

# OPERATING INSTRUCTIONS

## MODEL 78 WIRE RECORDER

Dear Friend:

Your Model 78 wire Recorder is ready to record. Just plug it into a wall socket supplying 105-120 volts, 50/60 cycles AC; plug in the microphone; move the control lever; advance the volume control; and "you are on the wire".

An amplifier, oscillator and power supply, using miniature tubes, are built into the cabinet. When playing back a recording, the output of the amplifier is approximately 1 volt, comparable to the average R.F. tuner or crystal phono pickup. This is adequate for connecting to the amplifier and speaker of a radio receiver or to a public address type amplifier and speaker. This is also adequate voltage to operate a pair of headphones.

When used with an amplifier or radio having the usual bass and treble boost circuit, the playback response is essentially flat from 50 to 6000 cycles. This is equal to or better than the usual radio program or phonograph record. The circuit affords a moderate treble boost for maximum signal to noise ratio over a wide range in the recording amplifier. Additional compensation to suit the individual is readily obtained during playback with the conventional tone controls of the sound amplifier or radio.

Read these short, complete instructions and operating tips before operating the Model 78, in order that you may secure full satisfaction and enjoyment from your recorder. This is important to the experienced sound technician and home operator alike. Once you are familiar with your recorder, you will record programs of a professional quality which will be a source of pride and enjoyment for years to come.

Sincerely yours,

WEBSTER-CHICAGO CORPORATION

# WEBSTER — CHICAGO

5610 W. Bloomingdale Ave. Chicago 39, Ill.



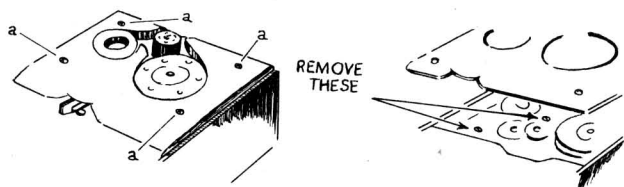
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### HOW TO SET UP THE MODEL 78 AND PREPARE TO RECORD

#### 1 — Remove the Shipping Screws



Remove the four top plate screws "a". Lift the top plate straight up. Remove the two shipping screws, identified by red washers, which hold the motor rigid during shipment. Replace the top plate and tighten screws "a" securely.

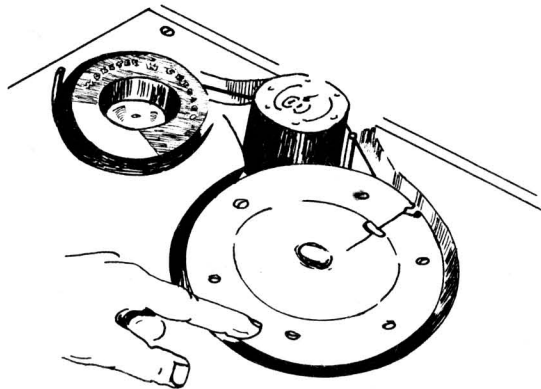
#### 2 — Plug in the AC Cord

Connect the power cord to an outlet supplying 105-120 volts 50 or 60 cycle ALTERNATING CURRENT. CAUTION: Do not connect the Model 78 to Direct Current (DC) or to source of any other voltage or frequency. If you are in doubt, call your local power company and give them your address. They can tell you what current you use.

#### 3 — Turn the Recorder On

The On-Off switch is incorporated in the volume control and is turned "on" in the first few degrees of rotation.

#### 4 — Raise the Recording Head



Rotate the takeup drum by hand until the recording head reaches the top of the stroke. This insures the

wire always starting from the same position and synchronizes the winding and unwinding of the wire. Failure to do this may result in the wire being pulled diagonally across the face of the unwinding spool causing the wire to catch and produce "wow" and "waver". The recording head raises and lowers as the takeup drum is rotated in either direction. This distributes the wire evenly and smoothly across the face of the drum.

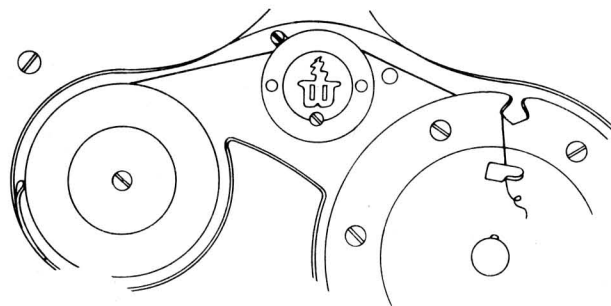
#### 5 — Place Spool of Wire

Place a spool of wire in position with the label side up. Before using a new spool of wire for recording, be certain to read paragraph "New Spool of Wire" on page 4.



#### 6 — Route the Wire

See the drawing. DO NOT route the wire over the small bracket by the supply spool. Push down the button in the center of the takeup drum to raise the wire retaining clip.



#### 7 — Plug in the Microphone

### TO MAKE A RECORDING

- 1 — Push the "Record 1" button on the recorder. (Use button "Record 2" to record direct from the radio after the connections described on page 3 have been made).
- 2 — Move the "Run-Rewind" control lever to the "Run" position.
- 3 — Advance the volume control for proper recording level. (See page 5.)

- 4 — Move the control lever to "Stop" at the end of the recording.
- 5 — Move the control lever to "Rewind". At the end of the rewind cycle, quickly move the control lever to "Stop".

## TO PLAY BACK A RECORDING

- 1 — Connect the Model 78 to your radio receiver or amplifier as explained below.
- 2 — Raise the head as for recording.
- 3 — Route the wire.

- 4 — Push the "Listen 3" button.
- 5 — Advance the recorder volume control and the radio volume control for enjoyable listening.
- 6 — Adjust the radio tone control to suit your preference.
- 7 — Move the control lever to "Stop" at the end of the playback.
- 8 — Move the control lever to "Rewind". At the end of the rewind cycle, quickly move the control lever to "Stop".

# CONNECTIONS

## TO CONNECT TO A RADIO RECEIVER

A 4-ft. cable is provided for connecting the Model 78 to a radio receiver. It is recommended that this cord be left intact if possible in order to make future rearrangements of the wire recorder and receiver possible without undue inconvenience.

Connect the cord to the receiver as indicated by the circuit diagrams. The circuit shown does not describe any particular radio receiver, but is typical of modern circuits. The .02 mfd. condenser (\*) is usually necessary on AC-DC receivers.

Some radio receivers deliver a stronger audio signal to the audio amplifier input than others. Failure to compensate for this would overload the 6AT6 input of the wire recorder and cause distortion which cannot be detected by the volume level indicator.

After the preliminary installation, make a test recording. When recording, the volume level meter needle should not reach the red portion of the dial

on the loud sounds until the volume control is advanced to at least 1 o'clock, considering the volume control pointer as the hour hand of a clock. If distortion is present during playback or if a lower volume control setting is necessary to avoid "over recording":

- 1 — Remove the cover from the recorder mechanism by removing the two mounting screws in each side.
- 2 — Cut the jumper which is connected across the 4.7 meg. resistor of the input voltage bleeder network, Fig. 1. This will double the value of the dropping resistor and compensate for the stronger signal.
- 3 — Make another test recording to be certain that distortion is not present.

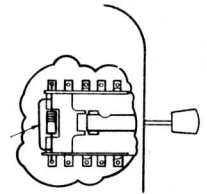
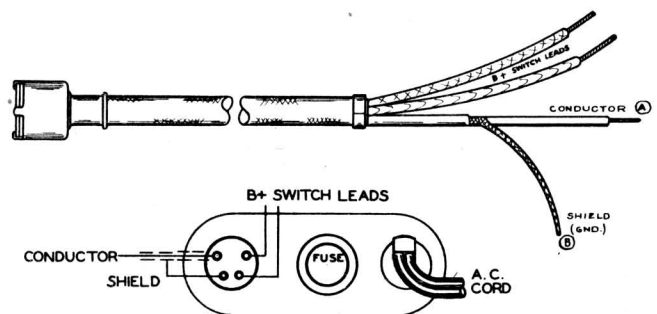
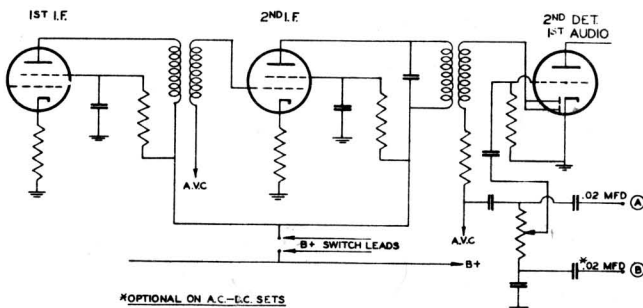


Fig. 1

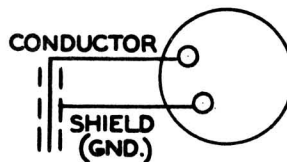
Although the circuit diagrams fully explain the few



connections necessary to install the Model 78, the connections should be made by a qualified service technician.

### TO CONNECT TO A PUBLIC ADDRESS TYPE AMPLIFIER AND SPEAKER

Solder one end of a length of microphone cable to the terminals of the extra female Cinch plug as indicated. Connect the other end of the cable to the phono input of the public address amplifier. Ignore the other two terminals of the output plug.



### TO USE HEADPHONES

Solder the two headphone leads to the terminals of the extra female Cinch plug as indicated. Ignore the other two terminals of the output plug.

## THE CONTROLS AND WHAT THEY DO

### THE CONTROL LEVER

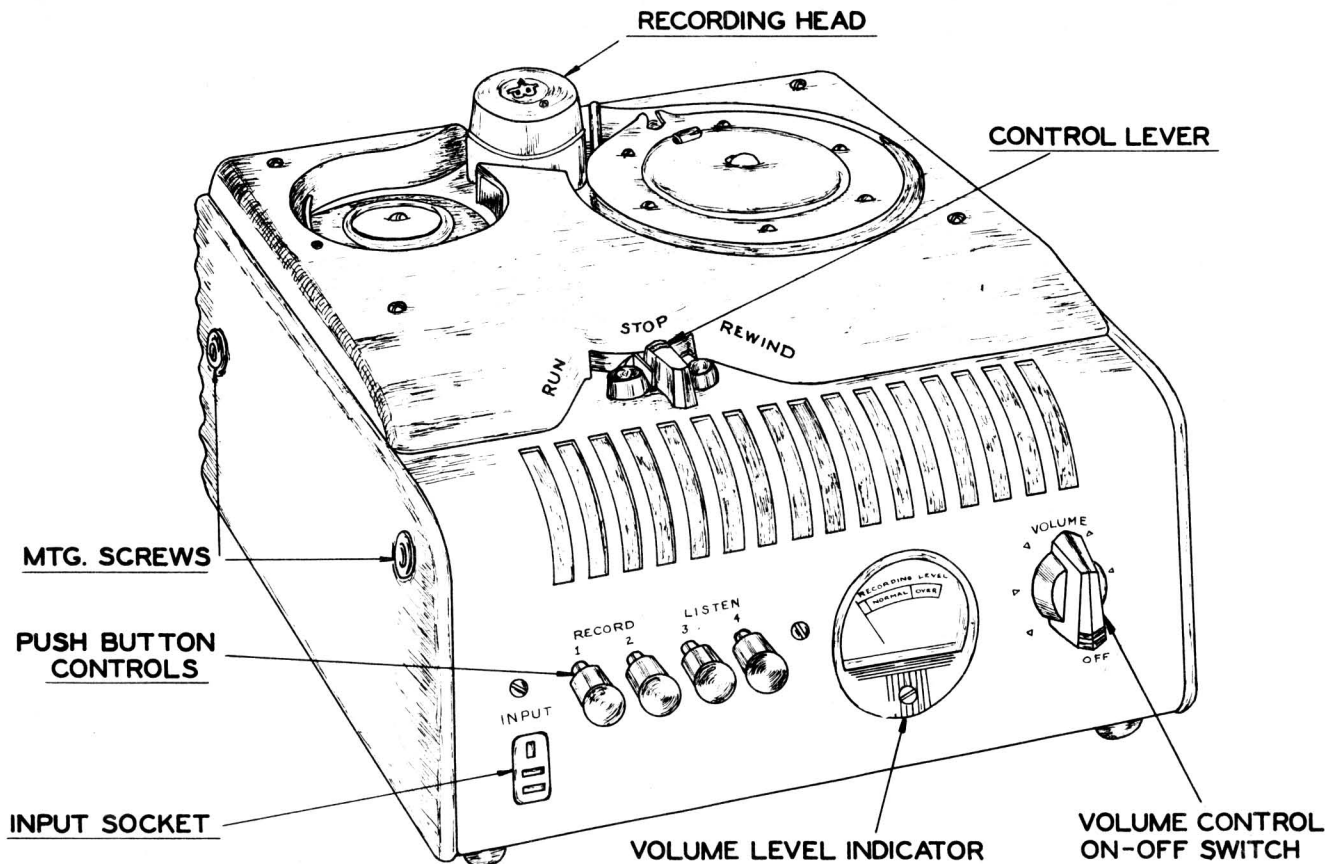
This lever shifts the motor and associated drive wheels to engage the takeup spool drum or the supply spool drum, whichever is desired. This winds the wire from one spool to the other across the groove of the recording head. At the same time the recording head moves up and down to wind the wire evenly on the spool or drum. The wire runs at a speed of approximately two feet per second in the "run" position and about seven times this speed in the "rewind" position. Either the forward or re-

wind cycle may be interrupted at any time by moving the control lever to the "stop" position.

This lever also actuates a set of brakes to prevent the wire from running loosely or too fast and snarling. For this reason it is not advisable to attempt to add a foot pedal switch or other means of remote control.

### INPUT SOCKET

This socket has three contacts. No. 1 — the vertical contact — is the common ground connection. No. 2 or the top horizontal contact is for microphone input.



It connects the microphone to the grid of the 6AT6 pre-amplifier for low level inputs. No. 3 — button horizontal contact — connects a crystal phono pickup to the first grid of the 6AU6 inter-stage amplifier for high level inputs.

## THE VOLUME LEVEL INDICATOR

Turn the volume control to the right until the meter just reaches the red or "overload" part of the scale on the loud sounds. Do not increase the volume during low level parts of a recording even though the meter needle temporarily drops to the small red part of the scale or the full dynamic range of the original program will not be reproduced. Most of the average recording will be made with the meter needle near the center of the green or normal area.

## THE PUSH BUTTON CONTROLS

When the button marked "Record 1" is depressed, terminals No. 1 and No. 2 of the input socket are connected across the grid resistor of the 6AT6 pre-amplifier tube. Any microphone with an output of -57DB or better may be used across these terminals. This button may be considered as "Record-Microphone".

Button "Record 2" connects the shielded lead of the four wire cord across the input voltage divider net-

work of the recorder. Depressing this button automatically connects the radio receiver or the pickup of a radio-phonograph combination to the input of the wire recorder when all other connections have been made. This button may be considered as "Record-Radio" or as "Record-Phono" in the case of a radio-phonograph combination.

Button "Listen 3" connects the output of the recorder to the output plug as indicated in the circuit diagram "Connections". The output voltage may be fed to the audio amplifier of a radio receiver through the shielded cord or to the phono input of a public address type amplifier and speaker by means of the extra female Cinch plug and a length of microphone cable. See "Connections". If the cord assembly is attached to a radio receiver, the B+ circuit is opened and the plate voltage is removed from the I. F. stages to eliminate any interference from a radio signal. This button may be considered as "Listen-Recorder" or "Playback".

Button "Listen 4" is for normal radio receiver operation. Depressing it removes the recorder circuit entirely from the radio or amplifier circuit.

No special precautions are necessary. Pushing the wrong button cannot damage the recorder, the radio or the external amplifier and speaker. However, only one button should be pushed at a time.

## OPERATING TIPS

### RECORDING ON NEW SPOOL OF WIRE

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: First, the wire will then be wound on the spool in direct relation to the rise and fall of the recording head. This is called phasing. Second, the rewind 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 in either position.

**CAUTION:** Do not attempt to use a one-hour spool of wire until you are experienced in the use of the fifteen minute and thirty minute spools and the controls of your recorder.

Before using a one-hour spool of wire be sure that:

- 1 — The groove of the recording head is clean. Use carbon tetrachloride and a brush or cloth to clean it.
- 2 — The brakes are properly adjusted. The wire

should not run or wind loosely especially during rewind.

- 3 — Wire winds evenly on the supply spool during rewind —



See your dealer for adjustments if any are necessary.

Do not record more than sixty minutes on any one spool. Save any excess wire on a spare spool for future use and rewind only the actual recording. Rewinding more than sixty-one minutes of wire on a single spool may cause the excess to spill over and part of the recording may be lost.

### MICROPHONE TECHNIQUE

The ability to get the best results with a microphone improves with practice. The microphone is held far enough from the mouth to permit the volume control

to be at at least "1 o'clock" without over-recording when recording a normal speaking voice as in public address work.

Some people pronounce "B's" and "P's" with an explosive puff which overloads the microphone; others speak sharp, clear sibilants which are over accentuated when the recording is played back. In such cases, or in recording whistling, the microphone should be held sideways so that it is at right angles to the mouth.

However, there are many variations in individual speech, and it is advisable to make a few practice recordings to discover the best microphone distance and volume setting for perfect recording. The usual tendency is to talk too loudly and too close to the microphone.

For recording musical instruments or singing, where the microphone may be several feet from the source of sound, it should be remembered that room echoes will seriously affect the quality of the recording. This is important. It is why Sound Studios and Radio Broadcast Studios are specially treated to keep such echoes from reaching the microphone.

The MM-35 microphone supplied with your recorder has excellent frequency characteristics and high sensitivity. Its output is rated at -52DB.

When recording groups, nondirectional characteristics will result from placing the microphone on its back on a soft pad (to absorb unwanted jars and vibration). Rather large groups can be recorded successfully.

When recording speeches or programs in auditoriums equipped with a good public address system, better results and convenient recording conditions may often be obtained by placing the microphone in front of one of the loudspeakers instead of trying to record directly at the speaker's stand.

Most problems associated with microphone placement and microphone technique are those encountered by the average public address technician. Each installation is different. Only experience will enable you to quickly analyze a new set of conditions and correctly place the microphone. However, you can learn your own home and the most frequently encountered recording conditions. Special problems can best be solved on the spot by consulting a local technician.

The volume level indicator is as useful in making a

good recording as an exposure meter in taking good pictures. Use it as explained on page 5.

## **CLEAN THE RECORDING HEAD**

**IMPORTANT.** Dirt and grime gradually accumulate in the groove of the recording head, causing the wire to stick and produce "wow" and spotty recording and playback. Clean the groove from time to time with carbon tetrachloride and a folded cloth or small stiff brush. While the cloth is saturated with carbon tet, remove the top from the mechanism and clean the brake drums and idler wheels.

## **ERASING A RECORDING**

As the wire passes across the recording head with the control lever set to "RUN" and either of the "RECORD" buttons depressed, the wire is demagnetized by the action of the erase coil just before it reaches the recording coil, both coils being incorporated in the dual-purpose head. Therefore, recording is always done on demagnetized wire.

If the microphone or other signal source is not plugged in, or if the volume control is turned off, the wire will be erased and no recording will remain. This feature of magnetic recording makes it possible to erase a word or phrase in a voice recording and, if desired, insert a new word or phrase in its place.

A wire may be used for thousands of successive recordings or a complete spool may be erased without putting any other sound on the wire.

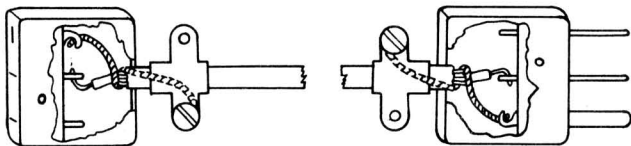
It is sometimes possible, by turning the volume control too far to the right, to magnetize the wire to such a degree that the recording cannot be erased by normal means. Recordings made under these circumstances would not be clear, but would be distorted due to the over-magnetization of the wire. The wire conditioner No. WC286, available from your dealer, will erase any unwanted previous recording.

## **MICROPHONE EXTENSIONS**

Special installations sometimes require a microphone cable longer than is supplied with the MM-35 microphone. Up to 25-35 feet additional cable may be added without undue loss of sensitivity or fidelity. For longer length, low impedance transmission lines and matching transformers should be used. The cable and plugs may be secured from leading radio parts distributors and many radio service technicians.

**REQUIRED PARTS:** 1 No. S-303CCT Jones socket.  
 1 No. P-303CCT Jones plug.  
 25 ft. good quality single conductor shielded microphone cable.

**CONNECTIONS:**

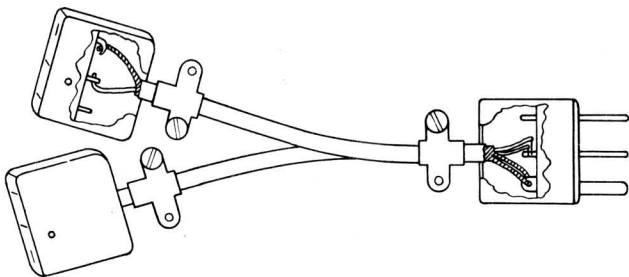


**MULTIPLE INPUTS**

Conference recordings or interviews sometimes make it advisable to use two or three microphones simultaneously.

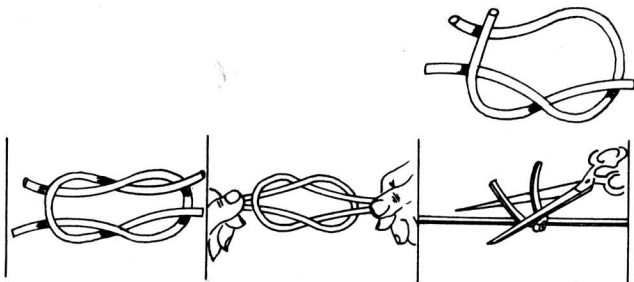
A simple multiple input can be improvised using parts easily secured from a radio parts distributor. Secure two or three No. S-303CCT Jones sockets, a No. P-303CCT Jones plug, and two or three lengths of microphone cable. Connect them as indicated.

In general, it is not advisable to connect microphones in parallel since the sensitivity of a microphone is reduced by each one added. The proper method of mixing is to provide each microphone with an individual volume control and mix all inputs in a simple pre-amplifier. However, the Model 78 has sufficient gain to permit a direct parallel hookup as an emergency measure, especially when the sound source is within a few feet of the microphones, and control of the input level of each microphone is not essential.



**SPLICING WIRE**

If it is desired to remove or insert a section for editing reasons, or if the wire is accidentally broken, the



ends may be spliced by tying them together with a simple square knot as shown. Pull the knot tight and cut off the loose ends close to the splice. The knot will pull across the recording head without catching.

**WHEN WIRE RUNS OFF SPOOL**

Try to avoid running the wire completely off the supply spool onto the drum . . . Stop the recording or playback with a few turns of wire remaining on the supply spool, thereby eliminating the necessity of re-threading the wire on the spool. If the wire does run off the spool, re-thread the wire onto the spool, with the label side up, wrapping a few turns of wire around the loose end as though you were winding the cord around a top. See the illustration.



**TO AVOID SPILLED WIRE**

Do NOT disconnect the power cord from the Model 78 or from a wall socket when the unit is in operation. Avoid placing the power cord where it may be accidentally disconnected. If the wire runs entirely off the take-up drum onto the supply spool, move the "Control Lever" to the "Stop" position immediately.

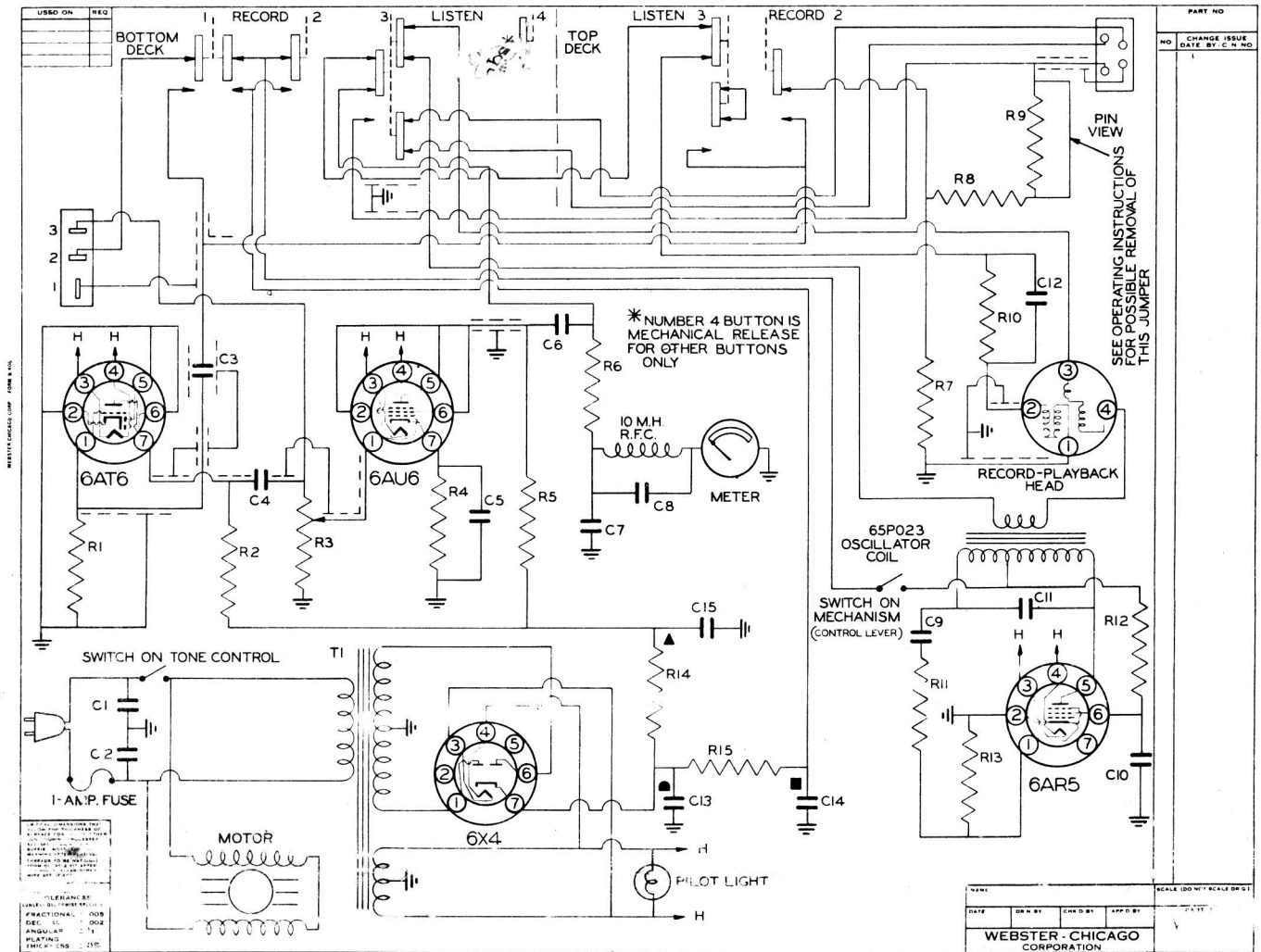


Loose brakes, especially on the takeup drum during the rewind cycle, will permit the wire to run loosely and possibly spill or snarl. The brake should be tight enough to keep the wire taut, but not tight enough to slow up the speed of the rewind. See your dealer for any necessary brake adjustment, especially if a one-hour spool is to be used. Also read the paragraph regarding the one-hour spool on page 5.

**MAINTENANCE AND ADJUSTMENT**

The Model 78 Wire Recorder leaves the factory completely adjusted, tested and lubricated. However, it is realized that adjustments, service parts or service repairs are sometimes required. Consult the dealer from whom you purchased the recorder for any service requirements. He has an adequate service department or an arrangement with a qualified service technician. Complete information regarding adjustments, lubrication, and a complete parts list are given in his service manual.





## PARTS LIST

R1	Carbon Resistor	4.7 Megohms	½ Watt	C1	Molded Condenser	.05 Mfd.	400 Volts
R2	Carbon Resistor	470,000 Ohms	½ Watt	C2	Molded Condenser	.05 Mfd.	400 Volts
R3	Carbon Resistor	1 Megohm		C3	Shielded Condenser	.01 Mfd.	
R4	Carbon Resistor	1,000 Ohms	½ Watt	C4	Paper Condenser	.02 Mfd.	400 Volts
R5	Carbon Resistor	39,000 Ohms	½ Watt	C5	Electrolytic Condenser	10. Mfd.	25 Volts
R6	Carbon Resistor	16,000 Ohms ±5%	½ Watt	C6	Paper Condenser	.5 Mfd.	400 Volts
R7	Carbon Resistor	220,000 Ohms	½ Watt	C7	Paper Condenser	.002 Mfd.	600 Volts
R8	Carbon Resistor	4.7 Megohms	½ Watt	C8	Paper Condenser	.002 Mfd.	600 Volts
R9	Carbon Resistor	4.7 Megohms	½ Watt	C9	Paper Condenser	.002 Mfd.	600 Volts
R10	Carbon Resistor	68,000 Ohms	½ Watt	C10	Paper Condenser	.002 Mfd.	600 Volts
R11	Carbon Resistor	3,900 Ohms	½ Watt	C11	Molded Condenser	.002 Mfd.	600 Volts ± 20%
R12	Carbon Resistor	22,000 Ohms	1 Watt	C12	Paper Condenser	.001 Mfd.	600 Volts
R13	Carbon Resistor	68,000 Ohms	½ Watt		Electrolytic Condenser — 3 Sec.		
R14	Carbon Resistor	15,000 Ohms	½ Watt	C13		20. Mfd.	450 Volts
R15	Carbon Resistor	1,000 Ohms	2 Watt	C14		10. Mfd.	450 Volts
				C15		10. Mfd.	350 Volts

All resistor values are ±10% unless otherwise specified.