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Aircraft Performance Program Part 1: Introduction to the computer programs for aircraft performance evaluation



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THE PREPARATION OF THIS DATA ITEM

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AIRCRAFT PERFORMANCE PROGRAM
PART 1: INTRODUCTION TO THE COMPUTER PROGRAMS FOR AIRCRAFT
PERFORMANCE EVALUATION

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AIRCRAFT PERFORMANCE PROGRAM

PART 1: INTRODUCTION TO THE COMPUTER PROGRAMS FOR AIRCRAFT PERFORMANCE EVALUATION

1. INTRODUCTION

The ESDU Aircraft Performance Program is a suite of programs to predict the performance of an aircraft design for which appropriate aerodynamic and powerplant data are available. This suite consists of programs to predict,

- Point and path performance (**Flight Performance**),
- Take-off and landing performance (**Airfield Performance**),
- Mission performance (**Military: Radius of Action** or **Civil: Block Fuel or Block Time**).

Figure 1 shows a simple hierarchical block diagram of the main program modules and the ESDU Data Items that contain relevant equations, techniques or assumptions. Figure 1 also shows how the modules in each program are inter-related. The highest level of modules are the control modules for the **Airfield** and **Radius of Action/Block Fuel or Block Time** programs. These control programs call the 'path performance' modules. Below these are the 'point performance' routines which are also used as service routines by the higher level path performance programs. Below these 'point performance' calculations are the 'general service routines'. The **Flight Performance** program is constructed using the 'path performance' and 'point performance' modules. There is provision for simple local searches for single-variable optimum conditions.

The programs being issued in this release are as follows.

APP02, the Flight Performance Program,

APP03, the Interpolation Program.

Figure 1 identifies which modules are included in each of these programs.

2. GENERAL

The suite of programs uses SI units internally. The user has the option to provide input in other sets of units or in mixtures of units. Output is in units compatible with the user input.

These programs are formulated to accept the implications of the various regulatory rules (JAR, FAR and DEF STAN (References 1 to 3)). This is particularly relevant to the airfield performance where the set of JAR-25 rules (Reference 1) is taken as the model. Keeping up to date with rule changes is accommodated by allowing the user to change the factors and margins used.

The user can specify the input data either as constant values or as tables of data varying with a range of possible variables. Engine performance data can be accepted for several sets of jets and propellers having different performance per engine in each set. It is assumed that the engine data are applicable to "fully installed" conditions (*i.e.* the data have been corrected, for example, for intake spillage, base drag and aerodynamic interferences) but provision is made for additional thrust factors and incremental aerodynamic effects which can be functions of engine-dependent variables.

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