NAVY SERVICE A
A-C OR D-C MASTER SWITCHES
TYPE SMP

PEDESTAL-MOUNTED • WATER-TIGHT ENCLOSURE

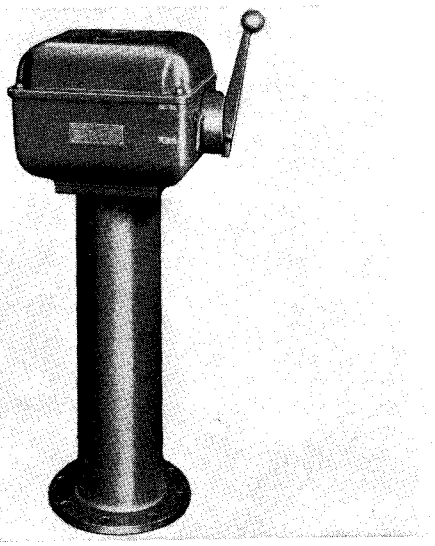

Fig. 1—Type SMP Pedestal-mounted Master Switch in Water-tight Enclosure (Cast Bronze)

APPLICATION

The pedestal-mounted Type SMP Master Switches are for deck application and are intended for use with magnetic controllers for winches, windlasses, capstans and other similar motor driven auxiliaries aboard ship. These master switches have been specifically designed for Navy Service A applications.

RATING

The switch unit ratings are in accordance with the information given in Fig. 2.

CONTACT						
DESCRIPTION	AMPERES CONTINUOUS CAPACITY	D-C RATING		A-C RATING		
		AMPERES INTERRUPTING CAPACITY FOR RESISTIVE LOAD		AMPERES INTERRUPTING CAPACITY FOR RESISTIVE LOAD		
		115 V.	230 V.	110 V.	220 V.	440 V.
Normally Open or Closed	25	50	25	50	25	10

Fig. 2—Switch Unit Rating Table

The enclosure heater is rated at 35 watts.

CONSTRUCTION

The pedestal Type SMP Master Switch shown in Fig. 1 consists of a cast bronze case and cover mounted on a relatively heavy section of steel pipe. The mounting flange at the bottom of the pipe pedestal is open to permit the control leads to be brought up through the deck and pedestal to the terminal boards in the enclosure. A gasket should be used between the pipe flange and the deck to prevent the entrance of water or moisture. The enclosure is split well below the centerline of the contact assemblies so that when the cover is removed, all parts are accessible. The cover is held on the case by four bronze bolts, one in each corner, and a neoprene gasket between case and cover. All parts are accessible when the cover is removed. The operating handle can be placed on either the right-hand or left-hand side of the enclosure. The handle is guided in such a manner that a small side motion is required when moving the handle from the forward to the reverse direction, or from the reverse to the forward direction. On the "Off" point the handle is usually in a vertical position. If it is desired, the handle assembly can be turned so that in the "Off" position the handle is in a horizontal position with respect to the enclosure. A greater angular movement of the handle is required between the "Off" position and the first point in either direction than between any other points. This provides some protection against accidental moving of the handle from the "Off" position. On the right-hand side of the enclosure a small auxiliary handle operates a switch unit known as the "Safe Switch" which must be moved from the "Off" to "On" position before any movement of the operating handle will be effective in operating the controller. This protects the apparatus and personnel against danger if the operating handle is moved inadvertently.

A resistor unit mounted inside the enclosure functions as a heater to prevent the condensation of moisture. The heater maintains the temperature inside the enclosure at a temperature level at which moisture cannot form. All metal parts are either made of corrosion-resisting material or are suitably protected against corrosion.

The single pole Type SM Switch Units have double-break gaps and silver contact buttons.

A single switch unit is shown by Fig. 3.

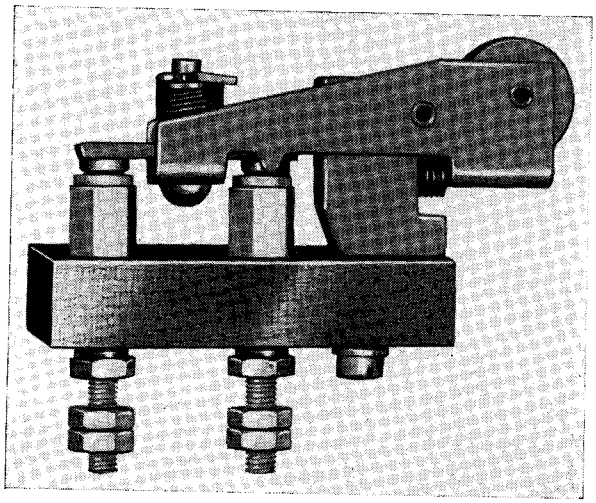

Fig. 3—Type SM Switch Unit

The relationship between a typical Type SM Switch Unit and the cam assembly is shown by Fig. 4.

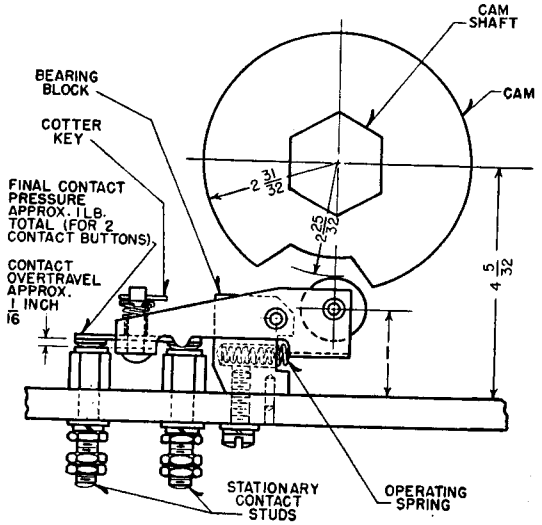

Fig. 4—Normally Closed Type SM Switch Unit Shown in Relationship to an approximately 6 Inch Diameter Operating Cam (Dwg. 5-C-4907)

When the cam shown in Fig. 4 is rotated, the operating roller is pushed down and the contacts are opened as shown by Fig. 5.

For a master switch assembly, a number of the switch units are usually mounted on an insulating base. The switch base is made from glass melamine

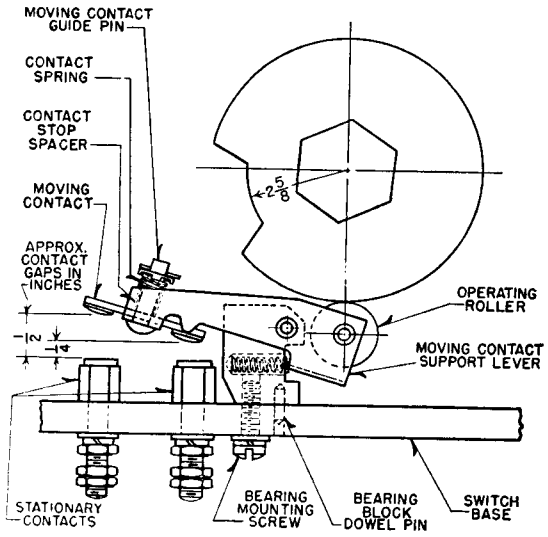

Fig. 5—Normally Open Type SM Switch Unit Shown in Relationship to an approximately 6 Inch Diameter Operating Cam (Dwg. 5-C-4907)

Micarta. The master switch assembly shown by Fig. 1 is suitable for accommodating a maximum of thirteen switch units and one "Safe Switch" unit. The switch units are operated by phenolic cams mounted on a hexagonal steel shaft which is mounted parallel to the switch bases. The switch unit contacts or circuits will open or close when the shaft is rotated. The sequence of operation of the switch units will be determined by the shape of the cams and their location on the shaft. A typical starwheel, pawl and roller assembly is shown by Fig. 6.

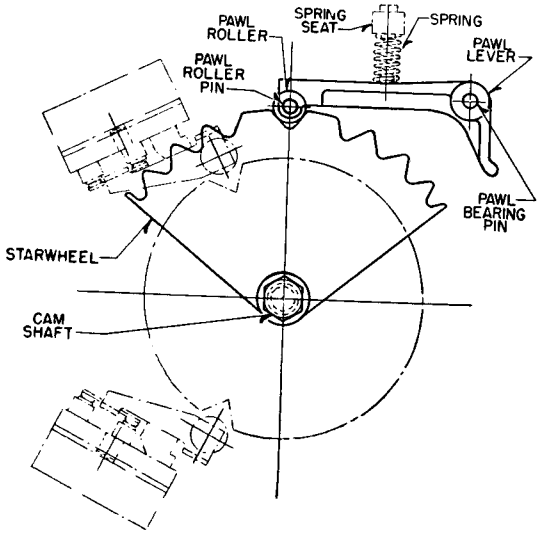

Fig. 6—Starwheel, Pawl and Roller Assembly (Dwg. 5-C-4930)

The starwheel and roller assembly provides definite positioning of the cam shaft at the various operating points. The operating handle will be held by the starwheel and roller assembly in the position selected until the operator moves it to another position.

These master switches can also be manufactured so that the operating handle will be spring returned to the "Off" position. With this type of assembly, the handle returns to the "Off" position as soon as the operator removes his hand from the handle.

Fig. 7 shows a partial view of a typical pedestal-mounted master switch with the cover removed to show the cam shaft assembly, switch units, switch bases, and heater.

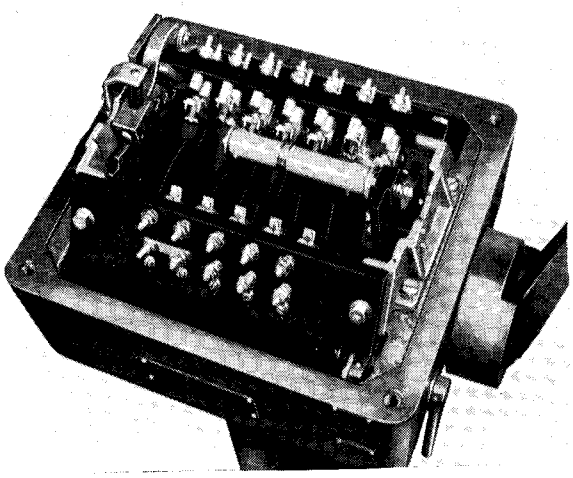

Fig. 7—Type SMP Pedestal Master Switch with the Cover Removed

OPERATION

1. **NORMAL**—The Type SM Switch Units are manually operated by a cam shaft. Rotation of the operating handle will rotate the cam shaft. When the shaft is rotated, the operating cams will engage with rollers mounted on the Type SM Switch Unit moving contact levers and will rotate the contact levers about their bearing pins. This in turn will open the electrical circuit. As the contacts are cam opened and spring closed, the contacts will reclose when the cam is rotated out of engagement with the roller. With this type of operating mechanism, there is no possibility of the contacts remaining closed when the cams fully engage with the rollers.

The switch units are arranged so that they have overtravel to take care of misalignment and contact wear.

When the contacts are in their closed position, there should always be ample clearance between the cams and the rollers as illustrated by Fig. 4.

The "Safe Switch" on the right-hand side of the master switch enclosure should be turned to the "Off" position when the control is not in use.

2. **UNDER SHOCK**—These master switches are constructed in such a manner that all parts can withstand high impact shock without breakage or deformation. The rotating parts are approximately balanced about the cam shaft and this characteristic helps to neutralize the shock forces tending to rotate the shaft. The starwheel, pawl and roller assembly also help to prevent the cam shaft from changing position during a shock.

The switch unit contacts may open momentarily during a shock. However, the master switch is usually applied and used in such a manner and circuit that momentary opening of the contacts does not affect the operation of the associated controller elements.

When the switch units are open, it is impossible for them to reclose when the master switch is subjected to shock as the cams and moving contact levers positively hold the moving contacts in the open position.

INSTALLATION—MAINTENANCE—REPLACEMENT OF PARTS

1. **GENERAL**—General instructions and suggestions for installation and maintenance can be found in Instruction Leaflet 6000-1. A periodic inspection should be made to insure that all screws, bolts and nuts of these master switches are tight. All current carrying parts should be kept clean and tight.

2. **MOUNTING**—The pedestal-mounted Type SMP Master Switches are provided with eight mounting holes in the flange of the pedestal for mounting them in a vertical position with respect to the deck. The master switch assemblies have a conduit or lead entrance through the mounting flange and pedestal.

3. MOVING CONTACTS—The moving contact may be removed by simply taking out the cotter key. A contact assembly may be readily removed from a switch base by taking out only the bearing mounting screw. When assembling a complete switch mechanism on a switch base, it should be made certain that the bearing block dowel pin shown in Fig. 5 is in place. This dowel pin is absolutely necessary to hold the switch assembly in the proper position. Also, check to see that the spacer on the moving contact pin is in place. This spacer or bushing is used to limit the overtravel of the moving contact assembly and prevents the contact spring from being solidly compressed or deformed.

4. STATIONARY CONTACTS—After the complete switch mechanism has been removed from the base, the two stationary contacts may be removed by taking off the nuts on rear of the switch base.

5. CONTACT GAP — OVERTRAVEL — PRESSURE — The contact gap is the distance between the moving and stationary contacts when the switch is in the open position. All switch unit assemblies should have approximately ¼ inch gap between the rear contact buttons and ½ inch gap between the front contact buttons as shown on Fig. 5. The total of the two gaps should be approximately ¾ inch.

The overtravel should be 1/16 inch. It is the distance that the moving contact would travel if it were not stopped by the stationary contacts.

The contact pressure should be approximately 1 pound total for the two contact buttons. Refer to Instruction Leaflet 6000-1 for typical methods of measuring the contact pressure.

6. CONTACT MAINTENANCE—Both the moving and stationary contacts should be inspected periodically to make sure that the overtravel is not less than 1/16 inch. If either the stationary or moving silver contact buttons wear or burn down to 1/32 inch from the brass or steel contact support, the contact should be immediately replaced. Brass and steel are extremely poor contact materials and may cause overheating or contact support welding. In general, moderately burned or blackened silver contacts do not require replacement or dressing as the discolored surface is generally still a good conductor. The moving contact should always operate freely on the guide pin. If excessive contact burning and pitting takes place, the overtravel and pressure should be checked to see that they are correct.

7. BEARINGS—The bearings, starwheel, pawl and roller assembly should be cleaned and oiled at frequent intervals.

8. CAMS—To remove the cams, first remove the lower switch base by taking out the two mounting bolts which are at each end of the base. Then, remove the four mounting bolts in the bearing plate at the end of the cam shaft opposite the handle. It is only necessary to remove the bearing plate at one end. Then, the complete cam shaft assembly can be pulled out of the enclosure. Next, remove the combination collar and coupling assembly from the cam shaft on the end opposite the starwheel by driving out the taper pin. The cams can then be pulled or pushed off the shaft. Before removing the cams, mark the cams with respect to the starwheel and shaft so that they can be re-assembled correctly.

9. OPERATING HANDLE LOCATION—The handle can be transferred from one side of enclosure to the other by removing the four bearing mounting bolts in each of the two bearing plates. Then, the handle bearing plate should be interchanged with the standard bearing plate and bolted securely to the enclosure. The position of the cam shaft assembly should not be changed when the handle location is changed.

10. ENCLOSURE HEATER—The resistor type of heater operates at a fairly high temperature. Care should be exercised to make certain that the resistor unit is not hot when any inspection or maintenance work must be done. A different resistor unit must be used for each voltage rating.

WEIGHT OF A TYPICAL MASTER SWITCH AND SPARE PARTS

DESCRIPTION	NO. PER SET	WEIGHT
Pedestal Mounted Master Switch—Fig. 1	..	110 lbs.
Type SM Switch Unit—Fig. 3	..	4½ oz.
Spare Parts		
Type SM Switch Units—Figs. 4 and 5		
Moving Contact	1	¼ oz. } 1 oz.
Stationary Contact	2	¾ oz. } 1 oz.
Contact Spring	1	..... } 1 oz.
Operating Spring	1	..... } 1 oz.
5 Inch Type WL Resistor Unit	1	4 oz.

Fig. 8—Weight Table

CIRCUIT DIAGRAM SYMBOL

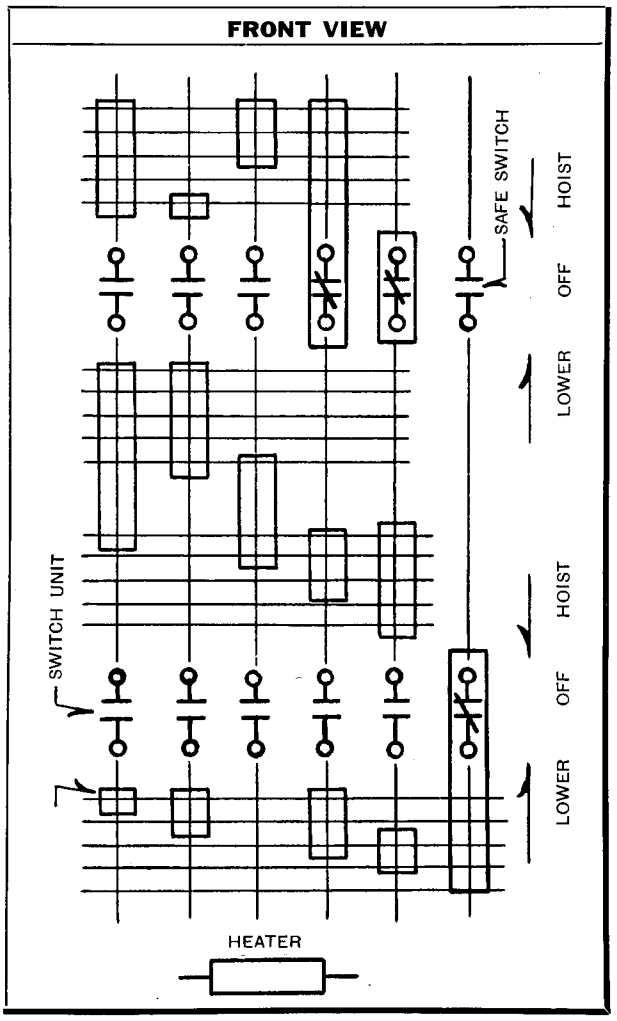

Fig. 9—Typical Wiring Diagram Symbol (Dwg. 5-C-4930)

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