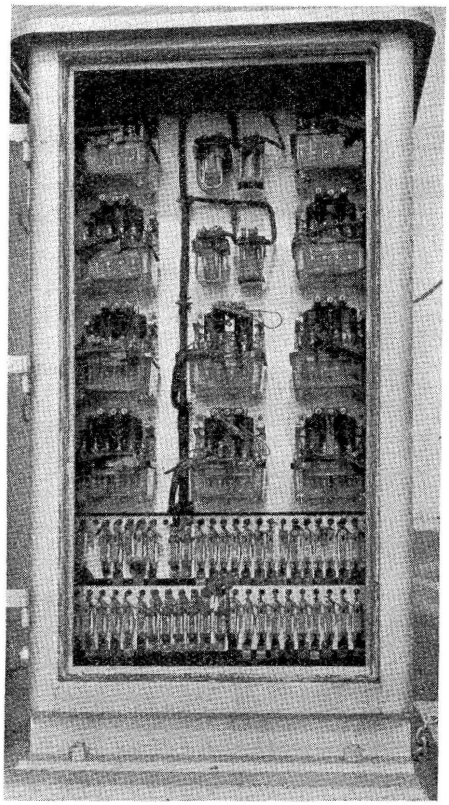
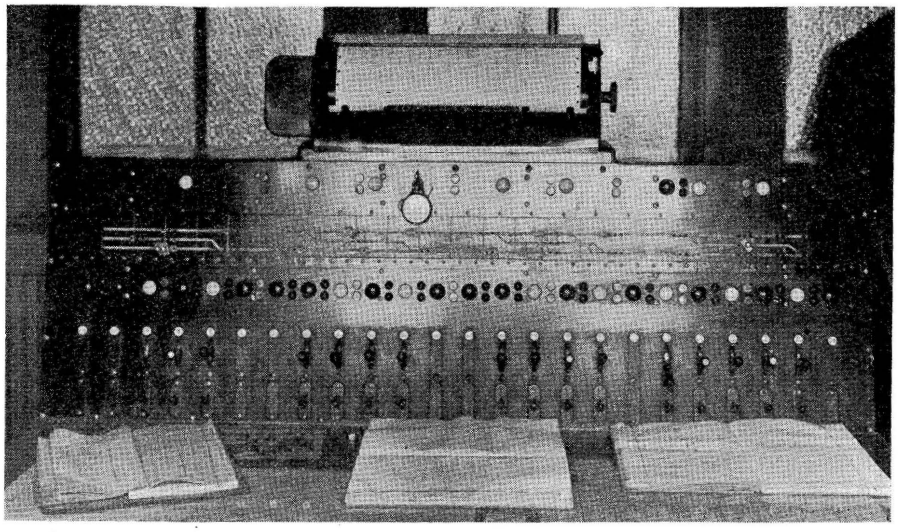


Wall-type relays are used

Centralized Traffic *on the Texas &*

Either-direction train operation by signal indication on both tracks of 32-mile double line with power-operated switches, increases track capacity and facilitates train movements—Flashing-light signals at all the crossings



The control machine is in the office at Ft. Worth

BETWEEN Dallas and Fort Worth, Tex., a distance of 32 mi., the Texas & Pacific has a double-track main line that is constructed with 110-lb. rail and crushed-stone ballast, to permit high-speed train operation; and centralized traffic control, using power switches and signals for directing train movements, has been provided to reduce delays to a minimum and to permit trains to be operated with the highest degree of safety. In order to reduce the hazard at highway crossings, flashing-light crossing signals have been installed at all of the 34 crossings in this territory.

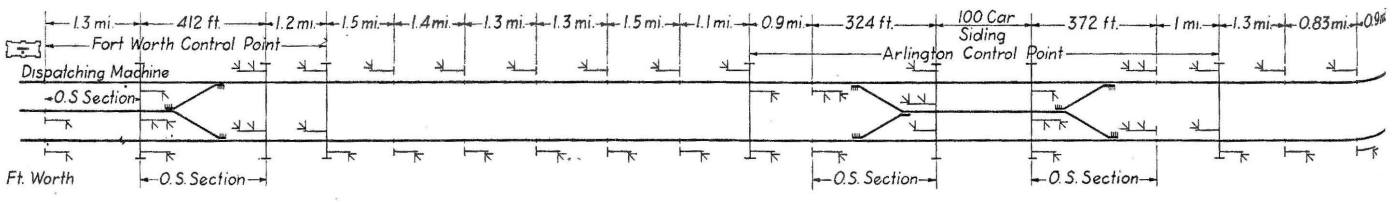
A glance at a railroad map shows that the Texas & Pacific extends from New Orleans and Texarkana, on the east, westward through Dallas and Fort Worth and to El Paso, the distance from New Orleans to El Paso being 1143 mi. Dallas and Fort Worth are both large business centers with numerous industries, and are points of interchange with other roads. An important Texas & Pacific freight classification yard, equipped with power switches and retarders, is located at Fort Worth. The 32-mi. section of line between Dallas and Fort Worth is, therefore, a "bottle neck" for train movements.

A second track was built from Fort Worth to Grand Prairie, a distance of 20 mi., in 1929, at which time centralized traffic control was installed on this section. The second track was completed on the Grand Prairie - Dallas section in 1931, and the centralized control was extended later to include this territory.

In 1929 the daily traffic included 14 passenger trains and 31 freight trains normally, and during peak seasons as many as 36 freight trains were operated in a day. At that time this line was handling not only the Texas & Pacific trains but also one through passenger train of the Gulf, Colorado & Santa Fe. At the present time the daily traffic includes 10 passenger trains and 10 freight trains regularly, with two or more extras.

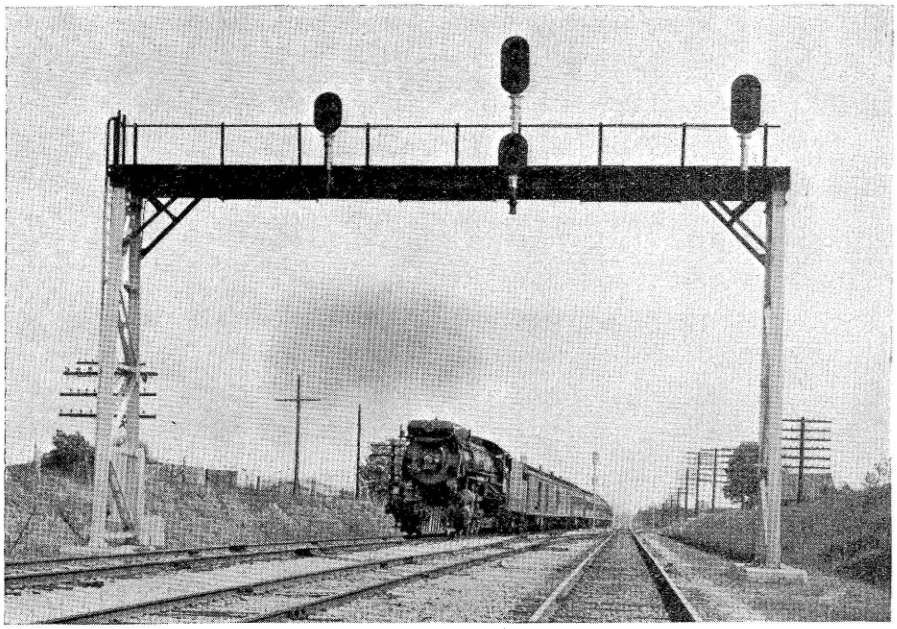
General Layout

The line traverses a rolling prairie country with a maximum grade of 1.1 percent and a maximum curvature of 3 deg. The passenger trains handle as many as 18 cars and run



Track and signal plan of the centralized traffic

Control *Pacific*



The Sunshine Special at Arlington

at speeds up to 65 m.p.h. The freight trains handle as many as 100 cars, totaling 3,100 tons, and run up to 45 m.p.h.

The new track layout between Dallas and Fort Worth includes four center passing tracks, each long enough to hold a train of 110 cars. These passing tracks are constructed with heavy rail and are well maintained to permit trains to run on them at speeds consistent with operation through the turnouts. In order to facilitate such movements, No. 16 turnouts are used, thus permitting speeds up to 25 m.p.h. with safety. The passing sidings, therefore, serve also to cross trains from one track to the other. The switches at the west end of the siding near Fort Worth are connected into and are operated by an electric interlocking plant near the passenger station. The switches at the east end of this passing track, as well as those at both ends of the other three center sidings, are power operated. All of these switch machines and the signals for directing train movements in either direction on the main track, as well as into or out of the passing tracks, are controlled from the C.T.C. machine by the dispatcher at Fort Worth.

Traffic is Bunched

On this section of the line, as is often the case on other roads, the trains are "bunched" during certain periods of the day so that the peak track capacity is of more vital importance than the total number of train movements. With the new track layout and system of signaling, it is practicable to handle a great many trains in a short period with a minimum delay to any train on the road, and furthermore, trains can be dispatched when they are ready to leave, without waiting at either Fort Worth or Dallas.

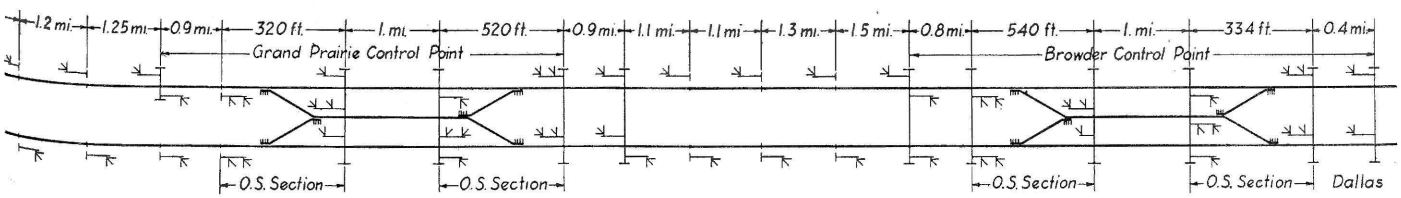
For example, eastbound manifest freight train No. 56 leaves Fort Worth about 2:20 p.m., and eastbound passenger train No. 2, the Sunshine Special, leaves at 2:25 p.m. When these trains leave at that time, the regular procedure is to run No. 56 out of Fort Worth on the right-hand track, and run passenger train, No. 2, on the left-hand track until it passes No. 56, and then cross No. 2 over to the right-hand main track to proceed to Dallas.

Likewise, a similar operation is carried out when an eastbound freight train leaves Fort Worth at 8:15 p.m., just ahead of passenger train No. 4 scheduled to leave at 8:20 p.m. However, in this case westbound passenger train No. 7, scheduled to leave Dallas at 8:55 p.m., runs on the right-hand track to Grand Prairie, passing No. 4 in the meantime, and then crosses over at Grand Prairie or Arlington to run on the left-hand main track to Fort Worth, passing freight train No. 54. Thus, with very few exceptions all trains are kept moving while enroute, on signal indications and without train orders. Under this system the average running time of freight trains in this territory has been reduced by one hour, and that of passenger trains by 15 minutes.

The Control System

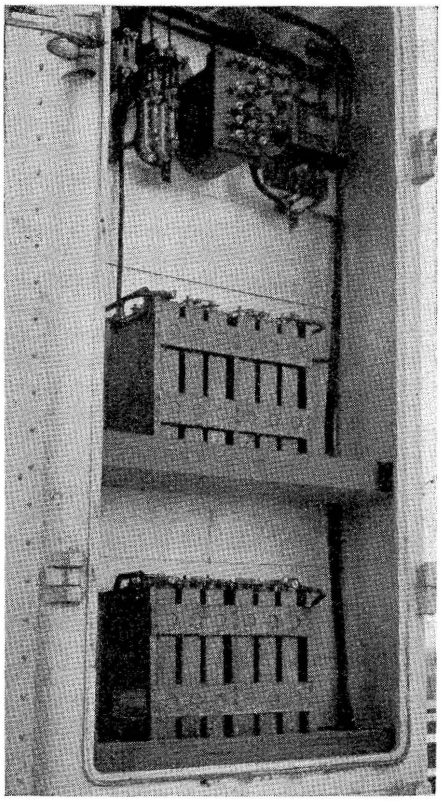
The centralized traffic control equipment on this installation is that of the General Railway Signal Company, using the direct one-wire control system of circuits. The control machine, in the dispatcher's office at Forth Worth, has 16 levers for the control of 21 switches and 79 signals. Lamp indicators above the levers repeat the operations of the switches and signals and show the direction in which traffic is set up on each track. Track-occupancy and "OS" reports are indicated by lamps and the ringing of an annunciator bell. The track diagram in the face of the board reproduces the track layout and indicates the position of the switches. Located in this diagram, at positions corresponding to "OS" points in the field, are small receptacles into which the operator pushes a plug when he gets an "OS" report from that point. This action causes the corresponding needle on the automatic train-graph to record the movement of the train.

The signals on this installation are of the color-light type having red, green and yellow aspects. In



control territory between Ft. Worth and Dallas

cases where a signal may direct trains over a diverging route, a second unit with a red and yellow aspect is mounted below the main three-aspect unit. All signals are mounted either on masts at the right of the track governed or on bridges, with the signal located above the right rail of the track governed.



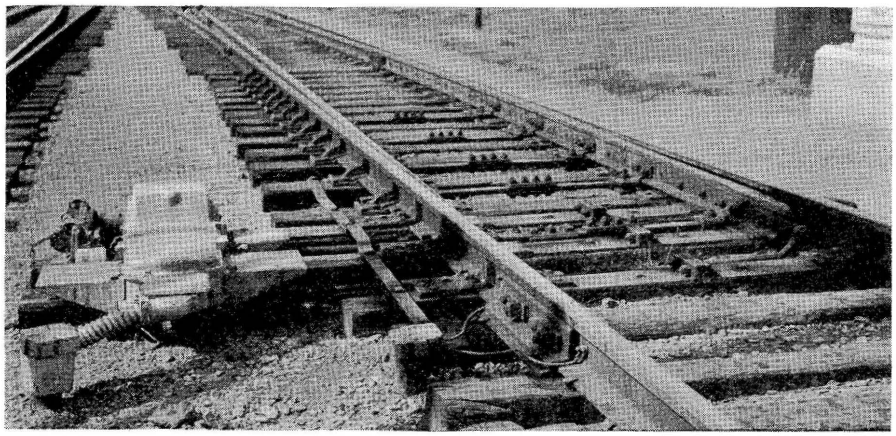
The battery is housed in metal cases

Dwarf signals are not used. The signals are the G.R.S. Type-D, using 8⅜-in. lenses and 8-volt, 18-watt lamps.

On the Grand Prairie-Dallas section, the switch machines are the G.R.S. Model 5-D, with dual-control mechanisms, while on the section completed earlier, the machines are of the 5-A type with dual-control selectors. All of the machines are equipped with point-detectors. Insulated gage plates, 1 in. thick and 7 in. wide, are used on three ties, including the one ahead of the points. On the latter, rail braces are used on both sides of the rail to prevent "rolling" of the rail. The other two gage plates extend and are bolted to the switch machine.

At the field locations, the relays, rectifiers, and transformers are housed in large-size double-door sheet-metal cases, set on a combination concrete foundation, and battery well. Each case is divided into two compartments, front and rear, by a wooden panel board to which the spring-mounted relays or other instruments are attached. The incoming wires are brought to Raco Everohm neon arresters with a double gap, mounted on the lower part of the panel. Jumpers made of flexible insulated wire run up through enameled bridle rings and out to the terminal posts of the relays.

The runs from the relay cases up the bridges and over to the signals are made-up cables supported by messenger wire attached to the bridge structure with eyebolts. The runs from the cases to track connections are in two-conductor No. 9 stranded flexible Okosheath cable. One cable goes to a cast-iron pot-head so located as to serve for connection to the rail on both sides of an insulated joint. In the pot-head, the cable wires are joined by a Kearney connector to a 126-strand copper cable which extends to a Raco rail terminal. When the joints are complete, the top of the pot-head is poured full of pitch to make it waterproof. The rail joints are bonded with stranded Copperweld bonds with ⅜-in. pins. Insulated wires and cables, other than the runs to the track, are of Okonite manufacture.



Dual-control switch layout near Dallas

The Power Supply System

A new pole line, built with 25-ft. creosoted pine poles spaced 30 to the mile, was constructed to carry the signal-control and power lines. The signal line-control circuits are of bare Copperweld wire, with No. 10 for automatic-signal controls and C.T.C. line controls, and No. 2 steel-reinforced aluminum cable for C.T.C. common, these wires being run on porcelain insulators. The 550-volt a-c. supply is carried on two No. 4 stranded aluminum steel-core conductors, carried on Pyrex glass saddle-type insulators. At each layout including power switch machines, the 550/110-volt line transformer is a General Electric Company air-cooled Type-M rated at 250-watts, while at other signal locations a 75-watt transformer is used.

At each location involving power switches, there is a set of 18 Edison A6H, 150-a.h. storage cells which supply energy to operate the switch machines. A split battery of 12 cells of the B2H 37.5-a.h. type is used at each signal location to supply the relays and line-control circuits and to act as a reserve supply for the signal lamps in case of an a-c. power outage. One B4H cell is used on each track circuit. At the control station, a set of 36 cells of B2H battery with a center connection is used to supply energy to the control circuits and as a standby for the lamps on the control machine. The K1 type G.R.S. low-voltage transformers are used for the signal lamp and to supply the rectifiers. At battery locations a Type-B rectifier is used to trickle charge the track cell. At switch and signal locations the G.R.S. Type-B rectifiers are used, while the rectifier at the control station is the Type BP-2 the normal charge being 600 m.a.

The flashing-light highway-crossing signals in this territory are of the Signal Section standard type without a stop sign. The lamp units are of the G.R.S. Type-W with 8⅜-in. lenses and 10-volt, 15-watt lamps. The approach control circuits are arranged to provide at least 20-sec. operation of the signals prior to the arrival of a train at a crossing for either direction of train movements on either track.

This signaling and C.T.C. installation was planned and installed by signal forces of the Texas & Pacific.