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Module

Chapter F: FOP & MAP Files

For endorsement, authorisation and issue record of this document, please refer to the SSI Applications Manual Contents, NR/L2/SIG/17002.

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Issue record

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6	August 2004	6 th Issue
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Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 03/03/2012.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 3 (Option Selection) to continue to comply with the issue of any relevant Network Rail standards current when GRIP Stage 3 was completed and not to comply with requirements contained herein, unless stipulated otherwise in the scope of this standard.

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1 Flag Operation Data (FOP File)

This file contains data which is used to update the Interlocking memory, but which is not associated with particular input or output telegrams, or panel requests. Each section of data is checked by the program once per major cycle. Most of the data is concerned with the release of sub-routes and sub-overlaps, but conditional statements can be included to carry out any other function. Any number of data blocks may be included, but each must be terminated with an end marker ".".

The file is now considered in four sections:

- Sub-route releases
- Sub-overlap releases
- Other data
- Route away

1.1 Sub-route releases

Sub-route releasing is explained below in two stages, with firstly the principle of sequential release, and secondly the addition of enhanced track circuit bobbing protection. The conditions for releasing sub-routes are very similar to the conditions for picking up route sticks in a Route Relay Interlocking.

For the first sub-route in a route, all the routes from the signal must be unset, and the track circuit over which the sub-route passes must be clear. Where routes from the signal diverge in this track circuit, then only those routes that lock the sub-route concerned need to be proved unset. Prior to the addition of enhanced track circuit bobbing protection the data is written in the form:

```
UEJ-BA f    if R11A xs , R11B xs , TEJ c \ .
```

The flag command then refers to the sub-route to be freed. If the sub-route is locked, the Interlocking will process the "if \" statement which follows, and will free the sub-route if the tests are true. The end marker "." indicates the end of data for the flag. Additional conditions can be inserted if required.

For subsequent sub-routes, the conditions are that the previous sub-route(s) are free, and the track circuit over which the current sub-route passes is clear. For example, continuing along route 11A, the blocks of data, prior to the addition of enhanced track circuit bobbing protection, will be:

```
UEK-CA f    if UEJ-BA f , TEK c \ .
UDE-BA f    if UEK-CA f , TDE c \ .
```

Signalling Principles Standard [GK/RT0011](#) (ref. 1) requires that enhanced protection be provided in sectional route release to protect against short term wrong-side track circuit failures (track circuit bobbing). As with a conventional Route Relay Interlocking, the sequential release of route locking behind a train as it proceeds through the route is dependent on the correct sequential occupation and clearing of the track circuits. If a track circuit clears before the following track circuit becomes occupied, its sub-route will be freed, and all the remaining sub-routes will be freed sequentially, wrongly releasing the route locking in front of the train.

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SSI already inherently provides protection against track circuit "bobs" of up to 2 seconds, but this is not considered to provide enough protection. The enhanced protection was previously applied where Automatic Route Setting of any type was employed, or where routes called reverse points with automatic restoration, but it is now required for all schemes.

This enhanced track circuit bobbing protection is provided in sub-route release data by replacing the test for "the track circuit for the sub-route clear" with the following conditions. (The tests for route(s) unset or previous sub-route(s) free are retained.)

(a) If there is a track circuit in advance:

the track circuit for the sub-route is clear AND
 (the track circuit in advance is occupied
 or the track circuit for the sub-route is clear for at least fifteen
 seconds)

The test for own track circuit clear AND next track circuit occupied allows the sub-route to release immediately when the train is proved on to it, and the alternative test for own track circuit clear for 15 seconds allows the sub-route to be freed when the route is cancelled before the train passes the signal, whilst still providing protection against track circuit bobs of up to 15 seconds. The use of certain types of rolling stock in class range 140 - 165 under certain conditions may require this time to be increased to 30 seconds. At present this is defined in Joint Departmental Procedure C006.

For the last sub-route in a route (i.e., that for the berth track circuit of the exit signal), if the next track circuit can be legitimately occupied by another train (typically on a converging or crossing move), the test in (a) of that track circuit occupied should be combined with a check that a corresponding sub-route on the next route is locked. This requirement is additional to that specified in [GK/RT0011](#).

The next track circuit tested occupied must use the same track circuit memory (or a copy of it where cross-boundary) that is tested clear in the releasing of the next sub-route(s). Thus where this track circuit is sectioned then the combined track circuit memory must be used.

(b) If there is no track circuit in advance:

the track circuit for the sub-route is clear for at least fifteen seconds

For consistency this always applies even if the sub-route does not provide a locking function.

Where there are facing signals at the same block joint and sub route freeing allows for train reversing, as above, then it should be noted that the bobbing protection can be fooled by the reverse sub route locked and track occupied as a train reverses thereby incorrectly allowing the route locking to release in front of the train. Sub route freeing should therefore not allow for train reversing in this situation.