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	¾-in. single block
1	¾-in. double block
300	Ft. ¾-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 ½ in. to 1½ 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	⅞-in. reamers wrench
1	⅝-in. and ¾-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	⅜-in. drill bits
4	9/32-in. drill bits
1	1¼-in. wood bit
1	⅜-in. wood bit
1	½-in. wood bit
1	13/16-in. wood bit
1	15/16-in. wood bit
1	Hand saw No. 8
1	⅜-in. socket wrench
1	⅝-in. socket wrench
1	¾-in. socket wrench
*1	1¼-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 ½-in. opening
1	No. 1416 Billings and Spencer style-S wrenches, 9/16-in. by ⅝-in. opening
1	G.R.S. Co. (door knob) short wood handle wrench for ½-in. face hex nuts
1	Long wood handle socket wrench similar to G.R.S. Co., 15194, except 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 ½-in. cotters
50	3/32-in. by ½-in. cotters
50	⅛-in. by 1¼-in. cotters
*1	1½-in. hot cutter
*1	1¾-in. bottom fuller
*1	¾-in. top fuller
*1	3-in. flatter
*1	1¼-in. top swage
*1	1¼-in. bottom swage
*1	1¼-in. hardee
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	1½-in. Cold cutter
*1	¾-in. Top swage
*1	¾-in. Bottom swage
*1	¾-in. Curved lip tongs
*1	1¼-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	¼-in. drill bit with round flat side shank
*1	½, 9/16, ⅝, 11/16, ¾, 13/16, ⅞, 15/16, 1-in. drill bits with round flat side shanks. (The above drills for drill presses.)

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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 simple 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?

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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.*

(Continued on page 442)