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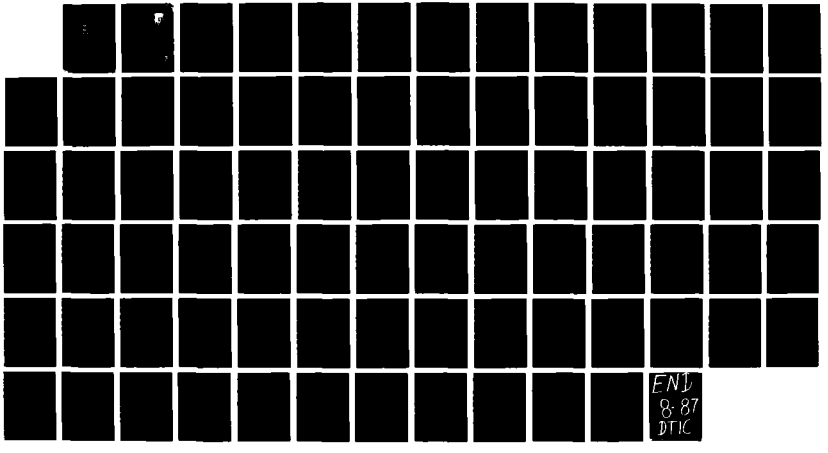

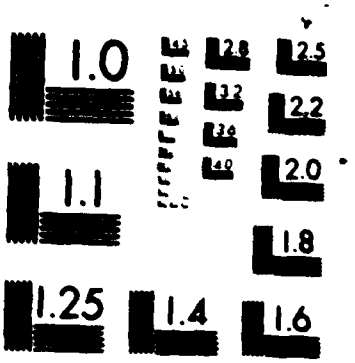

AFWAL-TR-86-4006
Volume VIII
Part 26

INTEGRATED INFORMATION SUPPORT SYSTEM (IISS)
Volume VIII - User Interface Subsystem
Part 26 - Rapid Application Generator User Manual

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

MATERIALS LABORATORY
AIR FORCE WRIGHT AERONAUTICAL LABORATORIES
AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AFB, OH 45433-6533

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This manual describes the Application Definition Language and the process used for translating textual definitions of interactive database applications into programs that access selected database information resident in the Common Data Model (CDM). These data are accessible through the IISS Neutral Data Manipulation Language. To generate an application, you must first use the Application Definition language to define the application. You then go through several runtime steps to generate the executable application program from the application definition. This manual describes the syntax of the language and how to run the application generator and produce the executable.

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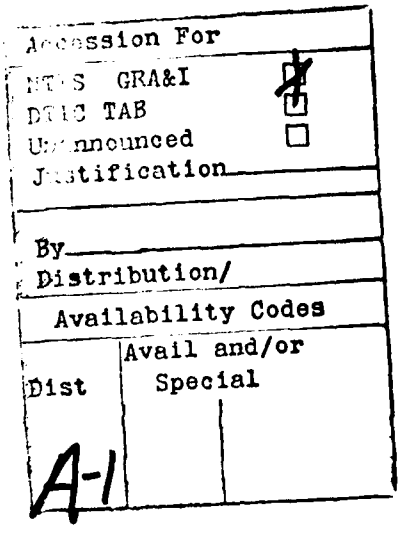

PREFACE

This user's manual 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

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

Subcontractors	Role
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 IDEF0 support.

TASKS 4.3 - 4.9 (TEST BED)

Subcontractors	Role
Boeing Military Aircraft Company (BMAC)	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.

Subcontractors	Role
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:

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

Contractors	ICAM Project	Contributing Activities
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.

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SECTION 1

INTRODUCTION

The Rapid Application Generator (RAP) is a tool for translating any textual definition of an interactive database application into the C and COBOL programs that are required to access selected data base information resident in the Common Data Model (CDM). These data are accessible through the Integrated Information Support System (IISS) Neutral Data Manipulation Language (NDML). To generate an application, you must first use the Application Definition Language (ADL) to define the application. You then go through several steps defined in Appendix A to generate the executable application program from the application definition.

Manual Objectives

The main objective of this manual is to describe the syntax of the ADL. Topics covered include:

- How to define an application.
- The syntax of the language
- How to run the application generator and produce the executable.

Intended Audience

The RAP is intended for use by application programmers in the IISS environment. Knowledge of User Interface forms, the CDM, and the Neutral Data Manipulation Language (NDML) is assumed.

Related Documents

The Form Editor User Manual describes how to define the User Interface forms. Information you should be familiar with includes:

- item, form and window fields
- repeating fields

The Form Processor User Manual explains several concepts you need to help you in defining and using forms for application software. These include:

- form hierarchies
- qualified names

The Neutral Data Manipulation Language User Manual describes the syntax of the NDML. This language provides the capability of communicating with the IISS testbed databases. You need to be familiar with the SELECT, DELETE, INSERT, and MODIFY commands of the NDML.

SECTION 2

DOCUMENTS

2.1 Reference Documents

[1] Structural Dynamics Research Corporation, IISS Rapid Application Generator Development Specification, DS 620144502 , 1 November 1985.

[2] Systran, ICAM Documentation Standards, 15 September 1983, IDS150120000C.

[4] Systran, User's Manual for the ICAM Integrated Support System (IISS) Neutral Data Manipulation Language (NDML), February, 1983.

[5] Systran, Implementation of Enhancements of NDML SELECT COMMAND, 25 July 1984, revised 9 September 1984.

[6] Systran, Discussion of Function Implementation NDML SELECT COMMAND, 25 July 1984, revised 4 September 1984.

This manual is one of a set of user manuals that together describe how to operate in the IISS environment. The complete set consists of the following manuals listed here for reference:

[1] Structural Dynamics Research Corporation, IISS Form Editor User Manual, UM 6201444400B, 1 November 1985.

Explains how to define and maintain electronic forms. It is intended to be used by programmers writing application programs that use the Form Processor.

[2] Structural Dynamics Research Corporation, IISS Form Processor User Manual, UM 620144200B, 1 November 1985.

Describes the set of callable execution time routines available to an application program to process electronic forms. It is intended to be used by programmers writing application programs for the IISS environment.

[3] Structural Dynamics Research Corporation, IISS Terminal Operator Guide, OM 620144000 , 1 November 1985.

Explains how to operate the generic IISS terminal when running an IISS application program. The IISS end user environment, function selection and some predefined applications are also described.

[4] Structural Dynamics Research Corporation, IISS Text Editor User Manual, UM 620144600B, 1 November 1985.

Explains how to use the file editing functions including: inserting, deleting, moving and replacing text.

[5] Structural Dynamics Research Corporation, IISS Rapid Application Generator User Manual, UM 620144502, 1 November 1985.

Describes the Application Definition Language and the process used for translating textual definitions of interactive database applications into programs that access selected data base information resident in the Common Data Model. This information is accessible through the IISS Neutral Data Manipulation Language.

[6] Structural Dynamics Research Corporation, IISS Report Writer User Manual, UM 620144501, 1 November 1985.

Describes the Report Definition Language and the process of creating a hard copy report of selected data base information resident in the Common Data Model. This information is accessible through the IISS Neutral Data Manipulation Language. This manual also describes the Hierarchical Report Writer which functions as a post processor to the initial report.

[7] Structural Dynamics Research Corporation, IISS Virtual Terminal User Manual, UM 620144300B, 1 November 1985.

Explains the program callable interface to the IISS Virtual Terminal. The callable routines, Virtual Terminal commands and the implementation of additional terminals are described. It is intended for application and system programmers working in the IISS environment.

2.2 Terms and Abbreviations

Application Definition Language: an extension of the Forms Definition Language that includes retrieval of database information and conditional actions. It is used to define interactive application programs.

Application Generator (AG), subset of the IISS User Interface that consists of software modules that generate IISS application code and associated form definitions based on a language input. The part of the AG that generates report programs is called the Report Writer. The part of the AG that generates interactive applications is called the Rapid Application Generator.

Application Interface: (AI), subset of the IISS User Interface that consists of the callable routines that are linked with applications that use the Form Processor or Virtual Terminal. The AI enables applications to be hosted on computers other than the host of the User Interface.

Application Process: (AP), a cohesive unit of software that can be initiated as a unit to perform some function or functions.

Attribute: field characteristic such as blinking, highlighted, black, etc. and various other combinations. Background attributes are defined for forms or windows only. Foreground attributes are defined for items. Attributes may be permanent, i.e., they remain the same unless changed by the application program, or they may be temporary, i.e., they remain in effect until the window is redisplayed.

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

Communication Services: allows on host interprocess communication and inter-host communication between the various Test Bed subsystems.

Communication Subsystem (COMM), IISS subsystem that provides communication services to the Test Bed and subsystems

Computer Program Configuration Item: (CPCI), an aggregation of computer programs or any of their discrete portions, which satisfies an end-use function.

Conceptual Schema: (CS), the standard definition used for all data in the CDM. It is based on IDEF1 information modelling.

Cursor Position: the position of the cursor after any command is issued.

Device Drivers: (DD), software modules written to handle I/O for a specific kind of terminal. The modules map terminal specific commands and data to a neutral format. Device Drivers are part of the UI Virtual Terminal.

Display List: is similar to the open list, except that it contains only those forms that have been added to the screen and are currently displayed on the screen.

External Schema: (ES), an application's view of the CDM's conceptual schema.

Field: two dimensional space on a terminal screen.

Field Pointer: indicates the ITEM which contains the current cursor position.

Form: structured view which may be imposed on windows or other forms. A form is composed of fields. These fields may be defined as forms, items, and windows.

Form Definition: (FD), forms definition language after compilation. It is read at runtime by the Form Processor.

Forms Definition Language: (FDL), the language in which electronic forms are defined.

Forms Driven Form Editor: (FDFE), subset of the FE which consists of a forms driven application used to create Form Definition files interactively.

Form Editor: (FE), subset of the IISS User Interface that is used to create definitions of forms. The FE consists of the Forms Driven Form Editor and the Forms Language Compiler.

Form Hierarchy: a graphic representation of the way in which forms, items and windows are related to their parent form.

Forms Language Compiler: (FLAN), subset of the FE that consists of a batch process that accepts a series of forms definition language statements and produces form definition files as output.

Form Processor: (FP), subset of the IISS User Interface that consists of a set of callable execution time routines available to an application program for form processing.

Form Processor Text Editor: (FPTE), subset of the Form Processor that consists of software modules that provide text editing capabilities to all users of applications that use the Form Processor.

IISS Function Screen: the first screen that is displayed after logon. It allows the user to specify the function he wants to access and the device type and device name on which he is working.

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 data bases supported by heterogeneous computers interconnected via a Local Area Network.

Item: non-decomposable area of a form in which hard-coded descriptive text may be placed and the only defined areas where user data may be input/output.

Logical Device: a conceptual device which to an application is indistinguishable from a physical device and is then mapped to part or all of a physical device.

Message: descriptive text which may be returned in the standard message line on the terminal screen. They are used to warn of errors or provide other user information.

Message Line: a line on the terminal screen that is used to display messages.

Network Transaction Manager: (NTM), IISS subsystem that 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), the command language by which the CDM is accessed for the purpose of extracting, deleting, adding, or modifying data.

Open List: a list of all the forms that have been and are currently open for an application process.

Operating System: (OS), software supplied with a computer which allows it to supervise its own operations and manage access to hardware facilities such as memory and peripherals.

Page: instance of forms in windows that are created whenever a form is added to a window.

Paging and Scrolling: a method which allows a form to contain more data than can be displayed with provisions for viewing any portion of the data buffer.

Physical Device: a hardware terminal.

Presentation Schema: (PS), may be equivalent to a form. It is the view presented to the user of the application.

Qualified Name: the name of a form, item or window preceded by the hierarchy path so that it is uniquely identified.

Rapid Application Generator: (RAP), part of the Application Generator that generates source code for interactive programs based on a language input.

Subform: a form that is used within another form.

Text Editor: (TE), subset of the IISS User Interface that consists of a file editor that is based on the text editing functions built into the Form Processor.

User Data: data which is either input by the user or output by the application programs to items.

User Interface: (UI), IISS subsystem that controls the user's terminal and interfaces with the rest of the system. The UI consists of two major subsystems: the User Interface Development System (UIDS) and the User Interface Management System (UIMS).

User Interface Development System: (UIDS), collection of IISS User Interface subsystems that are used by applications programmers as they develop IISS applications. The UIDS includes the Form Editor and the Application Generator.

User Interface Management System: (UIMS), the runtime UI. It consists of the Form Processor, Virtual Terminal, Application Interface, the User Interface Services and the Text Editor.

User Interface Monitor: (UIM), part of the Form Processor that handles messaging between the NTM and the UI. It also provides authorization checks and initiates applications.

User Interface Services: (UIS), subset of the IISS User Interface that consists of a package of routines that aid users in controlling their environment. It includes message management, change password, and application definition services.

User Interface/Virtual Terminal Interface: (UI/VTI), another name for the User Interface.

Virtual Terminal: (VT), subset of the IISS User Interface that 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 the 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.

Virtual Terminal Interface: (VTI), the callable interface to the VT.

Window: dynamic area of a terminal screen on which predefined forms may be placed at run time.

Window Manager: a facility which allows the following to be manipulated: size and location of windows, the device on which an application is running, the position of a form within a window. It is part of the Form Processor.

SECTION 3

APPLICATION DEFINITION LANGUAGE

The Application Definition Language (ADL) provides a very precise and flexible method for defining applications. It is an extension of the Form Definition Language that allows you to:

- Define the interactive environment that the application user will use to access the database (i.e., CDM data).
- Retrieve, delete, insert and modify the data in the database.
- Perform simple statistical calculations on the information such as counts, sums, and averages.

NOTE: Statistics are not available in Release 2.0.

3.1 ADL Format Notation

This manual uses the following notation to describe the syntax of the ADL.

UPPER-CASE	identifies reserved words that have specific meanings in the ADL. These words are generally required unless the portion of the statement containing them is itself optional.
lower-case	identifies names, numbers, or character strings that the user must supply.
Initial upper-case	identifies a statement or parameter that is defined later on.
_ Underscores	identify reserved words or portions of reserved words that are optional.
{ } Braces	enclosing vertically stacked options indicate that one of the enclosed options is required.
[ ] Brackets	indicate that the enclosed statement or parameter is optional. When two or more options are vertically stacked within the brackets, one or none of them may be specified.
... Ellipsis	indicates that the preceding statement or parameter may be repeated any number of times.

3.2 Application Definition Language Syntax

The complete ADL Syntax is listed in this section to show the structure of the language. The next section describes the characteristics and restrictions of the language statements.

Application Definition

```
CREATE APPLICATION application_name

     [ Form_Definition ] ...

     [ Condition_Definition ] ...
```

Form Definition

```
CREATE FORM form_name

     [ CONDITIONAL ]

     [ SIZE cols [ BY rows ] ]

     [ BACKGROUND { WHITE  } ]
                  { BLACK  }
     [ KEYPAD ( KEY n = function_name ... ) ]

     [ PROMPT Location prompt_string ] ...

     [ Field_Definition ] ...
```

Field Definition - Items

```
ITEM item_name [ Repeat_Spec ]

     [ Location ]

     [ SIZE cols [ BY rows ] ]

     [ VALUE {expression    } ]
             {INDEX(field_name)}
             {'._DATE'         }
             {'._TIME'         }

     [ NODUP ]

     DISPLAY AS { INPUT }
                { OUTPUT }
                { HIDDEN }
                { TEXT   }

     [ DOMAIN ([LEFT ] [UPPER] [ PICTURE picture_spec ])]
              [RIGHT] [LOWER]

              [ MUST ENTER ] [ MUST FILL ] [ NUMERIC ]
              [ MAXIMUM int ] [ MINIMUM int ]

     [ PROMPT Location prompt_string ...]

     [ HELP { string     } ]
            {form_name   }
            {APPLICATION}
```

Field Definition - Forms

```
FORM form_name [ Repeat Spec ]

     Location

     SIZE cols [ BY rows ]

     [ PROMPT Location prompt_string ] ...
```

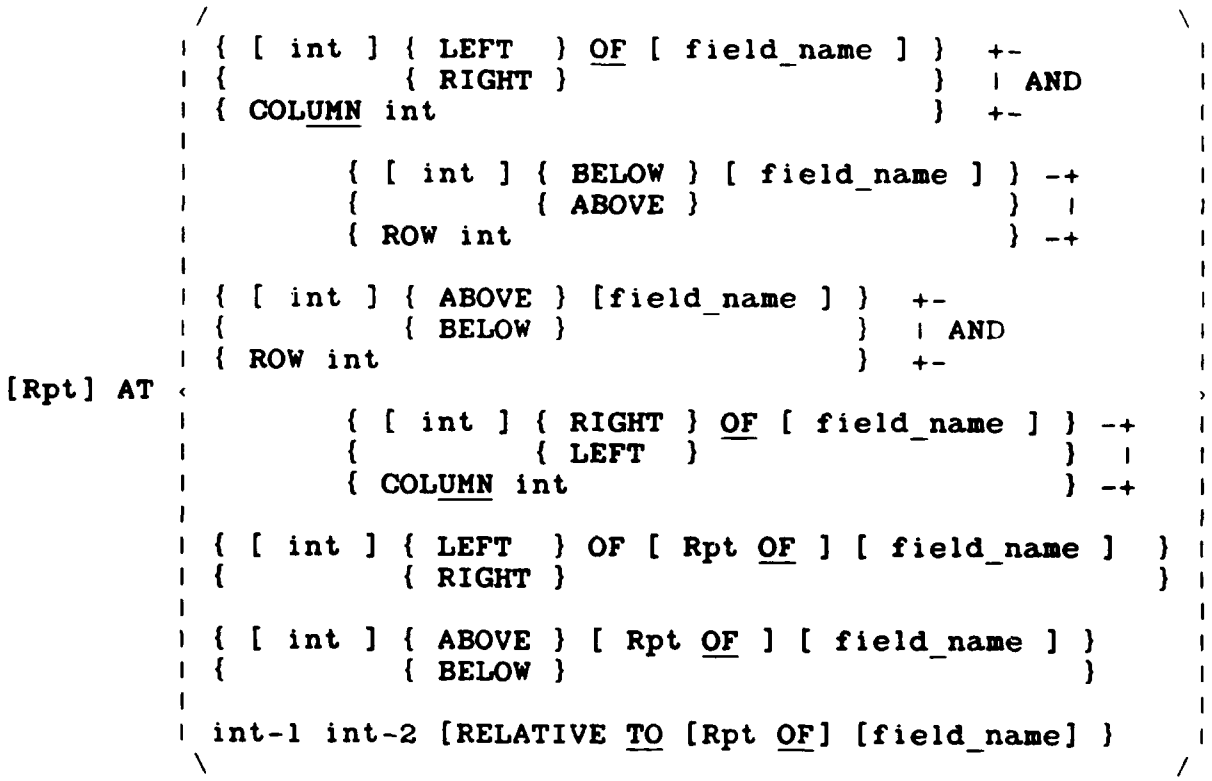
Field Definition - Windows

```
WINDOW window_name [ Repeat Spec ]

     Location

     SIZE int [BY int ]

     BACKGROUND { BLACK  }
                { WHITE  }

     [ PROMPT Location prompt_string ] ...
```

Repeat Spec

```
+--                                                              --+
| ({ * } { HORIZONTAL } [ WITH int SPACES ] [ , ... ] )          |
|  {int} { VERTICAL   }                                          |
+--                                                              --+
```

Location



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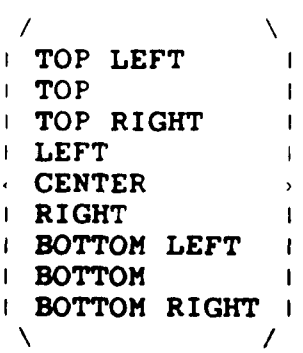


Condition Definition

```
                /                                                \
               | (OVERFLOW BY field_name) Condition_Action ...   |
               | (CHANGE item_name) Condition_Action ...         |
               | (item_field {= } value) Condition_Action ...    |
ON             <             {!=}                                >
               | [(PICK function_name) Condition_Action ...      |
               | [(PICK function_name & CURSOR IN field)         |
               |        Condition_Action ...                     |
               | (STARTUP) Condition_Action ...                  |
                \                                                /
```

Condition Action

```
               /                                \
              | PRESENT form_name [IN window ]   |
              | SET item_name = {string }        |
              |                 {integer}        |
              | HELP { string    }               |
              |      { form_name }               |
              < Delete_action                    >
              | Insert_action                    |
              | Modify_action                    |
              | Select_action                    |
              | EXIT                             |
               \                                /
```

Delete Action

```
DELETE FROM table WHERE Predicate
```

Insert Action

```
INSERT INTO  table (col_spec [...]) VALUES value_list
```

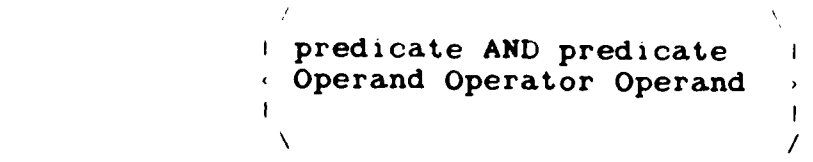
Modify Action

```
MODIFY table [USING table] SET column_assignment_list
       WHERE Predicate
```

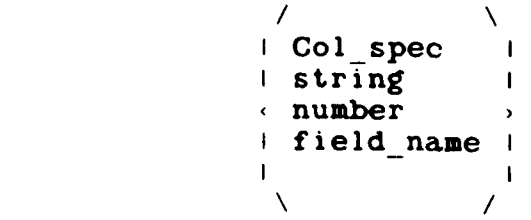
Select Action

```
SELECT qualified_name = col_spec ...
       [ DISTINCT ]
       [ FROM table [ abbreviation ] .... ]
       [ WHERE Predicate ]
       [ ORDER BY Col_spec { ASCENDING } ... ]
                           { DESCENDING}
       [ '{' select_action ... '}' ]
```

Predicate



Operand



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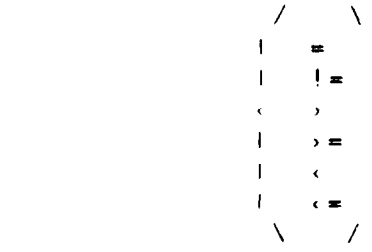

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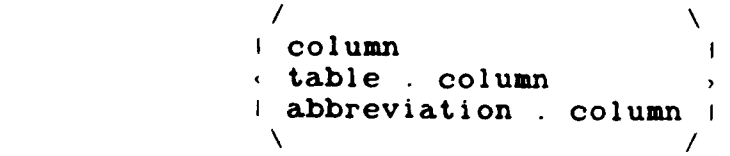


3.2.1 Application Definition Syntax

This section describes the characteristics and restrictions of the language statements.

The collection of ADL statements that define an application is an application definition. An application definition is created by writing ADL statements directly to an ADL source file with any text editor you might use to prepare a program source file. The ADL source file is processed by the Rapid Application Generator to produce an interactive application executable. The Form and Condition definitions may be written in any order.

The syntax for an application definition is:

```
CREATE APPLICATION application_name

[ Form_Definition ] ...

[ Condition_Definition ] ...
```

CREATE APPLICATION

Every application definition must begin with the CREATE APPLICATION statement. This tells the compiler that what follows is an application definition.

CREATE APPLICATION is the statement keyword.

application_name is a unique name of up to 10 letters and/or numbers associated with each application. An application_name is required. It cannot begin with a number and cannot be the same as any form name in the application definition. It is incorporated by the Rapid Application Generator into the Application name which is used to invoke the executable at run time. The exact form of the Application name created is system dependent and therefore the length of application_name

may be further restricted by the system you are running on.

Form_Definition

The Form_Definition portion(s) of an application definition define screens which application users will use to interact with the database. The forms may also describe the placement and formatting of retrieved data on the screen. Three types of information can be displayed: fixed textual information, database data and input received from the user at the terminal.

Condition_Definition

The Condition_Definition portion(s) of an application definition specify predefined actions that will occur as the result of user interaction with the software via the terminal. The interactions include: cursor positioning, function key selection, change of value in an item field or the occurrence of certain values in an item field. These user initiated events determine the course of execution of the software. The possible predefined actions that can be triggered by a user initiated event include: deletion of data in a table, insertion of data into a table, modification of data in a table, and selection of data.

NOTE: selection is available in release 2.0. Deletion, insertion and modification are not available in release 2.0.

3.2.2 Form Definition Syntax

Form definitions are used to define the physical layout of the terminal screen. They display selected data and allow for user interaction with the application.

The syntax for a form definition is:

```
CREATE FORM form_name

     [ CONDITIONAL ]

     [ SIZE cols  [ BY rows ] ]

     [ BACKGROUND { WHITE  } ]
                  { BLACK  }

     [ KEYPAD ( KEY n = function_name ... ) ]

     [ PROMPT Location prompt_string ] ...

     [ Field_Definition ] ...
```

CREATE FORM

Every form definition must begin with the CREATE FORM statement. This tells the compiler that what follows is a form definition. The end of a form definition is signalled by one of the following:

- another CREATE FORM statement
- an ON condition statement (Condition_Definition)

CREATE FORM	is the statement keyword.
form_name	is a unique name of up to 10 letters, and/or numbers associated with each form. You will use this name in specifying the qualified names for SELECT actions and condition definitions. A form_name is required and cannot begin with a number. The length of the form name may be further restricted by the system on which you are running.

CONDITIONAL

The CONDITIONAL clause allows you to specify that

the form only appears on the screen as a result of a PRESENT action of some ON condition.

CONDITIONAL — is the clause keyword.

SIZE

This clause determines the number of columns and rows the form will occupy when it is displayed. This clause is optional and if specified, when the form is displayed in a form or window field, the size of the form or window takes precedence. This means that the form will be "clipped" if the form size is larger than the size of the form or window it it displayed in. When the form size is smaller than the field size, the form will "grow" to fill the form or window field.

SIZE — is the clause keyword.

cols — is the width of the form. It is expressed as the number of columns it will occupy when displayed.

BY — is a reserved word that must be included when rows is specified. There must be a space before and after this word when used.

rows — is the height of the field. It is expressed as the number of rows it will occupy when displayed. This parameter is optional and defaults to one if not entered.

BACKGROUND

This clause allows you to define the background of the form. This is analogous to specifying what color of paper a paper form is printed on. This clause is optional. If it is omitted, the background of the form defaults to black.

BACKGROUND — is the clause keyword

WHITE	displays black characters on an opaque white background (sometimes known as reverse video).
BLACK	displays white characters on an opaque black background.

KEYPAD

This clause allows you to give a name to one of the terminal programmable function keys. This clause is optional.

KEYPAD	is the clause keyword.
KEY n	is the programmable function key. n can be any integer in the set {0,4 through 20}
function_name	is the name you choose to describe the function you are assigning to the key. The name can be a maximum of 10 alphabetic characters. You will use this name in ON PICK statements to specify the key that determines the action.

PROMPT

This clause allows you to specify fixed textual information such as titles and descriptions that will appear on the form. It is optional and may be repeated as many times as needed to specify the textual information.

PROMPT	is the clause keyword.
Location	describes where the text will be positioned on the form. The syntax is described in section 3.2.6 of this manual.
prompt_string	is the textual information to be displayed on the form and must be enclosed in double quotes ("text").

Field_Definition

Field definitions specify the fields a form contains. Forms can contain item, form and window fields. The information required to define a field is different for each field type.

3.2.3 Field Definition Syntax - Items

An item field is one that holds data. The application user can enter data into some item fields and the value entered may be used to determine the execution path of the application software. Item fields are also used to display database information by specifying the appropriate item fields when retrieving the information from the database. The syntax for an item field definition is:

```
ITEM item_name [ Repeat_Spec ]

     [ Location ]

     [ SIZE cols [ BY rows ] ]

     [ VALUE {string_constant   } ]
             {INDEX(field_name)}
             {'._DATE'          }
             {'._TIME'          }

     [ NODUP ]

     DISPLAY AS { INPUT }
                { OUTPUT }
                { HIDDEN }
                { TEXT   }

     [ DOMAIN ( [LEFT ] [UPPER] [ PICTURE picture_spec ])]
                [RIGHT] [LOWER]

                [ MUST ENTER ] [ MUST FILL ] [ NUMERIC ]
                [ MAXIMUM int ] [ MINIMUM int ]

     [ PROMPT Location prompt_string ...]

     [ HELP { string     } ]
            {form_name   }
            {APPLICATION}
```

ITEM

This statement specifies that the form contains a data field.

ITEM	is the statement keyword.
item_name	is a unique name of up to 10 letters, numbers, and/or underscores. It is used to specify where information selected from the database is to be stored. It is also used in ON Condition statements to specify the field whose value

triggers the Condition action. It is required and cannot begin with a number.

Repeat_Spec — specifies that the item appears on the form more than once. An item may repeat indefinitely, either horizontally or vertically, with m spaces between repetitions to form rows or columns. A repeat specification may be followed by another repeat to form two dimensional arrays of fields. The syntax for this parameter is described in section 3.2.7 of this manual.

Location

Location specifies where the first occurrence of the item field will be positioned on the containing form. When the item field is being used merely as a place holder and is not to be displayed, Location is not needed. The syntax for Location is described in section 3.2.6 of this manual.

SIZE

The SIZE clause determines the area on the form that each occurrence of the item occupies. This is specified by the width and height. An item may not overlap other fields or text and must be within the boundaries of its containing form. If the VALUE clause is included in the field definition, SIZE is optional for item fields. In this case, the width of the item defaults to the length of the string constant for the VALUE clause and the height is one. SIZE is also optional when the item field is being used as a place holder for a value not to be displayed.

SIZE	is the clause keyword.
cols	is the width of the field. It is expressed as the number of columns it occupies on the form.
BY	is a reserved word that must be included when rows is specified.
rows	is the height of the field. It is expressed as the number of rows it occupies on the form. It is optional and defaults to one if not entered.

VALUE

The VALUE clause allows you to specify a default value for the item field. This value is displayed on the screen. The VALUE clause is optional. If omitted the item is blank filled. If used to specify a default value and the SIZE clause is omitted from the field definition, the item is assumed to be one dimensional and its length is the number of characters in the string constant. When storing the date and time, the size of the item must be at least 9.

VALUE	is the clause keyword.
string_constant	is a character string enclosed in double quotes ("default value"). If the SIZE clause is included in the field definition, the length of the string constant must be no more than the total number of characters specified by the size. For example, if size is 4 by 3, then the string constant should be no more than 12 characters long. When entering default values for multi-dimensional fields, concatenate the values and they

will be split apart appropriately to fill the field. For example, if the size is 4 by 3 and the string constant is "****++++====", it will be displayed as

```
****
++++
====
```

INDEX(field_name) specifies that the value for this field is the name of the first displayed element of the array "field_name". The array must be on the same form as this item field and be enclosed in single quotes (i.e., INDEX('myfield')). If "myfield" is a two dimensional array, an example index would be "myfield(1,1)".

'._DATE' stores the current date in the item field. The format of the date is MM/DD/YY. The SIZE of the field must be at least 9.

'._TIME' stores the current time in the item field. The format of the time is HH:MM:SS. The SIZE of the field must be at least 9.

NODUP This clause optionally suppresses the output of unchanged item field values. For example, if the value of one item in an array is the same on several records, the records will be printed but only the first instance of the value will appear on the report.

DISPLAY AS

The DISPLAY AS clause controls access to the field and determines how the item value appears on the screen. This clause is required for every item field.

DISPLAY AS	is the clause keyword.
INPUT	means that the user may enter a value for this item and the value is echoed on the screen. The area where the user may type is highlighted on the form.
OUTPUT	means the value is data retrieved from the database and may not be entered by the user. It is displayed in bold type on screens that can display bold.
TEXT	is the same as OUTPUT but the value is not displayed in bold type.
HIDDEN	means that the user may enter a value for this item but the value is not echoed on the screen. This option is typically used for items of privileged information such as passwords. The area where the user may type is highlighted on the form.

DOMAIN

The DOMAIN clause allows you to reformat the value a user enters and specifies entry requirements and restrictions for the item field. This clause is optional. When included, the options may be entered in any order.

DOMAIN	is the clause keyword.
LEFT	is used to qualify input and output fields. It positions the value so that it begins in the leftmost position of the field. Any leading blanks are removed.

RIGHT	is used to qualify input and output fields. It positions the value so that it ends in the rightmost position of the field. The value is padded with leading blanks.

If neither LEFT nor RIGHT is specified, the value is stored in its original form.

UPPER	is used to qualify input and output fields. It converts all lower-case characters of a data value to upper-case.
LOWER	is used to qualify input and output fields. It converts all upper-case characters of a data value to lower-case.

If neither UPPER nor LOWER is specified, the data value remains in its original form.

MUST ENTER	is used to qualify input fields. It specifies that the user is required to enter a value for the item before the form can be processed by the application program.
MUST FILL	is used to qualify input fields. It specifies that the user is required to enter a value for the item and it must fill every position of the item. This option is typically used for items such as phone numbers or social security numbers.
NUMERIC	is used to qualify input fields. It specifies that only numbers will be accepted for the field value. If this option is not specified, all alphanumeric characters are accepted.

MAXIMUM int	is used to qualify input fields. It specifies that only numeric values will be accepted for the field and that the highest value is the number "int". The abbreviation "MAX" may be used for this option.
MINIMUM int	is used to qualify input fields. It specifies that only numeric values will be accepted for the field and that the lowest value is the number "int". The abbreviation "MIN" may be used for this option. If either MAX or MIN is specified, the field becomes NUMERIC. Both the MAX and MIN options may be specified to define a range of acceptable field values.
PICTURE	is used to qualify output fields. It allows you to define a COBOL format as the output format for the item data value. This includes numeric and alphanumeric specification, leading zero suppression, decimal placement, leading sign indicators, currency symbols, and placement of embedded commas.
picture_spec	is a COBOL picture specification (enclosed in double quotes) defining the specific output format desired.

PROMPT

The PROMPT clause allows you to specify textual information associated with the item field such as labels and instructions.

PROMPT	is the clause keyword.
Location	specifies where the information appears on the form. The syntax for Location is described in section 3.2.6.
prompt_string	is the textual information to be displayed on the form and must be enclosed in double quotes ("text").

HELP

The HELP clause allows you to specify help text that will be displayed during run time in response to a user request.

HELP	is the clause keyword.
string	is the text that you want to be displayed enclosed in double quotes.
form_name	is the name of the form that you want to be used to display the help text.
APPLICATION	is a reserved word that signifies how the processing of the HELP key will be handled by the application.

3.2.4 Field Definition Syntax - Forms

Form fields are used to incorporate a subform within a form. Form fields provide a convenient way to repeat groups of information on the screen. The syntax for a form field definition is:

```
FORM form_name [ Repeat_Spec ]

Location

SIZE cols [ BY rows ]

[ PROMPT Location prompt_string ] ...
```

FORM

This statement specifies that you are incorporating a form within the current form being defined. The form specified by this statement must be defined with its own form definition. The form definition must be in the current ADL source file.

FORM	is the statement keyword.
form_name	is a unique name of up to 10 letters and/or numbers. This form_name is the one used on the CREATE FORM statement to define this form. A form name is required and cannot begin with a number.
Repeat_Spec	specifies that the form appears on its containing form more than once. A form may repeat indefinitely either horizontally or vertically, with m spaces between repetitions to create rows or columns. That repeat specification may then be repeated to create two dimensional arrays of subforms. The syntax for this is described in section 3.2.7 of this manual.

Location

Location specifies the position of the first occurrence of the form. Repeating occurrences are then positioned relative to this occurrence based on the repeat specification. The Location syntax is described in section 3.2.6 of this manual

SIZE

The SIZE clause determines the area on its containing form that each occurrence of the subform may occupy. The top left character of the containing form becomes the origin of the first occurrence of the subform.

SIZE	is the clause keyword.
cols	is the width of the field. It is expressed as the number of columns it occupies on the form.
BY	is a reserved word that must be included when rows is specified.
rows	is the height of the field. It is expressed as the number of rows it occupies on the form. Rows is optional and defaults to one if not entered.

For form fields, the SIZE clause specifies the maximum space that this subform will occupy on its containing form. When a form contains a repeating field and the number of repetitions is unknown, you can define the size of the form to be open ended in the appropriate direction(s). This is done by using an asterisk (*) as the value for cols and/or rows. This means that some other factor such as the overflow of a fixed size form at a higher level will control the size of the openended form.

PROMPT

The PROMPT clause allows you to display fixed textual information associated with the form field such as labels and instructions.

PROMPT	is the clause keyword.
Location	specifies where to position the information on the form containing this form. The syntax for Location is described in section 3.2.6.
prompt_string	is the textual information to be displayed on the form. It must be enclosed in double quotes ("text").

3.2.5 Field Definition Syntax - Windows

Window fields are used as place holders on a form for subforms to be supplied by the Rapid Application Generator at run time. The syntax for a window field definition is:

```
WINDOW  window_name [ Repeat_Spec ]

Location

SIZE cols [ BY rows ]

[ PROMPT Location prompt_string ... ]
```

WINDOW

This statement specifies that you are defining a field on the form as a window. Its contents will be determined by the Rapid Application Generator at run time.

WINDOW	is the statement keyword.
window_name	is a unique name of up to 10 letters, numbers and/or underscores. This name cannot begin with a number or an underscore and is used by the Apliction Generator at run time to determine where to put subforms.
Repeat Spec	specifies that the window appears on the form more than once. A window may repeat, either horizontally or vertically, n times with m spaces between repetitions to form rows or columns. That repeat specification may then be repeated to form two dimensional arrays of fields.

Location

Location specifies the position of the first

occurrence of the window on the form. Repeating occurrences are then positioned relative to this occurrence based on the repeat specification. The Location syntax is described in section 3.2.6 of this manual.

SIZE

The SIZE clause determines the area on the form that each occurrence of the window may occupy. The top left character of the window field becomes the origin of any subforms it contains.

SIZE	is the clause keyword.
cols	is the width of the field. It is expressed as the number of columns it occupies on the form.
BY	is a reserved word that must be included if rows is specified.
rows	is the height of the field. It is expressed as the number of rows it occupies on the form. Rows is optional and defaults to one if not specified.

For window fields, the SIZE clause reserves the space on the host form for subforms to be supplied at run time. If a subform is bigger than the reserved window, it will be "clipped".

PROMPT

The PROMPT clause allows you to specify information associated with the field such as labels and instructions.

PROMPT	is the clause keyword.
Location	specifies where to position the information on the form containing the field. The syntax for Location is described in section 3.2.6 of this manual.

prompt_string	is the information to be displayed. It must be enclosed in double quotes ("prompt_string").

3.2.6 Location Syntax

Location specifies where fixed textual information and fields will be positioned on a form. Location may be absolute with respect to the origin of the form or relative to fields on the form. The origin of a form is at the top left corner with rows being positive down and columns positive to the right. Relative locations are especially useful for positioning text that is associated with fields. The syntax for location is:

```
                 /                                                          \
                 | { [ int ] { LEFT  } OF [ field_name ] }  +-              |
                 | {          { RIGHT }                   }  | AND         |
                 | { COLUMN int                           }  +-              |
                 |                                                          |
                 |        { [ int ] { BELOW } [ field_name ] } -+           |
                 |        {         { ABOVE }                 }  |           |
                 |        { ROW int                           } -+           |
                 |                                                          |
                 | { [ int ] { ABOVE } [field_name ] }  +-                  |
                 | {         { BELOW }               }  | AND               |
                 | { ROW int                         }  +-                  |
[Rpt] AT         <                                                          >
                 |        { [ int ] { RIGHT } OF [ field_name ] } -+        |
                 |        {         { LEFT  }                   }  |        |
                 |        { COLUMN int                         } -+        |
                 |                                                          |
                 | { [ int ] { LEFT  } OF [ Rpt OF ] [ field_name ]  }      |
                 | {         { RIGHT }                               }      |
                 |                                                          |
                 | { [ int ] { ABOVE } [ Rpt OF ] [ field_name ] }          |
                 | {         { BELOW }                          }           |
                 |                                                          |
                 | int-1 int-2 [RELATIVE TO [Rpt OF] [field_name] }         |
                 \                                                          /
```

When defining relative locations, field reference points are used. Figure 3-1 shows the nine possible reference points that a field can have.

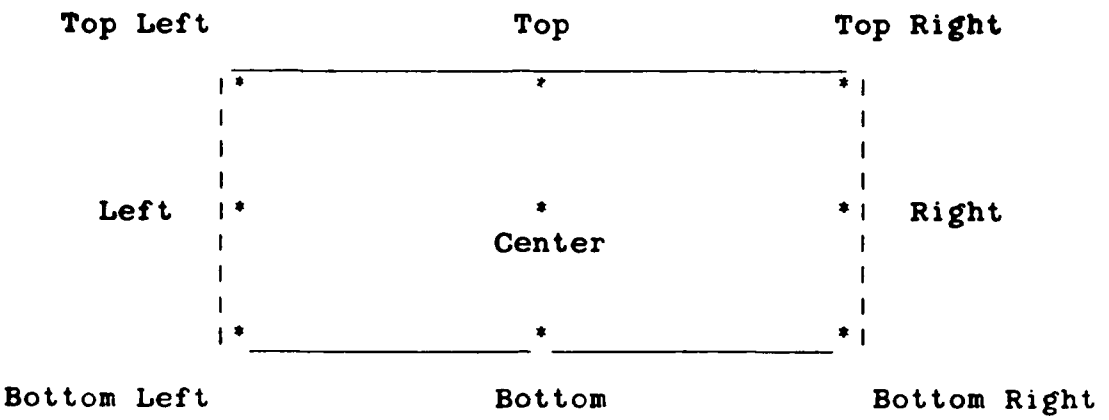


Figure 3-1 Field Reference Points

Each of the reference points represents a character. This means that if you have a one character field, all nine points are the same.

The syntax for the Rpt is:

```
/              \
| TOP LEFT      |
| TOP           |
| TOP RIGHT     |
| LEFT          |
< CENTER        >
| RIGHT         |
| BOTTOM LEFT   |
| BOTTOM        |
| BOTTOM RIGHT  |
\              /
```

When positioning text and fields, they must be contained within the boundaries of the containing form and cannot overlap other fields or text. Column one of a form must always be blank and there must be one blank space between an item field and any text. For example:

text: _____

is legal and

text:_____

is illegal.

The following sections describe and show how to use the location syntax to position fields. The syntax is basically the same for positioning text. # represents the form origin and * represents the default field reference point.

Absolute Location

An absolute location positions the first character of a text string or a reference point of a field at the intersection of row (n) and column (m) with respect to the form origin. Both coordinates must be given. When positioning a field, the default reference point is the top left if the reference point is not given.

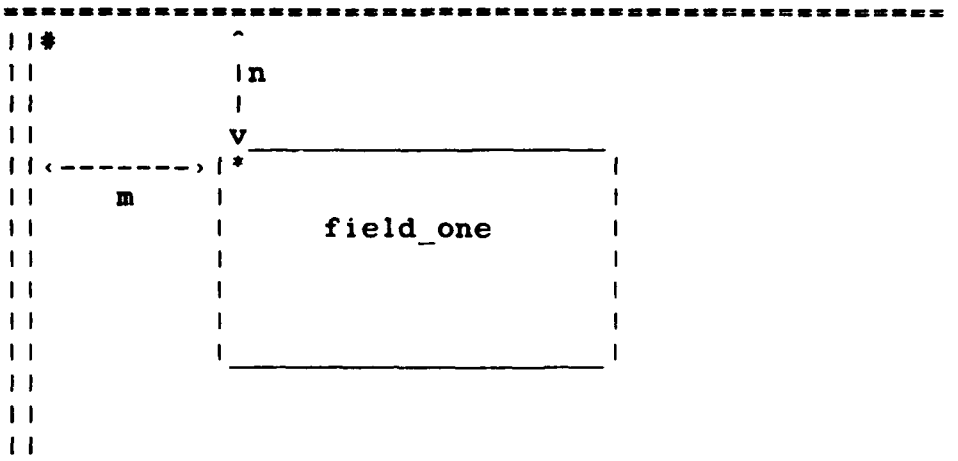


Figure 3-2 Absolute Location

The reference point of field_one (*) is positioned at the intersection of row n and column m. To position field_one as shown, you would use the location syntax:

[Rpt] AT COLUMN int AND ROW int

or

[Rpt] AT ROW int AND COLUMN int

or

[Rpt] AT int-1 int-2 [RELATIVE TO [Rpt OF] field_name]]

where int-1 is the row and int-2 is the column. Some valid Locations are:

TOP LEFT AT COL m AND ROW n

TOP LEFT AT n m

AT n m

Relative Location

The reference point of a field can be positioned at a point that is relative to the reference point of another field on the form. If a specific reference point for either of the fields is not given, the default is the top left.

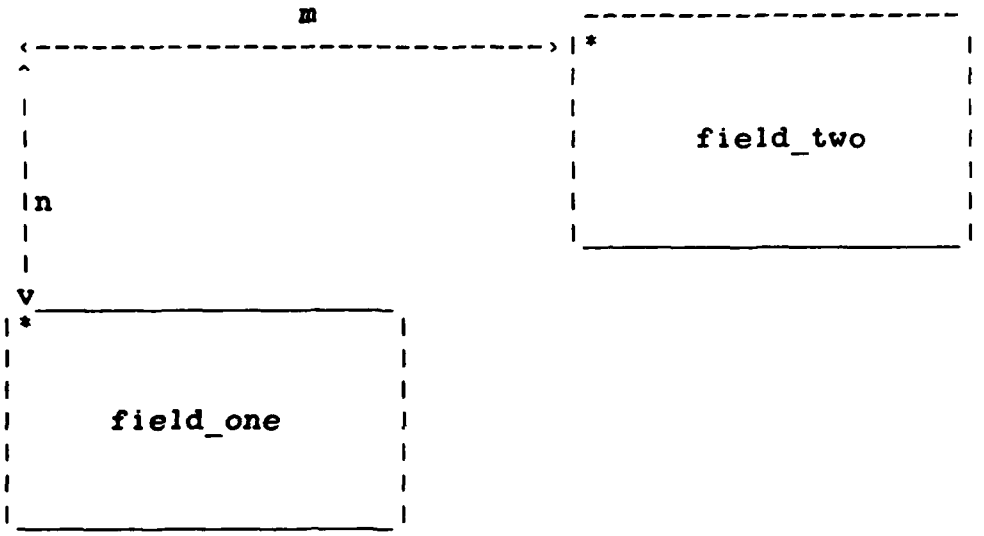


Figure 3-3 Relative Location

The reference point of field_two is positioned at row n and column m relative to the reference point of field_one. To position field_two as shown, you would use the location syntax:

[Rpt] AT int-1 int-2

where int-1 is the row and int-2 is the column. Some valid Locations are:

TOP LEFT AT -n m RELATIVE TO TOP LEFT OF field_one

AT -n m RELATIVE TO field_one

Relative Location (Above/Below)

The reference point of a field can be positioned n rows above or below the reference point of another field on the form. If reference points are not given for either of the fields, the default reference points are as shown by the *'s.

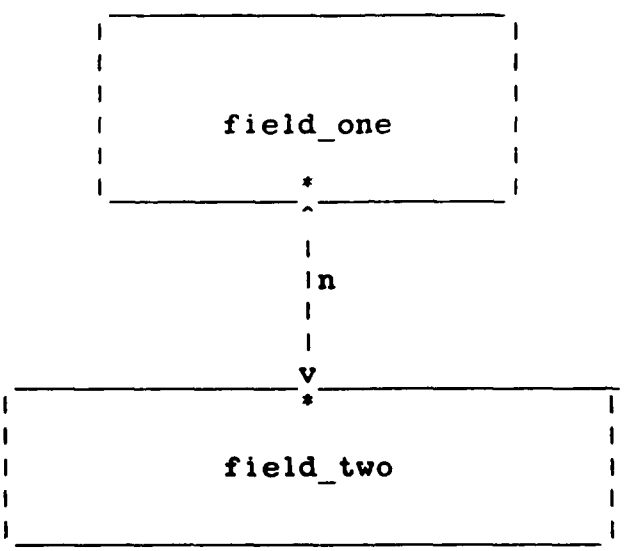


Figure 3-4 Relative Location (Above/Below)

The reference point of field_two is positioned n rows below the reference point of field_one. To position field_two as shown, you would use the location syntax:

```
[ Rpt ] AT [int] { ABOVE } [ Rpt OF ] [field_name]
                 { BELOW }
```

Some valid Location clauses are:

TOP AT n BELOW BOTTOM OF field_one

AT n BELOW field_one

Using the ABOVE keyword, you can position the reference point of field_one n rows above the reference point of field_two. Some valid Locations are:

BOTTOM AT n ABOVE TOP OF field_two

AT n ABOVE field_two

Relative Location (Right/Left)

The reference point of a field can be positioned m columns right or left of the reference point of another field on the form. If reference points are not given for either of the fields, the default points are as shown by the *'s.

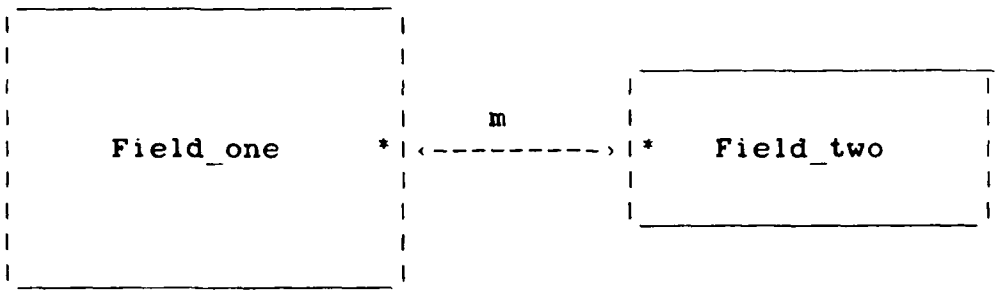


Figure 3-5 Relative Location (Right/Left)

The reference point (Rpt) of field_one is m columns to the left of the field_two reference point or the field_two reference point is m columns to the right of the field_one reference point. To position the fields as shown, you would use the location syntax:

[Rpt] AT [int] { LEFT } OF [Rpt OF] [field_name]
{ RIGHT}

Some valid Locations are:

RIGHT AT m LEFT OF LEFT OF field_two

AT m LEFT OF LEFT OF field_two

LEFT AT m RIGHT OF RIGHT OF field_one

AT m RIGHT OF RIGHT OF field_one

AT m RIGHT OF field_one

NOTE: The Rpt is optional so locations 1 and 2 shown above are identical as are locations 3 and 4.

Location Relative to Two Fields

The reference point of a field can be positioned n rows above or below the default reference point of one field and m columns right or left of the default reference point of another field. Any reference point can be specified for the field being positioned. The reference points for the other fields default to the edge of the field closest to the field being positioned as shown by the *'s.

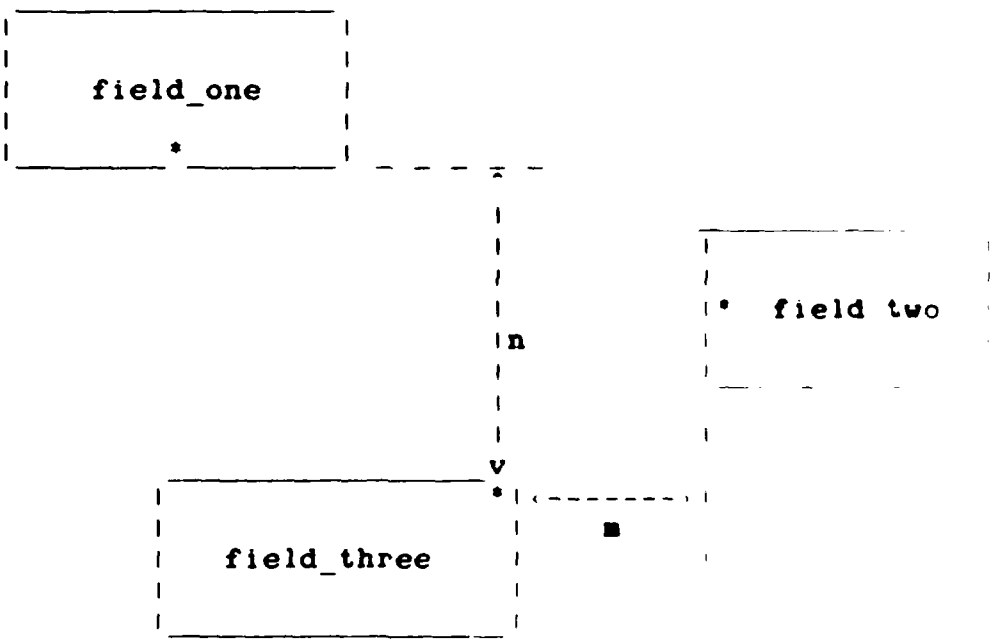


Figure 3-6 Location Relative to Two Fields

The reference point of field_three is positioned n rows below the bottom edge of field_one and m columns left of the left edge of field_two To position field_three as shown, you would use the location syntax:

```
[ Rpt ] AT [int] { ABOVE } [field_name]
                 { BELOW }

AND [int] { LEFT } OF [field_name]
```

{ RIGHT}

It does not matter which direction is specified first. Some valid Locations are:

TOP RIGHT AT n BELOW field_one AND m LEFT OF field_two

AT m LEFT field_two AND n BELOW field_one

AT n BELOW field_one AND m LEFT field_two

Combination Location

Field positions can be a combination of absolute and relative locations. The reference point of a field can be positioned at row n and m columns right or left of the default reference point of another field or at column m and n rows above or below the default reference point of another field. Any reference point can be specified for the field being positioned. The reference point for the other field defaults to the edge of the field closest to the field or text being positioned as shown by the *'s.

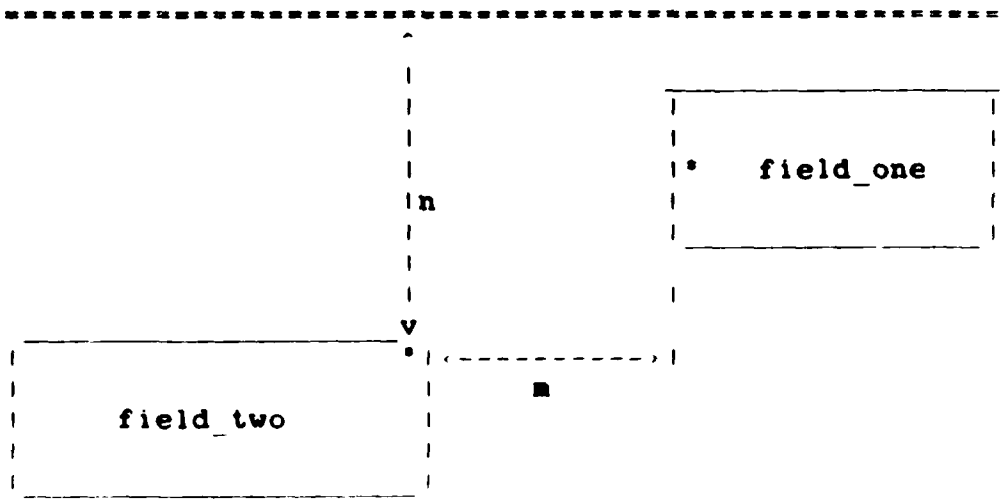


Figure 3-7 Absolute Row/Relative Column

The field_two reference point is in row n, m columns left of the left edge of field_one. To position field_two as shown, you would use the location syntax:

```
[ Rpt ] AT ROW int AND [int] { LEFT } OF [field_name]
                             { RIGHT}
```

or

[Rpt] AT [int] { LEFT } OF [field_name] AND ROW int
{ RIGHT}

Some valid Locations are:

TOP RIGHT AT ROW n AND m LEFT OF field_one

AT m LEFT field_one AND ROW n

AT ROW n AND m LEFT field_one

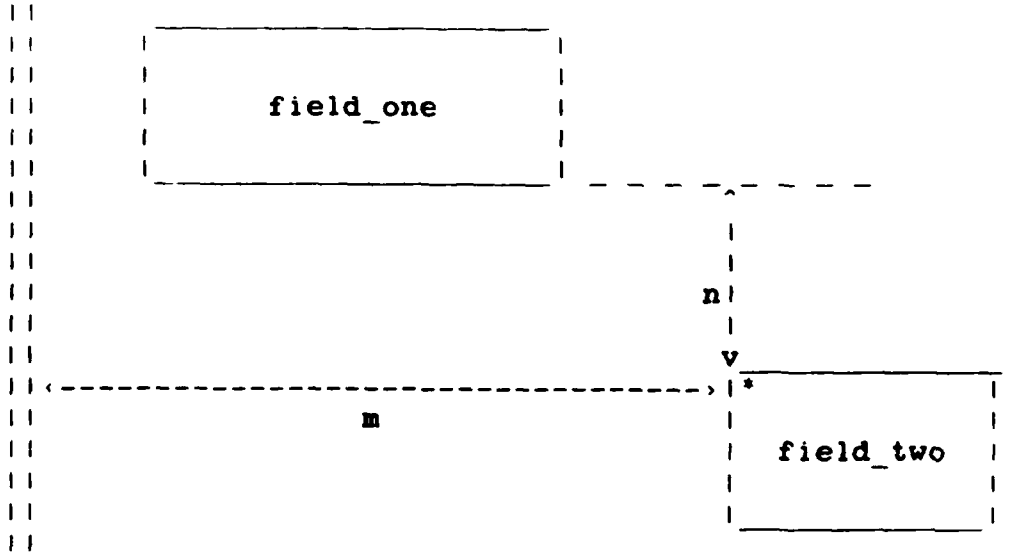


Figure 3-8 Absolute Column/Relative Row

The field_two reference point is in column m, n rows below the bottom edge of field_one. To position field_two as shown, you would use the location syntax:

[Rpt] AT [int] {ABOVE} [field_name] AND COLUMN int
{BELOW}

or

[RPT] AT COLUMN int AND [int { ABOVE } [field_name]
{ BELOW }

Some valid locations are:

```
TOP LEFT AT n BELOW field_one AND COL m

AT TOP LEFT n BELOW field_one AND COL m

AT COL m AND n BELOW field_one
```

3.2.7 Repeat Spec Syntax

The repeat specification specifies that the field appears on the form more than once. A field may repeat, either horizontally or vertically, an indefinite number times with n spaces between repetitions to form rows or columns. The repeat specification may then be repeated to form two dimensional arrays of fields. It is syntactically correct for a fixed size form to contain a repeating field. The overflow of the fixed size form can then be used to control paging and other formatting of the display. The syntax for the Repeat Specification is:

```
+--                                                                  --+
| ({ int-1         } { HORIZONTAL } [ WITH int SPACES ] [....] )      |
|   { int-1/int-2  } { VERTICAL   }                                   |
|   { int-1/int-1  }                                                  |
|   { *            }                                                  |
|   { int-1/ *     }                                                  |
+--                                                                  --+
```

int-1	is how many times to repeat the field on the form (i.e., display size).
int-1/int-2	indicates that the field is scrollable using the function keys in the "scrll/page" mode of the keyboard. Int-1 is how many times to repeat the field on the form and int-2 is the actual number of times the field occurs.
int-1/int-1	indicates that the field is scrollable using the function keys in the "scrll/page" mode of the keyboard but the keys are passed back to the application program. Int-1 is how many times to repeat the field on the form.
*	specifies that the field repeats indefinitely on the form.
int-1/ *	indicates a scrollable open-ended array which is not yet supported.
HORIZONTAL	states that the field repeats in a horizontal direction. The abbreviation H may be used for this option.
VERTICAL	states that the field repeats in a vertical

direction. The abbreviation V may be used for this option.

WITH	is an optional reserved word that may be included for readability.
int-3	is how many spaces to leave between field occurrences. It defaults to one if omitted.
SPACES	is an optional reserved word that may be included for readability.

Row of Fields

The Repeat Spec (* H 1) repeats a field horizontally with one space between repetitions. This would appear on the report as shown in Figure 3-9.

Figure 3-9 Row of Fields

Array of Fields

The Repeat Spec (* V 1,* H 1) repeats the row of fields defined by '* H 1' vertically with one blank row between repetitions. This would appear on the report as shown in Figure 3-10.

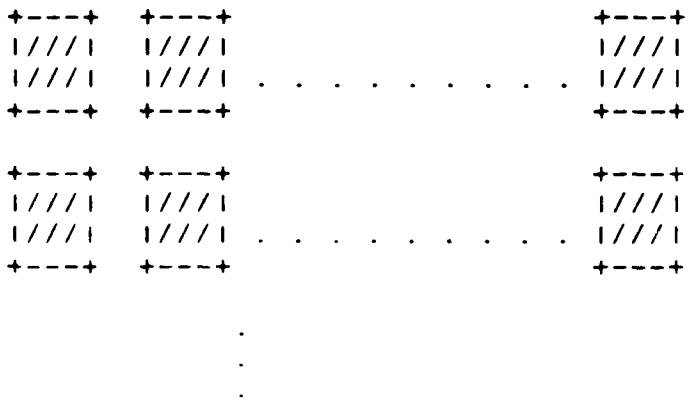


Figure 3-10 Array of Fields

3.2.8 Condition Definition Syntax

The Condition_Definition portion(s) of an application definition specify predefined actions that will occur as the result of user interaction with the software via the terminal. The interactions include: cursor positioning, function key selection, change of value in an item field or the occurrence of certain values in an item field. These user initiated events determine the course of execution of the software. The possible predefined actions that can be triggered by a user initiated event include: insertion of values into item fields, presentation of other forms, deletion of data in a table, insertion of data into a table, modification of data in a table, and selection of data from a table.

NOTE: Selection is available in release 2.0. Deletion, insertion and modification are not available in release 2.0.

The syntax for the Condition Definition is:

```
      /                                                    \
     | (OVERFLOW BY field_name) Condition_Action ...        |
     | (CHANGE item_name) Condition_Action ...              |
     | (item_field {= } value) Condition_Action ...         |
ON   <             {!=}                                    >
     | [(PICK function_name) Condition_Action ...           |
     | [(PICK function_name & CURSOR IN field)              |
     |        Condition_Action ...                          |
     | (STARTUP) Condition_Action ...                       |
      \                                                    /
```

ON is the statement keyword.

OVERFLOW Condition

This ON condition allows you to specify one or more actions to be performed when the size of a field is exceeded. A repeating field can cause the overflow of its containing field either by repetition in the horizontal or vertical direction. You specify the name of the field that causes the condition action to be triggered. For example, a set of nested forms with a one row repeating item field at the lowest level could be output with interruptions at the line level or at a higher level. This allows the application to require that a subform be output either in its entirety or not at all.

OVERFLOW	specifies that one or more actions will occur if the size of a named field is exceeded.
BY	is a reserved word that must be included.
field_name	is the qualified name of the item or form that will trigger the overflow if its next occurrence causes the size of its containing field to be exceeded. It is a required parameter. The name must be qualified with enough of the path name to make it unique.
Condition_action	specifies the action(s) to be performed when the overflow occurs. The syntax for this is defined in section 3.2.9 of this manual.

CHANGE Condition

This ON condition allows you to define one or more actions to be performed when the value of a named item field changes. If the item field being tested for a changing value contains database values, then it may be appropriate for these values to have been previously sorted so that all similar values are grouped together. This sorting can be achieved by using the "ORDER BY" option of the SELECT statement (see section 3.2.9 in this manual). If the test for a changing value is positive, the actions are taken after the item field is instantiated with the changed value.

CHANGE	specifies that one or more actions will be performed when the value of a named item field changes.
item_name	is the name of the item field whose change of value will trigger one or more actions.

Condition_action — specifies the action(s) to be performed when the item value changes. The syntax for this is defined in section 3.2.9 of this manual.

item_field { = } value Condition
{!= }

This ON condition allows you to define one or more actions to be performed when the value of a named item field is equal (not equal) to a value you specify. If the test for the value is positive, the actions are taken before the item field is instantiated with the value.

item_field — is the name of the item field whose value will be tested.

value — is the value of the item field that will cause the specified actions to be taken.

Condition_action — specifies the action(s) to be performed when the item value is equal to the value you specify. The syntax for this is defined in the section 3.2.9 of this manual.

PICK Condition

This ON condition allows you to define one or more actions to be performed when the user presses a programmable function key which you defined in the form definition KEYPAD clause. This condition can be used in combination with the CURSOR IN condition. If you use both conditions to trigger the actions, enter an ampersand "&" between them.

PICK — specifies that one or more actions will be performed when the user presses the specified key.

function_name	is the name you gave to the programmable function key in the form definition KEYPAD clause.

CURSOR IN Condition

This ON condition allows you to qualify a PICK condition by defining that the condition action(s) be performed when the user positions the cursor in a specified item or form field before pressing the key specified in PICK. This condition can only be used in combination with the PICK condition. If you use both conditions, enter an & between them.

CURSOR IN	specifies that one or more actions will be performed when the user positions the cursor in the defined location.
field	is the name of the field that the user must position the cursor in to trigger the action(s).
Condition_action	specifies the action(s) to be performed when the cursor is positioned in the field. The syntax for this is defined in section 3.2.9 of this manual.

STARTUP Condition

This ON condition allows you to define one or more actions to be performed at the beginning of the application. This condition is required and should include as one of its actions the presentation of an initial form.

STARTUP	specifies that when the application is started, one or more actions are to be performed.

Condition_action	specifies the action(s) to be performed when the application is started. The syntax for this is defined in section 3.2.9 of this manual.

3.2.9 Condition Action Syntax

These are actions to be taken when the specified ON condition occurs. The condition action syntax is:

```
/                                   \
| PRESENT form_name [IN window ]    |
| SET item_name = {string }         |
|                 {integer}         |
| HELP { string     }               |
|      { form_name }                |
| Delete_action                     |
| Insert_action                     |
| Modify_action                     |
| Select_action                     |
| EXIT                              |
\                                   /
```

PRESENT Action

This action causes the output of a specified form or array element.

PRESENT	is the action keyword.
form name	is the name of the form field to be output when the specified ON condition occurs. This is a required parameter.
IN window	allows you to output the form in a specific window. If the window is unspecified, then 'screen' is assumed.

SET Action

This action sets the value of an item field to a specified value. The value is either a constant or the result of an expression which is evaluated before assignment to the item.

	SET	is the action keyword.
	item_name	is the name of the item whose value you want to set. It is required and may be a qualified name in order to uniquely identify the item.
	constant	the value. Either an integer or a string constant.

HELP This clause allows you to define a help message that can be displayed as a condition action

	HELP	is the clause keyword.
	string	is the character string that you want to be displayed in the message line as the result of a specified condition. The string and form_name options are mutually exclusive.
	form_name	is the name of the predefined form that you want to be displayed as the result of a specified condition. The string and form_name options are mutually exclusive.

The DELETE, INSERT, and MODIFY actions are not available in release 2.0.

Select Action

This action causes data to be retrieved from the distributed database. The ADL uses the NDML SELECT command to retrieve the information. The syntax for the SELECT command is:

```
SELECT qualified name - col spec
       [ DISTINCT ]
       [ FROM table [ abbreviation ]       ]
       [ WHERE Predicate ]
       [ ORDER BY Col spec { ASCENDING  ,      }
                           { DESCENDING }
       [   {   select action       }   ]
```

SELECT is the action keyword

qualified name — the data you select is put into the field item that you name here. The name must be qualified with the path so that it is unique.

You must qualify the name enough to identify a unique item field in the form hierarchy. The name must be enclosed in single quotes (i.e. 'form.item'). This is an exception to normal NOMAD syntax where single quotes denote string constants. In the ADL string constants are denoted with double quotes and qualified names are denoted with single quotes. It is optional to end the name with a semi-colon. If you do not enter a semi-colon, the system enters one. Whenever a repeating field is part of a qualified name, it must include the subscript '1' (i.e. 'form(1).item'). This refers to the current occurrence of the field.

Col spec — specifies the column name of the data you are selecting from the database table. Only columns from the table are valid; no quoted literal text can be included and no arithmetic can be performed on the values selected before they are displayed.

DISTINCT

This clause is optional and specifies that duplicate records selected from the database will not be displayed. DISTINCT is the clause keyword.

FROM

This clause specifies the table that contains the data.

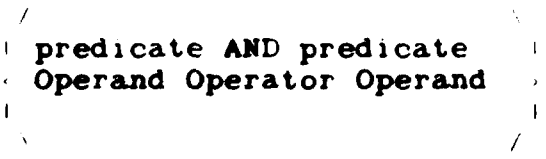
FROM	is the clause keyword.
table	is the full name of the table that contains the data.
abbreviation	allows you to define an abbreviated name for the database table. You can use this name to refer to the table throughout the application.

WHERE

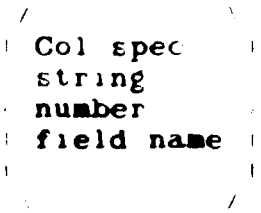
This clause allows you to specify criteria for selection of the data from the database table.

WHERE	is the clause keyword.
Predicate	specifies the criterion for selection of data. The syntax for Predicate is:

Predicate

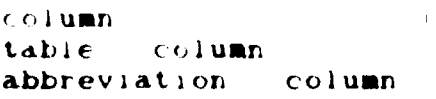


Operand



Operator

Col spec



ORDER BY

This clause allows you to specify the order in which the rows of data are displayed on the screen

ORDER BY is the clause keyword

Col_spec	specifies the table column to use as the sort key. More than one sort key can be specified. You can specify a sort direction (ASCENDING OR DESCENDING) FOR EACH SORT KEY. ASC is the default.

SELECTs must be defined in the order in which the data are to be presented on the screen. Nested SELECTs are grouped by use of braces ({ }).

EXIT Action

This action terminates the application.

SECTION 4

HOW TO CREATE AN APPLICATION DEFINITION

You create an application definition by writing ADL statements directly to a text file using any text editor.

4.1 Statement Format

ADL statements can be entered in free format. Free format means that keywords and numbers can be separated by 1 or more spaces. The ADL compiler treats tabs, comments, form feeds and carriage returns as spaces.

Application definition statements may be in any order.

The DOMAIN attribute options may be entered in any order.

Form field names used in the application definition syntax are pseudo qualified names in the form hierarchy. They are denoted by strings of the following type: *'form.item;'*. The single quotes are required. For release 2.0, wherever a field is repeating, the qualified name must include the subscript "1" (i.e., 'form.item(1)'). This always refers to the current occurrence of the field.

4.2 Restrictions

Every application definition must begin with the CREATE APPLICATION statement.

There must be at least one space before and after every keyword in the syntax.

A field name may only be omitted from the Location syntax in a PROMPT statement.

4.3 Abbreviations

Underscores in the ADL syntax indicate reserved words or portions of reserved words that are optional

4.4 Including Comments

You can include comments in a application definition by enclosing the comment text in (/*) and (*/). Comments are treated as spaces by the ADL compiler. For example:

```
CREATE APPLICATION application1 /* used to review salaries */
```

4.5 Reserved Words

This is an alphabetized list of the reserved words in the Application Definition Language.

ABOVE	COUNT	LEFT	RELATIVE
AND	CREATE	LOWER	REPORT
AP	CURSOR	MAX	RIGHT
APPLICATION	DESC	MAXIMUM	ROW
AS	DESCENDING	MIN	SELECT
ASCEND	DISPLAY	MINIMUM	SET
ASCENDING	DISTINCT	MUST	SIGNAL
AT	DOMAIN	NODUP	SIZE
AVERAGE	ENTER	NUM	SPACE
BACKGROUND	EXIT	NUMERIC	SPACES
BELOW	FILL	OF	STARTUP
BOTTOM	FORM	ON	SUM
BY	FROM	ORDER	SUMMARY
CENTER	HELP	OVERFLOW	TO
CHANGE	H	PAGE	TOP
COL	HORIZONTAL	PIC	UPPER
COLUMN	IN	PICK	VALUE
COND	ITEM	PICTURE	V
CONDITIONAL	KEY	PRESENT	VERTICAL
	KEYPAD	PROMPT	WHERE
			WINDOW
			WITH

APPENDIX A

STEPS FOR EXECUTING THE RAPID APPLICATION GENERATOR

Below is the procedure to use in invoking the Rapid Application Generator for Release 2.0. This procedure assumes that the NTM is up and running and the user is logged on to IISS. Refer to the Terminal Operator Guide for the procedure for logon to IISS. The following convention is used to document this section.

- Text in angle brackets is to be replaced with appropriate information by the user.
- Single upper case words enclosed in angle brackets represent terminal keys (e.g. ‹ENTER›).
- Text in upper case is to be entered as shown.

1 On the IISS Function Screen, fill in the following items:

FUNCTION: SDAPPGENER Press ‹ENTER›

2 On the Rapid Application Generator screen, fill in the following items:

Application Definition File Name Press ‹ENTER›

This file may reside anywhere as long as the complete filename is given. It is the file containing the application definition.

3 After the Rapid Application Generator has completed the following files exist in the NTM environment directory (all prefixed with the application name as given on the CREATE APPLICATION line of the application language file. For example, if the application name is UPDATEDB:

UPDATEDBC C	(generated C code for form processing)
UPDATEDBX PRC	(generated Cobol code for the NDML)
UPDATEDB H	(a header file to be used by UPDATEDBC C)
UPDATEDB WRN	(lists any errors where the External Schema and Presentation (Form) Schema item mapping may cause truncation)
fd	(form definition files)

It is best to use 8 characters for application names. These, together with the SD prefix make up the 10 characters required for the name used when executing the generated application program.

4 Now press the ‹QUIT› key twice to exit the Rapid Application Generator and the IISS and return to the operating system command level.

5 Run the NDML precompiler on the UPDATEDBX.PRC file. Follow the NDML Programmer's Guide.

6 Output from the NDML precompile consists of the following files (the exact file names can be found by looking at the output messages from the NDML precompile):

generated application program (with NDML statements converted to correct language (Cobol or Fortran))

one or more RP-Sub process files

one or more CS-ES subroutine files

an RP-main processor

7 All the above files must be compiled following the procedure given in the NDML Programmer's Guide.

8 Compile the generated UPDATEDBC.C program.

9 Link the generated RP main process and subprocess using LNKORP as outlined in the NDML Programmer's Guide

10 Link the generated application object, the CS-ES object(s) and the generated C application program into one executable. For this example, the executable is named UPDATEDB

11 Update the UI database. This step shows how to do this using ORACLE on the VAX

```
$ DELETE SEL*.DAT.*
$ UFI
username   username
password   password
```

Enter the following line

INSERT INTO ROLAPP VALUES ('‹role in capital letters›','SD‹application name padded to 8 characters with Z's›'); EXIT

12 Update the NTM tables. On the Vax this requires editing the following .DAT files.

$ EDIT/EDT ACTTBL.DAT

Insert new lines as follows:

‹application name padded to 8 characters with Z s›1
‹RP-Main process name padded to 8 characters with Z s›1

$ EDIT/EDT APITBL.DAT

Insert new lines as follows:

SD‹application name padded to 8 character with Z's›T1V1
GR‹RP-Main Bxxxx process name padded to 8 characters with Z's›T1V1

$ EDIT/EDT APTTBL.DAT

Insert new lines as follows:

‹application name padded to 8 characters with Z s›0599010320000010
‹RP-Main name padded to 8 characters with Z s›9999010120001130

Perform steps 13 through 16 to update the UI database

13 Return to the IISS and on the IISS Function Screen fill in the item as follows

FUNCTION: SDDEFINEAP

14 On the Define An Application form, fill in the item as follows:

APPLICATION: SDUPDATEDB

This name must match the executable name in step 10 and must be a total of 10 characters including the SD prefix

15 On the Define New Application form, fill in the items as follows:

DESCRIPTION:
HOST:
CLUSTER:
Press ‹ENTER›

Host and Cluster are variable and depend on the application.

16 Press ‹QUIT› to return to the IISS Function Screen.

To run the generated application program, perform step 17.

17 On the IISS Function Screen, fill in the item as follows:

FUNCTION: SDUPDATEDB **Press ‹ENTER›**

END

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