Railway file (.rly) specification

These are text files readable by any text editor or word processor, but beware of editing them directly because all strings (e.g names - for current purposes a string is anything that isn't a number) end with a NULL character (zero in ASCII), and text editors ignore NULLs. The files can be edited directly using Notepad++ (https://notepad-plus-plus.org/), which is a free editor that displays and can copy all special characters - see 'Changing-a-timetable-in-a-session-file-whilst-retaining-routes.pdf' (downloadable from the website) for details.

In this specification file contents are indicated in red.

Broad structure:

a) General information
b) Active track elements (elements that have tracks)
c) Inactive track elements (other elements - parapets, concourses, platforms, level crossings and non-station named locations)
d) Text
e) Preferred directions
f) User graphics

Detailed structure:

a) General information:
Version number of the railway.exe program that saved the file
Home horizontal offset *(positive or negative)*
Home vertical offset *(positive or negative)*

The whole railway is divided up into 16 x 16 pixel squares, each capable of holding a single track element, where each square is identified by its horizontal location (HLoc) and vertical location (VLoc). Position 0-0 (horizontal and vertical locations both zero) corresponds to the top left hand corner square of the screen when the railway first started to be built, and never changes for that railway thereafter. Although the railway can be any size (limited only by computer memory and operating system limitations), the displayed area is often smaller than full size. In order to retain the same 'Home' screen when a railway is saved the top left hand corner square of the home screen is saved as a horizontal offset and a vertical offset.

b) Active track elements:
Number of active elements
Identifier *two forms*:
    Active elements *(if no user graphics present)*
    Active elements1 *(if there are user graphics)*

Individual element information
Element number 0 *for first*, (Number of active elements - 1) *for last*
SpeedTag *see SpeedTag notes below*
HLoc *see above note under General information*
VLoc *as above*
if a gapjump:
    ConnLinkPos[0] *see Link notes below*
    Conn[0] *see Link notes below*
if a signal, points or level crossing:
    Attribute *special variable used only for points, signals & level crossings, ignored otherwise; points 0=set to go straight, 1=set to diverge, or, for 'Y' shaped points where both legs diverge 0=set to left fork, 1=set to right fork; signals 0=red; 1=yellow; 2=double yellow; 3 = green; level crossings 0 = raised barriers = closed to trains, 1 = lowered barriers = open to trains; 2 = changing state = closed to trains*

if a signal:
CallingOnSet *0 if a call on is not available, or 1 if it is*
if any other type of element: nothing

In a .rly file the signal and point Attribute and CallingOnSet values aren't needed, but they are included because the functions that create a .rly file are also used for building a session file, where they are needed.

Length01 *a track element can have two tracks (crossovers, bridges and points), or one (all other active elements). 01*
Length23 *corresponds to the first or single track, and 23 to the other*
SpeedLimit01 *as above*
SpeedLimit23 *as above*
LocationName *name not used for timetabling, only for identification purposes: platforms, non-station named locations, concourses and footcrossings have LocationNames*
ActiveTrackElementName *name used either in the timetable or for a continuation (continuation names are not used in timetables as trains can't stop there). Only active track elements where there are platforms or non-station named locations have ActiveTrackElementNames*
End of element marker
if 4 aspect signal 4*****
if 3 aspect signal 3*****
if 2 aspect signal 2*****
if ground signal G*****
if not a signal ******

c) Inactive track elements:
Number of inactive elements
Identifier
Inactive elements

Individual element information
Element number 0 *for first*, (Number of inactive elements - 1) *for last*
SpeedTag *see SpeedTag notes below*
HLoc *see above note under General information*
VLoc as above
LocationName *see description in Active track elements*
End of element marker
******

d) Text: *(no identifiers or end of item markers - individual items can be distinguished by text and font name)*
Number of text items *(includes location names)*
HPos *this and VPos correspond to the pixel position of the top left hand corner of the first text character*
VPos
Text string
Font name
Font size)
Font colour) integers
Font charset)
Font style)

e) Preferred directions:
A single preferred direction is an enhanced type of track element with additional information relating to the preferred direction. Each preferred direction element has only a single direction and a single track, so a bridge with both tracks having bidirectional preferred directions will be represented by four separate preferred direction elements.

Number of preferred direction elements

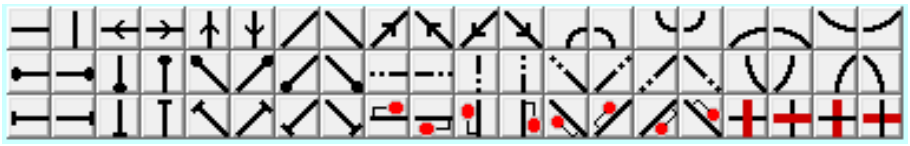
Individual element information
Element number 0 *for first*, (Number of preferred direction elements - 1) *for last*
TrackVectorPosition *the element number in the sequence of all active track elements that the preferred direction relates to*
ELink *the entry link number- see Link notes*
ELinkPos *the entry link array position (in Link[0-3])*
XLink *the exit link number*
XLinkPos *the exit link array position (in Link[0-3])*
EXNumber *a number identifying the required graphic for display purposes*
CheckCount *an internal check value used when building preferred directions*
IsARoute *preferred directions are also used for routes, so this indicates whether it is a route (value 1) or not (value 0)*
AutoSignals *a marker for routes to indicate whether or not it's an automatic signal route element*
ConsecSignals *as above for a preferred direction signal route element*
if the element is a route element and neither of the above is set then it's an unrestricted route element
End of element marker
If not last element ******
If last element **********

f) User graphics:
Number of user graphics

Individual graphic information
Graphic file name *must be of type .bmp, .jpg, .png or .gif*
HPos *this and VPos correspond to the pixel position of the top left hand corner of the graphic*
VPos

SpeedTag notes:

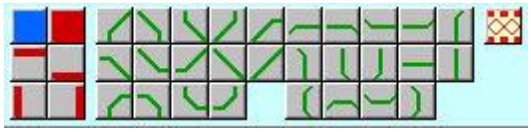
Windows includes a type of button called a SpeedButton, which is used for selecting particular elements when building a railway. This button has an attribute called a Tag, used to identify a particular SpeedButton in an application. In railway.exe this is called SpeedTag and is an integer. The diagram below shows all the track elements with their corresponding SpeedTag numbers.



1	2	125	126	127	128	18	19	140	142	141	143	3	4	5	6	20	21	22	23
88	89	90	91	92	93	94	95	80	81	82	83	84	85	86	87	26	27	24	25
60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	129	130	145	146

(top row speedtag numbers)
(second row speedtags)
(bottom row speedtags)

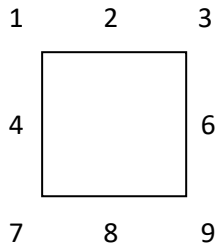
7	8	9	10	11	12	13	14	133	135	139	15	16	48	49	51	50
28	29	30	31	32	33	34	35	137	136	138	44	45	52	53	55	54
36	37	38	39	40	41	42	43	132	134		47	46	57	56	58	59



131	96	97	98	99	100	101	111	112	113	114	115	144
76	77	102	103	104	105	106	116	117	118	119	120	
78	79	107	108	109	110		121	122	123	124		

Link notes:

Each track element has a 4-integer array of links, corresponding to the positions where the track links to other elements. These are numbered as follows:-



Some elements have no links (platforms, concourses, parapets etc) but others have a maximum of four links (crossovers, bridges and points (although points only have 3 they are treated as having 4 where the leading link is listed for both tracks - it makes other program functions simpler). The simpler elements have just 2 links. For example a diagonal crossover would have numbers 1, 9, 3, and 7 in positions Link[0], Link[1], Link[2] and Link[3]. Number 5 is omitted for better symmetry - all opposites add to 10, all diagonals are odd, all horizontals and verticals are even. Points with straight track 4 to 6 and diverging track 4 to 9 would have numbers 4, 6, 4, and 9 in the four array positions as above. Unused links take the value -1 to indicate that they are not set.

The order of the links is vitally important as the position of a link is often used to find specific information. For example all continuations, buffers and gaps use Link[0] for the continuation/buffer/gap end and Link[1] for the other end; all points use Link[0] & Link[2] for the leading end, Link[1] for the straight or left-hand trailing link and Link[3] for the diverging or right-hand trailing link; and all bridges use Link[0] & Link[1] for the top track and Link[2] and Link[3] for the bottom track and similarly for others. Link information is not provided in .rly files because it can be found from the SpeedTag number.

Each element needs to know which other elements it connects to so that preferred directions and routes can be set and train movements properly controlled. To allow this each element contains two more 4-integer arrays Conn[0-3] and ConnLinkPos[0-3]. Conn[0-3] indicates the connecting element (i.e. its number in the sequence of all active track elements) in the same order as the order of Link[0-3]. ConnLinkPos[0-3] indicates the connecting element link array position again in the same order as the order of Link[0-3]. All values for Conn[0-3] and ConnLinkPos[0-3] are set when the user clicks the  'Link all track together' button, and if any can't be set then an error message is given and the offending element highlighted.

Sample start of LU Metropolitan Line (JKWok).rly: (copied from Notepad++)

NUL = NULL character
CR LF = carriage return & line feed = new line

·v2.5.0NULCRLF	Saved by program version v2.5.0
-46CRLF	Home horizontal offset -46
-12CRLF	Home vertical offset -12
2034CRLF	2034 active track elements
Active·elements1NULCRLF	Identifier with '1' at end indicating that there are user graphics
0CRLF	first element (no. 0)
20CRLF	SpeedTag = 20 = 
-46CRLF	HLoc
0CRLF	VLoc
100CRLF	Length01 (100m)
-1CRLF	Length23 not set (= -1) since it's a simple single track element
48CRLF	SpeedLimit01 (48km/h)
-1CRLF	SpeedLimit23 not set
NULCRLF	No LocationName
NULCRLF	No ActiveTrackElementName
******NULCRLF	End of element marker - not a signal so ******
1CRLF	2nd element (no. 1)
69CRLF	SpeedTag = 69 and it's a ground signal - see below - so it displays as 
-45CRLF	HLoc
0CRLF	VLoc
0CRLF	It's a signal so this is its Attribute = 0 = red (all signals red for a .rly file)
0CRLF	Again a signal so CallingOnSet = 0 = not available (all same for .rly file)
100CRLF	Length01 = 100m
-1CRLF	Length23 not set
48CRLF	SpeedLimit01 = 48km/h
-1CRLF	SpeedLimit23 = not set
NULCRLF	No Location Name
NULCRLF	No ActiveTrackElementName
G*****NULCRLF	End of element marker - it is a ground signal so prefixed by 'G'

The above includes lines 1 to 29 of the file. It continues until line 57,864 - which is quite big.
The biggest so far is Xeon's Shanghai Metro with 1,266,667 lines - beat that!!

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