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Migrating Data from Three Deprecated Transmission Screens

From time to time, the addition of new features or support for more detail in existing features causes the introduction of new library screens with substantially similar function (though most often with additional capabilities). The older, less capable screens are retained in the product to ensure backward compatibility and support updates of older databases. However, after a time the older screens are removed.

This Technical Memo provides instructions for migrating from three deprecated (i.e., marked for retirement)VS Browser libraries in CarSim and TruckSim:

- **Powertrain: Transmission (External, Deprecated)**
- **Powertrain: Downshift Schedule (Deprecated)**
- **Powertrain: Upshift Schedule (Deprecated)**

In the case of the powertrain screens, many extensions have been made to the models recently in support of electric and hybrid propulsion systems. The models allow many of the components of the internal model to be replaced with external models from Simulink or other third-party software. The existing screens support some specific options for replacing transmission, but at the same time, limit the options.

With the release of Version 2022.1, the three libraries listed have been deprecated. Normal policy is to retain a deprecated screen for two releases before removal, so these deprecated screens will be carried again in the 2023.0 scheduled release and removed for Version 2023.1.

Differences Between the Libraries

CarSim contains three top-level powertrain libraries:

- Powertrain: 4-Wheel Drive
- Powertrain: Front-Wheel Drive
- Powertrain: Rear-Wheel Drive

TruckSim also contains these three libraries, plus three others for powered vehicle units with three or more axles:

- Powertrain: 6-Wheel Drive
- Powertrain: 8-Wheel Drive
- Powertrain: 10-Wheel Drive

All these library screens include options to disable parts of the built-in powertrain model. that is available if the powertrain is powered solely by an internal combustion engine. For example, Figure

1 shows a dataset from the **Powertrain: 4-Wheel Drive** library with an internal-combustion engine specified (1), and settings made with drop-down controls to use an external engine model (2), external torque coupling (3), external transmission (4), and three external differentials ((7), (8), and (9)). In past versions, if an external transmission model was selected, it was mandatory to link to dataset from the **External Transmission** library (5).

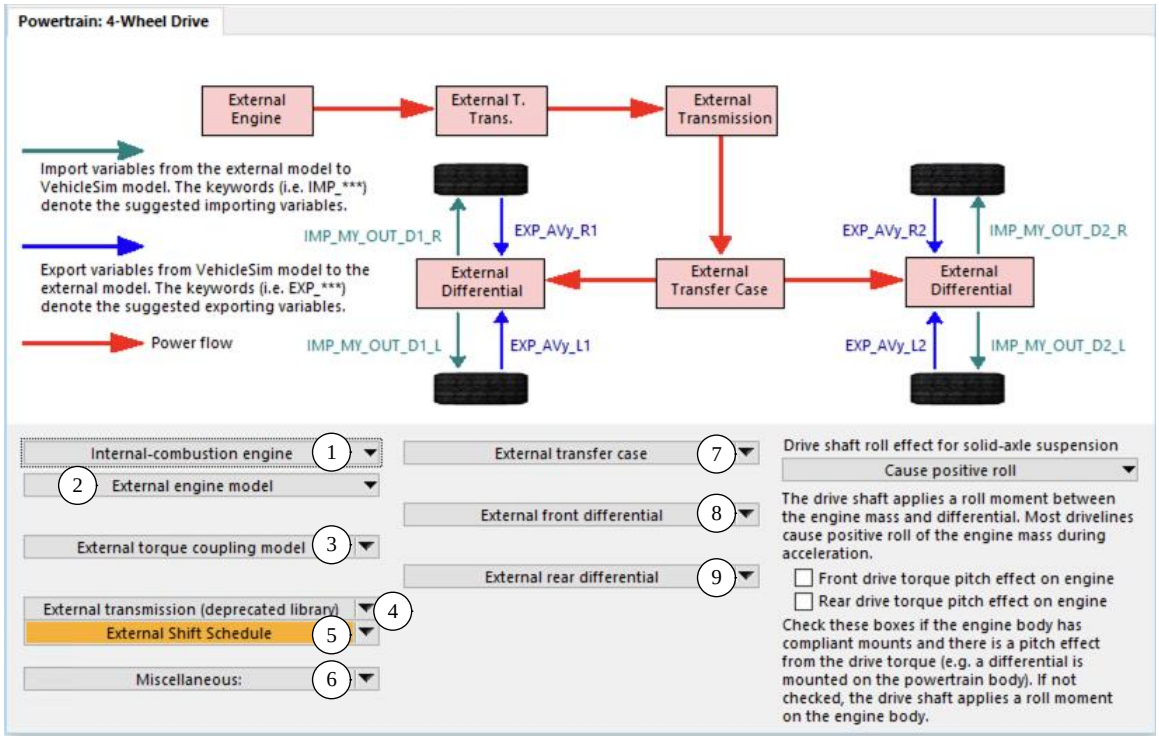

Figure 1. Four-wheel drive powertrain dataset with external components.

Starting with version 2022.1, a miscellaneous link is available (6) for advanced users to link to arbitrary generic datasets made with user-specified keywords and possibly tables.

The 2022.1 version also includes a newer drop-down control for the transmission model that includes three options (Figure 2). The first (deprecated library) and third (internal model) are the same as in past versions. The middle option is new: it simply set the transmission and shifting options to 0 (external); no link is needed.

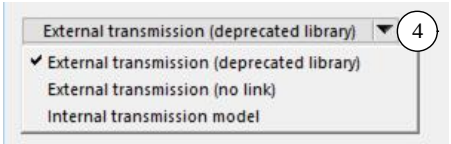

Figure 2. Options for the transmission model.

Types of Settings to Migrate

The deprecated external transmissions screen supported three options for external models:

1. Everything external (transmission, shifting information).
2. External transmission, automatic transmission shift schedule.
3. External transmission, with lock/unlock clutch schedule, possibly with time-delay parameters.

When the internal transmission model is used, the setting should remain with the third option: **Internal transmission model**.

The first option, External transmission (deprecated library) used to require a link to the now-deprecated library **Powertrain: Transmission (External, Deprecated)**. This link is no longer needed; instead, the control (4) should be changed to the second option: **External transmission (no link)**. This is the only change needed if internal shifting models are not used.

If the deprecated library is used to provide shift schedules or other features for shifting using the internal model, the information should be provided using alternative datasets:

1. Change the control (4) to **External transmission (no link)**.
2. Link to a Generic library in the new miscellaneous link (6). Duplicate the settings from the deprecated library screen with a Generic screen. (See the examples in the following two sections.)

Copying Shift Schedules to a Generic Data Group

Figure 3 shows the deprecated External Transmission screen for a dataset that also uses an internal shift schedule (1). With this setting from the drop-down control (1), two links are shown that have typically been linked to two other deprecated libraries: the Upshift Schedule (2) and the Downshift Schedule (3).

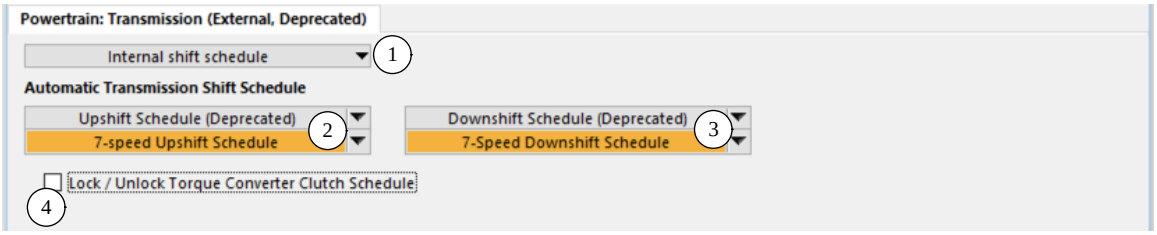

Figure 3. Powertrain: Transmission (External, Deprecated) library screen.

The settings in the dataset are visible in the Parsfile associated with the screen (Figure 4). The selection of the Internal shift schedule (1) is written for the VS Math Model in the Parsfile with the statement `OPT_SHIFT_INTERNAL 1`. The links to the two shift schedules are written the `PARSFILE` commands with pathnames for the upshift schedule (2) and downshift schedule (3).

To provide the same information without using deprecated libraries, it is necessary to provide the command `OPT_SHIFT_INTERNAL` 1 and provide the contents of the Upshift and Downshift datasets.

Figure 5 shows the deprecated Upshift Schedule screen, which was used in much older versions of the software when powertrain transmissions were limited to seven forward gears.

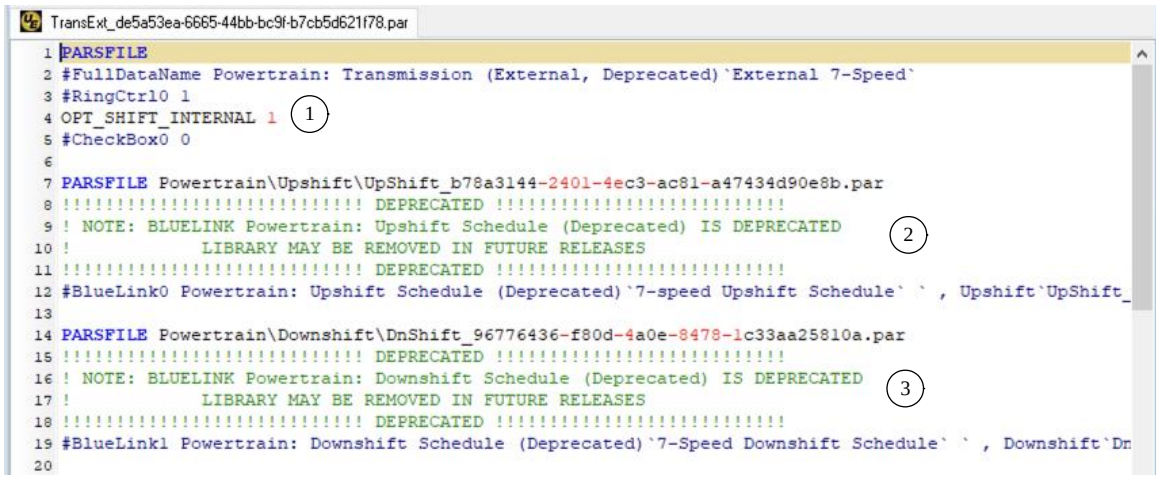

Figure 4. Parsfile for the screen data shown in Figure 3.

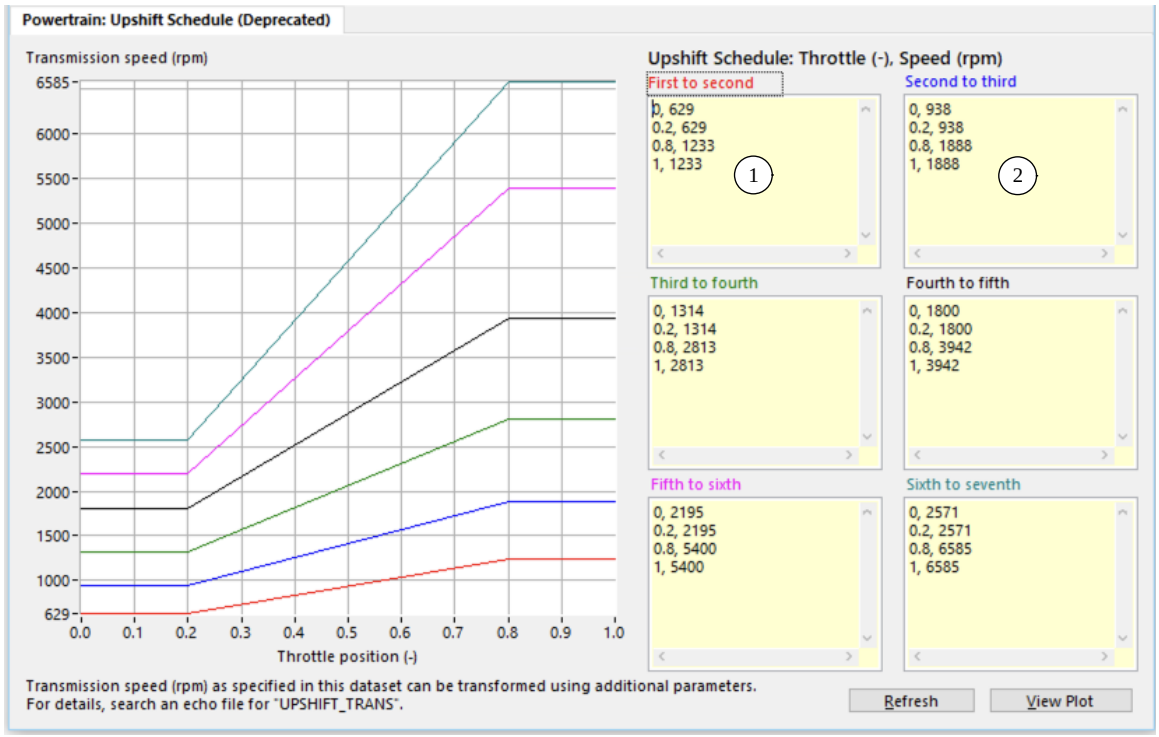

Figure 5. Powertrain: Upshift Schedule (Deprecated) screen.

The dataset has six tables, defining upshift conditions from gears one through six. Figure 6 shows part of the Parsfile with the data for Figure 5, in the form that is passed to the VS Math Model. All the tables have the same keyword `UPSHIFT_TRANS_TABLE` for Configurable Function datasets, with the context being set with the index parameter `IGEAR`. Note that the Parsfile uses the index parameter `IGEAR` to specify gear 1 for the first table (1), `IGEAR` = 2 for the second (2), and so on.

Figure 6. Parsfile for the screen data shown in Figure 5.

To provide shifting information from the three datasets from the deprecated libraries, there are two changes to make on the Powertrain screen (Figure 1).

1. Change the Transmission setting to External transmission (no link) (4) (Figure 2).
2. Use the Miscellaneous link (6) to link to either a **Generic Data Group** dataset (Figure 7) or an **External Parsfile** dataset that contains the shifting data. These two options described in the following subsections.

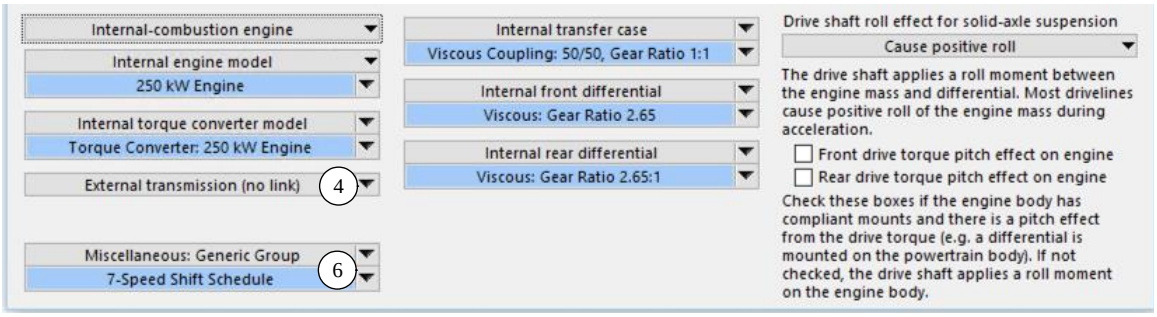

Figure 7. Powertrain modified to link to Generic Group dataset for shift schedule.

Using a Generic Data Group Dataset

The library **Generic Data Group** is well-suited for assembling a set of links to datasets from other libraries, along with custom keyword assignments. Figure 8 shows a dataset that replaces the dataset in Figure 3 that required three deprecated libraries. The first field (1) enables the internal shift scheduling with the parameter `OPT_SHIFT_INTERNAL` and sets the current gear to 1 using the index parameter `IGEAR`.

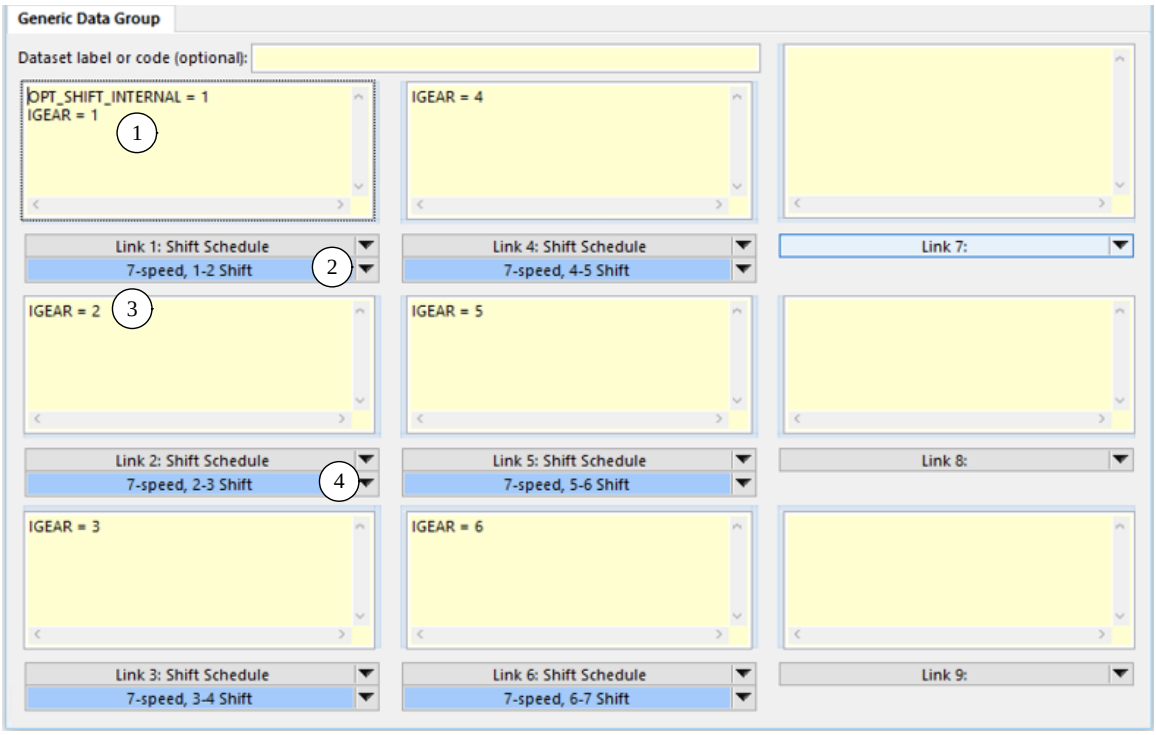

Figure 8. The Generic Data Group library, used for a 7-speed shift schedule.

The first blue link (2) links to a Shift dataset (Figure 9) with Upshift and Downshift data for shifting between gears 1 and 2.

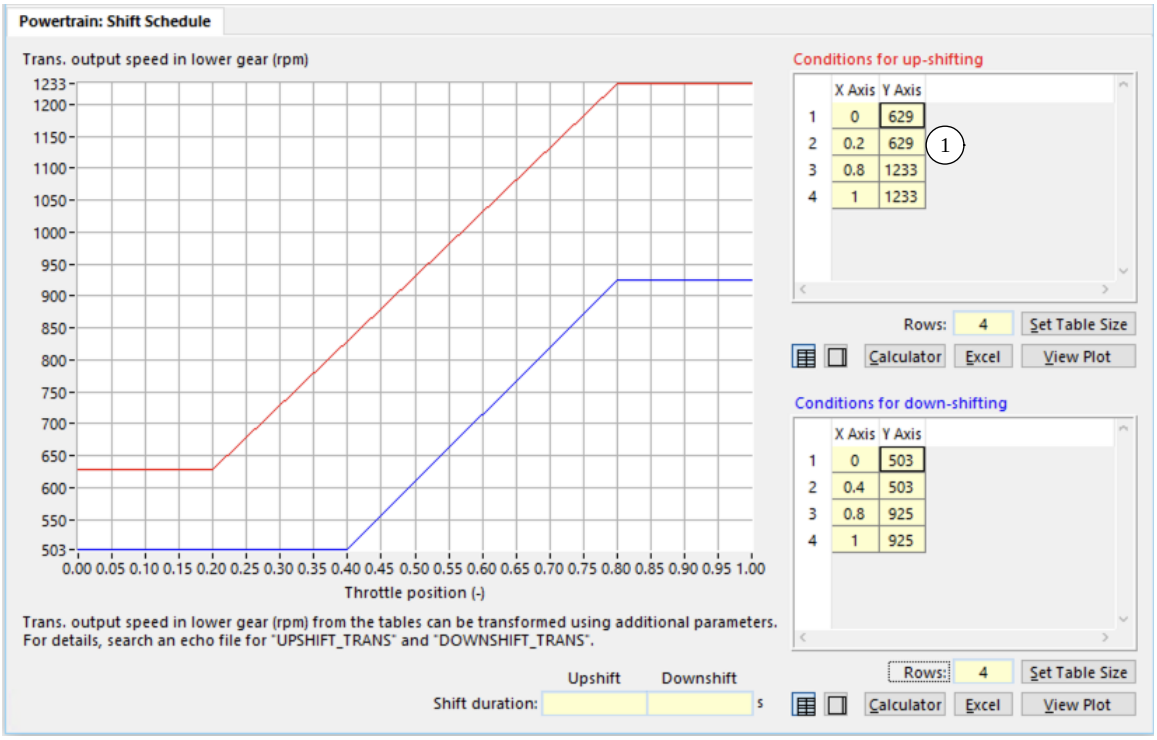

Figure 9. Dataset from the Powertrain: Shift Schedule library.

In the Shift dataset, notice that the table data for upshifting (1) (Figure 9) is the same as the table data shown in the dataset from the deprecated library (1) (Figure 5 and Figure 6).

The information provided to the VS Math Model is the same using the Generic Data Group dataset (Figure 8), which links to six datasets from the **Powertrain: Shift Schedule** library.

Using an External Parsfile and Data from a Run_All.Par file

Another method for using data from a deprecated library dataset that in turn has linked datasets is to copy text from the Run_all Parsfile that is sent to the VS Math Model when a simulation is made using the deprecated dataset.

For example, consider the same Deprecated dataset with the seven-speed shift schedule shown in Figure 3 and shown again in Figure 10. Find text in an existing Run_all Parsfile and used that text to replace the deprecated libraries using the following steps.

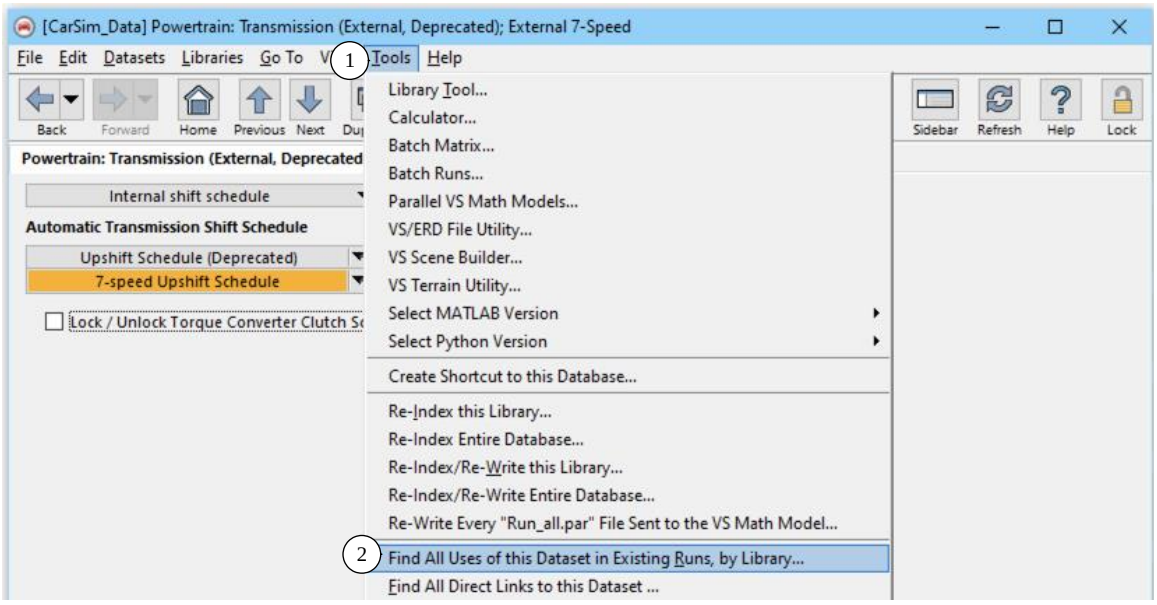

Figure 10. Use the Tools menu to find all uses of the current dataset.

1. Use the **Tools** menu (1) command **Find All Uses of this Dataset in Existing Runs, by Library…** (2) (Figure 10).
2. You will be prompted (2) (Figure 11) to select a library by double-clicking on the name in the list. Double-click the Run Control library (1) (first on the list).
3. You will be prompted to confirm the search (Figure 12). In most cases, click the **Don't Re-Write** button (2) (the simpler and faster option). However, if you have been making other changes in the database, it's not a bad idea to click the **Re-Write all 'Run_all.par' files** button (1).
4. The results of the search are shown in a new window named **Dataset References** (Figure 13). These are names of datasets in the specified library (e.g., **Run Control**). Double-click on a run name in this window to bring it into view.

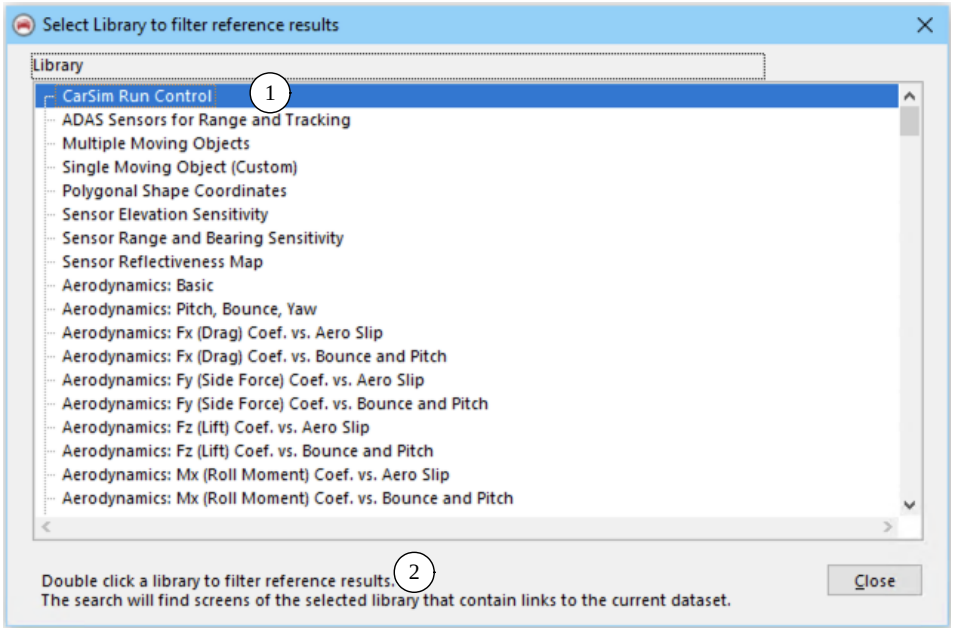

Figure 11. Select a library by double-clicking on its name.

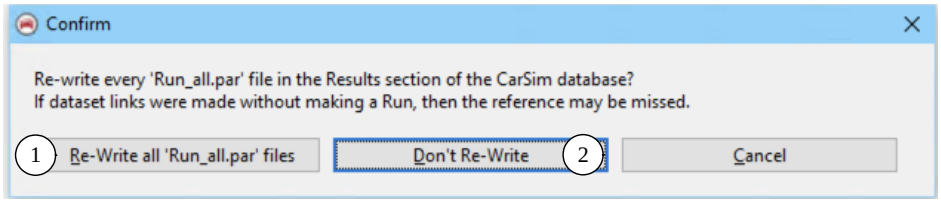

Figure 12. Confirm the search.

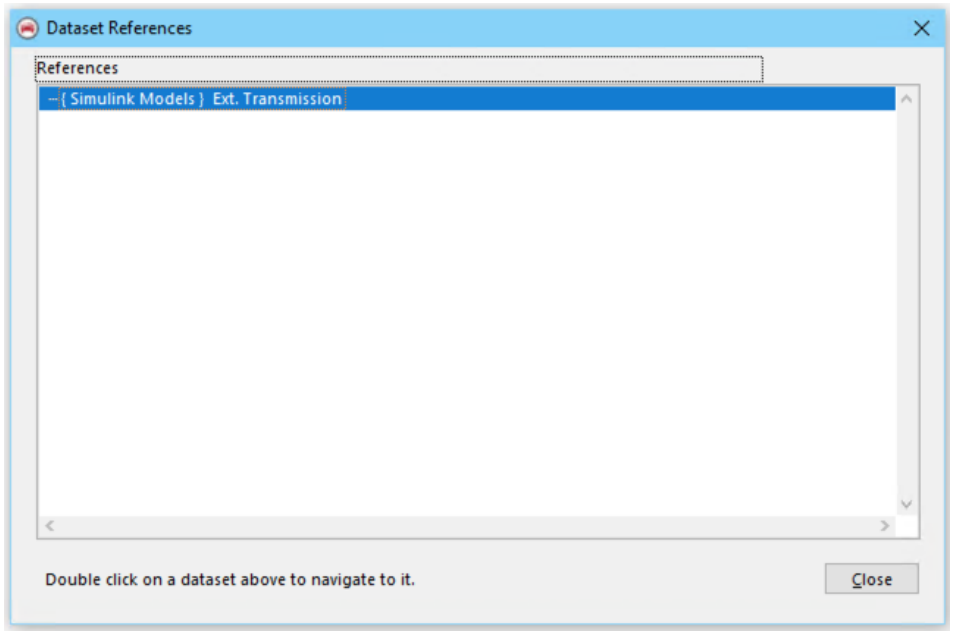

Figure 13. List of datasets from Run Control library that make use of deprecated dataset.

*In the lower-right corner of the **Run Control** screen (Figure 14), use the drop-down control (3) to bring up a list of types of machine-generated files to view. Select the item **All data for math model & visualizer** (2) and then click the **View** button (1) to see the file in a text editor (*

5. Figure 15).

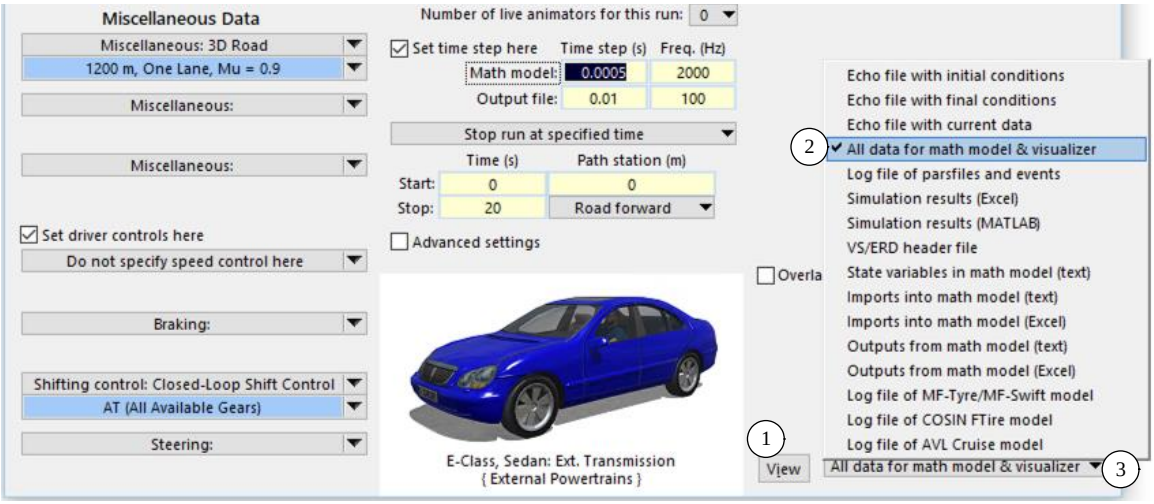

Figure 14. View the Run_all Parsfile for the run using the deprecated dataset.

Search the file for the title of the deprecated dataset. In this example, a search was made for the text `External 7-Speed`. Two occurrences were found in the file (

6. Figure 15): line 3370, right after an `ENTER_PARSFILE` command, and line 3466, right before an `ENTER_PARSFILE` command.

7. Make a new text file that begins with the line `PARSFILE`, then the content of the All.par file containing the content of interest, and possibly ending with the line `END`. Give the file a name and location that is convenient, and set the extension to `.par`.

8. Go to the VS Browser library **External Parsfile**. Make a new dataset and set the title to indicate the type of data. E.g., Figure 16 shows a dataset with the title **External Transmission with Shift Schedule** in the category **Deprecated Datasets**.

9. Link to the Parsfile created in step 7 by using the file browse button (1) on the screen. Notice that the name of the file is shown in the yellow field, and the contents are shown below. The file begins with the word `PARSFILE` and continues with the content pasted from the `Run_all` Parsfile in step 7 (3).

10. Link to the External Parsfile in the Powertrain screen (6) (Figure 7, page 5).

```
3366 LOG_ENTRY Used Dataset: Powertrain: Torque Converter; { Torque Converters: 150 kW to 250
3367 EXIT_PARSFILE Powertrain\TConv\TC_0d2c5e87-fc0e-4a25-9e05-1e57a458454e.par
3368
3369 ENTER_PARSFILE Powertrain\Extrans\TransExt_de5a53ea-6665-44bb-bc9f-b7cb5d621f78.par
3370 #FullDataName Powertrain: Transmission (Transmission, Deprecated)`External 7-Speed`
3371 OPT_SHIFT_INTERNAL 1
3372 ENTER_PARSFILE Powertrain\Upshift\UpShift_b78a3144-2401-4ec3-ac81-a47434d90e8b.par
3373 #FullDataName Powertrain: Upshift Schedule`7-speed Upshift Schedule`
3374 IGEAR 1
3375 UPSHIFT_TRANS_TABLE
3376 0, 629
3377 0.2, 629
3378 0.8, 1233
3379 1, 1233
3380 ENDTABLE
3381 IGEAR 2
3382 UPSHIFT_TRANS_TABLE
3383 0, 938
3384 0.2, 938
3385 0.8, 1888
3386 1, 1888
3387 ENDTABLE
3388 IGEAR 3
3389 UPSHIFT_TRANS_TABLE
3390 0, 1314
3391 0.2, 1314
```

(lines of data not shown in figure)

```
3456 IGEAR 6
3457 DOWNSHIFT_TRANS_TABLE
3458 0, 2057
3459 0.4, 2057
3460 0.8, 4939
3461 1, 4939
3462 ENDTABLE
3463 LOG_ENTRY Used Dataset: Powertrain: Downshift Schedule; 7-Speed Downshift Schedule
3464 EXIT_PARSFILE Powertrain\Downshift\DnShift_96776436-f80d-4a0e-8478-1c33aa25810a.par
3465
3466 LOG_ENTRY Used Dataset: Powertrain: Transmission (Transmission, Deprecated); External 7-S
3467 EXIT_PARSFILE Powertrain\Extrans\TransExt_de5a53ea-6665-44bb-bc9f-b7cb5d621f78.par
3468
3469 IDIFF 3
3470 ENTER_PARSFILE Powertrain\Centerdiff\XC_eab57451-9d2c-4c0a-91ca-a1c4a8b73a1a.par
```

Figure 15. Run_All.par file with content related to deprecated external transmission dataset.

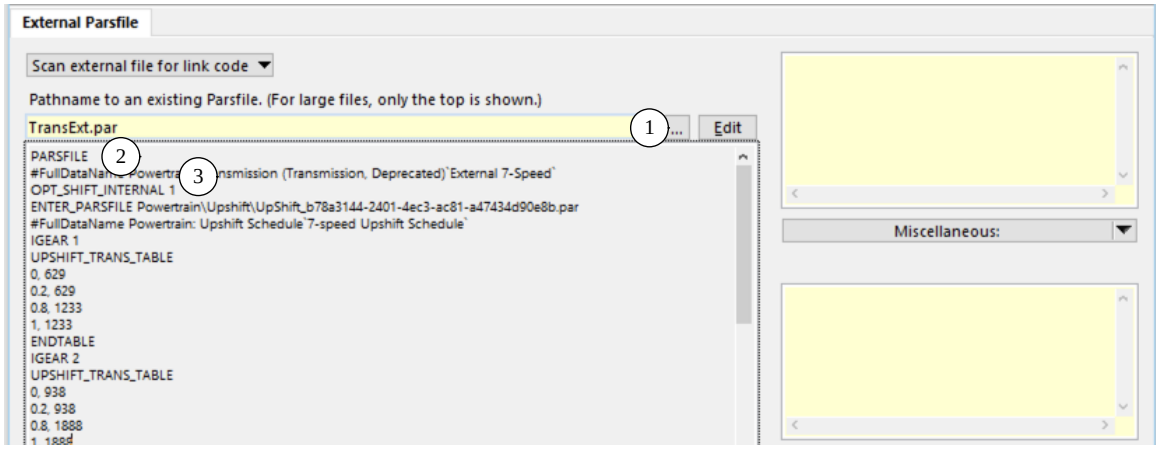

Figure 16. External Parsfile dataset linked to new text Parsfile with content copied from Run_all.par file.