GPL to rFactor track conversion tutorial

With many thanks to Steve [dB] Dienes.

Note that you cannot convert any of the tracks Papyrus created for GPL, only third party tracks.
Please make sure you have permission to convert a track if you intend to release.

Required Tools:

Sim Garage:

TrkMaker, at least version 1.6 and 3dSimEd at least version 1.12

Text Editor:

Any text editor will do. Notepad, Textpad etc.

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1.Preparation:

In this document it will be assumed that the track name is "`MyTrack`" just substitute the name of your track while working through this tutorial.

1.1.Setting up your workspace:

Set up a work space directory; `C:\Locations`.
Then create the root directory for your track, `C:\Locations\MyTrack`, this will hold the data from the track we are converting. Within this folder we need a temporary folder:
`C:\Locations\MyTrack\MyTrack_dat`

Within rFactor we need two folders: one for the geometry and textures

`RFactor\GameData\Locations\MyTrack`

and the second for the configuration files

`RFactor\GameData\Locations\MyTrack\MyTrack`

Open 3DSimEd, and from the Tools menu, select `Expand-> Papyrus DAT`. Navigate to where your original GPL track is located and select your `Mytrack.dat` file.
Next, point 3dSimEd to your `C:\Locations\MyTrack\MyTrack_dat folder` and extract the .dat file to that location. If your track was not packed into a .DAT file, then just copy the files to your `C:\Locations\MyTrack\MyTrack_dat` workspace.

Now copy the .LP files from the GPL track to your
`C:\Locations\MyTrack\MyTrack_dat` folder.

2. Texture conversion.

Use the `Texture Browser` in 3dSimEd and navigate to your
`C:\Locations\MyTrack\MyTrack_dat` folder. Click on `Batch Conversion`.
Select all of the texture files (.mip and .srb) and choose .DDS as the format to convert to. Point
3DSimEd to your `RFactor\GameData\Locations\MyTrack`   and you will now have all
your texture maps as .DDS files.

3.Creating the Track Surface with TrkMaker

3.1.Converting form GPL to XML.

If the GPL track was created with the tools GPLTRK and TRK23DOW, a lot of time can be saved
if the .TEX file used by TRK23DOW can be found. The .TEX file gives a listing of the texture
maps to be used for each track surface/wall. TrkMaker will automatically use such a file if it finds it
in the same folder as the .TRK file.

If you have a .TEX file for the track copy it to `C:\Locations\MyTrack\MyTrack_dat.`

Open TrkMaker and select `GPL  .TRK to XML`
Navigate to `C:\Locations\MyTrack\MyTrack_dat` and select `MyTrack.trk`
Save as `MyTrack.XML` in the folder of your choice.

3.2.Material Texture Maps

From the TrkMaker main window open `MyTrack.XML` with the `Open  XML` command.
You should see a list box with the names of the tables that are in `MyTrack.XML` , you will need to
open the `Material` table so click on `Material` in the list box.

Expand the columns of the grid display by placing the mouse over the column dividers, grabbing the dividers, so that you can resize the LLE and Comment fields.

column divider

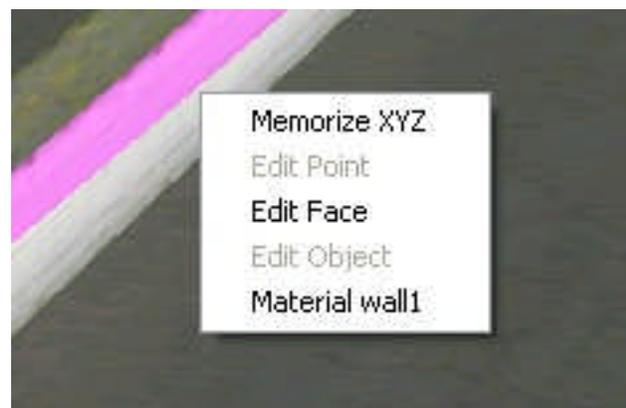| MateralName	MapName	Transparency	LLE String	Comment
wall11	error	0	LLE 554.902 6.495 0.200	Grip 2056 Index 6 Top Section 12
wall12	error	0	LLE 554.902 6.495 0.200	Grip 2056 Index 6 end Section 12
wall13	error	0	LLE 319.251 6.495 0.200	Grip 2056 Index 7 Side Section 4
wall14	error	0	LLE 319.251 6.495 0.200	Grip 2056 Index 7 Top Section 4
wall15	error	0	LLE 319.251 6.495 0.200	Grip 2056 Index 7 end Section 4
wall16	error	0	LLE 286.751 -30.074 0.200	Grip 2056 Index 9 Side Section 3
wall17	error	0	LLE 1558.005 6.495 0.200	Grip 2056 Index 10 Side Section 33
wall18	error	0	LLE 1558.005 6.495 0.200	Grip 2056 Index 10 Top Section 33
wall19	error	0	LLE 1558.005 6.495 0.200	Grip 2056 Index 10 end Section 33
wall20	error	0	LLE 25.250 10.185 0.200	Grip 2056 Index 11 Side Section 0
wall21	error	0	LLE 453.502 20.280 0.200	Grip 2056 Index 12 Side Section 8
wall22	error	0	LLE 453.502 20.280 0.200	Grip 2056 Index 12 Top Section 8
wall23	error	0	LLE 453.502 20.280 0.200	Grip 2056 Index 12 end Section 8
wall24	error	0	LLE 25.250 23.836 0.200	Grip 2056 Index 13 Side Section 0
wall25	error	0	LLE 25.250 23.836 0.200	Grip 2056 Index 13 Top Section 0
wall26	error	0	LLE 25.250 23.836 0.200	Grip 2056 Index 13 end Section 0
▶ wall27	error	0	LLE 25.250 ~~Undo~~	Grip 2056 Index 15 Side Section 0
wall28	error	0	LLE 25.250	Grip 2056 Index 15 Top Section 0
wall29	error	0	LLE 25.250 Cut	Grip 2056 Index 15 end Section 0
wall30	error	0	LLE 1839.4 Copy	Grip 2056 Index 16 Side Section 40
wall31	error	0	LLE 1839.4 ~~Paste~~	Grip 2056 Index 16 Top Section 40
wall32	error	0	LLE 1839.4 Delete	Grip 2056 Index 16 end Section 40

Select All

The field we need to set is `MapName`. Even if you had a .TEX file you may have some entries set to 'error'. In the example above there was no .TEX file so all the MapNames are set to error. In 3DSimED Imprt MyTrack.3DO from `C:\Locations\MyTrack\MyTrack_dat` and switch the display of all objects off with `Display->Object Filter ALL OFF`. In TrkMaker, select the text of the LLE field and use the mouse right button to give you a menu from which you choose Copy.
Go back to 3DSimED and select `View->Set View` (keyboard shortcut V) , within the Set View dialog choose Paste Pos, hit OK. The view centre of 3DSimED has now been set to the first occurrence of the material and by using either the mouse wheel or numeric key '+' you can zoom in on the geometry.
The `Edit->Select Geometry at Centre` command (shortcut 'M') will give you a context menu allowing you to select the faces at the view centre. In this example the MapName required will be wall1. *When you open a GPL track the material name is the texture map name*.

Look carefully at the Comment field in the material table as it describes the type of surface and for walls you may have to define the MapName for the top, or end, of the wall.

The Transparency field of the Material table should be zero for no-transparency (e.g.

Memorize XYZ
Edit Point
Edit Face
Edit Object
Material wall1

asphalt, grass paint etc), one for simple transparency (e.g. Armco) and two for multiple transparency (e.g. wire fences). If you are not sure you can always use the `Tools->Texture Browser` of 3DSimED to look at the textures.

Work through the material table until no more MapName entries are no longer set to 'error' (unless, of course, you do want to use a texture named error).

It's possible that TrkMaker may ask for a wall top or wall end texture when none was used in the Track.3DO. In this case you will need to remove the material in the `WallTex` table. In the grid example above the Material table is showing the wall with material wall28 for the top and wall29 for the end. If this wall should not have a top or end then in the `WallTex` table the TexTop and TexEnd fields set to wall28 and wall29 should be set to a blank (empty) string.

Make sure you save your work with the `Write XML` command.

3.3.Testing the Track Surface.

Inside TrkMaker, Select `XML to rFactor`. Navigate to `RFactor\GameData\Locations\MyTrack` and save. You will now have all of your track segments as .gmt objects and you will also have a file named _trkmaker.scn

Check your progress so far by Importing _trkmaker.scn with 3DSimED. Check that all faces generated by TrkMaker have textures assigned.
The quick way to confirm this is to use `Tools->Missing Textures & Objects`. If there are missing textures then you need to look at the Materials table within TrkMaker.

3.4.Creating Response Objects.

For the AI, and the correct timing of laps, rFactor needs a number of special response objects. These objects can be created in TrkMaker using the VerticalObj table. Using the TrkMaker Open XML command open the `MyTrack.XML` you created from the .TRK.
For each vertical object you need to define the longitude, latitude of the left and right of the object, bottom elevation, height and the material name. You will also need to give the title of the object which should be from the list below.
With the XML open go to the `VerticalObj` table (you may need to scroll down the list of tables on the left)

1) Xfinish. An object which spans the track (including the pit lane) at the start/finish line. Normally this object would have longitude of zero.
2) XSector1 & XSector2. As the names suggest these two objects span the track at the end of sectors 1 and 2 and should have longitudes of approximately 1/3rd and 2/3rd around the track
3) XPitin & XPitout. These objects mark the start and end of the pitlane. You need them to span the pitlane but not overlap any of the racing surface.

To get the correct longitudes and latitudes for these objects you can Import your original GPL .3DO with 3DSimED and move the mouse over the track watching the bottom right of the status bar for the three values labeled LLE which are the longitude, latitude and elevation of the cursor position. Alternatively, by right clicking and selecting Memorize XYZ these values will be copied as text to the clipboard and you can paste them into notepad to read or copy.

For each of the five objects make sure the Material is one already present in the Material table (e.g. road01), set the bottom elevation to -2 and the height to 10 (we are attempting to create objects that

cannot be missed so we are drawing it from 2m below the track surface to 8m above the surface). You would normally set the LongEnd to the same as the LongStart ensuring the object is perpendicular to the track. The LatStart is the left latitude and LatEnd the right latitude.

Once all five objects are added to the `VerticalObj` table, use Write to XML, and then use the Write rFactor function to re-create the track surface objects in the `RFactor\GameData\Locations\MyTrack` folder.

4.Converting the TSO .3do objects with 3dSimEd

From within 3DSimEd and from the File Menu, select `Import Model.`
Import your `MyTrack.3do` file from `C:\Locations\MyTrack\MyTrack_dat`.

At this point we should delete the flaggers as these objects have no purpose in rFactor. The quick way to do this is to go to `Display->Object Filter` and select All Off. Now switch back on the display of `flagger.3do` and starter.3do objects, and exit with OK. With `Edit->Select All Displayed` you should get a sub-menu with Objects, and from the `Objects` menu select `Erase`. With `Display->Object Filter All On` switch on the display of all your remaining objects.

From the File Menu, select `Save As rFactor GMT->Save as objects`
Point 3dSimEd to your `RFactor\GameData\Locations\MyTrack` folder and save. Now all of your TSO .3do objects are .gmt objects and you will also have an `_output.scn` file in which they are listed.

At this point, use 3DSimED to Import the _ouput.scn that has just been created to check for missing textures (`Tools->Missing Textures & Objects)`. The most likely missing texture is _rgbmap which is supplied with 3DSimED and TrkMaker.

5.Setting up the track configuration files.

5.1.Info

First, let's take a look at these file extensions and what these files do. All of these files can be viewed and edited with Notepad or other text editors. (You may need to right-click the file and select `Open With` and select Notepad) With the exception of `.tdf` files, each of these files will be located within a "configuration" folder within the main track folder. If your track has multiple configurations, Long, Short, GP, etc, you will have a folder for each configuration, and new copies of these files will be set up to reflect the needs of that layout.

`.scn` (scene) this file lists all of the objects the game will load when loading your track. It also contains the file paths to search for them, and information about lighting and fog values. Special properties for objects such as `movable` and `vis groups` (controls whether the object is hidden at low graphic detail settings) are also controlled by this file.
You will also notice, that unlike Papy .3do, where you only have one object of each type, such as cone.3do, and the .3DO file keeps track of multiple instances and their locations, you will have a unique `.gmt` file for each instance: cone.gmt, cone001.gmt, cone002.gmt, etc. and the XYZ coordinates are stored in the `.gmt` file itself.
TrkMaker writes a helper _NoName.scn file which includes a simple header.

`.gdb` contains the information about your event; Name, description, session details, pit speed, etc. TrkMaker writes a helper _NoName.gdb file which can be modified quickly to work with a converted track.

`.cam` This is the camera file, but editing it is beyond the current scope of this tutorial.

`.aiw` This is the AI file and includes the equivalent information as the GPL .lp files and portions of the track.ini. It contains the pit, garage, pace/safety car and start grid locations.

`.tdf` This file is found in the Locations folder and is named `terrain.tdf`. It defines the types of track surfaces, responses such as dust, grip settings, and bumpiness. If you need to define custom track surfaces or customize existing surfaces, you can make a copy of it and place it in the the root of your `MyTrack` folder, and rename it to `MyTrack.tdf`.

5.2.Borrowing files

Now that we know a little bit about the files we will be working with, we will need to borrow some existing ones to get us started. We will also need to borrow a `sky.gmt`, a `skyboxi.gmt` (horizon) and a texture file for the skyboxi.gmt. Toban will be the source for these.

Later there are other files we will need from Toban so we are going to extract all of the geometry and texture files. Create a folder `C:\locations\toban` and using the 3DSimED function Tools->Expand->rFactor .mas open first `Toban.mas` and then `Tobanmap.mas` (in `rFactor\Gamedata\Locations\Toban`) giving `C:\locations\toban` as the destination folder.

Copy `sky.gmt, skyboxi.gmt, and bkb.dds` from `C:\Locations\Toban` to `RFactor\GameData\Locations\MyTrack`

Go to your `rfactor\GameData\Locations\Toban\Toban_Long` folder and copy all of the files to `RFactor\GameData\Locations\MyTrack\MyTrack`
Rename each one to `MyTrack.AIW, MyTrack.cam` etc.
The three image files are the loading screen, and the preview images.
Rename these, keeping the naming scheme intact. Example: `MyTrackThmb.tga`
We can create custom image files for our track later.

5.2.1.MYTRACK.GDB

Open `_NoName.gdb` (from `rFactor\GameData\Locations\MyTrack`) with a text editor such as Notepad.
The opening line must match the title of the track, otherwise the track will not show up in the track list in RFACTOR. Go through the .GDB replacing all the NoName entries. At the same time you may wish to edit some of the other data for the track.

```
MyTrack
{
  Filter Properties = RoadCourse 2005 SRGrandPrix OWChallenge
  Attrition = 30
  TrackName = MyTrack
  EventName = MyTrack
  GrandPrixName = MyTrack //this must be the same as event name
  VenueName = MyTrack
  Location = MyTrack, NoPlace
  Length = 1.609 km / 1.0 miles
  TrackType = Permanent Road Course
```

Scroll down the bottom and do the same with the folder to save car setups to.

```
  SettingsFolder = MyTrack
```

Save, as `rFactor\GameData\Locations\MyTrack\MyTrack\MyTrack.gdb`.
Note the different folder from the one in which you opened the _NoName.gdb

5.2.2.MYTRACK.SCN

Open `_NoName.scn` (from `rFactor\GameData\Locations\MyTrack`)with a text editor.

The first section of the `.scn` file determines the search paths for your track files:
Replace references to `NoName` with `MyTrack.` Note the reference to Common which is essential for the sky objects referred to later on in the .TRK file.

```
CUBEASF

//------------------------------------------------------

SearchPath=.
SearchPath=MyTrack
```

```
SearchPath=MyTrack\MyTrack
```

```
//----------------------------------------------------

//MASFile= MyTrack.MAS
//MASFile= MyTrackMap.MAS

MASFile=COMMONMAPS.MAS

//---------------------------------------------------
```

The `//` are comment characters and anything to the right will be skipped. MyTrack.Mas and MyTrackMap.Map can be created later.
Save the scn file to (note the different folder)
`rFactor\GameData\Locations\MyTrack\MyTrack\MyTrack.scn.`

Now open your `_trkmaker.scn` file (in `rFactor\GameData\Locations\MyTrack`)
with a text editor. Select all of the text in `_trkMaker.scn` and copy it to the clipboard.
Paste all of this at the end of `MyTrack.scn.`
Close `_trkMaker.scn`

Open `_ouput.scn,` select all of the text, copy it to the clipboard.
Paste the text to the end of `MyTrack.scn`
Close `_ouput.scn`

Save and close `MyTrack.scn`

6.Creating the AI

The file `MyTrack.AIW` needs AI information for MyTrack. `TrkMaker` can help make a very basic, limited, AIW file which will get us started.

In `TrkMaker` open your MyTrack.XML. We need to complete the `AIInfo` table before creating the AIW (you may need to scroll down the list of tables to get to AIInfo).

All the values must be present. MergePitIn and MergePitOut are the longitudes at which the AI cars will merge to and from the pit line. StallsLongStart, and StallsLatStart give the longitude and latitude of the pit stall at the start of the pit lane while StallsLongEnd and StallsLatEnd are for the end of the pit lane. Don't forget you can use 3DSimED to help get these positions for you moving the mouse over the track watching the bottom right of the status bar for the three values labeled LLE which are the longitude, latitude and elevation of the cursor position. Alternatively, by right clicking and selecting Memorize XYZ these values will be copied as text to the clipboard and you can paste them into notepad to read or copy.

Once you have completed the `AIInfo` table hit the `Write AIW` button. You will be prompted for .LP files so navigate to your `C:\Locations\MyTrack\MyTrack_dat` folder and select one of the .LP files. Next you will be prompted for the AIW filename, browse to the your `RFactor\GameData\Locations\MyTrack\MyTrack` folder and overwrite `MyTrack.AIW`

7.Converting a Camera file

TrkMaker can convert N2K3 .CAM files to rFactor .CAM files. With MyTrack.XML opened in TrkMaker select the Cam Converter button. You will be prompted for your N2K3 .CAM file and then the name of the rFactor .CAM file to create which will be `rFactor\GameData\Locations\MyTrack\MyTrack.cam.` The rFactor .CAM file is a text file which you can edit yourself.

8.Testing and Troubleshooting.

Start rFactor and select MyTrack for a testing session.

If all went well, have fun turning a few laps and you should be also able to sit back and with CTRL-I let the AI take over the driving while you enjoy the scenery.

If your track does not show up in the track list then you have probably made a mistake in the top line of `MyTrack.GDB`.

If rFactor failed to load the track because of a problem with missing textures, you will get a message which should help you to find which texture is missing. If you are getting no error message try running rFactor with the argument `trace3` and then open trace.txt from the `UserData\LOG` folder and read the trace particularly at the end of the file.

If the trace.txt does not help, and you are crashing about 75% through loading then it may well be that there is a problem with the .AIW file.

8.1.Another way to create the AIW.

Look for the rFactor track this seems closest in length (but longer). Copy this AIW over `MyTrack.AIW` in the `rFactor\GameData\Locations\MyTrack\MyTrack` folder.

We now need to determine our garage location for where the car will appear when we first enter the track.

Import the either the original GPL .3DO *or* the `rFactor\GameData\Locations\MyTrack\MyTrack\MyTrack.scn` to 3dSimEd and rotate so you are looking down at the track and place your cursor over a spot on your pitlane. Write down the XYZ coordinates that are displayed in the lower right side of the `3dSimEd` window.
Close `3dSimEd`

Open `MyTrack.AIW` with notepad. Scroll down through the starting grid entries and look for this section:

```
[PITS]
TeamIndex=0
PitPos=(53.345,-2.370,-385.856)
PitOri=(-0.001,-1.526,0.000)
GarPos=(0,52.901,-2.370,-382.767)
GarOri=(0,-0.002,0.003,0.001)
```

```
GarPos=(1,50.156,-2.370,-382.759)
GarOri=(1,-0.002,0.003,0.001)
GarPos=(2,46.933,-2.370,-382.749)
GarOri=(2,-0.002,0.003,-0.001)
```

GarPos (Garage Position) is the location where your car appears when you first enter the track. Depending on the track, the garage and pit locations may or may not be the same, but for the purpose of this tutorial, we will assume that they are.
There are 3 possible garage locations for each pit stall and each is indicated by the index numbers 0, 1, 2. Be careful not to remove these index numbers when entering your coordinates.

The series of numbers are: (<index>,<X coordinate>,<Z coordinate>, <Y coordinate>)
*** Important*** notice that the coordinates are in XZY order, not XYZ. Pay attention to this when you enter the coordinates that you obtrained from 3dSimEd.

Enter the same coordinates for PitPos and GarPos.

The PitOri and GarOri (orientation) entries control the Pitch, Yaw and Roll of the position.

Save and close MyTrack.AIW

Now try opening the track with this new MyTrack.AIW

```
***IMPORTANT*** Turn OFF flag rules or you will get fined and DQ
for driving the wrong way. Until we create a new AIW file
specifically for our track, we will get Wrong Way warnings as we
drive.
```

Before testing this new .AIW make sure you delete
RFactor\UserData\LOG\HAT\MYTRACK.HAT

IF you have no luck you could try an .AIW from another track, repeating the process above.

8.2.Track Surface Materials

If you are having problems driving some of the surfaces or you think the surface should have different grip levels then you will need to edit the material names (Not the texture names, they can be named anything), but the materials must be named by surface types defined in rfactor\gamedata\locations\terrain.tdf.

These rules apply to driving surfaces, and walls, there is no need to change the material names of the track details used for the start line etc.

By default, the materials defined in the .tdf are:

Legal Material Names
Roads: road,rdax,rdta,rdcp
Dirt/Grass: rged,gras,grxs,grvl,dstg
Rumblestrips: rmbl
Walls: twal, cem, wal, cmwl, grdr, safer

The material name has to match something in the terrain.tdf file. More correctly, the material name has to start with a name defined in terrain.tdf.

So a valid name for a road material could be roada, road1, or roadzzzz and so on.

If a drivable surface is not named correctly, your car will get stuck and sink into it. Grass, paint lines, asphalt, cement, dirt/gravel and rumble strips *must* be named correctly.

For the walls the material name does not have to match one defined in the terrain.tdf but you will just get a solid wall if there is no match. For softer walls you will need a material prefixed with twal.

In TrkMaker open your TractionTex table and look at the Tex field.

For each TractionTex surface check the prefix of the material name and make sure it matches one of the prefixes defined in RFACTOR\gamedata\locations\terrain.tdf.

If you need to change a material name you are going to also have to reflect that change in the Material table.

The materials for the walls are defined in the WallTex table and again you should check for matches to walls in RFACTOR\gamedata\locations\terrain.tdf.
Again, if you change a material name the material table will also need editing.

Obviously, if you need to make changes you will have to write the rFactor objects again and attempt to drive the track again.

Note a quick way of changing the material names is to do the renaming in 3DSimED. Import _TrkMaker.scn and use the Edit->Material Editing to check/edit the material names. However, changing the material names in TrkMaker ensures you can keep your changes for every time you need to write the track.

9.Creating .MAS files

If you are going to release your track then at some point you should pack the .GMT and .DDS files to .MAS files.

You can do this using 3DSimED `Tools->Pack Files->rFactor .MAS`

Select all of the `.gmt` files from `rFactor\GameData\Locations\MyTrack` and Save As `rFactor\GameData\Locations\MyTrack\MyTrack.MAS`

Next, select all of the `.dds` files from `rFactor\GameData\Locations\MyTrack` and Save As `rFactor\GameData\Locations\MyTrack\MyTrackmap.MAS`

Once you have done this you should delete the .GMT and .DDS files.

You will also need to modify the MyTrack.Scn file in `rFactor\GameData\Locations\MyTrack\MyTrack` so that the header has all these entries:-

```
CUBEASF

//---------------------------------------------------

SearchPath=.
```

```
SearchPath= MyTrack
SearchPath= MyTrack\MyTrack

//---------------------------------------------------

MASFile= MyTrack.MAS
MASFile= MyTrackmap.MAS
MASFile=COMMONMAPS.MAS

//--------------------------------------------------
```

Double-check everything has worked by driving the track in rFactor.