

Class 321

Electric Multiple Unit



Contents

How to install	2
Technical information	3
Liveries	4
Class 320	4
Class 321	5
Class 322	11
Cab guide	12
Keyboard controls	14
Features	15
Driver only/guard operation	16
Driver only operation (DOO)	16
Guard operation	16
How to change operation	16
In-game driving options menu	17
Electronic destination display	17
AWS/DSD visual aids	18
Setting up the driver's cab	20
Driving guide	21
How to use in the scenario editor	22
How to place	22
Numbering	22
Scenarios	24
Credits	25

How to install

- 1) Locate where you have downloaded this pack and unzip it. Information on how to do this can be found [here](#).
- 2) Go to the location where you have extracted the files from the .zip file.
- 3) Now find the .exe called 'Class 321 EMU Pack'. Double-click this file.
- 4) Follow the steps and by the end of the process, the main part of this pack will have installed.
- 5) To apply the liveries, you will need to install the 'livery pack' which can be found on the [Class 321 Electric Multiple Unit Pack](#) product page.
- 6) If you intend to use any of the included scenarios, make sure you have the freely available extra stock pack and relevant payware add-on packs listed on the product page installed so the scenarios function as intended.

Technical information

Manufacturer	BREL (British Rail Engineering Limited) York
Years built	1988 - 1991
Number built	Class 320 - 22 (320301 - 320322) Class 321 - 117 (321301 - 321366, 321401 - 321448 & 321901 - 321903) Class 322 - 5 (322481 - 322485)
Traction motors	x4 Brush TM2141C / 359hp (268kw) each
Maximum speed	Class 320 - 90mph (145km/h) Class 321 & 322 - 100mph (161km/h)
Coupling type	Tightlock
Length	19.95m per car
Height	3.78m
Width	2.82m
Weight	Class 320 - 114.5 tonnes per 3 car unit Class 321 & 322 - 137.9 tonnes per 4 car unit

Liveries

Class 320

First ScotRail (SPT) - *First SPT*



ScotRail Saltire - *SR Saltire*



Class 321

First Capital Connect - FCC



First Great Eastern - FGE



Greater Anglia - GA



Greater Anglia (Blue Doors) - GA NXEA W



Greater Anglia (Ex-NXEA) - GA NXEA



London Midland - LM



Network SouthEast - NSE



NX East Anglia - NXEA



NX East Anglia (Ex-FGE) - NXEA FGE



NX East Anglia (White) - NXEA W



ONE



Silverlink - SL



Silverlink (Unbranded) - SLU

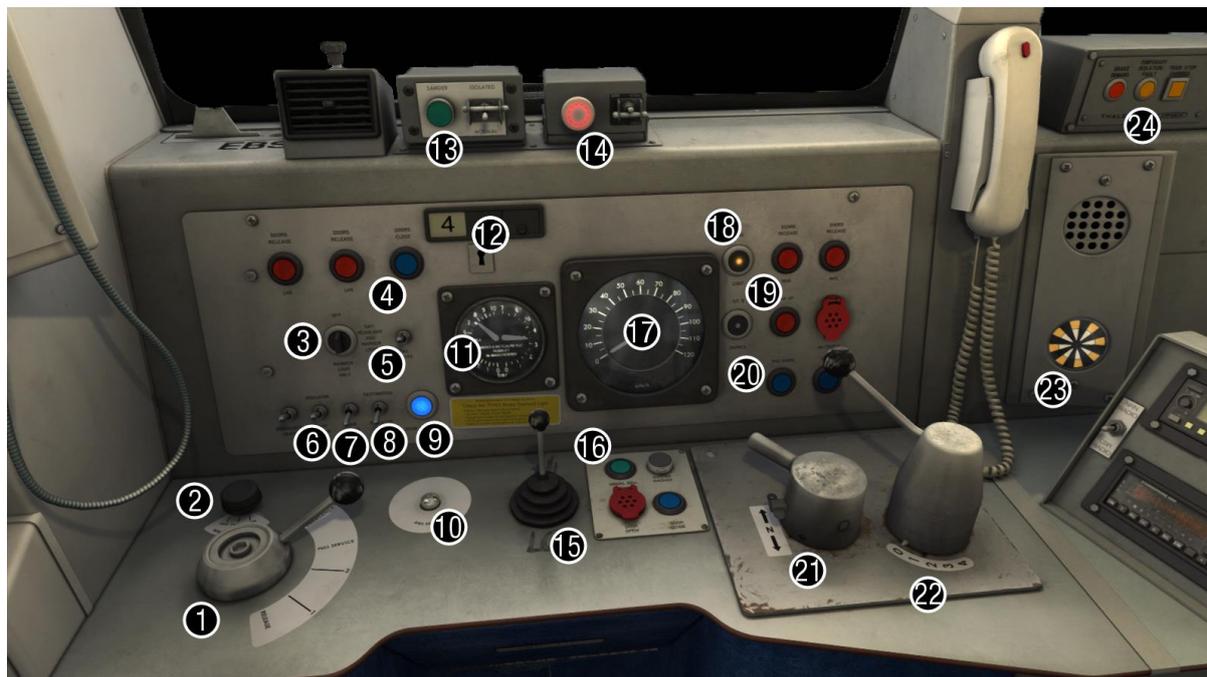


Class 322

First ScotRail - FSR



Cab guide



Desk

- 1 - Brake handle
- 2 - Windscreen wiper switch (fast/park/slow)
- 3 - Headlight switch (off/day/marker/night)
- 4 - Door close button
- 5 - Tail light switch (off/on)
- 6 - Line light dimmer switch (dim/bright)
- 7 - Cab lights switch (off/on)
- 8 - Destination indicator switch (off/on)
- 9 - Door interlock light
- 10 - AWS reset button
- 11 - Brake gauge
- 12 - Sliding car reminder (4/8/12)
- 13 - Sander
- 14 - DRA (Driver Reminder Appliance)
- 15 - Horn (high/low)
- 16 - Driver to guard bell button



- 17 - Speedometer
- 18 - Line light
- 19 - Pantograph up button
- 20 - Pantograph down button
- 21 - Reverser (off/forward/neutral/reverse)
- 22 - Power controller (0/1/2/3/4)
- 23 - AWS sunflower
- 24 - TPWS (Train Protection Warning System) unit

Back wall

- 25 - Air conditioning switch (off/on/off/vent only)
- 26 - Heater switch driver side (off/vent only/half/full)
- 27 - Heater switch non-driver side (off/on/off/on)
- 28 - Saloon lighting on button
- 29 - Saloon lighting off button

Back wall door control panel

- 30 - Door interlock light
- 31 - Door close button
- 32 - Driver to guard bell button

Keyboard controls

Non-standard keyboard controls are listed below:

L -	Cab light ON/OFF
E -	Deadman's pedal (DSD vigilance reset)
U -	Destination indicator ON/OFF
R -	Door close button
F -	DRA (Driver Reminder Appliance) ON/OFF
C -	Driver to guard bell
Ctrl+shift+E -	DSD vigilance ON/OFF
Space -	Horn (low tone)
B -	Horn (high tone)
P -	Pantograph UP
Shift+P -	Pantograph DOWN
Ctrl+Shift+R -	Passenger door operation toggle DOO/GOO
O -	Passenger saloon lighting ON
Shift+O -	Passenger saloon lighting OFF
K -	Tail lights ON/OFF
Ctrl+Numpad Enter -	Visual aids ON/OFF
V -	Wiper (driver) RIGHT
Shift+V -	Wiper (driver) LEFT
Ctrl+V -	Wiper (guard) RIGHT
Ctrl+Shift+V -	Wiper (guard) LEFT

Features

- High definition textures
- Detailed internal & external audio
- Accurate, driver-approved acceleration & braking physics
- [Driver only/guard operation option](#)
- [Electronic destination display](#) (old triangle-based & new dot matrix variants)
- Prototypical 3 step brake and [power controller](#)
- Accurate reverser function
- Traction interlock - power can't be applied with doors open
- Fully functioning AWS with accurate delay between passing over the magnet and hearing the warning sound
- AWS & TPWS self-test
- DRA (Driver Reminder Appliance)
- DVD (Driver Vigilance Device) (optional)
- [AWS/DSD visual aids](#) (optional)
- [In-game driving options menu](#)
- Guard/driver signal button
- Independent driver and guard wipers
- Opening cab windows
- Cab instrument lighting
- Cab light
- User-operable passenger saloon lights
- Sparking pantograph - sparks more often on winter mornings
- Prototypical day and night headlights with AI functionality
- TSX headlight and rain effects

Driver only/guard operation

In reality, class 321s often operate routes where there is no guard on board the train and as a result, the driver has to close the doors themselves. Please see below on what the relevant procedure is and how to change the type of operation whilst in-game:

Driver only operation (DOO)

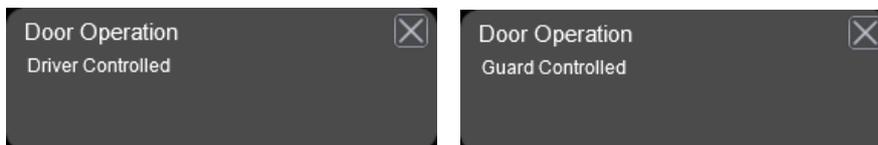
- 1) Open doors by pressing 'T' on the keyboard.
- 2) Wait for passengers to finish boarding/alighting and when ready, press 'R' on the keyboard, or the 'Door Close' button on the cab desk, to close the doors. Please note that you can not close the doors when passengers are still boarding/alighting.
- 3) Once the door interlock light illuminates, you may depart.

Guard operation

- 1) Open doors by pressing 'T' on the keyboard
- 2) Doors will be closed by the guard once passengers have finished boarding/alighting.
- 3) Once the door interlock light illuminates, the guard will give you two bells which you must then acknowledge by also giving two bells. This can be carried out by either pressing 'C' on the keyboard or the green 'Signal Bell' button on either the cab desk or the back wall door control panel.

How to change operation

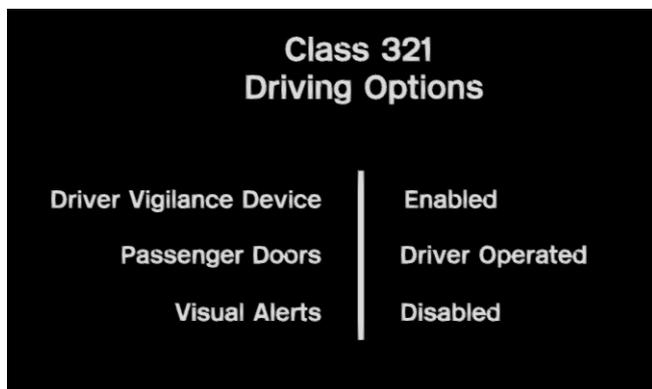
This can be changed in-game by either pressing 'Ctrl+Shift+R' on the keyboard which will produce a visual message in the top-right hand corner of your screen letting you know which option you have selected:



Alternatively, you can use the [in-game driving options menu](#) which is described in further detail below.

In-game driving options menu

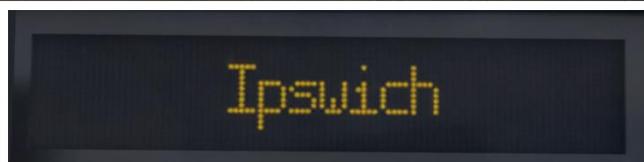
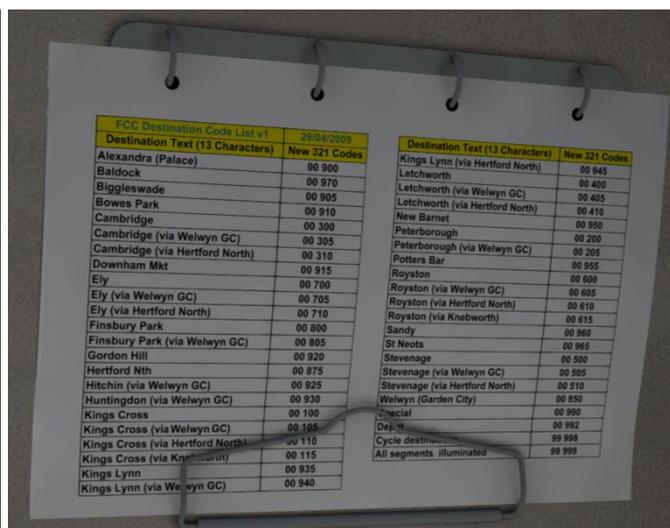
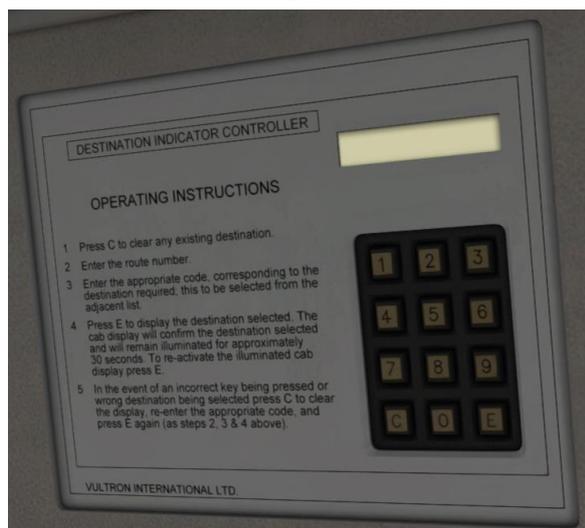
To save remembering various key commands and to easily check what your settings are currently set to, an in-game driving options menu is supplied. This can be accessed by pressing the left arrow key on the keyboard twice, assuming you are in the default cab position:



Each option can then be easily changed by clicking the relevant attribute.

Electronic destination display

A fully functioning electronic destination display is provided with both the old triangle-based and new dot matrix variants represented. Information on how to operate the display can be found on the internal computer with relevant destination codes provided on a sheet to the right. Please note that as per reality, the destination will only be shown in the cab you set it up in. You will need to go to the rear cab if you wish it to display there too:



Destination codes - old triangle-based

This destination display is used on all liveries except for GA, NXEA, ONE & ScotRail. Please note that only FCC destinations will function on the FCC livery:

Generic Destination Code List v1	13/09/1990	Destination Text (13 Characters)	321 Codes	Destination Text (13 Characters)	321 Codes	Destination Text (13 Characters)	321 Codes
Destination Text (13 Characters)	321 Codes	Ely (Via Hertford North)	00710	Letchworth (Via Welwyn GC)	00405	Southend Victoria	00817
Alexandra Palace	00900	Finsbury Park	00800	Letchworth (Via Hertford North)	00410	Southminster	00819
Baldock	00970	Finsbury Park (Via Welwyn GC)	00805	London Euston	00175	St. Albans Abbey	00256
Biggleswade	00905	Gidea Park	00815	London Euston (NE)	00176	St. Neots	00965
Birmingham International	00017	Gordon Hill	00920	London Liverpool St.	00811	Stansted Airport Express	00836
Birmingham New Street	00018	Harwich International	00831	Manningtree	00830	Stevenage	00500
Birmingham New Street (NE)	00019	Harwich Town	00832	Milton Keynes	00191	Stevenage (Via Welwyn GC)	00505
Bletchley	00023	Hemel Hempstead	00126	New Barnet	00950	Stevenage (Via Hertford North)	00510
Bletchley (NE)	00024	Hertford North	00875	Northampton	00199	Stowmarket	00834
Bowes Park	00910	Hitchin (Via Welwyn GC)	00925	Northampton (NE)	00201	Stratford	00812
Braintree	00823	Huntingdon (Via Welwyn GC)	00930	Norwich	00835	Thorpe-le-Soken	00828
Cambridge	00300	Ingatestone	00820	Peterborough	00200	Tring	00277
Cambridge (Via Welwyn GC)	00305	Ipswich	00833	Peterborough (Via Welwyn GC)	00205	Upminster	00814
Cambridge (Via Hertford North)	00310	Kelvedon	00824	Potters Bar	00955	Walton-on-Naze	00829
Chelmsford	00821	Kings Cross	00100	Romford	00813	Watford Junction	00294
Clacton	00827	Kings Cross (Via Welwyn GC)	00105	Royston	00600	Welwyn GC	00850
Colchester	00825	Kings Cross (Via Hertford North)	00110	Royston (Via Welwyn GC)	00605	Wickford	00818
Colchester Town	00826	Kings Cross (Via Knebworth)	00115	Royston (Via Hertford North)	00610	Witham	00822
Coventry	00052	Kings Lynn	00935	Royston (Via Knebworth)	00615	Wembley Central	00295
Downham Market	00915	Kings Lynn (Via Welwyn GC)	00940	Rugby	00234	Special	00990
Ely	00700	Kings Lynn (Via Hertford North)	00945	Sandy	00960	Empty to Depot	00992
Ely (Via Welwyn GC)	00705	Letchworth	00400	Shenfield	00816	Not in Service	00993

Destination codes - new dot matrix (Anglia)

This destination display is used on all GA, NXEA & ONE liveries:

Anglia Destination Code List v1	29/09/2005	Destination Text (13 Characters)	321 Codes
Destination Text (13 Characters)	321 Codes	Kelvedon	5518
Alesford	5524	London Liverpool St.	5500
Billericay	5543	Manningtree	5532
Braintree	5517	Marks Tey	5519
Braintree Freeport	5516	Mistley	5533
Brentwood	5507	Norwich	5541
Chelmsford	5510	Not In Service	5550
Clacton-on-Sea	5531	Rayleigh	5545
Colchester	5520	Romford	5504
Colchester Town	5521	Seven Kings	5503
Cressing	5515	Shenfield	5508
Diss	5540	Southend Victoria	5547
Empty for Depot	5551	Southminster	5549
Frinton-on-Sea	5529	Special Train	5552
Gidea Park	5505	Stowmarket	5539
Great Bentley	5525	Stratford	5501
Harold Wood	5506	Thorpe-le-Soken	5527
Harwich International	5535	Upminster	5542
Harwich Town	5537	Walton-on-Naze	5530
Hatfield Peverel	5512	White Notley	5514
Hythe	5522	Wickford	5544
Ilford	5502	Witham	5513
Ingatestone	5509		
Ipswich	5538		

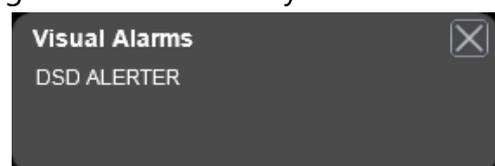
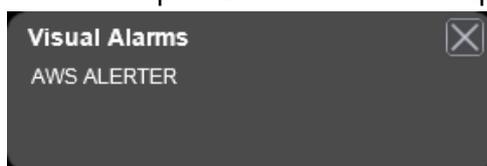
Destination codes - new dot matrix (ScotRail)

This destination display is used on all ScotRail liveries:

SR Destination Code List v1	29/04/2004
Destination	321 Codes
Larkhall	0001
Dalmuir	0002
Motherwell	0003
Milngavie	0004
Lanark	0005
Coatbridge Central	0006
Carstairs	0007
Partick	0008
Balloch	0009
Helensburgh Central	0010
Drumgelloch	0011
Airdrie	0012
Springburn	0013
Bellgrove	0014
Glasgow Queen Street	0015
Glasgow Central	0016
Glasgow Central Low Level	0017
Edinburgh Waverley	0018
Bathgate	0019
North Berwick	0020
Not In Service	0021
Empty For Depot	0022
Special	0023

AWS/DSD visual aids

For those who would like to make sure they don't miss an AWS alert or DSD vigilance alarm when in an external view or perhaps have trouble hearing high pitched sounds, visual aids can be activated and deactivated by pressing 'Ctrl+Numpad Enter'. These will appear in the top right-hand corner of your screen.



Setting up the driver's cab

Please follow the steps below to set up the cab of the class 321 so you are ready to move:

- 1) Move the reverser from 'Off' to 'Neutral' by pressing 'S' on the keyboard.
- 2) Cancel the AWS warning sound by pressing 'Q' on the keyboard.
- 3) Turn on the headlights by pressing 'H' on the keyboard until you reach your desired setting.
- 4) Switch to the rear cab and turn on the tail lights by pressing 'K' on the keyboard. Also, if required set up the destination display.
- 5) Return to the front cab and set up the destination display again if required.
- 6) Turn off the Driver Reminder Appliance (DRA) by pressing 'F' on the keyboard.

You should now be ready to move off. For information on how to do so, please see the ['Driving guide'](#) section below.

Driving guide

The following steps should allow you to drive the class 321 in a realistic and safe manner:

- 1) Move the reverser to your desired direction of travel by pressing either 'W' on the keyboard for forward or 'S' for reverse.
- 2) Move the train brake handle to step 1 by pressing the ';' key.
- 3) Move the power handle to notch 2 by pressing the 'A' key on the keyboard. At the same time, move the train brake handle to the 'release' position which will ensure you depart without rolling back.
- 4) From then on, apply further power as you see fit. Please see the ['Power controller'](#) section below for further detail on the performance of each power notch.
- 5) To brake the train, you may make applications and releases by moving the handle between step 1 and full service. It is recommended you only use full service as a last resort so as to ensure you always have more brake force available if required.
- 6) Just before coming to a stop, aim to have the brakes in step 1 so as to provide a smooth stop.
- 7) In the event of an emergency brake application, you will need to wait for your train to come to a stop. You must then place the reverser in neutral, power handle in off, make sure the brake handle is in emergency and then release.

Power controller

0 - Traction power is OFF

Notch 1 - Shunt notch that provides minimal power

Notch 2 - Approximately half power. A useful notch for holding speed around 75mph.

Notch 3 - Full power. This will offer only slightly reduced acceleration compared to notch 4 up to 40mph.

Notch 4 - Full power + weakfield. At 40mph, the weakfield contact is opened which allows for greater acceleration.

How to use in the scenario editor

How to place

To place a class 320/321/322 in the scenario editor, please follow the instructions below:

- 1) In the left-hand rolling stock fly-out, click the object set filter which looks like a blue box with an orange arrow to the right of it.
- 2) Go to the right-hand fly-out which should have appeared. Select 'AP' from the drop-down menu.
- 3) Tick the third box beside 'Class321Pack01'.
- 4) The class 320/321/322 liveries should now be visible in the left hand rolling stock fly-out.



Formations

Class 320

DTSO (A) + MSO + DTSO (B) - Pantograph on MSO closest to DTSO (B)

Class 321/322

DTCS + MSO + TSOL + DTSO - Pantograph on MSO closest to TSOL. Toilet window on TSOL closest to MSO.

Numbering

When placing a class 320/321/322 in the scenario editor, you are able to control the destination it displays via its number. This allows AI services to have a functioning destination display. As well as this, having a player service with a destination already entered means that the saloon lights will already be turned on to recreate when a driver picks up a unit that is already in service. So the player is still able to use the destination display, we recommend inputting what would have been that service's previous destination, the place you start the scenario.

Example number:

0000032142077960

Key:

00000 - Destination code (only 4 digits when using new dot matrix display)

321420 - Unit number

77960 - Coach number

Scenarios

APC321: 2Y16 08:44 Welwyn Garden City - London

King's Cross

Route = ECML London - Peterborough

Track covered = Welwyn Garden City - London King's Cross

Traction = First Capital Connect 321420 & 321403

Year = 2013

Duration = 35 minutes



APC321: 1F04 06:48 London Liverpool Street -

Colchester Town

Route = GEML London - Ipswich

Track covered = London Liverpool Street - Colchester Town

Traction = Greater Anglia 321362

Year = 2013

Duration = 1 hour 10 minutes



APC321: 1F09 06:40 Braintree - London Liverpool Street

Route = GEML London - Ipswich

Track covered = Braintree - London Liverpool Street

Traction = Greater Anglia (Ex-NXEA) 321428

Year = 2013

Duration = 1 hour 5 minutes



APC321: 1Y18 17:20 London Liverpool Street - Ipswich

Route = GEML London - Ipswich

Track covered = London Liverpool Street - Ipswich

Traction = Ex-SL 321434, Ex-FGE 321361 & NXEA 321426

Year = 2010

Duration = 1 hour 15 minutes



APC321: 1Y31 09:30 Ipswich - London Liverpool Street

Route = GEML London - Ipswich

Track covered = Ipswich - London Liverpool Street

Traction = Greater Anglia (Blue Doors) 321446 & 321354

Year = 2013

Duration = 1 hour 15 minutes



APC321: 2F71 18:56 Ipswich - Colchester

Route = GEML London - Ipswich

Track covered = Ipswich - Colchester C.S.

Traction = NXEA 321426, Ex-FGE 321361 & Ex-SL 321434

Year = 2010

Duration = 35 minutes



APC321: 2K79 15:10 Southend Victoria - London Liverpool Street

Route = GEML London - Ipswich

Track covered = Shenfield - London Liverpool Street

Traction = London Midland 321411 & NXEA 321303

Year = 2011

Duration = 25 minutes



**APC321: 5F04 05:45 Shenfield Down Siding - Braintree
Witham/2F04 06:16 Witham - Braintree**

Route = GEML London - Ipswich

Track covered = Shenfield Down Siding - Braintree

Traction = Greater Anglia (Ex-NXEA) 321428

Year = 2013

Duration = 50 minutes



Credits

Jordi Blumberg - Modelling and texturing

Waggonz - Scripting and additional texturing

James Welham - Assistance in researching of the cab and recording of sounds

Special thanks to all beta testers.