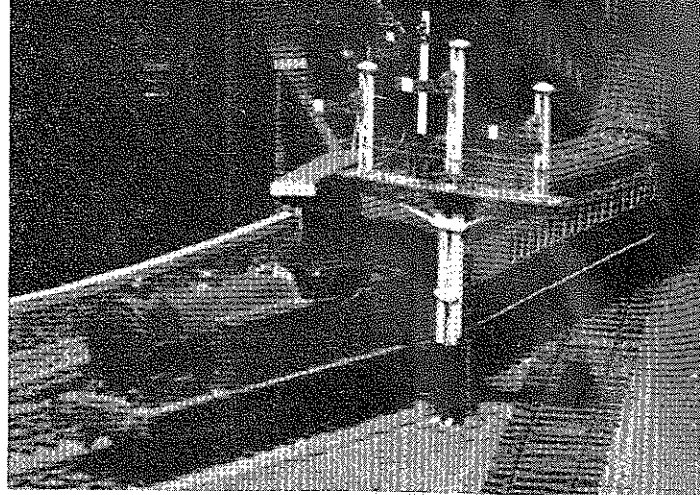


Linked-section control in action

by
L. E. Carroll

In the September, October and December 1953 and January 1954 issues of this magazine the author gave the basic data for this system



"WELL," said George, in his patronising way, "and how goes Linked-Section Control?"

I hadn't seen much of George since his Train Exchange effort, so I had rather looked forward to blinding him with science when the new electrification was complete.

"Fine!" I answered cheerfully. "Come and see. . ."

But the trouble with L.S.C. is that there really isn't much to see at all—no barrage of switches, no illuminated route diagrams half as big as the layout: just track, signals, lever-frames and, rather inconspicuously, the usual speed-control knobs.

"H'm . . ." said George, not visibly impressed. "Still, the proof of the pudding is in the eating. Can we have a go? But first of all you'd better recap. It's quite a while since I read your 'words and music'."

I recapped. . .

"The basic idea, as I dare say you remember, is an adaptation of normal cab control, but instead of having separate switchboards for the section switches (with any signalling entirely independent), in L.S.C. the section switches are actually operated by the signal levers themselves. And as the electrical sections are identical with the block-signalling sections, normal use of the levers ensures that the track sections are linked up in just the way needed for the movement signalled. So, not only is there less work to do, but also there can be no conflict between signal indications and current distribution. The possibility of the wrong train starting (or the right train stopping) by accident is entirely eliminated. Just look after the signals the juice looks after itself."

"M'yes . . ." said George, "though it seems too good to be true. And how does it work out in practice?"

"Well, here's a track diagram with each section numbered (Fig. 1). As you see, the new layout represents the Southern Central main line from Victoria to East Croydon and points south, plus the Reigate branch. On the main line we have Victoria, Clapham Junction and East Croydon, and normal block-sectioning is in force between them. Suppose, for example, Clapham has an up train for Victoria . . . he gets 'line clear' and pulls off his starting signal. This brings his up platform track (10) and the block section ahead (11) on to his own controller, so he can now start up and drive the train as far as Victoria's outer home signal. When this is pulled off by Victoria, Section 1 is linked to the block section in rear (11), allowing Clapham to continue driving straight through to the terminus."

"Sounds simple enough . . ." George

admitted, a shade sceptically, I thought.

"Well, yes," I pressed on, "and the beauty of it is that not only does Victoria, simply by pulling the signal, secure the transfer of the section, but also Clapham, by observing the signal at clear, knows it *has* been transferred. Incidentally, Clapham can restore his starter as soon as the train has passed it and Victoria restores his outer home when the train has stopped. It is then 'out of section' as regards both signals *and* power. The restoring of the signal indicates this to Clapham even before the appropriate message is given."

"And how about the actual switchgear?"

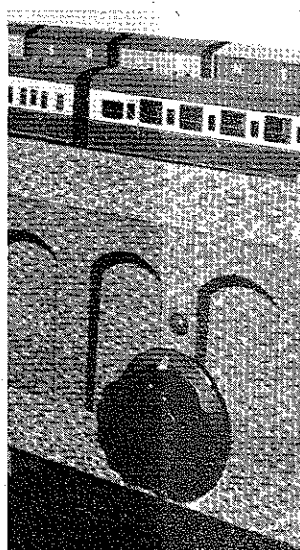
"At Victoria it could hardly be simpler . . . just a two-way switch, as in this diagram (Fig. 2). You can see that Section 1 remains linked to the Victoria controller except when the outer home is cleared for an up train, when, as I said, it is linked to Section 11 instead."

"At a through station like Clapham there are two stop signals on each road, and each of them has a separate switch. The homes have normal two-way switches, but the starters require double-pole two-ways. These four switches are connected to the adjacent feed rails and the local controller as in *this* diagram (Fig. 3)."

"Not quite so simple this time."

"True . . . but remember that the five switches at Victoria and Clapham actually control Sections 1, 2, 3, 4, 9, 10 and 11, and can link each of them to two or more controllers. And, of course, there's no traction wiring *between* control points, and no wiring radiating from them in all directions: it's all purely local."

"And what about *through* trains?"



The Victoria controller and overload cut-out, mounted on the retaining wall. These, with the lever frame and dead-end switch, constitute the only controls at Victoria. With Linked-Section Control no conventional switchboards are needed

* M.R.N. Sept. 1953, et seq.

"That's where the double-pole starter switches come in. If Victoria has a through train for Croydon, for example, Clapham pulls off his down home and down starter (Fig. 3 again). This links Sections 3 and 4 to Victoria's block section (2) and thus to his controller and to Section 1. The clearing of Croydon's down home adds Section 5 to the chain in the same way—and there you are: clear signals, and the juice, all the way.

"But let's get Harry round and we'll try it out properly."

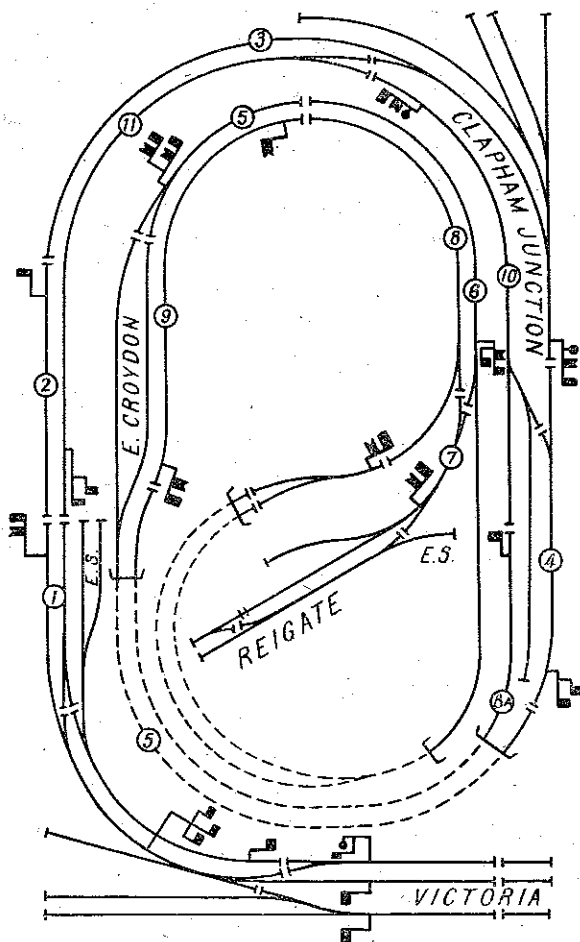
I gave Harry a tinkle.

"And how about the track beyond Croydon?" said George, while we were waiting, "... the famous return loop?"

"Well, Croydon is the last block-post on the line, so the loop is regarded as the block section in advance on the down line and the block section in rear on the up line. If we pull off the Croydon down starter—so—the loop is linked to Section 5, which is in turn linked to Croydon, Clapham or Victoria controller according to the state of the signals in rear. If, on the other hand, we pull off the Croydon up home, the loop is linked to Sections 8 and 9, and to the Croydon controller, for up trains—which Croydon can take right through to Victoria if the signals are set for a through train."

"And Reigate?"

"Perfectly straightforward. For down trains it is linked to Section 6, the loop, and for up trains to Section 8, which,



-----Tunnelled Track below VICTORIA

Fig. 1. Section diagram (not to scale)

with the block section in advance of Croydon (8a), is permanently linked to the Croydon controller. The two switches feeding Reigate are worked by the junction point-motors. So long as the junction is set for the main line, Section 7 remains dead, but for local shunting all we have to do is to set the junction as for an up train, when it is automatically fed from Croydon. Incidentally, the hidden loops are isolated unless the junction is set for the down or up main. The signals at Reigate, as well as the junction points, are worked from the two route-setting levers in Reigate box and therefore, as elsewhere, indicate the current distribution as well as the state of the line."

"So in fact you haven't got a single ordinary section switch on the whole layout?"

"Not on the main line, anyhow. But there is one rotary Yaxley switch at Victoria for the dead ends. Otherwise I have managed to do even the sub-sectioning entirely through the signal levers or the point blades."

But with a roar of mighty engines, there was Harry. . . . We put him at Croydon, set George to work at Clapham, and then, with me at Victoria, away we went. We started off with a down Reigate train, as follows:—

- Victoria: *Line clear for down stopping Reigate?*
- Clapham: *Line clear.* (Pulls off down home.)
- Victoria: Pulls off starter and advanced starter. *Train entering.* Drives train to Clapham. Restores own starters as the train clears them.
- Clapham: Restores down home when train stops. *Out of section.* Train isolated.
- Clapham: (to Croydon) *Line clear for down stopping Reigate?*
- Croydon: Sets points to Relief Road. Pulls off down home lever. Splitting down home automatically clears for Relief. *Line clear.*
- Clapham: Pulls off down starter. *Train entering.* Drives to Croydon, restoring starter when train has passed it.
- Croydon: Restores down home and points when train has stopped. *Out of section.* Train isolated.

Meanwhile . . . Victoria is preparing to dispatch an express due to pass the waiting Reigate train at Croydon.

- Victoria: (to Clapham). *Line clear for through Brighton Belle?*
- Clapham: Pulls off down home. *Line clear.*
- Clapham: (to Croydon). *Line clear for through Brighton Belle?*
- Croydon: Pulls off down home and down starter for Main Line, there being a vacant road on the return loop. *Line clear.*
- Clapham: Pulls off down starter.
- Victoria: (having received Clapham's *line clear*) *Train entering.* Pulls off starters and drives out, slowly at first, waiting for signals ahead to clear. Restores starters, and then, notching up, sails non-stop through Clapham and Croydon, past Reigate Junction and away off the map into the return loop tunnel with a clear road all the way—a full minute's run! When the train is well into the tunnel he throttles back and waits for "out of section."
- Clapham: (after giving train time to stop in tunnel) Restores signals. (To Victoria) *Out of section.*
- Croydon: Restores signals. (To Clapham) *Out of section.*

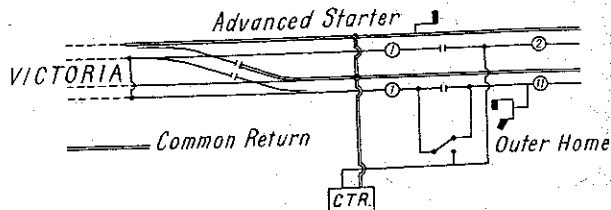
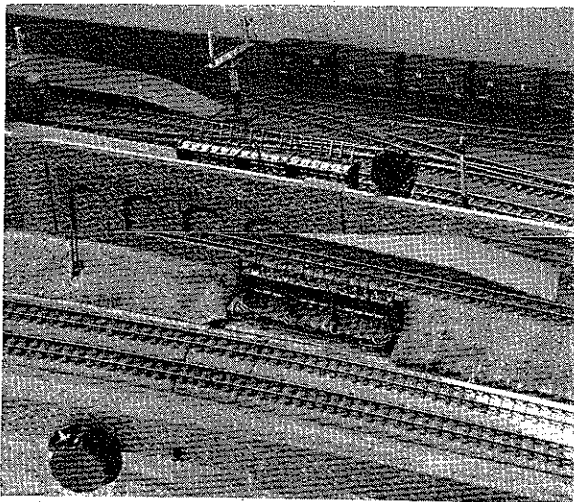


Fig. 2. Victoria Section switch



Above. Victoria lever-frame and rotary dead-end switch. These are located about 18 in. to the right of the control knob. Below: The controls at Clapham—reversing controller and overload cut-out, plus a 13-lever frame

"Pretty good," said George, warming up. "Quite a feel of the real thing. Now what about that Reigate train?"
 "All under control," purred Harry. "I've got two trains in the loop now (as indicated by the red light here), but I can take the local on to Reigate without interfering with them."

With that, he re-set Croydon points to Relief, pulled the down starter lever (thus clearing the splitting starters for the Relief Road) and, turning to Reigate Box at his left elbow, reversed the junction. Off went the train, and when it was safely tucked away the three levers were restored to normal, thus isolating it at Reigate.

"Okedoke! Now let's have an up train," said George, champing at the bit.

"Right . . ." replied Harry. "Let's pull off my up home signal, reverse the controller, and see what happens."

He turned up the juice, and what emerged from the return loop tunnel turned out to be an up Portsmouth that had been skulking there on the automatic changeover loop since the last session. Harry ran it round to Croydon and then offered it forward as a through train to Victoria, following a similar procedure to that used for the down Brighton Belle. If required, it could, of course, have been run non-stop straight through from the loop or made to stop at Clapham as well as at Croydon.

"And what," said George, after dealing with a down Tunbridge Wells, "what about all these other levers at Clapham? I don't seem to have needed them at all, so far."

"That's because you have had only main line traffic up to now. The extra red levers are for the 'shunt ahead' arms on your starter posts, and the black ones are for the crossovers and siding points. As the normal starters are not used in shunting, the starter switches are also actuated (at this station) by certain other levers, so that for every shunt movement the current is fed from your controller to the track being used. The other track still remains available to trains arriving from elsewhere."

To demonstrate, we brought a tank-hauled Hastings set from the Clapham carriage siding on the down side, ran round it, and then transferred it to the up platform via the crossover at the "south" end of the station. While this was going on we slipped the returning Brighton Belle through on the up road and then a fast Eastbourne on the down, using Croydon and Victoria controllers respectively.

"No ground signals, then?" said George, never satisfied.

"No . . . I did consider them, and they would have fitted

into the scheme all right. But to have used them consistently would have made the lever frames very much longer and more difficult to learn. And while you were sorting them out what would have happened to our frequent electric trains to all parts'?"

"*Touché*," he sighed. For as the four multiple-unit sets required no running round at Victoria, we were indeed able to live up to the old Southern slogan, and by keeping up the pressure with these I was able to snatch time to make up the occasional Oxted, Newhaven, or goods train at Victoria. George, handling dense traffic from both directions, began to look like the famous Shell advertisement, and was glad of a break when Harry said he had an assignation.

"What now?" he enquired, mopping his brow with a piece of cotton waste that had been a handkerchief.

"Now, we'll have to close down Clapham Box and treat Victoria—Croydon as one long block section. Just pull off the homes and starters at Clapham and we can run right through from each direction. Then you take over Croydon instead. A change of air will do you good. At Croydon you have only the Relief Road point-lever in addition to the basic four signals, but you do have the occasional Reigate train to handle, and you must watch your return loop 'Train on line' indicator. You mustn't send a third train in when the red light is on, and you can't bring a train out if it isn't."

From that point we carried on much as before, halting slow trains briefly at Clapham when required. Moreover, by using my remote control for the Clapham crossovers and principal yard point I was also able to work the odd empty stock to the carriage sidings. So we didn't really miss the Clapham operator at all, even though he had been up to his eyes all the time he was on duty.

"And suppose you want to run the line single-handed?" asked George when we knocked off for coffee. "Such things do happen. . . ."

"In that case I use my remote control again. All the Croydon relays are also connected to five buttons on this old push-button set, and I can reach the Reigate levers from here anyhow. I also have an alternative feed to the Croydon traction circuit. Going to the opposite extreme, by the way, we could use a separate driver and signalman at each control point, plus a traffic controller, so the line can be run effectively by from one to seven people, as required."

Continued on page 151

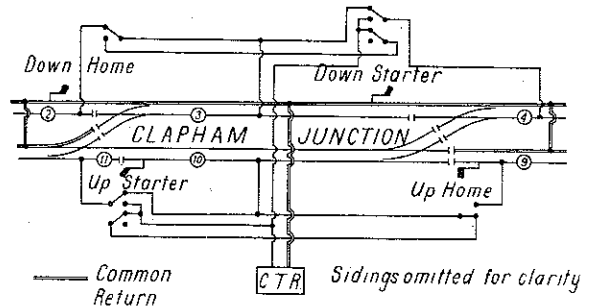


Fig. 3. Clapham Junction switchgear. The switches (here shown alongside the relevant signals) are actually at the signal box

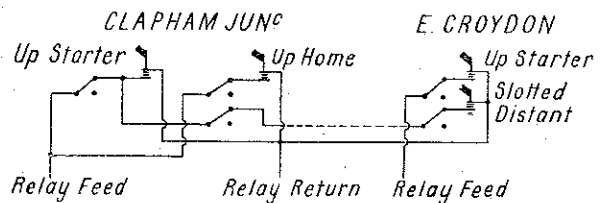


Fig. 4. Automatic distant signal circuit. (These switches actuate the signal arms: they are quite separate from the section switches in Fig. 3)

LINKED-SECTION CONTROL AT WORK

(Continued from page 137)

"Just the thing for a club, eh? But there's one thing I meant to ask: what happens about the distant signals? I don't see any yellow levers, yet the distant arms seem to pop up and down all right."

"I wondered when you'd spot that. . . . We could, of course, have made them manually controlled, but I wanted to keep the operational side as simple-as possible. So in fact the distants are relay-operated whenever the following two stop signals are both at "clear." And as the distants are on the same posts as the starters they are also electrically "slotted" so as to clear only if the starter is cleared too. The circuit is quite simple (Fig. 4)."

"A bit unorthodox, with semaphores! But it certainly works. Though why semaphores at all on the Southern Central—especially now that they've finally got colour lights all the way?"

"Ever tried reading a colour light from the back—or even, come to that, from the side? On a model line it's just not possible to site signals so that they can all be seen from the front by every operator, so there was no option. But anyhow, semaphores are much more decorative!"

"I grant you that. . . and what's more I do like the whole set-up. It's quite straightforward to operate and there don't seem to be any snags. And it really is nice to run a railway *as a railway*."

That, from George, was praise indeed, so before he got around to demanding when I was going to put in a dummy third rail I quietly raised the draw-bridge with a view to putting the car back to bed. . . .

"Good," I said over my shoulder, "and what about giving me a hand with the scenery some time. . . .?"