gap are displaced from a position normal to the line of tape travel by 1/2 wave length.

#### Erase Head Adjustments-

In order to position the erase head so that the tape passes through the center of the gap, loosen the erase head retaining screw and swing the head sideways to the proper position. Tighten the retaining screw. In order to locate the head vertically, loosen the retaining nut on front of the head mounting bracket,

#### ELECTRICAL AND SOUND TROUBLE CHART

TROUBLE	PROBABLE CAUSES	REMEDY
Amplifier squeals.	1. Broken shield at head connector.	Re-solder.
Crashing noises.	1. Damaged tubes.	Replace.
	2. Dirty switch.	Clean
Pitch of sound too high or too low.		See Mechanical trouble.
"Wows".	1. Pinch roller pressing too hard against capstan.	Re-adjust.
"Flutter".	1. Bent capstan shaft.	Replace capstan and flywheel assembly.
Loud tape hiss.	1. Very low recording level.	Record at correct level.
	2. Damaged erase head.	Replace head.
Will not record or play back.	1. Dirty recording head.	Clean.
Incomplete erasure.	1. Erase head not properly positioned.	Re-align.
	2. Damaged erase head.	Replace head.
	3. Excessive recording level.	Run tape thru erase process several times.



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TROUBLE CHART - Con't.

TROUBLE	PROBABLE CAUSES	REMEDY
Tape breaks on change from "Play" or "Record" to "Forward".	1. Feed spindle brake improperly adjusted (slack tape). 2. Pinch roller operation is sluggish.	Adjust brakes. Check adjustment and check plunger clearance.
Tape breaks on change from "Rewind" to "Forward".	1. Takeup spindle brake improperly adjusted.	Adjust brakes.
Tape rewound edgewise on feed reel.	1. Warped reel. 2. Erase head out of line. 3. Rewind driver clutch too tight. 4. Brakes improperly adjusted (slack tape).	Replace. Reposition. Adjust. Adjust.
Pitch of sound too high or too low.	1. Inadequate pressure on pinch roller. 2. Pinch solenoid plunger sticking. 3. Pinch solenoid open.	Adjust. Adjust. Replace.
Keys stick.	1. Mounting bracket misaligned. 2. Key slipped off of switch plunger. 3. Control panel mis-aligned.	Re-align. Re-align. Re-align.
Keys thump on up stroke.	1. Rubber cushion missing from control panel.	Replace cushion.
Selection locator (counter) does not operate.	1. Damaged belt. 2. Belt off of pulleys. 3. Control panel mis-aligned.	Replace. Reposition belt. Re-align.
Buzzing noises.	1. Takeup belt oscillating (occured only in early models). 2. Loose speaker grille. 3. Loose case hardware.	Exchange takeup drive pulley. Tighten. Tighten.
Squeal on starting.	1. Capstan bearings out of line.	Re-align.
Rubbing noises.	1. Warped reel. 2. Flywheel slipped on shaft (rough handling).	Replace. Press flywheel shaft back to correct position and stake.
Inadequate clearance for threading.	1. Erase head out of line. 2. Pressure pad in too far.	Re-align. Bend detent to produce proper clearance.

and raise or lower the head so that the top surface of the pole pieces are even with the top edge of the tape.

Switch Maintenance-

Switch contacts can be cleaned with alcohol or carbon tetrachloride. Lubricate with Vaseline.

LUBRICATION

Place a light film of "Lubriplate" on all pivots. Apply 2 drops of clock oil to each capstan shaft bear-

ing. The motor bearings are equipped with wicks which should be oiled once a year or every 500 hours of operation, whichever occurs first. Use clock oil or light machine oil (pure mineral oil only). Felt clutch disks may be cleaned with carbon tetrachloride, dried and then saturated with a mixture of 50% Amproil and 50% carbon tetrachloride. After lubricating the recorder, wipe the capstan, belts, pinch roller, feed spindle drum and rewind driver with a cloth dampened with carbon tetrachloride in order to remove any oil which might have seeped onto these parts.

TROUBLE CHART

TROUBLE	PROBABLE CAUSES	REMEDY
Recorder does not operate - no shadow in level eye.	1. Damaged switch on volume control. 2. Thermal cut-out in motor open due either to overheating or damage.	Replace. Clear air intakes, vents, and check fan.
Recorder does not operate - shadow in level eye.	1. Damaged solenoid power supply. 2. Shorted or open brake solenoid. 3. Brakes improperly adjusted.	Repair. Replace. Adjust.
Intermittent tape drive.	1. Thermal cut-out is cycling due to overheating.	Clean air intakes, vents, and check fan.
Motor runs - capstan does not revolve.	1. Damaged flywheel drive belt. 2. Flywheel drive belt off of pulleys. 3. Capstan shaft binding.	Replace. Place on pulleys and check alignment. Align bearings.
Takeup spindle does not revolve in "Play" or "Forward".	1. Damaged spindle drive belt. 2. Spindle solenoid plunger loose or improperly adjusted. 3. Forward solenoid open.	Replace. Adjust and tighten. Replace.
Takeup spindle revolves slowly in "Forward".	1. Forward solenoid improperly adjusted. 2. Forward solenoid partially shorted.	Adjust. Replace.
Feed spindle does not revolve in "Rewind".	1. Open solenoid. 2. Spindle arm is sticking. 3. Rewind driver clutch slipping.	Replace. Free the mechanism. Adjust.
Feed spindle turns clockwise to all running positions of keys.	1. Spindle arm is sticking. 2. Arm return spring is broken. 3. Solenoid plunger is sticking.	Free the mechanism. Replace. Free the plunger.
Tape winds loosely on takeup reel.	1. Warped reel. 2. Insufficient takeup tension.	Replace. Adjust.
Tape breaks on change from "Play" or "Record" to "Rewind".	1. Rewind driver clutch too tight. 2. Feed spindle brake improperly adjusted (slack tape). 3. Pinch roller operation is sluggish.	Adjust clutch. Adjust brakes. Check adjustment and check plunger clearance.

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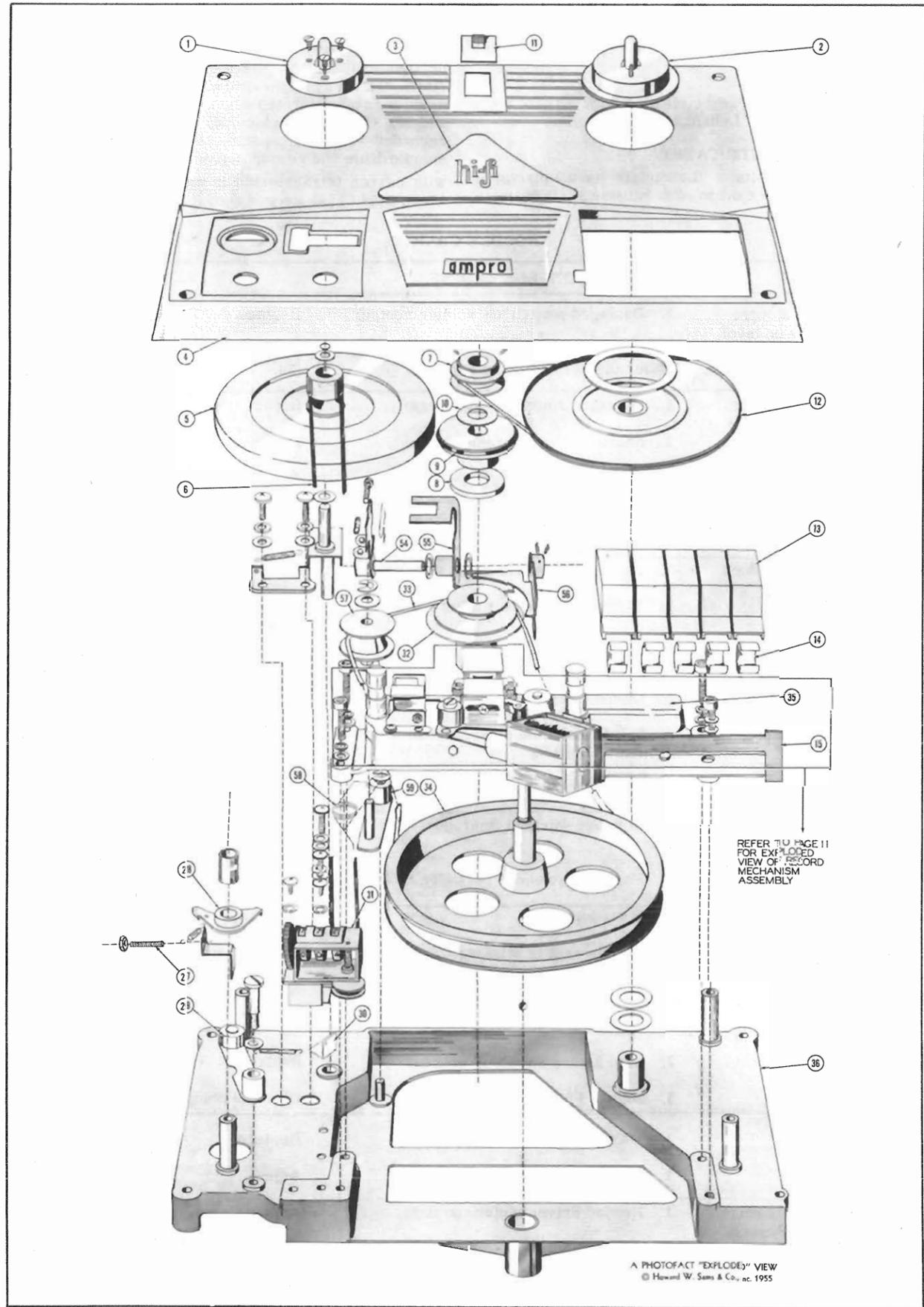


Figure 4A. Exploded View Of Parts Above Baseplate.

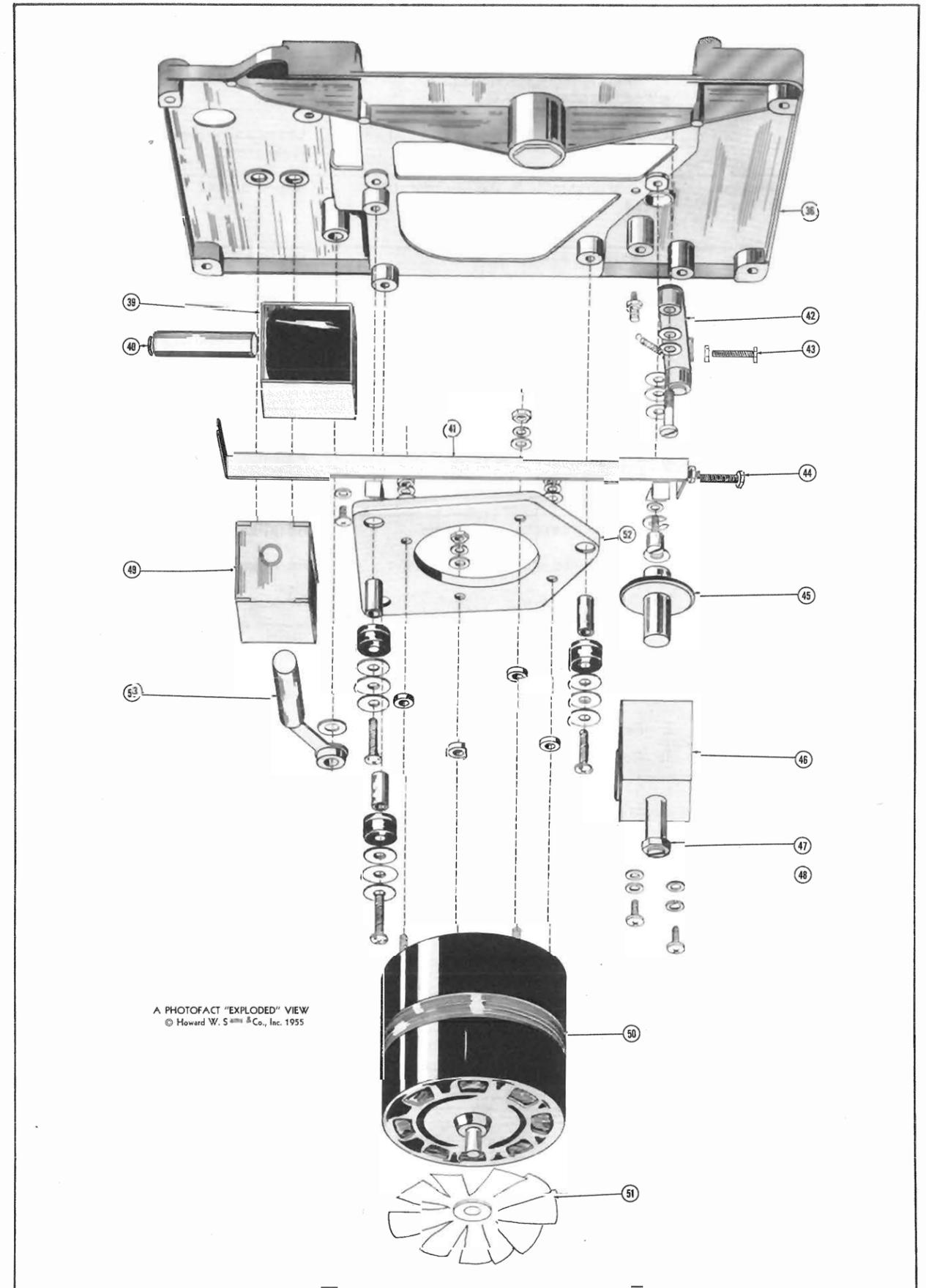


Figure 4B. Exploded View Of Parts Below Baseplate.