NOS/VE

Screen Formatting

Usage

60488813

CONTROL DATA

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Title: NOS/VE Screen Formatting
Publication No.: 60488813
Revision: C
Date: April 1988

REASON FOR CHANGE:

This manual reflects the release of Screen Formatting under NOS/VE Version 1.3.1, PSR Level 700.

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Usage

This product is intended for use only as described in this document. Control Data cannot be responsible for the proper functioning of undescribed features and parameters.

Publication Number 60488813

Manual History

Revision	System Version	PSR Level	Product Version	Date
A	1.2.1	670	1.0	December 1986
B	1.2.2	678	1.1	April 1987
C	1.3.1	700	4.0	April 1988

This manual reflects the release of Screen Formatting under NOS/VE Version 1.3.1, PSR Level 700.

This revision documents the following new features for managing forms using COBOL, CYBIL, and FORTRAN:

- Changing the size of a table.
- Combining forms.
- Setting line mode.

This revision also documents the following new features for creating forms using CYBIL:

- Converting to program and screen variables.
- Creating and displaying help and error forms.
- Creating and displaying help and error messages.

The information in this manual is reorganized and rewritten. Change bars mark only the technical changes.

This edition obsoletes all previous editions.

Contents

About This Manual

This manual describes the CONTROL DATA® Screen Formatting application for use under the CDC® Network Operating System/Virtual Environment (NOS/VE).

Audience

The first chapter of this manual describes Screen Formatting in a manner that does not require knowledge of programming.

The remainder of this manual is directed to application programmers who want to create forms with CYBIL programs and manage them by writing COBOL, FORTRAN, or CYBIL programs that use Screen Formatting. You need knowledge of these programming languages, as well as some knowledge of NOS/VE and the System Command Language (SCL) as presented in the Introduction to NOS/VE manual.

The NOS/VE Screen Design Facility manual describes a screen interface you can use for creating forms using Screen Formatting that requires no programming knowledge.

The NOS/VE User Manual Set

This manual is part of a set of user manuals that describe the command interface to NOS/VE. The descriptions of these manuals follow:

Introduction to NOS/VE

Introduces NOS/VE and SCL to users who have no previous experience with them. It describes, in tutorial style, the basic concepts of NOS/VE: creating and using files and catalogs of files, executing and debugging programs, submitting jobs, and getting help online.

The manual describes the conventions followed by all NOS/VE commands and parameters, and lists many of the major commands, products, and utilities available on NOS/VE.

NOS/VE System Usage

Describes the command interface to NOS/VE using the SCL language. It describes the complete SCL language specification, including language elements, expressions, variables, command stream structuring, and procedure creation. It also describes system access, interactive processing, access to online documentation, file and catalog management, job management, tape management, and terminal attributes.

NOS/VE File Editor

Describes the EDIT_FILE utility used to edit NOS/VE files and decks. The manual has basic and advanced chapters describing common uses of the utility, including creating files, copying lines, moving text, editing more than one file at a time, and creating editor procedures. It also contains descriptions of subcommands, functions, and terminals.

NOS/VE Source Code Management

Describes the SOURCE_CODE_UTILITY, a development tool used to organize and maintain libraries of ASCII source code. Topics include deck editing and extraction, conditional text expansion, modification state constraints, and using the EDIT_FILE utility.

NOS/VE Object Code Management

Describes the CREATE_OBJECT_LIBRARY utility used to store and manipulate units of object code within NOS/VE. Program execution is described in detail. Topics include loading a program,

program attributes, object files and modules, message module capabilities, code sharing, segment types and binding, ring attributes, and performance options for loading and executing.

NOS/VE Advanced File Management

Describes three file management tools: Sort/Merge, File Management Utility (FMU), and keyed-file utilities. Sort/Merge sorts and merges records; FMU reformats record data; and the keyed-file utilities copy, display, and create keyed files (such as indexed-sequential files).

NOS/VE Terminal Definition

Describes the DEFINE_TERMINAL command and the statements that define terminals for use with full-screen applications (for example, the EDIT_FILE utility).

NOS/VE Commands and Functions

Lists the formats of the commands, functions, and statements described in the NOS/VE user manual set. A format description includes brief explanations of the parameters and an example using the command, function, or statement.

Conventions

The following conventions are used in this manual:

Boldface	In a format, boldface type represents names and required parameters.
Italics	In a format, italic type represents optional parameters.
UPPERCASE	In a format, uppercase letters represent reserved words defined by the system for specific purposes. You must use these words exactly as shown.
lowercase	In a format, lowercase letters represent values you choose.
Blue	In examples of interactive terminal sessions, blue represents user input.
Vertical bar	A vertical bar in the margin indicates a technical change.
Numbers	All numbers are decimal unless otherwise noted.

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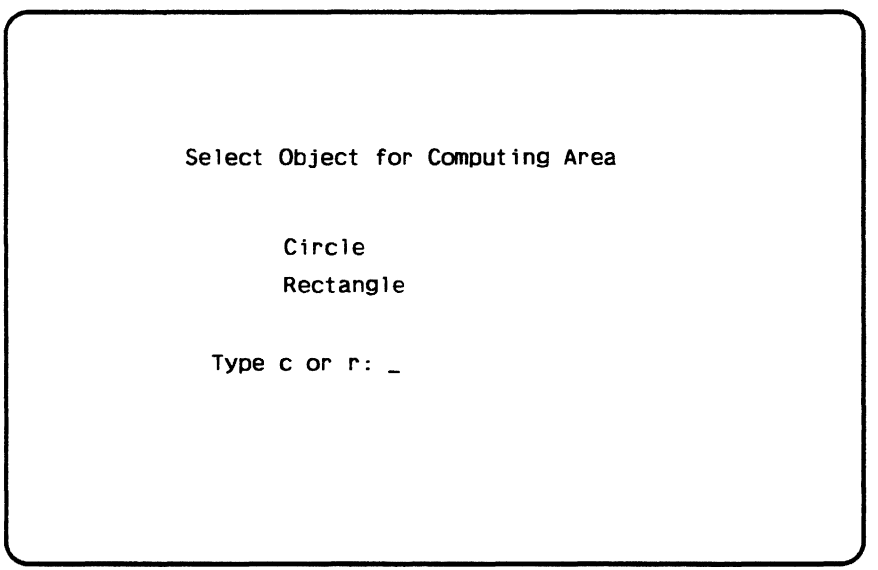
Introduction to Screen Formatting 1

Introduction to Screen Formatting 1

This chapter explains the NOS/VE Screen Formatting application and gives an example of how to use it.

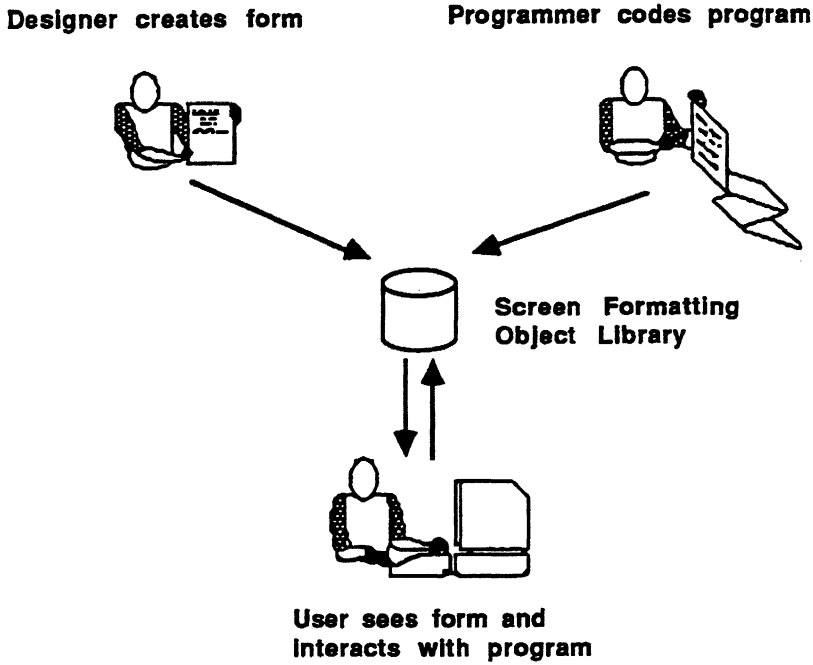
What Is Screen Formatting?

Screen Formatting consists of a set of subroutines and procedures on system object library $SYSTEM.FDF$LIBRARY. Using Screen Formatting subroutines and procedures, you can design a *form* that the user of an application program sees on the screen and uses to interact with the program. For example, for a program that computes the area of circles and rectangles, you might use Screen Formatting to design the following form:

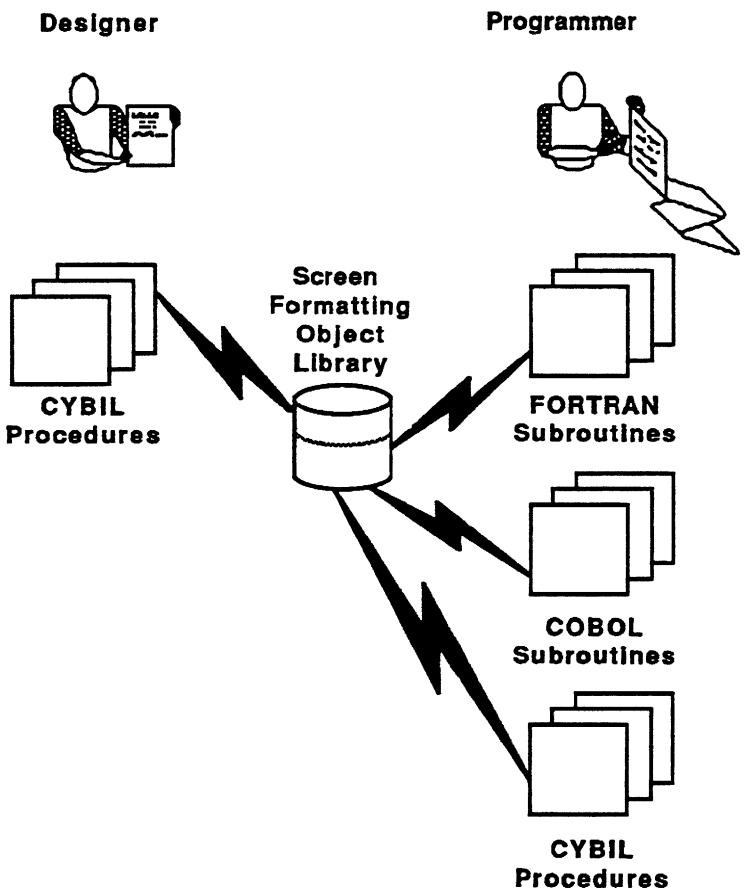


Besides designing the forms, you use Screen Formatting to manage the forms in the application program; for example, you use Screen Formatting to display and remove the forms from the application user's screen.

Designing the forms and managing the forms in the program are separate tasks, usually performed by two people. A *designer* familiar with the needs of the application user creates the forms and puts them on an object library; an *application programmer* manages the forms in the application. When a user executes the application, Screen Formatting combines the work done by the designer and the programmer:

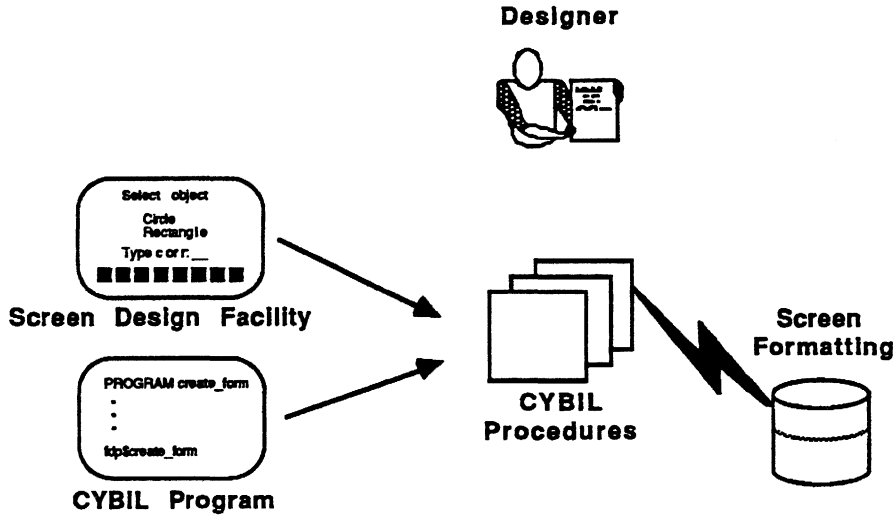


Screen Formatting provides different sets of procedures and subroutines for designing and managing forms. The form designer uses a set of CYBIL procedures, and the application programmer chooses between a set of COBOL subroutines, FORTRAN subroutines, or CYBIL procedures, depending on the language of the application program:



Application programmers access the procedures or subroutines that manage forms by including calls to the procedures or subroutines in the application program.

Designers, on the other hand, have a choice of how to access the CYBIL procedures that create forms. They can either call the procedures in a CYBIL program or use a screen interface provided by the Screen Design Facility:



With the Screen Design Facility, the designer uses function keys to draw the form on the screen, save its image, and define its characteristics. A designer who is not a CYBIL programmer will probably choose this method of designing forms.[1]

Designers who want to either provide special forms for help information or redefine forms while the application is running must use a CYBIL program to create the form. With CYBIL, the form is described in code, using attributes.

1. For more information, see the NOS/VE Screen Design Facility manual.

Screen Formatting also includes subroutines and procedures that relieve the program of some of the tasks it normally performs. For example, for a form that contains a table with more values than can be displayed at one time, Screen Formatting includes procedures and subroutines that page or scroll through the values.

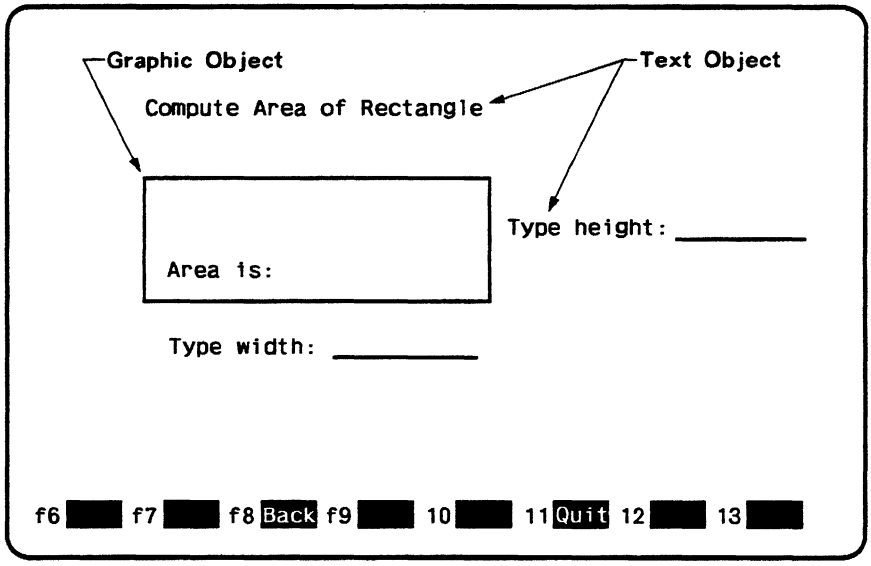
Screen Formatting is an intermediary between a form and the program. This means that when an application user enters a value on a form, the value is sent not to the program, but to Screen Formatting. Screen Formatting stores the value until it receives a call for the value from the program. Information is transferred between a form and the program only when the application programmer includes calls to Screen Formatting.

Example of Creating and Managing a Form

Using a specific form as an example, this section shows how the form designer and application programmer divide the tasks that create and manage forms.

Graphic or Text Objects

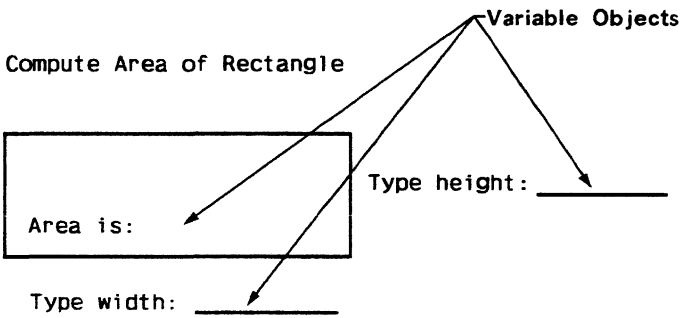
A form contains several discrete areas, each of which Screen Formatting calls either a graphic or a text *object*.



- The designer:
  - Determines what graphic or text objects appear on the form.
  - Defines *display attributes* for the objects. The designer chooses from many different attributes, such as blinking, inverse video, color, or underline.
  - Names the form so the programmer can identify it in the program.
- The programmer displays the form and removes it from the screen using the name assigned by the designer.

Variable Text Objects

For some forms, the designer's and programmer's tasks may be complete as just described. However, the example form has two objects that allow the application user to enter variables and one object that allows the program to return variables:



Variable text objects require the designer and programmer to perform additional tasks.

- The designer:
  - Defines the text objects to accept variables from the user or the program.
  - Names each text object and display attribute so the programmer can identify them in the program. For this form, the designer:
    - Assigned the name SIDE to the variable text object for the height of the rectangle. (This is the first occurrence of the variable SIDE.)
    - Assigned the name SIDE to the variable text object for the width of the rectangle. (This is the second occurrence of the variable SIDE.)
    - Assigned the name RECTANGLE-AREA to the variable text object for the computed area.
  - Defines the types of values the user can enter and the program can return. (On this form, the user can enter real numbers and the program returns a real number.)

- Defines the action the user takes to send the values to Screen Formatting. (For this form, the designer might define the action as pressing the return key.) An action like this returns control to Screen Formatting and is called an *event.*

- Names the event so the programmer can identify it in the program. (For this form, the event defined as pressing the return key is called COMPUTE.)

- Defines the event as a task that Screen Formatting either performs itself or passes to the program. (For this form, the user enters values for the program to compute, so the designer defines pressing the return key as passing the event from Screen Formatting to the program.)

- The programmer:

  - Copies the designer's definitions of the variable text objects into the beginning of the program.

  - Controls the position of the cursor, which allows the user to enter data.

  - Causes the program to wait for the event the user executed.

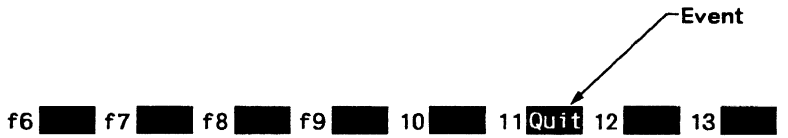
  - Provides the code to process the event named COMPUTE (pressing the return key). For this form, the programmer:

    - Enters calls to Screen Formatting to get the values the user entered for variable text objects from the form to the program. On the call, the programmer specifies the name of the variable text object. (For this form, the name is SIDE.) The programmer then causes the program to go to the part that computes the area.

    - Includes a call to Screen Formatting to redisplay the screen showing the computed area of the rectangle in the variable text object named RECTANGLE-AREA. The program replaces data on the form using the names of variables defined as objects on the form.

Events

At the bottom of the example form is a menu that contains an event the user can execute by pressing a function key.



The menu is optional and requires the designer and programmer to perform additional tasks.

- The designer:
  - Names the event so the programmer can identify it in the program and defines it to appear as part of a menu of events. (For this form, the name of the event is QUIT.)
  - Defines the event as a task that Screen Formatting either performs itself or passes to the program. (For this form, the designer defines the event named QUIT to pass control to the program.)
- The programmer provides code to process the event, identifying it in the program with the name assigned by the designer. (For this form, the programmer defines that the event named QUIT stops the application.)

Coordinating Tasks Using a Design Specification

As you saw in the example, the interaction between the form and the program is complex. To control the process, the designer prepares a list called the *design specification* that tells the programmer what appears on the form and the definitions used for the form and its events. In this specification the designer:

- Names the forms.
- Establishes the order in which forms appear and disappear on the screen.
- Defines and names the variable text objects.
- Defines the types of values the user or program can enter as variables.
- Defines and names the display attributes for objects.
- Defines and names the events that return the user to the program.
- Defines the events that Screen Formatting processes itself.

With this information available, the programmer:

- Displays and removes forms.
- Gets and replaces values on forms.
- Gets and processes events executed by the application user.
- Changes how variable text objects are displayed.
- Changes the position of the cursor on the screen.

Summary of the Process

To create a screen interface for an application user, the designer and programmer perform the following steps:

1. The form designer and programmer plan the forms and program.
2. The form designer creates the forms and prepares a design specification.
3. The form designer puts the forms in an object library and makes the form record available.
4. The programmer codes the program, including calls to Screen Formatting procedures based on the design specification.
5. The programmer expands and compiles the program.
6. The programmer writes a user procedure to start the application and helps the user set up the correct terminal environment for using the forms.

When the last step is complete, the program and forms are ready for the application user.

The process of creating a screen interface for an application user is described in detail in the remainder of this manual. The programmer's tasks and the formats of the subroutine or procedure calls are in chapters 2 (for COBOL programmers), 3 (for FORTRAN programmers), and 4 (for CYBIL programmers).

The designer's tasks and the formats for CYBIL procedure calls are described in chapter 5. (If you want to design forms using the Screen Design Facility, see the NOS/VE Screen Design Facility manual instead.)

Using COBOL to Manage Forms 2

Using COBOL to Manage Forms 2

Chapter 1 presented an overview of the process for creating and managing forms. It mentioned the following tasks a programmer uses to manage forms:

1. Writing the application program to include calls to the Screen Formatting COBOL subroutines that manage forms.
2. Expanding and compiling the program.
3. Creating a procedure that starts the program for the user.

This chapter describes these three tasks and shows them being executed in a COBOL program. At the end of the chapter you will find format and parameter descriptions for each COBOL subroutine used by Screen Formatting.

Writing a Program to Use Forms

To use forms in any program you write, you must:

- Copy the parameter definitions provided by Screen Formatting.
- Copy the data definitions generated by Screen Formatting when the designer creates the form. The data definitions hold values transferred to and from the form for the variable text objects.
- Call Screen Formatting subroutines to manage the forms and the variable text objects on the forms.

Following the descriptions of these tasks is a COBOL program in which these tasks are executed.

Copying Parameter Definitions

To obtain the values for the COBOL status parameter, copy the FDE$COBOL_STATUS deck into your program. The following example shows some of the contents of this deck:

```
01  FDE-COBOL-STATUS USAGE COMP PIC S9(18) SYNC LEFT.
    88 FDE-REQUEST-SUCCESSFUL VALUE 0.
    88 FDE-TERMINAL-DISCONNECTED VALUE 1.
    88 FDE-NO-INPUT-REQUEST VALUE 2.
    88 FDE-CURSOR-NOT-IN-VARIABLE VALUE 3.
```

To obtain the values for the COBOL variable status parameter, copy the FDE$COBOL_VARIABLE_STATUS deck into your program. The following example shows some of the contents of this deck:

```
01  FDE-COBOL-VARIABLE-STATUS USAGE COMP PIC S9(18) SYNC LEFT.
    88 FDE-NO-ERROR VALUE 0.
    88 FDE-INVALID-STRING VALUE 1.
    88 FDE-INVALID-REAL VALUE 2.
```

Copying Data Definitions

The data definitions for each form reside on a *form definition record* created by the form designer. In your program, you transfer data to and from variable text objects through this record.

When the designer creates a form, Screen Formatting generates a common deck that defines the form definition record. For example, Screen Formatting[1] generated the following source file for a form named COBOL-SELECT-FORM. (The form definition record name is the same as the form name.)

```
*DECK COBOL_SELECT_FORM expand = false
    01  COBOL-SELECT-FORM.
        03  SELECT-MESSAGE PIC X(40).
        03  OBJECT PIC X(1).
```

The designer saves this file as a deck on a NOS/VE SOURCE_CODE_UTILITY (SCU) library.[2]

In the beginning of your program, you must copy the form definition deck for each form the designer created:

- Get the name of the deck from the design specification (the designer assigns the name while creating the form).
- Copy the deck by specifying its name on either the SCU *COPY directive or the COBOL COPY statement.

1. For this example, Screen Formatting was accessed through the Screen Design Facility.

2. Because each form has its own definition and the STATUS parameters use common decks, we recommend that you manage the source text using SCU. (For information on SCU, see the NOS/VE Source Code Management manual.)

Calling Screen Formatting

When you write a program that uses forms, you perform two basic tasks with Screen Formatting subroutines:

- Displaying and removing forms and variable data on the application user's screen.
- Processing events executed by the user.

Displaying and Removing Forms and Variable Data

To control the display of forms and variable data on the user's screen, you perform the following steps in the sequence given:

1. Open the form.

   When you open a form, Screen Formatting locates it and allocates resources for processing the Screen Formatting calls that use the form.

   No matter how many times you use or update a form in your program, you need only open it once. For this reason, you usually begin an application program by opening all the forms you will use. However, when a form requires a large amount of storage for variables, you may want to open the form only when the application user needs it.

   (For the format of the call that opens forms, see *Opening a Form* later in this chapter).

2. Add the form.

   When you add a form, Screen Formatting schedules it for display on the application user's screen.

   To display more than one form at a time, add all the forms before you display them (the next step). The last form you schedule for display is the top form on the screen. Because forms are opaque, the top form covers other forms appearing in the same area. The cursor position indicates which form is ready for processing.

   (For the formats of the calls that schedule forms for display, see *Adding a Form* and *Combining Forms* later in this chapter.)

3. Read the form.

   When you read forms, Screen Formatting displays all the forms you added.

   When a form has an event or input variable defined, reading forms also accepts data from the application user and displays values returned by the program.

   (For the format of the call that reads forms, see *Reading Forms* later in this chapter. When none of the forms scheduled for display has an event or input variable defined, you can use a similar call described in *Showing Forms* later in this chapter.)

4. Delete the form.

   When you delete a form, Screen Formatting deletes it from the list of forms scheduled for display. The next time you read forms, the deleted form is removed from the screen. However, the form remains available for later use in the program (you must reschedule it for display).

   (For the format of the call that deletes a form, see *Deleting a Form* later in this chapter.)

5. Close the form.

   When you close a form, Screen Formatting releases the resources the form uses. The form is no longer available to the user or your program.

   (For the format of the call that closes a form, see *Closing a Form* later in this chapter.)

Processing Events and Data

When creating a form, the designer defines two types of events a user can execute to return control to the program: normal and abnormal.

- For normal events, the program performs requested actions such as getting variables, doing computations, and updating the form.
- For abnormal events, the program takes its own action. You generally then delete the form and go on, or stop the program.

Processing Normal Events

To process a normal event:

1. Get the name of the event and the position of the cursor from Screen Formatting.

   Screen Formatting validates the data the user enters (the form designer defined the validation rules) and transfers values of screen variables to its storage. The form designer may also have created error forms to be displayed when the user enters an incorrect value or presses a key not defined as an event.

   (For the format of the call that gets the event name and cursor position, see *Getting the Next Event* at the end of this chapter.)

2. Get the data from Screen Formatting storage and transfer it to program storage.

   (For formats of the calls that get data, see the following sections later in this chapter: *Getting a Record, Getting an Integer Variable, Getting a Real Variable,* and *Getting a String Variable.*)

3. Replace the data in Screen Formatting storage with the data in program storage.

   (For formats of the calls that replace variables, see the following sections later in this chapter: *Replacing a Record, Replacing an Integer Variable, Replacing a Real Variable,* and *Replacing a String Variable.*)

You can also reset the variables on a form to their original state. (For formats of the calls that reset variables to their original state, see *Resetting a Form* and *Resetting an Object Attribute* later in this chapter.)

Processing Abnormal Events

To process an abnormal event:

1. Get the name of the event and the position of the cursor from Screen Formatting.

   Unlike a normal event, Screen Formatting neither validates user entries nor transfers values of screen variables to Screen Formatting storage.

   (For the format of the call that gets the event name and cursor position, see *Getting the Next Event* later in this chapter.)

2. Write your own procedure to perform the task the design specification assigns to the event. Typical actions for an abnormal event include:

   - Resetting a form and redisplaying it.
   - Moving the user to a new form for additional processing.
   - Returning the user to a previous form.
   - Stopping the program.

   The user's screen is updated when you either read the forms again or end the program.

Example Program for Managing Forms with COBOL

The program in this example computes the area of circles and rectangles. The example includes:

- Pictures of the forms managed in the program.
- The design specification supplied by the form designer.
- The form definition decks.
- The example program.

Forms Managed in the Program

The example program manages three forms residing on an object library named EXAMPLE_OBJECT_LIBRARY that must be in the user's command list.

When a user starts the application, Select Form appears (figure 2-1).

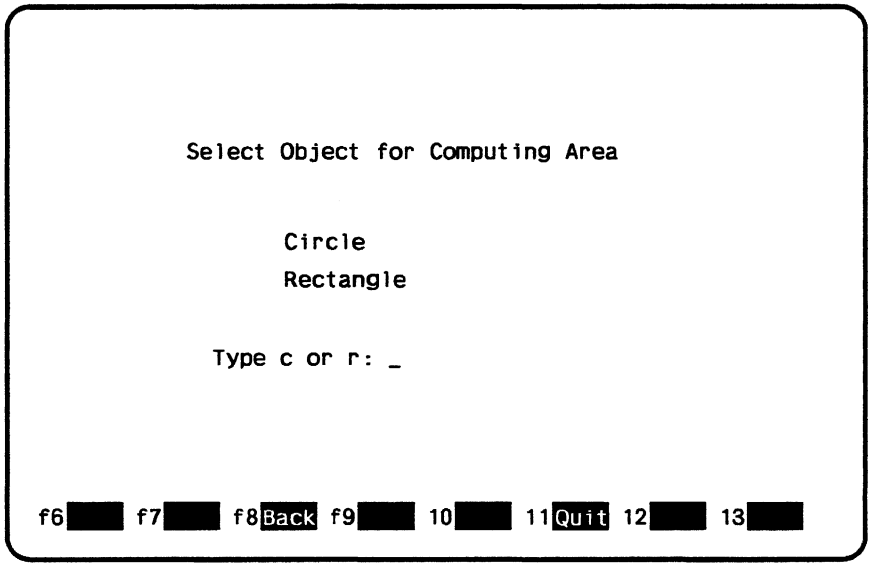


Figure 2-1. Select Form

On Select Form, a user enters either *c* to compute the area of a circle or *r* to compute the area of a rectangle.

When a user enters *r* on Select Form, Rectangle Form (figure 2-2) appears.

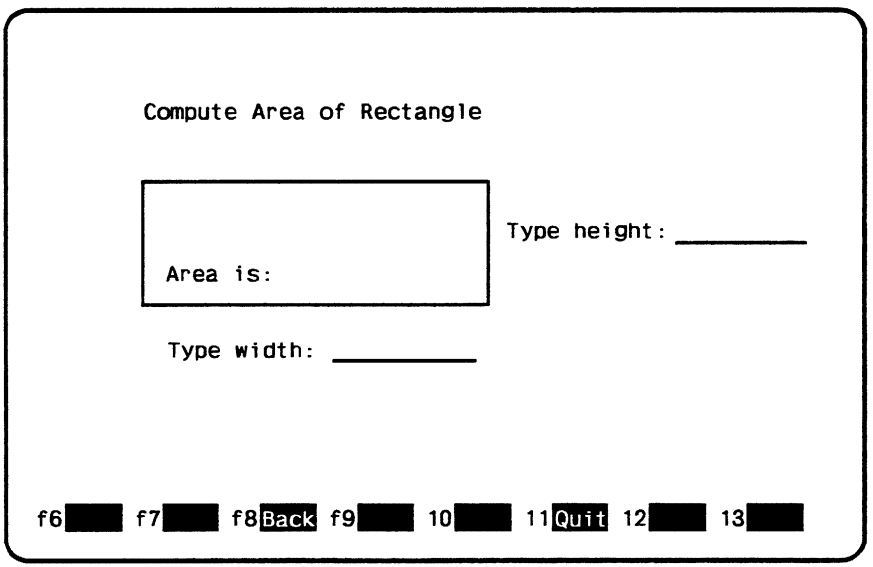


Figure 2-2. Rectangle Form

On Rectangle Form, the user enters the lengths of the sides of the rectangle as integers and presses the return key to have the program compute the area.

When a user enters *c* on Select Form, Circle Form (figure 2-3) appears.

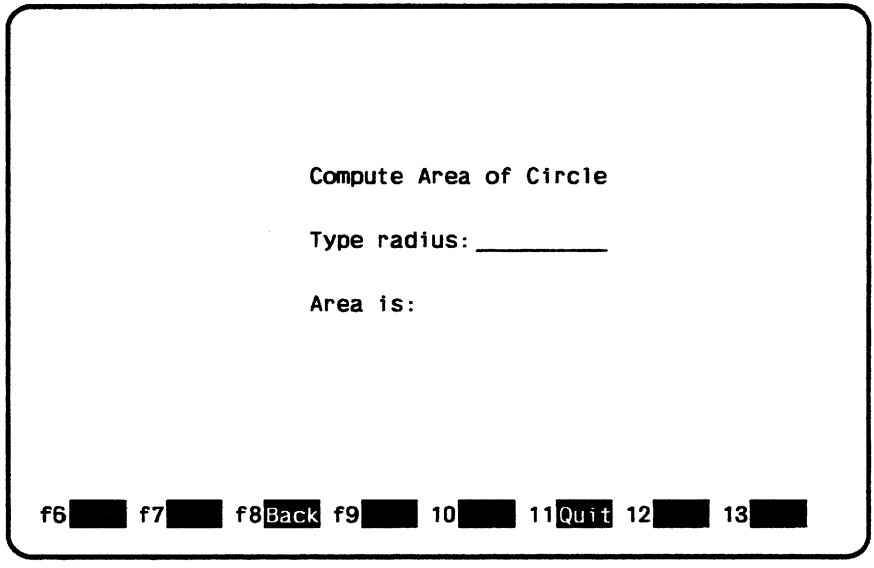


Figure 2-3. Circle Form

On Circle Form, the user enters the radius of the circle as a real value and presses the return key to have the program compute the area.

Design Specification

In writing the example program, the programmer uses the information the form designer listed in the following design specification:

- The names for the three forms used by the program are:

  COBOL_SELECT_FORM
  COBOL_RECTANGLE_FORM
  COBOL_CIRCLE_FORM

- The user can call both the Rectangle Form and Circle Form from the Select Form.

- The following variable text objects are defined on the forms:

Variable Object	Description
Select Form:	
SELECT-MESSAGE	Area for displaying error messages.
OBJECT	Area for user input of *r* or *c*.
Rectangle Form:	
SIDE-TABLE	Table that holds values for the rectangle's sides.
SIDE	Areas (two) for user input of values for the rectangle's sides.
RECTANGLE-AREA	Area for returning value of computed area.
RECTANGLE-MESSAGE	Area for displaying error messages.
Circle Form:	
RADIUS	Area for user input of value for the circle's radius.
CIRCLE-AREA	Area for returning value of computed area.
CIRCLE-MESSAGE	Area for displaying error messages.

- The following events are defined on the forms:

Event	Description
COMPUTE	A normal program event that processes data the user entered on the form. For Select Form, the COMPUTE event checks whether the user entered *r* or *c* and then displays the appropriate form. For the other forms, COMPUTE calculates the area and redisplays the form.
BACK	An abnormal program event that takes the user back to a previous environment. For Select Form, the BACK event stops the program. For the other forms, BACK returns the user to Select Form.
QUIT	An abnormal program event that stops the program.

Form Definition Decks

When the designer creates the three forms (by writing a program or using Screen Design Facility), a form definition record is created with each form. For the example program, the programmer copies the following form definition decks placed by the designer on an SCU library. The library in this example is named EXAMPLE_SOURCE_LIBRARY.

The COBOL_SELECT_FORM deck:

```
01  COBOL-SELECT-FORM.
    03  SELECT-MESSAGE PIC X(40).
    03  OBJECT PIC X(1).
```

The COBOL_RECTANGLE_FORM deck:

```
01  COBOL-RECTANGLE-FORM.
    03  SIDE-TABLE OCCURS 2.
        05  SIDE PIC S9(18)
            COMP SYNC LEFT.
    03  RECTANGLE-AREA PIC S9(18) COMP SYNC LEFT.
    03  RECTANGLE-MESSAGE PIC X(40).
```

The COBOL_CIRCLE_FORM deck:

```
01  COBOL-CIRCLE-FORM.
    03  CIRCLE-AREA COMP-1.
    03  RADIUS COMP-1.
    03  CIRCLE-MESSAGE PIC X(40).
```

Example COBOL Program

This COBOL program calls the forms and executes the events described in the previous sections. The program is in the SCU deck named COMPUTEAREA. To run the example program, see the Examples online manual.

```
       IDENTIFICATION DIVISION.
       PROGRAM-ID. COMPUTEAREA.
       DATA DIVISION.
       WORKING-STORAGE SECTION.

      * Copy definitions for Screen Formatting conditions.

*COPY FDE$COBOL_STATUS
*COPY FDE$COBOL_VARIABLE_STATUS

      * Copy record for select form.

*COPY cobol_select_form

      * Copy record for circle form.

*COPY cobol_circle_form

      * Copy record for rectangle form.

*COPY cobol_rectangle_form

       01  CHARACTER-POSITION
             USAGE COMP PIC S9(18) SYNC LEFT.
       01  CIRCLE-FORM-IDENTIFIER
             USAGE COMP PIC S9(18) SYNC LEFT.
       01  EVENT-NAME PIC X(31).
       01  EVENT-NORMAL PIC X.
       01  EVENT-OBJECT-NAME PIC X(31).
       01  EVENT-OCCURRENCE USAGE COMP PIC S9(18) SYNC LEFT.
       01  EVENT-POSITION USAGE COMP PIC S9(18) SYNC LEFT.
       01  EVENT-TYPE USAGE COMP PIC S9(18) SYNC LEFT.
       01  FORM-IDENTIFIER USAGE COMP PIC S9(18) SYNC LEFT.
       01  FORM-NAME PICTURE X(31).
       01  FORM-X-POSITION USAGE COMP PIC S9(18) SYNC LEFT.
       01  FORM-Y-POSITION USAGE COMP PIC S9(18) SYNC LEFT.
       01  LAST-EVENT PIC X.
       01  OCCURRENCE USAGE COMP PIC S9(18) SYNC LEFT.
       01  OBJECT-TYPE USAGE COMP PIC S9(18) SYNC LEFT.
```

```
01  OBJECT-X-POSITION USAGE COMP PIC S9(18) SYNC LEFT.
01  OBJECT-Y-POSITION USAGE COMP PIC S9(18) SYNC LEFT.
01  PI COMP-1 VALUE 3.14.
01  RECTANGLE-FORM-IDENTIFIER
      USAGE COMP PIC S9(18) SYNC LEFT.
01  SCREEN-X-POSITION USAGE COMP PIC S9(18) SYNC LEFT.
01  SCREEN-Y-POSITION USAGE COMP PIC S9(18) SYNC LEFT.
01  SELECT-FORM-IDENTIFIER
      USAGE COMP PIC S9(18) SYNC LEFT.
01  VARIABLE-NAME PIC X(31).
01  VARIABLE-STATUS USAGE COMP PIC S9(18) SYNC LEFT.

PROCEDURE DIVISION.
BEGIN.

* Open all forms used by the program
* and assign form identifiers.

    MOVE "COBOL_SELECT_FORM" TO FORM-NAME.
    CALL "FDP$XOPEN_FORM" USING FORM-NAME
      SELECT-FORM-IDENTIFIER FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Open failed on form select."
      STOP RUN
    END-IF.

    MOVE "COBOL_CIRCLE_FORM" TO FORM-NAME.
    CALL "FDP$XOPEN_FORM" USING FORM-NAME
      CIRCLE-FORM-IDENTIFIER FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Open failed on form circle."
      STOP RUN
    END-IF.

    MOVE "COBOL_RECTANGLE_FORM" TO FORM-NAME.
    CALL "FDP$XOPEN_FORM" USING FORM-NAME
      RECTANGLE-FORM-IDENTIFIER FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Open failed on form rectangle."
      STOP RUN
    END-IF.
```

```
* Add select form to list scheduled for display.

     CALL "FDP$XADD_FORM" USING SELECT-FORM-IDENTIFIER
       FDE-COBOL-STATUS.
     IF NOT FDE-REQUEST-SUCCESSFUL
       DISPLAY "Add failed on form select."
       STOP RUN
     END-IF.

* Update screen and accept user terminal entry
* for object; display all added forms.

 GET-OBJECT-INPUT.
     CALL "FDP$XREAD_FORMS" USING FDE-COBOL-STATUS.
     IF NOT FDE-REQUEST-SUCCESSFUL
       DISPLAY "Read failed on form select."
       STOP RUN
     END-IF.

* Get screen events that determine next actions.

     CALL "FDP$XGET_NEXT_EVENT" USING EVENT-NAME
       EVENT-NORMAL SCREEN-X-POSITION SCREEN-Y-POSITION
       FORM-IDENTIFIER FORM-X-POSITION FORM-Y-POSITION
       EVENT-TYPE EVENT-OBJECT-NAME EVENT-OCCURRENCE
       EVENT-POSITION OBJECT-TYPE OBJECT-X-POSITION
       OBJECT-Y-POSITION
       LAST-EVENT FDE-COBOL-STATUS.
     IF NOT FDE-REQUEST-SUCCESSFUL
       DISPLAY "Get event failed on form select."
       STOP RUN
     END-IF.

* Stop program on QUIT or BACK event.

     IF EVENT-NAME NOT EQUAL TO "COMPUTE"
       PERFORM STOP-PROGRAM
     END-IF.
```

```
* Transfer object variable from form to program.

    MOVE "OBJECT" TO VARIABLE-NAME.
    MOVE 1 TO OCCURRENCE.
    CALL "FDP$XGET_STRING_VARIABLE" USING
      SELECT-FORM-IDENTIFIER VARIABLE-NAME OCCURRENCE
      OBJECT FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Get string failed on form select."
      STOP RUN
    END-IF.

* If terminal user entered invalid data, display
* error message and ask for another entry.

    IF NOT FDE-NO-ERROR THEN
     MOVE "Type r or c" TO SELECT-MESSAGE
     MOVE "SELECT-MESSAGE" TO VARIABLE-NAME
     CALL "FDP$XREPLACE_STRING_VARIABLE" USING
      SELECT-FORM-IDENTIFIER VARIABLE-NAME
      OCCURRENCE SELECT-MESSAGE
      FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS
     GO TO GET-OBJECT-INPUT
    END-IF.

    IF OBJECT EQUALS "R" THEN

* Remove select form and compute area of rectangle.

      CALL "FDP$XDELETE_FORM" USING
        SELECT-FORM-IDENTIFIER FDE-COBOL-STATUS
        IF NOT FDE-REQUEST-SUCCESSFUL
          DISPLAY "Delete failed on form select."
          STOP RUN
        END-IF
      PERFORM COMPUTE-RECTANGLE-AREA THRU CRA-END
    ELSE
      IF OBJECT EQUALS "C" THEN
```

```
* Remove select form and compute area of circle.

        CALL "FDP$XDELETE_FORM" USING
          SELECT-FORM-IDENTIFIER FDE-COBOL-STATUS
          IF NOT FDE-REQUEST-SUCCESSFUL
            DISPLAY "Delete failed on form select."
            STOP RUN
          END-IF
        PERFORM COMPUTE-CIRCLE-AREA THRU CCA-END
      ELSE

* If terminal user entered invalid value for object,
* display error message and ask for another entry.

        MOVE "Type r or c." TO SELECT-MESSAGE
        MOVE "SELECT-MESSAGE" TO VARIABLE-NAME
        CALL "FDP$XREPLACE_STRING_VARIABLE" USING
          SELECT-FORM-IDENTIFIER VARIABLE-NAME
          OCCURRENCE SELECT-MESSAGE
          FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS
          IF NOT FDE-REQUEST-SUCCESSFUL
            DISPLAY
              "Replace string failed on form select."
            STOP RUN
          END-IF
        GO TO GET-OBJECT-INPUT
      END-IF
    END-IF.

* Process event from rectangle form or circle form.

    IF EVENT-NAME EQUALS "QUIT"
      PERFORM STOP-PROGRAM
    END-IF.
```

```
* A BACK event occurred; display select form in
* original state.

    CALL "FDP$XRESET_FORM" USING SELECT-FORM-IDENTIFIER
      FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Reset failed on form select."
      STOP RUN
    END-IF.

    CALL "FDP$XADD_FORM" USING SELECT-FORM-IDENTIFIER
      FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Add failed on form select."
      STOP RUN
    END-IF.

    GO TO GET-OBJECT-INPUT.

 COMPUTE-CIRCLE-AREA.

* Display circle form in original state.

    CALL "FDP$XRESET_FORM" USING CIRCLE-FORM-IDENTIFIER
      FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Reset failed on form circle."
      STOP RUN
    END-IF.

    CALL "FDP$XADD_FORM" USING CIRCLE-FORM-IDENTIFIER
      FDE-COBOL-STATUS.
      IF NOT FDE-REQUEST-SUCCESSFUL
        DISPLAY "Add failed on form circle."
        STOP RUN
      END-IF.
```

```
      * Update screen and get radius from
      * terminal user entry.

       GET-CIRCLE-INPUT.
           CALL "FDP$XREAD_FORMS" USING FDE-COBOL-STATUS.
           IF NOT FDE-REQUEST-SUCCESSFUL
             DISPLAY "Read failed on form circle."
             STOP RUN
           END-IF.

           CALL "FDP$XGET_NEXT_EVENT" USING EVENT-NAME
             EVENT-NORMAL SCREEN-X-POSITION SCREEN-Y-POSITION
             FORM-IDENTIFIER FORM-X-POSITION FORM-Y-POSITION
             EVENT-TYPE EVENT-OBJECT-NAME EVENT-OCCURRENCE
             EVENT-POSITION OBJECT-TYPE OBJECT-X-POSITION
             OBJECT-Y-POSITION
             LAST-EVENT FDE-COBOL-STATUS.
           IF NOT FDE-REQUEST-SUCCESSFUL
             DISPLAY "Get event failed on form circle."
             STOP RUN
           END-IF.

           IF EVENT-NAME NOT EQUAL TO "COMPUTE"
             CALL "FDP$XDELETE_FORM" USING
               CIRCLE-FORM-IDENTIFIER FDE-COBOL-STATUS
               IF NOT FDE-REQUEST-SUCCESSFUL
                 DISPLAY "Delete failed on form circle."
                 STOP RUN
               END-IF
              GO TO CCA-END
           END-IF.

      * Transfer terminal user entry for radius to program.

           MOVE "RADIUS" TO VARIABLE-NAME.
           MOVE 1 TO OCCURRENCE.
           CALL "FDP$XGET_REAL_VARIABLE" USING
             CIRCLE-FORM-IDENTIFIER VARIABLE-NAME OCCURRENCE
             RADIUS FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS.
           IF NOT FDE-REQUEST-SUCCESSFUL
             DISPLAY "Get real failed on form circle."
             STOP RUN
           END-IF.
```

```
           IF NOT FDE-NO-ERROR THEN
             MOVE "Type valid value for radius." TO
               CIRCLE-MESSAGE
             MOVE "CIRCLE-MESSAGE" TO VARIABLE-NAME
             CALL "FDP$XREPLACE_STRING_VARIABLE" USING
               CIRCLE-FORM-IDENTIFIER VARIABLE-NAME
               OCCURRENCE CIRCLE-MESSAGE
               FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS
             GO TO GET-CIRCLE-INPUT
           END-IF.

       * Compute area of circle and display it.

           COMPUTE CIRCLE-AREA = PI * RADIUS ** 2.

           MOVE "CIRCLE-AREA" TO VARIABLE-NAME.
           CALL "FDP$XREPLACE_REAL_VARIABLE" USING
             CIRCLE-FORM-IDENTIFIER VARIABLE-NAME OCCURRENCE
             CIRCLE-AREA FDE-COBOL-VARIABLE-STATUS
             FDE-COBOL-STATUS.
           IF NOT FDE-REQUEST-SUCCESSFUL
             DISPLAY
               "Replace real failed on form rectangle."
             STOP RUN
           END-IF.

           IF NOT FDE-NO-ERROR THEN

       * Area value could not be displayed using output
       * format defined for form.  Revise form or program
       * to accommodate size of number.

             MOVE "Format cannot display area." TO
                 CIRCLE-MESSAGE
             MOVE "CIRCLE-MESSAGE" TO VARIABLE-NAME
             CALL "FDP$XREPLACE_STRING_VARIABLE" USING
               CIRCLE-FORM-IDENTIFIER VARIABLE-NAME
               OCCURRENCE CIRCLE-MESSAGE
               FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS
             GO TO GET-CIRCLE-INPUT
           END-IF.
```

```
* Blank error message in case previously displayed.

     MOVE SPACES TO CIRCLE-MESSAGE.
     MOVE "CIRCLE-MESSAGE" TO VARIABLE-NAME.
     CALL "FDP$XREPLACE_STRING_VARIABLE" USING
       CIRCLE-FORM-IDENTIFIER VARIABLE-NAME
       OCCURRENCE CIRCLE-MESSAGE
       FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS.
     IF NOT FDE-REQUEST-SUCCESSFUL
       DISPLAY "Replace string failed on form circle."
       STOP RUN
     END-IF.

* Process next user entry.

     GO TO GET-CIRCLE-INPUT.
 CCA-END.  EXIT.

 COMPUTE-RECTANGLE-AREA.

* Display rectangle form in original state.

     CALL "FDP$XRESET_FORM" USING
       RECTANGLE-FORM-IDENTIFIER FDE-COBOL-STATUS.
     IF NOT FDE-REQUEST-SUCCESSFUL
       DISPLAY "Reset failed on form rectangle."
       STOP RUN
     END-IF.

     CALL "FDP$XADD_FORM" USING
       RECTANGLE-FORM-IDENTIFIER FDE-COBOL-STATUS.
     IF NOT FDE-REQUEST-SUCCESSFUL
       DISPLAY "Add failed on form rectangle."
       STOP RUN
     END-IF.
```

```
* Update screen and get terminal user entry for
* rectangle height and width.

 GET-RECTANGLE-INPUT.
     CALL "FDP$XREAD_FORMS" USING FDE-COBOL-STATUS.
     IF NOT FDE-REQUEST-SUCCESSFUL
       DISPLAY "Read failed on form rectangle."
       STOP RUN
     END-IF.

     CALL "FDP$XGET_NEXT_EVENT" USING EVENT-NAME
       EVENT-NORMAL SCREEN-X-POSITION SCREEN-Y-POSITION
       FORM-IDENTIFIER FORM-X-POSITION FORM-Y-POSITION
       EVENT-TYPE EVENT-OBJECT-NAME EVENT-OCCURRENCE
       EVENT-POSITION OBJECT-TYPE OBJECT-X-POSITION
       OBJECT-Y-POSITION
       LAST-EVENT FDE-COBOL-STATUS.
     IF NOT FDE-REQUEST-SUCCESSFUL
       DISPLAY "Get event failed on form rectangle."
       STOP RUN
     END-IF.

* If abnormal event (BACK or QUIT) occurs,
* return to caller.

     IF EVENT-NAME NOT EQUAL TO "COMPUTE"
       CALL "FDP$XDELETE_FORM" USING
         RECTANGLE-FORM-IDENTIFIER FDE-COBOL-STATUS
         IF NOT FDE-REQUEST-SUCCESSFUL
           DISPLAY "Delete failed on form rectangle."
           STOP RUN
         END-IF
        GO TO CRA-END
     END-IF.
```

```
* Transfer height value from form to program.

    MOVE "SIDE" TO VARIABLE-NAME.
    MOVE 1 TO OCCURRENCE.
    CALL "FDP$XGET_INTEGER_VARIABLE" USING
      RECTANGLE-FORM-IDENTIFIER VARIABLE-NAME
      OCCURRENCE SIDE (1) FDE-COBOL-VARIABLE-STATUS
      FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Get integer failed on form rectangle."
      STOP RUN
    END-IF.

* If data invalid, move cursor to height value
* and display error message.

    IF NOT FDE-NO-ERROR THEN
      MOVE 1 TO CHARACTER-POSITION
      CALL "FDP$XSET_CURSOR_POSITION" USING
        RECTANGLE-FORM-IDENTIFIER VARIABLE-NAME
        OCCURRENCE CHARACTER-POSITION
        FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS
      IF NOT FDE-REQUEST-SUCCESSFUL
        DISPLAY "Set cursor failed on form rectangle."
        STOP RUN
      END-IF

      MOVE "Type valid value for height." TO
         RECTANGLE-MESSAGE
      MOVE "RECTANGLE-MESSAGE" TO VARIABLE-NAME
      CALL "FDP$XREPLACE_STRING_VARIABLE" USING
        RECTANGLE-FORM-IDENTIFIER VARIABLE-NAME
        OCCURRENCE RECTANGLE-MESSAGE
        FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS
      GO TO GET-RECTANGLE-INPUT
    END-IF.
```

```
* Transfer width value from form to program.

    MOVE 2 TO OCCURRENCE.
    CALL "FDP$XGET_INTEGER_VARIABLE" USING
      RECTANGLE-FORM-IDENTIFIER VARIABLE-NAME
      OCCURRENCE SIDE (2) FDE-COBOL-VARIABLE-STATUS
      FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Get integer failed on form rectangle."
      STOP RUN
    END-IF.

* If data invalid, move cursor to width value and display
* error message.

    IF NOT FDE-NO-ERROR THEN
      MOVE 1 TO CHARACTER-POSITION
      CALL "FDP$XSET_CURSOR_POSITION" USING
        RECTANGLE-FORM-IDENTIFIER VARIABLE-NAME
        OCCURRENCE CHARACTER-POSITION
        FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS
      IF NOT FDE-REQUEST-SUCCESSFUL
        DISPLAY "Set cursor failed on form rectangle."
        STOP RUN
      END-IF

      MOVE "Type valid value for width."
        TO RECTANGLE-MESSAGE
      MOVE "RECTANGLE-MESSAGE" TO VARIABLE-NAME
      MOVE 1 TO OCCURRENCE
      CALL "FDP$XREPLACE_STRING_VARIABLE" USING
        RECTANGLE-FORM-IDENTIFIER VARIABLE-NAME
        OCCURRENCE RECTANGLE-MESSAGE
        FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS
      GO TO GET-RECTANGLE-INPUT
    END-IF.
```

```
* Compute area of rectangle and display it.

     MULTIPLY SIDE (1) BY SIDE (2) GIVING
       RECTANGLE-AREA.
     MOVE "RECTANGLE-AREA" TO VARIABLE-NAME.
     MOVE 1 TO OCCURRENCE.
     CALL "FDP$XREPLACE_INTEGER_VARIABLE" USING
         RECTANGLE-FORM-IDENTIFIER VARIABLE-NAME
         OCCURRENCE RECTANGLE-AREA
         FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS.
     IF NOT FDE-REQUEST-SUCCESSFUL
       DISPLAY
         "Replace integer failed on form rectangle."
       STOP RUN
     END-IF.


     IF NOT FDE-NO-ERROR THEN

* Area value could not be displayed using output
* format defined for form. Revise form or program
* to accommodate size of number.

       MOVE "Format cannot display area."
         TO RECTANGLE-MESSAGE
       MOVE "RECTANGLE-MESSAGE" TO VARIABLE-NAME
       MOVE 1 TO OCCURRENCE
       CALL "FDP$XREPLACE_STRING_VARIABLE" USING
         RECTANGLE-FORM-IDENTIFIER VARIABLE-NAME
         OCCURRENCE RECTANGLE-MESSAGE
         FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS
      GO TO GET-RECTANGLE-INPUT
     END-IF.
```

```
* Blank error message in case previously displayed.

    MOVE SPACES TO RECTANGLE-MESSAGE.
    MOVE "RECTANGLE-MESSAGE" TO VARIABLE-NAME.
    CALL "FDP$XREPLACE_STRING_VARIABLE" USING
      RECTANGLE-FORM-IDENTIFIER VARIABLE-NAME
      OCCURRENCE RECTANGLE-MESSAGE
      FDE-COBOL-VARIABLE-STATUS FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY
        "Replace string failed on form rectangle."
      STOP RUN
    END-IF.

* Process next user entry.

    GO TO GET-RECTANGLE-INPUT.
 CRA-END.  EXIT.

 STOP-PROGRAM.

* Close all forms and delete from list scheduled
* for display.

    CALL "FDP$XCLOSE_FORM" USING
      SELECT-FORM-IDENTIFIER FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Close failed on form select."
    END-IF.

    CALL "FDP$XCLOSE_FORM" USING
      CIRCLE-FORM-IDENTIFIER FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Close failed on form circle."
    END-IF.

    CALL "FDP$XCLOSE_FORM" USING
      RECTANGLE-FORM-IDENTIFIER FDE-COBOL-STATUS.
    IF NOT FDE-REQUEST-SUCCESSFUL
      DISPLAY "Close failed on form rectangle."
    END-IF.

    STOP RUN.
```

Expanding and Compiling a Program

Programs using Screen Formatting use common decks and form definition records that reside outside the main program. To manage the source text for this type of program, put the program in one or more SCU decks. This allows you to update individual parts of a program and to use forms in more than one program without duplicating code.[3]

To expand and compile a program maintained in SCU decks:

1. Expand the deck containing the main program.
2. Compile the expanded program.
3. Put the compiled program on an object library.

A procedure for compiling and expanding a program is shown in the following example. (The example is based on the example program and form definition records described earlier. The example shows how to place decks on library EXAMPLE_SOURCE_LIBRARY.)

```
PROC cobol_compile_deck, cobcd (
  deck,  d: name=$required
  status  : var of status = $optional
  )
  source_code_utility
    use_library base=example_source_library result=$null
    expand_deck deck=$value(deck) ..
    compile=$local.compile ..
    alternate_base=$system.cybil.osf$program_interface
  quit

  cobol input=$local.compile ..
    list=$local.listing runtime_checks=all  ..
    debug_aids=all
```

3. For information on SCU, see the NOS/VE Source Code Management manual.

```
  create_object_library
    add_module library=example_object_library
    combine_module library=$local.lgo
    generate_library library=example_object_library.$next
  quit

PROCEND cobol_compile_deck
```

To use the procedure, put it on library EXAMPLE_OBJECT_LIBRARY and then add the library to your command list (using the CREATE_COMMAND_LIST_ENTRY command). You can execute the procedure by entering:

```
/cobol_compile_deck deck=cobol_compute_object_area
```

The compiled program is now also on library EXAMPLE_OBJECT_LIBRARY.

For more information on writing and using procedures, see the NOS/VE System Usage manual.

Helping the User Start the Application

The complete application consists of your program and the forms created by the designer. To integrate the forms with your program, you must:

- Create a procedure that gives users access to the object library containing the forms.
- Ensure that the user's terminal environment is set up properly to use the forms (in most instances, by creating a user prolog).
- Ensure that users know how to start the application.

Creating a User Procedure

To give the user access to the object library containing the forms:

1. Write a NOS/VE procedure from which the user starts the application.
2. Place the procedure on the library that contains the compiled program.

For example, the following procedure executes the application that uses the starting procedure COMPUTEAREA on library EXAMPLE_OBJECT_LIBRARY. The other libraries accessed by the program are $SYSTEM.FDF$LIBRARY and $SYSTEM.TDU.TERMINAL_DEFINITIONS. Users must have these libraries available in order for the program to call the Screen Formatting subroutines.

```
PROC cobol_compute_area, cobca (
  status  : var of status = optional
  )

  execute_task ..
    library=(example_object_library,$system.fdf$library,..
    $system.tdu.terminal_definitions) ..
    starting_procedure=computearea

PROCEND cobol_compute_area
```

Creating a User Prolog

To ensure that the users' terminal environment is set up properly to use the forms, make sure they set the following terminal characteristics before they execute the procedure:

Characteristic	Description
Terminal model	Identifies the terminal to NOS/VE.
Attention character	Provides a character users can enter to interrupt the application.
Hold messages	Tells the network to hold all network messages until the user stops the application.

In most instances, users should set up their terminal for the entire terminal session in their user prologs. The example below does the following:

- Identifies a Digital Equipment Corporation VT220 terminal to the system.
- Chooses the exclamation point as a way to interrupt the program.
- Holds all messages from a NAMVE/CDCNET network.
- Sets up the way the terminal uses the exclamation point to interrupt the program.

The users add the following commands to their user prologs:

```
change_terminal_attributes terminal_model=dec_vt220 ..
  attention_character='!' ..
  status_action=hold
change_term_conn_defaults attention_character_action=1
change_connection_attributes terminal_file_name=input aca=1
change_connection_attributes terminal_file_name=output aca=1
change_connection_attributes terminal_file_name=command aca=1
```

For a further explanation of how to interrupt a screen application during an interactive session, and what commands to use for networks other than NAMVE/CDCNET, see the NOS/VE System Usage manual.

Starting the Application

To start the application, the users enter:

```
/create_command_list_entry e=example_object_library
/cobol_compute_area
```

When finished with the application, the users remove the object library from their command lists:

```
/delete_command_list_entry e=example_object_library
```

COBOL Subroutine Calls for Interacting with Forms

The subroutines that follow are used by Screen Formatting to manage forms. These subroutines are external routines that reside on the library called $SYSTEM.FDF$LIBRARY. To execute your program, users must have this library in their program library lists.

For each subroutine, there is a purpose description, input format, list of parameters and their types, condition identifiers, and pertinent remarks.

Adding a Form

Purpose FDP$XADD_FORM schedules a form for display on the application user's screen.

Format **CALL "FDP$XADD_FORM" USING form-identifier fde-cobol-status**

Parameters **form-identifier** {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-already-added
fde-form-pushed
fde-form-too-large-for-screen
fde-invalid-form-identifier
fde-no-space-available
fde-system-error

Remarks

- When you call either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting displays the added form on the terminal screen. The added form is placed on top of other forms occupying the same area on the screen.
- Before you add a form, you must open it.
- You cannot add a pushed form.

Changing Table Size

Purpose FDP$XCHANGE_TABLE_SIZE changes the size of the table during program execution.

Format **CALL "FDP$XCHANGE_TABLE_SIZE" USING form-identifier table-name table-size fde-cobol-status**

Parameters

form-identifier {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

table-name {input}

The name of the table to change in size. Include the following data description entry:

```
01 table_name PIC X(31).
```

table-size {input}

The size of the table. While this subroutine is in effect, Screen Formatting limits the number of stored occurrences allowed for a table to the value you specify on this parameter. How many occurrences are displayed at one time depends on the number of visible occurrences defined in the form.

If you specify zero for the table size, no occurrences appear on the form.

Include the following data description entry:

```
01 table-size
   USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-pushed
fde-invalid-form-identifier
fde-invalid-table-name
fde-invalid-table-size
fde-no-space-available
fde-unknown-table-name

Remarks

- The table must be present in an open form.
- The size limitation remains in effect until the next time you call the FDP$XCHANGE_TABLE_SIZE subroutine.
- The maximum size for a table is identified by the form as the maximum number of stored occurrences. If you specify a table size larger than the maximum, you receive an error message (fde-invalid-table-size).

Examples The following examples describe how changing the size of a table affects the application user. On the form, the table's specifications are a maximum of 20 stored occurrences, of which 6 occurrences can be visible at one time.

- If you specify a table size of 10, Screen Formatting displays 6 occurrences and allows the application user to page to the 10th occurrence.
- If you specify a table size of 4, Screen Formatting displays 4 occurrences and does not allow the application user to page.

Closing a Form

Purpose FDP$XCLOSE_FORM releases resources used to process a form and deletes the form from the list scheduled for display.

Format **CALL "FDP$XCLOSE_FORM" USING form-identifier fde-cobol-status**

Parameters **form-identifier** {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-invalid-form-identifier
fde-form-pushed
fde-no-space-available

Remarks

- When the program calls either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting removes the closed form from the terminal screen as a result of calling this procedure.
- Before you can close a form, you must open it.
- You cannot close a pushed form.

Combining Forms

Purpose FDP$XCOMBINE_FORM combines a form with a previously added form and schedules the combined form for display on the terminal screen.

Format

CALL "FDP$XCOMBINE_FORM" USING
added-form-identifier combine-form-identifier
fde-cobol-status

Parameters

added-form-identifier {input}

The identifier for this instance of the previously added form. Include the following data description entry:

```
01 added-form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

combine-form-identifier {input}

The identifier for the form you are combining with the previously added form. Include the following data description entry:

```
01 combine-form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-already-added
fde-form-already-combined
fde-form-pushed
fde-form-too-large-for-screen
fde-invalid-form-identifier
fde-no-space-available
fde-system-error

Remarks

- You cannot combine a pushed form.
- The combined form inherits the event definitions of the previously added form.
- Before you combine a form with a previously added form, you must open both forms.
- When the programs calls either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting displays the combined form. The combined form is placed on top of other forms occupying the same area on the screen.
- When the application user executes an event to return to the program normally, Screen Formatting updates all program variables associated with both the added and combined forms.
- To combine several forms with a previously added form, call this subroutine more than once.

Deleting a Form

Purpose FDP$XDELETE_FORM deletes a form from the list of forms scheduled for display.

Format **CALL "FDP$XDELETE_FORM" USING form-identifier fde-cobol-status**

Parameters **form-identifier** {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-not-scheduled
fde-form-pushed
fde-invalid-form-identifier
fde-no-space-available

Remarks

- When the program calls either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting removes the deleted form from the terminal screen and replots any forms uncovered by the deleted form with the next screen update.
- When you add a form (FDP$XADD_FORM) again that you previously deleted, the data in the form is retained.

- Before you delete a form, you must open it.
- You cannot delete a pushed form.
- If the form was added and has any combined forms associated with it, the combined forms are also deleted.
- When you delete a combined form, only that form is deleted. Areas covered by the combined form are replotted after the combined form is deleted.

Getting an Integer Variable

Purpose FDP$XGET_INTEGER_VARIABLE gets the value the user entered on a form for an integer variable and transfers it to the program.

Format

CALL "FDP$XGET_INTEGER_VARIABLE" USING form-identifier name occurrence variable fde-cobol-variable-status fde-cobol-status

Parameters

form-identifier {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

name {input}

The name of the integer variable to get and transfer to the program. Include the following data description entry:

```
01 name PIC X(31).
```

occurrence {input}

The occurrence of the variable name. Include the following data description entry:

```
01 occurrence
   USAGE COMP PIC S9(18) SYNC LEFT.
```

variable {output}

The integer variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include the following data description entry:

```
01 variable
   USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-variable-status {output}

The condition name that describes the status of the integer variable. The following values are possible:

FDE-INVALID-INTEGER

The user entered data that is not in the range defined for variable.

FDE-LOSS-OF-SIGNIFICANCE

The user entered an integer that is too large.

FDE-NO-ERROR

No error occurred.

This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

fde-cobol-status {output}

The variable that indicates the subroutine results. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions

The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-error
fde-invalid-form-identifier
fde-invalid-variable-name
fde-no-space-available
fde-system-error
fde-unknown-occurrence
fde-unknown-variable-name
fde-wrong-variable-type

Remarks

- Before you get an integer variable, you must open its form. If you get the variable after opening the form and before reading or replacing the variable on the form, the program returns the initial value specified by the form designer.

- If the form designer specifies data validation rules and error processing to display an error message or form, the program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Getting the Next Event

Purpose FDP$XGET_NEXT_EVENT gets the event resulting from the most recent FDP$XREAD_FORMS subroutine.

Format

CALL "FDP$XGET_NEXT_EVENT" USING event-name event-normal screen-x-position screen-y-position form-identifier form-x-position form-y-position event-type object-name object-occurrence character-position object-type object-x-position object-y-position last-event fde-cobol-status

Parameters

event-name {output}

A data name to receive the application user's event. Include the following data description entry:

```
01 event-name PIC X(31).
```

event-normal {output}

A data name to receive the event normal indication. If the event is normal, T is returned; if the event is not normal, F is returned. Include the following data description entry:

```
01 event-normal PIC X(1).
```

screen-x-position {output}

A data name to receive the x position of the event on the screen. The character position in the upper left corner of the screen is 1; the x position increases by 1 for each character on the screen counting from left to right. Include the following data description entry:

```
01 screen-x-position
   USAGE COMP PIC S9(18) SYNC LEFT.
```

screen-y-position {output}

A data name to receive the y position of the event on the screen. The character position in the upper left corner of the screen is 1; the y position increases by 1 for each character on the screen counting from top to bottom. Include the following data description entry:

```
01 screen-y-position
   USAGE COMP PIC S9(18) SYNC LEFT.
```

form-identifier {output}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

form-x-position {output}

A data name to receive the x position of the event on the form. The character in the upper left corner of the form is 1; the x position increases by 1 for each character you count from left to right. Include the following data description entry:

```
01 form-x-position
   USAGE COMP PIC S9(18) SYNC LEFT.
```

form-y-position {output}

A data name to receive the y position of the event on the form. The character in the upper left corner of the form is 1; the y position increases by 1 for each character you count from top to bottom. Include the following data description entry:

```
01 form-y-position
   USAGE COMP PIC S9(18) SYNC LEFT.
```

event-type {output}

The event type. The following values are possible:

Value	Event Type
0	The event occurred on an area of a form containing no object.
1	The event occurred on a form object.

Include the following data description entry:

```
01 event-type
   USAGE COMP PIC S9(18) SYNC LEFT.
```

object-name {output}

When event-type is 1, the variable returns a value giving the name of the object on which the event occurred. Include the following data description entry:

```
01 object-name PIC X(31).
```

object-occurrence {output}

When event-type is 1, the variable returns a value giving the occurrence of the object name. Include the following data description entry:

```
01 object-occurrence
   USAGE COMP PIC S9(18) SYNC LEFT.
```

character-position {output}

When event-type is 1, the variable returns a value giving the character position within the object where the event occurred. The first character position is 1. Include the following data description entry:

```
01 character-position
   USAGE COMP PIC S9(18) SYNC LEFT.
```

object-type {output}

When event-type is 1, the variable indicates the type of object on which the event occurred. The following values are possible:

Value	Object Type
0	Box
1	Constant text
2	Constant text box
3	Line
5	Variable text
6	Variable text box

Include the following data description entry:

```
01 object-type
   USAGE COMP PIC S9(18) SYNC LEFT.
```

object-x-position {output}

When event-type is 1, the value returned is the x origin position of the object. The character in the upper left corner of the form is 1; the x position increases by 1 for each character you count from left to right. Include the following data description entry:

```
01 object-x-position
   USAGE COMP PIC S9(18) SYNC LEFT.
```

object-y-position {output}

When event-type is 1, the value returned is the y origin position of the object. The character in the upper left corner of the form is 1; the y position increases by 1 for each character you count from top to bottom. Include the following data description entry:

```
01 object-y-position
   USAGE COMP PIC S9(18) SYNC LEFT.
```

last-event {output}

Indicates whether this is the last event. The following values are possible:

Value	Meaning
T	This is the last event.
F	This is not the last event.

Include the following data description entry:

```
01 last-event PIC X(1).
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

```
fde-bad-data-value
```

Remarks The FDP$XREAD_FORMS subroutine deletes existing events. If the event is normal, Screen Formatting updates the variables in the added and combined forms containing the event. Later, you can request the transfer of these variables to program storage. If the event is abnormal, Screen Formatting does not update or validate variables.

Getting a Real Variable

Purpose FDP$XGET_REAL_VARIABLE gets a value the user entered on a form for a real variable and transfers it to the program.

Format

```
CALL "FDP$XGET_REAL_VARIABLE" USING
form-identifier name occurrence variable
fde-cobol-variable-status fde-cobol-status
```

Parameters

form-identifier {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

name {input}

The name of the variable to get. Include the following data description entry:

```
01 name PIC X(31).
```

occurrence {input}

The occurrence of the variable name. Include the following data description entry:

```
01 occurrence
   USAGE COMP PIC S9(18) SYNC LEFT.
```

variable {output}

The value of the real variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include the following data description entry:

```
01 variable COMP-1.
```

fde-cobol-variable-status {output}

The condition that gives you the status of the variable. The following values are possible:

FDE-INDEFINITE

The user entered an indefinite number.

FDE-INVALID-BDP-DATA

The user entered data that does not correspond to the defined data type.

FDE-INVALID-REAL

The user entered data that is not within the range of real numbers defined for the variable.

FDE-LOSS-OF-SIGNIFICANCE

The user entered a number too large to be converted to the defined real program type.

FDE-NO-ERROR

No error occurred on the variable.

FDE-OVERFLOW

The user entered an exponent that is too large.

FDE-UNDERFLOW

The user entered an exponent that is too small.

This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-invalid-form-identifier
fde-invalid-variable-name
fde-no-space-available
fde-system-error
fde-unknown-occurrence
fde-unknown-variable-name

Remarks

- Before you get a real variable, you must open the form on which the user enters the value. If you get the variable after opening the form and before reading or replacing the variable on the form, the program returns the initial value specified by the form designer.

- If the form designer specifies data validation rules and error processing to display an error message or form, your program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Getting a Record

Purpose FDP$XGET_RECORD transfers the values of the form record to the program record.

Format **CALL "FDP$XGET_RECORD" USING form-identifier record fde-cobol-variable-status fde-cobol-status**

Parameters

form-identifier {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

record {output}

The name of the record that contains working storage information for the form. When the form is created, Screen Formatting generates the variable definition entries in this record. It is the program work area for the variables used on the form.

fde-cobol-variable-status {output}

The condition that gives you the status of the variable. The following values are possible:

FDE-INDEFINITE

The user entered an indefinite number.

FDE-INFINITE

The user entered an infinite number.

FDE-INVALID-BDP-DATA

The user entered data that does not correspond to the defined data type.

FDE-INVALID-INTEGER

The user entered data that is not within the range of integer numbers defined for the variable.

FDE-INVALID-REAL

The user entered data that is not within the range of real numbers defined for the variable.

FDE-INVALID-STRING

The user entered data that does not match the strings defined as valid for the variable.

FDE-LOSS-OF-SIGNIFICANCE

The user entered a number too large to be converted to the defined real or integer data type.

FDE-NO-DIGITS

The user, who should have entered a real or integer number, did not enter digits.

FDE-NO-ERROR

No error occurred on the variable.

FDE-OVERFLOW

The user entered an exponent that is too large.

FDE-UNDERFLOW

The user entered an exponent that is too small.

This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

ide-bad-data-value
fde-form-has-no-variables
fde-invalid-form-identifier
fde-no-space-available
fde-system-error
fde-work-invalid

Remarks

- Before you get a record for a form, you must open the form. If you get the record after opening the form and before reading or replacing the record, the program returns the initial value specified by the form designer.

- If the form designer specifies data validation rules and error processing to display an error message or form, your program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Getting a String Variable

Purpose FDP$XGET_STRING_VARIABLE gets a value the user entered on a form for a string variable and transfers it to the program.

Format **CALL "FDP$XGET_STRING_VARIABLE" USING form-identifier name occurrence variable fde-cobol-variable-status fde-cobol-status**

Parameters

form-identifier {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

name {input}

The name of the variable to get. Include the following data description entry:

```
01 name PIC X(31).
```

occurrence {input}

The occurrence of the variable name. Include the following data description entry:

```
01 occurrence
   USAGE COMP PIC S9(18) SYNC LEFT.
```

variable {output}

The variable that Screen Formatting generates automatically in the form definition record. The form definition record defines the variable. If you do not want to use the automatically generated variable, include the following data description entry (where n is the length of the variable):

```
01 variable PIC X(n).
```

fde-cobol-variable-status {output}

The condition that gives you the status of the variable. The following values are possible:

FDE-INVALID-STRING

The user entered a variable that does not match the strings defined for the variable.

FDE-NO-ERROR

No error occurred on the variable.

FDE-VARIABLE-TRUNCATED

The storage length of the parameter variable is not long enough.

This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

fde-cobol-status {output}

The variable that indicates the results of subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions

The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-invalid-form-identifier
fde-invalid-variable-name
fde-no-space-available
fde-system-error
fde-unknown-occurrence
fde-unknown-variable-name
fde-wrong-variable-name

Remarks

- Before you get a string variable, you must open the form on which the user enters the value. If you get the variable after opening the form and before reading or replacing the variable on the form, the program returns the initial value specified by the form designer.

- If the form designer specifies data validation rules and error processing to display an error message or form, your program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Opening a Form

Purpose FDP$XOPEN_FORM locates a form and and prepares it for use by the program.

Format **CALL "FDP$XOPEN_FORM" USING form-name form-identifier fde-cobol-status**

Parameters **form-name** {input}

The name of the form you want to open. Include the following data description entry:

```
01 form-name PIC X(31).
```

form-identifier {input-output}

The form identifier established for the form. Other Screen Formatting subroutines use this identifier when referencing the form. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-already-open
fde-form-not-ended
fde-form-requires-conversion
fde-invalid-form-identifier
fde-invalid-form-name
fde-no-space-available
fde-system-error
fde-terminal-not-identified
fde-unknown-form-name

Remarks

- Screen Formatting locates a form as follows:
  - If the form name is blank, Screen Formatting assumes that the form identifier specifies the required dynamically created form.
  - If the form name is not blank, Screen Formatting searches the list of ended dynamically created forms.
  - If the form name is not blank and is not in the list of ended dynamically created forms, Screen Formatting searches the command library list to find the form name on the object code libraries. (You specify the order in which Screen Formatting searches the list using the NOS/VE command CREATE_COMMAND_LIST_ENTRY).
- Executing FDP$XOPEN_FORM does not display the form on the screen.
- The form identifier that FDP$XOPEN_FORM returns identifies the instance of open for a form. Forms dynamically created have only one instance of open. Forms stored on object libraries can have more than one instance of open. For each instance of open, Screen Formatting maintains the working environment (current value of variables and their display attributes) of the form.

Popping a Form

Purpose FDP$XPOP_FORMS deletes forms scheduled (added or combined) since the last FDP$XPUSH_FORMS call.

Format **CALL "FDP$XPOP_FORMS" USING fde-cobol-status**

Parameters **fde-cobol-status** {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-no-forms-to-pop

Remarks Events associated with the last list of pushed forms become active.

Positioning a Form

Purpose FDP$XPOSITION_FORM schedules moving a form to a new location. Using this subroutine, you can define a form at one location and display it at another location, or you can move a form from where it is currently displayed to a new location.

Format **CALL "FDP$XPOSITION_FORM" USING form-identifier screen-x-position screen-y-position fde-cobol-status**

Parameters

form-identifier {input}

The form identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

screen-x-position {input}

The x position on the screen for determining the upper left corner of the form. The character position in the upper left corner of the screen is 1, and the x position increases by 1 for each character on the screen counting from left to right. Include the following data description entry:

```
01 screen-x-position
   USAGE COMP PIC S9(18) SYNC LEFT.
```

screen-y-position {input}

The y position on the screen for determining the upper left corner of the form. The character position in the upper left corner of the screen is 1, and the y position increases by 1 for each character on the screen counting from top to bottom. Include the following data description entry:

```
01 screen-y-position
   USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-pushed
fde-form-too-large-for-screen
fde-invalid-form-identifier
fde-no-space-available
fde-system-error

Remarks

- When the program calls either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting displays the form on the screen at the position specified in the call to FDP$XPOSITION_FORM.
- If you call this subroutine while the form is displayed, the form is deleted from its current location and added at the new location. The added form lays on top of any other form occupying the same area on the screen.
- If you call this procedure before the form is displayed, the form is displayed at the specified location.
- Before you position a form, you must open it.
- You cannot position a pushed form.

Pushing a Form

Purpose FDP$XPUSH_FORMS deactivates the events associated with forms scheduled for display (added or combined) since the last push call.

Format **CALL "FDP$XPUSH_FORMS" USING fde-cobol-status**

Parameters **fde-cobol-status** {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-no-forms-to-push

Remarks

- Events associated with these forms are not passed to the program.
- A program cannot change or close a pushed form.
- Pushed forms are displayed on the screen. If you want newly added forms to appear on a blank screen, first add a blank form that covers the screen.

  Updates to the screen continue to show the pushed forms.
- This subroutine causes Screen Formatting to record added and combined forms so you can return to them later.

Reading a Form

Purpose FDP$XREAD_FORMS updates the terminal screen and accepts input from the application user.

Format **CALL "FDP$XREAD_FORMS" USING fde-cobol-status**

Parameters **fde-cobol-status** {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-no-events-active
fde-no-forms-to-read
fde-system-error
fde-terminal-disconnected

Remarks

- A call to FDP$XREAD_FORMS:
  - Displays all the forms you scheduled for display and have not deleted. If you added or combined forms since the last FDP$XREAD_FORMS or FDP$XSHOW_FORMS call, it displays them for the first time.
  - Removes from the screen the forms you deleted since the last FDP$XREAD_FORMS or FDP$XSHOW_FORMS call.
  - Updates on the screen the variables replaced since the last FDP$XREAD_FORMS or FDP$XSHOW_FORMS call.
  - Updates on the screen the objects for which display attributes were set or reset since the last FDP$XREAD_FORMS or FDP$XSHOW_FORMS call.

- Events not retrieved with the FDP$XGET_NEXT_EVENT subroutine are deleted before any input is accepted from the user.
- The FDP$XREAD_FORMS subroutine does not execute unless the forms scheduled for display contain at least one active event.

Replacing an Integer Variable

Purpose FDP$XREPLACE_INTEGER_VARIABLE transfers a program integer variable to Screen Formatting.

Format

```
CALL "FDP$XREPLACE_INTEGER_VARIABLE"
USING form-indentifier name occurrence variable
fde-cobol-variable-status fde-cobol-status
```

Parameters

form-identifier {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

name {input}

The name of the variable to replace. Include the following data description entry:

```
01 name PIC X(31).
```

occurrence {input}

The occurrence of the variable name. Include the following data description entry:

```
01 occurrence
   USAGE COMP PIC S9(18) SYNC LEFT.
```

variable {input}

The integer variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include the following data description entry:

```
01 variable
   USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-variable-status {output}

The condition that gives you the status of the variable. The following values are possible:

FDE-INVALID-INTEGER

The program supplied a value that is not within the range of integer numbers defined for the variable.

FDE-LOSS-OF-SIGNIFICANCE

The program supplied a value that is too large for the form variable.

FDE-NO-ERROR

No error occurred on the variable.

FDE-OUTPUT-FORMAT-BAD

The output format defined for the variable cannot output the variable.

This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions

The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-pushed
fde-invalid-form-identifier
fde-invalid-variable-name
fde-no-space-available
fde-system-error
fde-unknown-occurrence
fde-unknown-variable-name
fde-wrong-variable-type

Remarks

- When you call either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting replaces the integer variable on the terminal screen.
- Before you replace an integer variable, you must open the form on which it is replaced.
- You cannot replace an integer variable for a pushed form.
- If the integer variable is not valid, it is not replaced.

Replacing a Real Variable

Purpose FDP$XREPLACE_REAL_VARIABLE transfers a program real variable to Screen Formatting.

Format

CALL "FDP$XREPLACE_REAL_VARIABLE" USING form-identifier name occurrence variable fde-cobol-variable-status fde-cobol-status

Parameters

form-identifier {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

name {input}

The name of the variable to replace. Include the following data description entry:

```
01 name PIC X(31).
```

occurrence {input}

The occurrence of the variable name. Include the following data description entry:

```
01 occurrence
   USAGE COMP PIC S9(18) SYNC LEFT.
```

variable {input}

The value of the real variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include the following data description entry:

```
01 variable COMP-1.
```

fde-cobol-variable-status {output}

The condition that gives you the status of the variable. The following values are possible:

FDE-INVALID-REAL

The value the program supplied is not within the range of real numbers defined for the variable.

FDE-LOSS-OF-SIGNIFICANCE

The value the program supplied is too large for the form variable.

FDE-NO-ERROR

No error occurred on the variable.

FDE-OUTPUT-FORMAT-BAD

The output format defined for the variable cannot output the variable.

This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions

The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-pushed
fde-invalid-form-identifier
fde-no-space-available
fde-system-error
fde-unknown-occurrence
fde-unknown-variable-name
fde-variable-name
fde-wrong-variable-type

Remarks

- When you call either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting replaces the real variable on the terminal screen.
- Before you replace a real variable, you must open the form on which it is replaced.
- You cannot replace a real variable for a pushed form.
- If the real variable is not valid, it is not replaced.

Replacing a Record

Purpose FDP$XREPLACE_RECORD transfers values of program variables to Screen Formatting for later display on a form.

Format **CALL "FDP$XREPLACE_RECORD" USING form-identifier record fde-cobol-variable-status fde-cobol-status**

Parameters

form-identifier {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

record {input}

The name of the record that contains working storage information for the form. When the form is created, Screen Formatting generates the variable definition entries in this record. It is the program work area for the variables used on the form.

fde-cobol-variable-status {output}

The condition that gives you the status of the variable. The following values are possible:

FDE-INDEFINITE

The program supplied an indefinite number.

FDE-INFINITE

The program supplied an infinite number.

FDE-LOSS-OF-SIGNIFICANCE

The program supplied a number too large to be converted to the form variable size.

FDE-NO-ERROR

No error occurred on the variable.

FDE-OUTPUT-FORMAT-BAD

The output format defined for the variable cannot output the variable.

FDE-OVERFLOW

The program supplied an exponent that is too large.

FDE-UNDERFLOW

The program supplied an exponent that is too small.

This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

fde-cobol-status {output}

The variable that indicates the results of subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions

The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-has-no-variables
fde-form-pushed
fde-invalid-form-identifier
fde-no-space-available
fde-work-invalid

Remarks

- When the program calls either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting replaces the variables on the terminal screen with the values stored in Screen Formatting.
- Before you replace a record, you must open the form on which the variables are replaced.
- You cannot replace a record for a pushed form.

Replacing a String Variable

Purpose FDP$XREPLACE_STRING_VARIABLE transfers a string variable to Screen Formatting.

Format

```
CALL "FDP$XREPLACE_STRING_VARIABLE"
USING form-identifier name occurrence variable
fde-cobol-variable-status fde-cobol-status
```

Parameters

form-identifier {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

name {input}

The name of the string variable to replace. Include the following data description entry:

```
01 name PIC X(31).
```

occurrence {input}

The occurrence of the variable name. Include the following data description entry:

```
01 occurrence
   USAGE COMP PIC S9(18) SYNC LEFT.
```

variable {input}

The variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include the following data description entry (n is the length of the variable):

```
01 variable PIC X(n).
```

fde-cobol-variable-status {output}

The condition that gives you the status of the variable. The following values are possible:

FDE-INVALID-STRING

The program supplied a variable that does not match the strings defined for the variable.

FDE-NO-ERROR

No error occurred on the variable.

This variable is defined with the SCU *COPY FDE$COBOL_VARIABLE_STATUS directive you put in the program.

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions

The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-pushed
fde-invalid-form-identifier
fde-invalid-variable-name
fde-no-space-available
fde-system-error
fde-unknown-occurrence
fde-unknown-variable-name
fde-wrong-variable-type

Remarks

- When the program calls either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting replaces the string variable on the terminal screen.
- Before you replace a string variable, you must open the form on which it is replaced.
- You cannot replace a string variable for a pushed form.
- If the string variable is not valid, it is not replaced.
- If the form specifies that the data must be in uppercase, Screen Formatting converts it to uppercase before storing the data in the form.

Resetting a Form

Purpose FDP$XRESET_FORM resets the form to the state specified by the form definition.

Format **CALL "FDP$XRESET_FORM" USING form-identifier fde-cobol-status**

Parameters **form-identifier** {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
    USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-pushed
fde-invalid-form-identifier
fde-no-space-available
fde-system-error

Remarks

- When the program calls either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting displays the form on the terminal screen with the reset specifications.
- All variables belonging to the form have their initial values and display attributes. The form is in its defined position.
- Before you reset a form, you must open it.
- You cannot reset a pushed form.

Resetting an Object Attribute

Purpose FDP$XRESET_OBJECT_ATTRIBUTE resets the display attributes for an object to those specified in the form definition.

Format **CALL "FDP$XRESET_OBJECT ATTRIBUTE" USING form-identifier object-name object-occurrence fde-cobol-status**

Parameters

form-identifier {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

object-name {input}

The name of the object whose attributes are reset. Include the following data description entry:

```
01 object-name PIC X(31).
```

object-occurrence {input}

The occurrence of the object. For the first or only occurrence, use 1. Include the following data description entry:

```
01 object-occurrence
   USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-not-scheduled
fde-form-pushed
fde-invalid-form-identifier
fde-invalid-object-name
fde-invalid-occurrence
fde-no-space-available
fde-unknown-object-name

Remarks

- You can reset the attributes of objects that are variable text, constant text, lines, or boxes.
- Before you reset the attribute of an object, you must open and either add or combine the form the object is on.
- When the program calls either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting displays the object using the reset attributes.
- If the object you specify is not displayed on the screen, Screen Formatting shifts the data so the object is displayed (updates the screen automatically.)

Setting the Cursor Position

Purpose FDP$XSET_CURSOR_POSITION sets the cursor to a selected position for later display.

Format **CALL "FDP$XSET_CURSOR_POSITION" USING form-identifier object-name object-occurrence character-position fde-cobol-status**

Parameters

form-identifier {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

object-name {input}

The name of the object on which you want the cursor set. Include the following data description entry:

```
01 object-name PIC X(31).
```

object-occurrence {input}

The integer specifying the occurrence of the object name. For the first occurrence, use 1. Include the following data description entry:

```
01 object-occurrence
   USAGE COMP PIC S9(18) SYNC LEFT.
```

character-position {input}

The character position to which you want the cursor set. For the first character position, use 1. Include the following data description entry:

```
01 character-position
   USAGE COMP PIC S9(18) SYNC LEFT.
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-not-scheduled
fde-form-pushed
fde-invalid-character-position
fde-invalid-form-identifier
fde-invalid-object-name
fde-no-object-available-defined
fde-no-space-available
fde-system-error
fde-unknown-object-name
fde-unknown-occurrence

Remarks

- Use this subroutine to alter the default sequence of the application user's entry of variables. (In the default sequence, Screen Formatting places the cursor on the first input variable of the highest priority form. The highest priority form is the form last added, combined, or positioned.)
- When you call either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting updates the terminal screen with the cursor at the specified position.
- If the position you specify is not visible on the screen, Screen Formatting shifts the data to make the cursor visible.
- Before you set the cursor position on a form, you must open the form and either add or combine it.
- You cannot set the cursor position in a pushed form.

Setting Line Mode

Purpose FDP$XSET_LINE_MODE begins line-by-line interaction with an application user.

Format **CALL "FDP$XSET_LINE_MODE" USING fde-cobol-status**

Parameters **fde-cobol-status** {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value

Remarks

- Use this call for extended dialogues in line mode. For short dialogues, Screen Formatting automatically switches to the proper mode (line or screen) but resources used for screen mode interaction remain.
- This call releases all screen mode resources:
  - Open forms are closed.
  - The mode is set to line.

Setting an Object Attribute

Purpose FDP$XSET_OBJECT_ATTRIBUTE changes a display attribute for an object.

Format **CALL "FDP$XSET_OBJECT_ATTRIBUTE" USING form-identifier object-name object-occurrence attribute-name fde-cobol-status**

Parameters **form-identifier** {input}

The identifier established when the form was opened. Include the following data description entry:

```
01 form-identifier
   USAGE COMP PIC S9(18) SYNC LEFT.
```

object-name {input}

The name of the object whose display attribute is being set. Include the following data description entry:

```
01 object-name PIC X(31).
```

object-occurrence {input}

The occurrence of the object. For the first or only occurrence, use 1. Include the following data description entry:

```
01 object-occurrence
   USAGE COMP PIC S9(18) SYNC LEFT.
```

attribute-name {input}

The program name of the display attribute being set. Include the following data description entry:

```
01 attribute-name PIC X(31).
```

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-not-scheduled
fde-form-pushed
fde-invalid-attribute-position
fde-invalid-form-identifier
fde-invalid-object-name
fde-invalid-occurrence
fde-no-space-available
fde-unknown-display-name
fde-unknown-object name
fde-unknown-occurrence

Remarks

- You can set the attributes of objects that are variable text, constant text, lines, or boxes.
- Changed attributes replace existing attributes.
- When you call either the FDP$XREAD_FORMS or FDP$XSHOW_FORMS subroutine, Screen Formatting displays the object using the set attributes.
- If the object you specify is not visible on the screen, Screen Formatting shifts the data to make the object visible.
- Before you set the attribute of an object, you must open the form the object is on and either add or combine it.
- You cannot set attributes of objects on a pushed form.

Showing Forms

Purpose FDP$XSHOW_FORMS updates the terminal screen.

Format

CALL "FDP$XSHOW_FORMS" USING
fde-cobol-status

Parameters

fde-cobol-status {output}

The variable that indicates the results of the subroutine. This variable is defined with the SCU *COPY FDE$COBOL_STATUS directive you put in the program.

Conditions The following conditions apply to this call and are defined as COBOL condition names in appendix D.

fde-bad-data-value
fde-form-too-large-for-screen
fde-form-to-show
fde-no-space-available
fde-system-error
fde-terminal-disconnected

Remarks

- When none of the forms scheduled for display has an event or input variable defined, use this subroutine instead of FDP$XREAD_FORMS.
- When you do not want any input from the terminal user, use this subroutine.
- A call to FDP$XSHOW_FORMS:
  - Displays all the forms you scheduled for display and have not deleted. If you added or combined forms since the last FDP$XREAD_FORMS or FDP$XSHOW_FORMS call, it displays them for the first time.
  - Removes from the screen the forms you deleted since the last FDP$XREAD_FORMS or FDP$XSHOW_FORMS call.

- Displays variables replaced since last FDP$XREAD_FORMS or FDP$XSHOW_FORMS call.
- Displays objects with attributes set or reset since last FDP$XREAD_FORMS or FDP$XSHOW_FORMS call.

Using FORTRAN to Manage Forms 3

Using FORTRAN to Manage Forms 3

Chapter 1 presented an overview of the process for creating and managing forms. It mentioned the following tasks a programmer uses to manage forms:

1. Writing the application program to include calls to the Screen Formatting FORTRAN subroutines that manage forms.
2. Expanding and compiling the program.
3. Creating a procedure that starts the program for the user.

This chapter describes these three tasks and shows them being executed in a FORTRAN program. At the end of the chapter you will find format and parameter descriptions for each FORTRAN subroutine used by Screen Formatting.

Writing a Program to Use Forms

To use forms in any program you write, you must:

- Copy the data definitions generated by Screen Formatting when the designer creates the form. The data definitions hold values transferred to and from the form for the variable text objects.
- Call Screen Formatting subroutines to manage the forms and the variable text objects on the forms.

Following the descriptions of these tasks is a FORTRAN program in which these tasks are executed.

Copying Data Definitions

The data definitions for each form reside on a *form definition record* created by the form designer. In your program, you transfer data to and from variable text objects through this record.

When the designer creates a form, Screen Formatting generates a common deck that defines the form definition record. For example, Screen Formatting[1] generated the following source file for a form named SELECT. (The form definition record name is the same as the form name.)

```
*DECK SELECT expand = false

    CHARACTER SELECT*41
    CHARACTER XSELEC(41)
    EQUIVALENCE (SELECT,XSELEC(1))
    CHARACTER MESSAG*40
    EQUIVALENCE (XSELEC(1),MESSAG)
    CHARACTER OBJECT*1
    EQUIVALENCE (XSELEC(41),OBJECT)
```

The designer saves this file as a deck on a NOS/VE SOURCE_CODE_UTILITY (SCU) library.[2]

In the beginning of your program, you must copy the form definition deck for each form the designer created:

- Get the name of the deck from the design specification (the designer assigns the name while creating the form).
- Copy the deck by specifying its name on the SCU *COPY directive.

1. For this example, Screen Formatting was accessed through the Screen Design Facility.

2. Because each form has its own definition and the STATUS parameters use common decks, we recommend that you manage the source text using SCU. (For information on SCU, see the NOS/VE Source Code Management manual.)

Calling Screen Formatting

When you write a program that uses forms, you perform two basic tasks with Screen Formatting subroutines:

- Displaying and removing forms and variable data on the application user's screen.
- Processing events executed by the user.

Displaying and Removing Forms and Variable Data

To control the display of forms and variable data on the user's screen, you perform the following steps in the sequence given:

1. Open the form.

   When you open a form, Screen Formatting locates it and allocates resources for processing the Screen Formatting calls that use the form.

   No matter how many times you use or update a form in your program, you need only open it once. For this reason, you usually begin an application program by opening all the forms you will use. However, when a form requires a large amount of storage for variables, you may want to open the form only when the application user needs it.

   (For the format of the call that opens forms, see *Opening a Form* later in this chapter).

2. Add the form.

   When you add a form, Screen Formatting schedules it for display on the application user's screen.

   To display more than one form at a time, add all the forms before you display them (the next step). The last form you schedule for display is the top form on the screen. Because forms are opaque, the top form covers other forms appearing in the same area. The cursor position indicates which form is ready for processing.

   (For the formats of the calls that schedule forms for display, see *Adding a Form* and *Combining Forms* later in this chapter.)

3. Read the form.

   When you read forms, Screen Formatting displays all the forms you added.

   When a form has an event or input variable defined, reading forms also accepts data from the application user and displays values returned by the program.

   (For the format of the call that reads forms, see *Reading Forms* later in this chapter. When none of the forms scheduled for display has an event or input variable defined, you can use a similar call described in *Showing Forms* later in this chapter.)

4. Delete the form.

   When you delete a form, Screen Formatting deletes it from the list of forms scheduled for display. The next time you read forms, the deleted form is removed from the screen. However, the form remains available for later use in the program (you must reschedule it for display).

   (For the format of the call that deletes a form, see *Deleting a Form* later in this chapter.)

5. Close the form.

   When you close a form, Screen Formatting releases the resources the form uses. The form is no longer available to the user or your program.

   (For the format of the call that closes a form, see *Closing a Form* later in this chapter.)

Processing Events and Data

When creating a form, the designer defines two types of events a user can execute to return control to the program: normal and abnormal.

- For normal events, the program performs requested actions such as getting variables, doing computations, and updating the form.
- For abnormal events, the program takes its own action. You generally then delete the form and go on, or stop the program.

Processing Normal Events

To process a normal event:

1. Get the name of the event and the position of the cursor from Screen Formatting.

   Screen Formatting validates the data the user enters (the form designer defined the validation rules) and transfers values of screen variables to its storage. The form designer may also have created error forms to be displayed when the user enters an incorrect value or presses a key not defined as an event.

   (For the format of the call that gets the event name and cursor position, see *Getting the Next Event* at the end of this chapter.)

2. Get the data from Screen Formatting storage and transfer it to program storage.

   (For formats of the calls that get data, see the following sections later in this chapter: *Getting a Record, Getting an Integer Variable, Getting a Real Variable,* and *Getting a String Variable.*)

3. Replace the data in Screen Formatting storage with the data in program storage.

   (For formats of the calls that replace variables, see the following sections later in this chapter: *Replacing a Record, Replacing an Integer Variable, Replacing a Real Variable,* and *Replacing a String Variable.*)

You can also reset the variables on a form to their original state. (For formats of the calls that reset variables to their original state, see *Resetting a Form* and *Resetting an Object Attribute* later in this chapter.)

Processing Abnormal Events

To process an abnormal event:

1. Get the name of the event and the position of the cursor from Screen Formatting.

   Unlike a normal event, Screen Formatting neither validates user entries nor transfers values of screen variables to Screen Formatting storage.

   (For the format of the call that gets the event name and cursor position, see *Getting the Next Event* later in this chapter.)

2. Write your own procedure to perform the task the design specification assigns to the event. Typical actions for an abnormal event include:

   - Resetting a form and redisplaying it.
   - Moving the user to a new form for additional processing.
   - Returning the user to a previous form.
   - Stopping the program.

   The user's screen is updated when you either read the forms again or end the program.

Example Program for Managing Forms with FORTRAN

The program in this example computes the area of circles and rectangles. The example includes:

- Pictures of the forms managed in the program.
- The design specification supplied by the form designer.
- The form definition decks.
- The example program.

Forms Managed in the Program

The example program manages three forms residing on an object library named EXAMPLE_OBJECT_LIBRARY that must be in the user's command list.

When a user starts the application, Select Form appears (figure 3-1).

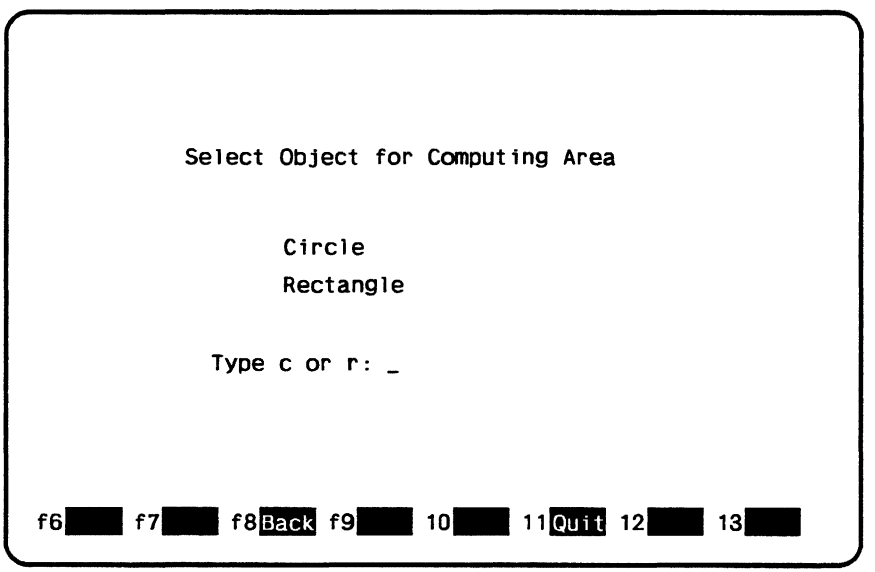


Figure 3-1. Select Form

On Select Form, a user enters either *c* to compute the area of a circle or *r* to compute the area of a rectangle.

When a user enters *r* on Select Form, Rectangle Form (figure 3-2) appears.

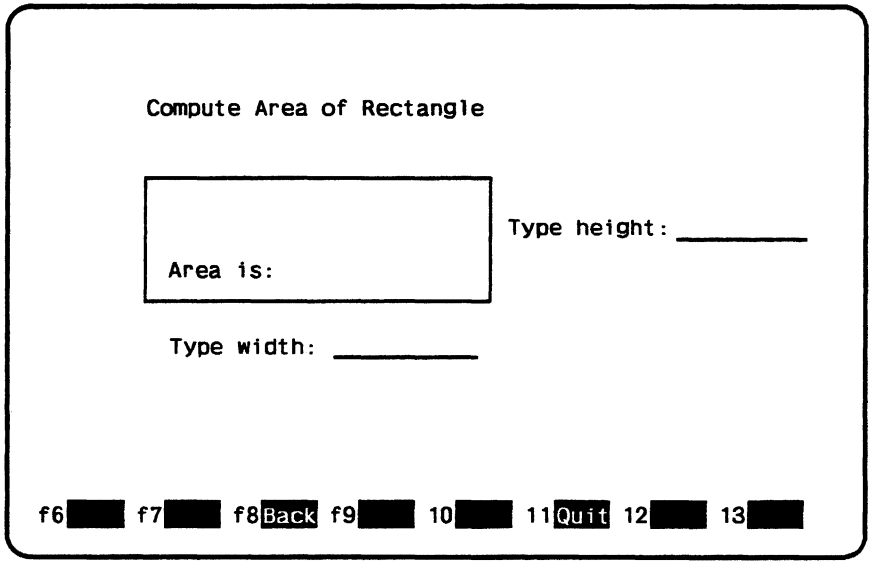


Figure 3-2. Rectangle Form

On Rectangle Form, the user enters the lengths of the sides of the rectangle as integers and presses the return key to have the program compute the area.

When a user enters *c* on Select Form, Circle Form (figure 3-3) appears.

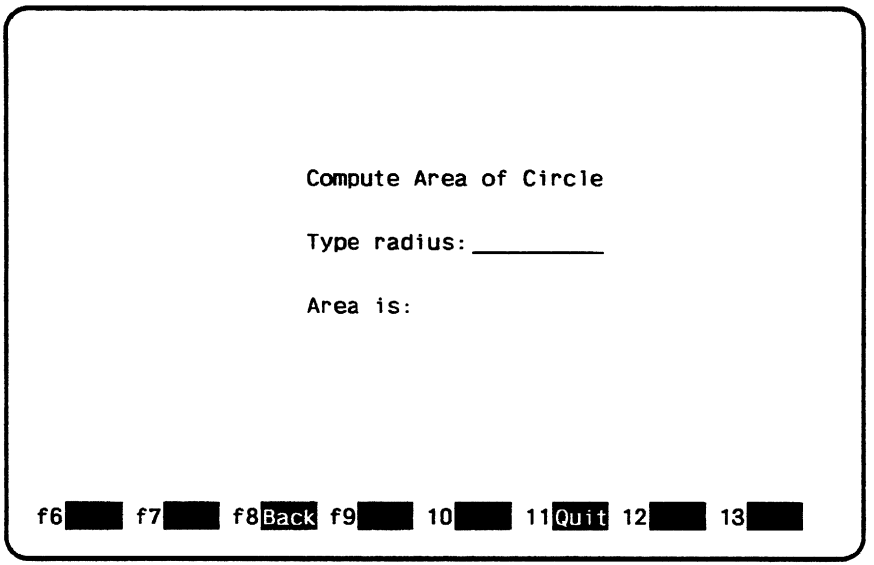


Figure 3-3. Circle Form

On Circle Form, the user enters the radius of the circle as a real value and presses the return key to have the program compute the area.

Design Specification

In writing the example program, the programmer uses the information the form designer listed in the following design specification:

- The names for the three forms used by the program are:

  SELECT (for Select Form)
  RECTAN (for Rectangle Form)
  CIRCLE (for Circle Form)

- The user can call both the Rectangle Form and Circle Form from the Select Form.

- The following variable text objects are defined on the forms:

Variable Object	Description
Select Form:	
MESSAG	Area for displaying error messages.
OBJECT	Area for user input of *r* or *c*.
Rectangle Form:	
SIDE	Areas (two) for user input of values for the rectangle's sides.
AREA	Area for returning value of computed area.
MESSAG	Area for displaying error messages.
Circle Form:	
RADIUS	Area for user input of value for the circle's radius.
AREA	Area for returning value of computed area.
MESSAG	Area for displaying error messages.

- The following events are defined on the forms:

Event	Description
COMPUTE	A normal program event that processes data the user entered on the form. For Select Form, the COMPUTE event checks whether the user entered *r* or *c* and then displays the appropriate form. For the other forms, COMPUTE calculates the area and redisplays the form.
BACK	An abnormal program event that takes the user back to a previous environment. For Select Form, the BACK event stops the program. For the other forms, BACK returns the user to Select Form.
QUIT	An abnormal program event that stops the program.

Form Definition Decks

When the designer creates the three forms (by writing a program or using Screen Design Facility), a form definition record is created with each form. For the example program, the programmer copies the following form definition decks placed by the designer on an SCU library. The library in this example is named EXAMPLE_SOURCE_LIBRARY.

The SELECT deck:

```
CHARACTER SELECT*41
CHARACTER XSELEC(41)
EQUIVALENCE (SELECT,XSELEC(1))
CHARACTER MESSAG*40
EQUIVALENCE (XSELEC(1),MESSAG)
CHARACTER OBJECT*1
EQUIVALENCE (XSELEC(41),OBJECT)
```

The RECTAN deck:

```
CHARACTER RECTAN*64
CHARACTER XRECTA(64)
EQUIVALENCE (RECTAN,XRECTA(1))
INTEGER SIDE (2)
EQUIVALENCE (XRECTA(1),SIDE(1))
INTEGER AREA
EQUIVALENCE (XRECTA(17),AREA)
CHARACTER MESSAG*40
EQUIVALENCE (XRECTA(25),MESSAG)
```

The CIRCLE deck:

```
CHARACTER CIRCLE*56
CHARACTER XCIRCL(56)
EQUIVALENCE (CIRCLE,XCIRCL(1))
REAL AREA
EQUIVALENCE (XCIRCL(1),AREA)
REAL RADIUS
EQUIVALENCE (XCIRCL(9),RADIUS)
CHARACTER MESSAG*40
EQUIVALENCE (XCIRCL(17),MESSAG)
```

Example FORTRAN Program

This FORTRAN program calls the forms and executes the events described in the previous sections. The program is in the SCU deck named COMPUT. To run the example program, see the Examples online manual.

```
      PROGRAM COMPUT (OUTPUT, TAPE2=OUTPUT)

* Copy definitions for Screen Formatting subroutines.

*COPY FDP$FORTRAN_ALIASES

* Copy variables for select form.

*COPY select

      INTEGER IFORM, ISFORM, ICFORM, IRFORM, ISTAT,IVSTAT
      INTEGER ISX,ISY,IFX,IFY,IET,IOCCUR,ICP,IOT,IOX,IOY
      CHARACTER*31 FNAME, ENAME, ONAME, VNAME
      CHARACTER*1 NORMAL, LAST

* Open all forms used by the program
* and assign form identifiers.

      FNAME='SELECT'
      CALL FDOPEN (FNAME, ISFORM, ISTAT)
      CALL CHECKS ('Open failed on form select', ISTAT)

      FNAME='CIRCLE'
      CALL FDOPEN (FNAME, ICFORM, ISTAT)
      CALL CHECKS ('Open failed on form circle', ISTAT)

      FNAME='RECTAN'
      CALL FDOPEN (FNAME, IRFORM, ISTAT)
      CALL CHECKS ('Open failed on form rectangle', ISTAT)

* Add select form to list scheduled for display.

      CALL FDADD (ISFORM, ISTAT)
      CALL CHECKS ('Add failed on form select', ISTAT)
```

```
* Update screen and accept user terminal entry
* for object; display all added forms.

   20 CALL FDREAD (ISTAT)
      CALL CHECKS ('Read failed on form select', ISTAT)

* Get screen events that determine next actions.

      CALL FDGETE (ENAME,NORMAL,ISX,ISY,IFORM,IFX,IFY,IET,
     - ONAME,IOCCUR,ICP,IOT,IOX,IOY,LAST,ISTAT)
      CALL CHECKS ('Get event failed on form select', ISTAT)

      IF (ENAME .NE. 'COMPUTE') THEN

* Stop program on QUIT or BACK event.

        GO TO 30
      END IF

* Transfer object variable from form to program.

      VNAME = 'OBJECT'
      CALL FDGETS (ISFORM, VNAME, 1, OBJECT, IVSTAT, ISTAT)
      CALL CHECKS
     -  ('Get string variable failed on form select', ISTAT)

* If terminal user entered invalid data, display
* error message and ask for another entry.

      IF (IVSTAT .NE. 0) THEN
        CALL DISMES ('Type r or c.', ISFORM)
        GO TO 20
      END IF

      IF (OBJECT .EQ. 'R') THEN
```

```
* Remove select form and compute area of rectangle.

        CALL FDDEL (ISFORM, ISTAT)
        CALL CHECKS ('Delete failed on form select', ISTAT)
        CALL COMPR (ENAME, IRFORM)
        GO TO 25
      END IF

      IF (OBJECT .EQ. 'C') THEN

* Remove select form and compute area of circle.

        CALL FDDEL (ISFORM, ISTAT)
        CALL CHECKS ('Delete failed on form select', ISTAT)
        CALL COMPC (ENAME, ICFORM)
        GO TO 25
      END IF

* If terminal user entered invalid value for object,
* display error message and ask for another entry.

      CALL DISMES ('Type r or c.', ISFORM)
      GO TO 20

* Process event from rectangle form or circle form.

   25 IF (ENAME .EQ. 'QUIT') THEN
        GO TO 30
      END IF

* A BACK event occurred on rectangle form or circle form;
* display select form in original state.

      CALL FDRESF (ISFORM, ISTAT)
      CALL CHECKS ('Reset failed on form select', ISTAT)

      CALL FDADD (ISFORM, ISTAT)
      CALL CHECKS ('Add failed on form select', ISTAT)
      GO TO 20
```

```
* Close all forms.

   30 CALL FDCLOS (ISFORM, ISTAT)
      CALL CHECKS ('Close failed on form select', ISTAT)

      CALL FDCLOS (ICFORM, ISTAT)
      CALL CHECKS ('Close failed on form circle', ISTAT)

      CALL FDCLOS (IRFORM, ISTAT)
      CALL CHECKS ('Close failed on form rectangle', ISTAT)

      STOP
      END

      SUBROUTINE CHECKS (MESSAG, ISTAT)

* Check Screen Formatting subroutine call status.

      INTEGER ISTAT
      CHARACTER*(*) MESSAG
    5 FORMAT (1X, A, ', status = ',I4)

      IF (ISTAT .NE. 0) THEN
        WRITE (2,5) MESSAG, ISTAT
        STOP
      END IF

      RETURN
      END

      SUBROUTINE DISMES (MESSAG, IFORM)
```

```
* Display message for variable status errors.

      INTEGER IFORM, IVSTAT, ISTAT
      CHARACTER*31 VNAME
      CHARACTER*(*) MESSAG

*COPY FDP$FORTRAN_ALIASES

      VNAME='MESSAG'
      CALL FDREPS (IFORM, VNAME, 1, MESSAG, IVSTAT, ISTAT)
      CALL CHECKS ('Replace string failed on message', ISTAT)
      RETURN
      END

      SUBROUTINE COMPC (ENAME, ICFORM)

* Copy subroutine to compute area for circle.

*COPY FDP$FORTRAN_ALIASES

* Copy variables for circle form.

*COPY circle

      INTEGER IFORM, ISTAT,IVSTAT, ICFORM
      INTEGER ISX,ISY,IFX,IFY,IET,IOCCUR,ICP,IOT,IOX,IOY
      CHARACTER*31 ENAME, ONAME, VNAME
      CHARACTER*1 NORMAL, LAST

* Display circle form in original state.

      CALL FDRESF (ICFORM, ISTAT)
      CALL CHECKS ('Reset failed on form circle', ISTAT)

      CALL FDADD (ICFORM, ISTAT)
      CALL CHECKS ('Add failed on form circle', ISTAT)
```

```
* Update screen and get radius from terminal user entry.

    5 CALL FDREAD (ISTAT)
      CALL CHECKS ('Read failed on form circle ', ISTAT)

      CALL FDGETE (ENAME,NORMAL,ISX,ISY,IFORM,IFX,IFY,IET,
     - ONAME,IOCCUR,ICP,IOT,IOX,IOY,LAST,ISTAT)
      CALL CHECKS ('Get event failed on form circle', ISTAT)

      IF (ENAME .NE. 'COMPUTE') THEN
        CALL FDDEL (ICFORM, ISTAT)
        CALL CHECKS ('Delete failed on form circle', ISTAT)
        RETURN
      END IF

* Transfer terminal user entry for radius to program.

      VNAME = 'RADIUS'
      CALL FDGETR (ICFORM, VNAME, 1, RADIUS, IVSTAT, ISTAT)
      CALL CHECKS
     -('Get real variable failed on form circle', ISTAT)
      IF (IVSTAT .NE. 0) THEN
        CALL DISMES ('Type valid value for radius.', ICFORM)
        GO TO 5
      END IF

* Compute area of circle and display it.

      AREA=3.15*(RADIUS**2)

      VNAME = 'AREA'
      CALL FDREPR (ICFORM, VNAME, 1, AREA, IVSTAT, ISTAT)
      CALL CHECKS
     -('Replace real variable failed on form circle', ISTAT)
      IF (IVSTAT .NE. 0) THEN
```

```
* Area value could not be displayed using output format
* defined for form. Revise form or program to accommodate
* size of number.

        CALL DISMES ('Type valid value for radius.', ICFORM)
        GO TO 5
      END IF

* Blank error message in case previously displayed.

      CALL DISMES (' ', ICFORM)

* Process next user entry.

      GO TO 5
      END

      SUBROUTINE COMPR (ENAME, IRFORM)

* Copy subroutine to compute area of rectangle.

*COPY FDP$FORTRAN_ALIASES

* Copy variables for rectangle form.

*COPY rectan

      INTEGER IFORM, ISTAT,IVSTAT,IRFORM
      INTEGER ISX,ISY,IFX,IFY,IET,IOCCUR,ICP,IOT,IOX,IOY
      CHARACTER*31 ENAME, ONAME, VNAME
      CHARACTER*1 NORMAL, LAST

* Display rectangle form in original state.

      CALL FDRESF (IRFORM, ISTAT)
      CALL CHECKS ('Reset failed on form rectangle', ISTAT)

      CALL FDADD (IRFORM, ISTAT)
      CALL CHECKS ('Add failed on form rectangle', ISTAT)
```

```
* Update screen and get terminal user entry
* for rectangle height and width.

    5 CALL FDREAD (ISTAT)
      CALL CHECKS ('Read failed on form rectangle', ISTAT)

      CALL FDGETE (ENAME,NORMAL,ISX,ISY,IFORM,IFX,IFY,IET,
     - ONAME,IOCCUR,ICP,IOT,IOX,IOY,LAST,ISTAT)
      CALL CHECKS ('Get event failed on form rectangle', ISTAT)

* If abnormal event (BACK or QUIT) occurs, return to caller.

      IF (ENAME .NE. 'COMPUTE') THEN
        CALL FDDEL (IRFORM, ISTAT)
        CALL CHECKS ('Delete failed on form rectangle', ISTAT)
        RETURN
      END IF

* Transfer height value from form to program.

      VNAME = 'SIDE'
      CALL FDGETI (IRFORM, VNAME, 1,SIDE (1), IVSTAT, ISTAT)
      CALL CHECKS
     -('Get integer variable failed on form rectangle', ISTAT)

* If data invalid, move cursor to height value
* and display error message.

      IF (IVSTAT .NE. 0) THEN
        CALL FDSETC (IRFORM, VNAME, 1, 1, ISTAT)
        CALL CHECKS
     -('Set cursor failed on form rectangle', ISTAT)
        CALL DISMES ('Type valid value for height.', IRFORM)
        GO TO 5
      END IF

* Transfer width value from form to program.

      CALL FDGETI (IRFORM, VNAME, 2, SIDE(2), IVSTAT, ISTAT)
      CALL CHECKS
     -('Get integer variable failed on form rectangle', ISTAT)
```

```
* If data invalid, move cursor to width value and display
* error message.

      IF (IVSTAT .NE. 0) THEN
        CALL FDSETC (IRFORM, VNAME, 2, 1, ISTAT)
        CALL CHECKS
     -('Set cursor failed on form rectangle', ISTAT)
        CALL DISMES ('Type valid value for width.', IRFORM)
        GO TO 5
      END IF

* Compute area of rectangle and display it.

      AREA=SIDE(1)*SIDE(2)

      VNAME = 'AREA'
      CALL FDREPI (IRFORM, VNAME, 1, AREA, IVSTAT, ISTAT)
      CALL CHECKS
     -('Replace integer variable failed on form rectangle',
     -ISTAT)
      IF (IVSTAT .NE. 0) THEN

* Area value could not be displayed using output format
* defined for form. Revise form or program to accommodate
* size of number.

        CALL DISMES ('Format cannot display area.', IRFORM)
        GO TO 5
      END IF

* Blank error message in case previously displayed.

      CALL DISMES (' ', IRFORM)

* Process next user entry.

      GO TO 5
      END
```

Expanding and Compiling a Program

Programs using Screen Formatting use common decks and form definition records that reside outside the main program. To manage the source text for this type of program, put the program in one or more SCU decks. This allows you to update individual parts of a program and to use forms in more than one program without duplicating code.[3]

To expand and compile a program maintained in SCU decks:

1. Expand the deck containing the main program.
2. Compile the expanded program.
3. Put the compiled program on an object library.

A procedure for compiling and expanding a program is shown in the following example. (The example is based on the example program and form definition records described earlier. The example shows how to place decks on library EXAMPLE_SOURCE_LIBRARY.)

```
PROC fortran_compile_deck, forcd (
  deck,  d: name=$required
  status  : var of status = $optional
  )
  source_code_utility
    use_library base=example_source_library result=$null
    expand_deck deck=$value(deck) ..
    compile=$local.compile ..
    alternate_base=$system.cybil.osf$program_interface
  quit

  fortran input=$local.compile ..
    list=$local.listing runtime_checks=all  ..
    debug_aids=dt
```

3. For information on SCU, see the NOS/VE Source Code Management manual.

```
  create_object_library
    add_module library=example_object_library
    combine_module library=$local.lgo
    generate_library library=example_object_library.$next
  quit

PROCEND fortran_compile_deck
```

To use the procedure, put it on library EXAMPLE_OBJECT_LIBRARY and then add the library to your command list (using the CREATE_COMMAND_LIST_ENTRY command). You can execute the procedure by entering:

```
/fortran_compile_deck deck=fortran_compute_object_area
```

The compiled program is now also on library EXAMPLE_OBJECT_LIBRARY.

For more information on writing and using procedures, see the NOS/VE System Usage manual.

Helping the User Start the Application

The complete application consists of your program and the forms created by the designer. To integrate the forms with your program, you must:

- Create a procedure that gives users access to the object library containing the forms.
- Ensure that the user's terminal environment is set up properly to use the forms (in most instances, by creating a user prolog).
- Ensure that users know how to start the application.

Creating a User Procedure

To give the user access to the object library containing the forms:

1. Write a NOS/VE procedure from which the user starts the application.
2. Place the procedure on the library that contains the compiled program.

For example, the following procedure executes the application that uses the starting procedure COMPUT on library EXAMPLE_OBJECT_LIBRARY. The other libraries accessed by the program are $SYSTEM.FDF$LIBRARY and $SYSTEM.TDU.TERMINAL_DEFINITIONS. Users must have these libraries available in order for the program to call the Screen Formatting subroutines.

```
PROC fortran_compute_area, forca (
  status  : var of status = optional
  )

  execute_task ..
    library=(example_object_library,$system.fdf$library,..
    $system.tdu.terminal_definitions) ..
    starting_procedure=comput

PROCEND fortran_compute_area
```

Creating a User Prolog

To ensure that the users' terminal environment is set up properly to use the forms, make sure they set the following terminal characteristics before they execute the procedure:

Characteristic	Description
Terminal model	Identifies the terminal to NOS/VE.
Attention character	Provides a character users can enter to interrupt the application.
Hold messages	Tells the network to hold all network messages until the user stops the application.

In most instances, users should set up their terminal for the entire terminal session in their user prologs. The example below does the following:

- Identifies a Digital Equipment Corporation VT220 terminal to the system.
- Chooses the exclamation point as a way to interrupt the program.
- Holds all messages from a NAMVE/CDCNET network.
- Sets up the way the terminal uses the exclamation point to interrupt the program.

The users add the following commands to their user prologs:

```
change_terminal_attributes terminal_model=dec_vt220 ..
  attention_character='!' ..
  status_action=hold
change_term_conn_defaults attention_character_action=1
change_connection_attributes terminal_file_name=input aca=1
change_connection_attributes terminal_file_name=output aca=1
change_connection_attributes terminal_file_name=command aca=1
```

For a further explanation of how to interrupt a screen application during an interactive session, and what commands to use for networks other than NAMVE/CDCNET, see the NOS/VE System Usage manual.

Starting the Application

To start the application, the users enter:

```
/create_command_list_entry e=example_object_library
/fortran_compute_area
```

When finished with the application, the users remove the object library from their command lists:

```
/delete_command_list_entry e=example_object_library
```

FORTRAN Subroutine Calls for Interacting with Forms

The following sections describe the FORTRAN subroutine calls to Screen Formatting modules. For each subroutine, there is a purpose description, input format, list of parameters and their types, and pertinent remarks.

The FORTRAN program calls Screen Formatting subroutines that allow a user to interact with forms. These subroutines are external routines that reside on the library called $SYSTEM.FDF$LIBRARY. This library must be in the user's program library list in order to execute the program.

A subroutine name is an alias that is defined by the deck FDP$FORTRAN_ALIASES. The SCU directive *COPY FDP$FORTRAN_ALIASES must be included for each application subroutine that calls a Screen Formatting subroutine. See appendix F for a list of aliases.

Adding a Form

Purpose FDADD schedules a form for display on the application user's screen.

Format **CALL FDADD (iform, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

istat {output}

The variable that indicates the results of the subroutine. The following values can be returned:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form identifier is invalid.
36	System error occurred.
39	Form is pushed.
70	Form is already added.
131	Form is too large for screen.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- When you call either the FDREAD or FDSHOW subroutine, Screen Formatting displays the added form on the terminal screen. The added form is placed on top of other forms occupying the same area on the screen.
- Before you add a form, you must open it.
- You cannot add a pushed form.

Changing Table Size

Purpose FDCHAT changes the size of the table during program execution.

Format **CALL FDCHAT (iform, tname, isize, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

tname {input}

The name of the table to change in size. Include the following type statement:

```
CHARACTER*31 tname
```

isize {input}

The size of the table. While this subroutine is in effect, Screen Formatting limits the number of stored occurrences allowed for a table to the value you specify on this parameter. How many occurrences are displayed at one time depends on the number of visible occurrences defined in the form.

If you specify zero for the table size, no occurrences appear on the form.

Include the following type statement:

```
INTEGER isize
```

istat {output}

The variable that indicates the results of the subroutine. The following values can be returned:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form identifier is invalid.
37	Table name is invalid.
39	Form is pushed.
40	Table name is unknown.
145	Data value is bad.
151	Table size is invalid.

Include the following type statement:

```
INTEGER istat
```

Remarks

- The table must be present in an open form.
- The size limitation remains in effect until the next time you call the FDCHAT subroutine.
- The maximum size for a table is identified by the form as the maximum number of stored occurrences. If you specify a table size larger than the maximum, you receive an error message (table size is invalid).

Examples

The following examples describe how changing the size of a table affects the application user. On the form, the table's specifications are a maximum of 20 stored occurrences, of which 6 occurrences can be visible at one time.

- If you specify a table size of 10, Screen Formatting displays 6 occurrences and allows the application user to page to the 10th occurrence.
- If you specify a table size of 4, Screen Formatting displays 4 occurrences and does not allow the application user to page.

Closing a Form

Purpose FDCLOS releases resources used to process a form and deletes the form from the list scheduled for display.

Format **CALL FDCLOS (iform, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

istat {output}

The variable that indicates the results of the subroutine. The following values can be returned:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form identifer is invalid.
39	Form is pushed.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- When the program calls either the FDREAD or FDSHOW subroutine, Screen Formatting removes the closed form from the terminal screen as a result of calling this procedure.
- Before you can close a form, you must open it.
- You cannot close a pushed form.

Combining Forms

Purpose FDCOM combines a form with a previously added form and schedules the combined form for display on the terminal screen.

Format **CALL FDCOM (iaform, icform, istat)**

Parameters **iaform** {input}

The identifier for this instance of the previously added form. Include the following type statement:

```
INTEGER iform
```

icform {input}

The identifier for the form you are combining with the previously added form. Include the following type statement:

```
INTEGER icform
```

istat {output}

The variable that indicates the results of the subroutine. The following values can be returned:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form identifer is invalid.
39	Form is pushed.
70	Form is already added.
131	Form is too large for screen.
145	Data value is bad.
150	Form is already combined.
152	Form is not added.

Include the following type statement:

```
INTEGER istat
```

Remarks

- You cannot combine a pushed form.
- The combined form inherits the event definitions of the previously added form.
- Before you combine a form with a previously added form, you must open both forms.
- When the programs calls either the FDREAD or FDSHOW subroutine, Screen Formatting displays the combined form. The combined form is placed on top of other forms occupying the same area on the screen.
- When the application user executes an event to return to the program normally, Screen Formatting updates all program variables associated with both the added and combined forms.
- To combine several forms with a previously added form, call this subroutine more than once.

Deleting a Form

Purpose FDDEL deletes the form from the list of forms scheduled for display.

Format **CALL FDDEL (iform, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

istat {output}

The variable that indicates the results of the subroutine. The following values can be returned:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form identifer is invalid.
39	Form is pushed.
54	Form is not scheduled for display.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- When the program calls either the FDREAD or FDSHOW subroutine, Screen Formatting removes the deleted form from the terminal screen and replots any forms uncovered by the deleted form.
- When you add a form (FDADD) again that you previously deleted, the data in the form is retained.
- Before you delete a form, you must open it.
- You cannot delete a pushed form.
- If the form was added and has any combined forms associated with it, the combined forms are also deleted.
- When you delete a combined form, only that form is deleted. Areas covered by the combined form are replotted after the combined form is deleted.

Getting an Integer Variable

Purpose FDGETI gets the value the user entered on a form for an integer variable and transfers it to the program.

Format **CALL FDGETI (iform, vname, ioccur, ivar, ivstat, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

vname {input}

The name of the variable to get and transfer to the program. Include the following type statement:

```
CHARACTER*31 vname
```

ioccur {input}

The occurrence of the variable name. Include the following type statement:

```
INTEGER ioccur
```

ivar {output}

The integer variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include the following type statement:

```
INTEGER ivar
```

ivstat {output}

The condition that gives you the status of the variable. The following values can be returned:

Value	Meaning
0	No error occurred on the variable.
3	The user entered data that is not a valid integer.
5	The user entered data that does not match the defined program data type.
7	User entered an integer that is too large.

Include the following type statement:

```
INTEGER ivstat
```

istat {output}

The variable that indicates the subroutine results. The following values can be returned:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form identifer is invalid.
11	Variable name is unknown.
36	System error exists.
38	Variable name is invalid.
91	Occurrence is unknown.
145	Data value is bad.
147	Variable type is wrong.

Include the following type statement:

```
INTEGER istat
```

Remarks

- Before you get an integer variable, you must open its form. If you get the variable after opening the form and before reading or replacing the variable on the form, the program returns the initial value specified by the form designer.

- If the form designer specifies data validation rules and error processing to display an error message or form, the program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Getting the Next Event

Purpose FDGETE gets the event resulting from the most recent FDREAD subroutine.

Format **CALL FDGETE (ename, normal, isx, isy, iform, ifx, ify, iet, oname, ioccur, icp, iot, iox, ioy, last, istat)**

Parameters

ename {output}

A data name to receive the application user's event. Include the following type statement:

```
CHARACTER*31 ename
```

normal {output}

A data name to receive the event normal indication. If the event is normal, T is returned. If the event is not normal, F is returned. Include the following type statement:

```
CHARACTER*1 normal
```

isx {output}

A data name to receive the x position of the event on the screen. The character position in the upper left corner of the screen is 1; the x position increases by 1 for each character you count from left to right. Include the following type statement:

```
INTEGER isx
```

isy {output}

A data name to receive the y position of the event on the screen. The character position in the upper left corner of the screen is 1; the y position increases by 1 for each character you count from top to bottom. Include the following type statement:

```
INTEGER isy
```

iform {output}

The variable that returns the instance of the form for the event. Include the following type statement:

```
INTEGER iform
```

ifx {output}

A data name to receive the x position of the event on the form. The character in the upper left corner of the form is 1; the x position increases by 1 for each character you count from left to right. Include the following type statement:

```
INTEGER ifx
```

ify {output}

A data name to receive the y position of the event on the form. The character in the upper left corner of the form is 1; the y position increases by 1 for each character you count from top to bottom. Include the following type statement:

```
INTEGER ify
```

iet {output}

The event type. The following values are possible:

Value	Meaning
0	The event occurred on an area of a form containing no object.
1	The event occurred on a form object.

Include the following type statement:

```
INTEGER iet
```

oname {output}

When event type is 1, the variable returns a value giving the name of the object where the event occurred. Include the following type statement:

```
CHARACTER*31 oname
```

ioccur {output}

When event type is 1, the variable returns a value giving the occurrence of the object name. Include the following type statement:

```
INTEGER ioccur
```

icp {output}

When event type is 1, the variable returns a value giving the character position within the object where the event occurred. The first character position is 1. Include the following type statement:

```
INTEGER icp
```

iot {output}

When event type is 1, the variable indicates the type of object on which the event occurred. The following values are possible:

Value	Object Type
0	Box
1	Constant text
2	Constant box
3	Line
5	Variable text
6	Variable box

Include the following type statement:

```
INTEGER iot
```

iox {output}

When event type is 1, the value returned is the x origin position of the object. The character in the upper left corner of the form is 1; the x position increases by 1 for each character you count from left to right. Include the following type statement:

```
INTEGER iox
```

ioy {output}

When event type is 1, the value returned is the y origin position of the object. The character in the upper left corner of the form is 1; the y position increases by 1 for each character you count from top to bottom. Include the following type statement:

```
INTEGER ioy
```

last {output}

Indicates whether this is the last event The following values are possible:

Value	Meaning
T	This is the last event.
F	This is not the last event.

Include the following type statement:

```
CHARACTER*1 last
```

istat {output}

The variable that indicates the results of the subroutine. The following values can be returned:

Value	Meaning
0	Routine completed successfully.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

The FDREAD subroutine deletes existing events. If the event is normal, Screen Formatting updates the variables in the added and combined forms containing the event. Later, you can request the transfer of these variables to program storage. If the event is abnormal, Screen Formatting does not update or validate variables.

Getting a Real Variable

Purpose FDGETR gets a value the user entered on a form for a real variable and transfers it to the program.

Format **CALL FDGETR (iform, vname, ioccur, var, ivstat, istat)**

Parameters

iform {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

vname {input}

The name of the variable to get. Include the following type statement:

```
CHARACTER*31 vname
```

ioccur {input}

The occurrence of the variable name. Include the following type statement:

```
INTEGER ioccur
```

var {output}

The value of the real variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include the following type statement:

```
REAL var
```

ivstat {output}

The condition that gives you the status of the variable. The following values are possible:

Value	Meaning
0	No error occurred on the variable.
2	The user entered data that is within the range of real numbers defined for the variable.
5	The user entered data that does not correspond to the defined data type.
7	The user entered a number too large to be converted to the defined real program type.
9	The user entered an exponent that is too large.
10	User entered an exponent that is too small.
11	User entered an indefinite number.

Include the following type statement:

```
INTEGER ivstat
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form identifier is invalid.
11	Variable name is unknown.
36	System error exists.
38	Variable name is invalid.
91	Occurrence is unknown.
145	Data value is bad.
147	Variable type is wrong.

Include the following type statement:

```
INTEGER istat
```

Remarks

- Before you get a real variable, you must open the form on which the user enters the value. If you get the variable after opening the form and before reading or replacing the variable on the form, the program returns the initial value specified by the form designer.

- If the form designer specifies data validation rules and error processing to display an error message or form, your program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Getting a Record

Purpose FDGET transfers the values of the form record to the program record.

Format **CALL FDGET (iform, record, ivstat, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

record {output}

The name of the record that contains working storage information for the form. When the form is created, Screen Formatting generates the type statements in this record. It is the program work area for the variables used on the form.

ivstat {output}

the condition that gives you the status of the variable. The following values are possible:

Value	Meaning
0	No error occurred on the variable.
1	The user entered data that does not match the strings defined for the variable.
2	The user entered data that is not within the range of real numbers defined for the variable.
3	The user entered data that is not within the range of integer numbers defined for the variable.
5	The user entered data that does not correspond to the defined data type.
7	User entered a number that is too large to be converted to the defined real or integer data type.
9	The user entered an exponent that is too large.

Value	Meaning
10	The user entered an exponent that is too small.
11	The user entered an indefinite number.
12	The user entered an infinite number.

Include the following type statement:

```
INTEGER ivstat
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
9	Form identifer is invalid.
14	Work area is invalid.
36	System error exists.
52	Form has no variable.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- Before you get a record for a form, you must open the form. If you get the record after opening the form and before reading or replacing the record, the program returns the initial value specified by the form designer.
- If the form designer specifies data validation rules and error processing to display an error message or form, your program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Getting a String Variable

Purpose FDGETS gets a value the user entered on a form for a string variable and transfers it to the program.

Format **CALL FDGETS (iform, vname, ioccur, cvar, ivstat, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

vname {input}

The name of the variable to get. Include the following type statement:

```
CHARACTER*31 vname
```

ioccur {input}

The occurrence of the variable name. Include the following type statement:

```
INTEGER ioccur
```

cvar {output}

The variable that Screen Formatting generates automatically in the form definition record. The form definition record defines the variable. If you do not want to use the automatically generated variable, include the following type statement (n is the number of characters in the variable):

```
CHARACTER*n
```

ivstat {output}

The condition that gives you the status of the variable. The following values are possible:

Value	Meaning
0	No error occurred on the variable.
1	The user entered data that does not match the strings defined for variable.
15	The storage length of the parameter variable is not long enough.

Include the following type statement:

```
INTEGER ivstat
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form identifer is invalid.
11	Variable name is unknown.
36	System error exists.
38	Variable name is invalid.
91	Occurrence is unknown.
145	Data value is bad.
147	Variable type is wrong.

Include the following type statement:

```
INTEGER istat
```

Remarks

- Before you get a string variable, you must open the form on which the user enters the value. If you get the variable after opening the form and before reading or replacing the variable on the form, the program returns the initial value specified by the form designer.

- If the form designer specifies data validation rules and error processing to display an error message or form, your program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Opening a Form

Purpose FDOPEN locates a form and prepares it for use by the program.

Format **CALL FDOPEN (fname, iform, istat)**

Parameters

fname {input}

The name of the form you want to open. Include the following type statement:

```
CHARACTER*31 fname
```

iform {input-output}

The form identifier established for the form. Other Screen Formatting subroutines use this identifier when referencing the form. Include the following type statement:

```
INTEGER iform
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
5	Form name is unknown.
7	No space is available.
9	Form indentifier is invalid.
26	Form name is invalid.
36	System error exists.
100	Terminal is not defined.
136	Form is not ended.
139	Form is already open.
141	Form requires conversion.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- Screen Formatting locates a form as follows:
  - If the form name is blank, Screen Formatting assumes that the form identifier specifies the required dynamically created form.
  - If the form name is not blank, Screen Formatting searches the list of ended dynamically created forms.
  - If the form name is not blank and is not in the list of ended dynamically created forms, Screen Formatting searches the command library list to find the form name on the object code libraries. (You specify the order in which Screen Formatting searches the list using the NOS/VE command CREATE_COMMAND_LIST_ENTRY).
- Executing FDP$XOPEN_FORM does not display the form on the screen.
- The form identifier that FDOPEN returns identifies the instance of open for a form. Forms dynamically created have only one instance of open. Forms stored on object code libraries can have more than one instance of open. For each instance of open, Screen Formatting maintains the working environment (current value of variables and their display attributes) of the form.

Popping a Form

Purpose FDPOP deletes forms scheduled (added or combined) since the last FDPUSH subroutine.

Format **CALL FDPOP (istat)**

Parameters **istat** {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
42	No forms are available to pop.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks Events associated with the last list of pushed forms become active.

Positioning a Form

Purpose FDPOS schedules moving a form to a new location. Using this subroutine, you can define a form at one location and display it at another location, or you can move a form from where it is currently displayed to a new location.

Format **CALL FDPOS (iform, isx, isy, istat)**

Parameters **iform** {input}

The form identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

isx {input}

The x position on the screen. The character position in the upper left corner of the screen is 1, and the x position increases by 1 for each character you count from left to right. Include the following type statement:

```
INTEGER isx
```

isy {input}

The y position on the screen. The character position in the upper left corner of the screen is 1, and the y position increases by 1 for each character you count from top to bottom. Include the following type statement:

```
INTEGER isy
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form identifer is invalid.
36	System error exists.
39	Form is pushed.
54	Form is not scheduled
131	Form is too large for screen.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- When the program calls either the FDREAD or FDSHOW subroutine, Screen Formatting displays the form on the screen at the position specified in the call to FDPOS.
- If you call this subroutine while the form is displayed, the form is deleted from its current location and added at the new location. The added form lays on top of any other form occupying the same area on the screen.
- If you call this procedure before the form is displayed, the form is displayed at the specified location.
- Before you position a form, you must open it.
- You cannot position a pushed form.

Pushing a Form

Purpose FDPUSH deactivates the events associated with forms scheduled for display (added or combined) since the last push call.

Format **CALL FDPUSH (istat)**

Parameters **istat** {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
46	No forms are available to push.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- Events associated with these forms are not passed to the program.
- A program cannot change or close a pushed form.
- Pushed forms are displayed on the screen. If you want newly added forms to appear on a blank screen, first add a blank form that covers the screen.

  Updates to the screen continue to show the pushed forms.
- This subroutine causes Screen Formatting to record added and combined forms so you can return to them later.

Reading Forms

Purpose FDREAD updates the terminal screen and accepts input from the application user.

Format **CALL FDREAD (istat)**

Parameters **istat** {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
1	Terminal is disconnected.
36	System error exists.
104	No forms to read.
142	No events are active.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- A call to FDREAD:
  - Displays all the forms you scheduled for display and have not deleted. If you added or combined forms since the last FDREAD or FDSHOW call, it displays them for the first time.
  - Removes from the screen the forms you deleted since the last FDREAD or FDXSHOW call.
  - Updates on the screen the variables replaced since the last FDREAD or FDSHOW call.
  - Updates on the screen the objects for which display attributes were set or reset since the last FDREAD or FDSHOW call.
- Events not retrieved with the FDGETE subroutine are deleted before any input is accepted from the user.
- The FDREAD subroutine does not execute unless the forms scheduled for display contain at least one active event.

Replacing an Integer Variable

Purpose FDREPI transfers a program integer variable to Screen Formatting.

Format **CALL FDREPI (iform,vname,ioccur,ivar,ivstat,istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

vname {input}

The name of the variable to replace. Include the following type statement:

```
CHARACTER*31 vname
```

ioccur {input}

The occurrence of the variable name. Include the following type statement:

```
INTEGER ioccur
```

ivar {input}

The integer variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include the following type statement:

```
INTEGER ivar
```

ivstat {output}

The condition that gives you the status of the variable. The following values are possible:

Value	Meaning
0	No error occurred on the variable.
3	The program supplied a variable that is not within the range of integer numbers defined for the variable.

Value	Meaning
7	The program supplied a value that is too large for the form variable.
14	The output format defined for the variable cannot cannot output the variable.

Include the following type statement:

```
INTEGER ivstat
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form indentifer is invalid.
11	Variable name is unknown.
36	System error exists.
38	Variable name is invalid.
39	Form is pushed.
91	Occurrence is unknown.
145	Data value is bad.
147	Variable type is wrong.

Include the following type statement:

```
INTEGER istat
```

Remarks

- When you call either the FDREAD or FDSHOW subroutine, Screen Formatting replaces the integer variable on the terminal screen.
- Before you replace an integer variable, you must open the form on which it is replaced.
- You cannot replace an integer variable for a pushed form.
- If the integer variable is not valid, it is not replaced.

Replacing a Real Variable

Purpose FDREPR transfers a program real variable to Screen Formatting.

Format **CALL FDREPR (iform, vname, ioccur, var, ivstat, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

vname {input}

The name of the variable to replace. Include the following type statement:

```
CHARACTER*31 vname
```

ioccur {input}

The occurrence of the variable name. Include the following type statement:

```
INTEGER ioccur
```

var {input}

The value of the real variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include the following type statement:

```
REAL var
```

ivstat {output}

The condition that gives you the status of the variable. The following values are possible:

Value	Meaning
0	No error occurred on the variable.
2	The value the program supplied is not within the range of real numbers defined for the variable.

Value	Meaning
7	The value the program supplied is too large for the for variable.
14	The output format defined for the variable cannot output the variable.

Include the following type statement:

```
INTEGER ivstat
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form identifer is invalid.
11	Variable name is unknown.
36	System error exists.
38	Variable name is invalid.
39	Form is pushed.
91	Occurrence is unknown.
145	Data value is bad.
147	Variable type is wrong.

Include the following type statement:

```
INTEGER istat
```

Remarks

- When you call either the FDREAD or FDSHOW subroutine, Screen Formatting replaces the real variable on the terminal screen.
- Before you replace a real variable, you must open the form on which it is replaced.
- You cannot replace a real variable for a pushed form.
- If the real variable is not valid, it is not replaced.

Replacing a Record

Purpose FDREP transfers values of program variables to Screen Formatting for later display on a form.

Format **CALL FDREP (iform, record, ivstat, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

record {input}

The name of the record that contains working storage information for the form. When the form is created, Screen Formatting generates the type statements in this record. It is the program work area for the variables used on the form.

ivstat {output}

The condition that gives you the status of the variable.

Value	Meaning
0	No error occurred on the variable.
1	The program supplied an invalid string variable.
2	The program supplied an invalid real variable.
3	The program supplied an invalid integer variable.
7	The program supplied a number too large to be converted to the form variable size.
9	The program supplied an exponent that is too large.
10	The program supplied an exponent that is too small.
11	The program supplied an indefinite number.

Value	Meaning
12	The program supplied an infinite number.
14	The output format defined for the variable cannot output the variable.

Include the following type statement:

```
INTEGER ivstat
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form indentifer is invalid.
014	Work area is invalid.
39	Form is pushed.
52	Form has no variable.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- When the program calls either the FDREAD or FDSHOW subroutine, Screen Formatting replaces the variables on the terminal screen with the values stored in Screen Formatting.
- Before you replace a record, you must open the form on which the variables are replaced.
- You cannot replace a record for a pushed form.

Replacing a String Variable

Purpose FDREPS transfers a program string variable to Screen Formatting.

Format **CALL FDREPS (iform, vname, ioccur, cvar, ivstat, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

vname {input}

The name of the variable to replace. Include the following type statement:

```
CHARACTER*31 vname
```

ioccur {input}

The occurrence of the variable name. Include the following type statement:

```
INTEGER ioccur
```

cvar {input}

The string variable that Screen Formatting generates automatically in the form definition record. The form definition record defines the variable. If you do not want to use the automatically generated variable, include the following type statement (n is the number of characters in the variable):

```
CHARACTER*n
```

ivstat {output}

The condition that gives you the status of the variable. The following values are possible:

Value	Meaning
0	No error occurred on the variable.
1	The program supplied a variable that does not match the strings defined for the variable.

Include the following type statement:

```
INTEGER ivstat
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form indentifier is invalid.
11	Variable name is unknown.
36	System error exists.
38	Variable name is invalid.
39	Form is pushed.
91	Occurrence is unknown.
145	Data value is bad.
147	Variable type is wrong.

Include the following type statement:

```
INTEGER istat
```

Remarks

- When the program calls either the FDREAD or FDSHOW subroutine, Screen Formatting replaces the string variable on the terminal screen.
- Before you replace a string variable, you must open the form on which it is replaced.
- You cannot replace a string variable for a pushed form.
- If the string variable is not valid, it is not replaced.
- If the form specifies that the data must be in upper case, Screen Formatting converts it to upper case before storing the data in the form.

Resetting a Form

Purpose FDRESF resets the form to the state specified by the form definition.

Format **CALL FDRESF (iform, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form indentifier is invalid.
36	System error exists.
39	Form is pushed.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- When the program calls either the FDREAD or FDSHOW subroutine, Screen Formatting displays the form on the terminal screen with the reset specifications.
- All variables belonging to the form have their initial values and display attributes. The form is in its defined position.
- Before you reset a form, you must open it.
- You cannot reset a pushed form.

Resetting an Object Attribute

Purpose FDRESO resets the display attributes for an object to those specified in the form definition.

Format **CALL FDRESO (iform, oname, ioccur, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

oname {input}

The name of the object whose attributes are reset. Include the following type statement:

```
CHARACTER*31 oname
```

ioccur {input}

The occurrence of the object. For the first or only occurrence, use 1. Include the following type statement:

```
INTEGER ioccur
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully
7	No space is available.
9	Form indentifer is invalid.
20	Occurrence is invalid.
25	Object name is invalid.
33	Object name is unknown.
39	Form is pushed.
54	Form is not scheduled.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- You can reset the attributes of objects that are variable text, constant text, lines, or boxes.
- Before you reset the attribute of an object, you must open and either add or combine the form the object is on.
- When the program calls either the FDREAD or FDSHOW subroutine, Screen Formatting displays the object using the reset attributes.

Setting the Cursor Position

Purpose FDSETC sets the cursor to a selected position for later display.

Format **CALL FDSETC (iform, oname, ioccur, icp, istat)**

Parameters

iform {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

oname {input}

The name of the object on which you want the cursor set. Include the following type statement:

```
CHARACTER*31 oname
```

ioccur {input}

The integer specifying the occurrence of the object name. For the first occurrence, use 1. Include the following type statement:

```
INTEGER ioccur
```

icp {input}

The character position to which you want the cursor set. For the first character position, use 1. Include the following type statement:

```
INTEGER icp
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form indentifer is invalid.
21	Character position is invalid.
25	Object name is invalid.
33	Object name is unknown.
36	System error exists.
39	Form is pushed.
54	Form is not scheduled.
86	Attribute name is unknown.
91	Occurrence is unknown.
134	No object variable is defined.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- Use this subroutine to alter the default sequence of the application user's entry of variables. (In the default sequence, Screen Formatting places the cursor on the first input variable of the highest priority form. The highest priority form is the form last added, combined, or positioned.)
- When you call either the FDREAD or FDSHOW subroutine, Screen Formatting updates the terminal screen with the cursor at the specified position.
- If the position you specify is not visible on the screen, Screen Formatting shifts the data to make the cursor visible.
- Before you set the cursor position on a form, you must open the form and either add or combine it.
- You cannot set the cursor position in a pushed form.

Setting Line Mode

Purpose FDSETL begins line-by-line interaction with an application user.

Format **CALL FDSETL (istat)**

Parameters **istat** {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- Use this call for extended dialogues in line mode. For short dialogues, Screen Formatting automatically switches to the proper mode (line or screen), but resources used for screen mode interaction remain.
- This call releases all screen mode resources:
  - Open forms are closed.
  - The mode is set to line.

Setting an Object Attribute

Purpose FDSETO changes a display attribute for an object.

Format **CALL FDSETO (iform, oname, ioccur, aname, istat)**

Parameters **iform** {input}

The identifier established when the form was opened. Include the following type statement:

```
INTEGER iform
```

oname {input}

The name of the object whose display attribute is being set. Include the following type statement:

```
CHARACTER*31 oname
```

ioccur {input}

The occurrence of the object. For the first or only occurrence, use 1. Include the following type statement:

```
INTEGER ioccur
```

aname {input}

The program name of the display attribute being set. Include the following type statement:

```
CHARACTER*31 aname
```

istat {output}

The variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
7	No space is available.
9	Form indentifer is invalid.
20	Occurrence is invalid.
25	Object name is invalid.
29	Attribute name is invalid.
33	Object name is invalid.
39	Form is pushed.
54	Form is not scheduled.
86	Attribute name is unknown.
91	Occurrence is unknown.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- You can set the attributes of objects that are variable text, constant text, lines, or boxes.
- Changed attributes replace existing attributes.
- When you call either the FDREAD or FDSHOW subroutine, Screen Formatting displays the object using the set attributes.
- If the object you specify is not visible on the screen, Screen Formatting shifts the data to make the object visible.
- Before you set the attribute of an object, you must open the form the object is on and either add or combine it.
- You cannot set attributes of objects on a pushed form.

Showing Forms

Purpose FDSHOW updates the terminal screen.

Format **CALL FDSHOW (istat)**

Parameters **istat** {output}

A status variable that indicates the results of the subroutine. The following values are possible:

Value	Meaning
0	Routine completed successfully.
1	Terminal is disconnected.
7	No space is available.
36	System error exists.
53	No forms are scheduled for display.
131	Form is too large for screen.
145	Data value is bad.

Include the following type statement:

```
INTEGER istat
```

Remarks

- When none of the forms scheduled for display has an event or input variable defined, use this subroutine instead of FDREAD.
- When you do not want any input from the terminal user, use this subroutine.
- A call to FDSHOW:
  - Displays all the forms you have scheduled for display and have not deleted. If you added or combined forms since the last FDREAD or FDSHOW call, it displays them for the first time.
  - Removes from the screen the forms you deleted since the last FDREAD or FDSHOW call.
  - Displays variables replaced since last FDREAD or FDSHOW call.
  - Displays objects with attributes set or reset since last FDREAD or FDSHOW call.

Using CYBIL to Manage Forms 4

Using CYBIL to Manage Forms 4

Chapter 1 presented an overview of the process for creating and managing forms. It mentioned the following tasks a programmer uses to manage forms:

1. Writing the application program to include calls to the Screen Formatting CYBIL procedures that manage forms.
2. Expanding and compiling the program.
3. Creating a procedure that starts the program for the user.

This chapter describes these three tasks and shows them being executed in a CYBIL program. At the end of the chapter you will find format and parameter descriptions for each CYBIL procedure used by Screen Formatting.

Writing a Program to Use Forms

To use forms in any program you write, you must:

- Copy the procedure definitions for the CYBIL procedures used by Screen Formatting.
- Copy the data definitions generated by Screen Formatting when the designer creates the form. The data definitions hold values transferred to and from the form for the variable text objects.
- Call Screen Formatting procedures to manage the forms and the variable text objects on the forms.

Following the descriptions of these tasks is a CYBIL program in which these tasks are executed.

Copying Procedure Definitions

The procedure definitions define the procedures and their parameters. For every procedure used in the program, you must copy the procedure definition using the SCU *COPYC directive.

Copying Data Definitions

The data definitions for each form reside on a *form definition record* created by the form designer. In your program, you transfer data to and from variable text objects through this record.

When the designer creates a form, Screen Formatting generates a common deck that defines the form definition record. For example, Screen Formatting[1] generated the following source file for a form named CYBIL-SELECT-FORM. (The form definition record name is the same as the form name.)

```
*DECK CYBIL_SELECT_FORM expand = false
  TYPE
    cybil_select_form = record
      align_field: ALIGNED [0 MOD 8] string (0),
      message: string (40),
      object: string (1),
    recend;
```

The designer saves this file as a deck on a NOS/VE source library using the SOURCE_CODE_UTILITY (SCU).[2]

In the beginning of your program, you must copy the form definition deck for each form the designer created:

- Get the name of the deck from the design specification (the designer assigns the name while creating the form).
- Copy the deck by specifying its name on the SCU *COPY directive.

1. For this example, Screen Formatting was accessed through the Screen Design Facility.

2. Because each form has its own definition and the STATUS parameters use common decks, we recommend that you manage the source text using SCU. (For information on SCU, see the NOS/VE Source Code Management manual.)

Calling Screen Formatting

When you write a program that uses forms, you perform two basic tasks with Screen Formatting procedures:

- Displaying and removing forms and variable data on the application user's screen.
- Processing events executed by the user.

Displaying and Removing Forms and Variable Data

To control the display of forms and variable data on the user's screen, you perform the following steps in the sequence given:

1. Open the form.

   When you open a form, Screen Formatting locates it and allocates resources for processing the Screen Formatting calls that use the form.

   No matter how many times you use or update a form in your program, you need only open it once. For this reason, you usually begin an application program by opening all the forms you will use. However, when a form requires a large amount of storage for variables, you may want to open the form only when the application user needs it.

   (For the format of the call that opens forms, see *Opening a Form* later in this chapter).

2. Add the form.

   When you add a form, Screen Formatting schedules it for display on the application user's screen.

   To display more than one form at a time, add all the forms before you display them (the next step). The last form you schedule for display is the top form on the screen. Because forms are opaque, the top form covers other forms appearing in the same area. The cursor position indicates which form is ready for processing.

   (For the formats of the calls that schedule forms for display, see *Adding a Form* and *Combining Forms* later in this chapter.)

3. Read the form.

   When you read forms, Screen Formatting displays all the forms you added.

   When a form has an event or input variable defined, reading forms also accepts data from the application user and displays values returned by the program.

   (For the format of the call that reads forms, see *Reading Forms* later in this chapter. When none of the forms scheduled for display has an event or input variable defined, you can use a similar call described in *Showing Forms* later in this chapter.)

4. Delete the form.

   When you delete a form, Screen Formatting deletes it from the list of forms scheduled for display. The next time you read forms, the deleted form is removed from the screen. However, the form remains available for later use in the program (you must reschedule it for display).

   (For the format of the call that deletes a form, see *Deleting a Form* later in this chapter.)

5. Close the form.

   When you close a form, Screen Formatting releases the resources the form uses. The form is no longer available to the user or your program.

   (For the format of the call that closes a form, see *Closing a Form* later in this chapter.)

Processing Events and Data

When creating a form, the designer defines two types of events a user can execute to return control to the program: normal and abnormal.

- For normal events, the program performs requested actions such as getting variables, doing computations, and updating the form.
- For abnormal events, the program takes its own action. You generally then delete the form and go on, or stop the program.

Processing Normal Events

To process a normal event:

1. Get the name of the event and the position of the cursor from Screen Formatting.

   Screen Formatting validates the data the user enters (the form designer defined the validation rules) and transfers values of screen variables to its storage. The form designer may also have created error forms to be displayed when the user enters an incorrect value or presses a key not defined as an event.

   (For the format of the call that gets the event name and cursor position, see *Getting the Next Event* at the end of this chapter.)

2. Get the data from Screen Formatting storage and transfer it to program storage.

   (For formats of the calls that get data, see the following sections later in this chapter: *Getting a Record, Getting an Integer Variable, Getting a Real Variable,* and *Getting a String Variable.*)

3. Replace the data in Screen Formatting storage with the data in program storage.

   (For formats of the calls that replace variables, see the following sections later in this chapter: *Replacing a Record, Replacing an Integer Variable, Replacing a Real Variable,* and *Replacing a String Variable.*)

You can also reset the variables on a form to their original state. (For formats of the calls that reset variables to their original state, see *Resetting a Form* and *Resetting an Object Attribute* later in this chapter.)

Processing Abnormal Events

To process an abnormal event:

1. Get the name of the event and the position of the cursor from Screen Formatting.

   Unlike a normal event, Screen Formatting neither validates user entries nor transfers values of screen variables to Screen Formatting storage.

   (For the format of the call that gets the event name and cursor position, see *Getting the Next Event* later in this chapter.)

2. Write your own procedure to perform the task the design specification assigns to the event. Typical actions for an abnormal event include:

   - Resetting a form and redisplaying it.
   - Moving the user to a new form for additional processing.
   - Returning the user to a previous form.
   - Stopping the program.

   The user's screen is updated when you either read the forms again or end the program.

Example Program for Managing Forms with CYBIL

The program in this example computes the area of circles and rectangles. The example includes:

- Pictures of the forms managed in the program.
- The design specification supplied by the form designer.
- The form definition decks.
- The example program.

Forms Managed in the Program

The example program manages three forms residing on an object library named EXAMPLE_OBJECT_LIBRARY that must be in the user's command list.

When a user starts the application, Select Form appears (figure 4-1).

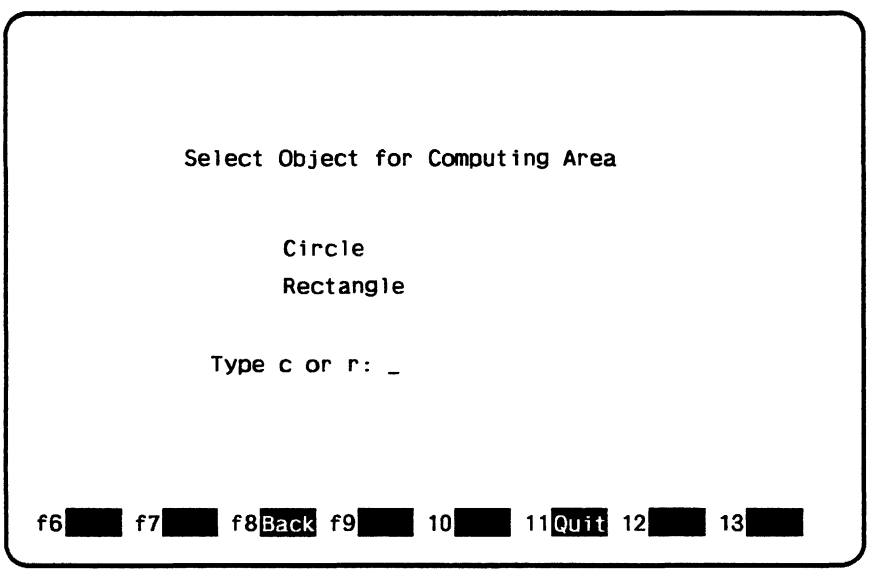


Figure 4-1. Select Form

On Select Form, a user enters either *c* to compute the area of a circle or *r* to compute the area of a rectangle.

When a user enters *r* on Select Form, Rectangle Form (figure 4-2) appears.

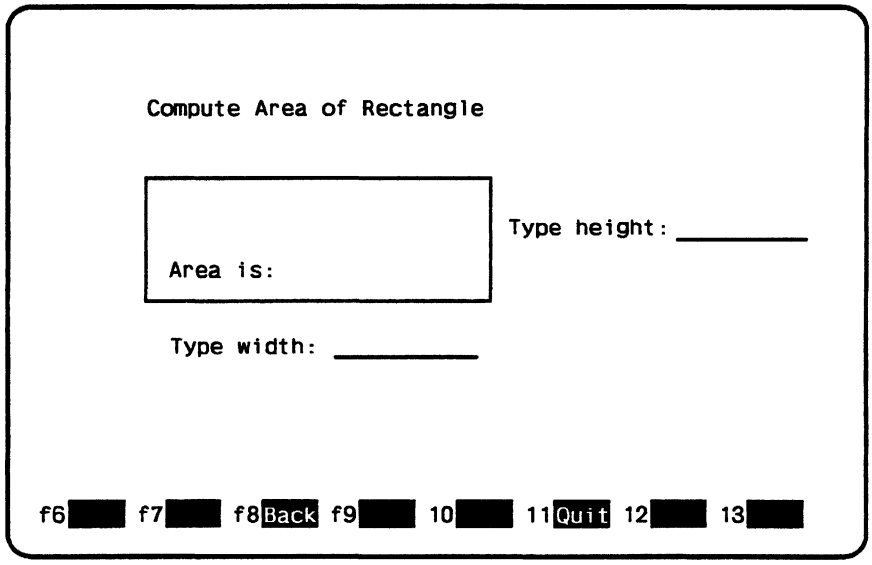


Figure 4-2. Rectangle Form

On Rectangle Form, the user enters the lengths of the sides of the rectangle as integers and presses the return key to have the program compute the area.

When a user enters *c* on Select Form, Circle Form (figure 4-3) appears.

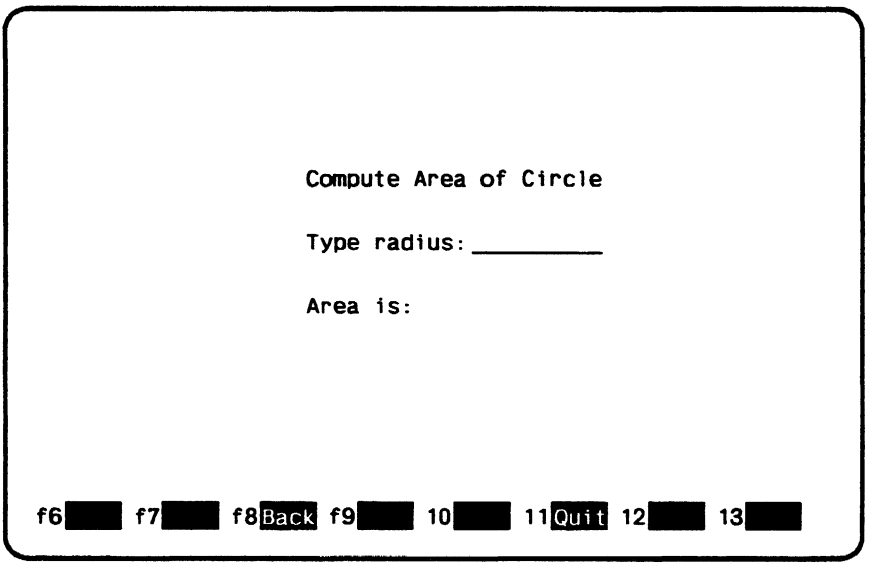


Figure 4-3. Circle Form

On Circle Form, the user enters the radius of the circle as a real value and presses the return key to have the program compute the area.

Design Specification

In writing the example program, the programmer uses the information the form designer listed in the following design specification:

- The names for the three forms used by the program are:

  CYBIL_SELECT_FORM
  CYBIL_RECTANGLE_FORM
  CYBIL_CIRCLE_FORM

- The user can call both the Rectangle Form and Circle Form from the Select Form.

- The following variable text objects are defined on the forms:

Variable Object	Description
Select Form:	
MESSAGE	Area for displaying error messages.
OBJECT	Area for user input of *r* or *c*.
Rectangle Form:	
SIDE_TABLE	Table that holds values for the rectangle's sides.
SIDE	Areas (two) for user input of values for the rectangle's sides.
AREA	Area for returning value of computed area.
RECTANGLE_MESSAGE	Area for displaying error messages.
Circle Form:	
RADIUS	Area for user input of value for the circle's radius.
AREA	Area for returning value of computed area.
MESSAGE	Area for displaying error messages.

- The following events are defined on the forms:

Event	Description
COMPUTE	A normal program event that processes data the user entered on the form. For Select Form, the COMPUTE event checks whether the user entered *r* or *c* and then displays the appropriate form. For the other forms, COMPUTE calculates the area and redisplays the form.
BACK	An abnormal program event that takes the user back to a previous environment. For Select Form, the BACK event stops the program. For the other forms, BACK returns the user to Select Form.
QUIT	An abnormal program event that stops the program.

Form Definition Decks

When the designer creates the three forms (by writing a program or using Screen Design Facility), a form definition record is created with each form. For the example program, the programmer copies the following form definition decks placed by the designer on an SCU library. The library in this example is named EXAMPLE_SOURCE_LIBRARY.

The CYBIL_SELECT_FORM deck:

```
TYPE
  cybil_select_form = record
    align_field: ALIGNED [0 MOD 8] string (0),
    message: string (40),
    object: string (1),
  recend;
```

The CYBIL_RECTANGLE_FORM deck:

```
TYPE
  cybil_rectangle_form = record
    align_field: ALIGNED [0 MOD 8] string (0),
    side_table: array [1 .. 2] of record
      side: ALIGNED [0 MOD 8] integer,
    recend,
    area: ALIGNED [0 MOD 8] integer,
    message: string (40),
  recend;
```

The CYBIL_CIRCLE_FORM deck:

```
TYPE
  cybil_circle_form = record
    align_field: ALIGNED [0 MOD 8] string (0),
    area: ALIGNED [0 MOD 8] real,
    radius: ALIGNED [0 MOD 8] real,
    message: string (40),
  recend;
```

Example CYBIL Program

This CYBIL program calls the forms and executes the events described in the previous sections. The program is in the SCU deck named COMPUTE_OBJECT_AREA. To run the example program, see the Examples online manual.

```
?? RIGHT := 110 ??
MODULE compute_object_area;

{ Copy definitions for Screen Formatting procedures.

*copyc fdp$add_form
*copyc fdp$close_form
*copyc fdp$delete_form
*copyc fdp$get_real_variable
*copyc fdp$get_integer_variable
*copyc fdp$get_next_event
*copyc fdp$get_string_variable
*copyc fdp$open_form
*copyc fdp$read_forms
*copyc fdp$replace_string_variable
*copyc fdp$replace_integer_variable
*copyc fdp$replace_real_variable
*copyc fdp$reset_form
*copyc fdp$set_cursor_position

*copyc pmp$abort
*copyc pmp$exit

  VAR
    circle_form_identifier: fdt$form_identifier,
    event_name: ost$name,
    event_normal: boolean,
    event_position: fdt$event_position,
    form_name: ost$name,
    last_event: boolean,
    rectangle_form_identifier: fdt$form_identifier,
    select_form_identifier: fdt$form_identifier,
    status: ost$status,
    variable_name: ost$name,
    variable_status: fdt$variable_status;
```

```
  PROCEDURE [INLINE] check_status;

    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;

  PROCEND check_status;

  PROCEDURE display_variable_status
    (    message: string ( * );
     VAR form_identifier: fdt$form_identifier);

    variable_name := 'MESSAGE';
    fdp$replace_string_variable (form_identifier, variable_name,
          1, message, variable_status, status);
    check_status;

  PROCEND display_variable_status;

  PROCEDURE compute_circle_area;

{ Copy variables for circle form.

*copyc cybil_circle_form

    VAR
      circle_data: cybil_circle_form;

{ Display circle form in original state.

    fdp$reset_form (circle_form_identifier, status);
    check_status;
    fdp$add_form (circle_form_identifier, status);
    check_status;
```

```
{ Update screen and get radius from terminal user entry.

  /get_input/
    REPEAT
      fdp$read_forms (status);
      check_status;

      fdp$get_next_event (event_name, event_normal,
            event_position, last_event, status);
      check_status;

{ On BACK or QUIT event, return to caller.

      IF event_name <> 'COMPUTE' THEN
        fdp$delete_form (circle_form_identifier, status);
        check_status;
        RETURN;
      IFEND;

{ Transfer terminal user entry for radius to program.

      variable_name := 'RADIUS';
      fdp$get_real_variable (circle_form_identifier,
            variable_name, 1, circle_data.radius,
            variable_status, status);
      check_status;
      IF variable_status <> fdc$no_error THEN
        display_variable_status ('Type valid value for radius.',
              circle_form_identifier);
        CYCLE /get_input/;
      IFEND;

{ Compute area of circle and display it.

      circle_data.area := 3.14 * (circle_data.radius *
            circle_data.radius);
      variable_name := 'AREA';
      fdp$replace_real_variable (circle_form_identifier,
            variable_name, 1, circle_data.area, variable_status,
            status);
      check_status;
```

```
{ Area value could not be displayed using output format
{ defined for form. Revise form or program.

      IF variable_status <> fdc$no_error THEN
        display_variable_status ('Format cannot display area.',
              circle_form_identifier);
        CYCLE /get_input/;
      IFEND;

{ Blank error message in case previously displayed.

      display_variable_status (' ', circle_form_identifier);
    UNTIL FALSE;

  PROCEND compute_circle_area;

  PROCEDURE compute_rectangle_area;

{ Copy variables for rectangle form.

*copyc cybil_rectangle_form

    VAR
      rectangle_data: cybil_rectangle_form;

{ Display rectangle form in original state.

    fdp$reset_form (rectangle_form_identifier, status);
    check_status;

    fdp$add_form (rectangle_form_identifier, status);
    check_status;

{ Update screen and get terminal user entry
{ for rectangle height and width.

  /get_input/
    REPEAT
      fdp$read_forms (status);
      check_status;

      fdp$get_next_event (event_name, event_normal,
            event_position, last_event, status);
      check_status;
```

```
{ If abnormal event (BACK or QUIT) occurs, return to caller.

      IF event_name <> 'COMPUTE' THEN
        fdp$delete_form (rectangle_form_identifier, status);
        check_status;
        RETURN;
      IFEND;

{ Transfer height value from form to program.

      variable_name := 'SIDE';
      fdp$get_integer_variable (rectangle_form_identifier,
            variable_name, 1, rectangle_data.side_table [1].side,
            variable_status, status);
      check_status;

{ If data invalid, move cursor to height value
{ and display error message.

      IF variable_status <> fdc$no_error THEN
        fdp$set_cursor_position (rectangle_form_identifier,
              variable_name, 1, 1, status);
        display_variable_status ('Type valid value for height.',
              rectangle_form_identifier);
        CYCLE /get_input/;
      IFEND;

{ Transfer width value from form to program.

      fdp$get_integer_variable (rectangle_form_identifier,
            variable_name, 2, rectangle_data.side_table [2].side,
            variable_status, status);
      check_status;
```

```
{ If data invalid, move cursor to width value
{ and display error message.

      IF variable_status <> fdc$no_error THEN
        fdp$set_cursor_position (rectangle_form_identifier,
              variable_name, 2, 1, status);
        display_variable_status ('Type valid value for width.',
              rectangle_form_identifier);
        CYCLE /get_input/;
      IFEND;

{ Compute area of rectangle and display it.

      rectangle_data.area := rectangle_data.side_table [1].side *
            rectangle_data.side_table [2].side;

      variable_name := 'AREA';
      fdp$replace_integer_variable (rectangle_form_identifier,
            variable_name, 1, rectangle_data.area,
            variable_status, status);
      check_status;
      IF variable_status <> fdc$no_error THEN

{ Area value could not be displayed using output format
{ defined for form. Revise form or program to accommodate
{ size of number.

        display_variable_status ('Format cannot display area.',
              rectangle_form_identifier);
        CYCLE /get_input/;
      IFEND;

{ Blank error message in case previously displayed.

      display_variable_status (' ', rectangle_form_identifier);

    UNTIL FALSE;

  PROCEND compute_rectangle_area;

  PROCEDURE stop_program;
```

```
{ Close all forms.

    fdp$close_form (select_form_identifier, status);
    check_status;

    fdp$close_form (circle_form_identifier, status);
    check_status;

    fdp$close_form (rectangle_form_identifier, status);
    check_status;

    status.normal := TRUE;
    pmp$exit (status);
  PROCEND stop_program;

  PROGRAM compute_object_area;

*copyc cybil_select_form

    VAR
      select_data: cybil_select_form;

{ Open all forms used by the program
{ and assign form identifiers.

    form_name := 'CYBIL_SELECT_FORM';
    fdp$open_form (form_name, select_form_identifier, status);
    check_status;

    form_name := 'CYBIL_CIRCLE_FORM';
    fdp$open_form (form_name, circle_form_identifier, status);
    check_status;

    form_name := 'CYBIL_RECTANGLE_FORM';
    fdp$open_form (form_name, rectangle_form_identifier, status);
    check_status;
```

```
{ Add select form to list scheduled for display.

    fdp$add_form (select_form_identifier, status);
    check_status;

{ Update screen and accept user terminal entry
{ for object; display all added forms.

  /get_input/
    REPEAT
      fdp$read_forms (status);
      check_status;

{ Get screen events that determine next actions.

      fdp$get_next_event (event_name, event_normal,
           event_position, last_event, status);
      check_status;

{ Stop program on QUIT or BACK event.

      IF event_name <> 'COMPUTE' THEN
        stop_program;
      IFEND;

{ Transfer object variable from form to program.

      variable_name := 'OBJECT';
      fdp$get_string_variable (select_form_identifier,
           variable_name, 1, select_data.object,
           variable_status, status);
      check_status;
      IF variable_status <> fdc$no_error THEN
        display_variable_status ('Type c or r.',
             select_form_identifier);
      IFEND;

      IF select_data.object = 'R' THEN
```

```
{ Remove select form and compute area of rectangle.

        fdp$delete_form (select_form_identifier, status);
        check_status;
        compute_rectangle_area;

      ELSEIF select_data.object = 'C' THEN

{ Remove select form and compute area of circle.

        fdp$delete_form (select_form_identifier, status);
        check_status;
        compute_circle_area
      ELSE

{ If terminal user entered invalid data, display
{ error message and ask for another entry.

        display_variable_status ('Type c or r.',
              select_form_identifier);
        CYCLE /get_input/;
      IFEND;

{ Process event from rectangle form or circle form.

      IF event_name = 'QUIT' THEN
        stop_program;
      IFEND;

{ A BACK event occurred on rectangle form or circle form;
{ display select form in original state.

      fdp$reset_form (select_form_identifier, status);
      check_status;

      fdp$add_form (select_form_identifier, status);
      check_status;

    UNTIL FALSE;

  PROCEND compute_object_area;
MODEND compute_object_area;
```

Expanding and Compiling a Program

Programs using Screen Formatting use common decks and form definition records that reside outside the main program. To manage the source text for this type of program, put the program in one or more SCU decks. This allows you to update individual parts of a program and to use forms in more than one program without duplicating code.[3]

To expand and compile a program maintained in SCU decks:

1. Expand the deck containing the main program.
2. Compile the expanded program.
3. Put the compiled program on an object library.

A procedure for compiling and expanding a program is shown in the following example. (The example is based on the example program and form definition records described earlier. The example shows how to place decks on library EXAMPLE_SOURCE_LIBRARY.)

```
PROC cybil_compile_deck, cybcd (
  deck,  d: name=$required
  status  : var of status = $optional
  )
  source_code_utility
    use_library base=example_source_library result=$null
    expand_deck deck=$value(deck) ..
    compile=$local.compile ..
    alternate_base=$system.cybil.osf$program_interface
  quit

  cybil input=$local.compile ..
    list=$local.listing runtime_checks=all  ..
    debug_aids=all
```

3. For information on SCU, see the NOS/VE Source Code Management manual.

```
  create_object_library
    add_module library=example_object_library
    combine_module library=$local.lgo
    generate_library library=example_object_library.$next
  quit

PROCEND cybil_compile_deck
```

To use the procedure, put it on library EXAMPLE_OBJECT_LIBRARY and then add the library to your command list (using the CREATE_COMMAND_LIST_ENTRY command). You can execute the procedure by entering:

```
/cybil_compile_deck deck=cybil_compute_object_area
```

The compiled program is now also on library EXAMPLE_OBJECT_LIBRARY.

For more information on writing and using procedures, see the NOS/VE System Usage manual.

Helping the User Start the Application

The complete application consists of your program and the forms created by the designer. To integrate the forms with your program, you must:

- Create a procedure that gives users access to the object library containing the forms.
- Ensure that the user's terminal environment is set up properly to use the forms (in most instances, by creating a user prolog).
- Ensure that users know how to start the application.

Creating a User Procedure

To give the user access to the object library containing the forms:

1. Write a NOS/VE procedure from which the user starts the application.
2. Place the procedure on the library that contains the compiled program.

For example, the following procedure executes the application that uses the starting procedure COMPUTE_OBJECT_AREA on library EXAMPLE_OBJECT_LIBRARY. The other libraries accessed by the program are $SYSTEM.FDF$LIBRARY and $SYSTEM.TDU.TERMINAL_DEFINITIONS. Users must have these libraries available in order for the program to call the Screen Formatting procedures.

```
PROC cybil_compute_area, cybca (
  status  : var of status = optional
  )

  execute_task ..
    library=(example_object_library,$system.fdf$library,..
    $system.tdu.terminal_definitions) ..
    starting_procedure=compute_object_area

PROCEND cybil_compute_area
```

Creating a User Prolog

To ensure that the users' terminal environment is set up properly to use the forms, make sure they set the following terminal characteristics before they execute the procedure:

Characteristic	Description
Terminal model	Identifies the terminal to NOS/VE.
Attention character	Provides a character users can enter to interrupt the application.
Hold messages	Tells the network to hold all network messages until the user stops the application.

In most instances, users should set up their terminal for the entire terminal session in their user prologs. The example below does the following:

- Identifies a Digital Equipment Corporation VT220 terminal to the system.
- Chooses the exclamation point as a way to interrupt the program.
- Holds all messages from a NAMVE/CDCNET network.
- Sets up the way the terminal uses the exclamation point to interrupt the program.

The users add the following commands to their user prologs:

```
change_terminal_attributes terminal_model=dec_vt220 ..
  attention_character='!' ..
  status_action=hold
change_term_conn_defaults attention_character_action=1
change_connection_attributes terminal_file_name=input aca=1
change_connection_attributes terminal_file_name=output aca=1
change_connection_attributes terminal_file_name=command aca=1
```

For a further explanation of how to interrupt a screen application during an interactive session, and what commands to use for networks other than NAMVE/CDCNET, see the NOS/VE System Usage manual.

Starting the Application

To start the application, the users enter:

```
/create_command_list_entry e=example_object_library
/cybil_compute_area
```

When finished with the application, the users remove the object library from their command lists:

```
/delete_command_list_entry e=example_object_library
```

CYBIL Procedure Calls for Interacting with Forms

The following sections describe the CYBIL procedure calls to Screen Formatting modules. For each procedure, there is a purpose description, input format, list of parameters and their types, condition identifiers, and pertinent remarks.

An application program calls Screen Formatting procedures to interact with an application user through the use of forms. Each of these procedures is defined as a deck on the SCU library $SYSTEM.CYBIL.OSF$PROGRAM_INTERFACE. This library must be in the alternate base when compiling the application program.

These procedures are external routines that reside on the library called $SYSTEM.FDF$LIBRARY. This library must be in the user's program library list in order to execute the program.

For detailed information on CYBIL procedure calls, see the CYBIL Language Definition manual.

Adding a Form

Purpose FDP$ADD_FORM schedules a form for display on the application user's screen.

Format **FDP$ADD_FORM (form_identifier, status)**

Parameters **form_identifier**: fdt$form_identifier;
The identifier established when the form was opened.

status: VAR of ost$status;
The record that indicates the results of the procedure.

Conditions
fde$bad_data_value
fde$form_already_added
fde$form_pushed
fde$form_too_large_for_screen
fde$invalid_form_identifier
fde$no_space_available
fde$system_error

Remarks

- When you call either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting displays the added form on the terminal screen. The added form is placed on top of other forms occupying the same area on the screen.
- Before you add a form, you must open it.
- You cannot add a pushed form.

Changing Table Size

Purpose FDP$CHANGE_TABLE_SIZE changes the size of the table during program execution.

Format **FDP$CHANGE_TABLE_SIZE (form_identifier, table_name, table_size, status)**

Parameters

form_identifier: fdt$form_identifier;

The identifier established when the form was opened.

table_name: ost$name;

The name of the table to change in size.

table_size: fdt$table_size;

The size of the table. While this procedure is in effect, Screen Formatting limits the number of stored occurrences allowed for a table to the value you specify on this parameter. How many occurrences are displayed at one time depends on the number of visible occurrences defined in the form.

If you specify zero for the table size, no occurrences appear on the form.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_value
fde$form_pushed
fde$invalid_form_identifier
fde$invalid_table_name
fde$invalid_table_size
fde$no_space_available
fde$unknown_table_name

Remarks

- The table must be present in an open form.
- The size limitation remains in effect until the next time you call the FDP$CHANGE_TABLE_SIZE procedure.
- The maximum size for a table is identified by the form as the maximum number of stored occurrences. If you specify a table size larger than the maximum, you receive an error message (fde$invalid_table_size).

Examples

The following examples describe how changing the size of a table affects the application user. On the form, the table's specifications are a maximum of 20 stored occurrences, of which 6 occurrences can be visible at one time.

- If you specify a table size of 10, Screen Formatting displays 6 occurrences and allows the application user to page to the 10th occurrence.
- If you specify a table size of 4, Screen Formatting displays 4 occurrences and does not allow the application user to page.

Closing a Form

Purpose FDP$CLOSE_FORM releases resources used to process a form and deletes the form from the list scheduled for display.

Format **FDP$CLOSE_FORM (form_identifier, status)**

Parameters **form_identifier**: fdt$form_identifier;

The identifier established when the form was opened.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions fde$bad_data_value
fde$invalid_form_identifier
fde$form_pushed
fde$no_space_available

Remarks

- When the program calls either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting removes the closed form from the terminal screen as a result of calling this procedure.
- Before you can close a form, you must open it.
- You cannot close a pushed form.

Combining Forms

Purpose FDP$COMBINE_FORM combines a form with a previously added form and schedules the combined form for display on the terminal screen.

Format **FDP$COMBINE_FORM (added_form_identifier, combine_form_identifier, status)**

Parameters **added_form_identifier**: fdt$form_identifier;

The identifier for this instance of the previously added form.

combine_form_identifier: fdt$form_identifier;

The identifier for the form you are combining with the previously added form.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions
fde$bad_data_value
fde$form_already_added
fde$form_already_combined
fde$form_pushed
fde$form_too_large_for_screen
fde$invalid_form_identifier
fde$no_space_available
fde$system_error

Remarks

- You cannot combine a pushed form.
- The combined form inherits the event definitions of the previously added form.
- Before you combine a form with a previously added form, you must open both forms.
- When the programs calls either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting displays the combined form. The combined form is placed on top of other forms occupying the same area on the screen.
- When the application user executes an event to return to the program normally, Screen Formatting updates all program variables associated with both the added and combined forms.
- To combine several forms with a previously added form, call this procedure more than once.

Deleting a Form

Purpose FDP$DELETE_FORM deletes the form from the list of forms scheduled for display.

Format **FDP$DELETE_FORM (form_identifier, status)**

Parameters **form_identifier**: fdt$form_identifier;

The identifier established when the form was opened.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions
fde$bad_data_value
fde$form_not_scheduled
fde$form_pushed
fde$invalid_form_identifier
fde$no_space_available

Remarks

- When the program calls either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting removes the deleted form from the terminal screen and replots any forms uncovered by the deleted form.
- When you add a form (FDP$ADD_FORM) again that you previously deleted, the data in the form is retained.
- Before you delete a form, you must open it.
- You cannot delete a pushed form.
- If the form was added and has any combined forms associated with it, the combined forms are also deleted.
- When you delete a combined form, only that form is deleted. Areas covered by the combined form are replotted after the combined form is deleted.

Getting an Integer Variable

Purpose FDP$GET_INTEGER_VARIABLE gets the value the user entered on the form for an integer variable and transfers it to the program.

Format **FDP$GET_INTEGER_VARIABLE (form_identifier, name, occurrence, variable, variable_status, status)**

Parameters

form_identifier: fdt$form_identifier;

The identifier established when the form was opened.

name: ost$name;

The name of the integer variable to get and transfer to the program. This name was defined when the form was created.

occurrence: fdt$occurrence;

The occurrence of the variable name. The values allowed are 1 .. 1000. Use 1 for the first or only occurrence.

variable: VAR of integer;

The integer variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, use a variable of type integer.

variable_status: VAR of fdt$variable_status;

The condition name that describes the status of the integer variable.

FDC$INVALID_BDP_DATA

The user entered data that does not correspond to the defined program data type.

FDC$INVALID_INTEGER

The user entered data that is not in the range defined for the variable.

FDC$LOSS_OF_SIGNIFICANCE

The user entered an integer that is too large.

FDC$NO_ERROR

No error occurred on the variable.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_error
fde$invalid_form_identifier
fde$invalid_variable_name
fde$no_space_available
fde$system_error
fde$unknown_occurrence
fde$unknown_variable_name
fde$wrong_variable_type

Remarks

- Before you get an integer variable, you must open its form. If you get the variable after opening the form and before reading or replacing the variable on the form, the program returns the initial value specified by the form designer.

- If the form designer specifies data validation rules and error processing to display an error message or form, the program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Getting the Next Event

Purpose FDP$GET_NEXT_EVENT gets the next event resulting from the most recent FDP$READ_FORMS procedure.

Format **FDP$GET_NEXT_EVENT (event_name, event_normal, event_position, last_event, status)**

Parameters **event_name**: VAR of ost$name;

A data name to receive the application user's event.

event_normal: VAR of boolean;

A data name to receive the event normal indication. If the event is normal, TRUE is returned; if the event is abnormal, FALSE is returned.

event_position: VAR of fdt$event_position;

A data name to receive the position of the event. The character position in the upper left corner of a screen or a form is 1; the x position increases by 1 for each character, counting from left to right; the y position increases by 1 for each character counting from top to bottom.

The following fields are returned:

Field	Meaning
form_identifier	The identifier of the form on which the event occurred.
screen_x_position	Returns the x position of the event on the terminal screen.
screen_y_position	Returns the y position of the event on the terminal screen.
form_x_position	Returns the x position of the event on the form.
form_y_position	Returns the y position of the event on the form.

For the event_position key, one of the following values is returned:

FDC$FORM_EVENT

The event occurred in a form, but not in an object.

FDC$OBJECT_EVENT

The event occurred in an object. It has the following fields:

Field	Meaning
object_name	The object name. If the object doesn't have a name, the field is OSC$NULL_NAME.
object_occurrence	The occurrence of the object. The first or only occurrence is returned as 1.
object_x_position	The x position of the object. The origin is the upper left corner of the form.
object_y_position	The y position of the object. The origin is the upper left corner of the form.
object_definition_key	A variant record that contains one of the following values: FDC$BOX FDC$LINE FDC$CONSTANT_TEXT FDC$CONSTANT_TEXT_BOX FDC$VARIABLE_TEXT FDC$VARIABLE_TEXT_BOX For variable text and variable text boxes, it also returns the character position of the variable as it appears in the program (which is not necessarily how it appears on the form). The first position is 1.

last_event: VAR of boolean;

Indicates whether this is the last event. If this is the last event, the value is TRUE; if this is not the last event, the value is FALSE.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions fde$bad_data_value

Remarks The FDP$READ_FORMS procedure deletes existing events. If the event is normal, Screen Formatting updates the variables in the added and combined forms containing the event. Later, you can request the transfer of these variables to program storage. If the event is abnormal, Screen Formatting does not update or validate variables.

Getting a Real Variable

Purpose FDP$GET_REAL_VARIABLE gets a value the user entered on a form for a real variable and transfers it to the program.

Format **FDP$GET_REAL_VARIABLE (form_identifier, name, occurrence, variable, variable_status, status)**

Parameters

form_identifier: fdt$form_identifier;

The identifier established when the form was opened.

name: ost$name;

The name of the variable to get. This name was defined when the form was created.

occurrence: fdt$occurrence;

The occurrence of the variable name. Use 1 for the first or only occurrence.

variable: VAR of real;

The value of the real variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include a variable of type real.

variable_status: VAR of fdt$variable_status;

An ordinal that gives you the status of the variable. The following values are possible:

FDC$INDEFINITE

The user entered an indefinite number.

FDC$INVALID_BDP_DATA

The user entered data that does not correspond to the defined data type.

FDC$INVALID_REAL

The user entered data that is not within the range of real numbers defined for the variable.

FDC$LOSS_OF_SIGNIFICANCE

The user entered a number too large to be converted to the defined real or integer program type.

FDC$NO_ERROR

No error occurred on the variable.

FDC$OVERFLOW

The user entered an exponent that is too large.

FDC$UNDERFLOW

The user entered an exponent that is too small.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_value
fde$invalid_form_identifier
fde$invalid_variable_name
fde$no_space_available
fde$system_error
fde$unknown_occurrence
fde$unknown_variable_name

Remarks

- Before you get a real variable, you must open the form on which the user enters the value. If you get the variable after opening the form and before reading or replacing the variable on the form, the program returns the initial value specified by the form designer.

- If the form designer specifies data validation rules and error processing to display an error message or form, your program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Getting a Record

Purpose FDP$GET_RECORD transfers the values of the form record to the program record.

Format **FDP$GET_RECORD (form_identifier, p_work_area, work_area_length, variable_status, status)**

Parameters **form_identifier**: fdt$form_identifier;

The identifier established when the form was opened.

p_work_area: { output } ^cell;

Pointer to the work area for the form record. When the form is created, Screen Formatting generates the variable definition entries in this record.

work_area_length: fdt$work_area_length;

The number of cells in the work area to be used in transferring the record.

variable_status: VAR of fdt$variable_status;

An ordinal that gives you the status of the variable. The following values are possible:

FDC$INDEFINITE

The user entered an indefinite number.

FDC$INFINITE

The user entered an infinite number.

FDC$INVALID_BDP_DATA

The user entered data that does not correspond to the defined data type.

FDC$INVALID_INTEGER

The user entered data that is not within the range of integer numbers defined for the variable.

FDC$INVALID_REAL

The user entered data that is not within the range of real numbers defined for the variable.

FDC$INVALID_STRING

The user entered data that does not match the strings defined for the variable.

FDC$LOSS_OF_SIGNIFICANCE

The user entered a number too large to be converted to the defined real or integer data type.

FDC$NO_ERROR

No error occurred on the variable.

FDC$OVERFLOW

The user entered an exponent that is too large.

FDC$UNDERFLOW

The user entered an exponent that is too small.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

ide$bad_data_value
fde$form_has_no_variables
fde$invalid_form_identifier
fde$no_space_available
fde$system_error
fde$work_invalid

Remarks

- Before you get a record for a form, you must open the form. If you get the record after opening the form and before reading or replacing the record, the program returns the initial value specified by the form designer.

- If the form designer specifies data validation rules and error processing to display an error message or form, your program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Getting a String Variable

Purpose FDP$GET_STRING_VARIABLE gets a value the user entered on a form for a string variable and transfers it to the program.

Format **FDP$GET_STRING_VARIABLE (form_identifier, name, occurrence, variable, variable_status, status)**

Parameters **form_identifier**: fdt$form_identifier;

The identifier established when the form was opened.

name: ost$name;

The name of the variable to get. The name was defined when the form was created.

occurrence: fdt$occurrence;

The occurrence of the variable name. Use 1 for the first or only occurrence.

variable: VAR of fdt$text;

The variable that Screen Formatting generates automatically in the form definition record. The form definition record defines the variable. If you do not want to use the automatically generated variable, include a variable of the following type (* is the number of characters in the variable):

```
string ( * )
```

variable_status: VAR of fdt$variable_status;

An ordinal that gives you the status of the variable. The following values are possible:

FDC$INVALID_STRING

The user entered data that does not match the strings defined for the variable.

FDC$NO_ERROR

No error occurred on the variable.

FDC$VARIABLE_TRUNCATED

The storage length of the VARIABLE parameter is not long enough.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_value
fde$invalid_form_identifier
fde$invalid_variable_name
fde$no_space_available
fde$system_error
fde$unknown_occurrence
fde$unknown_variable_name
fde$wrong_variable_name

Remarks

- Before you get a string variable, you must open the form on which the user enters the value. If you get the variable after opening the form and before reading or replacing the variable on the form, the program returns the initial value specified by the form designer.

- If the form designer specifies data validation rules and error processing to display an error message or form, your program does not need to look at the variable status parameter.

  If the form designer specifies data validation rules and no error processing, the program must look at the variable status parameter.

  If the form designer specifies no data validation rules, the program must look at the variable status parameter.

Opening a Form

Purpose FDP$OPEN_FORM locates a form and prepares it for use by the program.

Format **FDP$OPEN_FORM (form_name, form_identifier, status)**

Parameters **form_name**: ost$name;

The name of the form you want to open.

form_identifier: VAR { input-output } of fdt$form_identifier;

The form identifier established for the form. Other Screen Formatting procedures use this identifier when referencing the form.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions
fde$bad_data_value
fde$form_already_open
fde$form_not_ended
fde$form_requires_conversion
fde$invalid_form_identifier
fde$invalid_form_name
fde$no_space_available
fde$system_error
fde$terminal_not_identified
fde$unknown_form_name

Remarks

- Screen Formatting locates a form as follows:
  - If the form name is blank, Screen Formatting assumes that the form identifier specifies the required dynamically created form.
  - If the form name is not blank, Screen Formatting searches the list of ended dynamically created forms.
  - If the form name is not blank and is not in the list of ended dynamically created forms, Screen Formatting searches the command library list to find the form name on the object libraries. (You specify the order in which Screen Formatting searches the list using the NOS/VE command CREATE_COMMAND_LIST_ENTRY).
- Executing FDP$OPEN_FORM does not display the form on the screen. (See Reading a Form or Showing a Form.)
- The form identifier that FDP$OPEN_FORM returns identifies the instance of open for a form. Forms dynamically created have only one instance of open. Forms stored on object libraries can have more than one instance of open. For each instance of open, Screen Formatting maintains the working environment (current value of variables and their display attributes) of the form.

Popping a Form

Purpose FDP$POP_FORMS deletes forms scheduled (added or combined) since the last FDP$PUSH_FORMS call.

Format **FDP$POP_FORMS (status)**

Parameters **status**: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions fde$bad_data_value
fde$no_forms_to_pop

Remarks Events associated with the last list of pushed forms become active.

Positioning a Form

Purpose FDP$POSITION_FORM schedules moving a form to a new location. Using this procedure, you can define a form at one location and display it at another location, or you can move a form from where it is currently displayed to a new location.

Format **FDP$POSITION_FORM (form_identifier, screen_x_position, screen_y_position, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

screen_x_position: fdt$x_position;

The x position on the screen. The character position in the upper left corner of the screen is 1, and the x position increases by 1 for each character counting from left to right.

screen_y_position: fdt$y_position;

The y position on the screen. The character position in the upper left corner of the screen is 1, and the y position increases by 1 for each character counting from top to bottom.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_value
fde$form_pushed
fde$form_too_large_for_screen
fde$invalid_form_identifier
fde$no_space_available
fde$system_error

Remarks

- When the program calls either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting displays the form on the screen at the position specified in the call to FDP$POSITION_FORM.
- If you call this procedure while the form is displayed, the form is deleted from its current location and added at the new location. The added form is displayed on top of any other form occupying the same area on the screen.
- If you call this procedure before the form is displayed, the form is displayed at the specified location.
- Before you position a form, you must open it.
- You cannot position a pushed form.

Pushing a Form

Purpose FDP$PUSH_FORMS deactivates the events associated with forms scheduled for display (added or combined) since the last push call.

Format **FDP$PUSH_FORMS (status)**

Parameters **status**: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions fde$bad_data_value
fde$no_forms_to_push

Remarks

- Events associated with these forms are not passed to the program.
- A program cannot change or close a pushed form.
- Pushed forms are displayed on the screen. If you want newly added forms to appear on a blank screen, first add a blank form that covers the screen.

  Updates to the screen continue to show the pushed forms.
- This subroutine causes Screen Formatting to record added and combined forms so you can return to them later.

Reading a Form

Purpose FDP$READ_FORMS updates the terminal screen and accepts input from the application user.

Format **FDP$READ_FORMS (status)**

Parameters **status**: VAR of ost$status;
The record that indicates the results of the procedure.

Conditions fde$bad_data_value
fde$no_events_active
fde$no_forms_to_read
fde$system_error
fde$terminal_disconnected

Remarks

- A call to FDP$READ_FORMS:
  - Displays all the forms you scheduled for display and have not deleted. If you added or combined forms since the last FDP$READ_FORMS or FDP$SHOW_FORMS call, it displays them for the first time.
  - Removes from the screen the forms you deleted since the last FDP$READ_FORMS or FDP$SHOW_FORMS call.
  - Updates on the screen the variables replaced since the last FDP$READ_FORMS or FDP$SHOW_FORMS call.
  - Updates on the screen the objects for which display attributes were set or reset since the last FDP$READ_FORMS or FDP$SHOW_FORMS call.
- Events not retrieved with the FDP$GET_NEXT_EVENT procedure are deleted before any input is accepted from the user.

- The FDP$READ_FORMS procedure does not execute unless the forms scheduled for display contain at least one active event.
- After issuing this request, your program does not regain control until the user issues a normal event and Screen Formatting validates all the data, or the user issues an abnormal event.

Replacing an Integer Variable

Purpose FDP$REPLACE_INTEGER_VARIABLE transfers a program variable to Screen Formatting.

Format **FDP$REPLACE_INTEGER_VARIABLE (form_identifier, name, occurrence, variable, variable_status, status)**

Parameters

form_identifier: fdt$form_identifier;

The identifier established when the form was opened.

name: ost$name;

The name of the variable to replace. This name was defined when the form was created.

occurrence: fdt$occurrence;

The occurrence of the variable name. Use 1 for the first or only occurrence.

variable: integer;

The integer variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include a variable of type integer.

variable_status: VAR of fdt$variable_status;

An ordinal that gives you the status of the variable. The following values are possible:

FDC$LOSS_OF_SIGNIFICANCE

The program supplied a value that is too large for the form field.

FDC$NO_ERROR

No error occurred on the variable.

FDC$OUTPUT_FORMAT_BAD

The output format defined for the variable cannot output the variable.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_value
fde$form_pushed
fde$invalid_form_identifier
fde$invalid_variable_name
fde$no_space_available
fde$system_error
fde$unknown_occurrence
fde$unknown_variable_name
fde$wrong_variable_type

Remarks

- When you call either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting replaces the integer variable on the terminal screen.
- Before you replace an integer variable, you must open the form on which it is replaced.
- You cannot replace an integer variable for a pushed form.
- If the integer variable is not valid, it is not replaced.

Replacing a Real Variable

Purpose FDP$REPLACE_REAL_VARIABLE transfers a real program variable to Screen Formatting.

Format **FDP$REPLACE_REAL_VARIABLE (form_identifier, name, occurrence, variable, variable_status, status)**

Parameters

form_identifier: fdt$form_identifier;

The identifier established when the form was opened.

name: ost$name;

The name of the variable to replace. This name was defined when the form was created.

occurrence: fdt$occurrence;

The occurrence of the variable name. Use 1 for the first or only occurrence.

variable: real;

The value of the real variable that Screen Formatting generates automatically in the form definition record. If you do not want to use the automatically generated variable, include a variable of type real.

variable_status: VAR of variable_status;

An ordinal that gives you the status of the variable. The following values are possible:

FDC$LOSS_OF_SIGNIFICANCE

The value the program supplied is too large for the form variable.

FDC$NO_ERROR

No error occurred on the variable.

FDC$OUTPUT_FORMAT_BAD

The output format defined for the variable cannot output the variable.

status: VAR of status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_value
fde$form_pushed
fde$invalid_form_identifier
fde$no_space_available
fde$system_error
fde$unknown_occurrence
fde$unknown_variable_name
fde$variable_name
fde$wrong_variable_type

Remarks

- When you call either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting replaces the real variable on the terminal screen.
- Before you replace a real variable, you must open the form on which it is replaced.
- You cannot replace a real variable for a pushed form.
- If the real variable is not valid, it is not replaced.

Replacing a Record

Purpose FDP$REPLACE_RECORD transfers values of program variables to Screen Formatting for later display on a form.

Format **FDP$REPLACE_RECORD (form_identifier, p_work_area, work_area_length, variable_status, status)**

Parameters **form_identifier**: fdt$form_identifier;

The identifier established when the form was opened.

p_work_area: ^cell;

The pointer to the program work area for variables. When the form is created, Screen Formatting generates a type definition for you to assign to this variable.

work_area_length: fdt$work_area_length;

The number of cells in the work area.

variable_status: VAR of fdt$variable_status;

An ordinal that gives you the status of the variables. The following values are possible:

FDC$INDEFINITE

The program supplied an indefinite number.

FDC$INFINITE

The program supplied an infinite number.

FDC$LOSS_OF_SIGNIFICANCE

The program supplied a number that is too large to be converted to the form variable size.

FDC$NO_ERROR

No error occurred on the variables.

FDC$OUTPUT_FORMAT_BAD

The output format defined for a variable cannot output the variable.

FDC$OVERFLOW

The program supplied an exponent that is too large.

FDC$UNDERFLOW

The program supplied an exponent that is too small.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_value
fde$form_has_no_variables
fde$form_pushed
fde$invalid_form_identifier
fde$no_space_available
fde$work_invalid

Remarks

- When the program calls either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting replaces the variables on the terminal screen with the values stored in Screen Formatting.
- Before you replace a record, you must open the form on which the variables are replaced.
- You cannot replace a record for a pushed form.

Replacing a String Variable

Purpose FDP$REPLACE_STRING_VARIABLE transfers a program string variable to Screen Formatting.

Format **FDP$REPLACE_STRING_VARIABLE (form_identifier, name, occurrence, variable, variable_status, status)**

Parameters **form_identifier**: fdt$form_identifier;

The identifier established when the form was opened.

name ost$name;

The name of the variable to replace. This name was defined when the form was created.

occurrence: fdt$occurrence;

The occurrence of the variable name. Use 1 for the first or only occurrence.

variable: fdt$text;

The variable that Screen Formatting generates automatically in the form definition record. The form definition record defines the variable. If you do not want to use the automatically generated variable, use a variable of the following type (* is the number of characters in the variable):

string (*)

variable_status: VAR of fdt$variable_status;

An ordinal that gives you the status of the variable. The following value is possible:

FDC$NO_ERROR

No error occurred on the variable.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_value
fde$form_pushed
fde$invalid_form_identifier
fde$invalid_variable_name
fde$no_space_available
fde$system_error
fde$unknown_occurrence
fde$unknown_variable_name
fde$wrong_variable_type

Remarks

- When the program calls either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting replaces the string variable on the terminal screen.
- Before you replace a string variable, you must open the form on which it is replaced.
- You cannot replace a string variable for a pushed form.
- If the string variable is not valid, it is not replaced.
- If the form specifies that the data must be in upper case, Screen Formatting converts it to upper case before storing the data in the form.

Resetting a Form

Purpose FDP$RESET_FORM resets the form to the state specified by the form definition.

Format **FDE$RESET_FORM (form_identifier, status)**

Parameters **form_identifier**: fdt$form_identifier;
The identifier established when the form was opened.

status: VAR of ost$status;
The record that indicates the results of the procedure.

Conditions fde$bad_data_value
fde$form_pushed
fde$invalid_form_identifier
fde$no_space_available
fde$system_error

Remarks

- When the program calls either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting displays the form on the terminal screen with the reset specifications.
- All variables belonging to the form have their initial values and display attributes. The form is in its defined position.
- Before you reset a form, you must open it.
- You cannot reset a pushed form.

Resetting an Object Attribute

Purpose FDP$RESET_OBJECT_ATTRIBUTE resets the display attributes for an object to those specified in the form definition.

Format **FDP$RESET_OBJECT_ATTRIBUTE (form_identifier, object_name, occurrence, status)**

Parameters

form_identifier: fdt$form_identifier;

The identifier established when the form was opened.

object_name: ost$name;

The name of the object whose attributes are being reset. This name was defined when the form was created.

occurrence: fdt$occurrence;

The occurrence of the object. For the first or only occurrence, use 1.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_value
fde$form_not_scheduled
fde$form_pushed
fde$invalid_form_identifier
fde$invalid_object_name
fde$invalid_occurrence
fde$no_space_available
fde$unknown_object_name

Remarks

- You can reset the attributes of objects that are variable text, constant text, lines, or boxes.
- Before you reset the attribute of an object, you must open and either add or combine the form the object is on.
- When the program calls either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting displays the object using the reset attributes.

Setting the Cursor Position

Purpose FDP$SET_CURSOR_POSITION sets the cursor to a selected position for later display.

Format **FDP$SET_CURSOR_POSITION (form_identifier, object_name, occurrence, character_position, status)**

Parameters

form_identifier: fdt$form_identifier;

The identifier established when the form was opened.

object_name: ost$name;

The name of the object on which you want the cursor set. This name was defined when the form was created.

occurrence: fdt$occurrence;

The integer specifying the occurrence of the object name. Use 1 for the first occurrence.

character_position: fdt$character_position;

The character position to which you want the cursor set. Use 1 for the first character position.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_value
fde$form_not_scheduled
fde$form_pushed
fde$invalid_character_position
fde$invalid_form_identifier
fde$invalid_object_name
fde$no_object_available_defined
fde$no_space_available
fde$system_error
fde$unknown_object_name
fde$unknown_occurrence

Remarks

- One use of this procedure is to alter the default sequence of the application user's entry of variables. (In the default sequence, Screen Formatting places the cursor on the first input variable of the highest priority form. The first character of the highest priority form is the form last added, combined, or positioned.)
- When you call either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting updates the terminal screen with the cursor at the specified position.
- If the position you specify is not visible on the screen, Screen Formatting shifts the data to make the cursor visible.
- Before you set the cursor position on a form, you must open the form and either add or combine it.
- You cannot set the cursor position in a pushed form.

Setting Line Mode

Purpose FDP$SET_LINE_MODE begins line-by-line interaction with an application user.

Format **FDP$SET_LINE_MODE (status)**

Parameters **status**: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions fde$bad_data_value

Remarks

- Use this call for extended dialogues in line mode. For short dialogues, Screen Formatting automatically switches to the proper mode (line or screen) but resources used for screen mode interaction remain.
- This call releases all screen mode resources:
  - Open forms are closed.
  - The mode is set to line.

Setting an Object Attribute

Purpose FDP$SET_OBJECT_ATTRIBUTE changes a display attribute for an object.

Format **FDP$SET_OBJECT_ATTRIBUTE (form_identifier, object_name, occurrence, attribute, status)**

Parameters

form_identifier: fdt$form_identifier;

The identifier established when the form was opened.

object_name: ost$name;

The name of the object whose display attribute is being reset.

occurrence: fdt$occurrence;

The occurrence of the object. For the first or only occurrence, use 1.

attribute: ost$name;

The program name of the display attaribute being set.

status: VAR of ost$status;

The record that indicates the results of the procedure.

Conditions

fde$bad_data_value
fde$form_not_scheduled
fde$form_pushed
fde$invalid_attribute_position
fde$invalid_form_identifier
fde$invalid_object_name
fde$invalid_occurrence
fde$no_space_available
fde$unknown_display_name
fde$unknown_object_name
fde$unknown_occurrence

Remarks

- You can set the attributes of objects that are variable text, constant text, lines, or boxes.
- Changed attributes replace existing attributes.
- When you call either the FDP$READ_FORMS or FDP$SHOW_FORMS procedure, Screen Formatting displays the object using the set attributes.
- If the object you specify is not visible on the screen, Screen Formatting shifts the data to make the object visible.
- Before you set the attribute of an object, you must open the form the object is on and either add or combine it.
- You cannot set attributes of objects on a pushed form.

Showing Forms

Purpose FDP$SHOW_FORMS updates the terminal screen.

Format **FDP$SHOW_FORMS (status)**

Parameters **status**: VAR of ost$status;

A record that indicates the results of the procedure.

Conditions fde$bad_data_value
fde$form_too_large_for_screen
fde$form_to_show
fde$no_space_available
fde$system_error
fde$terminal_disconnected

Remarks

- When none of the forms scheduled for display has an event or input variable defined, use this procedure instead of FDP$READ_FORMS.
- When you do not want any input from the terminal user, use this subroutine.
- A call to FDP$SHOW_FORMS:
  - Displays all the forms you have scheduled for display and have not deleted. If you added or combined forms since the last FDP$READ_FORMS or FDP$SHOW_FORMS call, it displays them for the first time.
  - Removes from the screen the forms you deleted since the last FDP$READ_FORMS or FDP$SHOW_FORMS call.
  - Displays variables replaced since the last FDP$READ_FORMS or FDP$SHOW_FORMS call.
  - Displays objects with attributes set or reset since the last FDP$READ_FORMS or FDP$SHOW_FORMS call.

Using CYBIL Procedures to Create Forms 5

Using CYBIL Procedures to Create Forms 5

This chapter describes the structure of a form and explains how you create and change forms using CYBIL procedures with Screen Formatting. At the end of the chapter, the formats and parameters are described for each CYBIL procedure you can use.

What Is a Form?

A form is a collection of objects treated as a unit on the terminal screen. A form adds visual clarity and organization to the screen, making it easier for the user to interact with the computer. Forms have the following general properties:

- A form always occupies a rectangular area on a terminal screen.
- A form can occupy either the entire screen or a part of the screen.
- More than one form can be displayed simultaneously on a terminal screen.
- One form can completely or partially cover another form.
- All forms are opaque. When one form covers another form, the covered form is not visible.
- Forms have a priority for display on the terminal. The current form covers anything displayed previously.
- The lifetime of a form cannot exceed the lifetime of the program.
- A form and form objects can have different display attributes (display attributes include color, inverse video, and bold lines).
- A form can have one or more events associated with it.

What a Form Can Contain

A form can contain the following:

- Constant text objects (protected text, such as titles or labels)
- Variable text objects (unprotected text, such as user or program data entry)
- Tables (occurrences of variables)
- Graphic objects (lines or boxes)
- Display attributes (inverse video, color)
- Error and help messages
- Error and help forms
- Events (actions the user executes)

Constant Text Objects

A constant text object is text you do not intend the user or program to change. It is often general information, such as a title or a label. Constant text objects have the following properties:

- You can associate program display attributes with constant text.
- Programs and forms do not transfer constant text between each other.
- Constant text can occupy part or all of one or more lines on the form.
- You specify how constant text is formatted from line to line.
- If the user temporarily changes constant text (only on a terminal without protection), Screen Formatting resets the text to its initial value as soon as possible.

Variable Text Objects

Variable text objects are areas where data is entered by the user or the program. They have the following properties:

- A program refers to them by a variable name.
- When a variable name occurs more than once on a form, the variable text objects must be part of a table.
- They can occupy part or all of one or more lines on the form.
- You can specify the following attributes for variables:
  - Data flow
  - Data type
  - Output formatting

  These attributes are described in the following sections.

Data Flow Attributes

You can specify how you want the data to flow to and from the application user and to and from the application program.

The modes are:

- User Input Only

  When the user enters data, Screen Formatting attempts to prevent the data from being echoed to the screen. If the terminal does not support this mode, Screen Formatting replaces the data with blanks as soon as possible.

- Output Only

  Screen Formatting attempts to prevent the user from entering data in the variable text object. If the terminal does not protect text, Screen Formatting updates the form with the correct value when the user changes the variable.

- Terminal Input and Output

  When the user enters data, it appears on the screen. A program can change this data.

- Program Input and Output

  The data does not appear on the screen. A program uses a variable to record information about the user's interaction. This is called hidden text.

Data Type Attributes

For more convenient program processing, you can convert the type of data entered by the user as follows:

- Character

  The program receives data as entered by the user.

- Uppercase Character

  Screen Formatting converts the characters the user enters to uppercase and passes them to the program. When the program passes data to the screen, Screen Formatting converts it to uppercase also.

- Integer

  Screen Formatting converts the data the user enters to integers and passes them to the program.

- Real

  Screen Formatting converts the data the user enters to real numbers and passes them to the program.

Output Formatting Attributes

You specify the following output formatting attributes:

- You can assign an initial display attribute to variable text objects. (A program can temporarily change the attribute and later reset the attribute to its initial value.)

- When text is on more than one line, you define the text box by specifying its location, height, and width.

  You also specify how the text is mapped into the text box as follows:

  - Wrap Characters

    Text that does not fit on a line is placed on the next line. Data that exceeds the text box area is not displayed (the user can scroll to the undisplayed text).

- Wrap Words

  When possible, text is displayed in its box so that words are not broken between lines (a space indicates the end of a word). Data that exceeds the text box area is not displayed (the user can scroll to the undisplayed text).

Tables

A table contains one or more occurrences of one or more variable text objects. These objects can appear anywhere on the form.

Use a table to group variable text objects in the following ways:

- Objects that are logically related like quantity, part number, description, and cost on an order form.
- Objects whose attributes are identical except for their position on the form.

Graphic Objects

Graphic objects include boxes and line drawings (some terminals support only vertical and horizontal lines).

You can draw a box on a form or around a form. For example, you can use a box to point out a table to the application user or, when more than one form appears on the screen, to indicate the context of a form.

Graphic objects have the following general properties:

- You can assign display attributes to graphic objects. For example, a commonly used display attribute is line thickness.
- A program can change the display attribute.
- You can assign object names to graphic objects.
- A graphic object cannot intersect another graphic object.

Events

An *event* is an action the application user executes to return control to Screen Formatting. You define events by specifying both the *event trigger* that identifies the set of keystrokes the user makes and the *event action* that tells Screen Formatting to either perform a task itself or pass it through to the program. For example, you could define the following events:

- When users press the return key, Screen Formatting passes control to the program to make a call to display the next form.
- When users press the keys that perform the standard *move forward* event on their terminals, Screen Formatting pages forward in a table. (The standard events defined by Control Data are described later in this section.) The event is not passed through to the program.

You can allow the following user actions:

- The user enters data and then executes an event.
- The user places the cursor on an object and then executes an event.
- The user just executes an event.

When more than one form is on the user's screen, how Screen Formatting interprets events is determined by whether the forms are added or combined before they are displayed on the user's screen. If the forms are added, Screen Formatting processes only events associated with the form the user places the cursor on. Even though the events displayed are for all the forms appearing on the screen, when the events are processed only the data appearing on the form containing the cursor is affected.

If a form is combined with another form, the events associated with the first form are in effect for the combined form also; data appearing on either form is affected when Screen Formatting processes an event.

When more than one form is on the screen, the event and its position can be important to application processing. In the design specifications, identify whether forms should be added or combined before they are displayed.

The following sections describe the tasks you can specify for Screen Formatting and the standard events you can use.

Defining Screen Formatting Tasks

For each event, you must specify one of the following Screen Formatting tasks:

- Make a normal return to the program.
- Make an abnormal return to the program.
- Page or scroll on the form.
- Display help forms.
- Erase error and help forms.

Normal Return to Program

When you want the application to process the data the user enters on the form, you define an event to make a normal return to the program.

Before returning control to the program, Screen Formatting uses the data definitions to validate all the values the user entered. For each invalid value, Screen Formatting:

1. Highlights the invalid value.

   For each variable you define, you select the display attribute for highlighting errors. The default display attribute for errors is inverse video.

2. Sets the cursor to the first character of the invalid value.

3. Displays a message that explains how to correct the error.

   When you create the form, you define the error message either on its own form or in the program. If you do not, Screen Formatting skips this step.

4. Returns to the form for input from the application user.

Each time the user executes a normal event, Screen Formatting repeats the validation process until either no invalid values are left or the user executes an abnormal event. The program does not regain control until this occurs. Each time Screen Formatting checks for valid values, it removes previous error highlights and error messages.

Abnormal Return to Program

When you want the application to perform any task other than processing user-entered data, you define an event to make an abnormal return to the program.

Examples of program tasks that require you to define an abnormal return are:

- Quitting the program.
- Displaying a different form without checking for valid data on the first form.

Specifying several abnormal returns to the program allows the user flexibility in telling the program what to do next.

When the user makes an abnormal return to the program, Screen Formatting does not update or validate variables for the application.

Paging and Scrolling

When you have more data for a variable or table than you can display at one time, you define an event to page or scroll through the data. Screen Formatting performs this task; the application program does not need to execute any statements, nor does it regain control.

Displaying Help

When you define help information for a form, you also define an event that displays the help. Use the standard *request help* event defined by Control Data. The event action is FDC$DISPLAY_HELP. Screen Formatting performs this task; the application program does not need to execute any statements, nor does it regain control.

The help message displayed depends on the position of the cursor:

- When the user positions the cursor on a variable text object and executes the *request help* event, the help message for the variable is displayed.
- When the user positions the cursor anywhere else on the form and executes the *request help* event, the help message for the entire form is displayed.

Only one help or error message can appear on the screen at a time.

Executing a normal or abnormal event erases help messages. You can also define an event to erase the help message without returning to the program.

If you did not define help information when you created the form, Screen Formatting does nothing when a user executes the *request help* event.

Erasing Error and Help Forms

Because error or help forms can cover other forms on the screen, the user may want to erase the error or help forms.

When you define help information for a form, you can also define an event that allows the application user to erase it. Define the trigger and event action for erasing help forms as FDC$ERASE_HELP.

Screen Formatting supplies the standard *back to previous context* event to erase error forms. The user positions the cursor in the error form and executes the *back to previous context* event.

Standard Events

To be consistent with other NOS/VE screen applications, consider using the following Control Data-defined standard events in your own applications:

Standard Event	Description
Move backward	Display the previous set of data
Move to first	Display the first set of data
Move forward	Display the next set of data
Move to last	Display the last set of data
Back to previous context	Switch to a previously shown display
Request help	Display help
Undo last event	Remove changes made to the last event
Redo last event	Restore an undone user event
Quit save	Terminate the application and save any changed data
Alternate exit	Terminate the application and do not save any changed data

Display Attributes

While you are creating a form, you can associate display attributes with it and with objects on the form. You can specify terminal attributes (for example, color, inverse video, and bold lines) for program attributes (for example, error, warning, and title).

A form can also have a foreground and background color attribute. If you specify no attributes for an object on a form, the foreground and background color of the form are used.

For information about creating terminal attributes, refer to the NOS/VE Terminal Definition manual and to appendix C of this manual.

Protected and Unprotected Text

A form can contain text that cannot be changed by the user (protected text) and text that can be changed by the user (unprotected text). The following areas on a form are always protected:

- An area that contains no defined objects.
- Constant text objects.
- Graphic objects.

For variable text objects, you define whether they are protected or unprotected.

Error and Help Information

For each form you create, you can define:

- Error information for each variable text object on the form. Screen Formatting displays the error information when its validation process reveals that the user entered an invalid value.
- Help information for both the entire form and for each variable text object on the form. Screen Formatting displays the help information when the user executes the *request help* event (see Events earlier in this chapter).

Error and help information is on its own form, which Screen Formatting displays on top of the form currently being used.

You can also define an event that erases error or help forms. By positioning the cursor inside the error or help form and pressing the keys assigned, the user can remove the form from the screen before returning to the program. A normal or abnormal event also erases error and help forms.

You have a choice of two methods for creating an error or help form:

- You can use a form already created by Screen Formatting for this purpose (default message form) and simply define in your program the message you want to appear.
- You can create your own unique form just as you do any other form.

The advantage to using the default form is that the form is always the same and appears in the same place. The disadvantage is that the form is small and may not display all the data users want to see at one time.

The following sections describe the two methods for creating error and help forms.

Creating a Unique Form for Error and Help Information

You can create error and help forms the same way you create other forms. As with other forms, the object library on which the error or help forms reside must be in the user's command list. You display the error or help form by including its name in attributes for the user form:

- For an error form, specify its name on a field in FDC$VARIABLE_ERROR.

  The error form is displayed on the user's screen after the user enters data that is not valid for a given variable text object.

- For a help form, specify its name on a field in either FDC$FORM_HELP or FDC$VARIABLE_HELP.

  The help form is displayed when the user executes the *request help* event defined for the form.

Using the Default Form for Error and Help Information

You specify the text for the error or help message in the program that creates the user form and include a pointer to the message in the attributes for the form:

- For an error message, specify the pointer on a field in FDC$VARIABLE_ERROR.

  An error message is displayed on the user's screen after a user enters data that is not valid for a given variable text object.

- For a help message, specify the pointer on a field in either FDC$FORM_HELP or FDC$VARIABLE_HELP.

  A help message is displayed when the user executes a *request help* event that has been defined for the form.

The form Screen Formatting generates has the following characteristics:

- It occupies 78 columns and 3 lines.
- A box outlines the form.
- The upper left corner of the form is at column 2, row 1 of the user's screen.
- One variable text object is defined in the form for displaying a message. The variable starts at column 3 of the form (column 4 of the screen). The length of the variable can be up to 255 characters. However only 76 characters are visible on one line at one time.
- The standard events of *move forward, move backward, back to previous context, move to last,* and *move to first* are defined for the form. The user executes the *back to previous context* event to delete the form. The *move forward* and *move backward* events allow the user to scroll through the message when it is longer than one line. The *move to last* and *move to first* events display the first and last characters of the message.

You can change the default form by creating your own message form with the name given by FDC$MESSAGE_FORM_NAME (FDM$MESSAGE_FORM) and putting it in an object library included in the user's command list.

How a Form Is Created

There are two methods available for creating a form: using the Screen Design Facility[1] or using Screen Formatting procedures. The latter method requires writing a CYBIL program that uses the procedures documented in this chapter.

With either method, you create a form by defining attributes. These attributes are placed in a form definition record and stored in an object library. From this record, the program interacts with the form. The following items define a form:

- The position and area occupied by the form on a terminal screen.
- The display attributes that affect the entire form (such as background color).
- Events for the form.
- The program processor that accesses the form (COBOL, FORTRAN, or CYBIL). The language processor determines the rules for valid names of variables and tables, and how the record definition is generated.
- Objects on the form such as text, lines, or boxes.
- Display attributes for objects.
- Names for objects so that the objects can be manipulated by a program without concern for their form position.
- Variable attributes.

When creating a form with Screen Formatting procedures in a CYBIL program, you can also:

- Copy a form definition.
- Get the current definitions for a form, table, variable, or object.
- Change a form, table, variable or object.
- Delete a table, variable, or object.
- Create error and help messages and forms.

1. For more information, refer to the NOS/VE Screen Design Facility manual.

For instructions on creating a form with Screen Formatting procedures, refer to Instructions for Designing Forms, later in this chapter.

Data Validation Capabilities

Screen Formatting automatically validates the data entered by a user against a set of application-defined rules. The rules typically specify the format and values for the data. You specify the application rules when you create the form.

To provide a smooth interface for users when they encounter difficulties in using a form, you can use Screen Formatting to:

- Create help messages and forms.

  The message or form can be associated with the entire form or a specific variable text object on the form.

- Create error messages and forms.

  Screen Formatting identifies errors when it validates data. A message or form you create is automatically displayed when an error is detected.

- Change the highlighting display attribute for errors.

  Screen Formatting automatically highlights errors in inverse video. You can change the highlighting to another display attribute.

- Allow users to move to another part of the program without correcting an invalid value.

  You define abnormal events that return to the program without storing the values entered by the user.

- Allow users to enter just enough characters to make a text string unique so the system recognizes which valid character string it represents.

  When defining the values for a variable, you specify the strings that are acceptable entries and whether or not the system will recognize unique substrings.

To provide additional help to the application programmer in validating data, you can define data according to a specific format and content.

You can define the format as:

- Allowing numbers in FORTRAN integer formats.

  The integer format includes only numeric characters (0 through 9) or signed numeric characters.

- Allowing numbers in FORTRAN real formats.

  FORTRAN programmers know these as: Fw.d, Ew.d, Ew.dEe, Gw.d, and Gw.dEe edit descriptors.

You can define the content as:

- Allowing any characters.
- Allowing only alphabetic characters (A through Z; a through z).
- Allowing one or more specified integer ranges.
- Allowing one or more specified real ranges.
- Allowing unique substrings that contain enough characters to identify valid strings the system can recognize.
- Allowing only valid real or integer numbers.

  Any data conversions from the application user's input to program variables that cause loss of significance or overflow are invalid.

Cursor Positioning on the Form

By default, tab cursor positioning works on the form as a whole according to the terminal hardware. For terminals with protected fields, the tabbing works as follows. The cursor moves from one variable text object to the next variable text object. The cursor starts at the top line of the form. It moves from left to right on each line. When no variable text object appears on a line, the cursor moves down to the next line.

Screen Formatting places the cursor on the first variable text object of the highest priority form.

Instructions for Designing Forms

There are two ways of using Screen Formatting to create and change forms: dynamically or interactively.[2] These methods are described in the following sections.

Designing a Form Dynamically

The following are the steps for dynamically creating a form.

1. Create the form by executing the FDP$CREATE_FORM procedure.

2. Create objects (such as line or box graphics and constant or variable text) by executing the FDP$CREATE_OBJECT procedure. An object can have a name attribute, which allows you to associate a variable definition with the object. You also can change the attributes of an object by referring to the object name.

   The position of an object is relative to the form. The top left corner of the form is the origin of the form coordinate system. The x position starts at 1 and increases by 1 for each character counting from left to right. The y position starts at 1 and increases by 1 for each line counting from top to bottom.

   A variable can be created before or after the creation of the object. Each variable and visible variable table occurrence must have an associated object created before the FDP$END_FORM procedure is issued. An initial value for variable text is specified by using the FDP$CREATE_OBJECT procedure. The value is output by using the output format defined for the variable.

3. Create variables by executing the FDP$CREATE_VARIABLE procedure. Data is passed to and from the program using variables.

4. Create groups of variables that occur more than once by executing the FDP$CREATE_TABLE procedure. You can store more variables than can be shown on the screen at one time. The table can be created before all the variables have been created. All the variables in the table must be created before a FDP$END_FORM procedure is executed. Execute a FDP$CREATE_OBJECT procedure for each table occurrence visible on the form. If you

2. Forms can be created with CYBIL, but not with COBOL or FORTRAN.

want to specify an initial value of an occurrence that does not appear initially on the form, you can accept the default value of spaces or execute the FDP$CREATE_STORED_OBJECT procedure.

5. Change the record definition (containing attributes) that is used to transfer variables between the program and Screen Formatting by executing the FDP$CHANGE_FORM_RECORD procedure.

   The attributes affected can be:

   - The SCU deck name. If you don't specify a name, Screen Formatting uses the form name.

   - The record definition name. In COBOL, the record definition is a COBOL 01-level data name; in CYBIL, it is a CYBIL record type name.

6. End the form definition by executing the FDP$END_FORM procedure. Any errors are returned in a sequence.

7. Write the form definition to a file by executing the FDP$WRITE_FORM_DEFINITION procedure. You can now save the form on an object library.

   The file attributes must have particular values to be processed by the CREATE_OBJECT_LIBRARY utility. The file content attribute must be set to SCREEN (AMC$SCREEN) and the file structure attribute must be set to FORM (AMC$FORM). The CREATE_OBJECT_LIBRARY utility subcommands ADD_MODULE, COMBINE_MODULE, REPLACE_MODULE, and DELETE_MODULE update the library using this file.

8. Write the record definition to permanent storage by executing the FDP$WRITE_RECORD_DEFINITION procedure.

9. You can now interact with the form by issuing Screen Formatting requests that get the form values and transfer them to the program.

10. When you have finished interacting with the form, close it by executing the FDP$CLOSE_FORM procedure.

Changing a Form

The general steps for changing an existing form definition are as follows:

1. If the form exists on an object library, open the form by using the FDP$OPEN_FORM procedure, copy the form by using the FDP$COPY_FORM procedure, and issue the FDP$EDIT_FORM procedure. If the form was created with the FDP$CREATE_FORM procedure, then delete the form (if the form is currently scheduled for display) and issue the FDP$EDIT_FORM procedure.

2. Get the desired attributes about the form by using the FDP$GET_FORM_ATTRIBUTES procedure. These attributes can supply values to be used in forms that tell the application user about display attributes. This request can also tell you the number of objects in the form image.

3. You then allocate an array for the object definitions and execute the FDP$GET_FORM_OBJECTS procedure to obtain the objects. From these definitions the visual image of the form can be recreated on a form designed for editing. You can also get names of tables and variables for a form by using the FDP$GET_FORM_NAMES procedure. You can change the attributes associated with tables and variables.

4. Change the form attributes by using the FDP$CHANGE_FORM procedure. You can add, replace, or delete attributes associated with the form.

5. Get the variable attributes by executing the FDP$GET_VARIABLE_ATTRIBUTES procedure. Change the variable attributes by executing the FDP$CHANGE_VARIABLE procedure. You can add, replace, or delete attributes associated with the variable. The variable name can be changed.

6. Get the table attributes by using the FDP$GET_TABLE_ATTRIBUTES procedure. Change the table attributes by using the FDP$CHANGE_TABLE procedure. You can add, replace, or delete attributes associated with the table. The table name can be changed.

7. Get the object attributes on the form image by using the FDP$GET_OBJECT_ATTRIBUTES procedure. Change the attributes of an object on the form image by using the FDP$CHANGE_OBJECT procedure. You can add, replace, or delete attributes associated with the object. The position of the object can be changed.

8. Delete an object at a particular form position by using the FDP$DELETE_OBJECT procedure. This does not update any related tables or variables.

   Delete a table by using the FDP$DELETE_TABLE procedure. Variables and objects associated with the table are not deleted.

   Delete a variable by using the FDP$DELETE_VARIABLE procedure. This does not update any related table or objects.

9. Get the definitions for the form record by using the FDP$GET_RECORD_ATTRIBUTES procedure. Change the definitions for the form record by using the FDP$CHANGE_RECORD_ATTRIBUTES procedure.

10. End the form definition. The FDP$END_FORM procedure checks the form for consistency and ends the form definition. This request returns the errors in a sequence. To make further changes to the form definition, you must issue a FDP$EDIT_FORM procedure.

11. Save the changed form by using the FDP$WRITE_FORM_DEFINITION procedure.

    Save the changed record definition by using the FDP$WRITE RECORD_DEFINITION procedure.

12. Close the copied form by using the FDP$CLOSE_FORM procedure.

    Close the original form by using the FDP$CLOSE_FORM procedure.

Designing a Form Interactively

You can write an application program that interacts with the user to create, display, or change a form. A user might, for instance, want some of the text of the form translated into another language.

Creating the Form

To create a form interactively with an application user, you use two forms:

- The design form is used interactively by the application user to create the desired form.
- The target form is the form the application user desires, and is created by using the design form.

Each form has different properties. The design form has events such as save, mark, and define that help the application user and your application program design a form. Save collects all the information for a target form and stores it on an object library for future use. Mark displays text with distinctive display attributes so that the application user can recognize what text will be affected by some future command such as copy, move, or define. Define allows the application user to specify some special attributes about the marked text. For example, the application user may want to define the text as a variable for program interaction or to have special display attributes such as inverse video.

The target form has events meaningful to the application user's application. A target form used for helping an application user can have no events.

The text on the two forms also can have different display attributes. To make entry of text easy, allow the application user to simply type the desired text on the design form where it will appear on the target form. If the application user makes an error or decides on a different entry, he or she should be able to simply type in the new text. Most of the design form is not protected from modification by the application user. However, when the application user's application program displays the target form, the application user may want to protect much of the same text from modification.

The display attributes of the text on the two forms can also differ in another way. Some text the application user enters on the design form requires special attributes. The application user wants the text to be a variable for program interaction or to be displayed with special attributes such as inverse video on the target form. On the design form, the text with special attributes must be protected. The protection prevents changes in other text from changing the text which has special attributes. For example, deleting a character might change the text assigned special attributes. On the target form, that text can require modification. For example, on the design form, text that will be a variable on the target form needs to be protected. On the target form the variable text is unprotected.

Some terminals do not have hardware that prevents modification of text displayed on the screen. In this case, Screen Formatting restores any modified text that is supposed to be protected after the application user transmits the data. When your form design application must handle these terminals, an additional problem appears. The application user can modify any text on the design form. However, some of the text can be logically protected by Screen Formatting. When the application user transmits the data, some of the changed text is restored to protected value.

One way to alleviate this problem is to provide a display attribute which allows the application user to recognize protected areas. The form attribute FDC$DESIGN_DISPLAY_ATTRIBUTE provides this feature. When an object on a design form does not have an attribute, Screen Formatting uses this attribute to display the object.

The general steps for designing a form interactively are:

- Create a design form. Define events that allow the application user to specify attributes for text. The events will cause your application program to display other forms on which the application user specifies the attributes.
- Create a target form. A profile of the application user's application can help specify many of the values for the target form and reduce the number of inputs by the application user.
- Tell the application user to type in text on the design form that represents what the user wants on the target form.

- Give the application user a menu of events that perform special events on the text.
- When the application user executes an event such as define, your design application creates objects for the design form and for the target form. Suppose the application user wants to define some text as a variable for program interaction. In that case, create a constant text object on the design form, and a variable and variable text object on the target form.
- When the application user wants to save the target form, create constant text objects for the target form from the unprotected text on the design form.

The following steps describe this process in more detail.

1. Create a design form by using the FDP$CREATE_DESIGN_FORM procedure. You specify form attributes just like on the FDP$CREATE_FORM procedure.

   The FDP$CREATE_DESIGN_FORM procedure, however, does not need a FDP$END_FORM procedure to signal the completion of its definition. Before displaying the design form on the terminal screen you need to issue FDP$OPEN_FORM and FDP$ADD_FORM procedures.

   The FDP$CREATE_DESIGN_FORM procedure creates a table and a variable that allows you to access all characters on the design form. The name of the variable is specified by using the form attribute FDC$DESIGN_VARIABLE_NAME. If you do not specify this form attribute, the variable name is given by FDC$SYSTEM_DESIGN_VARIABLE_NAME. You can use the FDP$GET_STRING_VARIABLE and FDP$REPLACE_STRING_VARIABLE procedures to access characters on the design form. The variable has a length the same as the width of the design form. The table has the number of occurrences the same as the height of the design form. The program data type of the variable is character. The variable allows both terminal input and output.

2. Create a target form by using the FDP$CREATE_FORM procedure.
3. Open the design form by using the FDP$OPEN_FORM procedure.
4. Schedule the design form for display by using the FDP$ADD_FORM procedure. The next FDP$READ_FORMS procedure displays the design form.

5. Place initial text on the design form. The initial text might come from information the application user specified earlier in the application profile. Text the application user can simply modify by typing over is placed on the design form by using the FDP$REPLACE_STRING_VARIABLE procedure. Text which must be protected is placed on the design form by using the FDP$CREATE_OBJECT procedure. You cannot create any variable text objects on the design form. Any text created by the FDP$CREATE_OBJECT procedure is also stored in the design form and can be retrieved by using the FDP$GET_STRING_VARIABLE procedure.

6. Update the screen and read the design form by using the FDP$READ_FORMS procedure.

7. Get the events the application user executed by using the FDP$GET_NEXT_EVENT procedure.

   a. If the application user executes a save form event:

      1) Collect the unprotected text on the design form by using the FDP$CREATE_CONSTANT_TEXT procedure. This creates constant objects with no attributes for the target form. Any protected text on the design form is ignored. You previously created objects on the target form for protected text.

      2) End the target form. The FDP$END_FORM procedure checks the form for consistency and ends the form definition. This request returns the errors in a sequence. Screen Formatting organizes the data for the form for efficient processing of form interaction requests. To make further changes to the form definition, you must issue a FDP$EDIT_FORM procedure.

      3) Write the form to permanent storage by using the FDP$WRITE_FORM_DEFINITION procedure. Update the object library containing the application user's forms.

   b. If the application user executes a mark text event:

      1) Save the position of the event. This is the beginning of the text.

      2) Issue a FDP$CREATE_MARK procedure to show the application user the beginning of the marked text.

3) Read the design form by using the FDP$READ_FORMS procedure. The screen is updated and the application user can see the mark.

4) Get the next event the application user executes by using the FDP$GET_NEXT_EVENT procedure. In this case, assume the application user executes another mark event.

5) Save the position of the event. This is the end of the text.

6) Use a FDP$CREATE_MARK procedure to show the application user the full area of text selected.

7) Update the form and get the application users next input event by using the FDP$READ_FORMS procedure.

c. If the application user executes a define variable event, do the following:

1) Conduct a dialogue with the user to obtain additional information about the variable. For instance, the application user may want to specify the variable name, the program data type, and the terminal input and output actions. The marked text on the design form gives the position, length and initial value of the variable. Create the variable for the target form by using the FDP$CREATE_VARIABLE procedure.

2) Protect the text representing the variable on the design form by creating a constant text object by using the FDP$CREATE_OBJECT procedure. Also create a variable text object on the target form by using the FDP$CREATE_OBJECT procedure.

d. If the application user executes a delete mark event, clear any program pointers to marked text, issue the FDP$DELETE_MARK procedure, and read the design form by using the FDP$READ_FORMS procedure.

e. If the application user executes a move event, do the following. Assume that the application user had previously marked the area to be moved and moved the cursor to the desired destination when executing the move event.

1) Move the objects on the design form by using the FDP$MOVE_AREA procedure. On the design form, both constant text objects (protected text) and unprotected text will then be moved. Move the objects on the target form by using the FDP$MOVE_AREA procedure.

2) Update the terminal screen by using the FDP$READ_FORMS procedure.

f. If the application user executes a copy event, do the following. Assume that the application user had previously marked the area to be copied and then moved the cursor to the desired destination when executing the copy event.

1) Copy the objects on the design form by using the FDP$COPY_AREA procedure. On the design form, both constant text objects and unprotected text will then be copied. Copy the objects on the target form by using the FDP$COPY_AREA procedure.

2) Update the terminal screen by using the FDP$READ_FORMS procedure.

Displaying a Form

Your interactive form design application needs to display previously saved forms to the application user. The application user may want to view a form to evaluate some changes. You want to define one consistent event for the application user to execute to end the viewing of any form handled by your interactive design form application. This means you want to change the events originally defined for the form. To do this, you program the following steps.

1. Open the desired form by using the FDP$OPEN_FORM procedure.

2. Copy the form to storage that can be modified by using the FDP$COPY_FORM procedure.

3. Begin editing of the copied form by using the FDP$EDIT_FORM procedure.

4. Change the events associated with the copied form by using the FDP$CHANGE_FORM procedure. You delete all previous events by using the form attribute FDC$DELETE_ALL_EVENTS. Define one event that the application user executes to terminate viewing of the form.

5. End the form changes for the copied form by using the FDP$END_FORM procedure.

6. Open the copied form by using the FDP$OPEN_FORM procedure.

7. Schedule the copied form for display by using the FDP$ADD_FORM procedure.

8. Display the form by using the FDP$READ_FORMS procedure.

9. Learn when the application user wants to finish viewing the form by using the FDP$GET_NEXT_EVENT procedure. When the application user executes the display termination event, close the opened form and the copied form by using the FDP$CLOSE_FORM procedure. Otherwise, continue displaying the form.

Changing the Target Form

The steps for changing a form are as follows:

1. Open the form by using the FDP$OPEN_FORM procedure.

2. Copy the form by using the FDP$COPY_FORM procedure. The output of the FDP$COPY_FORM procedure is the target form.

3. Indicate that you wish to change the target form by using the FDP$EDIT_FORM procedure.

4. Create the design form by using the FDP$CREATE_DESIGN_FORM procedure.

5. Create the initial data on the design form. The FDP$CREATE_DESIGN_TEXT procedure creates constant text objects (protected text), line drawings (protected), and unprotected text on the design form from the target form. Constant text objects with attributes on the target form will be represented as constant text objects on the design form. Variables on the target form will be represented as constant text objects using their initial value on the design form. If the variable has no display attributes, the display attributes specified by the form attribute FDC$DESIGN_DISPLAY_ATTRIBUTE will be used. The FDC$DESIGN_DISPLAY_ATTRIBUTE helps the form designer to recognize variables.

   Constant text objects without any attributes will be represented as unprotected text on the design form. Objects in the target form representing unprotected text on the design form are deleted from

the target form. When the application user saves the form, the constant text objects for the target form will be created using the unprotected text from the design form.

6. Schedule the design form for display by using the FDP$ADD_FORM procedure.

7. Read the design form by using the FDP$READ_FORMS procedure. The application user may freely modify unprotected text (such as form titles, variable labels, and directions). The application user executes events to change protected text.

8. Get the events the application user executed by using the FDP$GET_NEXT_EVENT procedure. Many of the events described in the section on creating a form also occur when changing a form. The following steps highlight events that occur when changing a form.

   a. If the application user executes a delete event:

      1) Delete the object from the design form by using the FDP$DELETE_OBJECT procedure. Any text on the design form associated with the object is set to spaces. An FDP$GET_STRING_VARIABLE procedure accessing characters occupied by the deleted object would get spaces. Also delete the object from the target form. If the object is a variable text object, you may also want to delete the variable with the FDP$DELETE_VARIABLE procedure and update the table (if any). The variable is associated with using the FDP$CHANGE_TABLE procedure.

      2) Update the screen and get the terminals user's next input by using the FDP$READ_FORMS procedure.

   b. If the application user executes a change event:

      1) Get the current attributes of the object by using the appropriate FDP$GET_OBJECT_ATTRIBUTES, FDP$GET_VARIABLE_ATTRIBUTES, and FDP$GET_TABLE_ATTRIBUTES procedures.

      2) Conduct a dialogue with the application user to learn the desired change. Show the application user the current attributes. Allow the application user to change only the attributes that the user desires.

3) Change the object on the design form by using the FDP$CHANGE_OBJECT procedure. Any text on the design form is also changed. An FDP$GET_STRING_VARIBLE procedure would see the changed text. Change the object on the target form by using the appropriate FDP$CHANGE_OBJECT, FDP$CHANGE_TABLE, and FDP$CHANGE_VARIABLE procedures.

Rectangle Form Program

The following example shows a program that creates the form and form definition record for Rectangle Form (used in the CYBIL program in chapter 4).

```
?? RIGHT := 110 ??
MODULE create_rectangle_form;
*copyc amp$close
*copyc amp$get_segment_pointer
*copyc amp$open
*copyc amp$set_segment_eoi
*copyc fdp$close_form
*copyc fdp$create_form
*copyc fdp$create_object
*copyc fdp$create_table
*copyc fdp$create_variable
*copyc fdp$end_form
*copyc fdp$write_form_definition
*copyc fdp$write_record_definition
*copyc pmp$abort

  PROGRAM create_rectangle_form
    (VAR status: ost$status);

    VAR
      access_selections: [STATIC] array [1 .. 3] of
            amt$access_selection := [[amc$access_mode,
            $pft$usage_selections [pfc$read, pfc$append,
            pfc$shorten, pfc$modify]],
            [amc$file_contents, amc$screen],
            [amc$file_structure, amc$form]],
      area_variable_name: [READ] ost$name := 'AREA',
      form_attributes: array [1 .. 5] of fdt$form_attribute,
      form_fid: amt$file_identifier,
      form_identifier: fdt$form_identifier,
      form_lfn: [STATIC] amt$local_file_name := 'FORM_BINARY',
      form_name: [READ] ost$name := 'CYBIL_RECTANGLE_FORM',
      local_status: ost$status,
      number_errors: fdt$number_errors,
      message_variable_name: [READ] ost$name := 'MESSAGE',
      object_attributes: array [1 .. 2] of fdt$object_attribute,
      object_definition: fdt$object_definition,
      p_errors: ^SEQ ( * ),
      record_lfn: [STATIC] amt$local_file_name := 'FORM_RECORD',
```

```
  record_fid: amt$file_identifier,
  segment_pointer: amt$segment_pointer,
  side_table_name: [READ] ost$name := 'SIDE_TABLE',
  side_variable_name: [READ] ost$name := 'SIDE',
  table_attributes: array [1 .. 2] of fdt$table_attribute,
  text: string (80),
  variable_attributes: array [1 .. 2] of
        fdt$variable_attribute;

{   Define form attributes.

form_attributes [1].key := fdc$add_event;
form_attributes [1].event_action :=
      fdc$return_program_normal;
form_attributes [1].event_name := 'COMPUTE';
form_attributes [1].event_label := 'Comput';
form_attributes [1].event_trigger := fdc$next;
form_attributes [2].key := fdc$add_event;
form_attributes [2].event_action :=
      fdc$return_program_abnormal;
form_attributes [2].event_name := 'QUIT';
form_attributes [2].event_label := 'Quit';
form_attributes [2].event_trigger := fdc$stop;
form_attributes [3].key := fdc$add_event;
form_attributes [3].event_action :=
      fdc$return_program_abnormal;
form_attributes [3].event_name := 'BACK';
form_attributes [3].event_label := 'Back';
form_attributes [3].event_trigger := fdc$back;
form_attributes [4].key := fdc$form_name;
form_attributes [4].form_name := form_name;
form_attributes [5].key := fdc$event_form;
form_attributes [5].event_form_definition.key :=
      fdc$system_default_event_form;
fdp$create_form (form_identifier, form_attributes, status);
IF NOT status.normal THEN
  pmp$abort (status);
IFEND;
```

```
{   Create variable for side.

    variable_attributes [1].key := fdc$program_data_type;
    variable_attributes [1].program_data_type :=
          fdc$program_integer_type;
    variable_attributes [2].key := fdc$unused_variable_entry;
    fdp$create_variable (form_identifier, side_variable_name,
          variable_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;

{ Create variable for area.

    variable_attributes [2].key := fdc$io_mode;
    variable_attributes [2].io_mode := fdc$terminal_output;
    fdp$create_variable (form_identifier, area_variable_name,
          variable_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;

{ Create variable for message.

    variable_attributes [1].key := fdc$unused_variable_entry;
    fdp$create_variable (form_identifier, message_variable_name,
          variable_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;

{ Create table of rectangle sides.

    table_attributes [1].key := fdc$stored_occurrence;
    table_attributes [1].stored_occurrence := 2;
    table_attributes [2].key := fdc$add_table_variable;
    table_attributes [2].variable_name := side_variable_name;
    fdp$create_table (form_identifier, side_table_name,
          table_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;
```

```
{ Create constant text objects.

    object_attributes [1].key := fdc$unused_object_entry;
    object_attributes [2].key := fdc$unused_object_entry;
    text := 'Compute Area of Rectangle:';
    object_definition.key := fdc$constant_text;
    object_definition.p_constant_text := ^text (1, 26);
    object_definition.constant_text_width := 26;
    fdp$create_object (form_identifier, 20, 5, object_definition,
          object_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;

    text := 'Type height:';
    object_definition.p_constant_text := ^text (1, 12);
    object_definition.constant_text_width := 12;
    fdp$create_object (form_identifier, 52, 9, object_definition,
          object_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;

    text := 'Type width:';
    object_definition.p_constant_text := ^text (1, 11);
    object_definition.constant_text_width := 11;
    fdp$create_object (form_identifier, 20, 11,
          object_definition, object_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;

    text := 'Area is:';
    object_definition.p_constant_text := ^text (1, 8);
    object_definition.constant_text_width := 8;
    fdp$create_object (form_identifier, 20, 9, object_definition,
          object_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;
```

```
{ Create box.

    object_definition.key := fdc$box;
    object_definition.box_width := 36;
    object_definition.box_height := 4;
    object_attributes [1].key := fdc$unused_object_entry;
    object_attributes [2].key := fdc$unused_object_entry;
    fdp$create_object (form_identifier, 15, 7, object_definition,
          object_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;

{ Create variable text for height (side [1]).

    object_definition.key := fdc$variable_text;
    object_definition.variable_text_width := 10;
    text (1, 10) := ' ';
    object_definition.p_variable_text := ^text (1, 10);
    object_attributes [1].key := fdc$object_name;
    object_attributes [1].object_name := side_variable_name;
    object_attributes [1].occurrence := 1;
    object_attributes [2].key := fdc$object_display;
    object_attributes [2].display_attribute :=
          $fdt$display_attribute_set [fdc$underline];
    fdp$create_object (form_identifier, 65, 9, object_definition,
          object_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;

{ Create variable text for width (side [2]).

    object_attributes [1].occurrence := 2;
    fdp$create_object (form_identifier, 32, 11,
          object_definition, object_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;
```

```
{ Create variable text for area.

    object_attributes [1].object_name := area_variable_name;
    object_attributes [1].occurrence := 1;
    object_attributes [2].key := fdc$unused_object_entry;
    fdp$create_object (form_identifier, 29, 9, object_definition,
          object_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;

{ Create variable text for message.

    object_attributes [1].object_name := message_variable_name;
    text (1, 40) := ' ';
    object_definition.variable_text_width := 40;
    object_definition.p_variable_text := ^text (1, 40);
    fdp$create_object (form_identifier, 20, 15,
          object_definition, object_attributes, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;

    fdp$end_form (form_identifier, NIL, number_errors, p_errors,
          status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;
    IF number_errors <> 0 THEN
      pmp$abort (status);
    IFEND;

    amp$open (form_lfn, amc$segment, ^access_selections,
          form_fid, status);
    IF NOT status.normal THEN
      pmp$abort (status);
    IFEND;
```

```
      amp$get_segment_pointer (form_fid, amc$sequence_pointer,
            segment_pointer, status);
      IF NOT status.normal THEN
        pmp$abort (status);
      IFEND;

      RESET segment_pointer.sequence_pointer;

  { Write binary form definition for object library.

      fdp$write_form_definition (form_identifier,
            segment_pointer.sequence_pointer, status);
      IF NOT status.normal THEN
        pmp$abort (status);
      IFEND;

      amp$set_segment_eoi (form_fid, segment_pointer, status);
      amp$close (form_fid, local_status);
      IF NOT status.normal THEN
        pmp$abort (status);
      IFEND;

  { Generate CYBIL record definition for source library.

      amp$open (record_lfn, amc$record, NIL, record_fid, status);
      IF NOT status.normal THEN
        pmp$abort (status);
      IFEND;

      fdp$write_record_definition (form_identifier, record_fid,
            fdc$cybil_processor, status);
      IF NOT status.normal THEN
        pmp$abort (status);
      IFEND;

      amp$close (record_fid, status);
      fdp$close_form (form_identifier, status);

    PROCEND create_rectangle_form;

  MODEND create_rectangle_form;
```

Defining Attributes for a Form

When defining a form using Screen Formatting, you must define its attributes. These attributes can be categorized as:

- General attributes

  Attributes that describe the appearance of the form and events associated with it; for example, the names of the events that are part of the form.

- Variable attributes

  Attributes that describe variables on a form; for example, the data types of the variables.

- Table attributes

  Attributes that describe tables containing variables, for example, the number of occurrences of the variables in the table.

- Object attributes

  Attributes for objects that appear on the form; for example, the name and position of objects. Objects can be either text or graphics.

- Record attributes

  Attributes for form definition records, including the name and length of the record.

You can add new attributes, replace attributes, and delete attributes, as well as accept default attributes. You can also retrieve the current attributes.

These attributes are contained in an array of records, each attribute stored as a value in a separate record. You must initialize this value to the desired attribute in order to create, change, or get a specific attribute.

General Attributes

These attributes define the appearance of the form and its events. They are divided into two groups, those for creating and changing forms and those for getting other attributes.

Creating and Changing Forms

The following attributes are for creating and changing forms. As stated earlier, each attribute is specified as a value in a record in an initialized array. Each record is of type FDT$FORM_ATTRIBUTE, which is listed in appendix E.

Once established, this array is named on the form_attributes parameter in the call to any of the following CYBIL procedures, which are described later in this chapter:

FDP$CHANGE_FORM
FDP$CREATE_FORM
FDP$CREATE_DESIGN_FORM
FDP$CREATE_EVENT_FORM

The following are the attribute records, their descriptions, and the values permitted for each. The attribute record names are in italics.

add_event

Specifies that an event is added to the list of events for a form. This record contains the following fields: event_name, event_label, event_trigger, and event_action.

event_name

The name of the event that the application programs use (type OST$NAME). It must be unique and follow the form processor language conventions. Examples are copy, delete, and add. The event name is also the variable name on an event form associated with this form.

event_label

The label a user sees when Screen Formatting displays an event form associated with this form (type OST$NAME). Screen Formatting uses only the first 6 characters of the event label when generating an event form. For the standard events defined by Control Data, use the following labels.

Standard Event	Label
Move backward	Bkw
Move to first	First
Move forward	Fwd
Move to last	Last
Back to previous context	Back
Request help	Help
Undo last event	Undo
Redo last event	Redo
Quit save	Quit
Alternate exit	Exit

event_trigger

An ordinal that specifies the terminal event (type FDT$EVENT_TRIGGER). These correspond to keys that can be specified in the terminal definition. Screen Formatting assigns a key when a key does not exist in the terminal definition. If a terminal definition key does not have a label, Screen Formatting assumes the key does not exist. If a key cannot be assigned, Screen Formatting still permits you to interact with the form. Screen Formatting uses the following rules to assign keys:

- Screen Formatting first assigns the event triggers to their corresponding terminal definition keys using the priority given after these rules.
- If an event trigger cannot be assigned, Screen Formatting executes the following steps:

  1. Assigns standard event triggers (FDC$NEXT, FDC$SHIFT_NEXT, .. FDC$SHIFT_DATA) to unused terminal function keys (FDC$FUNCTION_1, FDC$SHIFT_FUNCTION_1, .. FDC$SHIFT_FUNCTION_16).

2. Assigns application event triggers to unused terminal function keys in ascending order of function number. This means that FDC$FUNCTION_1, FDC$SHIFT_FUNCTION_1 is assigned before FDC$FUNCTION_2, FDC$SHIFT_FUNCTION_2. (Triggers are assigned to the same key, whether shifted or unshifted, if possible.)

3. Assigns non-shifted event triggers to non-shifted unused terminal function keys. Screen Formatting tries to assign shifted event triggers to shifted unused terminal function keys.

4. Assigns keys while opening the form. By using the FDP$GET_FORM_ATTRIBUTES request with the key FDC$GET_NEXT_EVENT, you can learn the keys (event trigger) that Screen Formatting assigned.

The priority in which terminal definition keys are assigned is as follows:

FDC$NEXT
FDC$SHIFT_NEXT
FDC$HELP
FDC$SHIFT_HELP
FDC$STOP
FDC$SHIFT_STOP
FDC$BACK
FDC$SHIFT_BACK
FDC$UP
FDC$SHIFT_UP
FDC$DOWN
FDC$SHIFT_DOWN
FDC$FORWARD
FDC$SHIFT_FORWARD
FDC$BACKWARD
FDC$SHIFT_BACKWARD
FDC$UNDO
FDC$REDO
FDC$EDIT
FDC$SHIFT_EDIT
FDC$DATA
FDC$SHIFT_DATA
FDC$FUNCTION_1
FDC$SHIFT_FUNCTION_1
FDC$FUNCTION_2
FDC$SHIFT_FUNCTION_2
FDC$FUNCTION_3

FDC$SHIFT_FUNCTION_3
FDC$FUNCTION_4
FDC$SHIFT_FUNCTION_4
FDC$FUNCTION_5
FDC$SHIFT_FUNCTION_5
FDC$FUNCTION_6
FDC$SHIFT_FUNCTION_6
FDC$FUNCTION_7
FDC$SHIFT_FUNCTION_7
FDC$FUNCTION_8
FDC$SHIFT_FUNCTION_8
FDC$FUNCTION_9
FDC$SHIFT_FUNCTION_9
FDC$FUNCTION_10
FDC$SHIFT_FUNCTION_10
FDC$FUNCTION_11
FDC$SHIFT_FUNCTION_11
FDC$FUNCTION_12
FDC$SHIFT_FUNCTION_12
FDC$FUNCTION_13
FDC$SHIFT_FUNCTION_13
FDC$FUNCTION_14
FDC$SHIFT_FUNCTION_14
FDC$FUNCTION_15
FDC$FUNCTION_16
FDC$SHIFT_FUNCTION_16
FDC$PICK
FDC$INSERT_LINE
FDC$DELETE_LINE
FDC$HOME_CURSOR
FDC$CLEAR_SCREEN
FDC$TIME_OUT
FDC$VARIABLE_TRIGGER

Screen Formatting supports standard events. A standard event is one that has a label defined by Control Data and performs an event defined by Control Data.

The system assigns the standard events as follows:

1. The application must use the standard event if it exists for the event being defined.

2. If a terminal has a dedicated key that performs the standard event, the standard event is assigned to that key.

3. If a terminal does not have a dedicated key that performs the standard event, the standard event is assigned either to a key such as a programmable function key or to a sequence of keys defined by the terminal.

The following table lists the Screen Formatting trigger for each standard event.

Standard Event	Screen Formatting Trigger
Move backward	FDC$BACKWARD
Move to first	FDC$SHIFT_BACKWARD/ FDC$FIRST
Move forward	FDC$FORWARD
Move to last	FDC$SHIFT_FORWARD/ FDC$LAST
Back to previous context	FDC$BACK
Request help	FDC$HELP
Undo last event	FDC$UNDO
Redo last event	FDC$REDO
Quit save	FDC$STOP/ FDC$QUIT
Alternate exit	FDC$SHIFT_STOP/ FDC$EXIT

If you specify one of the alternate forms (FDC$FIRST, FDC$LAST, FDC$QUIT, FDC$EXIT) for the Screen Formatting trigger, Screen Formatting stores the primary form (FDC$SHIFT_BACKWARD, FDC$SHIFT_FORWARD, FDC$STOP, FDC$SHIFT_STOP). That means any request that returns a trigger returns the primary form.

event_action

Specifies a variant record of type FDT$EVENT_ACTION containing one of the following:

FDC$RETURN_PROGRAM_NORMAL

When this event occurs, Screen Formatting returns to the program indicating that the event is normal. You can specify one or more normal events.

FDC$RETURN_PROGRAM_ABNORMAL

When this event occurs, Screen Formatting returns to the program indicating that the event is abnormal. You can specify one or more abnormal events.

FDC$PAGE_TABLE_FORWARD

When this event occurs, Screen Formatting pages the table indicated by the cursor position forward. The next group of stored table occurrences is displayed on the screen. The table cannot be paged beyond the number of stored table occurrences. If there is only one table on the screen (form), the user does not need to position the cursor on the table. The user cannot specify more than one of these events. The event is not returned to the application program.

FDC$PAGE_TABLE_BACKWARD

When this event occurs, Screen Formatting pages the table indicated by the cursor position backward. The previous group of stored table occurrences is displayed on the screen. The table cannot be paged beyond the number of stored table occurrences. If there is only one table on the screen (form), the user does not need to position the cursor on the table. The user cannot specify more than one of these events. The event is not returned to the application program.

FDC$SCROLL_TABLE_FORWARD

When this event occurs, Screen Formatting scrolls forward the table indicated by the cursor position. The first variable the application user will see in the table on the screen is the one that the cursor was on when the event occurred providing that enough program occurrences exist to fill the visible size of the table. The table cannot be scrolled beyond the number of program variable occurrences. The user cannot specify more than one of these events. The event is not returned to the application program.

FDC$SCROLL_TABLE_BACKWARD

When this event occurs, Screen Formatting scrolls backward the table indicated by the cursor position. The last variable the application user will see in the table on the form is the one that the cursor was on when the event occurred. The user cannot specify more than one of these events. The event is not returned to the application program.

FDC$DISPLAY_HELP

When this event occurs, the help information is displayed for either the form, or for the variable on which the cursor is positioned.

FDC$ERASE_HELP

When this event occurs, the help information currently displayed on the screen is erased.

FDC$EXECUTE_COMMAND

Currently unused.

FDC$IGNORE_EVENT

When this event occurs, Screen Formatting ignores this event. The event is not returned to the application program.

FDC$TAB_TO_NEXT_FORM_FIELD

When this event occurs, Screen Formatting moves the cursor to the next input variable on the form. If the cursor is on the last variable on the form, then the cursor moves to the first input variable on the form. The variables on the form are ordered left to right, top to bottom. Note that this is different than tabbing to the next unprotected field on some terminals. This tabbing feature works on a form rather than on the whole screen. This feature is useful for terminals that do not support tabbing to the next unprotected field. The event is not returned to the application program.

FDC$TAB_TO_PREVIOUS_FORM_FIELD

When this event occurs, Screen Formatting moves the cursor to the previous variable on the form. If the cursor is on the first variable on the form, the cursor moves to the last input variable on the form. The input variables are ordered left to right, top to bottom on the form. Note that this is different from tabbing to the previous unprotected field provided in some terminals. This type of tabbing works on the form rather than the screen. This feature is useful on terminals that do not support tabbing to the previous unprotected field. The event is not returned to the application program.

FDC$SCROLL_VARIABLE_FORWARD

When this event occurs, Screen Formatting scrolls the variable specified by the cursor position forward. The first character the application user sees in the variable field on the form is the character the cursor is on when the event occurred providing that enough program variable characters exist to fill the visible size of the variable. The variable cannot be scrolled beyond the number of program variable characters. You cannot specify more than one of these events. The event is not returned to the application program.

FDC$SCROLL_VARIABLE_BACKWARD

When this event occurs, Screen Formatting scrolls the variable specified by the cursor position. The last character the user sees in the variable field on the form is the character the cursor is on when the event occurred. You cannot specify more than one of these events. The event is not returned to the application program.

add_form_comment

Currently unused.

add_display_definition

Specifies the set of terminal attributes for a program attribute that a program uses to change the display characteristics of an object on the form. This record contains two fields: display_attribute and display_name.

display_attribute

A set of display attributes (type FDT$DISPLAY_ATTRIBUTE_SET). Possible values are:

FDC$INVERSE_VIDEO
FDC$LOW_INTENSITY
FDC$HIGH_INTENSITY
FDC$BLINK
FDC$UNDERLINE
FDC$PROTECT
FDC$HIDDEN
FDC$BLACK_FOREGROUND
FDC$BLUE_FOREGROUND
FDC$GREEN_FOREGROUND
FDC$MAGENTA_FOREGROUND
FDC$RED_FOREGROUND
FDC$CYAN_FOREGROUND
FDC$YELLOW_FOREGROUND
FDC$WHITE_FOREGROUND
FDC$BLACK_BACKGROUND
FDC$BLUE_BACKGROUND
FDC$GREEN_BACKGROUND
FDC$MAGENTA_BACKGROUND
FDC$RED_BACKGROUND
FDC$CYAN_BACKGROUND
FDC$YELLOW_BACKGROUND
FDC$WHITE_BACKGROUND
FDC$FINE_LINE
FDC$MEDIUM_LINE
FDC$BOLD_LINE
FDC$ITALIC_DISPLAY_ATTRIBUTE
FDC$TITLE_DISPLAY_ATTRIBUTE
FDC$INPUT_DISPLAY_ATTRIBUTE
FDC$ERROR_DISPLAY_ATTRIBUTE
FDC$MESSAGE_DISPLAY_ATTRIBUTE

display_name

The application program name that sets the attribute for an object (type OST$NAME).

delete_all_displays

Deletes all currently defined displays.

delete_all_events

Deletes all events.

delete_event,

delete_display_definition

Deletes the specified event from a list of events, or deletes the specified display definition (type OST$NAME).

delete_form_comments

Currently unused.

design_display_attribute

Specifies the set of display attributes to be used with an object on the design form when the object has no attributes assigned. This allows the form designer to recognize the object (type FDT$DISPLAY_ATTRIBUTE_SET). The default is FDC$UNDERLINE. For the list of display attributes, refer to add_display_definition.

design_variable_name

Specifies the variable name used to access text on a design form (type OST$NAME).

event_form

Specifies the event form definition as a variant record (type FDT$EVENT_FORM_DEFINITION). The form being defined can have an associated event form that shows what terminal events cause program events. This event form can contain program event labels and terminal event labels.

A maximum of 16 terminal function keys can be shown on the event form. Two program event labels can appear for each terminal function key. The upper label is a shifted function key (MARK, for instance, is shifted F1 in the following example).

Here is an example of an event form:

```
    MARK        MOVE                  REDO
F1 UNMARK   F2 COPY      ...      F8 UNDO
```

F1, F2, ... F8 are terminal function key labels that come from the terminal definition. MARK, UNMARK, MOVE, COPY, ... REDO, UNDO are event labels that come from the form definition.

The KEY field (type FDT$EVENT_FORM_KEY) contains one of the following:

FDC$NO_EVENT_FORM

No event form is generated.

FDC$SYSTEM_DEFAULT_EVENT_FORM

Screen Formatting generates an event form showing application functions.

FDC$USER_EVENT_FORM

Screen Formatting uses the specified event form (type OST$NAME).

form_area

Contains a variant record specifying which area of the terminal screen is occupied by the specified form (type FDT$FORM_AREA). Its KEY field (type FDT$FORM_AREA_KEY) contains one of the following (by default, the entire terminal screen is occupied):

FDC$DEFINED_AREA

Indicates the location and size of the form. It contains four fields:

x_position

The first x is numbered 1. The x position on the screen is relative to the top left corner of the terminal screen. x increases by 1 left to right for each character. Allowable values are from 1 to 256.

y_position

The first y position is numbered 1. The y position on the screen is relative to the top left corner of the terminal screen. y increases by 1 for each line of the screen from top to bottom. Allowable values are from 1 to 256.

width

The form width represented in characters. It must be a number greater than or equal to one.

height

The form height represented in characters. It must be a number greater than or equal to one.

FDC$SCREEN_AREA

Uses the entire screen. The size of the screen (the number of columns and rows displayed) is determined by the number of lines the form contains and its widest line.

form_display_attribute

Specifies a set of display attributes for the form (type FDT$DISPLAY_ATTRIBUTE_SET). If you don't specify any attributes for an object on the form, the background and foreground attributes associated with this record are used. The default attributes are FDC$BLACK_BACKGROUND and FDC$WHITE_BACKGROUND.

FDC$INVERSE_VIDEO
FDC$BLACK_BACKGROUND
FDC$BLUE_BACKGROUND
FDC$GREEN_BACKGROUND
FDC$MAGENTA_BACKGROUND
FDC$RED_BACKGROUND
FDC$CYAN_BACKGROUND
FDC$YELLOW_BACKGROUND
FDC$WHITE_BACKGROUND
FDC$BLACK_FOREGROUND
FDC$BLUE_FOREGROUND
FDC$GREEN_FOREGROUND
FDC$MAGENTA_FOREGROUND
FDC$RED_FOREGROUND
FDC$CYAN_FOREGROUND
FDC$YELLOW_FOREGROUND
FDC$WHITE_FOREGROUND
FDC$FINE_BORDER
FDC$MEDIUM_BORDER
FDC$BOLD_BORDER

form_help

Contains a variant record (type FDT$HELP_DEFINITION) specifying the help information available with the form. This information is provided when the user executes a help event on a form area that contains no object. Its KEY field (type FDT$HELP_KEY) contains one of the following:

FDC$HELP_FORM

The name of an application-defined form containing the help (type OST$NAME).

FDC$HELP_MESSAGE

A pointer to a help message (type ^FDT$HELP_MESSAGE)

FDC$NO_HELP_RESPONSE

Specifies that Screen Formatting does nothing when the user executes the help event.

form_language

Currently unused.

form_name

Contains the name of the form (type OST$NAME). You must specify this attribute if you want to save the form on an object library.

form_processor

Specifies the computer language of the program that uses the form (type FDT$FORM_PROCESSOR). You should specify the language before any variable, table, object, or event is created. The default processor is FDC$CYBIL_PROCESSOR. The values are the following:

FDC$ANSI_FORTRAN_PROCESSOR
FDC$CDC_FORTRAN_PROCESSOR
FDC$COBOL_PROCESSOR
FDC$CYBIL_PROCESSOR
FDC$SCL_PROCESSOR

message_form

Specifies the name of the form that you have designed for error messages (type OST$NAME). This form must be in an object library in the user's command list.

unused_form_entry

Indicates a null filler in the FDT$FORM_ATTRIBUTES array.

Getting General Attributes

The following attribute records return certain other attributes of a form, such as its name or processor. These records are specified in an initialized array. Each record is of type FDT$GET_FORM_ATTRIBUTE, which is listed in Appendix E.

Once established, this array is named on the GET_FORM_ATTRIBUTES parameter in the call to the FDP$GET_FORM_ATTRIBUTES procedure, described later in this chapter.

All fields contained in each record are output, unless otherwise stated. The KEY field in the FDT$GET_FORM_ATTRIBUTE record is an input field.

The following are the attribute records, their descriptions, and the permitted values for each. The attribute record names are in italics.

get_event_form

Returns the event form definition. This record specifies a variant record (type FDT$EVENT_FORM_DEFINITION). Its KEY field (type FDT$EVENT_FORM_KEY) contains one of the following definitions:

FDC$NO_EVENT_FORM

An event form is not generated with the application functions.

FDC$SYSTEM_DEFAULT_EVENT_FORM

An event form is generated with the application functions.

FDC$USER_EVENT_FORM

The event form indicated by this record (type OST$NAME) is used.

get_event_form_identifier

Returns the form identifier of the event form (type FDT$FORM_IDENTIFIER). This identifier can be used in requests to change the value or display attributes of an event label.

get_form_area

Returns the area occupied by the form (type FDT$FORM_AREA). This record specifies a variant record (type FDT$FORM_AREA). Its KEY field (type FDT$FORM_AREA_KEY) contains one of the following:

FDC$DEFINED_AREA

Specifies the location and size of the rectangle which the form occupies. This record returns the following fields:

x_position

The x position is determined relative to the top left corner of the screen. The first x position (type FDC$X_POSITION) is one.

y_position

The y position is determined relative to the top left corner of the screen. The first y position (type FDC$Y_POSITION) is one.

width

The form width (type FDT$WIDTH) is represented as a number greater than or equal to one.

height

The form height (type FDT$HEIGHT) is represented as a number greater than or equal to one.

FDC$SCREEN_AREA

The entire terminal screen is used.

get_form_display_attribute

Returns the set of display attributes used by the form (type FDT$_DISPLAY_ATTRIBUTE_SET). It can be one or more of:

FDC$INVERSE_VIDEO
FDC$BLACK_BACKGROUND
FDC$BLUE_BACKGROUND
FDC$GREEN_BACKGROUND
FDC$MAGENTA_BACKGROUND
FDC$RED_BACKGROUND
FDC$CYAN_BACKGROUND
FDC$YELLOW_BACKGROUND
FDC$WHITE_BACKGROUND
FDC$BLACK_FOREGROUND
FDC$BLUE_FOREGROUND
FDC$GREEN_FOREGROUND
FDC$MAGENTA_FOREGROUND
FDC$RED_FOREGROUND
FDC$CYAN_FOREGROUND
FDC$YELLOW_FOREGROUND
FDC$WHITE_FOREGROUND
FDC$FINE_BORDER
FDC$MEDIUM_BORDER
FDC$BOLD_BORDER

get_form_help

Contains a variant record which returns the help processing available for the form (type FDT$GET_HELP_DEFINITION). Its KEY field (type FDT$GET_HELP_KEY) contains one of:

FDC$GET_HELP_FORM

Returns the name of an application-defined help form (type OST$NAME).

FDC$GET_HELP_MESSAGE

Returns the length of the help message in characters (type FDT$HELP_MESSAGE_LENGTH). Use get_form_help_message to return the help message.

FDC$GET_NO_HELP_RESPONSE

Specifies that Screen Formatting does nothing when the user executes the help event.

get_form_help_message

Contains a pointer (type ^FDT$HELP_MESSAGE) for Screen Formatting to return the help message displayed when the user executes the help event on an area of the form that does not contain an object.

get_form_name

Returns the form name that is used in the object library (type OST$NAME). The default is OSC$NULL_NAME.

get_form_processor

Returns the computer language of the program that uses the form (type FDT$FORM_PROCESSOR).

FDC$COBOL_PROCESSOR
FDC$CYBIL_PROCESSOR
FDC$ANSI_FORTRAN_PROCESSOR
FDC$CDC_FORTRAN_PROCESSOR

get_next_event

Returns the next event in the list of events for a form. The first occurrence of this record returns the first event, the second returns the second, and so forth. The following events may be returned:

event_action

Refer to the description of the event_action record under the add_event attribute earlier in this chapter (type FDT$EVENT_ACTION).

event_name

Returns the event name (type OST$NAME).

event_command_length

Currently unused.

event_trigger

Refer to the description of the event_trigger record under the add_event attribute earlier in this chapter (type FDT$EVENT_TRIGGER).

get_next_display

Returns the next display definition, which allows a program to change the attributes of a form object. The first occurrence of this record returns the first display attribute, the second returns the second, and so forth. This record contains two fields:

display_attribute

Returns the following display attributes (type FDT$DISPLAY_ATTRIBUTE_SET).

FDC$INVERSE_VIDEO
FDC$LOW_INTENSITY
FDC$HIGH_INTENSITY
FDC$BLINK
FDC$HIDDEN
FDC$BLACK_BACKGROUND
FDC$BLUE_BACKGROUND
FDC$GREEN_BACKGROUND
FDC$MAGENTA_BACKGROUND
FDC$RED_BACKGROUND
FDC$CYAN_BACKGROUND
FDC$YELLOW_BACKGROUND
FDC$WHITE_BACKGROUND
FDC$BLACK_FOREGROUND
FDC$BLUE_FOREGROUND
FDC$GREEN_FOREGROUND
FDC$MAGENTA_FOREGROUND
FDC$RED_FOREGROUND
FDC$CYAN_FOREGROUND
FDC$YELLOW_FOREGROUND
FDC$WHITE_FOREGROUND
FDC$FINE_LINE
FDC$MEDIUM_LINE
FDC$BOLD_LINE
FDC$ITALIC_DISPLAY_ATTRIBUTE
FDC$TITLE_DISPLAY_ATTRIBUTE
FDC$INPUT_DISPLAY_ATTRIBUTE
FDC$ERROR_DISPLAY_ATTRIBUTE
FDC$MESSAGE_DISPLAY_ATTRIBUTE

display_name

Returns the display attribute name (type OST$NAME).

get_number_events

Returns the number of records needed to get the events for the form (type FDT$NUMBER_EVENTS).

get_number_displays

Returns the number of display attributes specified for a form (type FDT$NUMBER_OBJECT_DISPLAYS). For the set of display attributes, refer to the get_next_display record earlier in this section.

get_number_objects

Returns the number of objects on the form (type FDT$NUMBER_OBJECTS).

get_number_tables

Returns the number of tables on the form (type FDT$NUMBER_TABLES).

get_number_variables

Returns the number of form variable definitions created for a particular form (type FDT$NUMBER_VARIABLES). Occurrences created by a table definition are not included.

get_unused_form_entry

Indicates a null filler in the FDT$GET_FORM_ATTRIBUTES array.

Variable Attributes

The attributes in this section define form variables.[3] They are divided into two groups, those for creating and changing variables and those for returning the values of other variable attributes.

Creating and Changing Variables

Each attribute for creating or changing variables is specified as a value in a record in an initialized array. Each record is of type FDT$VARIABLE_ATTRIBUTE, which is listed in Appendix E.

Once established, this array is named on the VARIABLE_ATTRIBUTES parameter in the call to the FDP$CHANGE_VARIABLE or FDP$CREATE_VARIABLE procedure, described later in this chapter.

The following are the attribute records, their descriptions, and the permitted values for each. The attribute record names are in italics.

add_valid_integer_range,

delete_valid_integer_range

Adds or deletes a range of integer values that are valid for the variable. The range must not overlap any existing integer ranges. To specify more than one range, you may use this record more than once. The range specified for delete_valid_integer_range must correspond to the range that was specified by add_valid_integer_range. This record has two fields:

maximum_integer

The maximum integer value for the variable (type integer).

minimum_integer

The minimum integer value for the variable (type integer).

3. For more information on variables, refer to What a Form Can Contain, earlier in this chapter.

add_valid_real_range,

delete_valid_real_range

Adds or deletes a range of real values that are valid for the variable. The range must not overlap any existing real ranges. To specify more than one range, you may use this record more than once. The range specified for delete_valid_real_range must correspond to the range that was specified by add_valid_real_range. This record has two fields:

maximum_real

The maximum real value for the variable (type real).

minimum_real

The minimum real value for the variable (type real).

add_valid_string,

delete_valid_string

Adds or deletes a string that is valid for the variable. To specify more than one string, you may use this record more than once. This record specifies a pointer (type ^FDT$VALID_STRING) to a string of characters which the user may enter at the terminal. Comparison takes place according to the rules laid down by the string_compare_rules attribute, described later in this section.

input_format

Specifies the data-entry format for the terminal. This is a variant record (type FDT$INPUT_FORMAT). Its KEY field (type FDT$INPUT_FORMAT_KEY) contains one of the following:

FDC$CHARACTER_INPUT_FORMAT

Allows any ASCII characters. This is the default value.

FDC$ALPHABETIC_INPUT_FORMAT

Allows alphabetic characters only (upper and lower case A through Z).

FDC$DIGITS_INPUT_FORMAT

Allows numeric characters only (0 through 9).

FDC$REAL_INPUT_FORMAT

Allows real numbers in the format of FORTRAN F, E, or G.

FDC$SIGNED_INPUT_FORMAT

Allows numeric characters with or without leading signs.

io_mode

Specifies the input and output transferring of variables (type FDT$IO_MODE). The following values are available:

FDC$PROGRAM_INPUT_OUTPUT

Programs save data from one application user interaction to another. The user does not see the entered variable.

FDC$TERMINAL_INPUT

The user inputs data, which is blanked out as soon as possible.

FDC$TERMINAL_INPUT_OUTPUT

The user inputs data, which remains visible. The program outputs data to this variable. This is the default value.

FDC$TERMINAL_OUTPUT

The program outputs data to the terminal (the user cannot enter data). Any modification of the variable is corrected as soon as possible.

new_variable_name

Specifies another name for a variable (type OST$NAME). The form processor language rules must be obeyed.

error_display

Specifies the attribute used for displaying an error when a variable does not pass validation. This record (type FDT$DISPLAY_ATTRIBUTE_SET) may contain one or more of the following values. The default value is FDC$INVERSE_VIDEO.

FDC$INVERSE_VIDEO
FDC$LOW_INTENSITY
FDC$HIGH_INTENSITY
FDC$BLINK
FDC$UNDERLINE
FDC$BLACK_FOREGROUND
FDC$BLUE_FOREGROUND
FDC$GREEN_FOREGROUND
FDC$MAGENTA_FOREGROUND
FDC$RED_FOREGROUND
FDC$CYAN_FOREGROUND
FDC$YELLOW_FOREGROUND
FDC$WHITE_FOREGROUND
FDC$BLACK_BACKGROUND
FDC$BLUE_BACKGROUND
FDC$GREEN_BACKGROUND
FDC$MAGENTA_BACKGROUND
FDC$RED_BACKGROUND
FDC$CYAN_BACKGROUND
FDC$YELLOW_BACKGROUND
FDC$WHITE_BACKGROUND
FDC$ITALIC_DISPLAY_ATTRIBUTE
FDC$TITLE_DISPLAY_ATTRIBUTE
FDC$INPUT_DISPLAY_ATTRIBUTE
FDC$ERROR_DISPLAY_ATTRIBUTE
FDC$MESSAGE_DISPLAY_ATTRIBUTE

output_format

Contains a variant record (type FDT$OUTPUT_FORMAT) specifying the output format and the length of the formatted output for a variable text object.

Its KEY field (type FDT$OUTPUT_FORMAT_KEY) contains one of the following output formats:

FDC$CHARACTER_OUTPUT_FORMAT

The ASCII characters are output as is. This record specifies the character field width, which corresponds to the FORTRAN A descriptor.

FDC$E_E_OUTPUT_FORMAT, FDC$G_E_OUTPUT_FORMAT

These are the FORTRAN Ew.dEe and Gw.dEe formats (type FDT$EXPONENT_OUTPUT_FORMAT). This record contains the following fields:

field_width

The FORTRAN w descriptor (type FDT$REAL_FIELD_WIDTH).

digits_in_exponent

The FORTRAN e descriptor (type FDT$DIGITS_IN_EXPONENT).

digits_right_decimal

The FORTRAN d descriptor (type FDT$DIGITS_RIGHT_DECIMAL).

sign_treatment

A value of MLC$MINUS_IF_NEGATIVE or MLC$ALWAYS_SIGNED (type FDT$SIGN_TREATMENT).

suppress_zero

A boolean value. If TRUE, a zero is displayed as spaces.

FDCF_OUTPUT_FORMAT, FDCE_OUTPUT_FORMAT, FDC$G_OUTPUT_FORMAT

This record specifies the FORTRAN Fw.d, Ew.d, and Gw.d formats (type FDT$FLOAT_OUTPUT_FORMAT). It contains the following fields:

digits_right_of_decimal

The FORTRAN d descriptor (type FDT$DIGITS_RIGHT_DECIMAL).

field_width

The FORTRAN w descriptor (type FDT$REAL_FIELD_WIDTH).

sign_treatment

A value of MLC$MINUS_IF_NEGATIVE or MLC$ALWAYS_SIGNED (type FDT$SIGN_TREATMENT).

suppress_zero

A boolean. If TRUE, a zero is displayed as spaces.

INTEGER_OUTPUT_FORMAT

This record (type FDT$INTEGER_OUTPUT_FORMAT) corresponds to the FORTRAN I format. It contains the following fields:

field_width

The FORTRAN w descriptor (type FDT$INTEGER_FIELD_WIDTH).

minimum_output_digits

The FORTRAN m descriptor (type FDT$MINIMUM_OUTPUT_DIGITS).

sign_treatment

A value of MLC$MINUS_IF_NEGATIVE or MLC$ALWAYS_SIGNED (type FDT$SIGN_TREATMENT).

program_data_type

Specifies the program data type for the variable (type FDT$PROGRAM_DATA_TYPE) using one of the following values:

FDC$PROGRAM_CHARACTER_TYPE

The characters entered by the user are passed to the program.

FDC$PROGRAM_INTEGER_TYPE

The characters entered by the user are converted to an integer.

FDC$PROGRAM_REAL_TYPE

The characters entered by the user are converted to a real type.

FDC$PROGRAM_UPPER_CASE_TYPE

The characters entered by the user are converted to uppercase before being transferred to the program. The characters transferred by the program to the form are also converted to uppercase.

string_compare_rules

Specifies how the terminal input is compared to valid strings specified for the variable. For information on establishing valid strings for a variable, refer to the add_valid_string attribute earlier in this section. Contains two fields:

compare_in_upper_case

A boolean. If TRUE, the user's input is converted to upper case before the comparison is made with the valid strings. Otherwise, the user's input is not changed before the comparison is made.

compare_to_unique_substring

A boolean. If TRUE, the user may enter a unique substring for the value. The comparison starts at column 1. The complete strings are defined by the add_valid_string record. The application program gets the entire string as specified by add_valid_string.

unused_variable_entry

Indicates a null filler in the FDT$VARIABLE_ATTRIBUTES array.

variable_error

Contains a variant record (type FDT$ERROR_DEFINITION) specifying the error processing for the variable. Its KEY field (type FDT$ERROR_KEY) contains one of the following:

FDC$ERROR_FORM

The name of an application-defined form to be displayed (type OST$NAME).

FDC$ERROR_MESSAGE

A pointer to the message to be displayed (type ^FDT$ERROR_MESSAGE).

FDC$NO_ERROR_RESPONSE

Screen Formatting does not display an error form or message when the user enters invalid data.

variable_help

Contains a variant record (type FDT$HELP_DEFINITION) specifying the help information provided when the user executes a help event with the cursor placed on the variable. Its KEY field (type FDT$HELP_KEY) contains one of the following:

FDC$HELP_FORM

The name of an application-defined form containing the help (type OST$NAME).

FDC$HELP_MESSAGE

A pointer to a help message (type ^FDT$HELP_MESSAGE).

FDC$NO_HELP_RESPONSE

Screen Formatting does nothing when the user executes the help event.

variable_length

Contains an input field that specifies the character length of the data area for a character variable (type FDT$VARIABLE_LENGTH). If the length is not specified, the size of the screen text object for the variable is used. The user can execute scrolling commands to see all the data in the program variable. This attribute does not apply to real and integer data types.

Getting Variable Attributes

The following attribute records return additional attributes of a form. These records are specified in an initialized array. Each record is of type FDT$GET_VARIABLE_ATTRIBUTE, which is listed in Appendix E.

Once established, this array is named on the GET_VARIABLE_ATTRIBUTES parameter in the call to the FDP$GET_VARIABLE_ATTRIBUTES procedure, described later in this chapter. All fields contained in each record are output, unless otherwise stated. The KEY field in the FDT$GET_VARIABLE_ATTRIBUTE record is an input field.

The following are the attribute records, their descriptions, and the permitted values for each. The attribute record names are in italics.

get_error_display

Returns the display attribute(s) used when the variable does not pass validation (type FDT$DISPLAY_ATTRIBUTE_SET). May be one or more of the following:

FDC$INVERSE_VIDEO
FDC$LOW_INTENSITY
FDC$HIGH_INTENSITY
FDC$BLINK
FDC$UNDERLINIE
FDC$BLACK_BACKGROUND
FDC$BLUE_BACKGROUND
FDC$GREEN_BACKGROUND
FDC$MAGENTA_BACKGROUND
FDC$RED_BACKGROUND
FDC$CYAN_BACKGROUND
FDC$YELLOW_BACKGROUND
FDC$WHITE_BACKGROUND
FDC$BLACK_FOREGROUND
FDC$BLUE_FOREGROUND
FDC$GREEN_FOREGROUND
FDC$MAGENTA_FOREGROUND
FDC$RED_FOREGROUND
FDC$CYAN_FOREGROUND
FDC$YELLOW_FOREGROUND
FDC$WHITE_FOREGROUND
FDC$ITALIC_DISPLAY_ATTRIBUTE
FDC$TITLE_DISPLAY_ATTRIBUTE
FDC$INPUT_DISPLAY_ATTRIBUTE

FDC$ERROR_DISPLAY_ATTRIBUTE
FDC$MESSAGE_DISPLAY_ATTRIBUTE

get_input_format

Contains a variable record (type FDT$INPUT_FORMAT) that returns the type of data the user can enter. Its KEY field (type FDT$INPUT_FORMAT_KEY) contains one of the following:

FDC$CHARACTER_INPUT_FORMAT

Allows any ASCII characters. This is the default value.

FDC$ALPHABETIC_INPUT_FORMAT

Allows alphabetic characters only (upper and lower case A through Z).

FDC$DIGITS_INPUT_FORMAT

Allows numeric characters only (0 through 9).

FDC$REAL_INPUT_FORMAT

Allows real numbers in the format of FORTRAN F, E, or G.

FDC$SIGNED_INPUT_FORMAT

Allows numeric characters with or without a leading plus or minus sign.

get_io_mode

Returns the input and output transfers done for the variable (type FDT$IO_MODE). The following values can be returned:

FDC$PROGRAM_INPUT_OUTPUT

The program uses the variable to save data from one application user interaction to another. The user does not see the entered variable.

FDC$TERMINAL_INPUT

The user inputs data, which is blanked out as soon as possible.

FDC$TERMINAL_INPUT_OUTPUT

The user inputs data, which remains visible. The program outputs data to this variable.

FDC$TERMINAL_OUTPUT

The program outputs data to the terminal (the user cannot enter data). Any modification of the variable is corrected as soon as possible.

get_next_valid_real_range

Returns the next range of real values that are valid for the variable. To return more than one range, you can use this record more than once. The first record returns the first range, the second record returns the second range, and so on.

This record contains two fields:

minimum_real

The minimum real valid value for the variable (type real).

maximum_real

The maximum real valid value for the variable (type real).

get_next_valid_string

Returns to the pointer the next string of characters valid for the variable (type ^FDT$VALID_STRING). These are the characters the user can enter. To return more than one string, you can use this record more than once. The first record returns the first string, the second record returns the second string, and so on.

get_number_valid_integers

Returns the number of valid integer ranges (type FDT$NUMBER_VALID_INTEGERS). You then allocate an array of attributes to get the valid integer ranges and use the get_valid_integer_range attribute to return them.

get_number_valid_reals

Returns the number of valid real ranges (type FDT$NUMBER_VALID_REALS). You then allocate an array of attributes to get the valid real ranges and use the get_next_valid_real_range attribute to return them.

get_number_valid_strings

Returns the number of valid strings (type FDT$NUMBER_VALID_STRINGS). You then allocate an array of attributes to get the lengths of the valid strings and use the get_next_valid_string attribute to return them.

get_output_format

Returns the output format (type FDT$OUTPUT_FORMAT). For a description of this record, refer to the output_format attribute earlier in this chapter under Creating and Changing Variables.

get_program_data_type

Returns the data type the program uses for manipulation (type FDT$PROGRAM_DATA_TYPE). For a description of this record, refer to the description of the program_data_type attribute earlier in this chapter under Creating and Changing Variables.

get_string_compare_rules

Returns the values that specify how the terminal input is compared to valid strings specified for the variable. Contains the fields compare_in_upper_case and compare_to_unique_substring. Refer to the string_compare_rules attribute earlier in this secton for a description of these fields.

get_unused_variable_entry

Indicates a null filler in the FDT$GET_VARIABLE_ATTRIBUTES array.

get_valid_integer_range

Returns the next range of integer values that are valid for the variable. To return more than one range, you may use this record more than once. The first record returns the first range, the second record returns the second range, and so forth.

This record contains two fields:

minimum_integer

The minimum integer value valid for the variable (type integer).

maximum_integer

The maximum integer value valid for the variable (type integer).

get_valid_string_length

Returns the length of a string for valid string validation (type FDT$VALID_STRING_LENGTH). To return more than one string length, you can use this record more than once. The first record returns the first valid string length, the second record returns the second length, and so forth.

get_var_error_message

Contains an input field that returns the message displayed in the message form when the data entered by the user does not pass validation (type ^FDT$ERROR_MESSAGE). The error message is returned to the string specified by this pointer.

get_var_help_message

Contains an input field that returns the message displayed in the message form when the user executes the help event on this variable (type ^FDT$HELP_MESSAGE). The help message is returned to the string specified by this pointer.

get_variable_error

Contains a variant record that returns information about error processing for the variable (type FDT$GET_ERROR_DEFINITION). Its KEY field (type FDT$GET_ERROR_KEY) contains one of the following:

FDC$GET_ERROR_FORM

The name of the error form (type OST$NAME).

FDC$GET_ERROR_MESSAGE

The length of the error message in characters (type FDT$ERROR_MESSAGE_LENGTH). You then allocate a string of this length and use the FDP$GET_VARIABLE_ATTRIBUTES procedure with the get_var_error_message record to obtain the message.

FDC$GET_NO_ERROR_RESPONSE

Screen Formatting does not display an error form or message when the user enters invalid data.

get_variable_help

Contains a variant record that returns information about help processing for the variable (type FDT$GET_HELP_DEFINITION). This processing applies when the user executes the help event with the cursor placed on the variable. Its KEY field (type FDT$GET_HELP_KEY) contains one of the following:

FDC$GET_HELP_FORM

The name of the help form (type OST$NAME).

FDC$GET_HELP_MESSAGE

The length of the help message in characters (type FDT$HELP_MESSAGE_LENGTH). You then allocate a string of this length and use the FDP$GET_VARIABLE_ATTRIBUTES procedure with the get_var_help_message attribute to obtain the message.

FDC$GET_NO_HELP_RESPONSE

Screen Formatting does not display a help form or message.

get_variable_length

Returns the character length of the program data area for the variable (type FDT$VARIABLE_LENGTH).

Table Attributes

The attributes in this section describe the tables containing variables. These attributes are divided into two groups, those for creating and changing tables and those for returning the values of other table attributes.

Creating and Changing Tables

Each attribute for creating or changing tables is specified as a value in a record in an initialized array. Each record is of type FDT$TABLE_ATTRIBUTE, which is listed in Appendix E.

Once established, this array is named on the TABLE_ATTRIBUTES parameter in the call to the FDP$CHANGE_TABLE or FDP$CREATE_TABLE procedure, described later in this chapter.

The following are the attribute records, their descriptions, and the permitted values for each. The attribute record names are in italics. All fields are input fields unless otherwise noted.

add_table_variable,

delete_table_variable

Associates a variable with a table or deletes one from a table (type OST$NAME).

For add_table_variable, the following rules apply:

- The variable name can already have been created when this attribute is specified.
- The variable name must exist when the form definition ends, but must not currently exist in the list of variable names associated with the table.
- The name must obey the rules for names given by the form processor.
- A variable cannot be associated with more than one table.

For delete_table_variable, any variable definition created by the FDP$DEFINE_VARIABLE procedure is not deleted.

new_table_name

Specifies a new name for the table (type OST$NAME). The name must follow the rules for names given by the form processor language. The new name must be unique.

stored_occurrence

Specifies the maximum number of stored occurrences allowed in the table (type FDT$OCCURRENCE). The value must be greater than or equal to the value for the visible_occurrence attribute, described below. The default value is 1. (You can create stored objects using FDP$CREATE_STORED_OBJECT.)

unused_table_entry

Indicates a null filler in the FDT$TABLE_ATTRIBUTES array.

visible_occurrence

Specifies the number of occurrences in the table that are visible to the user (type FDT$OCCURRENCE). You must create a visible object that is variable text for each occurrence on the form (FDP$CREATE_OBJECT).

This attribute is optional. The default is the current value of the stored_occurrence attribute (described above).

Getting Table Attributes

The following records return the values of other table attributes. These records are specified in an initialized array. Each record is of type FDT$GET_TABLE_ATTRIBUTE, which is listed in Appendix E.

Once established, this array is named on the GET_TABLE_ATTRIBUTES parameter in the call to the FDP$GET_TABLE_ATTRIBUTES procedure, described later in this chapter.

All fields contained in each record are output fields. The KEY field in the FDT$GET_TABLE_ATTRIBUTE record is an input field.

The following are the attribute records, their descriptions, and the permitted values for each. The attribute record names are in italics.

get_next_table_variable

Returns the next variable associated with the table (type OST$NAME). To return more than one variable, you can use this record more than once. The first record in the array returns the first variable, the second returns the second variable, etc.

get_number_table_variables

Returns the number of variables in the table (type FDT$NUMBER_TABLE_VARIABLES). You can use this record to allocate an array and then use the get_next_table_variable attribute to return the variables.

get_stored_occurrence

Returns the number of stored occurrences in the table (type FDT$OCCURRENCE).

get_unused_table_entry

Indicates a null filler in the FDT$GET_TABLE_ATTRIBUTES array.

get_visible_occurrence

Returns the number of occurrences in the table that are visible to the user (type FDT$OCCURRENCE).

Form Definition Record Attributes

The attributes in this section are in two groups, those for creating and changing form definition records and those for getting other form definition record attributes.

Changing Records

Each attribute for creating or changing form definition records is specified as a value in a record in an initialized array. Each record is of type FDT$RECORD_ATTRIBUTE, which is listed in Appendix E.

Once established, this array is named on the RECORD_ATTRIBUTES parameter in the call to the FDP$CHANGE_FORM_RECORD procedure, described later in this chapter.

The following are the attribute records, their descriptions, and the permitted values for each. The attribute record names are in italics. All fields are input fields, unless otherwise specified.

record_deck_name

Specifies the Source Code Utility deck name for the form definition record (type OST$NAME). If you don't specify this name, the form name is used.

record_name

This is the name of the 01-level item for COBOL or the type for CYBIL. Specifies the name of the record (type OST$NAME). If you don't specify this name, the deck name is used.

unused_table_entry

Indicates a null filler in the FDT$RECORD_ATTRIBUTES array.

Getting Record Attributes

The following records return the values of other record attributes. These records are specified in an initialized array. Each record is of type FDT$GET_RECORD_ATTRIBUTE, which is listed in Appendix E.

Once established, this array is named on the GET_RECORD_ATTRIBUTES parameter in the call to the FDP$GET_RECORD_ATTRIBUTES procedure, described later in this chapter. All fields contained in each record are output fields. The KEY field in the FDT$GET_RECORD_ATTRIBUTE record is an input field.

The following are the attribute records, their descriptions, and the permitted values for each. The attribute record names are in italics.

get_record_deck_name

Returns the name of the deck for the SOURCE_CODE_UTILITY (type OST$NAME).

get_record_length

Returns the length of the record in cells (type FDT$RECORD_LENGTH).

get_record_name

Returns the record name (type OST$NAME).

get_unused_record_entry

Indicates a null filler in the FDT$GET_RECORD_ATTRIBUTES array.

Object Attributes

This section describes the attributes for form objects.[4] Objects can be either text or graphics. They are divided into two groups, those for creating and changing objects and those for returning the values of other object attributes.

Creating and Changing Objects

Each attribute for creating or changing an object is specified as a value in a record in an initialized array. Each record is of type FDT$OBJECT_ATTRIBUTE, which is listed in Appendix E.

Once established, this array is named on the OBJECT_ATTRIBUTES parameter in the call to the FDP$CHANGE_OBJECT or FDP$CREATE_OBJECT procedure, described later in this chapter.

4. For more information on objects, refer to chapter 1.

The following are the attribute records, their descriptions, and the permitted values for each. The attribute record names are in italics. All fields are input fields, unless otherwise specified.

object_display

Specifies a set of display attributes for the object (type FDT$DISPLAY_ATTRIBUTE_SET). When the object is displayed, this attribute is used. This set may contain one or more of the following:

FDC$INVERSE_VIDEO
FDC$LOW_INTENSITY
FDC$HIGH_INTENSITY
FDC$BLINK
FDC$UNDERLINE
FDC$PROTECT
FDC$HIDDEN
FDC$BLACK_FOREGROUND
FDC$BLUE_FOREGROUND
FDC$GREEN_FOREGROUND
FDC$MAGENTA_FOREGROUND
FDC$RED_FOREGROUND
FDC$CYAN_FOREGROUND
FDC$YELLOW_FOREGROUND
FDC$WHITE_FOREGROUND
FDC$BLACK_BACKGROUND
FDC$BLUE_BACKGROUND
FDC$GREEN_BACKGROUND
FDC$MAGENTA_BACKGROUND
FDC$RED_BACKGROUND
FDC$CYAN_BACKGROUND
FDC$YELLOW_BACKGROUND
FDC$WHITE_BACKGROUND
FDC$FINE_LINE
FDC$MEDIUM_LINE
FDC$BOLD_LINE
FDC$ITALIC_DISPLAY_ATTRIBUTE
FDC$TITLE_DISPLAY_ATTRIBUTE
FDC$INPUT_DISPLAY_ATTRIBUTE
FDC$ERROR_DISPLAY_ATTRIBUTE
FDC$MESSAGE_DISPLAY_ATTRIBUTE

object_height

Specifies the height of the object (type FDT$HEIGHT).

object_line_x_increment

Specifies the new x increment by changing the x increment from The line origin to the line destination (type FDT$X_ INCREMENT).

object_line_y_increment

Specifies the new y increment by changing the y increment from the line origin to the line destination (type FDT$Y_INCREMENT).

object_name

Specifies a name for the object. The object name must follow the conventions of the form processor. Use the object name to associate an object on the form with a variable definition. This record contains two fields:

object_name

The name of the object (type OST$NAME).

occurrence

The occurrence of the name (type FDT$OCCURRENCE).

object_position

Specifies a new position for the object, with the following two fields:

x_position

The new x position of the object (type FDT$X_POSITION).

y_position

The new y position of the object (type FDT$Y_POSITION).

object_text

Changes the text associated with an object or a constant text box object. Specifies a pointer to the new text (type ^FDT$TEXT).

object_text_processing

Changes the text processing for a text box object (type FDT$TEXT_BOX_PROCESSING). Contains the following values:

FDC$CENTER_CHARACTERS

Currently unused.

FDC$WRAP_CHARACTERS

Wraps data that extends past the left boundary of the box onto the next line, character-by-character.

FDC$WRAP_WORDS

Wraps data at the left boundary of the box onto the next line, word-by-word. A space indicates the end of a word.

object_width

Specifies the width of the object (type FDT$WIDTH).

unused_object_entry

Indicates a null filler in the FDT$OBJECT_ATTRIBUTES array.

Getting Object Attributes

The following records return the values of other object attributes. These records are specified in an initialized array. Each record is of type FDT$GET_OBJECT_ATTRIBUTE, which is listed in Appendix E.

Once established, this array is named on the object_attributes parameter in the call to the FDP$GET_OBJECT_ATTRIBUTES procedure, described later in this chapter. All fields contained in each record are output fields. The KEY field in the FDT$GET_OBJECT_ATTRIBUTE record is an input field.

The following are the attribute records, their descriptions, and the permitted values for each. The attribute record names are in italics.

get_object_definition

Returns the object definition. This is a variant record (type aDT$GET_OBJECT_DEFINITION). Its KEY field (type FDT$OBJECT_DEFINITION_KEY) can contain one of the following values. (For each of these values, additional fields describe each object.)

FDC$BOX

Describes the box with two fields:

box_width

The character width (1 .. FDC$MAXIMUM_X_POSITION) of the box (type FDT$WIDTH).

box_height

The character height (1 .. FDC$MAXIMUM_Y_POSITION) of the box (type FDT$HEIGHT).

FDC$LINE

Describes the line with two fields:

x_increment

The number of characters needed to increment the x line origin position given in the request to determine the end point of the line (type FDT$X_INCREMENT).

y_increment

The number of characters needed to increment the y line origin position given in the request to determine the end point of the line (type FDT$Y_INCREMENT).

FDC$CONSTANT_TEXT

Displays constant text on the form. Contains two fields:

constant_text_width

The width of the constant text in characters on the screen (type FDT$WIDTH).

constant_text_length

The length of the text in characters (type FDT$TEXT_LENGTH). Use the get_object_text attribute to obtain the text. The text length indicates how much space is needed to hold the text.

FDC$CONSTANT_TEXT_BOX

Describes a constant text box on the form. The text can occupy several lines. Contains four fields:

constant_box_height

The height of the text area in characters (type FDT$HEIGHT).

constant_box_processing

One of the following (type FDT$TEXT_BOX_PROCESSING):

FDC$CENTER_CHARACTERS

Currently unused.

FDC$WRAP_CHARACTERS

Wraps data that extends past the left boundary of the box onto the next line, character-by-character.

FDC$WRAP_WORDS

Wraps data at the left boundary of the box onto the next line, word-by-word. A space indicates the end of a word.

constant_box_width

The width of the text area in characters (type FDT$WIDTH).

constant_box_text_length

The number of characters of text created for the text box (type FDT$TEXT_LENGTH). Allocate the amount of space needed for the text using the text length, then use the get_object_text attribute.

FDC$TABLE

Currently unused.

FDC$VARIABLE_TEXT_BOX

Describes a variable text box on the form. The text can occupy more than one line. Contains four fields:

variable_box_height

The height of the text area in characters (type FDT$HEIGHT).

variable_box_processing

One of the following (type FDT$TEXT_BOX_PROCESSING):

FDC$CENTER_CHARACTERS

Currently unused.

FDC$WRAP_CHARACTERS

Wraps data that extends past the left boundary of the box onto the next line, character-by-character.

FDC$WRAP_WORDS

Wraps data at the left boundary of the box onto the next line, word-by-word. A space indicates the end of a word.

variable_box_text_length

The number of characters of text created for the text box (type FDT$TEXT_LENGTH). Allocate the amount of space needed for the text using the text length, then use the get_object_text attribute.

variable_box_width

The width of the text area in characters (type FDT$WIDTH).

FDC$VARIABLE_TEXT

Describes a variable text object on the form. Contains two fields:

variable_text_length

The number of characters of text created for the variable text (type FDT$TEXT_LENGTH). Allocate the amount of space needed for the text using the text length, then use the get_object_text attribute.

variable_text_width

The visible form width of the text area in characters (type FDT$WIDTH).

get_object_display

Returns the display attribute for the object (type FDT$DISPLAY_ATTRIBUTE_SET). When the object is displayed, this attribute is used. Returns one or more of the following:

FDC$INVERSE_VIDEO
FDC$LOW_INTENSITY
FDC$HIGH_INTENSITY
FDC$BLINK
FDC$UNDERLINE
FDC$PROTECT
FDC$HIDDEN
FDC$BLACK_FOREGROUND
FDC$BLUE_FOREGROUND
FDC$GREEN_FOREGROUND
FDC$MAGENTA_FOREGROUND
FDC$RED_FOREGROUND
FDC$CYAN_FOREGROUND
FDC$YELLOW_FOREGROUND
FDC$WHITE_FOREGROUND
FDC$BLACK_BACKGROUND
FDC$BLUE_BACKGROUND
FDC$GREEN_BACKGROUND
FDC$MAGENTA_BACKGROUND
FDC$RED_BACKGROUND
FDC$CYAN_BACKGROUND
FDC$YELLOW_BACKGROUND
FDC$WHITE_BACKGROUND
FDC$FINE_LINE
FDC$MEDIUM_LINE
FDC$BOLD_LINE

FDC$ITALIC_DISPLAY_ATTRIBUTE
FDC$TITLE_DISPLAY_ATTRIBUTE
FDC$INPUT_DISPLAY_ATTRIBUTE
FDC$ERROR_DISPLAY_ATTRIBUTE
FDC$MESSAGE_DISPLAY_ATTRIBUTE

get_object_name

Returns the name for the object. Programs manipulate the object using this name. Contains two fields:

object_name

The name for the object (type OST$NAME).

occurrence

The occurrence of the name (type FDT$OCCURRENCE).

get_object_text

Returns the object text to the specified pointer (type ^FDT$TEXT).

get_object_text_length

Returns the character length of the text (type FDT$TEXT_LENGTH).

get_unused_object_entry

Indicates a null filler in the FDT$GET_OBJECT_ATTRIBUTES array.

CYBIL Screen Formatting Procedures

Use the following CYBIL procedure calls when creating forms within a CYBIL program.

Changing a Form

Purpose FDP$CHANGE_FORM procedure changes the attributes that apply to the entire form.

Format **FDP$CHANGE_FORM (form_identifier, form_attributes, status)**

Parameters **form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

form_attributes: VAR { input-output } of fdt$form_attributes;

An array containing form attributes.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions
fde$bad_data_value
fde$cannot_update_opened_form
fde$display_name_exists
fde$event_name_exists
fde$invalid_display_name
fde$invalid_event_name
fde$invalid_form_area_key
fde$invalid_form_identifier
fde$invalid_form_language
fde$invalid_form_name
fde$no_comments_to_delete
fde$no_space_available
fde$system_error
fde$unknown_display_name
fde$unknown_event_name

Changing the Form Definition Record

Purpose FDP$CHANGE_FORM_RECORD procedure changes the form record definition used to transfer data from the program to Screen Formatting, and from Screen Formatting to the program.

Format **FDP$CHANGE_FORM_RECORD (form_identifier, record_attributes, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

record_attributes: VAR { input-output } of fdt$record_attributes;

An array containing record attributes.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_deck_name
fde$invalid_record_name
fde$invalid_table_name

Changing an Object

Purpose FDP$CHANGE_OBJECT procedure changes the object attributes.

Format **FDP$CHANGE_OBJECT (form_identifier, x_position, y_position, object_attributes, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

x_position: fdt$x_position;

The x position of the object relative to the form.

y_position: fdt$y_position;

The y position of the object relative to the form.

object_attributes: VAR { input-output } of fdt$object_attributes;

An array of object attributes.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_object_change
fde$invalid_object_name
fde$no_object_at_position
fde$no_space_available
fde$no_string_specified
fde$object_occurrence_exists
fde$system_error
fde$unknown_object_name

Changing a Stored Object

Purpose FDP$CHANGE_STORED_OBJECT procedure changes the initial value for the occurrence of a table variable that does not initially appear on a form.

Format **FDP$CHANGE_STORED_OBJECT (form_identifier, name, occurrence, text, display_attribute_set, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

name: ost$name;

The object name.

occurrence: fdt$occurrence;

The occurrence of the object.

text: fdt$text;

The text indicating the initial value.

display_attribute_set: fdt$display_attribute_set;

The set of attributes that describe how to display the object.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_object_name
fde$invalid_occurrence
fde$no_space_available
fde$no_string_specified
fde$system_error
fde$unknown_object_name

Remarks The user can see stored cccurrences by executing paging or scrolling events.

Changing a Table

Purpose FDP$CHANGE_TABLE procedure changes the attributes of a table.

Format **FDP$CHANGE_TABLE (form_identifier, table_name, table_attributes, status)**

Parameters **form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

table_name: ost$name;

The name of the table.

table_attributes: VAR { input-output } of fdt$table_attributes;

An array containing table attributes.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions
fde$bad_data_value
fde$cannot_change_form
fde$invalid_form_identifier
fde$invalid_occurrence
fde$invalid_table_name
fde$invalid_variable_name
fde$no_space_available
fde$system_error
fde$table_name_exists
fde$unknown_table_name
fde$unknown_variable_name

Changing a Variable

Purpose FDP$CHANGE_VARIABLE procedure changes the variable attributes.

Format **FDP$CHANGE_VARIABLE (form_identifier, variable_name, variable_attributes, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

variable_name: ost$name;

The variable name.

variable_attributes: VAR { input-output } of fdt$variable_attributes;

An array containing variable attributes.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$variable_name_exists
fde$valid_string_exists
fde$unknown_variable_name
fde$unknown_valid_string
fde$unknown_real_range
fde$unknown_integer_range
fde$system_error
fde$range_overlap
fde$no_string_specified
fde$no_space_available
fde$no_comments_to_delete
fde$invalid_variable_name
fde$invalid_real_range
fde$invalid_integer_range
fde$invalid_form_name
fde$invalid_form_identifier
fde$cannot_update_opened_form
fde$bad_data_value

Converting to Program Variable

Purpose FDP$CONVERT_TO_PROGRAM_VARIABLE procedure converts data entered by an application user to program data.

Format **FDP$CONVERT_TO_PROGRAM_VARIABLE (program_data_type, p_program_variable, program_variable_length, input_format, p_screen_variable, screen_variable_length, variable_status, status)**

Parameters **program_data_type**: fdt$program_data_type;

The variable definition of the data type the program uses to manipulate the variable.

p_program_variable: ^cell;

A pointer to the first cell to receive the converted data for the program variable.

program_variable_length: fdt$program_variable_length;

Length of the program variable in cells.

input_format: fdt$input_format;

The variable definition for the application user's input format.

p_screen_variable: ^fdt$text;

A pointer to the string that contains the characters entered by the application user to be converted.

screen_variable_length: fdt$text_length;

Length of the string containing the user's characters.

variable_status: VAR of fdt$variable status;

An ordinal value that gives you the status of the variable.

FDC$INVALID_BDP_DATA

The screen variable contains characters that can not be converted to the program data type.

FDC$LOSS_OF_SIGNIFICANCE

The screen variable is too large to fit in the program variable.

FDC$NO_ERROR

No error occurred on the conversion.

FDC$OVERFLOW

The screen variable when converted to the program variable is infinite or indefinite.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions fde$bad_data_value

Converting to Screen Variable

Purpose FDP$CONVERT_TO_SCREEN_VARIABLE procedure converts program data to characters for screen display.

Format **FDP$CONVERT_TO_SCREEN_VARIABLE (program_data_type, p_program_variable, program_variable_length, output_format, p_screen_variable, screen_variable_length, variable_status, status)**

Parameters

program_data_type: fdt$program_data_type;

The variable definition of the data type the program uses to manipulate the variable.

p_program_variable: ^cell;

A pointer to the first cell of the program variable to be converted to the screen variable.

program_variable_length: fdt$program_variable_length;

Length of the program variable in cells.

output_format: fdt$output_format;

The variable definition for the screen output format.

p_screen_variable: ^fdt$text;

A pointer to the string to receive the characters converted from the program variable.

screen_variable_length: fdt$text_length;

Length of the string displayed at the user's screen.

variable_status: VAR of fdt$variable status;

An ordinal value that gives you the status of the variable.

FDC$BAD_PRARAMETERS

The output format is not correct.

FDC$INDEFINITE

The program variable contains an indefinite number.

FDC$INVALID_BDP_DATA

The program variable contains characters used for terminal control.

FDC$LOSS_OF_SIGNIFICANCE

The program variable is too large to display in the area specified for screen display.

FDC$NO_ERROR

No error occurred on the conversion.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions fde$bad_data_value

Copying an Area

Purpose FDP$COPY_AREA procedure copies all objects and unprotected text from one area to another on a form.

Format **FDP$COPY_AREA (form_identifier, form_x_position, form_y_position, width, height, to_x_postion, to_y_position, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

form_x_position: fdt$x_position;

The form x position of the area that encloses the data to be copied. The origin of the area is the upper left corner, relative to the form.

form_y_position: fdt$y_position;

The form y position of the area that encloses the data to be copied. The origin of the area is the upper left corner, relative to the form.

height: fdt$height;

The height of the area to be copied.

width: fdt$width;

The width of the area to be copied.

to_x_position: fdt$x_position;

The x position of the destination area upper left corner, relative to the form.

to_y_position: fdt$y_position;

The y position of the destination area upper left corner, relative to the form.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$area_cuts_object
fde$bad_data_value
fde$copy_outside_form
fde$invalid_form_identifier
fde$no_space_available
fde$object_overlays
fde$system_error

Remarks

- A design form has objects (protected text, line drawings) and unprotected text.
- A target form contains only objects. The area to be copied must not slice any objects. The destination area must not contain any objects. Object names and occurrence attributes are not copied.

Copying a Form

Purpose FDP$COPY_FORM procedure copies a form and assigns a new form identifier to the copied form.

Format **FDP$COPY_FORM (from_form_identifier, to_form_identifier, status)**

Parameters **from_form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

to_form_identifier: VAR of fdt$form_identifier;

The new form identifier that Screen Formatting assigns to the copied form.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions fde$bad_data_value
fde$invalid_form_identifier
fde$no_space_available
fde$system_error

Remarks To modify a copied form, you must issue an FDP$EDIT_FORM procedure.

Creating Constant Text

Purpose FDP$CREATE_CONSTANT_TEXT procedure creates constant text objects for a target form using the unprotected text on the design form. These objects have the background and foreground attributes of the target form.

Format **FDP$CREATE_CONSTANT_TEXT (design_form_identifier, target_form_identifier, status)**

Parameters

design_form_identifier: fdt$form_identifier;

The form identifier of a design form that Screen Formatting uses to create constant text objects.

target_form_identifier: fdt$form_identifier;

The form identifier of a target form where Screen Formatting stores the constant text objects.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$invalid_form_identifier
fde$no_space_available
fde$system_error

Creating a Design Form

Purpose FDP$CREATE_DESIGN_FORM procedure creates a form for designing other forms interactively.

Format **FDP$CREATE_DESIGN_FORM (form_identifier, form_attributes, status)**

Parameters **form_identifier**: VAR of fdt$form_identifier;

The form identifier established when the form was opened.

form_attributes: VAR { input-output } of fdt$form_attributes;

An array containing attributes that apply to the entire form.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions
fde$bad_data_value
fde$display_name_exists
fde$event_name_exists
fde$invalid_display_name
fde$invalid_event_name
fde$invalid_form_area_key
fde$invalid_form_identifier
fde$invalid_form_language
fde$invalid_form_name
fde$no_comments_to_delete
fde$no_space_available
fde$system_error
fde$terminal_disconnected
fde$unknown_display_name
fde$unknown_event_name

Remarks

- It is not necessary to execute an FDP$END_FORM procedure to indicate the end of the definition. You open the design form with the FDP$OPEN_FORM procedure and can then execute other procedures, such as FDP$ADD_FORM and FDP$READ_FORM.

- A table and a variable are created for the design form so the FDP$GET_STRING_VARIABLE and FDP$REPLACE_STRING_VARIABLE procedures can access text on the form. The variable character field width is the form width. Refer to Defining Attributes for a Form in this chapter to read about the attribute FDC$DESIGN_VARIABLE_NAME.

- The table has as many occurrences as the height of the form. On the design form, you can create constant objects and line drawing objects, but no variable objects.

Creating Design Text

Purpose FDP$CREATE_DESIGN_TEXT procedure creates objects and unprotected text on the design form from objects defined on the target form.

Format **FDP$CREATE_DESIGN_TEXT (target_form_identifier, design_form_identifier, status)**

Parameters

target_form_identifier: fdt$form_identifier;

The target form identifier to use as the source of the text for the design form.

design_form_identifier: fdt$form_identifier;

The form identifier of the design form.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_change_form
fde$invalid_design_form
fde$invalid_form_identifier
fde$no_space_available
fde$system_error

Remarks The constant text objects on the target form (except for ones with the same color attributes as the target form) are created as objects on the design form. Constant text objects on the target form with the same color attributes as the target form and without names become free text on the design form.

Creating a Form

Purpose FDP$CREATE_FORM procedure creates a form.

Format **FDP$CREATE_FORM (form_identifier, form_attributes, status)**

Parameters

form_identifier: VAR of fdt$form_identifier;

The form identifier established when the form was opened.

form_attributes: VAR { input-output } of fdt$form_attributes;

An array containing attributes that apply to the entire form.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$display_name_exists
fde$event_name_exists
fde$invalid_display_name
fde$invalid_event_name
fde$invalid_form_area_key
fde$invalid_form_identifier
fde$invalid_form_language
fde$invalid_form_name
fde$no_comments_to_delete
fde$no_space_available
fde$system_error
fde$unknown_display_name
fde$unknown_event_name

Remarks After creating a form, you must issue an FDP$END_FORM procedure to end it.

Creating an Event Form

Purpose FDP$CREATE_EVENT_FORM procedure creates a form to display events.

Format **FDP$CREATE_EVENT_FORM (event_menus, form_attributes, form_identifier, status)**

Parameters **event_menus**: array [1 ..*];

An array of fdt$event_menu records. This record contains three fields:

event_label

The initial variable value on the form for the variable event_name.

event_name

The event name the application program uses to recognize the event. Also the variable name an application program can use to change the display attribute or event label value.

event_trigger

The event trigger on the terminal that causes the event.

form_attributes: VAR { input-output } of fdt$form_attibutes;

An array containing attributes that apply to the entire form. Screen Formatting calculates the form size based on the number of application event triggers given in the event_menus. Screen Formatting calculates the form location based on the form size and home cursor position of the terminal.

If the home cursor position is on the first line of the terminal screen, the event form occupies the last line of the terminal. If the home cursor position is on the last line of the terminal, then the event form occupies the next to the last line of the terminal.

form_identifier: VAR of fdt$form_identifier;

The form identifier established when the form was opened.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$invalid_display_name
fde$invalid_event_name
fde$invalid_form_language
fde$invalid_form_name
fde$no_space_available
fde$system_error
fde$unknown_event_name

Remarks

- This procedure ends the event form definition.
- The form identifier the procedure returns was established when the form was opened.
- Save the form by executing the FDP$WRITE_FORM_DEFINITION procedure.

Creating a Mark

Purpose FDP$CREATE_MARK procedure creates a display attribute for a specific text area.

Format **FDP$CREATE_MARK (form_identifier, start_x_position, start_y_position, end_x_position, end_y_position, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

start_x_position: fdt$x_position;

The form x position that starts the mark on the form. The leftmost character is 1. X positions go from left to right.

start_y_position: fdt$x_position;

The form y position that starts the mark on the form. The top character is 1. Y positions go from top to bottom.

end_x_position: fdt$x_position;

The end x position to end the mark.

end_y_position: fdt$x_position;

The end y position to end the mark.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$area_cuts_object
fde$bad_data_value
fde$create_mark_invalid
fde$form_not_scheduled
fde$form_pushed
fde$mark_outside_form
fde$no_space_available
fde$system_error

Remarks

- The marked area of the form must not slice any objects.
- This attribute marks text on which the terminal user wants to perform an operation.
- This procedure applies only to a design form.

Creating an Object

Purpose FDP$CREATE_OBJECT procedure creates an object on the form.

Format **FDP$CREATE_OBJECT (form_identifier, x_position, y_position, object_definition, object_attributes, status)**

Parameters **form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

x_position: fdt$x_position;

The x coordinate for the origin of the object relative to the form.

y_position: fdt$x_position;

The y coordinate for the origin of the object relative to the form.

object_definition: fdt$object_definition;

This is a variant record that specifies the object type. Its KEY fields contain the following:

FDC$BOX

Draws a box on the form image. The FDP$CREATE_OBJECT procedure gives the origin of the box with respect to the origin of the form. The origin of the form is the upper left corner. The origin of the box is the upper left corner. The FDC$BOX field contains two other fields:

box_width

The width, in characters, of the box (type FDT$WIDTH). The box_width must be greater than, or equal to, one.

box_height

The height, in characters, of the box (type FDT$HEIGHT). The box_height must be greater than, or equal to, one.

FDC$CONSTANT_TEXT

Displays constant text on the form image. The origin of the text object is given by the FDP$CREATE_OBJECT procedure. The text can occupy all or part of a row on the form. The FDC$CONSTANT_TEXT field contains two other fields:

constant_text_width

The width of the constant text, in characters, on the screen (type FDT$WIDTH). This must be a number greater than or equal to one.

p_constant_text

This is the text to display on the form image (type ^FDT$TEXT).

FDC$LINE

Draws a line on the form image. The FDC$LINE field contains two other fields:

x_increment

The number of characters to increment the x position given in the procedure to determine the end point of the line (type FDT$X_INCREMENT). Some terminals only support vertical and horizontal lines. The x increment can be greater than or equal to zero.

y_increment

The number of characters to increment the y position given in the procedure to determine the end point of the line (type FDT$Y_INCREMENT). The x increment can greater than or equal to zero.

FDC$CONSTANT_TEXT_BOX

Defines an area on the form to display constant text. The text can occupy several lines. You can specify how text that crosses the right boundary of the text box is processed. The FDC$CONSTANT_TEXT_BOX field contains the following fields:

constant_text_box_height

The height of the text area, in characters (type FDT$HEIGHT). This must be greater than, or equal to, one.

constant_text_box_processing

Uses FDC$WRAP_WORD to wrap data at the right boundary of the box to the next line, if any, on a word basis (type FDT$TEXT_BOX_PROCESSING). The text for word wrap processing can include a formatting character. FDC$NEW_LINE_CHARACTER causes Screen Formatting to start a new line in a text box. Uses FDC$WRAP_CHARACTER to wrap data that goes past the right boundary of the box to the next line on a character basis.

constant_text_box_width

The width of the text area, in characters (type FDT$WIDTH). This must be greater than, or equal to, one.

p_constant_box_text

The text to display on the form image (type ^FDT$TEXT).

FDC$VARIABLE_TEXT

Defines an object for variable text. You associate the object to the variable by using an object name specified through the object attributes. The FDC$VARIABLE_TEXT field contains the following fields:

p_variable_text

The pointer to the text (type ^FDT$TEXT). This is the initial value of the variable.

variable_text_width

The width of the variable text in characters on the screen (type FDT$WIDTH). This must be a number greater than or equal to one.

FDC$VARIABLE_TEXT_BOX

Defines an area on the form to display variable text. The text can occupy several lines. You associate the object to the variable by using an object name specified through the object attributes. You can specify how text that crosses the right boundary of the text box is processed. The FDC$VARIABLE_TEXT_BOX field contains the following fields:

p_variable_box_text

The pointer to the text (type ^FDT$TEXT). This is the initial value of the variable.

variable_text_box_height

The height of the text area, in rows (type FDT$HEIGHT). This must be a number greater than or equal to one.

variable_text_box_processing

Uses FDC$WRAP_WORD to wrap data at the right boundary of the box to the next line, if any, on a word basis (type FDT$TEXT_BOX_PROCESSING). The text for word wrap processing can include a formatting character. The FDC$NEW_LINE_CHARACTER causes Screen Formatting to start a new line in a text box. Uses FDC$WRAP_CHARACTER to wrap data that goes past the right boundary of the box to the next line on a character basis.

variable_text_box_width

The width of the text area, in characters (type FDT$WIDTH). This must be greater than or equal to one.

object_attributes: VAR { input-output } of fdt$object_attributes;

An array of object attributes.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_object_change
fde$invalid_object_name
fde$no_space_available
fde$no_string_specified
fde$object_occurrence_exists
fde$system_error

Remarks

- When the program data is too large to display on the form, it can be put into a text box. The user can then execute scroll events to see or modify the text.
- A text box permits text processing. Characters or words can wrap from line to line in the text box. You can give name and display attributes to the object.
- Programs can manipulate the object using the name. The name associates a variable text object with its variable definition. The initial value comes from the value specified for the object and is displayed using the output format defined for the variable and display attributes specified for the object.
- Objects can be line or box graphics, constant or variable text. They can occupy a single line or a rectangular area (box) on the form.

Creating a Stored Object

Purpose FDP$CREATE_STORED_OBJECT procedure creates an initial value for a table variable occurrence that does not initially appear on the form.

Format **FDP$CREATE_STORED_OBJECT (form_identifier, name, occurrence, text, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

name: ost$name;

The object name.

occurrence: fdt$occurrence;

The occurrence of the object.

text: fdt$text;

The text specifying the initial value.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_object_name
fde$invalid_occurrence
fde$no_space_available
fde$no_string_specified
fde$object_exists
fde$object_occurrence_exists
fde$system_error

Remarks

- The visible occurrences of a table initially appear on the form. The user can execute paging or scrolling events to look at the stored occurrences.
- If this procedure is not issued, the initial value for a stored object is the first occurrence of the object. A table can have one or more variables, and a variable in a table can have one or more occurrences.

Creating a Table

Purpose FDP$CREATE_TABLE procedure creates a table containing variables.

Format **FDP$CREATE_TABLE (form_identifier, table_name, table_attributes, status)**

Parameters **form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

table_name: ost$name;

The table name.

table_attributes: VAR { input-output } of fdt$table_attributes;

The attributes of the table.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_table_name
fde$no_space_available
fde$table_name_exists

Remarks

- The variables in a table can occur more than once and appear anywhere on the form.
- A table name cannot duplicate an existing table or variable name.
- You must create objects for table variable occurrences and variables for the table. When executing a FDP$END_FORM procedure, all variables and objects for the table must be defined.

Creating a Variable

Purpose FDP$CREATE_VARIABLE procedure creates a variable.

Format **FDP$CREATE_VARIABLE (form_identifier, variable_name, variable_attributes, status)**

Parameters **form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

variable_name: ost$name;

The name of the variable.

variable_attributes: VAR { input-output } of fdt$variable_attributes;

An array containing variable attributes.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_form_name
fde$invalid_integer_range
fde$invalid_real_range
fde$invalid_variable_name
fde$no_comments_to_delete
fde$no_space_available
fde$no_string_specified
fde$range_overlap
fde$system_error
fde$unknown_integer_range
fde$unknown_real_range
fde$unknown_valid_string
fde$valid_string_exists
fde$variable_name_exists

Remarks

- Every variable that appears to the user must have an object associated with it. The object can be created before or after the creation of the variable. Some variables are not shown on the form.
- Issue an FDP$CREATE_OBJECT procedure to specify the initial value and display attributes for a variable appearing on the form.

Deleting an Area

Purpose FDP$DELETE_AREA procedure deletes all objects and unprotected text in a specified area on the form. Any associated table and variable definitions are not deleted.

Format **FDP$DELETE_AREA (form_identifier, x_position, y_position, width, height, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

x_position: fdt$x_position;

The x position of the origin (upper left corner) of the area enclosing the data to be deleted.

y_position: fdt$y_position;

The y position of the origin (upper left corner) of the area enclosing the data to be deleted.

width: fdt$width;

The width of the area.

height: fdt$height;

The height of the area.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$area_cuts_object
fde$bad_data_value
fde$delete_outside_form
fde$invalid_form_identifier
fde$no_space_available
fde$system_error

Deleting a Mark

Purpose FDP$DELETE_MARK procedure deletes the previous mark set by the FDP$CREATE_MARK procedure.

Format **FDP$DELETE_MARK (form_identifier, status)**

Parameters

form_identifier fdt$form_identifier;

The form identifier established when the form was opened.

status VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$delete_mark_invalid
fde$form_not_scheduled
fde$form_pushed
fde$invalid_form_identifier
fde$no_space_available
fde$system_error

Remarks This procedure can only be used on a form created with the FDP$CREATE_DESIGN_FORM procedure.

Deleting an Object

Purpose FDP$DELETE_OBJECT procedure deletes an object at a specified location on the form. Any variable or table definitions associated with the object are not deleted.

Format **FDP$DELETE_OBJECT (form_identifier, x_position, y_position, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

x_position: fdt$x_position;

The x position of the object to delete.

y_position: fdt$y_position;

The y position of the object to delete.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$no_object_at_position

Deleting a Stored Object

Purpose FDP$DELETE_STORED_OBJECT procedure deletes an initial value for a table variable occurrence that does not initially appear on a form.

Format **FDP$DELETE_STORED_OBJECT (form_identifier, name, occurrence, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

name: ost$name;

The object name.

occurrence: fdt$occurrence;

The occurrence of the object.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_object_name
fde$no_space_available
fde$system_error
fde$unknown_object_name

Deleting a Table

Purpose FDP$DELETE_TABLE procedure deletes a table. Any variables or object definitions associated with the table are not deleted.

Format **FDP$DELETE_TABLE (form_identifier, table_name, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

table_name: ost$name;

The table to be deleted.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_table_name
fde$unknown_table_name

Deleting a Variable

Purpose FDP$DELETE_VARIABLE procedure deletes a variable. Any table or object definitions associated with the variable are not deleted.

Format **FDP$DELETE_VARIABLE (form_identifier, variable_name, status)**

Parameters **form_identifier**: integer;

The form identifier established when the form was opened.

variable_name: name;

The variable to be deleted.

status: VAR of status;

The status variable in which the completion status is returned.

Conditions fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_variable_name
fde$unknown_variable_name

Editing a Form

Purpose FDP$EDIT_FORM procedure permits you to make further changes to a copied form or a previously ended form definition.

Format **FDP$EDIT_FORM (form_identifier, status)**

Parameters **form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_form_identifier

Ending a Form

Purpose FDP$END_FORM procedure ends the definition of a form.

Format **FDP$END_FORM (form_identifier, p_sequence, number_errors, p_errors, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

p_sequence: ^SEQ(*);

The sequence to return any errors.

number_errors: VAR of fdt$number_errors;

The number of errors contained in the form definition.

p_errors: VAR of ^SEQ (*);

The sequence that contains the errors.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$no_space_available
fde$system_error

Remarks This procedure must be executed before you can use a form to interact with a terminal user.

Getting Form Attributes

Purpose FDP$GET_FORM_ATTRIBUTES procedure gets the current form attributes. The form must be open or dynamically created.

Format **FDP$GET_FORM_ATTRIBUTES (form_identifier, get_form_attributes, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

get_form_attributes: VAR { input-output } of fdt$get_form_attributes;

An array containing form attributes.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_event_name
fde$invalid_form_identifier
fde$string_too_small
fde$system_error
fde$unknown_event_name

Getting Form Names

Purpose FDP$GET_FORM_NAMES procedure gets the current names of tables, variables, and objects defined for a form.

Format **FDP$GET_FORM_NAMES (form_identifier, name_selections, form_names, number_names, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

name_selections: fdt$name_selections;

A set containing selections for names. You can select FDC$SELECT_VARIABLE_NAMES, FDC$SELECT_TABLE_NAMES, and FDC$SELECT_OBJECT_NAMES.

form_names: VAR of fdt$form_names;

An array containing the form names. The form names are contained in a record with name and name_type fields.

Field	Meaning
name	The item name (variable, table, object).
name_type	The name type (FDC$SELECT_VARIABLE, FDC$SELECT_TABLE, FDC$SELECT_OBJECT).

number_names: VAR of fdt$number_names;

The number of names returned.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$too_many_form_names

Remarks

- Issue the FDP$GET_FORM_ATTRIBUTES procedure using the attribute key of FDC$GET_NUMBER_OBJECTS, FDC$GET_NUMBER_TABLES, and FDC$GET_NUMBER_VARIABLES.
- This procedure enables you to learn the array size needed to receive the form names.

Getting Form Attributes

Purpose FDP$GET_FORM_ATTRIBUTES procedure gets the current form attributes. The form must be open or dynamically created.

Format **FDP$GET_FORM_ATTRIBUTES (form_identifier, get_form_attributes, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

get_form_attributes: VAR { input-output } of fdt$get_form_attributes;

An array containing form attributes.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_event_name
fde$invalid_form_identifier
fde$string_too_small
fde$system_error
fde$unknown_event_name

Getting Form Names

Purpose FDP$GET_FORM_NAMES procedure gets the current names of tables, variables, and objects defined for a form.

Format **FDP$GET_FORM_NAMES (form_identifier, name_selections, form_names, number_names, status)**

Parameters **form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

name_selections: fdt$name_selections;

A set containing selections for names. You can select FDC$SELECT_VARIABLE_NAMES, FDC$SELECT_TABLE_NAMES, and FDC$SELECT_OBJECT_NAMES.

form_names: VAR of fdt$form_names;

An array containing the form names. The form names are contained in a record with name and name_type fields.

Field	Meaning
name	The item name (variable, table, object).
name_type	The name type (FDC$SELECT_VARIABLE, FDC$SELECT_TABLE, FDC$SELECT_OBJECT).

number_names: VAR of fdt$number_names;

The number of names returned.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$too_many_form_names

Remarks

- Issue the FDP$GET_FORM_ATTRIBUTES procedure using the attribute key of FDC$GET_NUMBER_OBJECTS, FDC$GET_NUMBER_TABLES, and FDC$GET_NUMBER_VARIABLES.
- This procedure enables you to learn the array size needed to receive the form names.

Getting Form Objects

Purpose FDP$GET_FORM_OBJECTS procedure gets objects defined for a form.

Format **FDP$GET_FORM_OBJECTS (form_identifier, form_objects, number_objects, status)**

Parameters **form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

form_objects: VAR of fdt$form_objects;

An array containing the form objects that Screen Formatting returns. Each record in the array has a name and an object field.

Field	Meaning
name	The object name. If the object did not have a name defined, the name equals OSC$NULL_NAME.
object	The object type.

FDC$BOX

The object is a box.

FDC$CONSTANT_TEXT

The object is constant text.

FDC$CONSTANT_TEXT_BOX

The object is a constant text box.

FDC$LINE

The object is a line.

FDC$VARIABLE_TEXT

The object is variable text.

FDC$VARIABLE_TEXT_BOX

The object is a variable text box.

Field	Meaning
occurrence	The occurrence of the object name. If the name is OSC$NULL_NAME, the occurrence equals 1.
x_position	The form x position of the object.
y_position	The form y position of the object.

number_objects: VAR of fdt$number_objects;

The number of objects returned from Screen Formatting.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$too_many_form_objects

Remarks

Issue the FDP$GET_FORM_ATTRIBUTES procedure by using the attribute key of FDC$GET_NUMBER_OBJECTS. This procedure enables you to learn the array size needed to receive the form objects.

Getting Object Attributes

Purpose FDP$GET_OBJECT_ATTRIBUTES procedure gets specified attributes about an object on the form. This procedure can be used on an open or dynamically created form.

Format **FDP$GET_OBJECT_ATTRIBUTES (form_identifier, x_position, y_position, get_object_attributes, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

x_position: fdt$x_position;

The x position on the form.

y_position: fdt$y_position;

The y position on the form.

object_attributes: VAR { input-output } of fdt$get_object_attributes;

An array containing object attributes. Before you specify this parameter, you must first establish the array.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$no_object_at_position
fde$system_error

Getting Record Attributes

Purpose FDP$GET_RECORD_ATTRIBUTES procedure gets form definition record attributes. You can execute this procedure on an open or dynamically created form.

Format **FDP$GET_RECORD_ATTRIBUTES (form_identifier, get_record_attributes, status)**

Parameters **form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

get_record_attributes: VAR { input-output } of fdt$get_record_attributes;

An array containing form definition record attributes. Before you specify this parameter, you must first establish the array.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_table_name
fde$invalid_variable_name
fde$system_error
fde$unknown_occurrence
fde$unknown_table_name

Getting a Stored Object

Purpose FDP$GET_STORED_OBJECT procedure gets the initial value for a table variable occurrence that does not appear initially on a form.

Format **FDP$GET_STORED_OBJECT (form_identifier, name, occurrence, text, text_length, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

name: ost$name;

The object name.

occurrence: fdt$occurrence;

The occurrence of the object.

text: VAR of fdt$text;

The text specifying the initial value.

text_length: VAR of fdt$text_length;

The stored object length. This length can exceed the parameter text length. Allocate more space for the text and re-issue the procedure if the text_length is greater than the allocated space for the text.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$invalid_address
fde$invalid_form_identifier
fde$invalid_object_name
fde$invalid_occurrence
fde$no_space_available
fde$no_string_specified
fde$system_error
fde$system_error
fde$unknown_object_name

Getting Table Attributes

Purpose FDP$GET_TABLE_ATTRIBUTES gets procedure-specified table attributes. You can execute this procedure on an open or dynamically created form.

Format **FDP$GET_TABLE_ATTRIBUTES (form_identifier, get_table_attributes, status)**

Parameters **form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

table_name: ost$name;

The table name.

get_table_attributes: VAR { input-output } of fdt$get_table_attributes;

Table attributes.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions fde$bad_data_vaule
fde$invalid_form_identifier
fde$no_object_at_position
fde$system_error

Getting Variable Attributes

Purpose FDP$GET_VARIABLE_ATTRIBUTES procedure gets selected information about a variable. You can execute this procedure on an open or dynamically created form.

Format **FDP$GET_VARIABLE_ATTRIBUTES (form_identifier, variable_name, get_variable_attributes, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

variable_name: ost$name;

The variable name.

get_variable_attributes: VAR { input-output } of fdt$get_variable_attributes;

Gets an array containing attributes.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_vaule
fde$cannot_update_opened_form
fde$invalid_form_identifier
fde$invalid_variable_name
fde$string_too_small
fde$system_error
fde$unknown_variable_name

Moving an Area

Purpose FDP$MOVE_AREA procedure moves all objects and unprotected text from one area of a form to another. The destination area cannot slice any objects outside the origin area.

Format **FDP$MOVE_AREA (form_identifier, from_x_position, from_y_position, width, height, to_x_position, to_y_position, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

from_x_position: fdt$x_position;

The x position of the origin (upper left_hand corner) of the area enclosing the data to be moved.

from_y_position: fdt$y_position;

The y position of the origin (upper left_hand corner) of the area enclosing the data to be moved.

width: fdt$width;

The width of the area.

height: fdt$height;

The height of the area.

to_x_position: fdt$x_position;

The x position of the area (upper left_hand corner) where the data is to be copied.

to_y_position: fdt$y_position;

The y position of the area (upper left_hand corner) where the data is to be copied.

status: VAR of ost$status

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$invalid_form_identifier
fde$move_outside_form
fde$no_space_available
fde$object_overlays
fde$system_error

Writing a Form Definition

Purpose FDP$WRITE_FORM_DEFINITION procedure writes a form to a segment access file.

Format **FDP$WRITE_FORM_DEFINITION (form_identifier, p_form_module, status)**

Parameters **form_identifier**: fdt$form_identifier;

The form identifier established when the form was opened.

p_form_module: VAR { input-output } of ^SEQ (*);

A pointer to a sequence that holds the form module.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions fde$bad_data_value
fde$invalid_form_identifier
fde$no_space_available

Remarks A segment access file can be used with the CREATE_OBJECT_LIBRARY command to save a form. The form does not have to be ended and can contain errors. The form must have a non-blank name.

Writing a Form Record Definition

Purpose FDP$WRITE_RECORD_DEFINITION procedure writes the Source Code Utility deck defining the record to transfer data between the program and Screen Formatting.

Format **FDP$WRITE_RECORD_DEFINITION (form_identifier, file_identifier, form_processor, status)**

Parameters

form_identifier: fdt$form_identifier;

The form identifier established when the form was opened.

file_identifier: amt$file_identifier;

The file identifier returned by the FSP$OPEN_FILE request that opened the file. This is the file to which the deck is written.

form_processor: fdt$form_processor;

The processor that uses the record definition.

status: VAR of ost$status;

The status variable in which the completion status is returned.

Conditions

fde$bad_data_value
fde$form_definition_errors
fde$form_has_no_variables
fde$form_not_ended
fde$invalid_form_identifier
fde$invalid_form_processor

Remarks The form cannot have any errors and must have ended with the FDP$END_FORM procedure.

A

Alphabetic Character

One of the following letters:

A through Z
a through z

See also Character.

Attribute

A property of a form, variable, table of variables, object, or constant that is needed to process a form.

B

Batch Mode

A mode of execution in which a job is submitted and processed as a unit with no intervention from a user. Contrast with Interactive Mode.

C

Catalog

A directory of files maintained by the operating system for a user. In addition to files, a catalog can contain other catalogs. The catalog $LOCAL contains only file entries.

Catalog Name

The name of a catalog in a catalog hierarchy. By convention, the name of the user's master catalog is the same as the user's user name.

Character

An alphabetic character, digit, space, or symbol. See also Alphabetic Character, Digit, and Symbol.

D

Design Form

One of two types of forms necessary for enabling a terminal user to interact with an application program in order to create, display, or change a form.

Digit

One of the following characters:

0 1 2 3 4 5 6 7 8 9

See also Character.

E

Event

A property of a form that is defined by the application programmer. An example would be a function key.

F

Family

A logical grouping of NOS/VE users that determines the location of their permanent files.

Family Name

A name that identifies a NOS/VE family.

File

A collection of records referenced by a file name. A file is an autonomous collection of information that exists separately from the programs that read or write the file.

File Name

The name of a NOS/VE file. See also Name.

Full Screen

A program that utilizes the entire terminal screen to display the data and/or the user's options. The user can move the cursor around on the screen to modify data or to indicate which operation to execute.

Full Screen Definition

Instructions to NOS/VE describing the full screen features and function keys for a terminal. To run full screen programs on a terminal, NOS/VE needs a full screen definition for the type of terminal used.

Function

An instruction to a full screen program. If function keys are available on the keyboard, the user can press a function key to execute a function.

Function Key

A key on a keyboard that is used to execute a function. Function keys are often labelled with an F and a digit. For example, F1, F2, or F3.

Function Key Assignments

The association of functions with the function keys on the user's keyboard. In most full screen programs, the function key assignments are displayed at the bottom of the screen.

I

Identifier

A character of group of characters that identify items of data.

Integer

Numeric data (positive or negative) that represents a whole number. An integer is stored internally as a binary value rather than as a character value.

Interactive Mode

A mode of execution during which a user enters commands, subcommands, or functions at a terminal and the computer responds immediately to each command, subcommand, or function.

L

Local File

A file that is accessed via the $LOCAL catalog as follows:

$LOCAL.filename

NOS/VE discards all $LOCAL files when the user logs out. Contrast with Permanent File.

Login

The process used at a terminal to gain access to an operating system such as NOS/VE. Logging in starts a terminal session.

Logout

The process used at a terminal to end a terminal session.

M

Main Menu

The menu that is available at the beginning of a program or online manual.

Master Catalog

The catalog the operating system creates for each user name. The user's master catalog contains entries for all permanent files and catalogs a user creates. By convention, the name of the master catalog is the same as the user name.

N

Name

A combination of 1 through 31 characters chosen from the following:

Alphabetic characters (A through Z and a through z)
Digits (0 through 9)
Special characters (#, @, $, or _)

The first character of a name cannot be a digit.

NOS/VE

Network Operating System/Virtual Environment.

O

Object

An object can be constant or variable text, box drawing, line drawing, or a table that contains one or more occurrences of one or more variable text objects.

Occurrence

The number of times an object appears on a form.

Online Manual

A manual that the user reads on the terminal screen. The EXPLAIN command opens an online manual.

P

Permanent Catalog

A catalog of permanent files, such as the master catalog or a catalog within the master catalog.

Permanent File

A file that is accessed via the user's master catalog. Permanent files are not discarded when the user logs out of NOS/VE. Contrast with Local File.

Program

A set of instructions or actions that can interface with Screen Formatting.

Protected and Unprotected Text

Protected text is text that cannot be changed by the terminal user. Unprotected text can be changed by the terminal user.

S

SCL

See System Command Language

Special Character

See Symbol.

Symbol

Any character that is not an alphabetic character or a digit. Examples are: #, $, %, &, and *. See also Character.

System Command Language

The language that provides the interface to the features and capabilities of NOS/VE.

T

Target Form

The desired form that is created from the design form.

Temporary File

See Local File.

Terminal Session

The processing sequence that begins when a user logs in to an operating system and ends when the user logs out.

U

User Name

A name that identifies a NOS/VE user.

Related Manuals B

The following lists the categories of manuals which relate to NOS/VE.

If you are familiar with the SCL System Interface, SCL Language Definition, and SCL Quick Reference manuals, you will find they are retitled and reorganized for NOS/VE release 1.3.1, PSR level 700. Descriptions of the changes follow:

SCL System Interface and SCL Language Definition

The SCL System Interface and SCL Language Definition manuals are replaced by a single manual, *NOS/VE System Usage*. NOS/VE System Usage contains the information you once found in the two manuals, except for the formats of commands and functions. Look for the command and function formats in the NOS/VE Commands and Functions manual.

SCL Quick Reference

The SCL Quick Reference manual is retitled *NOS/VE Commands and Functions*. It contains the same information, but is organized differently. Book 1 describes the formats of the commands and functions not associated with utilities. Book 2 describes the commands and subcommands of the command utilities.

Related Manuals B

All NOS/VE manuals and related hardware manuals are listed in table B-1. If your site has installed the online manuals, you can find an abstract for each NOS/VE manual in the online System Information manual. To access this manual, enter:

```
/explain
```

Ordering Printed Manuals

To order a printed Control Data manual, send an order form to:

Control Data Corporation
Literature and Distribution Services
308 North Dale Street
St. Paul, Minnesota 55103

To obtain an order form or to get more information about ordering Control Data manuals, write to the above address or call (612) 292-2101. If you are a Control Data employee, call (612) 292-2100.

Accessing Online Manuals

To access the online version of a printed manual, log in to NOS/VE and enter the online title on the EXPLAIN command (table B-1 supplies the online titles). For example, to see the NOS/VE Commands and Functions manual, enter:

```
/help manual=scl
```

The examples in some printed manuals exist also in the online Examples manual. To access this manual, enter:

```
/help manual=examples
```

When EXAMPLES is listed in the Online Manuals column in table B-1, that manual is represented in the online Examples manual.

Table B-1. Related Manuals

Manual Title	Publication Number	Online Manuals[1]
NOS/VE Site Manuals:		
CYBER 930 Computer System Guide to Operations Usage	60469560	
CYBER Initialization Package (CIP) Reference Manual	60457180	
Desktop/VE Host Utilities Usage	60463918	
MAINTAIN_MAIL[2] Usage		MAIM
NOS/VE Accounting Analysis System Usage	60463923	
NOS/VE Accounting and Validation Utilities for Dual State Usage	60458910	
NOS/VE LCN Configuration and Network Management Usage	60463917	
NOS/VE Network Management Usage	60463916	
NOS/VE Operations Usage	60463914	

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

2. To access this manual, you must be the administrator for MAIL/VE.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
Site Manuals (Continued):		
NOS/VE System Performance and Maintenance Volume 1: Performance Usage	60463915	
NOS/VE System Performance and Maintenance Volume 2: Maintenance Usage	60463925	
NOS/VE User Validation Usage	60464513	
NOS/VE User Manuals:		
EDIT_CATALOG Usage		EDIT_ CATALOG
EDIT_CATALOG for NOS/VE Summary	60487719	
Introduction to NOS/VE Tutorial	60464012	
NOS/VE Advanced File Management Tutorial	60486412	AFM_T

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
NOS/VE User Manuals (Continued):		
NOS/VE Advanced File Management Usage	60486413	AFM
NOS/VE Advanced File Management Summary	60486419	
NOS/VE Commands and Functions Quick Reference	60464018	SCL
NOS/VE File Editor Tutorial/Usage	60464015	EXAMPLES
NOS/VE Object Code Management Usage	60464413	OCM
NOS/VE Screen Formatting Usage	60488813	EXAMPLES
NOS/VE Source Code Management Usage	60464313	SCM and EXAMPLES
NOS/VE System Usage	60464014	EXAMPLES
NOS/VE Terminal Definition Usage	60464016	
Screen Design Facility for NOS/VE Usage	60488613	SDF

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
CYBIL Manuals:		
CYBIL for NOS/VE File Management Usage	60464114	EXAMPLES
CYBIL for NOS/VE Keyed-File and Sort/Merge Interfaces Usage	60464117	EXAMPLES
CYBIL for NOS/VE Language Definition Usage	60464113	CYBIL and EXAMPLES
CYBIL for NOS/VE Sequential and Byte-Addressable Files Usage	60464116	EXAMPLES
CYBIL for NOS/VE System Interface Usage	60464115	EXAMPLES

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
FORTRAN Manuals:		
FORTRAN Version 1 for NOS/VE Language Definition Usage	60485913	EXAMPLES
FORTRAN Version 1 for NOS/VE Quick Reference		FORTRAN
FORTRAN Version 2 for NOS/VE Language Definition Usage	60487113	EXAMPLES
FORTRAN Version 2 for NOS/VE Quick Reference		VFORTRAN
FORTRAN for NOS/VE Tutorial	60485912	FORTRAN_T
FORTRAN for NOS/VE Topics for FORTRAN Programmers Usage	60485916	
FORTRAN for NOS/VE Summary	60485919	
COBOL Manuals:		
COBOL for NOS/VE Summary	60486019	

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
COBOL Manuals (Continued):		
COBOL for NOS/VE Tutorial	60486012	COBOL_T
COBOL for NOS/VE Usage	60486013	COBOL and EXAMPLES
Other Compiler Manuals:		
ADA for NOS/VE Usage	60498113	ADA
ADA for NOS/VE Reference Manual	60498118	EXAMPLES
APL for NOS/VE File Utilities Usage	60485814	
APL for NOS/VE Language Definition Usage	60485813	
BASIC for NOS/VE Summary Card	60486319	
BASIC for NOS/VE Usage	60486313	BASIC
LISP for NOS/VE Usage Supplement	60486213	
Pascal for NOS/VE Summary Card	60485619	

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
Other Compiler Manuals (Continued):		
Pascal for NOS/VE Usage	60485613	PASCAL and EXAMPLES
Prolog for NOS/VE Quick Reference	60486718	PROLOG
Prolog for NOS/VE Usage	60486713	
VX/VE Manuals:		
C/VE for NOS/VE Quick Reference		C
C/VE for NOS/VE Usage	60469830	
DWB/VX Introduction and User Reference Tutorial/Usage	60469890	
DWB/VX Macro Packages Guide Usage	60469910	
DWB/VX Preprocessors Guide Usage	60469920	
DWB/VX Text Formatters Guide Usage	60469900	

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
VX/VE Manuals (Continued):		
VX/VE Administrator Guide and Reference Tutorial/Usage	60469770	
VX/VE An Introduction for UNIX Users Tutorial/Usage	60469980	
VX/VE Programmer Guide Tutorial	60469790	
VX/VE Programmer Reference Usage	60469820	
VX/VE Support Tools Guide Tutorial	60469800	
VX/VE User Guide Tutorial	60469780	
VX/VE User Reference Usage	60469810	

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
Data Management Manuals:		
DM Command Procedures Reference Manual	60487905	
DM Concepts and Facilities Manual	60487900	
DM Error Message Summary for DM on CDC NOS/VE	60487906	
DM Fundamental Query and Manipulation Manual	60487903	
DM Report Writer Reference Manual	60487904	
DM System Administrator's Reference Manual for DM on CDC NOS/VE	60487902	
DM Utilities Reference Manual for DM on CDC NOS/VE	60487901	

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
Information Management Manuals:		
IM/Control for NOS/VE Quick Reference	L60488918	CONTROL
IM/Control for NOS/VE Usage	60488913	
IM/Quick for NOS/VE Tutorial	60485712	
IM/Quick for NOS/VE Summary	60485714	
IM/Quick for NOS/VE Usage		QUICK
CDCNET Manuals:		
CDCNET Access Guide	60463830	CDCNET_ ACCESS
CDCNET Batch Device User Guide	60463863	CDCNET_ BATCH
CDCNET Commands Quick Reference	60000020	
CDCNET Configuration and Site Administration Guide	60461550	
CDCNET Diagnostic Messages	60461600	
CDCNET Conceptual Overview	60461540	

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
CDCNET Manuals (Continued):		
CDCNET Network Analysis	60461590	
CDCNET Network Configuration Utility		NETCU
CDCNET Network Configuration Utility Summary Card	60000269	
CDCNET Network Operations	60461520	
CDCNET Network Performance Analyzer	60461510	
CDCNET Product Descriptions	60460590	
CDCNET Systems Programmer's Reference Manual Volume 1 Base System Software	60462410	
CDCNET Systems Programmer's Reference Manual Volume 2 Network Management Entities and Layer Interfaces	60462420	
CDCNET Systems Programmer's Reference Manual Volume 3 Network Protocols	60462430	
CDCNET Terminal Interface Usage	60463850	
CDCNET TCP/IP Usage	60000214	

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
Migration Manuals:		
Migration from IBM to NOS/VE Tutorial/Usage	60489507	
Migration from NOS to NOS/VE Tutorial/Usage	60489503	
Migration from NOS to NOS/VE Standalone Tutorial/Usage	60489504	
Migration from NOS/BE to NOS/VE Tutorial/Usage	60489505	
Migration from NOS/BE to NOS/VE Standalone Tutorial/Usage	60489506	
Migration from VAX/VMS to NOS/VE Tutorial/Usage	60489508	
Miscellaneous Manuals:		
Applications Directory	60455370	
CONTEXT Summary Card	60488419	
CYBER Online Text for NOS/VE Usage	60488403	CONTEXT
Control Data CONNECT User's Guide	60462560	

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
Miscellaneous Manuals (Continued):		
Debug for NOS/VE Quick Reference		DEBUG
Debug for NOS/VE Usage	60488213	
Desktop/VE for Macintosh Tutorial	60464502	
Desktop/VE for Macintosh Usage	60464503	
NOS/VE Diagnostic Messages Usage	60464613	MESSAGES
MAIL/VE Summary Card	60464519	
MAIL/VE Usage		MAIL_VE
Math Library for NOS/VE Usage	60486513	
NOS/VE Examples Usage		EXAMPLES
NOS/VE System Information		NOS_VE

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
Miscellaneous Manuals (Continued):		
Programming Environment for NOS/VE Usage		ENVIRON-MENT
Programming Environment for NOS/VE Summary	60486819	
Professional Programming Environment for NOS/VE Quick Reference		PPE
Professional Programming Environment for NOS/VE Usage	60486613	
Remote Host Facility Usage	60460620	
Hardware Manuals:		
CYBER 170 Computer Systems Models 825, 835, and 855 General Description Hardware Reference	60459960	
CYBER 170 Computer Systems, Models 815, 825, 835, 845, and 855 CYBER 180 Models 810, 830, 835, 840, 845, 850, 855, and 860 Codes Booklet	60458100	

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

(Continued)

Table B-1. Related Manuals *(Continued)*

Manual Title	Publication Number	Online Manuals[1]
Hardware Manuals (Continued):		
CYBER 170 Computer Systems, Models 815, 825, 835, 845, and 855 CYBER 180 Models 810, 830, 835, 840, 845, 850, 855, and 860 Maintenance Register Codes Booklet	60458110	
HPA/VE Reference	60461930	
Virtual State Volume II Hardware Reference	60458890	
7021-31/32 Advanced Tape Subsystem Reference	60449600	
7221-1 Intelligent Small Magnetic Tape Subsystem Reference	60461090	

1. This column lists the title of the online version of the manual and indicates whether the examples in the printed manual are in the online Examples manual.

Screen Formatting and Terminal Definitions

C

Screen Formatting and Terminal Definitions C

Here is a list of Screen Formatting and terminal definition attributes. Screen Formatting attributes are mapped to terminal definition attributes. Changing a terminal definition attribute can change how a Screen Formatting attribute is displayed on the screen.

Screen Formatting Attribute	Terminal Definition Attribute
fdc$inverse_video	inverse_begin
fdc$low_intensity	low_intensity_begin
fdc$high_intensity	high_intensity_begin
fdc$blink	blink_begin
fdc$underline	underline_begin
fdc$protect	protect_begin
fdc$black_foreground	black_foreground
fdc$blue_foreground	blue_foreground
fdc$green_foreground	green_foreground
fdc$magenta_foreground	magenta_foreground
fdc$red_foreground	red_foreground
fdc$cyan_foreground	cyan_foreground
fdc$yellow_foreground	yellow_foreground
fdc$white_foreground	white_foreground
fdc$black_background	black_background
fdc$blue_background	blue_background
fdc$green_background	green_background
fdc$magenta_background	magenta_background
fdc$red_background	red_background
fdc$cyan_background	cyan_background
fdc$yellow_background	yellow_background
fdc$white_background	white_background
fdc$fine_line	ld_fine_begin
fdc$medium_line	ld_medium_begin
fdc$bold_line	ld_bold_begin
fdc$fine_border	ld_fine_begin
fdc$medium_border	ld_medium_begin
fdc$bold_border	ld_bold_begin
fdc$italic_display_attribute	italic_begin
fdc$title_display_attribute	title_begin
fdc$input_display_attribute	input_text_begin
fdc$error_display_attribute	error_begin
fdc$message_display_attribute	message_begin

Screen Formatting uses for defaults:

fdc$black_background, fdc$white_foreground for forms

fdc$medium_line for lines and boxes

fdc$inverse_video for event label text in event forms

fdc$underline for design attributes of objects that do not have any other display attributes

Here is a list of Screen Formatting event triggers and the appropriate terminal definition keys. The Screen Formatting event trigger maps the Screen Formatting definitions to the terminal definitions.

Screen Formatting Event Trigger	Terminal Definition Keys
fdc$next	next
fdc$shift_next	next_s
fdc$help	help
fdc$shift_help	help_s
fdc$stop	stop
fdc$shift_stop	stop_s
fdc$back	back
fdc$undo	undo
fdc$redo	redo
fdc$quit	stop_s
fdc$exit	stop
fdc$shift_back	back_s
fdc$up	up
fdc$shift_up	up_s
fdc$down	down
fdc$shift_down	down_s
fdc$foreward	fwd
fdc$shift_foreward	fwd_s
fdc$backward	bkw
fdc$shift_backward	bkw_s
fdc$edit	edit
fdc$shift_edit	edit_s
fdc$data	data
fdc$shift_data	data_s
fdc$function_1	f1
fdc$shift_function_1	f1_s

Screen Formatting Event Trigger	Terminal Definition Keys
fdc$function_2	f2
fdc$shift_function_2	f2_s
fdc$function_3	f3
fdc$shift_function_3	f3_s
fdc$function_4	f4
fdc$shift_function_4	f4_s
fdc$function_5	f5
fdc$shift_function_5	f5_s
fdc$function_6	f6
fdc$shift_function_6	f6_s
fdc$function_7	f7
fdc$shift_function_7	f7_s
fdc$function_8	f8
fdc$shift_function_8	f8_s
fdc$function_9	f9
fdc$shift_function_9	f9_s
fdc$function_10	f10
fdc$shift_function_10	f10_s
fdc$function_11	f11
fdc$shift_function_11	f11_s
fdc$function_12	f12
fdc$shift_function_12	f12_s
fdc$function_13	f13
fdc$shift_function_13	f13_s
fdc$function_14	f14
fdc$shift_function_14	f14_s
fdc$function_15	f15
fdc$shift_function_15	f15_s
fdc$function_16	f16
fdc$shift_function_16	f16_s

COBOL Parameter Definitions D

COBOL Parameter Definitions D

This appendix contains the COBOL parameter definitions. Your COBOL program should copy the FDE$COBOL_STATUS deck into the program to obtain the conditions for the COBOL status parameter (see chapter 2). Your program should also copy the FDE$COBOL_VARIABLE_STATUS deck into the program to obtain the conditions for the COBOL variable status parameter. Errors are then generated (if they occur) when the program is run.

See chapter 2 for details on how to obtain the decks that contain the COBOL parameter definitions. The library,

$SYSTEM.CYBIL.OSF$PROGRAM_INTERFACE

contains the information you need to execute the COBOL program.

FDE$COBOL_STATUS Deck

The contents of this deck follow.

```
01  FDE-COBOL-STATUS USAGE COMP PIC S9(18) SYNC LEFT.
    88 FDE-REQUEST-SUCCESSFUL VALUE 0.
    88 FDE-TERMINAL-DISCONNECTED VALUE 1.
    88 FDE-NO-INPUT-REQUEST VALUE 2.
    88 FDE-CURSOR-NOT-IN-VARIABLE VALUE 3.

    88 FDE-MORE-ERRORS-EXIST VALUE 4.
    88 FDE-UNKNOWN-FORM-NAME VALUE 5.
    88 FDE-FORM-COMPILATION-ERRORS VALUE 6.
    88 FDE-NO-SPACE-AVAILABLE VALUE 7.

    88 FDE-UNSUPPORTED-TERMINAL VALUE 8.
    88 FDE-INVALID-FORM-IDENTIFIER VALUE 9.
    88 FDE-INVALID-USER-ENTRY VALUE 10.
    88 FDE-UNKNOWN-VARIABLE-NAME VALUE 11.

    88 FDE-TOO-MANY-INTEGERS VALUE 12.
    88 FDE-OBJECT-NAME-EXISTS VALUE 13.
    88 FDE-WORK-INVALID VALUE 14.
    88 FDE-INVALID-X-FORM-POSITION VALUE 15.
```

```
88 FDE-INVALID-Y-FORM-POSITION VALUE 16.
88 FDE-INVALID-WIDTH VALUE 17.
88 FDE-INVALID-HEIGHT VALUE 18.
88 FDE-INVALID-MESSAGE-FORM-NAME VALUE 19.

88 FDE-INVALID-OCCURRENCE VALUE 20.
88 FDE-INVALID-CHARACTER-POSITION VALUE 21.
88 FDE-INVALID-MODE VALUE 22.
88 FDE-INVALID-STATE VALUE 23.

88 FDE-INVALID-VARIABLE-VALUE VALUE 24.
88 FDE-INVALID-OBJECT-NAME VALUE 25.
88 FDE-INVALID-FORM-NAME VALUE 26.
88 FDE-FORM-CLOSED VALUE 27.

88 FDE-TOO-MANY-ATTRIBUTES VALUE 28.
88 FDE-INVALID-ATTRIBUTE-NAME VALUE 29.
88 FDE-TOO-MANY-SCREEN-OCCURRENCE VALUE 30.
88 FDE-NO-FORM-DEFINITION VALUE 31.

88 FDE-TOO-MANY-STORED-OCCURRENCE VALUE 32.
88 FDE-UNKNOWN-OBJECT-NAME VALUE 33.
88 FDE-NO-DEFINE-OBJECT-NAME VALUE 34.
88 FDE-INVALID-NAME VALUE 35.

88 FDE-SYSTEM-ERROR VALUE 36.
88 FDE-INVALID-TABLE-NAME VALUE 37.
88 FDE-INVALID-VARIABLE-NAME VALUE 38.
88 FDE-FORM-PUSHED VALUE 39.

88 FDE-UNKNOWN-TABLE-NAME VALUE 40.
88 FDE-NO-VARIABLE-DEFINED VALUE 41.
88 FDE-NO-FORMS-TO-POP VALUE 42.
88 FDE-ONLY-CHARACTER-DATA VALUE 43.

88 FDE-ONLY-NONCHARACTER-DATA VALUE 44.
88 FDE-FORM-DEFINITION-ERRORS VALUE 45.
88 FDE-NO-FORMS-TO-PUSH VALUE 46.
88 FDE-INVALID-PROGRAM-VALUES VALUE 47.
```

```
88 FDE-INPUT-HAS-UNKNOWN-VALUE VALUE 48.
88 FDE-INVALID-INPUT-VALUES VALUE 49.
88 FDE-NOT-AN-INPUT-VARIABLE VALUE 50.
88 FDE-CURSOR-NOT-IN-FORM VALUE 51.

88 FDE-FORM-HAS-NO-VARIABLES VALUE 52.
88 FDE-NO-FORMS-TO-SHOW VALUE 53.
88 FDE-FORM-NOT-SCHEDULED VALUE 54.
88 FDE-INVALID-EVENT-NAME VALUE 55.

88 FDE-INVALID-X-POSITION VALUE 56.
88 FDE-INVALID-Y-POSITION VALUE 57.
88 FDE-UNKNOWN-EVENT-NAME VALUE 58.
88 FDE-INVALID-DECK-NAME VALUE 59.

88 FDE-INVALID-RECORD-NAME VALUE 60.
88 FDE-OBJECT-EXISTS VALUE 61.
88 FDE-TABLE-NAME-EXISTS VALUE 62.
88 FDE-OBJECT-OVERLAYS VALUE 63.

88 FDE-TOO-MANY-REALS VALUE 64.
88 FDE-TOO-MANY-STRINGS VALUE 65.
88 FDE-NO-OBJECT-AT-POSITION VALUE 66.
88 FDE-ARRAY-TOO-SMALL VALUE 67.

88 FDE-STRING-TOO-SMALL VALUE 68.
88 FDE-VARIABLE-NAME-EXISTS VALUE 69.
88 FDE-FORM-ALREADY-ADDED VALUE 70.
88 FDE-INVALID-EVENT-ACTIVE VALUE 72.

88 FDE-CANNOT-UPDATE-OPENED-FORM VALUE 73.
88 FDE-HELP-FORM-EXISTS VALUE 74.
88 FDE-ERROR-FORM-EXISTS VALUE 75.
88 FDE-ERROR-MESSAGE-EXISTS VALUE 76.

88 FDE-HELP-MESSAGE-EXISTS VALUE 77.
88 FDE-INVALID-DISPLAY-NAME VALUE 78.
88 FDE-INVALID-REAL-RANGE VALUE 79.
88 FDE-INVALID-INTEGER-RANGE VALUE 80.
```

```
88 FDE-UNKNOWN-INTEGER-RANGE VALUE 81.
88 FDE-UNKNOWN-REAL-RANGE VALUE 82.
88 FDE-UNKNOWN-VALID-STRING VALUE 83.
88 FDE-DISPLAY-NAME-EXISTS VALUE 84.

88 FDE-EVENT-NAME-EXISTS VALUE 85.
88 FDE-UNKNOWN-DISPLAY-NAME VALUE 86.
88 FDE-TOO-MANY-FORM-NAMES VALUE 87.
88 FDE-TOO-MANY-FORM-OBJECTS VALUE 88.

88 FDE-NO-TEXT-AT-POSITION VALUE 89.
88 FDE-NO-TEXT-FOR-OBJECT VALUE 90.
88 FDE-UNKNOWN-OCCURRENCE VALUE 91.
88 FDE-NO-STRING VALUE 92.

88 FDE-RANGE-OVERLAP VALUE 93.
88 FDE-NO-COMMENTS-TO-DELETE VALUE 94.
88 FDE-OBJECT-OCCURRENCE-EXISTS VALUE 95.
88 FDE-NO-STRING-SPECIFIED VALUE 96.

88 FDE-VALID-STRING-EXISTS VALUE 97.
88 FDE-INVALID-OBJECT-CHANGE VALUE 98.
88 FDE-INVALID-ADDRESS VALUE 99.
88 FDE-TERMINAL-NOT-IDENTIFIED VALUE 100.

88 FDE-INVALID-FORM-LANGUAGE VALUE 101.
88 FDE-INVALID-FORM-AREA-KEY VALUE 102.
88 FDE-FORM-NAME-REQUIRED VALUE 103.
88 FDE-NO-FORMS-TO-READ VALUE 104.

88 FDE-INVALID-HELP-FORM-NAME VALUE 105.
88 FDE-INVALID-ERROR-FORM-NAME VALUE 106.
88 FDE-CREATE-MARK-INVALID VALUE 107.
88 FDE-DELETE-MARK-INVALID VALUE 108.

88 FDE-NO-MARK-DEFINED VALUE 109.
88 FDE-AREA-CUTS-OBJECT VALUE 110.
88 FDE-COPY-OUTSIDE-FORM VALUE 111.
88 FDE-MOVE-OUTSIDE-FORM VALUE 112.
```

```
88 FDE-INVALID-FORM-ATTRIBUTE VALUE 113.
88 FDE-INVALID-RECORD-ATTRIBUTE VALUE 114.
88 FDE-INVALID-OBJECT-KEY VALUE 115.
88 FDE-INVALID-OBJECT-ATTRIBUTE VALUE 116.

88 FDE-INVALID-TABLE-ATTRIBUTE VALUE 117.
88 FDE-PROGRAM-DATA-TYPE VALUE 118.
88 FDE-INVALID-OUTPUT-FORMAT-KEY VALUE 119.
88 FDE-INVALID-ERROR-KEY VALUE 120.

88 FDE-INVALID-VARIABLE-ATTRIBUTE VALUE 121.
88 FDE-INVALID-HELP-KEY VALUE 123.
88 FDE-FEATURE-NOT-IMPLEMENTED VALUE 124.
88 FDE-CANNOT-CHANGE-FORM VALUE 125.

88 FDE-INVALID-RECORD-TYPE VALUE 126.
88 FDE-OBJECT-NOT-IN-FORM VALUE 127.
88 FDE-INVALID-FORM-PROCESSOR VALUE 128.
88 FDE-INVALID-X-INCREMENT VALUE 129.

88 FDE-INVALID-Y-INCREMENT VALUE 130.
88 FDE-FORM-TOO-LARGE-FOR-SCREEN VALUE 131.
88 FDE-INVALID-TEXT-PROCESSING VALUE 132.
88 FDE-INVALID-DESIGN-FORM VALUE 133.

88 FDE-NO-OBJECT-VAR-DEFINED VALUE 134.
88 FDE-EVENT-NOT-ASSIGNED VALUE 135.
88 FDE-FORM-NOT-ENDED VALUE 136.
88 FDE-INVALID-EVENT-FORM-NAME VALUE 137.

88 FDE-INVALID-EVENT-FORM-KEY VALUE 138.
88 FDE-FORM-ALREADY-OPEN VALUE 139.
88 FDE-INVALID-EVENT-LABEL VALUE 140.
88 FDE-FORM-NEEDS-CONVERSION VALUE 141.

88 FDE-NO-EVENTS-ACTIVE VALUE 142.
88 FDE-DELETE-OUTSIDE-FORM VALUE 143.
88 FDE-MARK-OUTSIDE-FORM VALUE 144.
88 FDE-BAD-DATA-VALUE VALUE 145.
```

```
        88 FDE-RECORD-DEFN-NOT-WRITTEN VALUE 146.
        88 FDE-WRONG-VARIABLE-TYPE VALUE 147.
        88 FDE-INVALID-VARIABLE-LENGTH VALUE 148.
        88 FDE-EVENT-TRIGGER-EXISTS VALUE 149.

        88 FDE-FORM-ALREADY-COMBINED VALUE 150
        88 FDE-INVALID-TABLE-SIZE VALUE 151.
        88 FDE-FORM-NOT-ADDED-VALUE 152.
        88 FDE-INVALID-INPUT-FORMAT-KEY VALUE 153.
```

FDE$COBOL_VARIABLE_STATUS Deck

The contents of this deck follow.

```
    01  FDE-COBOL-VARIABLE-STATUS USAGE COMP PIC S9(18) SYNC LEFT.
        88 FDE-NO-ERROR VALUE 0.
        88 FDE-INVALID-STRING VALUE 1.
        88 FDE-INVALID-REAL VALUE 2.

        88 FDE-INVALID-INTEGER VALUE 3.
        88 FDE-UNKNOWN-USER-VALUE VALUE 4.
        88 FDE-INVALID-BDP-DATA VALUE 5.
        88 FDE-NO-DIGITS VALUE 6.

        88 FDE-LOSS-OF-SIGNIFICANCE VALUE 7.
        88 FDE-VARIABLE-NO-FILLED VALUE 8.
        88 FDE-OVERFLOW VALUE 9.
        88 FDE-UNDERFLOW VALUE 10.

        88 FDE-INDEFINITE VALUE 11.
        88 FDE-INFINITE VALUE 12.
        88 FDE-VARIABLE-NOT-ENTERED VALUE 13.
        88 FDE-OUTPUT-FORMAT-BAD VALUE 14.
        88 FDE-VARIABLE-TRUNCATED VALUE 15.
```

CYBIL Constants and Types E

CYBIL Constants and Types E

This section lists the types and constants that are in each external reference routine. You can copy the data into your program by using the appropriate SCU *COPY directive. For an example, refer to the CYBIL chapters in this manual and the section on file interface procedures in the CYBIL for NOS/VE Usage manual.

Constants

```
fdc$max_character_position = fdc$maximum_record_length;
fdc$maximum_comment_length = fdc$maximum_text_length;
fdc$maximum_comments = 10000;
fdc$maximum_errors = 10000;

fdc$maximum_error_length = fdc$maximum_text_length;
fdc$maximum_events = 1000;
fdc$maximum_help_length = fdc$maximum_text_length;
fdc$maximum_form_identifier = 1000;

fdc$maximum_objects = 10000;
fdc$maximum_object_displays = 100;
fdc$maximum_occurrence = 1000;
fdc$maximum_record_length = osc$max_segment_length;

fdc$maximum_table_variables = 10000;
fdc$maximum_tables = 10000;
fdc$maximum_text_length = cyc$max_string_size;
fdc$maximum_valid_ranges = 10000;

fdc$maximum_valid_string = fdc$maximum_text_length;
fdc$maximum_valid_strings = 10000;
fdc$maximum_variable_length = fdc$maximum_record_length;
fdc$maximum_variables = fdc$maximum_objects;

fdc$maximum_x_position = 256;
fdc$maximum_y_position = 256;
fdc$message_form_name = 'FDM$MESSAGE_FORM
fdc$new_line_character = $char (31); {Unit separator}
```

```
fdc$system_coordinate_system = fdc$character_system;
fdc$system_currency_sign = '$';
fdc$system_decimal_point = '.';
fdc$system_design_table_name = 'DTBL';

fdc$system_design_variable_name = 'DVAR';
fdc$system_display_name = 'HIGHLIGHT';
fdc$system_error_message = 'Please correct.';
fdc$system_exponent_character = 'E';

fdc$system_form_processor = fdc$cybil_processor;
fdc$system_help_message = 'Please enter.';
fdc$system_input_format = fdc$character_input_format;
fdc$system_io_mode = fdc$terminal_input_output;

fdc$system_output_format = fdc$character_output_format;
fdc$system_occurrence = 1;
fdc$system_program_data_type = fdc$program_character_type;
fdc$system_record_type = fdc$program_data_type_record;

fdc$system_thousands_separator = ',';
fdc$system_unknown_entry = '?';
fdc$system_user_entry = fdc$must_enter;
```

Types

```
fdt$change_form_key = (fdc$add_display_definition,
   fdc$add_event, fdc$add_form_comment, fdc$delete_all_displays,
   fdc$delete_all_events, fdc$delete_display_defintion,
   fdc$delete_event, fdc$delete_form_comments,
   fdc$design_display_attribute, fdc$design_variable_name,
   fdc$event_form, fdc$form_area, fdc$form_display_attribute,
   fdc$form_help, fdc$form_language, fdc$form_name,
   fdc$form_processor, fdc$message_form, fdc$unused_form_entry);

fdt$change_object_key = (fdc$object_name, fdc$object_display,
   fdc$object_position, fdc$unused_object_entry,
   fdc$object_width, fdc$object_height, fdc$object_text,
   fdc$object_line_x_increment, fdc$object_line_y_increment,
   fdc$object_text_processing);

fdt$change_record_key = (fdc$record_deck_name, fdc$record_name,
   fdc$record_type, fdc$table_access, fdc$unused_record_entry);

fdt$change_table_key = (fdc$add_table_variable,
   fdc$delete_table_variable, fdc$new_table_name,
   fdc$stored_occurrence, fdc$unused_table_entry,
   fdc$visible_occurrence);

fdt$change_variable_key = (fdc$error_display,
   fdc$output_format, fdc$input_format, fdc$io_mode,
   fdc$terminal_user_entry, fdc$variable_length,
   fdc$add_valid_real_range, fdc$delete_valid_real_range,
   fdc$add_valid_integer_range, fdc$delete_valid_integer_range,
   fdc$add_valid_string, fdc$delete_valid_string,
   fdc$variable_help, fdc$variable_error, fdc$add_var_comment,
   fdc$delete_var_comments, fdc$unused_variable_entry,
   fdc$new_variable_name, fdc$process_as_event,
   fdc$unknown_entry_character, fdc$string_compare_rules,
   fdc$program_data_type);
```

```
fdt$character_position = 1 .. fdc$max_character_position;

fdt$comment = string ( * <= fdc$maximum_comment_length);

fdt$comment_length = 0 .. fdc$maximum_comment_length;

fdt$digits_in_exponent = mlt$exponent_style;

fdt$digits_right_decimal = 1 .. 19;

fdt$display_attribute = (fdc$inverse_video, fdc$low_intensity,
   fdc$high_intensity, fdc$blink, fdc$underline, fdc$protect,
   fdc$hidden, fdc$black_foreground, fdc$black_background,
   fdc$blue_foreground, fdc$blue_background,
   fdc$green_foreground, fdc$green_background,
   fdc$magenta_foreground, fdc$magenta_background,
   fdc$red_foreground, fdc$red_background, fdc$cyan_foreground,
   fdc$cyan_background, fdc$yellow_foreground,
   fdc$yellow_background, fdc$white_foreground,
   fdc$white_background, fdc$fine_line, fdc$medium_line,
   fdc$bold_line, fdc$fine_border, fdc$medium_border,
   fdc$bold_border, fdc$italic_display_attribute,
   fdc$title_display_attribute, fdc$input_display_attribute,
   fdc$error_display_attribute, fdc$message_display_attribute,
   fdc$display_left_to_right, fdc$display_right_to_left,
   fdc$push_input_character, fdc$user_attribute_1,
   fdc$user_attribute_2, fdc$user_attribute_3,
   fdc$user_attribute_4, fdc$user_attribute_5,
   fdc$user_attribute_6, fdc$user_attribute_7,
   fdc$user_attribute_8, fdc$user_attribute_9,
   fdc$user_attribute_10);

fdt$display_attribute_set = set of fdt$display_attribute;
```

```
fdt$error_definition = record
   case key: fdt$error_key of
   =  fdc$error_form =
      error_form: ost$name,
   =  fdc$error_message =
      p_error_message: ^fdt$error_message,
   =  fdc$no_error_response =
      ,
   =  fdc$system_default_error =
      ,
   casend
recend;

fdt$error_key = (fdc$error_form, fdc$error_message,
   fdc$no_error_response, fdc$system_default_error);

fdt$error_message = string ( * <= fdc$maximum_error_length);

fdt$error_message_length = 0 .. fdc$maximum_error_length;

fdt$error_no_table_object = record
   occurrence: fdt$occurrence,
   table_name: ost$name,
   variable_name: ost$name,
recend;

fdt$error_no_table_variable = record
   table_name: ost$name,
   variable_name: ost$name,
recend;

fdt$error_no_variable_object = record
   occurrence: fdt$occurrence,
   variable_name: ost$name,
recend;
```

```
fdt$event_action = (fdc$return_program_normal,
   fdc$return_program_abnormal, fdc$page_table_forward,
   fdc$page_table_backward, fdc$scroll_table_forward,
   fdc$scroll_table_backward, fdc$display_help, fdc$erase_help,
   fdc$execute_command, fdc$ignore_event,
   fdc$tab_to_next_form_field, fdc$tab_to_previous_form_field,
   fdc$scroll_variable_forward, fdc$scroll_variable_backward),
   fdc$page_variable_forward,fdc$page_variable_backward,
   fdc$page_variable_first,fdc$page_variable_last,
   fdc$page_table_first,fdc$page_table_last);

fdt$event_command = string ( * );

fdt$event_form_definition = record
   case key: fdt$event_form_key of
   = fdc$no_event_form =
      ,
   = fdc$system_default_event_form =
      ,
   = fdc$user_event_form =
      event_form_name: ost$name,
   casend
recend;
```

```
fdt$event_form_key = (fdc$no_event_form,
   fdc$system_default_event_form, fdc$user_event_form);

fdt$event_position = record
   form_identifier: fdt$form_identifier,
   form_x_position: fdt$x_position,
   form_y_position: fdt$y_position,
   screen_x_position: fdt$x_position,
   screen_y_position: fdt$y_position,
   case key: fdt$event_position_key of
   =  fdc$form_event =
      ,
   =  fdc$object_event =
      object_name: ost$name,
      object_occurrence: fdt$occurrence,
      object_x_position: fdt$x_position,
      object_y_position: fdt$y_position,
      case object_definition_key: fdt$object_definition_key of
      =  fdc$box,fdc$constant_text, fdc$constant_text_box,
         fdc$line,fdc$table =
         ,
      =  fdc$variable_text, fdc$variable_text_box =
        character_position: fdt$character_position,
      casend
   casend
recend;
```

```
fdt$event_position_key = (fdc$form_event, fdc$object_event,
   fdc$screen_event);

fdt$event_trigger = (fdc$next, fdc$help, fdc$stop, fdc$back,
   fdc$up, fdc$down, fdc$forward, fdc$backward, fdc$undo,
   fdc$redo, fdc$quit, fdc$exit, fdc$first, fdc$last, fdc$edit,
   fdc$data, fdc$function_1, fdc$function_2, fdc$function_3,
   fdc$function_4, fdc$function_5, fdc$function_6,
   fdc$function_7, fdc$function_8, fdc$function_9,
   fdc$function_10, fdc$function_11, fdc$function_12,
   fdc$function_13, fdc$function_14, fdc$function_15,
   fdc$function_16, fdc$shift_next, fdc$shift_help,
   fdc$shift_stop, fdc$shift_back, fdc$shift_up, fdc$shift_down,
   fdc$shift_forward, fdc$shift_backward, fdc$shift_edit,
   fdc$shift_data, fdc$shift_function_1, fdc$shift_function_2,
   fdc$shift_function_3, fdc$shift_function_4,
   fdc$shift_function_5, fdc$shift_function_6,
   fdc$shift_function_7, fdc$shift_function_8,
   fdc$shift_function_9, fdc$shift_function_10,
   fdc$shift_function_11, fdc$shift_function_12,
   fdc$shift_function_13, fdc$shift_function_14,
   fdc$shift_function_15, fdc$shift_function_16, fdc$pick,
   fdc$insert_line, fdc$delete_line, fdc$home_cursor,
   fdc$clear_screen, fdc$time_out, fdc$variable_trigger);

fdt$exponent_output_format = record
   field_width: fdt$real_field_width {w FORTRAN descriptor},
   digits_in_exponent: fdt$digits_in_exponent {e FORTRAN
      descriptor},
   digits_right_decimal: fdt$digits_right_decimal {d FORTRAN
      descriptor},
   sign_treatment: fdt$sign_treatment,
   suppress_zero: boolean {TRUE to display zero as blanks},
recend;

fdt$float_output_format = record
   digits_right_decimal: fdt$digits_right_decimal
      {d FORTRAN descriptor},
   field_width: fdt$real_field_width {w FORTRAN descriptor},
   sign_treatment: fdt$sign_treatment,
   suppress_zero: boolean {TRUE to display zero as blanks},
recend;
```

```
fdt$form_area = record
   case key: fdt$form_area_key of
   =  fdc$defined_area =
      x_position: fdt$x_position,
      y_position: fdt$y_position,
      width: fdt$width,
      height: fdt$height,
   =  fdc$screen_area =
      ,
   casend
recend;

fdt$form_area_key = (fdc$defined_area, fdc$screen_area);

fdt$form_attribute = record
   put_value_status: fdt$put_value_status {output},
   case key: fdt$change_form_key {input} of {input}
   =  fdc$add_event =
      event_name: ost$name,
      event_label: ost$name,
      event_trigger: fdt$event_trigger,
      case event_action: fdt$event_action of
      =  fdc$execute_command =
         p_event_command: ^fdt$event_command,
       casend,
   =  fdc$add_form_comment =
      p_form_comment: ^fdt$comment,
   =  fdc$add_display_definition =
      display_attribute: fdt$display_attribute_set,
      display_name: ost$name,
   =  fdc$delete_all_displays =
      ,
   =  fdc$delete_all_events =
      ,
   =  fdc$delete_event, fdc$delete_display_definition =
      name: ost$name,
   =  fdc$delete_form_comments =
      ,
   =  fdc$design_display_attribute =
      design_display_attribute: fdt$display_attribute_set,
   =  fdc$design_variable_name =
      design_variable_name: ost$name,
```

```
      = fdc$event_form =
        event_form_definition: fdt$event_form_definition,
      = fdc$form_area =
        form_area: fdt$form_area,
      = fdc$form_display_attribute =
        form_display_attribute: fdt$display_attribute_set,
      = fdc$form_help =
        form_help: fdt$help_definition,
      = fdc$form_language =
        form_language: ost$natural_language,
      = fdc$form_name =
        form_name: ost$name,
      = fdc$form_processor =
        form_processor: fdt$form_processor,
      = fdc$message_form =
        message_form: ost$name,
      = fdc$unused_form_entry =
        ,
    casend
  recend;

  fdt$form_attributes = array [1 .. * ] of fdt$form_attribute;

  fdt$form_identifier = 1 .. fdc$maximum_form_identifier;

  fdt$form_module = SEQ ( * );

  fdt$form_name = record
    name: ost$name,
    name_selection: fdt$name_selection,
  recend;

  fdt$form_names = array [1 .. * ] of fdt$form_name;
```

```
fdt$form_object = record
   name: ost$name,
   object: fdt$object_definition_key,
   occurrence: fdt$occurrence,
   x_position: fdt$x_position,
   y_position: fdt$y_position,
recend;

fdt$form_objects = array [1 .. * ] of fdt$form_object;

fdt$form_processor = (fdc$ansi_fortran_processor,
   fdc$cdc_fortran_processor, fdc$cobol_processor,
   fdc$cybil_processor, fdc$scl_processor);

fdt$get_error_definition = record
   case key: fdt$get_error_key of
   =  fdc$get_error_form =
      error_form: ost$name,
   =  fdc$get_error_message, fdc$get_system_default_error =
      error_message_length: fdt$error_message_length,
   =  fdc$get_no_error_response =
      ,
   casend
recend;

fdt$get_error_key = (fdc$get_error_form, fdc$get_error_message,
   fdc$get_no_error_response, fdc$get_system_default_error);

fdt$get_form_attribute = record
    get_value_status: fdt$get_value_status {output},
    case key: {input} fdt$get_form_key of
    =  fdc$get_event_command =
       event_command_name: {input} ost$name,
       p_event_command: {output} ^fdt$event_command,
    =  fdc$get_event_form =
       event_form_definition: {output} fdt$event_form_definition,
    =  fdc$get_event_form_identifier =
       event_form_identifier: {output} fdt$form_identifier,
    =  fdc$get_form_area =
       form_area: {output} fdt$form_area,
    =  fdc$get_form_comment_length =
       form_comment_length: {output} fdt$comment_length,
```

```
      = fdc$get_form_display_attribute =
        form_display_attribute: {output} fdt$display_attribute_set,
      = fdc$get_form_help =
        form_help: {output} fdt$get_help_definition,
      = fdc$get_form_help_message =
        p_form_help_message: {input} ^fdt$help_message,
      = fdc$get_form_language =
        form_language: {output} ost$natural_language,
      = fdc$get_form_name =
        form_name: {output} ost$name,
      = fdc$get_form_processor =
        form_processor: {output} fdt$form_processor,
      = fdc$get_message_form =
        message_form: {output} ost$name,
      = fdc$get_next_event =
        event_action: {output} fdt$event_action,
        event_label: {output} ost$name,
        event_name: {output} ost$name,
        event_command_length: {output} integer,
        event_trigger: {output} fdt$event_trigger,
      = fdc$get_next_form_comment =
        p_form_comment: {input} ^fdt$comment,
      = fdc$get_next_display =
        display_attribute: {output} fdt$display_attribute_set,
        display_name: {output} ost$name,
      = fdc$get_number_events =
        number_events: {output} fdt$number_events,
      = fdc$get_number_form_comments =
        number_form_comments: {output} fdt$number_comments,
      = fdc$get_number_displays =
        number_form_displays: {output} fdt$number_object_displays,
      = fdc$get_number_objects =
        number_objects: {output} fdt$number_objects,
      = fdc$get_number_tables =
        number_tables: {output} fdt$number_tables,
      = fdc$get_number_variables =
        number_variables: {output} fdt$number_variables,
      = fdc$get_unused_form_entry =
        ,
    casend
  recend;
```

```
fdt$get_form_key = (fdc$get_event_command, fdc$get_event_form,
   fdc$get_event_form_identifier, fdc$get_form_area,
   fdc$get_form_comment_length, fdc$get_form_display_attribute,
   fdc$get_form_help, fdc$get_form_help_message,
   fdc$get_form_language, fdc$get_form_name,
      fdc$get_form_processor,
   fdc$get_message_form, fdc$get_next_display,
      fdc$get_next_event,
   fdc$get_next_form_comment, fdc$get_number_displays,
   fdc$get_number_events, fdc$get_number_form_comments,
   fdc$get_number_objects, fdc$get_number_tables,
   fdc$get_number_variables, fdc$get_unused_form_entry);

fdt$get_form_attributes = array [1 .. * ] of
   fdt$get_form_attribute;

fdt$get_help_definition = record
   case key: fdt$get_help_key of
   =  fdc$get_help_form =
      help_form: ost$name,
   =  fdc$get_help_message, fdc$get_system_default_help =
      help_message_length: fdt$help_message_length,
   =  fdc$get_no_help_response =
      ,
   casend
recend;
```

```
fdt$get_object_attribute = record
   get_value_status: fdt$get_value_status {output},
   case key: {input} fdt$get_object_key of
   = fdc$get_object_definition =
      get_object_definition: {output} fdt$get_object_definition,
   = fdc$get_object_display =
      display_attribute: {output} fdt$display_attribute_set,
   = fdc$get_object_name =
      object_name: {output} ost$name,
      occurrence: {output} fdt$occurrence,
   = fdc$get_object_text =
      p_text: {input} ^fdt$text,
   = fdc$get_object_text_length =
      text_length: {output} fdt$text_length,
   = fdc$get_unused_object_entry =
      ,
   casend
recend;

fdt$get_object_attributes = array [1 .. * ] of
   fdt$get_object_attribute;

fdt$get_object_definition = record
   case key: {input} fdt$object_definition_key of
   = fdc$box =
      box_width: {output} fdt$width,
      box_height: {output} fdt$height,
   = fdc$line =
      x_increment: {output} fdt$x_increment,
      y_increment: {output} fdt$y_increment,
   = fdc$constant_text =
      constant_text_width: {output} fdt$width,
      constant_text_length: {output} fdt$text_length,
   = fdc$constant_text_box =
      constant_box_height: {output} fdt$height,
      constant_box_processing: {output} fdt$text_box_processing,
      constant_box_width: {output} fdt$width,
      constant_box_text_length: {output} fdt$text_length,
   = fdc$table =
      table_height: {output} fdt$height,
      table_width: {output} fdt$width,
```

```
      = fdc$variable_text_box =
        variable_box_height: {output} fdt$height,
        variable_box_processing: {output} fdt$text_box_processing,
        variable_box_text_length: {output} fdt$text_length,
        variable_box_width: {output} fdt$width,
      = fdc$variable_text =
        variable_text_length: {output} fdt$text_length,
        variable_text_width: {output} fdt$width,
    casend
  recend;

  fdt$get_object_key = (fdc$get_object_definition,
    fdc$get_object_display, fdc$get_object_name,
    fdc$get_object_text, fdc$get_object_text_length,
    fdc$get_unused_object_entry);

  fdt$get_record_attribute = record
    get_value_status {output} : fdt$get_value_status,
    case key {input} fdt$get_record_key of
    = fdc$get_record_deck_name =
      record_deck_name: {output} ost$name,
    = fdc$get_record_length =
      record_length {output} : fdt$record_length,
    = fdc$get_record_name =
      record_name {output} : ost$name,
    = fdc$get_record_type =
      record_type {output} : fdt$record_type,
    = fdc$get_table_access =
      table_name {input} : ost$name,
      access_all_occurrences {output} : boolean,
    = fdc$get_unused_record_entry =
      ,
     casend
  recend;

  fdt$get_record_attributes = array [1 .. * ] of
    fdt$get_record_attribute;
```

```
fdt$get_record_key = (fdc$get_number_record_variable,
   fdc$get_record_deck_name, fdc$get_record_definition,
   fdc$get_record_length, fdc$get_record_name,
   fdc$get_record_type, fdc$get_record_variable_names,
   fdc$get_table_access, fdc$get_unused_record_entry);

fdt$get_table_attribute = record
   get_value_status: {output} fdt$get_value_status,
   case key: {input} fdt$get_table_key of
   = fdc$get_next_table_variable =
      variable_name: {output} ost$name,
   = fdc$get_number_table_variables =
      number_table_variables: {output}
      fdt$number_table_variables,
   = fdc$get_stored_occurrence =
      stored_occurrence: {output} fdt$occurrence,
   = fdc$get_unused_table_entry =
      ,
   = fdc$get_visible_occurrence =
      visible_occurrence: {output} fdt$occurrence,
   casend
recend;

fdt$get_table_attributes = array [1 .. * ] of
   fdt$get_table_attribute;

fdt$get_table_key = (fdc$get_next_table_variable,
   fdc$get_number_table_variables, fdc$get_stored_occurrence,
   fdc$get_unused_table_entry, fdc$get_visible_occurrence);

fdt$get_value_status = (fdc$system_computed_value,
   fdc$system_default_value, fdc$undefined_value,
   fdc$unprocessed_get_value, fdc$user_defined_value);

fdt$get_variable_attribute = record
   get_value_status: {output} fdt$get_value_status,
   case key: {input} fdt$get_variable_key of
   = fdc$get_error_display =
      display_attribute: {output} fdt$display_attribute_set,
   = fdc$get_input_format =
      input_format: {output} fdt$input_format,
   = fdc$get_io_mode =
      io_mode: {output} fdt$io_mode,
```

```
  = fdc$get_next_valid_real_range =
    minimum_real: {output} real,
    maximum_real: {output} real,
  = fdc$get_next_valid_string =
    p_valid_string: {input} ^fdt$valid_string,
  = fdc$get_next_var_comment =
    p_var_comment: {input} ^fdt$comment,
  = fdc$get_number_valid_integers =
    number_valid_integers: {output} fdt$number_valid_integers,
  = fdc$get_number_valid_reals =
    number_valid_reals: {output} fdt$number_valid_reals,
  = fdc$get_number_valid_strings =
    number_valid_strings: {output} fdt$number_valid_strings,
  = fdc$get_number_var_comments =
    number_var_comments: {output} fdt$number_comments,
  = fdc$get_output_format =
    output_format: {output} fdt$output_format,
  = fdc$get_process_as_event =
    process_as_event: {output} boolean,
  = fdc$get_program_data_type =
    program_data_type: {output} fdt$program_data_type,
  = fdc$get_string_compare_rules =
    compare_in_upper_case: {output} boolean,
    compare_to_unique_substring: {output} boolean,
  = fdc$get_terminal_user_entry =
    terminal_user_entry: {output} fdt$terminal_user_entry,
  = fdc$get_unknown_entry_character =
    unknown_entry_character: {output} string (1),
  = fdc$get_unused_variable_entry =
    ,
  = fdc$get_valid_integer_range =
    minimum_integer: {output} integer,
    maximum_integer: {output} integer,
  = fdc$get_valid_string_length =
    valid_string_length: {output} fdt$valid_string_length,
  = fdc$get_var_comment_length =
    var_comment_length: {output} fdt$comment_length,
  = fdc$get_var_error_message =
    p_error_message: {input} ^fdt$error_message,
  = fdc$get_var_help_message =
    p_help_message: {input} ^fdt$help_message,
```

```
      = fdc$get_variable_error =
        variable_error: {output} fdt$get_error_definition,
      = fdc$get_variable_help =
        variable_help: {output} fdt$get_help_definition,
      = fdc$get_variable_length =
        variable_length: {output} fdt$variable_length,
    casend
  recend;

  fdt$get_variable_attributes = array [1 .. * ] of
    fdt$get_variable_attribute;

  fdt$get_variable_key = (fdc$get_error_display,
    fdc$get_input_format, fdc$get_io_mode,
    fdc$get_next_valid_real_range, fdc$get_next_valid_string,
    fdc$get_next_var_comment, fdc$get_number_valid_integers,
    fdc$get_number_valid_reals, fdc$get_number_valid_strings,
    fdc$get_number_var_comments, fdc$get_output_format,
    fdc$get_process_as_event, fdc$get_program_data_type,
    fdc$get_string_compare_rules, fdc$get_terminal_user_entry,
    fdc$get_unknown_entry_character,
    fdc$get_unused_variable_entry, fdc$get_valid_integer_range,
    fdc$get_valid_string_length, fdc$get_var_comment_length,
    fdc$get_var_error_message, fdc$get_var_help_message,
    fdc$get_variable_help, fdc$get_variable_error,
    fdc$get_variable_length);

  fdt$height = 1 .. fdc$maximum_y_position;

  fdt$help_definition = record
    case key: fdt$help_key of
    = fdc$help_form =
      help_form: ost$name,
    = fdc$help_message =
      p_help_message: ^fdt$help_message,
    = fdc$no_help_response, fdc$system_default_help =
      ,
    casend
  recend;
```

```
fdt$help_key = (fdc$help_form, fdc$help_message,
   fdc$no_help_response, fdc$system_default_help);

fdt$help_message = string ( * <= fdc$maximum_help_length);

fdt$help_message_length = 0 .. fdc$maximum_help_length;

fdt$input_currency_format = record
   currency_sybmol: string (1),
   thousands_separator: string (1),
   decimal_point: string (1),
recend;

fdt$input_format = record
   case key: fdt$input_format_key of
   =   fdc$character_input_format, fdc$alphabetic_input_format,
       fdc$digits_input_format, fdc$real_input_format,
       fdc$signed_input_format, fdc$ydm_format, fdc$mdy_format,
       fdc$dmy_format, fdc$iso_date_format,
       fdc$month_dd_yyyy_format =
       ,
    =  fdc$currency_input_format =
       input_currency_format: fdt$input_currency_format,
    casend
recend;

fdt$input_format_key = (fdc$alphabetic_input_format,
   fdc$character_input_format, fdc$currency_input_format,
   fdc$digits_input_format, fdc$dmy_format, fdc$mdy_format,
   fdc$month_dd_yyyy_format,fdc$iso_date_format,
   fdc$real_input_format, fdc$signed_input_format,
   fdc$ydm_format);

fdt$integer_field_width = 1 .. 19;

fdt$integer_output_format = record
   field_width: fdt$integer_field_width {w FORTRAN descriptor},
   minimum_output_digits: fdt$minimum_output_digits {m FORTRAN
      descriptor},
   sign_treatment: fdt$sign_treatment,
recend;
```

```
fdt$io_mode = (fdc$program_input_output {no io to terminal},
   fdc$terminal_input, fdc$terminal_input_output,
   fdc$terminal_output);

fdt$minimum_output_digits = 0 .. 19;

fdt$name_selection = (fdc$select_object, fdc$select_table,
   fdc$select_variable);

fdt$number_comments = 0 .. fdc$maximum_comments;

fdt$number_errors = integer;

fdt$number_events = 0 .. fdc$maximum_events;

fdt$number_names = integer;

fdt$number_object_displays = 0 .. fdc$maximum_object_displays;

fdt$number_objects = 0 .. fdc$maximum_objects;

fdt$number_table_variables = 0 .. fdc$maximum_table_variables;

fdt$number_tables = 0 .. fdc$maximum_tables;

fdt$number_valid_integers = 0 .. fdc$maximum_valid_ranges;

fdt$number_valid_reals = 0 .. fdc$maximum_valid_ranges;

fdt$number_valid_strings = 0 .. fdc$maximum_valid_strings;

fdt$number_variables = 0 .. fdc$maximum_variables;
```

```
fdt$object_attribute = record
   put_value_status: {output} fdt$put_value_status,
   case key: {input} fdt$change_object_key of
   =  fdc$object_display =
      display_attribute: {input} fdt$display_attribute_set,
   =  fdc$object_height =
      height: {input} fdt$height,
   =  fdc$object_line_x_increment =
      x_increment: {input} fdt$x_increment,
   =  fdc$object_line_y_increment =
      y_increment: {input} fdt$y_increment,
   =  fdc$object_name =
      object_name: {input} ost$name,
      occurrence: {input} fdt$occurrence,
   =  fdc$object_position =
      x_position: {input} fdt$x_position,
      y_position: {input} fdt$y_position,
   =  fdc$object_text =
      p_text: {input} ^fdt$text,
   =  fdc$object_text_processing =
      text_box_processing: {input} fdt$text_box_processing,
   =  fdc$object_width =
      width: {input} fdt$width,
   =  fdc$unused_object_entry =
      ,
   casend
recend;

fdt$object_attributes = array [1 .. * ] of fdt$object_attribute;

fdt$object_definition = record
   case key: {input} fdt$object_definition_key of {input}
   =  fdc$box =
      box_width: fdt$width,
      box_height: fdt$height,
   =  fdc$constant_text =
      constant_text_width: fdt$width,
      p_constant_text: ^fdt$text,
```

```
      = fdc$constant_text_box =
         constant_box_height: fdt$height,
         constant_box_processing: fdt$text_box_processing,
         constant_box_width: fdt$width,
         p_constant_box_text: ^fdt$text,
      = fdc$line =
         x_increment: fdt$x_increment,
         y_increment: fdt$y_increment,
      = fdc$table =
         table_width: fdt$width,
         table_height: fdt$height,
      = fdc$variable_text =
         p_variable_text: ^fdt$text,
         variable_text_width: fdt$width,
      = fdc$variable_text_box =
         p_variable_box_text: ^fdt$text,
         variable_box_height: fdt$height,
         variable_box_processing: fdt$text_box_processing,
         variable_box_width: fdt$width,
      casend
   recend;

   fdt$object_definition_key = (fdc$box, fdc$constant_text,
      fdc$constant_text_box, fdc$line, fdc$table,
      fdc$variable_text, fdc$variable_text_box);

   fdt$object_event_position = record
      form_identifier: fdt$form_identifier,
      object_name: ost$name,
      occurrence: fdt$occurrence,
      case key: fdt$object_definition_key of
      = fdc$box, fdc$line, fdc$constant_text,
         fdc$constant_text_box =
         {The x, y positions are relative to the form}
         form_x_position: fdt$x_position,
         form_y_position: fdt$y_position,
      = fdc$variable_text, fdc$variable_text_box =
         character_position: fdt$character_position,
      casend
   recend;
```

```
fdt$occurrence = 1 .. fdc$maximum_occurrence;

fdt$output_currency_format = record
   currency_sybmol: string (1),
   thousands_separator: string (1),
   decimal_point: string (1),
   field_width: fdt$text_length,
   sign_treatment: fdt$sign_treatment,
   suppress_leading_zeros: boolean {TRUE to suppress},
recend;

fdt$output_format = record
   case key: fdt$output_format_key of
   =  fdc$character_output_format =
      ,
   =  fdc$currency_output_format =
      output_currency_format: fdt$output_currency_format,
   = fdc$dmy_output_format =
      {Uses an 8 character field, dd/mm/yy}
      ,
   =  fdc$e_e_output_format, fdc$g_e_output_format =
      exponent_output_format: fdt$exponent_output_format,
   =  fdc$f_output_format, fdc$e_output_format,
      fdc$g_output_format =
      float_output_format: fdt$float_output_format,
   =  fdc$integer_output_format =
      integer_output_format: fdt$integer_output_format,
   =  fdc$iso_output_format =
      {Uses a 10 character field, yyyy-mm-dd}
      ,
   =  fdc$mdy_output_format =
      {Uses an 8 character field, mm/dd/yy}
      ,
   =  fdc$month_dd_yyyy_out_format =
      {Uses a 18 character field, monthxxxx dd, yyyy}
      ,
   =  fdc$undefined_output_format =
      ,
   =  fdc$ydm_output_format =
      {Uses an 8 character field, yy/dd/mm}
      ,
   casend
recend;
```

```
fdt$output_format_key = (fdc$character_output_format,
   fdc$currency_output_format, fdc$dmy_output_format,
   fdc$e_e_output_format, fdc$e_output_format,
   fdc$f_output_format, fdc$g_e_output_format,
   fdc$g_output_format, fdc$iso_output_format,
   fdc$mdy_output_format, fdc$month_dd_yyyy_out_format,
   fdc$integer_output_format, fdc$undefined_output_format,
   fdc$ydm_output_format);

fdt$put_value_status = (fdc$put_value_accepted,
   fdc$unprocessed_put_value);

fdt$program_data_type = (fdc$program_character_type,
   fdc$program_integer_type, fdc$program_real_type,
   fdc$program_upper_case_type);

fdt$real_field_width = 1 .. 19;

fdt$record_attribute = record
   put_value_status: {output} fdt$put_value_status,
   case key: {input} fdt$change_record_key of
   = fdc$record_deck_name =
      record_deck_name: {input} ost$name,
   = fdc$record_name =
      record_name: {input} ost$name,
   = fdc$record_type =
      record_type: {input} fdt$record_type,
   = fdc$table_access =
      table_name: {input} ost$name,
      access_all_occurrences: {input} boolean,
   = fdc$unused_record_entry =
      ,
   casend
recend;

fdt$record_attributes = array [1 .. * ] of fdt$record_attribute;

fdt$record_length = 0 .. fdc$maximum_record_length;

fdt$record_position = 1 .. fdc$maximum_record_length;
```

```
fdt$record_type = (fdc$character_record,
   fdc$program_data_type_record);

fdt$sign_treatment = mlt$sign_treatment;

fdt$table_attribute = record
   put_value_status: {output} fdt$put_value_status,
   case key: {input} fdt$change_table_key of
   = fdc$add_table_variable, fdc$delete_table_variable =
      variable_name: {input} ost$name,
   = fdc$new_table_name =
      new_table_name: {input} ost$name,
   = fdc$stored_occurrence =
      stored_occurrence: {input} fdt$occurrence,
   = fdc$unused_table_entry =
      ,
   = fdc$visible_occurrence =
      visible_occurrence: {input} fdt$occurrence,
   casend
recend;

fdt$table_size = 0 .. fdc$maximum_occurrence;

fdt$table_attributes = array [1 .. * ] of fdt$table_attribute;

fdt$terminal_user_entry = set of (fdc$entry_optional,
   fdc$must_enter,fdc$may_enter_unknown, fdc$must_fill);

fdt$text = string ( * <= fdc$maximum_text_length);

fdt$text_box_processing = (fdc$center_characters,
   fdc$wrap_characters, fdc$wrap_words);

fdt$text_length = 0 .. fdc$maximum_text_length;

fdt$valid_string = string ( * <= fdc$maximum_valid_string);

fdt$valid_string_length = 0 .. fdc$maximum_valid_string;
```

```
fdt$variable_attribute = record
   put_value_status: {output} fdt$put_value_status,
   case key: {input} fdt$change_variable_key {input} of
   =  fdc$add_valid_integer_range,
      fdc$delete_valid_integer_range =
      maximum_integer: integer,
      minimum_integer: integer,
   =  fdc$add_valid_real_range, fdc$delete_valid_real_range =
      maximum_real: real,
      minimum_real: real,
   =  fdc$add_valid_string, fdc$delete_valid_string =
      p_valid_string: ^fdt$valid_string,
   =  fdc$add_var_comment =
      p_var_comment: ^fdt$comment,
   =  fdc$delete_var_comments =
      ,
   =  fdc$input_format =
      input_format: fdt$input_format,
   =  fdc$io_mode =
      io_mode: fdt$io_mode,
   =  fdc$new_variable_name =
      new_variable_name: ost$name,
   =  fdc$error_display =
      display_attribute: fdt$display_attribute_set,
   =  fdc$output_format =
      output_format: fdt$output_format,
   =  fdc$program_data_type =
      program_data_type: fdt$program_data_type,
   =  fdc$process_as_event =
      process_as_event: boolean {If true, the value of the
      variable is treated as an event rather than a data item to
      be transferred to and from a program},
   =  fdc$string_compare_rules =
      compare_in_upper_case: boolean,
      compare_to_unique_substring: boolean,
   =  fdc$terminal_user_entry =
      terminal_user_entry: fdt$terminal_user_entry,
   =  fdc$unknown_entry_character =
      unknown_entry_character: string (1),
   =  fdc$unused_variable_entry =
      ,
   =  fdc$variable_error =
      variable_error: fdt$error_definition,
```

```
    = fdc$variable_help =
      variable_help: fdt$help_definition,
    = fdc$variable_length =
      variable_length: fdt$variable_length,
    casend
  recend;

  fdt$variable_attributes = array [1 .. * ] of
    fdt$variable_attribute;

  fdt$variable_length = 1 .. fdc$maximum_variable_length;

  fdt$variable_status = (fdc$no_error, fdc$invalid_string,
    fdc$invalid_real, fdc$invalid_integer,
    fdc$unknown_user_value, fdc$invalid_bdp_data, fdc$no_digits,
    fdc$loss_of_significance, fdc$variable_not_filled,
    fdc$overflow, fdc$underflow, fdc$indefinite, fdc$infinite,
    fdc$variable_not_entered, fdc$output_format_bad,
    fdc$variable_truncated);

  fdt$width = 1 .. fdc$maximum_x_position;

  fdt$work_area_length = 1 .. fdc$maximum_record_length;

  fdt$x_increment = 0 .. fdc$maximum_x_position - 1;

  fdt$x_position = 1 .. fdc$maximum_x_position;

  fdt$y_increment = 0 .. fdc$maximum_y_position - 1;

  fdt$y_position = 1 .. fdc$maximum_y_position;

  ost$name = string (osc$max_name_size);

  ost$status = record
    case normal: boolean of
    = FALSE =
      condition: ost$status_condition_code,
      text: ost$string
    = TRUE =
      ,
    casend
  recend;
```

FORTRAN Call Definitions F

The following FORTRAN call definitions give the aliases for the Screen Formatting subroutines used in the FORTRAN calls. These definitions must be present whenever you call Screen Formatting. Include the following SCU directive in every program or subroutine that has Screen Formatting calls:

```
*COPY FDP$FORTRAN_ALIASES
```

The contents of FDF$FORTRAN_ALIASES follows.

```
C$   EXTERNAL (ALIAS='FDP$XADD_FORM',LANG=FTN), FDADD
C$   EXTERNAL (ALIAS='FDP$XCHANGE_TABLE_SIZE',LANG=FTN), FDCHAT
C$   EXTERNAL (ALIAS='FDP$XCOMBINE_FORM',LANG=FTN), FDCOM
C$   EXTERNAL (ALIAS='FDP$XCLOSE_FORM',LANG=FTN), FDCLOS
C$   EXTERNAL (ALIAS='FDP$XDELETE_FORM',LANG=FTN), FDDEL
C$   EXTERNAL (ALIAS='FDP$XGET_INTEGER VARIABLE,LANG=FTN), FDGETI
C$   EXTERNAL (ALIAS='FDP$XGET_NEXT_EVENT',LAMG=FTN), FSGETE
C$   EXTERNAL (ALIAS='FDP$XGET_REAL_VARIABLE',LANG=FTN), FDGETR
C$   EXTERNAL (ALIAS='FDP$XGET_RECORD',LANG=FTN), FDGET
C$   EXTERNAL (ALIAS='FDP$XGET_STRING_VARIABLE',LANG=FTN), FDGETS
C$   EXTERNAL (ALIAS='FDP$XOPEN_FORM',LANG=FTN), FDOPEN
C$   EXTERNAL (ALIAS='FDP$XPOP_FORMS',LANG=FTN), FDPOP
C$   EXTERNAL (ALIAS='FDP$XPOSITION_FORM',LANG=FTN), FDPOS
C$   EXTERNAL (ALIAS='FDP$XPUSH_FORMS',LANG=FTN), FDPUSH
C$   EXTERNAL (ALIAS='FDP$XREAD_FORMS',LANG=FTN), FDREAD
C$   EXTERNAL (ALIAS='FDP$XREPLACE_INTEGER_VARIABLE',LANG=FTN), FDREPI
C$   EXTERNAL (ALIAS='FDP$XREPLACE_REAL_VARIABLE',LANG=FTN), FDREPR
C$   EXTERNAL (ALIAS='FDP$XREPLACE_RECORD'LANG=FTN), FDREP
C$   EXTERNAL (ALIAS='FDP$XREPLACE_STRING_VARIABLE',LANG=FTN), FDREPS
C$   EXTERNAL (ALIAS='FDP$XRESET_FORM',LANG=FTN), FDRESF
C$   EXTERNAL (ALIAS='FDP$XRESET_OBJECT_ATTRIBUTE',LANG=FTN), FDRESO
C$   EXTERNAL (ALIAS='FDP$XSET_CURSOR_POSITION',LANG=FTN), FDSETC
C$   EXTERNAL (ALIAS='FDP$XSET_LINE_MODE',LANG=FTN), FDSETL
C$   EXTERNAL (ALIAS='FDP$XSET_OBJECT_ATTRIBUTE',LANG=FTN), FDSETO
C$   EXTERNAL (ALIAS='FDP$XSHOW_FORMS',LANG=FTN), FDSHOW
```

Accessing Online Examples G

Accessing Online Examples G

An online manual named Examples contains examples which show you how to use various NOS/VE concepts, SCL commands, and CYBIL procedures. You can use the online Examples manual to perform the following operations.

- Access examples by name, manual, command name, or procedure name.
- View the example.
- Print the example.
- Copy the example into your $USER catalog for subsequent execution.

To access the online manual, enter:

```
/help manual=examples
```

In response, the system displays a menu of the topics for which examples are provided. This menu includes topics from the following manuals:

COBOL for NOS/VE
CYBIL File Management
CYBIL Keyed-File and Sort/Merge Interfaces
CYBIL Language Definition
CYBIL Sequential and Byte-Addressable Files
CYBIL System Interface
FORTRAN for NOS/VE
Introduction to NOS/VE
NOS/VE File Editor
NOS/VE Screen Formatting
NOS/VE System Usage
NOS/VE Object Code Management
NOS/VE Source Code Management

Accessing Examples by Name or by Manual

In each of the printed manuals containing examples, the example's name is supplied in the introduction to the example. Because the online Examples manual is indexed by example name, you can access the example directly by specifying its name.

For example, suppose you are reading the CREATE_PERMIT_PF_1 example in the CYBIL File Management manual and you want to have a copy of the example in one of your catalogs. You can quickly access the example by using either of the following methods.

- Specify the name of the example on the SUBJECT parameter of the HELP command when you access the manual. For example:

```
help subject=create_permit_pf_1 manual=examples
```

- If you have already accessed the Examples manual, enter the example's name followed by a question mark:

```
create_permit_pf_1?
```

You are then positioned to the introductory screen of the CREATE_PERMIT_PF_1 example. This screen prompts you to view, copy, or print the example.

To access examples associated with a specific manual, select an option from the main menu. The system displays a list of example names associated with that manual. You can then choose a specific example from the list.

Searching for Examples by Command or Procedure Name

The online Examples manual also enables you to search for examples by SCL command or CYBIL procedure names. You can either view the list of index topics by pressing the key associated with the Index operation, or you can access a topic directly by entering the command or procedure name itself.

For example, if you want to look at one or more ways in which the CREATE_FILE command is used, enter the following request on the home line:

```
create_file?
```

If you want to see one or more ways that the FSP$OPEN_FILE procedure call is used in examples, enter:

```
fsp$open_file?
```

In response, the system displays an example that illustrates the use of the procedure or command you specified.

You can also specify the command or procedure name on the SUBJECT parameter of the HELP command when you access the manual. For example:

```
help subject=fsp$open_file manual=examples
```

To view a further example that illustrates the use of the command or procedure you specified, enter another question mark (?). You can enter as many question marks as there are examples indexed for that command or procedure.

When the number of examples for that command or procedure is exhausted, an informative message is displayed.

Viewing, Copying, and Printing an Example

After you access a particular example, the following menu of options appears:

```
Enter your menu choice:
 a. view the example
 b. copy the example
 c. print the example
```

USe the menu of options as follows:

- To view the example, choose menu selection A, followed by a return. The example is displayed at your terminal. Since the example appears in full-screen mode, you can easily move from screen to screen by following the function key prompts.
- To copy the example to a file, choose menu selection B, followed by a return. You are then prompted for the name of the file to which you want the example copied. Once you enter a file name, NOS/VE displays a message verifying the name of the file to which the example was copied.
- To print the example, choose menu selection C. A message soon appears which indicates that the file has been sent to the printer.

Executing an Example

After copying an example to a file, you can easily execute the example by completing the following steps:

1. Exit the online Examples manual by entering a QUIT directive on the home line.
2. Enter the full path name of the file to which the example was copied.

For example, to execute the example contained in file DUP_FILE_EXAMPLE in your $USER catalog, exit the online Examples manual and enter:

```
/$user.dup_file_example
```

Using Function Keys and Directives

Once you access the online Examples manual, you can read it by pressing function keys or by entering directives on the home line.

Function key prompts for using this manual are displayed at the bottom of your screen, provided you are in full-screen mode. These function keys vary according to the type of terminal you are using.

If you need assistance on what a particular function key does, press the help key for your terminal, and then press the function key in question. Pressing the help key again displays a menu of online help options (such as how to use the menus, or how to page forward and backward).

The following function key prompts help you search for examples:

Function Key Prompt	Description
Find	Enables you to locate screens where an example, command, or procedure you specify appears.
Index	Enables you to access the manual's index. After pressing the key associated with this operation, you can do one of the following: • Specify the topic where you want to begin reading the index. • Press RETURN to display the beginning of the index.

Many terminals have function keys or dedicated keys that return you to the main menu (the first screen in the manual). On a VT220 terminal, hold down the shift key and press the **F17** key. Alternatively, you can enter the FIRST or TOP directive on the home line of any terminal at which you can read online manuals.

The Quit function key prompt is associated with the key(s) you press to leave the Examples manual. On a VT220 terminal, press the **F11** key. Alternatively, you can enter the QUIT directive on the home line of any terminal at which you can read online manuals.

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