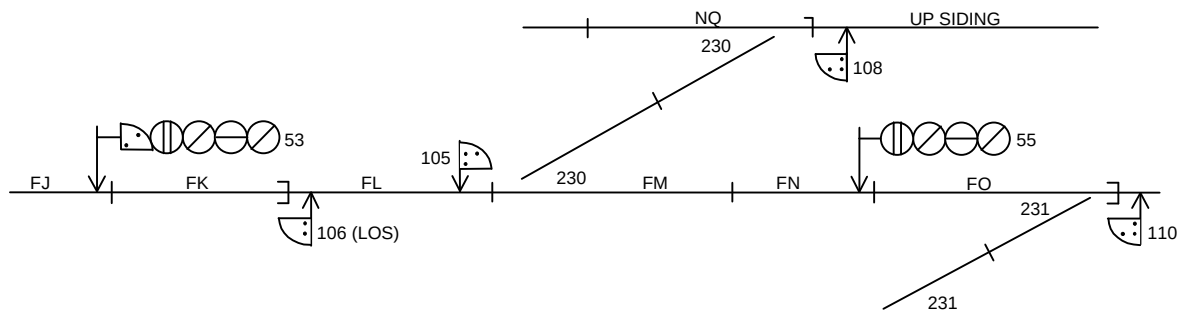


Chapter B: principles and Data Preparation

1 Introduction

In certain circumstances it is necessary to define routes which pass by one or more intermediate position light shunting signals between the signal controlling the entrance to the route and the route's exit. These intermediate signals are operated in a special "preset" mode. In the example below, signal 105 is operated in this way:



In this example three routes are available from signal 53:

53A(S): Conventional shunt route from 53 to 105.

53B(S): Shunt route from 53 to Up Siding, requiring 105 preset.

53C(M): Main route from 53 to 55, requiring 105 preset.

2 Principles

2.1 Route Setting

2.1.1 Short Route

The short route from the first signal (route 53A(S) in the example) may not be set if any of the long routes from the same signal (53B(S) & 53C(M)) remain set, or a train is between the first and intermediate signals on one of these routes. Also, any other route finishing at the intermediate signal may not be set whilst a train is between the first and the intermediate signal on one of the long routes.

2.1.2 Long Routes

The long routes from the first signal (53B(S) & 53C(M)) may not be set if:

(a) the short route from the same signal is set.

or

(b) a train is now between the first and intermediate signals after the short route has been set and then released.

or

(c) any of the shunt routes from the intermediate signal (105A or 105B) are set.

2.1.3 Route from Intermediate Signal

The shunt routes from the intermediate signal may not be set if the signal is operating in the "preset" mode. This mode of operation is selected when any of the long routes from the first signal are set, and remains in force until this route is released and the train has either passed the intermediate signal or has never entered the route. In SSI the preset mode of operation is registered by means of a route memory; an extra route identity is allocated for each route requiring the intermediate signal to be preset.

In the example these identities will be:

R105A(PS): set when route 53B(S) is set.

R105B(PS): set when route 53C(M) is set.

2.2 Aspect Controls

The short route from the first signal and the shunt routes from the intermediate signal have standard aspect controls.

When a long route from the first signal is set, this signal may only clear when the normal aspect control conditions for the long route are satisfied and the controls for the intermediate signal are off.

When operating in the preset mode, the intermediate signal may initially clear only after satisfying all the aspect control and approach release conditions for the long route which has been set from the first signal. After the train has passed into the section of track between the first and intermediate signals, the intermediate signal may then remain off provided the aspect control conditions for the section of the route commencing at the intermediate signal are satisfied.

To implement this feature in SSI requires the definition of a special latch in the FLG file associated with the intermediate signal. In the example this is given the identity L105(PS)OFF. The latch is set when the train has entered the route with the first signal "off" for one of the long routes. Network Rail standard RT/E/C/11600 [1] in effect also requires the latch to be set if a train passes the first signal at red as a result of the signal being button-replaced ahead of the train. It is unset when the track sections between the first and intermediate signals are all clear (route not cancelled until after track sections are cleared, or route is overset) or the berth sub-routes for the intermediate signal are free (route cancels behind train).

2.3 Replacement Conditions

The replacement conditions are conventional for the first signal when a short route is set, and for the intermediate signal when a shunt route is set. Special conditions apply to the long routes from the first signal.

- (i) Train on approach side of first signal: Pulling either the first or the intermediate signal button on the Panel will replace both signals. Restroking the complete long route will allow both signals to clear again. Approach locking release by timer or map search may only take place if the first signal button was pulled; the route will remain set indefinitely if the intermediate button was pulled.
- (ii) Train passed first signal: Pulling the first signal button has no effect on the aspect of the intermediate signal, but may initiate route release if TORR has not already taken place. Pulling the intermediate signal button will replace this signal, but no approach locking release will take place, and the remaining portion of the route will remain locked until the train has passed through. The signal may only be re-cleared by restroking the route from the intermediate signal entrance button to the next exit button on the line of the route which is set. This last condition differs from Route Relay Interlocking practice, where only the intermediate signal entrance button needs to be pressed to allow the signal to re-clear (it is treated as an emergency replacement). This is not possible in SSI as a push button may not be used both as a single operation button and as the entrance button for a multi-button sequence.

2.4 Panel Indications for the Intermediate Signal

2.4.1 Entrance Button

The entrance button at the intermediate signal is to be illuminated when a route is set which requires the signal to operate in the preset mode. This button should remain illuminated until either:

- (i) The route requiring the intermediate signal to be preset has been cancelled as a result of pulling the entrance button for the first signal before a train has entered the route.

OR

- (ii) The route requiring the intermediate signal to be preset has been released after the train has passed the first signal, and this train has now also passed the intermediate signal.

This button light is also extinguished if this button is pulled. The light will be restored if the route from this button is re-stroked before (i) or (ii) occur.

2.4.2 Signal Indications

The red and white Panel indications for the intermediate signal should operate in the normal manner, i.e. the current aspect control should be indicated, and the red lamp should be flashed if approach locking is timing out. As pulling of the entrance button for this signal when it is operating in the preset mode will act as an emergency replacement and will not initiate route release, the red lamp must not be flashed in these circumstances.

3 Panel Request Data

The Interlocking panel request data (PRR file) embodies the route setting requirements outlined above, and also processes the pulling of the Panel buttons for the first and intermediate signals. For the example signalling layout the complete panel request data will be:

/ Short route from first signal

```
*QR53A(S)
  if R53A(S) a
    UFL-AB f
    R105A(PS) xs , R105B(PS) xs
  then R53A(S) s
    UFK-BA l , UFL-BA l
    S53 clear bpull
  \.
```

/ Long route from first signal into siding

```
*QR53B(S)
  if R53B(S) a , R105A(PS) a
    UFL-AB f
    R105A xs ( UFL-BA f or R105A(PS) s )
    P230 crf
  then R53B(S) s , R105A(PS) s
    P230 cr
    UFK-BA l , UFL-BA l , UFM-CA l , UNQ-BA l
    S53 clear bpull
    if L105(PS)OFF xs then S105 clear bpull \
  \ .
```

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/ Long route from first signal along main line

```
*QR53C(M)
  if R53C(M) a , R105B(PS) a
    UFL-AB f
    R105B xs ( UFL-BA f or R105B(PS) s )
    P230 cnf , P231 cnf
  then R53C(M) s , R105B(PS) s
    P230 cn , P231 cn
    UFK-BA l , UFL-BA l , UFM-CB l , UFN-BA l , OFO-CA l
    S53 clear bpull
    if L105(PS)OFF xs then S105 clear bpull \
  \ .
```

/ Shunt route from intermediate signal into siding

```
*QR105A
  if L105(PS)OFF s , R105A(PS) s
  then S105 clear bpull
  else if R105A a
    UFM-AC f
    R105A(PS) xs
    P230 crf
  then R105A s
    P230 cr
    UFM-CA l , UNQ-BA l
    S105 clear bpull
  \
  \ .
```

/ Shunt route from intermediate signal along main line

```
*QR105B
  if L105(PS)OFF s , R105B(PS) s
  then S105 clear bpull
  else if R105B a
    UFM-BC f
    R105B(PS) xs
    P230 cnf
  then R105B s
    P230 cn
    UFM-CB l , UFN-BA l
    S105 clear bpull
  \
  \ .
```

/ Pulled entry buttons

```
*QXS53   S53 set bpull .
```

```
*QXS105
  S105 set bpull
  if ( R105A(PS) s or R105B(PS) s )
  then S105 set foal
  \ .
```

Note the following points:

- (i) There are no panel requests corresponding to the special preset routes from the intermediate signal (105A(PS) & 105B(PS)). These routes are set in the panel request data for the corresponding long routes (53B(S) & 53C(M)) from the first signal.
- (ii) Setting a long route will clear the "button pulled" bit for the first signal, and for the intermediate signal if the special latch is not set. This latter item ensures that, if the intermediate signal button is pulled to replace that signal after a train has passed the first signal, then attempting to reclear the intermediate signal by wrongly setting the long route will be inhibited.
- (iii) The test for "[berth sub-route of short route free or corresponding preset route from intermediate signal set]", i.e. "(UFL-BA f or R105A(PS) s)" in the data for the long routes from the first signal provides the required locking against the short route from the same signal, while allowing the long route to be restroked if it was previously set.
- (iv) If the special latch L105(PS)OFF is set and a preset route is set from the intermediate signal, a panel request for the corresponding shunt route from the intermediate signal is interpreted as a request to cancel a previous emergency replacement of this signal, and so the "button pulled" bit is cleared and no other action is taken.
- (v) Pulling of a signal entrance button will only set the "button pulled" bit for that signal. If the circumstances are such that replacement of the other signal is also required, this takes place indirectly via the output telegram data (see below).
- (vi) If the entrance button at the intermediate signal is pulled when a preset route is set, the "free of approach locking" bit for this signal will be set. This prevents the flashing of the red Panel indication for the intermediate signal when operating in preset mode. Approach locking protection for the route is still provided by the first signal.
- (vii) In the data for the short route from the first signal, tests for no preset routes set from the intermediate signal ensure that a previous train on a long route has passed the intermediate signal, and the berth sub-route becoming free has allowed the preset route to release (see Section 5.2 note (i)). This also applies to any other routes ending at an intermediate signal.

4 FOP & MAP Data

4.1 Sub-route Release

The sub-route release is carried out in the usual sequence. The only case which requires special consideration is that of the sub-routes immediately following the intermediate signal, which require to test that both the normal