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Ada COMPILER
VALIDATION SUMMARY REPORT:
Certificate Number: 891030W1.10179
TELESOFT
TeleGen2 Ada Development System for the 1750A, Version 2.1.0
IBM 4381 P3 Host and
MIL-STD-1750A ECSP0 RAID Simulator, Version 4.0 on a MicroVAX II Target

Completion of On-Site Testing:
30 October 1989

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United States Department of Defense
Washington DC 20301-3081

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Ada Compiler Validation Summary Report:

Compiler Name: TeleGen2 Ada Development System for the 1750A,
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Host: IBM 4381 P3 under
MVS/XA, Version 3.8

Target: MIL-STD-1750A ECSP0 RAID Simulator, Version 4.0 on a MicroVAX II
under VMS, Version V5.2

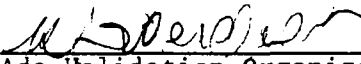
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This report has been reviewed and is approved.



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CHAPTER 1

INTRODUCTION

✓
This Validation Summary Report (VSR) describes the extent to which a specific Ada compiler conforms to the Ada Standard, ANSI/MIL-STD-1815A. This report explains all technical terms used within it and thoroughly reports the results of testing this compiler using the Ada Compiler Validation Capability (ACVC). An Ada compiler must be implemented according to the Ada Standard, and any implementation-dependent features must conform to the requirements of the Ada Standard. The Ada Standard must be implemented in its entirety, and nothing can be implemented that is not in the Standard.

Even though all validated Ada compilers conform to the Ada Standard, it must be understood that some differences do exist between implementations. The Ada Standard permits some implementation dependencies--for example, the maximum length of identifiers or the maximum values of integer types. Other differences between compilers result from the characteristics of particular operating systems, hardware, or implementation strategies. All the dependencies observed during the process of testing this compiler are given in this report. JS

The information in this report is derived from the test results produced during validation testing. The validation process includes submitting a suite of standardized tests, the ACVC, as inputs to an Ada compiler and evaluating the results. The purpose of validating is to ensure conformity of the compiler to the Ada Standard by testing that the compiler properly implements legal language constructs and that it identifies and rejects illegal language constructs. The testing also identifies behavior that is implementation-dependent but is permitted by the Ada Standard. Six classes of tests are used. These tests are designed to perform checks at compile time, at link time, and during execution.

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1.1 PURPOSE OF THIS VALIDATION SUMMARY REPORT

This VSR documents the results of the validation testing performed on an Ada compiler. Testing was carried out for the following purposes:

- . To attempt to identify any language constructs supported by the compiler that do not conform to the Ada Standard
- . To attempt to identify any language constructs not supported by the compiler but required by the Ada Standard
- . To determine that the implementation-dependent behavior is allowed by the Ada Standard

Testing of this compiler was conducted by SofTech, Inc. under the direction of the AVF according to procedures established by the Ada Joint Program Office and administered by the Ada Validation Organization (AVO). On-site testing was completed 30 October 1989 at San Diego CA.

1.2 USE OF THIS VALIDATION SUMMARY REPORT

Consistent with the national laws of the originating country, the AVO 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 compiler has no nonconformities to the Ada Standard other than those presented. Copies of this report are available to the public from:

Ada Information Clearinghouse
Ada Joint Program Office
OUSDRE
The Pentagon, Rm 3D-139 (Fern Street)
Washington DC 20301-3081

or from:

Ada Validation Facility
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Wright-Patterson AFB OH 45433-6503

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Questions regarding this report or the validation test results should be directed to the AVF listed above or to:

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

1.3 REFERENCES

1. Reference Manual for the Ada Programming Language, ANSI/MIL-STD-1815A, February 1983 and ISO 8652-1987.
2. Ada Compiler Validation Procedures, Version 2.0, Ada Joint Program Office, May 1989.
3. Ada Compiler Validation Capability Implementers' Guide, SofTech, Inc., December 1986.
4. Ada Compiler Validation Capability User's Guide, December 1986.

1.4 DEFINITION OF TERMS

ACVC	The Ada Compiler Validation Capability. The set of Ada programs that tests the conformity of an Ada compiler to the Ada programming language.
Ada Commentary	An Ada Commentary contains all information relevant to the point addressed by a comment on the Ada Standard. These comments are given a unique identification number having the form AI-ddddd.
Ada Standard	ANSI/MIL-STD-1815A, February 1983 and ISO 8652-1987.
Applicant	The agency requesting validation.
AVF	The Ada Validation Facility. The AVF is responsible for conducting compiler validations according to procedures contained in the <u>Ada Compiler Validation Procedures</u> .
AVO	The Ada Validation Organization. The AVO has oversight authority over all AVF practices for the purpose of maintaining a uniform process for validation of Ada compilers. The AVO provides administrative and technical support for Ada validations to ensure consistent practices.
Compiler	A processor for the Ada language. In the context of this report, a compiler is any language processor, including cross-compilers, translators, and interpreters.

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Failed test	An ACVC test for which the compiler generates a result that demonstrates nonconformity to the Ada Standard.
Host	The computer on which the compiler resides.
Inapplicable test	An ACVC test that uses features of the language that a compiler is not required to support or may legitimately support in a way other than the one expected by the test.
Passed test	An ACVC test for which a compiler generates the expected result.
Target	The computer for which a compiler generates code.
Test	A program that checks a compiler's conformity regarding a particular feature or a combination of features to the Ada Standard. In the context of this report, the term is used to designate a single test, which may comprise one or more files.
Withdrawn test	An ACVC test found to be incorrect and not used to check conformity to the Ada Standard. A test may be incorrect because it has an invalid test objective, fails to meet its test objective, or contains illegal or erroneous use of the language.

1.5 ACVC TEST CLASSES

Conformity to the Ada Standard is measured using the ACVC. The ACVC contains both legal and illegal Ada 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, and special program units are used to report their results during execution. Class B tests are expected to produce compilation errors. Class L tests are expected to produce compilation or link errors because of the way in which a program library is used at link time.

Class A tests ensure the successful compilation of legal Ada programs with certain language constructs which cannot be verified at compile time. There are no explicit program components in a Class A test to check semantics. For example, a Class A test checks that reserved words of another language (other than those already reserved in the Ada language) are not treated as reserved words by an Ada compiler. A Class A test is passed if no errors are detected at compile time and the program executes to produce a PASSED message.

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 every syntax or semantic error in the test is detected. A Class B test is passed if every illegal construct that it contains is detected by the compiler.

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Class C tests check the run time system to ensure that legal Ada programs can be correctly compiled and executed. Each Class C test is self-checking and produces a PASSED, FAILED, or NOT APPLICABLE message indicating the result when it is executed.

Class D tests check the compilation and execution capacities of a compiler. Since there are no capacity requirements placed on a compiler by the Ada Standard for some parameters--for example, the number of identifiers permitted in a compilation or the number of units in a library--a compiler may refuse to compile a Class D test and still be a conforming compiler. Therefore, if a Class D test fails to compile because the capacity of the compiler is exceeded, the test is classified as inapplicable. If a Class D test compiles successfully, it is self-checking and produces a PASSED or FAILED message during execution.

Class E tests are expected to execute successfully and check implementation-dependent options and resolutions of ambiguities in the Ada Standard. Each Class E test is self-checking and produces a NOT APPLICABLE, PASSED, or FAILED message when it is compiled and executed. However, the Ada Standard permits an implementation to reject programs containing some features addressed by Class E tests during compilation. Therefore, a Class E test is passed by a compiler if it is compiled successfully and executes to produce a PASSED message, or if it is rejected by the compiler for an allowable reason.

Class L tests check that incomplete or illegal Ada programs involving multiple, separately compiled units are detected and not allowed to execute. Class L tests are compiled separately and execution is attempted. A Class L test passes if it is rejected at link time--that is, an attempt to execute the main program must generate an error message before any declarations in the main program or any units referenced by the main program are elaborated. In some cases, an implementation may legitimately detect errors during compilation of the test.

Two library units, the package REPORT and the procedure CHECK_FILE, support the self-checking features of the executable tests. The package REPORT provides the mechanism by which executable tests report PASSED, FAILED, or NOT APPLICABLE results. It 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 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. These tests produce messages that are examined to verify that the units are operating correctly. If these units are not operating correctly, then the validation is not attempted.

The text of each test in the ACVC follows conventions that are intended to ensure that the tests are reasonably portable without modification. For example, the tests make use of only the basic set of 55 characters, contain lines with a maximum length of 72 characters, use small numeric values, and place features that may not be supported by all implementations in separate tests. However, some tests contain values that require the test to be

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customized according to implementation-specific values--for example, an illegal file name. A list of the values used for this validation is provided in Appendix C.

A compiler must correctly process each of the tests in the suite and demonstrate conformity to the Ada Standard by either meeting the pass criteria given for the test or by showing that the test is inapplicable to the implementation. The applicability of a test to an implementation is considered each time the implementation is validated. A test that is inapplicable for one validation is not necessarily inapplicable for a subsequent validation. Any test that was determined to contain an illegal language construct or an erroneous language construct is withdrawn from the ACVC and, therefore, is not used in testing a compiler. The tests withdrawn at the time of this validation are given in Appendix D.

CHAPTER 2
CONFIGURATION INFORMATION

2.1 CONFIGURATION TESTED

The candidate compilation system for this validation was tested under the following configuration:

Compiler: TeleGen2 Ada Development System for the 1750A,
Version 2.1.0

ACVC Version: 1.10

Certificate Number: 891030W1.10179

Host Computer:

Machine:	IBM 4381 P3
Operating System:	MVS/XA Version 3.8
Memory Size:	32 MB

Target Computer:

Machine:	MIL-STD-1750A ECSP0 RAID Simulator, Version 4.0 on a MicroVAX II
Operating System:	VMS Version V5.2
Memory Size:	9/16 MB

CONFIGURATION INFORMATION

2.2 IMPLEMENTATION CHARACTERISTICS

One of the purposes of validating compilers is to determine the behavior of a compiler in those areas of the Ada Standard that permit implementations to differ. Class D and E tests specifically check for such implementation differences. However, tests in other classes also characterize an implementation. The tests demonstrate the following characteristics:

a. Capacities.

- (1) The compiler correctly processes a compilation containing 723 variables in the same declarative part. (See test D29002K.)
- (2) The compiler correctly processes tests containing loop statements nested to 65 levels. (See tests D55A03A..H (8 tests).)
- (3) The compiler correctly processes tests containing block statements nested to 65 levels. (See test D56001B.)
- (4) The compiler correctly processes tests containing recursive procedures separately compiled as subunits nested to 17 levels. (See tests D64005E..G (3 tests).)

b. Predefined types.

- (1) This implementation supports the additional predefined types LONG INTEGER and LONG FLOAT in package STANDARD. (See tests B86001T..Z (7 tests).)

c. Expression evaluation.

The order in which expressions are evaluated and the time at which constraints are checked are not defined by the language. While the ACVC tests do not specifically attempt to determine the order of evaluation of expressions, test results indicate the following:

- (1) Some of the default initialization expressions for record components are evaluated before any value is checked for membership in a component's subtype. (See test C32117A.)
- (2) Assignments for subtypes are performed with the same precision as the base type. (See test C35712B.)
- (3) This implementation uses no extra bits for extra precision and uses no extra bits for extra range. (See test C35903A.)

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- (4) Sometimes `NUMERIC_ERROR` is raised when an integer literal operand in a comparison or membership test is outside the range of the base type. (See test C45232A.)
- (5) Sometimes `NUMERIC_ERROR` is raised when a literal operand in a fixed-point comparison or membership test is outside the range of the base type. (See test C45252A.)
- (6) Underflow is not gradual. (See tests C45524A..Z (26 tests).)

d. Rounding.

The method by which values are rounded in type conversions is not defined by the language. While the ACVC tests do not specifically attempt to determine the method of rounding, the test results indicate the following:

- (1) The method used for rounding to integer is round away from zero. (See tests C46012A..Z (26 tests).)
- (2) The method used for rounding to longest integer is round away from zero. (See tests C46012A..Z (26 tests).)
- (3) The method used for rounding to integer in static universal real expressions is round away from zero. (See test C4A014A.)

e. Array types.

An implementation is allowed to raise `NUMERIC_ERROR` or `CONSTRAINT_ERROR` for an array having a `'LENGTH` that exceeds `STANDARD.INTEGER'LAST` and/or `SYSTEM.MAX_INT`.

For this implementation:

- (1) Declaration of an array type or subtype declaration with more than `SYSTEM.MAX_INT` components raises `NUMERIC_ERROR` only for a two-dimensional array subtype when the big dimension is the second one. (See test C36003A.)
- (2) `NUMERIC_ERROR` is raised when `'LENGTH` is applied to an array type with `INTEGER'LAST + 2` components with each component being a null array. (See test C36202A.)
- (3) `NUMERIC_ERROR` is raised when an array type with `SYSTEM.MAX_INT + 2` components with each component being a null array is declared. (See test C36202B.)
- (4) A packed `BOOLEAN` array having a `'LENGTH` exceeding `INTEGER'LAST` raises `NUMERIC_ERROR` when the array objects are sliced. (See test C52103X.)

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- (5) A packed two-dimensional BOOLEAN array with more than INTEGER'LAST components raises CONSTRAINT_ERROR when the length of a dimension is calculated and exceeds INTEGER'LAST. (See test C52104Y.)
- (6) A null array with one dimension of length greater than INTEGER'LAST may raise NUMERIC_ERROR or CONSTRAINT_ERROR either when declared or assigned. Alternatively, an implementation may accept the declaration. However, lengths must match in array slice assignments. This implementation raises no exception. (See test E52103Y.)
- (7) In assigning one-dimensional array types, the expression is evaluated in its entirety before CONSTRAINT_ERROR is raised when checking whether the expression's subtype is compatible with the target's subtype. (See test C52013A.)
- (8) In assigning two-dimensional array types, the expression is not evaluated in its entirety before CONSTRAINT_ERROR is raised when checking whether the expression's subtype is compatible with the target's subtype. (See test C52013A.)

f. Discriminated types.

- (1) In assigning record types with discriminants, the expression is evaluated in its entirety before CONSTRAINT_ERROR is raised when checking whether the expression's subtype is compatible with the target's subtype. (See test C52013A.)

g. Aggregates.

- (1) In the evaluation of a multi-dimensional aggregate, index subtype checks are made as choices are evaluated. (See tests C43207A and C43207B.)
- (2) In the evaluation of an aggregate containing subaggregates, not all choices are evaluated before being checked for identical bounds. (See test E43212B.)
- (3) CONSTRAINT_ERROR is raised after all choices are evaluated when a bound in a non-null range of a non-null aggregate does not belong to an index subtype. (See test E43211B.)

h. Pragmas.

- (1) The pragma INLINE is supported for procedures, but not for functions. (See tests LA3004A..B (2 tests), EA3004C..D (2 tests), and CA3004E..F (2 tests).)

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i. Generics.

- (1) Generic library subprogram specifications and bodies can be compiled in separate compilations. (See test CA1012A.)
- (2) Generic non-library subprogram bodies cannot be compiled in separate compilations from their stubs. (See test CA2009F.)
- (3) Generic library package specifications and bodies can be compiled in separate compilations. (See tests BC3204C and BC3205D.)
- (4) Generic non-library package bodies as subunits cannot be compiled in separate compilations. (See test CA2009C.)
- (5) Generic unit bodies and their subunits can be compiled in separate compilations. (See test CA3011A.)

j. Input and output.

- (1) The package `SEQUENTIAL_IO` cannot be instantiated with unconstrained array types or record types with discriminants without defaults. (See tests AE2101C, EE2201D, and EE2201E.)
- (2) The package `DIRECT_IO` cannot be instantiated with unconstrained array types or record types with discriminants without defaults. (See tests AE2101H, EE2401D, and EE2401G.)
- (3) Sequential, Direct, and Text files are not supported by this implementation.

CHAPTER 3

TEST INFORMATION

3.1 TEST RESULTS

Version 1.10 of the ACVC comprises 3717 tests. When this compiler was tested, 44 tests had been withdrawn because of test errors. The AVF determined that 615 tests were inapplicable to this implementation. All inapplicable tests were processed during validation testing except for 285 executable tests that use floating-point precision exceeding that supported by the implementation and 238 executable tests that use file operations not supported by the implementation. Modifications to the code, processing, or grading for 11 tests were required to successfully demonstrate the test objective.

The AVF concludes that the testing results demonstrate acceptable conformity to the Ada Standard.

3.2 SUMMARY OF TEST RESULTS BY CLASS

RESULT	TEST CLASS						TOTAL
	A	B	C	D	E	L	
Passed	127	1131	1723	17	15	45	3058
Inapplicable	2	7	592	0	13	1	615
Withdrawn	1	2	35	0	6	0	44
TOTAL	130	1140	2350	17	34	46	3717

TEST INFORMATION

3.3 SUMMARY OF TEST RESULTS BY CHAPTER

RESULT	CHAPTER													TOTAL
	2	3	4	5	6	7	8	9	10	11	12	13	14	
Passed	192	543	496	245	172	99	160	332	132	36	252	325	74	3058
Inappl	20	106	184	3	0	0	6	0	5	0	0	44	247	615
Wdrn	1	1	0	0	0	0	0	2	0	0	1	35	4	44
TOTAL	213	650	680	248	172	99	166	334	137	36	253	404	325	3717

3.4 WITHDRAWN TESTS

The following 44 tests were withdrawn from ACVC Version 1.10 at the time of this validation:

E28005C	A39005G	B97102E	C97116A	BC3009B	CD2A62D
CD2A63A	CD2A63B	CD2A63C	CD2A63D	CD2A66A	CD2A66B
CD2A66C	CD2A66D	CD2A73A	CD2A73B	CD2A73C	CD2A73D
CD2A76A	CD2A76B	CD2A76C	CD2A76D	CD2A81G	CD2A83G
CD2A84M	CD2A84N	CD2B15C	CD2D11B	CD5007B	CD50110
ED7004B	ED7005C	ED7005D	ED7006C	ED7006D	CD7105A
CD7203B	CD7204B	CD7205C	CD7205D	CE2107I	CE3111C
CE3301A	CE3411B				

See Appendix D for the reason that each of these tests was withdrawn.

3.5 INAPPLICABLE TESTS

Some tests do not apply to all compilers because they make use of features that a compiler is not required by the Ada Standard to support. Others may depend on the result of another test that is either inapplicable or withdrawn. The applicability of a test to an implementation is considered each time a validation is attempted. A test that is inapplicable for one validation attempt is not necessarily inapplicable for a subsequent attempt. For this validation attempt, 615 tests were inapplicable for the reasons indicated:

- a. The following 285 tests are not applicable because they have floating-point type declarations requiring more digits than `SYSTEM.MAX_DIGITS`:

C24113F..Y (20 tests)	C35705F..Y (20 tests)
C35706F..Y (20 tests)	C35707F..Y (20 tests)
C35708F..Y (20 tests)	C35802F..Z (21 tests)

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C45241F..Y (20 tests)	C45321F..Y (20 tests)
C45421F..Y (20 tests)	C45521F..Z (21 tests)
C45524F..Z (21 tests)	C45621F..Z (21 tests)
C45641F..Y (20 tests)	C46012F..Z (21 tests)

- b. C35508I, C35508J, C35508M, and C35508N are not applicable because they include enumeration representation clauses for BOOLEAN types in which the representation values are other than (FALSE => 0, TRUE => 1). Under the terms of AI-00325, this implementation is not required to support such representation clauses.
- c. C35702A and B86001T are not applicable because this implementation supports no predefined type SHORT_FLOAT.
- d. The following 16 tests are not applicable because this implementation does not support a predefined type SHORT_INTEGER:

C45231B	C45304B	C45502B	C45503B	C45504B
C45504E	C45611B	C45613B	C45614B	C45631B
C45632B	B52004E	C55B07B	B55B09D	B86001V
CD7101E				
- e. C45231D, B86001X, and CD7101G are not applicable because this implementation does not support any predefined integer type with a name other than INTEGER, LONG_INTEGER, or SHORT_INTEGER.
- f. C45531M..P (4 tests) and C45532M..P (4 tests) are not applicable because the value of SYSTEM.MAX_MANTISSA is less than 48.
- g. C86001F is not applicable because, for this implementation, the package TEXT_IO is dependent upon package SYSTEM. This test recompiles package SYSTEM, making package TEXT_IO, and hence package REPORT, obsolete.
- h. B86001Y is not applicable because this implementation supports no predefined fixed-point type other than DURATION.
- i. B86001Z is not applicable because this implementation supports no predefined floating-point type with a name other than FLOAT, LONG_FLOAT, or SHORT_FLOAT.
- j. CA2009C is not applicable because this implementation does not permit compilation of generic non-library package bodies as subunits in separate files from their stubs.
- k. CA2009F is not applicable because this implementation does not permit compilation of generic non-library subprogram bodies as subunits in separate files from their stubs.
- l. LA3004B, EA3004D, and CA3004F are not applicable because this implementation does not support pragma INLINE for functions.

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- m. CD1009C, CD2A41A..B (2 tests), CD2A41E, and CD2A42A..J (10 tests) are not applicable because this implementation does not support size clauses of less than 32 bits for floating point types.
- n. CD2A61I and CD2A61J are not applicable because this implementation does not support size clauses for array types, which imply compression, with component types of composite or floating point types. This implementation requires an explicit size clause on the component type.
- o. CD2A71A..D (4 tests), CD2A72A..D (4 tests), CD2A74A..D (4 tests), and CD2A75A..D (4 tests) are not applicable because this implementation requires that a size specification for a record type be a multiple of 16 bits.
- p. CD2A84B..I (8 tests) and CD2A84K..L (2 tests) are not applicable because this implementation does not support size clauses of less than 16 bits for access types.
- q. 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.
- r. 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.
- s. The following 238 tests are inapplicable because sequential, text, and direct access files are not supported:

CE2102A..C (3)	CE2102G..H (2)	CE2102K	CE2102N..Y (12)
CE2103C..D (2)	CE2104A..D (4)	CE2105A..B (2)	CE2106A..B (2)
CE2107A..H (8)	CE2107L	CE2108A..B (2)	CE2108C..H (6)
CE2109A..C (3)	CE2110A..D (4)	CE2111A..I (9)	CE2115A..B (2)
CE2201A..C (3)	CE2201F..N (9)	CE2204A..D (4)	CE2205A
CE2208B	CE2401A..C (3)	CE2401E..F (2)	CE2401H..L (5)
CE2404A..B (2)	CE2405B	CE2406A	CE2407A..B (2)
CE2408A..B (2)	CE2409A..B (2)	CE2410A..B (2)	CE2411A
CE3102A..B (2)	EE3102C	CE3102F..H (3)	CE3102J..K (2)
CE3103A	CE3104A..C (3)	CE3107B	CE3108A..B (2)
CE3109A	CE3110A	CE3111A..B (2)	CE3111D..E (2)
CE3112A..D (4)	CE3114A..B (2)	CE3115A	EE3203A
CE3208A	EE3301B	CE3302A	CE3305A
CE3402A	EE3402B	CE3402C..D (2)	CE3403A..C (3)
CE3403E..F (2)	CE3404B..D (3)	CE3405A	EE3405B
CE3405C..D (2)	CE3406A..D (4)	CE3407A..C (3)	CE3408A..C (3)
CE3409A	CE3409C..E (3)	EE3409F	CE3410A
CE3410C..E (3)	EE3410F	CE3411A	CE3411C
CE3412A	EE3412C	CE3413A	CE3413C
CE3602A..D (4)	CE3603A	CE3604A..B (2)	CE3605A..E (5)

TEST INFORMATION

CE3606A..B (2)	CE3704A..F (6)	CE3704M..O (3)	CE3706D
CE3706F..G (2)	CE3804A..P (16)	CE3805A..B (2)	CE3806A..B (2)
CE3806D..E (2)	CE3806G..H (2)	CE3905A..C (3)	CE3905L
CE3906A..C (3)	CE3906E..F (2)		

- t. CE2103A..B (2 tests) and CE3107A are not applicable because this implementation does not support external file CREATE and OPEN operations. These tests raise the exception USE_ERROR. (See Section 3.6)

3.6 TEST, PROCESSING, AND EVALUATION MODIFICATIONS

It is expected that some tests will require modifications of code, processing, or evaluation in order to compensate for legitimate implementation behavior. Modifications are made by the AVF in cases where legitimate implementation behavior prevents the successful completion of an (otherwise) applicable test. Examples of such modifications include: adding a length clause to alter the default size of a collection; splitting a Class B test into subtests so that all errors are detected; and confirming that messages produced by an executable test demonstrate conforming behavior that wasn't anticipated by the test (such as raising one exception instead of another).

Modifications were required for 11 tests.

The following tests were split because syntax errors at one point resulted in the compiler not detecting other errors in the test:

BA3006A	BA3006B	BA3007B	BA3008A	BA3008B	BA3013A
---------	---------	---------	---------	---------	---------

C34005G and C34006D required evaluation modifications because the tests include some comparisons that use the 'SIZE attribute under assumptions that are not fully supported by the Ada Standard and are subject to ARG review. Thus, the AVO ruled that an implementation is considered to have passed these tests if the only REPORT.FAILED output is because of various 'SIZE checks. This implementation produced the messages "INCORRECT TYPE'SIZE", "INCORRECT OBJECT'SIZE, and "INCORRECT'BASE'SIZE" for C34005G and the message "INCORRECT TYPE'SIZE" for C34006D.

CE2103A, CE2103B, and CE3107A required code modifications because the tests raise USE_ERROR, for which there is no exception handler, and fail to execute properly. The AVO ruled that it was acceptable for these tests to raise USE_ERROR and be graded as not applicable. The tests were modified by adding an exception handler to catch USE_ERROR and output a message stating that USE_ERROR was raised.

TEST INFORMATION

3.7 ADDITIONAL TESTING INFORMATION

3.7.1 Prevalidation

Prior to validation, a set of test results for ACVC Version 1.10 produced by the TeleGen2 Ada Development System for the 1750A, Version 2.1.0 compiler was submitted to the AVF by the applicant for review. Analysis of these results demonstrated that the compiler successfully passed all applicable tests, and the compiler exhibited the expected behavior on all inapplicable tests.

3.7.2 Test Method

Testing of the TeleGen2 Ada Development System for the 1750A, Version 2.1.0 compiler using ACVC Version 1.10 was conducted on-site by a validation team from the AVF. The configuration in which the testing was performed is described by the following designations of hardware and software components:

Host computer:	IBM 4381 P3
Host operating system:	MVS/XA, Version 3.8
Target computer:	MIL-STD-1750A ECSPO RAID Simulator, Version 4.0 on a MicroVAX II
Target operating system:	VMS, Version V5.2
Compiler:	TeleGen2 Ada Development System for the 1750A, Version 2.1.0

A magnetic tape containing all tests except for withdrawn tests and tests requiring unsupported floating-point precisions was taken on-site by the validation team for processing. Tests that make use of implementation-specific values were customized before being written to the magnetic tape. Tests requiring modifications during the prevalidation testing were included in their modified form on the magnetic tape.

The contents of the magnetic tape were loaded onto the IBM 3083 (VM) system and ported to the MVS test system via RSCS (Remote Spooling Communications Subsystem).

After the test files were loaded to disk, the full set of tests was compiled and linked on the IBM 4381 P3. The object files were then loaded onto tape. The files were unloaded from the tape onto a MicroVAX II. All executable tests were then run on the MIL-STD-1750A ECSPO RAID Simulator, Version 4.0 on the MicroVAX II. Results were printed from the host computer.

The compiler was tested using command scripts provided by TELESOFT and reviewed by the validation team. The compiler was tested using all the following option settings. See Appendix E for a complete listing of the compiler options for this implementation. The following list of compiler options includes those options which were invoked by default:

TEST INFORMATION

FILE
NOAPPRENTICE
ERR/LIST (FOR NON-B TESTS)
LIST/ERRI (FOR B TESTS)
NOKEEP
NOMAP
OPT/AUTO
NOPRESERVE
NOSUPPRESS
NOXCEPTION_INFO

Tests were compiled, linked, and executed (as appropriate) using a single host and target computer. Test output, compilation 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.

3.7.3 Test Site

Testing was conducted at San Diego CA and was completed on 30 October 1989.

APPENDIX A

DECLARATION OF CONFORMANCE

TELESOFT has submitted the following Declaration of Conformance concerning the TeleGen2 Ada Development System for the 1750A, Version 2.1.0 compiler.

DECLARATION OF CONFORMANCE

Compiler Implementor: TELESOFT

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

Ada Compiler Validation Capability (ACVC), Version 1.10

Base Configuration

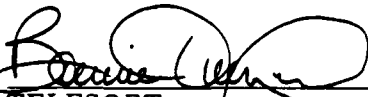
Base Compiler Name: TeleGen2 Ada Development System for the 1750A
Version: 2.1.0

Host Architecture ISA: IBM 4381 P3
OS&VER #: MVS/XA, Version 3.8

Target Architecture ISA: MIL-STD-1750A ECSPO RAID Simulator, Version 4.0 on a MicroVAX II
OS & VER #: VMS, Version V5.2

Implementor's Declaration

I, the undersigned, representing TELESOFT, have implemented no deliberate extensions to the Ada Language Standard ANSI/MIL-STD-1815A in the compiler(s) listed in this declaration. I declare that TELESOFT is the owner of record of the Ada language compiler(s) listed above and, as such, is responsible for maintaining said compiler(s) in conformance to ANSI/MIL-STD-1815A. All certificates and registrations for Ada language compiler(s) listed in this declaration shall be made only in the owner's corporate name.



TELESOFT

for Raymond A. Parra, Director, Contracts/Legal

Date: 14 SEPTEMBER 1989

Owner's Declaration

I, the undersigned, representing TELESOFT, take full responsibility for implementation and maintenance of the Ada compiler(s) listed above, and agree to the public disclosure of the final Validation Summary Report. I declare that all of the Ada language compilers listed, and their host/target performance, are in compliance with the Ada Language Standard ANSI/MIL-STD-1815A.



TELESOFT

for Raymond A. Parra, Director, Contracts/Legal

Date: 14 SEPTEMBER 1989

APPENDIX B

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 the TeleGen2 Ada Development System for the 1750A, Version 2.1.0 compiler, as described in this Appendix, are provided by TELESOFT. 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 -32768 .. 32767;

type LONG_INTEGER is range -2147483648 .. 2147483647;

type FLOAT is digits 6 range -1.0479E+38 .. 1.0479E+38;

type LONG_FLOAT is digits 9 range -1.6891629E+38 .. 1.6891629E+38;

type DURATION is delta 2#1.0#E-14 range -86400.0 .. 86400.0;

...

end STANDARD;

1. Implementation Dependent Pragmas

`pragma COMMENT(<string_literal>);`

It may only appear within a compilation unit.

The pragma comment has the effect of embedding the given sequence of characters in the object code of the compilation unit.

`pragma LINKNAME(<subprogram_name>, <string_literal>);`

It may appear in any declaration section of a unit.

This pragma must also appear directly after an interface pragma for the same <subprogram_name>. The pragma linkname has the effect of making `string_literal` apparent to the linker.

`pragma INTERRUPT(Function_Mapping);`

It may only appear immediately before a simple accept statement, a while loop directly enclosing only a single accept statement, or a select statement that includes an interrupt accept alternative. The pragma interrupt has the effect that entry calls to the associated entry, on behalf of an interrupt, are made with a reduced call overhead.

`pragma IMAGES(<enumeration_type>,Deferred) or`

`pragma IMAGES(<enumeration_type>,Immediate);`

It may only appear within a compilation unit.

The pragma images controls the creation and allocation of the image table for a specified enumeration type. The default is Deferred, which saves space in the literal pool by not creating an image table for an enumeration type unless the 'Image, 'Value, or 'Width attribute for the type is used. If one of these attributes is used, an image table is generated in the literal pool of the compilation unit in which the attribute appears. If the attributes are used in more than one compilation unit, more than one image table is generated, eliminating the benefits of deferring the table.

`pragma STATE_PARTITION_SET;`

It may appear in library level package specifications only.

This pragma identifies the root package of a package family that is placed into a 1750a address state by the linker.

2. Implementation Dependent Attributes

'Offset Attribute

'Offset along with the attribute 'Address, facilitates machine code insertions. For a prefix P that denotes a declared parameter object, P'Offset yields the statically known portion of the address of the first of the storage units allocated to P. The value is the object's offset relative to a base register and is of type Long_Integer.

INTEGER ATTRIBUTES

'Extended_Image Attribute

Usage: X'Extended_Image(Item,Width,Base,Based,Space_IF_Positive)

Returns the image associated with Item as per the Text_Io definition. The Text_Io definition states that the value of Item is an integer literal with no underlines, no exponent, no leading zeros (but a single zero for the zero value) and a minus sign if negative. If the resulting sequence of characters to be output has fewer than Width characters then leading spaces are first output to make up the difference. (LRM 14.3.7:10,14.3.7:11)

For a prefix X that is a discrete type or subtype; this attribute is a function that may have more than one parameter. The parameter Item must be an integer value. The resulting string is without underlines, leading zeros, or trailing spaces.

Parameter Descriptions:

Item	-- The user specifies the item that he wants the image of and passes it into the function. This parameter is required.
Width	-- The user may specify the minimum number of characters to be in the string that is returned. If no width is specified then the default (0) is assumed.
Base	-- The user may specify the base that the image is to be displayed in. If no base is specified then the default (10) is assumed.
Based	-- The user may specify whether he wants the string returned to be in base notation or not. If no preference is specified then the default (false) is assumed.
Space_If_Positive	-- The user may specify whether or not the sign bit of a positive integer is included in the string returned. If no preference is specified then the default (false) is assumed.

Examples:

Suppose the following subtype was declared:

Subtype X is Integer Range -10..16;

Then the following would be true:

X'Extended_Image(5)	= "5"
X'Extended_Image(5,0)	= "5"
X'Extended_Image(5,2)	= " 5"
X'Extended_Image(5,0,2)	= "101"
X'Extended_Image(5,4,2)	= " 101"
X'Extended_Image(5,0,2,True)	= "2#101#"
X'Extended_Image(5,0,10,False)	= "5"
X'Extended_Image(5,0,10,False,True)	= " 5"
X'Extended_Image(-1,0,10,False,False)	= "-1"
X'Extended_Image(-1,0,10,False,True)	= "-1"
X'Extended_Image(-1,1,10,False,True)	= "-1"
X'Extended_Image(-1,0,2,True,True)	= "-2#1#"
X'Extended_Image(-1,10,2,True,True)	= " -2#1#"

'Extended_Value Attribute

Usage: X'Extended_Value(Item)

Returns the value associated with Item as per the Text_Io definition. The Text_Io definition states that given a string, it reads an integer value from the beginning of the string. The value returned corresponds to the sequence input. (LRM 14.3.7:14)

For a prefix X that is a discrete type or subtype; this attribute is a function with a single parameter. The actual parameter Item must be of predefined type string. Any leading or trailing spaces in the string X are ignored. In the case where an illegal string is passed, a CONSTRAINT_ERROR is raised.

Parameter Descriptions:

Item -- The user passes to the function a parameter of the predefined type string. The type of the returned value is the base type X.

Examples:

Suppose the following subtype was declared:

Subtype X is Integer Range -10..16;

Then the following would be true:

X'Extended_Value("5")	= 5
X'Extended_Value(" 5")	= 5
X'Extended_Value("2#101#")	= 5
X'Extended_Value("-1")	= -1
X'Extended_Value(" -1")	= -1

'Extended_Width Attribute

Usage: X'Extended_Width(Base,Based,Space_If_Positive)

Returns the width for subtype of X.

For a prefix X that is a discrete subtype; this attribute is a function that may have multiple parameters. This attribute yields the maximum image length over all values of the type or subtype X.

Parameter Descriptions:

Base	--	The user specifies the base for which the width will be calculated. If no base is specified then the default (10) is assumed.
Based	--	The user specifies whether the subtype is stated in based notation. If no value for based is specified then the default (false) is assumed.
Space_If_Positive	--	The user may specify whether or not the sign bit of a positive integer is included in the string returned. If no preference is specified then the default (false) is assumed.

Examples:

Suppose the following subtype was declared:

Subtype X is Integer Range -10..16;

Then the following would be true:

X'Extended_Width	= 3	-- "-10"
X'Extended_Width(10)	= 3	-- "-10"
X'Extended_Width(2)	= 5	-- "10000"
X'Extended_Width(10,True)	= 7	-- "-10#10#"
X'Extended_Width(2,True)	= 8	-- "2#10000#"
X'Extended_Width(10,False,True)	= 3	-- " 16"
X'Extended_Width(10,True,False)	= 7	-- "-10#10#"
X'Extended_Width(10,True,True)	= 7	-- " 10#16#"
X'Extended_Width(2,True,True)	= 9	-- " 2#10000#"
X'Extended_Width(2,False,True)	= 6	-- " 10000"

ENUMERATION ATTRIBUTES

'Extended_Image Attribute

Usage: X'Extended_Image(Item,Width,Uppercase)

Returns the image associated with Item as per the Text_Io definition. The Text_Io definition states that given an enumeration literal, it will output the value of the enumeration literal (either an identifier or a character literal). The character case parameter is ignored for character literals. (LRM 14.3.9:9)

For a prefix X that is a discrete type or subtype; this attribute is a function that may have more than one parameter. The parameter Item must be an enumeration value. The image of an enumeration value is the corresponding identifier which may have character case and return string width specified.

Parameter Descriptions:

- | | | |
|-----------|----|---|
| Item | -- | The user specifies the item that he wants the image of and passes it into the function. This parameter is required. |
| Width | -- | The user may specify the minimum number of characters to be in the string that is returned. If no width is specified then the default (0) is assumed. If the Width specified is larger than the image of Item, then the return string is padded with trailing spaces; if the Width specified is smaller than the image of Item then the default is assumed and the image of the enumeration value is output completely. |
| Uppercase | -- | The user may specify whether the returned string is in uppercase characters. In the case of an enumeration type where the enumeration literals are character literals, the Uppercase is ignored and the case specified by the type definition is taken. If no preference is specified then the default (true) is assumed. |

Examples:

Suppose the following types were declared:

Type X is (red, green, blue, purple);
Type Y is ('a', 'B', 'c', 'D');

Then the following would be true:

X'Extended_Image(red)	= "RED"	
X'Extended_Image(red, 4)	= "RED "	
X'Extended_Image(red,2)	= "RED"	
X'Extended_Image(red,0,false)	= "red"	
X'Extended_Image(red,10,false)	= "red "	
Y'Extended_Image('a')	= "'a'"	
Y'Extended_Image('B')	= "'B'"	
Y'Extended_Image('a',6)	= "'a' "	
Y'Extended_Image('a',0,true)	= "'a'"	

'Extended_Value Attribute

Usage: X'Extended_Value(Item)

Returns the image associated with Item as per the Text_Io definition. The Text_Io definition states that it reads an enumeration value from the beginning of the given string and returns the value of the enumeration literal that corresponds to the sequence input. (LRM 14.3.9:11)

For a prefix X that is a discrete type or subtype; this attribute is a function with a single parameter. The actual parameter Item must be of predefined type string. Any leading or trailing spaces in the string X are ignored. In the case where an illegal string is passed, a CONSTRAINT_ERROR is raised.

Parameter Descriptions:

Item -- The user passes to the function a parameter of the predefined type string. The type of the returned value is the base type of X.

Examples:

Suppose the following type was declared:

Type X is (red, green, blue, purple);

Then the following would be true:

X'Extended_Value("red")	= red
X'Extended_Value(" green")	= green
X'Extended_Value(" Purple")	= purple
X'Extended_Value(" GreEn ")	= green

'Extended_Width Attribute

Usage: X'Extended_Width

Returns the width for subtype of X.

For a prefix X that is a discrete type or subtype; this attribute is a function. This attribute yields the maximum image length over all values of the enumeration type or subtype X.

Parameter Descriptions:

There are no parameters to this function. This function returns the width of the largest (width) enumeration literal in the enumeration type specified by X.

Examples:

Suppose the following types were declared:

Type X is (red, green, blue, purple);
Type Z is (X1, X12, X123, X1234);

Then the following would be true:

X'Extended_Width	= 6	-- "purple"
Z'Extended_Width	= 5	-- "X1234"

FLOATING POINT ATTRIBUTES

'Extended_Image Attribute

Usage: X'Extended_Image(Item,Fore,Aft,Exp,Base,Based)

Returns the image associated with Item as per the Text_Io definition. The Text_Io definition states that it outputs the value of the parameter Item as a decimal literal with the format defined by the other parameters. If the value is negative then a minus sign is included in the integer part of the value of Item. If Exp is 0 then the integer part of the output has as many digits as are needed to represent the integer part of the value of Item or is zero if the value of Item has no integer part. (LRM 14.3.8:13, 14.3.8:15)

For a prefix X that is a discrete type or subtype; this attribute is a function that may have more than one parameter. The parameter Item must be a Real value. The resulting string is without underlines or trailing spaces.

Parameter Descriptions:

- Item -- The user specifies the item that he wants the image of and passes it into the function. This parameter is required.
- Fore -- The user may specify the minimum number of characters for the integer part of the decimal representation in the return string. This includes a minus sign if the value is negative and the base with the '#' if based notation is specified. If the integer part to be output has fewer characters than specified by Fore, then leading spaces are output first to make up the difference. If no Fore is specified then the default (2) value is assumed.
- Aft -- The user may specify the minimum number of decimal digits after the decimal point to accommodate the precision desired. If the delta of the type or subtype is greater than 0.1 then Aft is one. If no Aft is specified then the default (X'Digits-1) is assumed. If based notation is specified the trailing '#' is included in aft.
- Exp -- The user may specify the minimum number of digits in the exponent; the exponent consists of a sign and the exponent, possibly with leading zeros. If no Exp is specified then the default (3) is assumed. If Exp is 0 then no exponent is used.
- Base -- The user may specify the base that the image is to be displayed in. If no base is specified then the default (10) is assumed.
- Based -- The user may specify whether he wants the string returned to be in based notation or not. If no preference is specified then the default (false) is assumed.

Examples:

Suppose the following type was declared:

Type X is digits 5 range -10.0 .. 16.0;

Then the following would be true:

X'Extended_Image(5.0)	= " 5.0000E+00"
X'Extended_Image(5.0,1)	= "5.0000E+00"
X'Extended_Image(-5.0,1)	= "-5.0000E+00"
X'Extended_Image(5.0,2,0)	= " 5.0E+00"
X'Extended_Image(5.0,2,0,0)	= " 5.0"
X'Extended_Image(5.0,2,0,0,2)	= "101.0"
X'Extended_Image(5.0,2,0,0,2,True)	= "2#101.0#"
X'Extended_Image(5.0,2,2,3,2,True)	= "2#1.1#E+02"

'Extended_Value Attribute

Usage: X'Extended_Value(Item)

Returns the value associated with Item as per the Text_10 definition. The Text_10 definition states that it skips any leading zeros, then reads a plus or minus sign if present then reads the string according to the syntax of a real literal. The return value is that which corresponds to the sequence input. (LRM 14.3.8:9, 14.3.8:10)

For a prefix X that is a discrete type or subtype; this attribute is a function with a single parameter. The actual parameter Item must be of predefined type string. Any leading or trailing spaces in the string X are ignored. In the case where an illegal string is passed, a CONSTRAINT_ERROR is raised.

Parameter Descriptions:

Item -- The user passes to the function a parameter of the predefined type string. The type of the returned value is the base type of the input string.

Examples:

Suppose the following type was declared:

Type X is digits 5 range -10.0 .. 16.0;

Then the following would be true:

X'Extended_Value("5.0")	= 5.0
X'Extended_Value("0.5E1")	= 5.0
X'Extended_Value("2#1.01#E2")	= 5.0

'Extended_Digits Attribute

Usage: X'Extended_Digits(Base)

Returns the number of digits using base in the mantissa of model numbers of the subtype X.

Parameter Descriptions:

Base -- The user may specify the base that the subtype is defined in. If no base is specified then the default (10) is assumed.

Examples:

Suppose the following type was declared:

Type X is digits 5 range -10.0 .. 16.0;

Then the following would be true:

X'Extended_Digits = 5

FIXED POINT ATTRIBUTES

'Extended_Image Attribute

Usage: X'Extended_Image(Item,Fore,Aft,Exp,Base,Based)

Returns the image associated with Item as per the Text_Io definition. The Text_Io definition states that it outputs the value of the parameter Item as a decimal literal with the format defined by the other parameters. If the value is negative then a minus sign is included in the integer part of the value of Item. If Exp is 0 then the integer part of the output has as many digits as are needed to represent the integer part of the value of Item or is zero if the value of Item has no integer part. (LRM 14.3.8:13, 14.3.8:15)

For a prefix X that is a discrete type or subtype; this attribute is a function that may have more than one parameter. The parameter Item must be a Real value. The resulting string is without underlines or trailing spaces.

Parameter Descriptions:

- Item -- The user specifies the item that he wants the image of and passes it into the function. This parameter is required.
- Fore -- The user may specify the minimum number of characters for the integer part of the decimal representation in the return string. This includes a minus sign if the value is negative and the base with the '#' if based notation is specified. If the integer part to be output has fewer characters than specified by Fore, then leading spaces are output first to make up the difference. If no Fore is specified then the default (2) value is assumed.
- Aft -- The user may specify the minimum number of decimal digits after the decimal point to accommodate the precision desired. If the delta of the type or subtype is greater than 0.1 then Aft is one. If no Aft is specified then the default (X'Digits-1) is assumed. If based notation is specified the trailing '#' is included in aft.
- Exp -- The user may specify the minimum number of digits in the exponent; the exponent consists of a sign and the exponent, possibly with leading zeros. If no Exp is specified then the default (3) is assumed. If Exp is 0 then no exponent is used.
- Base -- The user may specify the base that the image is to be displayed in. If no base is specified then the default (10) is assumed.
- Based -- The user may specify whether he wants the string returned to be in based notation or not. If no preference is specified then the default (false) is assumed.

Examples:

Suppose the following type was declared:

Type X is delta 0.1 range -10.0 .. 17.0;

Then the following would be true:

X'Extended_Image(5.0)	= " 5.00E+00"
X'Extended_Image(5.0,1)	= "5.00E+00"
X'Extended_Image(-5.0,1)	= "-5.00E+00"
X'Extended_Image(5.0,2,0)	= " 5.0E+00"
X'Extended_Image(5.0,2,0,0)	= " 5.0"
X'Extended_Image(5.0,2,0,0,2)	= "101.0"
X'Extended_Image(5.0,2,0,0,2,True)	= "2#101.0#"
X'Extended_Image(5.0,2,2,3,2,True)	= "2#1.1#E+02"

'Extended_Value Attribute

Usage: X'Extended_Value(Image)

Returns the value associated with Item as per the Text_Io definition. The Text_Io definition states that it skips any leading zeros, then reads a plus or minus sign if present then reads the string according to the syntax of a real literal. The return value is that which corresponds to the sequence input. (LRM 14.3.8:9, 14.3.8:10)

For a prefix X that is a discrete type or subtype; this attribute is a function with a single parameter. The actual parameter Item must be of predefined type string. Any leading or trailing spaces in the string X are ignored. In the case where an illegal string is passed, a CONSTRAINT_ERROR is raised.

Parameter Descriptions:

Image -- The user passes to the function a parameter of the predefined type string. The type of the returned value is the base type of the input string.

Examples:

Suppose the following type was declared:

Type X is delta 0.1 range -10.0 .. 17.0;

Then the following would be true:

X'Extended_Value("5.0")	= 5.0
X'Extended_Value("0.5E1")	= 5.0
X'Extended_Value("2#1.01#E2")	= 5.0

'Extended_Fore Attribute

Usage: X'Extended_Fore(Base,Based)

Returns the minimum number of characters required for the integer part of the based representation of X.

Parameter Descriptions:

- Base -- The user may specify the base that the subtype would be displayed in. If no base is specified then the default (10) is assumed.
- Based -- The user may specify whether he wants the string returned to be in based notation or not. If no preference is specified then the default (false) is assumed.

Examples:

Suppose the following type was declared:

Type X is delta 0.1 range -10.0 .. 17.1;

Then the following would be true:

X'Extended_Fore	= 3	-- "-10"
X'Extended_Fore(2)	= 6	-- " 10001"

'Extended_Aft Attribute

Usage: X'Extended_Aft(Base,Based)

Returns the minimum number of characters required for the fractional part of the based representation of X.

Parameter Descriptions:

Base -- The user may specify the base that the subtype would be displayed in. If no base is specified then the default (10) is assumed.

Based -- The user may specify whether he wants the string returned to be in based notation or not. If no preference is specified then the default (false) is assumed.

Examples:

Suppose the following type was declared:

Type X is delta 0.1 range -10.0 .. 17.1;

Then the following would be true:

X'Extended_Aft	= 1	-- "1" from 0.1
X'Extended_Aft(2)	= 4	-- "0001" from 2#0.0001#

3. Specification of Package SYSTEM

Package system Is

```
Type address Is Private;
null_address : Constant address;
Subtype physical_address Is long_integer Range 16#0#..16#FFFFFF#;
Subtype target_logical_address Is address;
Subtype target_address_state Is integer Range 0..15;
```

Type subprogram_value Is

Record

```
    logical_address : target_logical_address;
    address_state   : target_address_state;
    parameter_size  : natural;
    static_base     : target_logical_address;
```

End Record;

Type name Is (telesoft_ada);

```
system_name : Constant name := telesoft_ada;
storage_unit : Constant := 16;
memory_size : Constant := 65536;
min_int : Constant := -(2 ** 31);
max_int : Constant := (2 ** 31) - 1;
max_digits : Constant := 9;
max_mantissa : Constant := 31;
fine_delta : Constant := 1.0 / (2 ** (max_mantissa));
tick : Constant := 0.0001;
```

Subtype priority Is integer Range 0..31;

```
max_object_size : Constant := max_int;
max_record_count : Constant := max_int;
max_text_io_count : Constant := max_int-1;
max_text_io_field : Constant := 1000;
```

Private

```
Type address Is Access integer;
null_address : Constant address := null;
```

End system;

4. Restrictions on Representation Clauses

The Compiler supports the following representation clauses:

- Length Clauses: for enumeration and derived integer types 'SIZE attribute (LRM 13.2(a))
- Length Clauses: for array types 'SIZE attribute (LRM 13.2(a))
- Length Clauses: for record types 'SIZE attribute (LRM 13.2(a)) with restriction that simple expression must be a multiple of 16.
- Length Clauses: for access types 'STORAGE_SIZE attribute (LRM13.2(b))
- Length Clauses: for access types 'SIZE attribute (LRM 13.2(a)) with restriction that simple expression must be equal to 16.
- Length Clauses: for float types 'SIZE attribute (LRM 13.2(a)) with restriction that simple expression must be equal to the required hardware length for the type (32 or 48).
- Length Clauses: for tasks types 'STORAGE_SIZE attribute (LRM 13.2(c))
- Length Clauses: for fixed point types 'SMALL attribute (LRM13.2(d))
- Enumeration Clauses: for character and enumeration types other than boolean (LRM 13.3)
- Record representation Clauses (LRM 13.4) with following constraints:
 - Each component of the record must be specified with a component clause.
 - Bits are ordered right to left within a byte.
- Address Clauses: for objects, entries, and external subprograms (LRM 13.5(a)(c))

This compiler does NOT support the following representation clauses:

- Enumeration Clauses: for boolean (LRM 13.3)
- Address Clauses for packages, task units, or non-external Ada subprograms (LRM 13.5(b))

5. Implementation dependent naming conventions

There are no implementation-generated names denoting implementation dependent components.

6. Interpretation of Expressions In Address Clause

Expressions that appear in address specifications are interpreted as the first storage unit of the object.

7. Restrictions on Unchecked Conversions

Unchecked conversions are allowed between any types or subtypes unless the target type is an unconstrained record or array type.

8. I/O Package Characteristics

Sequential_IO and Direct_IO cannot be instantiated for unconstrained array types or unconstrained types with discriminants without default values.

External files are not supported. All open and create calls will result in USE_ERROR (LRM 14.2.1 (4)).

Only console I/O (I/O to default device) is supported.

9. Restrictions on Pragma Inline

Pragma inline is only implemented for procedures. A function name cannot be used as an argument to the inline pragma.

APPENDIX C TEST PARAMETERS

Certain tests in the ACVC make use of implementation-dependent values, such as the maximum length of an input line and invalid file names. A test that makes use of such values is identified by the extension .TST in its file name. Actual values to be substituted are represented by names that begin with a dollar sign. A value must be substituted for each of these names before the test is run. The values used for this validation are given below.

<u>Name and Meaning</u>	<u>Value</u>
\$ACC_SIZE An integer literal whose value is the number of bits sufficient to hold any value of an access type.	200
\$BIG_ID1 An identifier the size of the maximum input line length which is identical to \$BIG_ID2 except for the last character.	(1..199 => 'A', 200 => '1')
\$BIG_ID2 An identifier the size of the maximum input line length which is identical to \$BIG_ID1 except for the last character.	(1..199 => 'A', 200 => '2')
\$BIG_ID3 An identifier the size of the maximum input line length which is identical to \$BIG_ID4 except for a character near the middle.	(1..100 => 'A', 101 => '3', 102..200 => 'A')

TEST PARAMETERS

Name and Meaning	Value
\$BIG_ID4 An identifier the size of the maximum input line length which is identical to \$BIG_ID3 except for a character near the middle.	(1..100 => 'A', 101 => '4', 102..200 => 'A')
\$BIG_INT_LIT An integer literal of value 298 with enough leading zeroes so that it is the size of the maximum line length.	(1..197 => '0', 198..200 => "298")
\$BIG_REAL_LIT A universal real literal of value 690.0 with enough leading zeroes to be the size of the maximum line length.	(1..194 => '0', 195..200 => "69.0E1")
\$BIG_STRING1 A string literal which when catenated with \$BIG_STRING2 yields the image of \$BIG_ID1.	(1 => '"', 2..101 => 'A', 102 => '"')
\$BIG_STRING2 A string literal which when catenated to the end of \$BIG_STRING1 yields the image of \$BIG_ID1.	(1 => '"', 2..100 => 'A', 101 => '1', 102 => '"')
\$BLANKS A sequence of blanks twenty characters less than the size of the maximum line length.	(1..180 => ' ')
\$COUNT_LAST A universal integer literal whose value is TEXT_IO.COUNT'LAST.	2147483646
\$DEFAULT_MEM_SIZE An integer literal whose value is SYSTEM.MEMORY_SIZE.	65536
\$DEFAULT_STOR_UNIT An integer literal whose value is SYSTEM.STORAGE_UNIT.	16

TEST PARAMETERS

Name and Meaning	Value
\$DEFAULT_SYS NAME The value of the constant SYSTEM.SYSTEM_NAME.	TELESOFT_ADA
\$DELTA_DOC A real literal whose value is SYSTEM.FINE_DELTA.	2#1.0#E-31
\$FIELD_LAST A universal integer literal whose value is TEXT_IO.FIELD'LAST.	1000
\$FIXED_NAME The name of a predefined fixed-point type other than DURATION.	NO_SUCH_TYPE
\$FLOAT_NAME The name of a predefined floating-point type other than FLOAT, SHORT_FLOAT, or LONG_FLOAT.	NO_SUCH_TYPE
\$GREATER_THAN_DURATION A universal real literal that lies between DURATION'BASE'LAST and DURATION'LAST or any value in the range of DURATION.	86401.0
\$GREATER_THAN_DURATION_BASE_LAST A universal real literal that is greater than DURATION'BASE'LAST.	131073.0
\$HIGH_PRIORITY An integer literal whose value is the upper bound of the range for the subtype SYSTEM.PRIORITY.	31
\$ILLEGAL_EXTERNAL_FILE_NAME1 An external file name which contains invalid characters.	"BADCHAR*`/%"
\$ILLEGAL_EXTERNAL_FILE_NAME2 An external file name which is too long.	"/NONAME/DIRECTORY"
\$INTEGER_FIRST A universal integer literal whose value is INTEGER'FIRST.	-32768

TEST PARAMETERS

Name and Meaning	Value
\$INTEGER_LAST A universal integer literal whose value is INTEGER'LAST.	32767
\$INTEGER_LAST PLUS 1 A universal integer literal whose value is INTEGER'LAST + 1.	32768
\$LESS THAN DURATION A universal real literal that lies between DURATION'BASE'FIRST and DURATION'FIRST or any value in the range of DURATION.	-86401.0
\$LESS THAN DURATION BASE FIRST A universal real literal that is less than DURATION'BASE'FIRST.	-131073.0
\$LOW_PRIORITY An integer literal whose value is the lower bound of the range for the subtype SYSTEM.PRIORITY.	0
\$MANTISSA_DOC An integer literal whose value is SYSTEM.MAX_MANTISSA.	31
\$MAX_DIGITS Maximum digits supported for floating-point types.	9
\$MAX_IN_LEN Maximum input line length permitted by the implementation.	200
\$MAX_INT A universal integer literal whose value is SYSTEM.MAX_INT.	2147683647
\$MAX_INT PLUS 1 A universal integer literal whose value is SYSTEM.MAX_INT+1.	2147683648
\$MAX_LEN_INT_BASED_LITERAL A universal integer based literal whose value is 2#11# with enough leading zeroes in the mantissa to be \$MAX_IN_LEN long.	(1..2 => "2:", 3..197 => '0', 198..200 => "11:")

TEST PARAMETERS

Name and Meaning	Value
\$MAX_LEN_REAL_BASED_LITERAL A universal real based literal whose value is 16:F.E: with enough leading zeroes in the mantissa to be \$MAX_IN_LEN long.	(1..3 => "16:", 4..196 => '0', 197..200 => "F.E:")
\$MAX_STRING_LITERAL A string literal of size \$MAX_IN_LEN, including the quote characters.	(1 => '"', 2..199 => 'A', 200 => '"')
\$MIN_INT A universal integer literal whose value is SYSTEM.MIN_INT.	-2147483648
\$MIN_TASK_SIZE An integer literal whose value is the number of bits required to hold a task object which has no entries, no declarations, and "NULL;" as the only statement in its body.	16
\$NAME A name of a predefined numeric type other than FLOAT, INTEGER, SHORT_FLOAT, SHORT_INTEGER, LONG_FLOAT, or LONG_INTEGER.	NO_SUCH_TYPE_AVAILABLE
\$NAME_LIST A list of enumeration literals in the type SYSTEM.NAME, separated by commas.	TELESOFT_ADA
\$NEG_BASED_INT A based integer literal whose highest order nonzero bit falls in the sign bit position of the representation for SYSTEM.MAX_INT.	16#FFFFFFFFE#
\$NEW_MEM_SIZE An integer literal whose value is a permitted argument for pragma MEMORY_SIZE, other than \$DEFAULT_MEM_SIZE. If there is no other value, then use \$DEFAULT_MEM_SIZE.	65536

TEST PARAMETERS

Name and Meaning	Value
\$NEW_STOR_UNIT An integer literal whose value is a permitted argument for pragma STORAGE_UNIT, other than \$DEFAULT_STOR_UNIT. If there is no other permitted value, then use value of SYSTEM.STORAGE_UNIT.	16
\$NEW_SYS_NAME A value of the type SYSTEM.NAME, other than \$DEFAULT_SYS_NAME. If there is only one value of that type, then use that value.	TELESOFT_ADA
\$TASK_SIZE An integer literal whose value is the number of bits required to hold a task object which has a single entry with one 'IN OUT' parameter.	16
\$TICK A real literal whose value is SYSTEM.TICK.	0.0001

APPENDIX D

WITHDRAWN TESTS

Some tests are withdrawn from the ACVC because they do not conform to the Ada Standard. The following 44 tests had been withdrawn at the time of validation testing for the reasons indicated. A reference of the form AI-ddddd is to an Ada Commentary.

- a. E28005C: This test expects that the string "-- TOP OF PAGE. --63" of line 204 will appear at the top of the listing page due to a pragma PAGE in line 203; but line 203 contains text that follows the pragma, and it is this text that must appear at the top of the page.
- b. A39005G: This test unreasonably expects a component clause to pack an array component into a minimum size (line 30).
- c. B97102E: This test contains an unintended illegality: a select statement contains a null statement at the place of a selective wait alternative (line 31).
- d. C97116A: This test contains race conditions, and it assumes that guards are evaluated indivisibly. A conforming implementation may use interleaved execution in such a way that the evaluation of the guards at lines 50 & 54 and the execution of task CHANGING OF THE GUARD results in a call to REPORT.FAILED at one of lines 52 or 56.
- e. BC3009B: This test wrongly expects that circular instantiations will be detected in several compilation units even though none of the units is illegal with respect to the units it depends on; by AI-00256, the illegality need not be detected until execution is attempted (line 95).
- f. CD2A62D: This test wrongly requires that an array object's size be no greater than 10 although its subtype's size was specified to be 40 (line 137).

WITHDRAWN TESTS

- g. CD2A63A..D, CD2A66A..D, CD2A73A..D, and CD2A76A..D (16 tests): These tests wrongly attempt to check the size of objects of a derived type (for which a 'SIZE length clause is given) by passing them to a derived subprogram (which implicitly converts them to the parent type (Ada standard 3.4:14)). Additionally, they use the 'SIZE length clause and attribute, whose interpretation is considered problematic by the WG9 ARG.
- h. CD2A81G, CD2A83G, CD2A84M..N, and CD50110 (5 tests): These tests assume that dependent tasks will terminate while the main program executes a loop that simply tests for task termination; this is not the case, and the main program may loop indefinitely (lines 74, 85, 86, 96, and 58, respectively).
- i. CD2B15C and CD7205C: These tests expect that a 'STORAGE SIZE length clause provides precise control over the number of designated objects in a collection; the Ada standard 13.2:15 allows that such control must not be expected.
- j. CD2D11B: This test gives a SMALL representation clause for a derived fixed-point type (at line 30) that defines a set of model numbers that are not necessarily represented in the parent type; by Commentary AI-00099, all model numbers of a derived fixed-point type must be representable values of the parent type.
- k. CD5007B: This test wrongly expects an implicitly declared subprogram to be at the address that is specified for an unrelated subprogram (line 303).
- l. ED7004B, ED7005C..D, and ED7006C..D (5 tests): These tests check various aspects of the use of the three SYSTEM pragmas; the AVO withdraws these tests as being inappropriate for validation.
- m. CD7105A: This test requires that successive calls to CALENDAR.CLOCK change by at least SYSTEM.TICK; however, by Commentary AI-00201, it is only the expected frequency of change that must be at least SYSTEM.TICK--particular instances of change may be less (line 29).
- n. CD7203B and CD7204B: These tests use the 'SIZE length clause and attribute, whose interpretation is considered problematic by the WG9 ARG.
- o. CD7205D: This test checks an invalid test objective: it treats the specification of storage to be reserved for a task's activation as though it were like the specification of storage for a collection.

WITHDRAWN TESTS

- p. CE2107I: This test requires that objects of two similar scalar types be distinguished when read from a file--DATA_ERROR is expected to be raised by an attempt to read one object as of the other type. However, it is not clear exactly how the Ada standard 14.2.4:4 is to be interpreted; thus, this test objective is not considered valid (line 90).
- q. CE3111C: This test requires certain behavior, when two files are associated with the same external file, that is not required by the Ada standard.
- r. CE3301A: This test contains several calls to END_OF_LINE and END_OF_PAGE that have no parameter: these calls were intended to specify a file, not to refer to STANDARD_INPUT (lines 103, 107, 118, 132, and 136).
- s. CE3411B: This test requires that a text file's column number be set to COUNT'LAST in order to check that LAYOUT_ERROR is raised by a subsequent PUT operation. But the former operation will generally raise an exception due to a lack of available disk space, and the test would thus encumber validation testing.

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APPENDIX E

COMPILER OPTIONS AS SUPPLIED BY TELESOFT

Compiler: TeleGen2 Ada Development System for the 1750A, Version 2.1.0
ACVC Version: 1.10

THE ADA COMPILER

Table 2-1. A1750 Syntax and Options.

Option	Action	Default
?		Display list of options.
ADALibrary[/library_name]	Specify name of the library file.	ADA LIBRARY A
LIBrary	Informs the compiler that this is a library unit.	LIBrary
MAIn[/compilation_unit_name]	Compiles as a main and binds the program.	LIBrary
BINd	Binds a main program that has been previously compiled.	LIBrary
NOCompile	Suppresses execution of the compiler.	LIBrary
CHEck[/NOSemantic]	Perform syntax and semantic error checking only.	Produce object code.
COLlection	Optimize as a collection.	LIBrary
[NO]APPrentice [/option_file_name]	Use an apprentice option file to create a binder options file.	NOApprentice
[NO]ERRor_abort	Controls compiler behavior after errors are encountered.	NOError_Abort
[/SYNtax=n]	Specify the maximum number of syntax errors.	999
[/SEMantic=n]	Specify the maximum number of semantic errors.	999
[/LIST /NOList]	Cause an error listing to be produced.	NOList
[NO]INIt_sublibrary	Creates and initializes the working sublibrary.	NOInit_sublibrary
[/sublibrary_name]	Specifies name of working sublibrary.	ADA SUBLIB A
[/number_of_comp_units]	Specifies number of compilation units to be contained in the sublibrary.	≈4671
[NO]KEEp [/RDR]	Saves the console listing and spools it to the current spool virtual device.	NOKeep

Table 2-1. A1750 Syntax and Options (continued).

Option	Action	Default
[NO]LIST [/NOERR /ERRI /ERRF /ERRL [/XREF /NOXREF [/ILGEN /NOILGEN [=1750A =ISSS [/CALL /NOCALL	Produce a compilation listing. Error or source messages are not listed. Error source messages are interspersed with source. Error messages are first, followed by source. Error messages are last, preceded by source. Produce a cross-reference listing. Produce an interspersed listing with Ada source and assembly code. Assembly output is MIL-STD-1750A. Assembly output is ISSS instruction format. Produce a call graph for each compilation unit.	NOList NOERR NOERR NOERR NOERR NOXREF NOILGEN 1750A 1750A NOCALL
[NO]MAP [/IMAge /NOImage	Produce a linkage map after the bind step. Generate a memory image listing.	NOMap NOImage
[NO]OBJect /option_file_name	Used only with MAIN or BIND. Specify binder options file.	ADA BIND1750 A
[NO]OPTimize [/AUTinline /NOAutoinline	Optimizes the generated object code. Inlines all subprograms called from one place.	NOOptimize NOAutoline
[NO]PREserve	Retains additional information about the compilation units in the sublibrary.	NOPreserve
[NO]SUPpress [/CHEcks [/ELAb /NOElab	Suppresses selected runtime checks. Suppresses all checks. Suppresses only elaboration checks.	NOSuppress
[NO]XCEption_Info	Enables run-time display of full name and reasons of an unhandled exception.	NOXception_Info