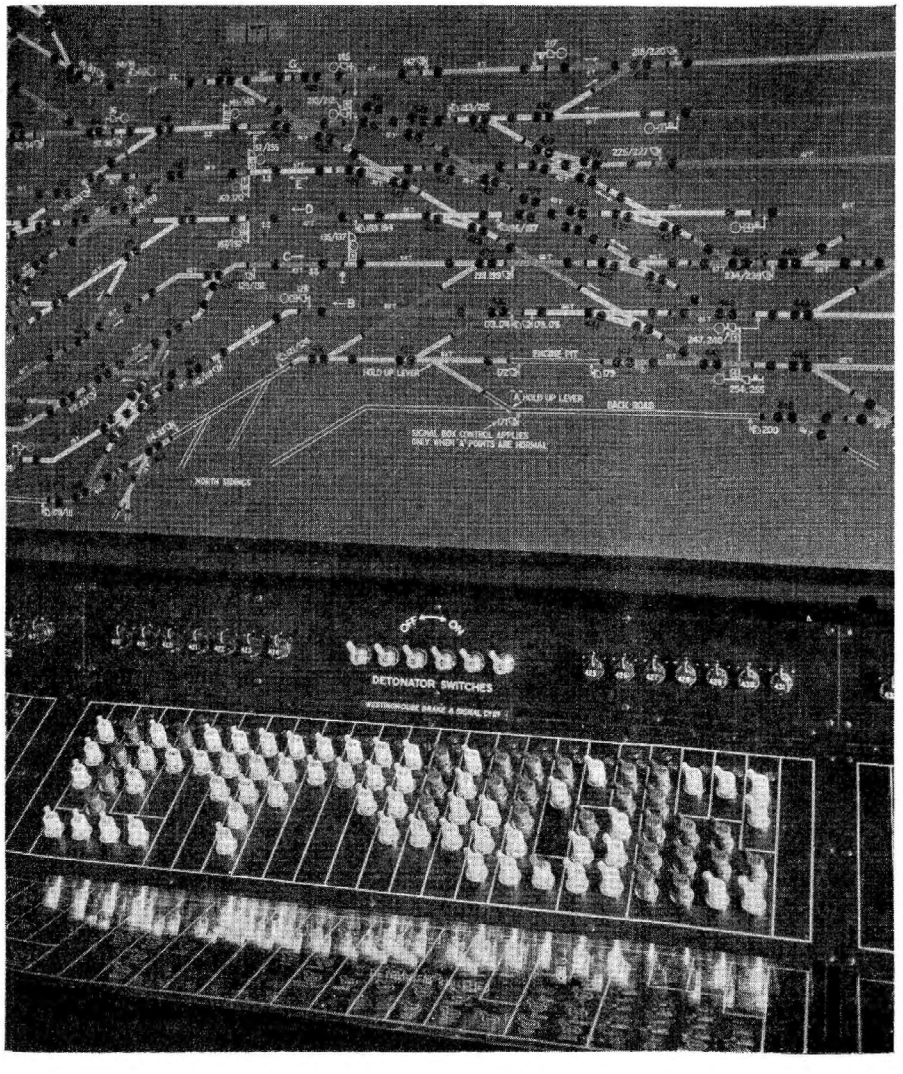
230 Routes In a Relay Interlocking

Installation on London & North Eastern at Paragon station, Hull, England, features unusual panel, rectified track circuits

THE largest route-control relay interlocking in England was completed during 1938 by the London & North Eastern at Paragon station, Hull. Two signal towers, containing between them 322 miniature levers, have been replaced by a modern brick signal tower housing a route-control machine providing control of train movements over 230 routes. The following description of the outstanding features of the new plant has been abstracted from an article appearing in the Railway Gazette of London.

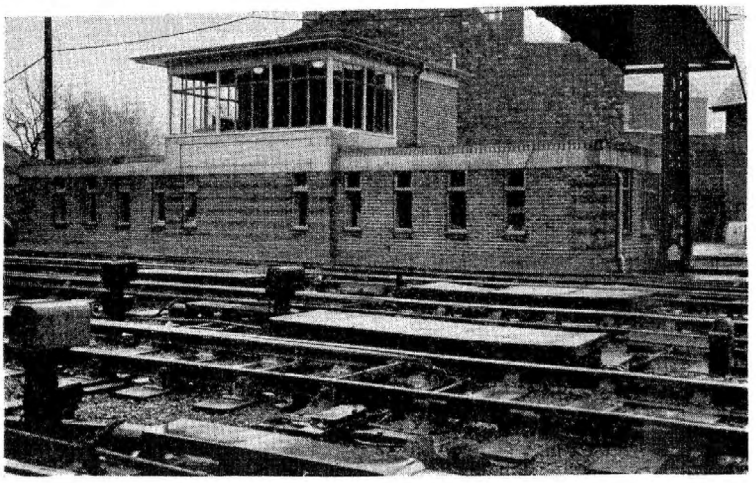
The new Paragon signaling installation is of outstanding interest, due to the fact that the principle of route-setting has been applied there to a large British terminal station for the first time. In the signaling at Leeds City station, opened just over a year ago, the first instance of relay interlocking at a large city station, the signals and switches are operated by individual thumb switches on the track diagram. At Hull, Paragon, however, the thumb switches are grouped on a sloping keyboard below the diagram. A group of route-setting thumb switches is associated with every signal, and is arranged to come as far as practicable, immediately below the position of the signal on the diagram. On the flat shelf of the panel instrument, in front of the sloping portion, is a key diagram showing clearly the route to which each operating switch applies. At the majority of signal locations there are a main and a subsidiary signal on the same post; the various routes over which such a combination may read are distinguished by the thumb switches being colored red for movements controlled by the main signal, and white for those controlled by the subsidiary signal. Altogether there are 32 running signals, 18 being equipped with route indicators, and 56 subsidiary signals. Individual control of each switch, involving 48 additional thumb switches in a single row on the vertical face of the panel, just below the diagram—together with 6 others for operating detonator placers—has also been provided, but for emergency use only. Individual control of a switch can be exercised only provided all conflicting route-setting switches and the relays associated therewith, are normal.



Central portion of control panel at Paragon station. Thumb route-setting switches below

Electro-Pneumatic Switches and Searchlight Signals

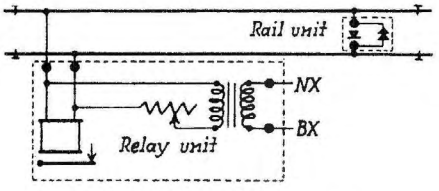
Electro-pneumatic switch operation, previously in service, has been retained. However, the control valves were mounted originally on a special bracket cast integrally with the cylinder head; this arrangement was not readily adaptable to the modern use of steel-armoured cable and sealed disconnection boxes, and the switch valves have, therefore, been removed from the cylinders to stands located in the inter-track clearance. The valves are of the early typical Westinghouse



Modern signal tower at Paragon station, Hull

Style-B type, with which air pressure is maintained in the cylinder after the completion of the stroke until the points are reversed again.

Many of the facing points were originally equipped with locking bars operated by separate air motors, and controlled, of course, by separate bar levers. This necessitated the elimination of some 100 locking bars and the



Location of Westrak units

conversion of many switch layouts to operate from combined point and lock movements instead of separate mechanisms as hitherto. In these and other instances new electric point detectors were provided.

The crossovers adjacent to the buffer stops in certain platform tracks are also electro-pneumatically operated, though not directly from the signal tower. Electric two-slide lever frames are provided which can be released by the operation of thumb switches on the main panel; the relevant release-control circuits are interlocked with those of conflicting switches and signals.

The main running signals are of the single-unit or searchlight type, equipped where necessary with multiple-lamp, double-faced route indicators; the platform starting signals, in locations where only a moderate sighting range is required, are medium-range, two- and three-indication, multi-lens signals of considerably less power than is necessary in a main running signal. The majority of the new signals are carried on tubular steel posts, but there are a few locations where sighting considerations require bracket posts of considerable overhang.

Rectified Track Circuits

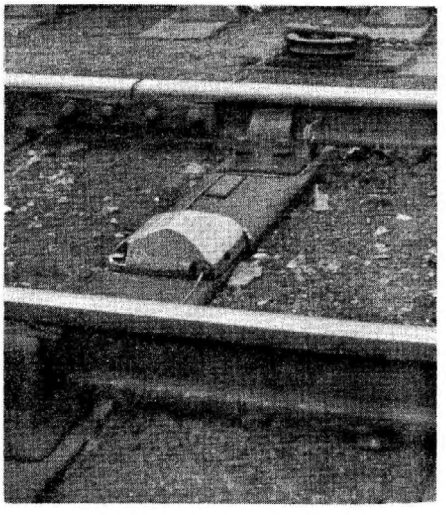
A feature of particular interest in this installation is the extensive application of rectified track circuits to a large terminal interlocking in order to obtain better shunting sensitivity.

Alternating current is fed to the rails on 101 track circuits through an adjustable feed resistance, but a d-c. track relay is incorporated in the feed circuits; this is energized, on the Westrak system, by the action of a half-wave metal rectifier connected to the rails at the other end of the track circuit as shown in the accompanying diagram. The relay, feed transformer and resistance are housed in a single unit, making for very convenient adjustment; the rectifier unit is connected to the rails by ordinary track bonding wire and housed in a small inconspicuous box fixed between the rails. Most of the Westrak relay and feed units are accommodated in the signal cabin, the remote ones alone being housed in all-welded steel location cases. For the outside cable runs, single-wire, armoured, lead-sheathed, oil-impregnated, paper-insulated, multicore cable is used, brought direct into the location cases in seal-in potheads, thus obviating the necessity for separate disconnection boxes.

Any route relay interlocking system naturally requires a comparatively large number of relays. A special type of relay has been used, incorporating special features to fulfill the many requirements of interlocking of this type, and, at the same, retaining the robust characteristics of standard signaling apparatus, as essential with this system as with any other. The relay can be fitted with detachable terminal arrangements mounted on special racks; this facility, and the incorporation of so many contacts in one unit, have made possible a very compact signal box layout. The ground floor of the signal cabin accommodates only the interlocking relays, signal control relays, a proportion of the track circuit relays and the power supply equipment.

Power is taken from two independent commercial feeders at 400 volts, 3 phase, 50 cycles, using duplicate 12-k.v.a. stepdown transformers. These feed at 110 volts a-c. various ring mains for the outside locations, and provide through further transformers 12 volts a-c. for panel indications and 110/55 volts a-c. for shunt signal lighting. A 50-volt d-c. supply for route indicator control and a 24-volt d-c. supply for the interlocking relays are obtained from the two main transformers through metal rectifiers. The compressor plant is contained in a separate building near the signal tower. There are two electrically-driven air compressors, with a capacity of 50 cu. ft. of free air a minute each at a maximum pressure of 80 lb. per sq. in. Normally one only is in use; the control includes automatic starting and cut-out features, regulated by the air pressure.

This installation was designed under the direction of A. E. Tattersall, now signal and telegraph engineer, Southern area, through the work was



Westrak rail unit mounted on tie between rails

carried out under the supervision of his successor, C. Carslake. With the exception of the large overhang bracket signal posts, which were constructed in the L. & N. E. shops at Hull, the whole of the equipment was supplied and installed by the Westinghouse Brake & Signal Co., Ltd., to whom the Craigpark Electric Cable Company and the Edison-Swan Electric Co., Ltd., were sub-contractors for all cables.