

Brighton Line Resignalling, Southern Region



The new Clapham Junction " B " box, which replaces the mechanical box on the left. The old box has now been demolished

THE second stage of the colour-light signalling scheme on the Central Section of the Southern Region of British Railways was brought into use in two parts—from Streatham Common to Selhurst on October 5, and from Battersea Park to Streatham Common on October 12. Eleven manually-operated signal boxes were abolished, and replaced by three new all-electric boxes at Clapham Junction, Balham, and Streatham Common.

The whole scheme, announced by the Southern Railway in 1946 and now estimated to cost approximately £2,000,000, includes the provision of eleven new all-electric signalboxes, of which three were brought into use in the first stage, inaugurated on October 7-8, 1950, between Bricklayers Arms Junction and Norwood Junction, on the London Bridge line. When completed, the project in conjunction with the existing installation between Coulsdon and Brighton *via* Quarry, will give continuous colour-light signalling from both Victoria and London Bridge to Brighton.

The new signalboxes for stage two of the scheme are Clapham Junction " B " (103 levers), Balham (43 levers), and Streatham Junction (79 levers). Included in the new boxes are relay and accumulator rooms, stores rooms, maintenance staff accommodation, and equipment associated with the main signalling.

The existing manually-worked Selhurst box is being retained until the introduction of the third stage, and the existing manually-worked box at Thornton Heath is being retained permanently, although it will normally be used for shunting movements only, and switched out at other times, the running signals then working automatically. In the whole of the second stage area there are 125 colour-light signals of the multiple-aspect, long-range type, and 20 junction indicators. The signal spacing provides for a $2\frac{1}{2}$ min. headway for following stopping trains.

Lightweight signal bridges were designed and erected by the Civil Engineer of the Southern Region. Tubular steel straight posts, with gallery, were designed

by contractors to the Signal & Telecommunications Engineer's requirements and erected by his staff. There are 43 floodlit disc-type shunting signals, solenoid operated, and 103 point machines, mostly operated from 120-V. accumulator batteries at the three new signalboxes, the batteries being float-charged by rectifiers; there are also stand-by rectifiers at these boxes for direct point operation if necessary. Telephones connected to separate circuits are provided at all automatic and most controlled signals, giving train crews direct communication with the signalbox concerned.

There are 239 condenser-fed track circuits, single and double rail, incorporating 290 impedance bonds. Track relays are so far as possible located in the signalbox relay rooms, local controller rooms, or the apparatus cases of automatic signal locations. The cable route is almost throughout surface concrete troughing, of which there is approximately 20 miles.

Multicore vulcanised insulated rubber lead-sheathed cables are used for signalling, the number of conductors varying from 10 to 40. There are 1 000 core-miles of signalling cable, 250 pair-miles of telephone cable, dry-core lead-sheathed and sheathed-wire armoured, and 12 miles of oil impregnated paper insulated lead-sheathed armoured twin feeder cables for current distribution at 480 V. and 110 V.

The lever frames at the new signalboxes are of miniature type, with individual levers and all-electric interlocking. Each lever is fitted with two lock magnets, one for interlocking purposes and the other for track and indication locking. All signal levers are fitted with back or normal indication locks, but front or normal selection locks are not provided. Normal and reverse track locks are fitted to each point lever. Behind each signal lever are repeated in miniature lights all aspects of the signal it controls, that is, red, one or two yellows or green. Running and shunt signals also have a light indication behind the lever, which when illuminated tells the signalman that the signal can be cleared by reversing the lever. Behind each point lever is an illuminated "N" or "R" indicating the position of the points it controls. Behind the lever frame is a large illuminated diagram of the area controlled by the

signalbox, showing all signals, points and track circuits, with their identification numbers and letters. When a train occupies any track circuit, its presence is indicated on the illuminated diagram, so that signalmen are continuously aware of the position and movement of trains.

Magazine train describers are provided between the signalboxes. These enable signalmen, merely by pressing a button, to advise adjacent signalboxes of the next train, its class and destination; there is an instrument at the "receiving" signalbox with descriptions corresponding to those on the instrument at the "sending" signalbox. The receiving instrument indicates the first, second and third trains, the indication automatically stepping up one as each first train is cancelled on passing the signalbox. There are 18 sending and 24 receiving instruments, with associated equipment. Each signalbox is in telephone communication with signals, adjacent signalboxes, and traffic control; telephone positions are duplicated as necessary so that the booking lad can also deal with calls.

The relay rooms house main transformers, fuses, rectifiers, and all the control apparatus on which depends the safe operation of the system. The main signalling supply at each signalbox is 480 V. into the relay room from the Mechanical & Electrical Engineer's portion of the signalbox. Local distribution is at 110 V., but all automatic signal and other major locations are fed at 480 V. The controlling relays, of which there are 760 in the various rooms, are on steel racks conveniently placed for observation, testing and changing. The fuse and cable termination panels, also of steel, are up to 24 ft. long, and each fuse panel carries 500 to 700 fuses. One hundred and fifty miles of flameproof wire have been used in the signalboxes and relay rooms.

The three new signalboxes were designed and constructed by the Civil Engineer, Southern Region, to the requirements of the Signal & Telecommunications Department. All three structures were sited on made-up ground, to depths up to about 20 ft., which had been deposited to form the railway embankments. At Streatham Junction, the fill was of a fairly uniform mixture of clay and stones, and a reinforced concrete raft was adopted. At Balham and Clapham Junction soil investigation revealed

ashes and variable material for considerable depths. It was decided, therefore, to resort to piled foundations, and piles of the *in situ* reinforced concrete type were successfully used for this work. Main drainage systems were installed at all three.

As in the first stage, the boxes have been provided with central heating and steel windows, including sliding sashes on ball bearings. The signalboxes were begun soon after midsummer, 1949, and were completed structurally early this year.

is of tapering triangular cross-section. It was flame sprayed in aluminium with the object of reducing maintenance to the minimum. Erection of these bridges was carried out quickly and several were erected in a night on previously prepared reinforced concrete bases.

The whole of the signalling installation was designed and carried out by the Signal & Telecommunications Engineer's Department. The number of men employed varied between 100 and 200 as the work progressed. The changeover was carried out by about 500 men of the



Interior of the new signalbox at Clapham Junction, showing the lever frame and the illuminated diagram

The signal bridges on the present stage of the colour-light signalling scheme are, in the main, welded steel spans up to about 70 ft. In designing these structures, which are light and of pleasing appearance, particular regard was paid to the desirability of keeping down maintenance costs, particularly of painting. Stanchions are of the single leg, welded box type and, where four roads have to be spanned, the girders are of the shallow solid-web type; for bridges spanning five roads an open Vierendeel type has been adopted.

The large cantilever structure at Pouparts Junction is of all-tubular welded construction; the cantilever part

Signal & Telecommunications Engineer's staff, and another 100 men from the Operating and Civil Engineering Departments, and was completed in time for normal resumption of traffic on the Sunday morning.

The third stage of the scheme, the Norwood-Selhurst-East Croydon triangle, is planned to be brought into use in 1954, and will link the first and second stages. The final stage, from East Croydon to Purley, forming the last link with the existing colour-light signalling to Brighton *via* the Quarry line should be completed in 1955. The alternative route *via* Redhill is not included in the scheme.