<u>Model Acceptance Script Package setup instructions:</u>

1. Ensure dll files are renamed so that correct file extension is active (i.e. remove ".txt" from "xxxx.dll.txt" if required)
2. Based on the version of PSS/E 34 you are using delete the unrequired dll files (i.e. if using PSS/E version 34.2 then delete "dsusr_zingen_34_4.dll")
3. Check included libraries in '.py' files in main folder to ensure required libraries are installed on your computer
4. Paste sav file (SMIB), dyr file, and all dll files, into main folder
5. Create two copies of the dyr file. These two dyr files are to facilitate the swing bus generator models:
    - GNCLS: uses generic SMIB model to facilitate the swing bus
        - Alter dyr name to be unique
        - Add line " SWING_BUS#,'GENCLS', 1, 999.9, 0.0 / " to dyr, where "SWING_BUS#" should be replaced with the swing bus number
    - ZINGEN: AEMO in-house model to provided voltage and frequency setpoint changes at the swing bus
        - Alter dyr name to be unique
        - Add line " SWING_BUS# 'USRMDL' 1 'ZINGEN' 1 0 1 0 1 1 1/ " to dyr, where "SWING_BUS#" should be replaced with the swing bus number
6. Update "DATA.txt" file to reflect the system and simulation parameters required
    - Note that "CON_PPCPref" and "CON_PPCVref" are the identifiers for the active power reference and voltage reference setpoints respectively. The current script assumes these setpoints are located in a model power plant controller and that within that model they are located in CONs. "VAR_PPCPini" and "VAR_PPCVini" are used to determine the initial setpoint of the active power and voltage respectively. These parameters are assumed to be located a model's power plant controller also. The script must be edited to account for inaccuracy in these assumptions.
    - Outlines of each required parameter are as follows:

SMIB = swing bus number ('9999' typically used)
POC = POC bus number
INV1_Bus = generator connected bus number
INV2_Bus = for any additional generators parameters should be added in the format "INV#_Bus = …"
POC_frBus = 'from' bus for measurement of P and Q quantities
POC_toBus = 'to' bus for measurement of P and Q quantities
mID1 = generator ID
mID2 = for any additional generators parameters should be added in the format "mID# = …"

bus_flt = fault bus number. Generally, this is added between the POC and swing bus with the addition of a zero-impedance line between the new bus and the swing bus ('7000' typically used)
bus_IDTRF = 'to' bus for applying angle step change (from bus is set to 'bus_flt')(this bus is created via a tap of bus_flt and SMIB by the script)
Pmax_actual = the maximum active power setpoint (in MW) of the generator (or of each generator); note the limitation here of the script requiring multi-generator cases to all have the same P, Q limitations
Qmax_pu = maximum Q setpoint (in pu) using the generator base as defined in the generator load flow parameters

SBASE = system base (in MVA) (generally equal to 100MVA)

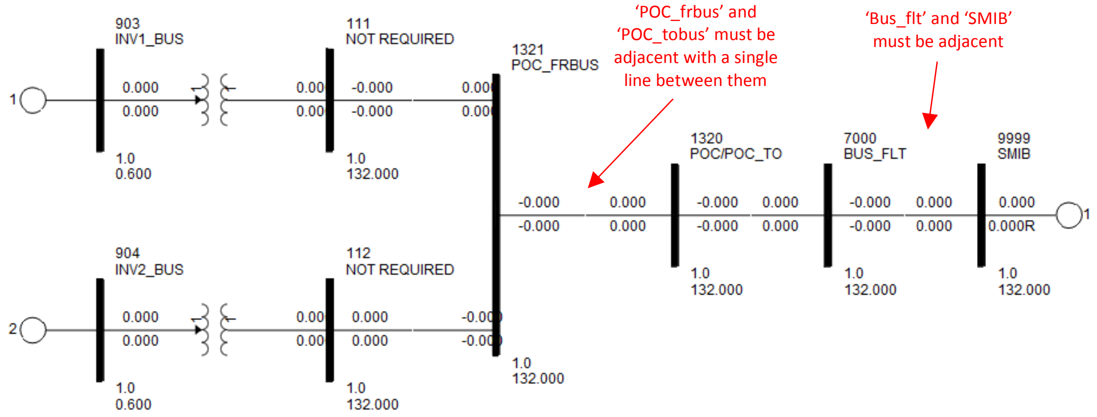
POC_VCtrl_Tgt = voltage control target at the POC (in pu)
CON_PPCPref = the CON number of the active power reference setpoint in the PPC (i.e. for J+20 this value equals 20)
CON_PPCVref = the CON number of the voltage reference setpoint in the PPC (i.e. for J+20 this value equals 20)
VAR_PPCVini = the VAR number of the initial voltage setpoint in the PPC (i.e. for L+20 this value equals 20)
VAR_PPCPini = the VAR number of the initial active power setpoint in the PPC (i.e. for L+20 this value equals 20)

ModelAccept_delete_create_savs = equal to '0' or '1'; this enables or disables the scripts ability to delete all sav cases in 'Model Assessment - AEMO\Test Files\' and to create new sav cases based on the data provided in this file (i.e. cases at different P and Q setpoint and at different SCR and X/R values)

DYR_File = full name of the dyr file setup for use with the ZINGEN swing bus generator model
DYR_File_GNCLS = full name of the dyr file setup for use with the GNCLS swing bus generator model
SAV_File = full name of the base sav case which will be copied and altered to create the sav cases which will be used in all studies

SCR = an array of SCR values to be tested; each will warrant the creation of a number of unique sav cases for testing (format = float) (Script assumes a base of 'SBASE' used)
XR_ratio = an array of X/R values to be tested; each will warrant the creation of a number of unique sav cases for testing (format = float)

7. Ensure the SMIB format is in keeping with this packages requirements, as outlined below:



'POC_frbus' and 'POC_tobus' must be adjacent with a single line between them

'Bus_flt' and 'SMIB' must be adjacent

The above figure in combination with the "DATA.txt" file provided give an example scenario where setup has been completed. Note that the above figure may not fully encompass all format requirements. For a complete understanding of the required format please study the python scripts.

8. For tailoring of 'ZINGEN' based studies any excel file titled "ZINGEN1_FUNCTION_NAME" can be edited in keeping this the format in each respective file, where 'FUNCTION_NAME' matches the python function name which utilises the file.

   For tailoring of GNCLS based functions alterations to the relevant python function within 'ModelAcceptance.py' must be made.

9. Update "RUN_STUDY_CHECKLIST.txt" to indicate which functions are desired to be run.

```
Model Assessment-------------------------------------------|
Voltage_Step_Test~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~|Y
POC_Vref_Step_Test~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~|N
```

   In the above example 'Voltage_Step_Test' function will be run, while 'POC_Vref_Step_Test' function will not.

10. If the script has not yet been run then update "DATA.txt" file parameter "ModelAccept_delete_create_savs" to equal '1'. This will enable the script to create a number of ".sav" files which will be used as the base cases for all subsequent script function runs.

    Note that This parameter can then be changed back to '0'.
    The ".sav" cases will require re-creation if changes to the base ".sav" case in the main folder are made, changes to the SCR or X/R's considered are made, or if any other significant changes are made to the parameters in DATA.txt; see "create_saved_cases" function in ModelAcceptance.py to understand the changes which will create a need to re-create these files.

11. Double click the “run.bat” file to run the model assessment.

Hints/Tips:

- If the outputs of “POC_Vref_Step_Test” or “POC_Pref_Step_Test” functions are not stepping voltage or active power respectively then ensure that the CON/VAR values defined in “DATA.txt” are correct for their purpose as described above.
- These scripts may require coded changes pertinent to a specific generator models functionality/operation. This package’s contained scripts should be studied and/or changed to suit each model’s unique attributes.
- All script outputs should be sanity checked after each run and in the presence of suspected errors the relevant scripts should be verified as operating correctly and appropriately for a given model.
- If PDF’s are not created on completion of script runs then PlottingPDF.py can be run manually. For guidance investigate the “plotResults()” function calls within “ModelAcceptance.py” which occur in each main function (main functions are those listed in RUN_STUDY_CHECKLIST.txt). “.bat” files like those created in these instances can be manually created and run to plot results.

If you identify any errors in the information provided, please notify us at connections@aemo.com.au.

AEMO is unable to provide technical support relating to the application of this script of model testing processes.

Note: Plotting format changes not outlined in this file.