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INTEGRATED INFORMATION SUPPORT SYSTEM (IISS) VOLUME 5

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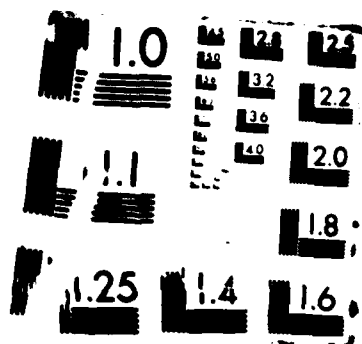
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**AFWAL-TR-86-4006  
Volume V  
Part 22**

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JUL 07 1987**



**INTEGRATED INFORMATION  
SUPPORT SYSTEM (IISS)  
Volume V - Common Data Model Subsystem  
Part 22 - NDML Precompiler Build Calls and Messages  
Product Specification**

**General Electric Company  
Production Resources Consulting  
One River Road  
Schenectady, New York 12345**

**Final Report for Period 22 September 1980 - 31 July 1985  
November 1985**

**Approved for public release; distribution is unlimited.**

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AIR FORCE WRIGHT AERONAUTICAL LABORATORIES  
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19 ABSTRACT (Continue on reverse if necessary and identify by block number)			
<p>↳ This document is the product specification establishing the design implementation of the IISS Configuration Item PRE10 which will generate code into a user's program which can communicate with other generated code and components of the distributed request processing architecture of IISS. → See p 1-1</p>			
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Integrated Information Support System (IISS)  
Vol V - Common Data Model Subsystem  
Part 22 - NDML Precompiler Build Calls and Messages  
Product Specification

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PREFACE

This product specification covers the work performed under Air Force Contract F33615-80-C-5155 (ICAM Project 6201). This contract is sponsored by the Materials Laboratory, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Gerald C. Shumaker, ICAM Program Manager, Manufacturing Technology Division, through Project Manager, Mr. David Judson. The Prime Contractor was Production Resources Consulting of the General Electric Company, Schenectady, New York, under the direction of Mr. Alan Rubenstein. The General Electric Project Manager was Mr. Myron Hurlbut of Industrial Automation Systems Department, Albany, New York.

Certain work aimed at improving Test Bed Technology has been performed by other contracts with Project 6201, performing integrating functions. This work consisted of enhancements to Test Bed software and establishment and operation of Test Bed hardware and communications for developers and other users. Documentation relating to the Test Bed from all of these contractors and projects have been integrated under Project 6201 for publication and treatment as an integrated set of documents. The particular contributors to each document are noted on the Report Documentation Page (DD1473). A listing and description of the entire project documentation system and how they are related is contained in document FTR620100001, Project Overview.

The subcontractors and their contributing activities were as follows:

TASK 4.2

<u>Subcontractors</u>	<u>Role</u>
Boeing Military Aircraft Company (EMAC)	Reviewer.
D. Appleton Company (DAGOM)	Responsible for IDEF support, state-of-the-art literature search.
General Dynamics/ Ft. Worth	Responsible for factory view function and information models.

<u>Subcontractors</u>	<u>Role</u>
Illinois Institute of Technology	Responsible for factory view function research (IITRI) and information models of small and medium-size business.
North American Rockwell	Reviewer.
Northrop Corporation	Responsible for factory view function and information models.
Pritsker and Associates	Responsible for IDEF2 support.
SofTech	Responsible for IDEFO support.

TASKS 4.3 - 4.9 (TEST BED)

<u>Subcontractors</u>	<u>Role</u>
Boeing Military Aircraft Company (EMAC)	Responsible for consultation on applications of the technology and on IBM computer technology.
Computer Technology Associates (CTA)	Assisted in the areas of communications systems, system design and integration methodology, and design of the Network Transaction Manager.
Control Data Corporation (CDC)	Responsible for the Common Data Model (CDM) implementation and part of the CDM design (shared with DACOM).
D. Appleton Company (DACOM)	Responsible for the overall CDM Subsystem design integration and test plan, as well as part of the design of the CDM (shared with CDC). DACOM also developed the Integration Methodology and did the schema mappings for the Application Subsystems.

<u>Subcontractors</u>	<u>Role</u>
Digital Equipment Corporation (DEC)	Consulting and support of the performance testing and on DEC software and computer systems operation.
McDonnell Douglas Automation Company (McAuto)	Responsible for the support and enhancements to the Network Transaction Manager Subsystem during 1984/1985 period.
On-Line Software International (OSI)	Responsible for programming the Communications Subsystem on the IBM and for consulting on the IBM.
Rath and Strong Systems Products (RSSP) (In 1985 became McCormack & Dodge)	Responsible for assistance in the implementation and use of the MRP II package (PIOS) that they supplied.
SofTech, Inc.	Responsible for the design and implementation of the Network Transaction Manager (NTM) in 1981/1984 period.
Software Performance Engineering (SPE)	Responsible for directing the work on performance evaluation and analysis.
Structural Dynamics Research Corporation (SDRC)	Responsible for the User Interface and Virtual Terminal Interface Subsystems.

Other prime contractors under other projects who have contributed to Test Bed Technology, their contributing activities and responsible projects are as follows:

<u>Contractors</u>	<u>ICAM Project</u>	<u>Contributing Activities</u>
Boeing Military Aircraft Company (BMAC)	1701, 2201, 2202	Enhancements for IBM node use. Technology Transfer to Integrated Sheet Metal Center (ISMC).

PS 620141258  
1 November 1985

<u>Contractors</u>	<u>ICAM Project</u>	<u>Contributing Activities</u>
Control Data Corporation (CDC)	1502, 1701	IISS enhancements to Common Data Model Processor (CDMP).
D. Appleton Company (DACOM)	1502	IISS enhancements to Integration Methodology.
General Electric	1502	Operation of the Test Bed and communications equipment.
Hughes Aircraft Company (HAC)	1701	Test Bed enhancements.
Structural Dynamics Research Corporation (SDRC)	1502, 1701, 1703	IISS enhancements to User Interface/Virtual Terminal Interface (UI/VTI).
Systran	1502	Test Bed enhancements. Operation of Test Bed.

TABLE OF CONTENTS

		<u>Page</u>
SECTION 1.0	SCOPE .....	1-1
1.1	Identification .....	1-1
1.2	Functional Summary .....	1-1
SECTION 2.0	DOCUMENTS .....	2-1
2.1	Reference Documents .....	2-1
2.2	Terms and Abbreviations .....	2-1
SECTION 3.0	REQUIREMENTS .....	3-1
3.1	Structural Description .....	3-1
3.2	Functional Flow .....	3-1
3.3	Interfaces .....	3-2
3.3.1	Inputs/Outputs .....	3-3
3.4	Program Interrupts .....	3-3
3.5	Timing and Sequencing Description ...	3-3
3.6	Special Control Features .....	3-4
3.7	Storage Allocation .....	3-4
3.7.1	Database Definition .....	3-4
3.7.1.1	File Description .....	3-4
3.7.1.2	Table Description .....	3-4
3.7.1.3	Item Description .....	3-4
3.8	Object Code Creation .....	3-4
3.9	Adaptation Data .....	3-4
3.10	Detail Design Description .....	3-5
3.10.1	Main Program List .....	3-5
3.10.2	Module List .....	3-7
3.10.3	External Routines List .....	3-9
3.10.4	Include File List .....	3-11
3.10.5	Where Include File Used List .....	3-13
3.10.6	Where External Routine Used List ..	3-21
3.10.7	Main Program Parts List .....	3-25
3.10.8	Module Documentation .....	3-27
3.10.9	Include File Description .....	3-49
3.10.10	Hierarchy Chart .....	3-69
3.11	Program Listings Comments .....	3-79
SECTION 4.0	QUALITY ASSURANCE PROVISIONS .....	4-1
4.1	Introduction and Definitions .....	4-1
4.2	Computer Programming and Test Evaluation .....	4-1

## SECTION 1

### SCOPE

#### 1.1 Identification

This specification establishes the design of Function PRE10, "Build Calls Messages into the Users AP", one of the major functions of the Configuration Item "Precompiler" to be built and formally accepted by the ICAM Program Office. This CI constitutes one of the subsystems of the Common Data Model Processor (CDMP).

#### 1.2 Functional Summary

The purpose of this Computer Program Configuration Item (CPCI) is to generate into the User Application process code to assemble tables and parameters needed by both the Distributed Request Supervisor and conceptual to external transformer to satisfy an NDML request. *Keywords: ICIP (Integrated Computer Product)*

The following functions will be performed by the CPCI: *(Manufacturing)*

1. Generate working storage for external schema variables to hold the ES results in the user specified structure or variables, and temporary conceptual schema variables necessary for the transformation.
2. Generate working storage variables to hold the precompile tables namely the Join Query Graph, Attribute Pair List, results table and conceptual schema Action List to satisfy the NDML request.
3. Generate Working Storage and Procedure Division statements for domain and assertion checks.
4. Generate Procedure Division statements to call the DRS, return with the results and call the conceptual to external transformer and move the ES results into the user variables or structure.

SECTION 2  
DOCUMENTS

2.1 Reference Documents

1. ICAM Documentation Standards: IDS15012000A, 28 December 1981.
2. D. Appleton Co., CDM Administrators Manual: UM620141000, March, 1984.
3. D. Appleton Co., CDM1-IDEF, Model of the Common Data Model: CCS620141000, 15 May, 1985.
4. D. Appleton Co., Computer Program Development Specification (DS) for ICAM Integrated Support System (IISS) Configuration Item: NDML Precompiler: DS620141200, October, 1984
5. D. Appleton Co., Embedded NDML Programmers Reference Manual: PRM620141200, March, 1985
6. Softech, Inc., NTM Programmers Guide: UM620140001, July 1984.
7. Control Data Corp., Computer Program Development Specification (DS) for ICAM Integrated Support System (IISS) Configuration Item: NDDL Command Processor: DS620141100, June 1985.

2.2 Terms and Abbreviations

Attribute Use Class: (AUC)

Conceptual Schema: (CS)

Common Data Model Processor: (CDMP)

Common Data Model: (CDM) Describes common data application process formats, form definitions, etc, of the IISS and includes conceptual schema, external, internal schemas, and schema transformation operators.

Data Field: (DF) An element of data in the external schema. It is by this name that an NDML programmer references

data.

Database Management System: (DBMS)

Distributed Request Supervisor: (DRS) This IISS CDM subsystem configuration item controls the execution of distributed NDML queries and non distributed updates.

Domain: A logical definition of legal attribute class values.

Domain Constraint: Predicate that applies to a single domain.

External Schema: (ES)

Forms: Structured views which may be imposed on windows or other forms. A form is composed of fields where each field is a form, item, or window.

Forms Processor: (FP) A set of callable execution time routines available to an application program for form processing.

Internal Schema: (IS)

Integrated Information Support System: (IISS) A test computing environment used to investigate, demonstrate and test the concepts of information management and information integration in the context of Aerospace Manufacturing. The IISS addresses the problems of integration of data resident on heterogeneous databases supported by heterogeneous computers interconnected via a local Area Network.

Mapping: The correspondence of independent objects in two schemas: ES to CS or CS to IS.

Network Transaction Manager: (NTM) Performs the coordination, communication and housekeeping functions required to integrate the application processes and system services resident on the various hosts into a cohesive system.

Neutral Data Manipulation Language: (NDML) A language developed by the IISS project to provide uniform access to common data, regardless of database manager or distribution criteria. It provides distributed retrieved and single node updates.

PS 620141258  
1 November 1985

ORACLE: Relational DBMS based on the SQL (Structured Query Language, a product of ORACLE Corp, Menlo Park, CA). The CDM is an ORACLE database.

Parcel: A sequential file containing sections of source code of the input Application Program.

Request Processor: (RP) A COBOL program that will satisfy a retrieval or update NDML subtransaction against a particular Database Management System.

User Interface: (UI) Controls the user's terminal and interfaces with the rest of the system.

Virtual Terminal Interface: (VTI) Performs the interfacing between different terminals and the UI. This is done by defining a specific set of terminal features and protocols which must be supported by UI software which constitutes the Virtual Terminal Definition. Specific terminals are then mapped against the Virtual Terminal software by specific software modules written for each type of real terminal supported.

SECTION 3  
REQUIREMENTS

3.1 Structural Description

The graphic portrayal of this CPCI is included in Section 3.10. This chart shows the hierarchical relationship of each module making up this CPCI.

This CPCI uses a number of lower level modules to handle specific operations such as:

1. Generate working storage for data definitions for Delete, Modify and Qualify data values (CDECWS).
2. Generate working storage for data definitions for insert values (CDP10E).
3. Generate working storage variables to hold ES results (CDP10F).
4. Generate the precompile tables needed by the Distributed Request Supervisor (DRS) into the Users AP, and Procedure division statements to move the results (CDP10B).
5. Generate the Working Storage and Procedure Division statements to perform domain and assertion verification (CDCONS).
6. Generate Procedure Division statements for transforming the external to conceptual and, if necessary, generate working storage if an algorithm was required to do the transformation (CDEC).
7. Control the processing logic to call routines to transform Working Storage and Procedure Division statements from conceptual to external (CDP10A).
8. Generate the final ES Results into user specified structure, variables or a file.

3.2 Functional Flow

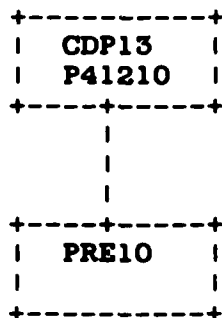
This CPCI implemented the logic defined in the Development

Specification for this CPCI. Details of inputs/outputs and relationships between modules are found in Section 3.10.

This CPCI has been designated to operate in a batch or interactive mode. It must operate in the system environment established for IISS; that is, the Network Transaction Manager. It currently can only be executed on the DEC VAX due to the dependence on the VAX sort although this can be changed for execution on the IBM.

### 3.3 Interfaces

The following diagram depicts the interface of this CPCI, PRE10 with other CPCI's in the system.



### 3.3.1 Inputs/Outputs

The following table depicts the inputs and outputs of this CPCI. A detailed description for each item can be found in the DS for this CPCI.

FUNCTION: PRE10

<u>INPUT</u>	<u>OUTPUT</u>
External Schema Action List	Module Status
External Schema Qualify List	
Conceptual Schema Action List	
Conceptual Schema Qualify List	
Internal Schema Action List	
Internal Schema Qualify List	
Join Query Graph	
JQG Attribute Pair List	
Results Field Table	
Subtrans Process ID table	
Code Generator Table	
ORACLE Log on Data Area	
IDfile Name	
FDFfile Name	
Working Storage File Name	
Procedure Division File Name	
Error File	
CS-ES Mod Name	
User View Abbreviation List	
ID Section Indicator	

### 3.4 Program Interrupts

Not applicable to the CPCI.

### 3.5 Timing and Sequencing Description

This CPCI is called for each NDML statement to generate calls to the Distributed Request Supervisor and/or Conceptual to External transformer, so the results may be returned in the manner the user specified.

### 3.6 Special Control Features

Not applicable to this CPCI.

### 3.7 Storage Allocation

#### 3.7.1 Database Definition

The database used by this CPCI is the Common Data Model (CDM) database. The model is defined by the GDM1, the IDEF-1 model of the CDM, Reference Document Number 3.

##### 3.7.1.1 File Description

No permanent files have been defined for this CPCI. It may use temporary scratch files for such things as input and results.

##### 3.7.1.2 Table Description

All tables used by this CPCI have been defined by the Development Specification for this CPCI.

##### 3.7.1.3 Item Description

Not applicable to this CPCI.

### 3.8 Object Code Creation

The object code for this CPCI will be created by the system integration team using defined IISS Software Configuration Management Procedures. This CPCI will use the COBOL language compiler.

### 3.9 Adaptation Data

This CPCI has been using ANSI COBOL language. The intent was to provide a transportable system. Any system environment supporting these languages, a virtual memory management schema, the COMM and NTM subsystems of IISS and the ORACLE Database Management System should be able to support this CPCI. Every possible attempt has been made to localize and identify any machine or environment dependent modules through the original design of the IISS and application of Configuration Management Procedures.

### 3.10 Detail Design Description

The following sections have been computer generated for this CPCI.

#### 3.10.1 Main Program List

The following is a list of all "Main Programs" which are modules that are not called by any other module being documented here. These modules are either program entry points or, if they are hooked into another set of programs via subroutine calls, they are the points the external programs can call and therefore enter through. To differentiate between the two types of entry points, look at the individual Module Documentation (section 3.10.8) and look at Module Type for each of the Main Program modules listed. Note whether the routine is a Program, Subroutine, or Function. If it is a Program, it is truly a main program entry point. If not, then it is merely called by other programs not being documented here.

PS 620141258  
1 November 1985

**BUILD CALLS AND MESSAGES Main Program List**

<b>Module Name</b> -----	<b>Purpose</b> -----
<b>CDP10</b>	<b>BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS</b>

PS 620141258  
1 November 1985

### 3.10.2 Module List

The following is a list of all the modules being documented here along with their purpose. Each module has a unique name, no matter what language it was written in.

**BUILD CALLS AND MESSAGES Module List**

<b>Module Name</b> -----	<b>Purpose</b> -----
<b>CDGONS</b>	<b>DOMAIN AND ASSERTION VERIFICATION MODULE</b>
<b>CDEC</b>	<b>GENERATES WS AND PROC DIV FOR DF FOR ES TO CS</b>
<b>CDECWS</b>	<b>ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL DATA VALUES</b>
<b>CDP10</b>	<b>BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS</b>
<b>CDP10A</b>	<b>GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES</b>
<b>CDP10B</b>	<b>GENERATED THE PRECOMPILE TABLES INTO THE USERS AP</b>
<b>CDP10C</b>	<b>GENERATE ES RESULTS INTO USER VARIABLES OR STRUCTURE</b>
<b>CDP10E</b>	<b>GENERATE ES/CS DATA DEFINITIONS FOR INSERT VALUES</b>
<b>CDP10F</b>	<b>GENERATE WORKING STORAGE VARIABLES TO HOLD ES RESULTS</b>
<b>CDUEMV</b>	<b>GENERATE EXTERNAL/CONCEPTUAL SCHEMA MOVE STATEMENTS</b>

PS 620141258  
1 November 1985

### 3.10.3 External Routines List

The following is a list of all routines or functions not documented here that are called by modules that are documented here. The first caller, in alphabetical order, is listed as well. The specification in which any module is documented may be found in the Module Documentation Index (Document Number CM 620100001). See section 3.10.6 for a list of the modules that call each of these external routines.

PS 620141258  
1 November 1985

**BUILD CALLS AND MESSAGES External Routines List**

<b>Module Name</b> -----	<b>First User</b> -----
CDMACR	CDP10A
CDPIC	CDP10F
ERRPRO	CDP10B
OBINDN	CDCONS
OCLOSE	CDEC
ODFINN	CDCONS
OEXEC	CDCONS
OFETCH	CDCONS
OOPEN	CDCONS
OSQL3	CDEC
RPTERR	CDCONS

#### 3.10.4 Include File List

The following is a list of all include files called in by modules being documented here. Each include file has a unique name regardless of the language being used. The purpose of each include file is listed as well. A more complete description of each include file is given in section 3.10.9. The purpose listed is the one that is in the source code of the include file.

A purpose of "\*\*\*\* PURPOSE NOT FOUND BY STRIPPER \*\*\*\*" indicates that a purpose statement was not written into the include file itself. The most common reason for this is that the include file comes from system libraries that were not developed by the project, such as 'C' libraries that are provided with the 'C' compiler.

See section 3.10.6 for a set of lists which show all the modules which call in each of these include files.

BUILD CALLS AND MESSAGES Include File List

File Name	Purpose
-----	-----
APL	JOIN QUERY ATTRIBUTE PAIR LIST
CGTABLE	CODE GENERATING TABLE- TRACKS ALL GENERATED SOFTWARE
CHKCDM	IISS CDM CHECK STATUS CODES
CSAL	CONCEPTUAL SCHEMA ACTION LIST
CSQUAL	CONCEPTUAL SCHEMA QUALIFY LIST
ERRCDM	IISS ERROR STATUS CODES FOR CDM MODULES
ERRPRO	PROCESS ERROR INCLUDE FILE
ESAL	EXTERNAL SCHEMA ACTION LIST
ESQUAL	EXTERNAL SCHEMA QUALIFY LIST
ISAL	INTERNAL SCHEMA ACTION LIST
ISQUAL	INTERNAL SCHEMA QUALIFY LIST
JQGTBL	JOIN QUERY GRAPH TELLS HOW TO CONNECT SUBTRANSACTIONS
LANGNO	SOURCE LANGUAGE VARIABLE
MACCALL	CALL THE MACRO COPY UTILITY
ORCLEDA	WS DEFINITION FOR THE ORACLE LOGIN AREA
RFTABLE	THE RESULT FIELD TABLE
SBSTLST	WS DEFINITION FOR THE SUBSTITUTION LIST TABLE
SUBPROC	SUBTRANSACTION PROCESSES ID TABLE
UVABBR	USER VIEW ABBREVIATION LIST

PS 620141258  
1 November 1985

**3.10.5 Where Include File Used List**

The following lists each include file from 3.10.4 and all the modules documented in this specification which include them. The purpose of each module is listed as well.

BUILD CALLS AND MESSAGES Where-include-file-used List

Include File -----	Module Name -----	Module Purpose -----
APL		
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10B	GENERATED THE PRECOMPILE TABLES INTO THE USERS AP
CGTABLE		
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10A	GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES
CHKCDM		
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10B	GENERATED THE PRECOMPILE TABLES INTO THE USERS AP
CSAL		
	CDCONS	DOMAIN AND ASSERTION VERIFICATION MODULE
	CDECWS	ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL DATA VALUES
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10A	GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES
	CDP10B	GENERATED THE PRECOMPILE TABLES INTO THE USERS AP
	CDP10F	GENERATE WORKING STORAGE VARIABLES TO HOLD ES RESULTS

BUILD CALLS AND MESSAGES Where-include-file-used List

Include File -----	Module Name -----	Module Purpose -----
	CDUEMV	GENERATE EXTERNAL/CONCEPTUAL SCHEMA MOVE STATEMENTS
CSQUAL		
	CDCONS	DOMAIN AND ASSERTION VERIFICATION MODULE
	CDECWS	ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL DATA VALUES
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10A	GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES
	CDUEMV	GENERATE EXTERNAL/CONCEPTUAL SCHEMA MOVE STATEMENTS
ERRCDM		
	CDCONS	DOMAIN AND ASSERTION VERIFICATION MODULE
	CDEC	GENERATES WS AND PROC DIV FOR DF FOR ES TO CS
	CDECWS	ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL DATA VALUES
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10A	GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES
	CDP10B	GENERATED THE PRECOMPILE TABLES INTO THE USERS AP
	CDP10C	GENERATE ES RESULTS INTO USER VARIABLES OR STRUCTURE
	CDP10E	GENERATE ES/CS DATA DEFINITIONS FOR INSERT VALUES
	CDP10F	GENERATE WORKING STORAGE VARIABLES TO HOLD ES RESULTS
	CDUEMV	GENERATE EXTERNAL/CONCEPTUAL SCHEMA MOVE STATEMENTS

**BUILD CALLS AND MESSAGES Where-include-file-used List**

<b>Include File</b>	<b>Module Name</b>	<b>Module Purpose</b>
-----	-----	-----
<b>ERRPRO</b>		
	<b>CDCONS</b>	<b>DOMAIN AND ASSERTION VERIFICATION MODULE</b>
	<b>CDEC</b>	<b>GENERATES WS AND PROC DIV FOR DF FOR ES TO CS</b>
	<b>CDECWS</b>	<b>ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL DATA VALUES</b>
	<b>CDP10</b>	<b>BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS</b>
	<b>CDP10A</b>	<b>GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES</b>
	<b>CDP10B</b>	<b>GENERATED THE PRECOMPILE TABLES INTO THE USERS AP</b>
	<b>CDP10C</b>	<b>GENERATE ES RESULTS INTO USER VARIABLES OR STRUCTURE</b>
	<b>CDP10E</b>	<b>GENERATE ES/CS DATA DEFINITIONS FOR INSERT VALUES</b>
	<b>CDP10F</b>	<b>GENERATE WORKING STORAGE VARIABLES TO HOLD ES RESULTS</b>
	<b>CDUEMV</b>	<b>GENERATE EXTERNAL/CONCEPTUAL SCHEMA MOVE STATEMENTS</b>
<b>ESAL</b>		
	<b>CDECWS</b>	<b>ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL DATA VALUES</b>
	<b>CDP10</b>	<b>BUILD CALLS AND MESSAGES .INTO THE USERS APPLICATION PROCESS</b>
	<b>CDP10A</b>	<b>GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES</b>
	<b>CDP10C</b>	<b>GENERATE ES RESULTS INTO USER VARIABLES OR STRUCTURE</b>
	<b>CDP10E</b>	<b>GENERATE ES/CS DATA DEFINITIONS FOR INSERT VALUES</b>

**BUILD CALLS AND MESSAGES Where-include-file-used List**

<b>Include File</b>	<b>Module Name</b>	<b>Module Purpose</b>
-----	-----	-----
	CDP10F	GENERATE WORKING STORAGE VARIABLES TO HOLD ES RESULTS
	CDUEMV	GENERATE EXTERNAL/CONCEPTUAL SCHEMA MOVE STATEMENTS
<b>ESQUAL</b>		
	CDECWS	ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL DATA VALUES
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10A	GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES
	CDUEMV	GENERATE EXTERNAL/CONCEPTUAL SCHEMA MOVE STATEMENTS
<b>ISAL</b>		
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10A	GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES
<b>ISQUAL</b>		
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10A	GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES
<b>JQGTBL</b>		

**BUILD CALLS AND MESSAGES Where-include-file-used List**

<b>Include File</b>	<b>Module Name</b>	<b>Module Purpose</b>
-----	-----	-----
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10B	GENERATED THE PRECOMPILE TABLES INTO THE USERS AP
<b>LANGNO</b>		
	CDGONS	DOMAIN AND ASSERTION VERIFICATION MODULE
	CDEC	GENERATES WS AND PROC DIV FOR DF FOR ES TO CS
	CDECWS	ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL DATA VALUES
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10A	GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES
	CDP10B	GENERATED THE PRECOMPILE TABLES INTO THE USERS AP
	CDP10C	GENERATE ES RESULTS INTO USER VARIABLES OR STRUCTURE
	CDP10E	GENERATE ES/CS DATA DEFINITIONS FOR INSERT VALUES
	CDP10F	GENERATE WORKING STORAGE VARIABLES TO HOLD ES RESULTS
	CDUEMV	GENERATE EXTERNAL/CONCEPTUAL SCHEMA MOVE STATEMENTS
<b>MACCALL</b>		
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10B	GENERATED THE PRECOMPILE TABLES INTO THE USERS AP

**BUILD CALLS AND MESSAGES Where-include-file-used List**

<b>Include File</b> -----	<b>Module Name</b> -----	<b>Module Purpose</b> -----
<b>ORCLEDA</b>		
	<b>CDCONS CDEC</b>	<b>DOMAIN AND ASSERTION VERIFICATION MODULE GENERATES WS AND PROC DIV FOR DF FOR ES TO CS</b>
	<b>CDP10</b>	<b>BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS</b>
	<b>CDP10A</b>	<b>GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES</b>
	<b>CDP10B</b>	<b>GENERATED THE PRECOMPILE TABLES INTO THE USERS AP</b>
<b>RFTABLE</b>		
	<b>CDP10</b>	<b>BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS</b>
	<b>CDP10B</b>	<b>GENERATED THE PRECOMPILE TABLES INTO THE USERS AP</b>
<b>SBSTLST</b>		
	<b>CDP10</b>	<b>BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS</b>
	<b>CDP10A</b>	<b>GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES</b>
	<b>CDP10B</b>	<b>GENERATED THE PRECOMPILE TABLES INTO THE USERS AP</b>
<b>SUBPROC</b>		

PS 620141258  
1 November 1985

**BUILD CALLS AND MESSAGES Where-include-file-used List**

<b>Include File</b> -----	<b>Module Name</b> -----	<b>Module Purpose</b> -----
	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10A	GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES
<b>UVABBR</b>	CDP10	BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDP10A	GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES

PS 620141258  
1 November 1985

**3.10.6 Where External Routine Used List**

The following lists each external function or routine listed in 3.10.3 and all the documented modules which call it. The purpose of each module is listed as well.

**BUILD CALLS AND MESSAGES Where-external-routine-used List**

<b>System Module</b> -----	<b>Module Name</b> -----	<b>Module Purpose</b> -----
<b>CDMACR</b>		
	<b>CDP10</b>	<b>BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS</b>
	<b>CDP10A</b>	<b>GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES</b>
	<b>CDP10B</b>	<b>GENERATED THE PRECOMPILE TABLES INTO THE USERS AP</b>
<b>CDPIC</b>		
	<b>CDCONS</b>	<b>DOMAIN AND ASSERTION VERIFICATION MODULE</b>
	<b>CDEC</b>	<b>GENERATES WS AND PROC DIV FOR DF FOR ES TO CS</b>
	<b>CDECWS</b>	<b>ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL DATA VALUES</b>
	<b>CDP10E</b>	<b>GENERATE ES/CS DATA DEFINITIONS FOR INSERT VALUES</b>
	<b>CDP10F</b>	<b>GENERATE WORKING STORAGE VARIABLES TO HOLD ES RESULTS</b>
<b>ERRPRO</b>		
	<b>CDCONS</b>	<b>DOMAIN AND ASSERTION VERIFICATION MODULE</b>
	<b>CDEC</b>	<b>GENERATES WS AND PROC DIV FOR DF FOR ES TO CS</b>
	<b>CDECWS</b>	<b>ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL DATA VALUES</b>
	<b>CDP10</b>	<b>BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS</b>
	<b>CDP10A</b>	<b>GENERATE THE TRANSFORMATION OF ES VALUES AND VARIABLES</b>
	<b>CDP10B</b>	<b>GENERATED THE PRECOMPILE TABLES INTO THE USERS AP</b>
	<b>CDP10C</b>	<b>GENERATE ES RESULTS INTO USER VARIABLES OR STRUCTURE</b>
	<b>CDP10E</b>	<b>GENERATE ES/CS DATA DEFINITIONS FOR INSERT VALUES</b>

**BUILD CALLS AND MESSAGES Where-external-routine-used List**

<b>System Module</b> -----	<b>Module Name</b> -----	<b>Module Purpose</b> -----
	CDP10F	GENERATE WORKING STORAGE VARIABLES TO HOLD ES RESULTS
	CDUEMV	GENERATE EXTERNAL/CONCEPTUAL SCHEMA MOVE STATEMENTS
<b>OBINDM</b>	CDCONS CDEC	DOMAIN AND ASSERTION VERIFICATION MODULE GENERATES WS AND PROC DIV FOR DF FOR ES TO CS
<b>OCLOSE</b>	CDCONS CDEC	DOMAIN AND ASSERTION VERIFICATION MODULE GENERATES WS AND PROC DIV FOR DF FOR ES TO CS
<b>ODFINM</b>	CDCONS CDEC	DOMAIN AND ASSERTION VERIFICATION MODULE GENERATES WS AND PROC DIV FOR DF FOR ES TO CS
<b>OEXEC</b>	CDCONS CDEC	DOMAIN AND ASSERTION VERIFICATION MODULE GENERATES WS AND PROC DIV FOR DF FOR ES TO CS
<b>OFETCH</b>	CDCONS CDEC	DOMAIN AND ASSERTION VERIFICATION MODULE GENERATES WS AND PROC DIV FOR DF FOR ES TO CS

PS 620141258  
1 November 1985

**BUILD CALLS AND MESSAGES Where-external-routine-used List**

<b>System Module</b> -----	<b>Module Name</b> -----	<b>Module Purpose</b> -----
<b>OOPEN</b>	<b>CDCONS CDEC</b>	<b>DOMAIN AND ASSERTION VERIFICATION MODULE GENERATES WS AND PROC DIV FOR DF FOR ES TO CS</b>
<b>OSQL3</b>	<b>CDCONS CDEC</b>	<b>DOMAIN AND ASSERTION VERIFICATION MODULE GENERATES WS AND PROC DIV FOR DF FOR ES TO CS</b>
<b>RPTERR</b>	<b>CDCONS</b>	<b>DOMAIN AND ASSERTION VERIFICATION MODULE</b>

PS 620141258  
1 November 1985

### 3.10.7 Main Program Parts List

The following lists each Main Program listed in 3.10.1 and all the modules which are called either by that module itself or by any of the documented modules which it calls. It is possible for a non-main module to be listed more than once if it is called by multiple modules. The called modules, in this case known as program parts, are marked as to whether they are documented here. If so, the phrase "well-defined module" appears by the module name, if not it is an "external routine". The Purpose of the Main Program module is listed as well.

BUILD CALLS AND MESSAGES Main Program Parts List

Main Pgm Name -----	Module Name -----	Module Type -----
CDP10		Purpose--> BUILD CALLS AND MESSAGES INTO THE USERS APPLICATION PROCESS
	CDCONS	Well-defined module
	CDEC	Well-defined module
	CDECWS	Well-defined module
	CDMACR	External routine
	CDP10A	Well-defined module
	CDP10B	Well-defined module
	CDP10C	Well-defined module
	CDP10E	Well-defined module
	CDP10F	Well-defined module
	CDPIC	External routine
	CDUEMV	Well-defined module
	ERRPRO	External routine
	OBINDN	External routine
	OCLOSE	External routine
	ODFINN	External routine
	OEXEC	External routine
	OFETCH	External routine
	OOPEN	External routine
	OSQL3	External routine
	RPTERR	External routine

### 3.10.8 Module Documentation

The following documentation describes information which is specific to each individual module being documented in this specification as listed in section 3.10.2. It provides a compact way of getting information that would be otherwise buried within each module's source code.

The specific items in this module documentation have the following meanings:

<b>NAME:</b>	Name of program Module.
<b>PURPOSE:</b>	Purpose of Module as detailed in the source code.
<b>LANGUAGE:</b>	Programming language source code is written in. The choices are: VAX-11 FORTRAN C (I/S-1 Workbench 'C') VAX-11 COBOL
<b>MODULE TYPE:</b>	Whether a Program, Subroutine, or Function.
<b>SOURCE FILE:</b>	Name of Source File from file specification.
<b>SOURCE FILE TYPE:</b>	Source File Extension from file specification.
<b>HOST:</b>	Whether this is a host-dependent routine (VAX or IBM) or blank if host-independent.
<b>SUBSYSTEM:</b>	IISS sub-system this file resides in.
<b>SUBDIRECTORY:</b>	Sub-directory of that subsystem in which this file resides.
<b>DOCUMENTATION GROUP:</b>	Name of documentation group of which this source file is a member.
<b>DESCRIPTION:</b>	A description of the module as obtained

PS 620141258  
1 November 1985

from the source code.

**ARGUMENTS:** The arguments with which this routine is called if it is a Subroutine or a Function.

**INCLUDE FILES:** A list of all the files that are included into this module as well as their purposes.

**ROUTINES CALLED:** Subroutines or Functions, either documented or external, called by this module, if any.

**CALLED DIRECTLY BY:** The documented routines which call this module, if any.

**USED IN MAIN PROGRAM(S):** The documented Main Programs which contain this module in their parts list according to the list in section 3.10.7.

The Module Documentation is arranged alphabetically according to Module Name.

BUILD CALLS AND MESSAGES Module Documentation

NAME: CDCONS  
PURPOSE: DOMAIN AND ASSERTION VERIFICATION MODULE  
LANGUAGE: VAX-11 COBOL  
MODULE TYPE: SUBROUTINE  
SOURCE FILE: CDCONS  
SOURCE FILE TYPE: .COB  
HOST:  
SUBSYSTEM: CDM  
SUBDIRECTORY:  
DOCUMENTATION GROUP: PS41258

DESCRIPTION:

ARGUMENTS:

-----  
LANG-NO = RECRD  
ORACLE-LDA = RECRD  
CS-ACTION-LIST = RECRD  
CS-QUALIFY-LIST = RECRD  
WORK-FILE-NAME = DSPLY [X(30)]  
PROC-FILE-NAME = DSPLY [X(30)]  
NEXT-PARAMETER-NO = DSPLY [999]  
ES-NDML-NO = DSPLY [999]  
ERROR-FILE = DSPLY [X(30)]  
RET-STATUS = DSPLY [X(5)]

INCLUDE FILES:

-----  
ERRCDM - IISS ERROR STATUS CODES FOR CDMP MODULES  
LANGNO - SOURCE LANGUAGE VARIABLE  
ORCLEDA - WS DEFINITION FOR THE ORACLE LOGIN AREA  
CSAL - CONCEPTUAL SCHEMA ACTION LIST  
CSQUAL - CONCEPTUAL SCHEMA QUALIFY LIST  
ERRPRO - PROCESS ERROR INCLUDE FILE

ROUTINES CALLED:

-----  
RPTERR

PS 620141258  
1 November 1985

CDPIC  
OOPEN  
OSQL3  
ODFINN  
OBINDN  
OEXEC  
OFETCH  
OCLOSE  
ERRPRO

CALLED DIRECTLY BY:

-----  
CDP10           - BUILD CALLS AND MESSAGES INTO THE USERS  
                  APPLICATION PROCESS

USED IN MAIN PROGRAM(S):

-----  
CDP10           - BUILD CALLS AND MESSAGES INTO THE USERS  
                  APPLICATION PROCESS

BUILD CALLS AND MESSAGES Module Documentation

NAME: CDEC  
PURPOSE: GENERATES WS AND PROC DIV FOR DF FOR ES  
TO CS  
LANGUAGE: VAX-11 COBOL  
MODULE TYPE: SUBROUTINE  
SOURCE FILE: CDEC  
SOURCE FILE TYPE: .COB  
HOST:  
SUBSYSTEM: CDM  
SUBDIRECTORY:  
DOCUMENTATION GROUP: PS41258

DESCRIPTION:

-----  
- THIS ROUTINE WILL GENERATE WORKING STORAGE  
-  
CODE WILL BE GENERATED INTO THE WORKING STORAGE

ARGUMENTS:

-----  
LANG-NO = RECRD  
WORK-FILE-NAME = DSPLY [X(30)]  
PROC-FILE-NAME = DSPLY [X(30)]  
ORACLE-LDA = RECRD  
NEXT-PARAMETER-NO = DSPLY [9(3)]  
CLIST-INDEX = DSPLY [99]  
ELIST-INDEX = DSPLY [99]  
ACTION-TYPE = DSPLY [X]  
ES-ACTION-TYPE = DSPLY [X]  
ES-NDML-NO = DSPLY [999]  
CS-NDML-NO = DSPLY [999]  
SEC-ID = DSPLY [X(30)]  
DI-ID = DSPLY [X(30)]  
VAR-OR-FILE-IND = DSPLY [X]  
RET-STATUS = DSPLY [X(5)]

INCLUDE FILES:

-----  
ERRCDM - IISS ERROR STATUS CODES FOR CDM MODULES  
LANGNO - SOURCE LANGUAGE VARIABLE  
ORCLEDA - WS DEFINITION FOR THE ORACLE LOGIN AREA  
ERRPRO - PROCESS ERROR INCLUDE FILE



BUILD CALLS AND MESSAGES Module Documentation

NAME: CDECWS  
PURPOSE: ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL  
DATA VALUES  
LANGUAGE: VAX-11 COBOL  
MODULE TYPE: SUBROUTINE  
SOURCE FILE: CDECWS  
SOURCE FILE TYPE: .COB  
HOST:  
SUBSYSTEM: CDM  
SUBDIRECTORY:  
DOCUMENTATION GROUP: PS41258

DESCRIPTION:

-----  
-  
EXTERNAL/CONCEPTUAL SCHEMA DATA DEFINITIONS  
FOR RUNTIME INSERT, MODIFY AND QUALIFY DATA VALUES  
-

CODE WILL BE GENERATED INTO THE WORKING STORAGE  
SECTION OF THE MODIFIED AP, DEPENDING ON THE  
CS-ACTION

THE FOLLOWING CODE WILL BE GENERATED :

01	CS-VAR-NDMLNO-NN	PIC TYPE(SIZE)[V9(ND)].
01	CSQ-VAR-NDMLNO-NN	PIC TYPE(SIZE)[V9(ND)].
01	ES-VAR-NDMLNO-NN	PIC TYPE(SIZE)[V9(ND)].
01	ESQ-VAR-NDMLNO-NN	PIC TYPE(SIZE)[V9(ND)].

WHERE NN IS EITHER THE CS-ES-PTR OR CSQ-ES-PTR  
OR CS-INDEX OR CSQ-INDEX.

ARGUMENTS:

-----  
LANG-NO = RECRD  
WORK-FILE-NAME = DSPLY [X(30)]  
CS-ACTION-LIST = RECRD  
CS-QUALIFY-LIST = RECRD  
ES-ACTION-LIST = RECRD  
ES-QUALIFY-LIST = RECRD  
RET-STATUS = DSPLY [X(5)]

PS 620141258  
1 November 1985

INCLUDE FILES:

-----  
ERRCDM - IISS ERROR STATUS CODES FOR CDMF MODULES  
LANGNO - SOURCE LANGUAGE VARIABLE  
CSAL - CONCEPTUAL SCHEMA ACTION LIST  
CSQUAL - CONCEPTUAL SCHEMA QUALIFY LIST  
ESAL - EXTERNAL SCHEMA ACTION LIST  
ESQUAL - EXTERNAL SCHEMA QUALIFY LIST  
ERRPRO - PROCESS ERROR INCLUDE FILE

ROUTINES CALLED:

-----  
CDPIC  
ERRPRO

CALLED DIRECTLY BY:

-----  
CDP10A - GENERATE THE TRANSFORMATION OF ES VALUES AND  
VARIABLES

USED IN MAIN PROGRAM(S):

-----  
CDP10 - BUILD CALLS AND MESSAGES INTO THE USERS  
APPLICATION PROCESS

**BUILD CALLS AND MESSAGES Module Documentation**

**NAME:** CDP10  
**PURPOSE:** BUILD CALLS AND MESSAGES INTO THE USERS  
APPLICATION PROCESS  
**LANGUAGE:** VAX-11 COBOL  
**MODULE TYPE:** SUBROUTINE  
**SOURCE FILE:** CDP10  
**SOURCE FILE TYPE:** .COB  
**HOST:**  
**SUBSYSTEM:** CDM  
**SUBDIRECTORY:**  
**DOCUMENTATION GROUP:** PS41258

**DESCRIPTION:**  
-----

GENERATES CODE INTO THE USERS APPLICATION PROGRAM REQUIRED  
TO PROCESS THE NDML REQUEST AT RUNTIME. THIS INCLUDES CODE  
TO ASSEMBLE TABLES AND PARAMETERS NEEDED BY THE DISTRIBUTED  
REQUEST SUPERVISOR TO SATISFY AN NDML REQUEST AND CODE TO  
RECEIVE THE RESULTS FROM THE REQUEST.

**ARGUMENTS:**  
-----

ES-ACTION-LIST = RECRD  
ES-QUALIFY-LIST = RECRD  
CS-ACTION-LIST = RECRD  
CS-QUALIFY-LIST = RECRD  
IS-ACTION-LIST = RECRD  
IS-QUALIFY-LIST = RECRD  
JQG = RECRD  
JQG-ATTRIBUTE-PAIR-LIST = RECRD  
RPT = RECRD  
SUBTRANS-PROCESS-ID-TABLE = RECRD  
CODE-GENERATOR-TABLE = RECRD  
ORACLE-LDA = RECRD  
IDFILE-NAME = DSPLY [X(30)]  
PDFILE-NAME = DSPLY [X(30)]  
WORKFILE-NAME = DSPLY [X(30)]  
PROCFILE-NAME = DSPLY [X(30)]  
ERROR-FILE = DSPLY [X(30)]

CS-ES-MOD-NAME = DSPLY [X(10)]  
SOURCE-LANGUAGE = DSPLY [X(10)]  
UV-ABBR-LIST = RECRD  
IOSECTION-INDICATOR = DSPLY [9]  
RETURN-STATUS = DSPLY [X(5)]

INCLUDE FILES:

-----  
ERRCDM - IISS ERROR STATUS CODES FOR CDMP MODULES  
CHKCDM - IISS CDMP CHECK STATUS CODES  
SBSTLST - WS DEFINITION FOR THE SUBSTITUTION LIST TABLE  
LANGNO - SOURCE LANGUAGE VARIABLE  
ESAL - EXTERNAL SCHEMA ACTION LIST  
ESQUAL - EXTERNAL SCHEMA QUALIFY LIST  
CSAL - CONCEPTUAL SCHEMA ACTION LIST  
CSQUAL - CONCEPTUAL SCHEMA QUALIFY LIST  
ISAL - INTERNAL SCHEMA ACTION LIST  
ISQUAL - INTERNAL SCHEMA QUALIFY LIST  
JQGTBL - JOIN QUERY GRAPH TELLS HOW TO CONNECT  
SUBTRANSACTIONS  
APL - JOIN QUERY ATTRIBUTE PAIR LIST  
RFTABLE - THE RESULT FIELD TABLE  
SUBPROC - SUBTRANSACTION PROCESSES ID TABLE  
CGTABLE - CODE GENERATING TABLE- TRACKS ALL GENERATED  
SOFTWARE  
UVABBR - USER VIEW ABBREVIATION LIST  
ORCLEDA - WS DEFINITION FOR THE ORACLE LOGIN AREA  
MACCALL - CALL THE MACRO COPY UTILITY  
ERRPRO - PROCESS ERROR INCLUDE FILE

ROUTINES CALLED:

-----  
CDP10C - GENERATE ES RESULTS INTO USER VARIABLES OR  
STRUCTURE  
CDP10A - GENERATE THE TRANSFORMATION OF ES VALUES AND  
VARIABLES  
CDP10B - GENERATED THE PRECOMPILE TABLES INTO THE USERS  
AP  
CDP10E - GENERATE ES/CS DATA DEFINITIONS FOR INSERT  
VALUES  
CDP10F - GENERATE WORKING STORAGE VARIABLES TO HOLD ES  
RESULTS  
CDGONS - DOMAIN AND ASSERTION VERIFICATION MODULE  
CDMACR  
ERRPRO

**BUILD CALLS AND MESSAGES Module Documentation**

**NAME:** CDP10A  
**PURPOSE:** GENERATE THE TRANSFORMATION OF ES VALUES  
AND VARIABLES  
**LANGUAGE:** VAX-11 COBOL  
**MODULE TYPE:** SUBROUTINE  
**SOURCE FILE:** CDP10A  
**SOURCE FILE TYPE:** .COB  
**HOST:**  
**SUBSYSTEM:** CDM  
**SUBDIRECTORY:**  
**DOCUMENTATION GROUP:** PS41258

**DESCRIPTION:**

-----  
-  
-

**ARGUMENTS:**

-----

LANG-NO = RECRD  
FD-FILE-NAME = DSPLY [X(30)]  
WORK-FILE-NAME = DSPLY [X(30)]  
PROC-FILE-NAME = DSPLY [X(20)]  
CS-ACTION-LIST = RECRD  
CS-QUALIFY-LIST = RECRD  
ES-ACTION-LIST = RECRD  
ES-QUALIFY-LIST = RECRD  
IS-ACTION-LIST = RECRD  
IS-QUALIFY-LIST = RECRD  
UV-ABBR-LIST = RECRD  
CODE-GENERATOR-TABLE = RECRD  
SUBTRANS-PROCESS-ID-TABLE = RECRD  
ORACLE-LDA = RECRD  
NEXT-PARAMETER-NO = DSPLY [999]  
ERROR-FILE = DSPLY [X(30)]  
RET-STATUS = DSPLY [X(5)]

**INCLUDE FILES:**

-----

PS 620141258  
1 November 1985

ERRCDM - IISS ERROR STATUS CODES FOR CDMF MODULES  
SBSTLST - WS DEFINITION FOR THE SUBSTITUTION LIST TABLE  
LANGNO - SOURCE LANGUAGE VARIABLE  
ORCLEDA - WS DEFINITION FOR THE ORACLE LOGIN AREA  
ESAL - EXTERNAL SCHEMA ACTION LIST  
ESQUAL - EXTERNAL SCHEMA QUALIFY LIST  
ISAL - INTERNAL SCHEMA ACTION LIST  
ISQUAL - INTERNAL SCHEMA QUALIFY LIST  
CSAL - CONCEPTUAL SCHEMA ACTION LIST  
CSQUAL - CONCEPTUAL SCHEMA QUALIFY LIST  
CGTABLE - CODE GENERATING TABLE- TRACKS ALL GENERATED  
SOFTWARE  
SUBPROC - SUBTRANSACTION PROCESSES ID TABLE  
UVABBR - USER VIEW ABBREVIATION LIST  
ERRPRO - PROCESS ERROR INCLUDE FILE

ROUTINES CALLED:

-----  
CDECWS - ES/CS DATA DEF FOR RT INSERT/MODIFY/QUAL DATA  
VALUES  
CDUEMV - GENERATE EXTERNAL/CONCEPTUAL SCHEMA MOVE  
STATEMENTS  
CDEC - GENERATES WS AND PROC DIV FOR DF FOR ES TO CS  
CDMACR  
ERRPRO

CALLED DIRECTLY BY:

-----  
CDP10 - BUILD CALLS AND MESSAGES INTO THE USERS  
APPLICATION PROCESS

USED IN MAIN PROGRAM(S):

-----  
CDP10 - BUILD CALLS AND MESSAGES INTO THE USERS  
APPLICATION PROCESS

PS 620141258  
1 November 1985

BUILD CALLS AND MESSAGES Module Documentation

NAME: CDP10B  
PURPOSE: GENERATED THE PRECOMPILE TABLES INTO THE  
USERS AP  
LANGUAGE: VAX-11 COBOL  
MODULE TYPE: SUBROUTINE  
SOURCE FILE: CDP10B  
SOURCE FILE TYPE: .COB  
HOST:  
SUBSYSTEM: CDM  
SUBDIRECTORY:  
DOCUMENTATION GROUP: PS41258

DESCRIPTION:

-----  
- GENERATE THE TRANSFER OF PRECOMPILE  
TABLES INTO THE USERS AP. THESE TABLES INCLUDE:  
JQG - JOIN QUERY GRAPH  
APL - ATTRIBUTE PAIR LIST  
RFT - RESULT FIELD TABLE  
CSAL - CONCEPTUAL SCHEMA ACTION LIST

-  
GENERATE WORKING STORAGE VARIABLES TO HOLD THE  
PRECOMPILE TABLES REQUIRED FOR THE NDML REQUEST. THEN  
POPULATE THESE VARIABLES WITH PRECOMPILED RESULTS  
REQUIRED FOR THE NDML REQUEST.

ARGUMENTS:

-----  
LANG-NO = RECRD  
WORKFILE-NAME = DSPLY [X(30)]  
PROCFE-NAME = DSPLY [X(30)]  
ES-NDML-NO = DSPLY [999]  
JQG = RECRD  
JQG-ATTRIBUTE-PAIR-LIST = RECRD  
RFT = RECRD  
CS-ACTION-LIST = RECRD  
ORACLE-LDA = RECRD  
RETURN-STATUS = DSPLY [X(5)]

INCLUDE FILES:

PS 620141258  
1 November 1985

-----  
ERRCDM - IISS ERROR STATUS CODES FOR CDMP MODULES  
CHKCDM - IISS CDMP CHECK STATUS CODES  
SBSTLST - WS DEFINITION FOR THE SUBSTITUTION LIST TABLE  
LANGNO - SOURCE LANGUAGE VARIABLE  
JQGTBL - JOIN QUERY GRAPH TELLS HOW TO CONNECT  
          SUBTRANSACTIONS  
APL - JOIN QUERY ATTRIBUTE PAIR LIST  
RFTABLE - THE RESULT FIELD TABLE  
CSAL - CONCEPTUAL SCHEMA ACTION LIST  
ORCLEDA - WS DEFINITION FOR THE ORACLE LOGIN AREA  
MACCALL - CALL THE MACRO COPY UTILITY  
ERRPRO - PROCESS ERROR INCLUDE FILE

ROUTINES CALLED:

-----  
CDMACR  
ERRPRO

CALLED DIRECTLY BY:

-----  
CDP10 - BUILD CALLS AND MESSAGES INTO THE USERS  
          APPLICATION PROCESS

USED IN MAIN PROGRAM(S):

-----  
CDP10 - BUILD CALLS AND MESSAGES INTO THE USERS  
          APPLICATION PROCESS

BUILD CALLS AND MESSAGES Module Documentation

NAME: CDP10C  
PURPOSE: GENERATE ES RESULTS INTO USER VARIABLES  
OR STRUCTURE  
LANGUAGE: VAX-11 COBOL  
MODULE TYPE: SUBROUTINE  
SOURCE FILE: CDP10C  
SOURCE FILE TYPE: .COB  
HOST:  
SUBSYSTEM: CDM  
SUBDIRECTORY:  
DOCUMENTATION GROUP: PS41258

DESCRIPTION:

-----  
-  
-

ARGUMENTS:

-----

LANG-NO = RECRD  
PROC-FILE-NAME = DSPLY [X(30)]  
ES-ACTION-LIST = RECRD  
CS-NDML-NO = DSPLY [999]  
RET-STATUS = DSPLY [X(5)]

INCLUDE FILES:

-----

ERRCDM - IISS ERROR STATUS CODES FOR CDMP MODULES  
LANGNO - SOURCE LANGUAGE VARIABLE  
ESAL - EXTERNAL SCHEMA ACTION LIST  
ERRPRO - PROCESS ERROR INCLUDE FILE

ROUTINES CALLED:

-----

ERRPRO



BUILD CALLS AND MESSAGES Module Documentation

NAME: CDP10E  
PURPOSE: GENERATE ES/CS DATA DEFINITIONS FOR  
INSERT VALUES  
LANGUAGE: VAX-11 COBOL  
MODULE TYPE: SUBROUTINE  
SOURCE FILE: CDP10E  
SOURCE FILE TYPE: .COB  
HOST:  
SUBSYSTEM: CDM  
SUBDIRECTORY:  
DOCUMENTATION GROUP: PS41258

DESCRIPTION:

-----  
-  
-

ARGUMENTS:

-----  
LANG-NO = RECRD  
ID-FILE-NAME = DSPLY [X(30)]  
FD-FILE-NAME = DSPLY [X(30)]  
WORK-FILE-NAME = DSPLY [X(30)]  
PROC-FILE-NAME = DSPLY [X(30)]  
ES-ACTION-LIST = RECRD  
ES-VALUE-USED = DSPLY [99]  
RET-STATUS = DSPLY [X(5)]

INCLUDE FILES:

-----  
ERRCDM - IISS ERROR STATUS CODES FOR CDMP MODULES  
LANGNO - SOURCE LANGUAGE VARIABLE  
ESAL - EXTERNAL SCHEMA ACTION LIST  
ERRPRO - PROCESS ERROR INCLUDE FILE

ROUTINES CALLED:

-----  
CDPIC

PS 620141258  
1 November 1985

ERRPRO

-----  
CALLED DIRECTLY BY:

-----  
CDP10 - BUILD CALLS AND MESSAGES INTO THE USERS  
APPLICATION PROCESS

-----  
USED IN MAIN PROGRAM(S):

-----  
CDP10 - BUILD CALLS AND MESSAGES INTO THE USERS  
APPLICATION PROCESS

BUILD CALLS AND MESSAGES Module Documentation

NAME: CDP10F  
PURPOSE: GENERATE WORKING STORAGE VARIABLES TO  
HOLD ES RESULTS  
LANGUAGE: VAX-11 COBOL  
MODULE TYPE: SUBROUTINE  
SOURCE FILE: CDP10F  
SOURCE FILE TYPE: .COB  
HOST:  
SUBSYSTEM: CDM  
SUBDIRECTORY:  
DOCUMENTATION GROUP: PS41258

DESCRIPTION:  
-----  
-

ARGUMENTS:  
-----

LANG-NO = RECRD  
CS-ACTION-LIST = RECRD  
ES-ACTION-LIST = RECRD  
FD-FILE-NAME = DSPLY [X(30)]  
WORK-FILE-NAME = DSPLY [X(30)]  
RET-STATUS = DSPLY [X(5)]

INCLUDE FILES:  
-----

ERRCDM - IISS ERROR STATUS CODES FOR CDM MODULES  
LANGMO - SOURCE LANGUAGE VARIABLE  
CSAL - CONCEPTUAL SCHEMA ACTION LIST  
ESAL - EXTERNAL SCHEMA ACTION LIST  
ERRPRO - PROCESS ERROR INCLUDE FILE

ROUTINES CALLED:  
-----

CDPIC  
ERRPRO



BUILD CALLS AND MESSAGES Module Documentation

NAME: CDUEMV  
PURPOSE: GENERATE EXTERNAL/CONCEPTUAL SCHEMA MOVE  
STATEMENTS  
LANGUAGE: VAX-11 COBOL  
MODULE TYPE: SUBROUTINE  
SOURCE FILE: CDUEMV  
SOURCE FILE TYPE: .COB  
HOST:  
SUBSYSTEM: GDM  
SUBDIRECTORY:  
DOCUMENTATION GROUP: PS41258

DESCRIPTION:

-----  
-  
-

ARGUMENTS:

-----  
LANG-NO = RECRD  
PROC-FILE-NAME = DSPLY [X(30)]  
CS-ACTION-LIST = RECRD  
CS-QUALIFY-LIST = RECRD  
ES-ACTION-LIST = RECRD  
ES-QUALIFY-LIST = RECRD  
RET-STATUS = DSPLY [X(5)]

INCLUDE FILES:

-----  
ERRCDM - IISS ERROR STATUS CODES FOR CDMF MODULES  
LANGNO - SOURCE LANGUAGE VARIABLE  
CSAL - CONCEPTUAL SCHEMA ACTION LIST  
CSQUAL - CONCEPTUAL SCHEMA QUALIFY LIST  
ESAL - EXTERNAL SCHEMA ACTION LIST  
ESQUAL - EXTERNAL SCHEMA QUALIFY LIST  
ERRPRO - PROCESS ERROR INCLUDE FILE

ROUTINES CALLED:

-----

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1 November 1985

ERRPRO

-----  
CALLED DIRECTLY BY:

CDP10A - GENERATE THE TRANSFORMATION OF ES VALUES AND  
VARIABLES

-----  
USED IN MAIN PROGRAM(S):

CDP10 - BUILD CALLS AND MESSAGES INTO THE USERS  
APPLICATION PROCESS

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1 November 1985

**3.10.9 Include File Descriptions**

The following list contains a purpose and description of each include file listed in 3.10.4 as specified in the source code. The language it is written in is also given.

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1 November 1985

**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: APL**  
**PURPOSE: JOIN QUERY ATTRIBUTE PAIR LIST**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**CONTAINS INFORMATION ABOUT THE JOIN  
ATTRIBUTES FOR NDML SUBTRANSACTIONS**

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: CGTABLE**  
**PURPOSE: CODE GENERATING TABLE- TRACKS ALL GENERATED SOFTWARE**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**CODE GENERATOR TABLE, HOLDS PERTINENT RESULTS  
ABOUT ALL CODE GENERATED OR MODIFIED BY THE  
PRECOMPILER  
NOTE: ROW 100 RESERVED FOR SWAPPING DURING SORTING.**

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME:** CHKCDM  
**PURPOSE:** IISS CDMP CHECK STATUS CODES  
**LANGUAGE:** VAX-11 COBOL

**DESCRIPTION:**

-----  
CONTAINS ALL STATUS CODES FOR THE  
CDMP MODULES

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: CSAL**  
**PURPOSE: CONCEPTUAL SCHEMA ACTION LIST**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**TABLE TO HOLD CONCEPTUAL DATA ABOUT THE REQUEST**

**\*\*\*\*\***

**THE CONCEPTUAL SCHEMA ACTION LIST**

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: CSQUAL**  
**PURPOSE: CONCEPTUAL SCHEMA QUALIFY LIST**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**CONTAINS CONCEPTUAL SCHEMA INFORMATION FOR  
THE REQUESTS QUALIFICATION**

**THE CONCEPTUAL SCHEMA QUALIFY LIST**

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: ERRCDM**  
**PURPOSE: IISS ERROR STATUS CODES FOR CDMP MODULES**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**

-----  
CONTAINS ALL ERROR CODES USED BY CDMP \*  
MODULES FOR ERROR HANDLING \*

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: ERRPRO**  
**PURPOSE: PROCESS ERROR INCLUDE FILE**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: ESAL**  
**PURPOSE: EXTERNAL SCHEMA ACTION LIST**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**CONTAINS THE EXTERNAL SCHEMA INFORMATION FOR AN  
NDML REQUEST**

**THE EXTERNAL SCHEMA ACTION LIST**

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: ESQUAL  
PURPOSE: EXTERNAL SCHEMA QUALIFY LIST  
LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**CONTAINS EXTERNAL SCHEMA INFORMATION FOR THE NDML  
QUALIFICATION**

**THE EXTERNAL SCHEMA QUALIFY LIST**

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: ISAL**  
**PURPOSE: INTERNAL SCHEMA ACTION LIST**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**CONTAINS INTERNAL SCHEMA INFORMATION ABOUT AN  
NDML REQUEST**

**THE INTERNAL SCHEMA ACTION LIST**

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: ISQUAL**  
**PURPOSE: INTERNAL SCHEMA QUALIFY LIST**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: JQGTBL**  
**PURPOSE: JOIN QUERY GRAPH TELLS HOW TO CONNECT**  
**SUBTRANSACTIONS**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: LANGNO**  
**PURPOSE: SOURCE LANGUAGE VARIABLE**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**CONTAINS THE VALUES FOR THE SOURCE LANGUAGE  
OF THE APPLICATION**

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: MACCALL**  
**PURPOSE: CALL THE MACRO COPY UTILITY**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**PARAGRAPHS TO SUBSTITUTE PARAMETERS FOR MACRO CALLS  
AND TO CALL "CDMACR" ROUTINE**

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: ORCLEDA**  
**PURPOSE: WS DEFINITION FOR THE ORACLE LOGIN AREA**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**THE ORACLE LOGON DATA AREA**

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1 November 1985

**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: RFTABLE**  
**PURPOSE: THE RESULT FIELD TABLE**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**CONTAINS CONCEPTUAL SCHEMA INFORMATION ABOUT  
THE RESULTS OF AN NDML REQUEST**

**THE RESULT FIELD TABLE**

**WHEN CHANGING THE STRUCTURE OF THIS TABLE  
BE SURE TO CHANGE THE LAYOUT IN THE  
LINKAGE SECTION OF THE DRS (CDS01)  
WHICH WAS COPIED FROM THIS.**

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: SBSTLST**  
**PURPOSE: WS DEFINITION FOR THE SUBSTITUTION LIST TABLE**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**SUBSTITUTION-LIST REPRESENTS THE INPUT TABLE  
OF SUBSTITUTION PARAMETERS FOR THE CDMACR  
MACRO EXPANSION SUBROUTINE**

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**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: SUBPROC**  
**PURPOSE: SUBTRANSACTION PROCESSES ID TABLE**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

**THIS TABLE MUST HAVE THE SAME NUMBER OF OCCURS  
AS THE RITABLE.INC SINCE THEY ARE PARALLEL  
TABLES.**

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1 November 1985

**BUILD CALLS AND MESSAGES Include File Description**

**FILE NAME: UVABBR**  
**PURPOSE: USER VIEW ABBREVIATION LIST**  
**LANGUAGE: VAX-11 COBOL**

**DESCRIPTION:**  
-----

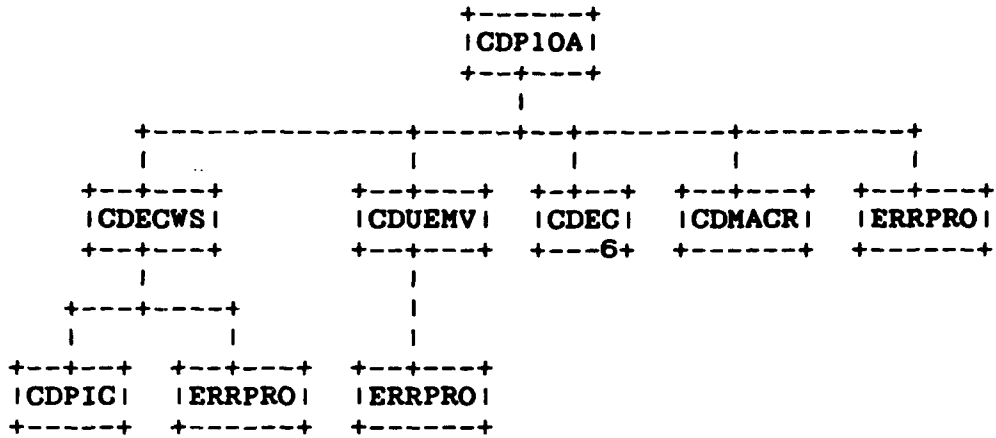
**CONTAINS THE ABBREVIATIONS FOR ALL USER  
VIEW REFERENCED IN THE NDML REQUEST**

### 3.10.10 Hierarchy Chart

The following hierarchy charts show the relationships between all of the modules mentioned in the above documentation. A module may call a subroutine several times within its code, but the call will only be shown once as a single relationship on this hierarchy chart. All modules shown at the top of the first page are considered Main Programs as described in section 3.10.1 above.

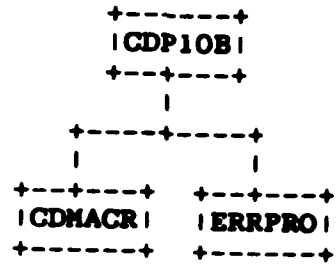
There is an internal paging scheme as marked by the numbers in the upper right corner of each page. An index after the last page of the chart shows where a routine and its calls are first defined. If a routine has no page reference, it either makes no calls or is an external routine. A continuation box on the end of a tree limb shows where that the tree continues on the page numbered mentioned. A number in a box with a routine name points to the page where the routine is further defined within the hierarchy tree. If there is no number in a box, the routine either makes no calls or is an external routine.





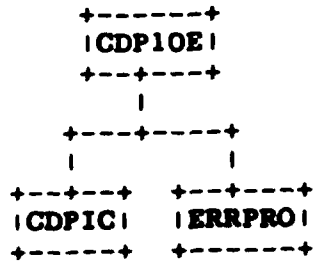
PS 620141258  
1 November 1985

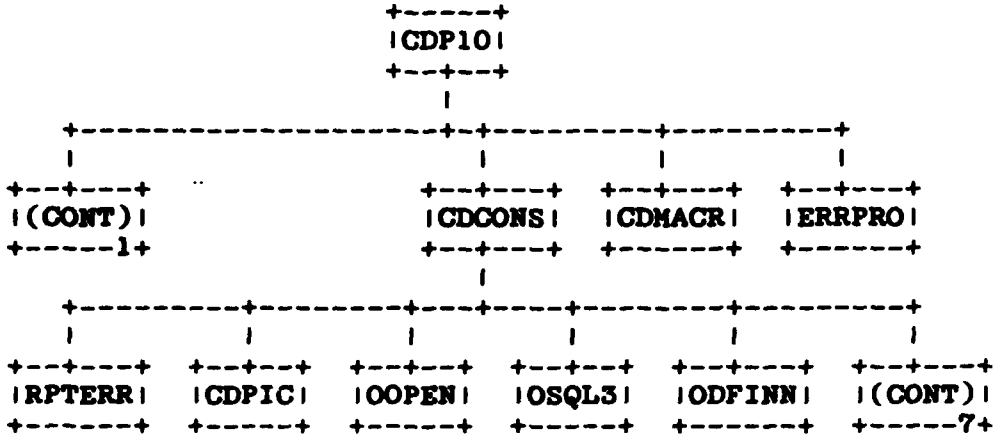
3



PS 620141258  
1 November 1985

4

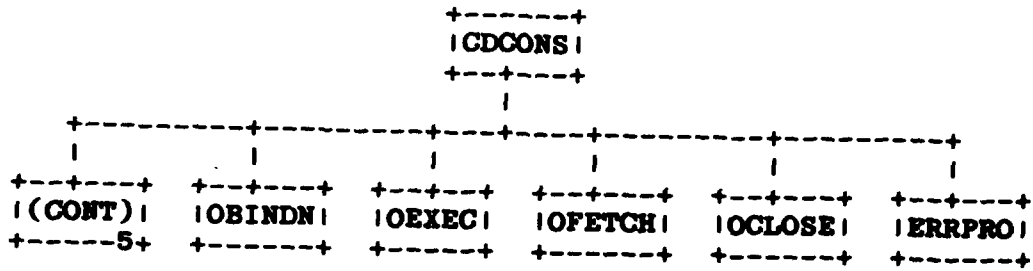


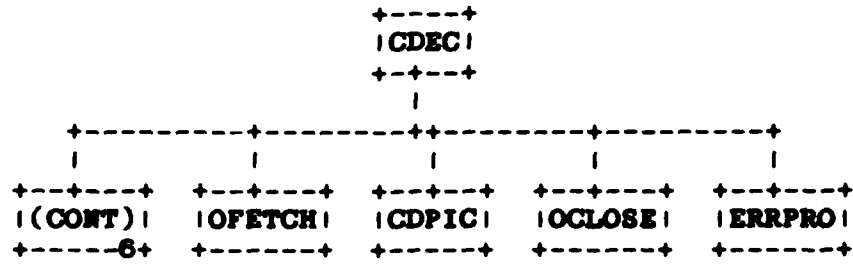


```
      +-----+  
      |CDEC|  
      +-----+  
      |  
+-----+  
|         |         |         |         |         |  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+  
|OOPEN| |OSQL3| |ODFINN| |OBINDN| |OEXEC| |(CONT)|  
+-----+ +-----+ +-----+ +-----+ +-----+ +-----8+
```

PS 620141258  
1 November 1985

7





PS 620141258  
1 November 1985

CDCONS.....5  
CDEC.....6  
CDECWS.....2  
CDMACR  
CDP10.....1  
CDP10A.....2  
CDP10B.....3  
CDP10C.....1  
CDP10E.....4  
CDP10F.....1  
CDPIC  
CDUENV.....2  
ERRPRO  
OBINDN  
OCLOSE  
ODFINN  
OEXEC  
OFETCH  
OOPEN  
OSQL3  
RPTERR

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1 November 1985

**3.11 Program Listings Comments**

This information is contained in the Module Descriptions in section 3.10.

## SECTION 4

### QUALITY ASSURANCE PROVISIONS

#### 4.1 Introduction and Definitions

"Testing" is a systematic process that may be preplanned and explicitly stated. Test techniques and procedures may be defined in advance, and a sequence of test steps may be specified. "Debugging" is the process of isolation and correction of the cause of an error.

"Antibugging" is defined as the philosophy of writing programs in such a way as to make bugs less likely to occur and when they do occur, to make them more noticeable to the programmer and the user. In other words, as much error checking as is practical and possible in each routine should be performed.

#### 4.2 Computer Programming Test and Evaluation

The quality assurance provisions for test consists of the normal testing techniques that are accomplished during the construction process. They consist of design and code walk-throughs, unit testing, and integration testing. These tests are performed by the design team. Structured design, design walk-through and the incorporation of "antibugging" facilitate this testing by exposing and addressing problem areas before they become coded "bugs."

END

DATE

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