The Engineering Society For Advancing Mobility Land Sea Air and Space®

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AEROSPACE RECOMMENDED PRACTICE

ARP4191

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GAS TURBINE ENGINE PERFORMANCE PRESENTATION FOR DIGITAL COMPUTER PROGRAMS USING FORTRAN 77

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1. PURPOSE:

This Aerospace Recommended Practice, (ARP) provides a method for digital computer programs for gas turbine engine, steady-state or transient, performance to be written using the FORTRAN 77 Language.

When it is agreed between the program User and Supplier that a particular program will be supplied in FORTRAN 77, it is recommended that this ARP be used in conjunction with AS681 for a steady-state program or ARP1257 for a transient program.

This ARP has two purposes:

1. To remove the requirement for HOLLERITH stores by replacing them with FORTRAN 77 CHARACTER stores.

2. To take advantage of the FORTRAN 77 CHARACTER storage to extend the information interface between the calling program and the engine subroutine.

The ARP has the same major section numbers as AS681 and ARP1257 to facilitate its use with these documents. The information given in each section of this ARP is additional to that given in AS681 and ARP1257.

2. GENERAL REQUIREMENTS:

Section 4 of the User's Manual will state which standard of FORTRAN is used and whether the recommendations of this ARP are followed. During the transition phase from FORTRAN 66 to FORTRAN 77, three types of program may be used:

1. A program for use with FORTRAN 66 compilers; this could include use with a multi-purpose compiler, switched to '66' mode. These compilers will not support FORTRAN 77 features. The programs are completely defined by AS681 and ARP1257 and, therefore, ARP4191 is not relevant to them.

2. A program for use with FORTRAN 77 compilers that support Hollerith storage. Most FORTRAN 77 compilers include Hollerith stores even though these are not included in the definition of FORTRAN 77. These programs will provide text information in both the Hollerith stores of FIXIN and FIXOUT and also in the CHARACTER stores defined in ARP4191. The text in FIXIN and FIXOUT will be duplicated in the CHARACTER COMMONS CHRIN and CHROUT. This will enable the user to take the text information from either type of storage, and therefore, the user can convert his software to use only CHARACTER storage without requesting another version of the program from the supplier.

3. A program for use with FORTRAN 77 compilers that do not support Hollerith storage. These programs will use the CHARACTER COMMONS CHRIN and CHROUT and will not use the Hollerith items in FIXIN and FIXOUT.

2. GENERAL REQUIREMENTS: (Continued)

The type of program to be supplied to the user must be coordinated between the user and supplier. The second and third types of program may also provide an extra text interface in the CHARACTER COMMON CHREXP which contains information that is not available from FIXIN, FIXOUT or CHRIN, CHROUT. The storage defined in CHREXP is quite large and, therefore, use of CHREXP must be coordinated between user and supplier.

(see Section 5 for details of CHRIN, CHROUT, CHREXP).

3. PROGRAMMING PRACTICES:

3.1 Program Language: Engine computer programs will use as a minimum language 'FORTRAN 77' as originally defined in ANSI X3.9 1978.

3.2 Nomenclature: The following symbols, which refer specifically to computer programs written in FORTRAN 77, are added to those of ARP755.

CCLASS - Engine Program Security Classification
CIDENT - Engine Program Titles - for print out
CTITLE - Title supplied by Program User
CPAGE - A full page of text providing information in addition to that contained in CIDENT. Typically this would include Contract numbers, Limited Rights Legends and would be printed once for each run of the program.
CLEGND - Text information that may summarize or replace CPAGE and is sufficiently short to be printed on each page of output from the program.
CMESSG - Text messages for Numerical Status Indicators.

4. PROGRAM CAPABILITIES:

As in AS681 and ARP1257.

5. INPUT/OUTPUT:

5.1 Program Interface Definition: The communication between the calling program and the engine subroutine will be handled completely by nine labeled COMMONS. These will be FIXIN, VARIN, EXPIN and CHRIN (character input) for input and FIXOUT, VAROUT, EXPOUT, CHROUT, and CHREXP (character output) for output. The engine subroutine will never store computed values in FIXIN, VARIN, EXPIN, or CHRIN.

5.2 Input:

5.2.1 FIXIN: FIXIN item 4 - TITLE (18).

5.2.2 CHRIN:

1. CTITLE User Title - CHARACTER * 72
   (equivalent to FIXIN item 4)

   If the program is supplied for use with compilers that support both CHARACTER and Hollerith stores then TITLE and CTITLE will both contain the User Title.

   If the program is supplied for use with FORTRAN 77 compilers that do not support Hollerith, the User Title will only be stored in CTITLE. FIXIN item 4 will be declared, but not used.

5.3 Output:

5.3.1 FIXOUT:

FIXOUT item 1 - CLASS (6)
FIXOUT item 2 - IDENT (36)

5.3.2 CHROUT:

1. CCLASS: Engine Program Security Classification - CHARACTER * 72
   (equivalent to FIXOUT item 1, but extended from 24 to 72 characters)

2. CIDENT (3): Engine Program Titles - Dimension 3, CHARACTER * 72
   (equivalent to FIXOUT item 2, but extended from 144 to 216 characters)

   If the program is supplied for use with compilers that support both Character and Hollerith, FIXOUT item 2 will contain the same information as the first 144 characters of CIDENT. Also, FIXOUT item 1 will contain the same information as the first 24 characters of CCLASS.

   If the program is supplied for use with FORTRAN 77 compilers that do not support Hollerith, the identification and classification will only be stored in CIDENT and CCLASS. FIXOUT items 1 and 2 will be declared, but not used.

5.3.3 CHREXP: CHREXP contains information which is additional to that described in AS681 and ARP1257.

1. CPAGE (100): Full page of text output - dimension 100, CHARACTER * 72.

2. CLEGND (10): Extra text output - dimension 10, CHARACTER * 72.

3. CMESSG (10): Messages for NSIs. Each message relates to the corresponding NSI in FIXOUT (e.g., CMESSG (3) is the message for NSI (3)). - dimension 10, CHARACTER * 72.

Items 1 and 2 would normally be fixed for a particular program. The contents of item 3 will vary for each case, depending on the numerical status indicators that are invoked.