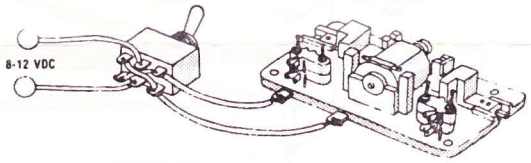
OPERATING/INSTALLATION INSTRUCTIONS for the PFM/FULGUREX SLOW-ACTION SWITCH MACHINE

I. Specifications & Maintenance:

Operating Voltage: 12V (Maximum), 8V (Minimum)
Operating Current: approximately 200 MA when motor is running
Switch Current: 5 amperes maximum
Travel: at 8 volts: .222" ± .010"; at 12 volts: .250" ± .015". (Travel variations due to coast time of motor.)
Lubrication: The PFM/Fulgurex Slow Action Switch Machine is factory lubricated and should probably never require lubrication. In the event of extremely heavy usage you should periodically add a little light white graphite grease on the worm, worm gear, worm gear side faces, screw shaft, and sides of traverse bar. The factory lubricant is white graphite and will turn black after short usage. This is normal."

II. Wiring:

A. Electrical control of the PFM/Fulgurex switch machine is exceedingly simple. Just wire 8-12V DC power to the two terminals on the switch machine through a DPDT polarity reversing switch. When the toggle switch is in one position, the switch machine travels to its limit in that direction. Reversing the toggle switch causes the switch machine to travel to its limit in the opposite direction.



B. Contacts: Four sets of contacts are already installed on the PFM/Fulgurex switch machine. The lower contact assembly on each side is used to control the limit of travel in that direction. The upper contact assembly on each side may be used by the customer for normal switching of frogs, etc.

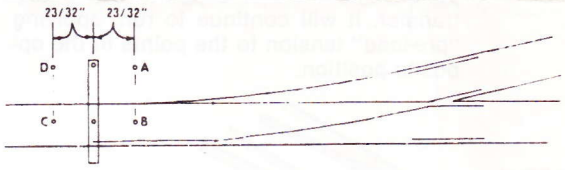
C. Additional Contacts: Additional contacts may be purchased and stacked on the existing studs for those applications requiring more auxiliary contacts than the two sets provided.

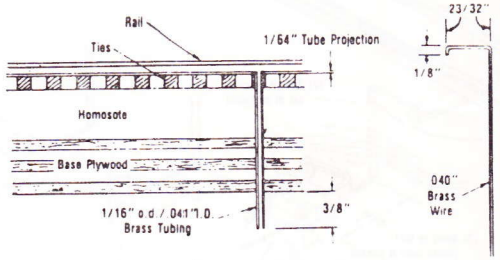
III. Mounting Instructions:

A. Below Layout:

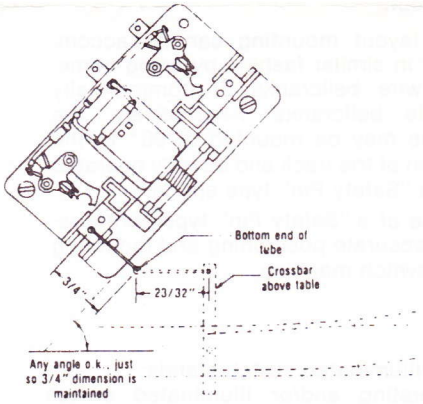
Note: You may wish to use a Tenshodo switch machine linkage kit, or construct your own from the brass wire and tube supplied. Both will work well, however the brass wire & tube combination will usually produce a less conspicuous operating method.

1. Locate and drill a 1/16" hole through the roadbed at a distance of 23/32" (just under 3/4") from the throw bar. Use one of the 4 locations shown (A, B, C, or D) according to your preference.
2. Insert the 1/16"o.d.(.0625") brass tube in the hole, leaving the top of the tube slightly higher (1/64") than the top of the ties. It may be necessary to shorten the tube slightly to suit your roadbed/layout thickness.
3. Drop the previously formed hook down the tube, and engage the 1/8" tang into the hole in the switch point throw arm.
4. Verify that the brass wire pivots freely and the points operate smoothly.
5. By means of spikes or tape, lock the switch points at the mid-point of their throw.
6. Manually operate the switch machine motor armature until the operating bar is at the mid-point of its travel.





7. Locate the switch machine on a flat mounting surface under the layout as shown, with the hole in the operating bar about 3/4" from the center of the projecting tube.



Note: You may use either end of the operating bar, and you may mount the switch machine at any angle to the trackwork (angle Ø on drawing) as long as the operating bar hole to be used remains 3/4" from the tube centerline. Fasten with at least 2 appropriate-sized round head wood screws at opposite corners of the switch machine.

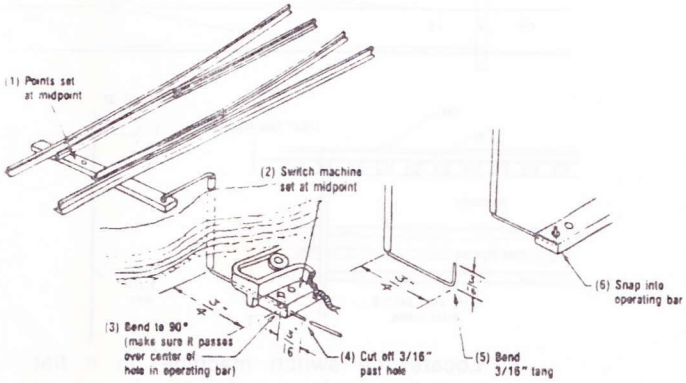
Note: Small rubber washers or pads may be used between the switch machine and the baseboard to isolate the sound if desired. Be sure to insert directly under screws so that no twist is imparted to the base.

8. With the points and the switch machine at their respective mid-point of travel, bend the .040" operating wire over to 90° at the bottom of the tube. Bend it in a straight line so that it directly intersects the hole in the operating rod. Then clip it off about 3/16 of an inch past the hole. Using small modeler's pliers, bend a 3/16" tang on the

end of the wire, and insert this tang in the hole in the operating rod.

9. This completes the installation. No adjustment is required as the overall operating arm travel is far more than necessary to drive the points from one side to the other. The extra travel of the operating arm will simply flex and/or torque the operating wire and add extra closing tension, or "pre-load," to the points.

In actual operation, the motor will run a little bit before the points move (unwinding pre-load tension). Then, about the mid-point of its travel, the points will slowly transfer. It will continue to run, applying "pre-load" tension to the points in the opposite position.



B. Above Layout:

1. Above layout mounting can be accomplished in similar fashion by using home-made wire bellcranks or commercially available bellcranks. Alternatively, the machine may be mounted at 90° to the direction of the track and directly operated using a "Safety Pin" type spring.

Use of a "Safety Pin" type spring requires accurate positioning and mounting of the switch machine.

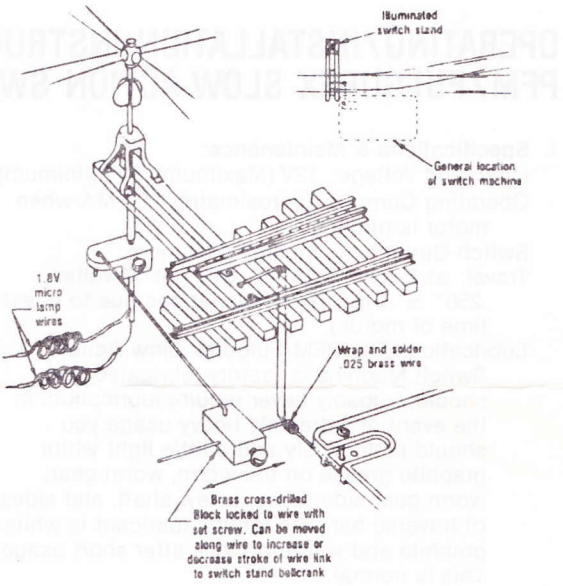
IV. Other Uses:

A. Operating illuminated switch stands:

1. If operating and/or illuminated switch stands are contemplated, the underneath mount with "do-it-yourself" bellcranks should be used. Some additional hardware will have to be made up, depending on the style and type of operating switch stand used.

The PFM/Fulgurex slow action machine is ideally suited for controlling such delicate devices due to its slow operating speed.

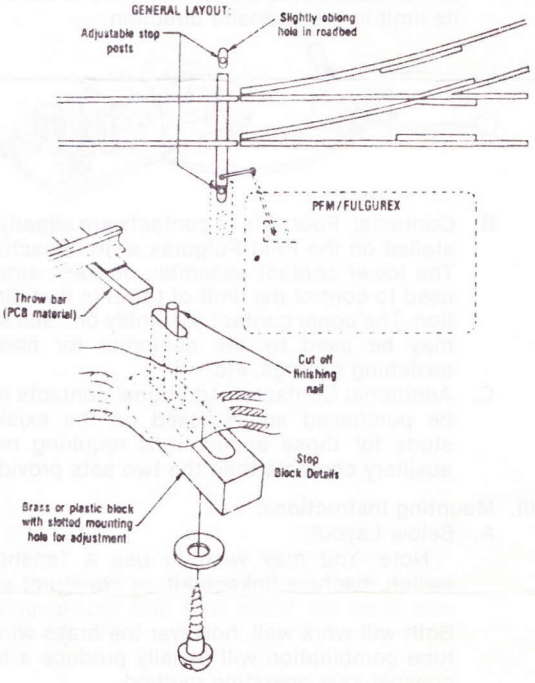
Final Installation:
Dust Cover: The plastic bubble packaging is designed to be a dust cover for the PFM/Fulgurex Slow Action Switch Machine. When installation is complete, use a modeler's knife to cut necessary opening for wires, etc., and attach to the layout underside with thumbtacks or tape."



B. Stub switches:

1. Two stops are needed for stub switch operation. They can be as simple as properly placed nails or brads; or they can be a little more exotic ... little plastic or metal blocks with adjusting screws.

A typical setup, with adjustable blocks, is pictured below.



C. Building doors, crossing gates, water spouts, etc.:

1. Many devices can be animated by means of suitably designed custom linkage and bellcranks.