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DATA ITEM DESCRIPTION

Title: GAS TURBINE ENGINE STEADY STATE AND TRANSIENT PERFORMANCE PRESENTATIONS FOR COMPUTER PROGRAMS

Number: DI-MSSM-81966A
AMSC Number: F9544
DTIC Applicable: No
Preparing Activity: 11 (AFLCMC/EZFP)

Approval Date: 20150511
Limitation: N/A
GIDEP Applicable: No
Project Number: MSSM-2015-001

Applicable Forms: N/A

Use/Relationship: This Data Item Description (DID) is related to DI-TMSS-81515, User's Manual for Gas Turbine Engine Steady-State and Transient Performance for Digital Computer Programs.

a. Engine steady state and transient computer programs (herein referred to as Models) provide a detailed description of the aero-thermodynamic cycle performance and stability characteristics of the Propulsion System. These Models will be provided to the Using Service for evaluation of Propulsion System performance and stability characteristics during source selections, evaluations/studies during the development program, and post-qualification modification evaluations throughout the life of the program.

b. This DID contains the format, content, and intended use information for data deliverable resulting from the work task described in paragraphs 3.2.1 and 4.2.1 of JSSG-2007, Engines Joint Service Specification Guide.

Requirements:

1. Reference Documents. The applicable issue of the documents cited herein, including their approval dates and dates of any applicable amendments, notices, and revisions, shall be as specified in the contract.

2. Format. The Models shall be formatted as follows:

2.1 Except as modified herein, the Models shall conform to the Society of Automotive Engineers Aerospace Standards AS681J, “Gas Turbine Engine Performance Presentation for Computer Programs” and AS755E, “Aircraft Propulsion System Performance Station Designation and Nomenclature”.

(SAE documents are available from SAE International, 400 Commonwealth Drive, Warrendale PA 15096-0001; 1-877-606-7323; www.sae.org.)

2.2 The Models shall be written and provided in either FORTRAN or Numerical Propulsion System Simulation (NPSS) source languages, and shall be capable of being compiled and executed on the computer system and platform identified by the Using Service.

2.3 The Models shall carry suitable identification including the engine model designation, manufacturer’s name, engine specification number, revision date, and Model identification number.

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2.4 The Models shall be thermodynamic cycle simulations in which component identity is maintained (i.e., each fan, axial compressor, and centrifugal compressor; each turbine, combustor, augmenter, and fan duct; and each exhaust nozzle must be identified as entities in the Model logic) as required to obtain and maintain an accurate simulation.

2.5 The Models shall be capable of operating throughout the engine operating envelope. Input test cases with output shall be provided with the Models to verify the capabilities and operation of the Models adequately prior to acceptance by the Using Service.

2.6 Model customer interface nomenclature shall be in accordance with SAE Aerospace Recommended Practice ARP5571B, "Gas Turbine Engine Performance Presentation and Nomenclature For Object-Oriented Computer Programs," for NPSS models and SAE AS4191, "Gas Turbine Engine Performance Presentation for Computer Programs Using FORTRAN," for FORTRAN models.

3. Content. The Models shall include the following:

3.1 Model deliveries shall consist of main and subroutines. Source codes shall include all program subroutines, and shall have internal documentation (i.e., detailed comment statements) within the program code to identify subroutines and their logic. The level of documentation within the program shall, at a minimum, be consistent with current best practices.

3.2 Inputs/outputs.

3.2.1 The Model shall be so organized that the input data can be separated from the output data. Output shall include engine and Model designations. Provision shall be made in the output to allow inclusion of declassification and authority information.

3.2.2 The Model shall also be capable of providing input for adders and scalars used to modify the major parameters for each of the engine components. Adders shall be made available on major component efficiencies, major pressure losses, nozzle coefficients, and component leakages and cooling flows. Scalars shall be made available on turbine flow parameters. The model shall also be capable of providing input for aircraft customer bleed flow rate, aircraft power extraction, aircraft inlet ram pressure recovery, heat exchanger heat flow, and fuel lower heating value as applicable for the model.

3.2.3 Control and aero-thermodynamic cycle parameters used in component performance evaluation and calculations shall be available as output (or expanded output) without reprogramming.

3.2.4 The units used on the input and output parameter values shall be based on the U.S. Customary System.

End of DI-MSSM-81966A