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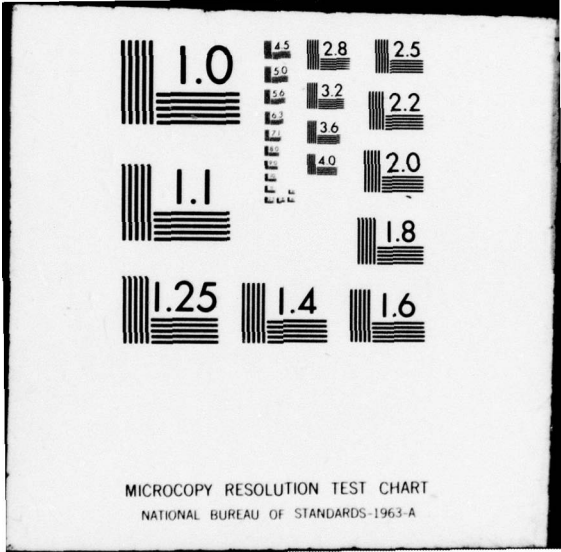
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**CENTRAL FLOW CONTROL
MANAGEMENT AIDS CODE AUDITOR (MACA)
PDL AND PROLOGUE**

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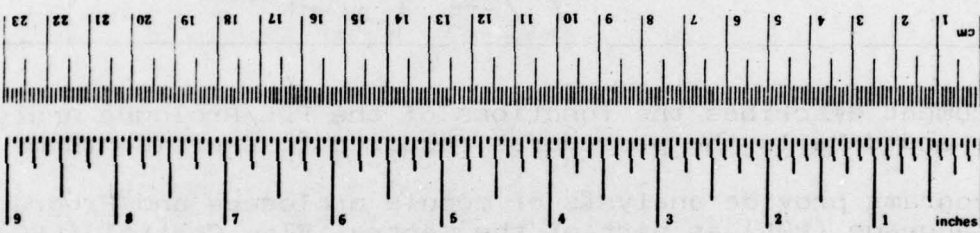
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<p>16. Abstract This document describes the functions of the PDL/Prologue Analysis programs and details the procedures required to exercise them. These programs provide analysis of module prologues and Program Design Language (PDL) as part of the Central Flow Control (CFC) Quality Assurance (QA) program, which assures accuracy, completeness, and adherence to project standards and guidelines. <i>(Title on t. page is correct per phone conversation w M. Swan DOT)</i></p>			
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures			Approximate Conversions from Metric Measures					
Symbol	When You Know	Multiply by	To Find	Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH								
in	inches	2.5	centimeters	cm	millimeters	0.04	inches	in
ft	feet	30	centimeters	cm	centimeters	0.4	inches	in
yd	yards	0.9	meters	m	meters	3.3	feet	ft
mi	miles	1.6	kilometers	km	kilometers	0.6	yards	yd
AREA								
in ²	square inches	6.5	square centimeters	cm ²	square centimeters	0.16	square inches	in ²
ft ²	square feet	0.09	square meters	m ²	square meters	1.2	square yards	yd ²
yd ²	square yards	0.8	square meters	m ²	square kilometers	0.4	square miles	mi ²
mi ²	square miles	2.6	square kilometers	km ²	hectares (10,000 m ²)	2.5	acres	ac
MASS (weight)								
oz	ounces	28	grams	g	grams	0.035	ounces	oz
lb	pounds	0.45	kilograms	kg	kilograms	2.2	pounds	lb
	short tons (2000 lb)	0.9	tonnes	t	tonnes (1000 kg)	1.1	short tons	st
VOLUME								
tsp	teaspoons	5	milliliters	ml	milliliters	0.03	fluid ounces	fl oz
Tbsp	tablespoons	15	milliliters	ml	liters	2.1	quarts	qt
fl oz	fluid ounces	30	milliliters	ml	liters	1.06	gallons	gal
c	cups	0.24	liters	l	cubic meters	35	cubic feet	cu ft
pt	pints	0.47	liters	l	cubic meters	1.3	cubic yards	cu yd
qt	quarts	0.96	liters	l				
gal	gallons	3.8	liters	l				
ft ³	cubic feet	0.03	cubic meters	m ³				
yd ³	cubic yards	0.76	cubic meters	m ³				
TEMPERATURE (exact)								
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



*1 in = 2.54 (exact). For other exact conversions and more detailed tables, see NBS Misc. Pub. 286, Units of Weights and Measures, Price \$2.25, SO Catalog No. C1310-286.

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SECTION 1 - INTRODUCTION

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1.1 PURPOSE AND SCOPE

The Automated Code Auditor is a support program which provides these services:

1. Analysis of module prologues for completeness and adherence to standards
2. Parsing of Program Design Language (PDL) for proper expression of the design
3. Generation of Test Specification charts from PDL.

The user's manual provides information on the set-up and execution of the Code Auditor.

1.2 BACKGROUND INFORMATION

Module prologue, PDL, and Test Specifications are design and documentation aids accompanying each module created for the Central Flow Control (CFC) project, following standards defined in the CFC Quality Assurance Plan. A sample module prologue appears in Figure 1-1; an example of PDL appears in Figure 1-2. A sample Test Specification appears in Figure 1-3, which has been generated from the PDL in Figure 1-2.

1.3 REFERENCES

Central Flow Control Quality Assurance Plan - CSC/SD-78/6060.

IBM System 360 Operating System: Job Control Language References, IBM.

Systems Reference Library, GC28-6704.

```

*****
**  MODULE- MARES  VERSION- 0  SUBSYS- SA  AUTHOR-RM PENLAND  **
*****
**  ENGLISH NAME- ANALYZE RETURN FROM RAEMSG MODULE  **
**  PURPOSE- CALLS RAEMSG AND EVALUATES THE RETURN CODE  **
**  LOCATION-  **
**  MODULE TYPE- PROCEDURE  **
**  USAGE-CLASS- SERIALLY REUSABLE  **
**  USAGE RESTRICTIONS- NONE  **
**  CORE REQUIREMENTS-  **
**    NUMBER-OF BYTES OF INSTRUCTIONS = 304 EST( ) ACT(X)  **
**    NUMBER OF BYTES OF DATA = 00 EST( ) ACT(X)  **
**  TIMING ESTIMATE-  **
**  --EST. TIME FOR ONE EXECUTION = 0.237 CPU AND 0.600 I/O  **
**  CALLED BY- MAEX, MALSC, MARPT  **
**  CALLS- RAEMSG  **
**  INPUT DATA-  **
**  NAME SRC STRUC T SIZE DESCRIPTION/PURPOSE  **
**  YRECOD ES ITEM C 5 ERROR MESSAGE MEMBER NAME  **
**  I0 ES VEC C 8 INSERT ARRAY  **
**  I1 ES VEC I 8 ASTERISK POSITION VEC  **
**  I2 ES VEC I 8 INSERT POSITION VEC  **
**  INTERMEDIATE DATA-  **
**  NAME STRUC T SIZE DESCRIPTION/PURPOSE  **
**  YRECOD ITEM C 5 ERROR MESSAGE NAME  **
**  MA RP-GPC 5 ERROR MESSAGE MEMB. NAME TABLE  **
**  I0 VEC C 8 SAME  **
**  I1 VEC I 8 AS  **
**  I2 VEC I 8 ABOVE  **
**  OUTPUT DATA-  **
**  NAME DST STRUC T SIZE DESCRIPTION/PURPOSE  **
**  ABORT ES ITEM I 16 ABORTION INDICATOR  **
**  ABNAME ES ITEM C 8 DNAME OF FILE CAUSING ABORT  **
**  **
**  METHOD NARRATIVE- MARES CALLS RAEMSG TO HAVE A DIAGNOSTIC  **
**  ERROR MESSAGE WRITTEN FROM A LIBRARY OF ERROR  **
**  MESSAGES TO A PRINT FILE. MARES ANALYZES THE CODE  **
**  RETURNED FROM RAEMSG AND TAKES APPROPRIATE ACTION  **
**  IN THE EVENT OF AN ERROR.  **
**  **
**  ERROR HANDLING- IF A MEMBER NAME IS NOT FOUND RAEMSG  **
**  IS CALLED TO WRITE A MESSAGE INDICATING THE ERROR.  **
**  IF THE MEMBER CONTAINING THE NOT FOUND MESSAGE IS  **
**  ALSO NOT FOUND ABORT IS SET.  **
**  IF AN I/O ERROR OCCURS ABORT AND ABNAME ARE SET.  **
**  **
**  SPECIAL TECHNIQUES- NONE  **
**  LIMITATIONS/ASSUMPTIONS- NONE  **
**  DATES OF CODING AND REVISIONS-  **
**  VERSION DATE REASON FOR VERSION ASSIGNMENT  **
**  0 3/27/78 INITIAL DESIGN  **
*****
**  END PROLOGUE  **

```

Figure 1-1. Module Prologue

```

**MODULE MARES
**CALL RAEMSG TO WRITE ERROR MESSAGE
**IF THE ERROR MESSAGE WAS NOT IN THE ERROR FILE
**   SET UP THE RAEMSG CALLING SEQUENCE TO WRITE
**   THE NOT FOUND MESSAGE
**   CALL RAEMSG TO WRITE THE MESSAGE
**ENDIF
**IF AN ERROR OCCURRED
**   SET ABORT TO THE APPROPRIATE VALUE FOR A READ
**   OR WRITE ERROR OR MESSAGE NOT FOUND
**ENDIF
**ENDMODULE MARES
** * END PDL

```

Figure 1-2. Program Design Language

AUTOMATED CODE AUDITOR
TEST PROCEDURE ANALYSIS

```

*****
DD * INIT *
PATH* CONSTR *
PARAMETER
TEST CASES
*1*2*3*4*5*6*7*8*9
*****
1 *IF-TRUE * THE ERROR MESSAGE WAS NOT IN TH * * * * *
2 *IF-FALSE* THE ERROR MESSAGE WAS NOT IN TH * * * * *
3 *IF-TRUE * AN ERROR OCCURRED * * * * *
4 *IF-FALSE* AN ERROR OCCURRED * * * * *
*****
MODULE= MARES DATE= 10/26/78 PAGE 1

```

Figure 1-3. Test Specification Chart

SECTION 2 - PROGRAM OPERATION

2.1 PROGRAM OPEATION OVERVIEW

Analysis of module prologues is accomplished through simple parsing of keywords and associated text. Prologue keywords fall into two classes: major and minor. Referring to the fourth line of Figure 1-1, ENGLISH is a major keyword and NAME- immediately thereafter is a minor keyword. Once a major keyword is recognized by the Code Auditor, comparison is made for the associated minor keyword(s) and descriptive text. Keywords must begin in specific card columns and must be spelled correctly. Any character string not meeting these criteria is considered descriptive text. Errors in card column alignment or missing keywords are flagged with an error message.

The Program Design Language (PDL) logical constructs are described in Section 3.2.1.2 of the CFC Quality Assurance Plan. Parsing of PDL by the Code Auditor involves the following groups of keywords:

```
IF/ENDIF  
IF/ELSE/ENDIF  
DO-WHILE/ENDDO  
REPEAT/UNTIL  
DO-CASE/ENDDO.
```

These groups of keywords are essentially delimiters of logical flow. For example, whenever the keyword DO-CASE is recognized, there must also appear a subsequent ENDDO beginning in the same card column. This relationship applies to all the keyword groups. Figure 1-2 contains an example of PDL.

The Test Specification chart is generated during the parsing of PDL. (Refer to Figure 1-3, which is a Test Specification Chart generated from the PDL in Figure 1-2.) Decision-to-decision paths are created as PDL keywords are recognized. The Code Auditor assigns a number to each of these, which is printed both on the left side of the Test Specification chart and on the right side of the PDL report. The first thirty characters following an IF, DO-WHILE, and DO-CASE are printed on the Test Specification Chart to help identify the decision-to-decision paths.

SECTION 3 - PROGRAM INPUTS

3.1 CONTROL CARDS

The control card data set is read from the SYSIN file and should appear as follows:

```
START $
```

```
.
```

```
.
```

```
MODULE CARDS
```

```
.
```

```
.
```

```
TERM $
```

The information on control cards may appear between columns 1 and 72 inclusive. The \$ delimiter is optional on each card; if present, the remainder of the card is ignored and may be used for comments.

The START card signals the beginning of the control card set and should not appear elsewhere. The format is:

```
START $
```

The MODULE card identifies the name and specifies options for a module to be analyzed. At least one and not more than one hundred of these cards must appear in the control card set. The format:

```
MODULE = name, option, option, option $
```

VALUE FIELD	LENGTH (BYTES)	VALUES	REQUIRED/OPTIONAL	DESCRIPTION
name	8		R	name of a member in the Prologue/PDL library
option	4	LPRL LSRC LTPA	0 0 0	list prologue only list PDL only generate and list Test Specification charts

Special attention must be given to the LTPA parameter. If LTPA is specified on the first MODULE card, Test Specification charts will be generated and listed for all modules. Similarly, if LTPA is not present on the first MODULE card, no Test Specification charts will be listed for any module.

If no optional parameters accompany a module name, only diagnostics will be listed. If LPRL and LSRC are present, the listing includes both Prologue and PDL.

The TERM card identifies the end of the control card set and should not appear elsewhere. The format is:

```
TERM    $
```

3.1.1 Control Card Examples

To generate Test Specification Charts

```
START    $
MODULE = MOD1, LTPA $
MODULE = MOD2    $
TERM     $
```

Test Specification Charts are to be generated and listed for modules MOD1 and MOD2, from their respective PDL. Their prologues and PDL will be analyzed and only diagnostics (if any) will be listed.

To Analyze and List the Prologue:

```
START      $
MODULE = MOD1, LPRL  $
TERM       $
```

The MOD1 Prologue is to be analyzed and listed with diagnostics.

To Analyze and List the PDL:

```
START      $
MODULE = MOD2, LSRC  $
TERM       $
```

The MOD2 PDL is to be listed. The MOD2 Prologue will be analyzed and diagnostics (if any) will be listed.

For All Code Auditor Services:

```
START      $
MODULE = MOD1, LPRL, LSRC, LTPA  $
MODULE = MOD2, LSRC, LPRL  $
MODULE = MOD3, LPRL, LSRC  $
TERM       $
```

The prologues and PDL of modules MOD1, MOD2, and MOD3 are to be analyzed and listed with diagnostics. Test Specification Charts are to be generated from PDL and listed for all three modules.

For Minimal Listing:

```
START      $
MODULE = MOD1  $
TERM       $
```

The PDL and prologue of MOD1 is to be analyzed, but not listed. Only diagnostics (if any) are to be listed.

3.2 DATA CARDS

Data cards are not used by the Code Auditor.

3.3 DATA SETS

The Automated Code Auditor uses the following data sets:

- Control Card Set
- Prologue/PDL Library Set
- Prologue/PDL Report Set
- Diagnostic Error Message Set

3.3.1 Control Card Set

Control cards are input through the sequential file defined by the SYSIN DD card. Logical records are 80 bytes long and can be blocked by the user. No specific hardware device must be used for the control card file.

3.3.2 Prologue/PDL Library Set

This input file is defined by the DATAIN DD card. The prologue/PDL library must be a partitioned data set whose members are modules to be analyzed. Each module should be composed of a prologue followed by PDL. The logical record length is 80 bytes, and the records should be blocked.

3.3.3 Prologue/PDL Report Set

The Automated Code Auditor has only one output, the Prologue/PDL Report Set, identified by the MARPTLST DD card. Logical record length is 133 bytes. As

this file is intended to be a print file, the record format is FBA, fixed-length blocked records with ANSI printer control characters.

3.3.4 Diagnostic Error Message Set

This file is a partitioned data set whose members each contain text for a diagnostic error message. This input file, identified via the MAEMSG DD card, is crucial to the Code Auditor and must be disk-resident whenever that program is executed. Each member is one 80 byte fixed-length record.

3.4 JOB CONTROL LANGUAGE

The following sections describe the Job Control Language (JCL) available for execution of MACA and its use.

3.4.1 MACA Procedure

The MACA catalogued procedure is a member of SYS2.PROCLIB, and contains the following:

```
//MACA PROC DATAIN=  
// EXEC PGM=MACA,REGION=170K  
//STEPLIB DD DSN=MA.LIB.LOAD,DISP=SHR  
//DATAIN DD DSN=&DATAIN,DISP=SHR  
//MARPTLST DD SYSOUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=3458)  
//MAEMSG DD DSN=SPCX.LIB.ERROR.CURRENT,DISP=SHR  
//MASUMLST DD DUMMY,DCB=*.MARPTLST
```

where the symbolic parameter DATAIN specifies the user's prologue/PDL library described in Section 3.3.2.

The DDNAMES are used as follows:

<u>DDNAME</u>	<u>USAGE</u>
STEPLIB	Library where MACA load module resides.
DATAIN	User's Prologue/PDL Library. This file must be catalogued.
MARPTLST	Prologue/PDL report file .
MAEMSG	Diagnostic Error Message Library. This file must be catalogued.
MASUMLST	Although this report file is not created, the DD card must be present as shown.

3.4.2 How to Use MACA Procedure

The example below illustrates the job control statements required to use the Code Auditor:

```
// EXEC MACA,DATAIN='user.catalogued.pds'  
//SYSIN DD *  
.  
.  
CONTROL CARDS  
.  
.  
/*
```

SECTION 4 - PROGRAM OUTPUTS

The Automated Code Auditor creates one output, a print file, which contains the following:

- Control Card Listing
- Module Prologue/PDL Listing
- Test Specification Chart.

The control card report, illustrated in Figure 4-1, is generated unconditionally as the first report in the output file. A Prologue/PDL Report, illustrated in Figure 4-2, is created conditionally for each input module at the user's request. The Test Specification Chart, illustrated in Figure 4-3, is created conditionally for all input modules at the user's request.

CENTRAL FLOW CONTROL PROJECT
AUTOMATED CODE AUDITOR
MODULE PROLOGUE ANALYSIS

CONTROL CARDS

START \$	00000010
MODULE = MARES, LPRL, LSRC, LTPA \$	00000020
TERM \$	00000030

Figure 4-1. Control Card Listing

MODULE: MARES

```

1 *****
2 *** MODULE- MARES VERSION- 0 SUBSYS- SA AUTHOR- RM PENLAND ** 70007117
3 ***** 00007020
4 *** ENGLISH NAME- ANALYZE RETURN FROM RAEMSG MODULE ** 00000037
5 *** PURPOSE- CALLS RAEMSG AND EVALUATES THE RETURN CODE ** 00000050
6 *** LOCATION- ** 00000063
7
8 *** MODULE TYPE- PROCEDURE ** 00000070
9 *** USAGE CLASS- SERIALLY REUSABLE ** 70007080
10 *** USAGE RESTRICTIONS- NONE ** 00000090
11 *** CODE REQUIREMENTS- ** 00000100
12 *** NUMBER OF BYTES OF INSTRUCTIONS = 304 EST( ) ACT(X) ** 00000110
13 *** NUMBER OF BYTES OF DATA = 00 EST( ) ACT(X) ** 00000120
14 *** TIMING ESTIMATE- ** 70007137
15 *** EST. TIME FOR ONE EXECUTION = 0.237 CPU AND 0.600 I/O ** 00000140
16 *** CALLED BY- MAFK, MALSC, MARPT ** 00000150
17 *** CALLS- RAEMSG ** 70007160
18 *** INPUT DATA- ** 00000170
19 *** NAME SRC STRUC T SIZE DESCRIPTION/PURPOSE ** 00000180
20 *** YRFCOD ES ITEM C 5 ERROR MESSAGE MEMBER NAME ** 00000190
21 *** 10 ES VEC C 9 INSERT AFRAY ** 00000200
22 *** 11 ES VEC I 9 ASTERISK POSITION VEC ** 00007210
23 *** 12 ES VEC I 9 INSERT POSITION VEC ** 00000220
24 *** INTERMEDIATE DATA- ** 00000240
25 *** NAME STRUC T SIZE DESCRIPTION/PURPOSE ** 00000250
26 *** YRFCOD ITEM C 5 ERROR MESSAGE NAME ** 00000260
27 *** 4A RP-GPC 5 ERROR MESSAGE MEMB. NAME TABLE ** 70007267
28 *** 17 VEC C 8 SAME ** 00000270
29 *** 11 VEC I 8 AS ** 00000280
30 *** 12 VEC I 9 ABOVE ** 70007290
31 *** OUTPUT DATA- ** 00000300
32 *** NAME DST STRUC T SIZE DESCRIPTION/PURPOSE ** 00000310
33 *** ADRRT ES ITEM I 16 ABORTION INDICATOR ** 00000320
34 *** ADRNAME ES ITEM C 9 ADDRNAME OF FILE CAUSING ABORT ** 00000330
35 *** METHOD NARRATIVE- MARES CALLS RAEMSG TO HAVE A DIAGNOSTIC ** 00000350
36 *** ERROR MESSAGE WRITTEN FROM A LIBRARY OF ERROP ** 00000360
37 *** MESSAGES TO A PRINT FILE. MARES ANALYZES THE CODE ** 70007370
38 *** RETURNED FROM RAEMSG AND TAKES APPROPRIATE ACTION ** 00000380
39 *** IN THE EVENT OF AN ERROR. ** 00000390
40 *** ** 00000400
41 *** ERROP HANDLING- IF A MEMBER NAME IS NOT FOUND RAEMSG ** 00000410
42 *** IS CALLED TO WRITE A MESSAGE INDICATING THE ERROP. ** 00000420
43 *** ** 00000430
44 *** IF THE MEMBER CONTAINING THE NOT FOUND MESSAGE IS ** 70000440
45 *** ALSO NOT FOUND ADRRT IS SET. ** 00000450
46 *** IF AN I/O ERROR OCCURS ADRRT AND ADRNAME ARE SET. ** 00000460
47 *** SPECIAL TECHNIQUES- NONE ** 00000470
48 *** LIMITATIONS/ASSUMPTIONS- NONE ** 70000480
49 *** DATES OF CODING AND REVISIONS- ** 00000490
50 *** VERSION DATE REASON FOR VERSION ASSIGNMENT ** 00000500
51 *** 0 3/27/78 INITIAL DESIGN ** 70000510
52 *** ** 00000520
53 ***** 00000530
54 *** END PROLOGUE ** 700070547
55 *** ** 00000550
56 *** MODULE MARES ** 00000560
57 *** CALL RAEMSG TO WRITE ERROR MESSAGE ** 00000570
58 *** IF THE ERROR MESSAGE WAS NOT IN THE ERROR FILE ** 1 00000580
59 *** SET UP THE RAEMSG CALLING SEQUENCE TO WRITE ** 00000590
60 *** THE NOT FOUND MESSAGE ** 00000600
61 *** CALL RAEMSG TO WRITE THE MESSAGE ** 00000610
62 *** ENDIF ** 70007627
63 *** IF AN ERROR OCCURRED ** 3 00000630
64 *** SET ADRRT TO THE APPROPRIATE VALUE FOR A READ ** 00000640
65 *** OR WRITE ERROR OR MESSAGE NOT FOUND ** 00007650
66 *** ENDIF ** 4 00000660
67 *** ENDMODULE MARES ** 00000670
68 *** ** 70007687
69 *** END PDL ** 00000690

```

Figure 4-2. Prologue/PDL Report

AUTOMATED CODE AUDITOR
TEST PROCEDURE ANALYSIS

```

*****
* DD *--INIT *-----PARAMETER-----TEST CASES --
*PATH* CONSTR *          *1*2*3*4*5*6*7*8*
*****
* 1 *IF-TRUE * THE ERROR MESSAGE WAS NOT IN TH      * * * * *
* 2 *IF-FALSE* THE ERROR MESSAGE WAS NOT IN TH      * * * * *
* 3 *IF-TRUE * AN ERROR OCCURRED                     * * * * *
* 4 *IF-FALSE* AN ERROR OCCURRED                     * * * * *
*****
                MODULE= MARES          DATE= 10/26/78          PAGE 1
  
```

Figure 4-3. Test Specifications Chart

SECTION 5 - DIAGNOSTICS

Diagnostic messages generated by the Code Auditor are described in this section. Explanations of the probable cause and solutions are included in appropriate cases. The majority of these messages are related to analysis of Module Prologue and PDL.

<p>Message MA001: Error code xxxxx not in error message file.</p>	<p>Explanation: An attempt has been made to print diagnostic error message xxxxxx, which is not in the diagnostic error message file.</p>
<p>Message MA002: Number of diagnostic messages exceeds maximum number.</p>	<p>Explanation: More than 100 diagnostics have been generated. No more will be generated for the module currently being analyzed.</p>
<p>Message MA003: PDL code without a release.</p>	<p>Explanation: PDL code found without a release.</p>
<p>Message MA004: PDL code without a release.</p>	<p>Explanation: PDL code found without a release.</p>
<p>Message MA005: PDL code without a release.</p>	<p>Explanation: PDL code found without a release.</p>
<p>Message MA006: PDL code without a release.</p>	<p>Explanation: PDL code found without a release.</p>
<p>Message MA007: PDL code without a release.</p>	<p>Explanation: PDL code found without a release.</p>

ERROR
NUMBER

MESSAGE TEXT

EXPLANATION

ERROR NUMBER	MESSAGE TEXT	EXPLANATION
MA001 MA002	Invalid Control Card Keyword Invalid Module Name-Skipping to next dollar sign.	See Section 3.1 on control card format. A module name has been specified on a control card which is either less than two characters, more than eight characters, or contains an illegal character.
MA004	The following source module is empty, xxxxxx thus cannot be analyzed.	Input module xxxxxx contains no data.
MA005	Missing or invalid keyword on control card - skipping to next dollar sign.	See Section 3.1 on control card format. format.
MA007	Missing start control card: skipping to next dollar sign.	See Section 3.1 on control card format.
MA008	Missing TERM control card.	See Section 3.1 on control card format.
MA009	The following source module is not in the source PDS: xxxxxx	MODULE XXXXXX, specified to be an- alyzed, is not in the prologue/PDL library.
MA010	END PDL keyword not present: the entire PDL is presumed missing.	An example of PDL including the END PDL card appears in Figure 1-2.
MA011	IF keyword found before pre- decessor IF condition satisfied.	An IF keyword appears in PDL with- out a matching ENDIF.
MA012	DO-WHILE keyword found before predecessor DO-WHILE condition satisfied.	A DO-WHILE keyword has appeared in PDL without a matching ENDDO.
MA013	ENDDO found without a related DO-WHILE condition.	Self-explanatory
MA014	Number of diagnostic messages exceeds maximum number.	More than 100 diagnostics have been generated. No more will be generated for the module currently being analyzed.
MA015	Error code xxxxxx not in error message file	An attempt has been made to print diagnostic error message xxxxxx, which is not in the diagnostic error message library.

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MA016	Executive control table full-remainder of commands ignored.	More than 100 MODULE cards are in the control card file. The first 100 are recognized.
MA017	Control Cards were found beyond the TERM \$ card and will be ignored.	See Section 3.1 on control card format.
MA018	Source text contains too many statements	More than 1000 statements have been input for a module prologue/PDL. This module will not be analyzed.
MA020	Predecessor DO-CASE end not satisfied.	A DO-CASE keyword has appeared in PDL without a matching ENDCASE.
MA021	ORIF is not a valid PDL keyword	ORIF is a JOVIAL keyword, but is not valid in PDL.
MA022	PD Table overflow	The main table used in creating test specification charts has overflowed.
MA024	Input cards exceed maximum of 106 - excess cards will be ignored.	Self-explanatory
MA025	Card contains an asterisk in CC 3 with no accompanying prologue keywords.	All cards containing keywords have an asterisk in column 3.
MA026	END prologue keyword not present. The entire prologue is presumed missing	Figure 1-1 contains a sample Module prologue.
MA027	END PDL keyword not present.	The entire PDL is presumed missing. Figure 1-2 contains sample PDL including the END PDL card.
MA028	Prologue analysis aborted: END PDL appears before end prologue keyword.	Input Modules should consist of a prologue followed by PDL.
MA029	Prologue and PDL cards must have comment delimiters in columns 1,2,65 and 66.	Valid comment delimiters are: asterisks, the character C, or single quotes.
MA-031	Text missing - skipping to next major prologue keyword.	Prologue text should have appeared where indicated by this message. Figure 1-1 contains a sample module prologue.

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MA032	One or both of these keywords is/are missing: usage class or usage restrictions.	See Figure 1-1 for a sample module prologue.
MA033	Duplicate keyword (or misplaced line of asterisks)-skipping to next major prologue keyword.	Major prologue keywords are those beginning in column eight. Also, the line of asterisks which begins the identification section is considered a major keyword.
MA034	Missing Minor prologue keyword associated with previous major keyword or possibly a missing asterisk in CC 3-skipping to next major keyword.	Minor prologue keywords begin in columns other than eight. All module prologue cards containing keywords must have an asterisk in column three.
MA035	Not a major prologue keyword (or missing * in cc3)-skipping to next major keyword.	A major prologue keyword should have appeared at the location indicated. Major keywords begin in column 8. Additionally, the line of asterisks beginning the identification section is considered to be a major keyword.
MA036	The line of asterisks which begins the identification section was never found.	Self-explanatory
MA037	Limit of Prologue Matrix exceeded: Remainder of prologue will be ignored.	The prologue being analyzed contains duplicate keywords and text beyond reasonable limits. The portion of the prologue preceding this message will be analyzed.
MA038	There should be a line of asterisks immediately preceding 'end prologue'.	'END Prologue' refers to the END Prologue card.
MA039	Missing Minor keyword(s) in module identification section.	Minor keywords begin in columns other than eight. The only major keyword in the module identification section is the initial line of asterisks. Strange, but true.
MA040	Major Prologue keyword not locatable. Called By-	Self-explanatory
MA041	Major Prologue Keyword not locatable. Calls-	Self-explanatory
MA042	Major Prologue keyword not locatable. Core Requirements	Self-explanatory

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MA043	Major Prologue Keyword not locatable: Dates of Coding & Revisions-	Self-explanatory
MA044	Major Prologue Keyword not locatable: English name-	Self-explanatory
MA045	Major Prologue Keyword not locatable: Error handling-	Self-explanatory
MA046	Major Prologue Keyword not locatable: Input data	Self-explanatory
MA047	Major Prologue Keyword not locatable: Intermediate Data-	Self-explanatory
MA048	Major Prologue Keyword not locatable: Limitations/ Assumptions-	Self-explanatory
MA049	Major Prologue Keyword not locatable: Location.	Self-explanatory
MA050	Major Prologue Keyword not locatable - Method narrative-	Self-explanatory
MA051	Major Prologue Keyword not locatable: Module Type	Self-explanatory
MA052	Major Prologue Keyword not locatable: Output data-	Self-explanatory
MA053	Major Prologue Keyword not locatable: Purpose-	Self-explanatory
MA054	Major Prologue Keyword not locatable: Special Techniques	Self-explanatory
MA055	Major Prologue Keyword not locatable: Timing estimate-	Self-explanatory