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**4. TITLE AND SUBTITLE** Ada Compiler Validation Summary Report:
Verdix Corporation, VADS VAX/VMS = Intel 386, VMS 5.2, VAda-110-03315, Version 6.0, MicroVAX 3100 (Host) to iSBC 386/32 (Target) 900726W1.11022

**5. FUNDING NUMBERS**

**6. AUTHOR(S)**
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USA

**7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)**
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Ada Joint Program Office
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Verdix Corporation, VADS VAX/VMS = Intel 386, VMS 5.2, VAda-110-03315, Version 6.0, Wright-Patterson AFB, OH, MicroVAX 3100, VAX/VMS V5.2 (Host) to iSBC 386/32, bare machine (Target), ACVC 1.11.



**14. SUBJECT TERMS** Ada programming language, Ada Compiler Validation Summary Report, Ada Compiler Validation Capability, Validation Testing, Ada Validation Office, Ada Validation Facility, ANSI/MIL-STD-1815A, Ada Joint Program Office

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Certificate Information

The following Ada implementation was tested and determined to pass ACVC 1.11. Testing was completed on 26 July 1990.

Compiler Name and Version: VADS VAX/VMS=>Intel 386, VMS 5.2, VAda-110-03315, Version 6.0

Host Computer System: MicroVAX 3100, VAX/VMS V5.2

Target Computer System: iSBC 386/32, bare machine

Customer Agreement Number: 90-05-29-VRX

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

As a result of this validation effort, Validation Certificate 900726W1.11022 is awarded to Verdix Corporation. This certificate expires on 1 March 1993.

This report has been reviewed and is approved.

Ada Validation Facility
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Technical Director
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22 January 1991
90-05-29-VRX

Ada COMPILER
VALIDATION SUMMARY REPORT:
Certificate Number: 900726W1.11022
Verdix Corporation
VADS VAX/VMS=>Intel 386, VMS 5.2, VAda-110-03315, Version 6.0
MicroVAX 3100 => iSBC 386/32

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

DECLARATION OF CONFORMANCE

The following declaration of conformance was supplied by the customer.

DECLARATION OF CONFORMANCE

Customer: Verdix Corporation

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

ACVC Version: 1.11

Ada Implementation:

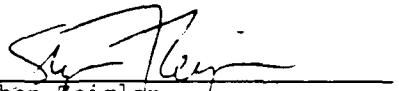
Compiler Name and Version: VADS VAX/VMS=>Intel 386, VMS 5.2, VAda-110-03315, Version 6.0

Host Computer System: MicroVAX 3100, VAX/VMS V5.2

Target Computer System: iSBC 386/32, bare machine

Customer's Declaration

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



Date: 7/26/90

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# CHAPTER 1

# INTRODUCTION

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

## 1.1 USE OF THIS VALIDATION SUMMARY REPORT

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

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

National Technical Information Service
5285 Port Royal Road
Springfield VA 22161

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

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

## 1.2 REFERENCES

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

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

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

## 1.3 ACVC TEST CLASSES

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

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

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

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

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

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

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

## 1.4 DEFINITION OF TERMS

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

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

# CHAPTER 2

# IMPLEMENTATION DEPENDENCIES

## 2.1 WITHDRAWN TESTS

The following tests have been withdrawn by the AVO. The rationale for withdrawing each test is available from either the AVO or the AVF. The publication date for this list of withdrawn tests is 18 May 1990.

| | | | | | |
|---|---|---|---|---|---|
| E28005C | B28006C | C34006D | B41308B | C43004A | C45114A |
| C45346A | C45612B | C45651A | C46022A | B49008A | A74006A |
| B83022B | B83022H | B83025B | B83025D | B83026B | C83026A |
| C83041A | C97116A | C98003B | BA2011A | CB7001A | CB7001B |
| CB7004A | CC1223A | BC1226A | CC1226B | BC3009B | AD1B08A |
| BD2A02A | CD2A21E | CD2A23E | CD2A32A | CD2A41A | CD2A41E |
| CD2A87A | CD2B15C | BD3006A | CD4022A | CD4022D | CD4024B |
| CD4024C | CD4024D | CD4031A | CD4051D | CD5111A | CD7004C |
| ED7005D | CD7005E | AD7006A | CD7006E | AD7201A | AD7201E |
| CD7204B | BD8002A | BD8004C | CD9005A | CD9005B | CDA201E |
| CE2107I | CE2119B | CE2205B | CE2405A | CE3111C | CE3118A |
| CE3411B | CE3412B | CE3812A | CE3814A | CE3902B | |

## 2.2 INAPPLICABLE TESTS

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

IMPLEMENTATION DEPENDENCIES

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

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

The following 21 tests check for the predefined type LONG_INTEGER:

| | | | | |
|---|---|---|---|---|
| C35404C | C45231C | C45304C | C45411C | C45412C |
| C45502C | C45503C | C45504C | C45504F | C45611C |
| C45612C | C45613C | C45614C | C45631C | C45632C |
| B52004D | C55B07A | B55B09C | B86001W | C86006C |
| CD7101F | | | | |

C35702B, C35713C, B86001U, and C86006G check for the predefined type LONG_FLOAT.

C35713D and B86001Z check for a predefined floating-point type with a name other than FLOAT, LONG_FLOAT, or SHORT_FLOAT.

A35801E checks that FLOAT'FIRST..FLOAT'LAST may be used as a range constraint in a floating-point type declaration; for this implementation that range exceeds the safe numbers and must be rejected. (See section 2.3)

C45531M..P (4 tests) and C45532M..P (4 tests) check fixed-point operations for the types that require a SYSTEM.MAX_MANTISSA of 47 or greater.

C45624A..B (2 tests) check that the proper exception is raised if MACHINE_OVERFLOWS is FALSE for floating point types; for this implementation, MACHINE_OVERFLOWS is TRUE.

C86001F recompiles package SYSTEM, making package TEXT_IO, and hence package REPORT, obsolete. For this implementation, the package TEXT_IO is dependent upon package SYSTEM.

B86001Y checks for a predefined fixed-point type other than DURATION.

C96005B checks for values of type DURATION'BASE that are outside the range of DURATION. There are no such values for this implementation.

CD1009C uses a representation clause specifying a non-default size for a floating-point type.

CD2A84A, CD2A84E, CD2A84I..J (2 tests), and CD2A840 use representation clauses specifying non-default sizes for access types.

The tests listed in the following table are not applicable because the given file operations are supported for the given combination of mode and file access method.

| Test | File Operation | Mode | File Access Method |
|---|---|---|---|
| CE2102D | CREATE | IN_FILE | SEQUENTIAL_IO |
| CE2102E | CREATE | OUT_FILE | SEQUENTIAL_IO |
| CE2102F | CREATE | INOUT_FILE | DIRECT_IO |
| CE2102I | CREATE | IN_FILE | DIRECT_IO |
| CE2102J | CREATE | OUT_FILE | DIRECT_IO |
| CE2102N | OPEN | IN_FILE | SEQUENTIAL_IO |
| CE2102O | RESET | IN_FILE | SEQUENTIAL_IO |
| CE2102P | OPEN | OUT_FILE | SEQUENTIAL_IO |
| CE2102Q | RESET | OUT_FILE | SEQUENTIAL_IO |
| CE2102R | OPEN | INOUT_FILE | DIRECT_IO |
| CE2102S | RESET | INOUT_FILE | DIRECT_IO |
| CE2102T | OPEN | IN_FILE | DIRECT_IO |
| CE2102U | RESET | IN_FILE | DIRECT_IO |
| CE2102V | OPEN | OUT_FILE | DIRECT_IO |
| CE2102W | RESET | OUT_FILE | DIRECT_IO |
| CE3102E | CREATE | IN_FILE | TEXT_IO |
| CE3102F | RESET | Any Mode | TEXT_IO |
| CE3102G | DELETE | -------- | TEXT_IO |
| CE3102I | CREATE | OUT_FILE | TEXT_IO |
| CE3102J | OPEN | IN_FILE | TEXT_IO |
| CE3102K | OPEN | OUT_FILE | TEXT_IO |

CE2107A..E (5 tests), CE2107L, CE2110B, and CE2111D attempt to associate multiple internal files with the same external file for sequential files. The proper exception is raised when multiple access is attempted.

CE2107F..H (3 tests), CE2110D, and CE2111H attempt to associate multiple internal files with the same external file for direct files. The proper exception is raised when multiple access is attempted.

CE2203A checks that WRITE raises USE_ERROR if the capacity of the external file is exceeded for SEQUENTIAL_IO. This implementation does not restrict file capacity.

CE2403A checks that WRITE raises USE_ERROR if the capacity of the external file is exceeded for DIRECT_IO. This implementation does not restrict file capacity.

CE3111A..B (2 tests), CE3111D..E (2 tests), CE3114B, and CE3115A attempt to associate multiple internal files with the same external file for text files. The proper exception is raised when multiple access is attempted.

CE3304A checks that USE_ERROR is raised if a call to SET_LINE_LENGTH or SET_PAGE_LENGTH specifies a value that is inappropriate for the external file. This implementation does not have inappropriate values for either line length or page length.

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

## 2.3 TEST MODIFICATIONS

Modifications (see section 1.3) were required for 22 tests.

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

| | | | | | |
|---|---|---|---|---|---|
| B24009A | B33301B | B38003A | B38003B | B38009A | B38009B |
| B85008G | B85008H | BC1303F | BC3005B | BD2B03A | BD2D03A |
| BD4003A | | | | | |

A35801E was graded inapplicable by Evaluation Modification as directed by the AVO; the compiler rejects the use of the range FLOAT'FIRST..FLOAT'LAST as the range constraint of a floating-point type declaration because the bounds lie outside of the range of safe numbers (cf. ARM 3.5.7(12)).

CD1009A, CD1009I, CD1C03A, CD2A22J, CD2A24A, and CD2A31A..C (3 tests) use instantiations of the support procedure Length_Check, which uses Unchecked_Conversion according to the interpretation given in AI-00590. The AVO ruled that this interpretation is not binding under ACVC 1.11; the tests are ruled to be passed if type produce Failed messages only from the instantiations of Length_Check -- i.e., the allowed Report.Failed messages have the general form:

"* CHECK ON REPRESENTATION FOR <TYPE_ID> FAILED."

# CHAPTER 3

# PROCESSING INFORMATION

## 3.1 TESTING ENVIRONMENT

The host and target computer systems for this Ada implementation were connected by an RS232 serial port. The rest of this Ada implementation is described adequately by the information given in the initial pages of this report.

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

Steve Hodges
Verdix Corporation
14130-A Sully Field Circle
Chantilly VA 22021

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

Steve Hodges
Verdix Corporation
14130-A Sully Field Circle
Chantilly VA 22021

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

## 3.2 SUMMARY OF TEST RESULTS

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

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

PROCESSING INFORMATION

| | | |
|---|---|---|
| a) Total Number of Applicable Tests | 3807 | |
| b) Total Number of Withdrawn Tests | 71 | |
| c) Processed Inapplicable Tests | 91 | |
| d) Non-Processed I/O Tests | 0 | |
| e) Non-Processed Floating-Point Precision Tests | 201 | |
| f) Total Number of Inapplicable Tests | 292 | (c+d+e) |
| g) Total Number of Tests for ACVC 1.11 | 4170 | (a+b+f) |

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

## 3.3 TEST EXECUTION

Version 1.11 of the ACVC comprises 4170 tests. When this compiler was tested, the tests listed in section 2.1 had been withdrawn because of test errors. The AVF determined that 292 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. In addition, the modified tests mentioned in section 2.3 were also processed.

A magnetic tape containing the customized test suite (see section 1.3) was taken on-site by the validation team for processing. The contents of the magnetic tape were not loaded directly onto the host computer. The tape was loaded onto a Sun Workstation, and the tests were copied over Ethernet to the host machine.

After the test files were loaded onto the host computer, the full set of tests was processed by the Ada implementation.

The tests were compiled and linked on the host computer system, as appropriate. The executable images were transferred to the target computer system by the communications link described above, and run. The results were captured on the host computer system.

Testing was performed using command scripts provided by the customer and reviewed by the validation team. See Appendix B for a complete listing of the processing options for this implementation. It also indicates the default options.

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

# APPENDIX A

## MACRO PARAMETERS

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

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

MACRO PARAMETERS

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

| Macro Parameter | Macro Value |
|---|---|
| $MAX_IN_LEN | 499 |
| $ACC_SIZE | 32 |
| $ALIGNMENT | 4 |
| $COUNT_LAST | 2_147_483_647 |
| $DEFAULT_MEM_SIZE | 16_777_216 |
| $DEFAULT_STOR_UNIT | 8 |
| $DEFAULT_SYS_NAME | I386 |
| $DELTA_DOC | 0.000000000465661287307739257812 5 |
| $ENTRY_ADDRESS | SYSTEM."+"(16#40#) |
| $ENTRY_ADDRESS1 | SYSTEM."+"(16#80#) |
| $ENTRY_ADDRESS2 | SYSTEM."+"(16#100#) |
| $FIELD_LAST | 2_147_483_647 |
| $FILE_TERMINATOR | ' ' |
| $FIXED_NAME | NO_SUCH_TYPE |
| $FLOAT_NAME | NO_SUCH_TYPE |
| $FORM_STRING | "" |
| $FORM_STRING2 | "CANNOT_RESTRICT_FILE_CAPACITY" |
| $GREATER_THAN_DURATION | 100_000.0 |
| $GREATER_THAN_DURATION_BASE_LAST | 10_000_000.0 |
| $GREATER_THAN_FLOAT_BASE_LAST | 1.8E+308 |
| $GREATER_THAN_FLOAT_SAFE_LARGE | 5.0E+307 |
| $GREATER_THAN_SHORT_FLOAT_SAFE_LARGE | |

```
                        9.0E+37

$HIGH_PRIORITY          99

$ILLEGAL_EXTERNAL_FILE_NAME1
                        /illegal/file_name/2}]%2102c.dat

$ILLEGAL_EXTERNAL_FILE_NAME2
                        /illegal/file_name/CE2102C*.dat

$INAPPROPRIATE_LINE_LENGTH
                        -1

$INAPPROPRIATE_PAGE_LENGTH
                        -1

$INCLUDE_PRAGMA1        PRAGMA INCLUDE ("A28006D1.TST")

$INCLUDE_PRAGMA2        PRAGMA INCLUDE ("B28006F1.TST")

$INTEGER_FIRST          -2_147_483_648

$INTEGER_LAST           2_147_483_647

$INTEGER_LAST_PLUS_1    2_147_483_648

$INTERFACE_LANGUAGE     C

$LESS_THAN_DURATION     -100_000.0

$LESS_THAN_DURATION_BASE_FIRST
                        -10_000_000.0

$LINE_TERMINATOR        ASCII.LF

$LOW_PRIORITY           0

$MACHINE_CODE_STATEMENT
                        CODE_0'(OP => NOP);

$MACHINE_CODE_TYPE      CODE_0

$MANTISSA_DOC           31

$MAX_DIGITS             15

$MAX_INT                2_147_483_647

$MAX_INT_PLUS_1         2_147_483_648

$MIN_INT                -2_147_483_648

$NAME                   TINY_INTEGER
```

MACRO PARAMETERS

| | |
|---|---|
| $NAME_LIST | I386 |
| $NAME_SPECIFICATION1 | VMS386$DKB0:[ACVC1.11.C.E]X2120A.; |
| $NAME_SPECIFICATION2 | VMS386$DKB0:[ACVC1.11.C.E]X2120B.; |
| $NAME_SPECIFICATION3 | VMS386$DKB0:[ACVC1.11.C.E]X3119A.; |
| $NEG_BASED_INT | 16#F000000E# |
| $NEW_MEM_SIZE | 16_777_216 |
| $NEW_STOR_UNIT | 8 |
| $NEW_SYS_NAME | I386 |
| $PAGE_TERMINATOR | ASCII.LF & ASCII.FF |
| $RECORD_DEFINITION | RECORD SUBP : OPERAND; END RECORD; |
| $RECORD_NAME | CODE_0 |
| $TASK_SIZE | 32 |
| $TASK_STORAGE_SIZE | 1024 |
| $TICK | 0.01 |
| $VARIABLE_ADDRESS | VAR_1'ADDRESS |
| $VARIABLE_ADDRESS1 | VAR_2'ADDRESS |
| $VARIABLE_ADDRESS2 | VAR_3'ADDRESS |
| $YOUR_PRAGMA | PASSIVE |

# APPENDIX B

## COMPILATION SYSTEM OPTIONS

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

COMPILATION SYSTEM OPTIONS

2 VADS ADA
VADS ADA  Ada compiler

Syntax
VADS ADA source_file [, ...]

3 Command_Qualifiers

/APPEND Append all output to a log file.

/DEBUG
/DEBUG=G  Write out the gnrx.lib file in ASCII.

/DEFINE
/DEFINE=(identifier:type=value", ... )
Define identifier of a specified type and value. See VADS ADA PREPROCESSOR REFERENCE.

/DEPENDENCIES  Analyze for dependencies only; no link will be performed if this option is given (/MAIN and /OUTPUT options must not be used with this qualifier).

/ERRORS
/ERRORS[=(option [, ...])]  Process compilation error messages using the ERR tool and direct the output to SYS$OUTPUT; the parentheses can be omitted if only one qualifier is given (by default, only lines containing errors are listed).
Options:
LISTING List entire input file.

EDITOR["editor"]
Insert error messages into the source file and call a text editor (EDT by default). If a value is given as a quoted string, that string is used to invoke the editor. This allows other editors to be used instead of the default.

OUTPUT[=file_name]
Direct error processed output to the specified file name; if no file name is given, the source file name is used with a file extension .ERR.

BRIEF  List only the affected lines [default]

Only one of the BRIEF, LISTING, OUTPUT, or EDITOR options can be used in a single command.

For more information about the /ERRORS option, see also COMPILING ADA PROGRAMS, COMPILER ERROR MESSAGE PROCESSING.

/EXECUTABLE
/EXECUTABLE=file_name
Provide an explicit name for the executable when used with the /MAIN qualifier; the file_name value must be supplied (if the file type is omitted, .EXE is

assumed).

/KEEP_IL Keep the intermediate language (IL) file produced by the compiler front end. The IL file will be placed in the OBJECTS directory, with the name ADA_SOURCE.I.

/LIBRARY
/LIBRARY=library_name Operate in VADS library library_name (the current working directory is the default).

/LINK_ARGUMENTS
/LINK_ARGUMENTS="value"
Pass command qualifiers and parameters to the linker.

/MAIN
/MAIN[=unit_name] Produce an executable program using the named unit as the main program; if no value is given, the name is derived from the first Ada file name parameter (the .A suffix is removed); the executable file name is derived from the main program name unless the /EXECUTABLE qualifier is used.

/NOOPTIMIZE Do not optimize.

/WARNINGS Print warning diagnostics.

/OPTIMIZE
/OPTIMIZE[=number] Invoke the code optimizer (OPTIM3). An optional digit provides the level of optimization. /OPTIMIZE=4 is the default.

| | |
|---|---|
| /OPTIMIZE | no digit, full optimization |
| /OPTIMIZE=0 | prevents optimization |
| /OPTIMIZE=1 | no hoisting |
| /OPTIMIZE=2 | no hoisting, but more passes |
| /OPTIMIZE=3 | no hoisting, but even more passes |
| /OPTIMIZE=4 | hoisting from loops |
| /OPTIMIZE=5 | hoisting from loops, but more passes |
| /OPTIMIZE=6 | hoisting from loops with maximum passes |
| /OPTIMIZE=7 | hoisting from loops and branches |
| /OPTIMIZE=8 | hoisting from loops and branches, more passes |
| /OPTIMIZE=9 | hoisting from loops and branches, maximum passes |

Hoisting from branches (and cases alternatives) can be slow and does not always provide significant performance gains, so it can be suppressed.

For more information about optimization, see COMPILING ADA PROGRAMS, Optimization. See also pragma OPTIMIZE_CODE(OFF).

/OUTPUT
/OUTPUT=file_name Direct the output to file_name (the default is SYS$OUTPUT).

/PRE_PROCESS Invoke the Ada Preprocessor. See VADS ADA PREPROCESSOR REFERENCE.

COMPILATION SYSTEM OPTIONS

/RECOMPILE_LIBRARY
/RECOMPILE_LIBRARY=VADS_library
Force analysis of all generic instantiations causing reinstantiation of any that are out of date.

/SHOW Show the name of the tool executable but do not execute it.

/SHOW_ALL Print the name of the front end, code generator, optimizer, and linker, and list the tools that will be invoked.

/SUPPRESS Apply pragma SUPPRESS for all checks to the entire compilation. (See also pragma SUPPRESS(ALL_CHECKS))

/TIMING Print timing information for the compilation.

/VERBOSE Print information for the compilation.

3 Description

The command VADS 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.

By default, VADS ADA produces only object and net files. If the /MAIN option is used, the compiler automatically invokes VADS LD and builds a complete program with the named library unit as the main program.

Non-Ada object files may be given as arguments to VADS 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. The VADS ADA command within any version of VADS on a system will execute the correct compiler components based upon visible library directives.

Program listings with a disassembly of machine code instructions are generated by VADS DB or VADS DAS.

3 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.

## LINKER OPTIONS

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

2 VADS LD
VADS LD  prelinker

Syntax
VADS LD unit_name

3 Command_Qualifiers

/APPEND

/DEBUG Debug memory overflow (use in cases where linking a large number of units causes the error message "local symbol overflow" to occur).

/EARLY
/EARLY="unit_name"  Force the given unit to be elaborated as early as possible (unit_name must be enclosed in double quotes).

/EXECUTABLE
/EXECUTABLE[=file_name]
Put the output in the named file. The default executable names are <main_unit>.EXE on self-hosts or <main_unit>.VOX on cross targets.

/FILES Print a list of dependent files in elaboration order, and suppress linking.

/LIBRARY
/LIBRARY=library_name  Operate in VADS library library_name (the current working directory is the default).

/LINK_OPTIONS
/LINK_OPTIONS=object_file_or_qualifier [,...]"
Add the options surrounded by quotes to the invocation of the linker.

/OUTPUT
/OUTPUT=file_name  Direct output to file_name. Default is SYS$OUTPUT.

/SHOW  Show the name of the tool executable but do not execute it.

/UNITS Print a list of dependent units in order, and suppress linking.

/VERBOSE  Print the VMS linker command prior to execution.

/VERIFY Print the VMS linker command but suppress execution.

3 Description

VADS LD collects the object files needed to make unit_name a main program and calls the VMS linker to link together all Ada and other language objects required to produce an executable. unit_name must be a non-generic subprogram that is either a procedure or a function that returns an Ada STANDARD.INTEGER (the predefined type INTEGER). The utility uses the net files produced by the Ada compiler

to check dependency information. VADS LD produces an exception mapping table, a unit elaboration table, and passes this information to the linker.

VADS LD reads instructions for generating executables from the ADA.LIB file in the VADS libraries on the search list. Besides information generated by the compiler, these directives also include WITHn directives that allow the automatic linking of object modules compiled from other languages or Ada object modules not named in context clauses in the Ada source. Any number of WITH directives may be placed into a library, but they must be numbered contiguously beginning at WITH1. The directives are recorded in the library's ADA.LIB file and have the following form.

```
WITH1|LINK|object_file|
WITH2|LINK|archive_file|
```

WITH directives may be placed in the local Ada libraries or in any VADS library on the search list.

A WITH directive in a local VADS library or earlier on the library search list will hide the same numbered WITH directive in a library later in the library search list.

Use VADS INFO to change or report library directives in the current library.

All arguments after unit_name are passed on to the linker. These arguments may be linker options, names of object files or archive libraries, or library abbreviations.

3 Diagnostics

Self-explanatory diagnostics are produced for missing files, etc. Occasional additional messages are produced by the linker.

3 Files

Normally VADS LD generates an intermediate file with the process ID as a substring, VADSOPTION<process_ID>.OPT.

With either the /VERIFY or /VERBOSE qualifiers, however, VADS LD will produce the intermediate file <main_unit>.OPT.

# APPENDIX C

## APPENDIX F OF THE Ada STANDARD

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

```
package STANDARD is
   ..........
   type INTEGER is range -2147483648 .. 2147483647;
   type SHORT_INTEGER is range -32768 .. 32767;
   type TINY_INTEGER is range -128 .. 127;

   type FLOAT is digits 15
        range -1.79769313486232E+308 .. 1.79769313486232E+308;
   type SHORT_FLOAT is digits 6 range -3.40282E+38 .. 3.40282E+38;

   type DURATION is delta 0.001 range -2147483.648 .. 2147483.647;
   ..........
end STANDARD;
```

APPENDIX F OF THE Ada 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 saves code space. If a user erroneously makes an INLINE_ONLY subprogram recursive a warning message will be emitted and an PROGRAM_ERROR will be raised at run time.

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, for example the MACHINE_CODE package.

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 compatibility with earlier versions of 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. An attempt to use the IMAGE attribute on a type whose image array has been suppressed will result in a compilation warning and PROGRAM_ERROR raised at run time.

### 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_NAME Pragma

The INTERFACE_NAME pragma takes the name of a variable or subprogram defined in another language and allows it to be referenced directly in Ada. The pragma will replace all occurrences of the variable or subprogram 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 or subprogram 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 argu-

ment. 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.

### 1.8. OPTIMIZE_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 whether the code should be optimized by the compiler. The default is ON. When OFF is specified, the compiler will generate the code as specified.

## 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. NON_REENTRANT

This pragma takes one argument which can be the name of either a library subprogram or a subprogram declared immediately within a library package spec or body. It indicates to the compiler that the subprogram will not be called recursively, allowing the compiler to perform specific optimizations. The pragma can be applied to a subprogram or a set of overloaded subprograms within a package spec or package body.

## 2.8. 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.

## 2.9. OPTIMIZE

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

## 2.10. PACK

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

## 2.11. PAGE

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

## 2.12. PASSIVE

The pragma has three forms:

```
PRAGMA PASSIVE;
PRAGMA PASSIVE(SEMAPHORE);
PRAGMA PASSIVE(INTERRUPT, <number>);
```

This pragma Pragma passive can be applied to a task or task type declared immediately within a library package spec or body. The pragma directs the compiler to optimize certain tasking operations. It is possible that the statements in a task body will prevent the intended optimization; in these cases, a warning will be generated at compile time and will

raise TASKING_ERROR at runtime.

2.13. PRIORITY

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

2.14. SHARED

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

2.15. 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.

2.16. SUPPRESS

This pragma is implemented as described, except that DIVISION_CHECK and in some cases OVERFLOW_CHECK cannot be suppressed.

2.17. 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

For a prefix that denotes an object, a program unit, a label, or an entry:

This attribute denotes the effective address of the first of the storage units allocated to P. For a subprogram, package, task unit, or label, it refers to the address of the machine code associated with the corresponding body or statement. For an entry for which an address clause has been given, it refers to the corresponding hardware interrupt. The attribute is of the type OPERAND defined in the package MACHINE_CODE. The attribute is only allowed within a machine code procedure.

See section F.4.8 for more information on the use of this attribute.

(For a package, task unit, or entry, the 'REF attribute is not supported.)

3.2. T'TASKID

For a task object or a value T, T'TASK_ID yields the unique task id associated with a task. The value of this attribute is of the type ADDRESS in the package SYSTEM.

4. Specification of Package SYSTEM

```
-- Copyright 1990  Verdix Corporation

with UNSIGNED_TYPES;
package SYSTEM is

    pragma suppress(ALL_CHECKS);
    pragma suppress(EXCEPTION_TABLES);
    pragma not_elaborated;

        type NAME is ( i386 );

        SYSTEM_NAME             : constant NAME := i386;

        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;

        function ">" (A: ADDRESS; B: ADDRESS) return BOOLEAN;
        function "<" (A: ADDRESS; B: ADDRESS) return BOOLEAN;
        function ">="(A: ADDRESS; B: ADDRESS) return BOOLEAN;
        function "<="(A: ADDRESS; B: ADDRESS) return BOOLEAN;
        function "-" (A: ADDRESS; B: ADDRESS) return INTEGER;
        function "+" (A: ADDRESS; I: INTEGER) return ADDRESS;
        function "-" (A: ADDRESS; I: INTEGER) return ADDRESS;

        function "+" (I: UNSIGNED_TYPES.UNSIGNED_INTEGER) return ADDRESS;
```

```
        function MEMORY_ADDRESS
                (I: UNSIGNED_TYPES.UNSIGNED_INTEGER) return ADDRESS renames "+";

        NO_ADDR : constant ADDRESS;

        type TASK_ID is private;
        NO_TASK_ID : constant TASK_ID;

        type PROGRAM_ID is private;
        NO_PROGRAM_ID : constant PROGRAM_ID;

private

        type ADDRESS is new UNSIGNED_TYPES.UNSIGNED_INTEGER;

        NO_ADDR : constant ADDRESS := 0;

        pragma BUILT_IN(">");
        pragma BUILT_IN("<");
        pragma BUILT_IN(">=");
        pragma BUILT_IN("<=");
        pragma BUILT_IN("-");
        pragma BUILT_IN("+");

        type TASK_ID is new UNSIGNED_TYPES.UNSIGNED_INTEGER;
        NO_TASK_ID : constant TASK_ID := 0;

        type PROGRAM_ID is new UNSIGNED_TYPES.UNSIGNED_INTEGER;
        NO_PROGRAM_ID : constant PROGRAM_ID := 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 eliminates the pad ding where possible. Pragma PACK has no other effect on the storage allocated for record components for which a record representation is required.

### 5.2. Size Clauses

For scalar types, a representation clause will pack to the number of bits required to represent the range of the sub-type. A size clause applied to a record type will not cause packing of components; an explicit record representation clause must be given to specify the packing of the components. A size clause applied to a record type will cause

packing of components only when the component type is a discrete type. An error will be issued if there is insufficient space allocated. The SIZE attribute is not supported for task, access, or floating point types.

## 5.3. Address Clauses

Address clauses are only supported for variables. Since default initialization of a variable requires evaluation of the variable address, elaboration ordering requirements prohibit initialization of variables which have address clauses. The specified address indicates the physical address associated with the variable.

## 5.4. Interrupts

Interrupt entries are not supported.

## 5.5. Representation Attributes

The ADDRESS attribute is not supported for the following entities:

Packages
Tasks
Labels
Entries

## 5.6. Machine Code Insertions

Machine code insertions are supported.

The general definition of the package MACHINE_CODE provides an assembly language interface for the target machine. It provides the necessary record type(s) needed in the code statement, an enumeration type of all the opcode mnemonics, a set of register definitions, and a set of addressing mode functions.

The general syntax of a machine code statement is as follows:

```
CODE_n'( opcode, operand {, operand} );
```

where n indicates the number of operands in the aggregate.

A special case arises for a variable number of operands. The operands are listed within a subaggregate. The format is as follows:

```
CODE_N'( opcode, (operand {, operand}) );
```

For those opcodes that require no operands, named notation must be used (cf. RM 4.3(4)).

```
CODE_0'( op => opcode );
```

The opcode must be an enumeration literal (i.e., it cannot be an object, attribute, or a rename).

An operand can only be an entity defined in MACHINE_CODE or the 'REF attribute.

The arguments to any of the functions defined in MACHINE_CODE must be static expressions, string literals, or the functions defined in MACHINE_CODE. The 'REF attribute may not be used as an argument in any of these functions.

Inline expansion of machine code procedures is supported.

6. Conventions for Implementation-generated Names

There are no implementation-generated names.

7. Interpretation of Expressions in Address Clauses

Address expressions in an address clause are interpreted as physical addresses.

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 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.

## 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 4,000,000 x STORAGE_UNITS. The maximum size of a statically sized record type is 4,000,000 x 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.