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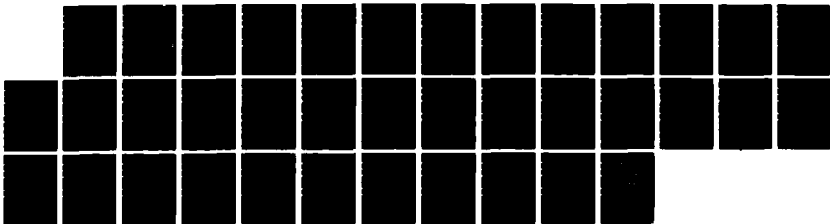
ADA (TRADE NAME) COMPILER VALIDATION SUMMARY REPORT:
VERDIX CORPORATION V (U) ADA JOINT PROGRAM OFFICE
ARLINGTON VA 19 JUN 87

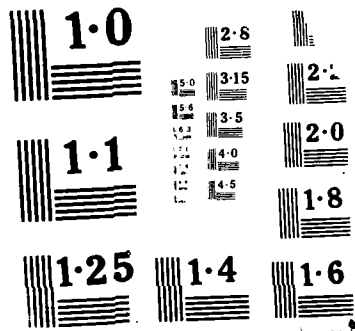
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AVF Control Number: AVF-VSR-102.1087
87-04-09-VRX

AD-A193 226

Ada[®] COMPILER
VALIDATION SUMMARY REPORT:
Verdix Corporation
VAda-010-03315, Version 5.5
MicroVAX II host
iSBC 386/20P Intel target

Completion of On-Site Testing:
19 June 1987

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

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SELECTED
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Prepared For:
Ada Joint Program Office
United States Department of Defense
Washington, D.C.

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| 1. REPORT NUMBER | 2. GOVT ACCESSION NO. | 3. RECIPIENT'S CATALOG NUMBER |
| 4. TITLE (and Subtitle) Ada Compiler Validation Summary Report: Verdix Corp. VAda-010-03315, Ver.5.5 MicroVAX II host iSBC 386/20P Intel target | | 5. TYPE OF REPORT & PERIOD COVERED 19 June '87 to 19 June '88 |
| | | 6. PERFORMING ORG. REPORT NUMBER |
| 7. AUTHOR(s) Wright-Patterson AFB OH 45433-6503 | | 8. CONTRACT OR GRANT NUMBER(s) |
| 9. PERFORMING ORGANIZATION AND ADDRESS Wright-Patterson AFB OH 45433-6503 | | 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS |
| 11. CONTROLLING OFFICE NAME AND ADDRESS Ada Joint Program Office United States Department of Defense Washington, DC 20301-3081ASD/SIOL | | 12. REPORT DATE 19 June '87 |
| | | 13. NUMBER OF PAGES 35 p. |
| 14. MONITORING AGENCY NAME & ADDRESS (If different from Controlling Office) Wright-Patterson AFB OH 45433-6503. | | 15. SECURITY CLASS (of this report) UNCLASSIFIED |
| | | 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A |
| 16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited. | | |
| 17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20. If different from Report) UNCLASSIFIED | | |
| 18. SUPPLEMENTARY NOTES | | |
| 19. KEYWORDS (Continue on reverse side if necessary and identify by block number) Ada Programming language, Ada Compiler Validation Summary Report, Ada Compiler Validation Capability, ACVC, Validation Testing, Ada Validation Office, AVO, Ada Validation Facility, AVF, ANSI/MIL-STD-1815A, Ada Joint Program Office, AJPO | | |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) See Attached. | | |

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Ada® Compiler Validation Summary Report:

Compiler Name: VAda-010-03315, Version 5.5

Host: MicroVAX II under MicroVMS, Version 4.4
Target: iSBC 386/20P Intel (bare machine) using file-server support from the host

Testing Completed 19 June 1987 Using ACVC 1.8

This report has been reviewed and is approved.

Steven P. Wilson
Ada Validation Facility
Steven P. Wilson
ASD/SCOL
Wright-Patterson AFB OH 45433-6503

John F. Kramer
Ada Validation Organization
Dr. John F. Kramer
Institute for Defense Analyses
Alexandria VA

Virginia L. Castor
Ada Joint Program Office
Virginia L. Castor
Director
Department of Defense
Washington DC



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EXECUTIVE SUMMARY

This Validation Summary Report (VSR) summarizes the results and conclusions of validation testing performed on the VAda-010-03315, Version 5.5, using Version 1.8 of the Ada[®] Compiler Validation Capability (ACVC). The VAda-010-03315 is hosted on a MicroVAX II operating under MicroVMS, Version 4.4. Programs processed by this compiler may be executed on an iSBC 386/20P Intel, having no operating system.

On-site testing was performed 12 June 1987 through 19 June 1987 at Verdix Corporation Western Operations, Aloha OR, under the direction of the Ada Validation Facility (AVF), according to Ada Validation Organization (AVO) policies and procedures. The AVF identified 2210 of the 2399 tests in ACVC Version 1.8 to be processed during on-site testing of the compiler. The 19 tests withdrawn at the time of validation testing, as well as the 170 executable tests that make use of floating-point precision exceeding that supported by the implementation, were not processed. After the 2210 tests were processed, results for Class A, C, D, and E tests were examined for correct execution. Compilation listings for Class B tests were analyzed for correct diagnosis of syntax and semantic errors. Compilation and link results of Class L tests were analyzed for correct detection of errors. There were nineteen of the processed tests determined to be inapplicable. The remaining 2191 tests were passed.

The results of validation are summarized in the following table:

| RESULT | CHAPTER | | | | | | | | | | | | | TOTAL |
|--------------|---------|-----|-----|-----|-----|----|-----|-----|-----|----|-----|-----|------|-------|
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | | |
| Passed | 102 | 252 | 334 | 244 | 161 | 97 | 139 | 261 | 130 | 32 | 218 | 221 | 2191 | |
| Failed | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Inapplicable | 14 | 73 | 86 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 12 | 189 | |
| Withdrawn | 0 | 5 | 5 | 0 | 0 | 1 | 1 | 2 | 4 | 0 | 1 | 0 | 19 | |
| TOTAL | 116 | 330 | 425 | 247 | 161 | 98 | 140 | 264 | 134 | 32 | 219 | 233 | 2399 | |

The AVF concludes that these results demonstrate acceptable conformity to ANSI/MIL-STD-1815A Ada.

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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 characteristics of particular operating systems, hardware, or implementation strategies. All of 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 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 unsupported language constructs 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 policies and procedures established by the Ada Validation Organization (AVO). On-site testing was conducted from 12 June 1987 through 19 June 1987 at Verdix Corporation Western Operations, Alpha OR.

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
ASD/SCOL
Wright-Patterson AFB OH 45433-6503

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

REFERENCES

1. Reference Manual for the Ada Programming Language, ANSI/MIL-STD-1815A, February 1983.
2. Ada Validation Organization: Procedures and Guidelines, Ada Joint Program Office, 1 January 1987.
3. Ada Compiler Validation Capability Implementers' Guide, SofTech, Inc., December 1984.

1.4 DEFINITION OF TERMS

| | |
|--------------|--|
| AVC | The Ada Compiler Validation Capability. A set of programs that evaluates the conformity of a compiler to the Ada language specification, ANSI/MIL-STD-1815A. |
| Ada Standard | ANSI/MIL-STD-1815A, February 1983. |
| Applicant | The agency requesting validation. |
| AVF | The Ada Validation Facility. In the context of this report, the AVF is responsible for conducting compiler validations according to established policies and procedures. |
| AVO | The Ada Validation Organization. In the context of this report, the AVO is responsible for setting procedures for compiler validations. |
| 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. |
| Failed test | A test for which the compiler generates a result that demonstrates nonconformity to the Ada Standard. |
| Host | The computer on which the compiler resides. |

INTRODUCTION

| | |
|-------------------|--|
| Inapplicable test | A 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 | A 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 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 | A test found to be incorrect and not used to check conformity to the Ada language specification. 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. |

THE 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 link errors.

Class A tests check that legal Ada programs can be successfully compiled and executed. However, no checks are performed during execution to see if the test objective has been met. 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 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

INTRODUCTION

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.

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.

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 these units 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 the tests in the ACVC follow 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 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.

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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 validation are given in Appendix D.

CHAPTER 2
CONFIGURATION INFORMATION

CONFIGURATION TESTED

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

Compiler: VAda-010-03315, Version 5.5

ACVC Version: 1.8

Certificate Number: 870615W1.08087

Host Computer:

Machine: MicroVAX II
Operating System: MicroVMS, Version 4.4
Memory Size: 11 megabytes

Target Computer:

Machine: iSBC 386/20P Intel using
file-server support from the host
Operating System: None
Memory Size: 2 megabytes

Communications Network: Ethernet

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. This compiler is characterized by the following interpretations of the Ada Standard:

. Capacities.

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

. Universal integer calculations.

An implementation is allowed to reject universal integer calculations having values that exceed `SYSTEM.MAX_INT`. This implementation does not reject such calculations and processes them correctly. (See tests D4A002A, D4A002B, D4A004A, and D4A004B.)

. Predefined types.

This implementation supports the additional predefined types `SHORT_INTEGER`, `SHORT_FLOAT`, and `TINY_INTEGER` in the package `STANDARD`. (See tests B86001C and B86001D.)

. Based literals.

An implementation is allowed to reject a based literal with a value exceeding `SYSTEM.MAX_INT` during compilation, or it may raise `NUMERIC_ERROR` or `CONSTRAINT_ERROR` during execution. This implementation raises `NUMERIC_ERROR` during execution. (See test E24101A.)

. 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`.

CONFIGURATION INFORMATION

A packed BOOLEAN array having a 'LENGTH exceeding INTEGER'LAST raises NUMERIC_ERROR when the array type is declared. (See test C52103X.)

A packed two-dimensional BOOLEAN array with more than INTEGER'LAST components raises NUMERIC_ERROR when the array subtype is declared. (See test C52104Y.)

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.)

In assigning one-dimensional array types, the expression appears to be evaluated in its entirety before CONSTRAINT_ERROR is raised when checking whether the expression's subtype is compatible with the target's subtype. In assigning two-dimensional array types, the expression does not appear to be 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.)

. Discriminated types.

During compilation, an implementation is allowed to either accept or reject an incomplete type with discriminants that is used in an access type definition with a compatible discriminant constraint. This implementation accepts such subtype indications. (See test E38104A.)

In assigning record types with discriminants, the expression appears to be 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.)

. Aggregates.

In the evaluation of a multi-dimensional aggregate, all choices appear to be evaluated before checking against the index type. (See tests C43207A and C43207B.)

In the evaluation of an aggregate containing subaggregates, all choices are evaluated before being checked for identical bounds. (See test E43212B.)

All choices are evaluated before CONSTRAINT_ERROR is raised if a bound in a nonnull range of a nonnull aggregate does not belong to an index subtype. (See test E43211B.)

CONFIGURATION INFORMATION

. Functions.

An implementation may allow the declaration of a parameterless function and an enumeration literal having the same profile in the same immediate scope, or it may reject the function declaration. If it accepts the function declaration, the use of the enumeration literal's identifier denotes the function. This implementation rejects the declaration. (See test E66001D.)

. Representation clauses.

The Ada Standard does not require an implementation to support representation clauses. If a representation clause is not supported, then the implementation must reject it. While the operation of representation clauses is not checked by Version 1.8 of the ACVC, they are used in testing other language features. This implementation accepts 'SIZE and 'STORAGE_SIZE for tasks, 'STORAGE_SIZE for collections, and 'SMALL clauses. Enumeration representation clauses, including those that specify noncontiguous values, appear to be supported. (See tests C55B16A, C87B62A, C87B62B, C87B62C, and BC1002A.)

. Pragmas.

The pragma INLINE is supported for procedures. The pragma INLINE is supported for functions. (See tests CA3004E and CA3004F.)

. Input/output.

The package SEQUENTIAL_IO can be instantiated with unconstrained array types and record types with discriminants. The package DIRECT_IO can be instantiated with unconstrained array types and record types with discriminants without defaults. (See tests AE2101C, AE2101H, CE2201D, CE2201E, and CE2401D.)

An existing text file can be opened in OUT_FILE mode, can be created in OUT_FILE mode, and can be created in IN_FILE mode. (See test EE3102C.)

More than one internal file can be associated with each external file for text I/O for reading only. (See tests CE3111A..E (5 tests).)

More than one internal file can be associated with each external file for sequential I/O for reading only. (See tests CE2107A..F (6 tests).)

More than one internal file can be associated with each external file for direct I/O for reading only. (See tests CE2107A..F (6 tests).)

CONFIGURATION INFORMATION

Temporary sequential files are given a name. Temporary direct files are given a name. Temporary files given names are deleted when they are closed. (See tests CE2108A and CE2108C.)

. Generics.

Generic subprogram declarations and bodies can be compiled in separate compilations. (See test CA2009F.)

Generic package declarations and bodies can be compiled in separate compilations. (See tests CA2009C and BC3205D.)

CHAPTER 3
TEST INFORMATION

3.1 TEST RESULTS

Version 1.8 of the ACVC contains 2399 tests. When validation testing of VAda-010-03315 was performed, 19 tests had been withdrawn. The remaining 2380 tests were potentially applicable to this validation. The AVF determined that 189 tests were inapplicable to this implementation, and that the 2191 applicable tests were passed by the implementation.

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 | 69 | 865 | 1181 | 17 | 13 | 46 | 2191 |
| Failed | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Inapplicable | 0 | 2 | 187 | 0 | 0 | 0 | 189 |
| Withdrawn | 0 | 7 | 12 | 0 | 0 | 0 | 19 |
| TOTAL | 69 | 874 | 1380 | 17 | 13 | 46 | 2399 |

TEST INFORMATION

3.3 SUMMARY OF TEST RESULTS BY CHAPTER

| RESULT | CHAPTER | | | | | | | | | | | | | TOTAL |
|--------------|---------|-----|-----|-----|-----|----|-----|-----|-----|----|-----|-----|------|-------|
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | | |
| Passed | 102 | 252 | 334 | 244 | 161 | 97 | 139 | 261 | 130 | 32 | 218 | 221 | 2191 | |
| Failed | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Inapplicable | 14 | 73 | 86 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 12 | 189 | |
| Withdrawn | 0 | 5 | 5 | 0 | 0 | 1 | 1 | 2 | 4 | 0 | 1 | 0 | 19 | |
| TOTAL | 116 | 330 | 425 | 247 | 161 | 98 | 140 | 264 | 134 | 32 | 219 | 233 | 2399 | |

3.4 WITHDRAWN TESTS

The following 19 tests were withdrawn from ACVC Version 1.8 at the time of this validation:

| | | |
|---------|---------|----------------------|
| C32114A | C41404A | B74101B |
| B33203C | B45116A | C87B50A |
| C34018A | C48008A | C92005A |
| C35904A | B49006A | C940ACA |
| B37401A | B4A010C | CA3005A..D (4 tests) |
| | | BC3204C |

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 is not necessarily inapplicable for a subsequent attempt. For this validation attempt, 189 tests were inapplicable for the reasons indicated:

- . C34001E, B52004D, B55B09C, and C55B07A use LONG_INTEGER which is not supported by this compiler.
- . C34001G and C35702B use LONG_FLOAT which is not supported by this compiler.

TEST INFORMATION

- C96005B checks implementations for which the smallest and largest values in type DURATION are different from the smallest and largest values in DURATION's base type. This is not the case for this implementation.
- CE2107B..E (4 tests), CE2110B, CE2111D, CE2111H, CE3111B..E (4 tests), and CE3114B are inapplicable because the same file cannot be shared for reading and writing. The proper exception is raised when multiple access is attempted.
- The following 170 tests require a floating-point accuracy that exceeds the maximum of 15 supported by the implementation:

| | |
|-----------------------|-----------------------|
| C24113L..Y (14 tests) | C35705L..Y (14 tests) |
| C35706L..Y (14 tests) | C35707L..Y (14 tests) |
| C35708L..Y (14 tests) | C35802L..Y (14 tests) |
| C45241L..Y (14 tests) | C45321L..Y (14 tests) |
| C45421L..Y (14 tests) | C45424L..Y (14 tests) |
| C45521L..Z (15 tests) | C45621L..Z (15 tests) |

3.6 SPLIT TESTS

If one or more errors do not appear to have been detected in a Class B test because of compiler error recovery, then the test is split into a set of smaller tests that contain the undetected errors. These splits are then compiled and examined. The splitting process continues until all errors are detected by the compiler or until there is exactly one error per split. Any Class A, Class C, or Class E test that cannot be compiled and executed because of its size is split into a set of smaller subtests that can be processed.

Splits were required for 19 Class B tests:

| | | |
|---------|---------|---------|
| B24204A | B37201A | B67001B |
| B24204B | B38008A | B67001C |
| B24204C | B41202A | B67001D |
| B2A003A | B44001A | B91003B |
| B2A003B | B64001A | B95001A |
| B2A003C | B67001A | B97102A |
| B33301A | | |

3.7 ADDITIONAL TESTING INFORMATION

TEST INFORMATION

3.7.1 Prevalidation

Prior to validation, a set of test results for ACVC Version 1.8, produced by the VAda-010-03315, was submitted to the AVF by the applicant for review. Analysis of these results demonstrated that the compiler successfully passed all applicable tests, and that the compiler exhibited the expected behavior on all inapplicable tests.

3.7.2 Test Method

Testing of the VAda-010-03315 using ACVC Version 1.8 was conducted on-site by the validation team from the AVF. The configuration consisted of a MicroVAX II host operating under MicroVMS, Version 4.4, and an iSBC 386/20P Intel target with no operating system. The host and target computers were linked via Ethernet.

A 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 tape. Tests requiring splits during the prevalidation testing were included in their split form on the tape.

The contents of the magnetic tape were loaded onto a Sun 3 computer. After modifying the test name extensions to make them compatible with the system naming conventions, the test sources were copied into the test area on the MicroVAX II machine with FTP (file transfer protocol) over a network system implementing standard IP on Ethernet.

After the test files were loaded to disk, the full set of tests was compiled and linked on the MicroVAX II, and all executable tests were run on the iSBC 386/20P. Results were transferred back to the MicroVAX II and routed to the network printer.

The REPORT package was modified to use SIMPLE_IO, a simplified version of TEXT_IO, for all tests except those in Chapter 14. The implementation of SIMPLE_IO uses a division of TEXT_IO developed by Verdix for previous validations performed from VMS to cross-target bare machines. In this cross-target implementation, the functions of TEXT_IO are logically and physically divided into two portions which run on both the host and the target. I/O file system requests are handled by the portion running on the host; output formatting is handled by the portion running on the target. Both portions are written in Ada. For the most part this implementation is completely transparent to the user, except that certain default file characteristics will be determined by the host operating system. A protocol has been developed to allow the target processor to make requests of the host file system by means of a daemon on the host. Any host on which the daemon is implemented can serve as the file system server for the target processor; thus this underlying implementation of TEXT_IO is independent of the host operating system.

TEST INFORMATION

Tests were compiled, linked, and executed (as appropriate) using a single host computer and a single target computer. Test output, compilation listings, and job logs were captured on tape and archived at the AVF. The listings examined on-site by the validation team were also archived.

3.7.3 Test Site

The validation was conducted at Verdex Corporation Western Operations, Aloha OR from 12 June 1987 through 19 June 1987.

APPENDIX A

COMPLIANCE STATEMENT

Verdix Corporation has submitted the following
declaration of conformance concerning the
VADA-010-03315.

DECLARATION OF CONFORMANCE

Compiler Implementor: Verdix Corporation
Ada[®] Validation Facility: ASD/SCOL, Wright-Patterson AFB, OH
Ada Compiler Validation Capability (ACVC) Version: 1.8

Base Configuration

Base Compiler Name: VAda-010-03315 Version: 5.41
Host Architecture ISA: MicroVAX II OS&VER #: MicroVMS, Version 4.4
Target Architecture ISA: iSBC 386/20P Intel using
 file-server support from the host
OS&VER #: (bare machine)

Implementor's Declaration

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

Michael Seyfrit
Verdix Corporation
Michael Seyfrit, Manager, Ada PIEM

Date: 6/15/87

Owner's Declaration

I, the undersigned, representing Verdix Corporation, take full responsibility for implementation and maintenance of the Ada compiler listed above, and agree to the public disclosure of the final Validation Summary Report. I further agree to continue to comply with the Ada trademark policy, as defined by the Ada Joint Program Office. 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.

Michael Seyfrit
Verdix Corporation
Michael Seyfrit, Manager, Ada PIEM

Date: 6/15/87

Ada is a registered trademark of the United States Government
(Ada Joint Program Office).

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 MIL-STD-1815A, and to certain allowed restrictions on representation classes. The implementation-dependent characteristics of the VAda-010-03315, Version 5.5, are described in the following sections which discuss topics in Appendix F of the Ada Language Reference Manual (ANSI/MIL-STD-1815A). Implementation-specific portions of the package STANDARD are also included in this appendix.

```
package STANDARD is
```

```
...
```

```
type INTEGER is range -2_147_483_648 .. 2_147_483_647;
```

```
type SHORT_INTEGER is range -32_768 .. 32_767;
```

```
type TINY_INTEGER is range -128 .. 127;
```

```
type FLOAT is digits 15
```

```
range -1.79769313486231E+308 .. 1.79769313486231E+308;
```

```
type SHORT_FLOAT is digits 6 range -3.4028E+38 .. 3.4028E+38;
```

```
type DURATION is delta 6.103515625E-05
```

```
range -131072.00000 .. 131071.99993;
```

```
...
```

```
end STANDARD;
```

ATTACHMENT II

APPENDIX F. Implementation-Dependent Characteristics

1. Implementation-Dependent Pragmas

1.1. SHARE_BODY Pragma

The `SHARE_BODY` 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.

1.2. 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.

1.3. INTERFACE_OBJECT Pragma

The `INTERFACE_OBJECT` pragma takes the name of a τ 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.

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. An optional third argument overrides the default link name. 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. OPTIMIZE

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

2.8. PACK

This pragma will cause the compiler to choose a non-aligned representation for composite types. Components that are smaller than a STORAGE_UNIT are packed into a number of bits that is a power of two. level.

2.9. PAGE

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

2.10. PRIORITY

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

2.11. SHARED

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

2.12. 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.

2.13. SUPPRESS

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

2.14. 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

NONE.

4. Specification Of Package SYSTEM

```
package SYSTEM
is
    type NAME is ( 1386 );
    SYSTEM_NAME          constant NAME := 1386;
    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_BITS             : constant := 15;
    MAX_MANTISSA         : constant := 31;
    MIN_FLOAT            : constant := 2.0**(-30);
    MAX_FLOAT            : constant := 0.01;

    -- System-dependent Declarations
    PRIORITY is INTEGER range 0 .. 99;
    MAX_REC_SIZE : integer := 64*1024;

    type ADDRESS is private;
    NO_ADDR : constant ADDRESS;

    function PHYSICAL_ADDRESS(I: INTEGER) return ADDRESS;
    function ADDR_OT(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_OT;
    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_OT);
    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

Array and record components that are smaller than a STORAGE_UNIT are packed into a number of bits that is a power of two. Objects and larger components are packed to the nearest whole STORAGE_UNIT.

5.2. Size Specification

The size specification T'SMALL is not supported except when the representation specification given is the same as 'SMALL for the base type.

5.3. Record Representation Clauses

Components not aligned on even STORAGE_UNIT boundaries may not span more than four STORAGE_UNITS.

5.4. Address Clauses

Address clauses are not supported.

5.5. Interrupts

Interrupts are not supported.

5.6. Representation Attributes

The ADDRESS attribute is not supported for the following entities:

- Packages
- Tasks
- Labels
- Entries

5.7. Machine Code Insertions

Machine code insertions are supported.

6. Conventions for Implementation-generated Names

There are no implementation-generated names.

7. Interpretation of Expressions in Address Clauses

Address clauses are not supported.

8. Restrictions on Unchecked Conversions

The predefined generic function UNCHECKED_CONVERSION cannot be instantiated with a target type which is an unconstrained array type or an unconstrained record type with discriminants.

9. 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 x 1024 x 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.

10. 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.

10.1. Line Length

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

10.2. Record and Array Sizes

The maximum size of a statically sized array type is $4,000,000 \times \text{STORAGE_UNITS}$. The maximum size of a statically sized record type is $4,000,000 \times \text{STORAGE_UNITS}$. A record type or array type declaration that exceeds these limits will generate a warning message.

10.3. 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 $10,240 \text{ STORAGE_UNITS}$. This is the value returned by `T'SORAGE_SIZE` for a task type T.

10.4. Default Collection Size

In the absence of an explicit `STORAGE_SIZE` length attribute the default collection size for an access type is $100,000 \text{ STORAGE_UNITS}$. This is the value returned by `T'SORAGE_SIZE` for an access type T.

10.5. Limit on Declared Objects

There is an absolute limit of $6,000,000 \times \text{STORAGE_UNITS}$ 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> |
|---|--|
| <u>\$BIG_ID1</u> Identifier the size of the maximum input line length with varying last character. | (1..498 => 'A', 499 => '1') |
| <u>\$BIG_ID2</u> Identifier the size of the maximum input line length with varying last character. | (1..498 => 'A', 499 => '2') |
| <u>\$BIG_ID3</u> Identifier the size of the maximum input line length with varying middle character. | (1..249 => 'A', 250 => '3', 251..499 => 'A') |
| <u>\$BIG_ID4</u> Identifier the size of the maximum input line length with varying middle character. | (1..249 => 'A', 250 => '4', 251..499 => 'A') |
| <u>\$BIG_INT_LIT</u> 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") |

TEST PARAMETERS

| <u>Name and Meaning</u> | <u>Value</u> |
|---|---|
| <p>\$BIG_REAL_LIT A real literal that can be either of floating- or fixed-point type, has value 690.0, and has enough leading zeroes to be the size of the maximum line length.</p> | (1..493 => '0', 494..499 => "69.0E1") |
| <p>\$BLANKS sequence of blanks (twenty characters fewer than the size of the maximum line length).</p> | (1..479 => ' ') |
| <p>\$COUNT_LAST A universal integer literal whose value is TEXT_IO.COUNT'LAST.</p> | 2_147_483_647 |
| <p>\$EXTENDED_ASCII_CHARS A string literal containing all the ASCII characters with printable graphics that are not in the basic 55 Ada character set.</p> | "abcdefghijklmnopqrstuvwxyz!\$%?@[\]^`{ }~" |
| <p>\$FIELD_LAST A universal integer literal whose value is TEXT_IO.FIELD'LAST.</p> | 2_147_483_647 |
| <p>\$FILE_NAME_WITH_BAD_CHARS An illegal external file name that either contains invalid characters, or is too long if no invalid characters exist.</p> | "/illegal/file_name/2{]}\$%2102C.DAT" |
| <p>\$FILE_NAME_WITH_WILD_CARD_CHAR An external file name that either contains a wild card character, or is too long if no wild card character exists.</p> | "/illegal/file_name/CE2102C*.DAT" |
| <p>\$GREATER_THAN_DURATION A universal real value that lies between DURATION'BASE'LAST and DURATION'LAST if any, otherwise any value in the range of DURATION.</p> | 100_000.0 |
| <p>\$GREATER_THAN_DURATION_BASE_LAST The universal real value that is greater than DURATION'BASE'LAST, if such a value exists.</p> | 10_000_000.0 |

TEST PARAMETERS

| <u>Name and Meaning</u> | <u>Value</u> |
|--|--|
| <p>\$ILLEGAL_EXTERNAL_FILE_NAME1 An illegal external file name.</p> | "/no/such/directory/ILLEGAL_EXTERNAL_FILE_NAME1" |
| <p>\$ILLEGAL_EXTERNAL_FILE_NAME2 An illegal external file name that is different from \$ILLEGAL_EXTERNAL_FILE_NAME1.</p> | "/no/such/directory/ILLEGAL_EXTERNAL_FILE_NAME2" |
| <p>\$INTEGER_FIRST The universal integer literal expression whose value is INTEGER'FIRST.</p> | -2_147_483_648 |
| <p>\$INTEGER_LAST The universal integer literal expression whose value is INTEGER'LAST.</p> | 2_147_483_647 |
| <p>\$LESS_THAN_DURATION A universal real value that lies between DURATION'BASE'FIRST and DURATION'FIRST if any, otherwise any value in the range of DURATION.</p> | -100_000.0 |
| <p>\$LESS_THAN_DURATION_BASE_FIRST The universal real value that is less than DURATION'BASE'FIRST, if such a value exists.</p> | -10_000_000.0 |
| <p>\$MAX_DIGITS The universal integer literal whose value is the maximum digits supported for floating-point types.</p> | 15 |
| <p>\$MAX_IN_LEN The universal integer literal whose value is the maximum input line length permitted by the implementation.</p> | 499 |
| <p>\$MAX_INT The universal integer literal whose value is SYSTEM.MAX_INT.</p> | 2_147_483_647 |

TEST PARAMETERS

| <u>Name and Meaning</u> | <u>Value</u> |
|--|--------------|
| <p>\$NAME A name of a predefined numeric type other than FLOAT, INTEGER, SHORT_FLOAT, SHORT_INTEGER, LONG_FLOAT, or LONG_INTEGER if one exists, otherwise any undefined name.</p> | TINY_INTEGER |
| <p>\$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.</p> | 16#FFFFFFFD# |
| <p>\$NON_ASCII_CHAR_TYPE An enumerated type definition for a character type whose literals are the identifier NON_NULL and all non-ASCII characters with printable graphics.</p> | (NON_NULL) |

APPENDIX D

WITHDRAWN TESTS

Some tests are withdrawn from the ACVC because they do not conform to the Ada Standard. The following 19 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.

- . C32114A: An unterminated string literal occurs at line 62.
- . B33203C: The reserved word "IS" is misspelled at line 45.
- . C34018A: The call of function G at line 114 is ambiguous in the presence of implicit conversions.
- . C35904A: The elaboration of subtype declarations SFX3 and SFX4 may raise NUMERIC_ERROR instead of CONSTRAINT_ERROR as expected in the test.
- . B37401A: The object declarations at lines 126 through 135 follow subprogram bodies declared in the same declarative part.
- . C41404A: The values of 'LAST and 'LENGTH are incorrect in the if statements from line 74 to the end of the test.
- . B45116A: ARRPRIBL1 and ARRPRIBL2 are initialized with a value of the wrong type--PRIBOOL_TYPE instead of ARRPRIBOOL_TYPE--at line 41.
- . C48008A: The assumption that evaluation of default initial values occurs when an exception is raised by an allocator is incorrect according to AI-00397.
- . B49006A: Object declarations at lines 41 and 50 are terminated incorrectly with colons, and end case; is missing from line 42.
- . B4A010C: The object declaration in line 18 follows a subprogram body of the same declarative part.

WITHDRAWN TESTS

- . B74101B: The begin at line 9 causes a declarative part to be treated as a sequence of statements.
- . C87B50A: The call of "/"= at line 31 requires a use clause for package A.
- . C92005A: The "/"= for type PACK.BIG_INT at line 40 is not visible without a use clause for the package PACK.
- . C940ACA: The assumption that allocated task TT1 will run prior to the main program, and thus assign SPYNUMB the value checked for by the main program, is erroneous.
- . CA3005A..D (4 tests): No valid elaboration order exists for these tests.
- . BC3204C: The body of BC3204C0 is missing.

END

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