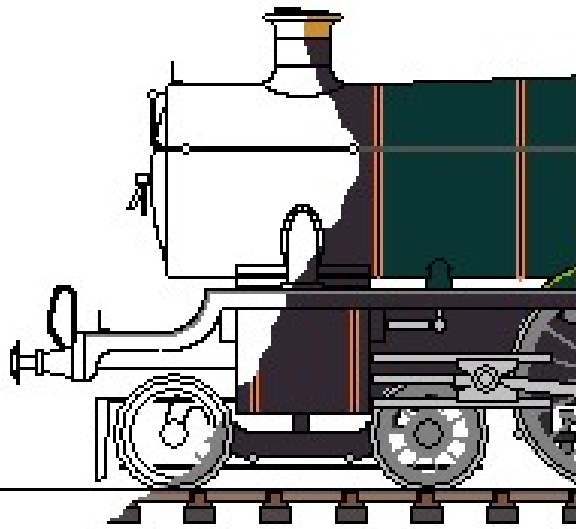


GWR LOCOMOTIVE SKETCHPAD



Design and Sketch
Steam Locomotives
based on
Great Western Railway
design principles

... and see what might have been ...

5.0.0



A Quick Tour

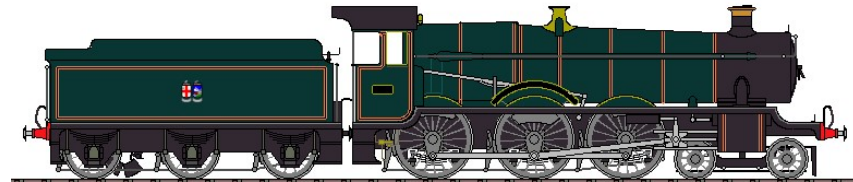
This Quick Tour is based on pictures - with just a few words.

Some books which you may find useful are shown here.

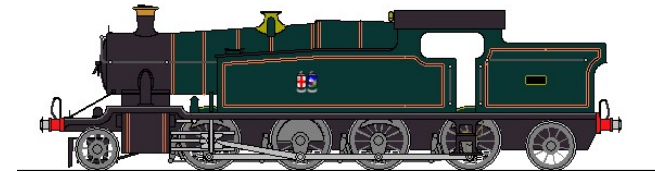


Aims

- To draw a Great Western Locomotive using as few measurements and options as possible
- To draw proposed or new types of steam locomotives using Great Western design principles



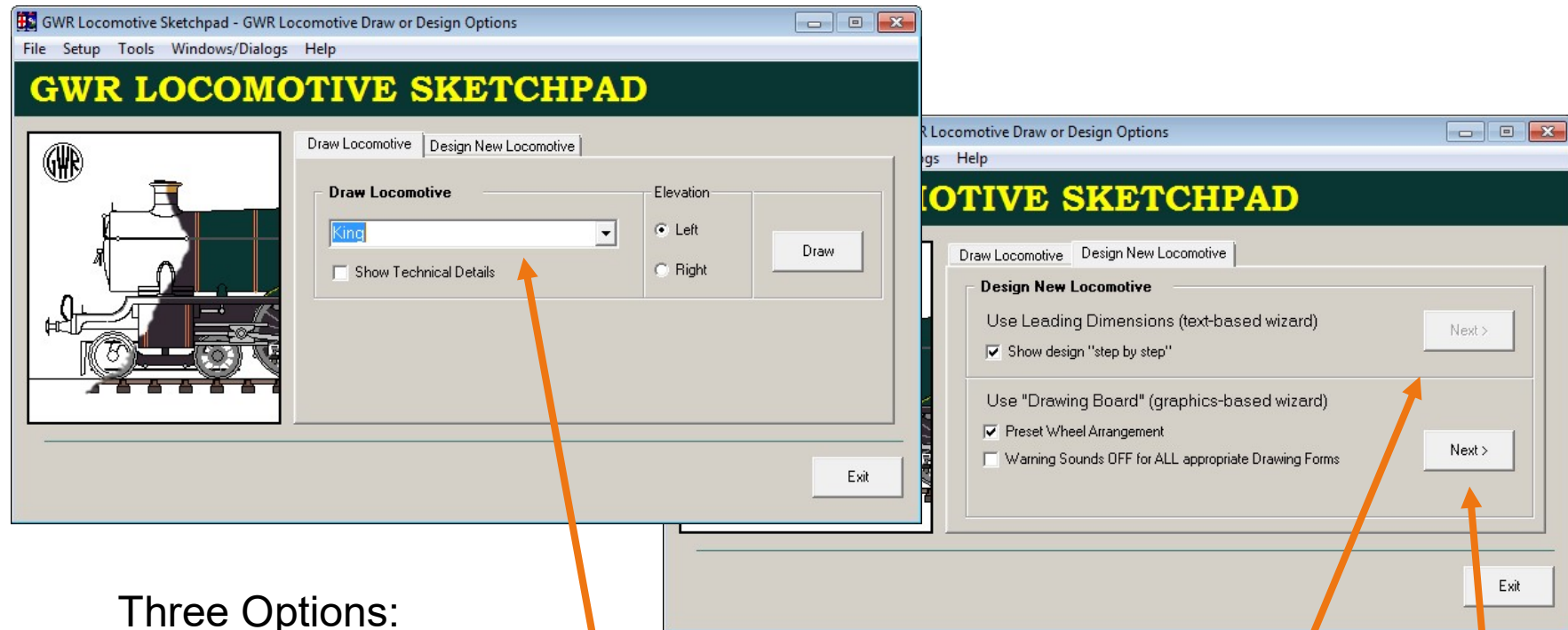
some **74** items of data



some **66** items of data

This is **NOT** a "Computer Assisted Design" program. It uses approximations based on rules and algorithms, and uses integer-based arithmetic. Any drawings are, at best, representative of the locomotive.

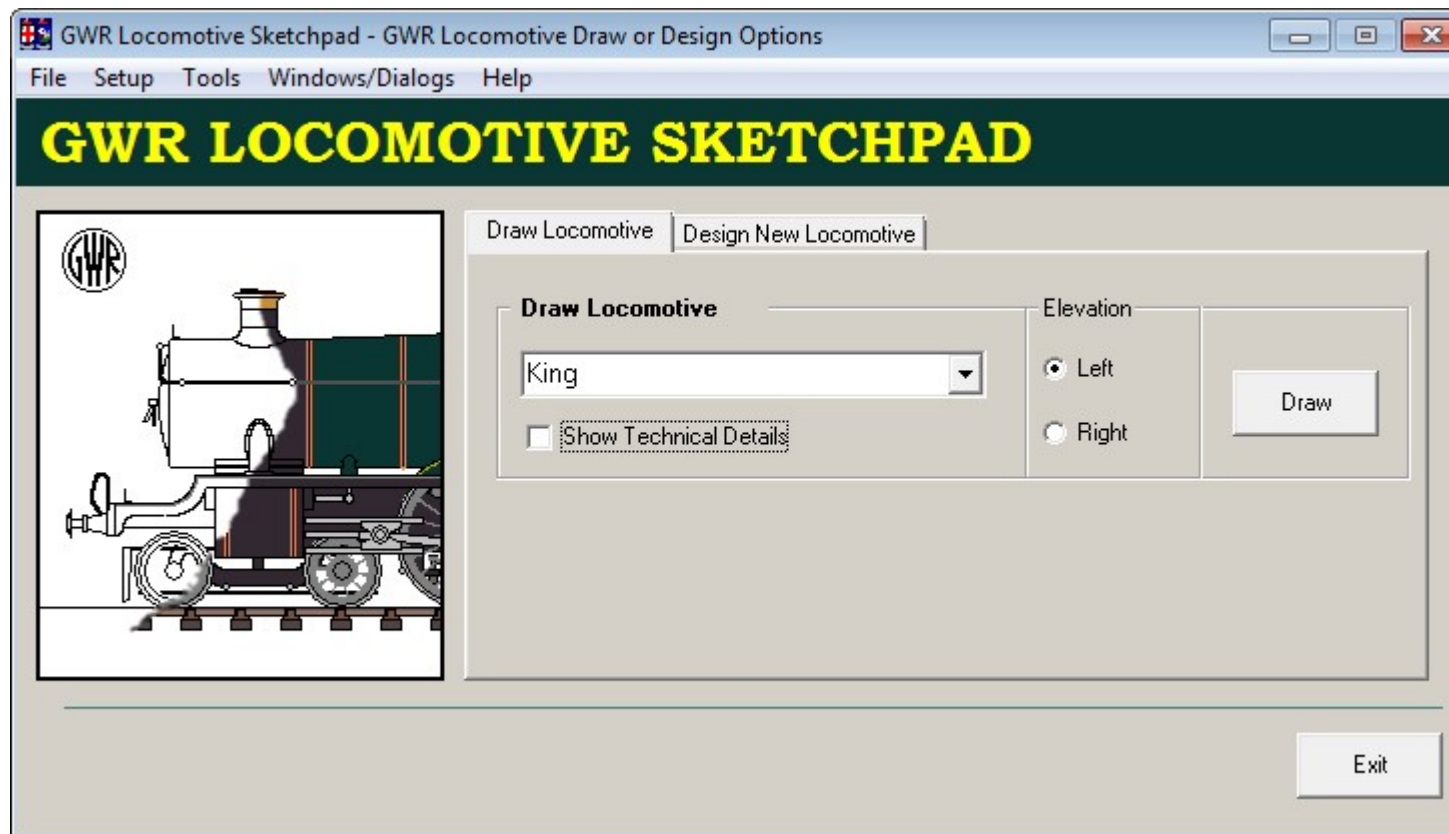
GWR Locomotive Sketchpad



Three Options:

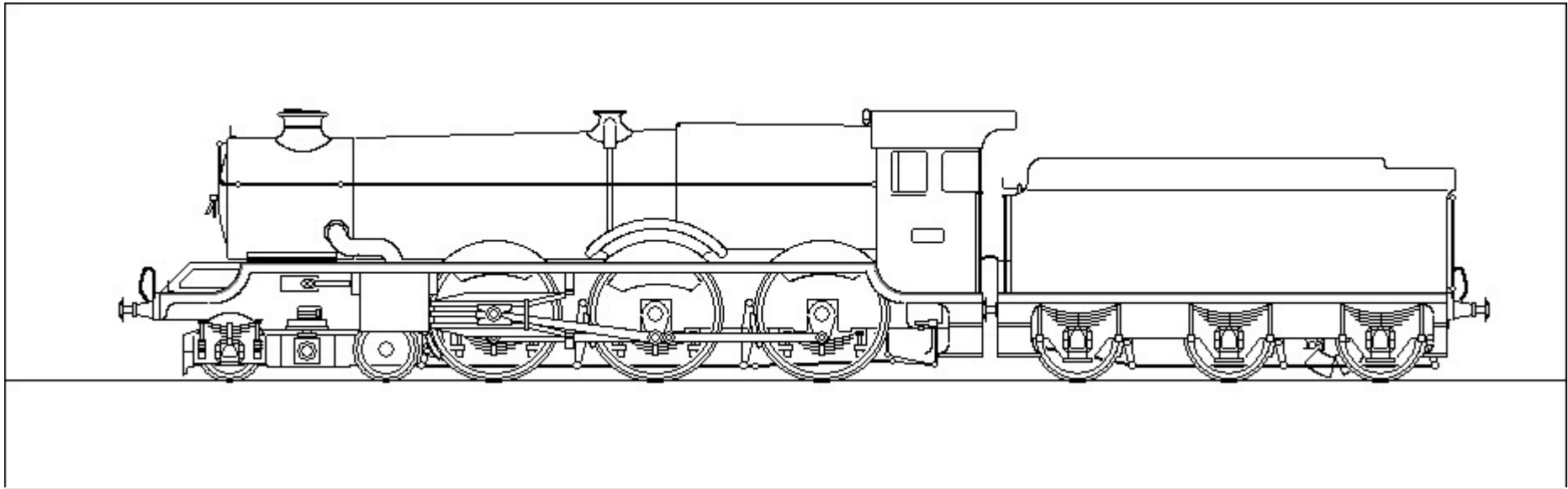
- Draw Existing Design
- Create new Design by input of critical measurements
- Create new Design by using drawing components which you resize

Draw Existing Design



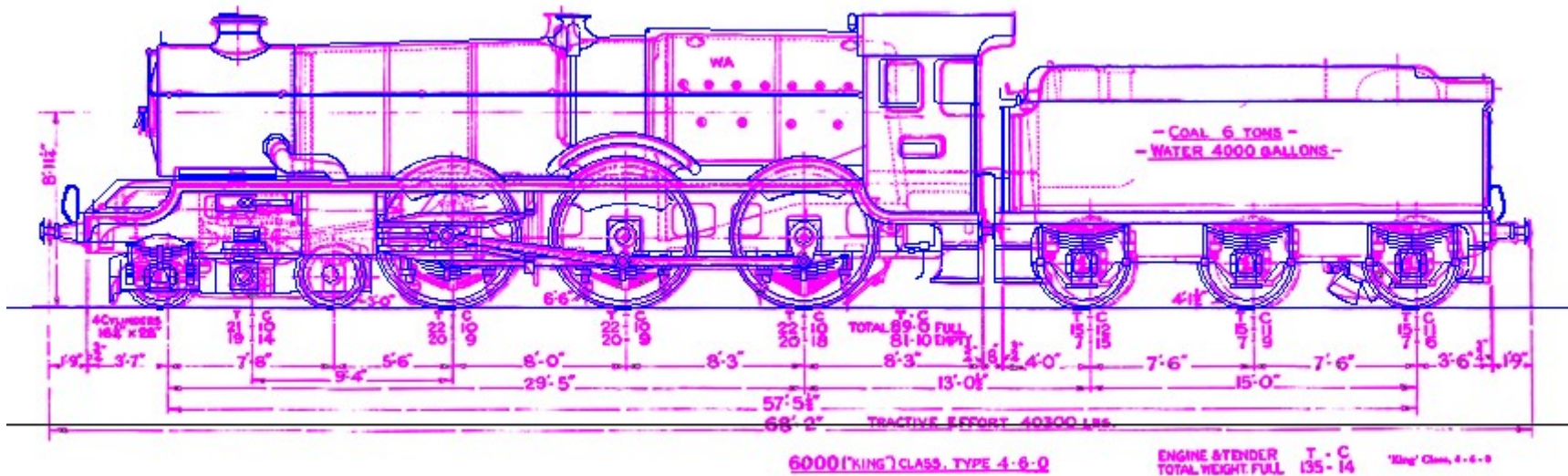
Note that the appearance of the forms – and the Start form in particular - depends on the Window Theme or Windowing system that you are using.

King class



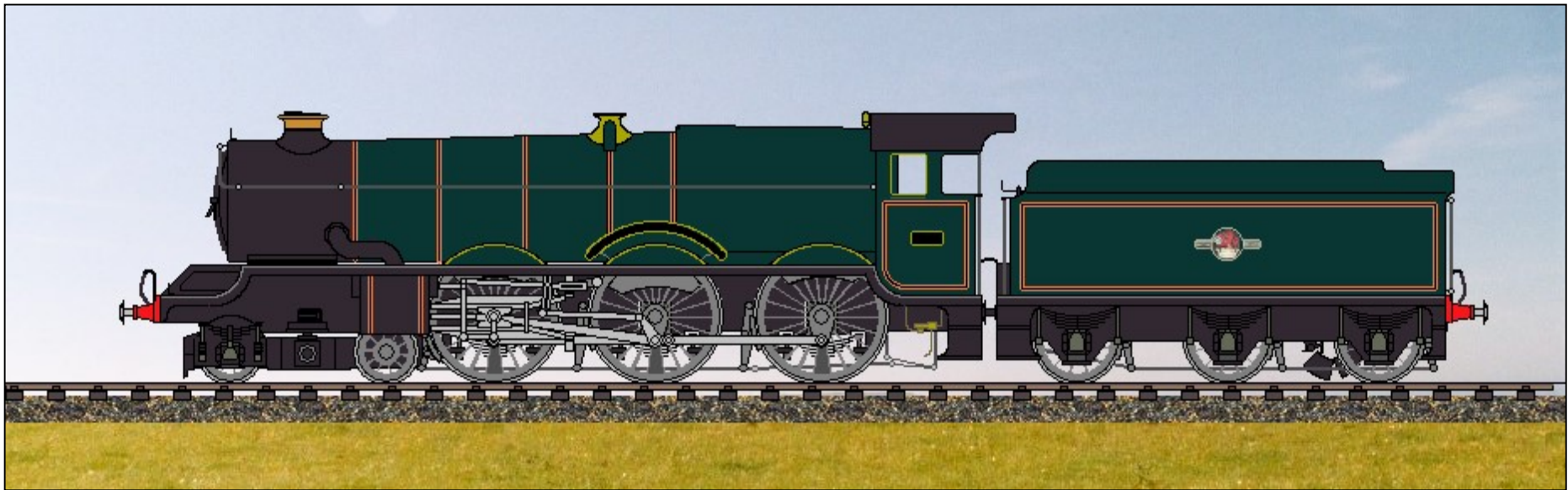
King Class Locomotive Drawing (“Weight Diagram”)
from the Sketchpad

GWR Loco Sketchpad "King" overlaid on the GWR Engine Diagram (outline General Arrangement Drawing)

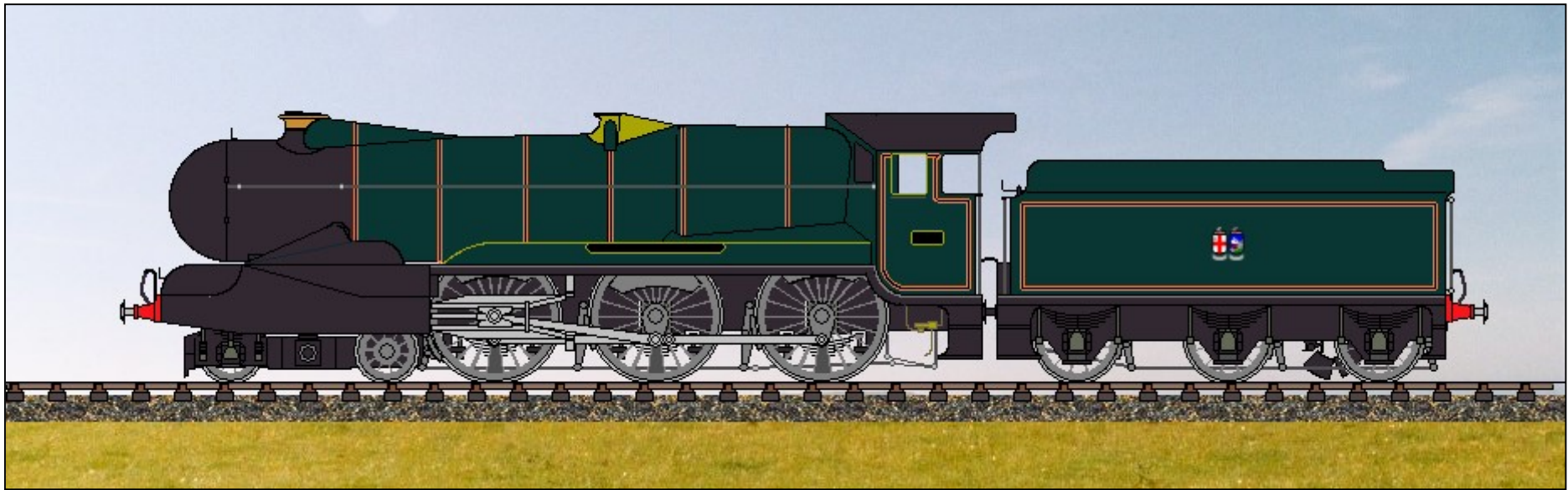


Some of these "differences" are due to the rules and algorithms used.

You can change any locomotive design - to show what "might have been".

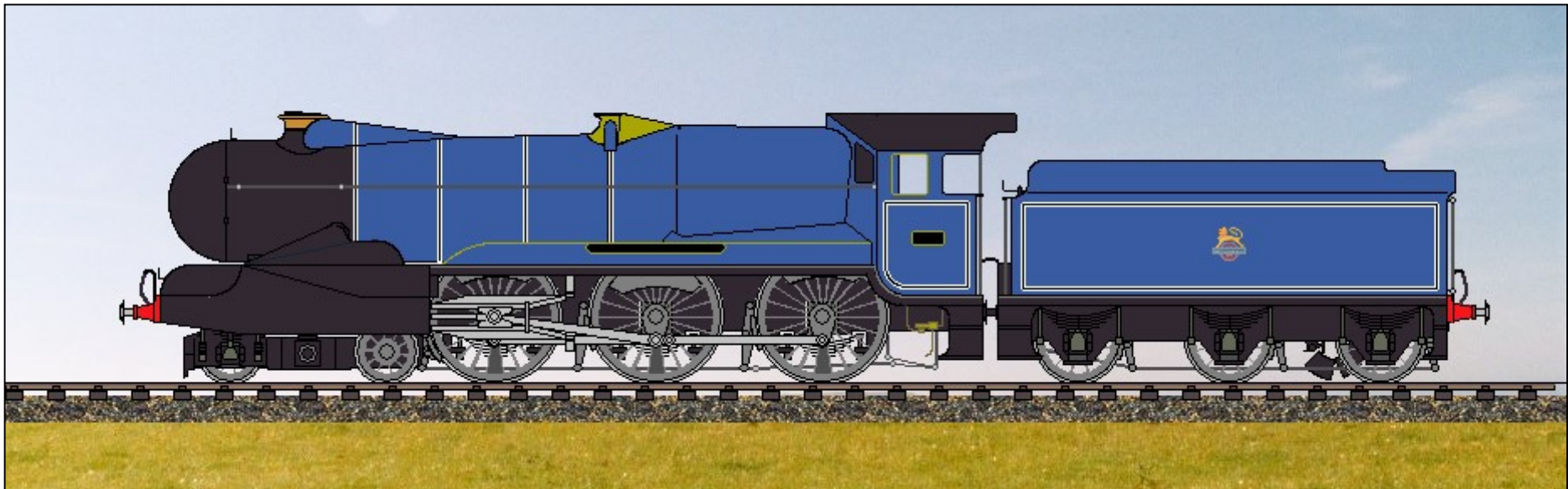


King Class Locomotive with outside Walschaerts Valve Gear



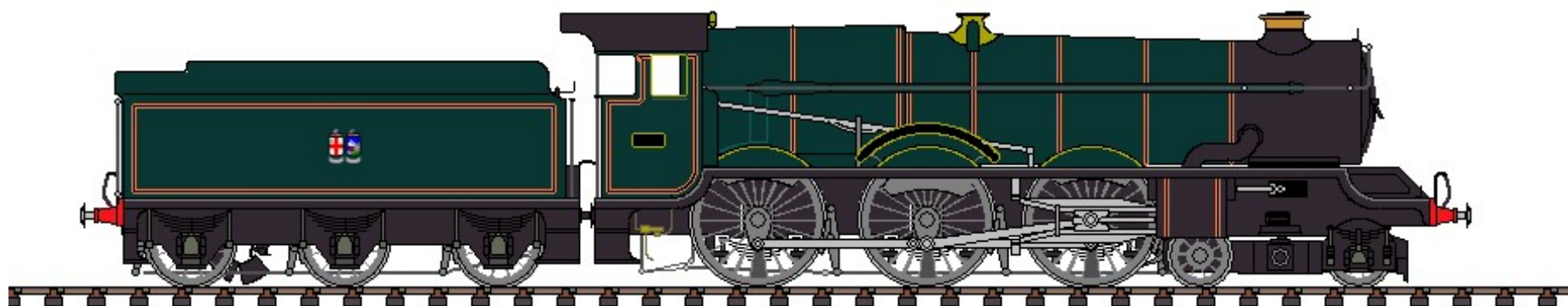
King Class Locomotive with full Air-Smooth casing

You can change the livery (to a recognised GWR/BR paint scheme).



What would a Streamlined King have looked like in BR "Caledonian" Blue?

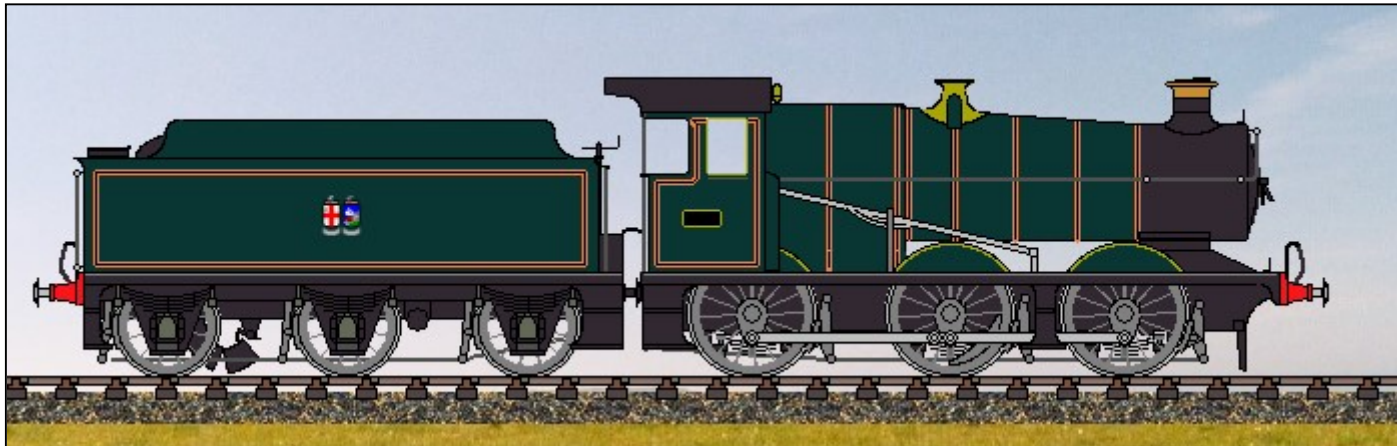
King class



Right Elevation:

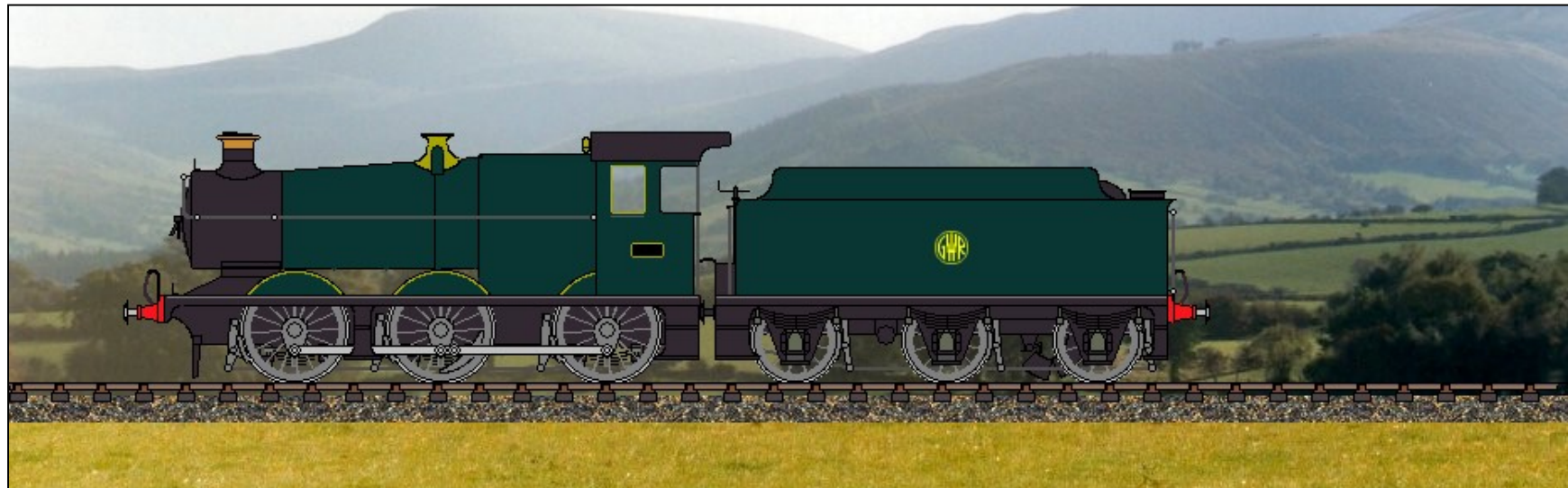
King Class Locomotive in Great Western Lined Livery

2251 class

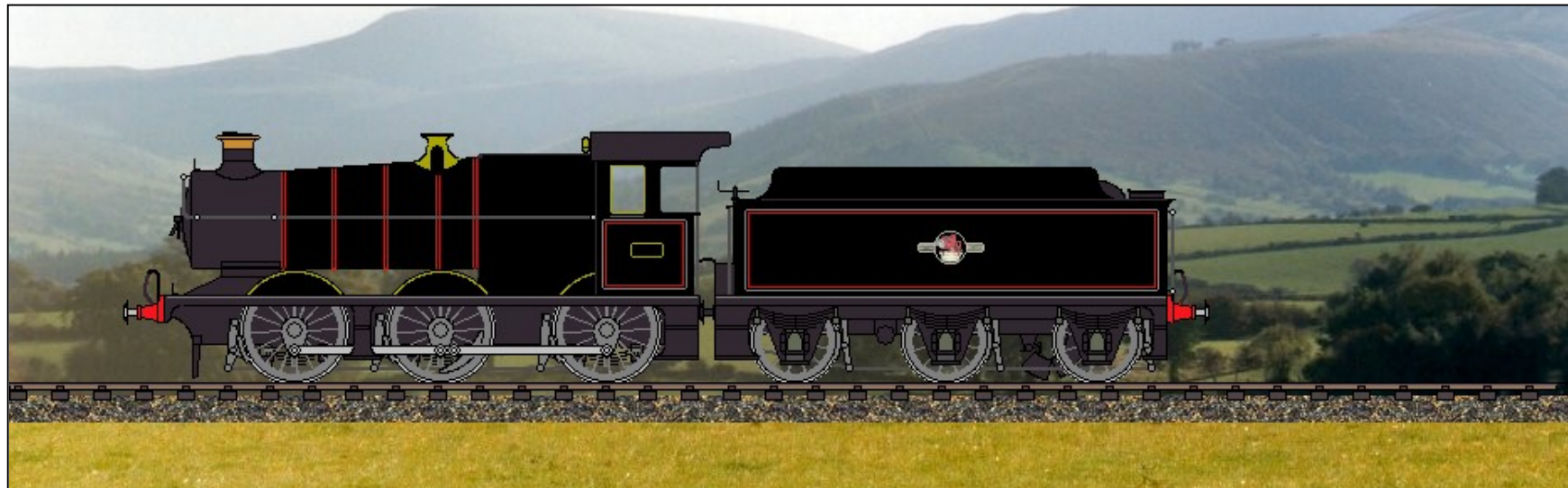


2251 in Great Western Lined "Passenger" Livery

You can use a number of supplied backgrounds.

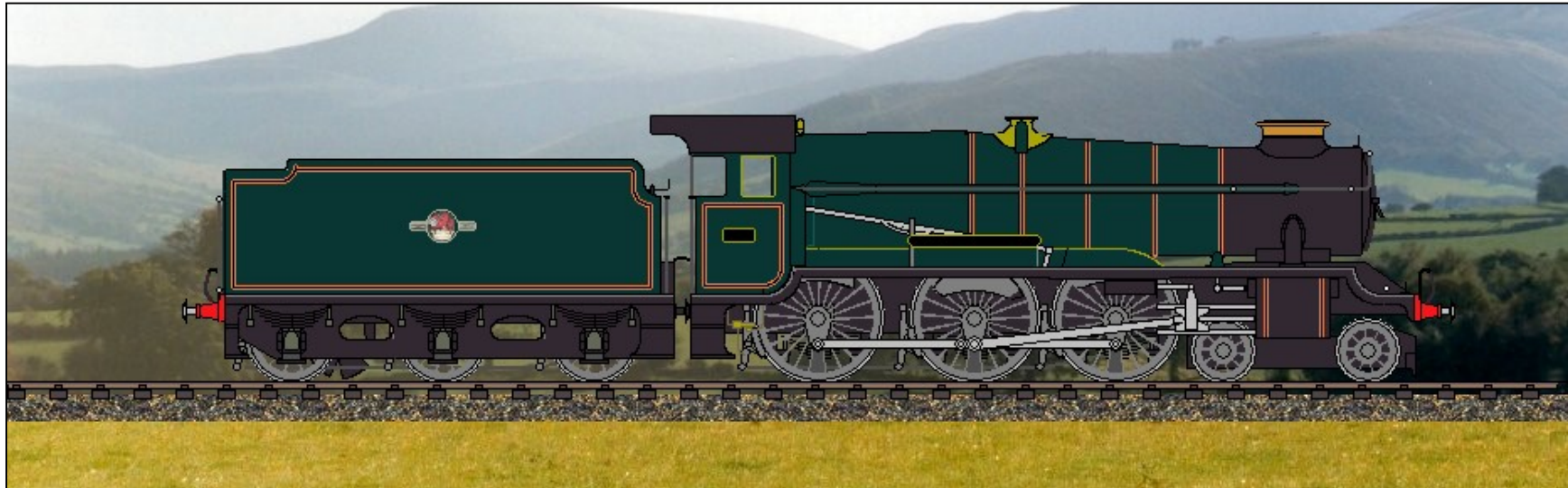


2251 in the Brecon Beacons (although this is not a view you can actually see from railside)



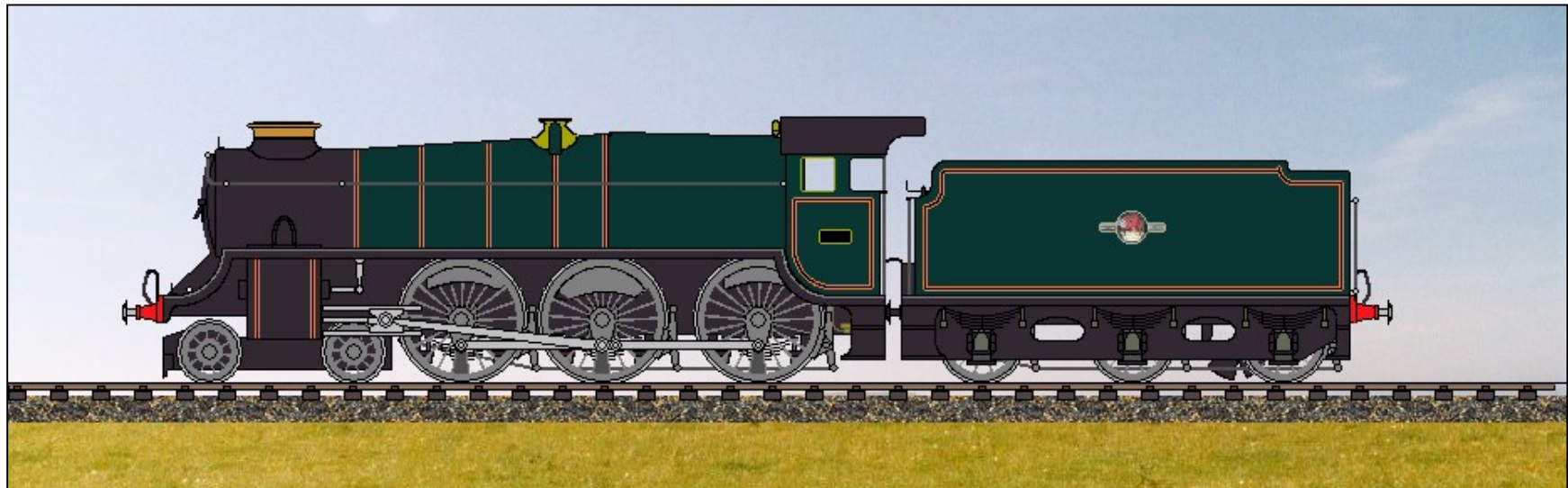
2251 in British Railways Lined Black "Passenger" Livery

County (4-6-0) class



County Class Locomotive in British Railways Lined Green Livery

You can see what a locomotive would look like if maintenance had become a key issue



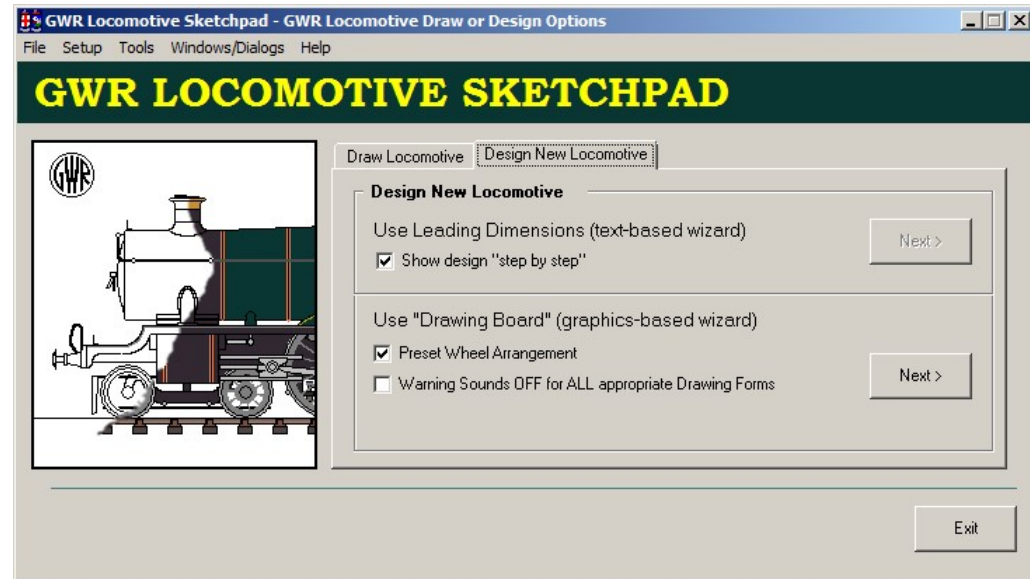
County Class Locomotive with raised Running Plate (Footplate)

GWR Locomotive Sketchpad

This section shows the GWR Locomotive Sketchpad freehand drawing option in use.

The locomotive drawing that follows is based on a sketched outline (done in 1946) for a "Pacific" or 4-6-2 locomotive.

(This is likely to have been just a drawing office unapproved "exercise".)



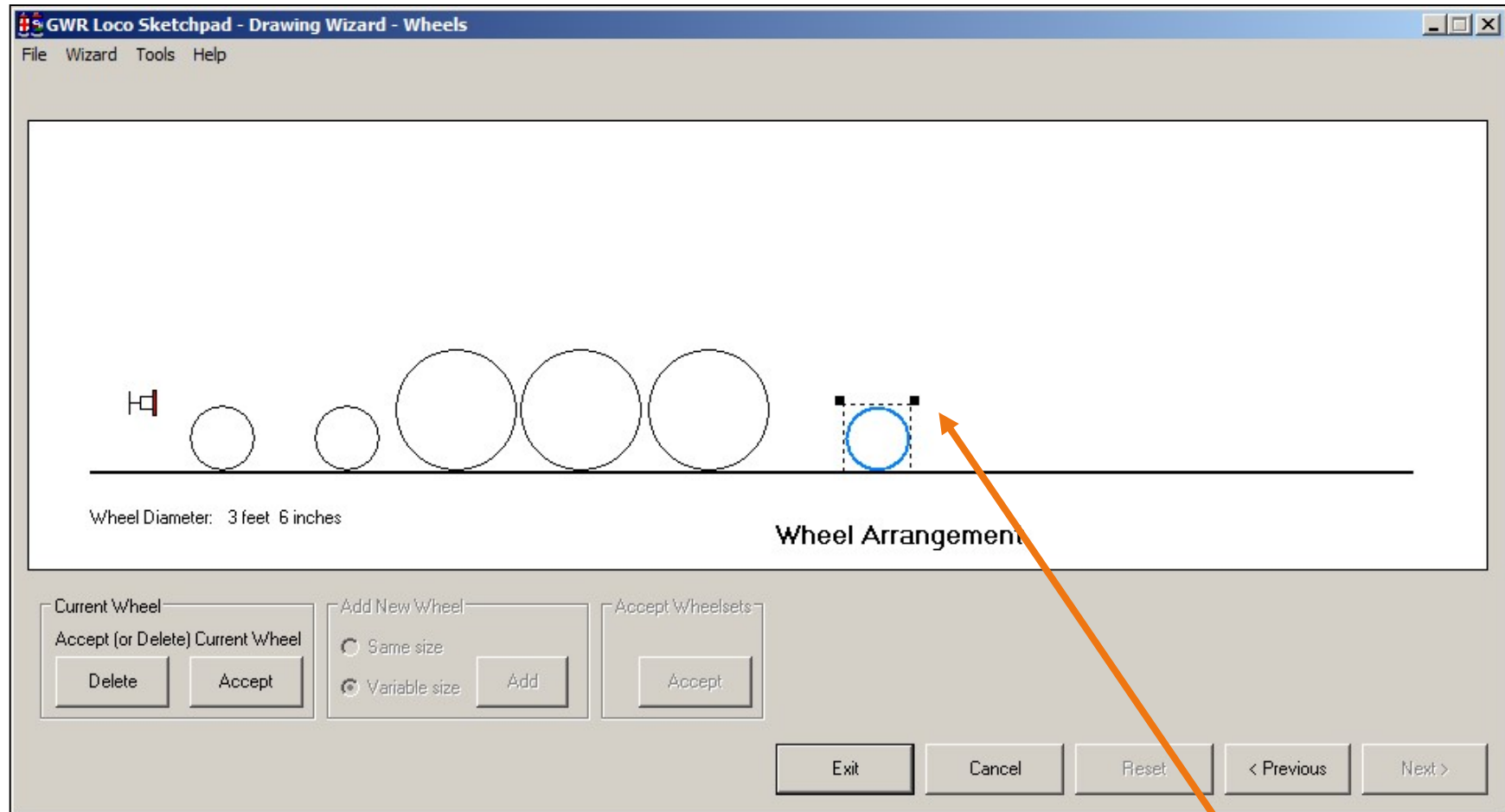
Source books:

Rutherford, M
Nock, O. S
Summers, L. A.

"Great Western 4-6-0's At Work" PRC
"The GWR Stars, Castles and Kings" David and Charles
"A New Update of Swindon Steam" GWS



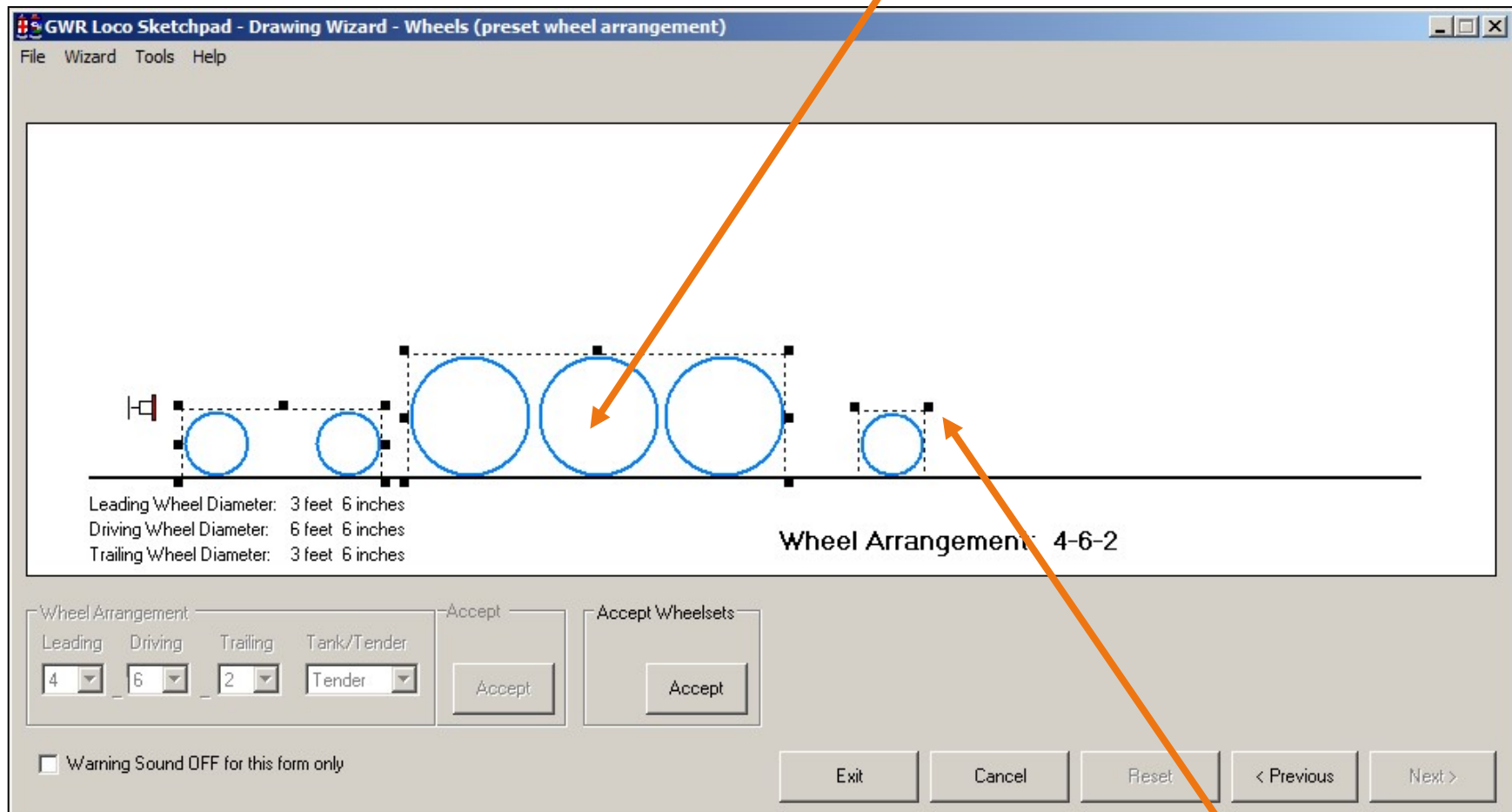
"Drawing Wizard" based Design



Either set the wheel sizes and spacing (using the resize handles and moving each wheel as you draw it), and then the wheel arrangement is calculated for you ...

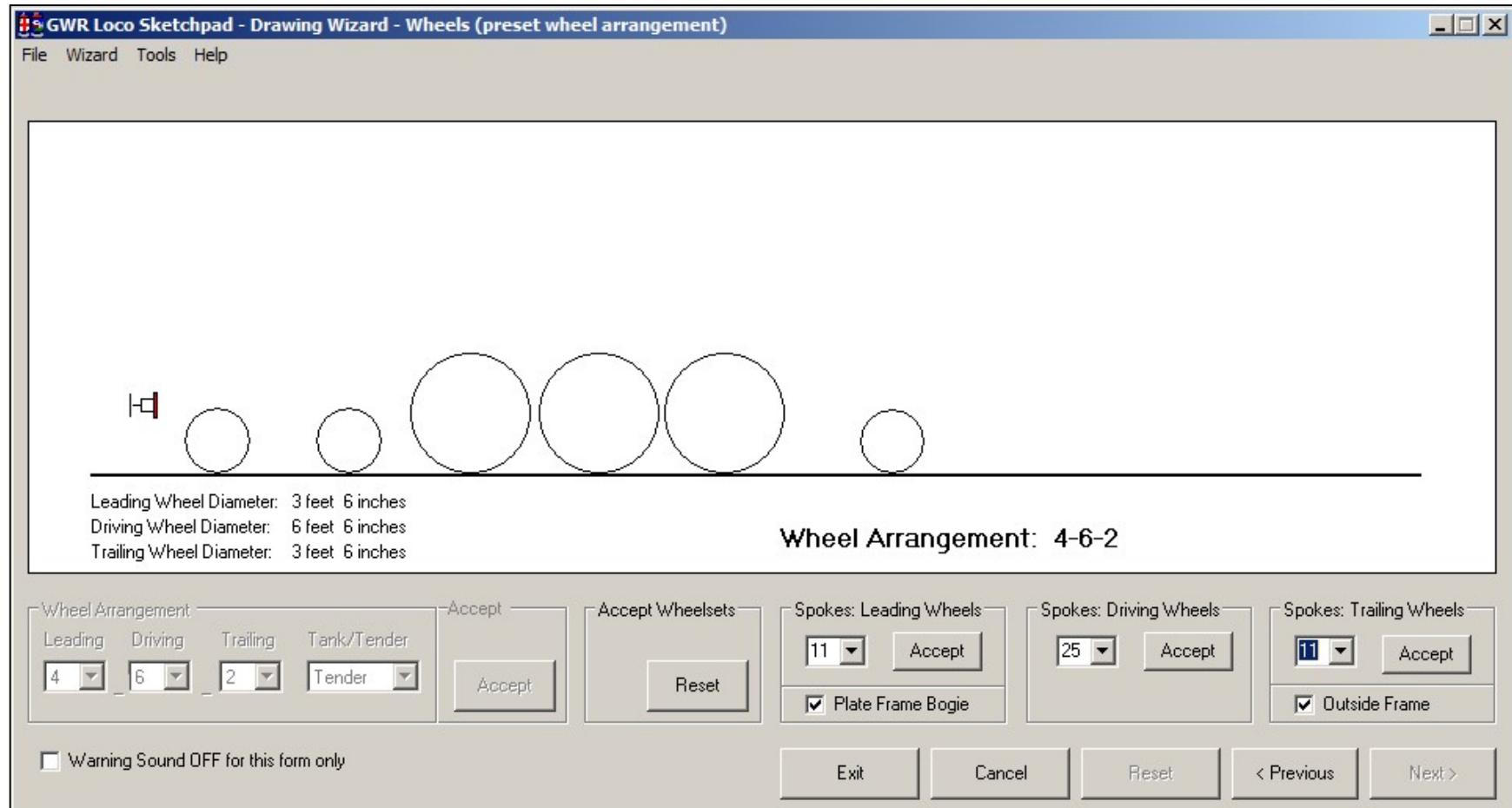
... or define the wheel arrangement and then set the wheel sizes and spacing.

Click on an individual wheel to move it within the wheelset.



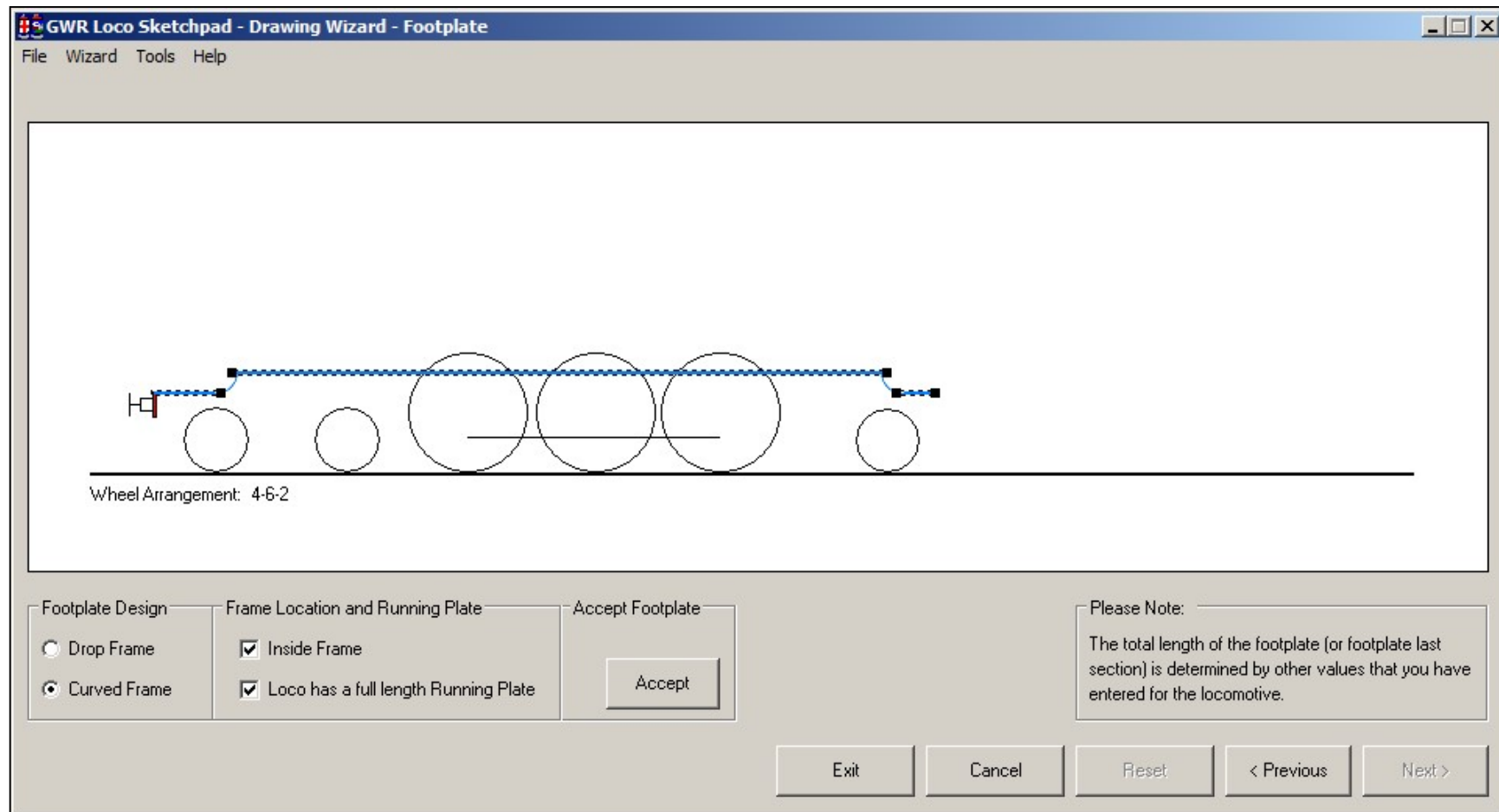
Resize the wheels and wheelsets by using the resize “handles”

Click **Accept** in the *Wheelset Complete* box ...then set the number of spokes.



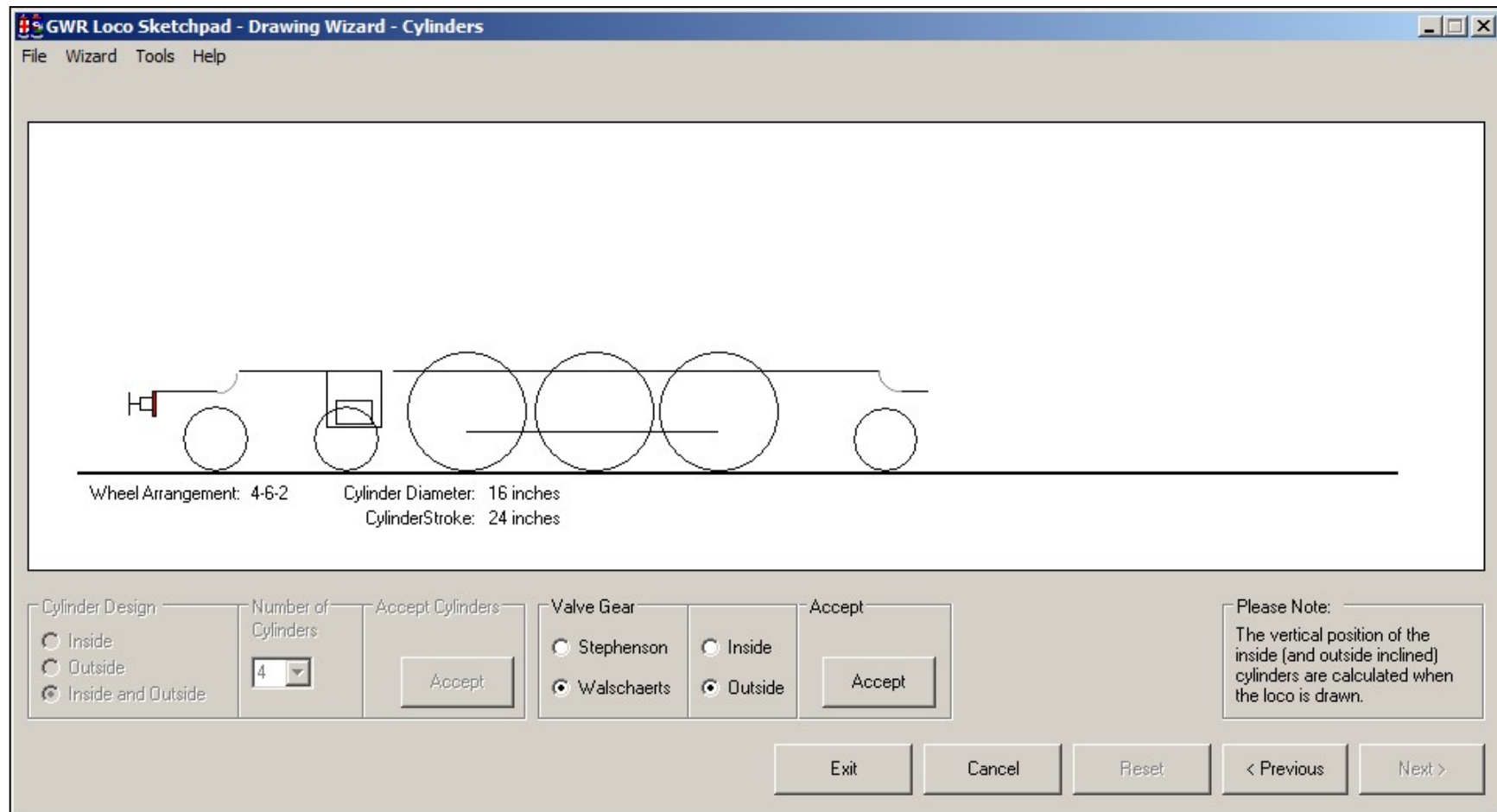
Click all **Accept** buttons, then click **Next**

Set the height of main footplate section and the relative lengths of each part:
grab a section (or section handles) and drag to new position or new size.



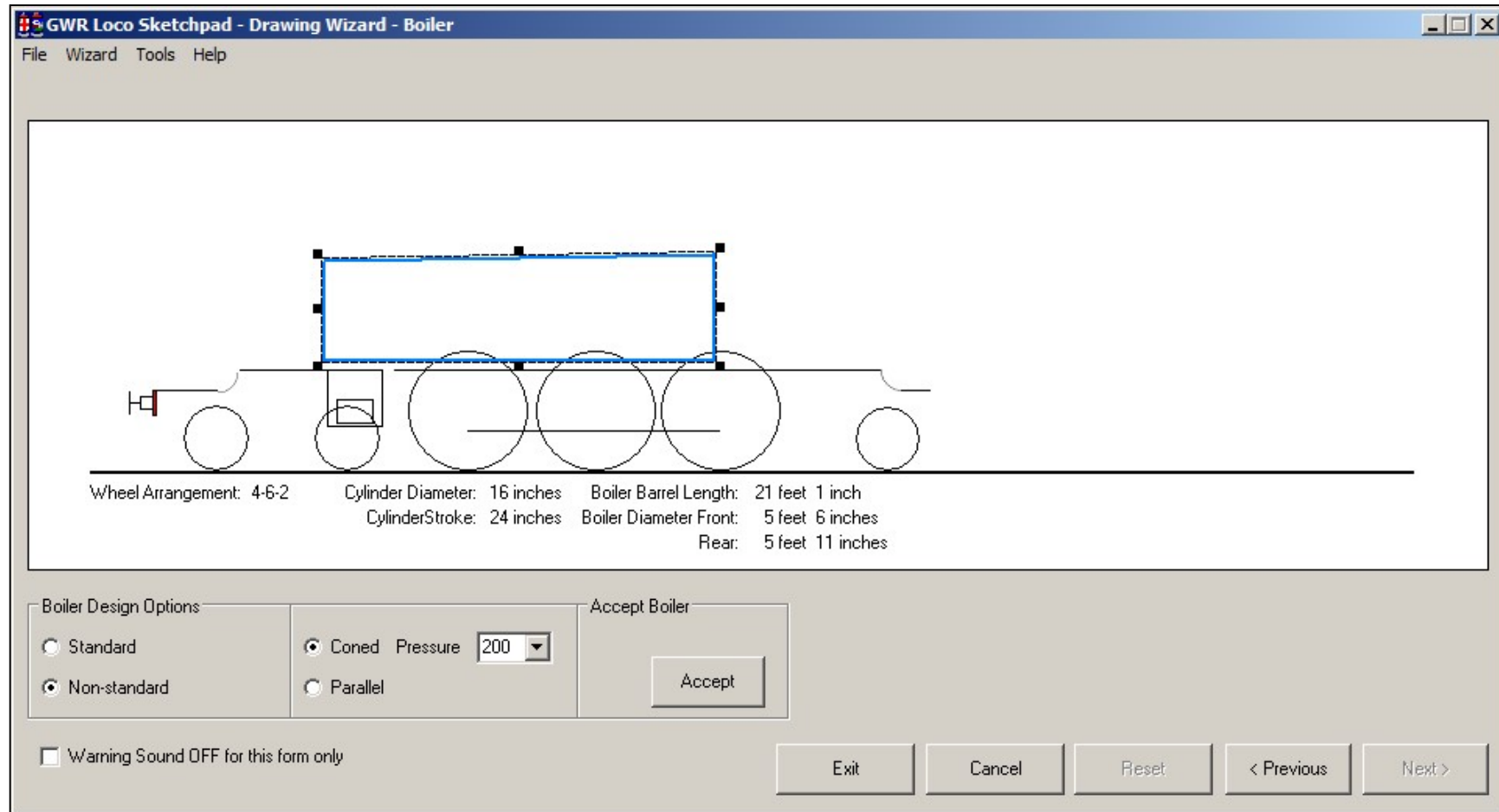
Option buttons and check boxes select the footplate "design".

Position and size cylinders (use the drawing handles - click on a handle and then drag it): options define number of cylinders and type of valve gear.



As a possible Hawksworth design, the 4-6-2 might have outside Walschaert valve gear

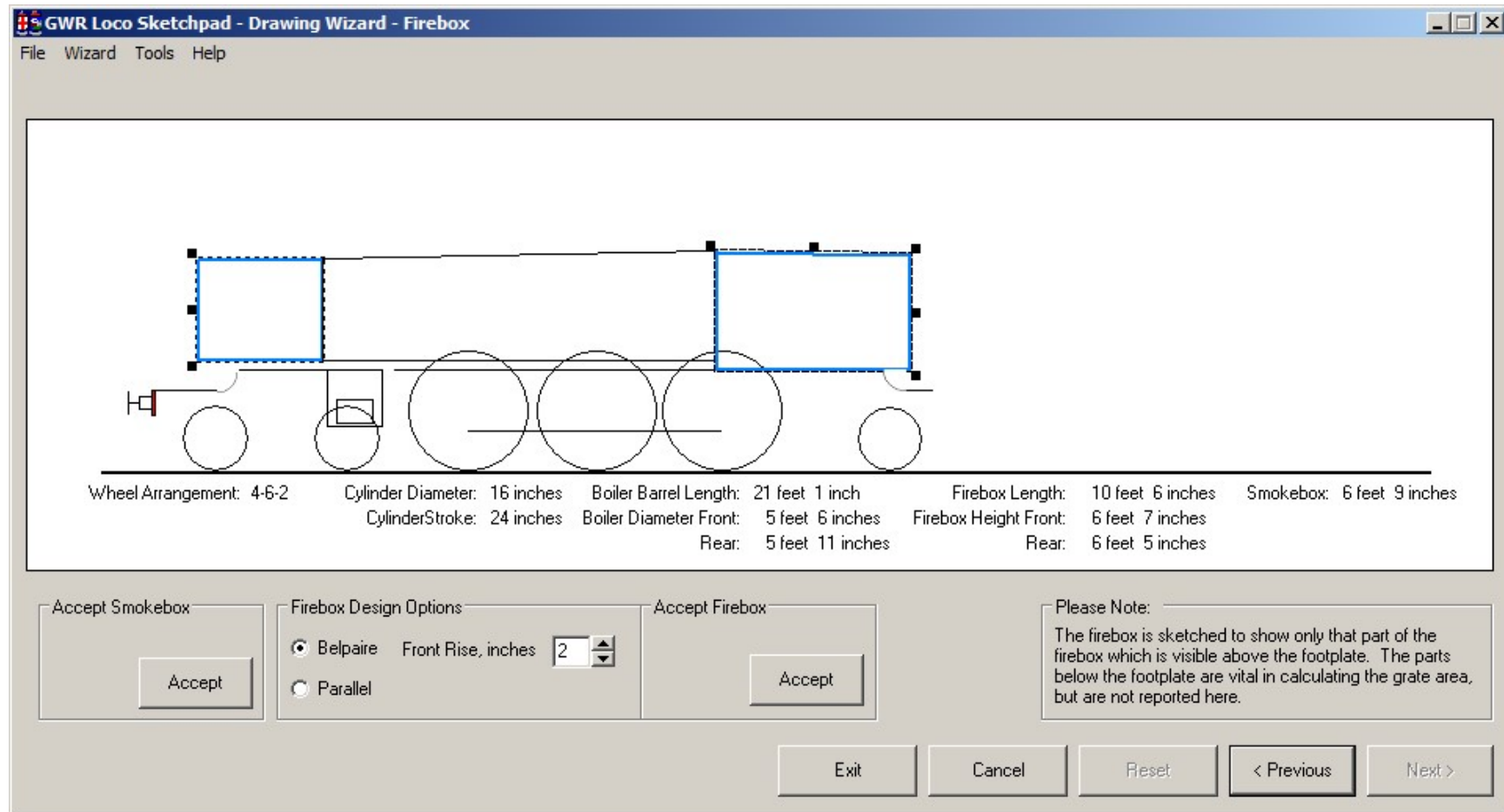
Use a Great Western Standard boiler - or design your own.
If you select “coned” but make a parallel boiler, you are warned and the option reverts to “parallel”.



For the Pacific, we use a non-standard boiler, based possibly on standard Number 12

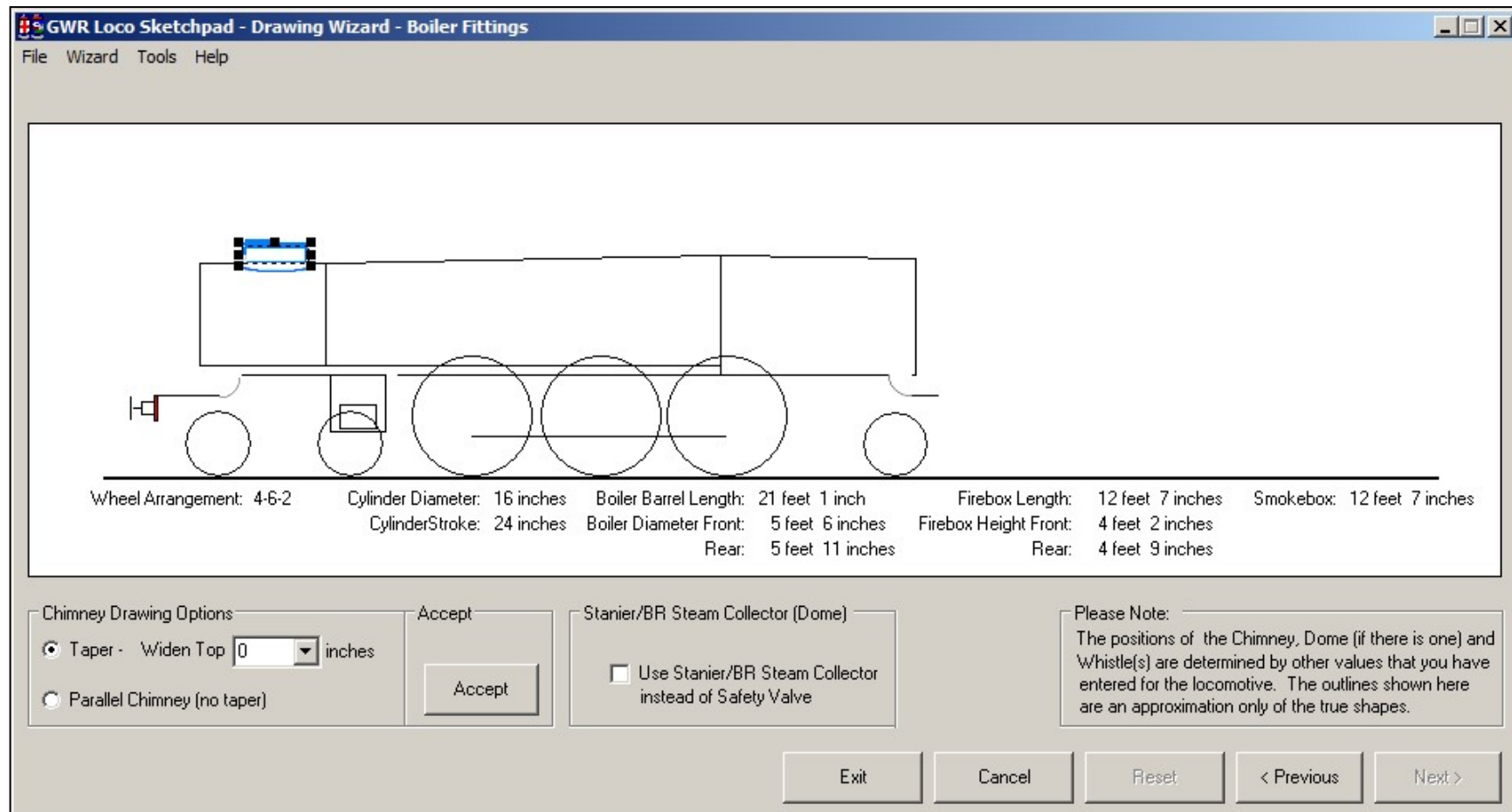


For a Belpaire firebox, adjust the rise at the front of the firebox using the drop-down list box. The sketches are quite rudimentary but show positions and sizes.



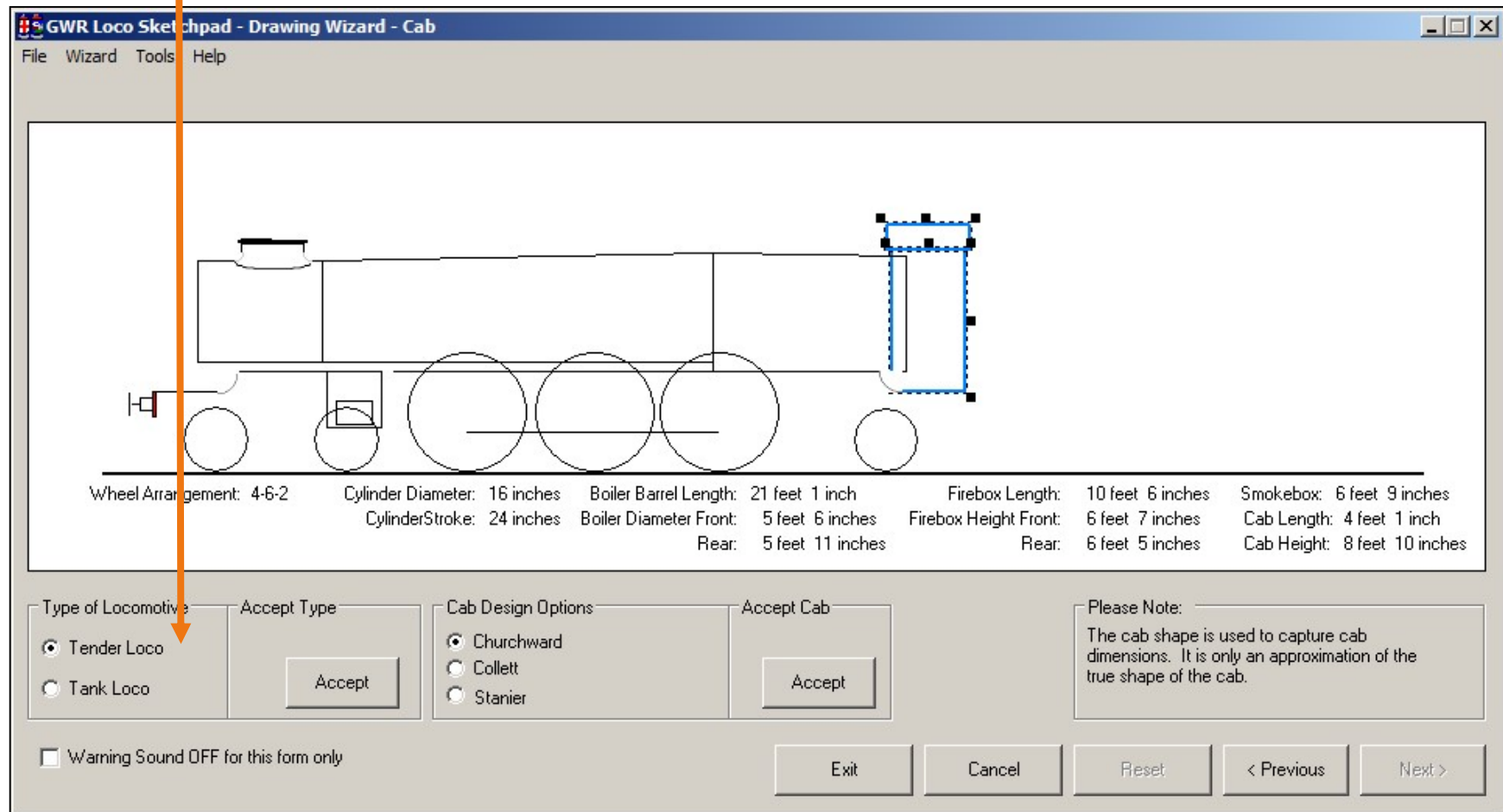
For this 4-6-2, use a non-standard firebox - not quite as long as the "King's" - but wider?

Boiler fittings are placed using rules and algorithms. You can set the size of the chimney, but not where it will be placed on the boiler.



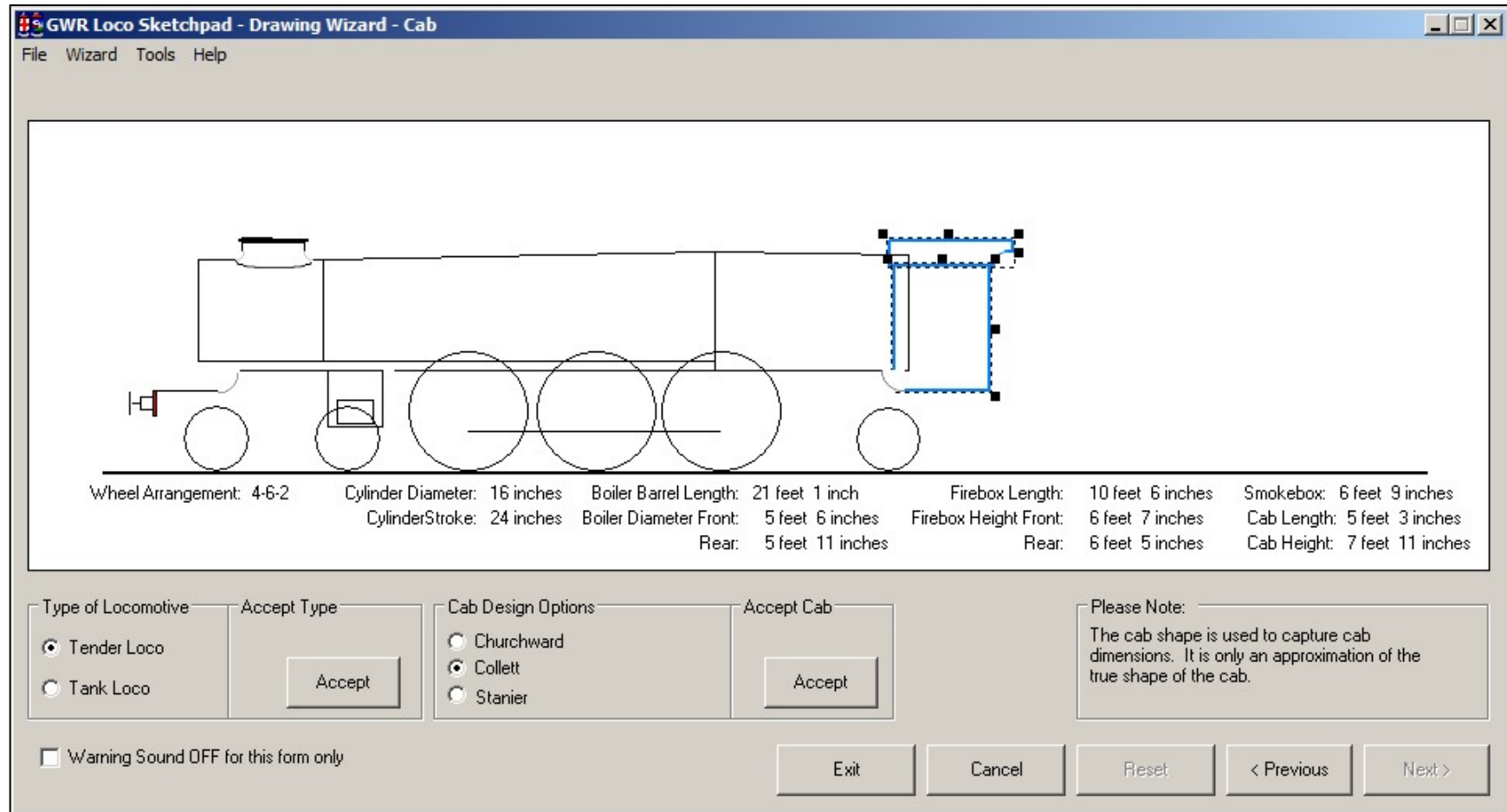
For this Drawing Office “outline” Pacific, use a double chimney as standard.

Choose whether to draw a Tender Locomotive or a Tank Engine.



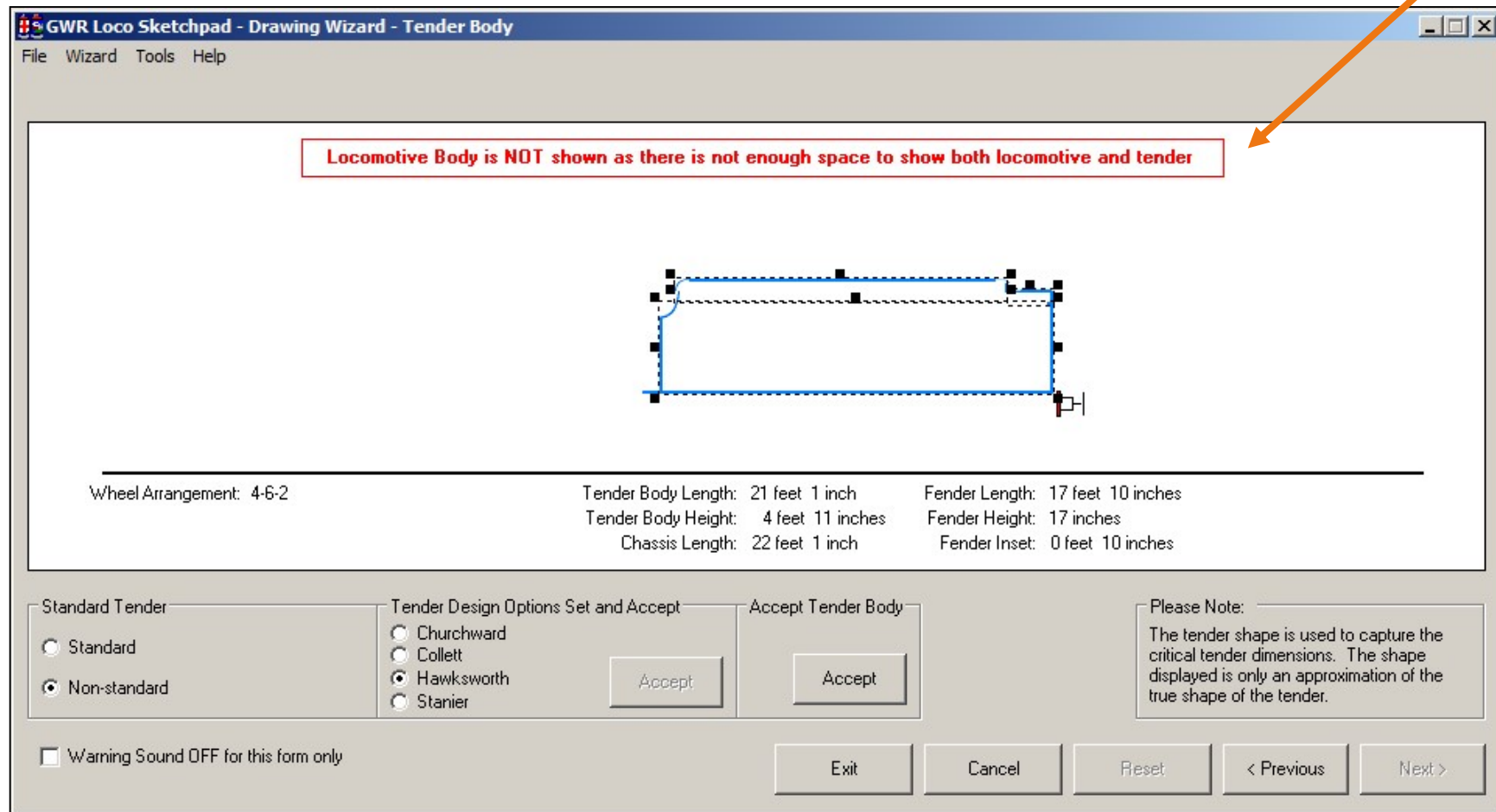
If you set the wheel arrangement in the first “drawing board” of this sequence, the option is already set for you - but you can change your mind!

The cab and the cab roof - including the roof length for a Collett cab (or Stanier cab (where this option is present)) - are sized independently of each other.



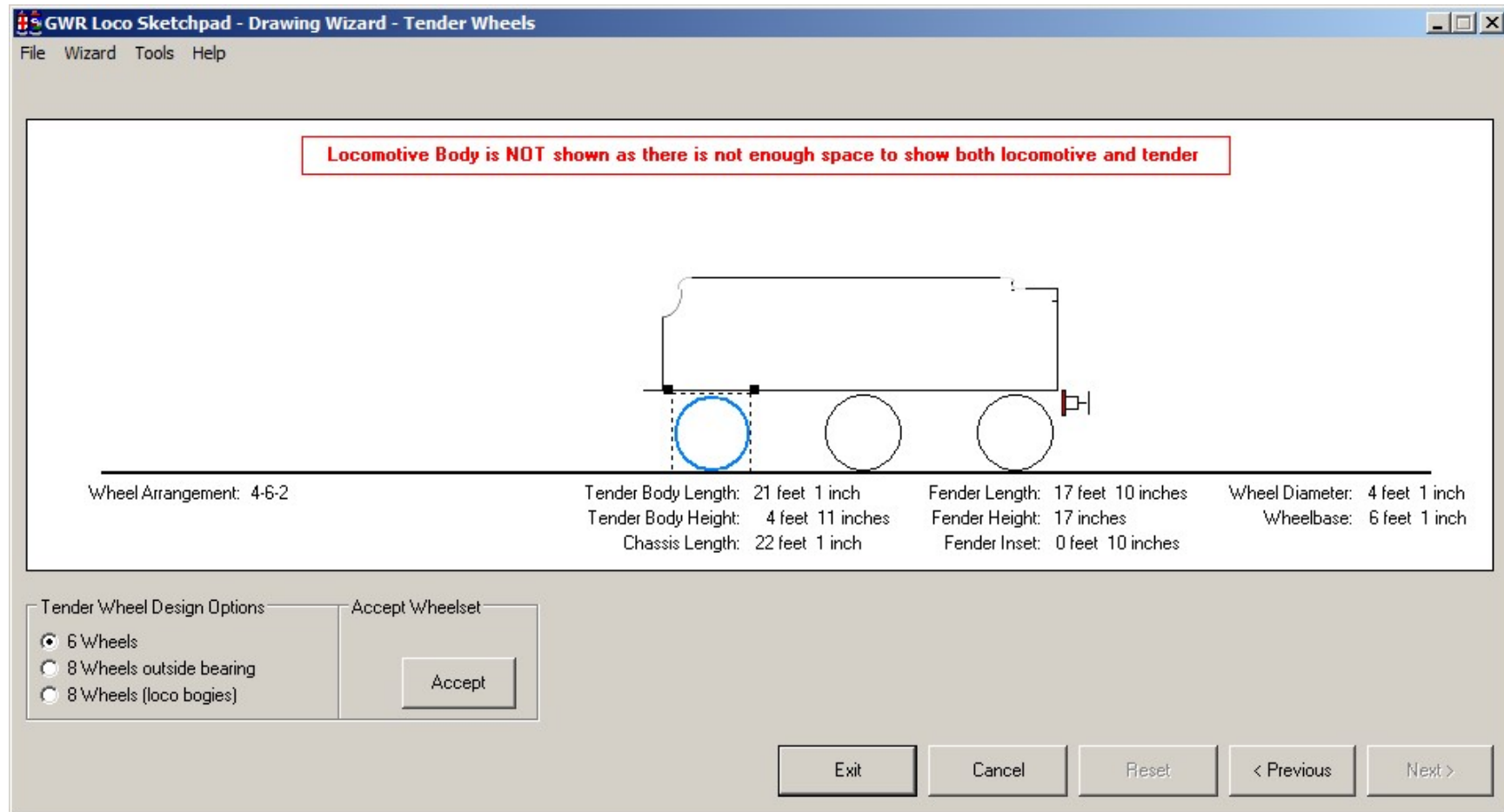
The Pacific uses a Collett Cab - of course!

If you are drawing a large locomotive, the tender is shown on its own. As with the cab, the tender body and the tender (coal) fender (coal sheets) are resized independently of each other.



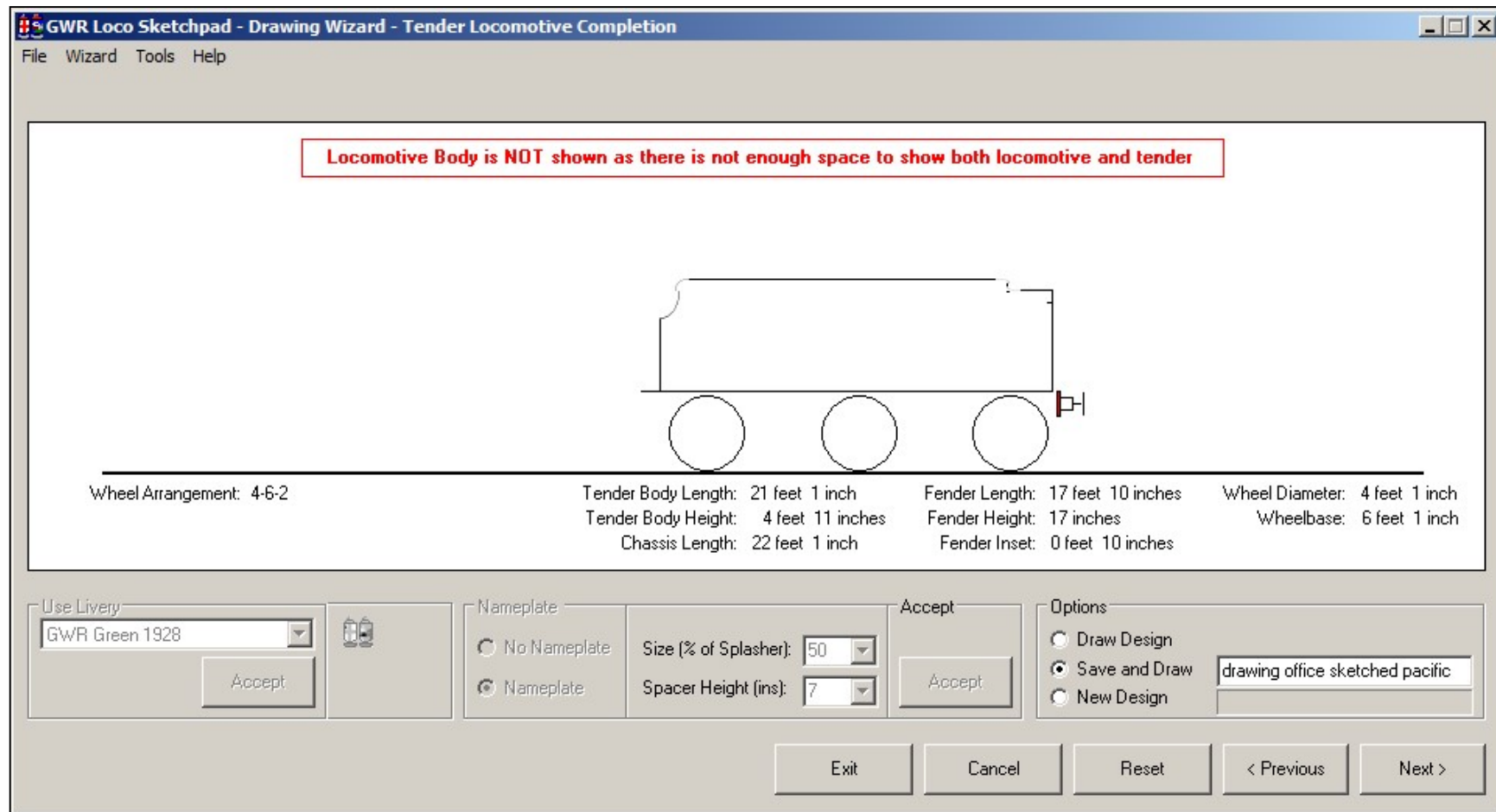
This “sketched” Pacific would most likely have had a Hawksworth pattern tender.

You can only resize and position the leading wheel of the tender wheelset:
the other wheels adjust automatically.



The tender would have had 6 wheels - there were only 2 GWR 8-wheeled tenders

You select the livery for every locomotive that you design. Passenger tender locomotives may optionally have a nameplate, which you can size (within limits) using the dropdown list boxes.



Select livery, select nameplate size, and identify your new locomotive class.

Impression of the Drawing Office outlined 4-6-2

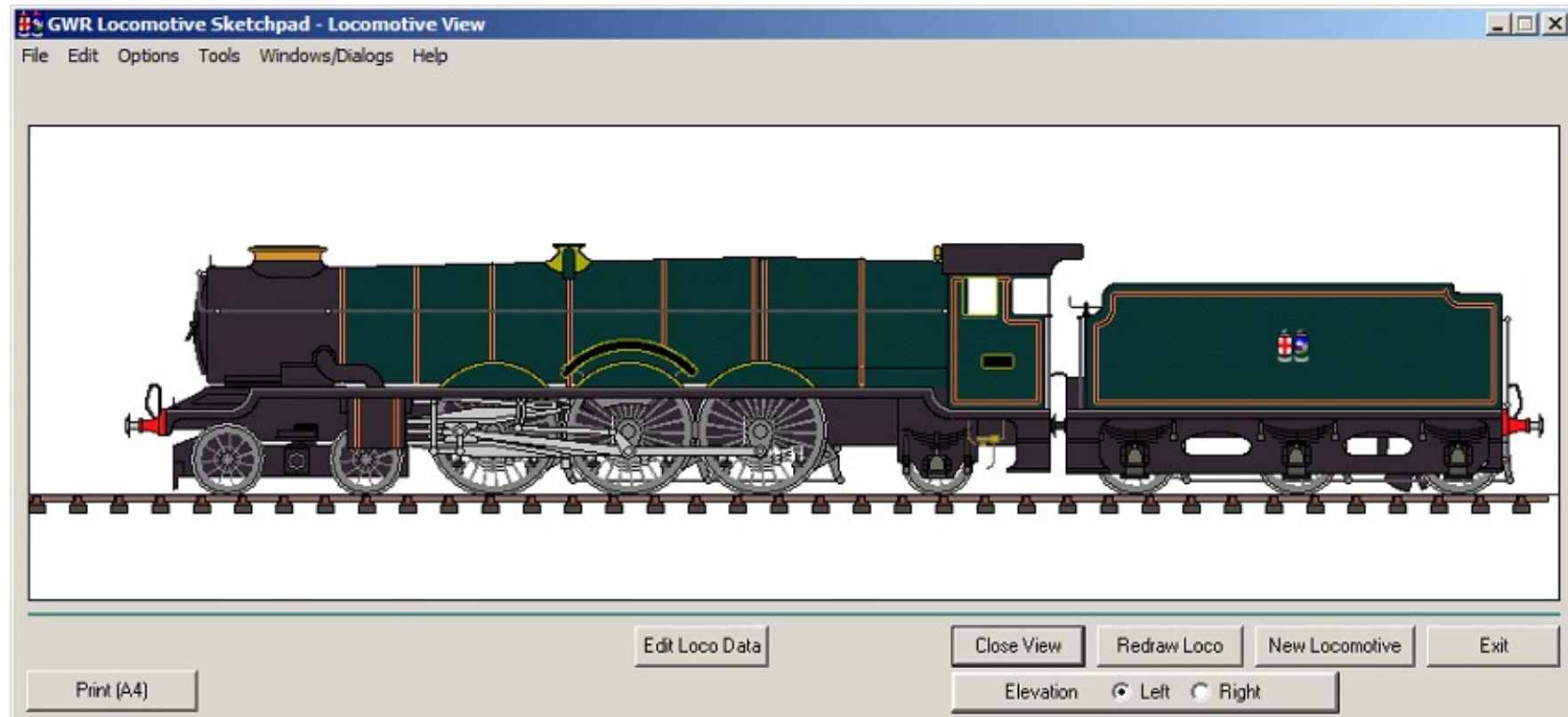
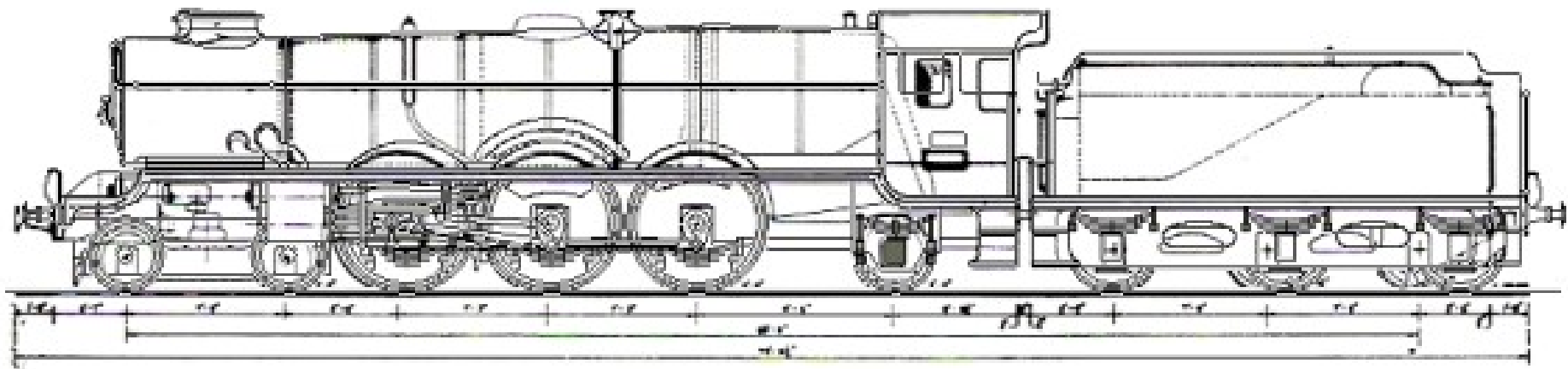


illustration taken from version 4.0.2



The Locomotive needs adjustment: from the Locomotive View select **Edit Loco Data** (if shown)

Comparison (overlay) of the sketchpad design and available outline sketches

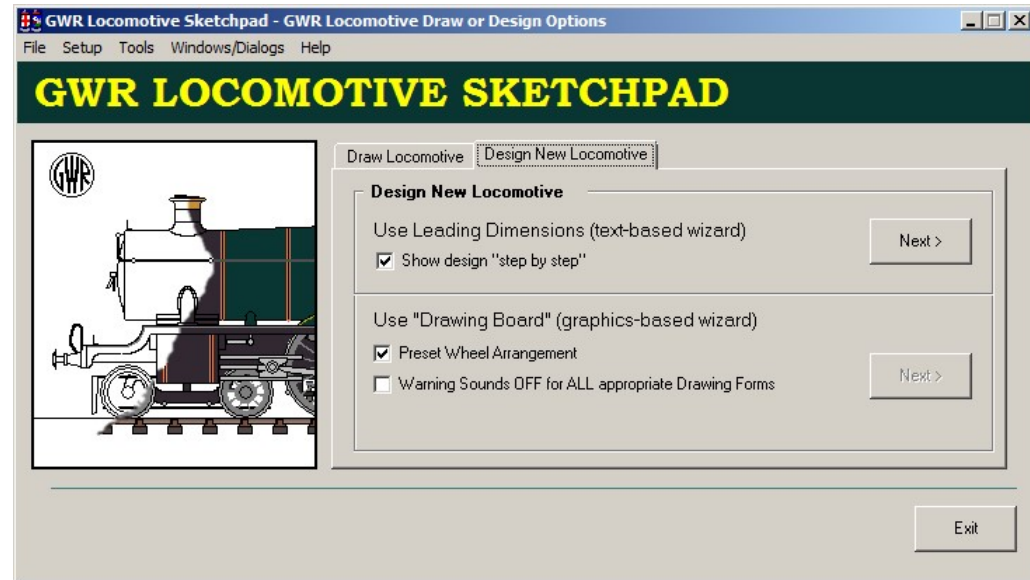


The button **Edit Loco Data** is not shown if the locomotive data file is "READ ONLY" or you have turned off the Advanced Options

Dimension-based "design"

This section shows the GWR Locomotive Sketchpad "dimension" based approach in use.

The Locomotive is the proposed Collett 2-10-2 Tank (1937)

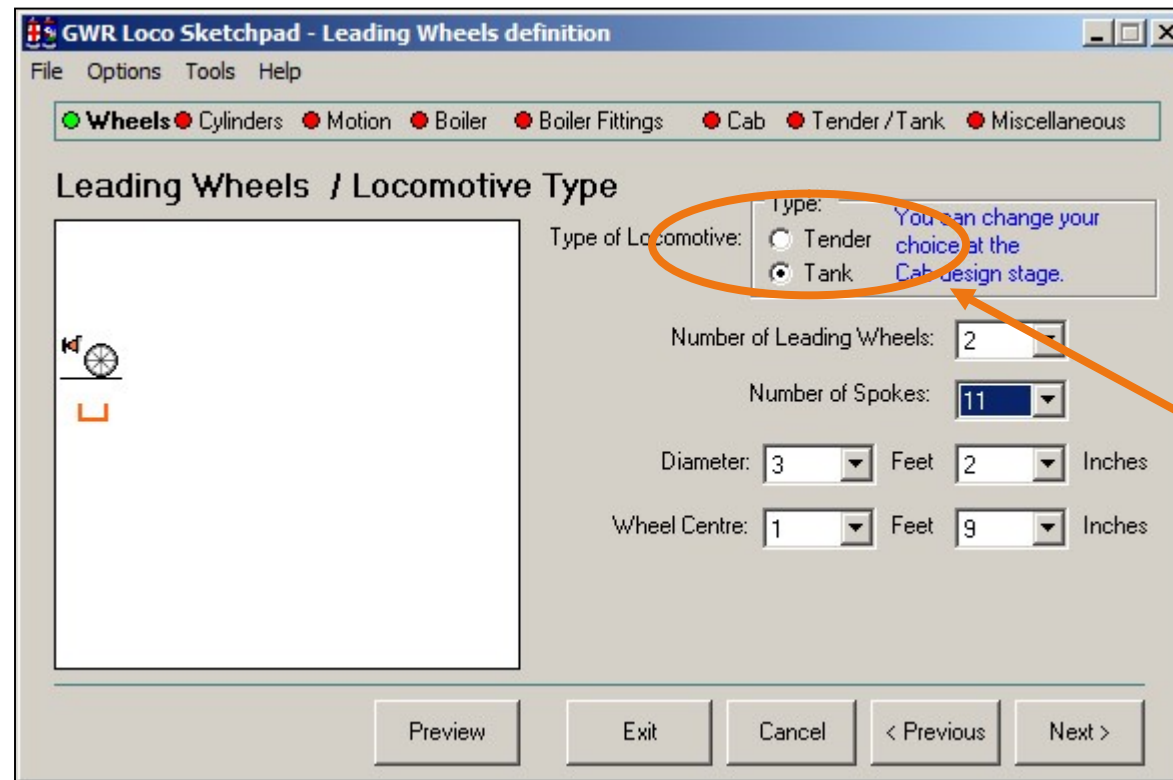


Source book:

Griffiths, D "Locomotive Engineers of the GWR" Patrick Stephens
Limited/Guild Publishing

RCTS Part 9

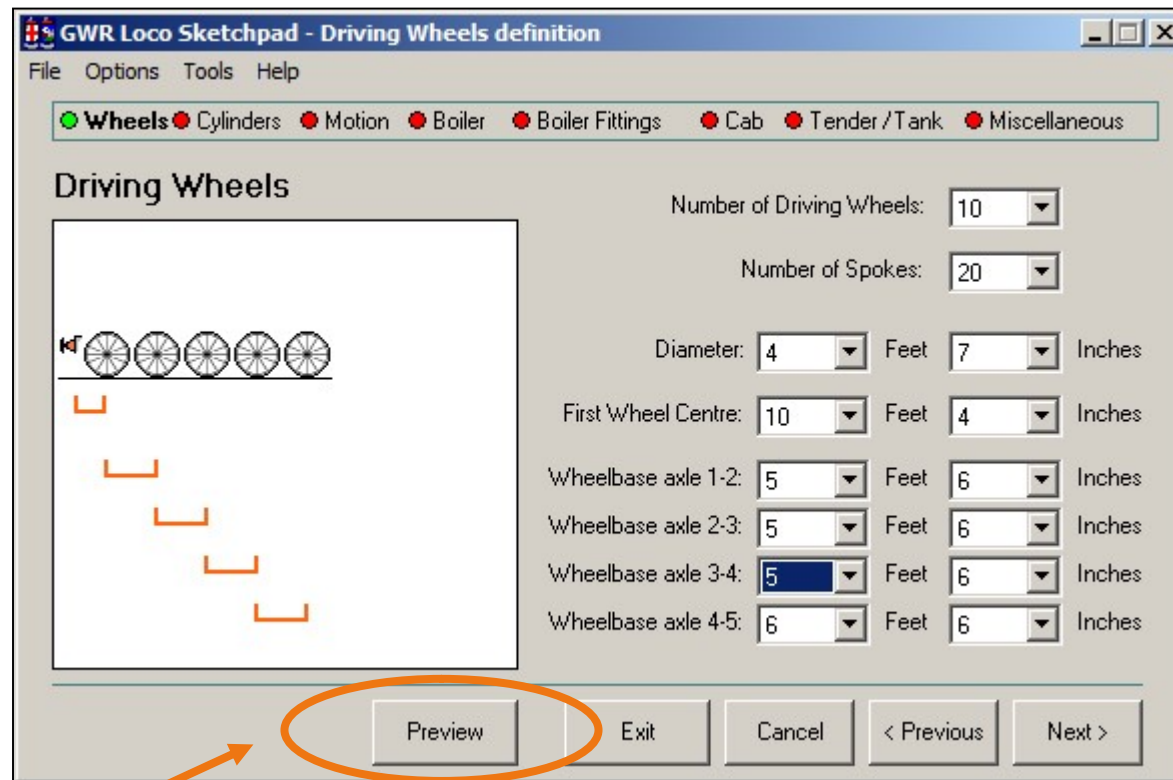
Dimension-based "design"



Tank
Engine

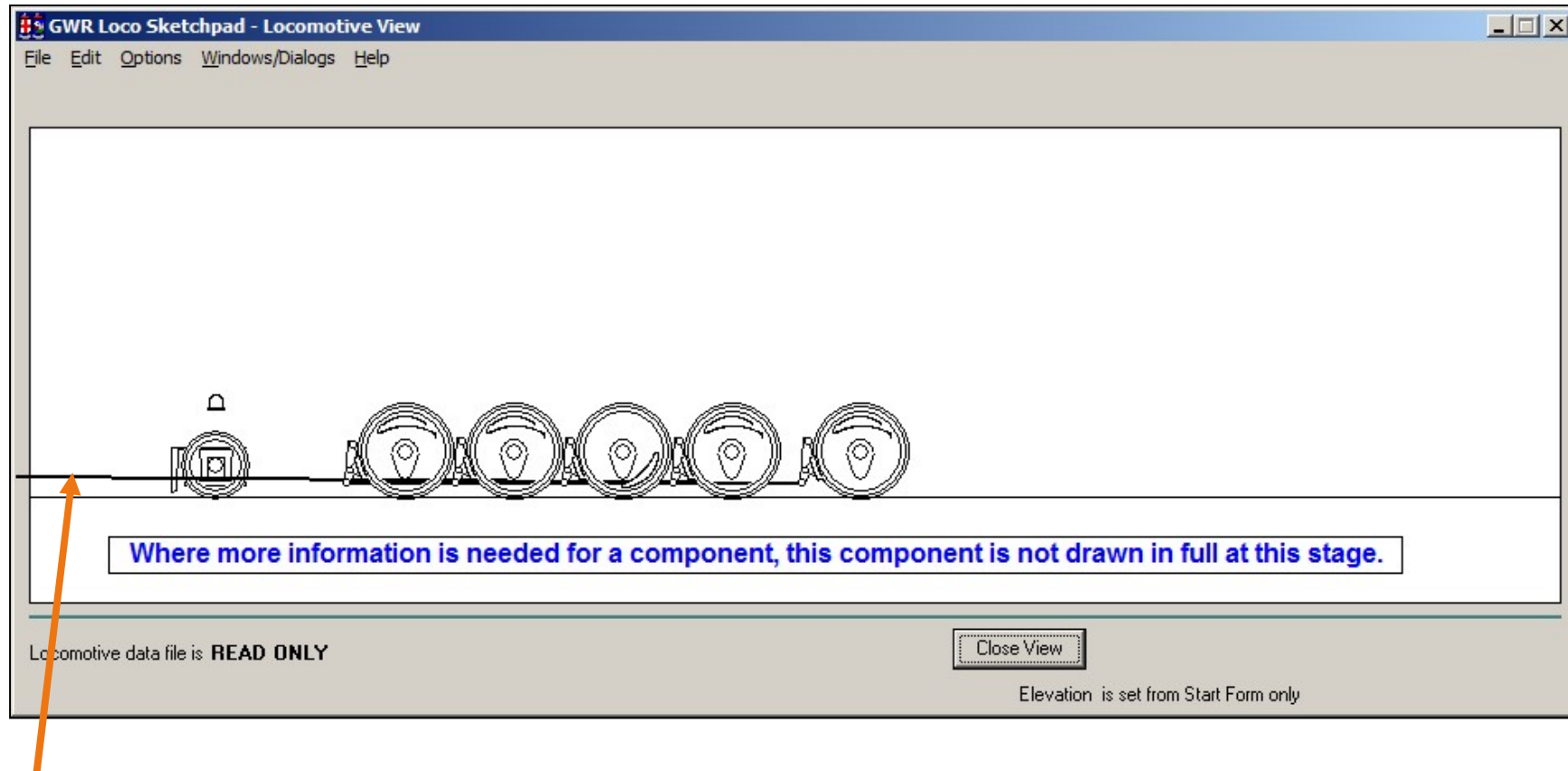
Define critical dimensions for existing, proposed or "freelance" GW-style Locomotives. This wizard is the one to use if you have the measurements to hand, or have a good idea as to the measurements that you need for your locomotive.

You use the previous dialog box or form to enter data for the locomotive leading wheels: in this form, you enter data for the driving wheels. One important measure is the distance from the front of the loco to the first driving axle centre line.



Optional preview of drawing during design phase.

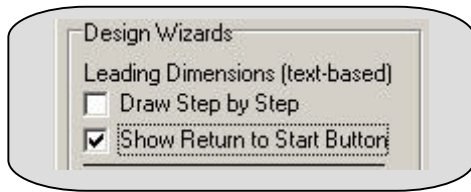
The dimensions-based wizard draws in full outline, as known at the current stage of design.



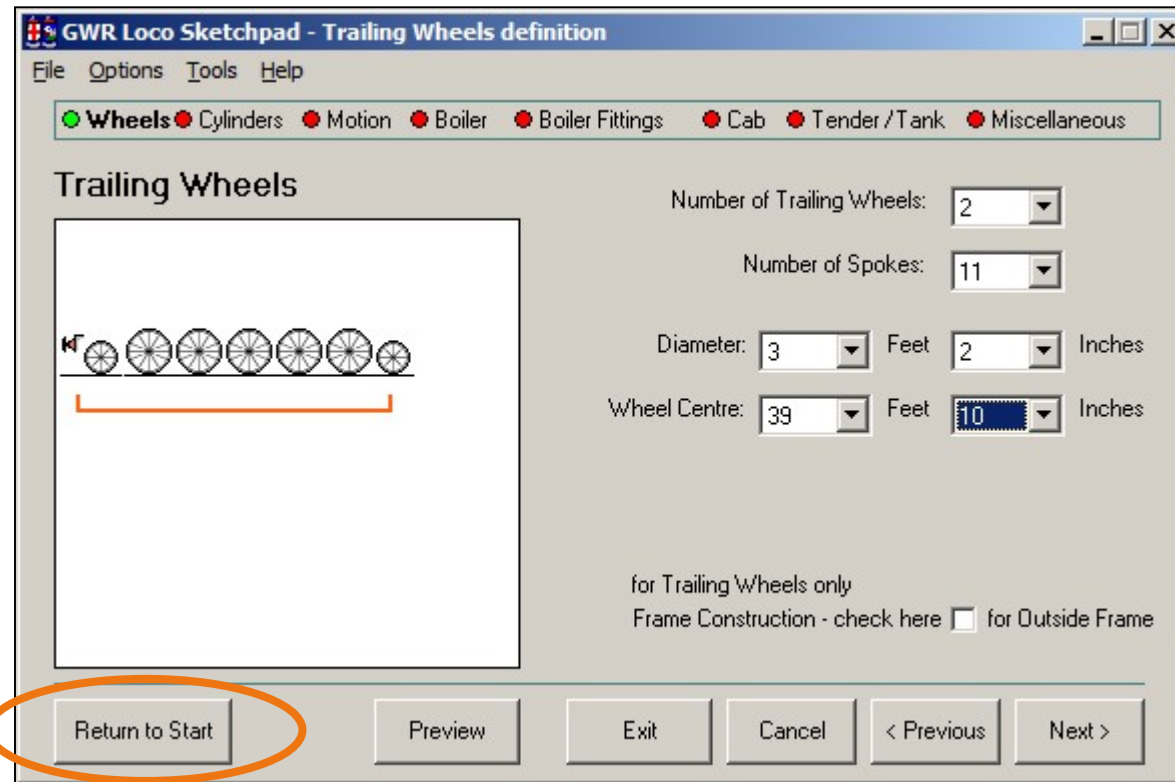
As not all information is available at this point, you may get some strange drawings that then adjust as more information is entered.

In this form, you enter data for the trailing wheels. Again, one important measure is the distance from the front of the loco to the first trailing axle centre line.

The screenshot shows the 'GWR Loco Sketchpad - Trailing Wheels definition' window. It features a menu bar with 'File', 'Options', 'Tools', and 'Help'. Below the menu is a toolbar with radio buttons for 'Wheels' (selected), 'Cylinders', 'Motion', 'Boiler', 'Boiler Fittings', 'Cab', 'Tender / Tank', and 'Miscellaneous'. The main area is titled 'Trailing Wheels' and contains a diagram of a locomotive's trailing axle arrangement with an orange dimension line indicating the distance from the front to the first trailing axle. To the right of the diagram are several input fields: 'Number of Trailing Wheels' (2), 'Number of Spokes' (11), 'Diameter' (3 Feet 2 Inches), and 'Wheel Centre' (39 Feet 10 Inches). At the bottom right, there is a checkbox for 'Frame Construction - check here for Outside Frame'. The window concludes with a row of buttons: 'Preview', 'Exit', 'Cancel', '< Previous', and 'Next >'.

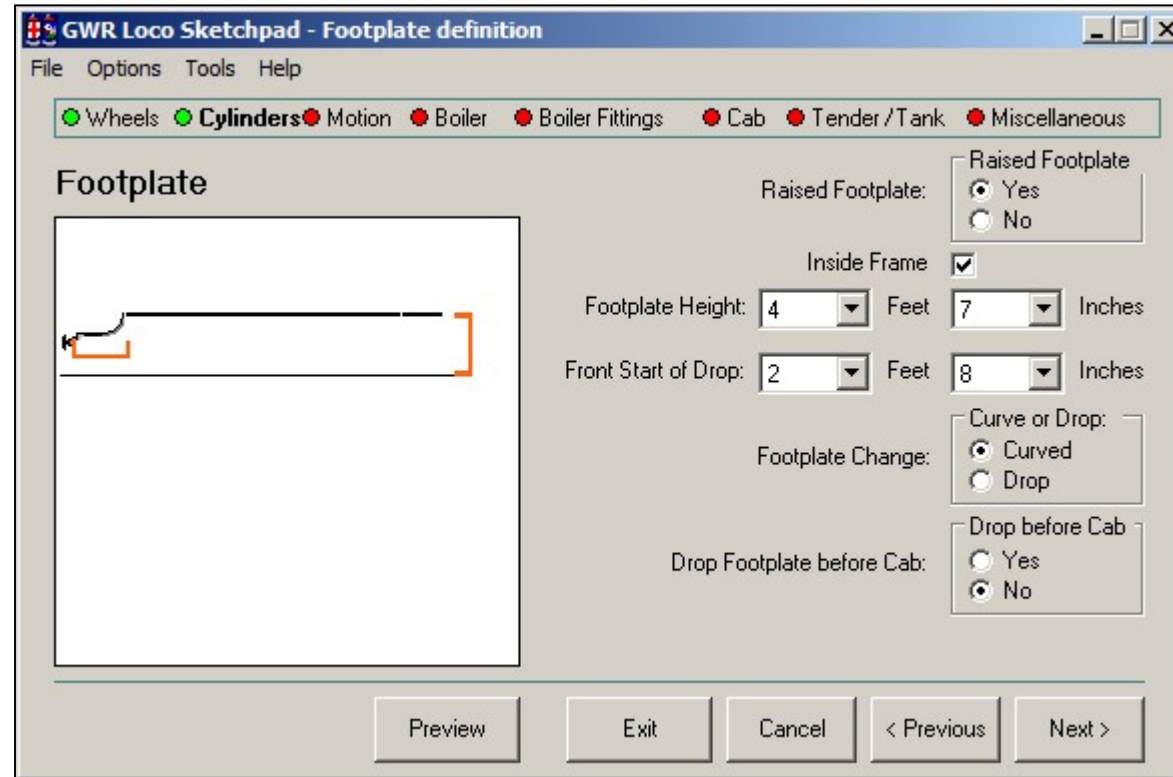


The General Options provide a "Return to Start" of the drawing wizard. This gives you a limited rework opportunity.



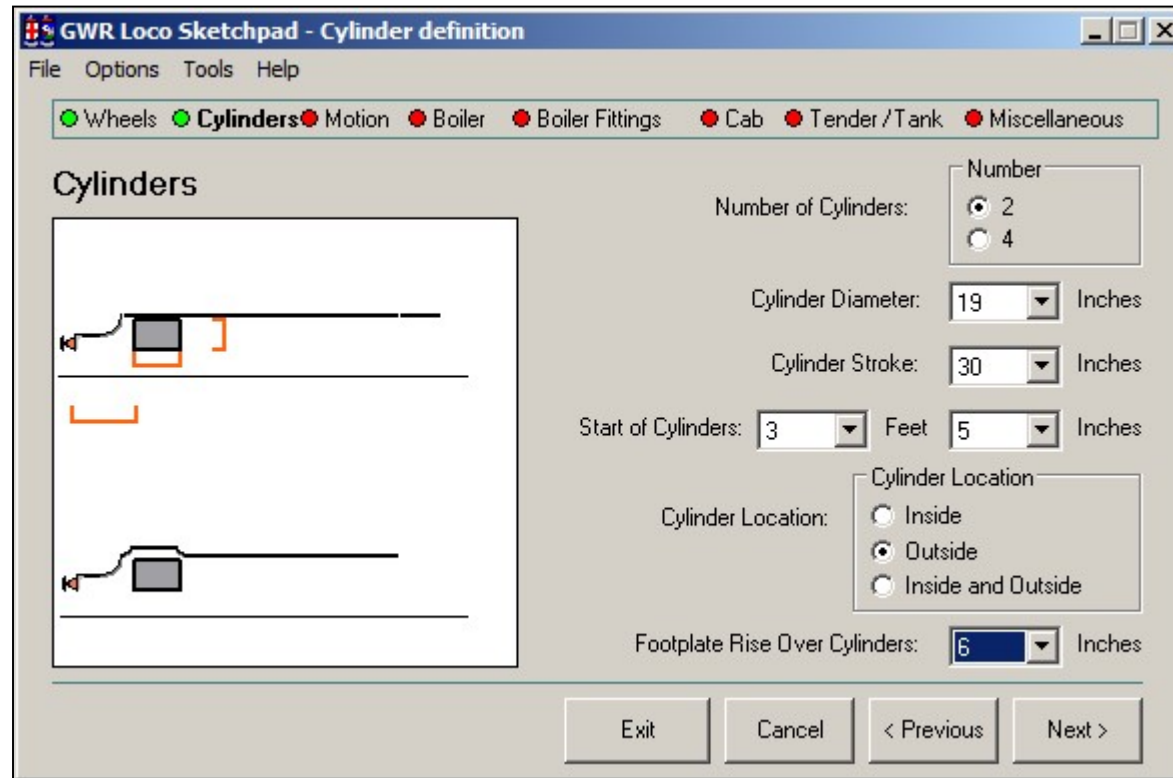
You have a limited choice of frame construction at this point: you can edit this later from the Locomotive View.

The footplate can be raised from its default height - above the buffer beam. You can select a "curve" between the two levels, or a simple "drop".

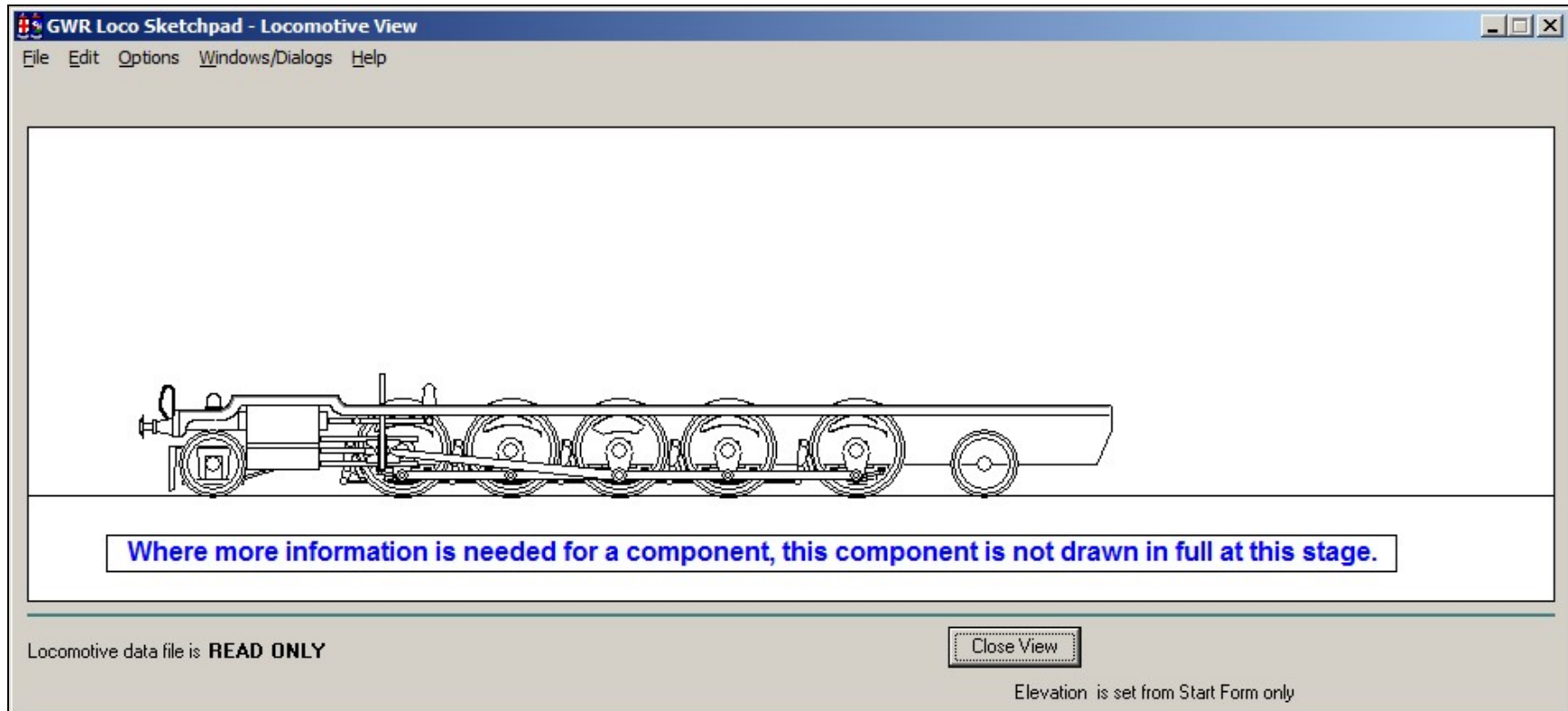


Passenger locomotives usually dropped the footplate level before the cab. Tank locomotives with raised footplates dropped the footplate after the cab door.

Size and position the locomotive cylinders. Two cylinder locos could have the cylinders inside the frame or outside the frame.

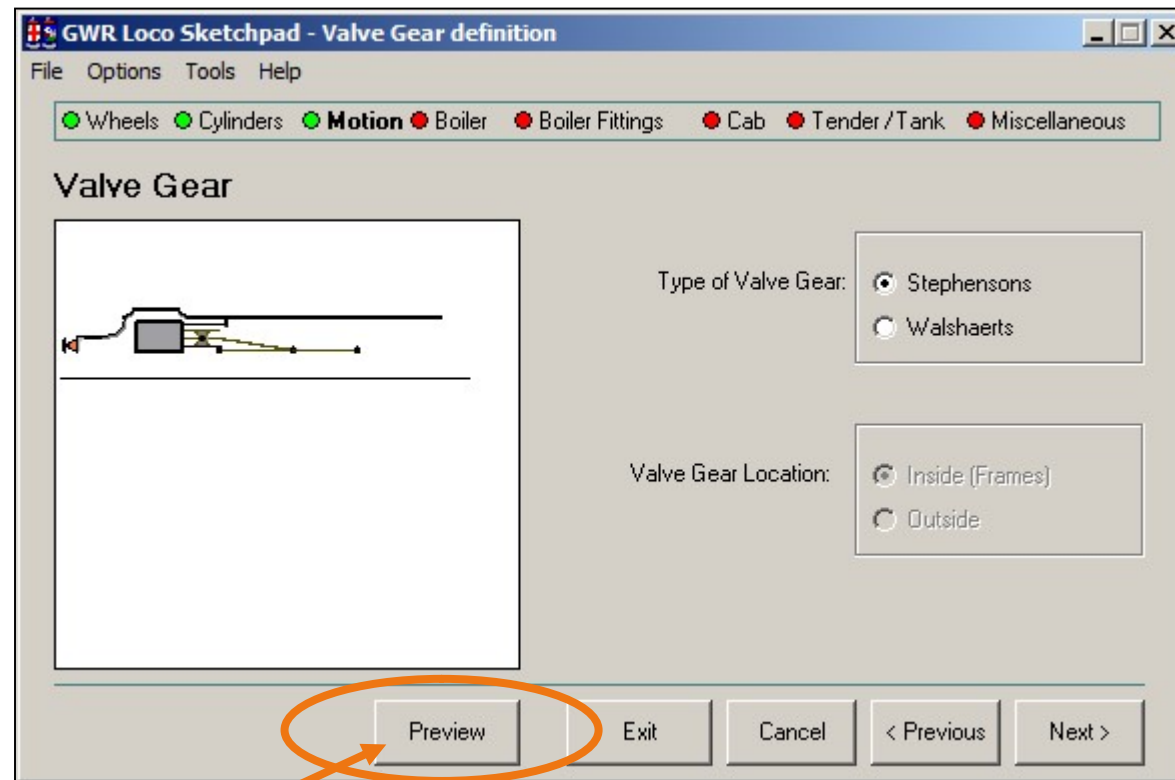


Some locomotives ("Grange", "Manor", 72xx Tank) had the footplate raised over the cylinders.



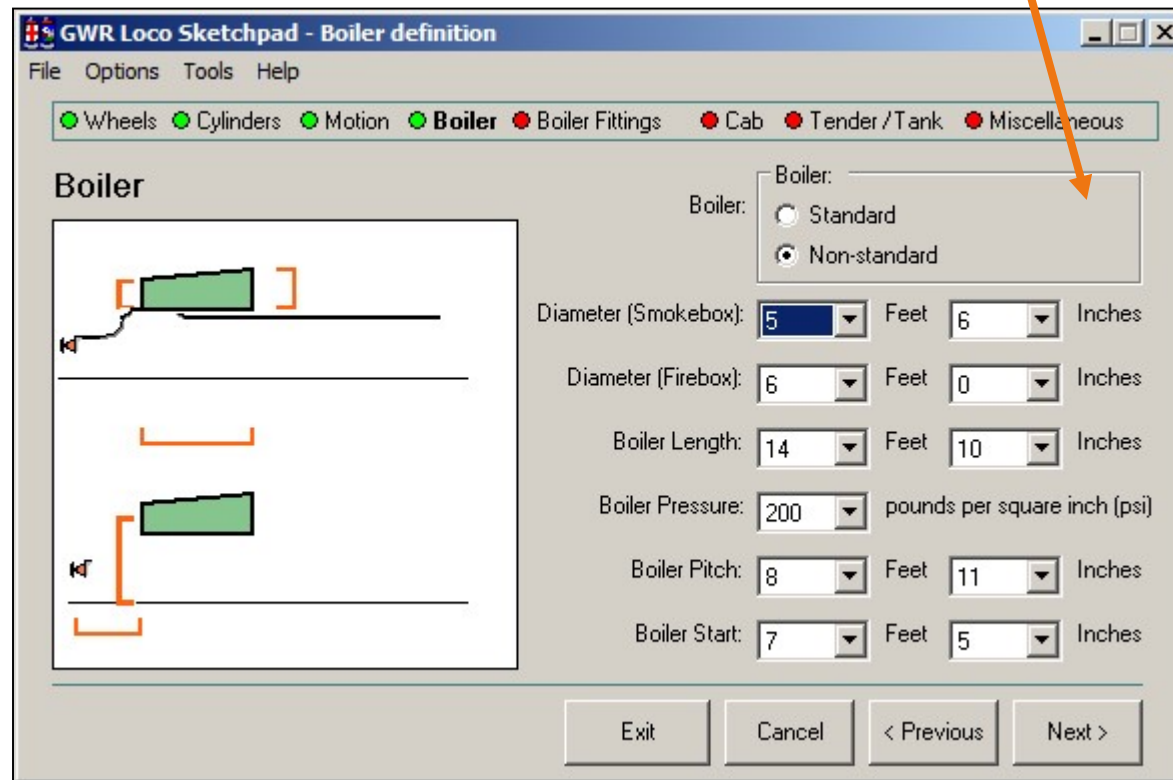
The frame, wheels and cylinders (the "engine") of the locomotive.

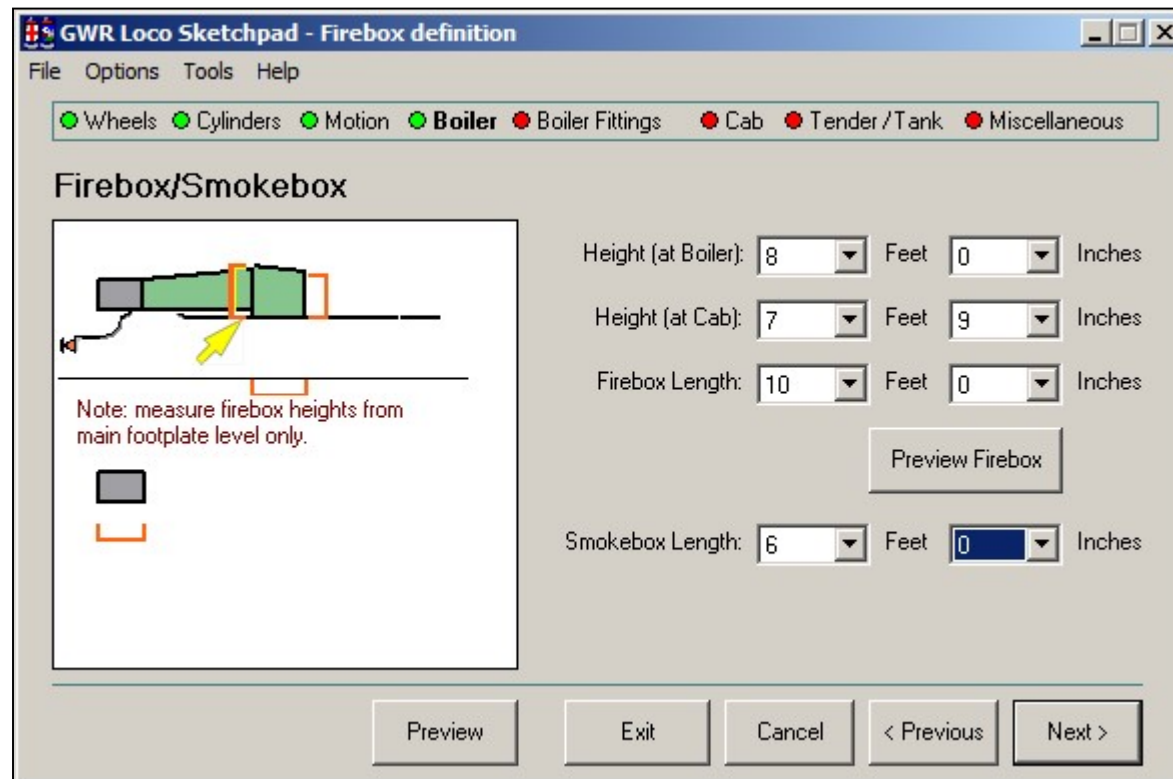
If you have outside cylinders, select the type of valve gear



Turn the draw Step-by-Step option off (or on) during your design session.

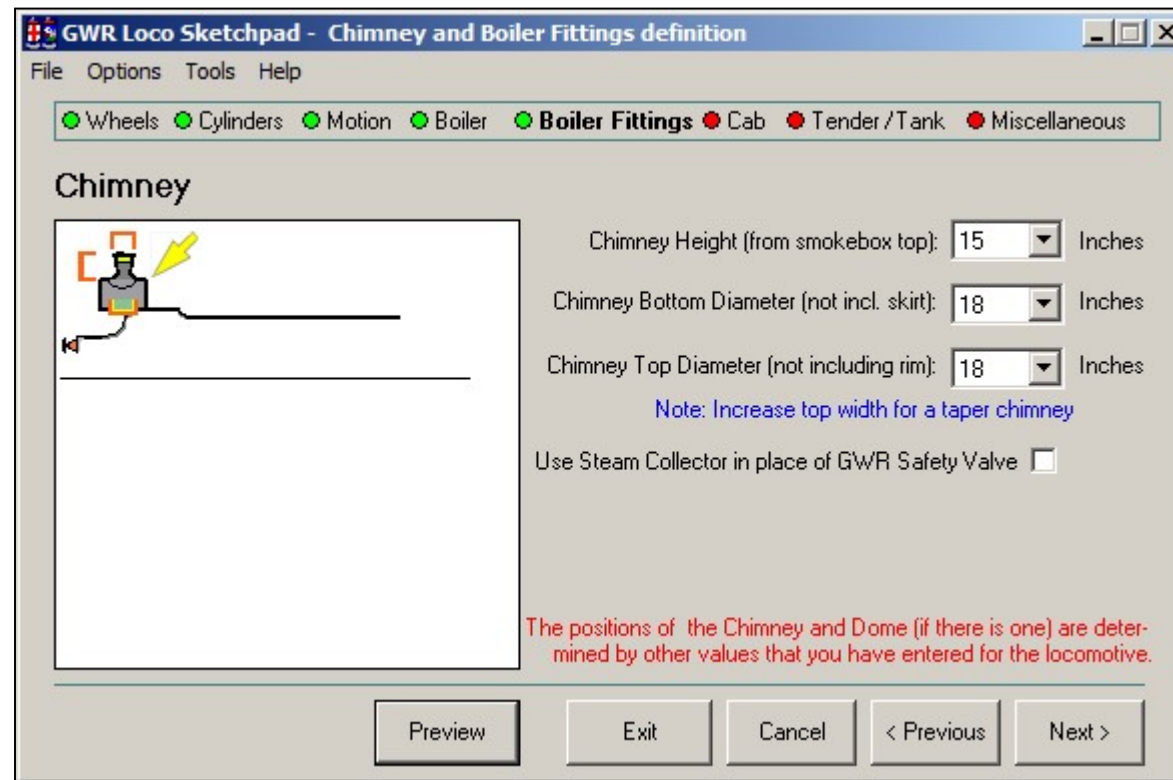
Standard or Non-standard Boiler





Set boiler to a Non-Standard Boiler if you need to adjust the firebox dimensions

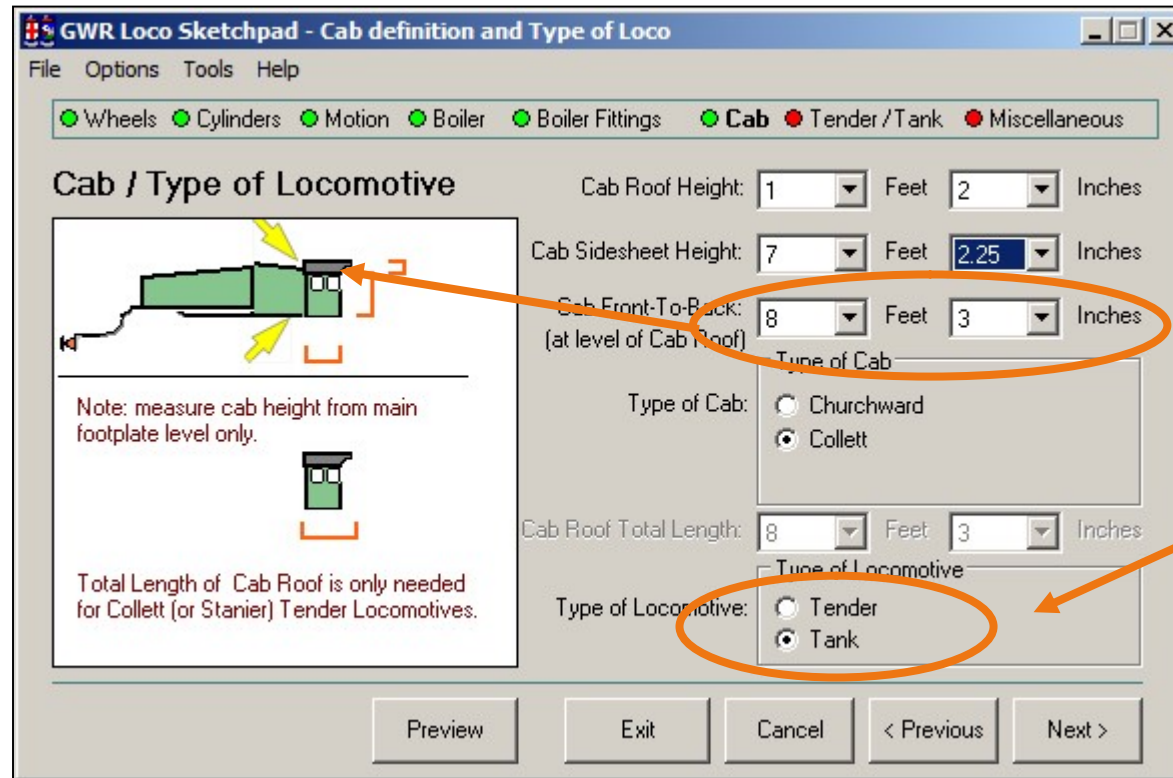
In the completed locomotive drawing, the chimney is placed in position based on internal rules and algorithms. You are able to set the dimensions of the chimney.



Similarly, you can set the size of the dome (on parallel boilers) (or Steam Collector on coned boilers if this option is available)

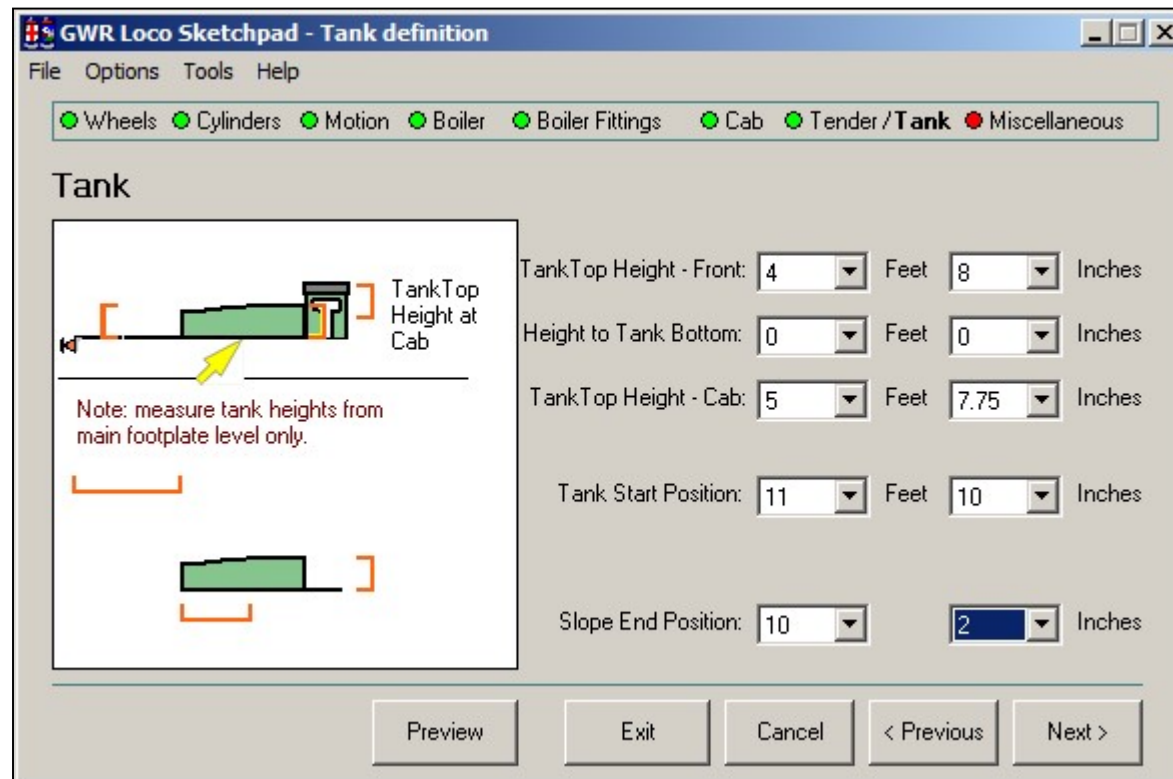
You can choose a Churchward or Collett style cab (or a Stanier style cab if the option is available). For the Collett (and Stanier) style, you also set the length of the cab roof.

For a Tank Engine:
Use the full
Cab width
at roof level



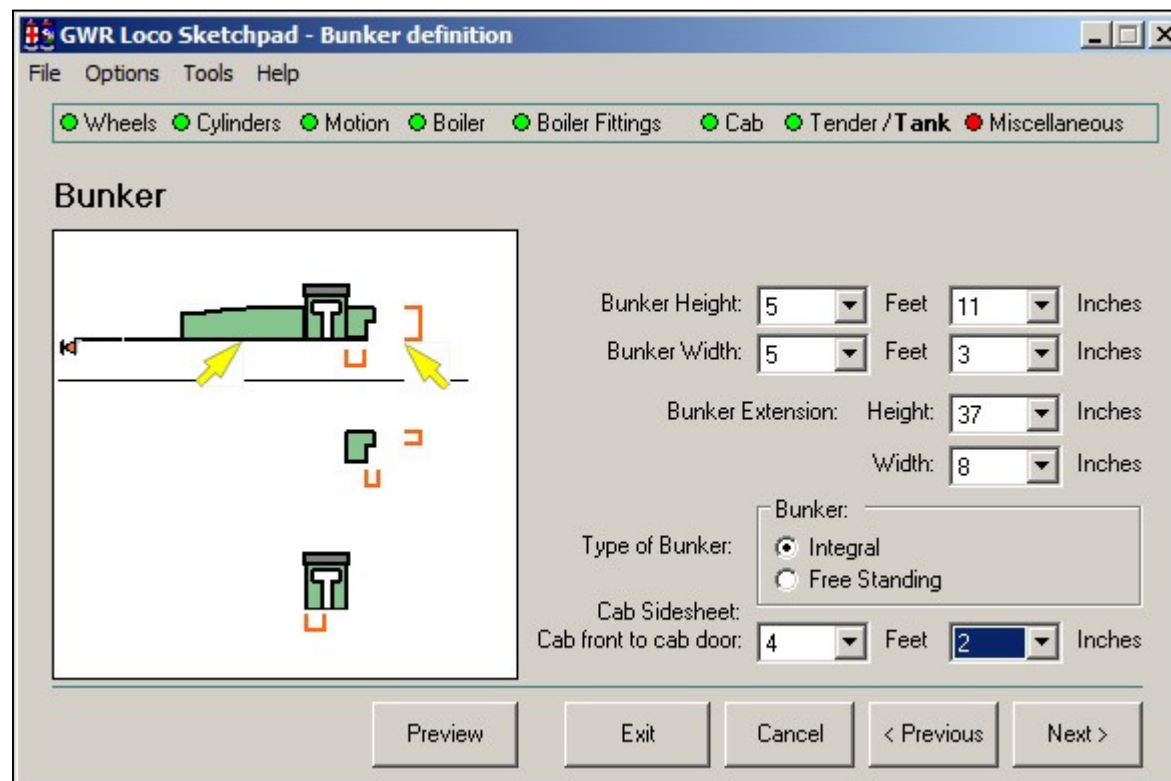
Tank
Engine:
confirm
design

For a Tank Locomotive, the Cab Front-To-Back measurement is taken to be the Cab Front-To-Back measurement at the cab roof level.

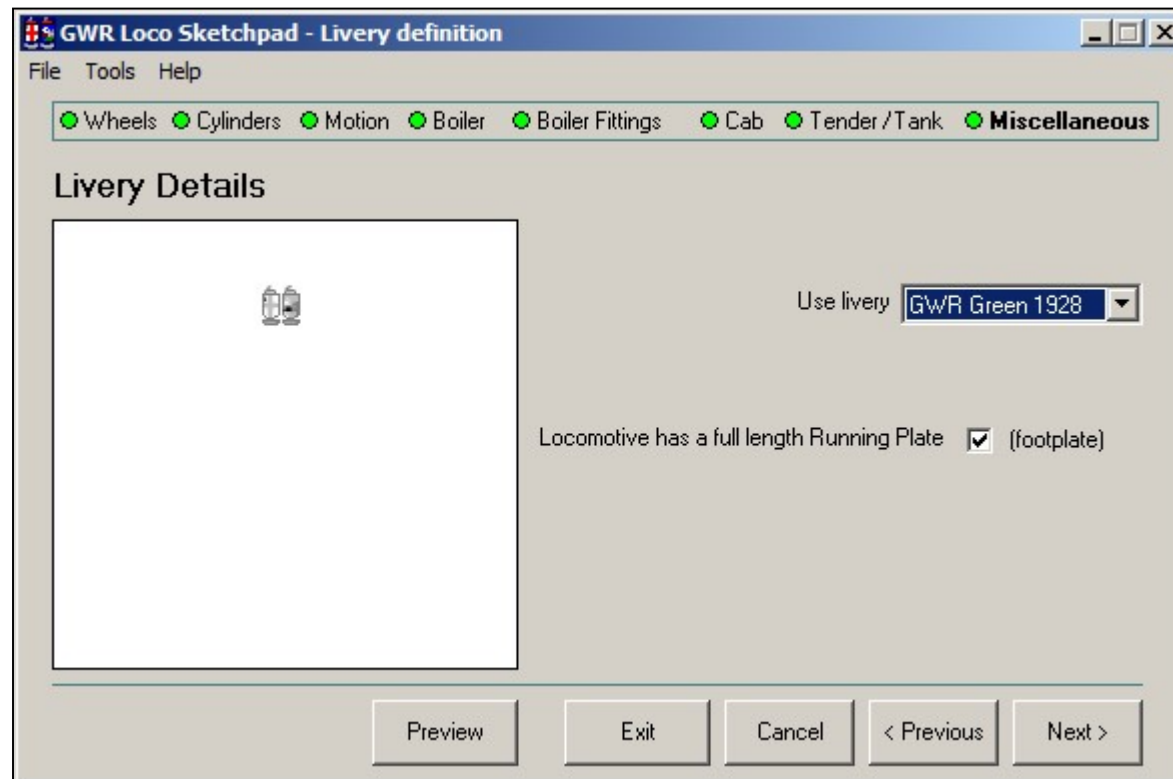


Tank measurements estimated

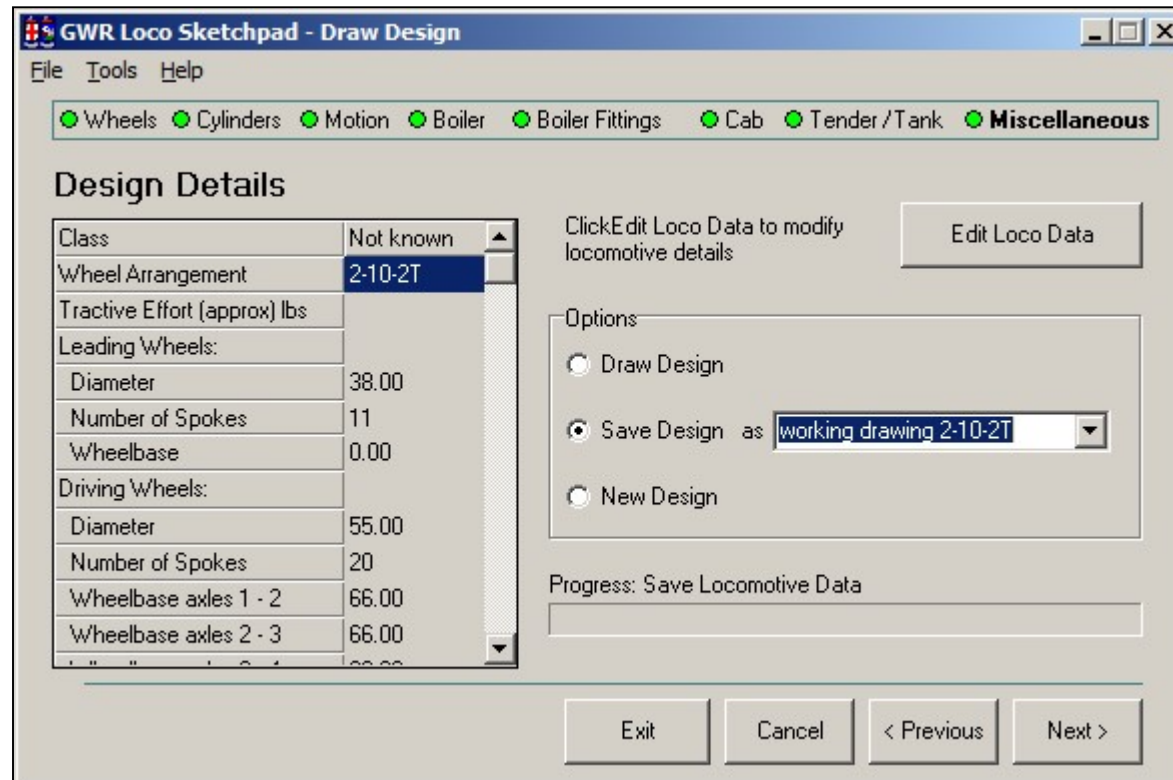
Bunker measurements estimated



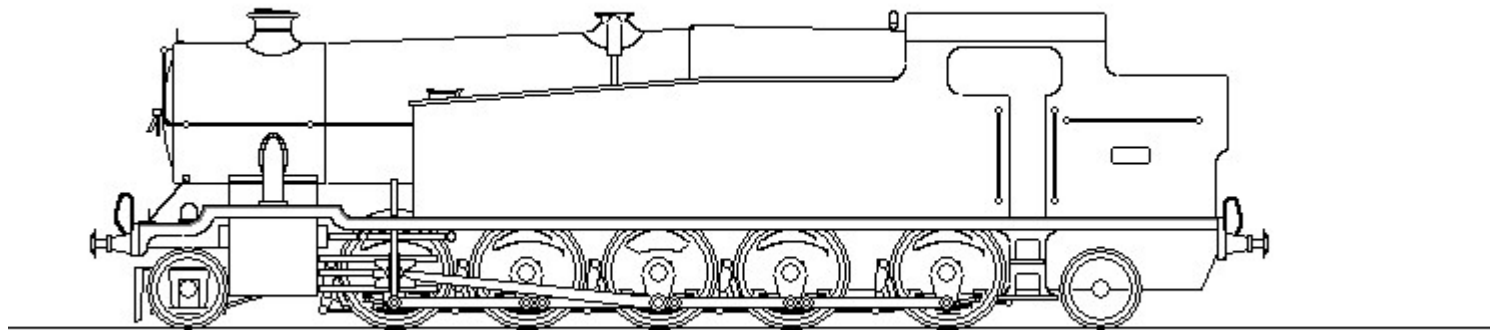
For a Tank Locomotive, the Cab Sidesheet measurement is used to define the measurement to the leading edge of the cab door (in the data file, this is the Cab Front-To-Back measurement).



Select the livery.

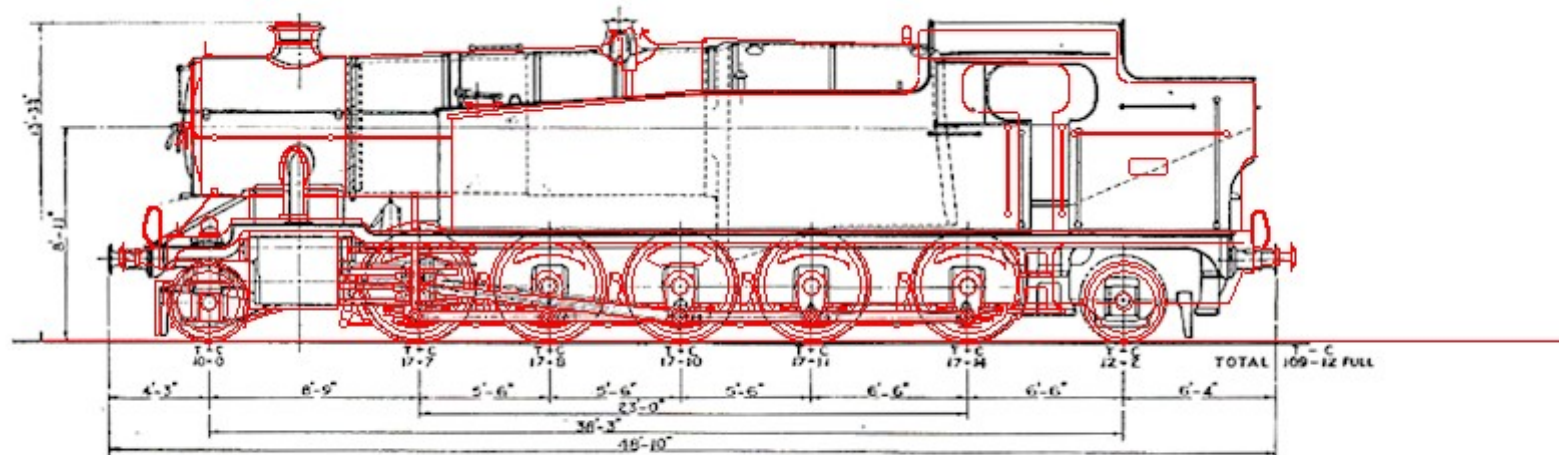


Check the dimensions and save your new locomotive design.



"Weight Diagram" (*compare with published pictures*)

The sketch has been overlaid on the engine diagram published in the RCTS "Locomotives of the GWR", part 9



2-10-2T with Standard No. 7 boiler (1937-8)

195

Still some adjustments to make ...



1 Make changes to dimension

2 Click **OK**

Tank: to cab door only

You see a warning message when you edit a locomotive which is *not* part of GWR Loco Sketchpad

Field	Value
Class:	proposed 2-10-2T
Cab:	
Style	Feet Inches
Cab Front-To-Back	4 2
Cab Height	7' 3"
Roof Height	1' 2"
Roof Length	7' 11"
Tank:	
Start Position	12' 1"
Tank Start Height	0' 0"
Tank Start Top	4' 8"
Slope End Position	22' 10"
Slope End Height	5' 11"

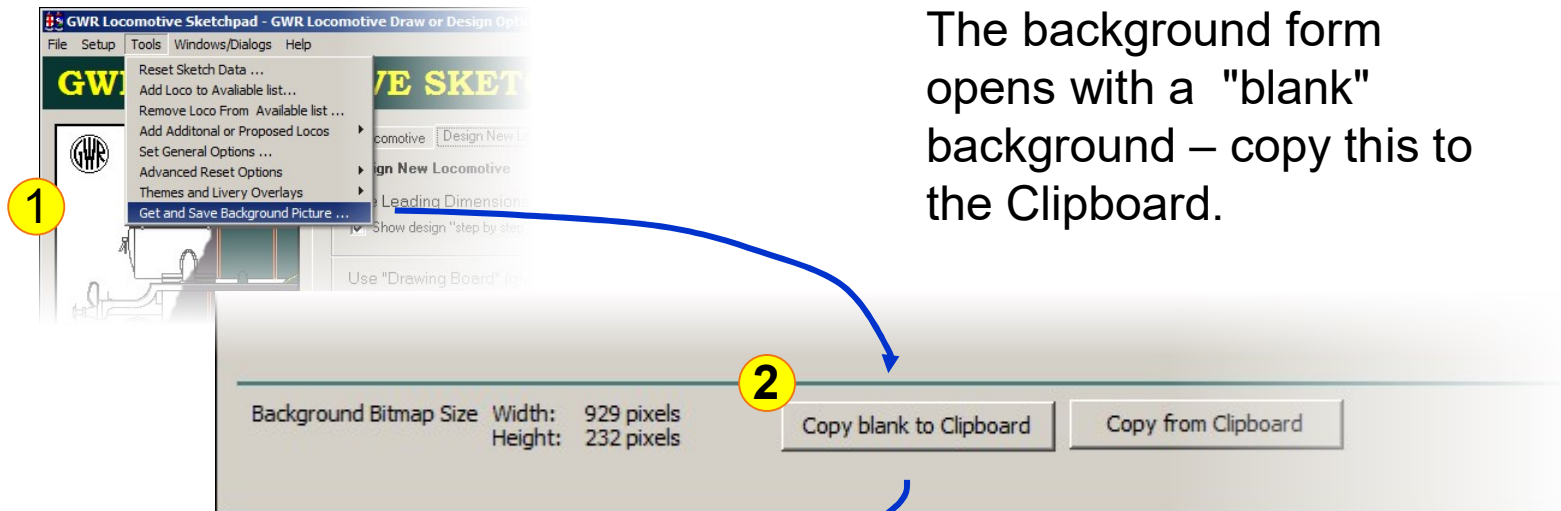
When all necessary changes are made, click **OK** on the Edit Loco Data form.



You can add your own Backgrounds

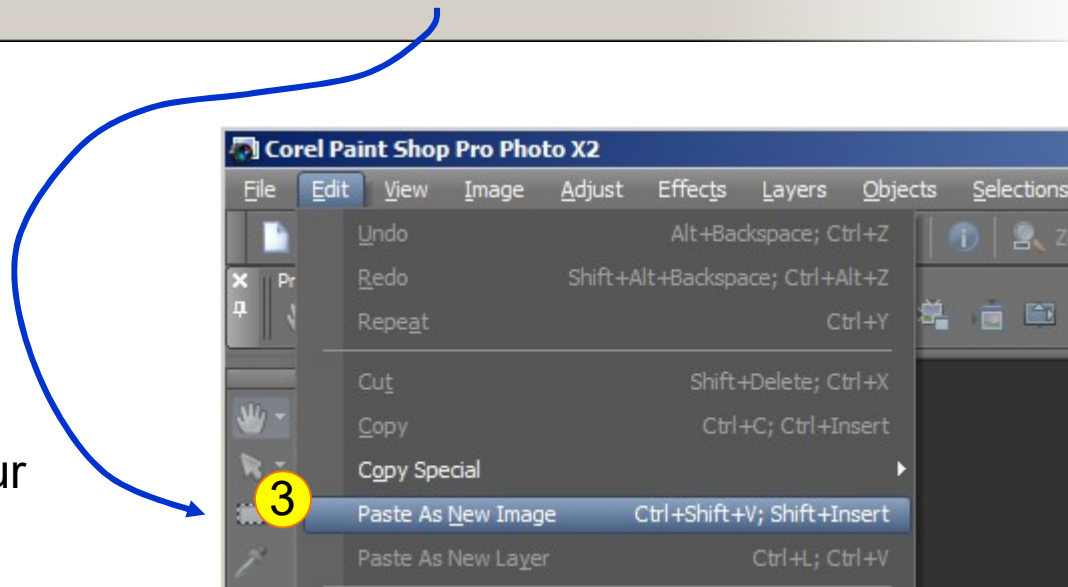


The Great Western Society's Travelling Post Office vehicle forms a suitable background for a "Hall" class locomotive.



The background form opens with a "blank" background – copy this to the Clipboard.

And copy this blank background into a suitable graphics package (image editor). This makes sure that your image size is correct.



see next →

4

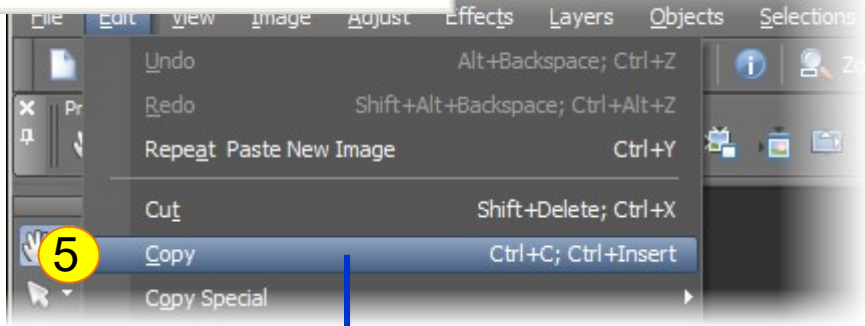


Copy your new background, paste into the blank background and position...

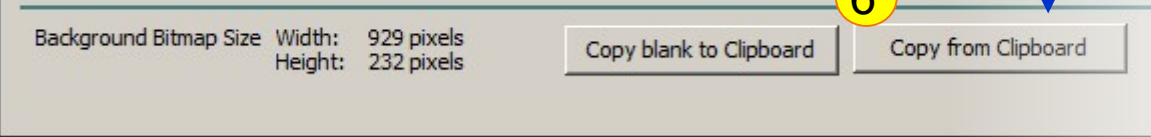
Copy your completed new background to the clipboard

...

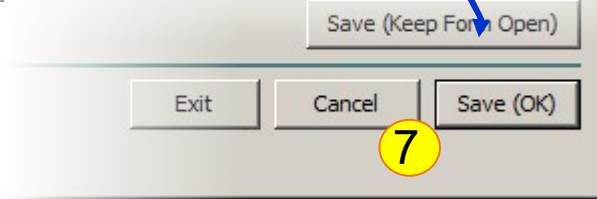
... and copy from the clipboard in the Background form



6



Check and save.

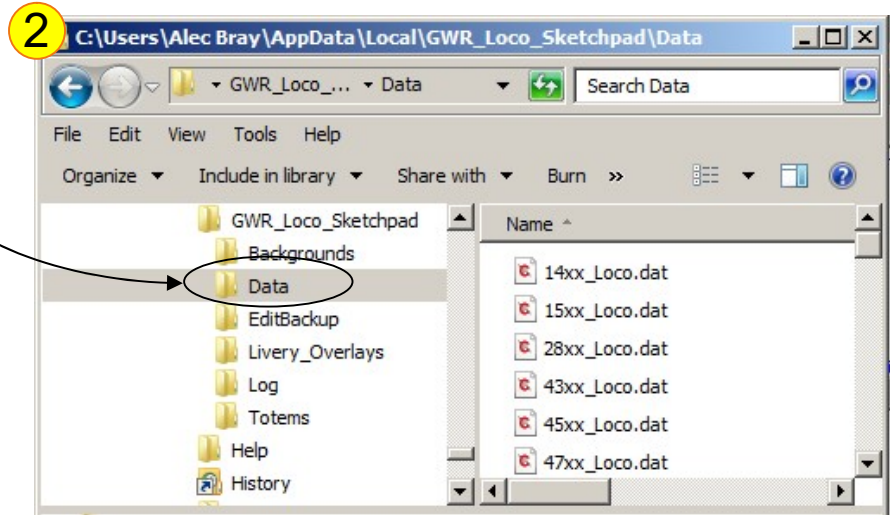


Add New Locomotive to View



Copy to your local, writeable Data folder

See Help → About for your local, writeable Data folder



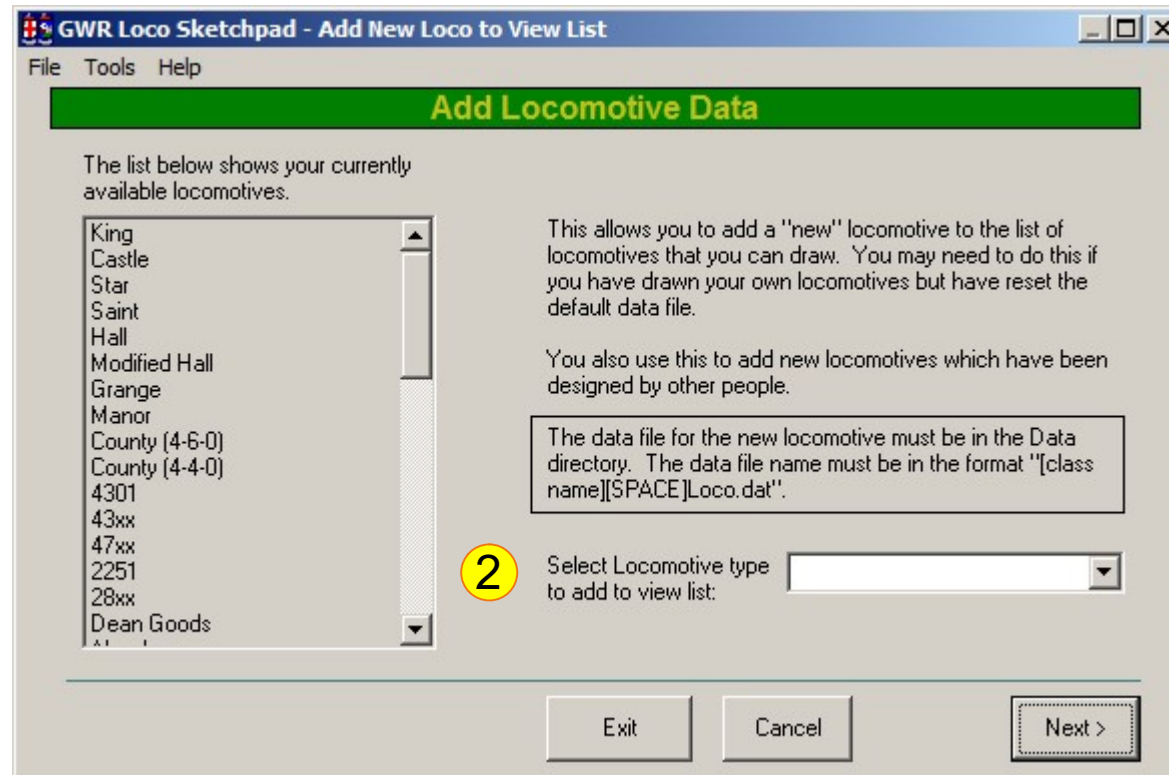
New Loco Data file

You can share locomotive data files with other users of GWR Locomotive Sketchpad



see next →

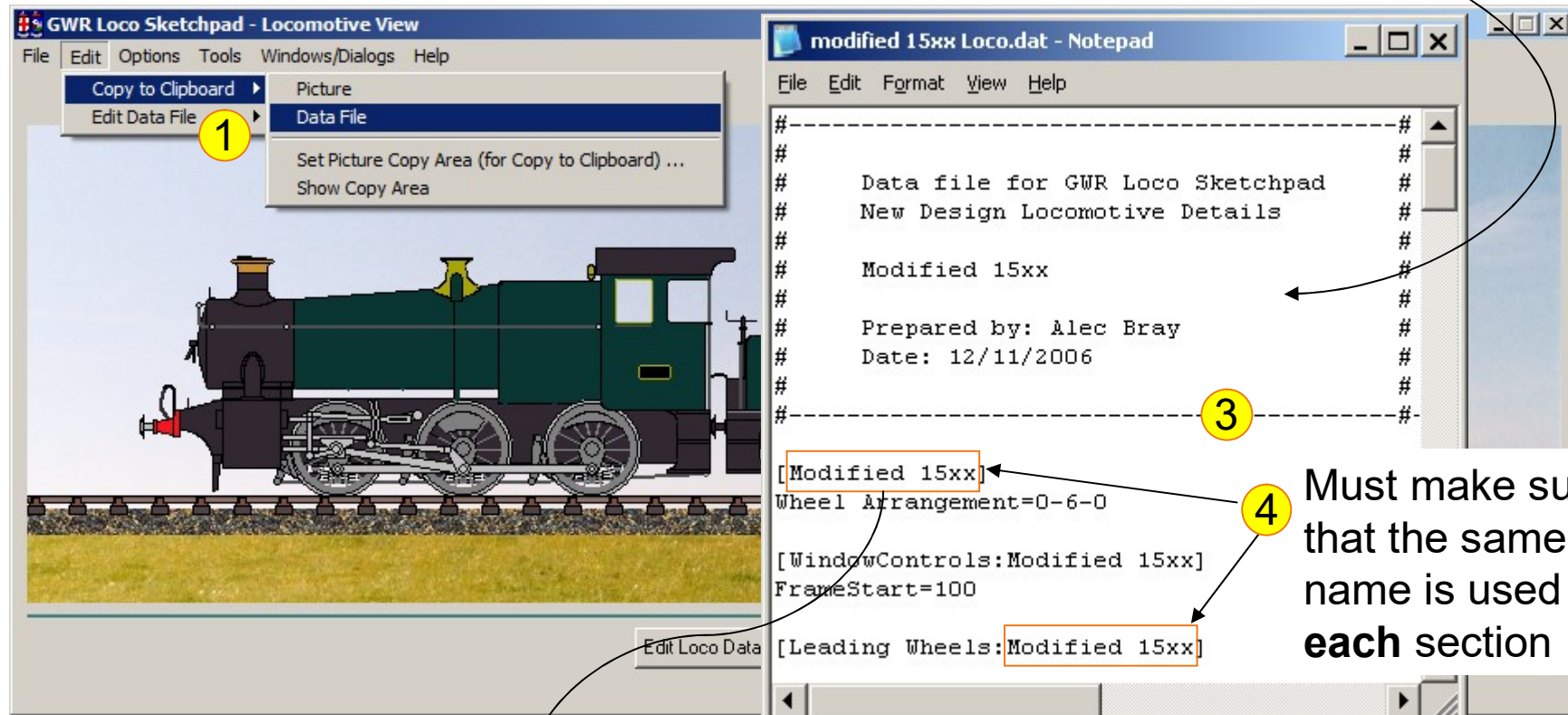
From Start form **Tools** menu



Select new locomotive type or class from drop down list: click **Next**.

One way copy a locomotive data file is to use the **Copy to Clipboard** menu and paste into Notepad.

2 Edit details

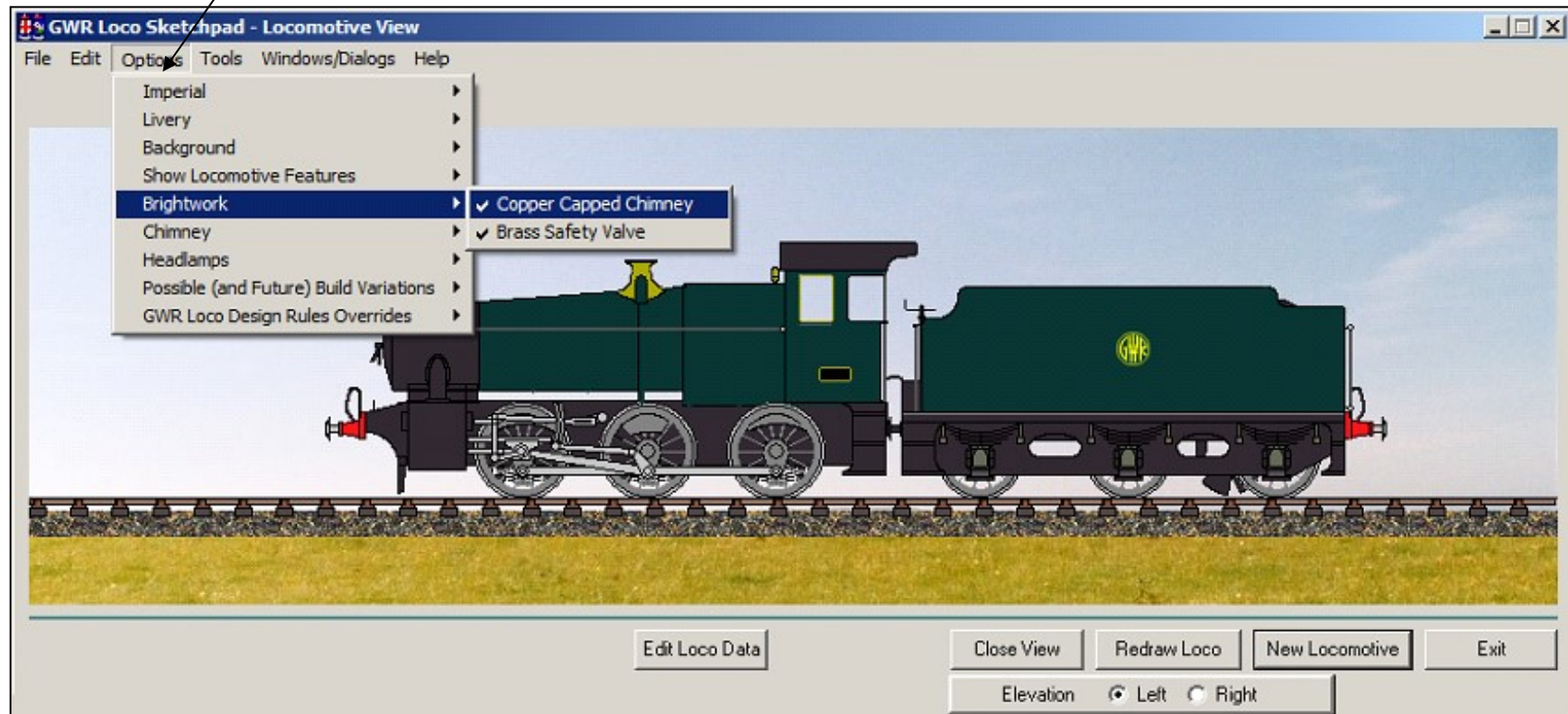


Must make sure that the same name is used in **each** section

5 save as `Locomotive Type Loco.dat` (**must** include " Loco.dat")

illustration taken from version 4.0.2

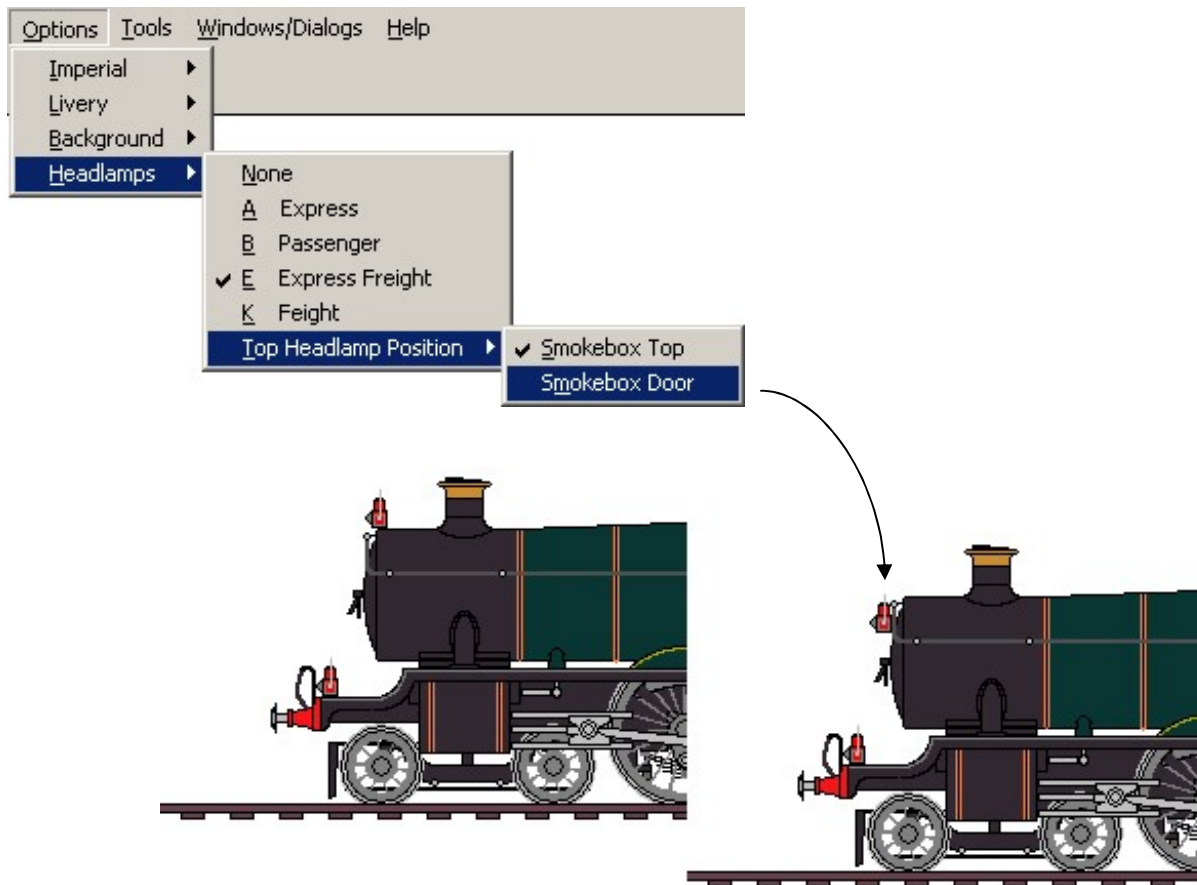
There are a number of run-time options that you can select. These depend on the locomotive type and the livery that you have chosen.



The 15xx Pannier Tank - but now with a small version of the Hawksworth tender.

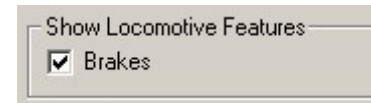
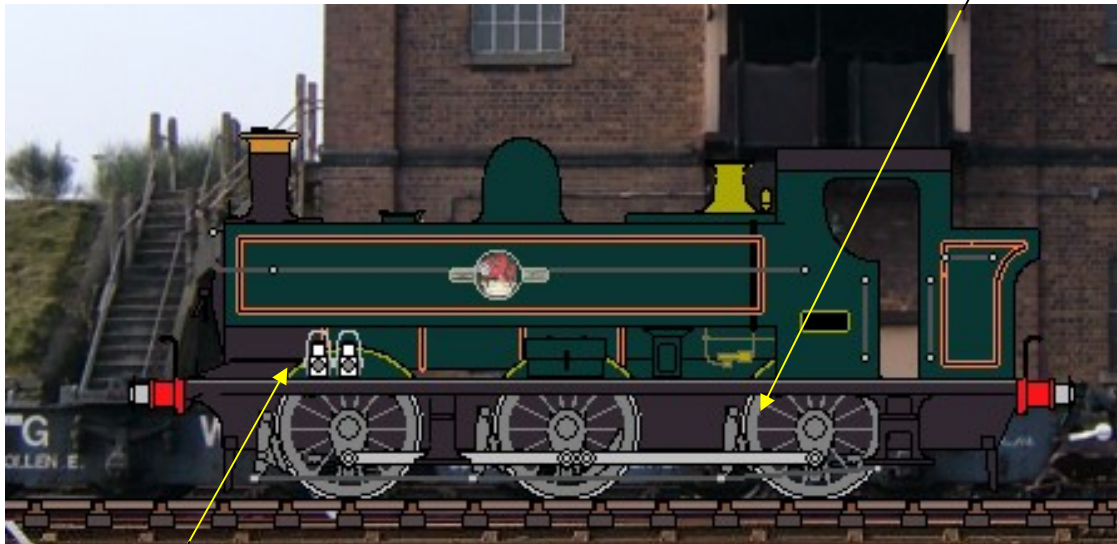
illustration taken from version 4.0.2





Add headlamps - change position of top headlamp.
Red headlamps are provided for GWR liveries, white for BR liveries

Optionally show brakes and
brake rodding.



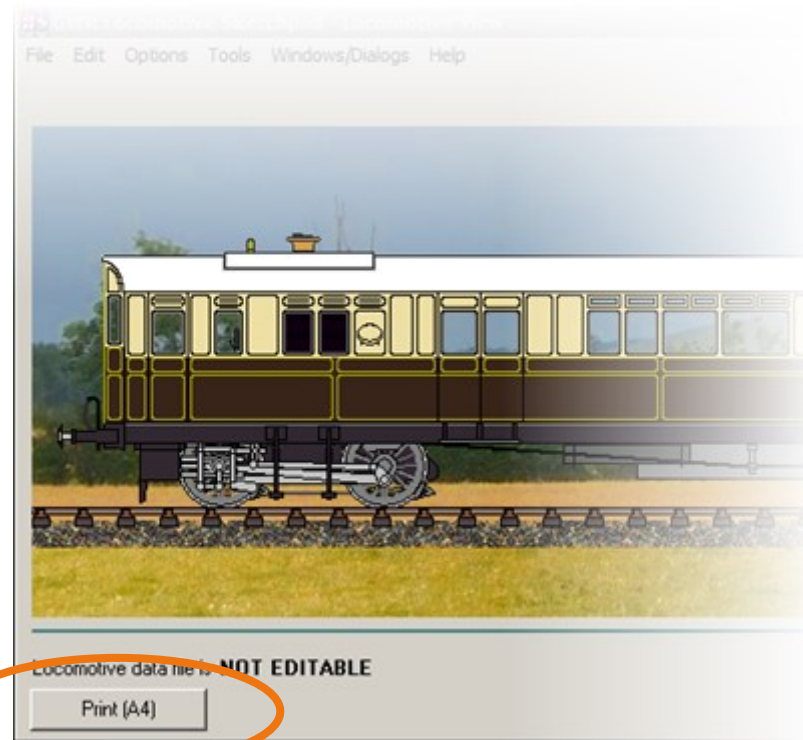
Pannier Tank headlamps can be parked when they are not needed.



Optionally show a Home (or Starting) signal in the left or right elevations.



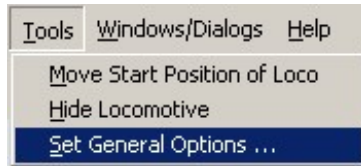
Optionally show a Print button
in the Locomotive View



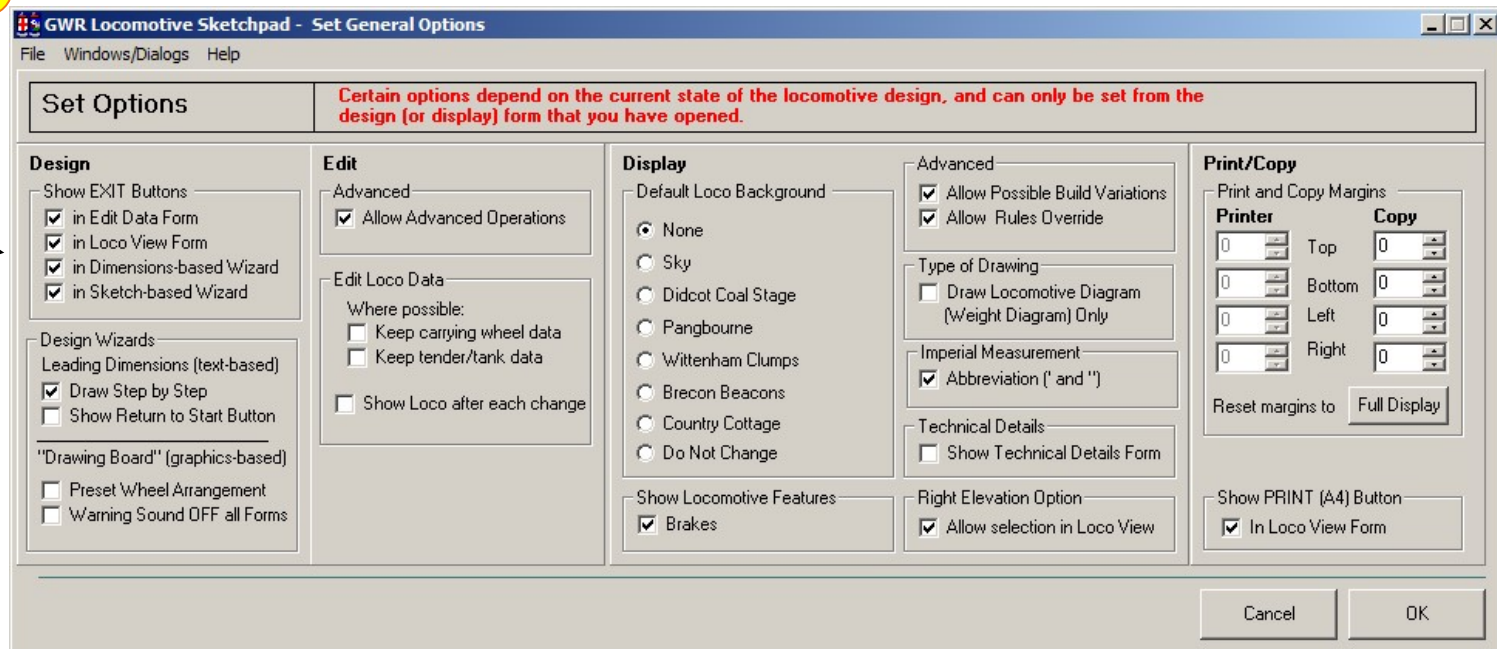
The printer has to be set up to
print on European A4 paper or
American Letter or US Letter
size paper (or equivalent)

General Options

General options can be set on individual forms or set in one central option form.



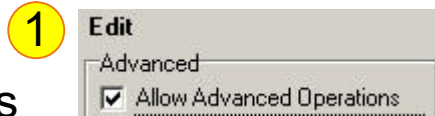
2



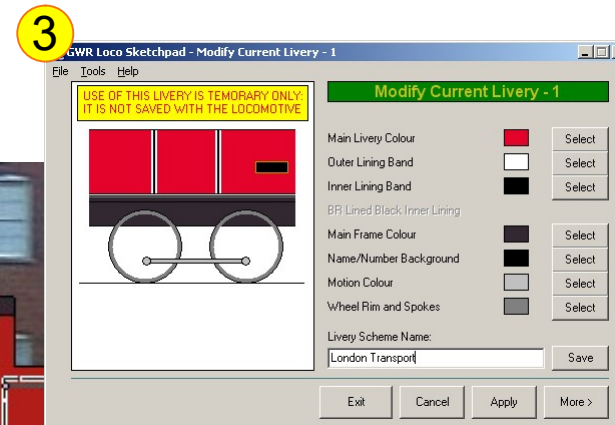
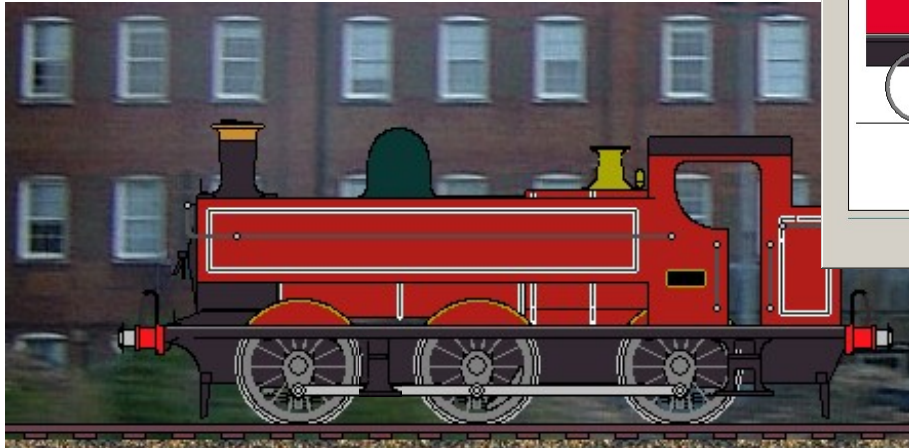
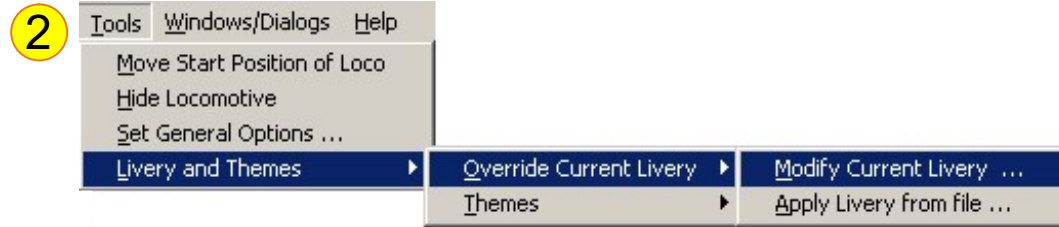
Menu choices vary from form to form

Some options are specific to an individual form and are not shown here.

If you have opted to Allow Advanced Operations



From Locomotive View select one of the Livery Overlay options



Using this feature, you can "repaint" your locomotive.

illustration taken from version 4.0.2



Themes allow you to apply

- Background
- Base Livery
- Livery Overlay ("repaint")
- Totem

in one operation

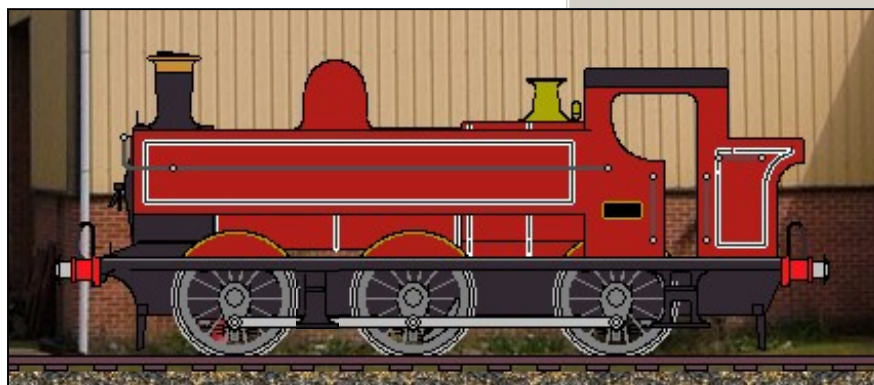
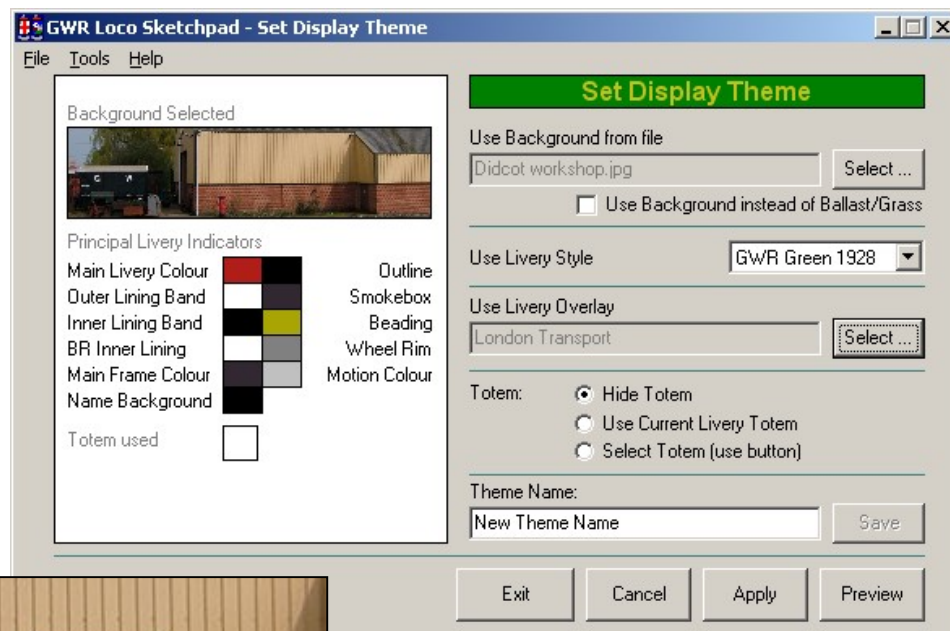
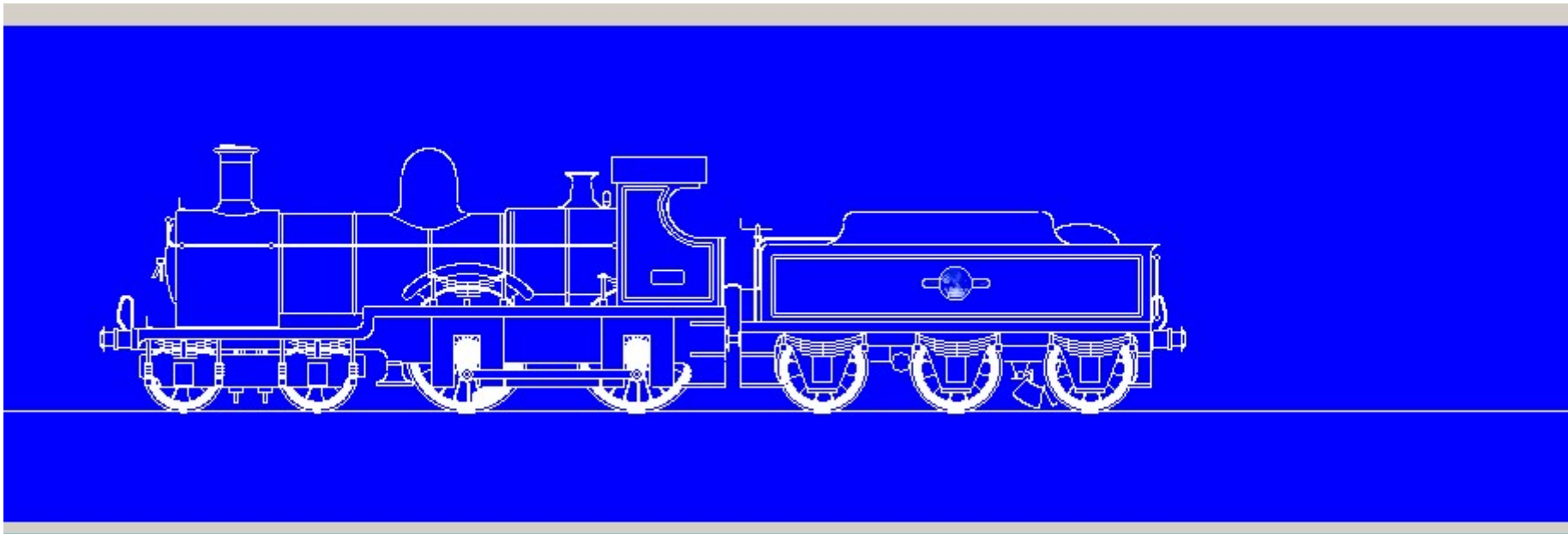


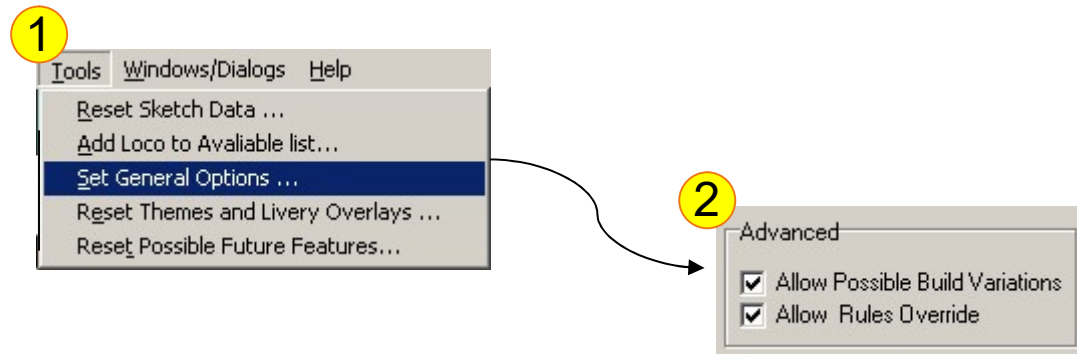
illustration taken from version 4.0.2



"Blueprint" is one of the supplied Themes.

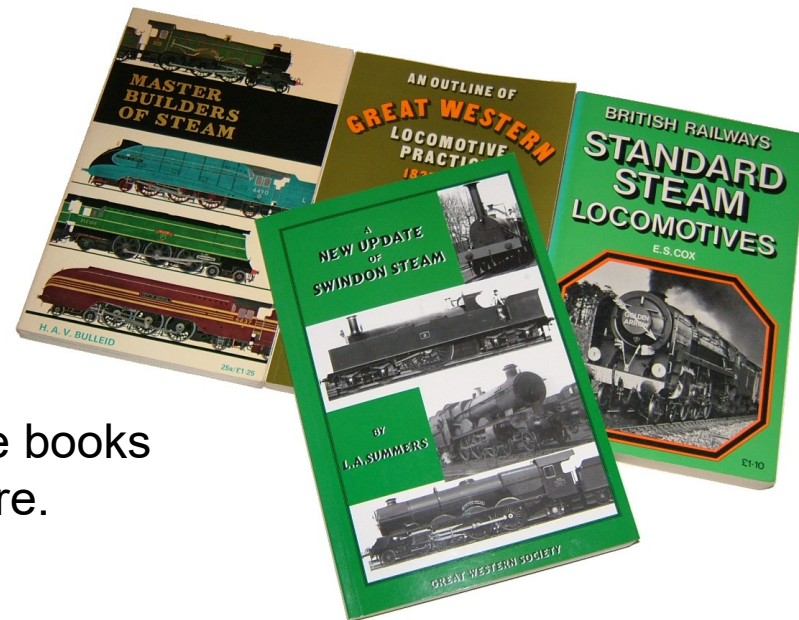


Explore Possible Build Variations



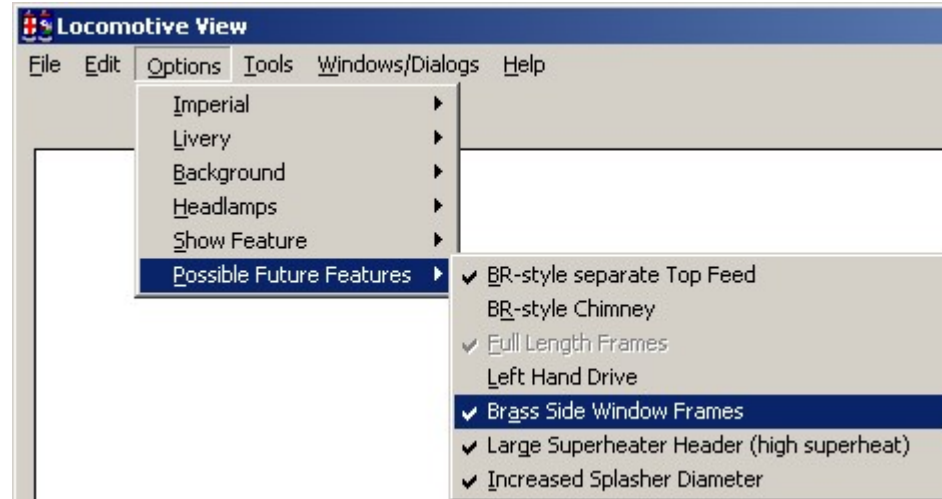
What if GWR
Locomotive
development had
continued after
nationalisation?

Some suitable books
are shown here.



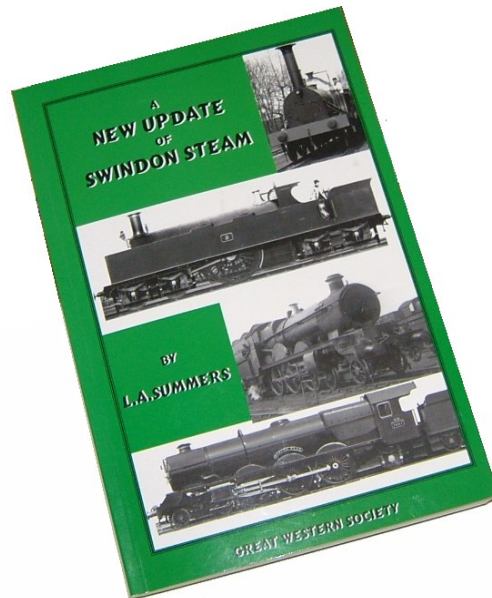
Apply possible future build variations.

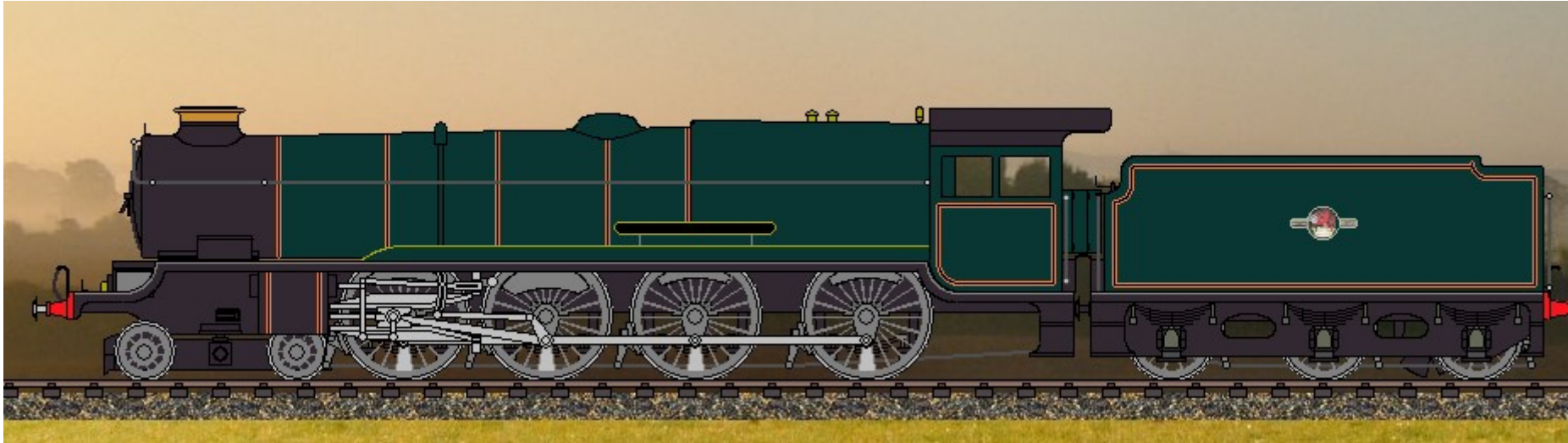
Draw a "GWR" locomotive with features based on GWR experiments or features in use on other railways around the time of nationalisation.



Options shown depend on other selections and settings for your locomotive.

For more information about possible GWR developments in locomotive design, please see L. A. Summers' book.





A possible development of Great Western locomotive design (based on suggestions by Les Summers: however, the cab is different (here using a Stanier design) as is the placement of the boiler fittings).

illustration taken from version 4.0.2



Possible Build Variations ...

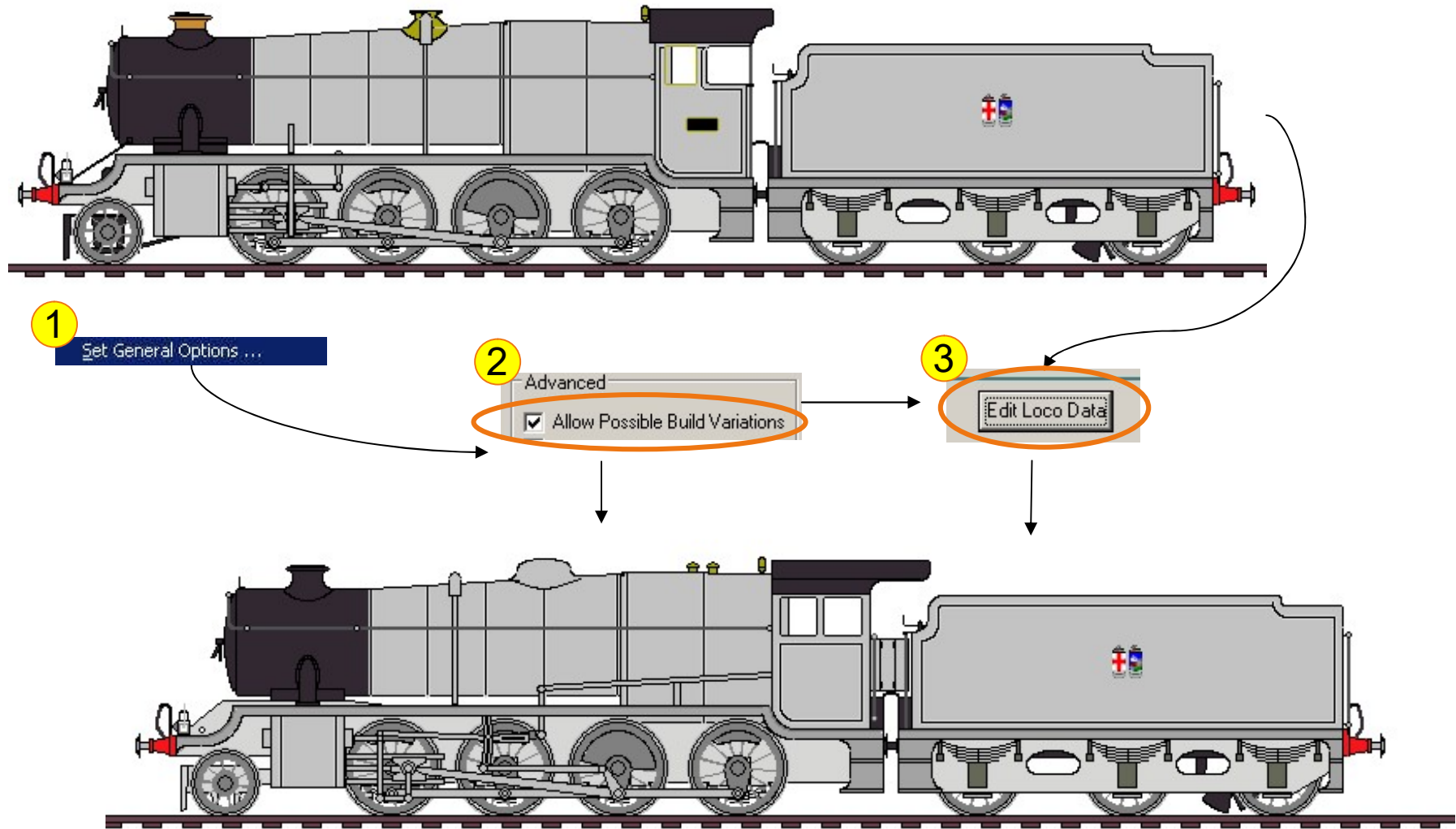
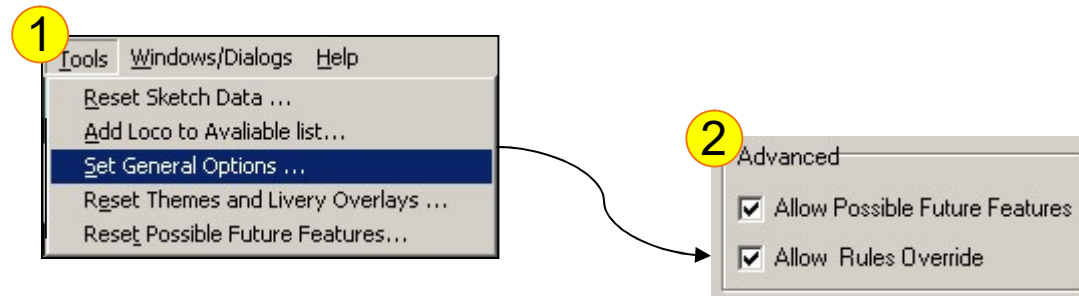
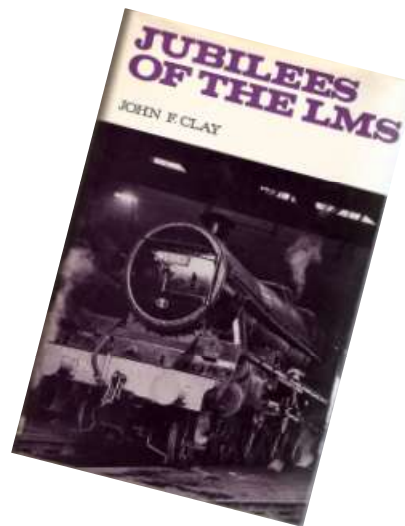


illustration taken from version 4.0.2

GWR Rules Overrides ...

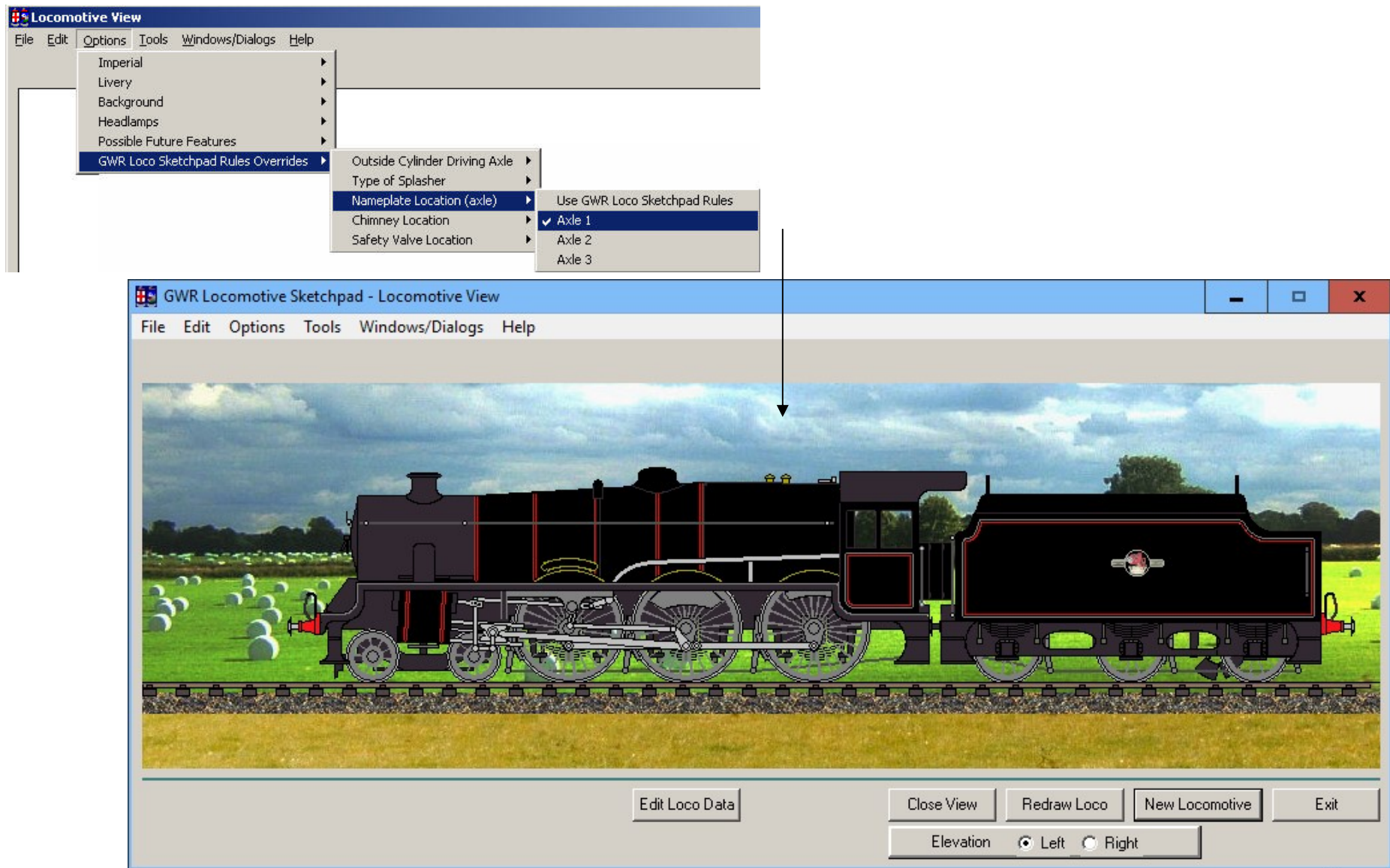


GWR-trained engineers moved to other railways, and took GWR design features with them.



Stanier went to the LMS.

Using GWR Rules Overrides

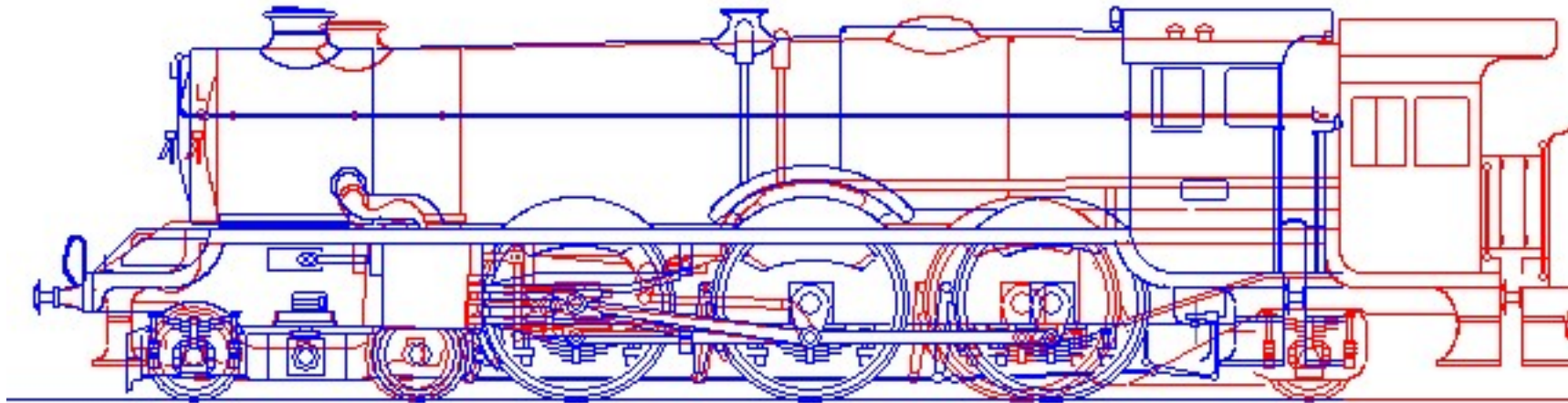


With Possible Future Features and GWR Rules Overrides enabled and appropriate features selected, a **very limited** range of Stanier "look alike" locomotives can be prepared for comparison with GWR locomotives.



The angle of inclination of the cylinders is set automatically.

Locomotive comparisons



A GWR King compared to an LMS Princess Royal
- both drawn using GWR Loco Sketchpad

Double-Heading

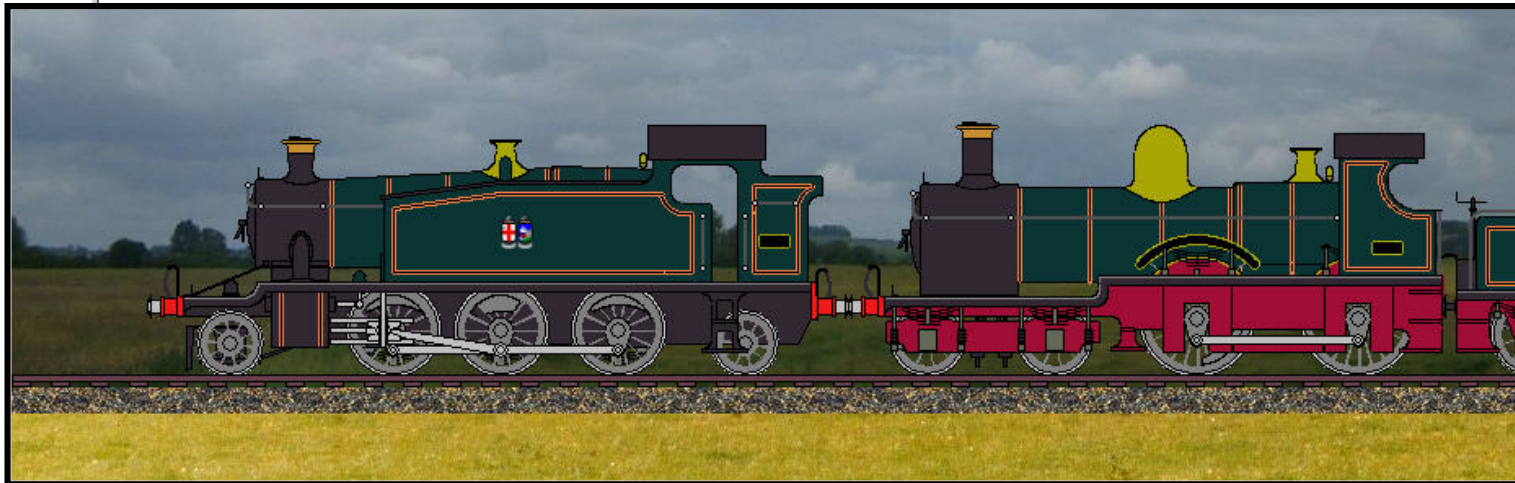
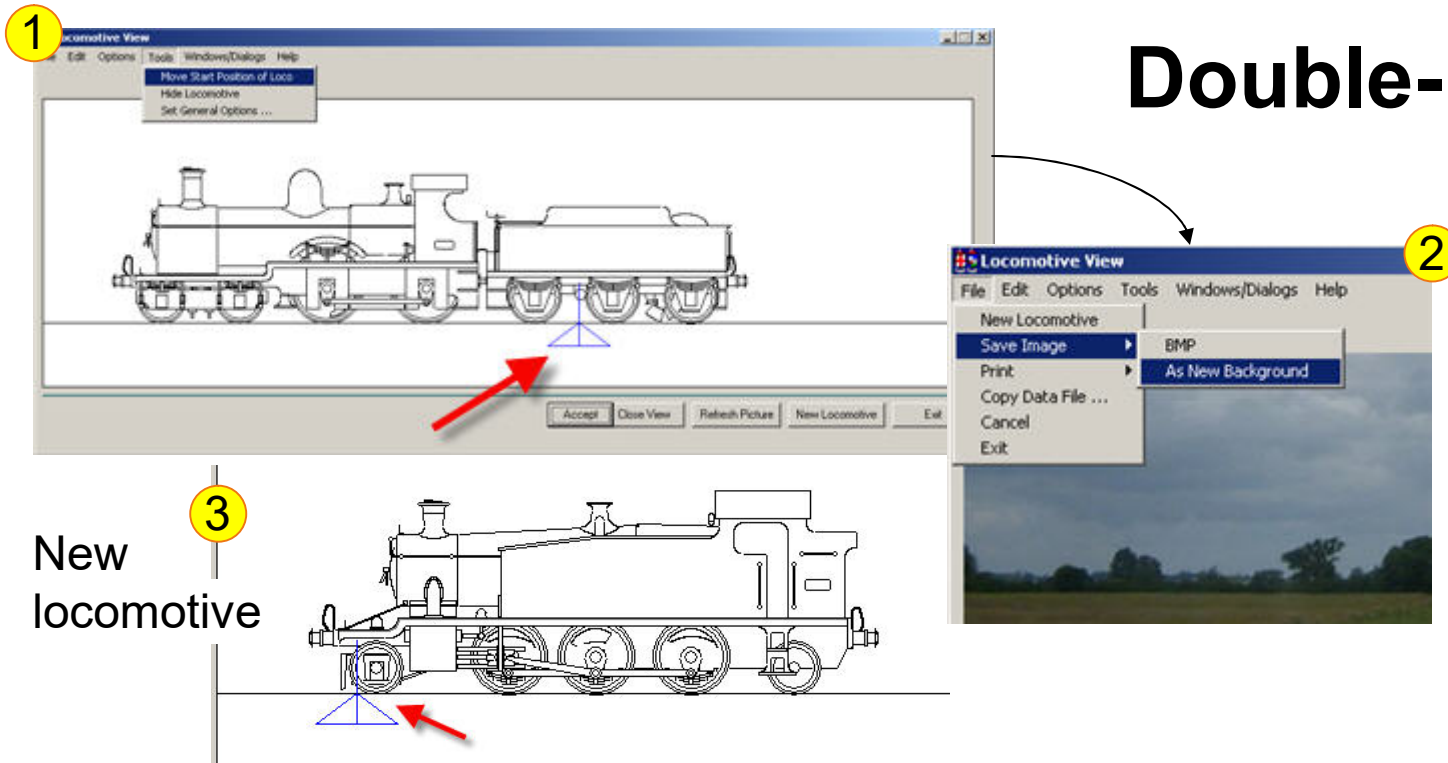


illustration taken from version 4.0.2

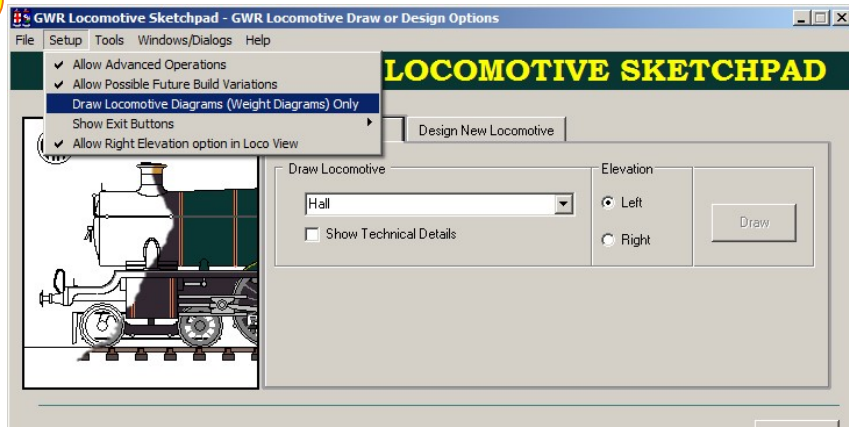


Narrow Gauge

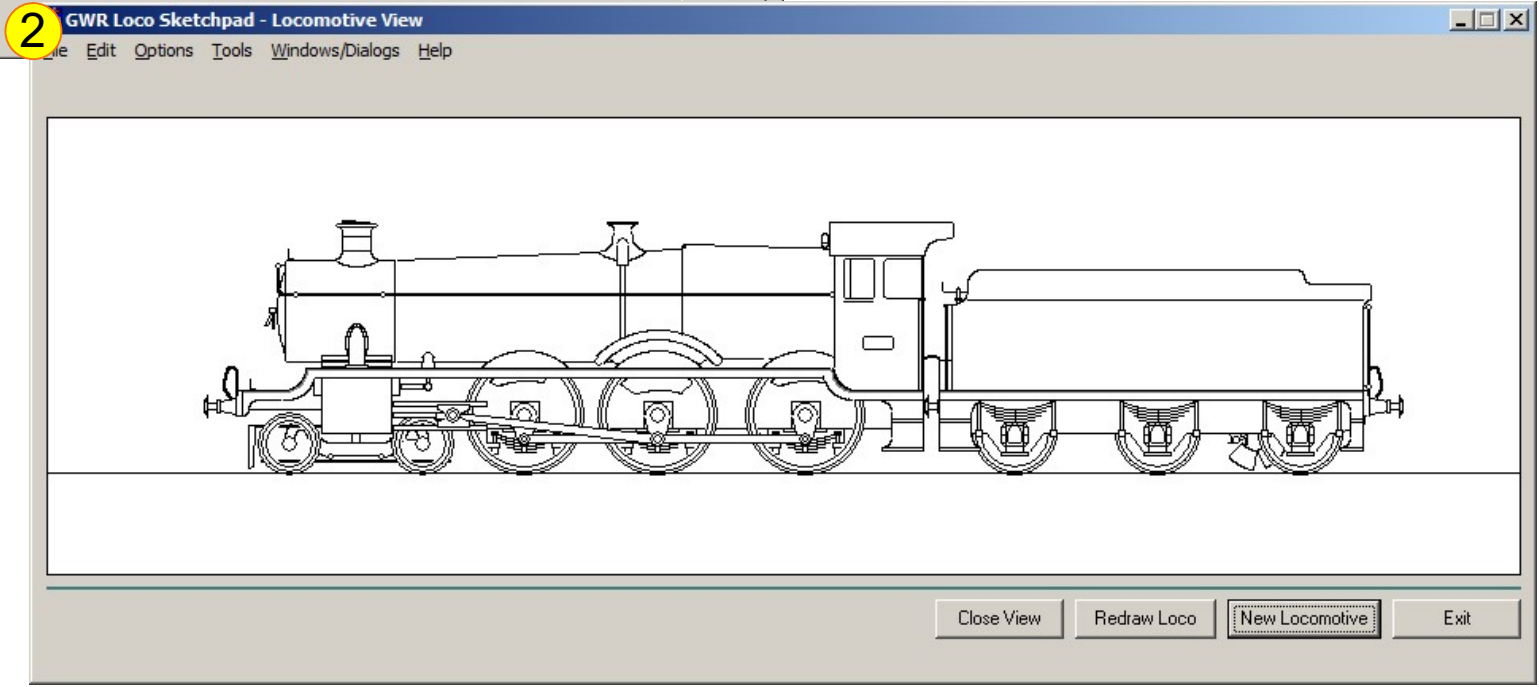


The Great Western built locomotives for the
Vale of Rheidol narrow gauge railway.

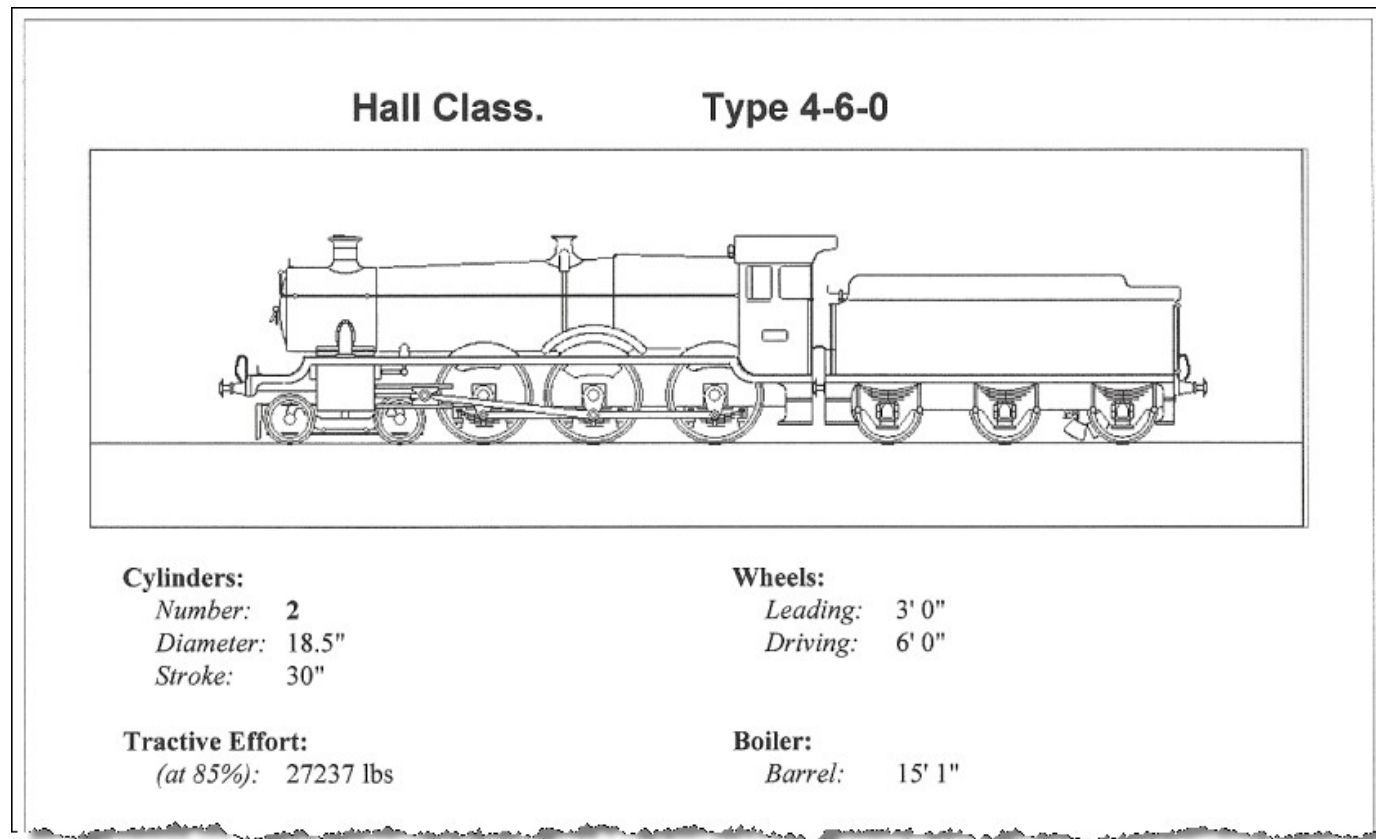
1



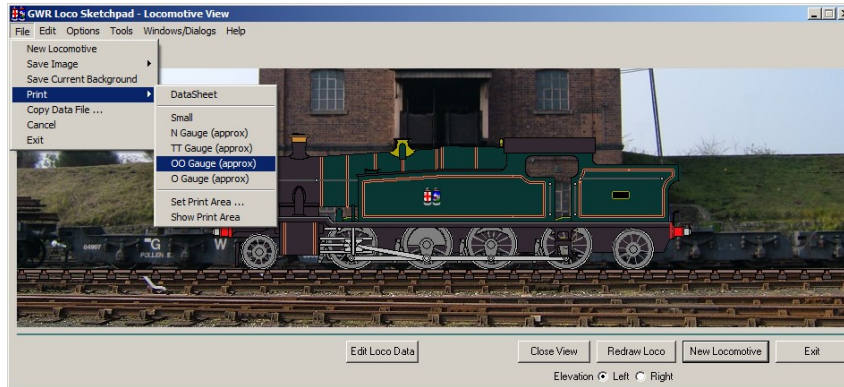
You can show Great Western style locomotive diagrams ...



... and prepare locomotive
data sheets ...



Finally ... Why not frame your pictures?



Useful Books

Chapman, W. G (... 1946) GWR Engines Names, Numbers, Types and Classes
reprinted as: GWR Engines Names, Numbers, Types and Classes (1975)
David and Charles (Publishers) Limited Newton Abbott ISBN 0 7153 5367 5

Russell, J. H. ((1975) A Pictorial Record of Great Western Engines Volumes 1, 2
Oxford Publishing Company Oxford SBN 902888 30 7

The Railway Correspondence and Travel Society The Locomotives of the Great
Western Railway Part One Preliminary Survey (1968) to Part Thirteen
Preservation and Supplementary Information (1983) ISBN 0 901115 60 6
The Railway Correspondence and Travel Society

Slinn, J. N. (1978) Great Western Way Historical Model Railway Society Frome
ISBN 0 902835 03 3

Summers, L, A. (2007) A New Update of Swindon Steam Great Western Society

Freezer, C. J. (1977) Locomotives in Outline Peco Publications and Publicity
Beer ISBN 0 900586 46 X

