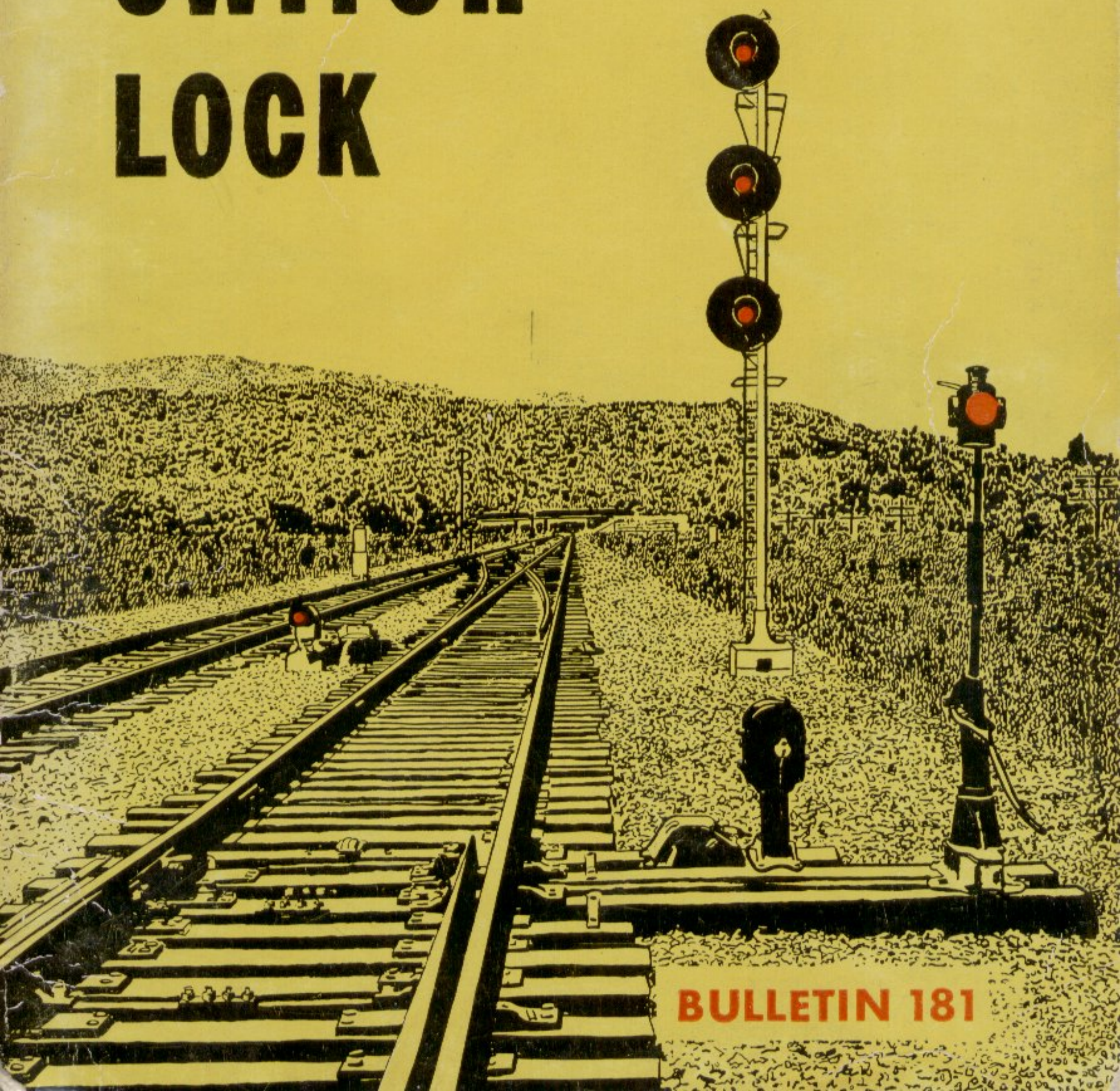
G-R-S MODEL 9A

ELECTRIC SWITCH LOCK



BULLETIN 181

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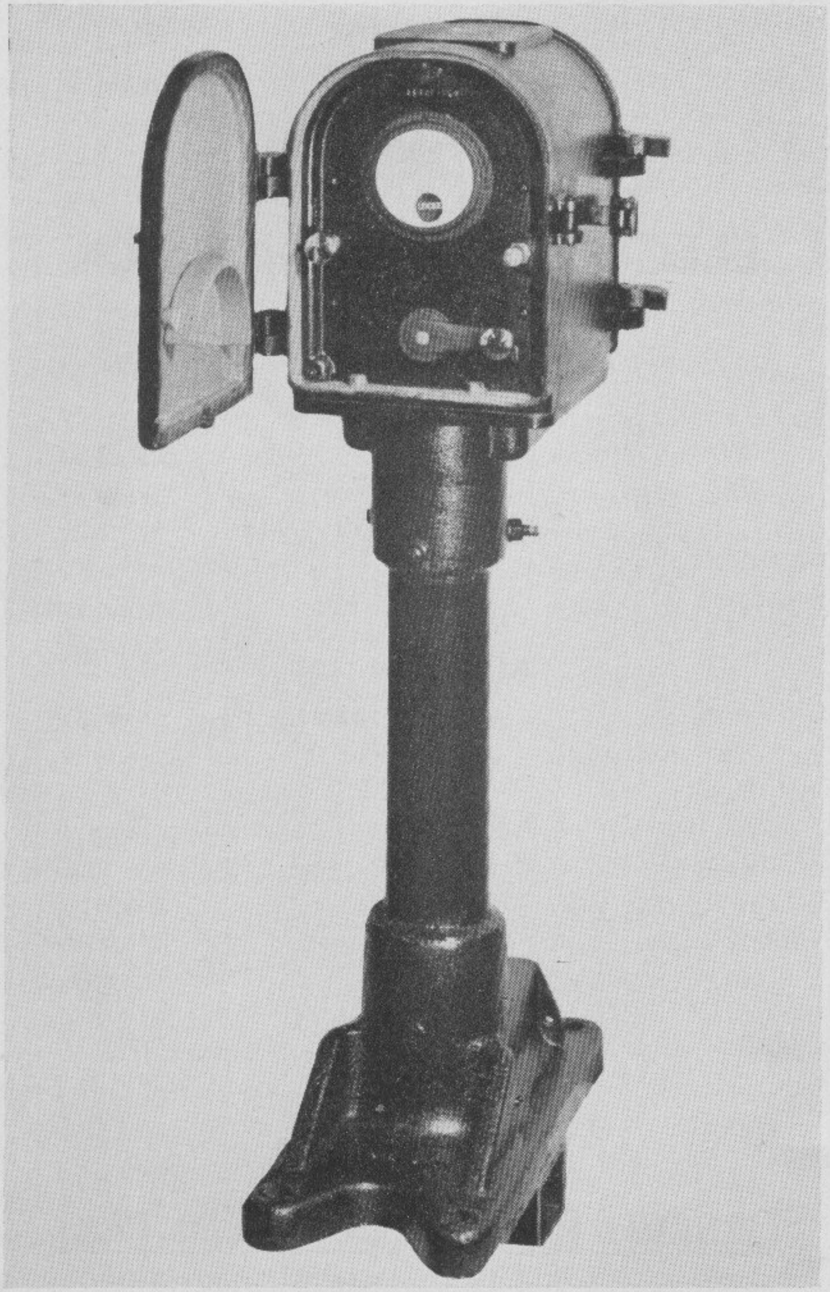


Figure 1. G-R-S Model 9A electric switch lock with disappearing-disc indicator, hand-operated circuit breaker, and door-operated circuit breaker.

G-R-S MODEL 9A ELECTRIC SWITCH LOCK

The G-R-S Model 9A electric switch lock, Figure 1, page 4, and Figure 2, page 6, consists essentially of a locking plunger that can be raised or lowered by a hand crank. The movement of the hand crank is normally blocked by an electrically actuated locking key so the trainman cannot raise the plunger if the lock coils are not energized by the controlling circuit.

HOW YOU CAN USE THE MODEL 9A SWITCH LOCK

You can use the Model 9A switch lock on any track switch—or on any other device—that can be locked with a lock rod. Figures 3 through 5, pages 7 and 8, show some typical applications of Model 9A switch locks to track switches. The centerline of the lowest Model 9A lock, such as shown in Figures 3 and 5, can be located as close as 4 feet ½ inch from the gage line when maintaining standard A.R.E.A. track clearance.

Figure 6, page 9, shows how a Model 9A lock is used to lock the locking plunger of a G-R-S Model 9 hand-operated switch machine.

There are other less common, but interesting, uses made of the Model 9A switch lock. Figure 7, page 10, shows a Model 9A lock that controls the locking of a tunnel door so that the door is effectively interlocked with the signaling system. In the installation shown in Figure 8, page 11, a Model 9A lock is arranged to secure the selector lever of a G-R-S dual-control electric switch machine. This keeps the trainman from operating the switch by hand unless the control circuit allows it.

You can order Model 9A switch locks in a wide range of heights, contact arrangements, coil resistances, and indicating devices. Many useful accessories, such as field telephones, clockwork time contactors, pushbuttons, and circuit breakers are also available to fit the Model 9A switch lock exactly to your needs.

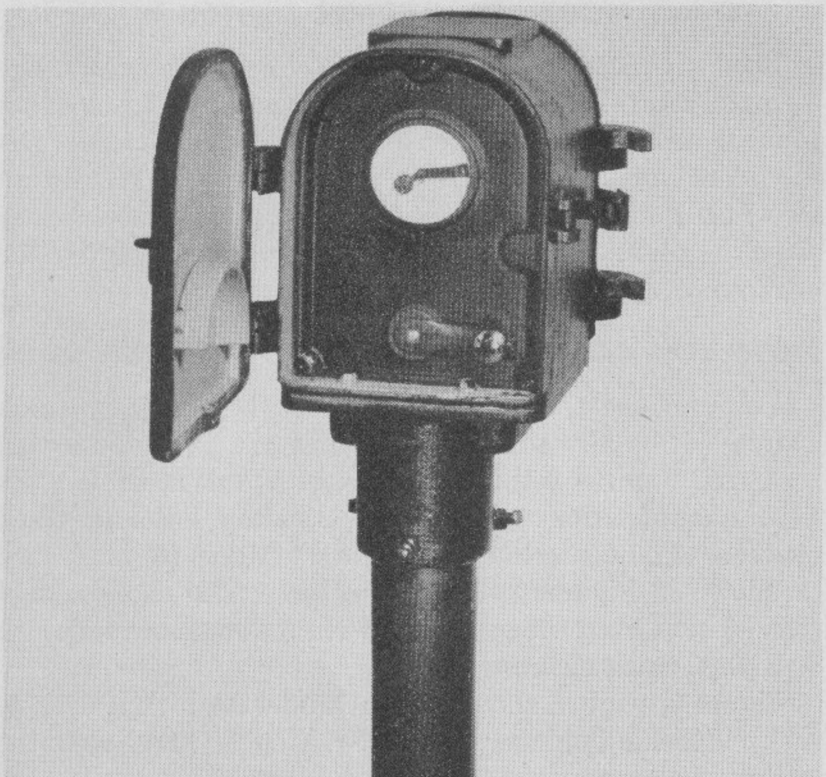


Figure 2. G-R-S Model 9A electric switch lock with lower right-hand quadrant semaphore indicator.

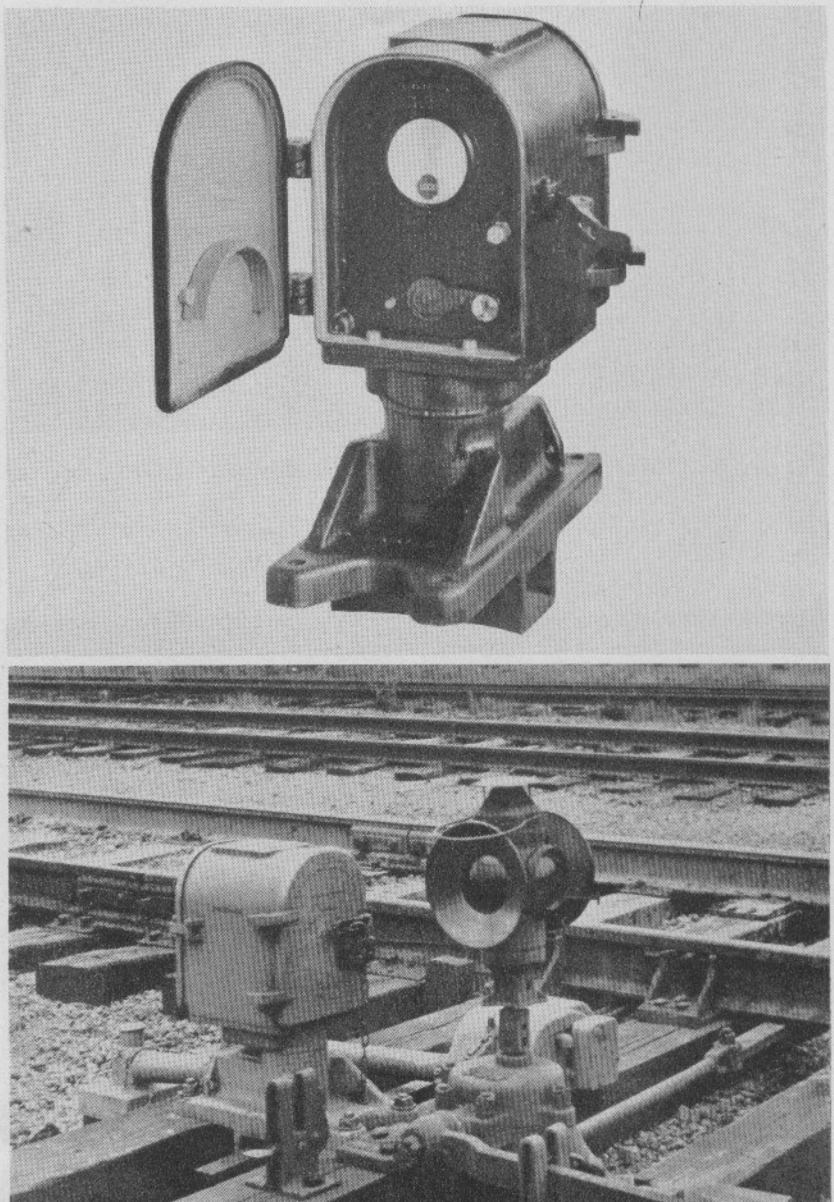


Figure 3. The upper view shows the most compact Model 9A switch lock. The lower view shows this lock installed. It stands only 22⅛ inches above the ties.

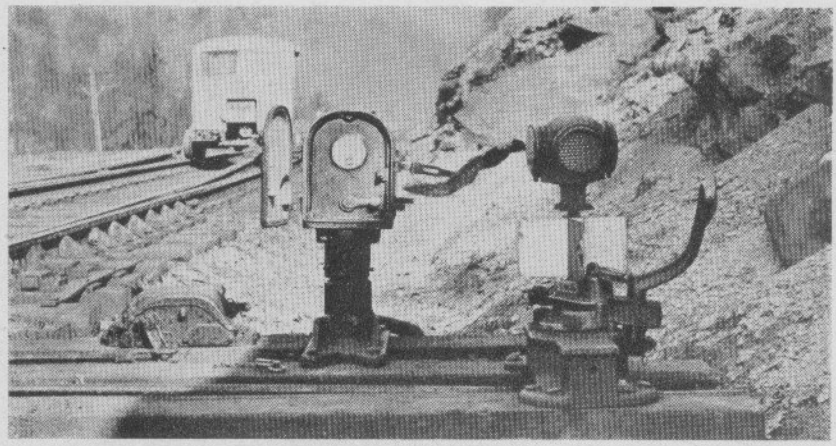


Figure 4. This Model 9A switch lock stands only 2 feet 5 inches above the ties.

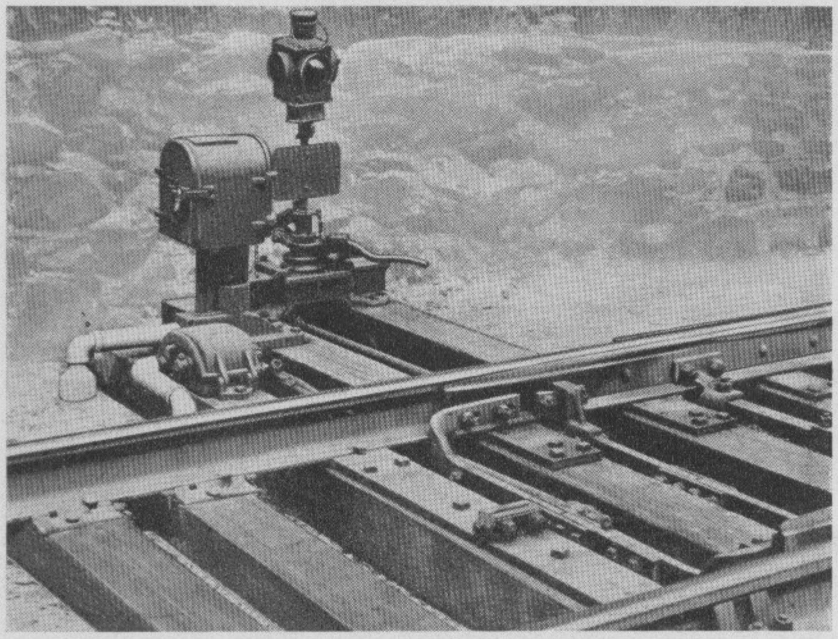


Figure 5. The compact Model 9A switch lock allows ample clearance, even where rock formations are a restricting factor.

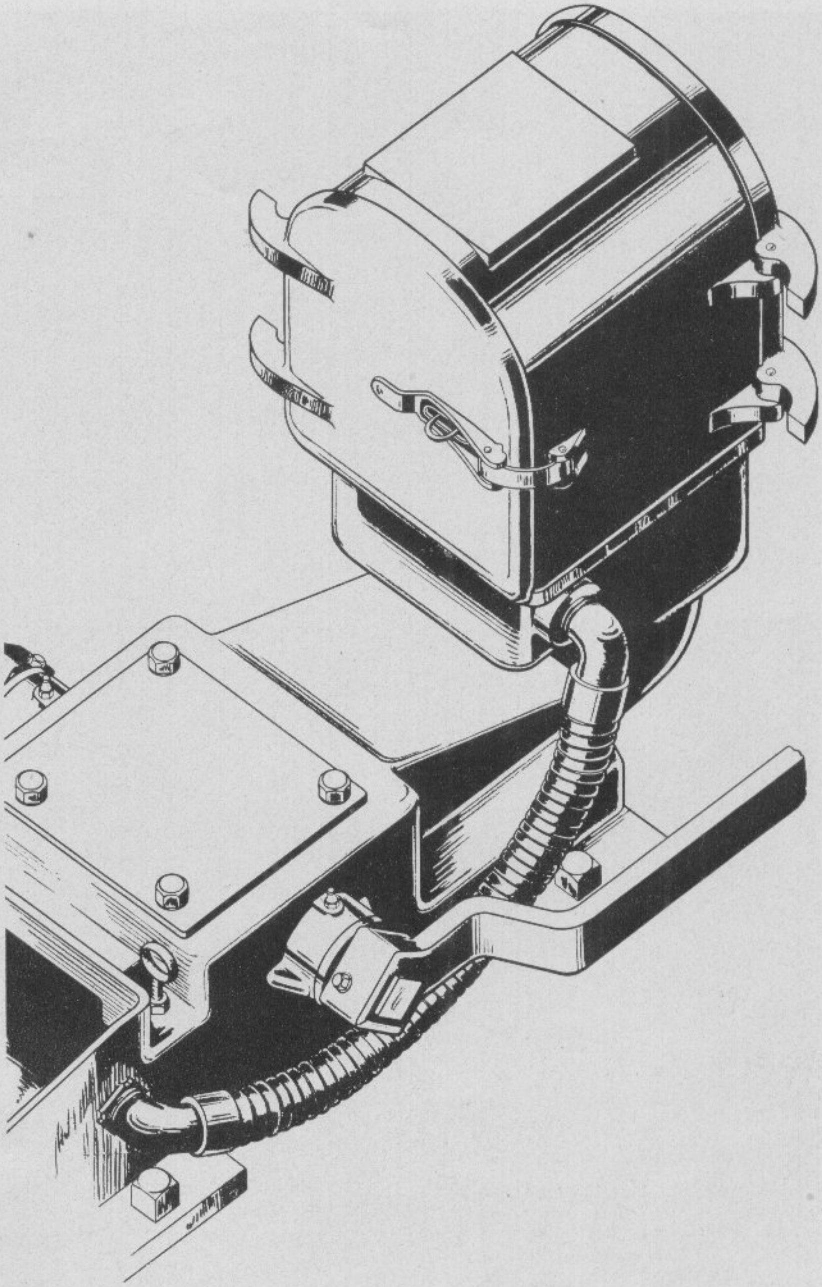


Figure 6. A Model 9A electric switch lock may be used to lock the locking plunger of a G-R-S Model 9 hand-operated switch machine.

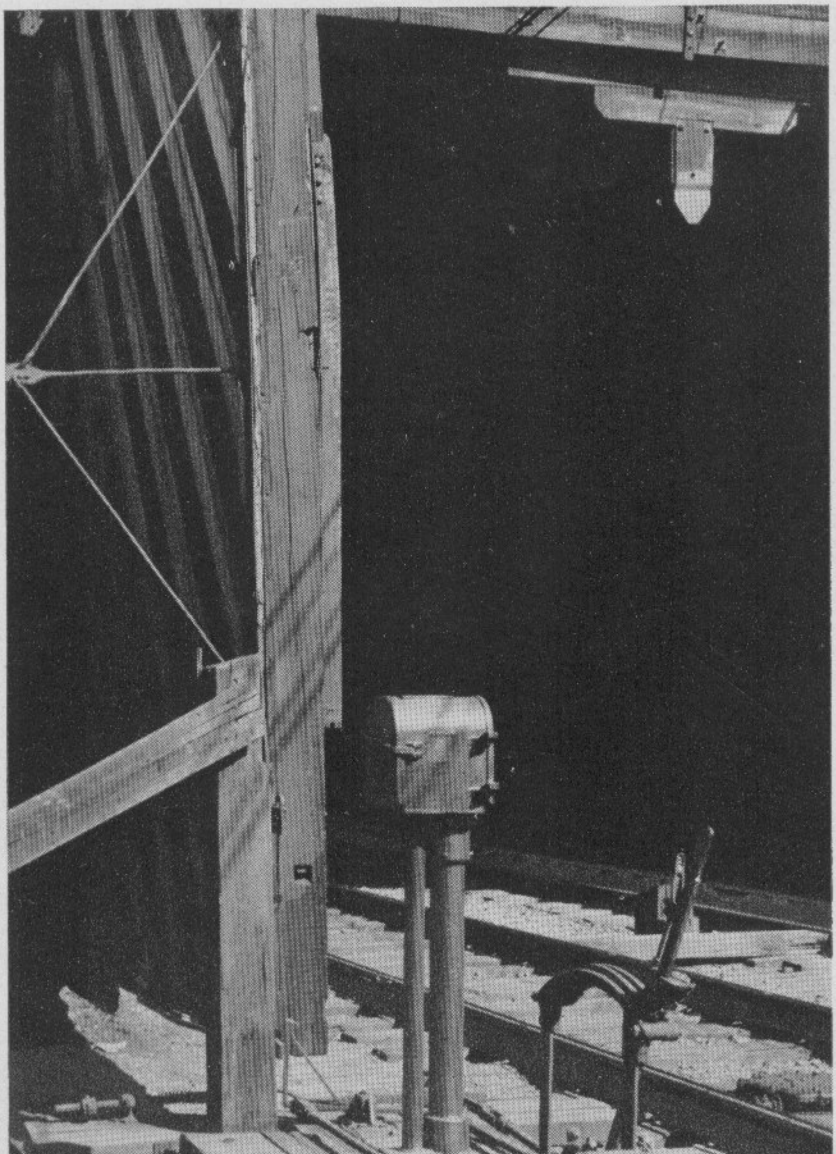


Figure 7. Here a Model 9A switch lock is used to control the locking of a tunnel door.

Figure 8. This Model 9A switch lock locks the selector lever on a G-R-S Model 5D dual-control electric switch machine.

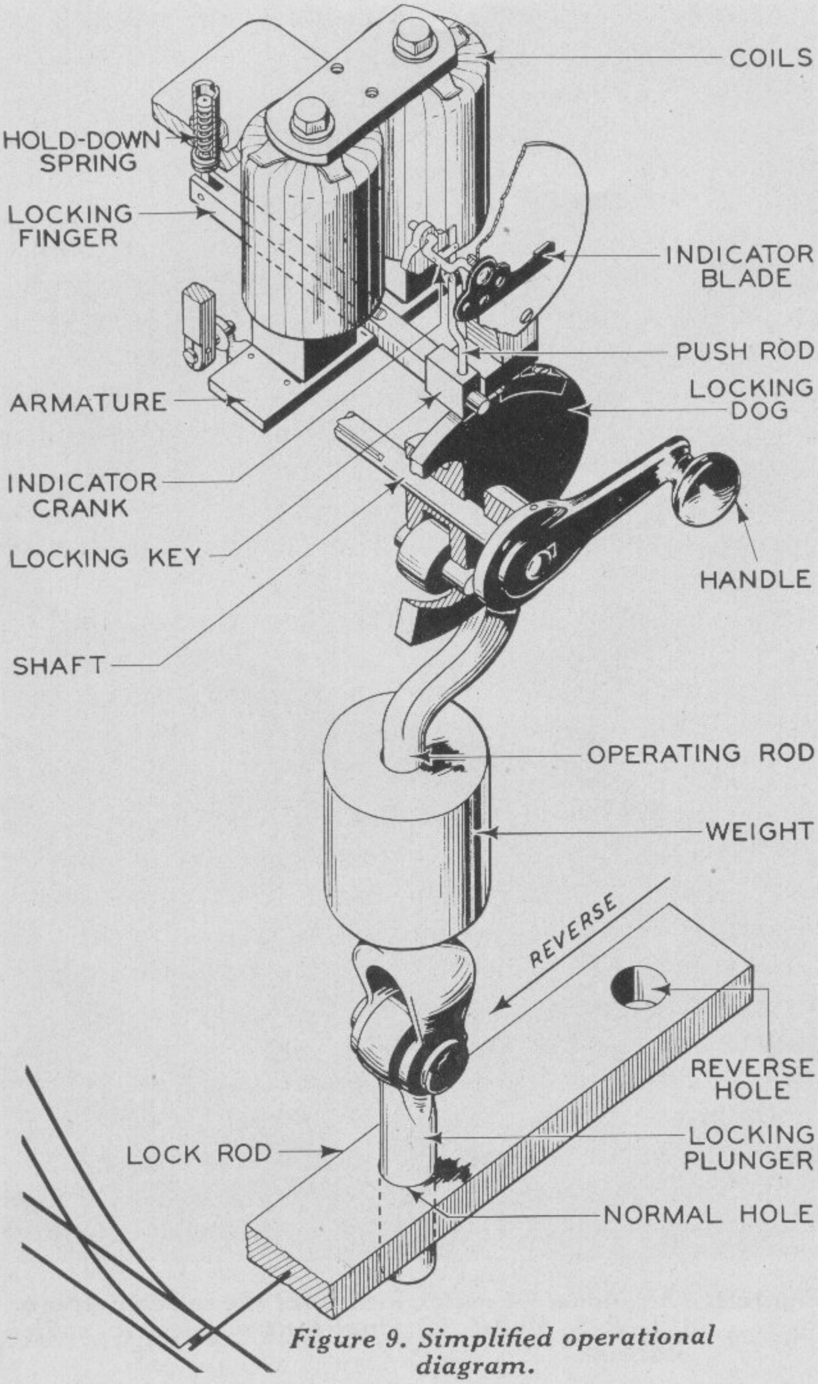


Figure 9. Simplified operational diagram.

HOW THE MODEL 9A SWITCH LOCK WORKS

Figure 9 shows you the Model 9A switch lock stripped down to those essentials that we shall refer to in explaining how the lock works. Other parts, such as housing, armature contacts, commutator contacts, circuit breakers, etc. are described elsewhere in this bulletin.

As shown here, the mechanism is locked in its normal position. The diagrammatic sketch of the track switch shows you the relative positions of the switch lock and the track switch.

When the coils are deenergized, the armature is forced down by gravity and by the hold-down spring. The locking finger, carrying the locking key, is attached to the armature. Thus, when the armature is down, as shown here, the locking key engages the step cut in the locking dog so that the handle cannot be turned to raise the locking plunger out of the hole in the lock rod. The indicator blade is in the horizontal position to show that the mechanism is locked.

Figures 22, 23, and 24, pages 38, 40, and 41, show typical circuits illustrating various methods of controlling the energy to the lock.

UNLOCKING THE SWITCH

When the trainman wishes to unlock the switch, he first removes the padlock from the spring hasp provided on the door of the switch lock housing, and he then opens the door. As the door opens, the door-operated circuit breaker (a spring-loaded switch—shown in Figure 17(a), page 30) automatically closes its normally open contacts. If the control circuit permits, the lock coils are energized and pick up the armature. As the armature picks up, the locking key is lifted up to clear the step cut in the locking dog. The indicator blade is moved from the horizontal position to the 45-degree position through the push rod (which is thrust upward by the locking key) and through the indicator crank. Indicators other than shown here are also available. The indicator blade, for example, may be arranged to move

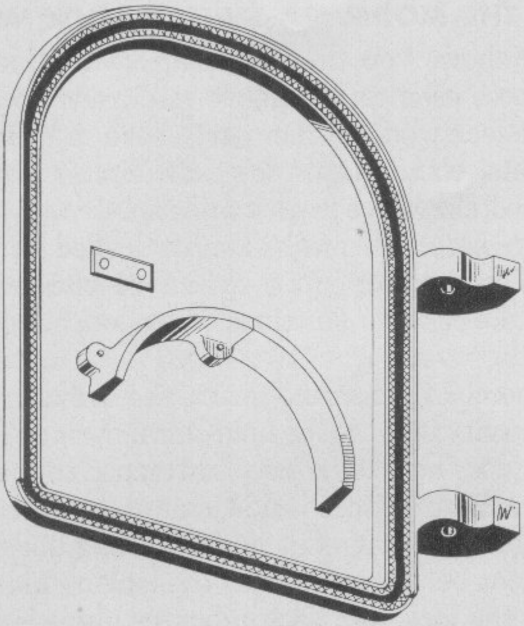


Figure 10. A door with a full lug like this cannot be closed unless the switch is locked.

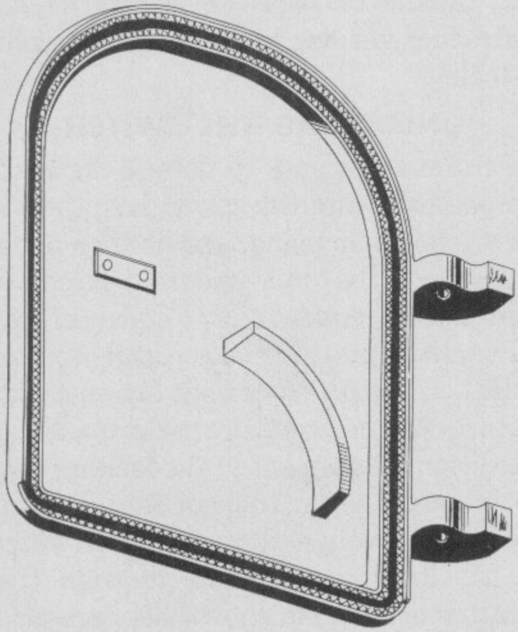


Figure 11. A door with a lug like this can be closed when the switch lock handle is in its vertical position.

from the horizontal to the vertical position instead of to the 45-degree position.

Contacts attached to the armature, shown in Figure 14, page 22, also operate when the armature is picked up.

When the trainman sees the indicator blade go to the 45-degree position, he knows that the handle is unlocked, and he turns it counterclockwise as far as it will go—180 degrees. The handle and locking dog are both keyed to the shaft. As the locking dog turns, the operating rod, which is pinned to the locking dog as shown in the cutaway view, is pulled upward so that the locking plunger is withdrawn from the normal hole in the lock rod. Contacts attached to the shaft also operate as the shaft turns. These contacts are shown in Figure 15, page 26.

After the handle has been turned counterclockwise 180 degrees, the trainman may throw the track switch in the usual way. As the switch is thrown, the lock rod moves in the direction of the arrow in Figure 9.

LOCKING THE SWITCH

If the track switch is to be locked normal only, the reverse locking hole is omitted. There are two ways to return such a lock to its normal locked position. The method used depends on whether the lug on the inside of the door of the switch lock is arranged like Figure 10 or like Figure 11, page 14.

With a door lug like Figure 10, the door of the switch lock cannot be closed unless the handle is positioned as shown in Figure 9. If the trainman tries to close the door with the handle in any other position, the door lug will strike the knob of the handle and hold the door partly open. To lock up a switch with a door lug of this type, the trainman returns the track switch to its normal position, thus aligning the normal hole with the locking plunger. He then returns the handle to the position shown in Figure 9, and the switch is again securely locked. Closing the door of the switch lock operates the door circuit breaker to open the circuit to the coils, and the locking key is forced down on the locking dog by gravity and by the hold-down spring.

With a door lug like Figure 11, the door can be closed with the handle in its vertical position. After the track switch has been unlocked and thrown reverse, the trainman turns the handle clockwise to its vertical position. The locking plunger will then rest on the lock rod, as the normal hole in the lock rod has now moved to the left and is no longer lined up with the locking plunger. The switchman closes and padlocks the door of the switch lock. Closing the door operates the door circuit breaker to open the circuit to the coils. The armature releases, and the locking key rests on the locking dog. When he returns the track switch to its normal position, the normal hole in the lock rod lines up with the plunger, and the weight drives the plunger down into the hole. The locking dog rotates clockwise as the plunger drops, and the locking key, by gravity and by the force of the hold-down spring, is forced down on the step cut in the locking dog, thus securely locking the movement up again as shown in Figure 9.

If the track switch is to be locked both normal and reverse, the lock rod also has a reverse-locking hole. The operation of unlocking such a switch is the same as described under "Unlocking the Switch," page 13.

After the trainman has thrown the track switch to its reverse position, he turns the handle clockwise 180 degrees so that the locking plunger enters the reverse hole to lock the switch reverse. He then closes the door of the switch lock housing.

To return the switch to its normal position, the trainman unlocks the switch by turning the handle counterclockwise 180 degrees. Then he throws the track switch back to its normal position, again turns the handle clockwise 180 degrees to lock the switch in its normal position, and closes the door of the switch lock.

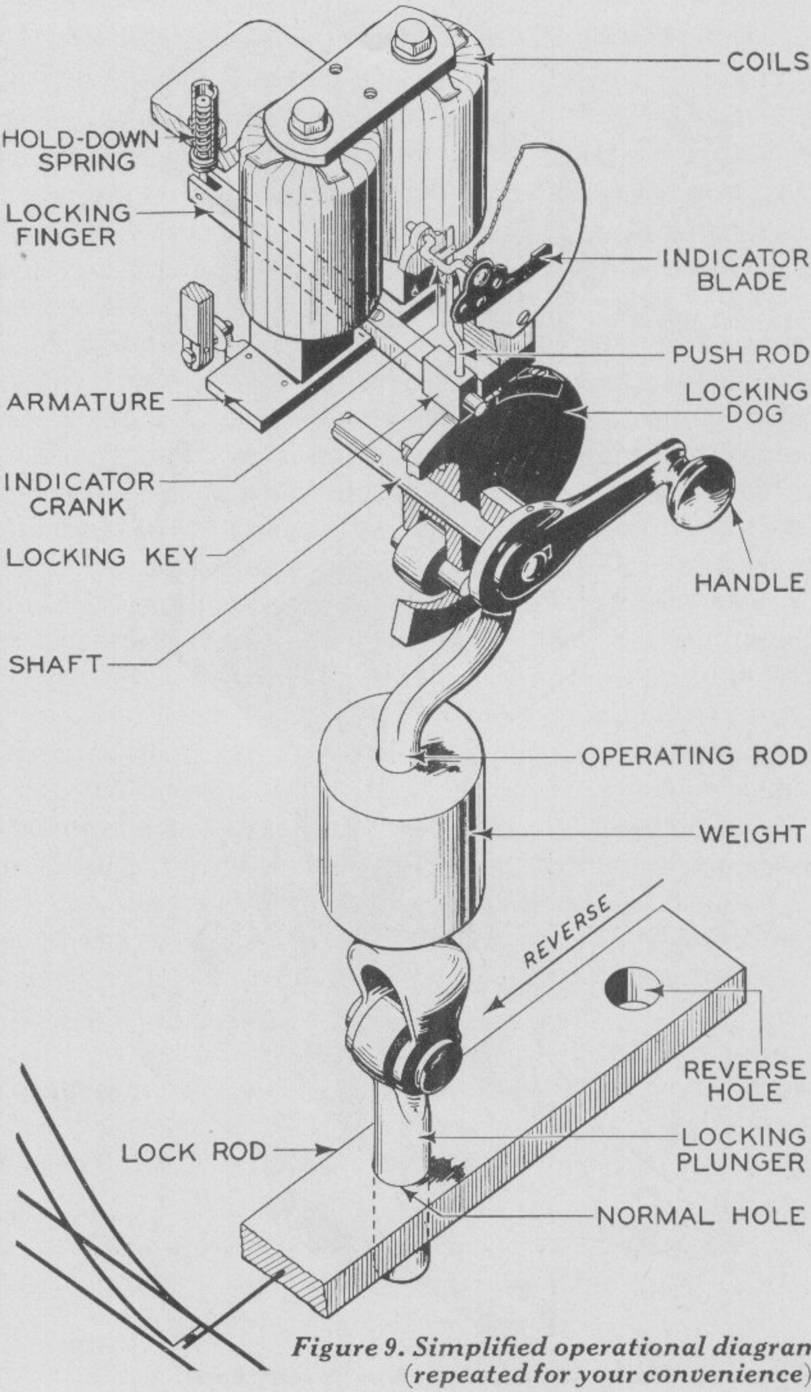


Figure 9. Simplified operational diagram (repeated for your convenience).

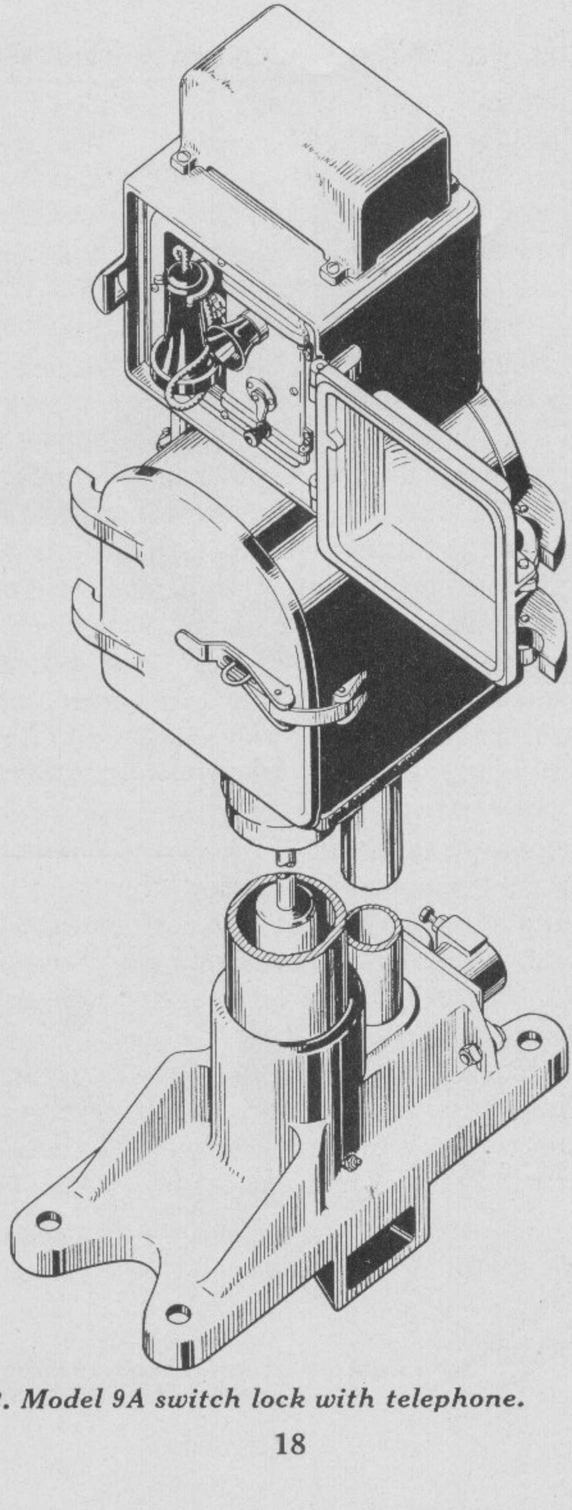


Figure 12. Model 9A switch lock with telephone.

MODEL 9A SWITCH LOCK WITH TELEPHONE

The Model 9A switch lock can be supplied with a telephone as shown in Figure 12, page 18. This telephone is specially made for use in damp, exposed locations, either underground or outdoors. All electrical parts are protected from the weather. Construction is such that the instrument will give you long service with little attention, even under severe conditions of weather and rough handling.

The housing is cast iron, finished with rust resistant paint. The door has a rubber gasket, a compression type latch, and a hasp that will take standard railroad padlocks.

The transmitter, receiver, and hookswitch are mounted on an inner door which can be opened for inspection of the internal parts. Transmitter is the long-distance, carbon-cup type. The receiver has an interchangeable capsule-type unit. An automatic cord take-up keeps the receiver cord from getting caught when the outer door is being closed.

The 1600-ohm ringer has loud, clear gongs protected by a cast-iron hood. The ringer, clapper rod, and armature are operated by magnetic induction through a watertight brass plate. This design permits mounting the ringer coils behind the inner door, protected from fumes and moisture.

There is a five-bar hand generator for ringing, and space for two number six dry cells. The instrument has an induction coil and is wired for bridged magneto service. Leaving the receiver off the hook does not interfere with ringing other telephones on the same line.

A terminal box, mounted beneath the housing, contains the two line terminals and the ground terminal. A rigid steel conduit connects the terminal box with the switch lock housing. A wiring diagram is enclosed with each telephone.

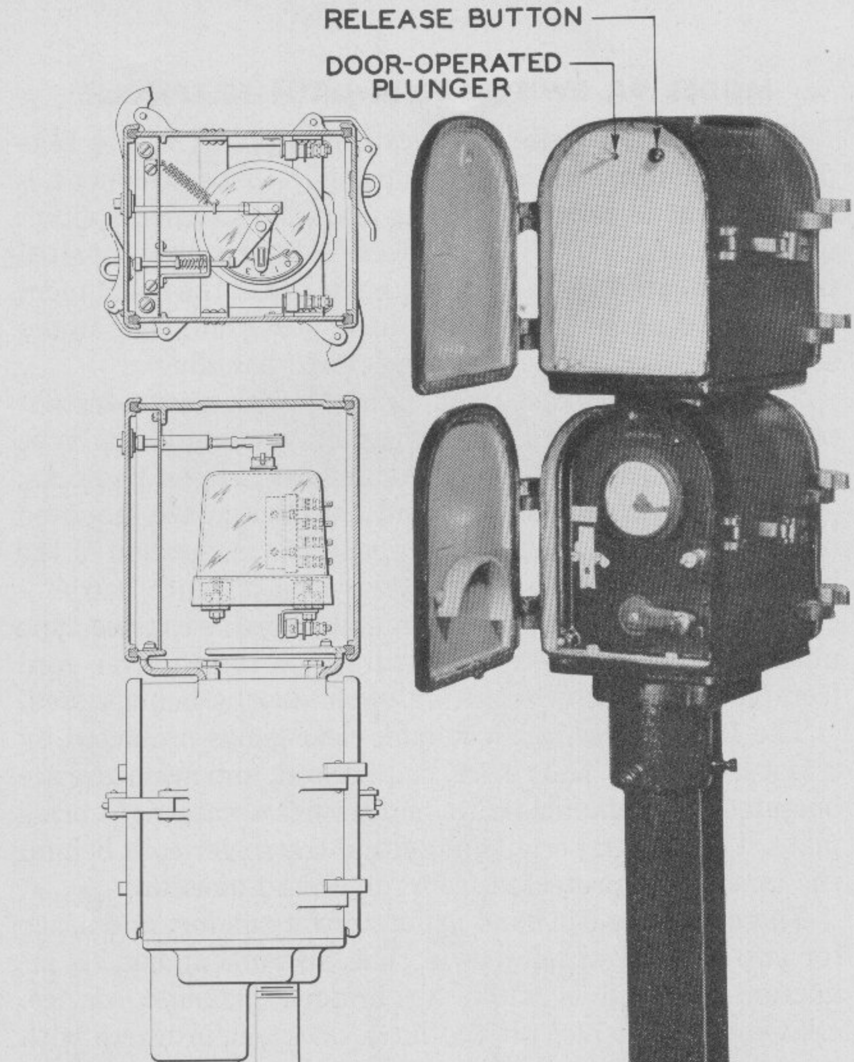


Figure 13. Model 9A switch lock with clockwork time contactor. Cutaway drawing at left shows location of contactor in housing.

MODEL 9A SWITCH LOCK WITH TIME CONTACTOR

Figure 13, page 20, shows a Model 9A electric switch lock equipped with a standard G-R-S universal clockwork time contactor. The time contactor is mounted in a heavy iron housing which is fastened directly to a pad on the top of the Model 9A switch lock housing. The contactor housing is similar in appearance and construction to the switch lock housing described on page 33. The contactor is the type shown in our Catalog Section K, Part 5.

The mechanism of the contactor is connected to a plunger, which is actuated by the movement of the housing door. Closing the door winds up the contactor. To start the timing cycle, the trainman opens the door and presses the release button, a mechanical trip.

The timing period may be two, three, or four minutes (or fractions thereof) as specified. The contactor has a maximum capacity of eight independent contacts to handle eight independent circuits. The eight contacts can be furnished in any combination of normal and reverse contacts. A normal contact is one that is closed when the door of the contactor housing is closed. Normal contacts open as soon as the trainman pushes the release button. Reverse contacts close at the end of the timing cycle. They open as soon as the trainman closes the door of the contactor housing. Contacts are silver to silver.

Contactors are shipped completely wired to convenient moulded plastic terminal blocks within the contactor housing. Terminals are standard 14-24 size. There is a large, weatherproof opening for making internal connections between the switch lock housing and the contactor housing.

The contactor is bolted to two brackets riveted to the housing. The clockwork mechanism and contacts are sealed within a heavy glass case, protected from dust, fumes, and moisture.

Figure 22, page 38, shows a typical circuit for using a time contactor with a Model 9A switch lock.

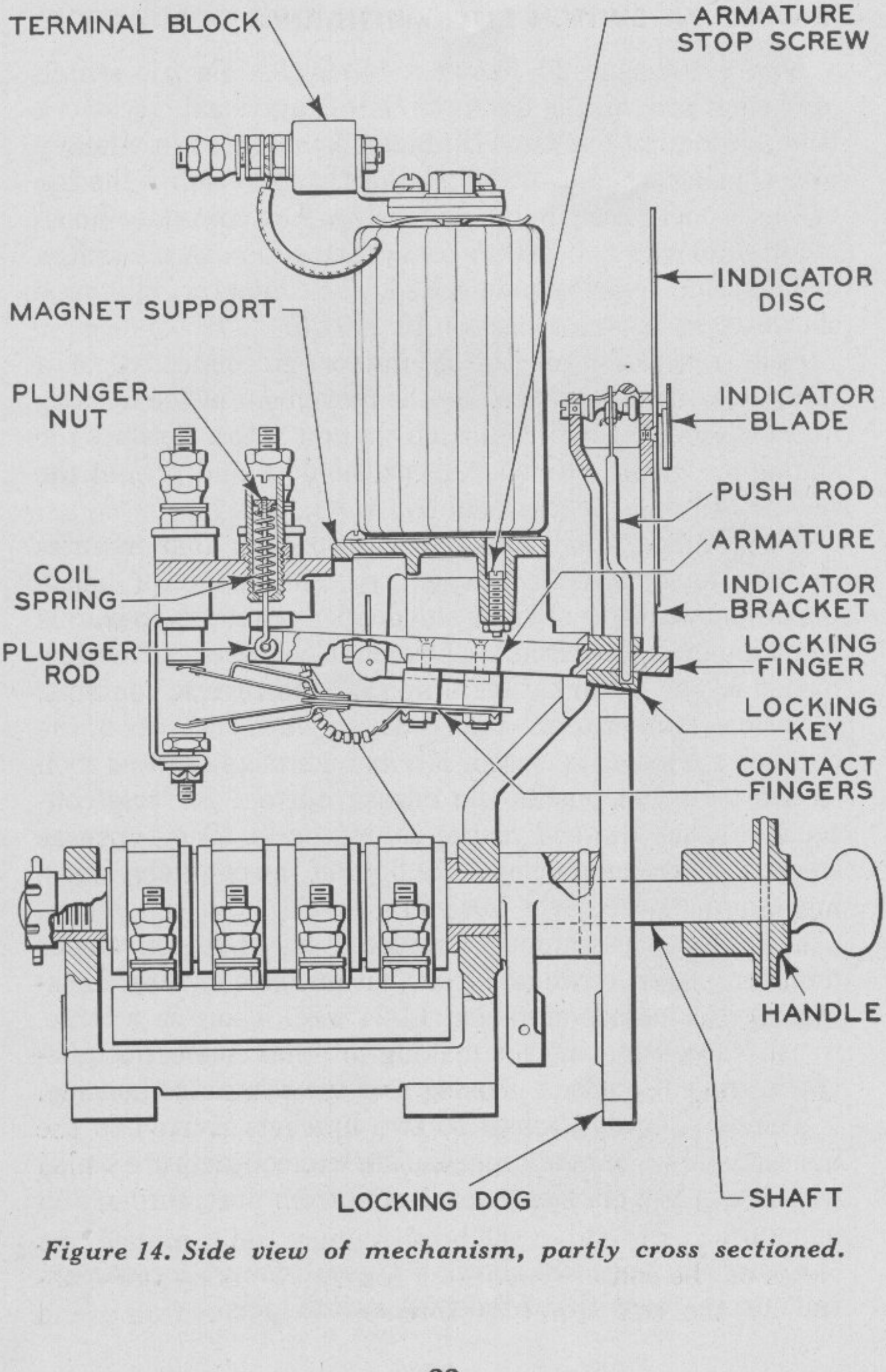


Figure 14. Side view of mechanism, partly cross sectioned.

OPERATING MECHANISM

The mechanism, Figure 14, is assembled on a cast-iron frame fastened to the head of the mounting post.

The terminal block for the coils has three 14-24 binding posts. It is fastened to the yoke. The core and armature assembly is carried by a cast aluminum magnet support.

The armature is mounted on hard-drawn, phosphor-bronze, adjustable trunnions carried by arms on the magnet support. Residual magnetism pins of copper-silicon alloy project 0.010 inch from the surfaces of the pole faces. The adjustable armature stop screw is phosphor-bronze. The armature air gap is between 0.019 and 0.022 inch.

Contact fingers are fastened to the armature and are insulated from it. Contacts are silver to silver. Contact opening is 0.065 inch ± 0.002 inch. Back contacts break by at least 0.015 inch before front contacts make. Trapped contact pressure is 1.5 to 2 ounces. Maximum resistance of silver-to-silver contacts under full pressure is 0.03 ohm. Standard 14-24 binding posts for the contacts are mounted in insulating bushings on the frame.

The locking finger is also fastened to the armature. It is tipped with a locking key of casehardened steel. The locking key is fitted on the locking finger so that it is free to turn slightly. If the step on the locking dog is forcibly jammed against the locking key, the locking key turns until it bears against the 3/8-inch thick iron buttresses of the main frame. Thus the heavy frame buttresses take all the stress, and none is put on the locking finger or armature.

The push rod fits freely in a blind hole drilled through the locking finger and part way through the locking key. Thus any possible binding of the indicator mechanism cannot affect the proper dropaway of the armature, locking finger, and locking key.

An eye in the end of the brass plunger rod is pinned to a clevis on the end of the locking finger. The brass tube containing the coil spring is threaded into the frame and

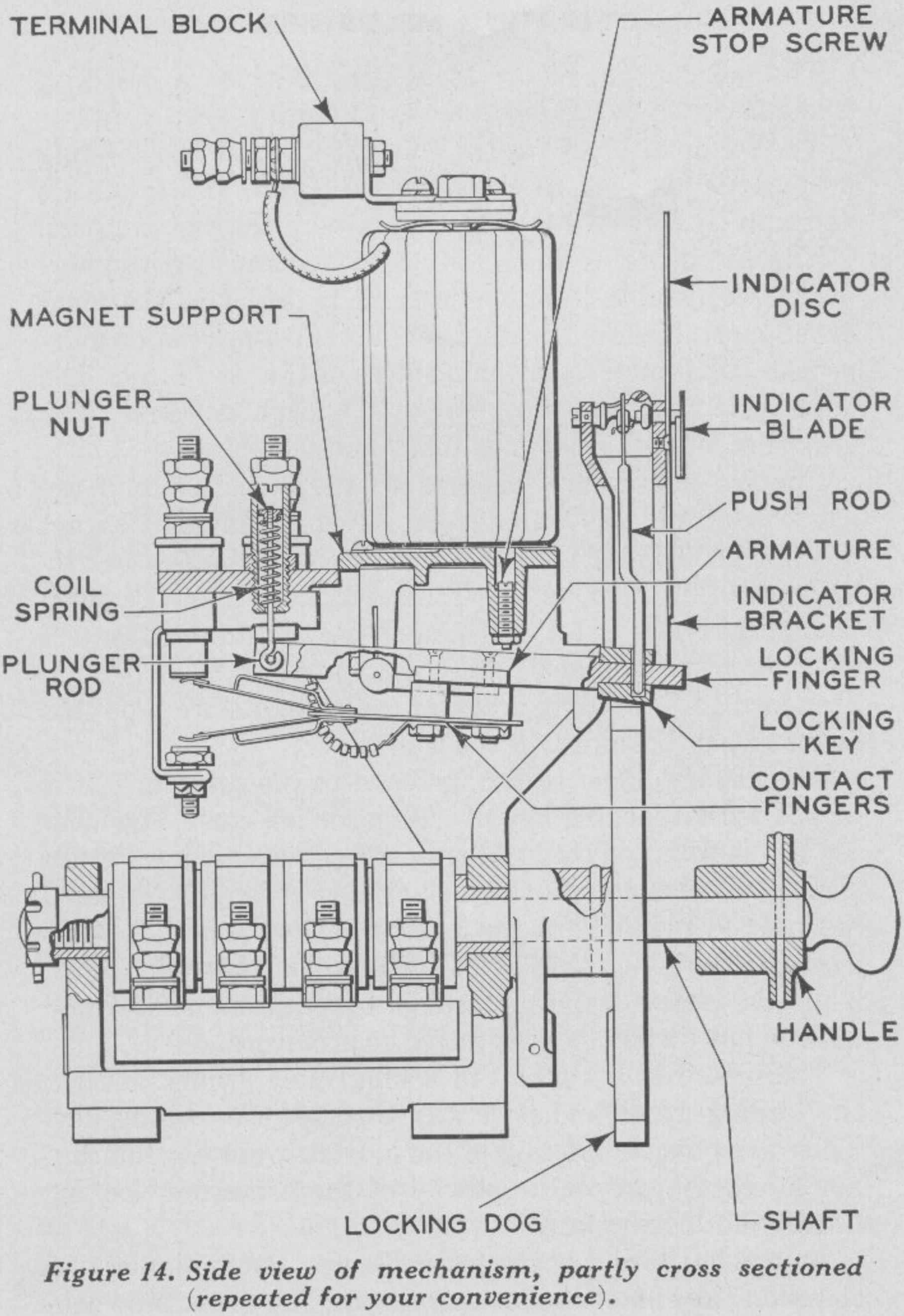


Figure 14. Side view of mechanism, partly cross sectioned (repeated for your convenience).

locked in adjustment with a lock nut. The bottom of the tube is closed except for a hole through which the plunger rod passes. After the coil spring and the plunger nut are installed, the plunger rod is peened to secure the nut. Thus the coil spring, when compressed, exerts stress between the nut and the bottom of the tube so as to cause the plunger rod to tend to force the armature to its deenergized position.

The coil spring may be either a "hold-down" spring or a "kick-off" spring, as required. If the switch lock is to be used where it will be subject to unusually severe vibration, a "hold-down" spring should be specified. A "hold-down" spring acts to force the armature down so that the back contacts are held firmly closed. It is effective throughout the entire range of the armature movement. This arrangement keeps the back contacts firmly closed, regardless of vibration, and also insures positive dropaway of the armature.

A "kick-off" spring is used when a "hold-down" spring is not required. The "kick-off" spring does not become effective until the armature is nearly picked up. It insures positive dropaway of the armature.

The push rod, indicator disc, and indicator blade are steel; all other parts of the indicator movement, including the indicator bracket, are bronze or brass. The indicator may be a lower right-hand quadrant semaphore blade, Figure 2, page 6; a disappearing disc, Figure 3, page 7; or an upper right-hand quadrant semaphore blade, Figure 13, page 20. Semaphore indicators are furnished to operate through an arc of 45 degrees or 90 degrees, as specified.

The locking dog is cast iron, $\frac{3}{8}$-inch thick. It is secured to the shaft with a steel pin and a Woodruff key. The step in the dog is an insert of casehardened steel. (You can see this insert more clearly in Figure 9, page 17.) The handle is cast iron with a nickel plated and polished knob. A Woodruff key and a steel pin fasten the handle to the shaft.

The shaft is $\frac{1}{2}$-inch in diameter and is made of cold-

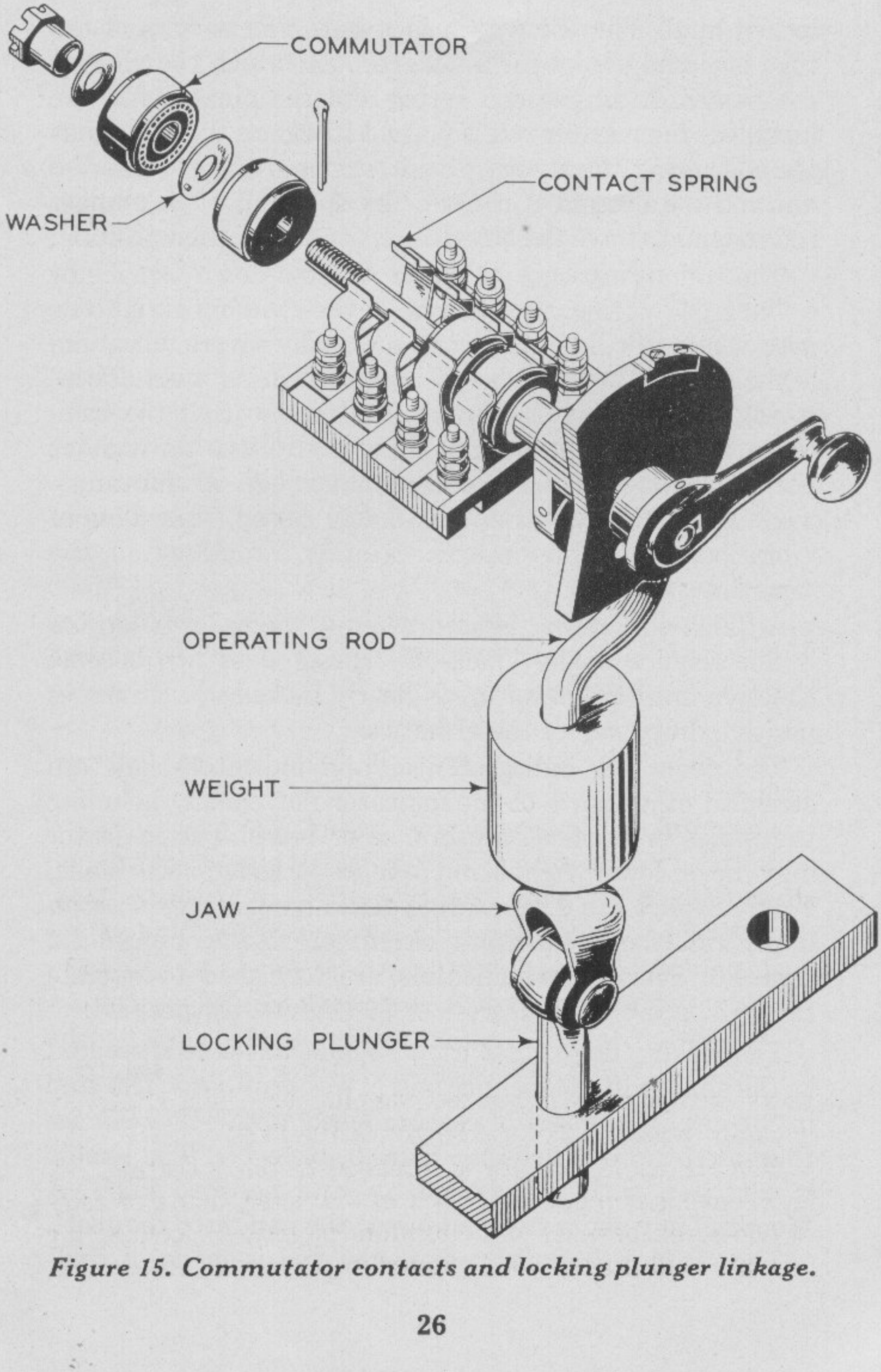


Figure 15. Commutator contacts and locking plunger linkage.

drawn steel. The front bearing is a brass sleeve, and the rear bearing is a cadmium plated, shouldered castle nut with a nickel plated brass thrust washer. Figure 15 shows how the four commutators are assembled on the shaft and also shows the linkage to the locking plunger. The commutators are moulded plastic. The highly polished nickel-silver contact bands are moulded on the commutators. Contact bands are $\frac{5}{8}$-inch wide and $\frac{1}{16}$-inch thick. They occupy 216 degrees of the circumference of each commutator. There are two washers like the one indicated by the arrow, one to fit between each pair of commutators. These washers key into the $\frac{1}{8}$-inch wide keyway in the commutator shaft. Pins projecting from either side of the washers mesh with slots moulded in the sides of the commutators. These slots are 12 degrees apart and permit fine commutator adjustment.

The contact springs are spring phosphor-bronze, $\frac{5}{8}$-inch wide and 0.036-inch thick. They are firmly anchored in the $\frac{5}{8}$-inch thick, laminated phenolic terminal board with number 14-24 binding posts. The contact block is screwed to the frame of the mechanism. Contact pressure is adjusted at the factory at from 10 to 14 ounces for each spring.

The crank and operating rod assembly is of very heavy and strong construction. The operating rod is cold-drawn steel, $\frac{5}{8}$-inch diameter. The weight is cast iron or lead, depending on the height of the post between the mounting base and the post-head casting. A lead weight is used when this post is not more than $15\frac{1}{2}$ inches high. Where no post is used, such as shown in Figure 18(a), page 32, a cast-iron weight of greater mass is used. By these means, the total downward pressure on the locking plunger is kept relatively constant regardless of the height of the lock.

The malleable iron jaw is threaded to the operating rod. The locking plunger is $\frac{7}{8}$-inch in diameter, made of cold-drawn steel, beveled and cadmium plated. All connecting pins are cold-drawn steel, secured in place with cotter pins.

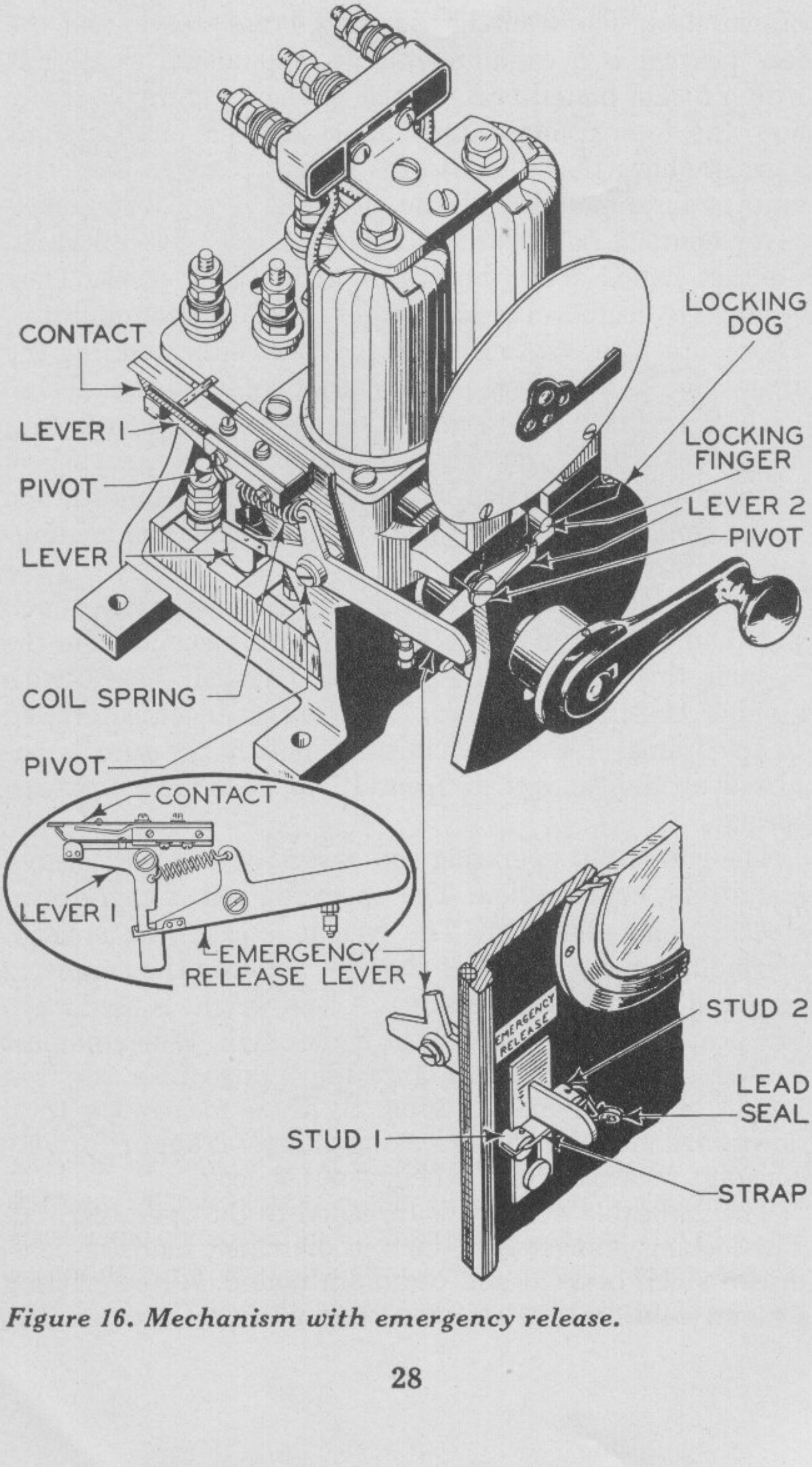


Figure 16. Mechanism with emergency release.

EMERGENCY RELEASE

If, for any reason, an electrical release cannot be made, and a trainman has to throw the switch, he can release the lock by breaking the seal on the emergency release and pushing the release lever down. Figure 16, page 28, shows how the emergency release attaches to a Model 9A switch lock. This is optional equipment.

To operate, the trainman takes the seal out of the hole through stud 2 and the strap, swings the strap out of the way (it hinges on stud 1), and presses down on the emergency release lever. The emergency release lever pivots down and causes lever 2 to raise the locking finger so the attached locking key clears the step cut in the locking dog.

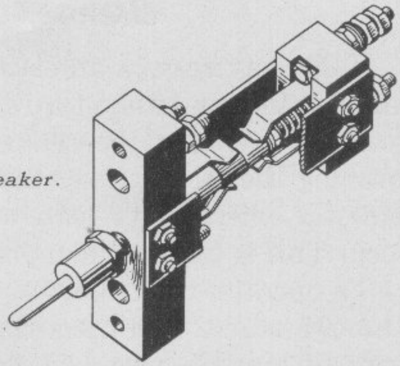
As the end of the emergency release lever moves up, the coil spring causes the end of the emergency release lever to snap into the deeper of the two notches cut into lever 1 (these notches are shown more clearly in the partly cutaway view inserted in Figure 16).

As the end of the emergency release lever engages in the deeper notch in lever 1, lever 1 pivots counterclockwise and allows the contact to open. The lock mechanism is now latched in the unlocked position. The trainman cannot restore it by the emergency release lever.

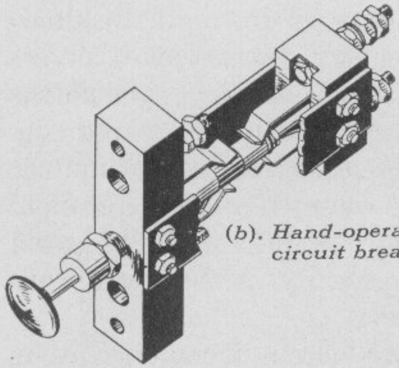
The switch is now unlocked, and the trainman can operate it in the usual way except that he cannot restore the lock to normal. This must be done by a person authorized to open the rear door of the switch lock housing. Pulling lever 1 away from the emergency release lever allows the emergency release lever to snap down again into the position shown, and the switch can be locked again.

Contact is silver to silver with 3 to 3.5 ounces pressure and 0.100-inch minimum opening. It is connected in series with one normally closed, independent armature contact.

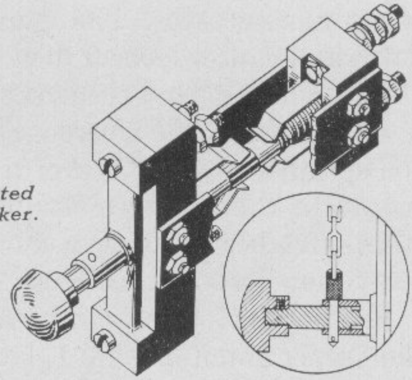
If you do not need a mechanically interlocked emergency release contact, you may wish to use a sealed pushbutton such as shown in Figure 17(c), page 30.



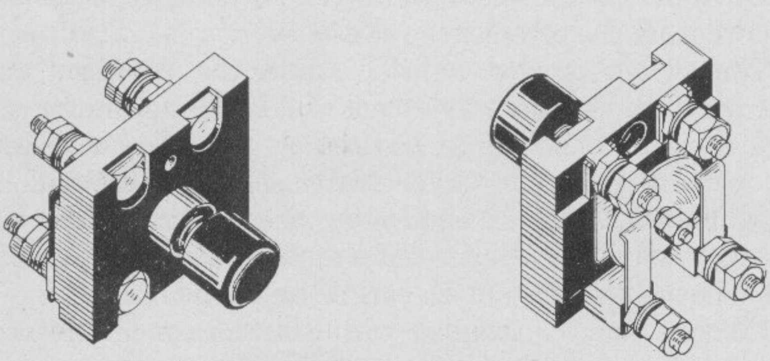
(a). *Door-operated circuit breaker.*



(b). *Hand-operated circuit breaker.*



(c). *Spring-return pushbutton with provision for sealing with flat or wire car seals.*



(d). *Compact spring-return pushbutton, front and rear views.*

Figure 17. Circuit breakers and pushbuttons.

CIRCUIT BREAKERS AND PUSHBUTTONS

Figure 17 shows circuit breakers and pushbuttons that can be mounted on the partition of the Model 9A switch lock. Others are shown in Section K, Part 3, Plate K0221 of our catalog. There is space on the partition for a maximum of two circuit breakers and one pushbutton like Figure 17(d). An emergency release like Figure 16, page 28, takes the space of one circuit breaker.

Figure 17(a), a door-operated circuit breaker with one normally closed and one normally open contact, is also available with two normally open and two normally closed contacts, or with two normally closed contacts. The plunger contact is hard-drawn nickel-silver, insulated from the plunger by fiber bushings. The phosphor-bronze contact springs are firmly anchored in laminated phenolic terminal blocks with number 14-24 binding posts. Two bolts fasten the circuit breaker to the partition. The same general construction is used in items (b) and (c).

Figure 17(b) is a hand-operated circuit breaker. Having no return spring, it remains in its last operated position. You can have this circuit breaker with one normally open and one normally closed contact, as shown, or with two normally open (or closed) contacts. Figure 17(c) is a spring-return pushbutton with one normally closed and one normally open contact. It can be sealed with a flat car seal passed through the slot in the plunger. The cross sectioned view shows how this same pushbutton may also be supplied so that you can seal it by threading a wire car seal through the hole in the end of the locking pin. The pin is chained to the partition so that it cannot be lost.

Figure 17(d), a spring-return pushbutton with one normally closed and one normally open contact, is also available with one normally open contact only. The contacting disc is soft nickel-silver, and the contact springs are hard, spring nickel-silver. Binding posts are number 10-32. Two bolts secure this pushbutton to the partition.

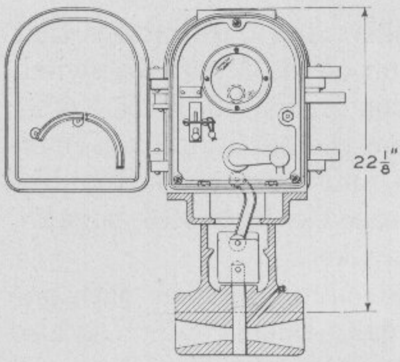


Figure 18(a). Lowest Model 9A lock, partly cross sectioned.

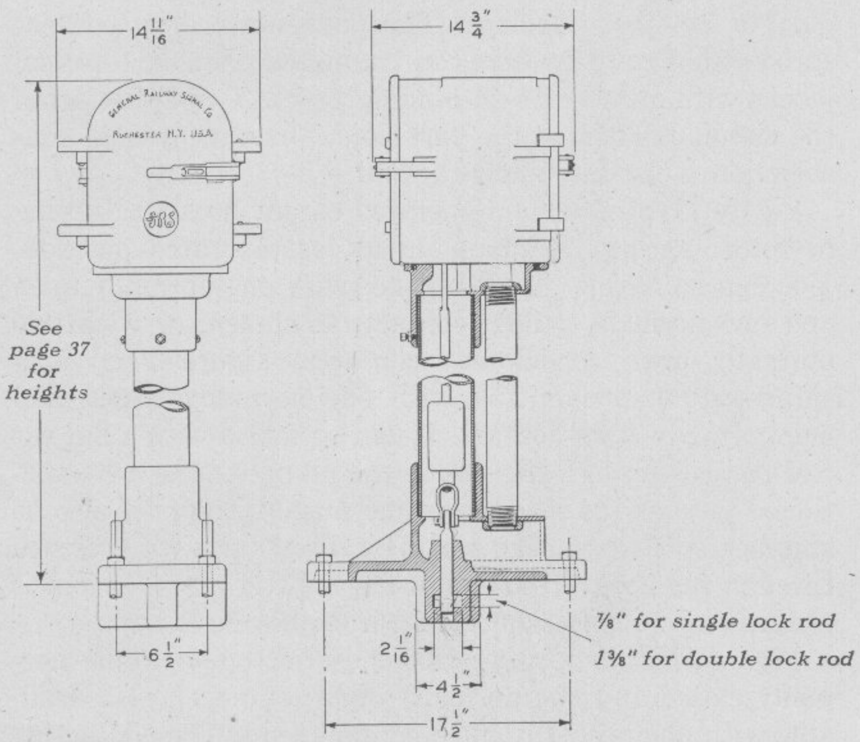


Figure 18(b). Principal dimensions of Model 9A lock.

HOUSING, POST, AND BASE

Figures 18(a) and 18(b) show the principal dimensions of the lowest Model 9A lock, Figure 18(a), and the higher models, Figure 18(b). For heights, see page 37.

The housing is cast iron, ¼-inch thick. The housing is fastened to the post-head casting with four ⅜-inch cap screws. Both front and rear doors are cast iron, $\frac{3}{16}$-inch thick. They are gasketed with heavy cotton wicking. Half of each hinge is cast on the door, and the other half of each hinge is cast on the housing. The hinges are pivoted on $\frac{5}{16}$-inch steel studs. Stop lugs cast on the door parts of the hinges restrict the door opening to an arc of 90 degrees. The doors are kept tightly closed by spring hasps, which take standard railroad padlocks.

The partition on which the indicator, circuit breaker, etc. are mounted is cast iron, ¼-inch thick. The indicator is protected by a $\frac{3}{16}$-inch thick plate glass window, which is gasketed and secured in place with a bezel ring screwed to the partition.

The post in Figure 18(b) is $4\frac{7}{16}$-inch O.D. iron pipe, sealed into a socket in the base. The post-head casting is secured to the post with four heavy set screws equipped with lock nuts. In the lowest model, Figure 18(a), a post is not used. The post-head casting is welded to the base to form a single unit. The wiring conduit is 2-inch I.D. steel. It is fastened to the base and to the post-head casting.

The base is cast iron. Mounting holes are ⅞-inch diameter. ¾-inch lag screws 6 inches long are usually used to fasten the base to the ties. A lubrication fitting in the base provides for greasing the locking plunger. Bases can also be supplied for lock rods that operate through watertight stuffing boxes.

Figures 19 and 20, pages 34 and 35, show some of the more common wiring inlets for the Model 9A switch lock.

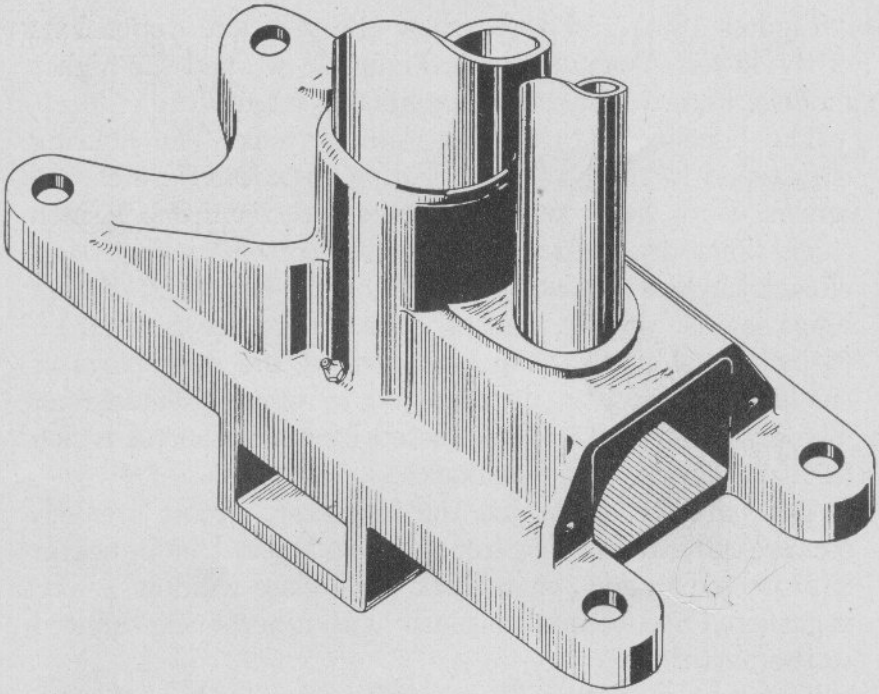


Figure 19(a). Base with wiring inlet removed.

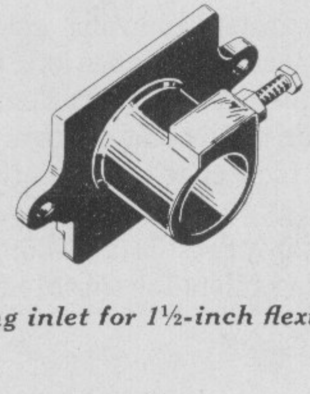


Figure 19(b). Wiring inlet for 1½-inch flexible conduit.

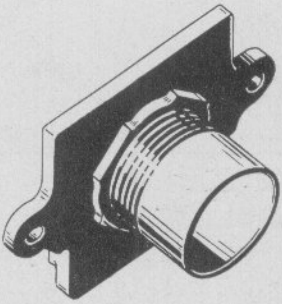


Figure 20(a). Wiring inlet for 2⅜-inch I.D. rubber hose.

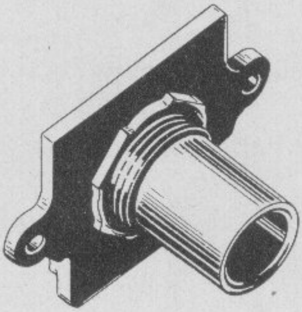


Figure 20(b). Wiring inlet for 2-inch I.D. rubber hose.

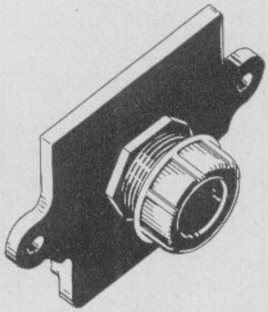


Figure 20(c). Wiring inlet for 1³⁄₁₆-inch to 1⅜-inch O.D. parkway cable.

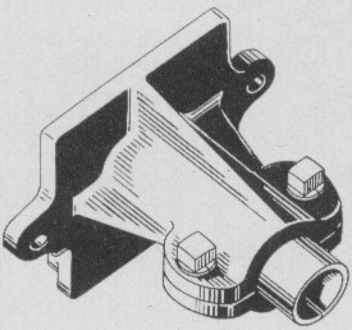


Figure 20(d). Wiring inlet for 1⅛-inch O.D. parkway cable.

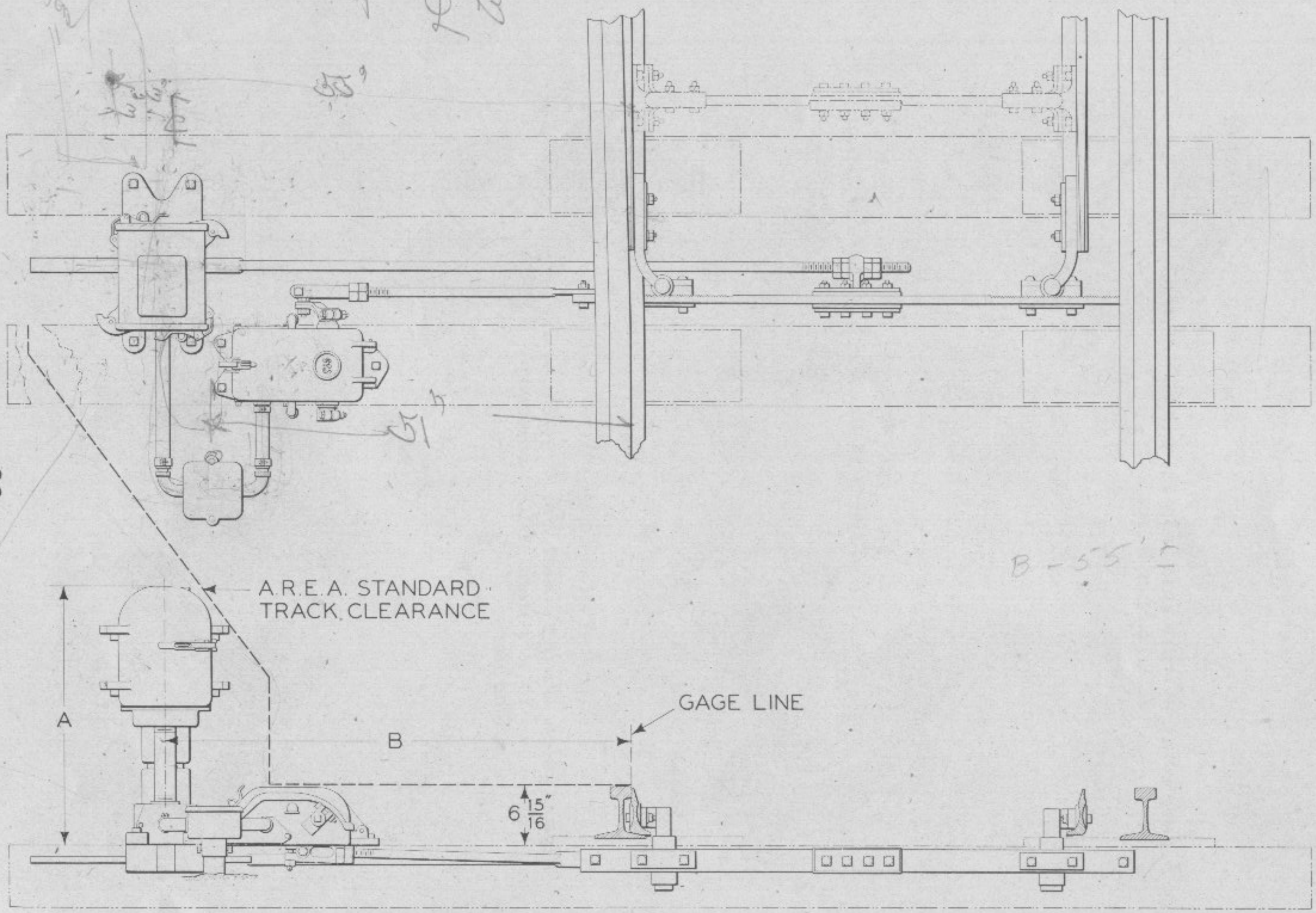


Figure 21. Clearance diagram. For dimensions A and B, see table on page 37.

TRACK CLEARANCE

Figure 21 and the following table show how the distance from the gage line to the centerline of a Model 9A switch lock (dimension B) will vary with the height of the switch lock (dimension A). Note that we have based the A.R.E.A. clearance line on a rail height of not more than 6 15/16 inches above the ties. This will clear a G-R-S switch circuit controller.

Note also that the second part of the following table is based on Model 9A switch locks mounted on G-R-S Model 9 hand-operated switch machines that are installed directly on the ties. Figure 6, page 9, shows the lowest Model 9A switch lock mounted on a G-R-S Model 9 switch machine.

Figure 25, page 44, shows type of foundation recommended for locks more than about 3 feet 6 inches high.

MODEL 9A SWITCH LOCK MOUNTED ON TIES					
LOCK ONLY		WITH TELEPHONE		WITH TIME CONTACTOR	
Dim. A	Dim. B	Dim. A	Dim. B	Dim. A	Dim. B
1′10⅛″	4′½″	3′3½″	5′½″	3′½″	4′10½″
2′5″	4′4½″	3′10⅜″	5′5½″	3′7⅜″	5′3½″
2′7½″	4′6½″	4′⅞″	5′7½″	3′9⅞″	5′5½″
3′1″	4′10½″	4′6⅜″	5′11½″	4′3⅜″	5′9½″
3′6¼″	5′2½″	4′11⅝″	6′3″	4′8⅝″	6′1½″
3′11⅞″	5′7″	5′5¼″	6′3″	5′2¼″	6′3″
4′6¼″	5′11½″				
4′11″	6′3″				
5′1½″	6′3″				

MODEL 9A SWITCH LOCK MOUNTED ON G-R-S MODEL 9 HAND-OPERATED SWITCH MACHINE					
LOCK ONLY		WITH TELEPHONE		WITH TIME CONTACTOR	
Dim. A	Dim. B	Dim. A	Dim. B	Dim. A	Dim. B
2′3¼″	4′8″	3′8⅝″	5′2″	3′5⅝″	5′1½″
2′11″	4′9″	4′4⅜″	5′10″	4′1⅜″	5′7½″
3′1″	5′1″	4′6⅜″	5′11½″	4′3⅜″	5′10″
3′6¼″	5′2″	4′11⅝″	6′2½″	4′8⅝″	6′1″
3′11⅞″	5′6½″	5′5¼″	6′2½″	5′2¼″	6′2½″
4′6¼″	5′11″				
4′11″	6′2½″				
5′1½″	6′2½″				

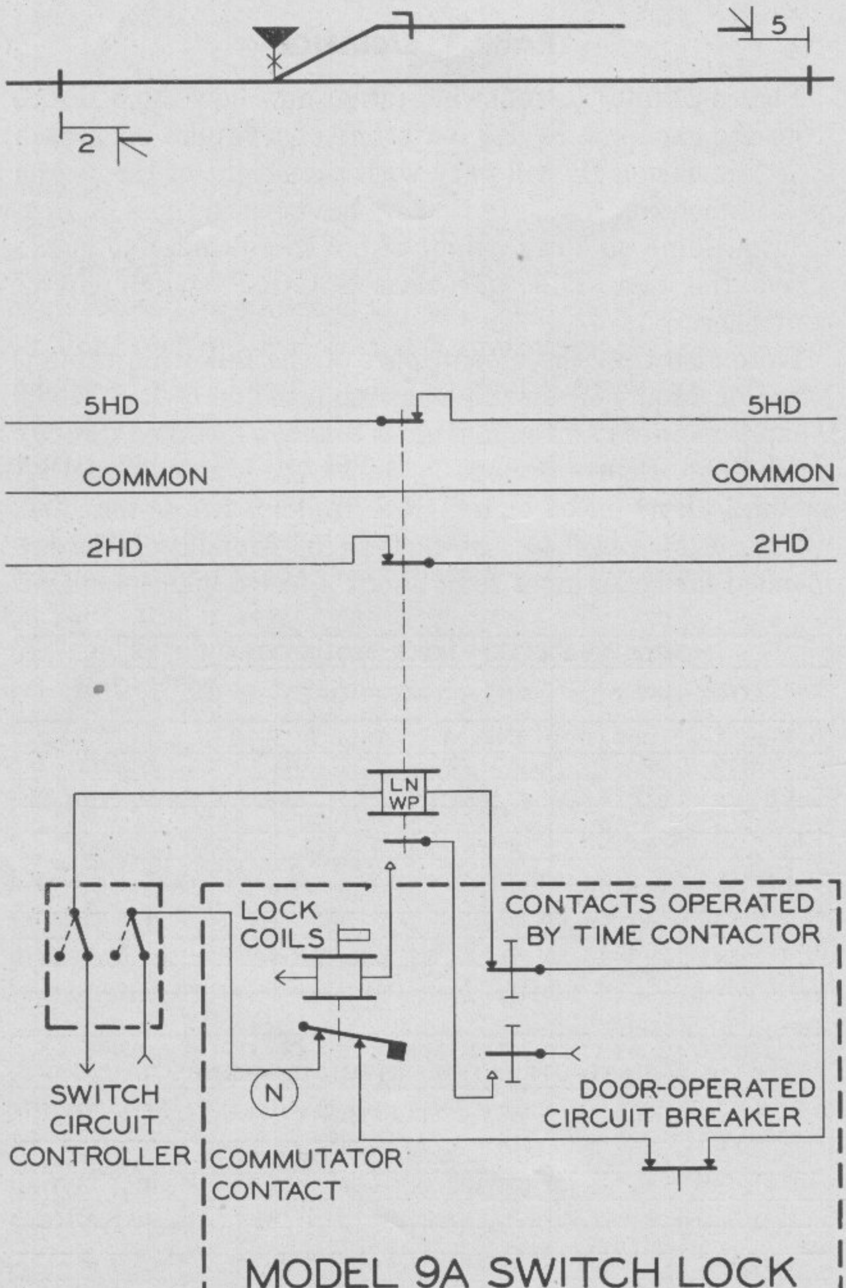


Figure 22. Typical circuit showing use of G-R-S clockwork time contactor with Model 9A switch lock.

TYPICAL CIRCUITS

The designing of switch lock circuits is so dependent upon the characteristics of the associated signaling circuits and upon the operating conditions of the particular railroad, that it is difficult to set up any standard circuits that would be satisfactory for all installations. The circuits shown here are intended more as general examples than as specific recommendations. Your G-R-S engineer will be glad to work with you in designing circuits fitted to your specific requirements.

Figure 22, page 38, shows a circuit for a Model 9A switch lock equipped with a G-R-S clockwork time contactor such as shown in Figure 13, page 20. When the trainman opens the door of the switch lock, the door-operated circuit breaker opens the circuit to relay LNWP, thus putting signals 2 and 5 to their deenergized positions. Then the trainman opens the door of the time contactor and presses a button to start the timing mechanism. At the end of the timing period (two, three or four minutes, as specified), the contactor completes the circuit to the lock coils, and the switch may be unlocked.

Figure 23, page 40, shows how a Model 9A switch lock can be circuited for manual control, with full supervisory track circuit protection. With this arrangement, the trainman must get a release from the operator to enter or to leave the siding.

Figure 24, page 41, shows fully automatic control of a Model 9A lock. A train entering the siding gets an immediate release by occupying the short track circuit at the switch. When the train wishes to leave the siding, signals 2 and 5 are put to stop as soon as the door of the switch lock is opened. If both 5HD and 2HD are energized, the switch may be unlocked immediately. If either 5HD or 2HD is deenergized, the switch may not be unlocked until time-element relay TE has completed its timing cycle.

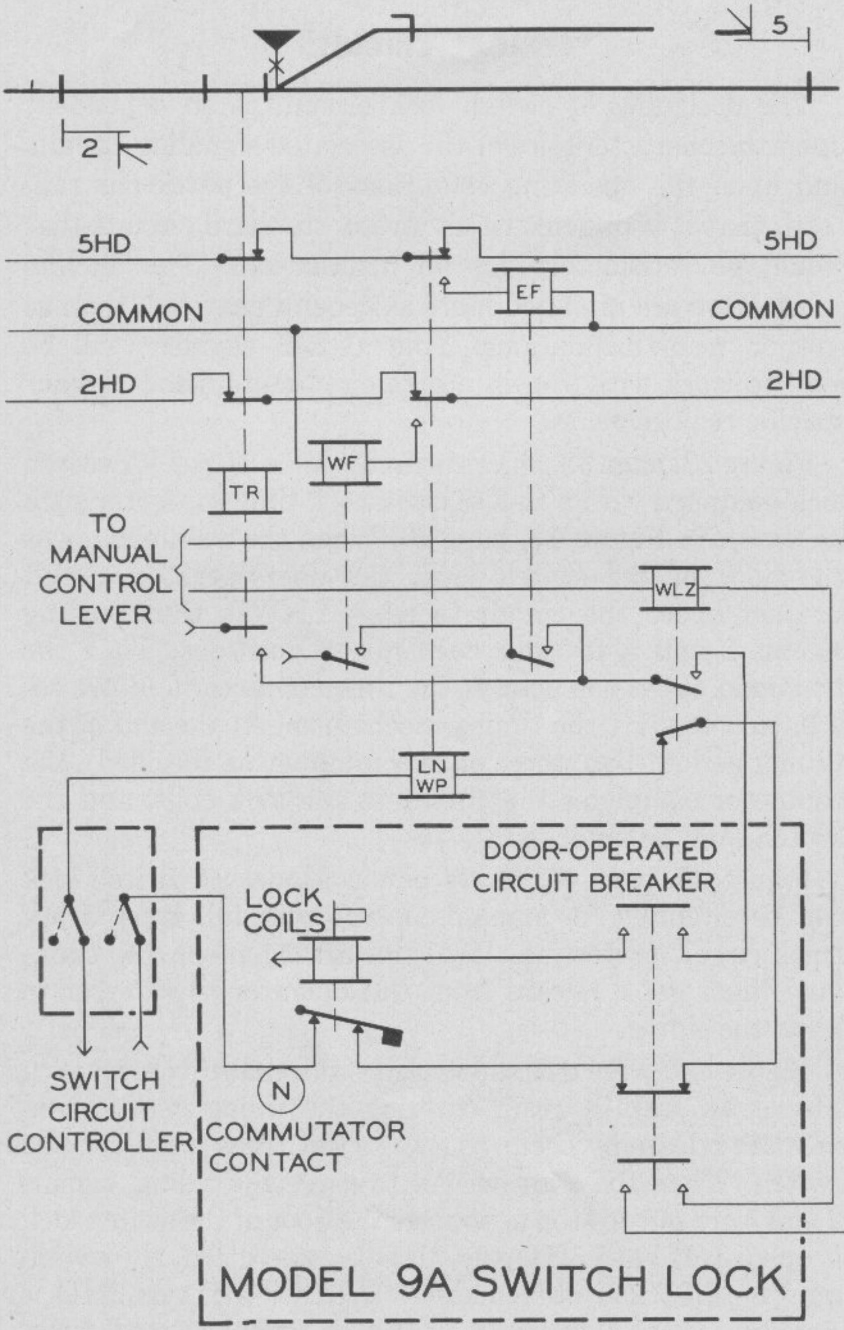


Figure 23. Typical circuit for manual control of Model 9A switch lock.

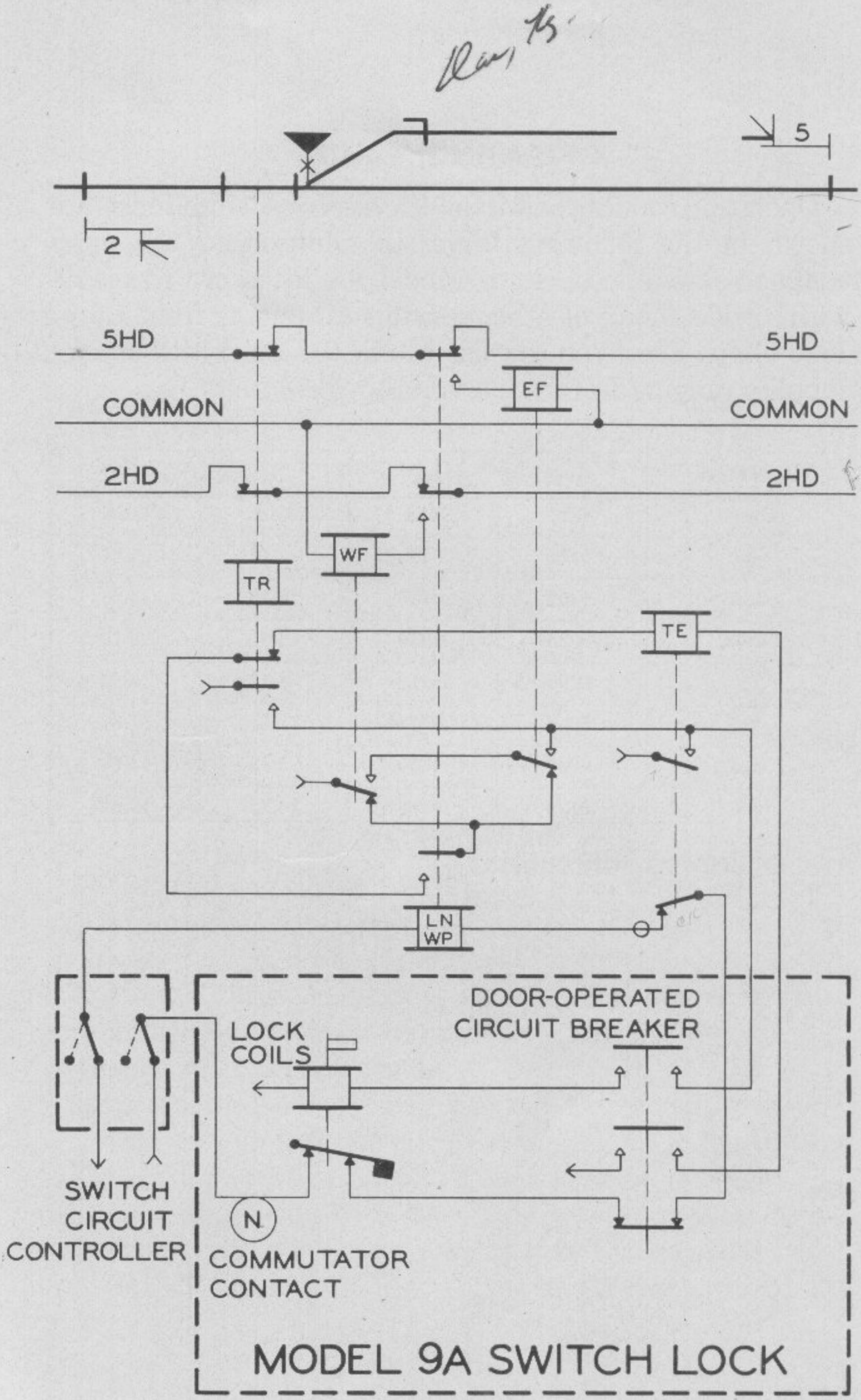


Figure 24. Typical circuit for automatic control of Model 9A switch lock.

OPERATING VALUES

Operating values for Model 9A electric switch locks are shown in the following table. In addition to the more common resistances listed, Model 9A locks are available with a wide choice of other resistances ranging from 1.6 to 1980 ohms. Thus you can use Model 9A locks with energy supplies ranging from 0.493 volts to 26.73 volts.

Resistance of Lock Ohms	Working Current		Working Volts*	
	Min.	Max.	Min.	Max.
90	.0455	.0486	4.10	4.37
126	.0405	.0435	5.10	5.48
194	.0325	.0350	6.31	6.79
280	.0290	.0310	8.12	8.68
430	.0260	.0275	11.18	11.83
640	.0206	.0220	13.18	14.08
960	.0170	.0183	16.32	17.57

*At 68 degrees Fahrenheit.

LUBRICATION

Model 9A electric switch locks are shipped fully lubricated and ready for service.

The following parts should be given a drop of G-R-S Fine Relay Oil MS 2-186 about once a year: armature bearings, indicator bearings, and hold-down (or kick-off) spring-and-plunger assembly.

Also about once a year, a drop of G-R-S 2A Semaphore Oil MS 2-50 should be put on the commutator shaft bearings and on the three pivots of the emergency release mechanism. All the attention required by the commutator contacts is a yearly wiping with a chamois slightly moistened with G-R-S 2A Semaphore Oil.

The locking plunger is lubricated through a fitting in the base. Three or four times a year, a wide temperature range grease meeting Army-Navy Specification AN-G-3A should be applied through this fitting.

HOW TO ORDER

G-R-S Catalog Section K, Part 2, gives complete ordering information for Model 9A electric switch locks. You can order just the lock or a complete layout, such as shown in Figure 21, page 36, with G-R-S switch circuit controller, terminal box, couplings, conduit, lock rod, lag screws, etc., complete and ready to install.

Your G-R-S engineer will be glad to consult with you concerning any special arrangements or circuits you may require to solve a particular operating problem. He can also supply you with layout drawings to give you installation data. There is no obligation for these services. Addresses of G-R-S district offices are given on page 47.

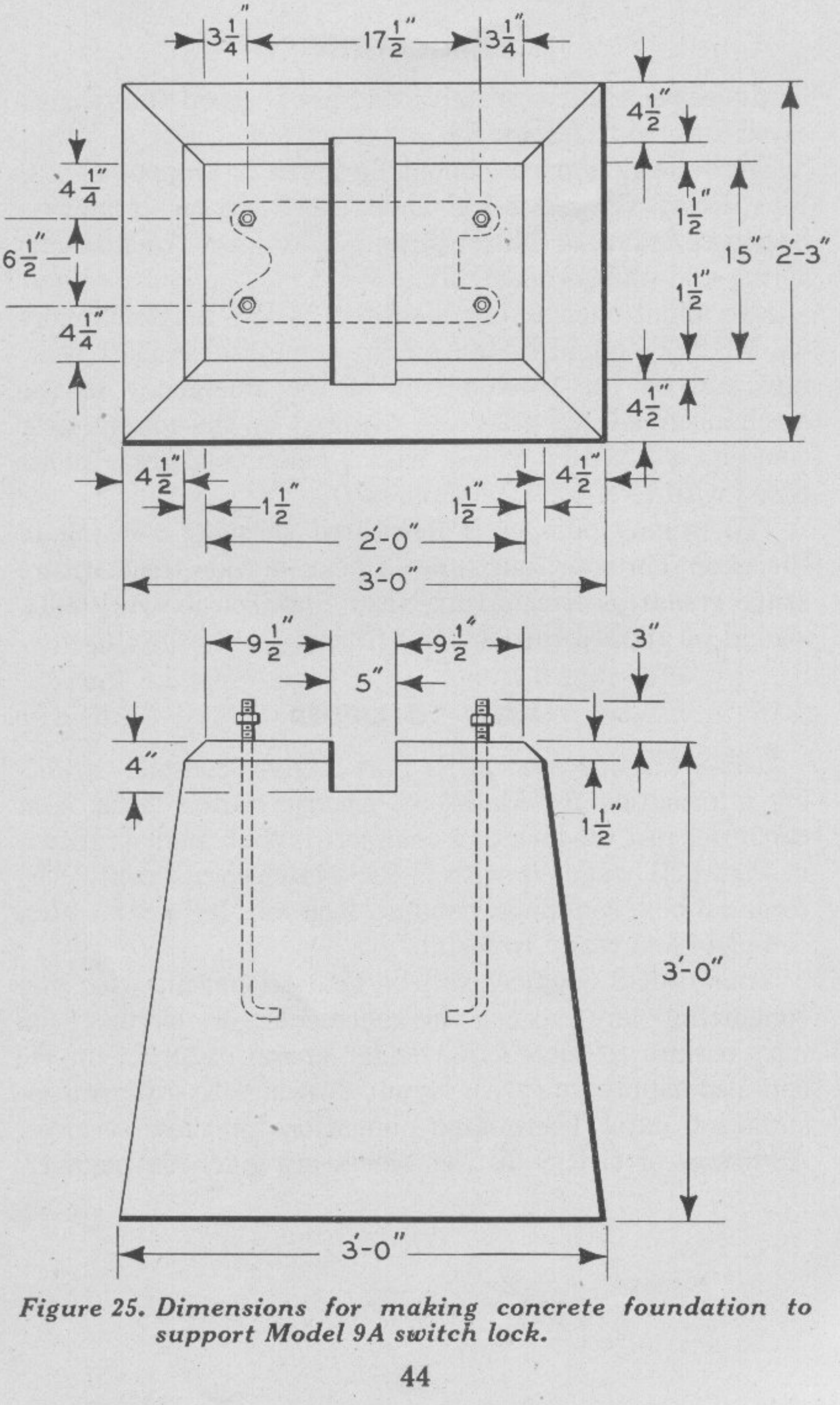


Figure 25. Dimensions for making concrete foundation to support Model 9A switch lock.

CONCRETE FOUNDATION

Switch locks, particularly when mounted near the ends of long ties, are subjected to severe vibration. The effects of this vibration can be considerably lessened by using locks not more than about 3 feet 6 inches in overall height. Higher locks should be supported on a concrete foundation. Dimensions for making such a foundation are shown in Figure 25.

NOTES

DISTRICT OFFICES
OF THE
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NEW YORK OFFICE

230 Park Avenue, New York 17, New York
Telephone: MUrray Hill 9-7533

CHICAGO OFFICE

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Telephones: HArrison 7-2361

ST. LOUIS OFFICE

611 Olive Street, St. Louis 1, Missouri
Telephone: MAin 4696

EASTERN CANADIAN OFFICE

P.O. Box 600, Rochester 2, New York
Telephone: GEnesee 1483

WASHINGTON OFFICE

613 15th Street, Northwest, Washington 5, D.C.
Telephone: EXecutive 4757

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