

Control and Instrument Switches

Westinghouse Type W



I.L. 34-250-1

Introduction

The Westinghouse Type W switch is a low voltage manually operated rotary switch. It is made with two types of contacts: momentary and maintained. Momentary contact type is spring return to "off" or center position and is used for circuit breaker, rheostat, and other electrically controlled apparatus. The maintained contact type remains in each position as rotated and is used for performing various circuit combinations with instruments, relays, meters, and other electrical apparatus.

The switch is of rugged and simple construction and meets most electric utility and industrial requirements. (Not tested to seismic requirements.)

Detailed Description

The Type W switch is a box shaped device having an insulated base at the bottom, a metal cover at the top, and a rotating drum between these parts supported by the end members. On the insulated base are mounted stationary fingers having a terminal stud connection on outside of base. These fingers are spring loaded and mounted on the base opposite to one another so as to make a circuit with the rotating segment on the drum. The finger tips are so arranged to be on the horizontal center line of the rotating drum and the segments are shaped to project outward to make contact at the finger tips. A circuit is made entering the one terminal, through the finger to the metal segment on the rotating drum, through the segment to opposite finger tip, down the finger to the other terminal stud. By rotating the drum, different circuits are closed or opened. A handle on the shaft produces the means of rotating the drum and a dial plate identifies the various positions. Proper insulation is provided for use on 600 Volts A-C or D-C.

Refer to Figures 1 and 2 showing projectional view of switch. An open circuit is shown with one side of the circuit connected to one stud and the other side connected to the other stud. Clockwise rotation of the rotor will cause a circuit to be made between the two fingers. Good contact pressure with wiping action and self-alignment is obtained by the finger spring and the rounded surface of the finger at the pivot point. Multilaminated copper shunts conduct the current from the finger to the terminal stud. The moving segments are brass having a silver finish and are separated by hot-molded

insulating material. The segments are keyed (held fast) to the insulating tube which is made of Micarta (phenolic laminate cotton cloth tubing). The operating shaft is made of cold-rolled steel rod and rotates in bronze bearings placed in the steel front and rear end plates. The base is made of phenolic molded insulating material and is ribbed to give ample creepage distance between studs. Terminal stud identification numbers are molded on the base of the switch adjacent to the base of each terminal stud. These numbers are the same numbers shown on the connection diagrams. The studs are mounted on the terminal base in such a manner that they positively will not turn or become loose. Insulated side plates slide in grooves between the top and base of the switch, snapping snugly into the closed position. This arrangement provides immediate access for inspection of the contacts. The top cover is a steel channel with Micarta (phenolic laminate) insulation underneath to insulate it from the rotating segments. Figures 1 and 2 show projection views of the maintained and momentary contacts switch designs. These figures show readily how the switch parts are assembled together and the various shaped handles available. Switch handles available are pistol-grip, oval, round notch, and special pistol-grip. Each are used according to the function of the switch.

Installation

The Type W switch as manufactured is ready for installation and use without any further adjustment or alignment.

To mount the switch on a panel, remove handle screw and pull handle from shaft. Remove dial nameplate by pressing down at the top and pushing upward; the movement will release plate at the bottom and it will be free for removal. Take out mounting screws and washers, and remove dial plate. Place switch on rear of panel with shaft extending through 7/8" dia. hole of panel drilling. Replace dial plate on shaft on front of panel and fasten securely to switch with mounting screws. Replace dial nameplate by sliding plate into the top of the dial plate and then pushing downward and in at the bottom until it is held securely. Fasten handle on shaft with handle screw. To remove the switch from the panel the above procedure should be followed in reverse order.

Adjustments

If it is necessary to make any adjustments to the switch rotor, it can be done in two ways: (1) the segments can be

moved slightly on the rotor by releasing the end clamp nut and (2) the finger rise and fall on the segments can be changed by bending the finger bracket inward or outward.

These adjustments are made properly at the factory and are not required for a new switch.

Operation

The maintained contact switch design can be made for partial rotation or complete 360° rotation around the dial. Positioning points are made by a notched wheel (star-wheel) mounted on the front end of the rotor and two steel finger assemblies mounted on the base on opposite sides of the starwheel. These fingers snap into the notches as the rotor turns producing position indication. Starwheels are available for 120° throw (2 position), 90° throw (2 and 4 position), 60° throw (3 or 6 position), 45° throw (3-4 or 8 positions), and 36° throw (5 or 10 positions). Stops are provided for partial throw switches by means of a projection on the handle insert fitting into a broach or cutout in the dial plate; adjusting the broach to proper angles of cut produces the desired limited rotation.

The momentary contact switches are designed for 60° travel on each side of a neutral point. This allows the design to be made for 3 or 2 position switches. The return spring is assembled at the front end of the switch with the ends of the spring retained at a fixed point by means of a pin projecting from the front end plate. A stop is obtained by the pin striking a projection on the flange of the spring holding part. For 2 position switch the stop is made with a broached dial plate and handle same as on the maintained contact switch design.

In general all contacts are made between opposite terminal fingers producing a double break single pole contact. Sometimes, it is convenient to make contact between adjacent fingers on the base. This is done where the rotor travel might be 180° or greater and a repeat contact is not desired. This is accomplished on the rotor by separating the segments with a metal instead of an insulating part. Any number of these metal spacers can be used along the rotor depending on the circuitry desired.

Operating Instructions

The Type W switch is a manually operated switch and it can be rotated clockwise or counterclockwise. On maintained contact switches, the positioning device indicates by feel when the rotor has rotated to the next position. On momentary contact switches, the operator should rotate till the stops are reached. The handle is returned by spring pressure to the neutral position.

The nameplate position marking is located so that when the handle is at a position, it points as nearly as possible to the middle of the marking.

Maintenance

In general no maintenance schedule is required for periodic routine checking of the Type W switch. Since the contacts are self-wiping, routine operation should keep the contacts clean. Removal of the side plates gives the maintenance man a quick view of the contacts. Charred or burned fingers or segments should be replaced. No lubrication of parts is necessary. Contacts showing heavy wear should be checked to make certain good contacting is still maintained; adjust finger bracket if heavier contacting seems desirable. Fingers should rise from 1/16 to 3/32 of an inch when making a contact.

When replacing a contact, disconnect the wires to the contact, remove them from the switch, and tape the ends. On hinged panel construction, it should not be necessary to remove the switch from the panel when replacing contacts.

When replacing a moving contact segment, it is necessary to remove the complete rotor assembly. This is accomplished by first removing the handle which is secured to the shaft by a screw. The switch rear end plate should then be removed by removing the four screws from the top cover and insulating base. The rotor may now be withdrawn from the rear. Remove the locking nut at the end of the rotor and the spacers and segments can be slid off. The contact segment key notches are numbered to facilitate correct assembly. If a record of the key number is made as each segment is removed, the correct re-assembly may be easily made.

Instrument Switch

1. Operating Shaft
2. Micarta Insulating Tube
3. Notch Key
4. Starwheel Stop
5. Starwheel Stop Pin
6. Insulating Spacer
7. Moving Contact Segment
8. End Spacer
9. Contact Finger Terminal Screw
10. Starwheel Stop Finger
11. Stationary Contact Finger
12. Terminal Base
15. Front End Plate with Bearing
16. Rear End Plate with Bearing
17. Side Plate
18. Top Cover
19. Top Cover Liner
20. Dial Plate
21. Dial Nameplate
22. Heavy Duty Round Notch Handle
23. Modern Round Handle
24. Modern Oval Handle
25. Modern Pistol Grip Handle
26. Modern Special Pistol Grip Handle
27. Front Rotor Collar

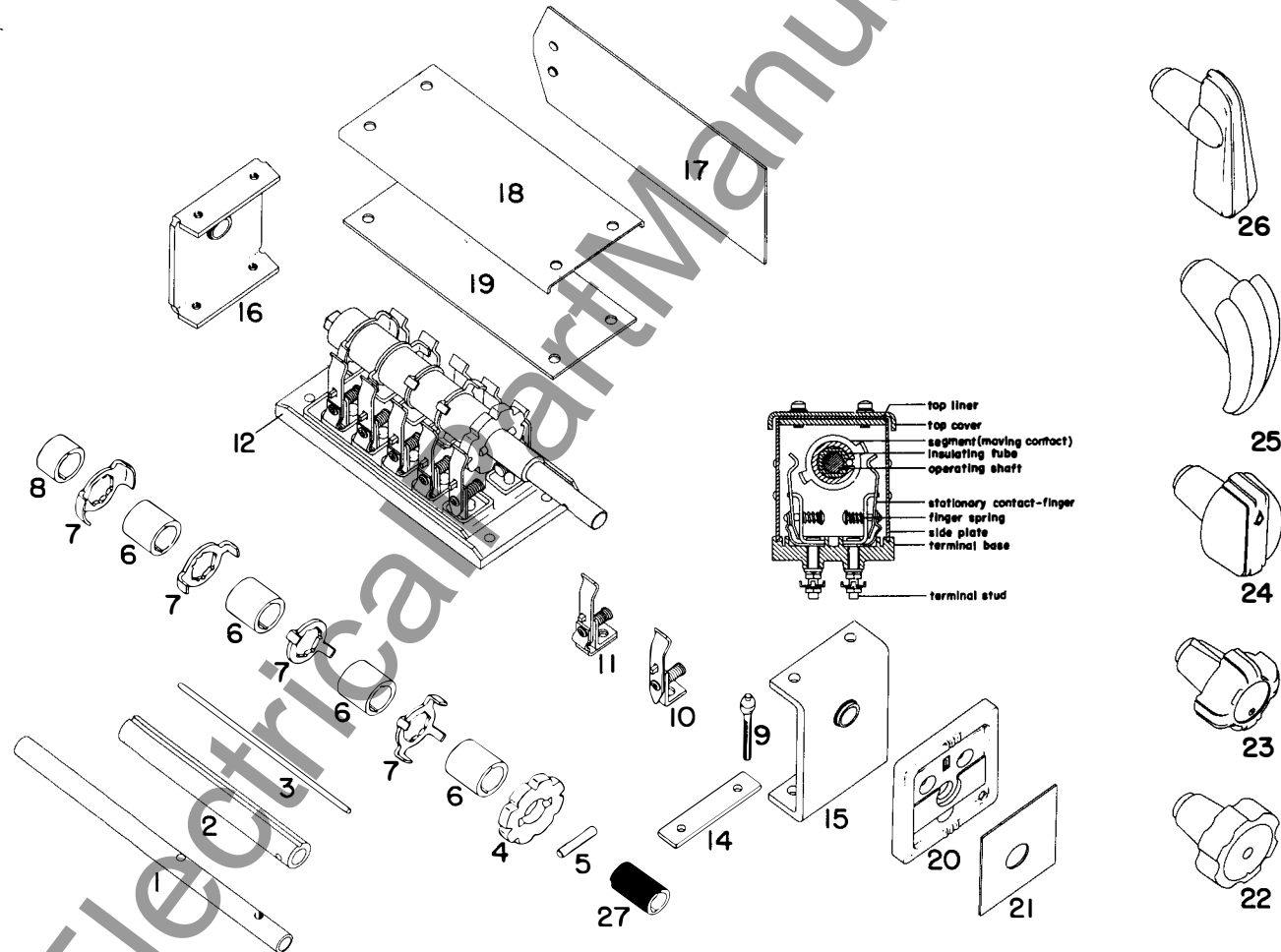


Fig. 1 Instrument Switch (Westinghouse Type W)

Control Switch

1. Operating Shaft
2. Micarta Insulating Tube
3. Notch Key
4. Centering Spring Spacer
5. Centering Spring Spacer Pin
6. Centering Spring
7. Centering Spring Stop
9. Insulating Spacer
10. Moving Contact Segment
11. Contact Finger Terminal Screw
12. Stationary Contact Finger
13. Terminal Base
16. Front End Plate with Bearing
17. Rear End Plate with Bearing
18. Side Plate
19. Top Cover
20. Top Cover Liner
21. Dial Plate
22. Nameplate
23. Heavy Duty Round Notch Handle
24. Modern Round Handle
25. Modern Oval Handle
26. Modern Pistol Grip Handle
27. Modern Special Pistol Grip Handle

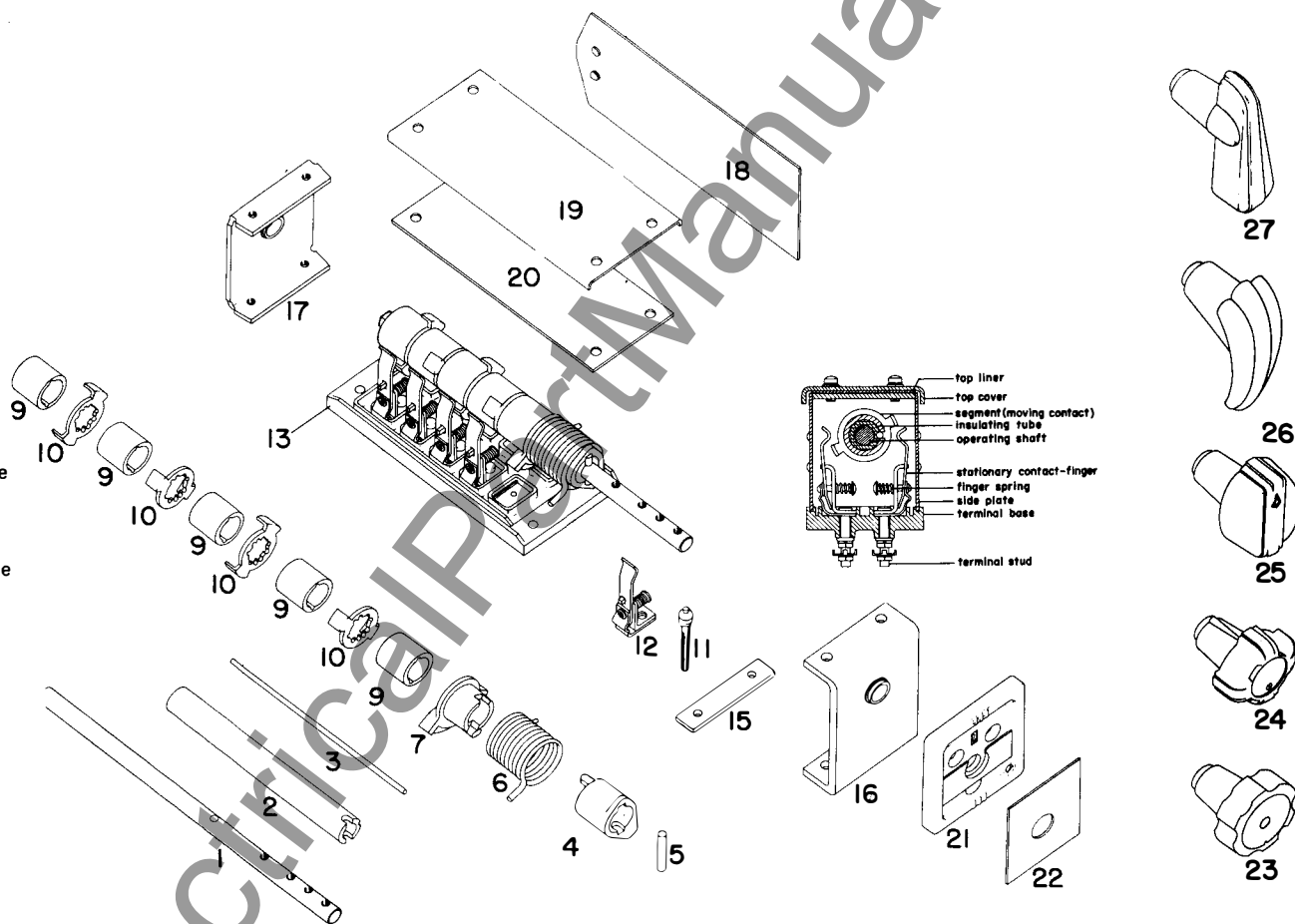


Fig. 2 Control Switch (Westinghouse Type W)