



WEBSTER
MODEL 178

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Figure 1

GENERAL INFORMATION

The Webster-Chicago Wire Recorder Mechanism consists of a complete wire transporting mechanism using a triple-purpose recording head which records, erases and plays back a recording.

The Model 178 has the following features:

1. An elapsed Time Indicator calibrated in 5-minute and 1-minute intervals.
2. A removable takeup spool to permit the recording of programs longer than one hour. A new spool of wire and takeup spool can be placed in position in just a few seconds' time.
3. Automatic stops in both directions. The stop shuts off the amplifier as well as the wire transporting mechanism.

The Webster 178 is designed to operate on 105-120 volts AC.

Manufactured by:

Webster-Chicago Corporation
5610 Bloomingdale Avenue
Chicago 39, Illinois

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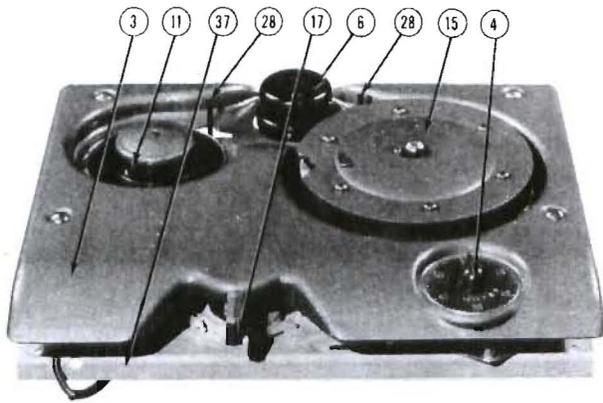


Figure 2

OPERATION

Making a Recording -

1. Place the recorder on a level table in order that the drive pulleys and brakes will operate properly.
2. Connect the power cord to an outlet supplying 105-120 volts ac.
3. Place a spool of wire on the supply chuck (11). The spool should be placed label-side up so that the wire will feed from the rear of the spool.
4. Rotate the takeup spool (15), by hand, until the recording head (6) reaches the top of its vertical travel.
5. Pull the loose end of the wire past the recording head, through the groove in the takeup spool cover (12), and under the clip on this cover with a little to spare. The clip may be loosened to permit the wire to slip under it by pressing on the button in the center of the takeup spool cover.

CAUTION: Before making a recording on a new spool of wire, it is advisable to run the entire spool through the recorder once and rewind it. This is advisable for two reasons:

- (a) The wire will then be wound on the spool in direct relation to the rise and fall of the recording head.
- (b) The rewound spool will be somewhat more loosely wound and the free end may "tuck in" more securely.

This operation may be performed with the Record-Listen switch (M2) push buttons in either position.

6. To record from "Mike," press Record Button 1. To record for radio, press Record Button 2. Press down on the control limiting button and move the control lever (17) to "Run" position. The limiting buttons are provided to prevent moving the control lever past "Stop" position when changing from either "Run" or "Rewind" position. The brakes are arranged so that a heavy brake is applied to the trailing spool when the control lever is moved to "Stop" position. This prevents wire spilling, which would otherwise occur due to the inertia of the

spools. If the control lever is moved past the "Stop" position, the wire is almost certain to spill since the brake will be removed, allowing the spool to spin freely.

7. Rotate the clock-pointer (4) to the position marked "60." This indicates the start of the recording.

8. Adjust the volume control, Figure 1, until the needle of the indicator moves in the area marked "Normal." If the volume control setting during "Record" is too low, the background noise will be unduly high during "Listen." A volume control setting too high, while recording, will cause distortion, just as will an attempt to get too much output from a radio receiver. Also, it is possible, with the volume control turned full on, to saturate the wire to such an extent that it cannot be erased by ordinary means. If this should happen, the wire can be cleaned by using a "wire conditioner," which is a small, but powerful, magnet. This magnet may be attached to the recording head to erase wire passing it in either direction.

After the recording is completed, the control lever (17) should be moved to "Stop." Note the time of the clock indicator. Each recording should be logged. This is helpful in finding the start of a particular recording on the wire when rewinding.

To Rewind -

The rewind speed is about seven times the speed in the forward direction. In order to rewind the wire, press the limiting button and turn the control lever (17) to rewind. If a particular recording is to be played, note the clock indicator reading at the start of the recording. Rewind the wire to this reading and turn the control lever (17) to the stop position. If the wire is allowed to run completely off the takeup spool, the tension of the clip will cause the last turn to tuck into the supply spool and prevent unraveling.

Playback -

For playback, the wire is threaded exactly as for recording. Press push-button No. 3, depress the limiting button and turn the control lever (17) to "Run." The volume and tone controls may be adjusted to suit the listener. Playing a magnetic recording has no effect on the record, so a record can be played many times with no appreciable effect on its volume or quality. On the other hand, since the process of recording makes no mechanical change in the wire, a given wire can be erased and reused for new recordings as often as desired.

Erase -

If it becomes desirable to erase a record without, at the same time, placing a new record on the wire, the wire may be run through in the "Run" direction with the volume control turned to minimum and the "Record" button depressed. It is impossible to accidentally erase a record in the "Rewind" position, since the contacts on assembly (49) automatically open the erase circuit except in "Run" position.

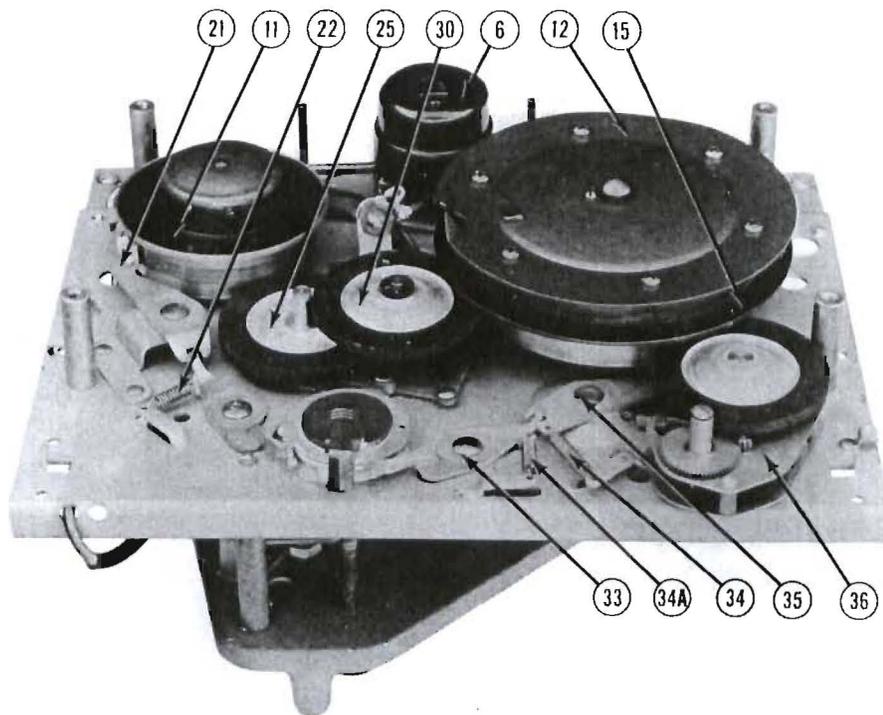


Figure 3

ADJUSTMENTS

Spools and Head - Height Adjustment -

The height of the takeup spool (15) and supply spool (11) is adjusted by loosening the lock nuts (56) and turning the set screws (57). In early models, these adjustments must be made after the mechanism has been installed in the cabinet, since the mechanism is usually warped, to some extent, when fastened to the cabinet. This warping will not affect the operation except to change the height of the spools. Holes are provided in the bottom of the cabinet to facilitate making the final adjustments. A preliminary adjustment should be made before the mechanism is installed, since the height of the head is not adjustable in the cabinet. On later models, having a rigid frame, the complete adjustment may be made with the mechanism out of the cabinet. The takeup spool (15) should be adjusted first. The upper edge of the lower flange of this spool should be adjusted flush, or not more than $1/32''$ above the flange of the top cover assembly (3). If the adjustment is too high, it is possible for the wire to pass under the flange and pile up on the underside of the spool. If the adjustment is too low, the wire will not wind all the way to the flange and a tangle could result.

The recording head should next be adjusted to level wind the wire on to the takeup spool. This adjustment is made by means of the spring-loaded adjustment screw (58), Figure (4), on the slide and socket assembly (16). Improper adjustment is indicated by a tendency for the wire to pile up at one end of the spool.

After the takeup spool and the head have been adjusted, the supply spool (11) should be adjusted so that the head will level wind the wire properly on it

during "Rewind." The collars (59), Figure (4), should fit over the slots in the shafts and should not touch the bearings; they should always allow some end play in the shafts.

Brakes -

With the power off, move the motor control lever (17) to "Rewind," and force it slightly beyond its normal position. In this position, both brakes should be released and the spools should be free to spin. Check also by moving past the "Run" position in the same way.

Supply Spool Brake -

When the motor control is moved from "Stop" to its normal "Run" position, a light brake should be applied to the supply spool (11). The brake tension should be such that a pull of $1/2$ to $5/8$ ounces is required to pull wire from a nearly empty spool. In this position, the upright flange of the left brake lever (23) should be approximately centered in the slot of the left brake shoe assembly (21). Adjustment may be made, if necessary, by bending the brake lever (23). Assuming that the brake lever is not touching the brake shoe assembly, improper brake pressure may be remedied by bending the base plate lug to which the tension spring (20) is attached.

The purpose of this brake is to prevent spilling of the wire, which would happen if the supply spool should run faster than the takeup spool. Insufficient tension on the brake would be indicated by a tendency for the wire to "spill" in "Run" position. Too much tension may cause the motor to run slowly and unevenly resulting in poor recordings.

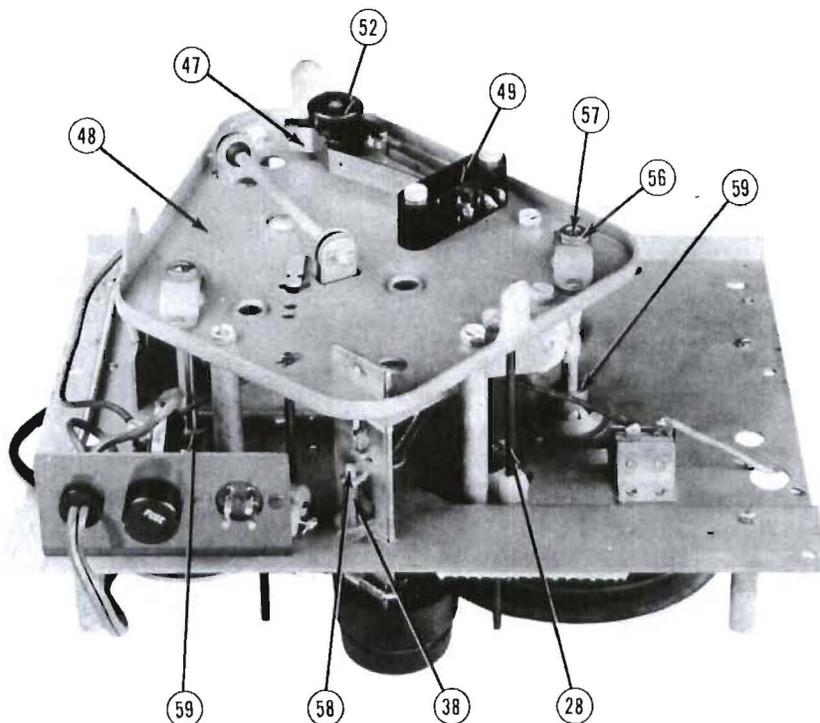


Figure 4

Takeup Spool Brake -

With the motor control moved to "Rewind," a light brake should be applied to the takeup spool. The brake tension should be such that a pull of 5/16 to 7/16 ounce is required to pull wire from the take-up spool when the head is on its downward stroke. Adjustment is made by bending the base plate lug to which the tension spring (20) is attached. Before making this adjustment, check to see that the upright flange of the right brake lever (33) is approximately centered in the slot of the right brake shoe assembly (35).

If the brake tension is too light, the wire may have a tendency to "spill" in "Rewind" position. Too much tension will cause the wire to wind so tightly on the supply spool that "tucking" will not occur when the wire pulls out of the clip at the end of the rewind operation.

Stopping Brakes -

When the motor control is moved from either operating position to "Stop," a heavy brake should be applied to the trailing spool. This stops the wire quickly and prevents spilling when power is removed from the driven spool. The brake cams (29 and 26) are so arranged that during operation a light brake is always applied to the spool from which wire is being removed, and a heavy brake is always applied to this spool when the motor control lever is moved to "Stop" position. The heavy brakes are controlled by the tension springs (22) acting through the brake levers (33) and (23).

Motor Drive Tension -

With the motor control lever in "Run" position, the motor shaft should press against the idler

wheel (30) with a tension of from 7 to 9 ounces. This adjustment may be made by bending the lug on the motor plate to which the tension spring (42) is attached. Unless a special tool is used, it is necessary to remove the motor and make this adjustment by trial and error. A simple tool for adjusting this tension, without disassembling the mechanism, may be made by filing a slot near the end of a rectangular metal bar to fit over the adjustment lug.

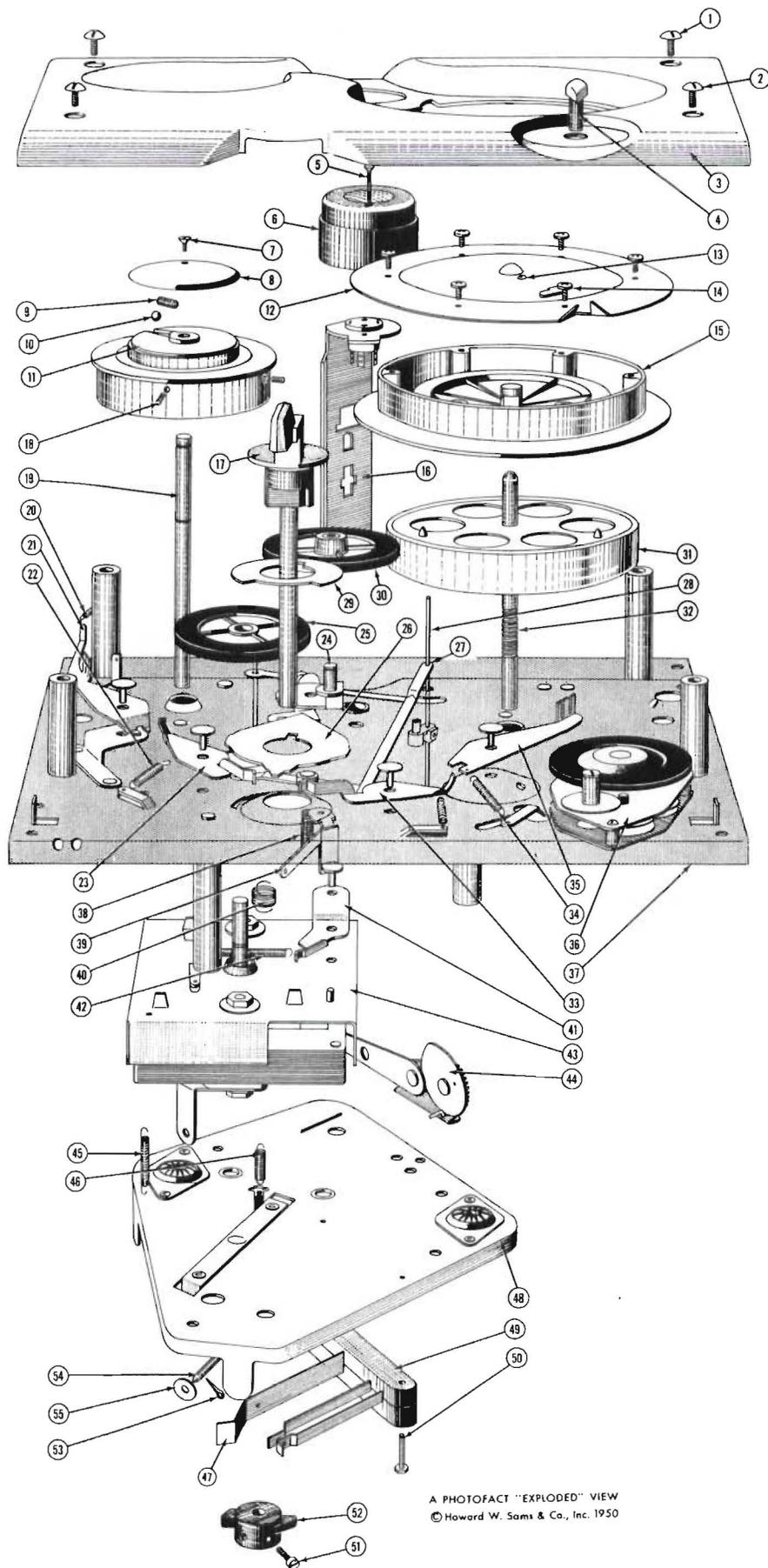
With the motor control lever in "Rewind" position, the drive wheel (25) should press against the supply spool (11) with a tension of from 2 to 3 ounces. In this position, there should be no tendency toward "motor bounce." Adjustment may be made by bending the sub-base lug to which the tension spring (46) is attached.

Cam and Rocker Arm Assembly -

The small end of the rocker arm (44) should be centered in the slot of the slide (16). At the same time, the cam gear should engage the worm with an appreciable amount of backlash, and the cam itself should not touch the worm. The mounting holes for the cam and rocker arm assembly are made large enough to permit adjustment in any direction merely by loosening the mounting screws.

Wire Clip -

The wire clip on the takeup spool cover (12) is provided to give a little "jerk" as the last turn of wire leaves the spool during "Rewind." This jerk causes the last turn to tuck into the lower layers of wire on the supply spool and prevent unraveling. If the spring tension on the clip is too weak, this tucking will not take place. Too much tension may cause consistent breaking of the wire at the end of the rewind operation. Occasional breaking at the clip is



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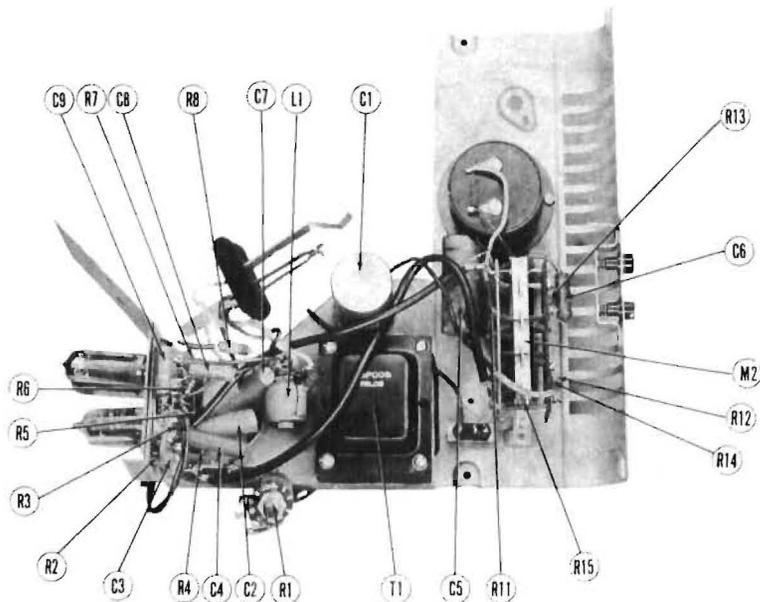


Figure 5

normal, due to kinking near the end of the wire. Since only a fraction of a second of recording time is lost with each break, no harm is done.

The tension of the clip is adjusted by turning the clip tension screw (13). For this purpose, it will be necessary to remove the cover (12). The tension should be adjusted so that a pressure of 17 oz. is required on the center button to allow a piece of wire to slip freely from under the clip.

LUBRICATION

Use a grease, such as Lubriplate, at the following points:

1. Sliding surfaces of slide and socket assembly (16).
2. Sliding surfaces of brake cams (29 and 26) and motor control lever (17). Be sure to grease the edges of the cams where they rub against the brake lever (33 and 26).
3. Pivots of brake control levers (33 and 26), and brake shoe assemblies (21 and 35). Do not use grease in the slots of the brake shoe assemblies.
4. Under the idler lever assembly (24).
5. On the worm shaft (32) where it contacts the gear of the rocker and cam assembly (44).
6. On the outside edge of the cam (44).
7. On the rubbing surfaces of the switch cam (52).

Use light oil at the following points:

1. Idler (30) bearing on felt washer.
2. On the self-aligning bearings of shafts (19 and 32).

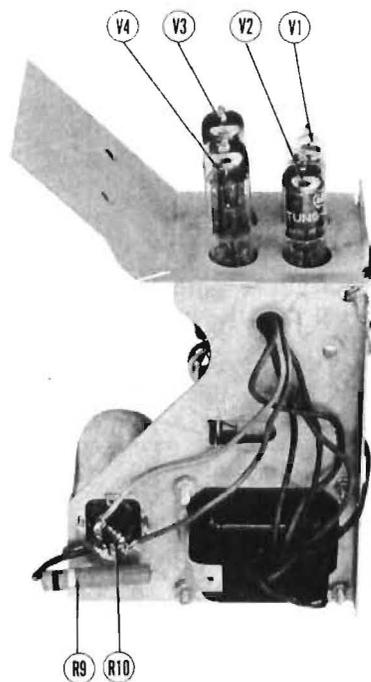
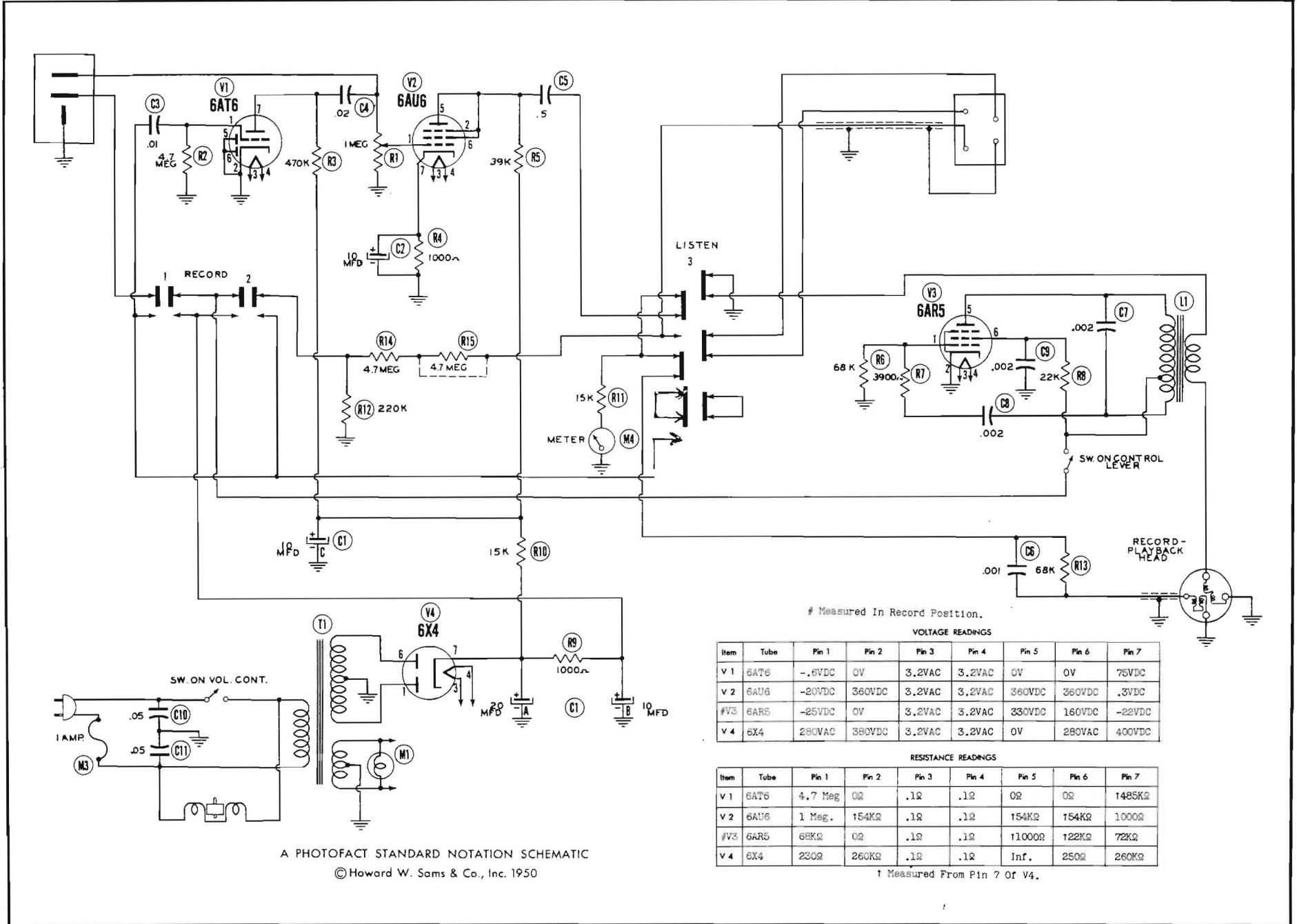


Figure 6

3. Motor bearings.
4. If new brake shoe assemblies (21 and 35) are installed, apply one drop of light oil to each felt. Otherwise, do not oil these felts.

Be very careful not to allow oil or grease to touch the rubber surfaces of the drive wheel (65) or the idler wheel (60). Any lubricant on these surfaces should be immediately removed with carbon tetrachloride. Excess lubricant on the brake felts will cause an oil surface on the supply or takeup spools. Such oil should be removed with carbon tetrachloride.



Measured In Record Position.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6AT6	-.6VDC	0V	3.2VAC	3.2VAC	0V	0V	75VDC
V 2	6AUG	-20VDC	360VDC	3.2VAC	3.2VAC	360VDC	360VDC	.3VDC
#V3	6AR5	-25VDC	0V	3.2VAC	3.2VAC	330VDC	160VDC	-22VDC
V 4	6X4	280VAC	380VDC	3.2VAC	3.2VAC	0V	280VAC	400VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6AT6	4.7 Meg	∞Ω	.1Ω	.1Ω	∞Ω	∞Ω	1485KΩ
V 2	6AUG	1 Meg.	154KΩ	.1Ω	.1Ω	154KΩ	154KΩ	1000Ω
#V3	6AR5	68KΩ	∞Ω	.1Ω	.1Ω	11000Ω	122KΩ	72KΩ
V 4	6X4	230Ω	260KΩ	.1Ω	.1Ω	Inf.	250Ω	260KΩ

† Measured From Pin 7 Of V4.

PARTS LIST

MECHANICAL					
Ref. No.	Part No.	Description			
1	26P826	Top Cover Mounting Screw	52	49P105	R. F. Bias Switch Cam
2	26P826	Top Cover Mounting Screw	53		Cotter Pin
3	45P725	Top Cover	54	41P617	Motor Pivot Pin
4	49X106	Clock Pointer	55		Washer
5	26P764	Recorder Head Mounting Screws	56	26P077	Spool Height Adjusting Lock Nut
6	11X380	Recorder Head	57	41X591	Spool Height Adjusting Screw Assembly
7	26P827	Chuck Cap Mounting Screws			
8	45P492	Chuck Cap	58	26P284	Head Stroke Adjusting Screw
9	46P142	Compression Spring	59	41P577	Thrust Collar
10	48P014	Supply Spool Retaining Ball	ELECTRICAL		
11	42P192	Supply Spool Chuck			
12	11X181	Takeup Spool Cover	Item No. Use and Description		
13	26P305	Wire Clip Tension Screw			
14	26P804	Drum Cover Mounting Screw	V1	Preamplifier, 6AT6	
15	11X346	Takeup Spool - Removable	V2	Audio Output, 6AU6	
16	11X208	Slide and Socket Assembly	V3	Oscillator, 6AR5	
17	42X195	Control Lever	V4	Rectifier, 6X4	
18	26P633	Chuck Mounting Screw	C1A	Filter (Electrolytic) 20 MFD. @ 450 V.	
19	41P618	Supply Spool Chuck Shaft	C1B	Filter (Electrolytic) 10 MFD. @ 450V.	
20	46P130	Tension Spring Supply Spool Light Brake	C1C	Filter (Electrolytic) 10 MFD. @ 350 V.	
21	11X341	Left Brake Shoe Assembly	C2	Output Cathode Bypass (Electrolytic) 10 MFD. @ 25 V.	
22	46P131	Heavy Brake Tension Spring	C3	Audio Coupling, .01 MFD. @ 100 V.	
23	45P719	Left Brake Lever Cam Follower	C4	Audio Coupling, .02 MFD. @ 400 V.	
24	11X179	Idler Lever Assembly	C5	Audio Coupling, .5 MFD. @ 400 V.	
25	11X195	Drive Wheel Assembly	C6	Tone Compensation, .001 MFD. @ 600 V.	
26	45P720	Reset and Brake Release Cam	C7	Fixer Trimmer, .002 MFD. @ 600 V.	
27	11X342	Motor Shut-off Link - Long	C8	Bias Oscillator Grid Cap., .002 MFD. @ 600 V.	
28	41P623	Motor Shut-off Crank	C9	Bias Oscillator Screen Bypass, .002 MFD. @ 600 V.	
29	45P495	Light Brake Cam	C10	Line Filter, .05 MFD. @ 400 V.	
30	11X366	Idler Wheel Assembly	C11	Line Filter, .05 MFD. @ 400 V.	
31	11X344	Takeup Drum	R1	Volume Control and Switch, 1 Meg.	
32	47P030	Takeup Drum Shaft	R2	Preamp. Grid, 4.7 Meg., 1/2 Watt	
33	45P521	Right Brake Lever Cam Follower	R3	Preamp., Plate, 470K Ohm, 1/2 Watt	
34	46P145	Light Brake Tension Spring - Right	R4	Output Cathode, 1000 Ohm, 1/2 Watt	
34A	46P131	Heavy Brake Tension Spring	R5	Output Plate, 39K Ohm, 1/2 Watt	
35	11X247	Right Brake Shoe Assembly	R6	Oscillator Grid, 68K Ohm, 1/2 Watt	
36	11X357	"Clock" Gear Train (complete with drive wheel)	R7	Oscillator Feedback, 3900 Ohm, 1/2 Watt	
	46P165	"Clock" to Drum Tension Spring	R8	Oscillator Screen, 22K Ohm, 1 Watt	
37	11X340	Sub-Base Assembly	R9	Filter, 1000 Ohm, 2 Watt	
38	46P135	Head Stroke Adjusting Spring	R10	Filter, 15K Ohm, 1/2 Watt	
39	45P544	Head Stroke Adjusting Bracket	R11	Multiplier, 15K Ohm, 1/2 Watt	
40	46P132	Head Slide Tension Spring	R12	Voltage Divider, 200K Ohm, 1/2 Watt	
41	45P493	Yoke	R13	Tone Compensation, 68K Ohm, 1/2 Watt	
42	46P182	Motor Pressure Tension Spring	R14	Voltage Divider, 4.7 Meg., 1/2 Watt	
43	15X093	Motor Assembly	R15	Voltage Divider, 4.7 Meg., 1/2 Watt	
44	11X345	Cam and Rocker Assembly	T1	Power Transformer	
45	46P183	Motor Pressure Tension Spring	L1	Oscillator Coil	
46	46P183	Motor Pressure Tension Spring	M1	Pilot Light (Type #51)	
47	45P728	Detent Spring	M2	Listen-Record Switch	
48	11X338	Bottom Plate Assembly	M3	Fuse (1 Amp.)	
49	49P060	Contact Base	M4	Meter (Record Level)	
	11X176	Switch Leaf			
	11X339	Switch Leaf			
50	26P285	Switch Mounting Screws			
51	26P079	Switch Cam Mounting Screw			