

# How To Add New Aircraft And Flight Control System Dynamics to AVDS

## ***Background***

AVDS was designed to be very flexible. Basically it contains three simulation models, an aircraft, a flight control system (FCS) and the simulated environment. The aircraft and FCS models are defined by the user. They consist of two parts a model structure that is linked into a windows dynamic link library (DLL) and multidimensional look-up tables saved in text files. The demonstration version of AVDS is supplied with examples of a FCS model and an aircraft model. One can find the code making up the model structure for both under the directory *AVDS\model*. The corresponding look-up table files are *AVDS\userfiles\fbgain.fcs.txt* and *AVDS\userfiles\f18.av.txt*. To connect the inputs and outputs of the simulation models AVDS provides a ***Simulation Configuration*** dialog window, from the AVDS menu select ***Configure->Simulation***. The user defines all inputs, outputs, and look-up table parameters. This give the user complete flexibility to build the simulation that fits the job.

## ***Files and Directories***

- By default AVDS is installed in the directory *C:\Program Files\AVDS*.
- The directory *AVDS\userfiles* contains the multidimensional look-up tables that contain parameters such as control and stability derivative.
- The files *userfiles\\*.av.txt* contain the control and stability derivatives, mass moment of inertias, engine force tables, etc. for the aircraft models.
- The files *userfiles\\*.fcs.txt* contain the tables for gain scheduling the FCS models.
- The files *userfiles\\*.sim.ini* are the locations where the simulation is stored. These files reflect the simulation as configured in the ***Simulation Configuration*** dialog window in AVDS (from the AVDS menu select ***Configure->Simulation***).
- By default aircraft and FCS dynamics model files are located in the directory *AVDS\model*.
- The file *model\modelcap.txt* is a text file that is used by AVDS to list the DLL dynamics model files that are to be loaded into AVDS.
- The files *model\\*.dll* are the aircraft and FCS dynamics models in the form of dynamic-link library files.
- The directories under the *model* directory contain source code and Microsoft Visual C++ project files for the aircraft and FCS dynamics models.

**Note:** AVDS checks the *modelcap.txt* file and loads the model DLLs when started. Therefore any changes to these files will not take affect until AVDS is exited and then restarted.

## ***Changing Aircraft And FCS Parameters***

The dynamics of aircraft and FCS models can be changed by modifying control and stability derivatives, inertias, engine parameters, or FCS parameters in the look-up tables. These tables are located in the *userfiles* directory. The look-up tables files have the

extensions **.av.txt** and **.fcs.txt** by default. Once the tables have been changed, the AVDS simulation can be restarted with the new dynamics.

### ***Inserting New Dynamics Models***

1. Copy one of the sample dynamics model directories.
2. Modify the source code in the new model directory and then compile it into a dynamic-link library using the MS Visual C++ project settings or settings appropriate for the compiler being used.
3. Place the resulting DLL in the **AVDS\model** directory.
4. Enter the name of the new DLL in the file **model\modelcap.txt**.
5. Start AVDS.
6. Configure the new simulation for use using the *Simulation Configuration* dialog window (from the AVDS menu select *Configure->Simulation*).

Note: Details on building simulation dynamics model can be found in the AVDS manual in *Chapter 4*.