

INITIAL QUESTIONS WHEN PLANNING TRAINS

There are many questions we will need to ask when we start planning a train service such as:

- Is the line open?
- Are all the signal boxes and stations open?
- 3. Is the track fit to run this sort of train and run to the speed sought by the Train Operator?
- Is there any engineering work or other disruption planned which will affect us?
- What other constraints? What can we do? What can we NOT do?? etc.

Before starting work on the timetable you need to know the 'rules of the game' and we do this by the provision of two documents called Rules of the Route (ROTR) and Rules of the Plan (ROTP).

RULES OF THE ROUTE

'Rules of the Route' comprise rules regulating:

- Location, number, times and duration of major engineering work planned on each route for the timetable in question.
- Any pre-planned temporary speed and/or other restrictions on the trains.
- Any alternative routes or stopping patterns which will be necessary.

RULES OF THE PLAN

'Rules of the Plan' comprise rules regulating standard timings and other related matters necessary for trains to be planned and scheduled.

Some examples are:

- Timing margins, junction allowances
- Minimum timing margins or headways
- Minimum and maximum station dwell times
- Vehicle restrictions e.g. speed, routing, weight, length
- Freight train loads
- Route opening hours

POINT TO POINT TIMINGS

Traditionally Point to Point timings were traditionally produced via a computer using a system calling 'TRATIM' and many of the timings in use today are from this process. New timings are produced by:

- The actual timing of trains
- Use of OTMR systems
- Use of computer system actual values
- Use of computer simulation tools (Railsys and TPS)
- By any other agreed methodology

The amount of time a train takes between timing points is calculated taking into account:

- Distance (between timing points)
- Geography including gradients
- Power of train locomotive/units
- Maximum speed
- Load of train
- Train classification
- Permanent Speed Restrictions

The selection of timing locations is usually stations, junctions, crossing or other strategic places used for train performance reporting etc.

Timings are calculated into 4 sets of data:

- Stopping to Starting
- Stopping to Passing
- Passing to Stopping
- Passing to Passing

EXERCISE

The distances between stations between Oxted and East Grinstead are as follows:

- Oxted to Hurst Green – 1 mile
- Hurst Green to Lingfield – 5 miles
- Lingfield to Dormans – 1½ miles
- Dormans to East Grinstead – 2¼ miles

There are 3 inter-related formula you need to know:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

Assume that it takes 1 minute to bring a train to rest from 75 mph or for a train to accelerate from rest to reach 75 mph.

Calculate all the SRTs for the route based on a 375 Electrostar limited to 75 mph. (For this simple exercise you can ignore any Speed restrictions and gradients.)

To get you started: Hurst Green to Lingfield a distance of 5 miles at 75 mph gives you a time of 0.6667. Multiply by 60 (mins in an hour) to give you a Pass to Pass time of 4 mins. A Pass to Stop time and a stop to pass time would be 5 mins. A start to stop time would be (4+1+1) 6 mins

TIMING ALLOWANCES

It is from Rules of the Route and Rules of the Plan that we can add to our point to point timings the additional allowances we need to include in the train times.

[3] - Engineering Allowance

Additional time added to a train in order to provide an allowance for reduced speed over sections of route as a result of engineering work. It is sometimes referred to as either Recovery Time or sometimes as 'Box Time' because the traditional method of representation in a Working Timetable is a number in a box or between a pair of square brackets.

< 3 > - Performance Allowance

Additional time added to a train to provide a margin for late running on a day-to-day basis such that an on time arrival can be achieved. Performance Allowance is also referred to as 'Diamond Time' because of the traditional method of representation in a Working Timetable when the number is enclosed between a diamond-shaped pair of brackets.

{ 3 } - Adjustment Allowance

Where it is necessary to slow a train over a section of route for the purposes of routing, typically leaving the mainline and travelling onto a minor (or branch) line. We do this by the additional of "Curley Bracket Time" or more correctly an adjustment allowance. This allowance may also be set negatively (ie to reduce timings). It is NOT shown in any live systems or in the (printed) timetables.

ALL THE ABOVE ARE CONTAINED IN RULES OF THE PLAN

(3) - Pathing Allowance

Additional time added to a train in order that the path does not conflict with other trains at for instance a junction location or because trains of different speeds are operating over a route. Pathing allowance is often called 'Circle Time' because of the traditional method of representation in a Working Timetable when the number is shown within a circle.

These are a function of the timetable itself, the more trains there are on the network the more likelihood of trains catching each other; all of which is prevented by the use of circle time as an

indication to the driver how much speed/time he has to lose over the next section of track. There are links to the topics in the following section.

HEADWAYS AND MARGINS

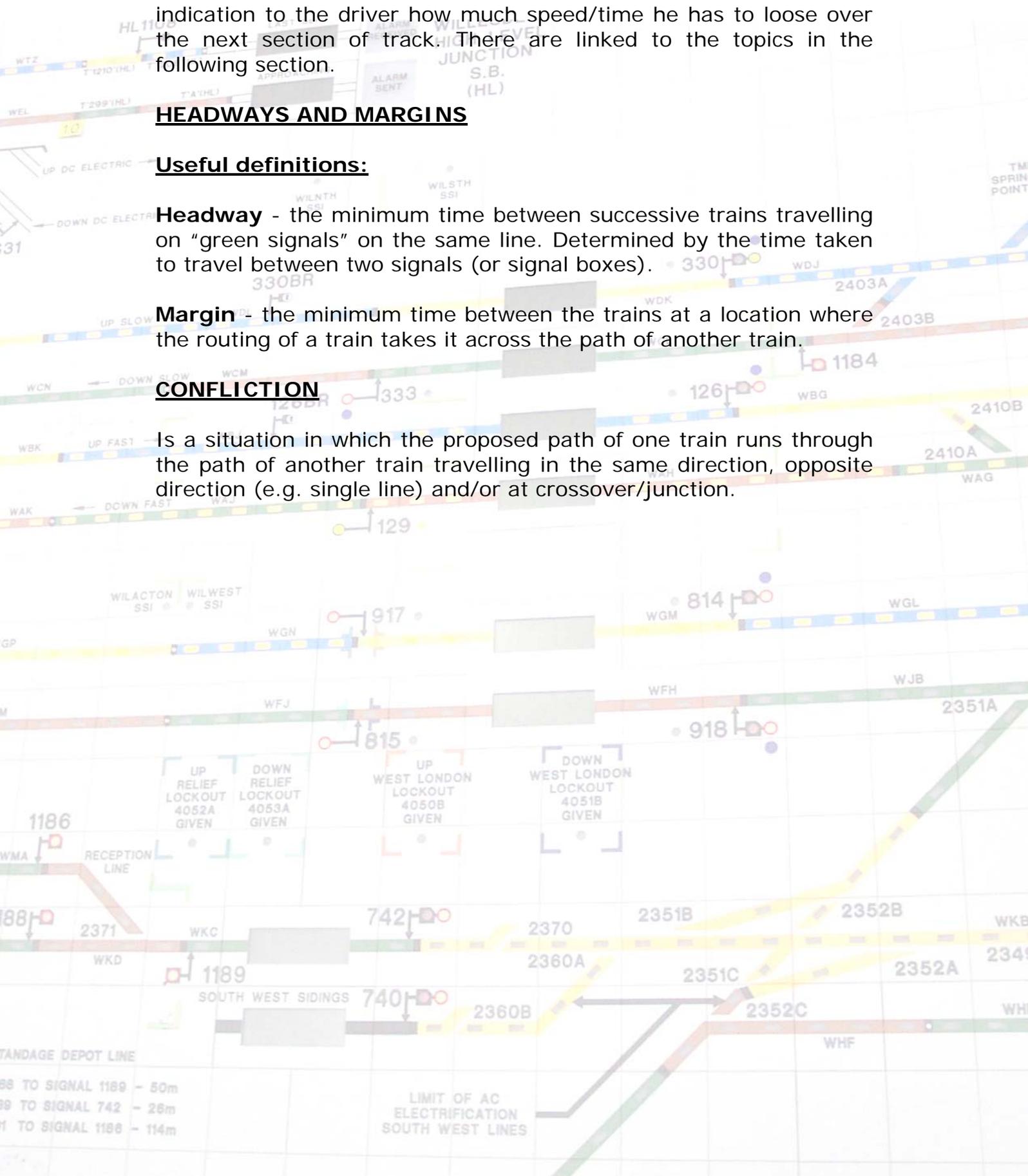
Useful definitions:

Headway - the minimum time between successive trains travelling on "green signals" on the same line. Determined by the time taken to travel between two signals (or signal boxes).

Margin - the minimum time between the trains at a location where the routing of a train takes it across the path of another train.

CONFLICTION

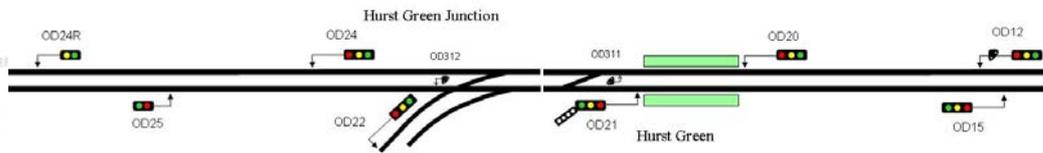
Is a situation in which the proposed path of one train runs through the path of another train travelling in the same direction, opposite direction (e.g. single line) and/or at crossover/junction.



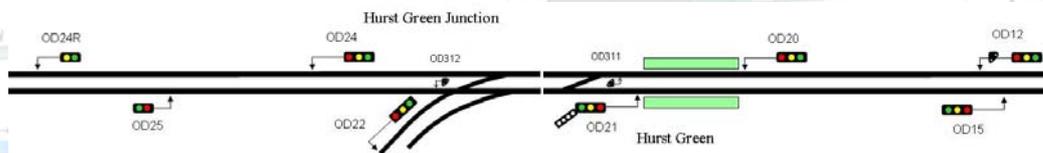
EXERCISE

Using a High-lighter pen, show the 4 Junction Margins that would need to be considered at Hurst Green:

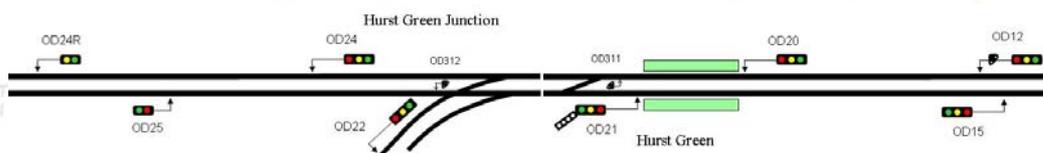
1. OD24 Signal to OD20



2. OD22 Signal to OD20



3. OD21 Signal to OD25



4. OD21 Signal towards Uckfield



THE TIMETABLE PLAN

Network Rail provides a core service to Train Operators by scheduling their trains and advertising these trains in the NRT file. This responsibility for the oversight of the national timetable was given to Railtrack as part of the Railways Act 1993, which set up the privatisation of the rail industry.

Operational Planning teams prepare timetable train data but only Network Rail staff can input data to the rail industry's national timetable database: TSDB (Train Service Database). Many people and computer systems have access to the data for 'read only' or for 'extraction only' but remember only Operational Planners can input/change that data. The purpose of TSDB is to provide data to the customer/user who needs it.

Working Timetables are produced from TrainPlan. They include all permanent timetabled trains including passenger, freight, empty stock, etc. They include detailed operational information as against the purely commercial information of the national passenger timetable. Working Timetables are the basis for operating the railway. Other timetables e.g. Special Traffic Notices, Weekly Amended Train Notices, Passenger Advices etc, contain similar operational data.

The NRT file is produced by Network Rail from data input to TSDB and is available on line. A printed edition was traditionally produced but the final issue published by Network Rail was in May 2007. Since then, The Stationery Office (TSO) have published it as have The Middleton Press. The files that form the timetable are published (in PDF) on the Network Rail website and are free to download.

Local passenger timetables are produced by Train Operators. They vary in size, shape and presentation e.g. Pocket Timetables, Derivatives, Posters, Cards etc., BUT remember the data comes as a result of the Train Planning Process, via the NRT edit function in TSDB.

The LATIN (Local Access to Train Information) system enables staff on the ground at stations to access the data to produce local publications. Particularly popular are Signalling Centre and Station Simplifiers or Working Books which give either printed output from the computer or downloaded files to a purpose designed micro package. These outputs enable users to edit the data to fit their local needs and provide staff with local information in a user friendly way.

Some of the more important systems are able to extract their data every night, seven days a week, 52 weeks per year. To do this TSDB looks at every new item of data input by the Operational Planners, amended trains, new trains perhaps running for one day only like some freight or engineering trains.

Three major systems used for the running of the operational railway are:

- **TOPS (Total Operational Processing System)**
Providing timetable data (whether permanent, or short term for Operators using it round the clock to provide the most robust plan for the current performance of the railway
- **TRUST (Train Running System on TOPS)**
provides information about the current movement of a train on its journey. Measurement is taken from track circuits (part of the signalling system) against the point to point times generated in the schedule, to determine that trains' performance.
- **IECC (Integrated Electronic Control Centre)**
These 'Super Signal Boxes' take data on a daily basis as the signalling plan. An IECC is in effect a replacement for a large number of signal boxes and provide computer based signalling operation frequently covering hundreds of mile of track.

We need to mention three other very important examples of electronic timetables because these demonstrate how YOUR data gets into the public domain. This emphasises that YOU are part of the railway industry team.

Retail Systems give Train Operators retail staff and National Rail Enquiry Scheme staff the ability to provide journey information including the ability to produce tickets with train journey times and reservations printed on them.

Railplanner is a Windows-based timetable enquiry system produced by a private company and widely used by business houses, and individual customers. You can find it on local networks.

Internet Timetable – the National Rail website provides a timetable enquiry facility, the data being supplied by Network Rail, updated regularly and attracts millions of enquiries per year.

GOLDEN RULE

G.I.G.O - Garbage In - Garbage Out.