C.T.C Extended on the Rio

Extensive track layouts, at two ends of new freight yard, are added to a previously existing C.T.C. project

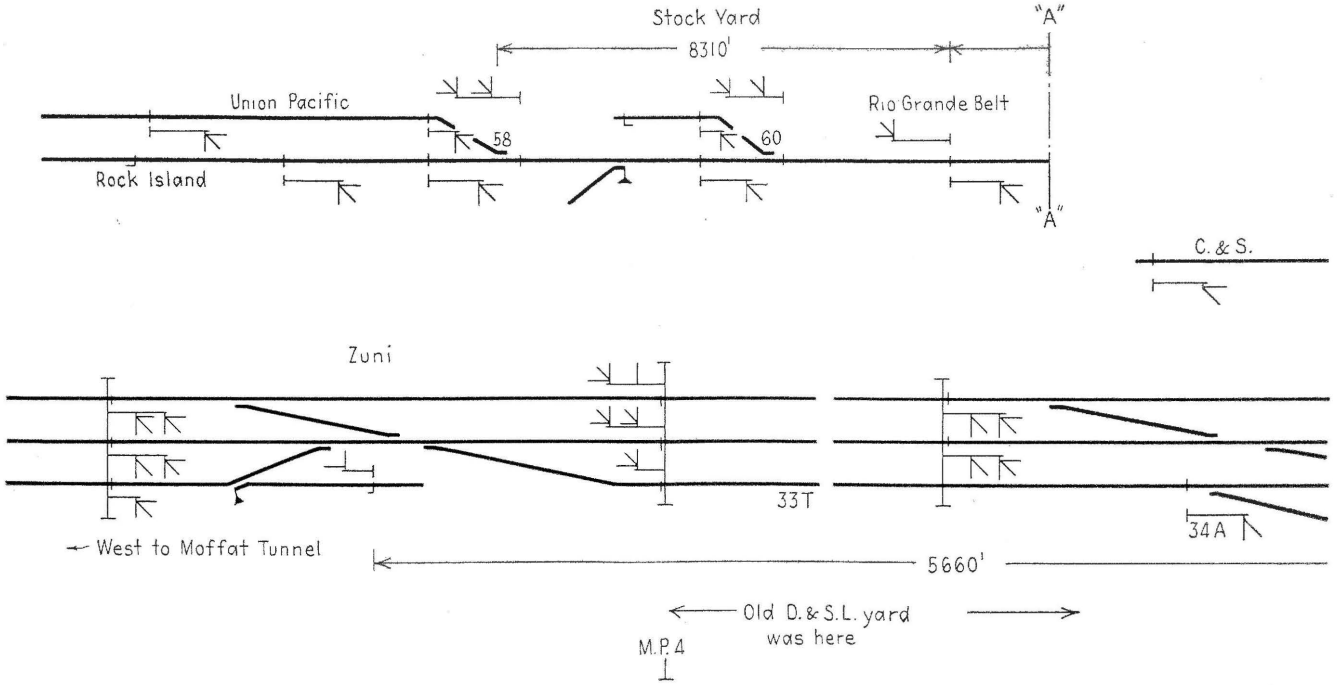
NEAR North Denver, Colo., the Denver & Rio Grande Western has made an extensive addition to the centralized traffic control between Fox Junction, in Denver, to Orestod, 128 mi. Of this total, 56 mi. between Fox Junction and Winter Park is controlled from a C.T.C. machine in the dispatcher's office in Denver. The recently completed additions to the C.T.C. include switches, crossovers and signals at the two entrances to a new freight classification yard built last year.

This project is on the Moffat Tunnel route, formerly known as the Denver & Salt Lake. The Moffat Tunnel was completed and train operation by the D.&S.L. started Feb. 27, 1928. The Rio Grande completed a connection 38 mi. long, known as the "Dotsero Cut-Off", between the D.&S.L. main track at Orestood and the D.&R.G.W. main track at Orestod, and began operation over the D.&S.L. through the Moffat Tunnel on June 15, 1934. Certain through trains are operated over the 128 mi. of the D.&S.L. tracks to Orestod, thence via the cut off and Rio Grande tracks to Salt Lake City, Utah, 441 mi. west of Orestod. On April 11, 1947 the D.&S.L. was consolidated into the operating structure of the Rio Grande. Between 1937 and the completion of the new yard in 1949, the Rio Grande freight trains using the Moffat Tunnel route were received at and departed from a small yard on the north side of the main tracks near Fox Junction, which is at M.P. 2, as shown in the accompanying plan. The freight trains operated by the D.&S.L. were received and departed from a small yard to the south of the main tracks, between M.P. 3 and 4.

Previously the Rio Grande interchanged traffic with the Burlington and the Colorado & Southern in the yard at Fox Junction. In order to improve service to shippers by expediting yard operations and saving time in interchange movements, the Rio Grande, in 1949, constructed an entirely new 19-track flat yard located to the south of the main tracks, and extending in general between M.P. 2 and 3. This new yard now handles all trains formerly handled in, not only the old Rio Grande yard at Fox Junction, but also the old D.&S.L. yard at M.P. 4, and will also become a joint yard later with C.R.I. & P. This obviates interchange previously required between those old yards. Interchange with the Burlington is in the new yard. The west end of the new yard connects with the Rio Grande Belt, on which it is proposed to make interchanges with the Union Pacific. The Belt Line will also handle the main-line freight trains of the Rock Island. Thus, the new yard will minimize time formerly required for interchange moves.

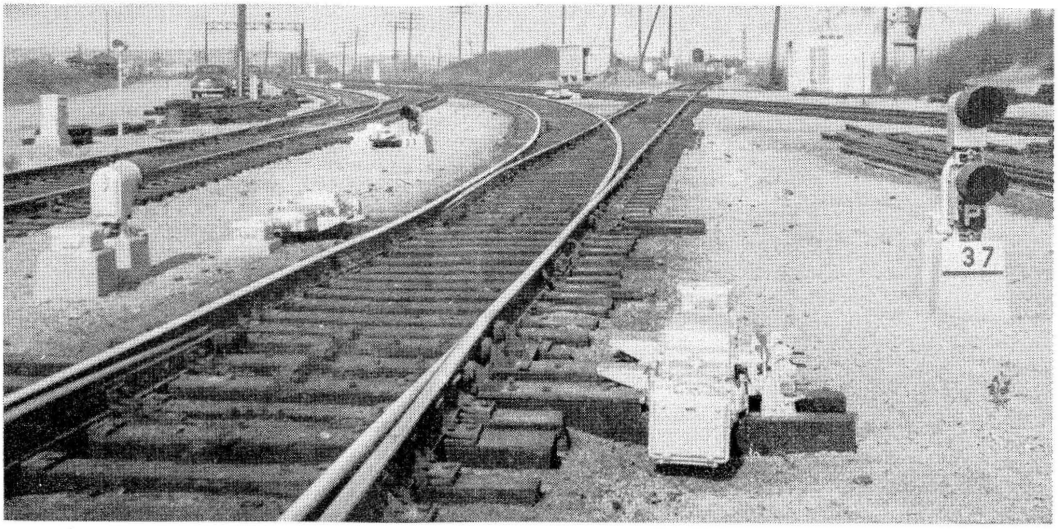
Main Track Changes

Several track changes and corresponding changes in C.T.C. were made at Fox Junction, which is now the end of double track from there east, and also is the entrance to and exit from the east end of the new freight yard. This layout now includes one single power switch, two power crossovers, and five home signals. In the new layout, a single-track main line, used mostly by passenger trains, extends between Fox and Utah Junctions at the west end of the new yard. As shown in the plan, this new Utah Junction layout includes four power single switches,



Track and signal plan of the sections beyond the two ends of the new yard

Grande



View showing switches No. 78 and No. 22 and signal No. 37

three power crossovers, and 12 home signals. This layout includes protection for the Rio Grande Belt crossings of the single-track passenger main of the Rio Grande and the single-track main of the Colorado & Southern.

On the Rio Grande Belt, switch 60 leads to the stock yards, and switch 58 connects to the Union Pacific and the Rock Island. Construction is now underway to include power switch machines and signals at these two switches. On the main line west from Utah Junction, there is a yard lead track (33T) approxmately 1 mi. west to Zuni which includes two single power switches, one power crossover, one dwarf signal and six home signals which are on signal bridges.

Of interest in the discussion, is the fact that the control of the power switch machines, electric locks on hand switches, and home signals at the new layouts at Fox, Utah Junction, Zuni, and on the belt, switch 58 inclusive, are now all incorporated into the previous C.T.C. control machine in the office at Denver, which previously controlled through this section, as well as all the way to Winter Park, a total of 56 mi. All of these changes and additions to the track layouts and C.T.C. were made under traffic, with a normal number of train movements. For this reason, a considerable amount of temporary construction and duplication of effort were required to keep the signaling protection in service all the while.

Switching Signal

When making switching moves in and out of the yard tracks at the west end, switches can be lined from the yard to the switching lead (33T) and signals 34A, 37, and 31 can be cleared to display the caution-slow-speed aspect, which authorizes a switch engine to move back and forth. The control of the signals in such instances is through the switch circuit controllers to check the position of switches, but the controls are independent of track circuits.

Approach-Stick Relays

For a through train movement through a plant area such as Utah Junction, the clearing of the signal releases the approach-stick relays controlling the locking of the switch in the route set up. As movement is made through the home signal limits, the approach-stick relays are energized progressively, thus releasing the route locking behind a receding

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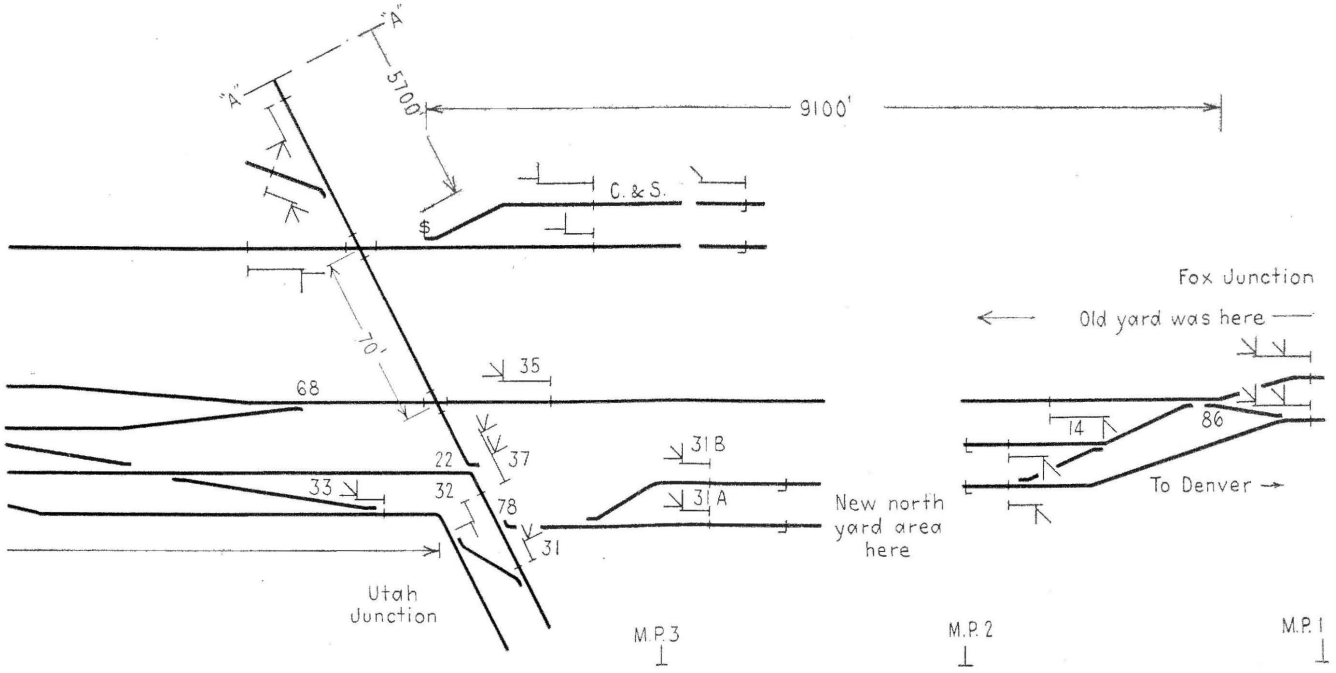
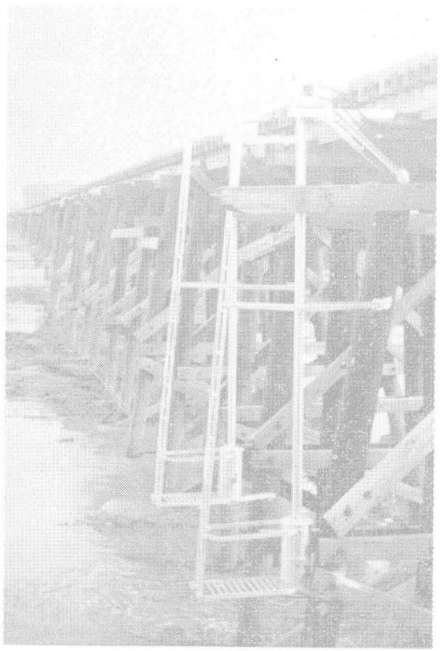


territory, where C.T.C. facilitates train movements into and out of the yard

These signals are the color-light type and are normally dark.

In approach to each signal, there is a track circuit, about 2,500 ft. long, which is for the approach lighting control of its respective signal. At the



Water at level below detector floats

right of the track at the point where a train enters an approach track circuit, there is a fixed sign which is the equivalent of a fixed distant signal. The track relay for an approach track section is at its signal.

A special track circuit extends from one signal to the other. This circuit is connected at either end to the contacts of the approach track relay so that, as long as this approach relay is energized, four cells of battery in multiple are connected to the middle track circuit at each end. When the approach relay contacts are down, a four-ohm track relay replaces the track battery, through the back contacts, and then the circuit becomes a conventional circuit with battery flowing from the opposing signal through the rails, around the insulated joints through the closed contacts of the flood detectors.

When the track relay for an approach track section is released by an approaching train, a circuit is complete through a back contact of this relay, and a front contact of the relay of the track circuit extending to the flood detector, to light the green lamp in the signal. If the flood-detector has been operated, the track relay is down and the red lamp is lighted in the signal, when a train approaches. Also the red lamp is lighted if a train is occupying the track circuit between this signal and the opposing signal, thus giving regular automatic protection to this extent. Each signal has two green lamp units. If the lamp in one green unit fails, the second green lamp is cut in automatically.

Four cells of Edison 500-ah. primary cells are for each track circuit and a set of 12 cells of the same type of battery feeds the lamps at each signal. The signals and relays were made by the Union Switch & Signal Company. The flood-detector project was planned and installed by Katy forces under the direction of R. R. Wood, signal engineer.

C.T.C. on Rio Grande

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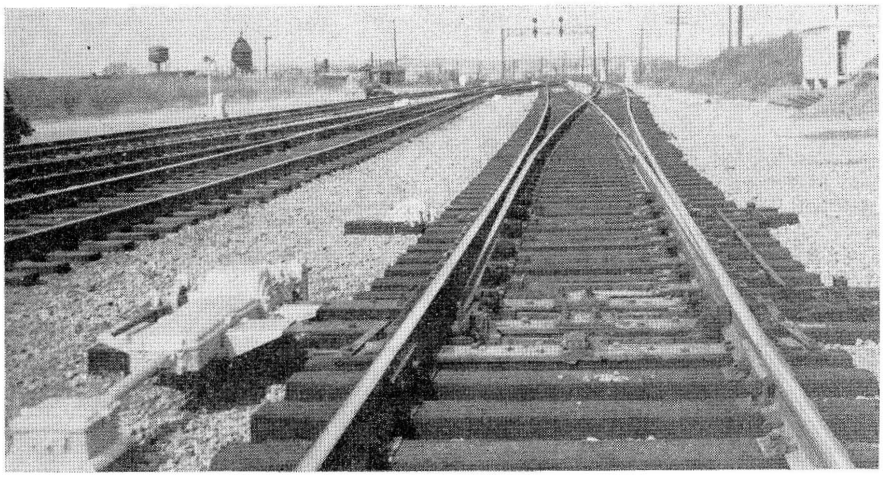
train, so that switches can be operated to line up another route promptly.

At the ends of double track, switches 68 and 86, the turnouts were made equilateral so that the speed through the turnout is the same regardless of the direction of the route selected. For this reason, signals 35 and 14 were made single-arm signals. Speeds up to 55 m.p.h. are permitted over these switches. The signals are the searchlight type. New sheet-metal houses for the relays, battery, etc. were installed at Fox, Utah Junction, Zuni and other locations as required.

The switch machines are the model 5D with dual control, and with d.c. motors rated at 24 volts. The ties on which the switch machines are mounted, are dapped just enough so that the operating rod is straight. The switch layouts are well constructed as shown in one of the accompanying pictures which shows No. 68 at Utah Junction. This layout has a No. 15 turnout with 33-ft. curved switch points. Insulated gage plates, 1 in. thick and 8 in. wide, are used an three ties, including the No. 0 tie and the No. 1 and No. 2 ties. Ramapo-Ajax adjustable rail braces are used on these ties. A Type-MF front rod and five Type-M switch rods are used on this switch. These are Ramapo-Ajax vertical-type rods with vertical pins designed to prevent "rolling" of the switch points. These switch points are 33 t. long, and in order to be sure that the entire length is moved over properly, a pipe connection from the operating rod extends through cranks to a second operating connection on the fifth tie rod, 14 ft. 7 in. from the points of the switch. An extra switch circuit contoller checks the position of the switch points at the second connection.

Master Stepper Added

The control machine was equipped with a second master stepper unit. The original stepper unit controls and receivers indications from Ralston (M.P. 7.2) to Winter Park and the new master controls and receives indications from Fox Junction to Zuni inclusive. This necessitated a second set of code wires from the control office to Zuni. At the same time, a set of transfer relays were installed so that either master unit could be cut out and the other unit would take over the duties of both units by converting from single- to double-end operation on the master unit retained in service. This makes it possible to avoid failures due to faulty master



Power switch No. 68 with 33-ft. curved switch points

unit operation, and also provides means of servicing the units without any danger of an interruption of the controls or indications. The C.T.C. control sytsem is the G.R.S. Type-F Class-M 10-step.

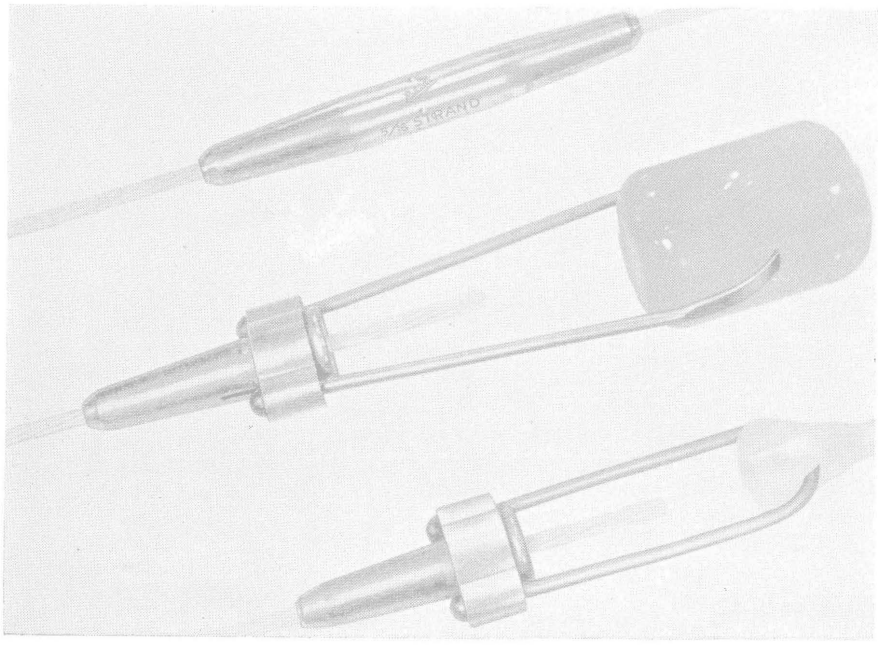
This C.T.C. project was designed and installed by signal department forces of the Denver & Rio Grande Western, under the jurisdiction of B. W. Molis, signal engineer. The major items of signaling equipment were furnished by the General Railway Signal Company. The insulated wire and cable was made by the Kerite Company and the batteries by the Electric Storage Battery Company.

New Developments

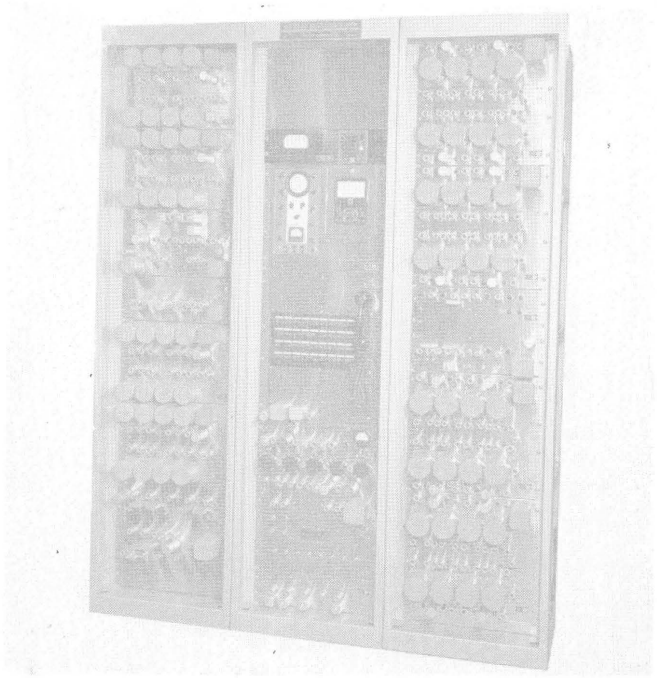
SPLICES AND DEADENDS

DESIGNED for strength and economy is a new line of automatic-type splices and deadends for 5/16 and 3/8-in. steel-strand messenger, static and guy wires, recently announced by the Reliable Electric Company, 3145 Carroll Avenue, Chicago 12, Ill. "Strandlink" and "Strandvise" are the identifying names and, according to the manufacturer, their holding power surpasses the ultimate strength of standard steel strand, irrespective of grade. In addition, claim is made for marked installed cost reduction, steel-strand savings and speed of assembly. Tension applied with either hoists or blocks feeds the strand through the Strandvise for any desired distance.

Among the design features are the gripping jaws, which are composed of several hundred case-hardened Zinolyte-plated steel teeth, per set, with a protective coating. The housing on both units is heat-treated aluminum alloy, and the bails are Type-304 stainless steel. Descriptive literature and samples are available from the manufacturer upon request on your business letterhead, with your title.



Below—The splices and deadends are designed for 5/16 and 3/8-in. steel-strand guys, messengers and static wires. Right—The multiplex equipment is available for 4, 8, 12, 16, 24 and 32 voice channels



MULTIPLEX TERMINALS

COMMUNICATIONS channelizing of the time-division type for use with microwave relay systems is now being manufactured by the Philco Corporation, Philadelphia, Pa., according to a recent announcement by the company's Industrial Division. Employing pulse amplitude modulation (PAM) multiplex terminals, known as the series CMT-4 are available in various models to provide 4, 8, 12, 16, 24 or 32 voice channels. Pulse amplitude modulation time-division multiplexing is said to have an inherent economy of bandwidth, compared to other time-division systems. The CMT-4 terminals have both the freedom from crosstalk of time-division systems, and the spectrum economy normally associated with commercial telephone carrier systems. The composite output of a 32-channel terminal is less than 300 kc. wide. An important feature of the system is the ability to drop out one or more channels at repeater stations. It is possible to employ "party-line" techniques, making the system particularly adaptable to railroad operations. Individual voice channels may also be subdivided to provide a number of telegraph, telemeter or remote control circuits.

Please mention *Railway Signaling and Communications* when writing manufacturers.