A-7E OFP "USES" SPECIFICATION

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References:

[EC] Britton, Clements, Parnas, Weiss; *Interface Specifications for the SCR (A-7E) Extended Computer Module*, NRL Memorandum Report 4843, 9 May 1983.

[MG] Britton, Parnas: "A-7E Software Module Guide", NRL Memorandum Report 4702, 8 December 1981.

[USES] Parnas, D. L.: "Designing Software for Ease of Extension and Contraction", *Proceedings of the 3rd International Conference on Software Engineering (10-12 May 1978)*, pp. 264-277.

[SO] Clements, Parker, Parnas, Shore, Britton: "A Standard Organization for Specifying Abstract Interfaces", NRL Report 8815, 14 June 1984.

1. Some Preliminary Rules and Concepts

This document specifies the relation *is allowed to use* between run-time programs in the A-7E (SCR) operational flight program (OFP). *Use* is defined in [USES]†. Let A and B be distinct programs. If (A,B) is in the relation, then program A is allowed to use program B. A set of ordered pairs can be specified by naming two lists of programs (L1,L2); this specifies the set of ordered pairs (a,b) such that a is in L1 and B is in L2. In this document, the programs specified are access programs on the interface of a module. A list of programs may be given as a module name, which is shorthand for every program on the interface of that module. If (A,B) is not in the relation, it means that A is **not** allowed to use B.

In some cases, we have not allowed uses that may in fact be acceptable when more information becomes available. If the implementor of a module discovers that a desired use is ruled out, he or she should apply to the keeper of this document for a modification of the relation.

2. Specification of the ‘‘Allowed to Use’’ Relation

Program names begin with one of the following: **+ @T @F =T =F**. All other names are modules or abbreviations for modules that are described in [MG] or documents referenced by [MG]. Exception: Data Banker programs are specified by naming the submodule that produces the values. For instance, "DB.DI.PNL" refers to those programs in the Data Banker that return values produced by DI.PNL. ‘‘AT.STE.2.5.1’’ and ‘‘AT.STE.2.5.2’’ refer to the set of programs specified in sections STE.2.5.1 and STE.2.5.2, respectively, of [AT]. ‘‘XX.ABC/DEF’’ is shorthand for ‘‘XX.ABC and XX.DEF’’.

The entries in each column are lists of programs. The programs in a lefthand column entry use the programs in the corresponding righthand column entry. The used programs are listed in alphabetical order by module, except that Extended Computer programs are listed first.

Note: Uses information is largely yet to be determined for the Physical Models module and the system-generation-time programs of the Data Banker module.

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†In the case of types and entity declarations, the following rules hold. Any program that is implemented with an entity (as defined in [EC]) uses the program by which the entity and its type are declared; it also uses the *invocations* of those declaration programs.

USING PROGRAMS	USED PROGRAMS
Extended Computer Module	None.
Device Interface Module	EC.DATA/PGM/IO*, AT.NUM/STE.2.5.1/STE.2.5.2, SU
Air Data Computer	PM.ECM, +DB.G_SS.Vertical_velocity_system+
Angle of Attack	
Audible Signal	
+S_BEEP_RATE+	EC.TIMER*
All others	EC.PAR*/SMPH
Computer Fail Signal	
Doppler Radar Set	
Flight Information Displays	DI.IOREP, DI.FLR
Forward Looking Radar	
+S_FLR_BLINK_RATE+	EC.TIMER*
All others	DI.IOREP, DB.DI.MFSW, EC.PAR*/SMPH
Head-Up Display	
+S_HUD_BLINK_RATE+	EC.TIMER*
All others	EC.PAR*/SMPH
Inertial Measurement Set	PM.ACM
Input/Output Rep'n	
Panel	EC.PAR*/SMPH
Radar Altimeter	
SINS	EC.PAR*/SMPH
Slew Control	EC.PAR*/SMPH
Switch Bank	EC.PAR*/SMPH
TACAN	
Visual Indicators	
+S_AUTOCAL_BLINK_RATE+	EC.TIMER*
+S_NON_ALIGN_BLINK_RATE+	EC.TIMER*
Waypoint Information System	
Weapon Characteristics	+DB.G_SS.stik_quan+ +DB.@T_DI.High_Drag_changed+ +DB.@T_DI.Mult_Rack_changed+ +DB.G_DI.nbr_rdy_sta+ +DB.G_DI.Weap_Pairs+ +DB.G_DI.Mult_Rack+ +DB.G_DI.Rel_in_Progress+
Weapon Release System	DB.DI.MFSW, EC.PAR*/SMPH,
+G_MULT_RACK+	+DB.G_DI.Weapon_Class+
+RELEASE_WEAPON+	+DB.G_DI.Weapon_Class+
+PREPARE_WEAPON+	+DB.G_DI.preparation_time+
Weight on Gear	EC.PAR*/SMPH
Function Driver Module	EC.DATA/PAR*/PGM/SMPH, AT.NUM/STE.2.5.1, SU DB.SS.MODE/SS.PNL.INPUT/SS.STAGE/SS.SYSVAL, DB.DI, DB.++, SS.SUBRTN, ++SS.DCL_MODE++
Air Data Computer Fns.	DB.DI.ADC, DI.ADC, PM.FILTER
Audible Signal Fns.	DI.AUDSIG
Computer Fail Signal Fns.	DI.CFS, EC.STATE
Doppler Radar Fns.	DI.DRS
Flight Info Display Fns.	DI.FID
FLR Fns.	DI.FLR
HUD Fns.	DI.HUD
IMS Fns.	DB.DI.IMS, DI.IMS
Panel Fns.	EC.IO* DB.SS.PNL.CONFIG, SS.PNL.FORMAT DI.ADC, DI.IMS, DI.PMDS, DI.PNL

USING PROGRAMS	USED PROGRAMS
PMDS Fns.	DB.DI.PMDS, DI.PMDS
SINS Fns.	DI.SINS
Visual Indicator Fns.	DI.VI
Weapon Release Fns.	DI.WRS
Ground Test Fns.	Any program +TEST_...+ in EC.IO/MEM/PAR.1/TIMER
Any demand function	AT.STE.2.5.2
Shared Services Module	EC.DATA/PGM/PAR*/SMPH, AT.NUM/STE.2.5.1, SU, DB.++
Mode Determination	DB.DI/PM.ACM
Panel I/O Support	DB.SS.MODE, ++SS.DCL_MODE++
Input	DB.DI.PNL, DB.DI.SWB, SS.PNL.CONFIG, DI.PNL
Display format	DB.DI.PNL, DI.PNL
Configuration	DB.DI.PNL, DB.DI.SWB
Shared Subroutine	DB.DI.HUD
Stage Director	DB.DI.IMS/PM.ACM
System Value	DB.DI, PM.FILTER, DB.SS.MODE, ++SS.DCL_MODE++
Imsaln	EC.TIMER*
Application Data Type Module	EC.DATA/PGM
Numeric Data Types	
State Transition Events	EC.PAR*/SMPH
Software Utility Module	EC.DATA/PGM, AT.NUM/STE.2.5.1
Power-Up Initialization	FD.INIT, SS.INIT, DI.INIT, DB.INIT, FB.INIT, PM.INIT, SU.INIT, +NA.INIT+, +NA.FIRST_INIT+
Physical Models Module	EC.DATA/PGM, AT.NUM/STE.2.5.1
Data Banker	
Each submodule DB.*xxx*	Corresponding module *xxx* where *xxx* ∈ {DI PM SS}
Any @T or @F program	AT.STE.2.5.2

3. Known Loops

The goal of documenting and engineering the uses hierarchy is to facilitate straightforward definition of subsets [USES]. A loop in the hierarchy means that all programs in the loop must be in any subset to which any belong. This section lists the loops implied by the relations specified in this document.

(1) Programs in DI.ADC use +SS.G_VERTICAL_VELOCIY_SYSTEM+ (via the Data Banker), which in turn uses programs in DI.ADC (again via the Data Banker).

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* Does not include any program of the form +TEST_...+

Does not include any device reconfiguration program; these occur in the DI.ADC, DI.IMS, and DI.PMDS submodules. Does not include programs in the DI.MFSW submodule.

This means any system-generation-time program of the Data Banker module, and any run-time program(s) created by the invocation of that sysgen program.