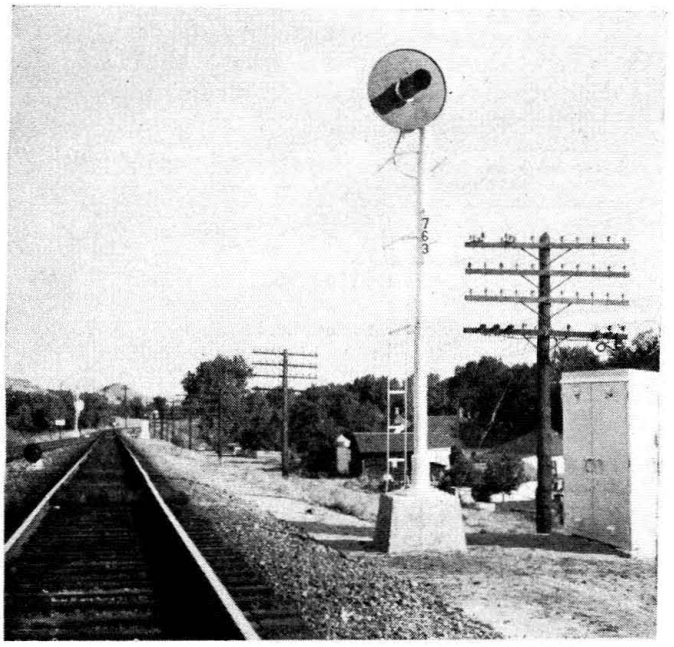
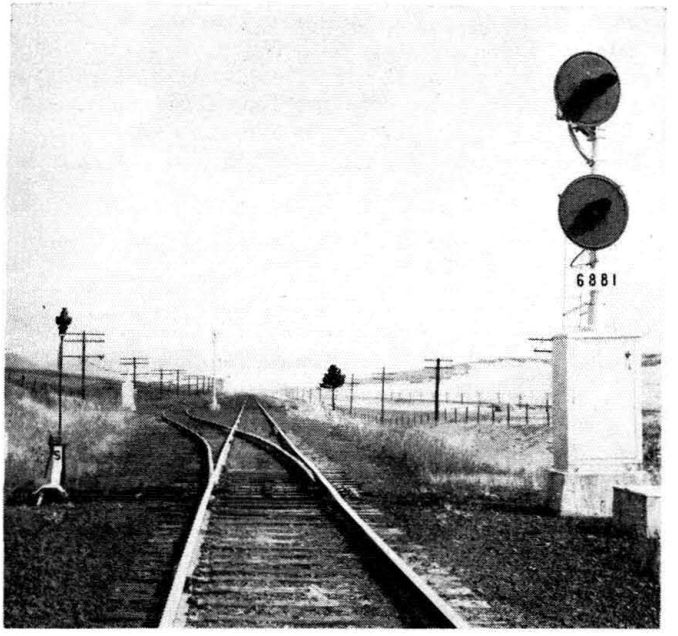


Station-leaving signals at end of siding on the Rio Grande



Special reverse signal at end of siding on the Santa Fe

Automatic Block Increases Safety On Paired Trackage

Installation on 103.9 mi. of double track, operated jointly by the Santa Fe and Rio Grande, replaces manual block

TO provide increased protection and facility for train movements, the Atchison, Topeka & Santa Fe and the Denver & Rio Grande Western have installed automatic block signaling, including spring switches at the leaving ends of 39 sidings, on 103.9 mi. of jointly-operated double track between South Denver, Colo., and Bragdon. This railroad was originally two separate and independently-operated single-track lines, which crisscrossed each other at three different locations between South Denver and Bragdon. In 1919, however, bridges at these locations were discontinued, and the lines tied through to form the double-track line, with trains operating right-hand running. Consequently, the southbound main track consists of two sections of Santa Fe and two sections of Rio Grande property, and the northbound main track, two sections of Santa Fe and two sections of Rio Grande property. This is illustrated in the accompanying simplified straight-line diagram, Fig. 1, which also shows the locations of the spring switches.

In addition to the new automatic signals and spring switches, two interlockings on Santa Fe property and highway crossing protection on properties of both roads were modernized, and the Rio Grande converted a short section of double track to single track with C.T.C. operation on the south end of the project. All of this work was done by the regular signal department construction forces of each road on their respective sections of property.

Some Sharp Curves

Between Denver and Pueblo, the railroad follows along the eastern slopes of the Rocky Mountains via Colorado Springs, 75 mi. south of Denver. The tracks are parallel at points, such as in the vicinities where they used to cross each other, but up to about a mile apart at other locations. A number of communities thus have two stations —one for southbound service and the other for northbound service. From Denver, the southbound main track ascends from an elevation of 5,198 ft. to 7,237 ft. at Palmer Lake, 23 mi. north of Colorado Springs, then descends to 4,673 ft. at Pueblo, the maximum ascending grade at any point being 1.4 per cent between Tomah and Larkspur. Curvature ranges up to 6 deg. 30 min. The northbound main track ascends from Pueblo to 7,242 ft. at Palmer Lake, then descends into Denver, the maximum ascending grade being 1.4 per cent between Pring and Palmer Lake. The curvature between Pueblo and Denver ranges up to 7 deg. 30 min.

In addition to trains of the Rio Grande and the Santa Fe, the Colorado & Southern has trackage rights in the territory, and the Rio Grande

operates certain trains of the Missouri Pacific into and out of Denver. There are an average of approximately 15 passenger and 7 freight trains, thus totaling about 22 trains daily. On both lines, train movements were formerly governed by manual block, timetable and train orders, with permissive block and 5-min. spacing for all but passenger trains. Because of heavy descending grades southward between Palmer Lake and Husted, on the Rio Grande, absolute manual blocking was in effect for all trains. Consequently, trains were often delayed in these vicinities.

Trains Speeded Up

The new signals have eliminated manual block and, thus the necessity for any absolute blocks in the operation of trains. Where, in certain instances, trains may have lagged behind under the previous method of operation, they can now get over the road more rapidly than before. Seven train order offices were closed on Rio Grande property—Pinion, Wigwam, Buttes, Kelker, Husted, Monument and Larkspur. Similarly, nine offices were closed on Santa Fe property—Pinion, Buttes, Kelker, Pikeview, Husted, Tomah, Castle Rock, Orsa and Sedalia.

On both Santa Fe and Rio Grande property, the southbound and northbound tracks are signaled for the normal direction of running only. Spacing is approximately 11,000 ft. on descending grades and 6,000 ft. on ascending grades, the signals displaying red for Stop-and-Proceed, yellow for Approach and green for Clear. Where braking distances are insufficient because of local operating conditions, however, a fourth aspect of yellow-over-yellow, Advance, is introduced, indicating to a train to proceed, approaching the next signal at medium speed—no successive single-yellow aspects are used.

At spring switch locations at the leaving ends of sidings, a three-aspect high signal on the main line and a three-aspect dwarf leaving signal on the siding are provided immediately in advance of the spring switch, as shown in Fig. 2, to govern train movements in the normal direction of traffic over the switch.

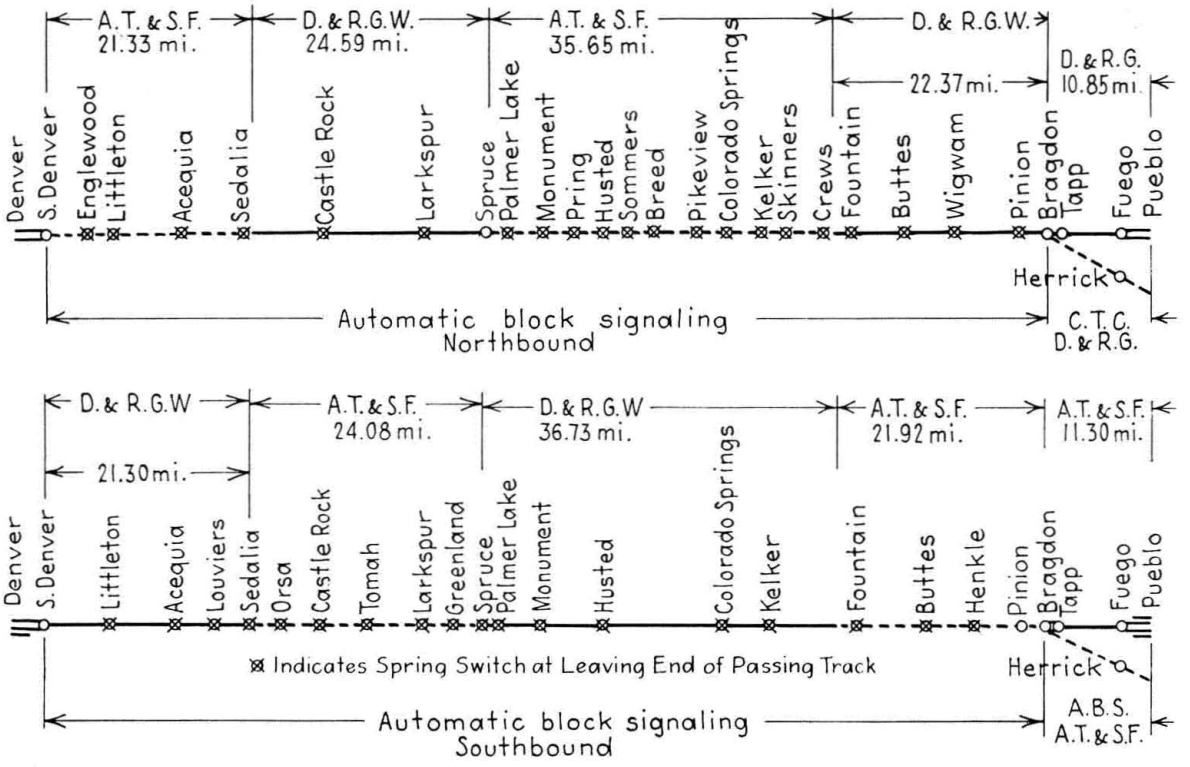


Fig. 1—Diagram of signaling on the Santa Fe and Rio Grande between South Denver and Bragdon

At spring switch locations at the leaving ends of sidings, a three-aspect high signal on the main line and a three-aspect dwarf leaving signal on the siding are provided immediately in advance of the spring switch, as shown in Fig. 2, to govern train movements in the normal direction of traffic over the switch.

Special Reverse Signals

In addition to the normal-direction signals at spring switches, and as also shown in Fig. 2, a special three-aspect high signal in the opposite direction is provided on the main line, immediately in advance to the spring switch, to protect and govern reverse facing-point train movements over the switch. Such movements, however, are seldom made under present operation. The special signals are used in lieu of spring switch indicators in order to provide increased protection and better visibility.

The special reverse signals display red or green for main-line movements, the control being overlaped into the first track circuit in

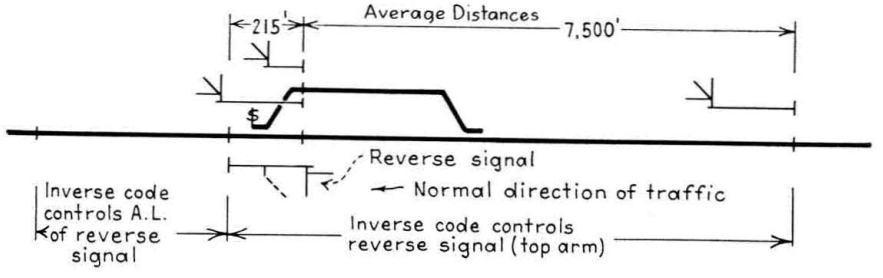


Fig 2—Signaling at a typical siding with spring switch at the leaving end

the rear of the normal-direction distant signal for the spring switch-equipped siding end. In addition to providing signal protection for facing moves over the spring switch, the reverse signals serve as an indicator to a slower moving train that it is being overtaken. The signals display red-over-yellow, Restricting, to govern a movement to the siding when the switch has been reversed by hand.

ON THE SANTA FE

THE new automatic signals on the Santa Fe are the Union Switch & Signal Company's Style H-5 searchlight type. As part of the project, semaphore signals formerly in service at electric interlockings at Colorado Springs and Bragdon—interchange points with the Rio Grande—were replaced with this type signal, which is equipped with a plug-in mechanism. Marker units, used as second "arms" are the Style H-33. The operative and marker units are both equipped with 35-in. circular backgrounds, except in the case of dwarf signals.

Deflecting Prisms

To improve the visibility of certain signals, such as those where curvature of track is extensive, the signals are equipped with 10 or 20-deg. side deflecting prisms. Two-unit signals are equipped with 10-volt, 18-watt single-filament lamps, and the dwarfs and single-unit high signals are equipped with 8 volt, 13.5 + 3.5-watt double-filament lamps, except signals with deflecting prisms, which are equipped with 8-volt, 18 + 3.5-watt double-filament lamps. Where high automatic signals were mounted between the siding and main track, the siding was shoved over to an 18-ft. center, to allow for sufficient clearance.

All the automatics on the Santa Fe are normal-clear signals, being controlled by conventional neutral track and two-wire polarized and neutral line circuits. The track relays are the 2-ohm Style DN-11, and the line relays are the 500-ohm polarized Style DP-14 and 500-ohm neutral Style DN-11.

Special Lighting Circuit

The signals are approach lighted through a contact in their mechanism for the red "position," except the dwarf signals, which are continuously lighted. On the spring switch indicator signals, which are capable of displaying a red-over-yellow aspect, and as shown in Fig. 3, there is a DN-22L relay, known as the CR, in series with the lamp in the top unit of the signal. When the signal is cleared for a main-line movement, this lamp is lighted over back contacts of the CR relay and the H relay for the yellow marker and through an iron-core inductance. However, when the signal is cleared for a train movement into the siding, the H relay for the yellow marker is up, the lamp in the top "arm" is lighted over a front contact of the H relay and through the coils of the CR relay, and the yellow marker is lighted over front contacts of its H relay and the CR relay.

Thus, if the signal is cleared for a train movement to the siding, and the top lamp fails, the CR relay drops and opens the lamp circuit for the marker, so it cannot display a more favorable aspect with the top lamp out. For a mainline train movement, should the CR relay ever stick up, it is impossible to light the top arm, because this unit for such a movement is normally lighted over a back contact of that relay and through the inductance. Assurance is thus provided that the CR relay is operating properly.

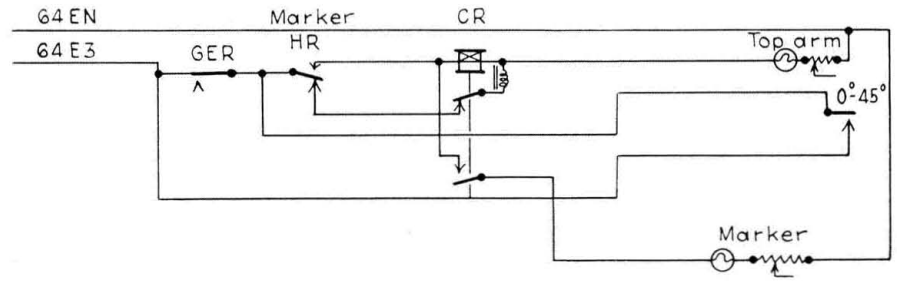
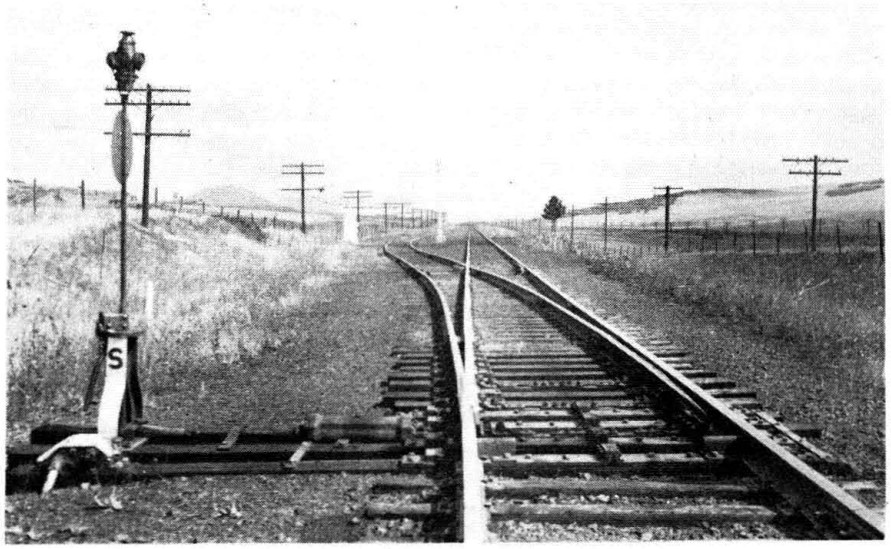


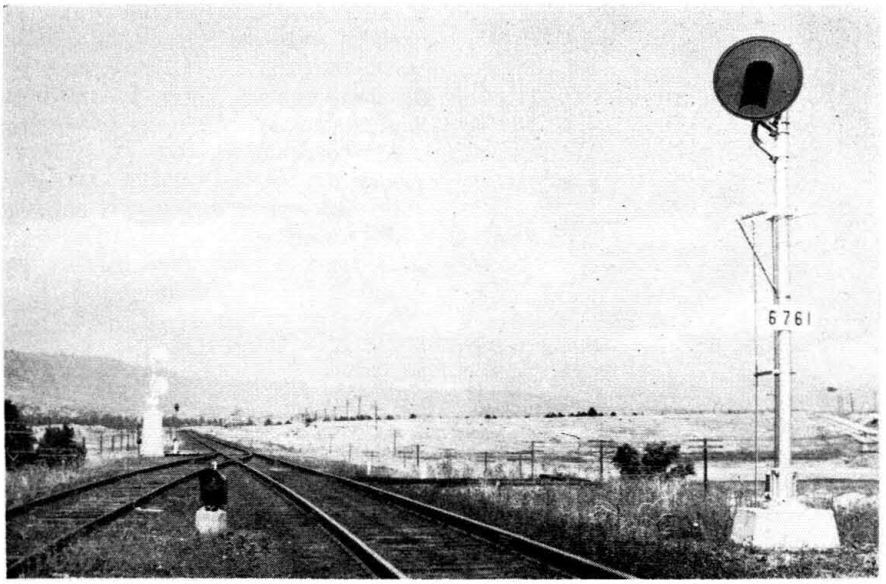
Fig. 3—Special lighting circuit for reverse signals on the Santa Fe

Spring Switch Layouts

The spring switch mechanisms on the leaving ends of the sidings on the Santa Fe are the Pettibone-Mulliken Mechanical Switchman type. The turnouts are No. 10's with 16-ft. 6-in. points. Four gage plates are used at each layout, the first of which is on the first tie preceding the points, and the next



Typical spring-switch layout at the leaving end of a siding on the Santa Fe



High and dwarf station-leaving signals at spring-switch end of a siding on the Santa Fe. Spring switch and reverse signal are in background

three of which are under the points, and all of which include Pettibone-Mulliken type adjustable rail braces.

Each spring switch, as well as main-line hand-throw switch is equipped with a Union Style U-5 switch circuit controller. The base of the switch stand at each spring switch is painted white with a black letter 'S" showing in each direction down the track to identify the spring switch from ordinary hand-throw switches.

Motor car indicators of the light type are in service at all points where visibility is poor, due to curves and geographical conditions. The controls for the indicators extend an average of 3½ mi., conventional line circuits being used.

Battery and Power Line

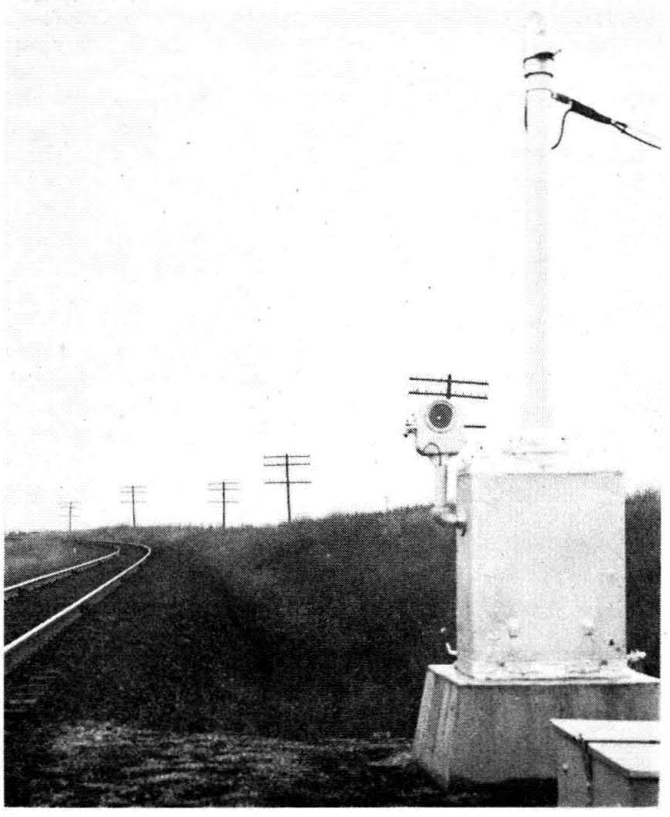
The track circuits average 4,500 ft. in length, each of which is fed by two cells of Edison 500-a.h. primary battery, across which is connected a Union Style RTA-104 automatic copper-oxide rectifier. The rectifier normally carries the entire load, except for 20 mils—10 per cell. The signals and line circuits are powered by five cells of Exide DMGO-9 or Philco (now Gould) 80-a.h. lead acid storage battery, on floating charge from a Style RT-10 copper-oxide rectifier, at each location. The storage battery and primary battery is sheltered in precast concrete battery boxes on top of the ground.

Power is received from the Southern Colorado Power Company at Bragdon, the cities at Fountain and Colorado and the R.E.A. at Monument and Sedalia. From South Denver to Littleton, power is received from the Rio Grande at 550 volts a.c., the roads paralleling each other between these points. Elsewhere, the power line is rated at 440 volts, except between Colorado Springs and Pikeview, where it is 110 volts. In the 440-volt territory, a 250-watt transformer is mounted on a pole line crossarm at each signal location at the ends of sidings, and a 100-watt transformer is in service at each intermediate location. All of these transformers were furnished by the Gregory Electric Company. General Electric arresters and cutouts are also in service on the crossarms at these locations. The power circuit is protected against overload in each instrument case by a Westinghouse 5.8-amp. Sentinel circuit breaker.

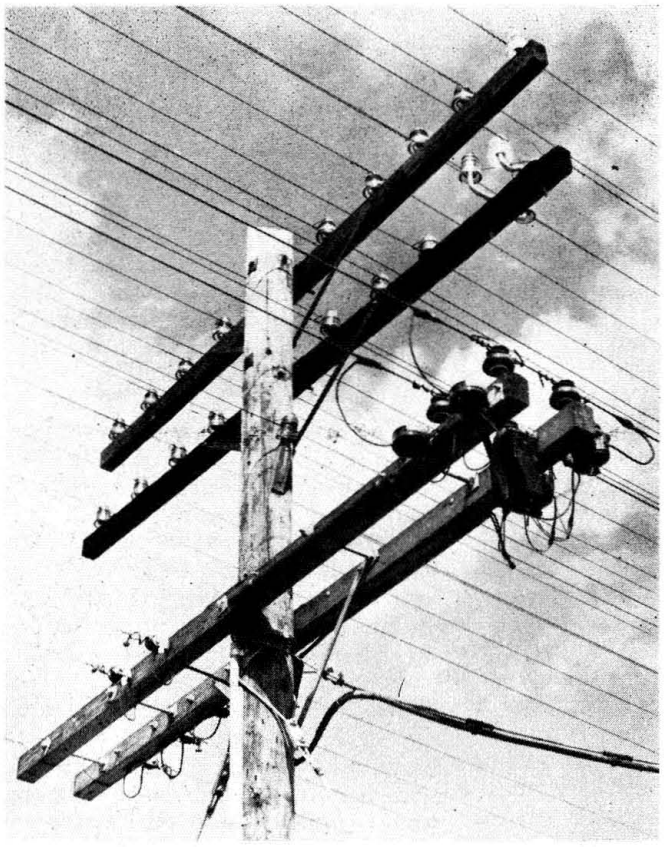
Existing Pole Line Used

The new signal and power circuits were strung on the existing communciations pole line which had been completely rebuilt just prior to this installation. It was, therefore, in good condition and required little work other than the addition of a 10-pin untreated fir crossarm with ½-in. iron pins below the telephone and telegraph arms.

Signal line control circuits are on No. 8 B.W.G. galvanized iron line wire, and the power circuits are on No. 6 A.W.G. double-weatherproof braid copper wire. Signal wires are tied to Hemingray No. 42 clear glass insulators, and the power circuits are tied to R. Thomas & Sons' brown glazed porcelain top-groove insulators to distinguish them from the low-voltage signal circuits. All wires are spliced with Nicopress compression-type sleeves, line taps are made with Kearney clamps, and



Motor car indicators of the light type are in service at all points in Santa Fe territory where visibility is poor



The existing pole line was used for the new signal and power circuits. View shows cross-arm-mounted transformer, arresters, cutouts and line taps

line breaks are terminated on Raco dead-end brackets with Nicopress compression-type off-set sleeves.

Line drops are in aerial cable, consisting of from 4 to 19 No. 14 conductors. At the pole end of line drops, the cable is fanned out on the crossarm through bridle rings. Between the pole and case it is supported by 9/32-in. galvanized messenger strand with scrap-wire ties. Case wiring is No. 16 flexible for the low-voltage circuits and No. 14 flexible for power circuits.

Underground Cables

Underground cables entering battery boxes are brought up through a 3-in. pipe with a 12-in. inside nipple, a 3-in. coupling being placed in the base of the box at the time of casting. The top of this nipple and around the cables is sealed with cotton waste and Arcosealite—a product of the American Radiator Company. Underground cables entering signals are brought up through two 3½-in. cored holes in the foundation, which are filled with sand around the cables and sealed at the top with the same compound. The cables then extend to a base-of-mast junction box where they are terminated. From this point to the signal heads the circuits are in No. 14 individual insulated copper conductors, except the lighting circuit which is in No. 9 conductors.

Okonite or Kerite single-conductor No. 9 underground cable is used between cases and bootlegs. Connections to tracks are made with Raco bootlegs and two seven-strand conductors with 3/8-in. plugs. The newer rail in the territory, which is 112-lb. stock, is bonded with American Steel & Wire Company Tiger-weld railhead bonds, and the older rail with double stranded bonds with 3/8-in. plugs, furnished by the same company. The latter type bond conductors are also used on fouling circuits.

Three untreated grounds, reading 25 ohms or less, were installed at each signal and cut section location. Each of these grounds consists of a 10-ft. galvanized iron ground rod, with a Fargo Manufacturing Company two-bolt iron ground clamp at the top. These grounds, the instrument case and cable pole at each location are all tied together by No. 6 bare soft-annealed copper wire.

Construction Procedure

The signals on the Santa Fe were placed in service in seven successive sections, namely, (1) Colorado Springs north to Palmer Lake, (2) Sedalia south to Spruce, (3) Sedalia north to Littleton, (4) Littleton north to Denver, (5) Fountain north to Colorado Springs, (6) Fountain south to Bragdon, and (7) old semaphore signals at Bragdon and Colorado Springs interlockers replaced with searchlights signals. The work was done in four steps by one line gang and four signal gangs, each consisting of about 10 men. The

Interior of base-of-mast case at signal

first gang out was the line gang, which installed the new crossarms, and line wires. The other four gangs, which had no special assigned duties, with the assistance of a work train (1) set off the foundations, signals and cases, (2) installed underground and aerial line drops, and (3) hooked up cases, tested and placed signals in service.

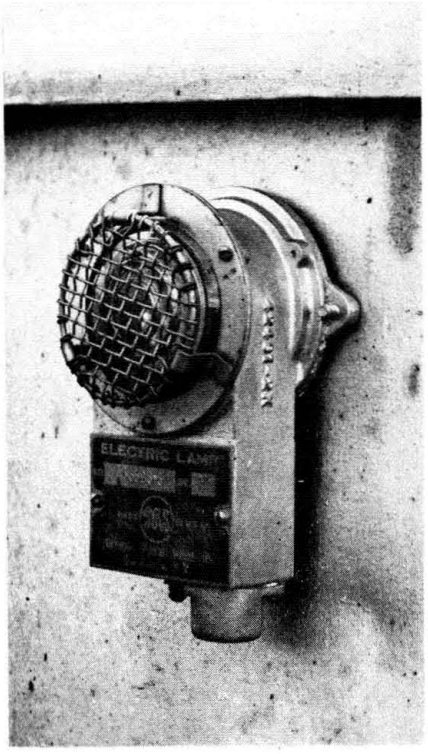
The signals are maintained by three maintainers under the supervision of supervisor P. E. Robinson, at La Junta, Colo. The maintainers include W. F. Barto, at Bragdon; F. C. Hollar, at Colorado Springs; and E. H. Haubensak, at Littleton.

This part of the installation on the Santa Fe was placed in service under the direction of G. K. Thom-

as, signal engineer system, and H. A. Appleby, signal engineer, western lines, and under the immediate supervision of L. B. McCune, assistant signal engineer. The major items of signaling equipment were furnished by the Union Switch & Signal Company. Wire and underground cable were furnished by the Kerite and Okonite Companies.

ON THE RIO GRANDE

THE siding turnouts on the Rio Grande are No. 10's with 16-ft. points and No. 15's with 33-ft. points. Heavy-duty switch stands with Union Switch & Signal Company double-acting oil buffers are used on the switch at the departure end of each siding. A piece of canvas is over the buffer piston rod to keep cinders and sand off of it and from working into the stuffing box. Racor vertical front rods are used on all spring switch layouts, three gage plates being mounted on the ties under the switch. Racor adjustable rail braces are used on these plates, and each switch is equipped with two G.R.S. Model-7 switch circuit controllers (normal and reverse).



Motor car indicator on the Rio Grande

Each main-line hand-throw switch is equipped with one such controller. The spring switch layouts are identified by a white sign near the switch with the words "Spring Switch" in black.

Motor car indicators are provided at every signal and cut section location between Colorado Springs and Palmer Lake on the southbound track and between Palmer Lake and Larkspur on the northbound track. These are light type-indicators, the controls for which protect against normal-direction train movements. The control limit extends about three miles. The indicators consist of a G.R.S. No. 56598-3 lamp unit with a 3-watt lamp and 3-in. optical lens, covered by mesh to protect it against breakage.

The new signals are the General Railway Signal Company's Type-SA searchlight and the second "arm" units on high signals are Type-D markers, the latter on all special spring switch indicator signals for reverse movements being equipped with Phankill units. Where high signals are located between main track and sidings, the sidings were shoved over to 19-ft. centers. Backgrounds are used on all dwarfs to improve visibility.

In open country, the signals are approach lighted and, where there are many curves, they are continuously lighted to provide additional protection for men on motor cars. The dwarf signals are normal-danger signals and are approach lighted by occupancy of a 400-ft. short track circuit immediately in approach to the signal.

Signal Controls

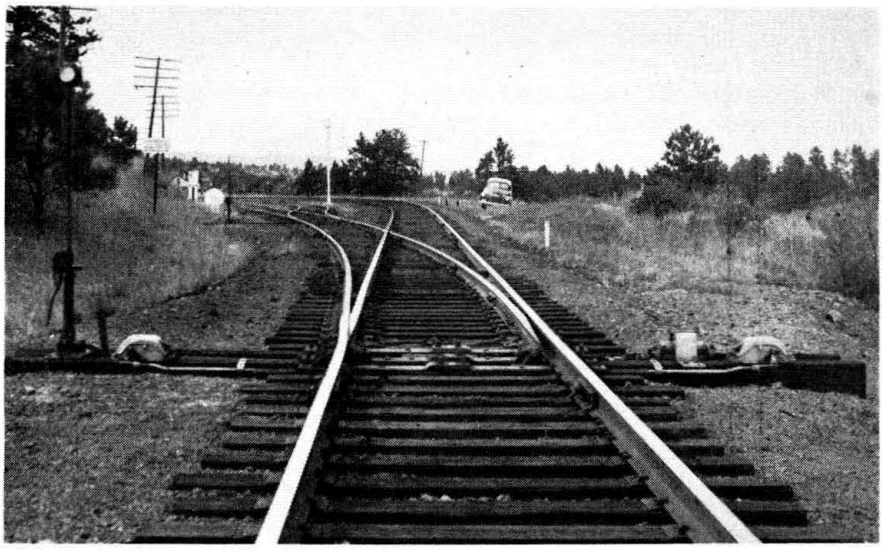
In general, the signals are controlled through the use of coded track circuits averaging approximately one mile in length. In the territory where motor car indicators were installed between Colorado Springs and Larkspur, 75-rate only coded track circuits are used for track-occupancy detection, and the signal controls are two-wire polarized. An approach circuit extends from the normal-direction spring switch-protection signal to and including the first track circuit in approach to the distant signal.

Between Littleton and Bragdon, with the exception noted in the foregoing paragraph, multiple-rate coded track circuits are used, thus eliminating the necessity for line wire for signal control. Seventy five-rate code is used for the home or yellow control and 180-rate code for the distant or green control. In place of the approach circuit mentioned above, inverse code is used.

Operation of the Coded Track Circuits

Figure 4 shows a typical siding arrangement in multiple-coded track circuit territory. Signals 1 and 1A are normally at Stop and distant signal 3 in the restrictive or yellow position. Under these conditions, 75-rate code originates at signal 1 and feeds to signal 3 to display the yellow indication. Then, 180-rate

Special reverse signal and spring swicth at end of siding on the Rio Grande



Typical spring-switch layout at end of siding on the Rio Grande. Note the two circuit controllers

code feeds out at signal 3 to display a Clear indication at the next location. At the same time, inverse code originates at the cut section approaching signal 3 and repeats back to the spring-switch location. When an approaching train enters track circuit 3A, the inverse code is shunted out, causing it to collapse to signal 1, thus dropping an approach relay. This, then, with field conditions permitting, clears signal 1 and applies 180 rate code to tracks B3 and A3 to display a Clear indication at signal 3. A train which is ready to leave via the siding will automatically clear signal 1A upon entering the short track circuit in approach to the signal, if the field conditions beyond the signal permit, and the approach circuit to signal 1 is unoccupied. The switch-indicator signal 2 is controlled through the approach relay, thus displaying Clear when the spring switch is normal and the approach unoccupied.

All the New Signals Have Light-Out Protection

All normally-lighted signals have a "hot-check" light-out relay, and the approach-lighted signals a "hot-and-cold check" light-out relay to check the integrity of the lamp circuit. Should a lamp be burned out, 75-rate code only is fed to the next signal in the rear, thus insuring that a yellow indication will be displayed to a train approaching a dark signal.

The code-following track relays are rated at .25 ohms, and the track repeaters are 38-ohm relays operated through decoding transformers. Line relays are the 500-ohm Type K, and the approach-lighting relays are the Type K2-CR. The inverse code following relays operate through 0.1 ohm magnetic stick relays.

C.T.C. and Xing Protection

Between Bragdon and Pueblo, about 11 mi., the Rio Grande operates over its own trackage and the Santa Fe over its own. The Rio Grande originally had double track between these points, but as part of the project, abandoned 7 mi. of the second track between Bragdon and Fuego, to save on track maintenance, and installed C.T.C., as shown in Fig. 5. Equilateral No. 15 turnouts with 33-ft. curved points were installed at both E.D.T. locations, a G.R.S. Model-5D machine being used on the layout at Fuego and a spring mechanism on the layout at Bragdon. The signals and switch at Fuego are controlled from Pueblo Junction tower, about 1.6 mi. south, and the signals at Tapp are controlled from the Santa Fe interlocking tower at Bragdon, approximately 1 mi. north.

At Colorado Springs, the Rio Grande also equipped the north end of the passing track with a power-operated turnout into the main line, with associated signals controlled from the road's office at that point. The main purpose of this layout was to facilitate and expedite the entrance of southbound trains into the station and yard.

Also, as a part of the overall signal program, all existing wigwag highway crossing signals in the territory were replaced with modern flashing-light signals. These are

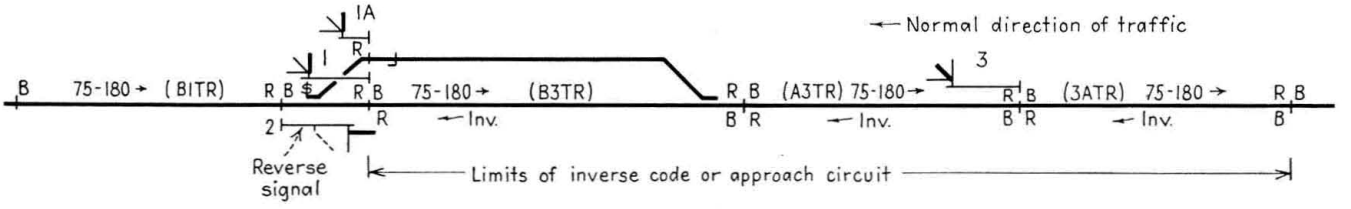


Fig. 4—Typical siding arrangement in multiple-coded track circuit territory on the Rio Grande

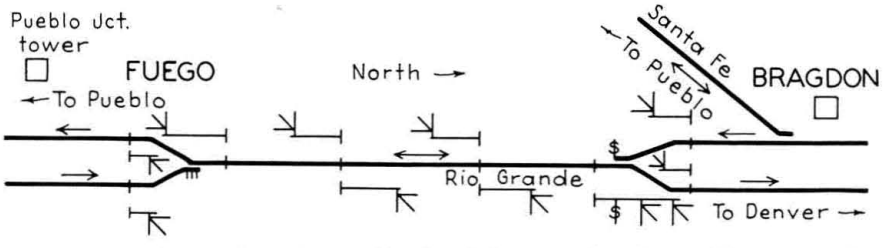


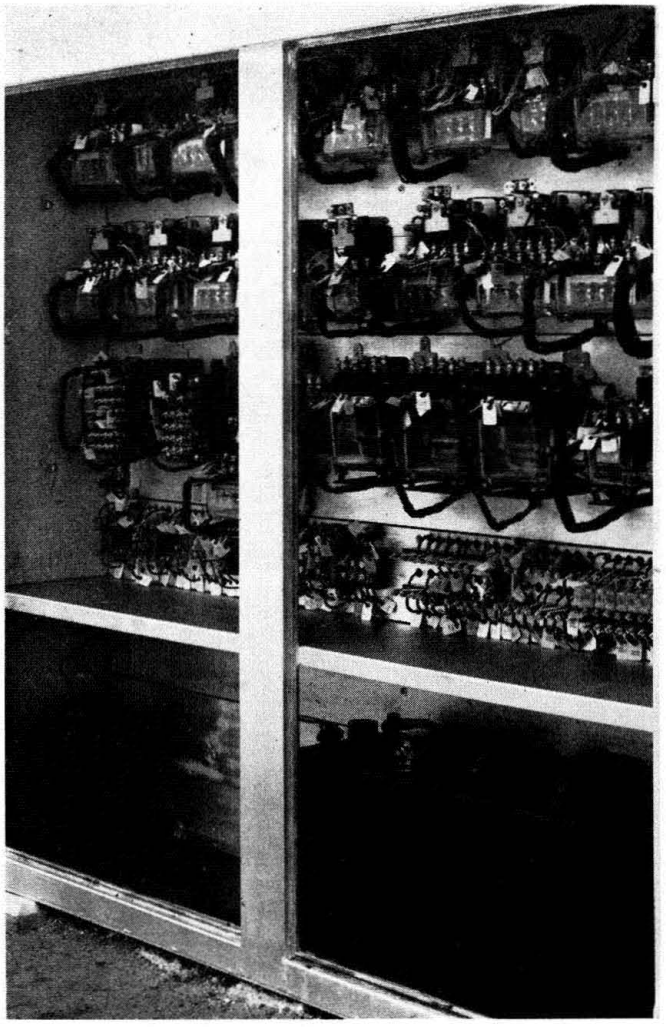
Fig. 5—7 mi. of second track was abandoned between Bragdon and Fuego on the Rio Grande by the installation of C.T.C.

the General Railway Signal Company's Type XA.

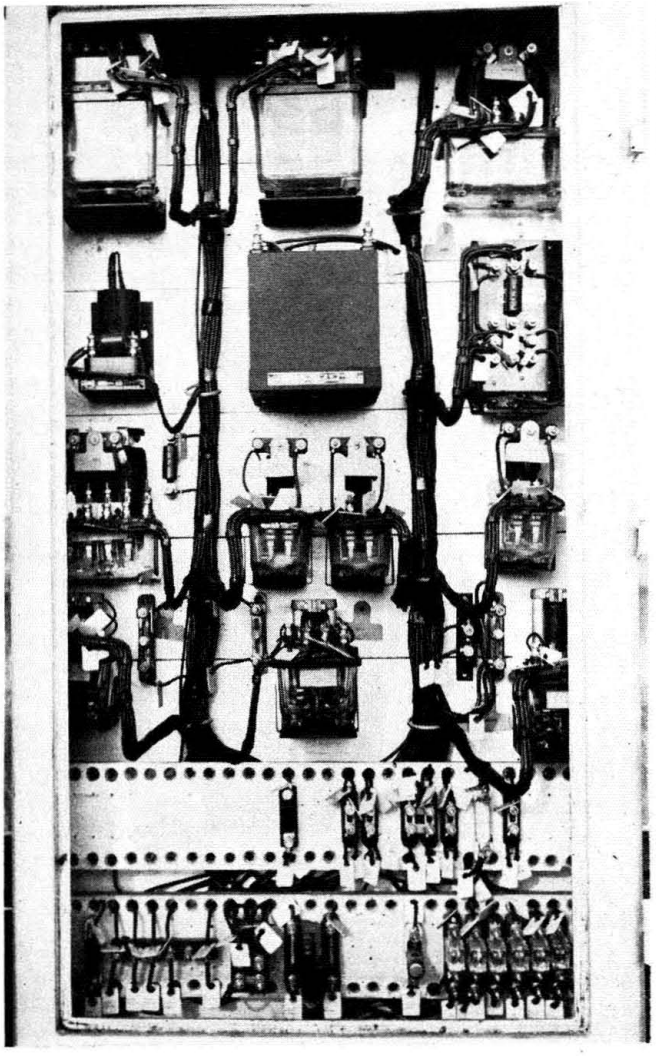
Storage Battery

At each signal location, the signals and line circuits are fed by five cells of Exide or Philco (now Gould) 80 a.h. storage battery on floating charge from a B-132 rectifier, and each track circuit is fed by one cell of Exide or Philco 11-plate, 2-volt 200-a.h. storage battery, on floating charge from a B3-104 rectifier. This battery is sheltered in the instrument housings at the various locations, high double-door cases being used at all signal locations and low double and single-door cases being used at cut sections.

The power circuit on the Rio Grande is rated at 550 volts, a.c. Power for the line is picked up at South Denver, Littleton, Palmer Lake and Kelker, the line being transposed approximately every quarter mile in accordance with Western Union transposition standards. At each spring switch location, there is a G.R.S. 0.3 kva. 550-110 crossarm transformer, and at each intermediate and cut section location a 0.150 kva. transformer. General Electric 10-mfd. Pyranol capacitors are across the power circuit at each spring switch location for power factor correction. This is approximately every 8 mi. General Electric cut outs and pellet-type arresters are in service on the pole line at all power taps.



Relays and storage battery in instrument case at station-leaving signal location on Rio Grande



Coding apparatus and other equipment in relay case at signal location on the Rio Grande

The Pole Line

The existing communication line was used for the new line circuits, and a new 10-pin untreated fir crossarm with steel pins was installed on each pole. Other than this, the pole line required little work other than to reset a pole here and there to raise the line to the minimum clearance above ground. Signal line circuits are on No. 8 insulated iron line wire, and the power circuit is on No. 6 weatherproof copper. The signal circuits are tied to Hemingray No. 42 clear glass insulators, and the power circuit to

(Continued on page 47)

Automatic Block

(Continued from page 41)

General Electric, Ohio Brass, Locke or Westinghouse top-groove brown glazed porcelain insulators.

Compression-Type Sleeves For Splicing

All line wires are spliced with National Telephone Supply Nicopress sleeves and all line taps are made with James R. Kearney connectors. Line breaks are made on McKeen break irons. Line drops are made up to No. 14 conductors, supported by No. 8 iron messenger and scrap wire ties. Case wiring is No. 14 flexible for signal circuits and No. 10 rubber covered for battery leads. Three grounds are in service at each signal and cut section location, each of which consists of an 8-ft. Copperweld ground rod and an OB ground clamp.

The track consists of 112-lb. rail and slag ballast, the rails being bonded with rail-head bonds. Bootleg connections employ Raco risers and American Steel & Wire Company stranded bootleg bonds with 3/8-in. plugs. The insulated joints are the Rail Joint Company's four-bolt continuous type. All track and line circuits are protected by Raco Clearview lightning arresters. Signal cases and signal units are locked with Signal Accessories Corporation screw-type padlocks.

Three Maintenance Sections On Rio Grande

The Rio Grande is divided into three maintenance territories, each of which is about 45 mi. in length. These include Bragdon-Husted, Husted-Ascequia and Ascequia-South Denver, which are maintained by maintainers H. W. Marguard at Colorado Springs, J. E. Abbett, Castle Rock and R. E. Byber, at South Denver, under the supervision of O. E. Brown, signal inspector and A. H. Asnicar, signal supervisor.

This part of the installation on the Rio Grande was placed in service under the direction of B. W. Molis, signal engineer. The major items of signaling equipment were furnished by the General Railway Signal Company, and the underground cable and wire by the Kerite Company.

NEW DEVELOPMENTS

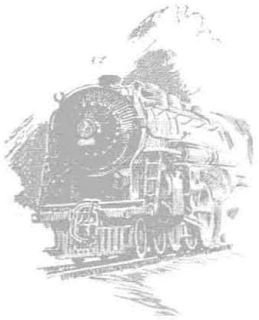
NEW PRIMARY BATTERY

A NEW, 1,000-a.h., non-renewable, add-water primary battery, known as the Edison Carbonaire, has been placed on the market by the Primary Battery Divison Division of Thomas A. Edison, Incorporated, Bloomfield, N. J. The cells and battery, as a whole, are assembled in the factory, and are inert and free from internal deterioration during shipping and storage. The cells are made ready for service, simply by the addition of water. This can be done when placing them in service for several days previously, if necessary or convenient.

The new Edison Carbonaire battery is rated at 1,000 a. h.

The Type 2SJ1, is a battery consisting of two cells connected in series and sealed in a molded hard-rubber case, as shown in the accompanying illustration. The over-all dimensions are 8¼-in. long, 7¼-in. wide and 9½-in. high. This arrangement of a battery of two cells in a single case was designed especially to feed an electric lamp in a switch target, thus replacing an oil lamp. At 2.6 volts, the 1,000-a.h. battery will feed a switch lamp continuously for 10 months or more.

Further battery information can be obtained from Thomas A. Edison, Inc., Primary Battery Division, Bloomfield, N. J.



NEW BOOK

Who's Who In Railroading (Twelfth Edition). 827 pages, 8¾ by 5¾ in. Bound in cloth. Compiled and published by the Simmons-Boardman Publishing Corporation, 30 Church Street, New York 7. $10.00

THE past few years have been marked by an exceptionally large number of changes in the ranks of American railroad officers, reflecting adjustments sometimes postponed and sometimes accelerated by the abnormal conditions resulting from the war. These many changes have required revision of this standard reference work, so that up-to-date biographical data may continue to be available about the important people connected with the railroad industry. In its present twelfth edition, promotions, transfers and retirements effective since the eleventh edition was printed in 1946 have required more or less major modifications of nearly every sketch which appeared in the preceding edition, while the rise of newcomers to the top ranks of railroad personnel has required inclusion of sketches of about 2,000 individuals not previously listed. Special attention has been given to war service records of those railroad men who served with the armed forces.

The present edition includes some 6,100 individual biographies, a net increase of about 400 as compared with the 1946 volume. The 6,100 sketches include not only railroad officers, but also leaders of the railway supply industry and of railroad labor, regulatory authorities, transportation economists and railway financial analysts, educators concerned with transportation problems, I. C. C. practitioners and a selected group of consultants, authors and editors.