

supply requirements for each section, as shown in the list below, varying somewhat for maintenance sections having only straight automatic signals and those having automatic signals and interlockings.

LIST OF TOOLS AND SUPPLIES FOR SIGNAL MAINTENANCE SECTIONS

Items * not furnished to automatic signal maintainers.

- 1 Lineman's climbing outfit complete
- 1 3/4-in. single block
- 1 3/4-in. double block
- 300 Ft. 3/4-in. hemp rope
- 1 Set come-alongs
- 3 10-qt. water buckets
- 2 Engine-oil cans
- 2 2-gal. oil cans with spouts
- 1 5-gal. oil can without spouts
- 1 60-gal. gasoline tank
- *1 60-gal. L.T.B. oil tank
- 2 Deitz inspectors lanterns
- 1 White hand lantern
- 1 Red hand lantern
- 2 Red flags
- 24 Torpedoes
- 24 Fuzees
- *1 Pipe vise
- 1 Combination bench vise
- *1 Oster bulldog stock and die 1/2 in. to 1 1/2 in. for pipe
- *1 Drill press for shop
- 1 Bonding drill machine, Hyduty
- 1 Voltammeter Type-S2; amp., 0.03 to 30; volts 3 to 150, 3-range
- 1 14-in. flat file
- 1 16-in. round file
- 1 16-in. stillson wrench
- 1 18-in. stillson wrench
- 1 7/8-in. reamers wrench
- 1 5/8-in. and 3/4-in. "S" end wrenches
- *1 2-in. Switch adjusting wrench
- *1 Blacksmith forge complete; maintainers
- 1 2-in. paint brush
- 1 3-in. paint brush
- 1 One qt. gasoline blow torch
- 1 Solder pot
- 1 Ladle
- 4 3/8-in. drill bits
- 4 9/32-in. drill bits
- 1 1 1/4-in. wood bit
- 1 3/8-in. wood bit
- 1 1/2-in. wood bit
- 1 13/16-in. wood bit
- 1 15/16-in. wood bit
- 1 Hand saw No. 8
- 1 3/8-in. socket wrench
- 1 5/8-in. socket wrench
- 1 3/4-in. socket wrench
- *1 1 1/4-in. pipe cutter
- 1 Pair gas-pliers, 8-in.
- 1 Pair side-cutting pliers, 8 in.
- 1 Tommy bar
- 1 14-in. Monkey wrench
- 1 8-in. Monkey wrench
- 2 No. 1 straight-shank drills
- 1 No. 1409 Billings and Spencer style-S wrenches, 7/16-in. by 1/2-in. opening
- 1 No. 1416 Billings and Spencer style-S wrenches, 9/16-in. by 5/8-in. opening
- 1 G.R.S. Co. (door knob) short wood handle wrench for 1/2-in. face hex nuts
- 1 Long wood handle socket wrench similar to G.R.S. Co., 15194, ex-

- cept for 7/16-in. face hex nuts
- 1 Short wood handle socket wrench similar to G.R.S. Co., door knob except for 7/15-in. face hex nuts
- 2 Contact finger, benders for use on US&S Co., relays
- 1 Alemite grease gun
- 50 1/16-in. by 1/2-in. cotters
- 50 3/32-in. by 1/2-in. cotters
- 50 1/8-in. by 1/4-in. cotters
- *1 1 1/2-in. hot cutter
- *1 1 3/4-in. bottom fuller
- *1 3/4-in. top fuller
- *1 3-in. flatter
- *1 1 1/4-in. top swage
- *1 1 1/4-in. bottom swage
- *1 1 1/4-in. hardie
- 3 Ball-pein hammer handles
- 1 Tool grinder, Keystone
- 1 1-in. wood chisel
- 2 1-in. cold chisels
- 2 Starting punches
- 2 Drift punches
- 1 12-in. hack-saw frame
- 6 12-in. hack-saw blades
- 1 Carpenter brace, 6-in. sweep
- *1 Anvil, 150 lb.
- *1 1 1/2-in. Cold cutter
- *1 3/4-in. Top swage
- *1 3/4-in. Bottom swage
- *1 3/4-in. Curved lip tongs
- *1 1 1/4-in. Curved lip tong
- *1 2-in. flat tong
- 1 Ratchet (Boilermakers or 12-in. ratchet)
- 2 11/16-in. drill bits with square tapered shanks
- 2 13/16-in. drill bits with square tapered shanks
- 2 9/16-in. drill bits with square tapered shanks
- *1 10-lb. sledge hammer
- 1 2-lb. ball-pein hand hammer
- 1 3-lb. ball pein hand hammer
- *1 3/4-in. drill bit with round flat side shank
- *1 1/2, 9/16, 5/8, 11/16, 3/4, 13/16, 7/8, 15/16, 1-in. drill bits with round flat side shanks. (The above drills for drill presses.)



Circuits for Crossing Signals

"Which control system for a highway crossing signal is better, the interlocking-relay type or the neutral stick-relay type, from an operating as well as from an economic standpoint? What is the basis of your judgment?"

Favors Neutral Stick Relays

N. B. Coley

Signal Maintainer, Toronto Terminal, Toronto, Ont.

From an economic standpoint the merits of the interlocking-relay versus neutral stick-relay control systems, for highway crossing signals, vary with individual cases. In a sim-

ple installation having no switching moves to protect, the use of either of these systems will result in similar expense. However, in certain complicated installations, such as outlined in the May, 1934, issue of *Railway Signaling*, it is possible to so adjust the operation of the interlocking relay that several neutral relays are eliminated. The saving in such instances would favor the interlocking relay system of control.

When considered from an operating standpoint, however, I believe that the neutral stick-relay system is more reliable, provided these relays are normally energized. There have been cases of highway crossing signals failing to operate due to mechanical trouble in the interlocking relay. It seems reasonable to assume that the more mechanical parts there are in a relay, the greater chance there is of relay trouble. The trend away from the interlocking relay appears in the decision of some roads to abandon their use for signal control circuits. If they are not dependable for wayside signal controls, are they satisfactory for the protection of human lives by the crossing signal?



Night Intensity of Signal Lamps

"Is it desirable to reduce the voltage on color-light signals at night in order to secure a strong indication in daylight and not too brilliant an indication at night? How can this be accomplished economically?"

Light-Sensitive Relay Useful

F. S. Stallknecht

General Sales Engineer, Thomas A. Edison, Inc., Bloomfield, N.J.

Since some signal engineers believe that it is desirable to reduce the voltage on color-light signals at night while others do not feel that such a procedure is practicable, this is a controversial question.

Where it is considered desirable to do so, a voltage reduction can be reliably accomplished by the use of the Edison sun relay which is regularly equipped with either one front or one back contact depending upon which is specified. The contact on the sun relay is designed to carry a non-inductive load of only 25 watts at a maximum of 20 volts or 3 amp.

For another answer to this question see page 324 of the June issue of *Railway Signaling*.

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Therefore, where the lighting load exceeds these values the sun-relay point is used to control an auxiliary relay capable of carrying heavy loads either inductive or non-inductive as the case may be.

If the signal lamps are normally energized from an a-c. line the sun relay can be used either at each individual signal location or at the feed end of the a-c. line to switch the lamps to a lower transformer tap at dusk or when it starts to get dark. In the morning, provided the light intensity reaches a predetermined degree, the sun relay will again switch the lights to the higher tap. On dark days the lights will be dimmed. Since the light intensity may be different at various points along any right-of-way some engineers favor the use of a sun relay at each individual signal location.

Where the lamps are operated from direct current the sun relay can be used to shunt a resistance unit placed in series with the lamps during daylight—the shunt across the unit being automatically opened when it becomes dark. Of course, the sun relay should be mounted where it will be exposed to a maximum amount of light.



Inspecting Switch Circuit Controllers

"On main-line automatic-block signal territory, how frequently should switch circuit controllers, connections, and the circuits affected, be tested and inspected?"

Number of Inspections Depends on Traffic

D. W. Fuller

Assistant Signal Engineer, Atchison, Topeka & Santa Fe, Topeka, Kan.

We endeavor to have an inspection made of all switch circuit controllers on rigid switches twice monthly, while on spring switches an inspection is to be made weekly. It is very important that fouling shunt wires should be given close inspection, and we endeavor to have these tested twice monthly.

The frequency of inspection of switch boxes and fouling jumpers, of course, depends largely on track conditions, and traffic, there being no question but that more frequent inspections are required on some sections of line than on others.

Where rail is well anchored, switch boxes will hold their adjustment better than where it is not, and for that reason the conditions change due to

temperature variations, which would have a bearing on the frequency of inspections.

Constant Attention

O. S. Tomkins

General Signal Inspector Chicago & North Western, Chicago

On main line automatic block signal territory, switch circuit controllers, connections and the circuits affected, should be tested and inspected at least every 60 days. The connections and position of the switch points should

be given a close visual inspection and checked whenever the signalman passes a switch location. Whenever the signalman is working in the close vicinity he should also watch for any unusual conditions which may have been caused by dragging equipment or by some "ambitious" section foreman spiking in the stock rail without notifying the signalman of his intent. The signalman should also make an operating check of the opening of the points as frequently as possible between the 60 day inspections.

Other answers to this question will be published later.



Operating Long Switch Points

"What arrangement can be used for operating long switch points so as to be sure that the points do not spring over, leaving the mid-section out of line?"

Second Connection Used on Pennsylvania

When installing new junctions in the vicinity of Cincinnati, Ohio, to make connections to lines extending to the new Union Station, the Pennsylvania installed some long cross-overs and turnouts, using switch points 45 ft. long in layouts where 131-lb. rail section is used. These switches are power operated by d-c. low-voltage switch machines which are controlled remotely as a part of a centralized traffic control installation.

and operating rod attached to the switch 22.5 ft. from the points. The first crank is so drilled as to obtain a 4-in. movement of the pipe line. Adjustments are made at the second switch adjuster to co-ordinate the operation at the two locations and to secure the correct amount of throw of the points at the mid-section.

This arrangement throws the entire length of the switch points as a unit, without springing the points out of line. The position of the switch at the point is, of course, checked by the point detector which is a part of the switch machine. In order to check the position of the mid-section of the switch points, an extra switch circuit controller, including contacts in the SS control circuit, is connected to a switch foot attached to the right-



Switch layout using second connection

The use of switch points 45 ft. long introduced a new problem. In order to be assured that the points complete their movement throughout their entire length, rather than being sprung over at the point, leaving a part of the length out of proper alignment, a special pipe connection was devised. This one-inch pipe connection extends from the operating rod at the points through cranks to a sec-

ond hand point 22.5 ft. from the point.

Adjustable rail braces are used on the first four ties under the points and on every other tie throughout at least 25 ft. of the length of the switch points so that the stock rails can be maintained in proper position. These installations, including the 45-ft. switch points, have been in service since April, 1933, and the arrangement has proved entirely satisfactory.