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Ada COMPILER
VALIDATION SUMMARY REPORT:
Certificate Number: 910425W1.11141
Intermetrics, Inc.
UTS Ada Compiler, Version 302.03
IBM 3083 => IBM 3083

Prepared By:
Ada Validation Facility
ASD/SCEL
Wright Patterson AFB OH 45433-6503

Certificate Information

The following Ada implementation was tested and determined to pass ACVC 1.11. Testing was completed on 25 April, 1991.

Compiler Name and Version: UTS Ada Compiler, Version 302.03

Host Computer System: IBM 3083 under UTS 580 Release 1.2.3

Target Computer System: IBM 3083 under UTS 580 Release 1.2.3

Customer Agreement Number: 90-11-16-INT

See Section 3.1 for any additional information about the testing environment.

As a result of this validation effort, Validation Certificate 910425W1.11141 is awarded to Intermetrics, Inc. This certificate expires on 1 June 1993.

This report has been reviewed and is approved.

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DECLARATION OF CONFORMANCE

Customer: Intermetrics, Inc., Cambridge, MA

Ada Validation Facility: ASD/SCEL Wright-Patterson AFB, OH 45433-6503

ACVC Version: 1.11

Ada Implementation

Compiler Name and Version: UTS Ada Compiler, Version 302.03
Host Computer System: IBM 3083, UTS 580 Release 1.2.3
Target Computer System: same

Customer's Declaration

I, the undersigned, representing Intermetrics, Inc., declare that Intermetrics, Inc. has no knowledge of deliberate deviations from the Ada Language Standard ANSI/MIL-STD-1815A in the implementation listed in this declaration. I declare that Intermetrics, Inc. is the owner of record of the above implementation and the certificates shall be awarded in Intermetrics' corporate name.

Dennis D. Struble Jm Date: 3/8/91

Dennis Struble, Deputy General Manager,
Development Systems Group, Intermetrics, Inc.

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CHAPTER 1

INTRODUCTION

The Ada implementation described above was tested according to the Ada Validation Procedures [Pro90] against the Ada Standard [Ada83] using the current Ada Compiler Validation Capability (ACVC). This Validation Summary Report (VSR) gives an account of the testing of this Ada implementation. For any technical terms used in this report, the reader is referred to [Pro90]. A detailed description of the ACVC may be found in the current ACVC User's Guide [UG89].

1.1 USE OF THIS VALIDATION SUMMARY REPORT

Consistent with the national laws of the originating country, the Ada Certification Body may make full and free public disclosure of this report. In the United States, this is provided in accordance with the "Freedom of Information Act" (5 U.S.C. #552). The results of this validation apply only to the computers, operating systems, and compiler versions identified in this report.

The organizations represented on the signature page of this report do not represent or warrant that all statements set forth in this report are accurate and complete, or that the subject implementation has no nonconformities to the Ada Standard other than those presented. Copies of this report are available to the public from the AVF which performed this validation or from:

National Technical Information Service
5285 Port Royal Road
Springfield VA 22161

Questions regarding this report or the validation test results should be directed to the AVF which performed this validation or to:

Ada Validation Organization
Institute for Defense Analyses
1801 North Beauregard Street
Alexandria VA 22311

1.2 REFERENCES

[Ada83] Reference Manual for the Ada Programming Language, ANSI/MIL-STD-1815A, February 1983 and ISO 8652-1987.

[Pro90] Ada Compiler Validation Procedures, Version 2.1, Ada Joint Program Office, August 1990.

[UG89] Ada Compiler Validation Capability User's Guide, 21 June 1989.

1.3 ACVC TEST CLASSES

Compliance of Ada implementations is tested by means of the ACVC. The ACVC contains a collection of test programs structured into six test classes: A, B, C, D, E, and L. The first letter of a test name identifies the class to which it belongs. Class A, C, D, and E tests are executable. Class B and class L tests are expected to produce errors at compile time and link time, respectively.

The executable tests are written in a self-checking manner and produce a PASSED, FAILED, or NOT APPLICABLE message indicating the result when they are executed. Three Ada library units, the packages REPORT and SPPRT13, and the procedure CHECK_FILE are used for this purpose. The package REPORT also provides a set of identity functions used to defeat some compiler optimizations allowed by the Ada Standard that would circumvent a test objective. The package SPPRT13 is used by many tests for Chapter 13 of the Ada Standard. The procedure CHECK_FILE is used to check the contents of text files written by some of the Class C tests for Chapter 14 of the Ada Standard. The operation of REPORT and CHECK_FILE is checked by a set of executable tests. If these units are not operating correctly, validation testing is discontinued.

Class B tests check that a compiler detects illegal language usage. Class B tests are not executable. Each test in this class is compiled and the resulting compilation listing is examined to verify that all violations of the Ada Standard are detected. Some of the class B tests contain legal Ada code which must not be flagged illegal by the compiler. This behavior is also verified.

Class L tests check that an Ada implementation correctly detects violation of the Ada Standard involving multiple, separately compiled units. Errors are expected at link time, and execution is attempted.

In some tests of the ACVC, certain macro strings have to be replaced by implementation-specific values -- for example, the largest integer. A list of the values used for this implementation is provided in Appendix A. In addition to these anticipated test modifications, additional changes may be required to remove unforeseen conflicts between the tests and implementation-dependent characteristics. The modifications required for this implementation are described in section 2.3.

For each Ada implementation, a customized test suite is produced by the AVF. This customization consists of making the modifications described in the preceding paragraph, removing withdrawn tests (see section 2.1) and, possibly some inapplicable tests (see Section 2.2 and [UG89]).

In order to pass an ACVC an Ada implementation must process each test of the customized test suite according to the Ada Standard.

1.4 DEFINITION OF TERMS

Ada Compiler	The software and any needed hardware that have to be added to a given host and target computer system to allow transformation of Ada programs into executable form and execution thereof.
Ada Compiler Validation Capability (ACVC)	The means for testing compliance of Ada implementations, consisting of the test suite, the support programs, the ACVC user's guide and the template for the validation summary report.
Ada Implementation	An Ada compiler with its host computer system and its target computer system.
Ada Joint Program Office (AJPO)	The part of the certification body which provides policy and guidance for the Ada certification system.
Ada Validation Facility (AVF)	The part of the certification body which carries out the procedures required to establish the compliance of an Ada implementation.
Ada Validation Organization (AVO)	The part of the certification body that provides technical guidance for operations of the Ada certification system.
Compliance of an Ada Implementation	The ability of the implementation to pass an ACVC version.
Computer System	A functional unit, consisting of one or more computers and associated software, that uses common storage for all or part of a program and also for all or part of the data necessary for the execution of the program; executes user-written or user-designated programs; performs user-designated data manipulation, including arithmetic operations and logic operations; and that can execute programs that modify themselves during execution. A computer system may be a stand-alone unit or may consist of several inter-connected units.

Conformity	Fulfillment by a product, process or service of all requirements specified.
Customer	An individual or corporate entity who enters into an agreement with an AVF which specifies the terms and conditions for AVF services (of any kind) to be performed.
Declaration of Conformance	A formal statement from a customer assuring that conformity is realized or attainable on the Ada implementation for which validation status is realized.
Host Computer System	A computer system where Ada source programs are transformed into executable form.
Inapplicable test	A test that contains one or more test objectives found to be irrelevant for the given Ada implementation.
ISO	International Organization for Standardization.
Operating System	Software that controls the execution of programs and that provides services such as resource allocation, scheduling, input/output control, and data management. Usually, operating systems are predominantly software, but partial or complete hardware implementations are possible.
Target Computer System	A computer system where the executable form of Ada programs are executed.
Validated Ada Compiler	The compiler of a validated Ada implementation.
Validated Ada Implementation	An Ada implementation that has been validated successfully either by AVF testing or by registration [Pro90].
Validation	The process of checking the conformity of an Ada compiler to the Ada programming language and of issuing a certificate for this implementation.
Withdrawn test	A test found to be incorrect and not used in conformity testing. A test may be incorrect because it has an invalid test objective, fails to meet its test objective or contains erroneous or illegal use of the Ada programming language.

CHAPTER 2

IMPLEMENTATION DEPENDENCIES

2.1 WITHDRAWN TESTS

The following tests have been withdrawn by the AVO. The rationale for withdrawing each test is available from either the AVO or the AVF. The publication date for this list of withdrawn tests is 14 MARCH 1991.

E28005C	B28006C	C34006D	C35508I	C35508J	C35508M
C35508N	C35702A	C35702B	B41308B	C43004A	C45114A
C45346A	C45612A	C45612B	C45612C	C45651A	C46022A
B49008A	A74006A	C74308A	B83022B	B83022H	B83025B
B83025D	C83026A	B83026B	C83041A	B85001L	C86001F
C94021A	C97116A	C98003B	BA2011A	CB7001A	CB7001B
CB7004A	CC1223A	BC1226A	CC1226B	BC3009B	BD1B02B
BD1B06A	AD1B08A	BD2A02A	CD2A21E	CD2A23E	CD2A32A
CD2A41A	CD2A41E	CD2A87A	CD2B15C	BD3006A	BD4008A
CD4022A	CD4022D	CD4024B	CD4024C	CD4024D	CD4031A
CD4051D	CD5111A	CD7004C	ED7005D	CD7005E	AD7006A
CD7006E	AD7201A	AD7201E	CD7204B	AD7206A	BD8002A
BD8004C	CD9005A	CD9005B	CDA201E	CE2107I	CE2117A
CE2117B	CE2119B	CE2205B	CE2405A	CE3111C	CE3116A
CE3118A	CE3411B	CE3412B	CE3607B	CE3607C	CE3607D
CE3812A	CE3814A	CE3902B			

2.2 INAPPLICABLE TESTS

A test is inapplicable if it contains test objectives which are irrelevant for a given Ada implementation. Reasons for a test's inapplicability may be supported by documents issued by the ISO and the AJPO known as Ada Commentaries and commonly referenced in the format AI-ddddd. For this implementation, the following tests were determined to be inapplicable for the reasons indicated; references to Ada Commentaries are included as appropriate.

IMPLEMENTATION DEPENDENCIES

The following 201 tests have floating-point type declarations requiring more digits than SYSTEM.MAX_DIGITS:

C24113L..Y (14 tests)	C35705L..Y (14 tests)
C35706L..Y (14 tests)	C35707L..Y (14 tests)
C35708L..Y (14 tests)	C35802L..Z (15 tests)
C45241L..Y (14 tests)	C45321L..Y (14 tests)
C45421L..Y (14 tests)	C45521L..Z (15 tests)
C45524L..Z (15 tests)	C45621L..Z (15 tests)
C45641L..Y (14 tests)	C46012L..Z (15 tests)

The following 21 tests check for the predefined type SHORT_INTEGER; for this implementation, there is no such type:

C35404B	B36105C	C45231B	C45304B	C45411B
C45412B	C45502B	C45503B	C45504B	C45504E
C45611B	C45613B	C45614B	C45631B	C45632B
B52004E	C55B07B	B55B09D	B86001V	C86006D
CD7101E				

The following 20 tests check for the predefined type LONG_INTEGER; for this implementation, there is no such type:

C35404C	C45231C	C45304C	C45411C	C45412C
C45502C	C45503C	C45504C	C45504F	C45611C
C45613C	C45614C	C45631C	C45632C	B52004D
C55B07A	B55B09C	B86001W	C86006C	CD7101F

C35404D, C45231D, B86001X, C86006E, and CD7101G check for a predefined integer type with a name other than INTEGER, LONG_INTEGER, or SHORT_INTEGER; for this implementation, there is no such type.

C35713C, B86001U, and C86006G check for the predefined type LONG_FLOAT; for this implementation, there is no such type.

C35713D and B86001Z check for a predefined floating-point type with a name other than FLOAT, LONG_FLOAT, or SHORT_FLOAT; for this implementation, there is no such type.

C45423A..B (2 tests), C45523A, and C45622A check that if MACHINE_OVERFLOWS is TRUE and the results of various floating-point operations lie outside the range of the base type, then the proper exception is raised; for this implementation, MACHINE_OVERFLOWS is FALSE.

C45531M..P and C45532M..P (8 tests) check fixed-point operations for types that require a SYSTEM.MAX_MANTISSA of 47 or greater; for this implementation, MAX_MANTISSA is less than 47.

C46013B, C46031B, C46033B, and C46034B contain length clauses that specify values for small that are not powers of two or five; this implementation does not support such values for small.

D55A03E..H (4 tests) use 31 levels of loop nesting which exceeds the capacity of the compiler.

D56001B uses 65 levels of block nesting which exceeds the capacity of the compiler.

B86001Y uses the name of a predefined fixed-point type other than type DURATION; for this implementation, there is no such type.

CA2009C and CA2009F check whether a generic unit can be instantiated before the separate compilation of its body (and any of its subunits); this implementation requires that the body and subunits of a generic unit be in the same compilation as the specification if instantiations precede them. (See section 2.3.)

CD1009C checks whether a length clause can specify a non-default size for a floating-point type. The representation which this implementation uses for floating point types is the smallest available; therefore, when this test attempts to use a representation of other than 32 or 64 bits, the length clause is rejected.

CD2A84A, CD2A84E, CD2A84I..J (2 tests), and CD2A84O use length clauses to specify non-default sizes for access types; this implementation does not support such sizes.

BD8001A, BD8003A, BD8004A..B (2 tests), and AD8011A use machine code insertions; this implementation provides no package MACHINE_CODE.

AE2101C and EE2201D..E (2 tests) use instantiations of package SEQUENTIAL_IO with unconstrained array types and record types with discriminants without defaults; these instantiations are rejected by this compiler.

AE2101H, EE2401D, and EE2401G use instantiations of package DIRECT_IO with unconstrained array types and record types with discriminants without defaults; these instantiations are rejected by this compiler.

The tests listed in the following table check that USE_ERROR is raised if the given file operations are not supported for the given combination of mode and access method; this implementation supports these operations.

Test	File Operation	Mode	File Access Method
CE2102D	CREATE	IN_FILE	SEQUENTIAL_IO
CE2102E	CREATE	OUT_FILE	SEQUENTIAL_IO
CE2102F	CREATE	INOUT_FILE	DIRECT_IO
CE2102I	CREATE	IN_FILE	DIRECT_IO
CE2102J	CREATE	OUT_FILE	DIRECT_IO
CE2102N	OPEN	IN_FILE	SEQUENTIAL_IO
CE2102O	RESET	IN_FILE	SEQUENTIAL_IO
CE2102P	OPEN	OUT_FILE	SEQUENTIAL_IO
CE2102Q	RESET	OUT_FILE	SEQUENTIAL_IO

CE2102R	OPEN	INOUT_FILE	DIRECT_IO
CE2102S	RESET	INOUT_FILE	DIRECT_IO
CE2102T	OPEN	IN_FILE	DIRECT_IO
CE2102U	RESET	IN_FILE	DIRECT_IO
CE2102V	OPEN	OUT_FILE	DIRECT_IO
CE2102W	RESET	OUT_FILE	DIRECT_IO
CE3102E	CREATE	IN_FILE	TEXT_IO
CE3102F	RESET	Any Mode	TEXT_IO
CE3102G	DELETE	--------	TEXT_IO
CE3102I	CREATE	OUT_FILE	TEXT_IO
CE3102J	OPEN	IN_FILE	TEXT_IO
CE3102K	OPEN	OUT_FILE	TEXT_IO

CE2203A checks that WRITE raises USE_ERROR if the capacity of an external sequential file is exceeded; this implementation cannot restrict file capacity.

CE2403A checks that WRITE raises USE_ERROR if the capacity of an external direct file is exceeded; this implementation cannot restrict file capacity.

CE3111B and CE3115A associate multiple internal text files with the same external file and attempt to read from one file what was written to the other, which is assumed to be immediately available; this implementation buffers output. (See section 2.3.)

CE3304A checks that SET_LINE_LENGTH and SET_PAGE_LENGTH raise USE_ERROR if they specify an inappropriate value for the external file; there are no inappropriate values for this implementation.

CE3413B checks that PAGE raises LAYOUT_ERROR when the value of the page number exceeds COUNT'LAST; for this implementation, the value of COUNT'LAST is greater than 150000, making the checking of this objective impractical.

2.3 TEST MODIFICATIONS

Modifications (see section 1.3) were required for 6 tests.

The following tests were split into two or more tests because this implementation did not report the violations of the Ada Standard in the way expected by the original tests.

BA1101C BC3205D

CA2009C and CA2009F were graded inapplicable by Evaluation Modification as directed by the AVO. These tests contain instantiations of a generic unit prior to the separate compilation of that unit's body; as allowed by AI-257, this implementation requires that the bodies of a generic unit be

in the same compilation if instantiations of that unit precede the bodies. The instantiations were rejected at compile time.

CE3111B and CE3115A were graded inapplicable by Evaluation Modification as directed by the AVO. The tests assume that output from one internal file is unbuffered and may be immediately read by another file that shares the same external file. This implementation raises END_ERROR on the attempts to read at lines 87 and 101, respectively.

CHAPTER 3

PROCESSING INFORMATION

3.1 TESTING ENVIRONMENT

The Ada implementation tested in this validation effort is described adequately by the information given in the initial pages of this report.

For a point of contact for sales or technical information about this Ada implementation system, see:

Mike Ryer
Intermetrics, Inc.
733 Concord Ave.
Cambridge MA 02138

Testing of this Ada implementation was conducted at the customer's site by a validation team from the AVF.

3.2 SUMMARY OF TEST RESULTS

An Ada Implementation passes a given ACVC version if it processes each test of the customized test suite in accordance with the Ada Programming Language Standard, whether the test is applicable or inapplicable; otherwise, the Ada Implementation fails the ACVC [Pro90].

For all processed tests (inapplicable and applicable), a result was obtained that conforms to the Ada Programming Language Standard.

a) Total Number of Applicable Tests	3757
b) Total Number of Withdrawn Tests	93
c) Processed Inapplicable Tests	119
d) Non-Processed I/O Tests	0
e) Non-Processed Floating-Point Precision Tests	201
f) Total Number of Inapplicable Tests	320
g) Total Number of Tests for ACVC 1.11	4170

All I/O tests of the test suite were processed because this implementation supports a file system. The above number of floating-point tests were not processed because they used floating-point precision exceeding that supported by the implementation. When this compiler was tested, the tests listed in section 2.1 had been withdrawn because of test errors.

3.3 TEST EXECUTION

A magnetic tape containing the customized test suite (see section 1.3) was taken on-site by the validation team for processing. The contents of the the magnetic tape were loaded directly onto the host computer.

After the test files were loaded onto the host computer, the full set of tests was processed by the Ada implementation. Results were transferred to via RSCS to a Sun 4 for printing.

Testing was performed using command scripts provided by the customer and reviewed by the validation team. See Appendix B for a complete listing of the processing options for this implementation. It also indicates the default options. The options invoked explicitly for validation testing during this test were:

Option | Switch	Effect
LIB	Ada program library name
LISTING	Name of listing file

Test output, compiler and linker listings, and job logs were captured on magnetic tape and archived at the AVF. The listings examined on-site by the validation team were also archived.

APPENDIX A

MACRO PARAMETERS

This appendix contains the macro parameters used for customizing the ACVC. The meaning and purpose of these parameters are explained in [UG89]. The parameter values are presented in two tables. The first table lists the values that are defined in terms of the maximum input-line length, which is the value for $MAX_IN_LEN—also listed here. These values are expressed here as Ada string aggregates, where "V" represents the maximum input-line length.

Macro Parameter	Macro Value
$MAX_IN_LEN	255
$BIG_ID1	(1..V-1 => 'A', V => '1')
$BIG_ID2	(1..V-1 => 'A', V => '2')
$BIG_ID3	(1..V/2 => 'A') & '3' & (1..V-1-V/2 => 'A')
$BIG_ID4	(1..V/2 => 'A') & '4' & (1..V-1-V/2 => 'A')
$BIG_INT_LIT	(1..V-3 => '0') & "298"
$BIG_REAL_LIT	(1..V-5 => '0') & "690.0"
$BIG_STRING1	'"' & (1..V/2 => 'A') & '"'
$BIG_STRING2	'"' & (1..V-1-V/2 => 'A') & '1' & '"'
$BLANKS	(1..V-20 => ' ')
$MAX_LEN_INT_BASED_LITERAL	"2:" & (1..V-5 => '0') & "11:"
$MAX_LEN_REAL_BASED_LITERAL	"16:" & (1..V-7 => '0') & "F.E:"

MACRO PARAMETERS

$MAX_STRING_LITERAL '"' & (1..V-2 => 'A') & '"'

The following table lists all of the other macro parameters and their respective values.

Macro Parameter	Macro Value
$ACC_SIZE	32
$ALIGNMENT	4
$COUNT_LAST	2_147_483_647
$DEFAULT_MEM_SIZE	2**31
$DEFAULT_STOR_UNIT	8
$DEFAULT_SYS_NAME	UTS
$DELTA_DOC	2.0**(-31)
$ENTRY_ADDRESS	SYSTEM.MAKE_ADDRESS(16#40#)
$ENTRY_ADDRESS1	SYSTEM.MAKE_ADDRESS(16#80#)
$ENTRY_ADDRESS2	SYSTEM.MAKE_ADDRESS(16#100#)
$FIELD_LAST	2_147_483_647
$FILE_TERMINATOR	TEST_WITHDRAWN
$FIXED_NAME	NO_SUCH_FIXED_TYPE
$FLOAT_NAME	NO_SUCH_FLOAT_TYPE
$FORM_STRING	""
$FORM_STRING2	"CANNOT_RESTRICT_FILE_CAPACITY"
$GREATER_THAN_DURATION	90_000.0
$GREATER_THAN_DURATION_BASE_LAST	10_000_000.0
$GREATER_THAN_FLOAT_BASE_LAST	1.0E+63
$GREATER_THAN_FLOAT_SAFE_LARGE	16#0.FFFFFFFFFFFFE1#E+63

```
$GREATER_THAN_SHORT_FLOAT_SAFE_LARGE
                        16#0.FFFFF9#E+63

$HIGH_PRIORITY          127

$ILLEGAL_EXTERNAL_FILE_NAME1
                        MISSING/DIRECTORY/FILENAME

$ILLEGAL_EXTERNAL_FILE_NAME2
                        STILL/NO/DIRECTORY/FILENAME

$INAPPROPRIATE_LINE_LENGTH
                        -1

$INAPPROPRIATE_PAGE_LENGTH
                        -1

$INCLUDE_PRAGMA1        "PRAGMA INCLUDE ("A28006D1.TST")"

$INCLUDE_PRAGMA2        "PRAGMA INCLUDE ("B28006F1.TST")"

$INTEGER_FIRST          -2147483648

$INTEGER_LAST           2147483647

$INTEGER_LAST_PLUS_1    2_147_483_648

$INTERFACE_LANGUAGE     AIE_ASSEMBLER

$LESS_THAN_DURATION     -90_000.0

$LESS_THAN_DURATION_BASE_FIRST
                        -10_000_000.0

$LINE_TERMINATOR        ASCII.LF

$LOW_PRIORITY           -127

$MACHINE_CODE_STATEMENT
                        NULL;

$MACHINE_CODE_TYPE      NO_SUCH_TYPE

$MANTISSA_DOC           31

$MAX_DIGITS             15

$MAX_INT                2147483647

$MAX_INT_PLUS_1         2147483648

$MIN_INT                -2147483648
```

MACRO PARAMETERS

$NAME	NO_SUCH_INTEGER_TYPE
$NAME_LIST	UTS,MVS,CMS,PRIME50,SPERRY1100, MIL_STD_1750A
$NAME_SPECIFICATION1	/acvc/testing/1/tst_tmp/X2120A
$NAME_SPECIFICATION2	/acvc/testing/1/tst_tmp/X2120B
$NAME_SPECIFICATION3	/acvc/testing/1/tst_tmp/X3119A
$NEG_BASED_INT	16#FFFFFFFE#
$NEW_MEM_SIZE	TEST_WITHDRAWN
$NEW_STOR_UNIT	8
$NEW_SYS_NAME	TEST_WITHDRAWN
$PAGE_TERMINATOR	TEST_WITHDRAWN
$RECORD_DEFINITION	TEST_WITHDRAWN
$RECORD_NAME	TEST_WITHDRAWN
$TASK_SIZE	96
$TASK_STORAGE_SIZE	1024
$TICK	1.0E-3
$VARIABLE_ADDRESS	SYSTEM.MAKE_ADDRESS(16#0020#)
$VARIABLE_ADDRESS1	SYSTEM.MAKE_ADDRESS(16#0024#)
$VARIABLE_ADDRESS2	SYSTEM.MAKE_ADDRESS(16#0028#)
$YOUR_PRAGMA	TEST_WITHDRAWN

APPENDIX B

COMPILATION SYSTEM OPTIONS

COMPILER OPTIONS

The compiler options of this Ada implementation, as described in this Appendix, are provided by the customer. Unless specifically noted otherwise, references in this appendix are to compiler documentation and not to this report.

COMPILER OPTIONS

```
-- AIECOMP : AIE Compiler Driver


type YES_NO_TYPE    is (YES, NO);
subtype
     OPTIMIZE_RANGE is INTEGER range 0 .. 10;
type FLAG_TYPE      is (YES, NO, ON_MESSAGE);
type PHASE          is (TB, SEM, GEN, STO, EXP, FLOW, CG, FLOW_CG,
    SRC_INT, LISTER, BL_LISTER, DI_LISTER, ECHO, NONE);

procedure AIECOMP(
   SOURCE           : in STRING          := "";
   LIB              : in STRING          := "ADALIB";
   LISTING          : in STRING          := "";
   STATS            : in YES_NO_TYPE     := NO;
   OPTIMIZE         : in OPTIMIZE_RANGE  := 10;
   LIST             : in FLAG_TYPE       := ON_MESSAGE;
   ASM              : in YES_NO_TYPE     := NO;
   NUM_INSTRS       : in YES_NO_TYPE     := NO;
   OPTIONS_FILE     : in STRING          := "";
   SHOW_OPTIONS     : in YES_NO_TYPE     := NO;
   VERSION          : in STRING          := "None";
   STARTWITH        : in PHASE           := TB;
   STOPAFTER        : in PHASE           := CG;
   DUMP_DIANA_AFTER : in PHASE           := NONE;
   DUMP_BILL_AFTER  : in PHASE           := NONE;
   TBOPT            : in STRING          := "";
   SEMOPT           : in STRING          := "";
   GENOPT           : in STRING          := "";
   STOOPT           : in STRING          := "";
   EXPOPT           : in STRING          := "";
   FLOWOPT          : in STRING          := "";
   CGOPT            : in STRING          := "";
   FLOWCGOPT        : in STRING          := "";
   SRC_INTOPT       : in STRING          := "";
   LISTOPT          : in STRING          := "";
   ALLOPT           : in STRING          := "";
   DEBUG            : in YES_NO_TYPE     := NO
   );

-- SOURCE           : Ada source file
-- LIB              : Ada program library
-- LISTING          : Name of listing file
-- STATS            : Requests compilation statistics (yes or no)
-- OPTIMIZE         : Controls code optimization (10 is all)
-- LIST             : Controls generation of listing
-- ASM              : Requests assembly language listing (yes or no)
-- NUM_INSTRS       : Requests the number of instructions generated (yes or no
-- OPTIONS_FILE     : File to read for additional phase options
-- SHOW_OPTIONS     : Show the options passed to each phase
-- VERSION          : The default version of the compiler is determined from t
-- STARTWITH        : The phase to begin the compilation with
-- STOPAFTER        : The last phase in the compilation
-- DUMP_DIANA_AFTER : Dumps the DIANA of the compilation
-- DUMP_BILL_AFTER  : Dumps the BILL of the compilation
-- TBOPT            : Options passed thru to tree build
```

```
-- SEMOPT          : Options passed thru to semantics
-- GENOPT          : Options passed thru to gen inst
-- STOOPT          : Options passed thru to storage
-- EXPOPT          : Options passed thru to expand
-- FLOWOPT         : Options passed thru to flow
-- CGOPT           : Options passed thru to codegen
-- FLOWCGOPT       : Options passed thru to the combined flow-cg
-- SRC_INTOPT      : Options passed thru to the source intersperser
-- LISTOPT         : Options passed thru to the lister
-- ALLOPT          : Options which will be passed to ALL executables
-- DEBUG           : Controls debugging output of the aiecomp executable
```

LINKER OPTIONS

The linker options of this Ada implementation, as described in this Appendix, are provided by the customer. Unless specifically noted otherwise, references in this appendix are to linker documentation and not to this report.

LINKER OPTIONS

```
-- AIEBUILD : AIE Program Builder


type YES_NO_TYPE is (YES, NO);
type PHASE       is (PB_CONV, LD, MKDEMAND);

procedure AIEBUILD(
   UNIT          : in STRING;
   LIB           : in STRING       := "ADALIB";
   LISTING       : in STRING       := "";
   EXEC          : in STRING       := "";
   SHAREABLE     : in YES_NO_TYPE  := YES;
   XREF          : in YES_NO_TYPE  := NO;
   SYMTAB        : in YES_NO_TYPE  := NO;
   SHOW_LINKS    : in YES_NO_TYPE  := YES;
   SHOW_OPTIONS  : in YES_NO_TYPE  := NO;
   STATS         : in YES_NO_TYPE  := NO;
   DEMAND        : in YES_NO_TYPE  := NO;
   MAP           : in YES_NO_TYPE  := NO;
   VERSION       : in STRING       := "None";
   ARCHIVE_LIST  : in STRING       := "";
   RTS_VERSION   : in STRING       := "4.0";
   STARTWITH     : in PHASE        := PB_CONV;
   STOPAFTER     : in PHASE        := LD;
   PBCONVOPT     : in STRING       := "";
   LDOPT         : in STRING       := "";
   DEBUG         : in YES_NO_TYPE  := NO
   );

-- UNIT          : Name of Ada main
-- LIB           : Ada program library
-- LISTING       : Name of listing file
-- EXEC          : Where to put the resultant executable
-- SHAREABLE     :Make the text read-only and shareable by multiple users
-- XREF          :Produce a cross reference listing
-- SYMTAB        :Correspondence between Ada names, link names, and addresses
-- SHOW_LINKS    :List the catalog links of program library
-- SHOW_OPTIONS  :Show the options passed to each of the builder phases
-- STATS         : Requests building statistics (yes or no)
-- DEMAND        : Make the executable demand-paged (I2 UTS only)
-- MAP           : Produce a link map
-- VERSION       : Version of the Program Builder
-- ARCHIVE_LIST  : Name of file containing a list of archives
-- RTS_VERSION   : Version of the RTS to use
-- STARTWITH     : Phase to begin linking with
-- STOPAFTER     : Phase to end linking with
-- PBCONVOPT     : Options passed thru to pb_conv
-- LDOPT         : Options passed thru to ld
-- DEBUG         : Controls debugging output of the aiebuild executable
```

APPENDIX C

APPENDIX F OF THE Ada STANDARD

The only allowed implementation dependencies correspond to implementation-dependent pragmas, to certain machine-dependent conventions as mentioned in Chapter 13 of the Ada Standard, and to certain allowed restrictions on representation clauses. The implementation-dependent characteristics of this Ada implementation, as described in this Appendix, are provided by the customer. Unless specifically noted otherwise, references in this Appendix are to compiler documentation and not to this report. Implementation-specific portions of the package STANDARD, which are not a part of Appendix F, are:

```
package STANDARD is

   ...
   type INTEGER is range -2147483648 .. 2147483647;

   type FLOAT is digits 15 range -16#0.FFFFFFFFFFFFFF#E63 ..
                                  16#0.FFFFFFFFFFFFFF#E63;
   type SHORT_FLOAT is digits 6 range -16#0.FFFFFF#E63 .. 16#0.FFFFFF#E63;

   type DURATION is delta 2.0 ** (-14) range -86400.0 .. 86400.0;
   ...

end STANDARD;
```

Appendix F. IMPLEMENTATION DEPENDENCIES

This section constitutes Appendix F of the Ada LRM for this implementation. Appendix F from the LRM states:

> *The Ada language allows for certain machine-dependencies in a controlled manner. No machine-dependent syntax or semantic extensions or restrictions are allowed. The only allowed implementation-dependencies correspond to implementation-dependent pragmas and attributes, certain machine-dependent conventions as mentioned in Chapter 13, and certain allowed restrictions on representation clauses.*
>
> *The reference manual of each Ada implementation must include an appendix (called Appendix F) that describes all implementation-dependent characteristics. The Appendix F for a given implementation must list in particular:*
>
> 1. *The form, allowed places, and effect of every implementation-dependent pragma.*
> 2. *The name and the type of every implementation-dependent attribute.*
> 3. *The specification of the package SYSTEM (see 13.7).*
> 4. *The list of all restrictions on representation clauses (see 13.1).*
> 5. *The conventions used for any implementation-generated name denoting implementation-dependent components (see 13.4).*
> 6. *The interpretation of expressions that appear in address clauses, including those for interrupts (see 13.5).*
> 7. *Any restriction on unchecked conversions (see 13.10.2).*
> 8. *Any implementation-dependent characteristics of the input-output packages (see 14).*

In addition, the present section will describe the following topics:

9. Any implementation-dependent rules for termination of tasks dependent on library packages (see 9.4:13).
10. Other implementation dependencies.
11. Compiler capacity limitations.

F.1 Pragmas

This section describes the form, allowed places, and effect of every implementation-dependent pragma.

F.1.1 Pragmas LIST, PAGE, PRIORITY, ELABORATE

Pragmas LIST, PAGE, PRIORITY and ELABORATE are supported exactly in the form, in the allowed places, and with the effect as described in the LRM.

F.1.2 Pragma SUPPRESS

Form: Pragma SUPPRESS (identifier)
where the identifier is that of the check that can be omitted. This is as specified in LRM B(14), except that suppression of checks for a particular name is not supported. The name clause (ON=>name), if given, causes the entire pragma to be ignored.

The suppression of the following run-time checks, which correspond to situations in which the exceptions CONSTRAINT_ERROR, STORAGE_ERROR, or PROGRAM_ERROR may be raised, are supported:

ACCESS_CHECK
DISCRIMINANT_CHECK
INDEX_CHECK
LENGTH_CHECK
RANGE_CHECK
STORAGE_CHECK
ELABORATION_CHECK

The checks which correspond to situations in which the exception NUMERIC_ERROR may be raised occur in the hardware and therefore pragma SUPPRESS of DIVISION_CHECK and OVERFLOW_CHECK are not supported.

Allowed Places: As specified in LRM B(14) : SUPPRESS.

Effect: Permits the compiler not to emit code in the unit being compiled to perform various checking operations during program execution. The supported checks have the effect of suppressing the specified check as described in the LRM. A pragma SUPPRESS specifying an unsupported check is ignored.

F.1.3 Pragma SUPPRESS_ALL

Form: Pragma SUPPRESS_ALL

Allowed Places: As specified in LRM B(14) for pragma SUPPRESS.

Effect: The implementation-defined pragma SUPPRESS_ALL has the same effect as the specification of a pragma SUPPRESS for each of the supported checks.

F.1.4 Pragma INLINE

Form: Pragma INLINE (SubprogramNameCommaList)

Allowed Places: As specified in LRM B(4) : INLINE.

Effect: If the subprogram body is available, and the subprogram is not recursive, the code is expanded in-line at every call site and is subject to all optimizations.

The stack-frame needed for the elaboration of the inline subprogram will be allocated as a temporary in the frame of the containing code.

Parameters will be passed properly, by value or by reference, as for non-inline subprograms. Register-saving and the like will be suppressed. Parameters may be stored in the local stack-frame or held in registers, as global code generation allows.

Exception-handlers for the INLINE subprogram will be handled as for block-statements.

Use: This pragma is used either when it is believed that the time required for a call to the specified routine will in general be excessive (this for frequently called subprograms) or when the average expected size of expanded code is thought to be comparable to that of a call.

F.1.5 Pragma INTERFACE

Form: Pragma INTERFACE (language_name, subprogram_name)
where the language_name must be an enumeration value of the type SYSTEM.Supported_Language_Name (see Package SYSTEM below).

Allowed Place: As specified in LRM B(5) : INTERFACE.

Effect: Specifies that a subprogram will be provided outside the Ada program library and will be callable with a specified calling interface. Neither an Ada body nor an Ada body_stub may be provided for a subprogram for which INTERFACE has been specified.

Use: Use with a subprogram being provided via another programming language and for which no body will be given in any Ada program. See

also the LINK_NAME pragma.

F.1.6 Pragma LINK_NAME

Form: Pragma LINK_NAME (subprogram_name, link_name)

Allowed Places: As specified in LRM B(5) for pragma INTERFACE.

Effect: Associates with subprogram subprogram_name the name link_name as its entry point name.

Syntax: The value of link_name must be a character string literal.

Use: To allow Ada programs, with help from INTERFACE pragma, to reference non-Ada subprograms. Also allows non-Ada programs to call specified Ada subprograms.

F.1.7 Pragma CONTROLLED

Form: Pragma CONTROLLED (AccessTypeName)

Allowed Places: As specified in LRM B(2) : CONTROLLED.

Effect: Ensures that heap objects are not automatically reclaimed. Since no automatic garbage collection is is ever performed, this pragma currently has no effect.

F.1.8 Pragma PACK

Form: Pragma PACK (type_simple_name)

Allowed Places: As specified in LRM 13.1(12)

Effect: Components are allowed their minimal number of storage units as provided for by their own representation and/or packing.

Floating-point components are aligned on storage-unit boundaries, either 4 bytes or 8 bytes, depending on digits.

Use: Pragma PACK is used to reduce storage size. This can allow records and arrays, in some cases, to be passed by value instead of by reference.

Size reduction usually implies an increased cost of accessing components. The decrease in storage size may be offset by increase in size of accessing code and by slowing of accessing operations.

F.1.9 Pragmas SYSTEM_NAME, STORAGE_UNIT, MEMORY_SIZE, SHARED

These pragmas are not supported and are ignored.

F.1.10 Pragma OPTIMIZE

Pragma OPTIMIZE is ignored; optimization is always enabled.

F.2 Implementation-dependent Attributes

This section describes the name and the type of every implementation-dependent attribute.

There are no implementation defined attributes. These are the values for certain language-defined, implementation-dependent attributes:

Type INTEGER.

INTEGER'SIZE	= 32 -- bits.
INTEGER'FIRST	= - (2**31)
INTEGER'LAST	= (2**31-1)

Type SHORT_FLOAT.

SHORT_FLOAT'SIZE	= 32 -- bits.
SHORT_FLOAT'DIGITS	= 6
SHORT_FLOAT'MANTISSA	= 21
SHORT_FLOAT'EMAX	= 84
SHORT_FLOAT'EPSILON	= 2.0**(-20)
SHORT_FLOAT'SMALL	= 2.0**(-85)
SHORT_FLOAT'LARGE	= 2.0**84
SHORT_FLOAT'MACHINE_ROUNDS	= false
SHORT_FLOAT'MACHINE_RADIX	= 16
SHORT_FLOAT'MACHINE_MANTISSA	= 6
SHORT_FLOAT'MACHINE_EMAX	= 63
SHORT_FLOAT'MACHINE_EMIN	=-64
SHORT_FLOAT'MACHINE_OVERFLOWS	= false
SHORT_FLOAT'SAFE_EMAX	= 252
SHORT_FLOAT'SAFE_SMALL	= 16#0.800000#E-63
SHORT_FLOAT'SAFE_LARGE	= 16#0.FFFFF8#E63

Type FLOAT.

FLOAT'SIZE	= 64 -- bits.
FLOAT'DIGITS	= 15
FLOAT'MANTISSA	= 51
FLOAT'EMAX	= 204
FLOAT'EPSILON	= 2.0**(-50)
FLOAT'SMALL	= 2.0**(-205)
FLOAT'LARGE	= (1.0-2**(-51))*2.0**204
FLOAT'MACHINE_ROUNDS	= false
FLOAT'MACHINE_RADIX	= 16
FLOAT'MACHINE_MANTISSA	= 14
FLOAT'MACHINE_EMAX	= 63
FLOAT'MACHINE_EMIN	= -64
FLOAT'MACHINE_OVERFLOWS	= false

```
        FLOAT'SAFE_EMAX                 = 252
        FLOAT'SAFE_SMALL                = 16#0.80000000000000#E-63
        FLOAT'SAFE_LARGE                = 16#0.FFFFFFFFFFFFE0#E63

Type DURATION.
        DURATION'DELTA                  =  2.0**(-14) -- seconds
        DURATION'FIRST                  = - 86,400
        DURATION'LAST                   =  86,400
        DURATION'SMALL                  =  2.0**(-14)

Type PRIORITY.
        PRIORITY'FIRST                  = -127
        PRIORITY'LAST                   =  127
```

F.3 Package SYSTEM

```
package SYSTEM is

   type ADDRESS is private,     -- "=", "/=" defined implicitly
   type NAME is (UTS, MVS, CMS, Prime50, Sperry1100, MIL_STD_1750A),

SYSTEM_NAME    constant NAME  = UTS      -- Target dependent

   STORAGE_UNIT    constant  = 8,
MEMORY_SIZE    constant  = 2**31,
           -- In storage units

           -- System-Dependent Named Numbers

   MIN_INT    constant  = INTEGER'POS(INTEGER'FIRST),
   MAX_INT    constant  = INTEGER'POS(INTEGER'LAST),
   MAX_DIGITS    constant  = 15,
   MAX_MANTISSA    constant  = 31,
   FINE_DELTA    constant  = 2 0**(-31),
   TICK    constant  = 1 0E-3,   -- CLOCK function has msec resolution

           -- Other System-Dependent Declarations

   subtype PRIORITY is INTEGER range -127  127

--------------------------------------------------------------
-- Implementation-dependent additions to package SYSTEM --
--------------------------------------------------------------

   NULL_ADDRESS    constant ADDRESS,
           -- Same bit pattern as "null" access value
           -- This is the value of 'ADDRESS for named numbers
           -- The 'ADDRESS of any object which occupies storage
           --   is NOT equal to this value

   ADDRESS_SIZE    constant  = 32,
           -- Number of bits in ADDRESS objects,
           --          = ADDRESS'SIZE, but static

   ADDRESS_SEGMENT_SIZE    constant  = 2**24
           -- Number of storage units in address segment

   type ADDRESS_OFFSET is new INTEGER,
           -- Used for address arithmetic
   type ADDRESS_SEGMENT is new INTEGER,
           -- Always zero on targets with
           --     unsegmented address space

   subtype NORMALIZED_ADDRESS_OFFSET is
     ADDRESS_OFFSET range 0     ADDRESS_SEGMENT_SIZE - 1,
           -- Range of address offsets returned by OFFSET_OF

   function "+"(addr    ADDRESS  offset    ADDRESS_OFFSET) return ADDRESS
   function "+"(offset    ADDRESS_OFFSET  addr    ADDRESS) return ADDRESS
   --| EFFECTS
   --|
```

```
    --| Add an offset to an address  May cross segment boundaries on
    --| targets where objects may span segments  On other targets,
    --| CONSTRAINT_ERROR will be raised when
    --| OFFSET_OF(addr) + offset not in NORMALIZED_ADDRESS_OFFSET

    function "-"(left, right    ADDRESS) return ADDRESS_OFFSET,
    --| EFFECTS
    --|
    --| Subtract two addresses  returning an offset  This
    --| offset may exceed the segment size on targets where
    --| objects may span segments  On other targets,
    --| CONSTRAINT_ERROR will be raised if SEGMENT_OF(left) /=
    --| SEGMENT_OF(right)

    function "-"(addr    ADDRESS, offset    ADDRESS_OFFSET) return
      ADDRESS,
    --| EFFECTS
    --|
    --| Subtract an offset from an address  returning an address
    --| May cross segment boundaries on targets where
    --|  objects may span segments
    --| On other targets, CONSTRAINT_ERROR will be raised when
    --|  OFFSET_OF(addr) - offset not in NORMALIZED_ADDRESS_OFFSET

    function OFFSET_OF (addr    ADDRESS) return NORMALIZED_ADDRESS_OFFSET,
            -- Extract offset part of ADDRESS
            -- Always in range 0  seg_size - 1

    function SEGMENT_OF (addr    ADDRESS) return ADDRESS_SEGMENT



    function MAKE_ADDRESS (offset    ADDRESS_OFFSET,
                           segment    ADDRESS_SEGMENT  = 0) return ADDRESS
     --| EFFECTS
     --|
     --| Builds an address given an offset and a segment
     --| Offsets may be > segment size on targets where objects may
     --| span segments, in which case it is equivalent to
     --| "MAKE_ADDRESS (0, segment) + offset"
     --| On other targets, CONSTRAINT_ERROR will be raised when
     --| offset not in NORMALIZED_ADDRESS_OFFSET

    type Supported_Language_Name is (   -- Target dependent
            -- The following are "foreign" languages
       ASSEMBLER,
       AIE_ASSEMBLER -- NOT a "foreign" language - uses AIE RTS
    ),
            -- Most/least accurate built-in integer and float types

    subtype LONGEST_INTEGER is STANDARD.INTEGER,
    subtype SHORTEST_INTEGER is STANDARD.INTEGER,

    subtype LONGEST_FLOAT is STANDARD.FLOAT
    subtype SHORTEST_FLOAT is STANDARD.SHORT_FLOAT,

private

    type ADDRESS is access INTEGER
            -- Note  The designated type here  INTEGER) is
```

```
        --          irrelevant   ADDRESS is made an access type
        --          simply to guarantee it has the same size as
        --          access values, which are single addresses
        --          Allocators of type ADDRESS are NOT meaningful

    NULL_ADDRESS    constant ADDRESS  := null;

end SYSTEM
```

F.4 Representation Clauses

This section describes the list of all restrictions on representation clauses.

"*NOTE: An implementation may limit its acceptance of representation clauses to those that can be handled simply by the underlying hardware.... If a program contains a representation clause that is not accepted [by the compiler], then the program is illegal.*" (LRM 13.1(10)).

Those restrictions which are defined by the LRM are not listed. A description of the effect of the representation clause is also included where appropriate.

a. Length clauses:

- Size specification: T'SIZE.

  The size specification may be applied to a type T or first-named subtype T which is an access type, a scalar type, an array type or a record type.

  AI-00536/07 has alterered the meaning of a size specification. In particular, the statement from the LRM 13.2.a that the expression in the length clause specifies an upper bound for the number of bits to be allocated to objects of the type is incorrect. Instead, the expression specifies the exact size for the type. Objects of the type may be larger than the specified size for padding. Note that the specified size is not used when the type is used as a component of a record type and a component clause specifying a different size is given.

  If the length clause can not be satisfied by the type, an error message will be generated.

  The supported values of the size expression are explained for the types as follows. If the value of the size expression is not supported, an error message will be generated.

  access type: the only size supported is 32.

  integer, fixed point, or enumeration type: minimum size supported is 1, the maximum size that is supported is 32, the size of the largest predefined integer type. Biased representation is not supported.

  floating point type: the sizes supported are 32 and 64. Note that the size must satisfy the DIGITS requirement. No support is provided for shortened mantissa and/or exponent lengths.

  record type: if the size of the unpacked type is greater than the specified size of the length clause, an implicit pragma pack will be assumed on the record type. If the size of the implicit pragma packed record type is still greater than the specified size of the

length clause, an error will be generated. (See also Pragma Pack F.1.8 and Record Representation Clauses F.4.c).

array type: if the size of the unpacked array type is greater than the size clause expression, an implicit pragma pack will be assumed on the array type. If the size of an implicit pragma packed array type is still greater than the size expression clause, an error will be generated.

- Specification of collection size: T'STORAGE_SIZE.

  The effect of the specification of collection size is that a contiguous area of the required size will be allocated for the collection. If an attempt to allocate an object within the collection requires more space than currently exists in the collection, STORAGE_ERROR will be raised. Note that this space includes the header information.

- Specification of storage for a task activation: T'STORAGE_SIZE.

  The value specified by the length clause will be the total size of the stacks allocated for the task, rounded up to a multiple of 8192 (two 'pages' or 'stack chunks'). The primary and secondary stacks will each be allocated one half of the (rounded-up) size.

- Specification of small for a fixed point type : T'SMALL

  The value of T'SMALL is restricted to composite powers of 2 and 5 (e.g. 2, 5, 10).

b. Enumeration Representation Clauses:

   Values must be in the range of MIN_INT .. MAX_INT.

c. Record-representation-clause:

   An alignment clause forces each record of the given type to be allocated at a starting address that is a multiple of the value of the given expression. Allowed alignment values are 1 (SU aligned), 2 (half-word aligned) and 4 (full-word aligned).

   The range of bits specified has the following restrictions: if the starting bit is 0, there is no limit on the value for the ending bit; if the starting bit is greater than 0, then the ending bit must be less than or equal to 31.

   Record components, including those generated implicitly by the compiler, whose locations are not given by the representation-clause, are laid out by the compiler following all the components whose locations are given by the representation-clause. Such components of the invariant part of the record are allocated to follow the user-specified components of the invariant part.

and such components in any given variant part are allocated to follow the user-specified components of that variant part.

The actual size of the record object (including its use as a component of a record or array type) will always be a multiple of storage units (e.g 8,16,24, etc. bits) with padding added to the end of the record, if necessary. User-specified ranges must contain at least the minimal number of bits required to represent a (bit-packed) object of the corresponding type: e.g. to represent an integer type with a range of 0..15, at least 4 bits must be specified in the record representation specification range.

d. Address clauses:

Address clauses are allowed for objects (variable or constant) and for subprograms to which a pragma INTERFACE applies. Address clauses are not allowed for packages or tasks. The interpretation of the value of an address clause is described in F.6.

F.5 Implementation-dependent Components

This section describes the conventions used for any implementation-generated name denoting implementation-dependent components.

There are no implementation-generated names denoting implementation-dependent (record) components, although there are, indeed, such components. Hence, there is no convention (or possibility) of naming them and, therefore, no way to offer a representation clause for such components.

NOTE: Records containing dynamic-sized components will contain (generally) unnamed offset components which will "point" to the dynamic-sized components stored later in the record. There is no way to specify the representation of such components.

F.6 Address Clauses

This section describes the interpretation of expressions that appear in address clauses, including those for interrupts.

The address specified by the simple_expression of an address clause,

```
for simple_name use at simple_expression ;
```

may be a call on SYSTEM.MAKE_ADDRESS, for example,

```
for ABC use at SYSTEM.MAKE_ADDRESS( 16#FF# ) ;
```

Values in the range 0..System.Memory_Size-1 will be interpreted as addresses as written.

F.7 Unchecked Conversions

This section describes any restrictions on unchecked conversions.

The source and target must both be of a staticly sized type (other than a discriminated record type) and both types must have the same static size.

F.8 Input-Output

This section describes implementation-dependent characteristics of the input-output packages.

(a) Declaration of type Direct_IO.Count? [14.2.5]
0..Integer'last;

(b) Effect of input/output for access types?
Not meaningful if read by different program invocations

(c) Disposition of unclosed IN_FILE files at program termination? [14.1(7)]
Files are closed.

(d) Disposition of unclosed OUT_FILE files at program termination? [14.1(7)]
Files are closed.

(e) Disposition of unclosed INOUT_FILE files at program termination? [14.1(7)]
Files are closed.

(f) Form of, and restrictions on, file names? [14.1(1)]
UTS filenames

(g) Possible uses of FORM parameter in I/O subprograms? [14.1(1)]
The image of an integer specifying the UTS file protection on CREATE.

(h) Where are I/O exceptions raised beyond what is described in Chapter 14? [14.1(11)]
None raised.

(i) Are alternate specifications (such as abbreviations) allowed for file names? If so, what is the form of these alternatives? [14.2.1(21)]
No.

(j) When is DATA_ERROR *not* raised for sequential or direct input of an inappropriate ELEMENT_TYPE? [14.2.2(4), 14.2.4(4)]
When it can be assigned without CONSTRAINT_ERROR to a variable of ELEMENT_TYPE.

(k) What are the standard input and standard output files? [14.3(5)]
UTS standard input and output

(l) What are the forms of line terminators and page terminators? [14.3(7)]
Line terminator is ASCII.LF (line feed);
page terminator is ASCII.FF (form feed)

(m) Value of Text_IO.Count'last? [14.3(8)]
integer'last

(n) Value of Text_IO.Field'last? [14.3.7(2)]
integer'last

(o) Effect of instantiating ENUMERATION_IO for an integer type? [14.3.9(15)]
The instantiated Put will work properly, but the instantiated Get will raise Data_Error

(p) Restrictions on types that can be instantiated for input/output?
Neither direct I/O nor sequential I/O can be instantiated for an unconstrained array type or for an unconstrained record type lacking default values for its discriminants.

(q) Specification of package Low_Level_IO? [14.6]
Low_Level_IO is not provided.

F.9 Tasking

This section describes implementation-dependent characteristics of the tasking run-time packages.

Even though a main program completes and terminates (its dependent tasks, if any, having terminated), the elaboration of the program as a whole continues until each task dependent upon a library unit package has either terminated or reached an open terminate alternative. See LRM 9.4(13).

F.10 Other Matters

This section describes other implementation-dependent characteristics of the system.

a. Package Machine_Code
   Will not be provided.

b. Order of compilation of generic bodies and subunits (LRM 10.3:9):
   Body and subunits of generic must be in the same compilation as the specification if instantiations precede them (see AI-00257/02).

F.11 Compiler Limitations

(a) Maximum length of source line?

255 characters.

(b) Maximum number of "use" scopes?

Limit is 50, set arbitrarily by SEMANTICS as maximum number of distinct packages actively "used."

(c) Maximum length of identifier?

255 characters.

(d) Maximum number of nested loops?

24 nested loops.