Figure 1

GENERAL INFORMATION

The Webster-Chicago Model 228 wire recorder is designed to magnetically record and reproduce on the standard .0036" stainless steel recording wire. In addition to being a complete wire recorder, Model 228 includes a foot switch to start, stop and reverse the mechanism for the convenience of recording or playing back recordings, dictation, etc. The microphone also included with the Model 228, has a built-in Start-Stop switch, which permits the user to control the machine conveniently.

The Elapsed Time Indicator incorporated in this machine is calibrated quarter minute and minute intervals. This Indicator makes a complete revolution in 15 minutes.

Model 228 is designed to operate on 105-120 volt 50/60 cycle AC. 50 Cycle current will cause the recorder to run a little slower but this will not harm the motor or impair the quality of the recorder.

Never attempt to operate from Direct Current (DC) or from a power supply with a frequency other than 50/60 Cycles.

Manufactured by:
Webster-Chicago
5610 Bloomingdale Ave., Chicago 39, Ill.
OPERATING INSTRUCTIONS

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 supply 105-120 volts AC.

3. Place a spool of wire on the supply chuck (20). 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, by hand, until the recording head reaches the top of its vertical travel.

5. Pull the loose end of the thread leader past the recording head, through the groove in the takeup spool cover (6), and under the clip on this cover with a little spare. The clip may be loosened to permit the leader to slip under it by pressing on the button in the center of the takeup spool cover.

NOTE: 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.

6. Rotate the time indicator pointer (3) to the position marked 15.

7. Turn the "On-Off-Volume" control knob clockwise until a click is heard. This turns the unit on.

Use of the Microphone -

The microphone supplied with the Model 228 has a built-in Start-Stop switch whereby the dictation machine may be controlled in "Run" position only to start and stop the machine. This switch will operate for Dictation or Transcribe. In order for the microphone switch to operate, both plugs on the cord of the microphone must be plugged into their proper sockets. The small plug in the input socket and the large plug into the large socket on the side of the case.

1. To make a recording using the microphone, depress the Dictate push button.

2. Adjust the Volume control to a point where the red Recording Level Indicator just flashes when you speak into the microphone.

3. Press down on the stop (25) and turn the control lever (27) to Run.

4. The recorder may now be started and stopped at any time by using the switch on the microphone,
and whatever sound enters the microphone, while the machine is running, will be recorded on the wire.

Use of Foot Control Switch -

Model 228 includes a foot switch which may be used to "start" "stop" or "backspace" (rewind). To operate the foot switch insert its 3-prong plug into socket on the side of the case. Turn the control lever (27) to run. The "start" "stop" "rewind" operation will now be entirely controlled by the foot switch. When using the microphone with the foot switch, use only the small plug on the microphone cord which is inserted in input socket. By pressing on the right side of the foot switch will start or stop the machine, pressing on the left side of the switch rewinds the wire. The Model 228 can be operated as a normal manually operated recorder to record or play back by removing the foot switch plug from the machine.

NOTE: It is not recommended to rewind an entire spool of wire using the foot switch. Hold down the lock (25) and turn the control lever (27) to "Rewind".

To Playback a Recording -

1. For playback, the wire is threaded exactly as for recording.

2. Depress the push button "Transcribe".

1. Push down on the lock (25) and turn the control lever (27) to run. This starts the wire moving. The microphone, when plugged in, will operate the machine for stopping or starting. The foot switch when used will start, stop, or rewind the wire. However, in each case for the wire to move the control lever (27) must be in Run position.

4. Adjust the Volume control to suit.

Erase -

If it becomes necessary to erase a recording without, at the same time, placing a new recording on the wire, the wire may be run through in the Run direction with the Volume control turned to minimum and the Dictate button depressed.

FUNCTION OF PRINCIPAL PARTS AND ADJUSTMENTS

Motor and Drive Wheel Assembly -

The motor (79) is mounted on the pivot bar (77) and is rocked forward by the cam follower (78A), which is riveted to the cover (7B). The cam follower (78A) is actuated by the control lever (27) cam when the control lever (27) is turned to Run. This brings the motor shaft into contact the idler wheel (39) which in turn drives the takeup drum (9) to wind the wire.

1. When the control lever (27) is in Stop position the control lever cam engages the cam follower just enough so the motor is held in a neutral position i.e. the motor shaft does not engage the idler wheel and the drive wheel, an the motor shaft is not touching the supply chuck.

When the control lever (27) is turned to Rewind the control lever cam is pivoted away from the cam follower (78A). The motor is then pulled back by its
weight and the weight of solenoid (65) on the solenoid tilt arm (78A) plus the pull of the rewind tension spring (76). This brings the supply spool drive wheel (29) in contact with the supply chuck.

2. With the control lever (27) in the Stop position and the foot switch not plugged in, the space between the motor shaft and the idler wheel (39) and between the motor drive wheel (29) and the supply spool chuck (20) should be approximately equal 1/32". The position of the motor shaft is adjusted by bending the cam follower (78B) so it holds the motor in the proper position to insure the clearance desired.

3. With the control lever (27) in the "Run" position, the motor shaft should press against the idler wheel (39) which in turn engages the takeup drum (9). This engagement must be firm but not too tight. To determine whether or not the motor shaft engagement is correct, check the mechanism as follows:

   (a) Remove the retaining clip (40) and lift the idler wheel from its shaft.
   (b) Move the control (27) to Run.
   (c) Replace the idler wheel on its shaft with one side against the motor shaft and the other side resting on the edge of the takeup drum (9). The idler wheel should overlap the drum (9) about 1/32". This overlap is an indication of the pressure exerted on the idler by the motor shaft and on the drum chuck by the idler. If an adjustment is necessary bend the cam follower (78B).

The Brakes -

The brakes (57) and (49) are operated by the control lever (27) through the cam of the cam and link assembly (38) and the cam followers (56) and (59).

When the control lever (27) is turned to Run position, and the foot control or microphone not plugged in, the turned up end of the cam followers (56) and (59) will be positioned in the center of their relative brake arms (49) and (57). This removes all brake pressure to the brake arms (49) and (57) by the cam followers (56) and (59) and their connected springs (58) and (55). However a light brake pressure is applied to the takeup drum (9) and supply chuck (20) by springs (32) and (54) which are connected to their relative brake arms.

The light brake adjustment is very important when recording or playing back a recording. If the light brake pressure to the supply chuck is too light, the wire will be loose and jumpy and will wind uneven on the takeup drum. Too heavy of a light brake pressure will cause slow starting when the foot switch is used.

When the control lever (27) is turned from Run to Stop position, the cam (38) is pivoted away from the cam followers (56) and (59). This allows the tension springs (55) and (58) to pull on the cam followers which in turn applies pressure on the brake arms (49) and (57). This stops the mechanism promptly and keeps the wire from unwinding. The heavy brake applied to the takeup drum prevents back lash.

When the control lever (27) is turned to Rewind the brake arm (57) is pivot completely away from the supply chuck (20). However the control cam moves the right cam follower (56) to the center of the slot in the takeup brake arm (49) thus allowing a light brake pressure to be applied to the takeup drum by the tension spring (54). Additional brake pressure is applied to the takeup drum by the relay switch arm (46). This prevents the wire from over riding when the wire...
is rewinding at a high rate of speed.

**Level Wind Adjustment**

The height of the takeup spool (7) and supply chuck (20) are adjusted by loosening the lock nuts (71) and turning the set screw, see Figure 4. The brass collars (52), (Figure 4) are set on the shaft beneath the top plate bearings to restrict the upward movement of the drum and chuck. The collar on the takeup drum shaft (9) is set so that the drum (9) is free to turn but has practically no vertical play. If the collar on the takeup drum is set too low, vertical play may cause poor rewind of the wire onto the supply spool. If set too high the drum will not turn freely. The setting of the collar on the supply chuck shaft should provide approximately 1/16” vertical play of the chuck.

In order to properly adjust the level wind -

1. Remove the recorder mechanism from the cabinet by removing the bottom cover and the four mounting screws from the side cover.

2. Place a one hour spool of wire on the supply chuck (20) and properly route the wire on the mechanism.

3. Turn the On-Off-Volume control switch on and move the control lever (27) to Run.

4. Check the mechanism occasionally to see how the wire is winding on the takeup spool. If wire begins to build up toward either flange of the takeup drum (7), adjust the head stroke adjustment screw (62A). Turning this screw clockwise raises the head, counter-clockwise lowers it. Rewind the wire then run it forward again, observing the way the wire winds on the takeup spool and adjust the head until the level wind is even on the drum. Location of screw (62A) is shown in Figure 4. This adjustment is made from the top of the mechanism. The screw is accessible through a hole in the baseplate just behind the recording head.

5. Rewind the wire and observe the way it winds on the supply spool. If the wire builds up at the top or bottom of the spool, loosen the hex nut (52) on the bottom of the supply shaft (23) and turn the set screw, then tighten the nut. Turning the set screw in raises the supply chuck, counter-clockwise lowers the chuck.

**Forward and Reverse Solenoids**

1. Before any forward and reverse solenoid adjustment is made, be sure the manual operated drive mechanism is operating properly. See "Motor and Drive Wheel Assembly".

2. Remove the case from the recording unit.

3. Plug in the foot control switch.

4. Plug the line cord into an outlet supplying 117 Volts.

5. Turn the Volume-On-Off control switch on.

6. Turn the control knob (27) to Run.

After the recorder has been prepared as described in steps 1 through 6, the operation of the mechanism, may be observed and adjustments made as described in the following paragraphs:
Stop Position -

When solenoid (66) is energized (stop position) by the foot switch, the motor tilt lever (78A), assembled to the motor cover, is pulled down thereby pulling the motor shaft away from the idler wheel (39).

(a) The space between the motor shaft and the idler wheel (39) should not be less than 1/64" and not more than 1/32".

(b) To obtain the correct spacing, bend the motor tilt lever (78A) up or down to increase or decrease the distance.

Forward Position -

When the switch is opened, the motor tilt lever (78A), (assembled to the motor cover), is pulled down thereby pulling the motor shaft away from the idler wheel (39), which in turn drives the takeup drum.

(a) Check the space between the solenoid anchor pin (66B), Figure 5 and the top of the motor tilt lever (75A). The anchor pin (66B) should clear the motor tilt lever by approximately 1/32".

(b) To obtain this dimension, bend the lug, which is directly above the "T" plunger of the solenoid, up or down to obtain this 1/32" clearance.

NOTE: A heavy brake is applied against the supply spool brake shoe by the solenoid (66), allowing the motor shaft to engage the idler wheel (39) which in turn drives the takeup drum.

Forward Position -

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(b) To obtain this dimension, bend the lug, which is directly above the "T" plunger of the solenoid, up or down to obtain this 1/32" clearance.

NOTE: A heavy brake is applied against the supply spool brake shoe by the solenoid (66), allowing the motor shaft to engage the idler wheel (39) which in turn drives the takeup drum.

To Adjust -

(a) If the tension of spring (64) on the brake arm (35) is too light, the spool chuck will coast instead of stopping immediately. To correct this, bend the spring anchor arm (35A) down slightly to lessen the spring tension. See Figure 5.

(b) If the tension of spring (64) on the brake arm (35) is too great, the solenoid will not be able to seat properly therefore, bend the anchor arm (35A) down slightly to lessen the spring tension.

(c) After the above adjustment is made turn the control knob to Rewind and check the clearance between the tip of the brake arm (35) and the brake shoe of the left brake arm (36) and the brake shoe on the left brake arm (57). This clearance of 1/64" when the control lever is in the Rewind position.

Emergency Brake -

The emergency brake (items 11 and 12), Figure 2 is ready to work at any time during rewind. If during rewind the recording wire becomes loose or is broken, the emergency brake immediately applies a heavy brake to the takeup drum (9) stopping the drum. This prompt action prevents the "flywheel effect" of the takeup drum from spilling or tangling the wire.

4. With motor tilt arm (78A) properly adjusted and the gauge removed, the additional movement of the drive wheel (29) toward the chuck should give a quick pickup in rewind.

When the control (27) is turned to Rewind, the hook on the end of link (38A) is moved away from the stop arm (11). This allows the stop arm to move against the wire. During Rewind and as long as the wire winds properly, the wire will be tight enough to hold the emergency brake away from the takeup chuck (9). However, if the wire should brake, the stop arm (11) is released by the wire, thereby allowing the emergency brake, to engage the takeup drum (9) immediately stopping the drum, thus preventing the wire from spilling. Tension spring (12A) has a very short but moderately strong pull. However, it is almost completely relaxed when the upright end of the control arm (11) comes to within 1/8" to 1/16" of the hook on the end lever (38A).

If the wire brakes, the pull of the spring is strong enough to snap the control arm (11) back, thus actuating the emergency brake.

Adjust the emergency brake as follows -

With no wire on the recorder and the control lever (27) turned to Rewind, there should be about 1/16" clearance between the brake control arm (11) and the hook on the end of lever (38A), when the brake shoe (12D) barely touches the chuck (9).
When the takeup drum (9) is turning "backward" shorting contacts "6-7" to kill the Audio signal. When the takeup drum is running in a clockwise direction the head should be bent so there is about 1/16" clearance between the control arm (11) and the hook (38A).

4. Attach the tension spring (47). If, after spring (47) is attached to the emergency brake (12), the brake pad engages the drum (9) or does not touch the drum, adjust the spring tension.

(a) Loosen set screw holding the adjusting bracket (48).
(b) Adjust the bracket until the pad (12B) just touches the drum. The pad should be adjusted so the drum can be turned counter-clockwise, by hand, without the brake grabbing. Then increase the spring tension just enough so the brake will grab, unless the control arm (11) is held more than 1/10" to 1/8" away from the hook lever (38).

The Relay and Relay Control Switch -

The relay control switch (46) is in a single pole double throw switch. This switch (46) is in constant contact with takeup drum and is actuated by the direction of rotation of the drum. When the takeup drum is running in a clockwise direction, the control switch connects the 28 volt solenoid control voltage to the Run-Stop solenoid (66). The circuit is completed to ground through the foot switch. As long as the relay is energized the contacts "3-4" are closed completing the circuit from the RF bias oscillator to the erase and bias coils during rewind, the bias circuit is opened by the transcribe switch even though contacts "3-4" remain closed.

When the takeup drum (9) is turning "backward" during rewind, the relay control switch (46) is automatically reversed. The 28 volts are removed from the run-stop solenoid (66) and applied to the relay (70). This opens the bias circuit contacts "3-4" to prevent accidental erasure and closes the 6AR5 grid shorting contacts "6-7" to kill the Audio signal.

The relay control switch arm should meet the takeup drum chuck at a right angle or up to 15° toward the recording head. It should never lead the takeup drum or it will rest past its pivot point and not flip back when the drum turns counter-clockwise. The upright form lug which limits the throw of the switch (46) towards the head should be bent so there is about 1/16" movement of the switch after the contacts have "made". There should also be a slight movement in the opposite direction after the contacts "make" with the drum going forward.

The solenoid ground switch (69B and C) is opened mechanically when the main control lever (27) is moved to Rewind. It is then impossible for the solenoids to act. They can operate only when the control lever is in the Run position and the ground switch closed.

It is important that the switch contacts (69B and C) (see Figure 3) "make" before the control lever reaches the first "bump" of the cam, the spot at which it becomes hard to move the lever at the same time they cannot be too close together or arcing will be heard when the lever is moved from Run to Stop. Special care must be used when adjusting the spacing of the contacts of this switch.

TROUBLES
Rewind Starts Too Slowly With Foot Control -

1. The rear section of the motor tilt arm (18A) may be bent too high, thereby causing the drive wheel (29) to be pulled too tightly against the supply spool chuck (20). See "Reverse Position" under "Forward and Reverse Solenoids".

2. Emergency Brake Fails to Work or Grabs During Normal Rewind -

1. Brake shoe pad may be worn thereby causing the brake to fail in operation.

2. Emergency brake out of adjustment. See "Emergency Brake".

3. Spring (47) may be out of adjustment. See "Emergency Brake".

Wire Does Not Wind on Supply Chuck or Takeup Drum Evenly -

1. Supply chuck shaft (23) or takeup drum shaft (9) out of adjustment. See "Level Wind Adjustment".

2. Check recording head and slide to see if it moves freely.

(a) Dirt may have accumulated on the head slide (22) or the lubricant may have hardened. Clean the slide with carbon tetrachloride and lubricate with light grease to insure smooth operation.

(b) The head slide (22) may be bent, causing it to stick. Repair or Replace.

Wire Winds Loosely -

1. Check the "Light Brake" on both drums. If they are not adjusted properly the wire will wind loose and uneven.

(a) See Paragraph on "The Brakes" under Adjustments.

Mechanism Will Not Reverse When Foot Control Is Used -

1. Motor tilt arm (78A) incorrectly adjusted thereby preventing proper engagement of the drive wheel (29) and supply chuck (30).

(a) See "Reverse Position" under "Forward and Reverse Solenoids".

Page 8
Erases During Reverse -

- Relay control switch (46) incorrectly positioned, thereby preventing the switch from being reversed when the takeup drum reverses.
  
  - See "Relay and Relay Control Switch".

Recorder Will Not Turn On -

1. Check for burned out fuse.
2. Loose A.C. plug connection.
3. Automatic stop control arms loose.
A PHOTOFAC Schematic

Howard W. Sams & Co., Inc., 1952
### MECHANICAL PARTS LIST

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*Includes items 16, 17, 18, 19, 20 and 23.*
Ref. Part No. Part Description
43 45P367 Bracket for item 46
43A 41P763 Pivot Pin for item 46
44 46P165 Tension Spring- Toggle Switch
45 41P770 Spacer - Lower for item 11
46 11X42 Switch, Bracket and Brake Assembly Complete- includes items 43, 43A, 44 and the following parts -
66 32P064 A. C. Switch
49P140 Brake Post
68 32P012 Brake Cam
47 46P265 Tension Spring for Safety Brake
48 45P1177 Adjusting Bracket for Tension Spring item 47
49 45P511 Right Brake Arm
50 26P098 Brake Pad
51 11X359 Wheel and Pinion
52 41P557 Play, Adjusting Collar
62 26P833 Set Screw
53 46P205 Tension Spring- Clock Mechanism
54 46P257 Tension Spring Right Brake Arm
55 46P311 Tension Spring- Cam Follower
56 45P321 Right Cam Follower
57 45P986 Left Brake Arm
68 26P908 Brake Pad
58 46P321 Tension Spring- Cam Follower
59 45P719 Left Cam Follower
60 11X342 Shut Off Link
61 46P315 Head Stroke Adjusting Spring
62 45P644 Head Stroke Adjusting Bracket
62A 26P294 Head Stroke Adjusting Screw
63 46P302 Head Slide Tension Spring
64 46P272 Tension Spring for item 65
65 65P035 Rewind Solenoid (Rear)
66 46P254 Tension Spring for item 66
67 11X740 Sub Base Assembly
68 46P255 Switch, Cam
69 49P650 Switch Black
4 A 45P28 Switch Leaf
4 B 11X600 Switch Leaf
C 11X339 Switch Leaf
70 26P747 Screw and Lock Washer
71 11X277 Spool Weight Adjusting Screw Assembly
72 11X345 Cam, Gear and Rocker Assembly
73 46P812 Tension Spring- Motor Cam
74 Leaf Switch for Automatic Shut Off
75 46P281 Motor Tension Spring
76 65P035 Relay
77 41P753 Motor Pivot Pin
50P095 Retainer
27P24 Cotter Pin
41P839 Spacer
51P047 Motor Shaft Bearing
78 17X507 Bearing and Cover Assembly
79 15X118 Motor and Cover Assembly
80 41P775 Pivot Shaft
81 41P774 Adjusting Screw for Foot Tension
82 45P899 "Forward" Foot Pedal
83 46P294 Tension Spring
84 49P142 Ratchet
41P722 Shaft for Ratchet
85 32P066 Switch- Forward