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Ada COMPILER
VALIDATION SUMMARY REPORT:
Certificate Number: 890614W1.10099
MIPS Computer Systems
MIPS ASAPP, Version 2.10
MIPS M/120 Host and MIPS R3200-6 CPU board Target

Completion of On-Site Testing:
14 June 1989

Prepared By:
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Prepared For:
Ada Joint Program Office
United States Department of Defense
Washington DC 20301-3081

Ada Compiler Validation Summary Report:

Compiler Name: MIPS ASAPP, Version 2.10

Certificate Number: 890614W1.10099

Host: MIPS M/120 under
RISC/os, 4.0

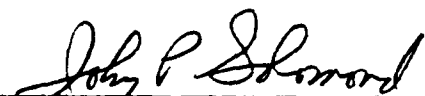
Target: MIPS R3200-6 CPU board
bare machine

Testing Completed 14 June 1989 Using ACVC 1.10

This report has been reviewed and is approved.


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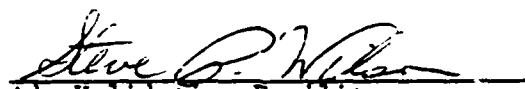
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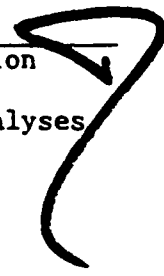
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CHAPTER 1

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.

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.

INTRODUCTION

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 14 June 1989 at Sunnyvale 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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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
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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 and Guidelines, Ada Joint Program Office, 1 January 1987.
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 and Guidelines</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

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cross-compilers, translators, and interpreters.

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.

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

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tests. However, some tests contain values that require the test to be 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: MIPS ASAPP, Version 2.10

ACVC Version: 1.10

Certificate Number: 890614W1.10099

Host Computer:

Machine: MIPS M/120

Operating System: RISC/os
4.0

Memory Size: 32 megabytes

Target Computer:

Machine: MIPS R3200-6 CPU board

Operating System: bare machine

Memory Size: 32 megabytes

CONFIGURATION INFORMATION

Communications Network: Ethernet

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 TINY INTEGER, SHORT 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) None 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.)

CONFIGURATION INFORMATION

- (3) This implementation uses no extra bits for extra precision and uses all extra bits for extra range. (See test C35903A.)
- (4) Sometimes `CONSTRAINT_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 gradual. (See tests C45524A..Z.)

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 to even. (See tests C46012A..Z.)
- (2) The method used for rounding to longest integer is round to even. (See tests C46012A..Z.)
- (3) The method used for rounding to integer in static universal real expressions is round to even. (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 no exception. (See test C36003A.)
- (2) `NUMERIC_ERROR` is raised when `'LENGTH'` is applied to a null array type with `INTEGER'LAST + 2` components. (See test C36202A.)
- (3) `NUMERIC_ERROR` is raised when `'LENGTH'` is applied to a null array type with `SYSTEM.MAX_INT + 2` components. (See test C36202B.)

CONFIGURATION INFORMATION

- (4) A packed BOOLEAN array having a 'LENGTH exceeding INTEGER'LAST raises NUMERIC_ERROR when the array type is declared. (See test C52103X.)
- (5) A packed two-dimensional BOOLEAN array with more than INTEGER'LAST components raises NUMERIC_ERROR when the array type is declared. (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 NUMERIC_ERROR when the array type is declared. (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, all choices are evaluated before checking against the index type. (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 before 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.)

CONFIGURATION INFORMATION

h. Pragmas.

- (1) The pragma `INLINE` is supported for functions and procedures. (See tests LA3004A..B, EA3004C..D, and CA3004E..F.)

i. Generics

- (1) Generic specifications and bodies can be compiled in separate compilations. (See tests CA1012A, CA2009C, CA2009F, BC3204C, and BC3205D.)
- (2) Generic unit bodies and their subunits can be compiled in separate compilations. (See test CA3011A.)

j. Input and output

- (1) The package `SEQUENTIAL_IO` can be instantiated with unconstrained array types and record types with discriminants without defaults. (See tests AE2101C, EE2201D, and EE2201E.)
- (2) The package `DIRECT_IO` can be instantiated with unconstrained array types and record types with discriminants without defaults. (See tests AE2101H, EE2401D, and EE2401G.)
- (3) The director, AJPO, has determined (AI-00332) that every call to `OPEN` and `CREATE` must raise `USE_ERROR` or `NAME_ERROR` if file input/output is not supported. This implementation exhibits this behavior for `SEQUENTIAL_IO`, `DIRECT_IO`, and `TEXT_IO`.

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 552 tests were inapplicable to this implementation. All inapplicable tests were processed during validation testing except for 201 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 12 tests were required to successfully demonstrate the test objective. (See section 3.6.)

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	129	1132	1781	17	16	46	3121
Inapplicable	0	6	534	0	12	0	552
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	198	577	545	245	172	99	161	331	137	36	252	292	76	3121
Inappl	14	72	135	3	0	0	5	1	0	0	0	77	245	552
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 A63 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, 552 tests were inapplicable for the reasons indicated:

- a. The following 201 tests are not applicable because they have floating-point type declarations requiring more digits than SYSTEM.MAX_DIGITS:

C24113L..Y	C35705L..Y	C35706L..Y	C35707L..Y
C35708L..Y	C35802L..Z	C45241L..Y	C45321L..Y
C45421L..Y	C45521L..Z	C45524L..Z	C45621L..Z

C45641L..Y C46012L..Z

- b. C35702A and B86001T are not applicable because this implementation supports no predefined type `SHORT_FLOAT`.
- c. The following 16 tests are not applicable because this implementation does not support a predefined type `LONG_INTEGER`:

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

- d. C45531M..P (4 tests) and C45532M..P (4 tests) are not applicable because the value of `SYSTEM.MAX_MANTISSA` is less than 47.
- e. C86001F is not applicable because, for this implementation, the package `TEXT_IO` is dependent upon package `SYSTEM`. These tests recompile package `SYSTEM`, making package `TEXT_IO`, and hence package `REPORT`, obsolete.
- f. B86001Y is not applicable because this implementation supports no predefined fixed-point type other than `DURATION`.
- g. B86001Z is not applicable because this implementation supports no predefined floating-point type with a name other than `FLOAT`, `LONG_FLOAT`, or `SHORT_FLOAT`.
- h. C96005B is not applicable because there are no values of type `DURATION`'BASE that are outside the range of `DURATION`.
- i. CD1009C, CD2A41A..B (2 tests), CD2A41E, and CD2A42A..J (10 tests) are not applicable because this implementation does not support size clauses for floating point types.
- j. 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.
- k. CD2A84B..I (8 tests) and CD2A84K..L (2 tests) are not applicable because this implementation does not support size clauses for access types.
- l. CD2A91A..E (5 tests), CD5012J, CD5013S, and CD5014S are not applicable because this implementation does not support size clauses for tasks or task types.
- m. The following 42 tests are not applicable because this implementation does not support an address clause when a dynamic address is applied to a variable requiring initialization:

TEST INFORMATION

CD5003B..H	CD5011A..H	CD5011L..N	CD5011Q
CD5011R	CD5012A..I	CD5012L	CD5013B
CD5013D	CD5013F	CD5013H	CD5013L
CD5013N	CD5013R	CD5014T..X	

n. The following 242 tests are inapplicable because sequential, text, and direct access files are not supported:

CE2102A..C (3 tests)	CE2102G..H (2 tests)
CE2102K	CE2102N..Y (12 tests)
CE2103C..D (2 tests)	CE2104A..D (4 tests)
CE2105A..B (2 tests)	CE2106A..B (2 tests)
CE2107A..H (8 tests)	CE2107L
CE2108A..B (2 tests)	CE2108C..H (5 tests)
CE2109A..C (3 tests)	CE2110A..D (4 tests)
CE2111A..I (9 tests)	CE2115A..B (2 tests)
CE2201A..C (3 tests)	CE2201F..N (9 tests)
CE2204A..D (4 tests)	CE2205A
CE2208B	EE2201D..E (2 tests)
EE2401D	EE2401G
CE2401A..C (3 tests)	CE2401E..F (2 tests)
CE2401H..L (5 tests)	CE2404A..B (2 tests)
CE2405B	CE2406A
CE2407A..B (2 tests)	CE2408A..B (2 tests)
CE2409A..B (2 tests)	CE2410A..B (2 tests)
CE2411A	CE3102A..B (2 tests)
EE3102C	CE3102F..H (3 tests)
CE3102J..K (2 tests)	CE3103A
CE3104A..C (3 tests)	CE3107B
CE3108A..B (2 tests)	CE3109A
CE3110A	CE3111A..B (2 tests)
CE3111D..E (2 tests)	CE3112A..D (4 tests)
CE3114A..B (2 tests)	CE3115A
EE3203A	CE3208A
EE3301B	CE3302A
CE3305A	CE3402A
EE3402B	CE3402C..D (2 tests)
CE3403A..C (3 tests)	CE3403E..F (2 tests)
CE3404B..D (3 tests)	CE3405A
EE3405B	CE3405C..D (2 tests)
CE3406A..D (4 tests)	CE3407A..C (3 tests)
CE3408A..C (3 tests)	CE3409A
CE3409C..E (3 tests)	EE3409F
CE3410A	CE3410C..E (3 tests)
EE3410F	CE3411A
CE3411C	CE3412A
EE3412C	CE3413A
CE3413C	CE3602A..D (4 tests)
CE3603A	CE3604A..B (2 tests)
CE3605A..E (5 tests)	CE3606A..B (2 tests)
CE3704A..F (6 tests)	CE3704M..O (3 tests)
CE3706D	CE3706F..G (2 tests)

TEST INFORMATION

CE3804A..P (16 tests)	CE3805A..B (2 tests)
CE3806A..B (2 tests)	CE3806D..E (2 tests)
CE3806G..H (2 tests)	CE3905A..C (3 tests)
CE3905L	CE3906A..C (3 tests)
CE3906E..F (2 tests)	

- o. CE2103A, CE2103B, and CE3107A are not applicable because this implementation does not support external file create and open operation. 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 12 tests.

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

B24009A	B33301B	B38003A	B38003B	B38009A	B38009B
B41202A	BC1303F	BC3005B			

At the recommendation of the AV0, the tests CE2103A, CE2103B, and CE3107A were modified because these tests do not allow the implementation to raise `USE_ERROR` for external file create and open operations when these operations are not supported by the implementation. Code was added to handle a `USE_ERROR` exception in these cases. The tests then execute, report that `USE_ERROR` was raised on `CREATE`, and print a result of `NOT_APPLICABLE`.

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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 MIPS ASAPP 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 MIPS ASAPP 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:	MIPS M/120
Host operating system:	RISC/os, 4.0
Target computer:	MIPS R3200-6 CPU board
Target operating system:	bare machine
Compiler:	MIPS ASAPP, Version 2.10

The host and target computers were linked via Ethernet.

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 a MIPS M/1000 and transferred to the host via NFS.

After the test files were loaded to disk, the full set of tests was compiled and linked on the MIPS M/120, then all executable images were transferred to the MIPS R3200-6 CPU board via Ethernet and run. Results were printed from the host computer.

The compiler was tested using command scripts provided by MIPS Computer Systems 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:

OPTION	EFFECT
-----	-----
-g0	Have the compiler produce additional symbol table information for accurate but limited

TEST INFORMATION

symbolic debugging of partially optimized code.

-01

Turn on all MIPS optimizations that can be done quickly and do one pass using the Verdix optimizer.

Tests were compiled, linked, and executed (as appropriate) using one host computer and one 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 Sunnyvale CA and was completed on 14 June 1989.

APPENDIX A

DECLARATION OF CONFORMANCE

MIPS Computer Systems has submitted the following
Declaration of Conformance concerning the MIPS ASAPP.



MIPS Computer Systems Inc
928 Arques Avenue
Sunnyvale CA 94086-3650

408 720-1700
TELEX # 510 601 5346
FAX # 408 720-9809

Declaration of Conformance

Compiler Implementor: MIPS Computer Systems
Ada Validation Facility: ASD/SCEL, Wright-Patterson AFB OH 45433-6503
Ada Compiler Validation Capability (ACVC) Version: 1.10

Base Configuration

Base Compiler name: MIPS ASAPP Version: 2.10
Host Architecture ISA: MIPS M/120 OS&VER: RISC/os 4.0
Target Architecture ISA: R3200-6 CPU board; No OS.

Derived Compiler Registration

Base Compiler name: MIPS ASAPP Version: 2.10
Host Architecture ISA: MIPS M/500, M/800, M/1000, M/2000, RC2030, RS2030
OS&VER: RISC/os 4.0
Target Architecture ISA: R3200-8, R2600(2601), R2800(2801) CPU boards.
No OS.

All possible combinations of the above hosts and targets are considered to be equivalent configurations.

Implementor's Declaration

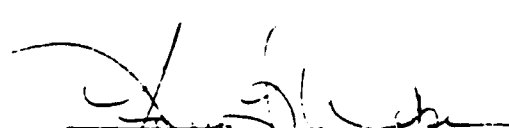
I, the undersigned, representing MIPS Computer Systems, have implemented no deliberate extensions to the Ada Language Standard ANSI/MIL-STD-1815A in the compiler(s) listed in this declaration. I declare that MIPS Computer Systems is the owner of record of the Ada compiler(s) in conformance to ANSI/MIL-STD-1815A.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


MIPS Computer Systems
Larry Weber, Vice President

Date: 4/16/1991

Owner's Declaration

I, the undersigned, representing MIPS Computer Systems, take full responsibility for implementation and maintenance for 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.


MIPS Computer Systems
Larry Weber, Vice President

Date: 4/16/1991

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 MIPS ASAPP, Version 2.10, as described in this Appendix, are provided by MIPS Computer Systems. 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 SHORT_INTEGER is range -32768 .. 32767;

type TINY_INTEGER is range -128 .. 127;

type FLOAT is digits 6 range -3.40282E+38 .. 3.40282E+38;

type LONG_FLOAT is digits 15

range -8.988465674312E+307 .. 8.988465674312E+308;

type DURATION is delta 1.00000E-03 range -2147483.648 .. -2147483.647;

...

end STANDARD;

ATTACHMENT I

APPENDIX F. Implementation-Dependent Characteristics

1. Implementation-Dependent Pragmas

1.1. **INLINE_ONLY** Pragma

The **INLINE_ONLY** pragma, when used in the same way as pragma **INLINE**, indicates to the compiler that the subprogram must *always* be inlined. This pragma also suppresses the generation of a callable version of the routine which save code space.

1.2. **BUILT_IN** Pragma

The **BUILT_IN** pragma is used in the implementation of some predefined Ada packages, but provides no user access. It is used only to implement code bodies for which no actual Ada body can be provided.

1.3. **SHARE_CODE** Pragma

The **SHARE_CODE** pragma takes the name of a generic instantiation or a generic unit as the first argument and one of the identifiers **TRUE** or **FALSE** as the second argument. This pragma is only allowed immediately at the place of a declarative item in a declarative part or package specification, or after a library unit in a compilation, but before any subsequent compilation unit.

When the first argument is a generic unit the pragma applies to all instantiations of that generic. When the first argument is the name of a generic instantiation the pragma applies only to the specified instantiation, or overloaded instantiations.

If the second argument is **TRUE** the compiler will try to share code generated for a generic instantiation with code generated for other instantiations of the same generic. When the second argument is **FALSE** each instantiation will get a unique copy of the generated code. The extent to which code is shared between instantiations depends on this pragma and the kind of generic formal parameters declared for the generic unit.

The name pragma **SHARE_BODY** is also recognized by the implementation and has the same effect as **SHARE_CODE**. It is included for compatability with earlier versions of MIPS VADS.

1.4. **NO_IMAGE** Pragma

The pragma suppresses the generation of the image array used for the **IMAGE** attribute of enumeration types. This eliminates the overhead required to store the array in the executable image. A reference to **X'IMAGE** will be accepted by the compiler if the pragma **NO_IMAGE** has been given.

1.5. **EXTERNAL_NAME** Pragma

The **EXTERNAL_NAME** pragma takes the name of a subprogram or variable defined in Ada and allows the user to specify a different external name that may be used to reference the entity from other languages. The pragma is allowed at the place of a declarative item in a package specification and must apply to an object declared earlier in the same package specification.

1.6. INTERFACE_OBJECT Pragma

The INTERFACE_OBJECT pragma takes the name of a variable defined in another language and allows it to be referenced directly in Ada. The pragma will replace all occurrences of the variable name with an external reference to the second, link_argument. The pragma is allowed at the place of a declarative item in a package specification and must apply to an object declared earlier in the same package specification. The object must be declared as a scalar or an access type. The object *cannot* be any of the following:

- a loop variable,
- a constant,
- an initialized variable,
- an array, or
- a record.

1.7. IMPLICIT_CODE Pragma

Takes one of the identifiers ON or OFF as the single argument. This pragma is only allowed within a machine code procedure. It specifies that implicit code generated by the compiler be allowed or disallowed. A warning is issued if OFF is used and any implicit code needs to be generated. The default is ON.

2. Implementation of Predefined Pragmas

2.1. CONTROLLED

This pragma is recognized by the implementation but has no effect.

2.2. ELABORATE

This pragma is implemented as described in Appendix B of the Ada RM.

2.3. INLINE

This pragma is implemented as described in Appendix B of the Ada RM.

2.4. INTERFACE

This pragma supports calls to 'C' and FORTRAN functions. The Ada subprograms can be either functions or procedures. The types of parameters and the result type for functions must be scalar, access or the predefined type ADDRESS in SYSTEM. All parameters must have mode IN. Record and array objects can be passed by reference using the ADDRESS attribute.

2.5. LIST

This pragma is implemented as described in Appendix B of the Ada RM.

2.6. MEMORY_SIZE

This pragma is recognized by the implementation. The implementation does not allow SYSTEM to be modified by means of pragmas, the SYSTEM package must be recompiled.

2.7. NOT_ELABORATED

This pragma can only appear in a library package specification. It indicates that the package will not be elaborated because it is either part of the RTS, a configuration package or an Ada package that is referenced from a language other than Ada. The presence of this pragma suppresses the generation of elaboration code and issues warnings if elaboration code is required.

2.8. OPTIMIZE

This pragma is recognized by the implementation but has no effect.

2.9. PACK

This pragma will cause the compiler to choose a non-aligned representation for composite types. It will not causes objects to be packed at the bit level.

2.10. PAGE

This pragma is implemented as described in Appendix B of the Ada RM.

2.11. PRIORITY

This pragma is implemented as described in Appendix B of the Ada RM.

2.12. SHARED

This pragma is recognized by the implementation but has no effect.

2.13. STORAGE_UNIT

This pragma is recognized by the implementation. The implementation does not allow SYSTEM to be modified by means of pragmas, the SYSTEM package must be recompiled.

2.14. SUPPRESS

This pragma is implemented as described, except that RANGE_CHECK and DIVISION_CHECK cannot be suppressed.

2.15. SYSTEM_NAME

This pragma is recognized by the implementation. The implementation does not allow SYSTEM to be modified by means of pragmas, the SYSTEM package must be recompiled.

3. Implementation-Dependent Attributes

3.1. P'REF

This attribute can be used to convert an integer to an address.

4. Specification Of Package SYSTEM

```
package SYSTEM
is
    type NAME is ( MIPS_CROSS_R2000 );

    SYSTEM_NAME      : constant NAME := MIPS_CROSS_R2000;

    STORAGE_UNIT      : constant := 8;
    MEMORY_SIZE       : constant := 16_777_216;

    -- System-Dependent Named Numbers

    MIN_INT           : constant := -2_147_483_648;
    MAX_INT           : constant := 2_147_483_647;
    MAX_DIGITS        : constant := 15;
    MAX_MANTISSA       : constant := 31;
    FINE_DELTA        : constant := 2.0**(-31);
    TICK              : constant := 0.01;

    -- Other System-dependent Declarations

    subtype PRIORITY is INTEGER range 0 .. 99;

    MAX_REC_SIZE : integer := 1024;

    type ADDRESS is private;

    NO_ADDR : constant ADDRESS;

    function PHYSICAL_ADDRESS(I: INTEGER) return ADDRESS;
    function ADDR_GT(A, B: ADDRESS) return BOOLEAN;
    function ADDR_LT(A, B: ADDRESS) return BOOLEAN;
    function ADDR_GE(A, B: ADDRESS) return BOOLEAN;
    function ADDR_LE(A, B: ADDRESS) return BOOLEAN;
    function ADDR_DIFF(A, B: ADDRESS) return INTEGER;
    function INCR_ADDR(A: ADDRESS; INCR: INTEGER) return ADDRESS;
    function DECR_ADDR(A: ADDRESS; DECR: INTEGER) return ADDRESS;

    function ">"(A, B: ADDRESS) return BOOLEAN renames ADDR_GT;
    function "<"(A, B: ADDRESS) return BOOLEAN renames ADDR_LT;
    function ">="(A, B: ADDRESS) return BOOLEAN renames ADDR_GE;
    function "<="(A, B: ADDRESS) return BOOLEAN renames ADDR_LE;
    function "-"(A, B: ADDRESS) return INTEGER renames ADDR_DIFF;
    function "+"(A: ADDRESS; INCR: INTEGER) return ADDRESS renames INCR_ADDR;
    function "-"(A: ADDRESS; DECR: INTEGER) return ADDRESS renames DECR_ADDR;

    pragma inline(ADDR_GT);
    pragma inline(ADDR_LT);
    pragma inline(ADDR_GE);
    pragma inline(ADDR_LE);
    pragma inline(ADDR_DIFF);
    pragma inline(INCR_ADDR);
    pragma inline(DECR_ADDR);
    pragma inline(PHYSICAL_ADDRESS);

private
    type ADDRESS is new integer;

    NO_ADDR : constant ADDRESS := 0;

end SYSTEM;
```

5. Restrictions On Representation Clauses

5.1. Pragma PACK

In the absence of pragma PACK record components are padded so as to provide for efficient access by the target hardware, pragma PACK applied to a record eliminate the padding where possible. Pragma PACK has no other effect on the storage allocated for record components a record representation is required.

5.2. Record Representation Clauses

For scalar types a representation clause will pack to the number of bits required to represent the range of the subtype. A record representation applied to a composite type will not cause the object to be packed to fit in the space required. An explicit representation clause must be given for the component type. An error will be issued if there is insufficient space allocated.

5.3. Address Clauses

Address clauses are supported for variables and constants that have no initial values in their declaration.

5.4. Interrupts

Interrupt entries are supported through signals.

5.5. Representation Attributes

The ADDRESS attribute is supported for the following entities, but a meaningless value is returned.

- Packages
- Tasks
- Labels
- Entries

6. Conventions for Implementation-generated Names

There are no implementation-generated names.

7. Interpretation of Expressions in Address Clauses

Address clauses are supported for constants and variables.

8. Restrictions on Unchecked Conversions

None.

9. Restrictions on Unchecked Deallocations

None.

10. Implementation Characteristics of I/O Packages

Instantiations of `DIRECT_IO` use the value `MAX_REC_SIZE` as the record size (expressed in `STORAGE_UNITS`) when the size of `ELEMENT_TYPE` exceeds that value. For example for unconstrained arrays such as string where `ELEMENT_TYPE'SIZE` is very large, `MAX_REC_SIZE` is used instead. `MAX_RECORD_SIZE` is defined in `SYSTEM` and can be changed by a program before instantiating `DIRECT_IO` to provide an upper limit on the record size. In any case the maximum size supported is $1024 \times 1024 \times \text{STORAGE_UNIT}$ bits. `DIRECT_IO` will raise `USE_ERROR` if `MAX_REC_SIZE` exceeds this absolute limit.

Instantiations of `SEQUENTIAL_IO` use the value `MAX_REC_SIZE` as the record size (expressed in `STORAGE_UNITS`) when the size of `ELEMENT_TYPE` exceeds that value. For example for unconstrained arrays such as string where `ELEMENT_TYPE'SIZE` is very large, `MAX_REC_SIZE` is used instead. `MAX_RECORD_SIZE` is defined in `SYSTEM` and can be changed by a program before instantiating `INTEGER_IO` to provide an upper limit on the record size. `SEQUENTIAL_IO` imposes no limit on `MAX_REC_SIZE`.

11. Implementation Limits

The following limits are actually enforced by the implementation. It is not intended to imply that resources up to or even near these limits are available to every program.

11.1. Line Length

The implementation supports a maximum line length of 500 characters including the end of line character.

11.2. Record and Array Sizes

The maximum size of a statically sized array type is $24,000,000 \times \text{STORAGE_UNITS}$. The maximum size of a statically sized record type is $24,000,000 \times \text{STORAGE_UNITS}$. A record type or array type declaration that exceeds these limits will generate a warning message.

11.3. Default Stack Size for Tasks

In the absence of an explicit `STORAGE_SIZE` length specification every task except the main program is allocated a fixed size stack of 10,240 `STORAGE_UNITS`. This is the value returned by `T'STORAGE_SIZE` for a task type `T`.

11.4. Default Collection Size

In the absence of an explicit `STORAGE_SIZE` length attribute the default collection size for an access type is 100 times the size of the designated type. This is the value returned by

T*STORAGE_SIZE for an access type T.

11.5. Limit on Declared Objects

There is an absolute limit of 6,000,000 x STORAGE_UNITS for objects declared statically within a compilation unit. If this value is exceeded the compiler will terminate the compilation of the unit with a FATAL error message.

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.	32
\$BIG_ID1 An identifier the size of the maximum input line length which is identical to \$BIG_ID2 except for the last character.	(1..498 => 'A', 499=> '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..498 => 'A', 499=> '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..249 => 'A', 250=> '3', 251..499 => '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..249 => 'A', 250=> '4', 251..499 => '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..496 => '0', 497..499 => "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..493 => '0', 494..499 => "69.0E1")
\$BIG_STRING1 A string literal which when catenated with BIG_STRING2 yields the image of BIG_ID1.	(1 => '"', 2..251 => 'A', 252 => '"')
\$BIG_STRING2 A string literal which when catenated to the end of BIG_STRING1 yields the image of BIG_ID1.	(1 => '"', 2..249 => 'A', 250 => '1', 251 => '"')
\$BLANKS A sequence of blanks twenty characters less than the size of the maximum line length.	(1..479 => ' ')
\$COUNT_LAST A universal integer literal whose value is TEXT_IO.COUNT'LAST.	2147483647
\$DEFAULT_MEM_SIZE An integer literal whose value is SYSTEM.MEMORY_SIZE.	16777216
\$DEFAULT_STOR_UNIT An integer literal whose value is SYSTEM.STORAGE_UNIT.	8

TEST PARAMETERS

Name and Meaning	Value
\$DEFAULT_SYS_NAME The value of the constant SYSTEM.SYSTEM_NAME.	MIPS_CROSS_R2000
\$DELTA_DOC A real literal whose value is SYSTEM.FINE_DELTA.	0.0000000004656612873077392578125
\$FIELD_LAST A universal integer literal whose value is TEXT_IO.FIELD'LAST.	2147483647
\$FIXED_NAME The name of a predefined fixed-point type other than DURATION.	NO_SUCH_FIXED_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.	100000.0
\$GREATER_THAN_DURATION_BASE_LAST A universal real literal that is greater than DURATION'BASE'LAST.	10000000.0
\$HIGH_PRIORITY An integer literal whose value is the upper bound of the range for the subtype SYSTEM.PRIORITY.	99
\$ILLEGAL_EXTERNAL_FILE_NAME1 An external file name which contains invalid characters.	ILLEGAL/FILE_NAME/2{ }\$X2102C*.DAT
\$ILLEGAL_EXTERNAL_FILE_NAME2 An external file name which is too long.	ILLEGAL/FILE_NAME/CE2102C*.DAT
\$INTEGER_FIRST A universal integer literal whose value is INTEGER'FIRST.	-2147483648

TEST PARAMETERS

Name and Meaning	Value
\$INTEGER LAST A universal integer literal whose value is INTEGER'LAST.	2147483647
\$INTEGER LAST PLUS 1 A universal integer literal whose value is INTEGER'LAST + 1.	2147483648
\$LESS THAN DURATION A universal real literal that lies between DURATION'BASE'FIRST and DURATION'FIRST or any value in the range of DURATION.	-100000.0
\$LESS THAN DURATION BASE FIRST A universal real literal that is less than DURATION'BASE'FIRST.	-10000000.0
\$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.	15
\$MAX IN LEN Maximum input line length permitted by the implementation.	499
\$MAX INT A universal integer literal whose value is SYSTEM.MAX_INT.	2147483647
\$MAX INT PLUS 1 A universal integer literal whose value is SYSTEM.MAX_INT+1.	2147483648
\$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..496 => '0', 497..499 => "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..495 => '0', 496..499 => "F.E:")
\$MAX_STRING_LITERAL A string literal of size MAX_IN_LEN, including the quote characters.	(1 => '"', 2..498 => 'A', 499 => '"')
\$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.	32
\$NAME A name of a predefined numeric type other than FLOAT, INTEGER, SHORT_FLOAT, SHORT_INTEGER, LONG_FLOAT, or LONG_INTEGER.	TINY_INTEGER
\$NAME_LIST A list of enumeration literals in the type SYSTEM.NAME, separated by commas.	MIPS_CROSS_R2000
\$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#FFFFFFFFD#
\$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.	16777216

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.	8
\$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.	MIPS_CROSS_R2000
\$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.	32
\$TICK A real literal whose value is SYSTEM.TICK.	0.01

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).
- g. CD2A63A..D, CD2A66A..D, CD2A73A..D, and CD2A76A..D (16 tests): These

WITHDRAWN TESTS

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.
- 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).

WITHDRAWN TESTS

- 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.

APPENDIX E

COMPILER OPTIONS AS SUPPLIED BY MIPS COMPUTER SYSTEMS

Compiler: MIPS ASAPP, Version 2.10

ACVC Version: 1.10

NAME

`ada` - Ada compiler

SYNTAX

`ada` [*options*] [*ada_source.a*]... [*linker_options*] [*object_file.o*]...

DESCRIPTION

The command `ada` executes the Ada compiler and compiles the named Ada source file, ending with the `.a` suffix. The file must reside in a VADS library directory. The `ada.lib` file in this directory is modified after each Ada unit is compiled.

The object for each compiled Ada unit is left in a file with the same name as that of the source with `.01`, `.02`, etc. substituted for `.a`. The `-o` option can be used to produce an executable with a name other than `a.out`, the default. For cross compilers, the default name is `a.vox`.

By default, `ada` produces only object and net files. If the `-M` option is used, the compiler automatically invokes `a.ld` and builds a complete program with the named library unit as the main program.

Non-Ada object files (`.o` files produced by a compiler for another language) may be given as arguments to `ada`. These files will be passed on to the linker and will be linked with the specified Ada object files.

Command line options may be specified in any order, but the order of compilation and the order of the files to be passed to the linker can be significant.

Several VADS compilers may be simultaneously available on a single system. Because the `ada` command in any `VADS_location/bin` on a system will execute the correct compiler components based upon visible library directives, the option `-sh` is provided to print the name of the components actually executed.

Program listings with a disassembly of machine instructions are generated by `a.db` or `a.das`.

OPTIONS

- `-a file_name` (archive) treat *file_name* as an *ar* file. Since archive files end with `.a`, `-a` is used to distinguish archive files from Ada source files.
- `-d` (dependencies) analyze for dependencies only. Do not do semantic analysis or code generation. Update the library, marking any defined units as uncompiled. The `-d` option is used by `a.make` to establish dependencies among new files.
- `-e` (error) process compilation error messages using `a.error` and direct it to `stdout`.- only the source lines containing errors are listed. Only one `-e` or `-E` option should be used.
- `-E`
- `-E file`
- `-E directory` (error output) without a file or directory argument, `ada` processes error messages using `a.error` and directs the output to `stdout`; the raw error messages are left in `ada_source.err`. If a file pathname is given, the raw error messages are placed in that file. If a directory argument is supplied, the raw error output is placed in `dir/source.err`. Only one `-e` or `-E` option should be used.
- `-el` (error listing) intersperse error messages among source lines and direct to `stdout`.
- `-El`

- E1 *file*
- E1 *directory* (error listing) same as the -E option, except that source listing with errors is produced.
- ev (error vi) process syntax error messages using **a.error**, embed them in the source file, and call the environment editor **ERROR_EDITOR**. (If **ERROR_EDITOR** is defined, the environment variable **ERROR_PATTERN** should also be defined. **ERROR_PATTERN** is an editor search command that locates the first occurrence of '###' in the error file.) If no editor is specified, call vi.
- g0 Have the compiler produce additional symbol table information for accurate but limited symbolic debugging of partially optimized code.
- g "or" -g2 Have the compiler produce additional symbol table information for full symbolic debugging and not do optimizations that limit full symbolic debugging. -g2 is the default.
- g3 Have the compiler produce additional symbol table information for full symbolic debugging for fully optimized code. This option makes the debugger inaccurate.
- l *file_abbreviation* (link) Link this library file. (Do not space between the -l and the file abbreviation.) See also

Operating system documentation, ld(1).
- M *unit_name* (main) produce an executable program using the named unit as the main program. The unit must be either a parameterless procedure or a parameterless function returning an integer. The executable program will be left in the file *a.out* unless overridden with the -o option.
- M *ada_source.a* (main) like -M *unit_name*, except that the unit name is assumed to be the root name of the *.a* file (for *foo.a* the unit is *foo*). Only one *.a* file may be preceded by -M.
- o *executable_file* (output) this option is to be used in conjunction with the -M option. *executable_file* is the name of the executable rather than the default *a.out*.
- O0 Turn off all optimizations.
- O1 Turn on all MIPS optimizations that can be done quickly and do one pass using the Verdex optimizer. This is the default.
- O2 Invoke the MIPS global ucode optimizer and optimize as far as possible using the Verdex optimizer. (MIPS global ucode optimizer not supported in this release.) -O is the same as -O2.
- R *VADS_library* (recompile instantiation) force analysis of all generic instantiations, causing reinstantiation of any that are out of date.
- S (suppress) apply **pragma SUPPRESS** to the entire compilation for all suppressible checks.
- T (timing) print timing information for the compilation.
- v (verbose) print compiler version number, date and time of compilation, name of file compiled, command input line, total compilation time, and error summary line.
- w (warnings) suppress warning diagnostics.

-G *Num* Specify the maximum size, in bytes, of a data item that is to be accessed from the global pointer. *Num* is assumed to be a decimal number. If *Num* is zero, no data is accessed from the global pointer. The default value for *Num* is 8 bytes.

-W *c arg1,[arg2....]* Pass the argument[s] *argi* to a compiler pass, where *c* is one of the characters in the next table that designates the pass.

Pass	Character
include	h
backend	D
driver	
ucgen	G
ujoin	j
uld	u
usplit	s
umesrge	m
uopt	o
ugen	c
asl	b

SEE ALSO

[VADS Reference] *a.db*, *a.error*, *a.ld*, *a.mklib*, *a.das* and Operating system documentation, *ld(1)*

DIAGNOSTICS

The diagnostics produced by the VADS compiler are intended to be self-explanatory. Most refer to the RM. Each RM reference includes a section number and optionally, a paragraph number enclosed in parentheses.