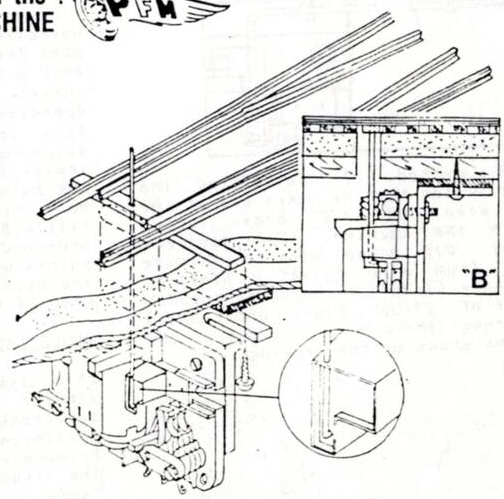
OPERATING/INSTALLATION INSTRUCTIONS for the PFM/FULGUREX SLOW-ACTION SWITCH MACHINE



The PFM/Fulgurex Slow Action Switch Machine may be installed in several different ways. The first method, suggested and developed by members of the Swamp Creek & Western Model RR Club of Edmonds, Washington, is a unique, vertical, under-the-table mount using aluminum "L" angles and a .047 piano wire to throw the points.

While it requires purchasing additional material, we have found this method to be quick, easy and practically "fail-safe".

Light aluminum or sheet metal angles (about 1-1/2") can be found in most large hardware stores or sheet metal shops. Piano wire should be available at your local hobby store. If aluminum angles are unavailable, L-shaped mounts can be fashioned from lengths of 1/4" plywood fastened to 3/4"x1-1/2" mounting block.

To begin...cut a piece of angle to the approximate length of the switch machine, around 3-3/16". On one side of the "L" mark and drill two 1/8" holes to mate with the holes in the switch machine base. On the other leg of the angle, drill two more holes the same size; then file them to form a "slot" or make a saw kerf slot 1/2" long. This side of the "L" will be mounted against the layout base and the slots allow room to adjust the mounted switch machine for proper point movement. Mount the machine on the angle using small (4-40x1/2") machine screws and nuts. Make sure the machine is mounted to provide enough clearance between the worm/gear and baseboard. (See "B").

On one of the "towers" that actuate the micro switches drill two holes to accept the .047 piano wire point actuator. The first is through the tower lip up (towards the worm end of the motor) and one in the lower "tongue" of the "tower" toward the switch machine base. Cut a piece of .047 piano wire about 6" long. Bent a 90 degree lip about 3/16" long on one end. Thread this through the upper hole and then insert the wire lip into the tower, pressing until it is seated. Do not use piano wire lighter than .047 or action will be lost in the wire "give". The other end of the wire slips through the switch point rivet or a suitable hole drilled in the throwbar. (With old nippers or a Dremel cutoff disc cut the excess wire off when installation has been completed.)

Now, find the location of the turnout throwbar. As shown in diagram "A", drill and rout a slot through the roadbed/baseboard approximately 3/4" wide, or enough to allow the .047 activator wire room to throw the points. Before final installation, tape or fasten the points in mid-position. Also make sure the switch machine throw bar is in the exact center of its travel.

Now fit the switch machine/mount under the turnout with the .047 wire running up through the slot in the roadbed, through the hole in the center of the turnout throw rod.

Before completing the installation it may be advisable to slip a piece of foam or rubber between the aluminum mount and baseboard to help isolate the sound.

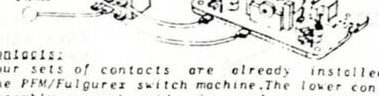
With the machine in position, mark and drill holes for small wood screws, through the slots of the aluminum mount. Insert screws but don't tighten. Wire the switch machine and test. Adjust the machine and mount until the points are operating properly. When this is done, tighten the mounting screws. Installation is now complete.

There may be portions on your layout where cross members and other obstacles prevent installing directly under the turnout. As shown in diagram "C", the .047 piano wire

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 12volts: .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.

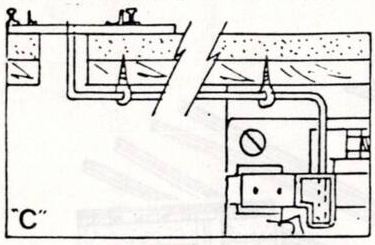
Wiring:
Electrical control of the PFM/Fulgurex switch machine is exceedingly simple. Just wire 8-12V DC power to the two terminals on the switch machine through a DPDT polarity reversing switch. When the toggle switch is in one position, the switch machine travels to its limit in that direction. Reversing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



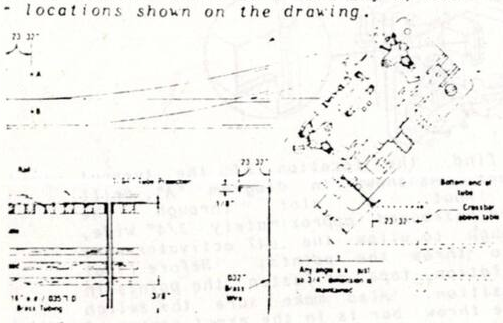
Contacts:
Four sets of contacts are already installed on the PFM/Fulgurex switch machine.The lower contact assembly on each side is used to control the limit of travel in that direction. The upper contact assembly on each side may be used by the customer for normal switching of frogs, etc.

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.

n be bent to a fairly long length and run the turnout throw bar through a series of ll eyelet screws or brass tubes.



second method of installing the /Fulgurex Switch Machine makes use of the 0 brass wire and 1/16" brass tubing plied with the machine. (Some modelers fer using .015 piano wire to minimize ion loss from wire "give".) Start by lling a hole (1/16") through the roadbed a distance of 23/32" (just under 3/4") n the turnout throw bar. Use any of the - locations shown on the drawing.

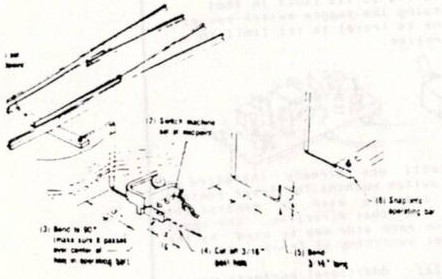


rt the 1/16" tubing in the hole, leaving top just slightly higher than the tops he ties. It may be necessary to shorten tube to suit your roadbed/layout thickness. the pre-formed .040 wire down the hole engage the 1/8" tang into the hole in turnout throw rod. Make sure the wire ts freely and the points operate thly. As with the vertical allation, lock the points in mid-point spikes or tape and make sure the switch ine throw rod is in the center of its el.

te the switch machine under the table as n, with the hole in the operating bar t 3/4" from the center of the projecting . NOTE: You may use either end of the and you may mount the machine at any e to the track, as long as operating bar remains 3/4" from the tube center line. en with two appropriate sized wood s at the opposite corners of the switch ine. As in the previous installation, rubber washers or pads may be used to isolate the sound. Be sure to insert directly under screws so that no twist is imparted to the base.

With the points and switch machine at their mid-point of travel, bend the .0470 operating wire over to 90 degrees at the bottom of the tube. Bend it in a straight line so that it intersects the hole in the operating rod. Then clip it off about 3/16" past the hole. Using small modelers pliers, bend a 3/16" tang on the end of the wire; insert this tang in the hole in the operating rod.

This installation is now complete. No adjustment is required as the overall arm travel is far more than necessary to drive the points from one side or the other. In both installations, the motor will run a little bit before the points move (unwinding pre-load tension). Then about mid-way, the points will slowly transfer. The "speed" of the points depends on the actual voltage used (9 volts is considered satisfactory).

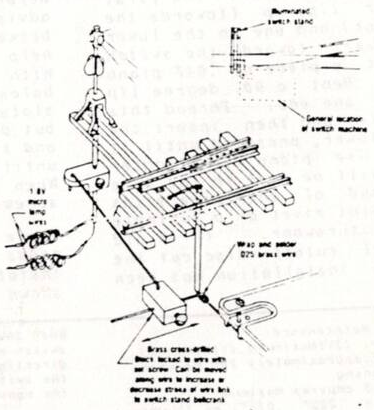


ABOVE LAYOUT

This type of mount can be accomplished in similar fashion using homemade wire bellcranks, or commercially available pbellcranks. Alternatively, the machine may be mounted at 90 degrees to the direction of the track and directly operated using a "safety pin" type spring. This requires accurate positioning and mounting of the machine.

OTHER USES

Operating and/or illuminating switchstands may be used in conjunction with the PFM/Fulgurex Slow Action Switch Machine. However, "do-it-yourself" bellcranks and additional hardware will have to be made up, depending on the type of installation and switchstand used. The drawing shows one example using the second method of installation.



STUB SWITCHES

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