

Equipment in machine shop includes drill presses, grinders, lathes and a screw machine

Three Signal Shops into One

Shop at Elkhart, Ind., handles repairs to relays, switch machines, train-stop inductors, rectifiers and circuit controllers on lines West of Buffalo

THE NEW YORK CENTRAL has enlarged its signal shop at Elkhart, Ind. to accommodate work formerly done at regional shops at Indianapolis, Ind. and Detroit, Mich. The Elkhart shop, formerly in one corner of the old roundhouse, is now in two separate one-story, brick buildings: (1) a 64 ft. by 120 ft. machine shop; and (2) a 72 ft. by 100 ft. building which houses a relay shop, carpentry shop and the shop supervisor's office. The signal storehouse, also located in Elkhart, is a consolidation of the Elkhart, Indianapolis and Detroit stores. Thus the repair, maintenance and stores of signal equipment are now handled at Elkhart for the entire railroad west of Buffalo.

A signal shop supervisor is in charge of the shop, and directs the work of a force of 26 men comprising one clerk, four leading signal mechanics, ten signal mechanics and eleven assistant signal mechanics. One leading signal mechanic is in

charge of the machine shop and supervises general repairs. Another lead mechanic is in charge of the blacksmith shop; with a third in charge of the relay shop. The fourth lead mechanic supervises the making of gate arms, carpentry and case wiring. With the exception of the men working in the relay shop, the mechanics are rotated in the different jobs, giving them experience in all types of work.

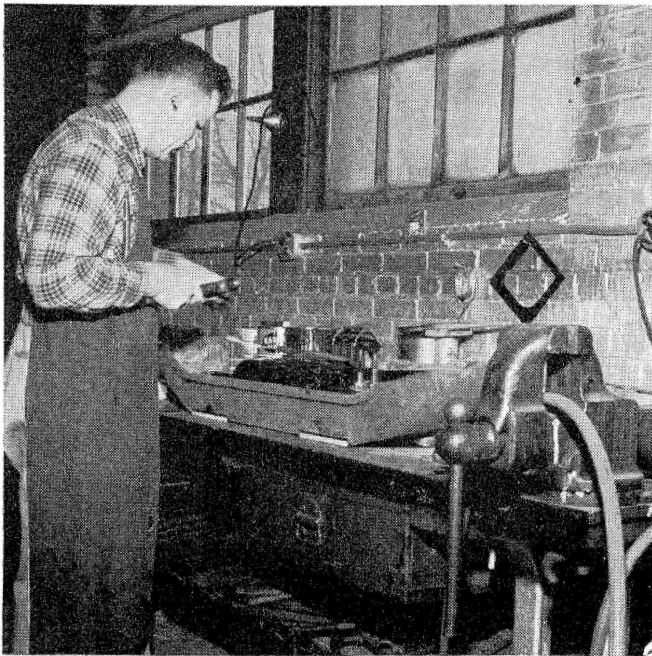
Machine Shop Handles Large Items

The machine shop building contains several working areas: a switch machine repair and assembly bay; machine shop; blacksmith shop; general repair and assembly section; battery repair section; train-stop inductor test equipment and bench; and semaphore signal and gate mechanism torque testing equipment. A railroad spur runs the length of the building into the blacksmith shop

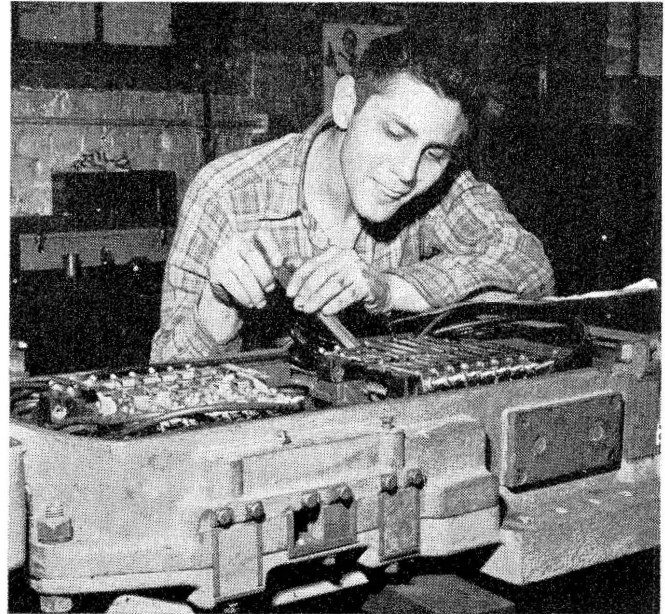
and general repair area. Thus instrument bungalows or signal masts can be brought into the building on a flat car or gondola. A 10-ton chain hoist operates on a track running the length of the building. Other hoists, rated at 1-ton each, are in the blacksmith shop and switch machine assembly bay.

The mechanics who repair switch machines use the chain hoist to lift a machine onto either of two stands. One is a metal rack and the other is a "roll away" steel table. They support a switch machine about 3 ft. above the floor, a convenient working height. The "roll away" table enables the mechanic to move the switch machine to the most convenient work area in the bay.

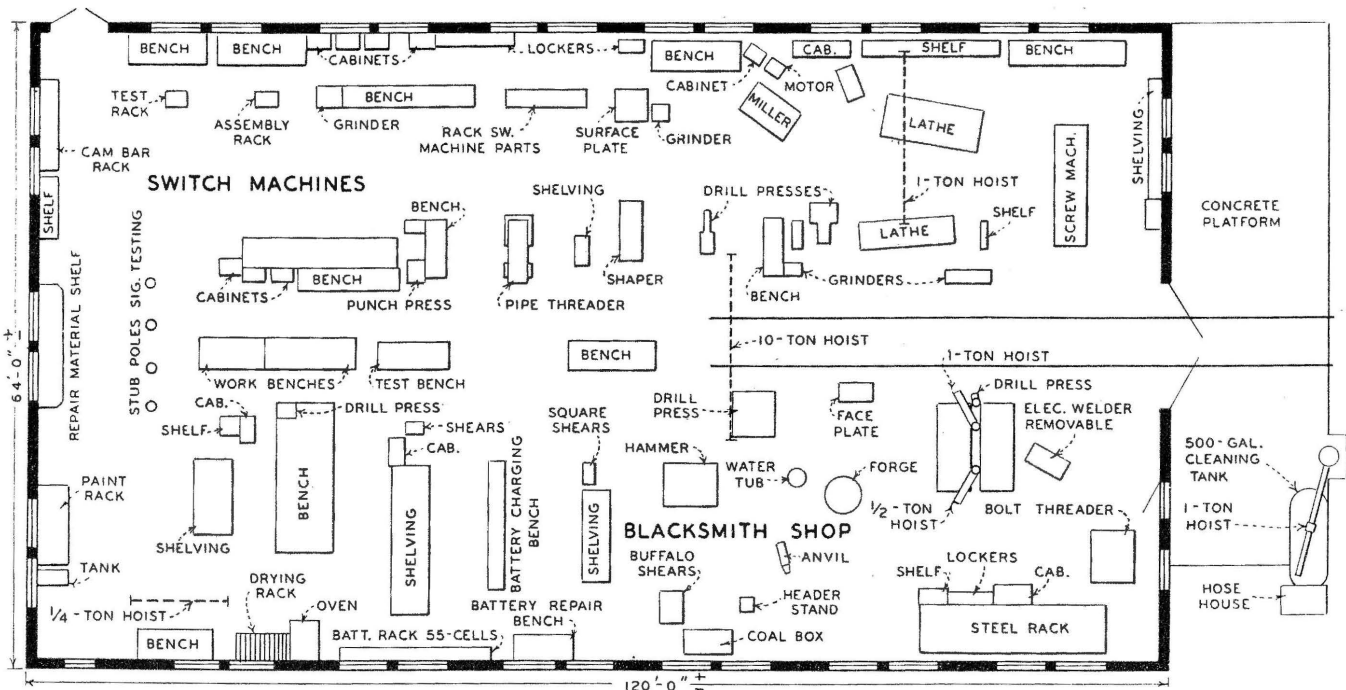
The equipment in this building includes the following power-operated machine tools: pipe threader; 20-in. Gould & Eberhardt shaper; Delta tool grinder; Cincinnati milling machine; Barnes drill press; Allen drill press; 16-in. American Pacemaker lathe; 16-in. Boyce & Emmes lathe; Jones & Lamson universal turret lathe; and two Wells metal bandsaws. The blacksmith shop has two one-ton chain hoists on booms, as



Train-stop inductors are repaired and tested here



Switch machines being repaired are put on roll-away tables



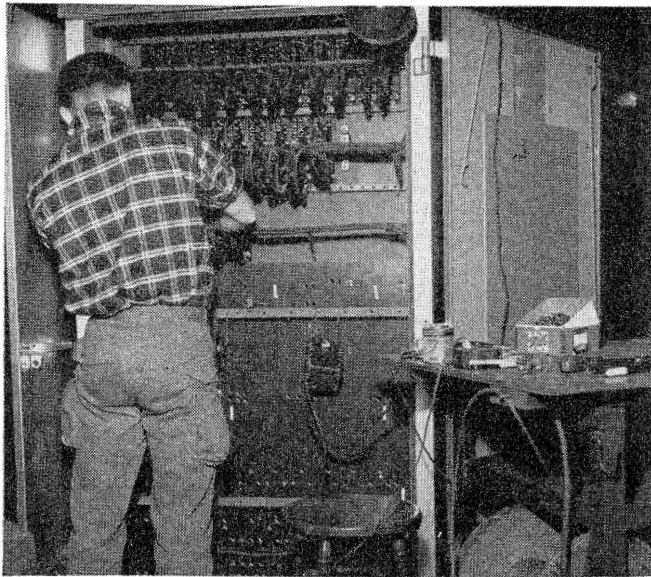
well as the following equipment and machines: a forge; a steel rack for stock; Bradley 200-lb. air hammer (drop-type); Buffalo Forge shears; Bridgeport grinder; Black & Decker small grinders (several); Acme bolt threader; equipment for heating rivets and leading; and a Lincoln welder. This welder is mounted on wheels and can be moved about the shop.

Work done in the general repair section includes the rehabilitation of bonding drills, signal cases, housings for signal mechanisms, circuit controllers, batteries, rectifiers, switch machine and signal motors, etc. Two types of battery are repaired: lead and nickel-iron. Lead battery plates

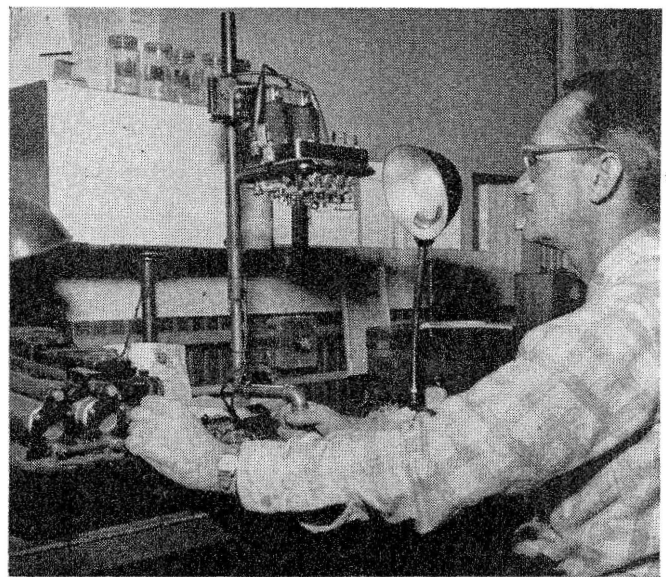
and electrolyte are replaced; the case is cleaned; and the battery re-assembled. The nickel-iron battery is flushed and refilled, and when necessary, the carrying case is renewed. Batteries are returned to the store-room at full charge. A battery charging line is fed from a Fansteel rectifier that operates off 110 volts a.c. Another d.c. line is supplied by 55 cells of 200-a.h. storage battery to provide 110 volts for rectifier, motor and battery benches. An Oliver drill grinder is used to sharpen bonding drills. Other machinery and equipment includes an oven for drying switch machine and signal motors (a separate bench is utilized for these

motor repairs); electronic coil shortage unit which measures the short of from one turn up to a coil size of 1 ft. in diameter; and armature bar-to-bar checker; a commutator undercutting machine; a rectifier repair and cleaning bench; and a high voltage transformer which has ratios of 100 to 1 and 0 to 10,000 volts for checking other transformers. Another bench is used for repairs and testing of train-stop inductors, and is equipped with a special test panel with three meters.

Metal parts which are to be painted, such as dwarf signal cases, signal backgrounds, and ladders are cleaned before painting. A 600-gal.



Roll-away table holds wire reels and tools for case wiring



White screen is good background for seeing relay contacts

cleaning vat, approximately 4 ft. wide, 7 ft. long and 3 ft. deep, is located outdoors at the east end of the machine shop building. Steam and hot water connections are available as well as a drain. A small steel shed houses chemicals, scrub brushes and other necessary tools. A 1-ton chain hoist on a swivel boom is used to lift heavy items in and out of the vat. Some painting is done by hand. For spray painting, a paint-spray booth, equipped with an exhaust fan, is located in the carpentry shop. A DeVilbiss electric sprayer is used for painting signal backgrounds, masts, and ladders, etc.

Case Wiring Simplified with Peg Board

Most of the case wiring done in this shop is for highway crossing protection projects. For these installations, plug-in relays are being used extensively. To facilitate wiring

to the relay plugboard terminals, the wireman makes use of a large peg board. Pegs are inserted in holes in combinations to represent plugboard terminals, and the wiring is formed on the board, being wrapped and tied. Thus the wire form can be lifted off the peg board and put in place at the rear of the relay case, and the wires soldered to the relay plugboard terminals.

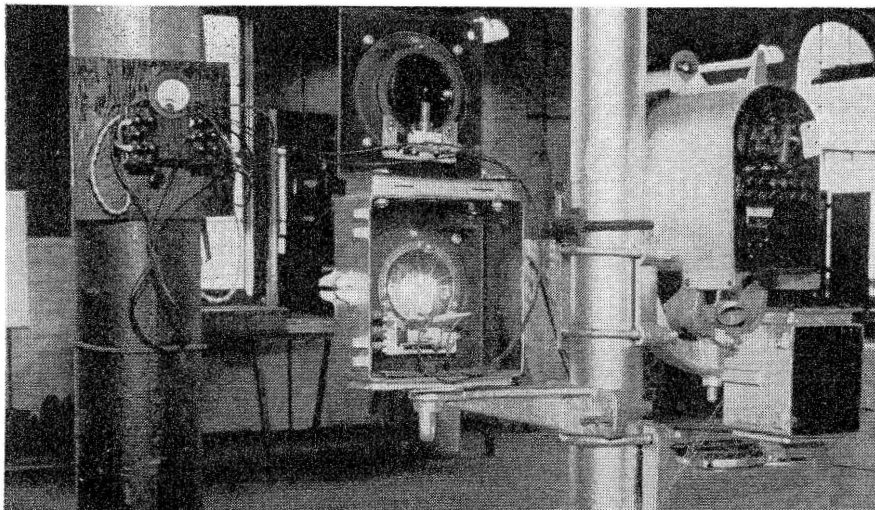
To enable the mechanic to have his tools, wire, etc., within easy reach, he has a "roll away" steel table with a plywood top and shelf below. This movable table is equipped with rubber-tyred casters. At each end of the table, a reel of wire is supported on a spindle, leaving the reel free to turn. Another feature of this movable table is that electrical connections are provided through two outlet boxes mounted on the top, one at each end. One extension cord connects the table to 110 or 220 volts a.c. The wireman has

an electric soldering iron, and a portable "trouble" light for close-up illumination. AMP solderless terminals are standard for NYC case wiring. Wrap-around labels are used for identifying wires on plug-in relays. These labels, made by W. H. Brady Co. of Milwaukee, Wis., come in strips with a self-sticking adhesive back. They come in a variety of numbers and letters so that any marking combination may be produced.

Signals Checked for Beam Alignment

Searchlight and colorlight signals are checked for light intensity and beam alignment. Brackets for the signals are mounted on a mast, and are such that only the light unit must be removed from the signal head for testing. The targets for this test arrangement are five black circles with white crosses painted on a plywood panel (4 ft. by 6 ft.), which is 25 ft. from the lamps to be tested. The center of each white cross is cut out forming an aperture 2 in. in diameter. A photo-electric light meter (Weston photographer's light meter) is placed in this aperture to record the amount of light entering through the opening. Although the light intensity measured by the light meter is in foot candles, this measure is converted into microamperes, and is shown as such on a meter at the lamp test location.

When testing, a colorlight signal unit is inserted in the correct test bracket and the lamp is lighted from a.c. The lamp is positioned so that the microammeter gives the highest reading. A complete signal head can



Target for signal lamp beam alignment is 25 ft away (rear of picture)

be checked for lamp alignment, in which case the head is mounted on one of the test bracket arms, and the mechanic adjusts the peep sight so that he sees the "peep" light on the target panel. This "peep" light is a small indication or dial lamp mounted above and to the right of the white cross.

Relay Repairs

Relay shop procedures at Elkhart are similar to those at other shops, i.e., relays are cleaned, repaired and adjusted in accordance with Signal Section, AAR recommended shop practices. Each work bench is equipped with fluorescent lighting, and one or more "goose neck" desk lamps for close-up illumination, also compressed air is available for cleaning purposes. For relay adjustment, a.c. and d.c. power is supplied. At each adjusting bench, the mechanic has a pipe-stand bracket for mounting the relay. A feature of the relay adjusting test bench is a fluorescently lighted opalene glass screen. When adjusting for contact opening and

closure, the mechanic looks "through the relay" toward this opalene screen. The contacts "stand out" so that adjustment is facilitated. Test circuits, including battery supply, rheostats, voltmeter, ammeter and switches are used to check the pickup and release values of relays. For checking relay magnets, a fluxmeter that "reads" from 0 to 150 gilberts is used. This meter was calibrated using GRS relay magnets as standards.

Replacement Gate Arms

Another type of work done at the Elkhart shop is that of making replacement arms for highway crossing gates. Two men work full time making gate arms, with assistance, part-time, from the lead mechanic. In addition to hand tools, such as saws, hammers, wrenches, etc., the shop is equipped with Delta power tools including a drill press, two bench saws, a planer and a sander. Also available are metal shears and a tinner's break (metal bending and/or breaking machine). Gate arms are black and white striped, being spray-

painted. Other carpentry work includes making shipping cases or crates and also wood frost covers for battery boxes.

Typical Month's Reclamation

A report is furnished to the signal engineer, listing work completed during each month, as well as work started but not completed. The following is a listing of items started and completed during a typical month: 7 crossing bells, 35 switch machines, 2 indication magnets, 10 storage cells, 40 rectifiers, 238 relays, 14 switch machine motors, 3 other motors, 45 train-stop inductors, 1 switch machine controller, 7 circuit controllers, 10 bonding drills, and 10 cases for dwarf signals. This report includes a statement of shop costs, including labor and repair parts, plus 35 per cent for overhead which includes supervision, use of tools and machinery, heat, light, building, etc.

The signal shop supervisor is T. R. Stephenson, and the shop is under the jurisdiction of C. F. Brooks, signal engineer at Cleveland.

