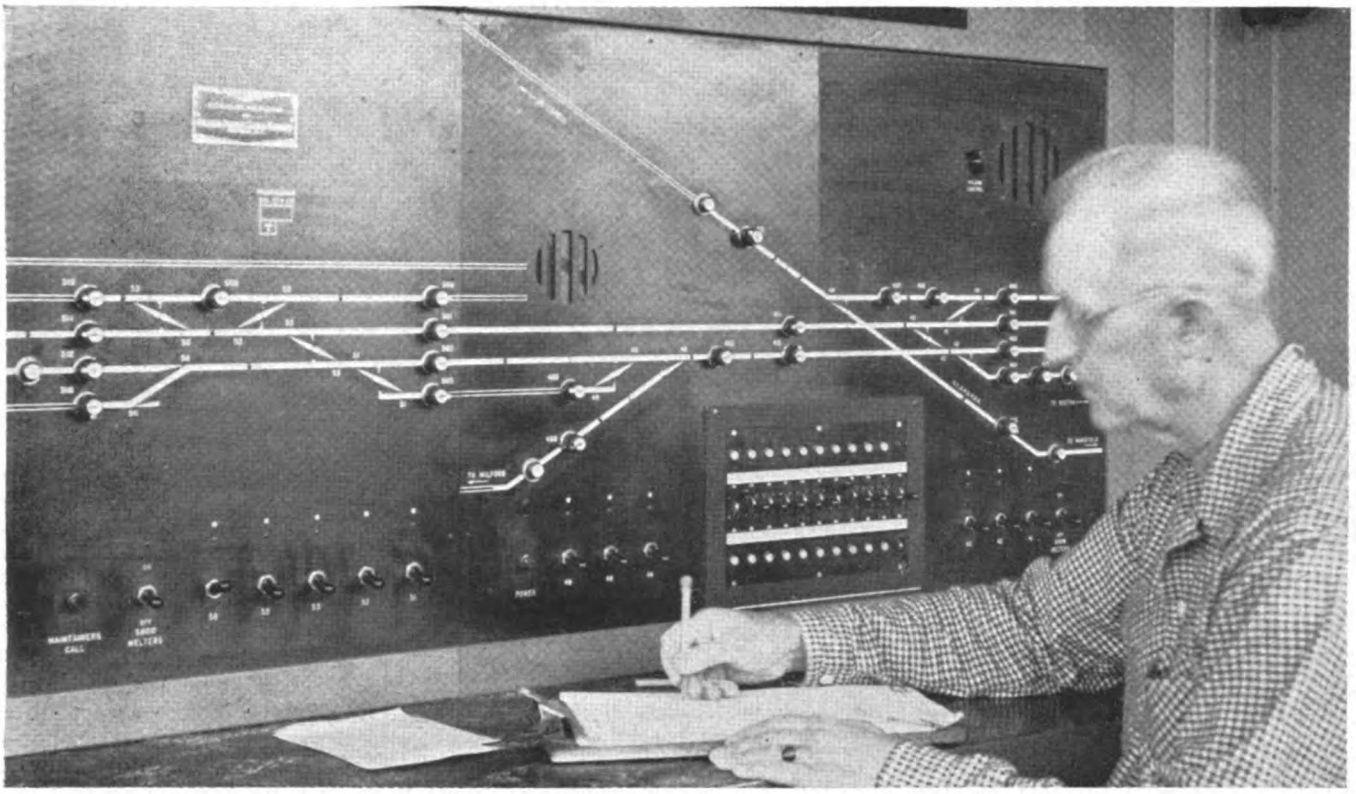


Signals are controlled by knobs on the diagram, and switches by toggle levers below diagram

NYC Combines Interlockings

Three mechanical interlockings have been replaced by new electric switch machines and light signals, all of which are now controlled by one panel machine

AT FRAMINGHAM, MASS., 21.4 mi. west of Boston, the New York Central has installed a new all-relay interlocking, including new power switch machines and searchlight home signals, which replace three previous mechanical interlockings, in a distance of about 4.5 mi. This territory handles numerous suburban passenger trains, in addition to through passenger and freight trains. On the average, the passenger and express trains total about 26 westbound and 28 eastbound daily. About 16 through freight trains and a local are operated daily. Numerous switching moves are made to serve factories in this area.

The first of the previous mechanical plants, located at mile post 21 west of Boston, was known as SS-20, Framingham. This layout, as revised, includes a crossing with a single-track line of the New Haven, and two single switches, as well as two crossovers, that form a junction of three main tracks from the east to two main tracks to the west. A part of the track changes were brought about by the removal of one of the four main tracks previously in service east from this layout 9.5 mi. to Riverside. The new project includes new automatic block signaling, controlled by non-coded direct current track circuits on the 9.5 mi. for train movements east on track No. 2; west on track No. 1; and both ways on the remaining track which is the previous track No. 4.

Two Other Layouts

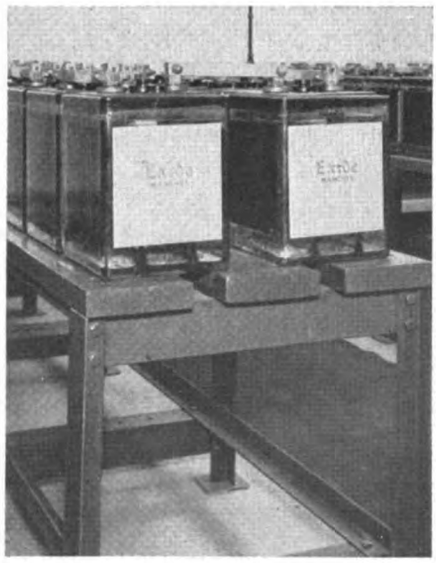
The second previous mechanical interlocking, located at milepost 21.4, just west of Framingham station, was known as SS-21, Framingham. This interlocking layout, as revised, includes a junction from the main line to the single-track Milford branch, and a switch to a long siding, extending west on the south side of the two main tracks.

The third previous mechanical interlocking, located at mile post 21.7, was known as SS-22 Framingham. This layout, as now revised, includes one crossover between the main tracks, two crossovers between the westward main and an industrial lead track; a single switch at the west end of the siding which extends east; and a single switch at the east end of a long siding extending to the west for 1.45 mi. along the south side of the two main tracks. The west end of this siding is connected to the eastward main track by a hand-thrown electrically locked switch machine.

Now Controlled by One Machine

The new electric switch machines and home signals in the entire area, shown in the track plan herewith, are now controlled by a new panel type machine, in a new building known as Signal Station 22, at milepost 21.75. This one machine controls 10 one-unit signals, 5 two-unit signals, 7 three-unit signals, 3 single switches, 3 switches and derails, 5 crossovers, and one traffic lever.

The panel of the new control machine is 24 in. high and 72 in. long. Each track is represented by a white line 3/16 in. wide. Small red lamps, in these lines, are lighted to indicate



The 110-volt main battery

Control station represents modern design

occupancy of each of the separate track sections.

Below the track diagram is a horizontal row of small toggle levers, each of which controls a corresponding switch or crossover. Such a lever is in the down position to control its switch to the normal position, and the lever is raised to reverse the switch. On the track diagram, each switch is represented by a small black triangular movable-point switch indicator which operates when the corresponding lever is thrown, so that the track line up is shown by a continuous white line 3/16 in. wide.

Indications of Switches

Above each switch lever are two small indication lamps. The upper lamp, which is white, is lighted when the switch is not in position corresponding with that of the lever. When the operator "calls for" an improper line up, the white correspondence lamp is flashed 75 times per minute as information to the leverman.

The lower indication lamp above each lever is red, and it is lighted when electric locking is in effect to prevent operation of the switch, even if the lever were thrown. Operation of the lever while locking is in effect will not result in operation of the switch after the locking is released.

Signals Controlled by Knobs

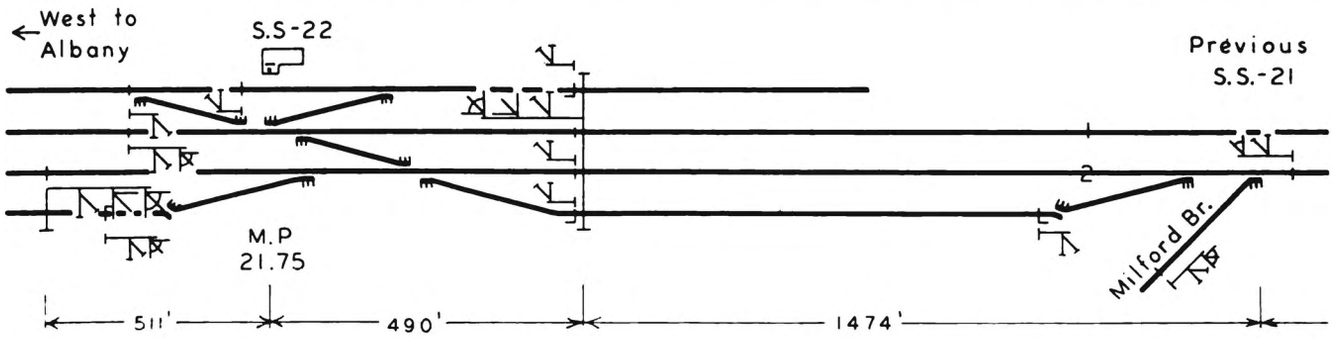
On the track lines on the illuminated track diagram each home signal is represented by a knob at the location corresponding with its signal. In the face of the knob there is a clear lense with a black arrow pointing in the direction which the signal governs. The outer rim of the knob turns, its normal position being with its white dot at the base of the arrow. The rim is rotated 90 deg. (to place the dot above the arrow) to control a signal to display aspects more favorable than the "restricted speed" aspect. The rim is rotated 90 deg. downward (dot below the arrow) to control the signal to display the restricted speed aspect. When the signal clears, a lamp is lighted behind the clear lense in the face of the knob. After the train accepts and passes a signal, the leverman must rotate the rim back to its normal position in order to return the controls to normal condition.

If a signal, which has been cleared, is to be "taken away," the leverman rotates the rim to its normal position (dot at base of arrow), and the signal will display stop aspect. Non-stick signal controls are in effect.

Approach annunciator buttons are on the lines representing approaches to the interlocking. When a train enters an approach section, a bell rings and a lamp, in the base of the annunciator button, flashes 75 times a minute. The button is pushed to acknowledge. This stops the bell, and makes the lamp burn steady.

Traffic direction locking is in effect for train movements either east or west on the Track No. 4 between Framingham and Riverside. This traffic movement control is established by cooperative action by the leverman at Signal Station 22 and at Signal Station 15 at Riverside. The traffic direction controls include a two-wire line circuit that breaks through all track circuits, and controls a polar relay at each signal location.

The switch machines are the GRS Model 5A, with 110-volt d.c. motors. A biased-neutral controller is lo-



Track and signal plan of the entire area of interlocking

cated in a relay case as near as practicable to each switch. If the switch points are obstructed, so that the motor takes excessive current, the overload relay, in the controller, picks up automatically to open the feed.

Operation of Switches

Each switch machine is supported on two ties, and mounted on ¾ in. saddle plates 7 in. wide and 31 in. long, made with two 2-in. butt straps, welded in place so that the switch machine fits snugly between these blocks. Each plate is fastened to the ties by five ¾ in. lag screws, and, in addition, two ¾ in. by 11½ in. bolts extend through the switch machine lug, the plate, and the tie.

The center line of each switch machine is 45 in. from the gauge side of the rail; thus clearance is provided, without dapping the ties. This mounting requires offsets in the rods, 2-13/16 in. in the throw rod, 4-15/16 in. in the lock rod, and 2-1/16 in. in the detector rod.

When installing a switch machine, the plates are laid loose on the ties, and the machine is placed. The rods are then connected and alined, the saddle plates and machine being shifted slightly as required. After adjustments are complete, the lags and bolts are installed. This procedure eliminates considerable fitting work, and therefore expedites construction.

In each switch layout, there are five 1-in. by 10 in. insulated gauge plates with adjustable rail braces. Five vertical-pin Ramapo-Ajax rods are used in each of the long switches. The switchpoints of the No. 18 switches are 33 ft. long. To insure that these points move over properly, a helper connection is made at 20 ft. from the No. 1 rod, and is pipe connected to the No. 2 rod.

Power Supply

The 110-volt switch machine motors are fed from a set of 60 cells of 480-a.h. Exide lead storage battery.

Track 3 was removed from old SS-22 to Riverside

Local relays and controls are fed from a set of 14 cells of 240-a.h. Exide lead storage battery. Each track circuit is fed by a half-wave rectifier, which operates on a.c. from a transformer. The d.c. relay on each track circuit is rated at 1.8 ohms. Signal lamps are on a.c. supply.

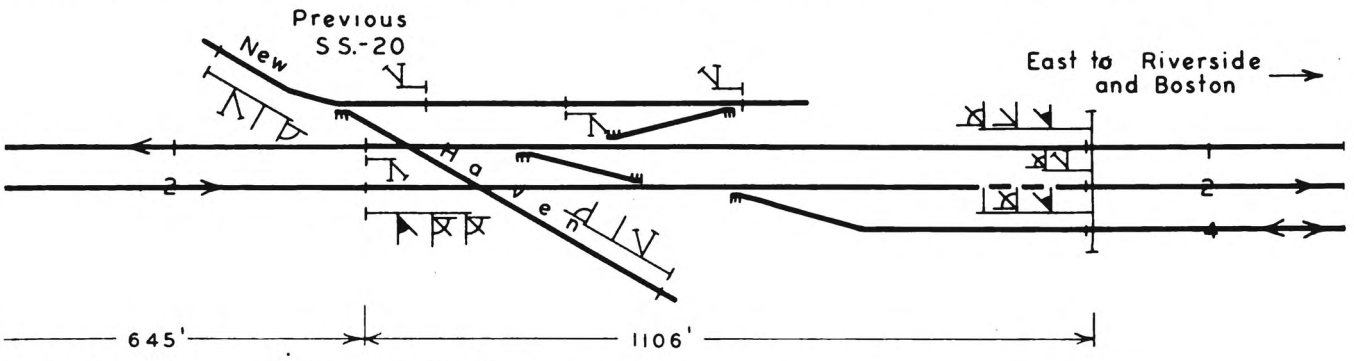
A 550-volt a.c. single-phase signal and interlocking power distribution circuit extends from this interlocking east for 9.5 miles to Riverside. This a.c. power circuit is normally fed from commercial supply at Signal Station 22. If incoming commercial a.c. fails, automatic switching devices at Signal Station 22 cut in three 1.5 kva General Electric inverter dynamotors, fed from the 110-volt switch battery. These machines will start and take over the a.c. interlocking and automatic load in about 5 cycles. This change is made so quickly that the signaling or interlocking is not affected.

The main battery has capacity to operate the switch machines and the dynamotors for at least 10 hours, if necessary. When the commercial a.c. fails, an indication lamp is lighted on the control machine and a bell is sounded. The operator then calls the maintainer, who checks the condition of the commercial service at Riverside. If the service is known to be OK, the automatic signaling load is manually transferred to the Riverside source. The local interlocking power at SS-22 Framingham would still be supplied by the single dynamotor operating off the switch battery. Should the commercial service at Riverside fail or the commercial service at Framingham remain off for a considerable period, the maintainer will start the emergency gasoline-driven generator at Framingham. This generator is rated at 5 KVA and 115 volts a.c., which is sufficient to carry the total signaling load as well as charge the batteries.

In Aerial Cables

In home signal limits the main wiring distribution is in neoprene jacketed aerial cables, which are supported in insulated straps attached to Copperweld stranded messengers on concrete posts. The control wires in these cables are No. 12, and the 110-volt d.c. switch feeds are on No. 2 wires. The wires to rail connections are No. 6, using Raco bootlegs.

This interlocking was planned and constructed by New York Central System forces under the jurisdiction of J. J. Corcoran, chief signal engineer, and under the direction of T. T. Hart, signal engineer, Line East. The major items of interlocking equipment were furnished by the General Railway Signal Company.



now controlled from new machine in Signal Station 22