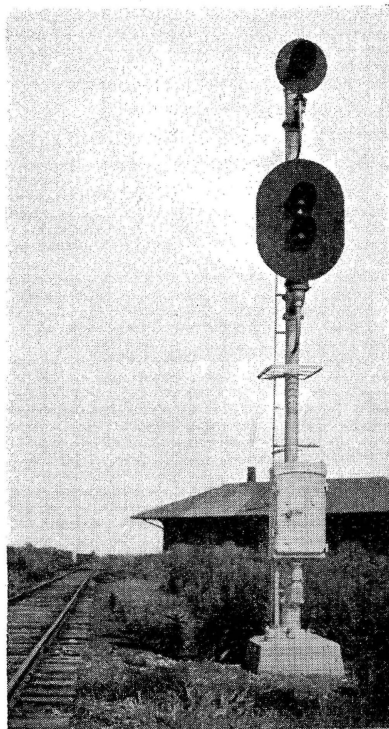
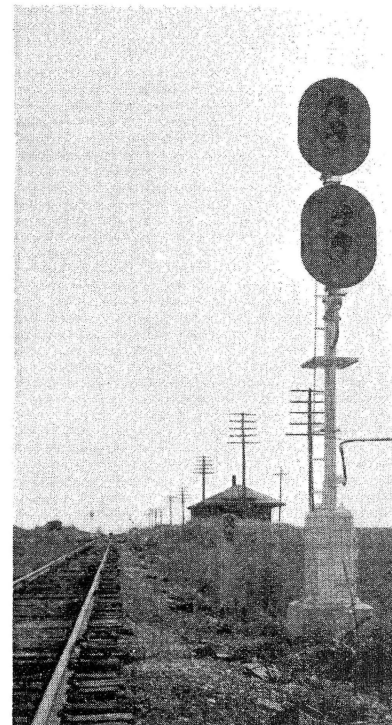


Great Western Constructs Automatic Interlocking



Northward Milwaukee home signal



Eastward Great Western home signal

Crossing with Milwaukee at
Wilkinson, Ill., formerly pro-
tected by mechanical plant—
New facilities show an increase
in operating efficiency result-
ing in outstanding economies

THE Chicago Great Western has replaced a mechanical interlocking at Wilkinson, Ill., with a modern automatic plant including color-light signals. At this station, which is 62 miles west of Chicago, the main line of the Chicago Great Western and a branch line of the Chicago, Milwaukee, St. Paul & Pacific, extending southward from Madison, Wis., cross at grade.

Although operators were formerly required, the traffic at Wilkinson now consists almost entirely of through movements, freight trains using the sidings and transfer tracks only occasionally. Under these circumstances the desirability of automatic operation of the signal protection is apparent, as the siding switch opposite the station need not be interlocked. Furthermore, as the track layout is relatively simple, the controlling functions are correspondingly free from complications and all train operations are satisfactorily provided for. The traffic over the crossing at present consists of four freight trains daily on the Milwaukee and nine or more trains on the Great Western, of which four are passenger trains.

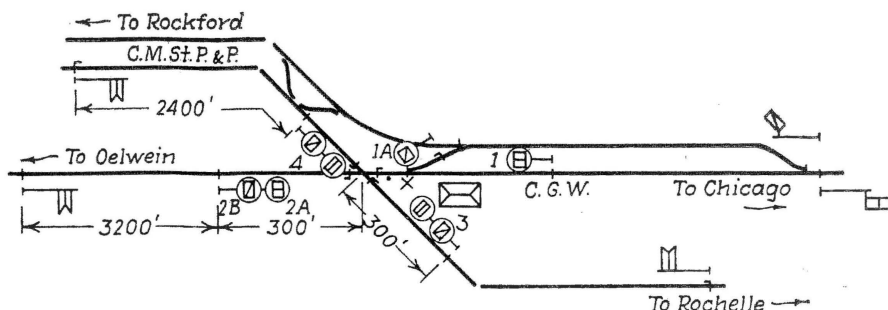
In this territory the Great Western line is equipped with single-track automatic block signaling of the two-position semaphore type. Consequently the westward automatic semaphore signal governing the east approach to the crossing, serving as a yard block in connection with the mechanical interlocking, was continued as such, with two aspects, caution and stop, and standing normally at the 45-deg. position. A fixed distant signal, situated 3,200 ft. west of the eastward home signal, was retained in service with the new facilities. Automatic block protection is provided as far as the eastward

home signal by an automatic signal at Clare, which is two miles west.

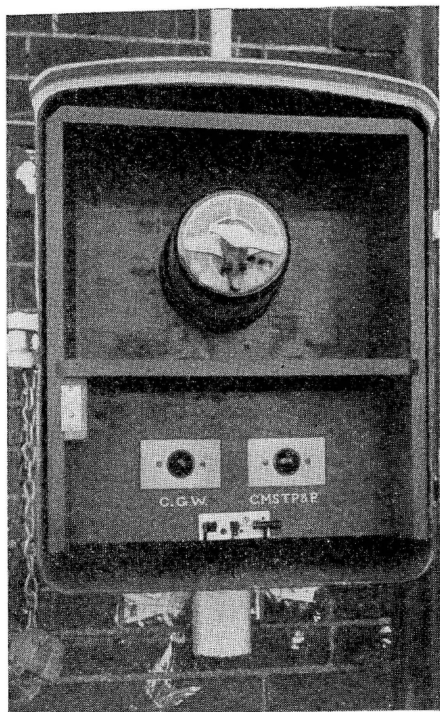
The track layout includes a passing siding extending from the westward automatic signal to a point within home signal limits but short of the crossing. From this track the transfer track extends to a siding on the Milwaukee. The crossing frog is for single track.

Siding Required Dwarf Signal

As the passing-track switch within home signal limits constitutes another approach to the crossing, a dwarf signal was provided to govern



Dwarf signal 1A governs movements from the Great Western siding



Releasing equipment located near the crossing

Principle instrument cabinet housed in the depot



this route. The controls are so arranged that operation of the main-line switch establishes the line-up, provided no conflicting movements are in progress. The dwarf signal and the main-line signal governing west-bound trains have two aspects, the former red or yellow, and the latter red or green.

Signals and Aspects

Inasmuch as the eastward home signal on the Great Western governs movements over the main line and the facing-point siding switch beyond the crossing as well, it consists of two two-aspect units. The top unit shows either red or green for the main-line route, whereas the lower unit displays either red or yellow for movements into the passing siding.

Both home signals on the Milwaukee have two aspects which are red over red for "stop" and red over yellow for "proceed." Each signal consists of a two-aspect color-light unit with the fixed red Type-HC-41 unit above. The upper unit is lighted by a 10-volt 10-watt lamp. The Type-P5 lower units, as well as the Great Western home signals of the same type, are equipped with 18-watt lamps.

All of the home signals are continuously lighted by a-c. energy obtained from Clare over a 220-volt circuit. However, the central battery constitutes a stand-by supply operating through a power-off relay. This battery consists of five Exide EMGO-9 cells charged by a Balkite full-wave rectifier and transformer. All of the local control circuits are also fed from this power group.

The Milwaukee distant signals are fixed semaphores displaying the caution aspect. Each of these is continuously lighted by a 4-cell Edison primary battery. The lamp units are Union Style-D with 3.5-volt lamps. With the normal lamp load of 120 m.a. these primary batteries last approximately six months. All of the outlying track circuits are also fed by primary battery. As the 220-volt power line from Clare passes by the fixed distant signal on the Great Western, a W-10 transformer and a 13.5-volt 0.25-amp. lamp were provided for lighting this signal from this source.

The operation of this interlocking is essentially the same as any automatic crossing installation. The home signals function to authorize movements over the crossing immediately after a train occupies the approach section, which begins at the distant signal. On the Great

Western, the westward distant signal gives automatic signal protection as far as the opposing home signal, and the stop block of the latter extends to this distant signal and overlaps into the first track section beyond. Control of the eastward signal at Clare extends only to the westward home signal, thus allowing a train to wait at Wilkinson while another, proceeding eastward from Clare, takes the siding.

Special provisions have been made for the release of the crossing by trainmen in the event of switching movements within the approach sections, or track-circuit interruption on the opposing road. Without such a provision, it would be possible for one road to obstruct the signaling while a movement requiring use of the crossing is not imminent. One of the accompanying illustrations shows the releasing apparatus mounted in a box at the station building, which is only a few feet from the crossing frog.

Trainmen Operate Manual Release

Whenever an opposing route, which has previously been set up, is to be released, a member of the train crew opens the release box and closes a two-way knife switch in the position marked for his road. The clockwork time release is then wound, immediately setting all signals in the restrictive aspect. After the two-minute interval elapses and the time release is again normal, the new line-up is automatically established and the train proceeds over the crossing.

Above the knife switch in the release box, two lights indicate whether a Great Western or a Milwaukee line-up has been established. This assists the train crews in the use of the releasing apparatus. These indications are provided by use of the small DNL-4 line relays, which are connected in series with the HR circuits for each road. Whenever a signal is set at "proceed" the HR circuit, being energized, is repeated by the series relay, which lights the proper indication lamp. However, neither lamp functions unless the door of the release box is open; when closed, the door operates a switch interrupting the circuit common to both lamps.

Excepting the track and HR relays at each home signal, all of the controlling instruments are located in the station building. With but two exceptions, the control circuits originate at the local battery and terminate on common return wires. Connections are made to all home sig-

nals by means of parkway cable runs.

For each road there is a normally-energized stick relay designated as the route-locking relay. Whenever a signal authorizes a movement over the plant or a train occupies track between home signal limits, the corresponding route-locking circuit is broken, and the relay breaks the HR circuits of the opposing road. Of course these HR circuits are already open in such a case. The locking circuit cannot again be completed until the signals authorizing the movement have been restored to normal.

For each pair of home signals, there is a relay which functions to establish the line-up upon the approach of a train. The control of this relay can be completed at either home signal depending upon the direction of the train movement. Whenever either approach is occupied, the relay is energized through a back contact of the corresponding track relay, providing there are no conflicting routes already established. This relay then completes the HR circuit involved, setting the signal at "proceed." Of course, the HR circuits include contacts of the track relays involved in addition to the route-locking relay of the opposing road, already mentioned.

An interesting feature of the control scheme is the means of releasing the route, while a train is trailing off the opposite approach section, having cleared the home signal limits. Interlocking relays are used to good advantage for this purpose, functioning in the usual manner to set up directional control of the route-locking relay. Each of these Type-DX-13 relays is connected to repeat the operation of the track relays of circuits adjacent to the home signal at which it is located.

Another notable feature of the signal controls is the provision against improper operation as a result of failure of a short train or motor car to shunt properly an approach track circuit, after the proceed aspect of a home signal has been established. In this contingency the line-up would ordinarily be released and a conflicting route could be immediately set up were not measures taken to prevent the operation.

In this interlocking, a DT-10 time-element relay is arranged to begin its timing cycle whenever any line-up is set up. If the movement is properly completed, the timing is interrupted. On the other hand, if the approach track relay should become energized for any reason, such as loss of shunt, the timing continues.

As the route-locking relay remains energized, the conflicting route is locked out for the necessary time interval. In this case, two minutes is considered sufficient time for a train to pass over the crossing safely.

Construction Features

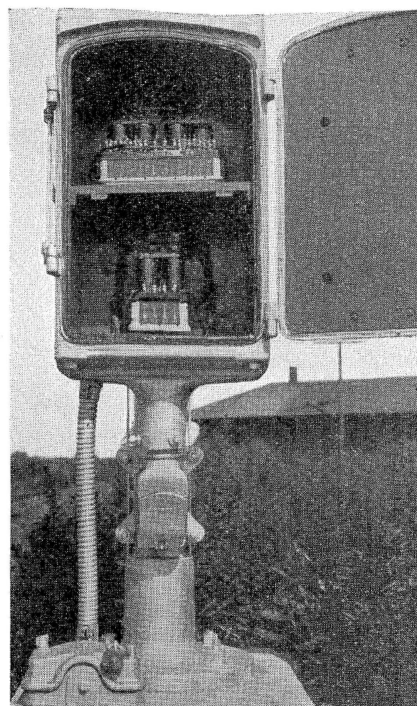
The control relays and operating battery are housed in a 4-ft. by 8 ft. by 1½-ft. steel relay cabinet within the station building. This cabinet accommodates 12 square based Model-13 relays, the power off relay, 3 DNL-4 repeaters, the DT-10 time-element relay, 2 transformers, the Balkite rectifier unit, 7 storage cells and two RX-10 rectifiers which charge the two DMGO-7 track cells. All of this equipment is insulated from the shelves by rubber matting, the relays being fitted with shock-absorbing springs.

The terminal boards form a false back set 4 in. from the rear wall of the cabinet, leaving ample space for wiring. The wires from the outside are terminated at the second shelf where they carry an identifying tag. However, from the terminals to the relays above, the flexible leads are grouped to each relay without tags, emerging from behind the false back through a 1¼-in. hole. As all relay contacts shown on the plans are numbered, there is no difficulty in identifying each wire at a relay by this means, further tagging being considered unnecessary.

As previously mentioned, all four home signals are connected to the control cabinet by Okonite parkway cable having steel tape and lead sheath. Each cable has four No. 14 and four No. 8 conductors. Other outside circuits are on the pole line and these are terminated on Premier No. 3 lightning arresters. The 220-volt power wires are terminated on crystal valve arresters. Each track-circuit feed and rectifier output circuit is provided with a special toggle switch for the convenience of the maintainer in testing and adjusting.

Each track lead consists of a No. 9 conductor in non-metallic Okonite cable. Union bootlegs are used at each rail connection. One 42-in. connecting cable made of seven No. 12 Copperweld strands with a ⅜-in. plug is run to the inside and another to the outside of each rail from the bootleg.

This interlocking was planned and constructed by the signal forces of the Chicago Great Western. The principal items of material were furnished by the Union Switch & Signal Company.



An interlocking relay at each home signal effects directional control

Primary batteries serve to light the distant signals continuously

