

# Bruce McCarl's GAMS Newsletter Number 31

This newsletter covers

- A new documentation version
- Developments in the GAMS 23.7 and 8 releases
- An updated GNUPLOT interface
- Including tabs in put files
- Future courses I will teach

## Expanded GAMS User Guide by McCarl et al.

I updated the Expanded User's Guide to reflect 23.7 and 23.8 with changes added here and there.

The latest can be found at

<http://www.gams.com/dd/docs/bigdocs/gams2002/mccarlgamsuserguide.pdf> and will be in upcoming GAMS releases.

Also GAMS has spent a lot of time trying to raise the inclusiveness of the Expanded Users Guide with respect to

- Command Line Parameters
- Dollar Control Options
- Model Attributes
- GAMS Intrinsic and Extrinsic Functions

This has also been included in the older GAMS User Guide, one I do not recommend consulting (as it is missing a lot of material).

## GAMS Features in Release 23.7 and 23.8

### *Installation*

- GAMS has changed its WINDOWS installation location to avoid problems with security settings, namely those produced by the permission settings of the *Program Files* location.
  - The default location is *C:\GAMS\win32|win64\23.8*
  - The new installer also lets one manipulate the path plus finds the license on the clipboard.
- Unfortunately it does not copy customization from the old gams system file (like *Gmsprmnt.txt*, programs the user put in *inclib* and possibly the systems file plus the license file). Perhaps someday this will happen.

### *New language elements*

Below I list elements from the release notes I find significant. Some minor other features are present that I fail to see much use for (a projection method and generally invisible changes in the exit script). Interested readers can consult the release [notes](#).

- Changes have been made to the API's for C#, PYTHON and VBA.

- Model definitions containing complementary equ.var pairs can now be used with all model types but the matching information will only be used with appropriate model types (e.g. MCP, MPEC, RMPEC).
- Model definitions can now use new notation including model names, a '+' and a '-'. For example given the prior model names a1 and a2 also with equation e1, one can use the syntax  

```
model new /all-a1+e1/
```

to define a model as all equations less those in model a1 plus the equation e1.  
Similarly, one can use the syntax  

```
model new2 / a1+a2-e1/
```

to define a model as all equations in models a1 and a2 less the equation e1
- Functions can have up to 10 arguments
- There are some new features involving stochastic programming as documented in <http://www.gams.com/dd/docs/solvers/empsp.pdf>. I have not spent enough time with this to explain it. If someone figures it all out I invite them to send me a write up for inclusion in the reference guide and a subsequent newsletter.
- Traditionally GAMS supported running other executables via the \$call and Execute in a (synchronous) way where GAMS waited for the program to finish execution before proceeding. The 23.7 release introduced asynchronous job handling. This means you can start a job and proceed without waiting for the result. This is done through \$Call.ASync, Execute.ASync and put\_utility fx 'Exec.ASync'
- GAMS has a Function Library Facility that allows users to import functions from an external library into a GAMS model. In turn, the imported functions can be used in the same way as intrinsic functions including in equation definitions. See the Extrinsic Functions section of the Expanded GAMS User Guide or chapter 6 of the older GAMS User Guide. Function packages now interfaced include
  - FITPACK-a collection of FORTRAN programs for curve and surface fitting with splines and tensor product splines developed by P. Dierckx as discussed [here](http://nalag.cs.kuleuven.be/research/topics/fitpack.shtml) at <http://nalag.cs.kuleuven.be/research/topics/fitpack.shtml>.
  - pwpclib: which evaluates piecewise polynomial functions
  - stodclib: which provides random deviates, probability density functions, cumulative density functions and inverse cumulative density functions for certain distributions
  - tricclib, tridclib, trifclib: which are simple examples and have associated source code written in C, Delphi and Fortran.

## *Solvers*

- Nearly all the solvers have library or other updates
- It appears across 23.7 and 23.8 especially significant changes in features appear in BARON, CPLEX, Gurobi, KNITRO, LINDO, LINDOGLOBAL, and XPRESS.
- New solvers glomiqo, lindo and Gather-Update-Solve-Scatter (GUSS)

## *Model Libraries*

NEW library files are included that illustrate

- Data for the Matlab interface
- EMP (Extended Mathematical Programming) where examples are given of models which currently cannot be solved reliably that are reformulated into models of established math programming classes.
- Several new applications
- Plus several for features testing

## **New Rutherford interface to GNUPLOT**

Tom Rutherford released an updated version of his interface to GNUPLOT that will work with GNUPLOT 4.7. it is available at <http://www.mpsge.org/gnuplot/index.html> . He also releases the earlier version at <http://www.mpsge.org/gnuplot4.5/index.html> .

## **Put files with TAB Characters**

Dialogue on the GAMS User List led to the release of a heretofore unknown internal feature `system.tab` that can be used as follows

```
file test / test.put /;  
put test; put "1", "%system.tab%", "2";
```

Where the syntax `"%system.tab%"` results in a tab character being put into the file.

## **Courses offered**

I will be teaching

- Basic to Advanced GAMS class July 30, 2012- Aug 3, 2012 (5 days) in the Colorado mountains at Frisco (near Breckenridge). The course bridges from Basic topics to an Advanced GAMS class. Details are given at [http://www.gams.com/courses/basic\\_and\\_advanced.pdf](http://www.gams.com/courses/basic_and_advanced.pdf) .
- Basic GAMS class July 30, 2012- Aug 1, 2012 (3 days) in the Colorado mountains at Frisco (near Breckenridge). The course starts assuming no GAMS background. Details are given at <http://www.gams.com/courses/basic.pdf>.
- Advanced GAMS class Aug 1, 2012- Aug 3, 2012 (3 days) in the Colorado mountains at Frisco (near Breckenridge). The course starts assuming users have a GAMS background. Details are given at <http://www.gams.com/courses/advanced.pdf> .
- A GAMS class much like Basic to advanced will be given in Australia in association with the Agricultural Economics meetings in February 2013. Look for details in future newsletters or on GAMS page just below if interested.
- Further information and other courses are listed on <http://www.gams.com/courses.htm>.

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