IBM System/36

Creating Displays: Screen Design Aid and System Support Program

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See *About this Manual* for a summary of major changes to this edition.

This edition applies to Release 4, Modification Level 0, of IBM System/36 System Support Program Product (Program 5727-SSP), and IBM System/36 Utilities Program Product (Program 5727-UT1), and to all subsequent releases and modifications until otherwise indicated in new editions.

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About This Manual

Who Should Use This Manual . . .

This manual is to be used by programmers who intend to design, create, and maintain menus and displays using either the screen design aid (SDA), which is a part of the Utilities Program Product, or the System Support Program (SSP). Using this manual, you should be able to:

- Understand what a menu is and how you can use one to simplify the operator's duties
- Understand what a display is and how you can use one to make an application easier to use
- Create and maintain menus using SDA
- Create and maintain help text for menus using SDA
- Create and maintain menus using the BLDMENU procedure, a part of the SSP
- Create and maintain display formats using SDA
- Create and maintain display formats using the FORMAT procedure, a part of the SSP
- Create and maintain help for display formats using SDA or the FORMAT procedure
- Create RPG II WORKSTN file specifications using SDA
- Create work station utility (WSU) programs using SDA.

How This Manual is Arranged . . .

The first three chapters of this manual contain general information about menus and displays. If you are familiar with menus and displays, and how they are designed, created, and used, you can skip these first three chapters and go directly to the chapters that describe SDA and the SSP procedures.

Chapter 1 contains introductory information about menus, their advantages, how they are used, and how they are designed.

Chapter 2 contains introductory information about displays, their advantages, how they are used, and how they are designed.

Chapter 3 gives some additional information you might consider when you design your displays. Chapter 3 describes how to:

- Design and use help text you can provide for the displays used by your applications
- Design your displays if they are used at remote display stations
- Design and use displays if they are used in combination with other displays
- Use fields that can check the data typed into them for accuracy and correctness
- Design and use displays shown by a procedure and used to pass data from the display to a program that is just starting.

Chapters 4 through 9 of this manual introduce you to SDA and describe the things you can do using SDA:

Chapter 4 contains introductory information about SDA.

Chapter 5 describes how you can use SDA to create and maintain menus. A foldout page at the end of Chapter 5 can help you to follow the path through the SDA displays used to create and update menus and to create and update menu help text. Chapter 5 explains how to:

- Create a new menu
- Update an existing menu
- Delete a menu
- Create and maintain help text for a menu.

Chapter 6 describes how you can use SDA to create and maintain display formats. A foldout page at the end of Chapter 6 can help you to follow the path through the SDA displays used to create and update display formats. Chapter 6 explains how to:

- Create a new display format

- Update an existing display format
- Create help text for a display format
- Delete a display format.

Chapter 7 describes how you can use SDA to build RPG II WORKSTN file description specifications and WSU programs for the display formats that you create.

Chapter 8 describes additional services provided by SDA. These services allow you to:

- Use the Development Support Utility (DSU) or the Source Entry Utility (SEU).
- View displays that you create.
- Print images of the displays that you create.
- Compile display format source members to create the display format load members used by your programs.

Chapter 9 explains how SDA allows you to recover your work if an SDA session is unexpectedly interrupted.

Chapters 10 and 11 of this manual describe how to use the BLDMENU and the FORMAT procedures, both part of the SSP.

Chapter 10 describes how you can use the SSP procedures to create and maintain menus. Chapter 10 describes the BLDMENU procedure.

Chapter 11 describes how you can use the SSP procedures to create and maintain display formats. Chapter 11 describes the FORMAT procedure.

The appendixes of this manual contain reference information you will use with both SDA and the FORMAT procedure:

Appendix A describes the specification entries used to define information about the entire display format.

Appendix B describes the specification entries used to define how help text for a display format is displayed to the operator.

Appendix C describes the specification entries used to define information about individual fields on the display format.

Appendix D describes problem determination procedures.

This publication follows the convention that *he* means *he* or *she*.

What You Should Know . . .

Before using this manual, you should be familiar with the System/36 manual *Learning about Your Computer*, SC21-9018, which contains introductory information about the System/36.

This manual contains references to display station operation. See the display station *Operators Guide* for complete operation information for your display.

If You Need More Information . . .

You might need some or all the following System/36 manuals while using this manual:

- *Operating Your Computer - 5360, 5362*, SC21-9026, and *Operating Your Computer - 5364*, SC21-9085 which contain information about how to operate the System/36.

- *System Reference*, SC21-9020, which contains information about how to use procedures, control commands, operation control language (OCL) statements, and SSP utility programs.

- *Concepts and Programmers Guide*, SC21-9019, which contains information about how to design and code applications for the System/36.

- *IBM 5250 Information Display System Functions Reference Manual,* SA21-9247, which describes the programming requirements for communicating with the remote work station controller that controls all attached 5250 work stations. The remote work station controller can be a 5251 Model 12 or a 5294 Control Unit. Use this manual for additional information when you create formats to be used by the 5250 Information Display System.

- *System Messages*, SC21-7938, which contains descriptions of the messages that the System/36 SSP displays and prints. Use this messages manual for information about all displayed and printed messages that begin with the characters SYS.

- *Utilities Messages*, SC21-7939, which contains descriptions of the messages that the System/36 Utilities Program Product (screen design aid, work station utility, source entry utility, and data file utility) prints and displays. Use this messages manual for information about all displayed and printed messages that begin with the characters SDA, WSU, SEU, and DFU.

- *Guide to Publications*, GC21-9015, which contains a general guide to the System/36 publications, a glossary of all the terms used in System/36 publications, and a list of topics and in which manual the information can be found.

- *Source Entry Utility Guide*, SC21-7901, which contains information about how to run the source entry utility. Use this manual for information about how to create and update source specifications, procedures and programs.

- *Development Support Utility Guide*, SC09-1085, which contains information about how to run the development support utility. Use this manual for information about how to create and update source specifications, procedures and programs.

- *Programming with RPG II*, SC21-9006, which contains information about RPG II programming. Use this manual when you code the RPG II programs that use the display formats you create.

- *Programming with COBOL*, SC21-9007, which contains information about COBOL programming. Use this manual when you code the COBOL programs that use the display formats you create.

- *Programming with BASIC*, SC21-9003, which contains information about BASIC programming. Use this manual when you code the BASIC programs that use the display formats you create.

- *Programming with FORTRAN IV*, SC21-9005, which contains information about FORTRAN programming. Use this manual when you code the FORTRAN programs that use the display formats you create.

- *Programming with Assembler*, SC21-7908, which contains information about Assembler programming. Use this manual when you code the Assembler programs that use the display formats you create.

- *Getting Started With DisplayWrite/36*, GC21-8005, which contains information about online documentation. Use this manual if you want to create online documents for your displays.

If You Need Programming or Debugging Material . . .

The following can be used to help you design, code and debug your displays:

- *IBM 5250 Keyboard Template Assignment Sheet and Display Screen Layout Sheet*, GX21-9271, which is a layout sheet that can be used to help you design your displays

- *IBM System/36 Display Format Specifications*, GX21-9800, which is a coding sheet that can be used to help you code the specifications that define your displays

- *IBM System/36 WSU/$SFGR Debugging Template*, GX21-7926, which is a template that you can use to help correct problems with the specifications that define your displays

- *IBM SYSTEM/36 Keyboard Template*, GX21-7929, which is a plastic template that summarizes the command keys used with the Utilities Program Product.

If You Do Not Understand a Term Used In This Manual . . .

See the glossary at the back of this manual if you do not understand a term. Many terms and concepts are introduced in this manual.

Summary of Changes

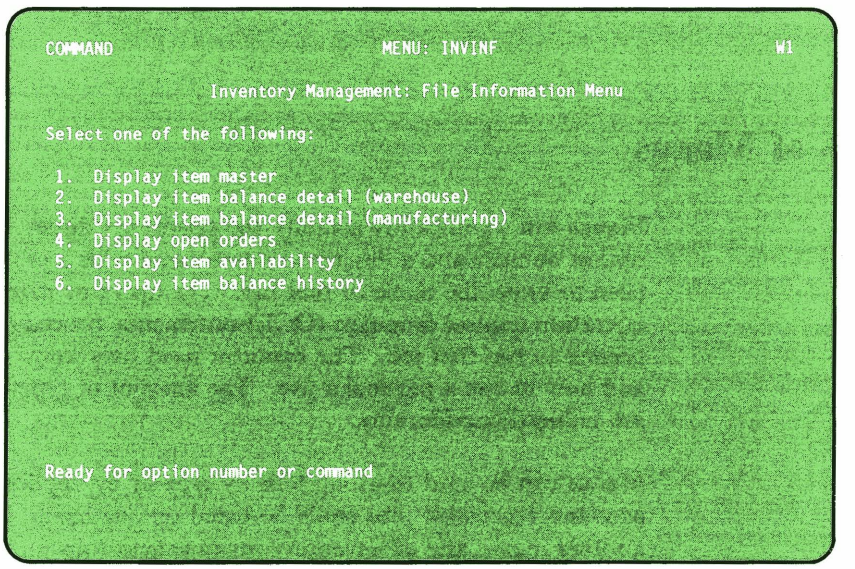
The following changes have been made for Release 4 Modification 0:

- A section on using the Development Support Utility (DSU) to create or update source and procedure members has been added.
- A new data type 'M', which allows alphanumeric data on data entry keyboards, has been added.
- Appendix D, which describes problem determination procedures, has been added.
- Various technical and editorial changes have been made to improve the quality and usability of this manual.

Chapter 1. Menus and Menu Design

A **menu** is a list of options from which the operator can make a selection. Each option is a brief description of the job that is run if the operator makes that selection. When the operator enters the **option number** that corresponds to a job description, the system runs the job associated with that option number.

The following is an example of a menu that an operator might use to run jobs that display information about the files used by the inventory management application:



Notice that the menu contains:

- The name of the menu
- A descriptive title for the menu
- The available option numbers
- A brief description of the job run by a particular option number
- Prompts telling the operator what to do.

Each number on a menu can represent an IBM-supplied procedure or control command, an OCL statement, or a procedure that you have created. For the previous menu, each option on the menu causes a user-written procedure to be run:

Option	Procedure	Description
1	INVMS	Displays item master file information
2	INVBW	Displays item balance detail for goods located at the warehouse
3	INVBM	Displays item balance detail for goods located on the manufacturing floor
4	INVOO	Displays status information about open orders
5	INVIA	Displays information about the availability of your inventory
6	INVBH	Displays history about the balance of your inventory

Benefits of Menus

Menus can significantly simplify the operator's duties. By simply selecting an option number and a description associated with a job, the operator does not need to know the name of that job. The operator needs no knowledge of the operation control language (OCL) statements, procedures, or control commands needed to run that job. The operator need only know when to make a selection and how to run a particular job. The amount of typing and the chance of error are reduced considerably.

Menus can be used to group jobs by type or by application; for example, all accounts receivable jobs could be listed on one menu, all order entry jobs on another menu, and all inventory management jobs on a third menu. Such grouping keeps related jobs together, allowing operators to run several related jobs consecutively.

Using Menus

The operator can display a menu by:

- Entering the name of a menu in the menu field during sign-on. The requested menu appears when the operator has signed on.
- Leaving the menu field blank during sign-on, if the operator is assigned a **default menu**. The default menu appears when the operator has signed on.
- Requesting a menu from the main system help menu

- Selecting a menu from another menu
- Running a procedure that displays a menu
- Entering a MENU control command.

The operator can respond to a menu by:

- Entering an option number
- Entering a control command, a procedure, or OCL statements
- Pressing the Help key to request help for the menu or its options
- Using the Home key to return to the menu named during sign-on, or to return to the default menu
- Using command key 3 to return to the menu displayed immediately before the current menu
- Using command key 5 to return to the Main menu
- Pressing the Dup (duplicate) key to redisplay the previously entered control command, procedure, OCL statement, or menu option. When the Dup key is pressed, the command input field at the bottom of the menu is filled with overscored asterisks (*). The operator can then press the Enter key to redisplay the previously entered command, procedure, statement, or option number. If the Enter key is pressed again, that command, procedure, statement, or option number is processed by the system.
- Entering the command HELP or using command key 6 to display the system help menu assigned to the operator
- Entering a 0 instead of an option number. This removes the current menu from the display screen and replaces it with a command display.

To limit what an operator can run, you can use a type of SSP-provided security called **menu security**. If the operator is assigned a default menu, that menu can also be defined as **mandatory**. If the default menu is mandatory, the operator is restricted to only making selections from that menu, and to a few control commands. The operator is limited to those jobs controlled by the mandatory menu.

The operator can also be assigned a system help menu. That help menu is called a **beginning help menu**. When the operator enters the command HELP or presses command key 6 when a menu is displayed, the beginning help menu is displayed. The beginning help menu is selected according to the operator's responsibilities and level of experience.

For more information about menu security, default menus, mandatory menus, and beginning help menus, see the System/36 manual, *System Security Guide*, SC21-9042.

Free-Format and Fixed-Format Menus

System/36 provides two types of formats for menus:

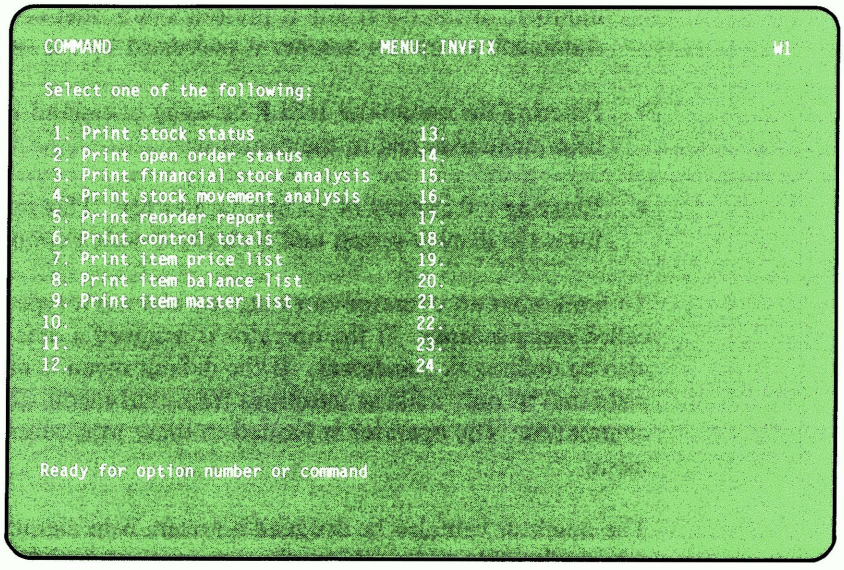
- **Fixed-format**
- **Free-format**.

Menus are to be displayed only as 24 x 80 formats. If a menu format is specified as 27 x 132 capable, unpredictable results may occur when trying to display the menu.

Fixed-Format Menus

When you create a fixed-format menu, you simply tell the system what option numbers you will use, give the descriptive text for each option, and supply the procedure to be run for each option. The system decides the placement of the information shown on the menu. A fixed-format menu always contains two columns of menu option numbers, 1 through 24, with 12 options in each column. Although all 24 option numbers are displayed on a fixed-format menu, the operator can select only the option numbers you have provided.

The following is an example of a fixed-format menu. In this menu, the programmer provided text and procedures for option numbers 1 through 9 only.



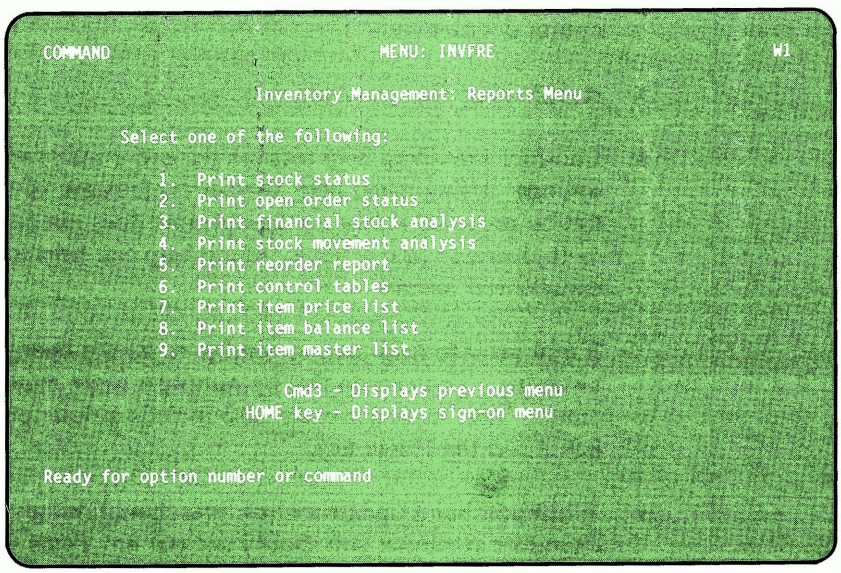
Free-Format Menus

Free-format menus allow you to determine exactly how the menu will look to the operator. You can use a large portion of the display screen to provide descriptive text to your operators.

When you create a free-format menu, you define up to 24 option numbers and descriptions, and the procedure, control commands or OCL statements associated

with each option number. You decide on the exact placement of the option numbers and their corresponding descriptions, as well as any other text you might consider helpful to the operator.

The following is an example of a free-format menu. Notice that the option numbers on this menu are the same as the option numbers shown on the fixed-format menu, but the programmer chose the location of the numbers and their descriptions, supplied a descriptive title, and provided more informative prompt text.



Designing the Menu

When you design a menu, you must consider how the menu will be used, the types of jobs you want the menu to control, and the level of experience or responsibility of the operator who uses the menu. A well-organized and descriptive menu helps to increase operator productivity.

Keep the following considerations in mind when designing your menus:

- Consider using free-format menus. Free-format menus will not have unused option numbers that can clutter the menu and confuse the operator.

  Avoid mixing free-format and fixed-format menus within the same application. Consistency is one way to gain operator confidence.

- Write your menus in both uppercase and lowercase letters. UPPERCASE LETTERS ARE MORE DIFFICULT TO READ.

- Number your options beginning with 1. The system cannot use an option number of 0. When the operator enters a 0 as an option number, the system displays a blank command display instead of running a job.

- Put your options in some recognizable and usable order. Place the most frequently selected options near the top of the menu, or place the options in the sequence they are to be selected, or arrange the option descriptions alphabetically.

- Make the menu title and option descriptions meaningful and descriptive. Use words that describe simply and clearly what job is to be selected. For example, Release Orders is a more meaningful option description than RELORD, the name of the program that releases orders.

- Use a word that suggests action, such as list or print, for the first word in the option description.

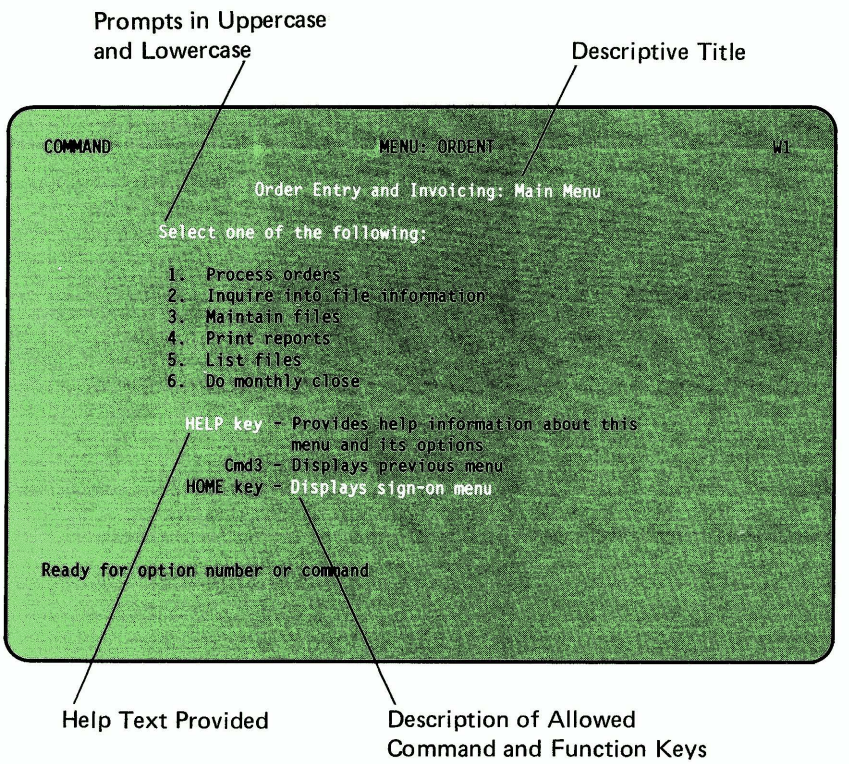
- Avoid using abbreviations.

- Consider providing help text for the entire menu and for each of the menu options. Using menu help, further explanation of the menu and its options can be provided online so the operator does not have to refer to a run book or to operator instructions. Menu help can help first-time users as well as experienced operators.

  If you provide help text, remember to let the operator know that it is available. You can do this by putting a short reminder at the bottom of the menu. That reminder could also include a description of the use of command key 3 and the Home key.

- When you build/update menus, you should not give the menu the 27 x 132 character attribute; you should not put any fields with user-supplied data on your menu; and you should not move the input field on your menu. Unpredictable results may occur.

The following menu illustrates good design technique:



Menu Chaining

Menu chaining is a good technique to use for applications on System/36 because it helps organize an operator's work by guiding the operator to the displays needed to do a particular job. Menu chaining uses a main menu that lists other menus (generally more specialized) from which an operator can select a job. For example, the previous menu is the main menu for order entry and invoicing applications.

The following shows some of the menus chained to the Order Entry and Invoicing Main Menu and the commands used to display them.

1. Process Orders

MENU ORDERS

```
COMMAND                          MENU: ORDERS                    W1

                 Order Entry and Invoicing:  Orders Menu

Select one of the following:

 1.  Enter orders
 2.  Enter orders and release immediately
```

2. Inquire into File Information

MENU ORDINF

```
COMMAND                          MENU: ORDINF                    W1

              Order Entry and Invoicing: File Information Menu

Select one of the following:

 1.  Display customer status
 2.  Display customer orders
```

3. Maintain Files

MENU ORDMNT

```
COMMAND                          MENU: ORDMNT                    W1

              Order Entry and Invoicing:  File Maintenance Menu

Select one of the following:

 1.  Maintain customer master file
 2.  Maintain item balance file
```

4. Print Reports

MENU ORDREP

```
COMMAND                          MENU: ORDREP                    W1

                 Order Entry and Invoicing:  Reports Menu

Select one of the following:

 1.  Print open orders by date
 2.  Print open orders by item
```

5. List Files

MENU ORDPRT

```
COMMAND                          MENU: ORDPRT                    W1

               Order Entry and Invoicing:  File Lists Menu

Select one of the following:

 1.  Print customer master file
 2.  Print item master file
 3.  Print ship to master file
 4.  Print contract price file
 5.  Print quantity price file



  Cmd3 - Displays previous menu        HOME key - Displays sign-on menu

Ready for option number or command
```

When an operator selects option 1 from the main menu, the MENU control command is run and the Orders Menu appears. When the operator selects an option from the Orders Menu, the operator sees either another menu, if there are additional order processing categories to select, or a display on which the operator can begin a job. The MENU OCL statement and the MENU control command are useful when you are building a menu chain.

When you chain menus, you might allow ways for an operator to display the main menu again. You can do so with an option on the lower level menu, or you can remind the operator that pressing command key 3 causes the previous menu (in this case the main menu) to be displayed. For example, on the Orders Menu, the operator can return to the main order entry and invoicing menu by pressing command key 3. Also, you might allow ways for experienced operators to bypass the menu chains and directly begin their jobs.

Creating the Menu

A menu is really made up of two different library members: the **menu text member** and the **command text member**:

- You use the menu text member to tell the *operator* what the selected option number will do. The menu text member describes what will appear on the display screen when the menu is displayed. This definition includes any descriptive text associated with an option number, the placement of the option numbers, and the name and title of the menu.

- You use the command text member to tell the *system* what to do for a selected option number. The command text member describes which commands or statements will be used to run a job when the operator selects an option number.

System/36 provides two ways for you to create your menus:

- The screen design aid (SDA)

- The BLDMENU procedure.

Using SDA to Create a Menu

The **screen design aid (SDA)**, part of the Utilities Program Product, is a program that can lead you through the steps used to create a menu. For this reason, you may find that SDA is considerably easier to use than the BLDMENU procedure.

SDA has several advantages over using the BLDMENU procedure to create a menu:

- You use SDA to design your menu on the display screen. This allows you to see immediately how your menu will look to the operator when it is displayed.

- SDA automatically creates the source and the load members required to display a menu. SDA does most of the work for you; you need only supply the menu text and the command text for the menu.

- You can also use SDA to create **help text** for each option on a menu or for the entire menu. Help text can provide additional information about each of the options available on a menu. The operator can display the help text for the entire menu by pressing the Help key when the menu is displayed. To display the help text for a particular menu option, the operator types in the option number, then presses the Help key (without pressing the Enter key). The help text for that option number is then displayed.

Chapter 5, "Creating Menus and Menu Help Text Using the Screen Design Aid," in this manual describes how to use SDA to create menus and help text for menus.

Using the BLDMENU Procedure to Create a Menu

The BLDMENU procedure, which runs the $BMENU utility program, is part of the SSP support. If you choose to use the BLDMENU procedure instead of SDA, you must first design your menu on a piece of paper. Having designed the menu, you can then use one of the following programs to enter and create the menu text and command text source members:

- Development support utility (DSU), a Program Product; or
- Source entry utility (SEU), part of the optional Utilities Program Product; or
- $MAINT utility program, part of the SSP.

Once you have built the source member, you run the BLDMENU procedure to convert the source members into the load members used by the system.

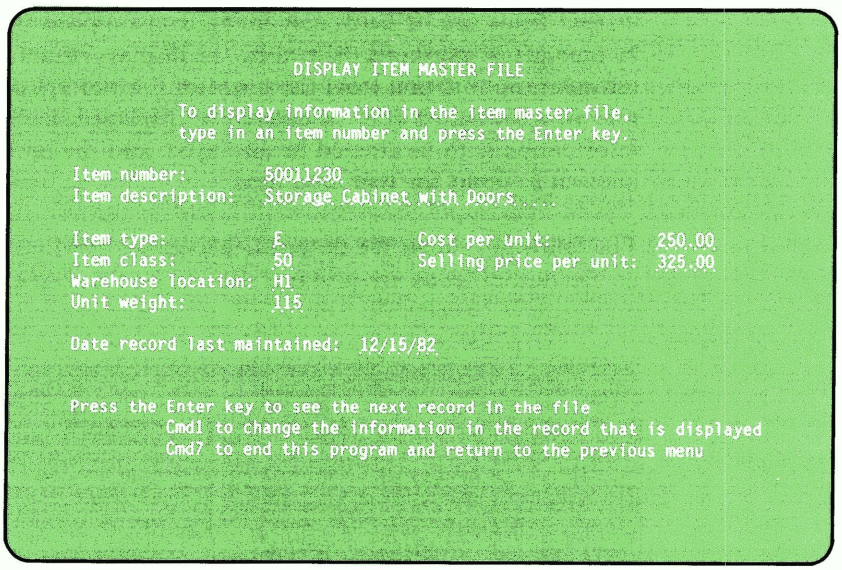
Although SDA is easier to use than the BLDMENU procedure, using the BLDMENU procedure to compile your source members is sometimes faster than using SDA. You might find it faster to make minor changes to your menu source members using DSU or SEU and then use the BLDMENU procedure to compile the members. You might want to try using SDA alone and SDA with the BLDMENU procedure to find out which works best for you. Remember, however, that an unsuccessful compilation of the new source member will cause the existing load member to be deleted.

Chapter 10, "Creating Menus without the Screen Design Aid" in this manual describes how to use the BLDMENU procedure to create menus.

Chapter 2. Display Formats and Display Design

The information shown on the display screen is called a **display**. That information and its use is defined by a **display format**. Using the display defined by a display format, a program can tell the operator when to enter required information or data. That program can also use the display to show requested information to the operator and to explain what is to be done with the information.

The following is a sample display:



Benefits of Displays and Display Formats

Displays defined by display formats are useful for three reasons:

- They make it easier for the operator to enter and get data.
- They improve productivity.
- They are defined separately from the program or procedure that uses them.

Using a display shown by a program, the operator can easily recognize what information is required, and how the information is to be entered. Also, by using the same or similarly designed displays again and again, the operator becomes

familiar with a job or application. That familiarity can improve productivity and build operator confidence.

Most important, because display formats are separate and independent of the procedure or program that uses them, one set of display formats can be used by different procedures or programs. And because display formats are separately defined, they usually can be changed without recompiling your programs.

Data Fields in a Display

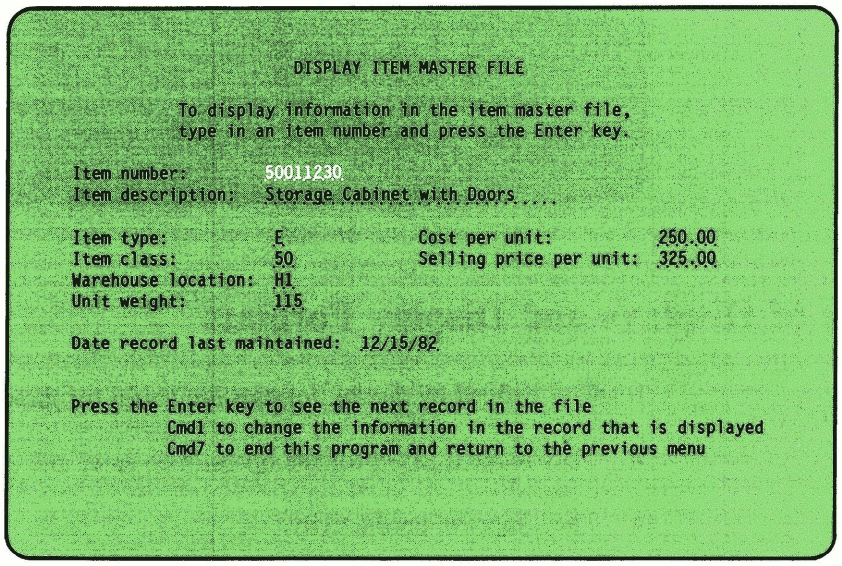
When you define a display, you do it in terms of the fields on that display: **output fields**, **input fields**, or **input/output** fields.

Output Fields

Output fields contain information that the operator cannot change. The contents of output fields are not returned to the program.

Output fields can be fields containing data supplied by the program, or they can be **prompts** or **constants** defined by the display format. A prompt is a request for information or action from the operator. A prompt can tell the operator what type of information is to be entered or displayed, the form in which that information is to be entered or displayed, and the options or values that are allowed as input for that data field.

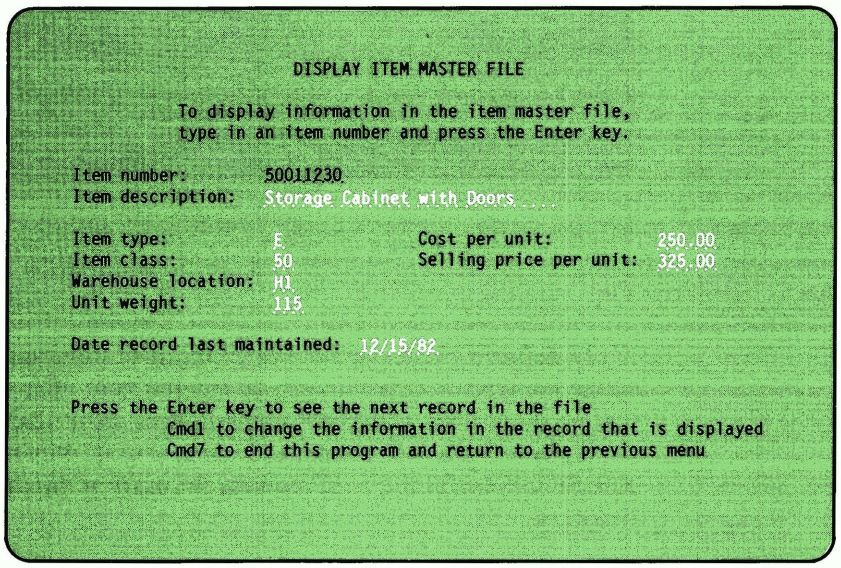
The following shows the output fields on the previous display. In this example, all the output fields are prompts defined by the display format.



Input Fields

Input fields are fields in which the operator can enter data. When a program shows a display, input fields are normally blank. The operator can type data into the input field; its contents are sent to the program when the operator enters the display. This data is then used by the program to do an operation, such as a calculation or a file update.

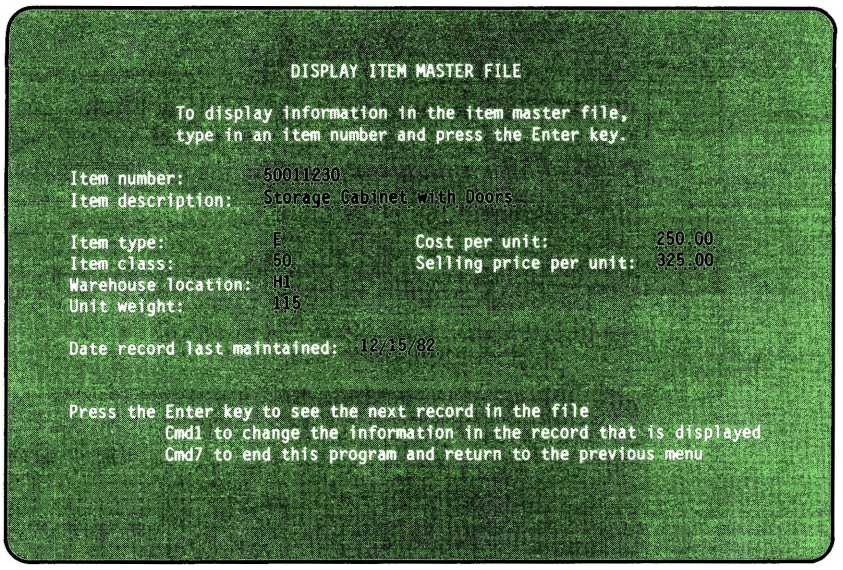
The following shows the input field on the previous display. The operator typed an item number, 50011230, in the input field. When the Enter key was pressed, the item number was sent to the program.



Input/Output Fields

Input/output fields allow data to be entered by the operator, and they allow data to be displayed to the operator. The operator can type in new data in a blank input/output field, or the operator can change data that might already be displayed in an input/output field. Data displayed to the operator can be supplied by the program or specified by the display format itself. Data contained in an input/output field is returned to the program when the operator enters the display.

The program supplies information about the requested item number. The operator can accept that information or change it. If the operator chooses to change the information in any of the input/output fields, the operator can do so, and then press command key 1 to enter those changes.



Data Types

If you define a particular field as an input or input/output field, you must also define the type of data that can be entered in it. For example, you can specify that an input field will accept numeric data only: that is, the field will accept only the digits 0 through 9, commas, decimal points, plus signs and minus signs. This definition is useful if a field requires the entry of inventory amounts or account balances.

You can specify that a field will accept alphameric data only: the characters A through Z, special characters, and any numeric data. This definition is useful when a field requires both alphabetic characters and numeric digits, such as a customer's address.

Other data type definitions include:

- Alphabetic data (Only the letters A through Z, and certain special characters, are allowed).
- Digits only (Only digits 0 through 9; no commas, decimal points, plus signs, or minus signs).
- Signed numeric (Only the numbers 0 through 9 are allowed; the sign is determined by which key is pressed, Field+ or Field-, after the numbers are entered).
- Magnetic stripe reader (This field contains data to be read from the magnetic stripe reader).
- Numeric shift (This field is valid on data entry keyboards only). The keyboard automatically shifts to numeric shift when manual shift is not active.

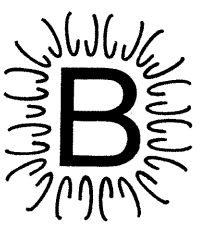
- Right-to-left field (If the appropriate national language RPQs are installed, the cursor moves from right-to-left within this field as the operator types in data).
- Katakana characters (Only Katakana characters are allowed).
- Alphameric and Katakana characters or ideographic characters (Alphameric and Katakana characters or ideographic characters, but not both).
- Ideographic characters (only).
- Any combination of alphameric, Katakana, and ideographic characters.

Attributes

Besides defining the field and the data type, you also define the physical characteristics, or **attributes**, of a field. The attributes that you can specify include:

- High intensity

  Data shown in high intensity is brighter than that shown in normal intensity. In effect, your data looks as though it were displayed in **boldface**. High intensity is useful for drawing attention to important information, such as display titles or column headings.

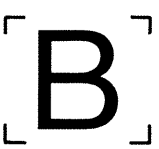


- Blink field

  If a field is a blink field, data displayed in that field will blink. A blinking field is easy to see and can be used to draw attention to important information. Blinking fields, however, are difficult to read and might annoy the operator if used too often.

- Nondisplay

  If data is typed in or sent to a nondisplay field, it cannot be seen by the operator. A nondisplay field is useful for information needed by the program but not by the operator, such as a display or record ID, or for information that must remain confidential, such as a password or security code.



- Reverse image

  Data on the display normally appears as light characters on a dark background. If a field has the reverse image attribute, the data in that field appears as dark characters on a light background. Reverse image is a good way to show the operator the location of a field or to draw attention to an error message or to fields in which the operator entered incorrect data.

- Underline

  An underlined field can be used to emphasize information, like this, or it can be used to show the length of an input field, like this: ___ Showing the operator the length of an input field is important because a keyboard error message results if the operator attempts to type data outside of the input field.

- Column separators

  Column separators are useful for showing the number of positions in an input field. Column separators appear as dots or vertical lines (depending on the type of display station) on either side of each character position within the field. Column separators do not require character positions of their own. An input field with five character positions, for example, might look like this: .i.n.p.u.t.

Attributes are allowed in certain combinations. Also, you can specify that certain attributes always be used, or that the attributes be controlled by the program. A special kind of switch called an **indicator**, can be used by the program to turn an attribute on or off. For specific information on the use of indicators for attribute control, see the appendixes.

Designing a Display

Display design is concerned primarily with the way data is displayed to the operator and the way the operator responds to this data. Input displays are designed for ease of data entry, and output displays are designed for ease of reading. Displays that show output and also allow input are the most challenging to design because you must try to balance ease of data entry and ease of reading.

Display formats must be clear, complete, and understandable. A well-organized and descriptive display format can help to improve operator productivity. When you design a display format, you must consider:

- How the display format will be used.
- What kind of information you want the display to process.
- The input provided by source documents.
- The level of experience or responsibility of the operator who uses the format.

The following topics will help you in designing your display formats.

Make the Operator Feel Productive

Because an operator uses the display station to do a job, the application must allow the operator to do a better job. Application programming and display design should not bore, scare, or annoy an operator. Try to use only as many features of the display station *as are necessary*. A display with too many blinking fields or too much underlined data and highlighted information might only confuse an operator. In addition, highlighted fields can lose their significance if used too often.

Whenever possible, give the more experienced operator the chance to take shortcuts from one display to another.

Identify the Displays

Each display should be identified by a display ID and a title.

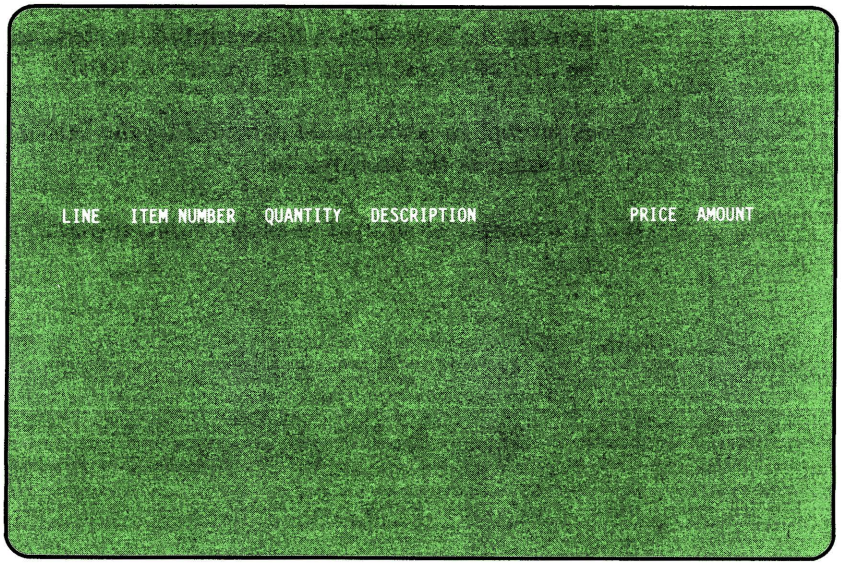
A display ID can be used by the program to identify the display from which input data was read. The display ID should be the first field on the display, and should be a nondisplayed and protected input/output field.

The title should be as short as possible, yet informative and meaningful. Titles are usually in uppercase and centered on line 1. You might consider underlining the title, or making it high intensity, or both.

Whatever method you use to identify your displays, be sure that you consistently use that method throughout your applications.

Provide Meaningful Column Headings

Descriptive column headings help operators understand what they see and do. For example, the headings on a display for entering line items from an order might be:



Column headings should be in uppercase and above the items they describe. If the column heading is longer than the values to be entered or listed below it, center the values. If the column heading is shorter than the value, line up the heading on the left.

Although your program might not actually process the contents of headings on the display, too many headings can increase the amount of data transmitted between the computer and the display station. This might increase the response time, especially at remote display stations. For more information about using display formats at remote display stations, see "Improving the Performance of Display Formats at Remote Display Stations" in Chapter 3.

Plan Displays That Are Easy to Read

The following suggestions can help you plan displays that are easy to read:

- Design the display to match a preprinted input form if one is used. For example, an order received from a customer is easier to transfer to the system if the display matches the format and content of the order form.
- Use blank space to separate areas or data fields on the display. Blank space is the most effective and least cluttering separator. Avoid using asterisks (*) or other special characters to outline parts of the display.
- Organize data in columns or lists. Text should be left-adjusted; numeric data should be right-adjusted and lined up at the decimal point or units position.
- Use complete words rather than abbreviations or contractions. For example, use *operator number* instead of *op. no.*; *do not* instead of *don't*.
- Design your displays in both uppercase and lowercase letters. ALL UPPERCASE LETTERS MAKE A SENTENCE HARDER TO READ.
- Use simple wording and short sentences. Do not use complex sentences.
- Carefully choose the words you use for prompt text. Where appropriate, identify the type of data to be entered, numeric ranges, or the type of units to be entered (for example 10s, dozens, or 100s?).
- A prompt or label should come before the field it describes, and should be on the same or the previous line.
- Use column separators to show character positions and the length of an input field.

- Organize prompts and input fields in a way familiar to the operator. For example:

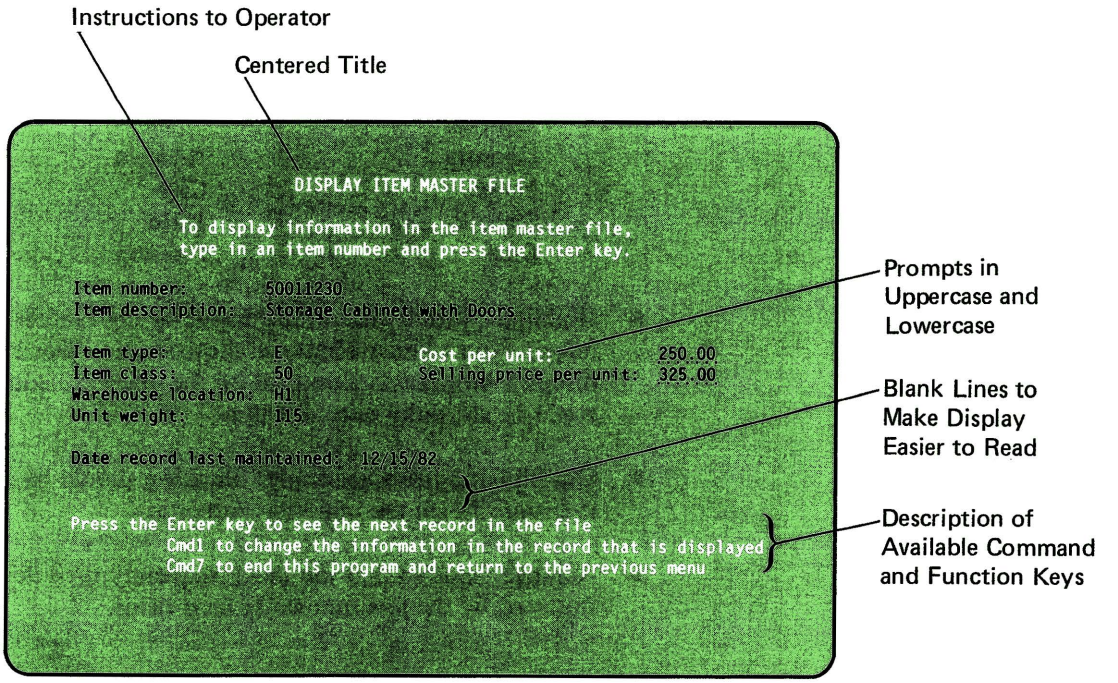
Do not use this order:	**Use this order:**
Address	Name
Country	Address
Name	City
State	State
City	Country

- Highlight, with either reverse image or high intensity, new or referenced information when a display is shown again. For example, if a display is reshown because data entered by the operator is in error, the incorrect data could be shown in reverse image.

- Use blinking fields sparingly. Blinking should be used only when it is necessary to get the operator's attention.

- Arrange fields so that the most frequently used fields are recorded first, followed by the less frequently used fields.

The following display illustrates some of the elements of good design:



Display a Small Amount of Data at One Time

Displays should be uncluttered and include only meaningful or required information. For example, do not display an entire record on an inquiry if the operator needs to look at only one or two fields. Instead, display the necessary fields, and provide a way for the operator to display the entire record or different portions of the record. (This might be done with a command key.)

Certain programs might accumulate data from display to display. Such accumulation might be desirable; however, it is possible that the display can get too cluttered and become difficult to read. Also, remember that a large amount of displayed information can increase response time, particularly at remote display stations.

You might consider using nondisplayed and protected input/output fields for information that is needed by your programs but not by your operator. The display format ID or a record ID are possible examples of such information.

Maintain Similarities among Displays

Each application has its own display design requirements, but good design requires similarity among applications. For example, words, necessary abbreviations, and recognizable codes should be the same from one application to another. Similarity is particularly important when the same operator works with

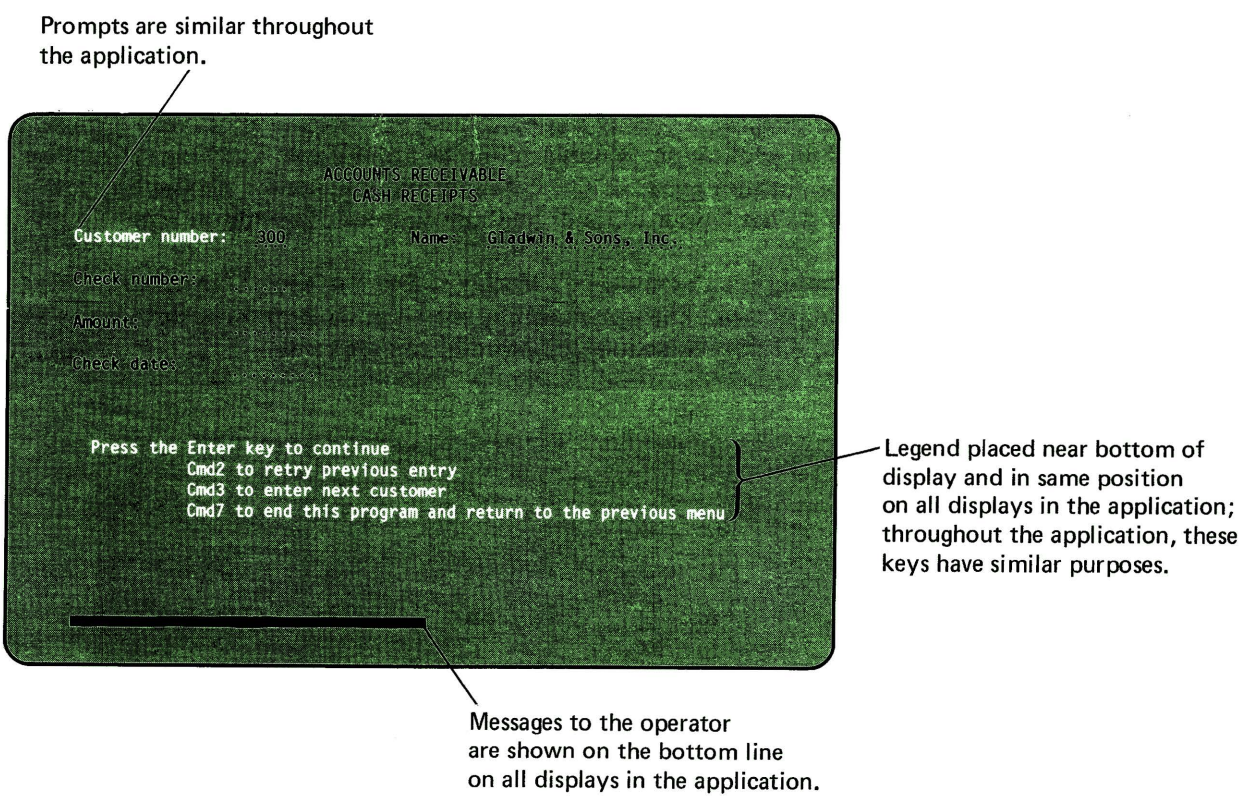
more than one application. The standards used within an application are even more important than the standards between applications.

Use of keys should be standardized for displays and applications. For example, avoid allowing command key 7 to end a job on one display and command key 9 to end a job on another display. Of course, a key sometimes has to be used in a way unique to an application, but a short legend at the bottom of the display can tell the operator the nonstandard use of the key.

Reserve certain areas of the display for similar types of information, and maintain the areas in the same locations on all displays. For example, try to provide operator instructions and display messages always near the bottom of the display.

Try to highlight a certain type of field in the same way each time it is used. For example, any fields in error could always be displayed in reverse image. If *only* error messages are shown in reverse image, the operator is soon aware that every time a reverse image field is displayed an important message must be read.

The following display shows some of the techniques you can use to maintain similarities among your displays:



Keep Operator Responses Short

Whenever possible, keep operator responses short but complete. Responses can include abbreviations or codes, but only if the operators are familiar with them. The abbreviations or codes used should be listed with their meanings in the Help text, just in case an operator needs assistance. See Chapter 3, *Using Help Areas and Help Formats* for more information.

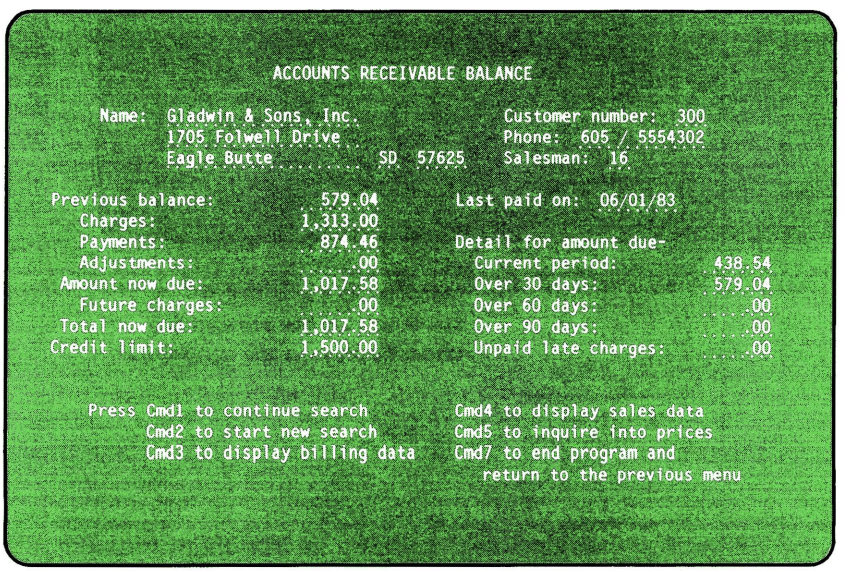
If a data field usually receives the same input each time it is displayed, consider showing that data in the field when the display appears. The constant can be supplied by the program using the display, or defined in the display format. If necessary, the operator can be allowed to change the data as required. If the operator does not change it, the constant data is returned to the program. This saves the operator time because additional keystrokes are needed only if the field requires a change.

Try to design displays so that operators do not need to move the cursor over unused fields. Put the lesser-used fields toward the bottom of the display, or place the cursor at the more-important and frequently used fields. When the display is first shown, the position of the cursor can be controlled by the program or defined by the display format.

Provide One Idea for Each Display

Whenever possible, a display should contain information about only a single aspect of an application. Concentrating on a single idea at a time reduces the chance of operator error. If you cannot think of a title for the display, you probably do not have a single or logically connected thought or step.

The following is an example of a display showing one idea: an accounts receivable balance. The command key legend at the bottom of this display shows additional displays or actions the operator can see or do.



Respond to Operator Input

You should consider the time an operator waits for System/36 to respond. If a program takes a long time to respond to an operator's action, you might want to have the program display a message letting the operator know that it is in the process of doing whatever the operator requested. For example, an in-process message might be displayed for a program that does extensive calculations with the operator's input. Remember, however, that telling the operator that the system has accepted entered data might cause poorer response time, particularly at remote display stations.

Some applications might require a long series of displays. It is helpful to the operator if summary information is shown (for example, every five to eight displays or at a logical break) that tells where the operator is and how much has been done. You might also allow the operator to cancel, review, or change information entered so far.

Make Error Correction Easy

Input errors can be reduced by detecting the errors as they occur, and by letting the operator know that errors must be corrected. If the operator is to make an extensive, final, and permanent change to data, you might consider showing the operator the results of the change before it is actually entered. The operator can then confirm the requested change by pressing a command key, or cancel the request if necessary by pressing the Enter key.

Provide Some Sort of Help Information

Operators should know what action to take when problems occur. Problem recovery steps should be included in the written operating procedures. Besides the recovery steps, further information about the error should be available for the operator to display.

Help areas and corresponding help text are one way of providing additional information to your operators. Help areas and help text are discussed in more detail in Chapter 3, "Additional Considerations for Display Design."

Use Color to Highlight Data

Any display that you design for a single-color display station, such as the 5251 Display Station, can also be used for a color display station, such as a 5292 Color Display Station. If you have a color display station, take advantage of the colors you can control using the display format.

Color used properly is more pleasing to the eye than single-color data, and it generally makes the display more interesting. Color can draw attention to certain areas that need operator attention, such as a request for operator input or a response to an error condition. Because of the color combinations possible, less time is spent by the operator searching for data on the display, and the operator is less likely to become tired or bored with the display.

The 5292 Color Display Station can display the following colors:

- Green
- Red
- White
- Blue
- Turquoise
- Pink
- Yellow.

Each color is controlled by using a combination of the following attributes:

- Blink field
- High intensity
- Reverse image
- Underline
- Column separators.

  Note: Color may also be selected by entering the appropriate number on the **Color Attributes For Field** menu.

When you design a color display, consider the following recommendations:

- Determine if the display format will be used on both color and single-color displays.

  If you are designing displays that will be shown at both color and single-color display stations, use the Limit Color Select option of the 5292 Color Display Station to preview the intended results. The Limit Color Select option reduces the number of colors displayed on the 5292 to two. This preview gives you an idea of how a display designed for color will appear when it is displayed at a single-color display station. Remember that a display designed for color will appear differently if it is displayed at a single-color display station.

- Give a color a particular meaning.

  You should choose a color, define what it means, and use it in the same way on every display. For example, if white is used to highlight important output fields or error messages, use this color in a similar manner throughout the displays that you design.

- Use color conservatively.

  Too many colors on a display can confuse the operator. The fewer colors used, the more effective each color becomes.

- Group colors into large areas.

  Grouping colors allows the eye to organize and follow information easily. Too many colors spread over a display can hide the meaning of the display.

For further information about the 5292 Color Display Station, see the *5292 Color Display Station Programmer's Guide to Using Color*, GA21-9413.

For a detailed description of how each attribute affects the color that is displayed, see Appendix C, "Entries on the Field Definition (D) Specifications."

Using the 3180 Model 2 Display Station

The 3180 Model 2 Display Station allows a 132-character display. It allows 27 rows of data. Any display that you design for an 80-column display can be displayed on a 3180 Model 2 Display Station. Any display that you design for a 3180 Model 2 Display Station can only be displayed on a 3180 Model 2.

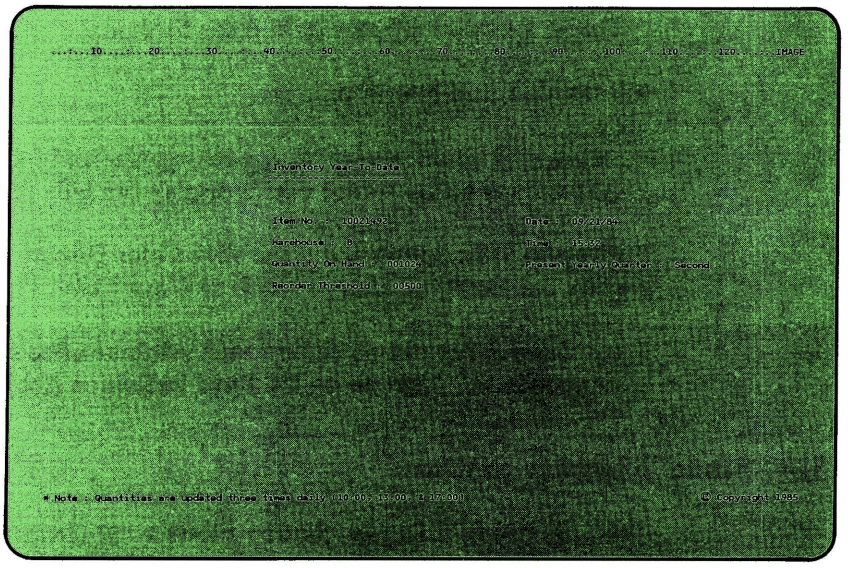
Note: When using SDA's option 7 to view a series of mixed format displays, and to go from 80-column processing to 132-column processing, you must specify on the S-specification that the 132-column screen is to clear all lines. If you forget to clear all lines and then try to view the format using option 7, the following message appears:

```
SYS-5469 Invalid data was sent to this display station
```

When going from 132- to 80-column processing, you should specify in the S-specification that the 80-column screen clears all lines.

When you have finished using option 7 to view the displays, remember to go back to the S-specification and enter your original data into the clear all lines prompt and recompile the format.

The following is an example of a 132-character display:



Document the Displays

Printed copies of your displays can be made using the Print key. You can also use the screen design aid (SDA) to print images of the displays. The printed copies can be labeled and stored with the output you get when you create your display formats. The printed copies are helpful in training your operators to use the displays, and are useful when you change the displays as your business changes.

When you print your displays, if possible, use a printer that can print lowercase letters.

Special Requirements for Designing Your Displays

The system has a few special requirements and limitations that you should be aware of when you design your displays. When designing the fields on your display, remember the following:

- The first position of the display screen (line 1, column 1) is reserved and is used by the system for control information; therefore a field such as a prompt or input field cannot start on line 1, column 1.
- Always allow at least one space before each field on your display. One control character (the character, supplied by the system, does not appear on the display screen) comes before each field on the display.
- If a field begins in column 1 of any line, the control character is in column 80 of the previous line for an 80-column format and column 132 of the previous line for a 132-column format. The same rule applies if a display overlays a portion of another display: allow at least one space between the first field on the new display and the last displayed field on the old display.

- A maximum of 256 fields is allowed in a display. Of those fields, the maximum number of input fields is 127, or less than 127 if any of the following is true:

  - If the specifications for the input fields on the display are in a different order in the display format specifications than they appear on the display
  - If you have fields that will contain data to be read from a magnetic stripe reader
  - If you specify modulus 10 or modulus 11 self-check fields.

  Use the following equation to determine the maximum number of input fields:

$$\text{Maximum number of input fields} = \frac{255 - SEQ - \begin{array}{c}\text{Number of}\\ \text{modulus 10}\\ \text{or modulus}\\ \text{11 fields}\end{array} - \begin{array}{c}\text{Number of}\\ \text{magnetic}\\ \text{stripe}\\ \text{reader}\\ \text{fields}\end{array} - \begin{array}{c}\text{1/2 the}\\ \text{length}\\ \text{of the}\\ \text{longest}\\ \text{magnetic}\\ \text{stripe}\\ \text{reader}\\ \text{field}\end{array}}{2}$$

  in which SEQ is equal to 0 if all input fields are defined by the display format in exactly the order they appear on the display. If one or more input fields are out of order, SEQ is equal to the number of out-of-order fields plus 1.

  For example, if 20 fields (ten modulus 10 and ten modulus 11) are specified out of order the maximum number of input fields is:

$$\frac{255 - 21 - 10}{2} = 112 \text{ input fields}$$

Creating the Display Format

When you have designed your display, you must create the library member the system uses to show the display. Remember that every display is defined by a **display format**. That display format is stored in a **display format member**.

The display format member can contain up to 255 individual display formats. Each display format is made up of **specifications**. These specifications define information about:

- The entire display. This information is found on a specification called the **display control specification** (or **S** specification).
- Individual fields on the display. This information is found on the specifications called the **field definition specifications** (or **D** specifications).

- Optionally, help text that is available for the display. This information is found on the specifications called the **help definition specifications** (or **H** specifications).

System/36 provides two ways to create your display formats:

- The screen design aid (SDA)
- The FORMAT procedure.

Using SDA to Create Display Formats

The screen design aid (SDA), part of the Utilities Program Product, is a program that can lead you through the steps used to create a display format. For this reason, you may find that SDA is considerably easier to use than the FORMAT procedure.

SDA has several advantages over using the FORMAT procedure to create your display formats:

- You can design your displays right on the display screen. This is particularly useful because it allows you to see immediately how the display will look when it is displayed.
- You can use SDA to test your displays. By controlling which indicators are on or off and by specifying the order in which a series of displays is shown, you can get a good idea of how your displays will work when the application is actually run.
- SDA does most of the work for you; you need only supply certain control information for the display, and the location and characteristics of the fields to be displayed.
- SDA also offers some additional options that may help you create your displays, and code and document your application programs. Using SDA, you can call the development support utility (DSU), an optional program product, or if you do not have DSU, you can call the source entry utility (SEU), part of the optional Utilities Program Product, to create or update source and procedure members. Furthermore, you can use SDA to create RPG and WSU program specifications for the display formats that you create.

Chapter 6, "Creating Display Formats and Help Using the Screen Design Aid" in this manual describes how to use SDA to create display formats and help text for display formats.

Using the FORMAT Procedure to Create Display Formats

The FORMAT procedure, which runs the $SFGR utility program, is part of the SSP support. If you choose to use the FORMAT procedure instead of SDA, you must first design your display on a piece of paper, or on a preprinted form that is described later in this manual. Having designed the display, you then use one of the following programs to enter and create the display format source member:

- Development support utility (DSU), an optional Program Product; or
- Source entry utility (SEU), a portion of the optional Utilities Program Product; or
- The $MAINT utility program, a part of the SSP.

And finally, you run the FORMAT procedure to convert the source member into the load member used by your program.

After the FORMAT procedure produces the load member, the system prints information about the display format you have defined. This information is useful for documenting your displays and can be used for correcting problems with your display formats and programs. The printout is necessary when coding the programs that will use the display formats you have defined.

Although SDA is easier to use than the FORMAT procedure, using the FORMAT procedure to compile format source members is sometimes faster than using SDA. You might find it faster to make minor changes to your display format using DSU or SEU and then use the FORMAT procedure to compile the displays. You might want to try using SDA alone and SDA with the FORMAT procedure to find out which works best for you.

Chapter 11, "Creating Display Formats and Help without the Screen Design Aid" in this manual describes how to use the FORMAT procedure to create display formats and help text for display formats.

Display Formats and Programming Languages

Each programming language is able to use display formats to accept input from or to send output to the display station. For detailed information about how the programming languages use display formats, see the manual or manuals about these languages.

Chapter 3. Additional Considerations for Display Design

This chapter discusses some additional considerations for designing and creating your displays. These subjects are discussed:

- Using Help Areas and Help Formats
- Using Help Areas for Online Document Support
- Improving the Performance of Display Formats at Remote Display Stations
- Using Multiple Formats
- Using the Read-Under-Format Technique
- Using and Determining Self-Check Digits.

Using Help Areas and Help Formats

You can define help text for your displays. The help text can be used to explain all or a portion of a display shown by the application program. To provide help text to your operators, you define rectangular areas on the display used by your application program. These areas are called **help areas**. Each help area is defined by a specification in the application format called the **help definition specification**, or H specification. The help area and its H specification correspond to help text on a special kind of display format called a **help format**.

If the cursor is within a help area when the Help key is pressed, the corresponding help format is displayed. Using the Roll-Up and Roll-Down keys, the operator can page through other help formats defined for the display. Once the operator has viewed the help formats, the operator can return to the original display by pressing the Enter key or a command key.

Help areas and help formats are a good way of providing operator instructions that can be kept on the system, separate from the application they describe, and ready to use whenever necessary. Although you should design your displays and your application with the idea of supplying help to your operators, you can easily add help to an existing application by making a few simple changes to the existing display formats and by creating the help format or formats that contain the help information. You generally will not have to rewrite or recompile your programs to support the new help information.

Restrictions on Using Help Formats

Help formats can do most of the things a format displayed by an application program can do, except operations that require information to be supplied by the program. If unsupported operations are used, they do not cause errors, but the desired operation is not performed. The operations that are not supported for help formats are:

- Variable start line number. If variable start line is specified in the S specification of a help format, 01 is assumed as the start line number.
- Output fields that require data supplied by the application program. If such output fields are specified in the D specifications of the help format, those fields are blank.
- Indicators controlled by the application program. Any indicators used in the S or D specifications of the help format are assumed to be off.
- Function key mask. If a function key mask is specified on the S specification for the help format, it is ignored when that format is displayed.

There is one additional and important restriction: *although help formats themselves can contain H specifications, those H specifications will not create help areas on the help displays.* In other words, the operator cannot use the Help key when help formats are already displayed.

Specifying the Help Formats for a Help Area

If you define a help area for a format displayed by an application program, you must also specify the *first* help format that will be displayed for that area. That help format is specified in columns 7 through 14 of the H specification for the help area. The load member that contains the help format is specified in columns 16 through 23, and the library that contains the load member is specified in columns 25 through 32. (Note that the help format does not have to belong in the same load member or the same library as the display format load member that contains the display formats used by the application program. For a detailed description of the entries made on the H specification, see Appendix B, *Entries on the Help Definition (H) Specifications*).

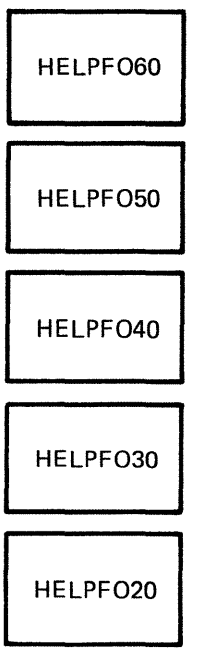
Additional help formats can be defined for a help area. These help formats must be contained in the same load member specified in the H specification for the help area. The first 6 characters of the format names must be the same as the first 6 characters of the help format name specified in the H specification. The last two characters of each format name are numeric digits that must be different for each format, and they must vary in the range 00 through 99. The last two digits are used by the system to determine the sequence in which the help formats are displayed.

Displaying the Help Formats for a Help Area

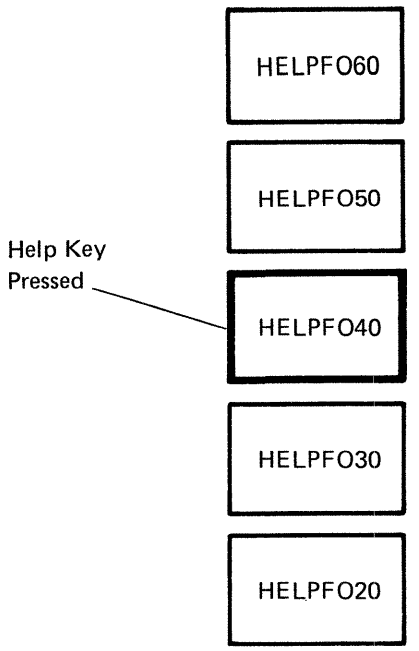
If the Help key is disabled by the format displayed by the application program or by the application program itself and the operator presses the Help key while the cursor is located within a help area, the application format is saved, and the help format specified in columns 7 through 14 of the corresponding H specification is displayed.

The operator can display the rest of the help formats for the help area using the Roll-Up and Roll-Down keys. When a Roll key is pressed, the system searches the load member specified in the H specification for the help area. If the Roll-Up key is pressed, the system searches the load member for a format name with the same first 6 characters and the *next higher* last 2 digits. If the Roll-Down key is pressed, the system searches the load member for the format name with the *next lower* last 2 digits. If a help format is found that satisfies these requirements, that help format is displayed.

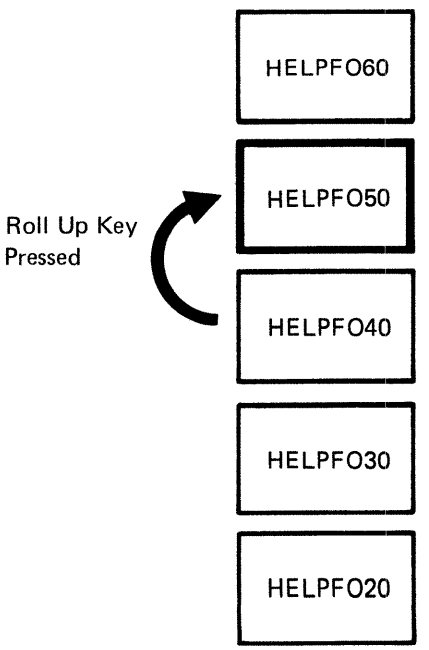
For example, suppose help format HELPFO40 is specified in the H specification for an area. HELPFO40 is contained in load member HELPFORM. Load member HELPFORM contains the following help formats:



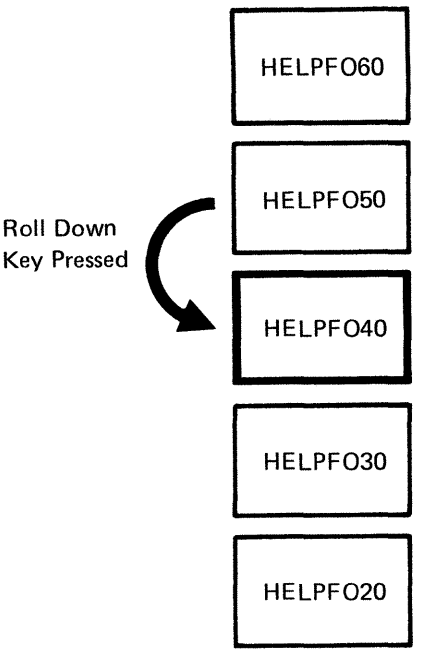
If the operator presses the Help key while the cursor is within the defined help area, help format HELPFO40 is displayed because it is specified in the H specification for that help area:



If the operator presses the Roll-Up key, help format HELPFO50 is displayed because its name contains the next higher last two digits:



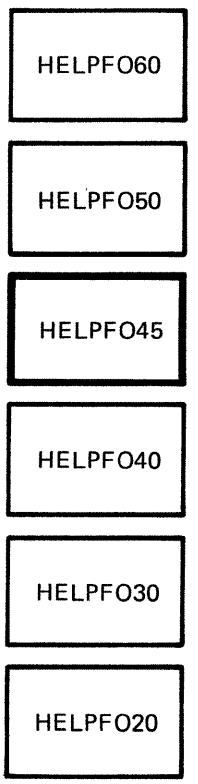
If the Roll-Down key is pressed, help format HELPFO40 is displayed because its name contains the next lower last two digits.



If the Roll-Down key is pressed again, HELPFO30 is displayed, and so on.

The method used by the system to select help formats allows you to easily add new help formats. All you have to do is define a new help format, add it to the load member for the help area, and recompile the load member. You are able to control the sequence in which the new help format will be selected by giving the format the appropriate name and sequence number.

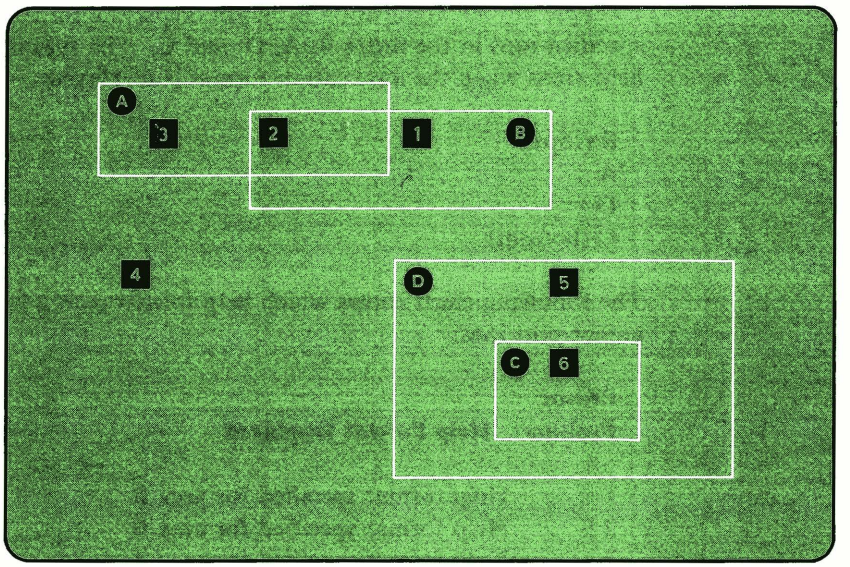
If you number your original help formats in increments of 5 or 10, you can easily insert a new help format. For example, suppose you want to add a new help format so that it will be displayed between formats HELPFO40 and HELPFO50. Give the new format a name with the same first 6 characters (in this case, HELPFO), and the last 2 digits in the range 41 through 49 (45, for example). Help format HELPFO45 would then be displayed between HELPFO40 and HELPFO50.



Displaying the Help Formats if Help Areas Overlap

Several help areas can be defined for a format displayed by an application program. These help areas can overlap, so the cursor might be located within two or more help areas when the Help key is pressed. *The order of the H specifications for the help areas determines which help format is displayed when the help key is pressed.*

For example, suppose an application format has four help areas defined for it. For this example, these help areas are called **A**, **B**, **C**, and **D**. Help areas **A** and **B** overlap, and help area **D** completely encloses help area **C**. There are six possible cursor positions at which the Help key can be pressed. These cursor positions are marked with a number **1** through **6**.



When a display format containing H specifications is displayed by an application program, the system saves those H specifications in a help list associated with that display station. The H specifications are listed in the same order they appear within the specifications for the displayed format. If previously defined H specifications already exist, any new H specifications are added to the top of the list of H specifications. (For the following examples, assume that the help area list does not currently contain any H specifications.)

Examples

Example 1: An application program displays a format that defines the H specifications in the order A, B, C, and D. The system builds the following list of help areas when the application format is displayed:

A (top)
B
C
D (bottom)

When the Help key is pressed while the cursor is positioned within one of these help areas, the system searches the help area list from top to bottom looking for the *first* help area that encloses the cursor position. The help format specified for

that help area is then displayed. The following chart shows which help format would be displayed for each of the cursor positions:

Cursor Position	Help Format Displayed
1	Help format specified for area B
2	Help format specified for area A
3	Help format specified for area A
4	Error message – no help area defined for this position
5	Help format specified for area D
6	Help format specified for area C

Example 2: An application program displays a format that defines the H specifications in the order B, A, D, and C. The system builds the following list of help areas when the application format is displayed:

B (top)
A
D
C (bottom)

The following chart shows which help format would be displayed for each of the cursor positions:

Cursor Position	Help Format Displayed
1	Help format specified for area B
2	Help format specified for area B
3	Help format specified for area A
4	Error message – no help area defined for this position
5	Help format specified for area D
6	Help format specified for area D

Note that if you define the help areas in this order, the help format for help area C cannot be displayed by moving the cursor to within the help area and pressing the Help key. That is because the system always searches the help area list for the **first** help area that encloses the cursor position (in this example, area D). However, if the help format for help area C follows the same naming convention as the help formats for the other help areas, that help format might be displayed using the Roll-Up or Roll-Down keys.

Displaying Help Formats for Different Help Areas

If the operator presses a Roll key while a help format is displayed, the system tries to display any other help formats defined for that help area. If the operator uses the Roll-Up or Roll-Down key, the system searches first the load member for the help format with the next higher or next lower last 2 digits in its name. If such a format can be found in the load member, that help format is displayed.

If a help format with the highest or lowest last 2 digits has been displayed, and a Roll key is pressed again, the system searches the rest of the help area list. This means that help formats for other help areas on the display can be displayed using the Roll-Up or Roll-Down key in the following way. The cursor does not have to be within the other help areas.

- If the Roll-Up key is pressed, the system searches *downward* through the help area list beginning with the help area defined immediately following the currently used help area.

- If the Roll-Down key is pressed, the system searches *upward* through the help area list, beginning with the help area defined immediately preceding the currently used help area.

For either the Roll-Up or the Roll-Down key, the search ends when a help area definition is found that differs from the current help area in any of the following ways:

- The format name starts with different characters in the first 6 positions.

- The load member name is different.

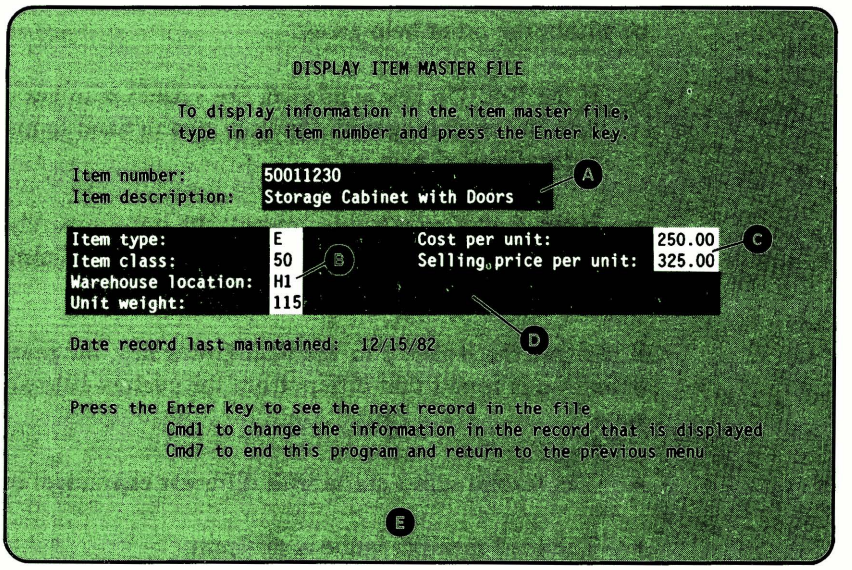
- The library name is different.

If any boundary indicators are set on in any of the H specifications within the help area list, the system searches a smaller portion of the help area list according to the preceding rules. For more information about how the system processes a help area list that has boundary indicators set on, see "Restricting the Amount of Help Text the Operator Can Display," later in this chapter.

If a help area that differs in any of the ways just mentioned is not found, the system goes to the opposite end of the help area list and continues the search. When a help area that differs in any of the ways just mentioned is found, the help format specified in that help area's H specification is displayed. The operator can then use the Roll-keys to display the help formats defined for that help area.

If a help area that differs cannot be found in the entire help area list, only those help formats for the currently used help area will be displayed. If the help format with the *highest* last two digits is displayed and the Roll-Up key is pressed, the system wraps around and the help format with the lowest last two digits is displayed. If the help format with the *lowest* last two digits is displayed and the Roll-Down key is pressed, the system wraps around and the help format with the highest two digits is displayed.

The following help areas could be defined by the optional H specifications for an application format. For this example, the help areas are identified by the letters **A** through **E** .



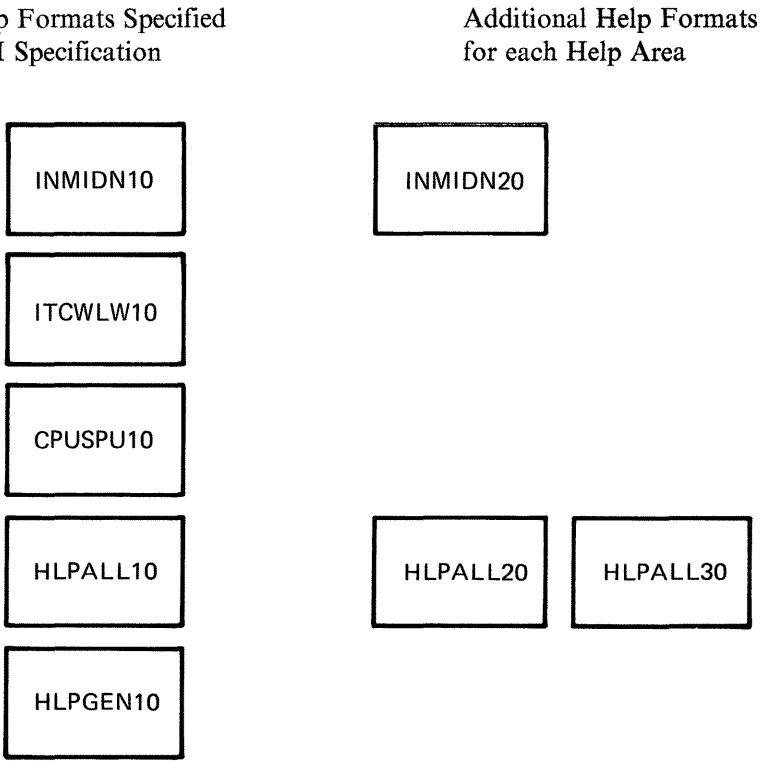
The H specifications for each help area specify the first help format to be displayed. The H specifications for the help areas on the application format could look like this:

Help Definition Specification

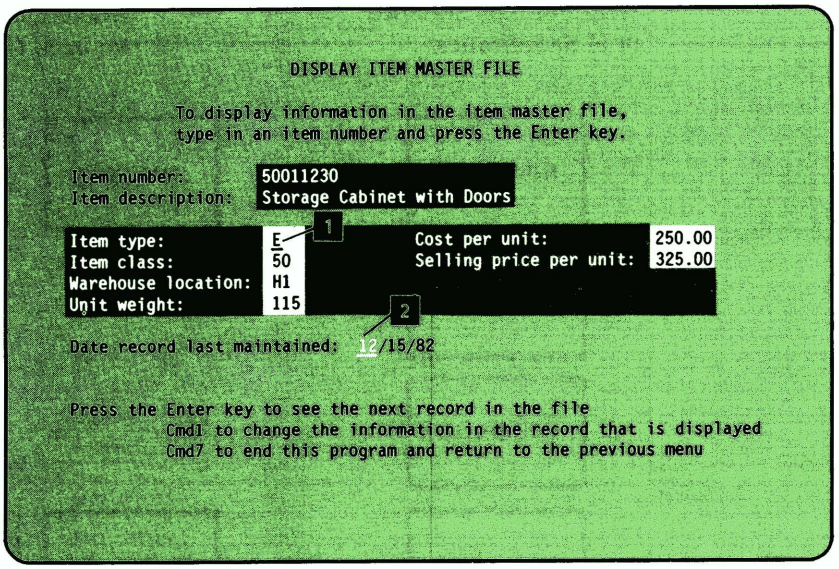
H

	Sequence Number	Specification Type	Help Format Name/Help Text Label	Reserved	Help Load Member Name/Help Document Name	Reserved	Help Library Name/Folder Name	Reserved	Upper Left Row Number	Upper Left Column Number	Reserved	Lower Right Row Number	Lower Right Column Number	Reserved	Suppress Selection Indicator	Reserved	Restore Application Format	Reserved	Boundary Indicator	Reserved
	1 2 3 4 5	6	7 8 9 10 11 12 13 14	15	16 17 18 19 20 21 22 23	24	25 26 27 28 29 30 31 32	33	34 35	36 37	38	39 40	41 42	43	44 45	46	47 48	49	50 51	52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
A		H	INMIDN10		HELPDIMF		INVLIB		0725			0854								
B		H	ITCWLW10		HELPDIMF		INVLIB		1026			1328								
C		H	CPUSPU10		HELPDIMF		INVLIB		1066			1171								
D		H	HLPALL10		HELPDIMF		INVLIB		1005			1371								
E		H	HLPGEN10		HELPDIMF		INVLIB		0101			2480								
		H																		

Besides the help formats specified in the H specifications, the help format load member contains additional help formats for each help area:

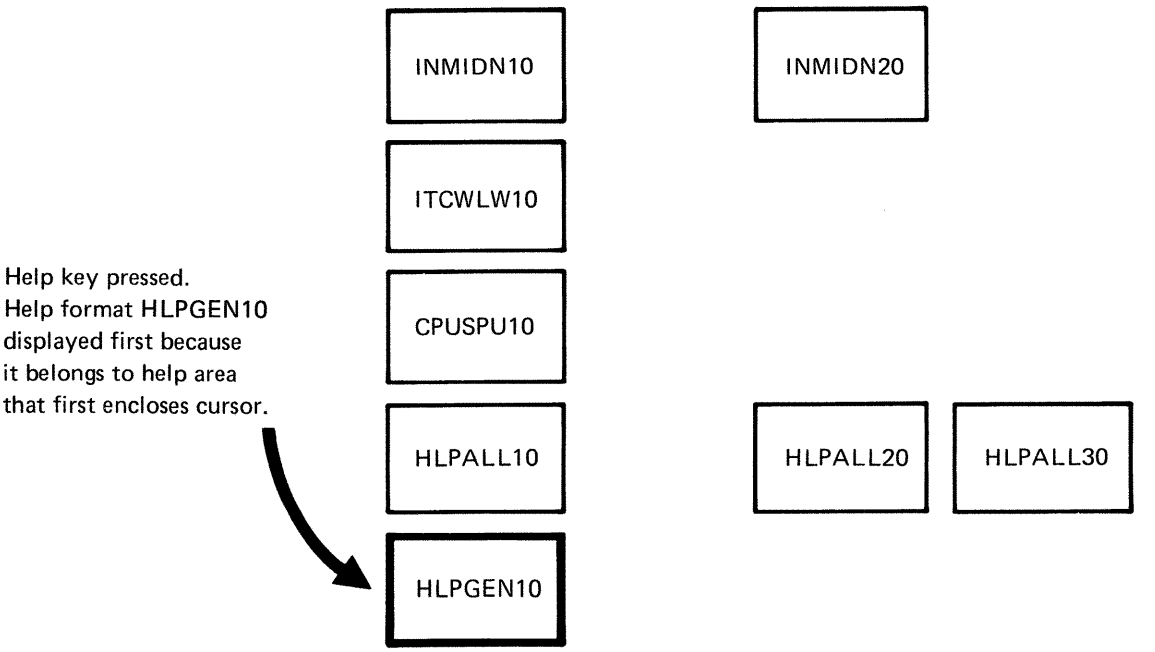


The following pages show the sequence of help formats that are displayed when the cursor is located at a particular position on the application format. For these examples, the cursor positions are indicated by the numbers **1** and **2**.

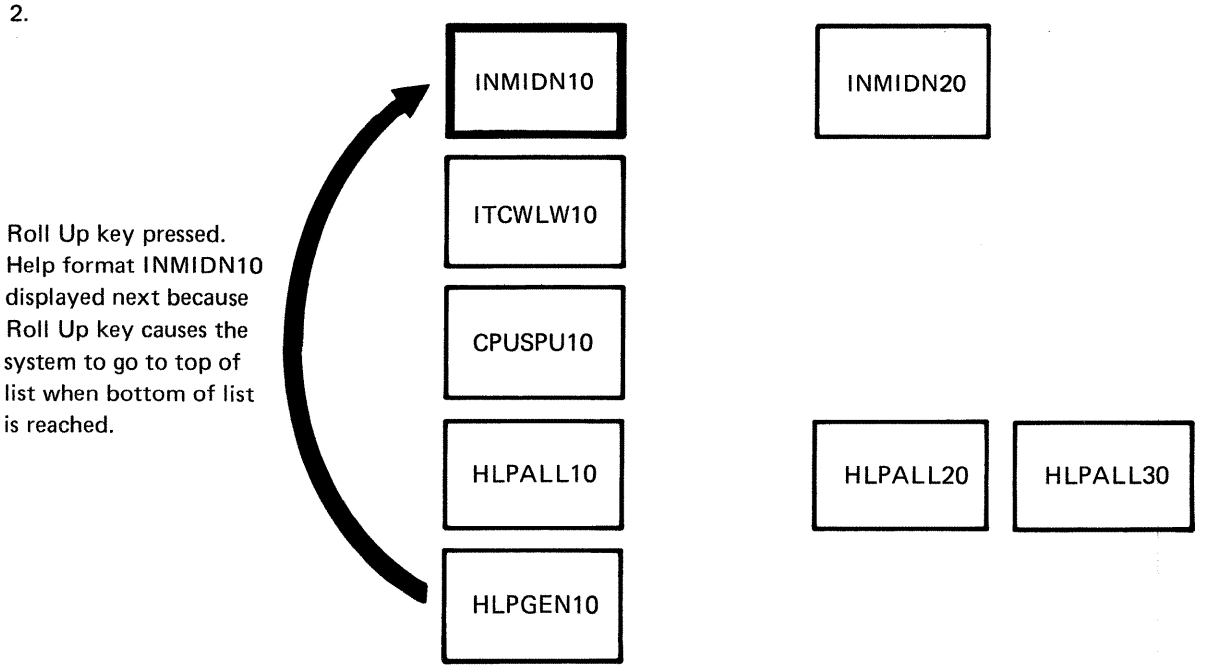


The following shows the sequence in which help formats are displayed when the cursor is located on line 15, column 35 (shown by a **2** on the previous display) of the application format.

1.

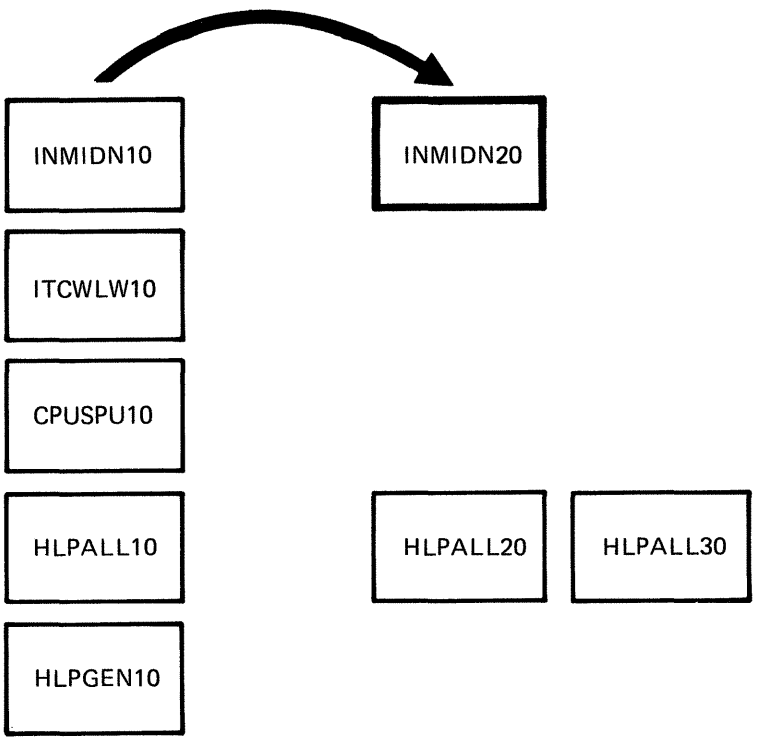


2.



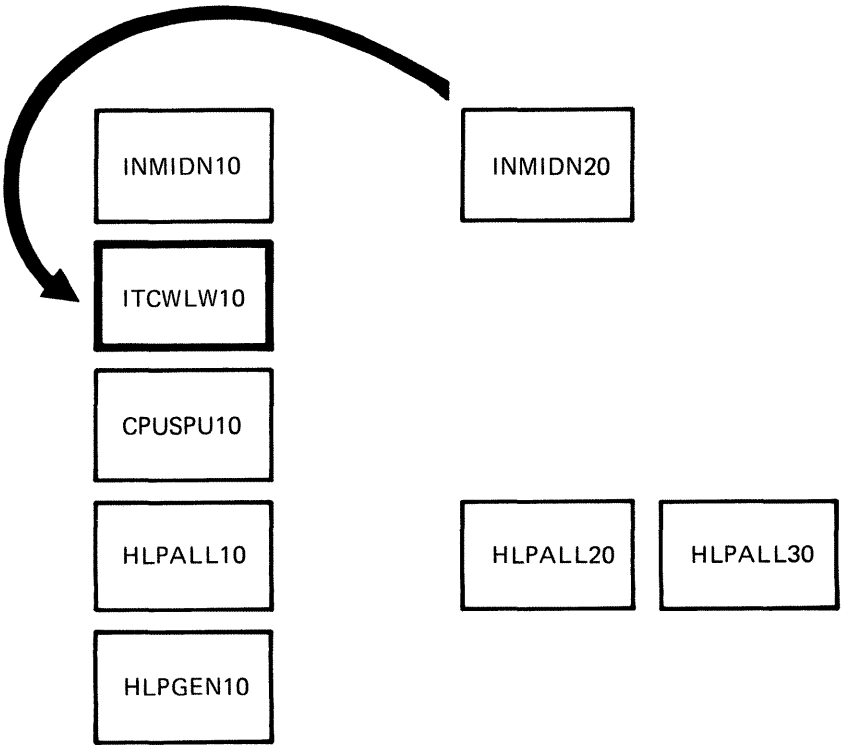
3.

Roll Up key pressed.
Help format INMIDN20
displayed next because
Roll Up key causes help
format with next higher
numbers to be displayed.

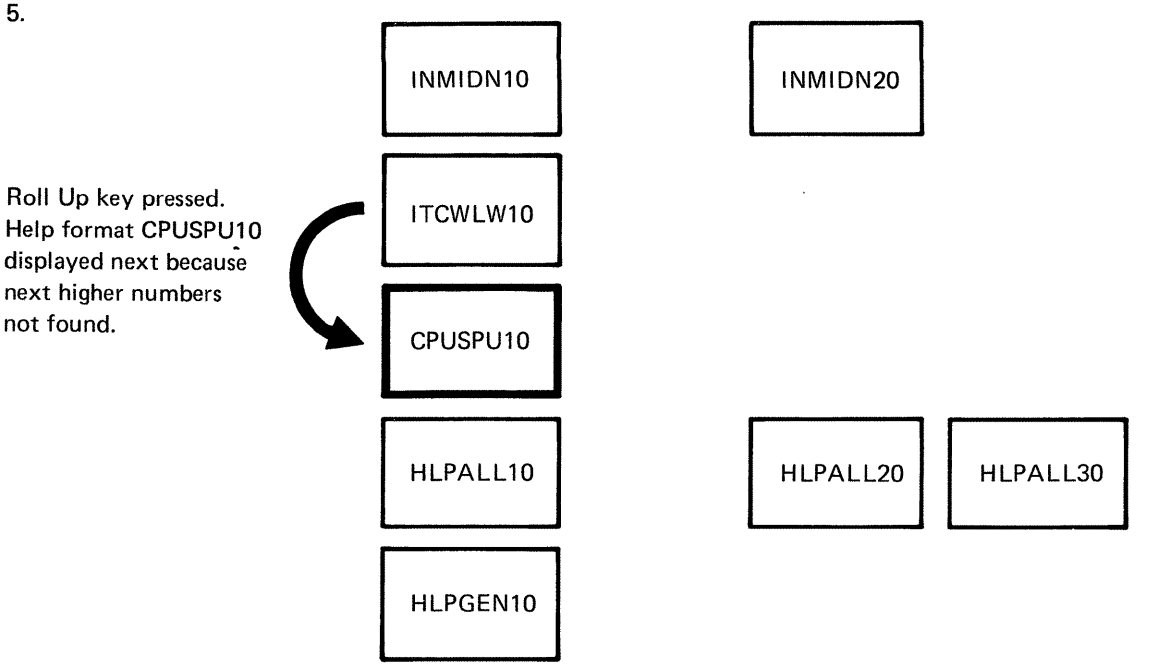


4.

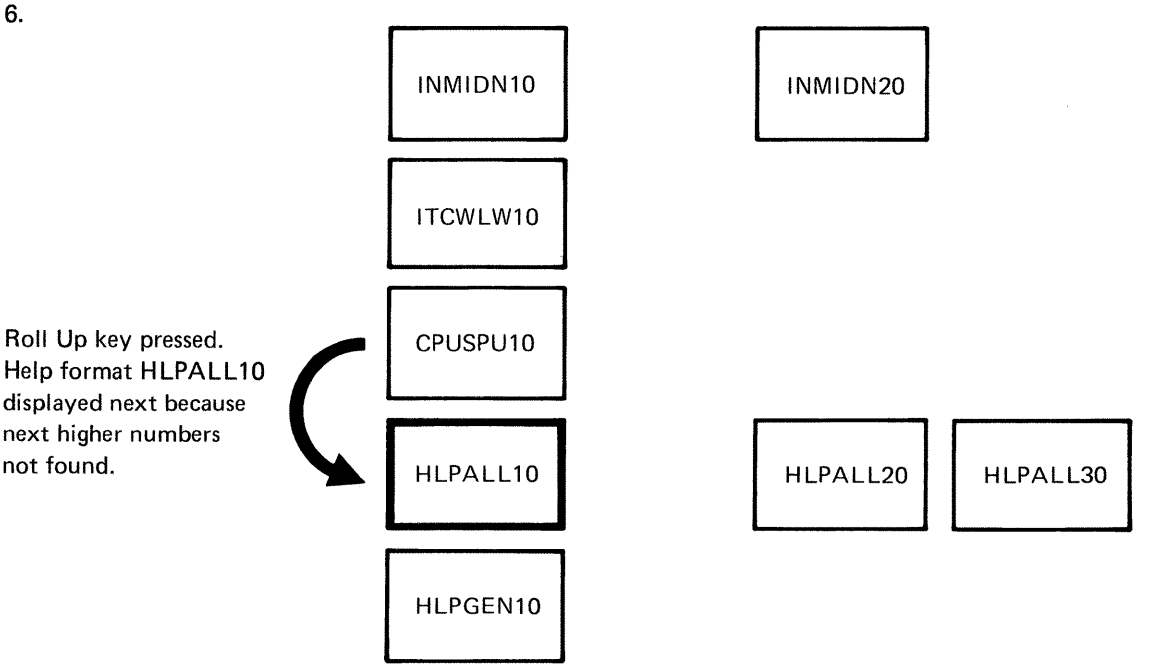
Roll Up key pressed.
Help format ITCWLW10
displayed next because
next higher numbers
not found.



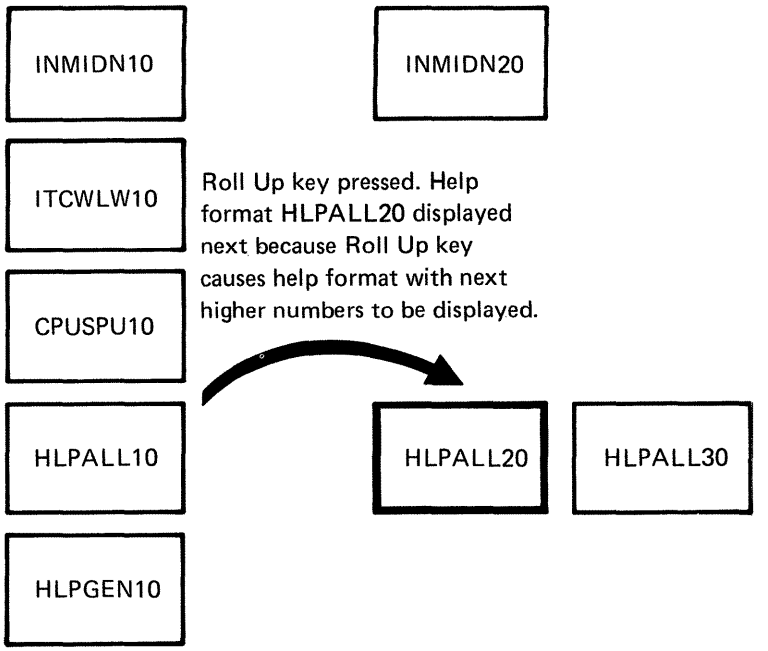
5.


INMIDN10
INMIDN20
Roll Up key pressed.
Help format CPUSPU10
displayed next because
next higher numbers
not found.
ITCWLW10
CPUSPU10
HLPALL10
HLPALL20
HLPALL30
HLPGEN10

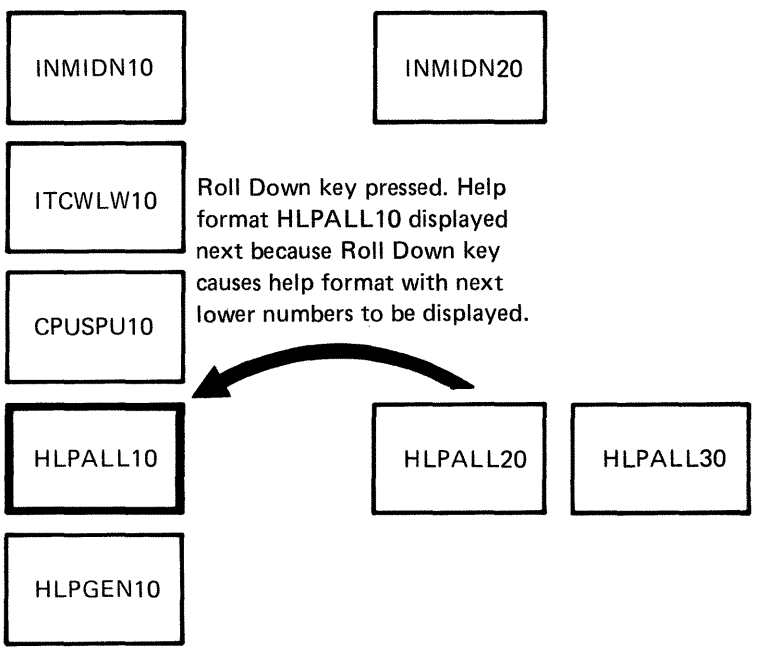
6.


INMIDN10
INMIDN20
ITCWLW10
Roll Up key pressed.
Help format HLPALL10
displayed next because
next higher numbers
not found.
CPUSPU10
HLPALL10
HLPALL20
HLPALL30
HLPGEN10

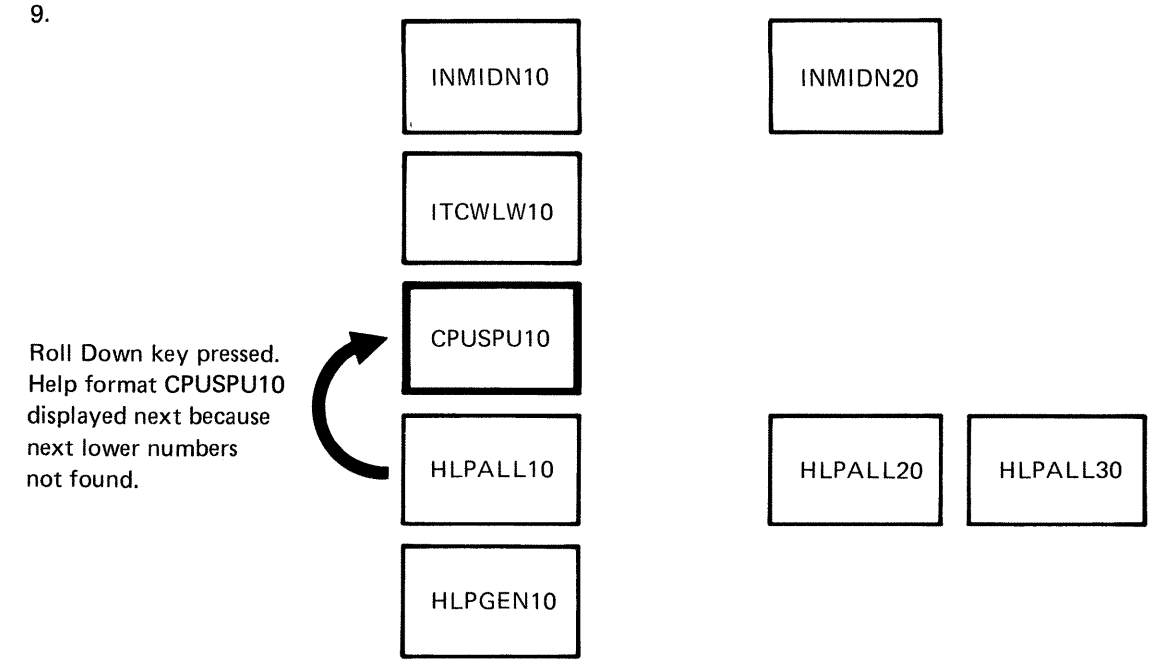
7.


INMIDN10
INMIDN20
ITCWLW10
Roll Up key pressed. Help format HLPALL20 displayed next because Roll Up key causes help format with next higher numbers to be displayed.
CPUSPU10
HLPALL10
HLPALL20
HLPALL30
HLPGEN10

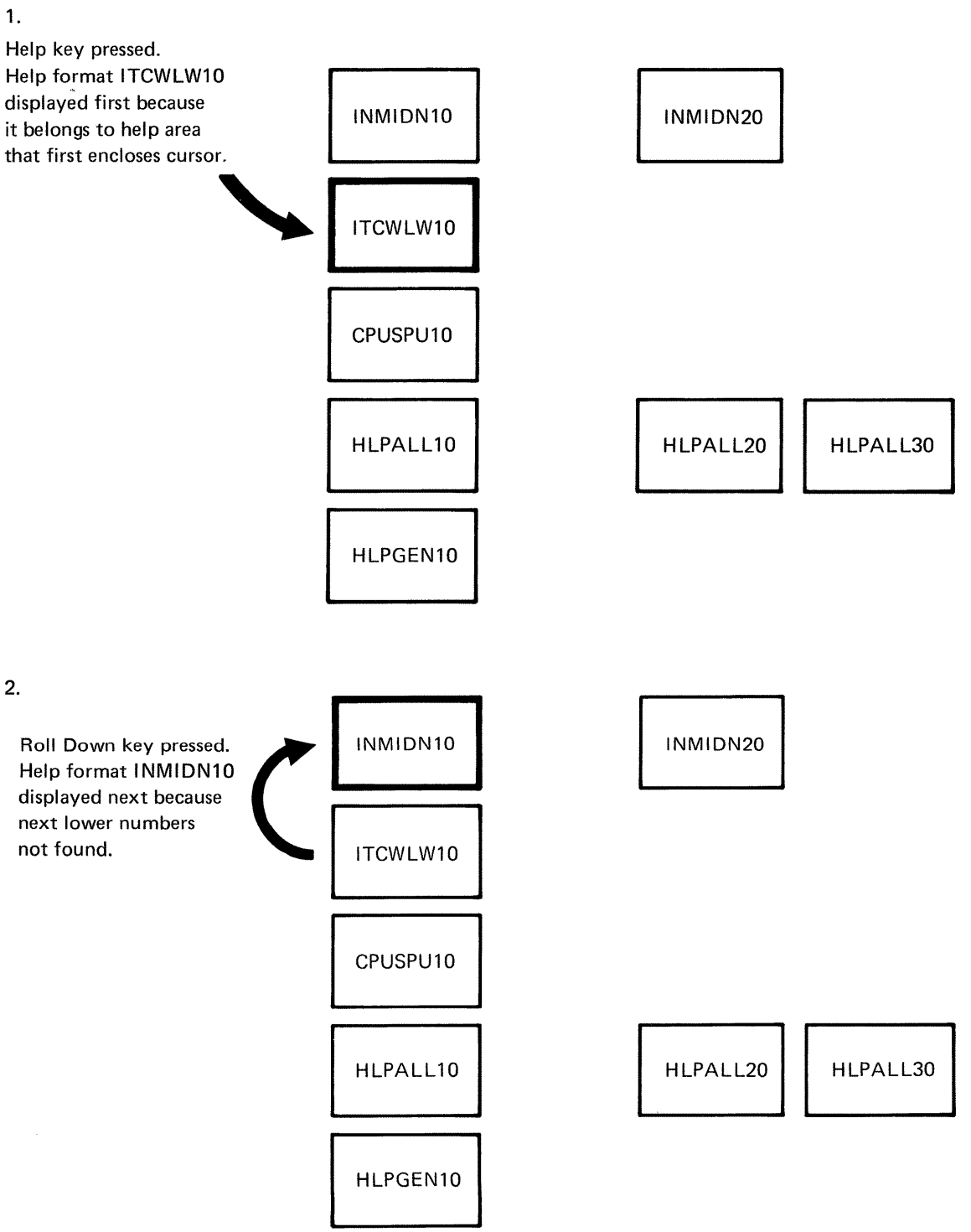
8.


INMIDN10
INMIDN20
ITCWLW10
Roll Down key pressed. Help format HLPALL10 displayed next because Roll Down key causes help format with next lower numbers to be displayed.
CPUSPU10
HLPALL10
HLPALL20
HLPALL30
HLPGEN10

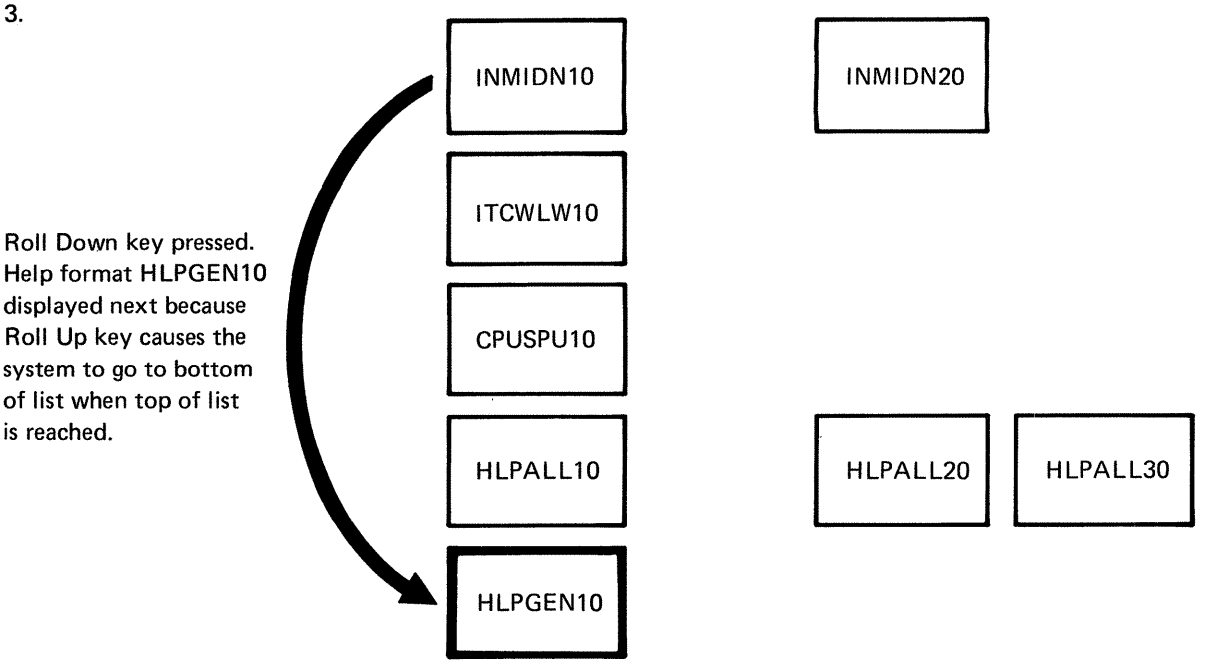
9.


INMIDN10
INMIDN20
ITCWLW10
CPUSPU10
Roll Down key pressed.
Help format CPUSPU10
displayed next because
next lower numbers
not found.
HLPALL10
HLPALL20
HLPALL30
HLPGEN10

The following shows the sequence in which help formats are displayed when the cursor is located on line 10, column 26 (shown by a **1** on the previous display) of the application format.



3.



Roll Down key pressed. Help format HLPGEN10 displayed next because Roll Up key causes the system to go to bottom of list when top of list is reached.

Obviously help area definitions can become very complex if areas overlap or enclose one another. For that reason, it is recommended that smaller, detailed areas be defined first, followed by larger, more general help areas that enclose one or more of the smaller areas. The one exception to this rule is that null help areas can be placed anywhere among the H specifications.

Using Null Help Areas

When an H specification for a help area omits both the upper left row and column numbers and the lower right row and column numbers, a **null help area** is created. The help formats associated with a null help area cannot be directly obtained by the operator pressing the Help key. To display the help formats for a null help area, the operator must use the Roll-Up or Roll-Down keys.

Suppose you wanted to have your help formats displayed in the following way:

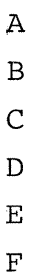
- The same general help format is displayed whenever the operator presses the Help key for any format within an application, regardless of the cursor position.
- Different secondary help text for each separate application format is displayed if the operator presses the Roll keys when the general help format is displayed.

To do this, you would create an H specification that defines a general help area occupying the entire display, followed by H specifications that define null help areas. This would allow the operator, after displaying the general help format, to display the help format for the null help areas by pressing the Roll keys.

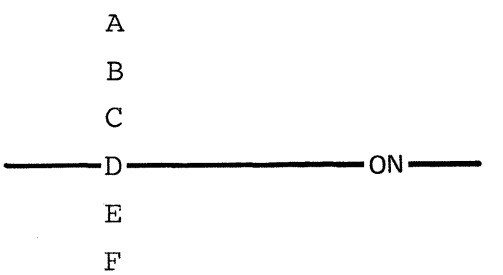
Restricting the Amount of Help Text the Operator Can Display

You can use a **boundary indicator** to effectively restrict the amount and kind of help text an operator can display. A boundary indicator, when turned on, indicates that an H specification and its corresponding help area and help text is an end point for Roll key processing. If you specify one or more boundaries, the top and the bottom of the help area list also become boundaries. You do not have to specify boundaries in pairs in order to get a beginning and an end for Roll key processing; the top and the bottom of the help area list can do this for you.

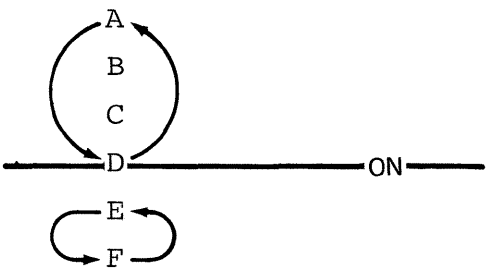
Suppose you have a help area list made up of 6 H specifications, labeled A through F:



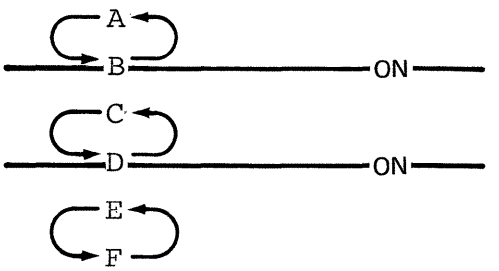
Now suppose the boundary indicator for the H specification labeled D is turned on. The help area defined by that H specification and the top and bottom of the help area list become the boundaries for Roll key processing:



By making the H specification labeled D the boundary, you have in effect divided the help list into two smaller sublists: A through D, and E through F. For example, if the operator presses the Help key while the cursor is positioned in the help area defined by the H specification labeled B, only the help text for H specifications A, B, C, and D can be displayed. If the operator presses the Help key while the cursor is positioned in the help area defined by the H specification labeled E, only the help text for H specifications E and F can be displayed.



If you have more than one boundary, the help text that can be displayed for a certain help area becomes even more restricted:



If the operator presses the Help key when the cursor is located in the help area defined by the specification labeled D, only the help text for H specifications C and D can be displayed.

Without boundary indicators, the operator can in effect display all the help text for a display format no matter which help area contains the cursor. This might be a problem if the operator expects to see only the help text for an order number field, for example, but is able to also display the help text for a customer name field. With good use of boundary indicators you should be able to minimize or avoid the confusion that an operator might have if *too much* help text is displayed.

As shown by the previous examples, boundaries divide the help area list into smaller sublists. If the Help key is pressed while the cursor is positioned in a help area defined by an H specification in one of the sublists, the system looks only at the H specifications within that sublist.

An important thing to remember about boundary indicators is that they mark the end for Roll key processing within the help area list (the H specifications of the format displayed by the program). Boundary indicators can only stop the operator from going from help text for one help area to help text for another area (or from one sublist to the next). Boundary indicators cannot be used to specify an end for roll key processing within the help formats for a particular help area. Boundary indicators also will not stop Roll key processing if all help formats for all help areas on a display are contained in the same load member, and all of the help formats have the same first 6 characters in their names.

Leaving Help Formats

The operator can leave a help format in one of two ways:

- Using the Enter key
- Using an enabled command key.

Using the Enter Key

The most common way of leaving the help formats and returning to the format originally displayed by the application program is to use the Enter key. When the Enter key is pressed, the format originally displayed by the program, and any data entered into that format, is restored. The control of the display station is returned to the application program. In addition, the cursor is returned to the same position that it was in when the operator originally pressed the Help key. If the operator is working at a local display station, the keyboard is unlocked, and the operator can then continue entering data into the application format as though the Help key had never been pressed. If the operator is working at a remote display station, the keyboard is locked, and the operator must press the Error Reset key before continuing.

Using an Enabled Command Key

Another way of leaving the help formats is to press an enabled command key. If the command key is enabled on both the help format and the format displayed by the program before the Help key was pressed, the operator can leave the help format by pressing the enabled command key. The command key is returned to the application program.

If the command key is disabled on either the help format or the format displayed by the program, the operator cannot use that command key to leave the help format. A message is displayed informing the operator that the particular command key is not allowed.

The following are recommendations for coding command key masks when you want to allow the operator to leave a help format using a command key:

1. Enable all desired command keys on the S specification of the format displayed by the application program.
2. On the S specification of every help format that is defined for the application format, enable either the same or a subset of the command keys enabled for the application format.

Remember, unless otherwise specified, all command keys are enabled. Also consider that the operator can page through the various help formats, and that the key mask for the currently displayed help format defines which command keys are allowed. For that reason, it is helpful to give the operator a legend on the displayed help format that identifies which command keys can be used to return to the application.

If an application uses many command keys to control various operations, it might be impractical to list every enabled command key on each format displayed by the

program. Instead, a help format could list the valid command keys, and the operator could press the appropriate command key when the help format is displayed. This eliminates the need to return to the application display before pressing the command key.

Restoring or Not Restoring the Application Format

Your program can accept input from either the help format or the application format that was displayed before the Help key was pressed. To indicate whether you want to redisplay the application format and accept input from it, or to accept input from the help format, you use a portion of the H specification called the restore application format entry (columns 47 and 48). Depending on the entry made in the H specification for the help area, the application format is redisplayed (restored) or the help format is left on the display. The restore application format entry is examined by the system *only* when a help format is exited using a command key. The restore application format entry is *never* examined when a help format is exited using the Enter key.

Restoring and Accepting Input from the Application Format

If the H specification for the help area that is used when the Help key is pressed indicates that the application format *should* be restored, the application format is displayed and the command key return code is passed to the program when an enabled command key is pressed at a help format. The keyboard will be locked. Any input field data contained on the *application format* is read and returned to the application program.

Accepting Input from the Help Format and Not Restoring the Application Format

If you need to accept input from the help format, you must use the restore application format entry on the H specification (column 47 and 48). If the H specification for the help area used when the Help key is pressed indicates that the application format *should not* be restored, the application format is not restored when an enabled command key is pressed at a help format. The command key return code is still passed to the program; however, any input field data contained on the *help format* is read and returned to the application program. The application program regains control of the display station with the help format displayed rather than the application format, and with the keyboard locked. Any input data that existed on the application format when the Help key was pressed is lost.

To avoid confusing the operator, help formats should not define input fields. However, if you choose to accept input from the help format and not restore the application format, the following items **must** be considered:

- Input data on the application format is lost.
- The program must be able to identify whether the input data is coming from the application format or from the help format. This can be accomplished by coding a nondisplay, protected, output/input field as the first field in the help format and the application format. The D specification for that first field should specify an output constant (a display ID) to help identify the input data.

- The program must clear the help format and display an application format.
- If input fields do not exist on the help format that was displayed when the command key was pressed, input data is not returned from either the help format or the application format.
- If input fields exist on the help format that was displayed when the command key was pressed, then the following additional items must be considered:
  - The input data on the help format is returned in place of the input data on the application format.
  - If multiple help formats exist for an application format, any of those formats could be the one displayed when the command key was pressed. The program must be able to determine whether the data came from a help format. The program must also test the contents and the format of the input data to determine from which of the help formats the input may have originated. The identification of the data can be accomplished using a display ID.
  - The program input area must be large enough to accept input data from any help format that contains input fields.

When a help format is displayed, it does not have to clear the entire display. Lines not cleared remain as they were before the Help key was pressed. Any data that might be typed into input fields on the help format or the remaining portion of the application format are lost when the operator leaves the help format and returns to the application format.

Considerations for Defining Help Areas and Using Help Formats

Restriction on the Number of H Specifications

There is a restriction on the number of H specifications that can be defined for an application format. When the application format is displayed, each H specification in the format requires a minimum of 15 bytes of storage to retain the information for the corresponding help area. Additional bytes of storage are required for an H specification depending on what it specifies:

- 8 additional bytes if a load member name is specified
- 8 additional bytes if a library name is specified
- 4 additional bytes if any one of the following is specified:
  - Suppress selection indicator
  - Restore application format indicator
  - Boundary indicator.

Each H specification requires between 15 bytes and 35 bytes of storage. A maximum of 4084 bytes of storage can be used for all the H specifications in an application format. If an application display is created using multiple formats, the total amount of storage for the H specifications contained in the formats used to build the display cannot exceed 4084 bytes.

Because the system has a limited space in which to store the list of H specifications, the following rules exist to ensure that the list of H specifications remains at a workable size:

- During an override operation, the system ignores any H specifications contained in the format displayed by the application program.

- If the application program clears the entire display, the entire list of H specifications is erased. Any H specifications specified in the format that clears the display, however, are added to the list.

- If a format displayed by the application program clears one or more lines on the display, some or all of the help areas might be removed. If any help areas are completely enclosed within the lines just cleared, the H specifications associated with the help areas are removed from the list. If any H specifications that define a null help area follow a removed H specification, those H specifications are also removed. Null help areas at the top of the list are never deleted except when the entire display is cleared.

  If the help area is only partially enclosed within the lines just cleared, the help area and the H specification associated with it are saved.

- If a help area completely encloses another help area specified by an H specification lower in the list, the lower help area and its H specification are removed. If any H specifications that define a null help area follow a removed H specification, those H specifications are also removed. Null help areas at the top of the list are never deleted except when the entire display is cleared.

- If the application program causes all or part of the display to be rolled, no change occurs to the list of H specifications.

- No help list processing occurs if an Assembler program issues an unformatted output operation. If the display is cleared using an unformatted data stream, the help area list is *not* deleted. Caution must be used when unformatted output operations are mixed with formatted operations that define help areas.

Clearing Less Than the Entire Screen When Displaying a Help Format

If you clear less than the entire screen when trying to display a Help format that does not contain any input fields, the previous displayed application formats input field(s) will remain defined on the display. The cursor will be positioned as described in the D-specification section (position cursor, columns 32-34) pertaining to the application format. The user will be able to enter data into these fields even though the control characters were overlaid. Entering data into these fields could overlay your help text. If at all possible, you should avoid clearing less than the entire display. If this is not possible and you wish to eliminate the previously defined input field(s), define at least one input field in the Help format. Protect this input field if you do not want data to be entered.

Naming Help Formats

If the first 6 characters of the help format names are the same as the first 6 characters in the application format names, the format originally displayed by the program might again be displayed when the operator uses the Roll keys after pressing the Help key. You should avoid such a naming convention because, in this case, the application format is treated as a help format.

If you put help formats intended for different applications into the same load member, and they all have the same first 6 characters in the help format names, the operator might use the Roll keys to cause the help formats for separate and independent applications to be displayed. This could become confusing to the operator when, for instance, help information for an inventory application is displayed when the operator is really expecting to see help information for an order entry application.

Performing Operations While a Help Format Is Displayed

An application program should not attempt to perform any output operations to the display station if a help format is currently displayed. If such an operation is attempted, the program is suspended until the operator exits the help format using the Enter key or an enabled command key.

Help areas and help formats can be used with displays used by MRT programs. However, an MRT program must be particularly careful about sending output to a display station that has a help format displayed. If an MRT program attempts to send output to a display station at which a help format is displayed, the program is suspended until the operator exits the help format using the Enter key or an enabled command key. Until the operator exits the help format, the MRT program cannot process *any* of the other attached display stations.

Using the ATTN Key While a Help Format Is Displayed

The ATTN key is disabled whenever a help format is displayed. Therefore, the operator cannot enter Inquiry mode if a help format is displayed. If the operator presses the ATTN key while a help format is displayed, the request for Inquiry mode is delayed until the operator leaves the help format.

Using the CANCEL Command When Displaying Help Formats

The system operator cannot use the CANCEL control command to cancel the system task that displays a help format. The task ends only when all operators leave help.

Defining Help for a Menu

Help areas are supported only for display formats; they are not supported for menus. H specifications should not be added to an existing menu. A different type of help support, which does not use H specifications, can be defined for menus. Menu help is described in Chapter 5, "Creating Menus and Menu Help Text using the Screen Design Aid".

Using Help Areas for Online Document Support

You can create online documents for your displays using DW/36 (DisplayWrite/36). Online document support is similar to the application help support in that the help areas are defined via screen format source specifications. Help areas are rectangular regions of the screen defined by the help definition specification or H specification. The help area and its H specification correspond to help text from an online document as opposed to a help display format.

If the cursor is within a help area when the Help key is pressed, the current display is saved and a document is displayed starting from a specified location within the document. The operator can page through the document by using the Roll-Up key and Roll-Down key.

The Online document support is very similar to application help support in regard to creating help areas and displaying help text via cursor location. The entries on the H specification for online document support differ from those for an application format in that a help text label, help document name, and folder name be specified in place of help format name, help load member name and help library name, respectively. The restore application format and boundary indicator entries must be left blank when a Y is specified for online document (column 53). The main difference between online document support and application help support is that the help text comes from an online document as opposed to a help display format. For more information on creating documents, refer to *Getting Started With DisplayWrite/36.*

Improving the Performance of Display Formats at Remote Display Stations

Program performance can be significantly affected by whether a format is displayed at a local display station or at a remote display station. Remote display stations communicate with the System/36 at a slower rate than do local display stations. Because of the slow transmission rate, remote display stations can tie up system activity. If remote display stations seem to cause poor performance, you can reduce the amount of data transmitted, or increase the line speed.

A reduction in the amount of data transmitted is the only method that can be directly controlled by programming techniques. Follow these suggestions when coding your display formats:

- Send only the minimum amount of data required by an operator to efficiently use the application. If both experienced and inexperienced operators use the application, consider creating help display formats that can be used by the operators to request additional information.
- Avoid redisplaying the same data and prompts.
- Specify N (no) for return input. If the operator does not enter data into the display, that information is not returned to the system. This reduces the amount of data transmitted over the communications line, and also reduces the response time.

If you have an identification field on a display format that is being read by a program, you should specify Y (yes) for return input.

- Use an erase input fields operation to remove the contents of an input field rather than redisplaying the entire format.
- Avoid using the read-under-format technique to pass information from one job step to another. Instead, consider using a temporary disk file, the local data area, or data structures or arrays to pass the information.
- Use an override fields operation to display error messages. Display the error message and only the fields in error. This technique avoids the retransmission of unnecessary data when errors occur.
- Avoid fields that are out of sequence on the display format specifications. That is, define the fields in the D specifications in the same left-to-right, top-to-bottom order that they will appear on the display.
- Use suppress input on all but the last format when displaying multiple formats. By specifying suppress input, you reduce the turnaround time before each new format is displayed. (Turnaround time is the time between receiving and transmitting data or between transmitting and receiving data.) If input is not suppressed, several line turnarounds are required after each format is displayed.

Using Multiple Formats

Each display format that is shown does not have to completely replace the previous display format. That is, information from several display formats can appear on the display at one time. This technique is useful if some information on the display is to remain unchanged while other information is to be replaced. If you use multiple formats, you get the following benefits:

- You save the time required to send unnecessary information to the display station. This is important in that response time can be reduced if the unnecessary transmission of data is avoided.
- The specifications for the new format are generally simpler. This reduces the amount of coding.
- The specifications for the new format are fewer. Thus, less disk space is required to store the display formats. The duplication of data is avoided.

When using multiple formats, be careful not to clear or replace any information that should remain on the display.

When multiple formats are displayed before information is read from the display, the system reads only those input fields from the last format displayed with input fields. This means that when all or a portion of a display format is replaced by a new display format, all previous input fields are lost, even if the input fields on the new display format are at different locations on the screen.

Correcting Work Station Errors on Multiple Formats

If *all* of the following are true, a work station error may occur when the operator enters the display:

- For the last format displayed, a value of other than 24 or blanks is specified for the number of lines to clear in columns 19 and 20 of the S specification.
- The last format displayed replaces or clears a line that contains a previously displayed input field.
- The last format displayed does not define new input fields.
- The last format displayed does not specify suppress input (the operator can enter data in the display).

To avoid a work station error and to reduce system workload when multiple formats are displayed, suppress input should be specified in columns 35 and 36 of the S specification for *all* but the last display format, even if the previous formats do not define any input fields. In addition, the last format *must* define at least one input field if *all* of the following conditions exist:

- A value of other than 24 or blanks is specified as the number of lines to clear in columns 19 and 20 of the S specification.
- The format replaces or clears a line that contains an input field created by a previous format displayed with input fields defined.
- Suppress input is not specified (the operator can enter data in the display).

For all RPG II, COBOL, BASIC, and FORTRAN programs, every format displayed without suppress input specified causes the keyboard to be enabled for input.

If an RPG II, COBOL, or BASIC MRT program displays multiple formats and does not suppress input on all but the last format, and if the operator interrupts the program using the ATTN key before the last format is displayed, *the program will be suspended.* No other display stations can use or start the program during the inquiry request. Operators at other display stations will not be informed by the system that the program has been suspended.

Multiple Format Considerations on the 3180 Model 2 Display Station

If you are putting multiple formats to a 3180 and the first format displayed is 132 columns, the 3180 will be placed in 132-column mode.

If you have an 80-column format and you want to overlay a portion of the screen with a 132-column format, you will get a work station error.

If you have a 132-column format displayed and you want to overlay part of it with an 80-column format, any field that starts in column 1 will not appear in column 1. The control character defines where the field will appear, and the control character immediately precedes the field. If a field begins in column 1 of

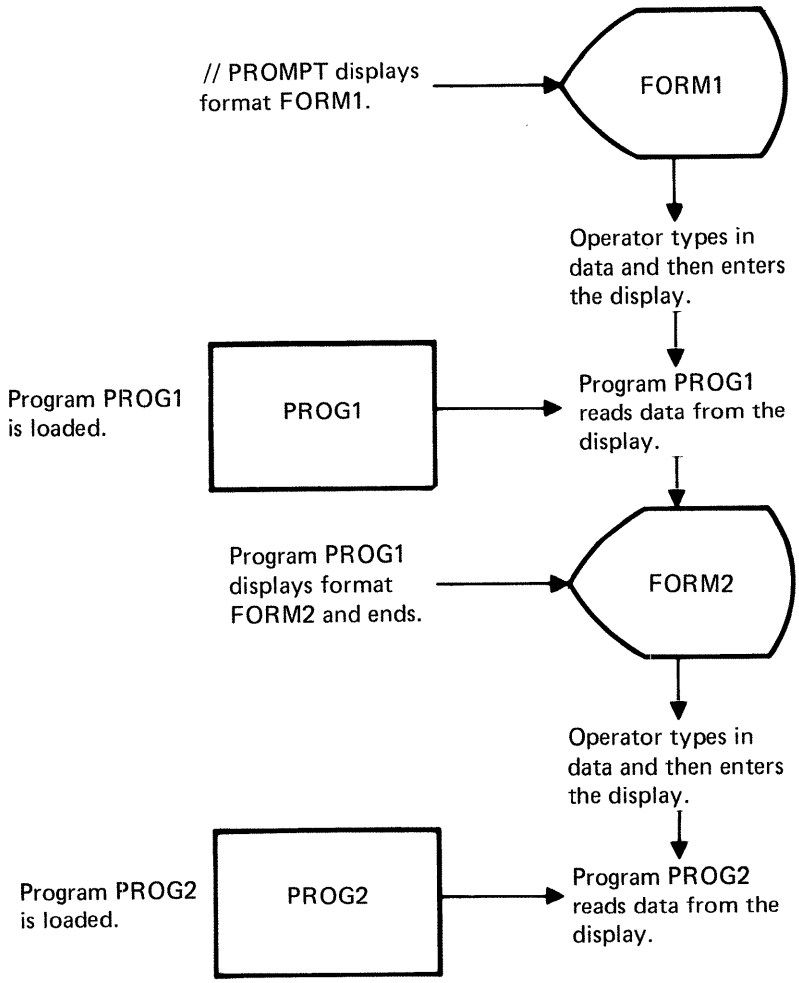
any line, the control character is in column 80 of the previous line for an 80-column format and column 132 of the previous line for a 132-column format. For example, if you want to overlay a portion of a 132-column format with an 80-column format, any field defined to start in column 1 will appear in column 81.

Using the Read-Under-Format Technique

The read-under-format technique allows the operator to enter information into a display while the program that uses the display is starting. When the read-under-format technique is used, a program or procedure displays a format, and the next program called reads it. This format is first displayed by a program or a PROMPT OCL statement with PDATA-YES specified. If an SRT program displays the format, it goes to end of job. An MRT program displaying the format releases the requesting display station. While the next program is being started, the operator can enter information into the display. When the operator enters the display, the information is sent to the second program.

The read-under-format technique can be used with all types of programs. The read-under-format technique can decrease the size of a program because fewer read and write operations are required. The read-under-format technique, however, might increase response time because of the extra work the system expends while starting and ending a program.

The following illustration shows a read-under-format technique that uses two displays and two programs. The PROMPT OCL statement is used to display the first format (FORM1).



Using and Determining Self-Check Digits

Self-checking numbers offer some amount of protection against clerical errors and fraud. Self-checking is particularly useful in applications that use account numbers.

The System/36 offers two methods of self-checking: modulus 10 and modulus 11. If a self-checking method (T for modulus 10 or E for modulus 11) is specified in column 30 of the D specification for an input field, System/36 determines a self-check digit for the field's contents, using the specified self-check method. That self-check digit is compared to the rightmost position of the input field. (Nulls and blanks are considered to be self-check digits of zero.) If the self-check digit matches the rightmost position of the input field, the contents of the input field are allowed and the operator can continue. If the numbers do not match, the contents of the input field are not allowed, and a keyboard error is displayed. The operator must then enter an allowed number before continuing. For

example, the number 123216 is a valid modulus 10 number. The self-check digit is 6 and must be in the rightmost position of the input field. The remaining digits, 12321, are used to determine whether the self-check is successful.

The following pages describe the methods for determining the self-check digit for the contents of an input field. After reviewing how the self-check digit is determined, you might want to write a program that generates input numbers that successfully complete a self-check. You can, for example, use the generated numbers as a basis for assigning account numbers, item numbers, or security codes.

Modulus 10

To determine the modulus 10 self-check digit, do the following:

1. Disregard the rightmost digit. This digit is not used in the remaining steps, but is used in determining whether the self-check is successful.

2. Multiply the units position (the rightmost digit of what resulted from step 1) and every alternate position of that number by 2.

3. Add the digits in the products to the digits in the numbers that were not multiplied in step 2 (again, excluding the original rightmost digit).

4. Subtract the sum from the next higher number ending in zero (0).

The difference is the self-check digit. Compare this digit with the rightmost digit of the input field. If those digits are the same, the self-check is successful.

For example, suppose you specify modulus 10 self-checking for an input field and the operator enters 123216:

Number to be self-checked	1 2 3 2 1
New rightmost position and every alternate position	1 3 1
Multiply by 2	2 6 2
Digits not multiplied	2 2
Add	2+2+6+2+2 = 14
Next higher number ending in 0	20
Subtract	20 - 14 = 6
Self-check digit	**6**

The self-check digit matches the rightmost digit of the entered number (in this case, 6). The self-check is successful.

Note: Remember that the self-check digit is always in the rightmost position of the input field.

Modulus 11

To determine the modulus 11 self-check digit, exclude the rightmost character and perform the following calculation on the remaining digits:

1. Assign a weighting factor to each digit of the entered number. These factors are: 2, 3, 4, 5, 6, 7, 2, 3, 4, 5, 6, 7, 2, 3, and so on, starting with the new rightmost position of the number and progressing toward the high-order digit (the leftmost digit).

For example, the input number 991246351 would be assigned the weighting factors as follows:

Number to be self-checked	9 9 1 2 4 6 3 5
Weighting factor	3 2 7 6 5 4 3 2

1. Multiply each digit by its weighting factor.
2. Add the products.
3. Divide this sum by 11.
4. Subtract the remainder from 11.

The difference is the self-check digit. Compare this digit with the rightmost digit of the input field. If those digits are the same, the self-check is successful.

Note: If the remainder from step 4 is 0, the self-check digit is 0. If the remainder is 1, the entered number does not have a self-check digit; you must ensure that numbers with remainders of 1 in step 4 are not used in the fields you define as self-check fields.

For example, suppose you specify modulus 11 self-checking for an input field and the operator enters 123218:

Number to be self-checked	1 2 3 2 1
Weighting factors	6 5 4 3 2
Multiply	6 10 12 6 2
Add	6+10+12+6+2 = 36
Divide	36/11 = 3 plus a remainder of 3
Subtract	11 - 3 = 8
Self-check digit	**8**

The self-check digit matches the rightmost digit of the input number (in this case, 8). The self-check is successful.

Note: Remember that the self-check digit is always in the rightmost position of the input field.

Chapter 4. Introduction to the Screen Design Aid

The screen design aid (SDA) is an interactive programming tool that lets you describe what you want to do, helps you do the job, and when you are finished, asks you what to do with the work you have done. Using SDA, you can:

- Create and maintain menus
- Create and maintain display formats
- Create programs
- Work with the Development Support Utility (DSU) or the Source Entry Utility (SEU)
- View, print, or compile display formats.

Because SDA is an interactive program, you can design your menus and displays and see them before they are used by the system or a program.

Create and Maintain Menus

You can use SDA to design a menu and its text, and to specify the commands or procedures that are run for a particular option on the menu. SDA generates the source specifications for the menu, optionally prints an image of the menu text, lists the commands or procedures run by the menu, and creates the load members needed to display your menu.

You can also use SDA to update and maintain menus. SDA allows you to update the menu text and the command text, or to delete the menu and all associated text. In addition, you can use SDA to create and maintain help text for your menu.

Create and Maintain Display Formats

You can use SDA to design your display. You can define certain characteristics about the entire display, and you can define the characteristics of individual fields on the display. SDA generates the source specifications for your display format, optionally prints an image of the display and lists the display format source specifications, and creates the load member needed to view and display your display formats.

You can also use SDA to update and maintain your display formats. SDA allows you to delete a display format, copy a display format, or create and maintain help text for your display formats.

Create Programs

You can use SDA to generate programs used by work station utility (WSU), or to generate RPG II WORKSTN file source specifications to use with the display formats that you create.

Work with the Development Support Utility or the Source Entry Utility

Using SDA, you can access the development support utility (DSU) (if you have DSU loaded on your system), an optional Program Product or you can access the source entry utility (SEU) (if you have SEU, but not DSU loaded on your system), an optional Utilities Program Product. Both DSU and SEU are interactive programs you use to create or update source specifications, procedures, or programs. This option of SDA is particularly useful if you update a display format in such a way that it affects a program that uses it.

DSU and SEU are similar in function, but DSU is easier to use than SEU and lets you perform multiple line edits at one time, while SEU lets you perform only single line edits at one time.

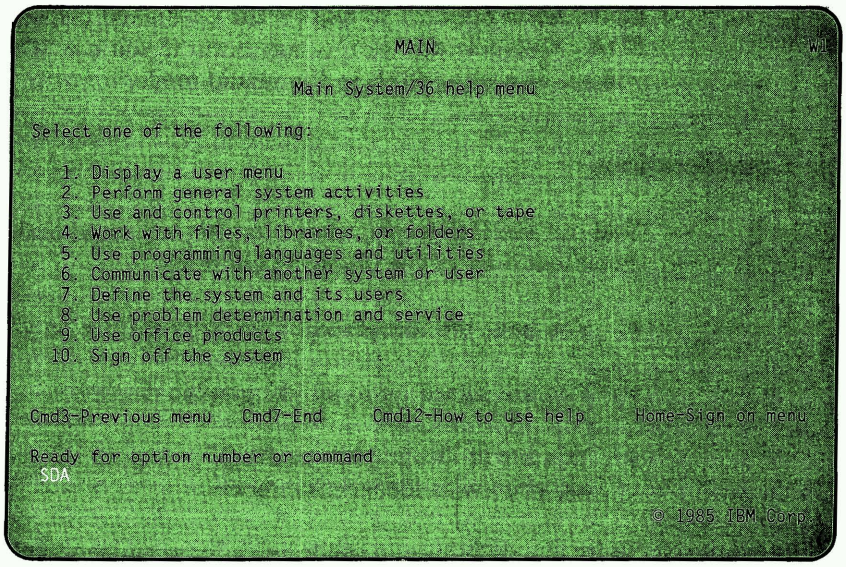
View, Print, or Compile Display Formats

SDA provides a few additional services that allow you to easily and quickly:

- View a display as it will be shown to your operator
- Print an image of a display and its source specifications
- Compile display format source specifications.

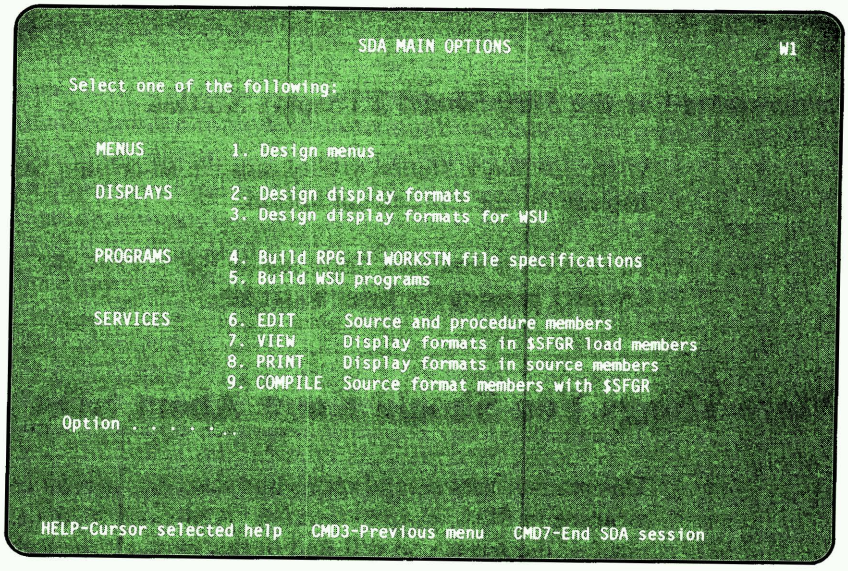
Getting Started in SDA

There are several ways in which you can start SDA. The simplest and the fastest way is to simply type in SDA on the command line, and press the Enter key:



SDA supplies the necessary parameters to get you started. For example, SDA uses your current library as the default value for any prompts that ask you to specify a library name. While you are using SDA you can easily change the library name or any of the other default values that SDA supplies. (In fact, much of the flexibility of SDA is possible because of the choices you can make within an SDA session.)

After you sign on to SDA, the SDA Main Options menu appears:



You use this menu to select the type of work you want to do. For example, to create or update a menu or to create help text for a menu, select option 1 (*Design menus*). SDA shows you a display on which you can specify such items as the menu name and the specific task that you want to do with that menu. SDA then leads you through the steps needed to complete your work with the menu.

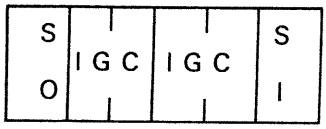
Note: When you are using SDA, do *not* use the ATTN key to go into Inquiry mode, select option 1 to request the Command display, and again sign on to SDA. Unpredictable results may occur if you use SDA in Inquiry mode while you are also using SDA in Command mode.

Ideographic Considerations

You can use ideographic characters in your input and output data and help and menu text if all of the following are true:

- You have the Ideographic Character feature on your system.
- You are signed on to an ideographic display.
- You are in ideographic mode. If you specified yes to the IGC prompt at sign on, you are in ideographic mode.

There is a difference in space usage between ideographic (IGC) characters and alphameric-Katakana (A/N/K) characters. As the following figure illustrates, ideographic data begins with a shift-out character (SO) of one position, followed by ideographic characters of two positions each, followed by a shift-in character (SI) of one position.



Other Considerations For the 3180 Model 2 Display Station

System/36 Work Station Utility uses the 80-column format. Do not code WSU displays for the 132-column format.

To reset error messages displayed on the 3180 Model 2 requires pressing the Enter key after pressing the Error Reset key.

A Few More Things You Should Know About SDA

This manual uses several terms and describes several concepts that have a special meaning in SDA, or in System/36. A glossary at the end of this manual defines most of the terms you will find in this manual: the following are the most common terms and concepts used within SDA.

Help

SDA supplies help information to aid you with problems that you might have. This help information can be displayed by pressing the Help key anytime and anywhere within your SDA session. In some cases, the help information that is first displayed depends on the position of the cursor when the Help key is pressed. If there is more than one page of help information, you can display the others by using the Roll-Up and Roll-Down keys.

To return to the SDA display that you were working with, press the Enter key.

Command Keys

Many of the SDA displays require that you use a command key. A command key can be used to do a certain operation, such as ending a task within SDA. The purpose of a command key is usually indicated on the display you are using. The numbered keys on the top row of the keyboard serve as command keys when used with the

command key.

To use command keys 1 through 12:

1. Press and release the

key.
2. Press the top row key that corresponds to the desired number of the command key.

To use command keys 13 through 24:

1. Press and release the

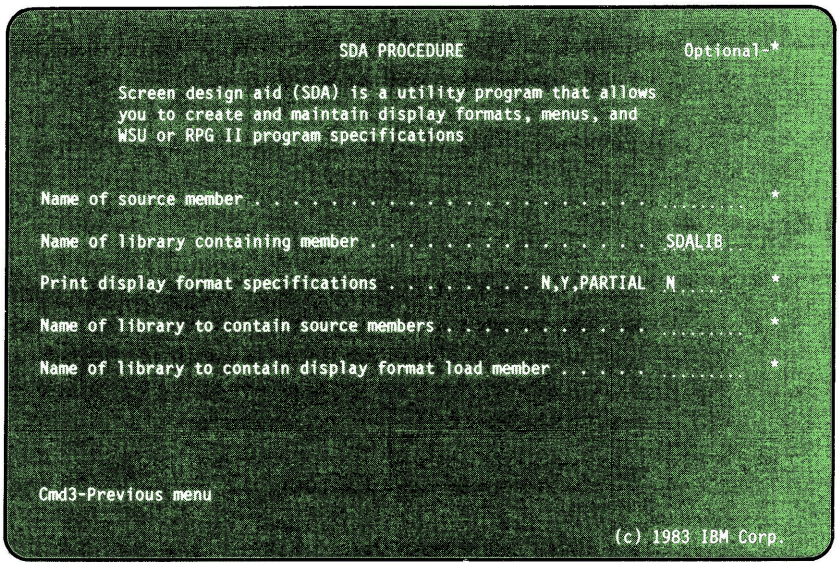
key.
2. Press and hold the (Upper Shift) key.
3. Press the top row key that corresponds to the number of the desired command key.

Profile

SDA maintains a profile of your session. The profile is used throughout the session to supply certain default values on the displays that require entries. You can change the default values on each display, and the new entries will be used in the profile until changed again.

SDA with Help

If you type in HELP SDA on the command line and press the Enter key, or type in SDA and press the Help key, the SDA help display appears:



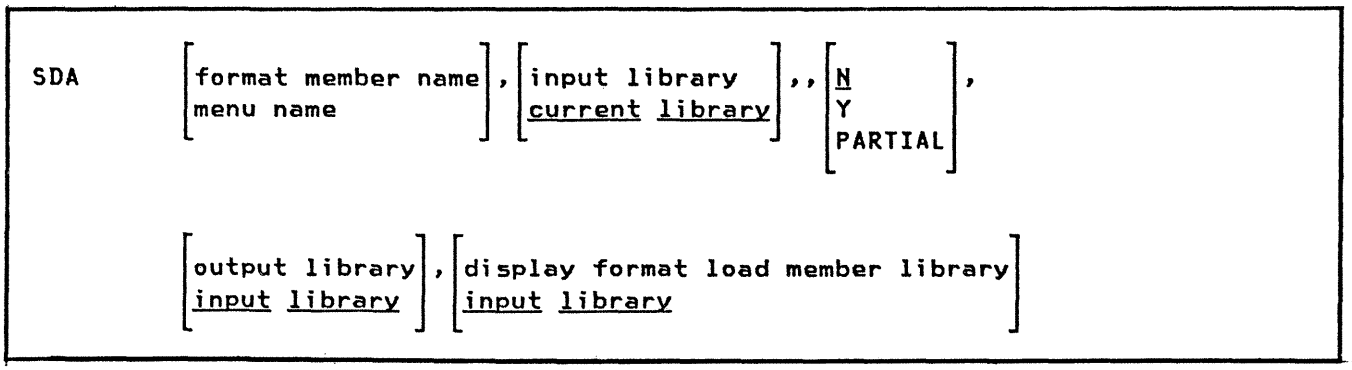
This display prompts you for information that SDA uses later in your session. You must respond with A/N/K characters. Ideographic characters cannot be entered on the SDA help display. Notice that SDA automatically supplies a name for the input library. SDA assumes that your current library contains any existing menus, display formats, or programs that you will work with during your session. If necessary, you can type in a different library name.

The input library name and all other entries on the SDA help display are optional. Any entries that you do make are used by SDA to create a profile of your session. The profile is used throughout the session to supply default values on the SDA displays. Remember that you can change the defaults on each SDA display.

Once you complete the SDA help display and press the Enter key, the SDA Main Options menu appears, and you can make the correct selection for the work you are doing.

SDA with Parameters

By typing in SDA followed by one or more parameters, you can supply the same information specified on the SDA help display. The SDA procedure format looks like this:



See the *System Reference* for more information about entering the SDA procedure with parameters. Any parameters that you enter are used by SDA to create a profile of your session, just as the SDA help display is used to build a profile of your session.

Once you enter the SDA procedure with the proper parameters, the SDA Main Options menu appears, and you can make the correct selection for the work you are doing.

Signing On after an Interrupted SDA Session

If a previous SDA session was interrupted, you can sign back on to SDA and recover the work you were doing. When you sign on to SDA again, the SDA Recovery Options display appears instead of the SDA Main Options menu. The SDA Recovery Options display and the recovery method is explained in detail in Chapter 9, "Recovering from an Interrupted Screen Design Aid Session."

Using the SDA Displays

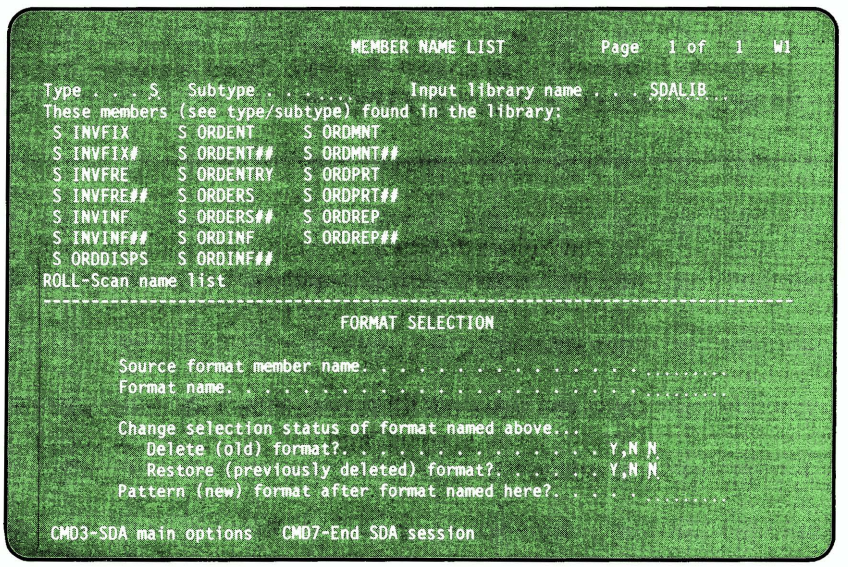
You have already seen the first display that SDA shows: the SDA Main Options display. Once you make a selection from the SDA options, you begin the work you do with your menus, display formats, or programs. As you are working, you will use three general types of displays:

- A selection display
- A number of work definition displays
- The end of option displays.

Selection Displays

SDA's selection displays allow you to specify the library and member you will be working with, in addition to the type of work you will do with the member. The selection displays list all the members in the specified library that have a **type** (source, load, subroutine, or procedure) appropriate to the work you are doing.

The following is the selection display you see if you select option 2, (*Design display formats*), of the SDA Main Options menu:

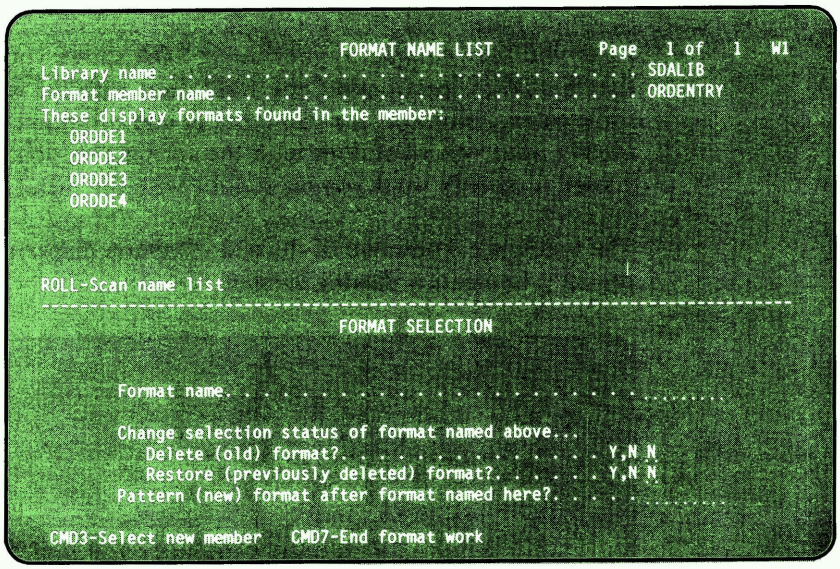


You can change the type of member that is listed, or you can request that all library member types be listed. The list of library members gives you an idea of the members that already exist in the library.

You can also use the selection display to specify a more specific category of library members (called a **subtype**). The subtype indication tells you more specifically what the member is and what it is used for. You can, for example, use the selection display to indicate that you want to list only those members in your library that have a subtype of display format.

In some cases, after you select a member to work with, you are shown another display on which you can select a particular **submember**. A submember is a part of the member you are working with (a display format, for example, is a submember of a display format source member because the display format is contained within the source member), or is a member associated with another member (the command text source member for a menu is a submember of the group of members that make up a menu).

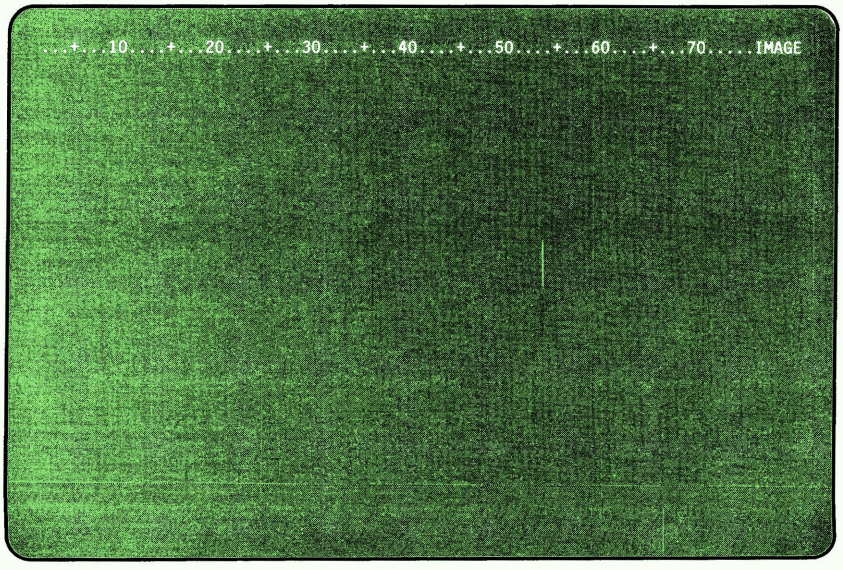
The following is the selection display you use to select a particular submember (a display format) from a display format source member:



Work Definition Displays

After you have used the selection display to specify the member you will work with and the work you will do with that member, you are shown a series of displays on which you do the work. These work definition displays vary from option to option, of course, and their format is dependent on the option you select.

The following is one of the work definition displays you will see if you select option 2 of the SDA Main Options menu to create a display format. This particular work definition display is used to design the layout of the display format:



On the 3180 Model 2 Display Station, this screen displays 132 columns.

End of Option Displays

After you have completed your work, SDA shows you an end of option display that is used to specify what you want done with the work you were doing. In some cases, you might see two types of end of option displays: one is used to specify what you want done with the submember you are working with; the other is used to specify what you want done with the member you are working with.

The following shows one of the end of option displays you will see if you use option 2 to create a display format:

```
                        END OF FORMAT OPTIONS                          W1

Select one of the following:

                0. Return to display format definition
                1. Save the work done
                2. Disregard work done on this display format

Option . . . . . 1

If option 1 is selected,

    Indicate if SDA should:
      Print an image of the display format . . . . . Y,N N
      Print source specifications for the display format . . . Y,N N
```

After you give SDA an indication of what you want done with the work you have completed, you are returned to the selection display to select another member or submember, or you are returned to the SDA Main Options menu to select another option.

Chapter 5. Creating Menus and Menu Help Text Using the Screen Design Aid

In Chapter 1, "Menus and Menu Design," you learned about menus and how they are used. In addition, you learned about a well-designed menu and about the two ways you can create your menus: using the screen design aid (SDA) or using BLDMENU, an SSP procedure.

This chapter describes how to use option 1 of the SDA Main Options menu to create and maintain your menus and the help text for your menus. You will learn how to use SDA to:

- Create a fixed-format menu
- Create a free-format menu
- Update an existing menu
- Convert a fixed-format menu to a free-format menu
- Delete a menu and all associated text.

You will also learn how to use SDA to:

- Create help text displays for menus and menu options
- Assign help text to particular menu options
- Pattern new help text after existing help text within the same menu
- Delete help text for a menu.

Creating or Maintaining Menus

To create a new menu or to maintain an existing menu, you complete the same general sequence of displays and actions:

1. On the SDA Main Options menu, select option 1 (*Design menus*).

   On the Member Name List/Menu Selection and Text Name List/Menu Selection displays, fill in the appropriate responses to the prompts shown.

2. On the Menu Text Definition display, design or update the menu text of the menu options.

3. On the Command Text Definition display, specify the commands and procedures for the menu options.

4. On the End of Menu/Command Text Options display, specify whether you want to accept the work completed on the previous displays, print an image of the menu and the source specifications for the menu, return to the work you did on the previous displays, or ignore the work completed for the menu.

5. On the End of Menu Options display, specify whether you want to save the work done on the menu, continue working with your menu, or discard the work done with your menu.

As you follow the steps to create and update a menu, use the foldout at the end of this chapter titled *An Overview of Menu Design*. This foldout can help you to follow the path through the SDA displays used to create and update a menu.

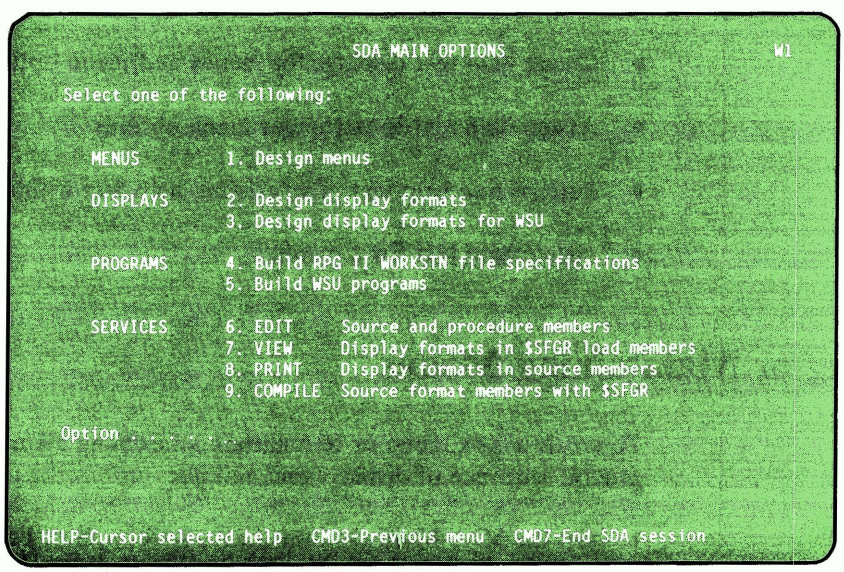
The following pages describe in detail the steps for creating a new menu and for updating an existing menu. The steps for deleting a menu and all associated text are also described.

Creating a New Menu

To create a new menu, do the following:

Step 1: Complete the Menu Selection Display

On the command display, type in SDA. The SDA Main Options menu appears:



Select option 1, *Design menus*. A display similar to the following is shown:

The previous display is called the Member Name List/Menu Selection display. Respond to the prompts on the Member Name List/Menu Selection display:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

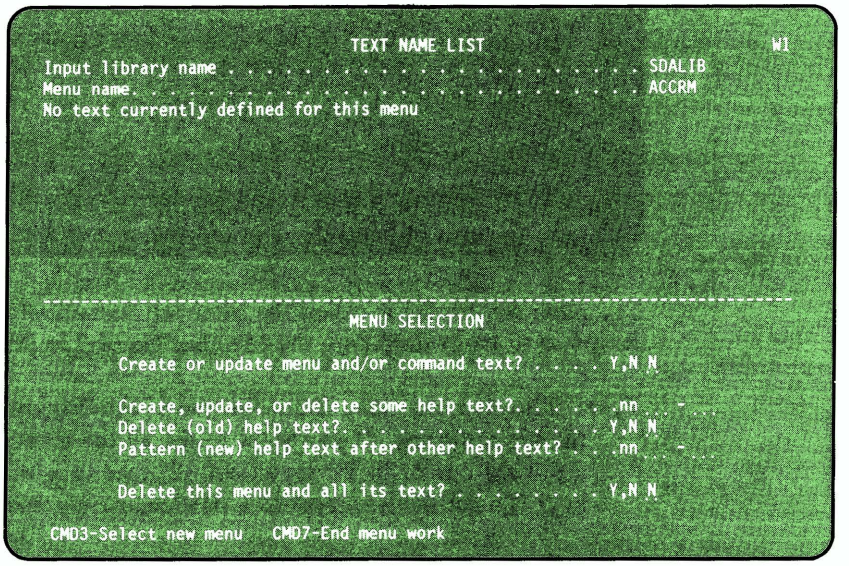
Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library shown on the Member Name List/Menu Selection display is the current library, or is the last library you specified on this display. If you want to display the contents of a different library, (1) move the cursor to this field, (2) type in the library's name, and (3) press the Enter key.

The library in which the newly created menu will be placed is specified on the End of Menu Options display (discussed in step 5).

Menu name: Type in the name of the menu that you want to create. A menu name can have a maximum of 6 alphameric characters. The first character in the menu name must be alphabetic (A through Z, #, $, or @); the remaining characters can be any character except blanks, commas (,), question marks (?), and periods (.).

You can continue responding to the prompts on the Member Name List/Menu Selection display, or you can press the Enter key. If you press the Enter key now, the Text Name List/Menu Selection display is shown:

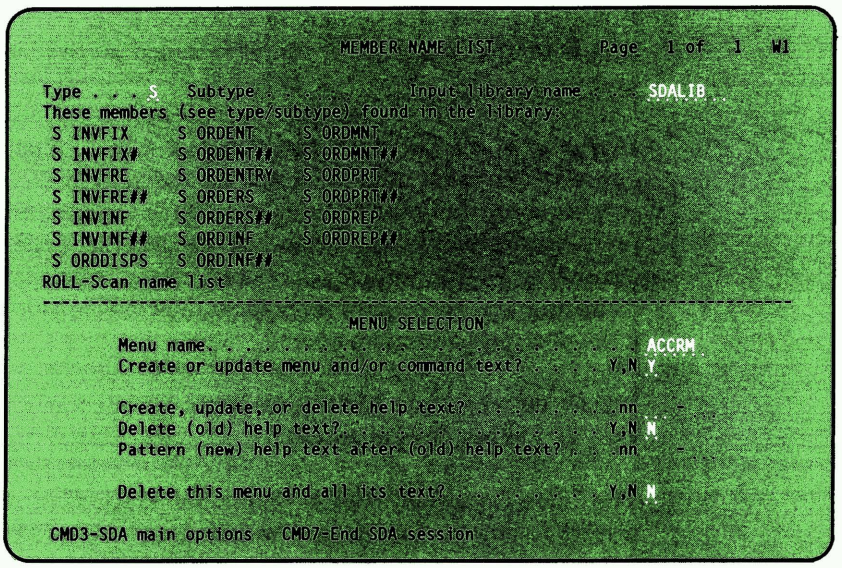


The Text Name List/Menu Selection display lists the submembers that make up your menu. (Because you are creating a new menu, a message is displayed indicating that there is no text currently defined for your menu.)

Because you are creating a menu, respond to the following prompt: *Create or update menu and/or command text?* To create a new menu, type in Y (yes).

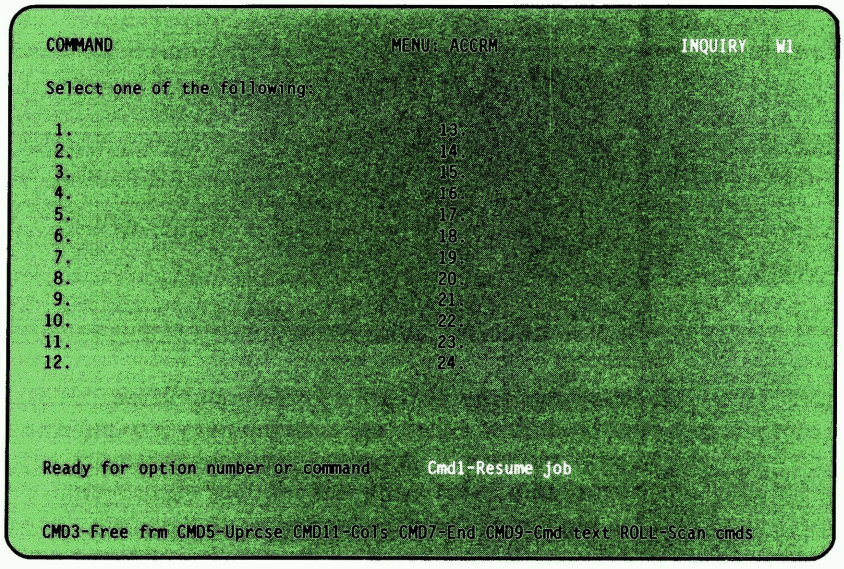
Do not respond to the remaining prompts; they are used for tasks other than creating a new menu, and will be described later in this chapter. Press the Enter key when you have finished responding to the prompts described in this step; the Menu Text Definition display appears.

Suppose you want to create a new menu named ACCRM, and that the menu is to be placed in the library named SDALIB. The following shows what you would specify on the Member Name List/Menu Selection display:



Step 2: Complete the Menu Text Definition Display

The following display is called the Menu Text Definition display. You use this display to design the text of the menu options your operator will see.



The Menu Text Definition display looks like a blank, fixed-format menu. The bottom three lines of information on the display are addressed to you as the SDA programmer; the contents of these three lines will not appear on the menu that you create. The command texts for the menu can be displayed on lines 22 and 23; you can see all the command texts by using the Roll keys. (Because you are creating a new menu and have not yet specified command text, that information is

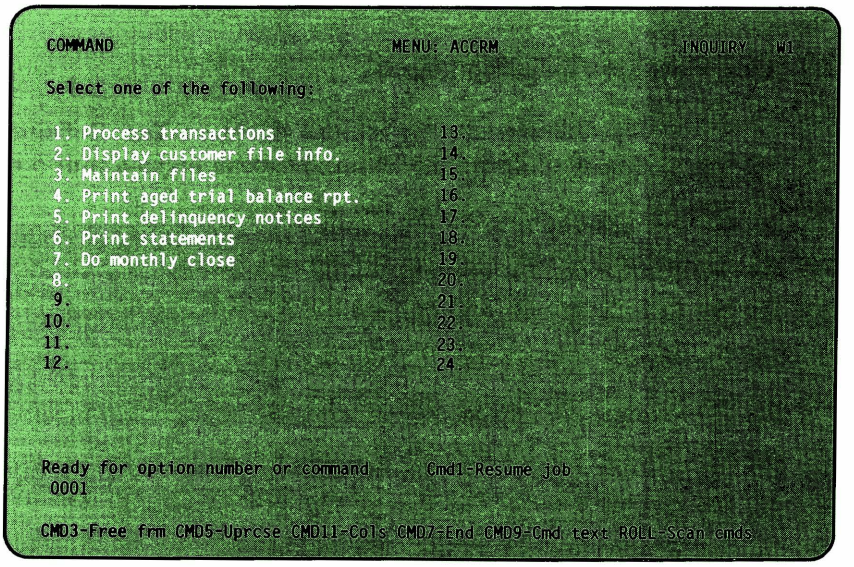
not filled in.) The uses of the command keys are described on the last line of the display.

Note: The "Inquiry" and "Cmd1-Resume job" fields are shown in this example to indicate the locations that are reserved for these fields. These fields will only appear on the display if the operator signed on to SDA after pressing the ATTN key.

Designing Menu Text for a Fixed-Format Menu: Type in the menu text for the options your menu uses. You are not required to use all 24 menu options; use only as many options as you need. You are limited to 30 alphameric text positions for each menu option. In ideographic mode, you can enter 30 A/N/K characters, 14 ideographic characters, or a combination of both. If you press command key 11, column separators show where you can type in menu text following each option number.

When you are satisfied with your work, press command key 9; the Command Text Definition display appears.

The following display shows what could be specified on the Menu Text Definition display for a new fixed-format menu named ACCRM:



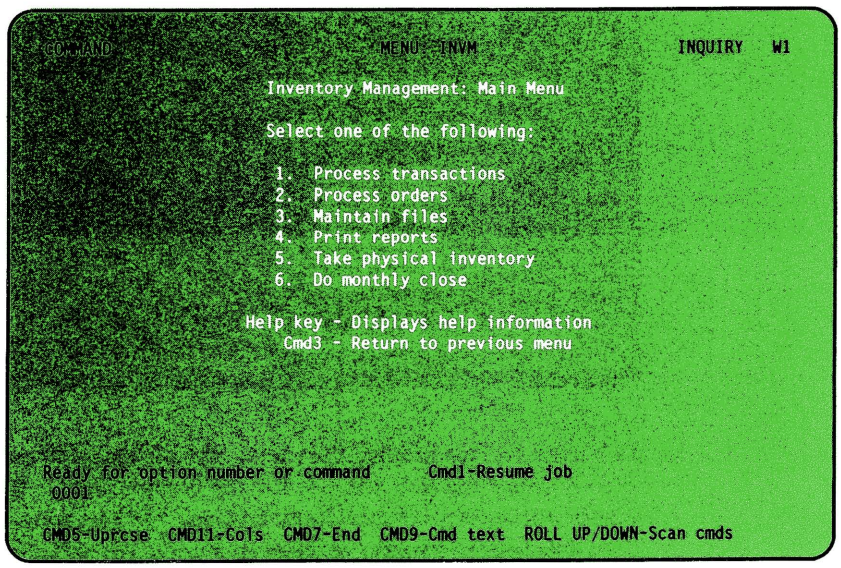
Designing Menu Text for a Free-Format Menu: When the Menu Text Definition display is first shown, use command key 3 to indicate that you want to design a free-format menu. After you press command key 3, you can use most of the display to provide menu text for your menu options. You can change or remove the top line of the menu (the name of the menu, for example) and you can remove or change the prompts that will be displayed to your operator (the prompt, *Ready for option number or command*, for example). To clear the menu name press the Field Exit key. To clear the rest of the display press the Field Exit key again. If you press command key 11, column separators show where you can type in the display text for a free-format menu.

Free-format menus can also use text that is A/N/K, ideographic, or both. The text can extend over more than one line. To avoid errors, ensure that each ideographic character string on each line is bracketed by a SO and a SI character.

That is, if the last character on one line is ideographic, and the first character on the next line is ideographic, put a SI to end the first line and a SO to start the next line.

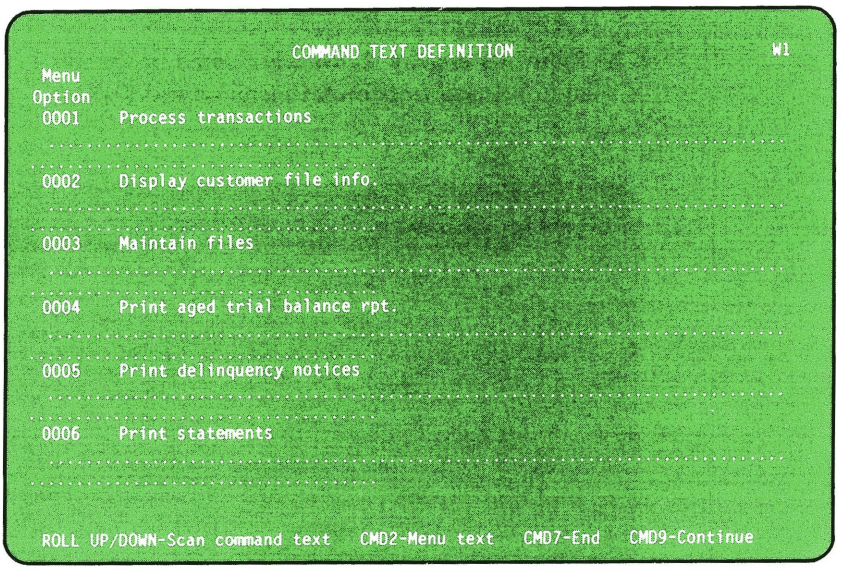
When you are satisfied with your work, press command key 9; the Command Text Definition display appears.

The following display shows what could be specified on the Menu Text Definition display for a new free-format menu named INVM:



Step 3: Complete the Command Text Definition Display

The following display is called the Command Text Definition display. You use this display to define the command or procedure that is run for a particular menu option.

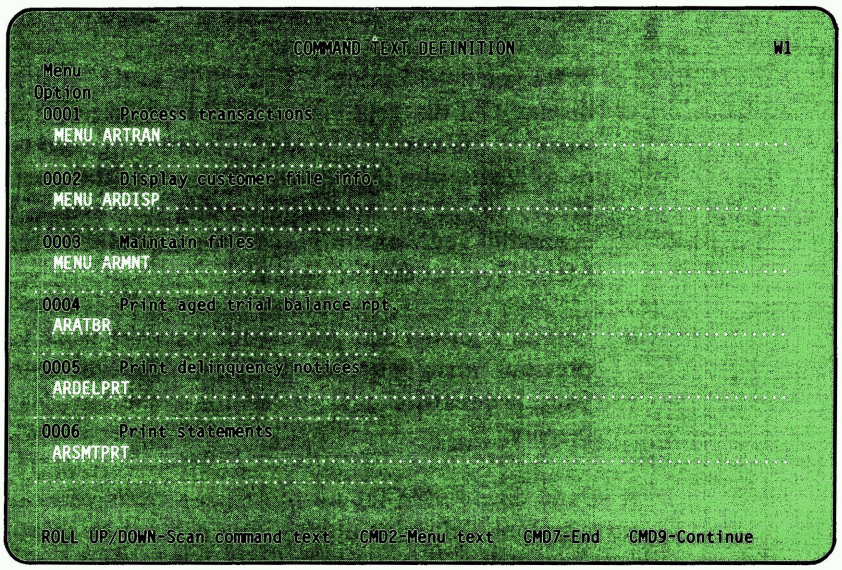


For fixed-format menus, the menu text of the corresponding menu option is shown above the line you use for the command text for that option. The menu text is not shown for free-format menus. If you want to go back to the Menu Text Definition display, perhaps to change the menu text or to check what you have entered, press command key 2.

For each menu option you used on the Menu Text Definition display, type in the control command or procedure that you want the system to process when the menu option is selected. Column separators show you the number of characters you can type in for each command text. You can use the Roll keys to page through all the command texts for your menu.

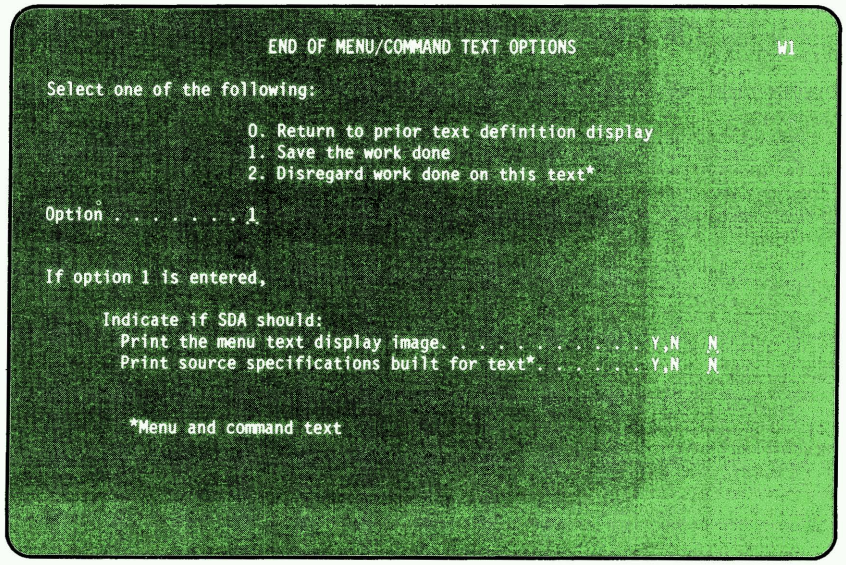
When you complete your work on the Command Text Definition display, press command key 9 to end the menu text and command text entry sequence; the End of Menu/Command Text Options display appears.

The following display shows what could be specified on the Command Text Definition display for the fixed-format menu named ACCRM:



Step 4: Complete the End of Menu/Command Text Options Display

The following display is called the End of Menu/Command Text Options display. You use this display to specify whether you want to return to the previous menu definition display, whether you want to accept the work just completed, or whether you want SDA to ignore the work you have just completed.



Enter option 0, 1, or 2 on the End of Menu/Command Text Options display:

- Option 0 allows you to return to the previous menu definition display. The work you have completed is not lost; you are returned to it in case you want to check it or change it.

- Option 1 allows you to save the work you have just completed. You can request that an image of the menu be printed, or that a list of source specifications for the menu text and command text be printed, or both. Option 1 is the default value for this display.

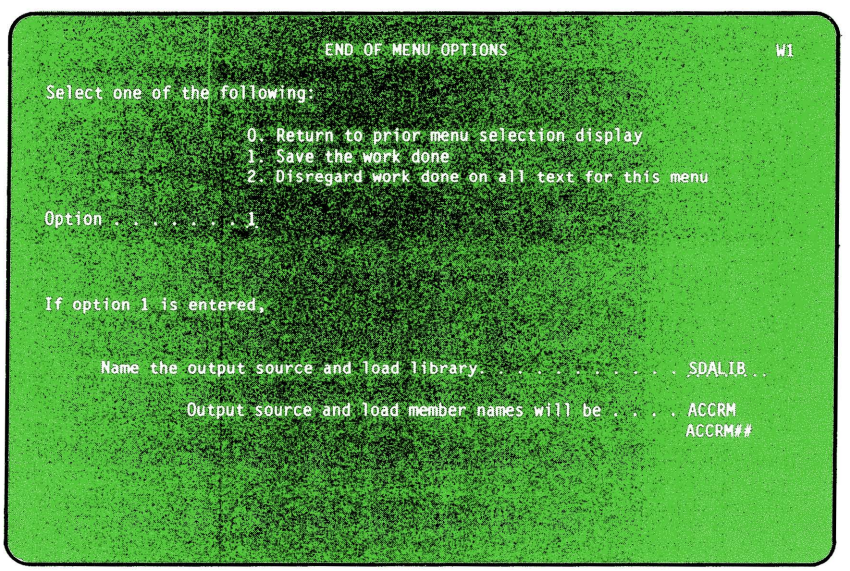
  After you enter option 1, you return to the Text Name List/Menu Selection display. At the Text Name List/Menu Selection display, you can choose to work on the same menu to check or change the menu text and command text or to create help text, or you can specify that you are finished with your menu. If you are finished designing your menu, press command key 3 or command key 7 at the Text Name List/Menu Selection display; the End of Menu Options display appears.

- Option 2 means that you do not want the work you completed on the previous menu definition displays. After you enter option 2, your update work is discarded, and you return to the Text Name/Menu Selection List display.

If at any time during the menu design process you have used command key 7 to leave a menu definition display, you will not be shown option 1 to save the work you have done. You can enter option 0 to return to the work you were doing, or you can enter option 2 to discard the work you were doing.

Step 5: Complete the End of Menu Options Display

The End of Menu Options display is shown when you press command key 3 or command key 7 on the Text Name List/Menu Selection display.



Enter option 0, 1, or 2 on the End of Menu Options display:

- Option 0 allows you to return to the Text Name List/Menu Selection display if you are not yet finished with working on your menu. The work you have already completed is not lost; you are returned to it in case you want to check it or change it.

- Option 1 allows you to save all the work done to the current menu and to specify the output source library to receive the work you have completed. Option 1 is the default value for this display.

  After you enter option 1, if command key 7 was pressed at the Text Name List/Menu Selection display, you are returned to the SDA Main Options menu. If command key 3 was pressed at the Text Name List/Menu Selection display, you are returned to the Member Name List/Menu Selection display. In either case, a message is sent to your display station indicating whether the attempt to compile your menu was successful.

- Option 2 means that you do not want any of the work you completed on the current menu. After you enter option 2, your work is discarded. If command key 7 was pressed on the Text Name List/Menu Selection display, you are returned to the SDA Main Options menu. If command key 3 was pressed on the Text Name List/Menu Selection display, you are returned to the Member Name List/Menu Selection display.

Output Produced by SDA

If you requested on the End of Menu/Command Text Options display that SDA print the menu's source specifications, the following is printed:

- The source specifications for the menu text
- The source specifications for the command text.

Following this output, if any, is a $SFGR listing. This listing consists of the display format source member name, any warning or terminating messages together with the statement causing the message, or any informational messages, the input and output library names, and the display format load member name.

Updating an Existing Menu

To update an existing menu, do the following:

Step 1: Complete the Menu Selection Display

On the command display, type in SDA. The SDA Main Options menu appears. Select option 1, *Design menus.* The Member Name List/Menu Selection display is shown. Respond to the prompts on the Member Name List/Menu Selection display:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)

- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Member Name List/Menu Selection display is the current library, or is the last library you specified on this display. If the menu you want to update is in a different library, (1) move the cursor to this field, (2) type in the library's name, and (3) press the Enter key.

Menu name: Type in the name of the menu that you want to update. You should be able to find the name of the menu within the source members listed on the top of the display.

You can continue responding to the prompts on the Member Name List/Menu Selection display, or you can press the Enter key. If you press the Enter key now, the Text Name List/Menu Selection display is shown. That display lists the submembers that make up the menu you are updating.

Because you are updating a menu, respond to the following prompt: *Create or update menu and/or command text?* To update an existing menu, type in Y (yes).

Do not respond to the remaining prompts; they are used for tasks other than updating an existing menu, and will be described later in this chapter. Press the Enter key when you have finished responding to the prompts described in this step; the Menu Text Definition display appears.

Step 2: Complete the Menu Text Definition Display

When you are updating an existing menu, the Menu Text Definition display looks similar to the menu that you want to update. Update the text of the menu options as required.

The bottom three lines of information on the display are addressed to you as the SDA programmer; the contents of these three lines will not appear on the menu that you are updating. The command texts for the menu are displayed on lines 22 and 23; you can see all the command texts by using the Roll keys.

The uses of the command keys are described on the last line of the display. You can use command key 3 to change an existing fixed-format menu to free-format, but you cannot change an existing free-format menu to fixed-format. If you press command key 3, your fixed-format menu is redisplayed, and you are free to update it as if it were a free-format menu.

When you are satisfied with your work, press command key 9; the Command Text Definition display appears.

Step 3: Complete the Command Text Definition Display

For fixed-format menus, the menu text of the corresponding menu option is shown above the line you use for the command text for that option. The menu text is not shown for free-format menus. If you want to go back to the Menu Text Definition display, perhaps to change the menu text or to check what you have entered, press command key 2.

Update the command or procedure that is run for a particular menu option as required. You can use the Roll keys to page through all the command texts for your menu.

When you complete your work on the Command Text Definition display, press command key 9 to end the menu text and command text entry sequence; the End of Menu/Command Text Options display appears.

Step 4: Complete the End of Menu/Command Text Options Display

The End of Menu/Command Text Options display is used to specify whether you want to accept the work just completed, whether you want to return to the previous menu definition display, or whether you want SDA to ignore the work you have just completed. Enter option 0, 1, or 2 on the End of Menu/Command Text Options display:

- Option 0 allows you to return to the previous menu definition display. The work you have already completed is not lost; you are returned to it in case you want to check it or change it.

- Option 1 allows you to save the work you have just completed. You can request that an image of the updated menu be printed, or that a list of source specifications for the updated menu text and command text be printed, or both. Option 1 is the default value for this display.

  After you enter option 1, you return to the Text Name List/Menu Selection display. At the Text Name List/Menu Selection display, you can choose to work on the same menu to check or change the menu text and command text or to create help text, or you can specify that you are finished with your menu. If you are finished updating your menu, press command key 3 or command key 7 at the Text Name List/Menu Selection display; the End of Menu Options display appears.

- Option 2 means that you do not want the work you completed on the previous menu definition displays. After you enter option 2, your update work is discarded, and you return to the Text Name List/Menu Selection display.

If at any time during the menu update process you have used command key 7 to leave a display, you will not be shown option 1 to save the work you have done. You can enter option 0 to return to the work you were doing, or you can enter option 2 to discard the work you were doing.

Step 5: Complete the End of Menu Options Display

The End of Menu Options display appears when you press command key 3 or command key 7 at the Text Name List/Menu Selection display. Enter option 0, 1, or 2 on the End of Menu Options display:

- Option 0 allows you to return to the Text Name List/Menu Selection display if you are not yet finished with working on your menu. The work you have already completed is not lost; you are returned to it in case you want to check it or change it.

- Option 1 allows you to save all the work done to the current menu and to specify the output source library to receive the work you have completed. Option 1 is the default value for this display.

  After you enter option 1, if command key 7 was pressed on the Text Name List/Menu Selection display, you are returned to the SDA Main Options menu. If command key 3 was pressed on the Text Name List/Menu Selection display, you are returned to the Member Name List/Menu Selection display. In either case, a message is sent to your display station indicating whether the attempt to compile your menu was successful.

- Option 2 means that you do not want any of the work you completed on the current menu. After you enter option 2, your work is discarded. If command key 7 was pressed at the Text Name List/Menu Selection display, you are returned to the SDA Main Options menu. If command key 3 was pressed at the Text Name List/Menu Selection display, you are returned to the Member Name List/Menu Selection display.

Deleting a Menu

To delete an existing menu, do the following:

Step 1: Complete the Menu Selection Display

On the command display, type in SDA. The SDA Main Options menu appears. Select option 1, *Design menus*. The Member Name List/Menu Selection display is shown. Respond to the prompts on the Member Name List/Menu Selection display:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Member Name List/Menu Selection display is the current library, or is the last library you specified on this display. If the menu you want to delete is in a different library, (1) move the cursor to this field, (2) type in the library's name, and (3) press the Enter key.

Menu name: Type in the name of the menu that you want to delete. You should be able to find the name of the menu within the source members listed on the top of the display.

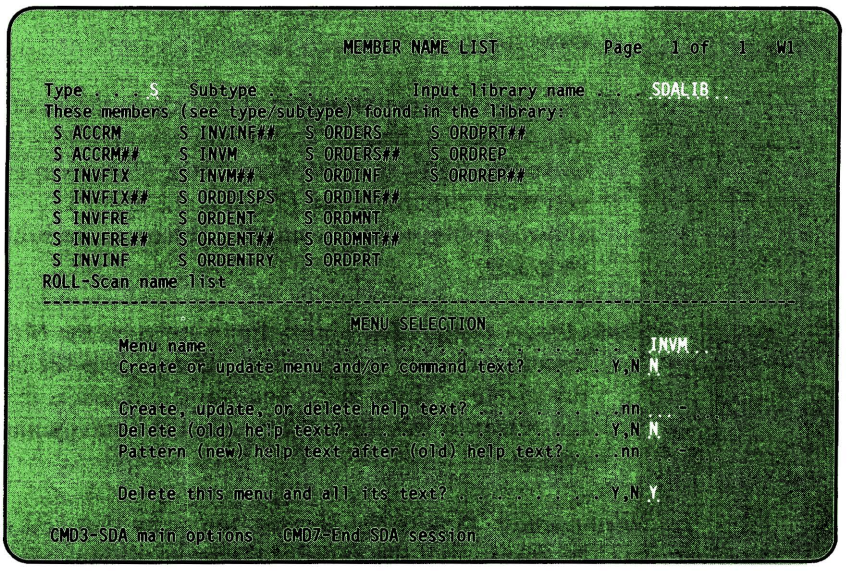
You can continue responding to the prompts on the Member Name List/Menu Selection display, or you can press the Enter key. If you press the Enter key now, the Text Name List/Menu Selection display is shown. That display lists the submembers that make up the menu you are deleting.

Because you are deleting a menu, respond to the following prompt: *Delete this menu and all its texts?* To delete an existing menu (all menu text, command text, and help text), type in Y (yes).

Do not respond to the remaining prompts; they are used for tasks other than deleting an existing menu, and are described elsewhere in this chapter. Press the Enter key when you have finished responding to the prompts described in this step.

Once you have responded to the appropriate prompts and have pressed the Enter key, the menu text, the command text, and the help texts associated with the menu you have named are marked with a D on the list at the top of the Menu Selection Display. These items will be deleted if you accept the work you have done on the End of Menu Options display. You can restore the menu using the End of Menu Options display to discard the work you have done on the menu. Press command key 7; the End of Menu Options display appears.

The following shows what to enter on the Member Name List/Menu Selection display to delete the menu named INVM, which is in the library named SDALIB:



Step 2: Complete the End of Menu Options Display

Enter option 0, 1, or 2 on the End of Menu Options display:

- Option 0 allows you to return to the Text Name List/Menu Selection display if you decide not to delete the menu. Press command key 3 on the Text Name List/Menu Selection to select a new menu; the current menu is not deleted.

- Option 1 allows you to delete the current menu. Option 1 is the default value for this display. If you enter option 1, the menu is deleted, and you return to the SDA Main Options menu.

- Option 2 means that you do not want to delete the current menu. If you enter option 2, the menu is not deleted, and you return to the SDA Main Options menu.

Creating or Maintaining Menu Help Text

To create new menu help text, or to maintain existing menu help text, you complete the same general sequence of displays:

1. On the SDA Main Options menu, select option 1 (*Design menus*).

   On the Member Name List/Menu Selection and Text Name List/Menu Selection displays, fill in the appropriate responses to the prompts shown.

2. On the Help Text Definition display, design or update a page of help text for a particular menu option, a range of menu options, or for the entire menu.

3. On the End of Help Text Options display, specify whether you want to accept the work completed on the previous displays, print an image of the menu and

the source specification for the menu, return to the work you did on the previous displays, or ignore the work completed for the menu.

4. On the End of Menu Options display, specify whether you want to save the work done on the menu, continue working with your menu, or discard the work done with your menu.

As you follow the steps to create and update menu help text, use the foldout at the end of this chapter titled "An Overview of Menu Help Text Design." This foldout can help you to follow the path through the SDA displays used to create and update menu help text.

The following pages describe the steps for creating new menu help text and for updating existing menu help text. The steps for deleting menu help text are also described.

Creating or Updating Menu Help Text

To create new menu help text for an existing menu or to update existing menu help text, do the following:

Step 1: Complete the Menu Selection Display

On the command display, type in SDA. The SDA Main Options menu appears. Select option 1, *Design menus*. The Member Name List/Menu Selection display is shown. Respond to the prompts on the Member Name List/Menu Selection display:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Member Name List/Menu Selection display is the current library, or is the last library you specified on this display. If the menu for which you want to create or update help text is in a different library, (1) move the cursor to this field, (2) type in the library's name, and (3) press the Enter key.

Menu name: Type in the name of the menu for which you want to create or to update help text. You should be able to find the name of the menu within the source members listed on the top of the display.

You can continue responding to the prompts on the Member Name List/Menu Selection display, or you can press the Enter key. If you press the Enter key now, the Text Name List/Menu Selection display is shown. That display lists the submembers that make up the menu for which you are creating or updating menu help text.

Create or update menu and/or command text? Type in N (no).

Create, update, or delete some help text? Type in the number or the range of numbers of the menu options the help text addresses. The numbers that you type in can be from 00 through 24. If you type in 01 only, for example, you will design the help text for menu option 1 only. That help text can be requested by the operator if menu option 1 is specified and the operator presses the Help key. If you type in 02 through 04, you will design the help text for menu options 2 through 4. That help text can be requested by the operator if menu option 2, 3, or 4 is specified and the operator presses the Help key. If you use the number 00 alone, you will define help text for the entire menu, and that help text can be requested by the operator only if the Help key is pressed when an option number is not specified.

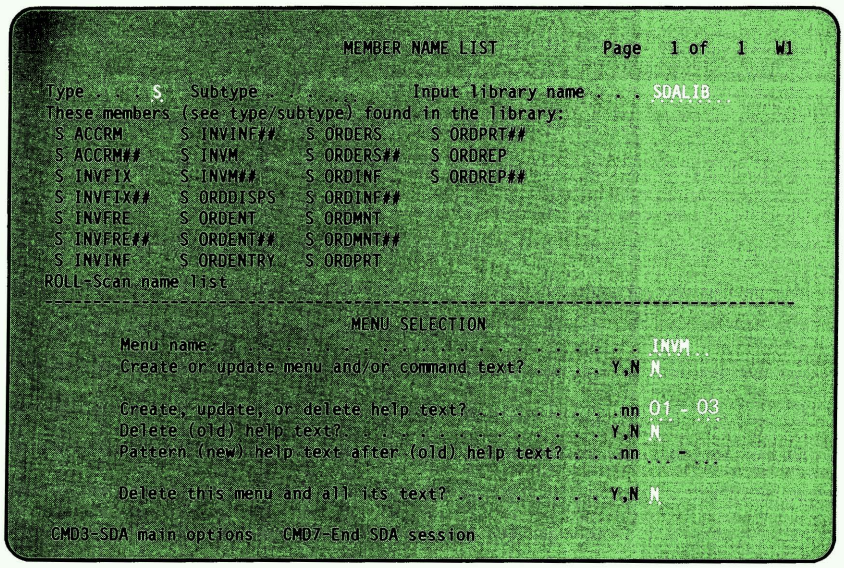
If help text exists for options 3 through 6, and you create help text for options 2 through 7, the help text for options 3 through 6 is marked for deletion. Deletion occurs when you save your work on the End of Menu Options display. If you have not saved your work on the End of Menu Options display, and are still on either the Member Name List display or the Text Name List display, deleting the help text for options 2 through 7 will restore the help text for options 3 through 6.

If help text for the specified menu option numbers already exists, that help text is displayed, and you can update it.

Pattern (new) help text after (old) help text? Type in a range of menu option numbers only if you are patterning new help text after help text that already exists. The help text for the menu options named here is copied to the help text for the menu options named in the previous prompt. You can then change that help text.

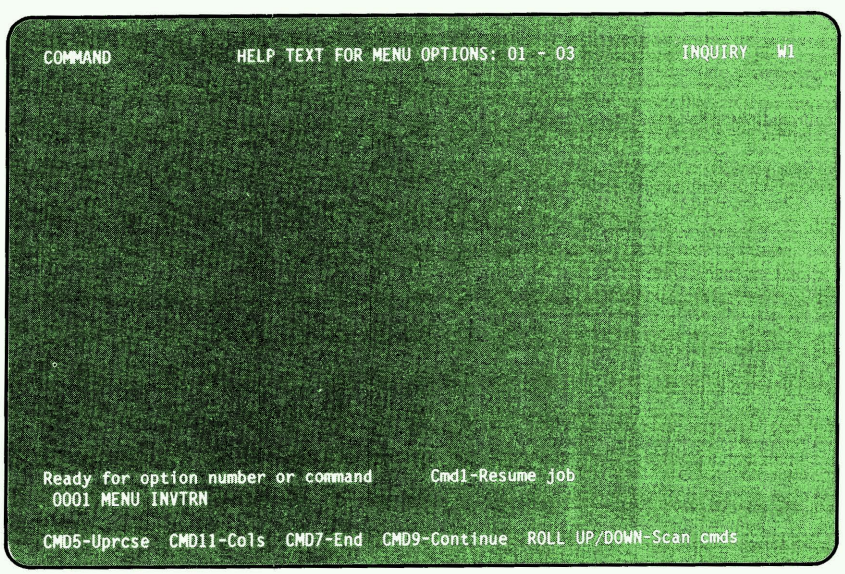
Do not respond to the remaining prompts; they are used for tasks other than creating or updating menu help text, and are described elsewhere in this chapter. Press the Enter key when you have finished responding to the prompts described in this step; the Help Text Definition display appears.

The following shows what could be entered on the Member Name List/Menu Selection display to create help text for options 1 through 3 of the menu named INVM. This menu is contained in the library named SDALIB.



Step 2: Complete the Help Text Definition Display

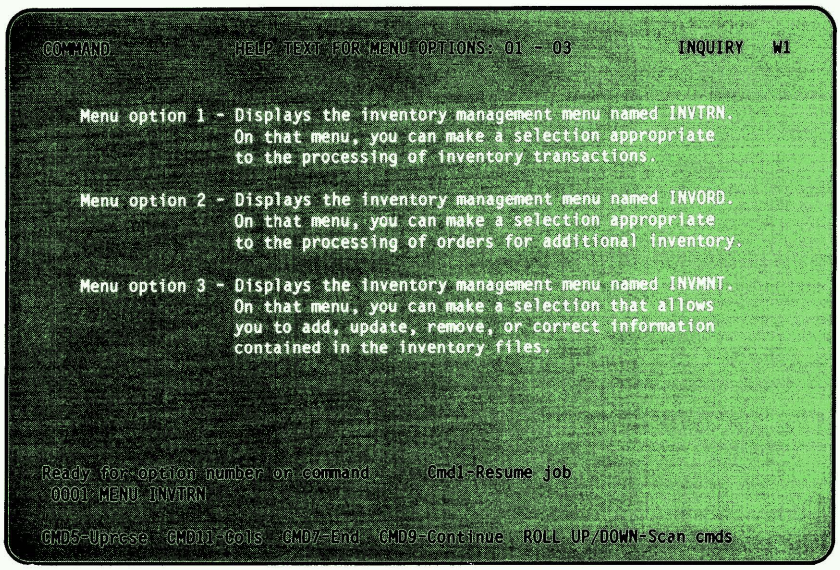
The following display is called the Help Text Definition display. You use this display to design a page of help text. This display shows existing help text to be updated, help text after which you are patterning new help text, or a blank display on which you can design new help text.



SDA creates a single page of help text for each range of menu options that you specified on the Menu Selection display.

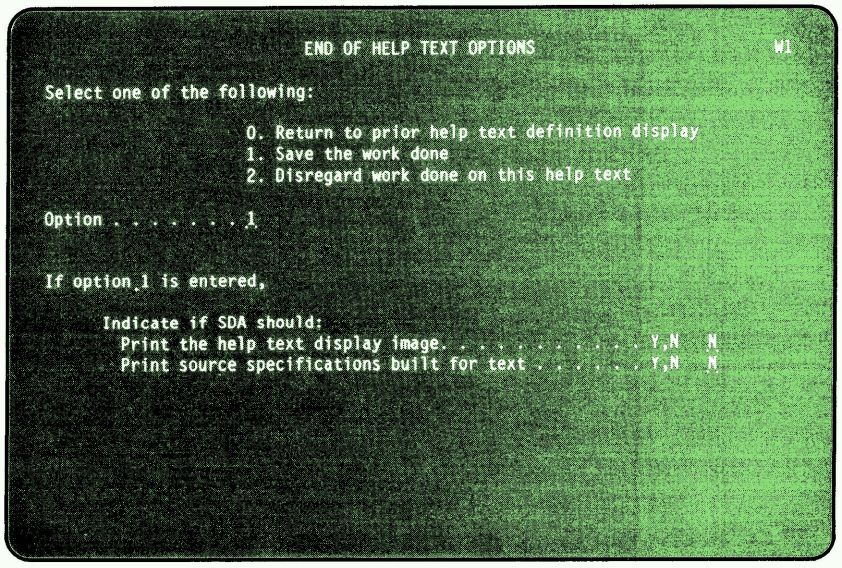
When you are finished designing the help text, press command key 9; the End of Help Text Options display appears.

The following display shows what could be specified on the Help Text Definition display to design help text for options 1 through 3 of the menu named INVM:



Step 3: Complete the End of Help Text Options Display

The End of Help Text Options display is used to specify whether you want to accept the work just completed, whether you want to return to the previous Help Text Definition display, or whether you want SDA to ignore the work you have just completed.



Enter option 0, 1, or 2, on the End of Help Text Options display:

- Option 0 allows you to return to the Help Text Definition display you have just left. The work you have already completed is not lost; you are returned to it in case you want to check it or change it.

- Option 1 allows you to save the work you have just completed. You can request that an image of the menu be printed, or that a list of source specifications for the menu text and command text be printed, or both. Option 1 is the default value for this display.

  After you enter option 1, you return to the Text Name List/Menu Selection display. At the Text Name List/Menu Selection display, you can choose to work on the same menu to check or change the menu text, command text, or help text, or you can specify that you are finished with your menu. If you are finished updating your menu, press command key 3 or command key 7 at the Text Name List/Menu Selection display; the End of Menu Options display appears.

- Option 2 means that you do not want the work you completed on the previous Help Text Definition displays. After you enter option 2, your work is discarded, and you return to the Text Name List/Menu Selection display.

If at any time during the help design process you have used command key 7 to leave a display, you will not be shown option 1 to save the work you have done. You can enter option 0 to return to the work you were doing, or you can enter option 2 to discard the work you were doing.

Step 4: Complete the End of Menu Options Display

The End of Menu Options display appears when you press command key 3 or command key 7 at the Text Name List/Menu Selection display. Enter option 0, 1, or 2 on the End of Menu Options display:

- Option 0 allows you to return to the Text Name List/Menu Selection display if you are not yet finished with working on your menu. The work you have already completed is not lost; you are returned to it in case you want to check it or change it.

- Option 1 allows you to save all the work done to the current menu and to specify the output library to receive the work you have completed. Option 1 is the default value for this display.

  After you enter option 1, if command key 7 was pressed at the Text Name List/Menu Selection display, you are returned to the SDA Main Options menu. If command key 3 was pressed at the Text Name List/Menu Selection display, you are returned to the Member Name List/Menu Selection display. In either case, a message is sent to your display station indicating whether the attempt to compile your menu was successful.

- Option 2 means that you do not want any of the work you completed on the current menu. After you enter option 2, your work is discarded. If command key 7 was pressed on the Text Name List/Menu Selection display, you are returned to the SDA Main Options menu. If command key 3 was pressed on the Text Name List/Menu Selection display, you are returned to the Member Name List/Menu Selection display.

Deleting Menu Help Text

To delete existing menu help text, do the following:

Step 1: Complete the Menu Selection Display

On the command display, type in SDA. The SDA Main Options menu appears. Select option 1, *Design menus*. The Member Name List/Menu Selection display is shown. Respond to the prompts on the Member Name List/Menu Selection display:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Member Name List/Menu Selection display is the current library, or is the last library you specified on this display. If the menu for which you want to delete help text is in a different library, (1) move the cursor to this field, (2) type in the library's name, and (3) press the Enter key.

Menu name: Type in the name of the menu that contains help text you want to delete. You should be able to find the name of the menu within the source members listed on the top of the display.

You can continue responding to the prompts on the Member Name List/Menu Selection display, or you can press the Enter key. If you press the Enter key now, the Text Name List/Menu Selection display is shown. That display lists the submembers that make up the menu for which you are creating or updating menu help text.

Create or update menu and/or command text? Type in N (no).

Create, update, or delete some help text? Type in the number or the range of numbers of the menu options for which you want to delete help text.

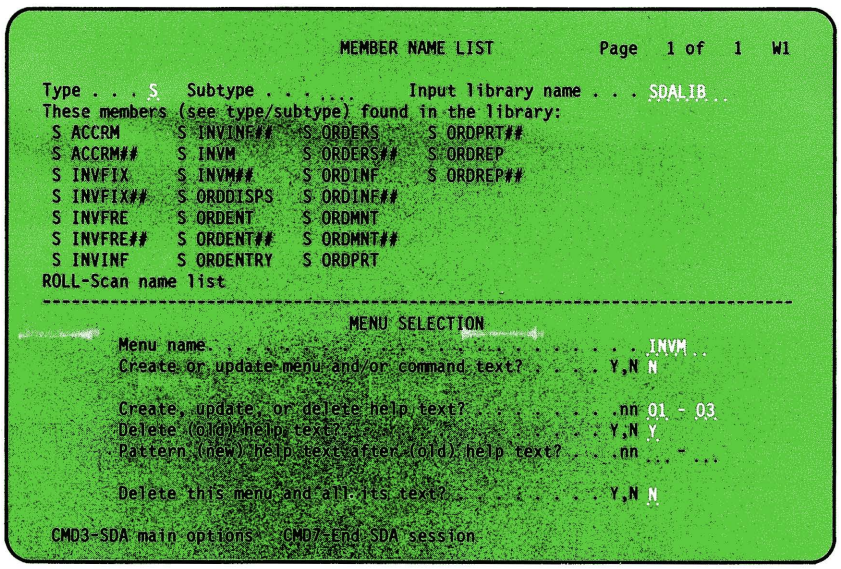
Delete (old) help text? Type in Y (yes) to delete the help text for the number or the range of numbers of the menu options specified in the previous prompt.

Delete this menu and all its texts? Type in N (no) because you want to delete only menu help text.

Do not respond to the remaining prompt; it is used for tasks other than deleting existing menu help text, and is described elsewhere in this chapter. Press the Enter key when you have finished responding to the prompts described in this step.

Once you have responded to the appropriate prompts and have pressed the Enter key, the help text associated with menu options you have specified are marked with a D on the list at the top of the Menu Selection Display. These items will be deleted when you accept the work you have done on the End of Menu Options display. Press command key 7; the End of Menu Options display appears. You can restore the help text by using the End of Menu Options display to discard the work you have done on the menu.

The following shows what could be entered on the Menu Selection display to delete the help text for menu options 1 through 3 of the menu named INVM. That menu is in the library named SDALIB:



2: Complete the End of Menu Options Display

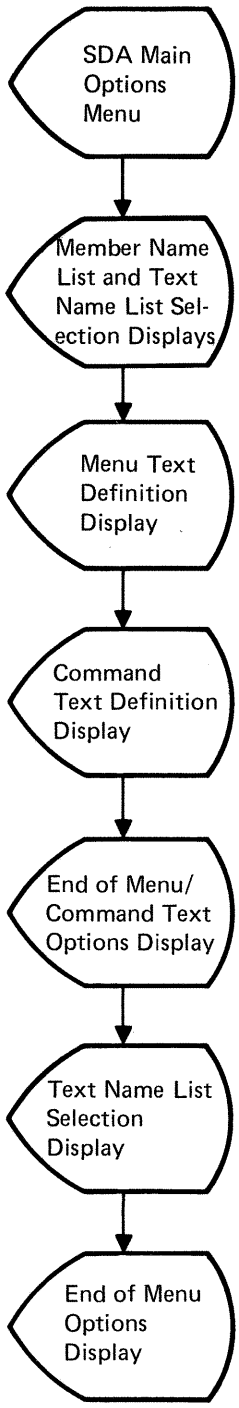
Once you have marked the help text for deletion and have pressed command key 7, the End of Menu Options display appears. Enter option 0, 1 , or 2 on the End of Menu Options display:

- Option 0 allows you to return to the Text Name List/Menu Selection display if you decide not to delete the menu help text. Press command key 3 on the

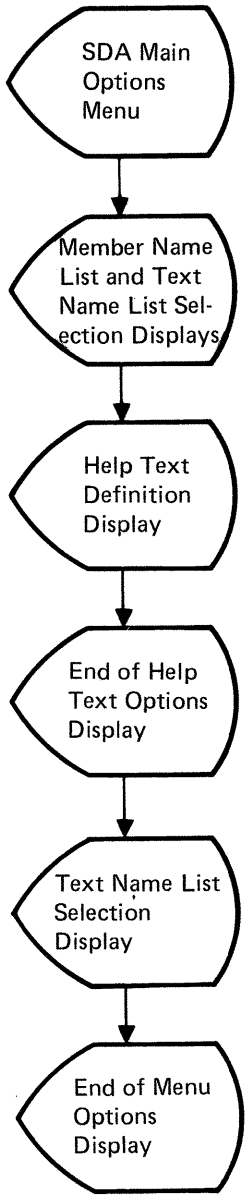
Text Name List/Menu Selection to select a new menu; the current menu help text is not deleted.

- Option 1 allows you to accept the work done on the menu. Option 1 is the default value for this display. If you enter option 1, the help text is deleted and you return to the SDA Main Options menu.

- Option 2 means that you do not want to delete the help text from the current menu. If you enter option 2, the help text is not deleted, and you return to the SDA Main Options menu.



An Overview of Menu Design



An Overview of Menu Help Text Design

Chapter 6. Creating Display Formats and Help Using the Screen Design Aid

In Chapter 2, "Display Formats and Display Design," you learned about display formats and how they are used. In addition, you learned about what goes into a well-designed display, and you learned about the two ways you can create your display formats: using the screen design aid (SDA) or using FORMAT, an SSP procedure.

This chapter describes how to use option 2 or option 3 of the SDA Main Options menu to create and maintain display formats. This chapter will show you how to:

- Create a display format to be used by a BASIC, a COBOL, a FORTRAN IV, an RPG II, or an Assembler program. (A program written in BASIC, COBOL, FORTRAN IV, RPG II, or Assembler is hereafter called a non-WSU program)
- Create a display format to be used by a work station utility (WSU) program
- Update a display format used by a non-WSU program
- Update a display format used by a WSU program
- Create help formats for a display format
- Delete a display format from a display format member.

Creating A New Display Format

To create a new display format, whether it is to be used by a WSU program or by a non-WSU program, you complete the same general sequence of displays:

1. On the SDA Main Options menu, select option 2 (*Design display formats*) or option 3 (*Design display formats for WSU*).

   On the Member Name List/Format Selection and Format Name List/Format Selection displays, fill in the appropriate responses to the prompts shown.

2. On the Image display, design the fields on the display.

3. On the Attribute display, define the characteristics of each field on the display.

On the Format Attributes display, define the characteristics of the entire display (this display is optional).

4. On the Field Attributes display, define additional characteristics of selected fields on the display (this step is optional).

5. On the End of Format display, specify whether you want to accept the work completed on the display format, print an image of the display format and the source specifications for the display format, return to the work you did on the display format, or discard the work you did on the display format.

6. On the End of Member Options display, specify whether you want to save the work done on the display formats in the source member, continue with the work done on the display formats in the source member, or disregard all work done on the display formats in the source member.

As you follow the steps to create a display format, use the foldout at the end of this chapter titled *An Overview of Display Design*. This foldout can help you to follow the path through the SDA displays used to create a display format.

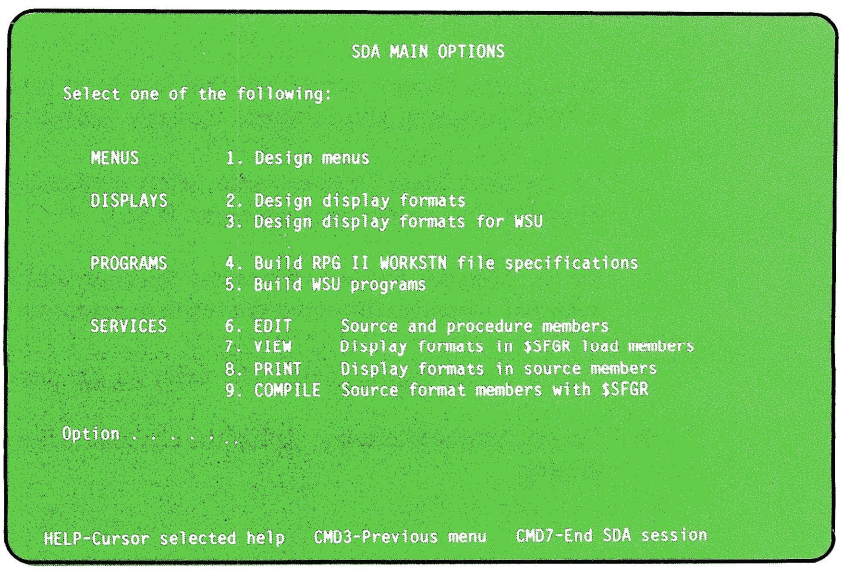
The work you will do and the displays are generally the same for options 2 and 3 of the SDA Main Options menu. There are a few prompts that are shown only with option 2 (non-WSU) or option 3 (WSU) display formats. These are explained as they occur.

Be sure you do not create displays for WSU and place them in a display format member to be used by a non-WSU program or create displays for a non-WSU program and place them in a display format member to be used by a WSU program. If you do, you will not be able to use the member for either WSU or non-WSU applications.

To create a new display format, do the following:

Step 1: Complete the Format Selection Display

On the command display, type in SDA. The SDA Main Options menu appears:



To create a display format for a non-WSU program, select option 2 (*Design display formats*). To create a display format for a WSU program, select option 3 (*Design display formats for WSU*).

For either option, the Member Name List/Format Selection display is shown.

Respond to the prompts on the Member Name List/Format Selection display:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

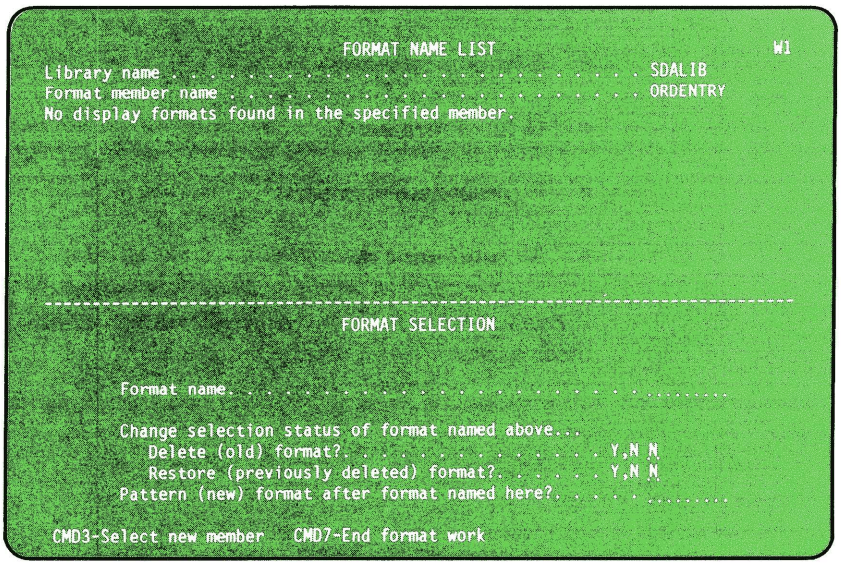
Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library shown on the Member Name List/Format Selection display is the current library, or is the last library you specified on this display. If you want to display the contents of a different library, (1) move the cursor to this field, (2) type in the name of the library, and (3) press the Enter key.

The library in which the newly created display format will be placed is specified on the End of Member Options display (discussed in step 6).

Source format member name: Type in the name of the display format source member to contain the display format that you want to create. You can specify a new format source member name, or you can specify the name of an existing display format source member. The format source member name can have a maximum of 8 characters. The first character in the format source member name must be alphabetic (A through Z, #, $, or @); the remaining characters can be any character except blanks, commas (,), question marks (?), and periods (.).

You can continue responding to the prompts on the Member Name List/Format Selection display, or you can press the Enter key. If you press the Enter key now, the Format Name List/Format Selection display is shown:



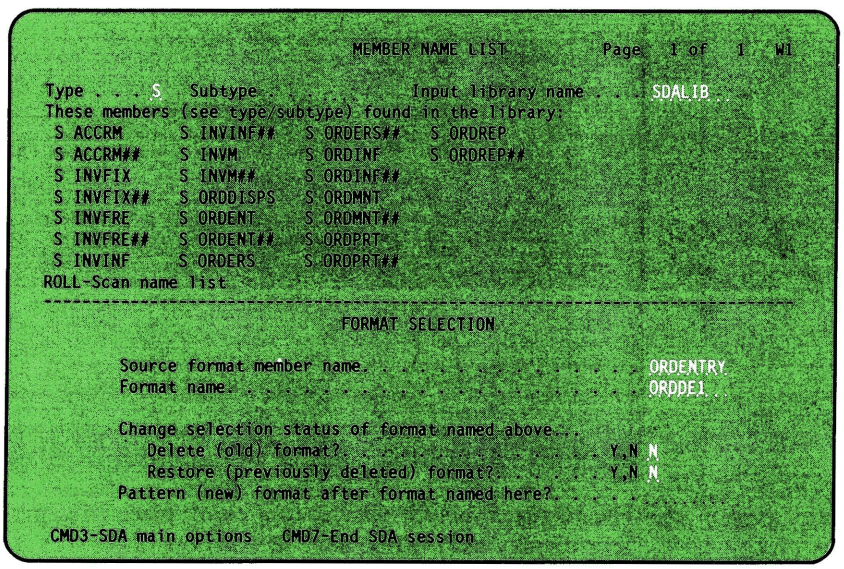
The Format Name List/Format Selection display lists all display formats in the specified source member. If there is more than one page of display format names, use the Roll keys to display those names. A message is displayed if no display formats currently exist in the specified source member.

Format name: Type in the name of the display format that you want to create. The display format name can have a maximum of 8 characters. The first character in the display format name must be alphabetic (A through Z, #, $, or @); the remaining characters can be any character except blanks, commas (,), question marks (?), and periods (.).

Pattern (new) format after format named here? If the display format that you want to create is similar to an existing display format within the same source member, you can choose to pattern the new display format after the one that already exists. To do so, type in the name of the existing display format after which you will pattern the new display format. When you press the Enter key, a copy of the existing display format is shown on the Update display, and you can change that display to meet the requirements of the new display format. The existing display format remains unchanged; you are only changing the new display. For more information about using the Update display, see "Step 2: Complete the Update Display" later in this chapter.

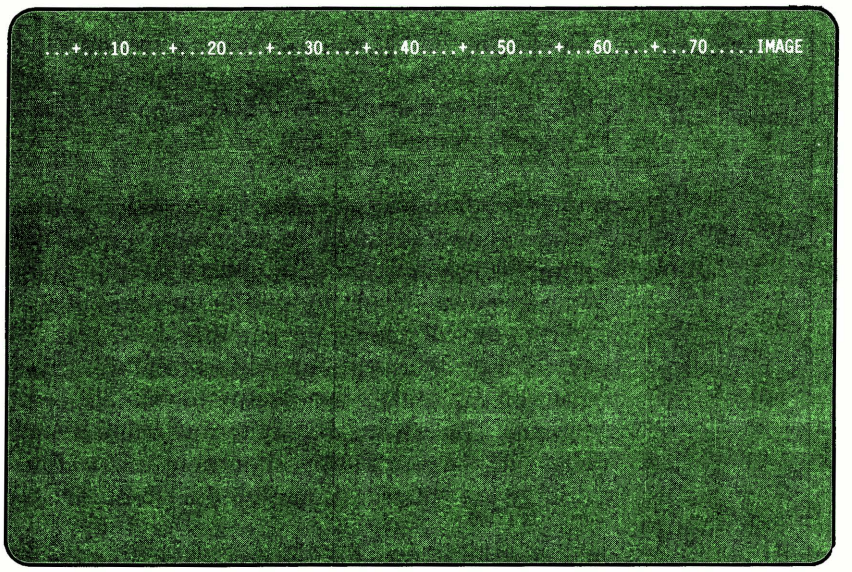
Do not respond to the remaining prompts; they are used for tasks other than creating a new display format. Press the Enter key when you have finished responding to the prompts described in this step; the Image display appears.

The following display shows what would be specified on the Member Name List/Format Selection display to create a new display format named ORDDE1. That display format is to be placed in the display format source member named ORDENTRY, which is in the library named SDALIB.

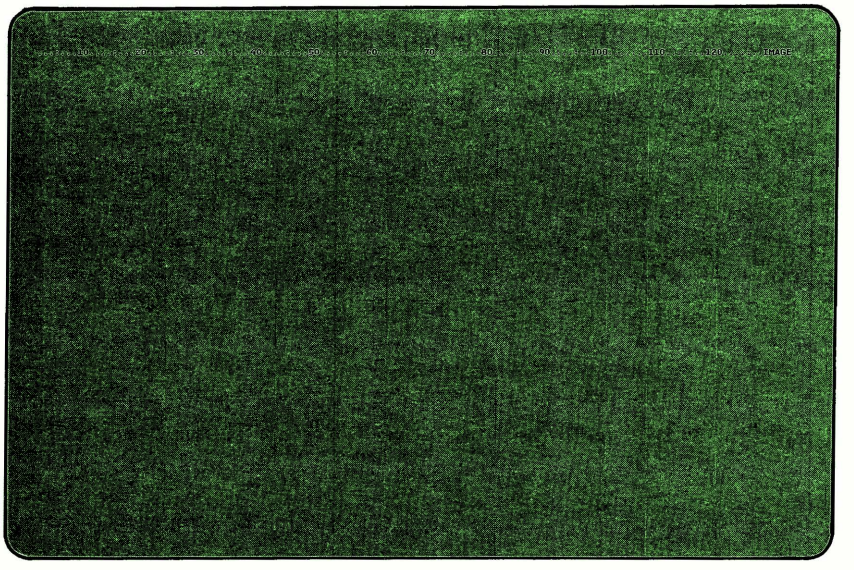


Step 2: Complete the Image Display

The Image display appears after you have responded to the appropriate prompts on the Format Selection display.



If you are using the 3180 Model 2 Display Station and you have selected 132-capable = 'Y' on the Format Attributes display, you will see 132 columns on your Image display screen:



The Image display is similar to a blank piece of paper on which you can design your display as it will appear to your operator. On the first line of the Image display is a row of numbers that show the columns of the display you are designing. The column headings will not appear on the display that you design; they appear on the Image display only to aid you in designing your display. Press command key 11 to remove the column headings from the Image display; if you press command key 11, line 1 can contain data that will appear on your display. To display the column headings again, press command key 11. The data on line 1 is not lost, it just is not displayed.

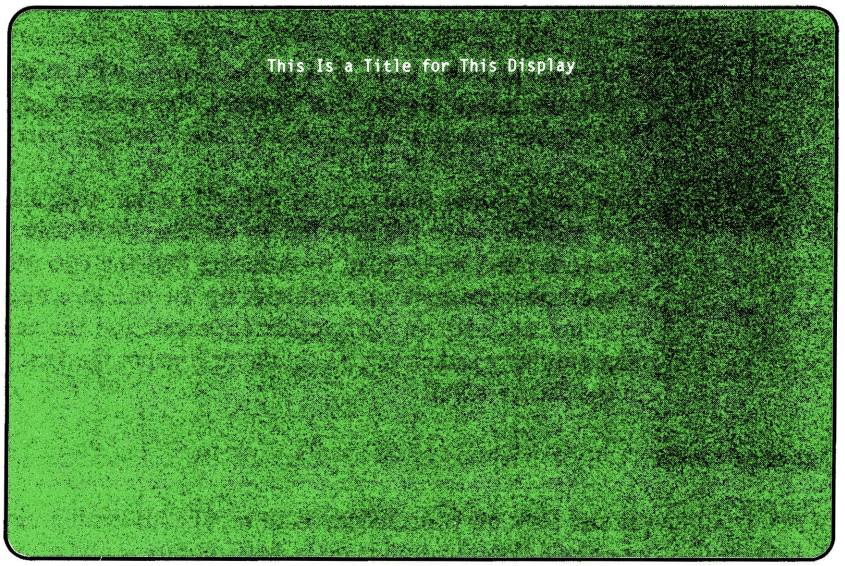
When the Image display first appears, you can design your display in both lowercase and uppercase characters. If you choose to design your display in only

uppercase characters, press command key 5. If you press command key 5 again, both lowercase and uppercase characters can again be used to design your display.

Describing Informational Text

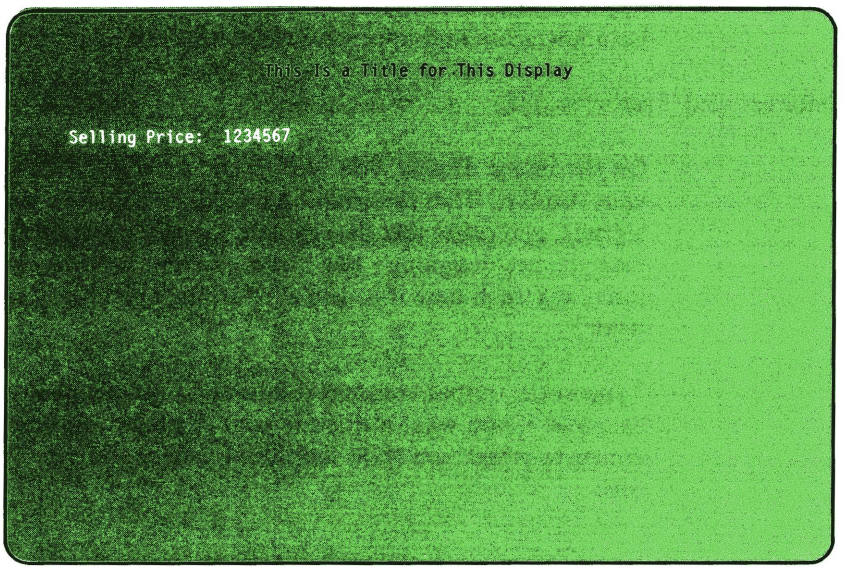
On the Image display, you type in and arrange all information that will appear on your display. That information includes all titles, prompts, column headings, legends, and other text that explain to your operator the purpose of the display that you are designing. Each title, prompt, heading, or legend that appears the same way each time it is displayed to the operator is called an output constant field.

Type in the output constant information exactly as it will be displayed. For example, if you want a title for your display to be centered on line 2, move the cursor to where you want the title to begin, and type the title on the display, like this:



Describing Input and Output Fields

You also show any input fields in which the operator can type in data, and any output fields in which program-supplied data is displayed to the operator. Some sort of representative data can be used to show field lengths, spacings, and margins. This representative data could be Xs (or any other character that works best for you), or it could be numbers indicating character positions within the field. For example, if you want to show a 7-character input field and the prompt for typing data into it, you could type in the following:



You must separate each field on the display with at least one blank character. When the Image display first appears, the cursor is located in position 2 of line 1. You cannot use positions 1 or 2 of line 1 for any part of a field.

Input and output fields can be defined so that they start on one line of the display and continue onto the next line of the display. Problems with ideographic characters can be avoided by ensuring that the two positions which make up an ideographic character are not split by the end of a line. Also ensure that, should one line end with an ideographic character and the next line begin with an ideographic character, a SI character finishes the first line and a SO character starts the next line.

Describing Message Fields

If any field on your display is to be filled in with a message identified by a message identification code (a MIC number) and a message member identifier:

- The first 4 characters of the field indicate the MIC of the message to be displayed
- The fifth and sixth characters of the field indicate the message member from which the message is to be retrieved:

Blank	User level 1 (required for WSU display formats)
U1	User level 1
U2	User level 2
P1	Program level 1
P2	Program level 2
M1	System level 1
M2	System level 2

Note: If the program using the display format determines which message is displayed, use 6 blank characters to indicate that the MIC and the message member identifier is supplied by the program when it is run.

Duplicating Information on the Display

You can duplicate information that you have typed in on the Image display by placing two single quotes in the leftmost positions of a blank line below the line that you want to copy. If you place two single quotes on more than one line, the original is copied on that number of lines. For example, suppose you type in:

```
This is a line to be copied.
```

and press the Enter key. To make two copies of that sentence, type in two single quotes on two blank lines below the sentence, and press the Enter key:

```
This is a line to be copied.
''
''
```

The following is displayed:

```
This is a line to be copied.
This is a line to be copied.
This is a line to be copied.
```

Command Keys Used with the Image Display

The following command keys can be used at any time while you are designing your display on the Image display:

Command key 1: Causes SDA to show the Format Attributes display. You use the Format Attributes display to define characteristics of the display that are not related to individual fields. SDA uses the Format Attributes display to build the S specification (the display control specification) for your display format.

Command key 5: Specifies that only uppercase characters can be typed on the Image display, or when pressed again, specifies that both uppercase and lowercase characters can be used.

Command key 7: Displays the End of Format Options display. You can choose to return to the work you were doing on the Image display, or you can discard that work. The End of Format Options display is described in step 5.

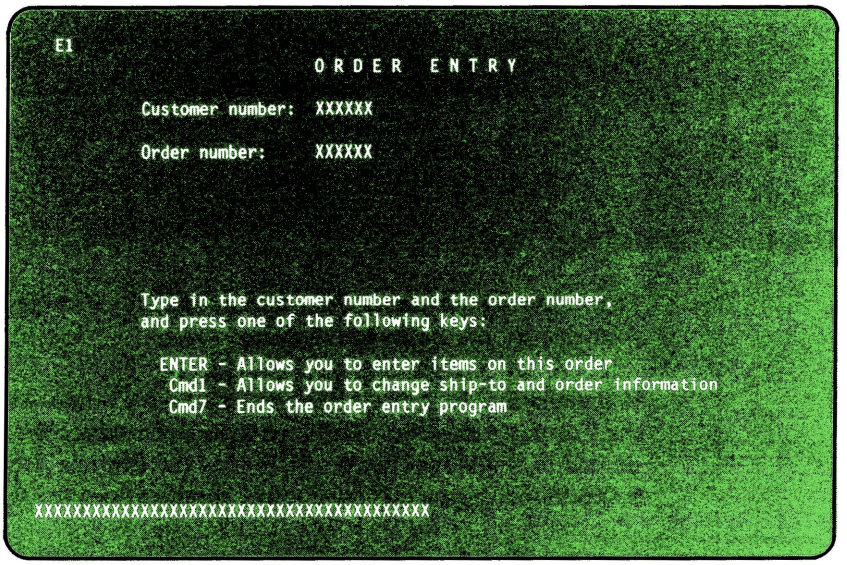
Command key 9: Displays the Attribute display, which is used to define the characteristics of individual fields on your display. The Attribute display is described in the next step.

Command key 11: Removes or displays the column headings shown at the top of the Image display.

Command key 12: If pressed before command key 9 is pressed, the Field Attributes display is not shown for fields that will have a field attribute of e (the field is an output field), i (the field is an input field), k (the field is an input/output field with a default value), or b (the field is an input/output field). The Field Attributes display is always shown for fields with a field attribute of * (you explicitly define the characteristics of the field). You use the Field Attributes display to further define the characteristics of the field. For more information about field attributes and the Field Attribute display, see the description of steps 3 and 4.

Press the Enter key at any time to check what you have typed in. When you are satisfied with the design of your display, and are certain that all necessary constants are typed in correctly and that all input and output fields have been represented, press command key 9; the Attribute display appears.

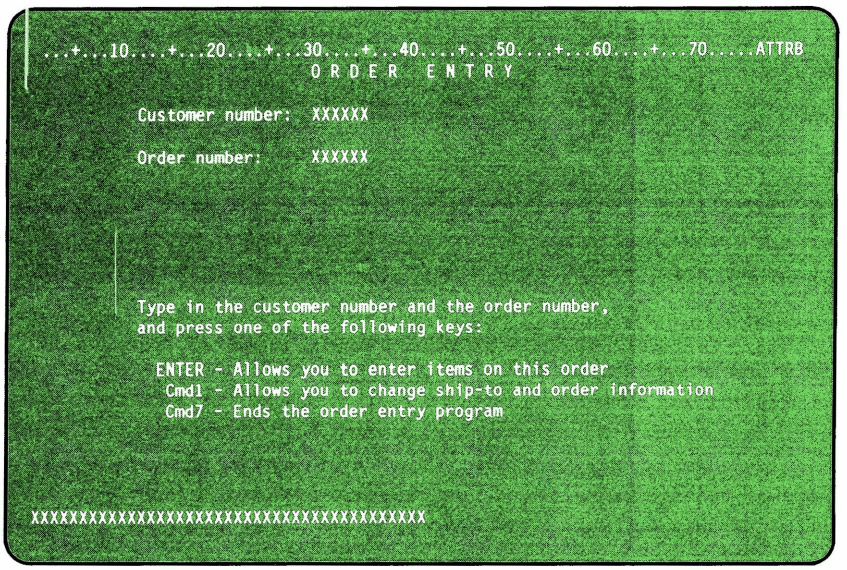
The following display shows what would be specified on the Image display to design the display named ORDDE1, which is used by a program within an order entry application. The operator has already pressed command key 11 to remove the column headings. All constant data such as a display title, prompts, and command key information has been typed in exactly as it will appear on the final display. Also, input and output fields have been represented with the character X to indicate character positions.



Step 3: Complete the Attribute Display

Once you have designed your display on the Image display and pressed command key 9, the Attribute display appears. The Attribute display looks similar to the Image display; it shows the display you designed in the previous step. The only change is that the characters ATTRB appear in the upper right corner of the display. To avoid errors, use the Insert and Delete function keys on the Image display, not on the Attribute display.

For example, if you pressed command key 9 at the Image display for the new display format named ORDDE1, the following would appear:



You use the Attribute display to define the characteristics of individual fields on your display, and if command key 1 is pressed, to define the characteristics of the entire display.

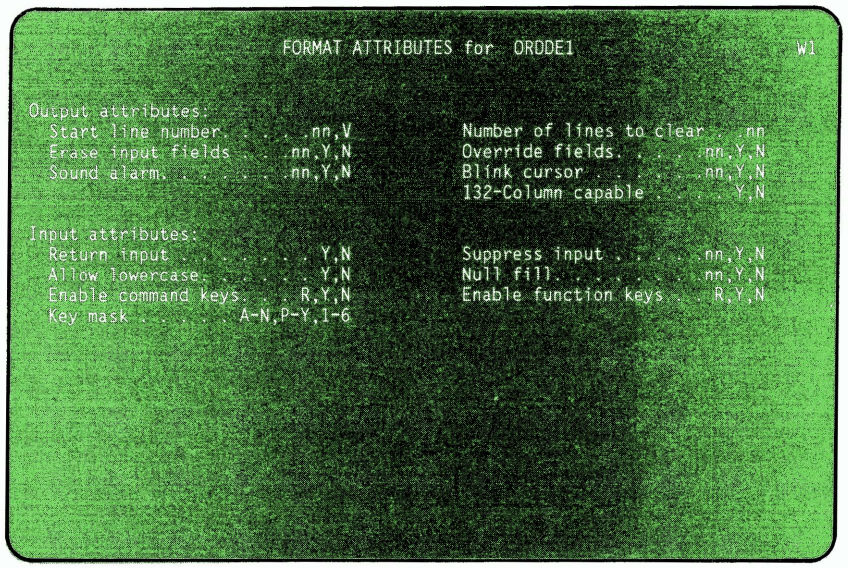
Defining the Characteristics of Your Entire Display

You might need to define certain characteristics about your entire display that do not affect individual fields on the display, such as:

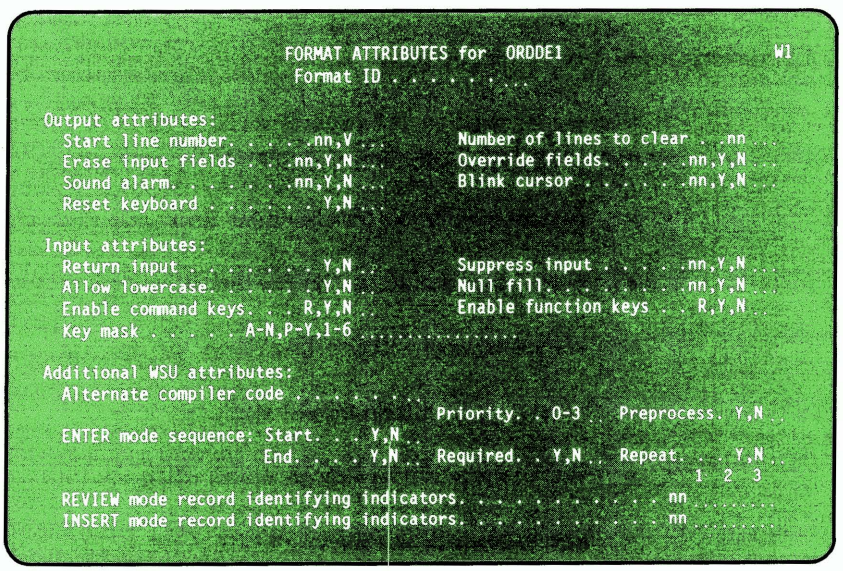
- Whether the operator can enter lowercase characters on the display.
- Whether data entered on the display is to be returned to the program.
- The command and functions keys the operator can use.
- Whether the cursor should blink.
- Whether the alarm should sound when the format is displayed.
- For 3180 display stations, whether the format will appear in 132-column mode.
- For WSU display formats, which record IDs are to be used for Enter, Review, and Inquiry modes.

To define these kinds of characteristics, press command key 1 when the Attribute display is shown.

If you are creating a display format for a non-WSU program, the following display appears:



If you are creating a display format for a WSU program, the following display appears:



The previous displays are called the Format Attributes display. SDA uses the information you enter on the Format Attributes display to build the S specification (display control specification) for your display format.

For most of the prompts on the Format Attributes display you can:

- Type in Y (yes) to cause the prompted characteristic to appear or to occur when your display format is shown by a program.
- Type in N (no) or leave the field blank to cause the characteristic not to appear or occur (N is the default value for most of the prompts).

- Type in an indicator in the range 00 through 99 (00 through 89 for WSU display formats). If the indicator is on when the display format is shown by a program, the prompted characteristic appears or occurs. If the indicator is off when the display format is shown by a program, the characteristic does not appear or occur.

Other prompts on the Format Attributes display require specific data or a value to be typed in. For example, to indicate which command keys are allowed on your display format, you must enter a series of alphabetic characters that correspond to the allowed command keys.

SDA shows you the responses that are allowed for each prompt on the Format Attributes display. You are not required to respond to any of the prompts on the Format Attributes display; use only those entries that apply to your display and application. For detailed information about the results of entries made on the Format Attributes display, see Appendix A, "Entries on the Display Control (S) Specification."

After you have typed in the appropriate responses to the prompts on the Format Attributes display, press the Enter key; you are returned to the Attribute display. You can continue by defining the characteristics of individual fields on the display.

Defining the Characteristics of Fields on Your Display

You also use the Attribute display to indicate the field type and the data type of the field for each field on the display. When you specify the field type, you are telling SDA whether the field is an input field, an output field, an input field *and* an output field, or a field that displays a message constant. When you specify the data type for an input field, you are telling SDA the kind of data the operator is allowed to type in that field. SDA uses the information you enter on the Attribute display to build the D specifications (field definition specifications) for your display format.

Specifying the Field Type: The field type is defined with a field attribute. The field attribute is a character that is placed in the blank space immediately before the field that you want to define. The field attributes can be typed in lowercase or in uppercase. Lowercase characters mean that the field is displayed in normal intensity, and uppercase characters mean that the field is displayed in high intensity. If you use an asterisk (*), you must define all attributes, including the field intensity, on the Field Attribute display.

The following field attributes can be used:

Character	Field Type
c (or blank)	The field is a constant field and is displayed with the data that was typed on the Image display. This field attribute is used for constants such as titles, prompts, legends, and so on.
k	The field is an input/output field. The data that was specified on the Image display is shown in the field. This field attribute is used for input/output fields that have a default value. When you complete the Attribute display and press command key 9, SDA

shows the Field Attributes display on which you can define other characteristics of this field.

e — The field is an output field. Data to be displayed in the field is supplied by the program when the display format is shown. When you complete the Attribute display and press command key 9, SDA shows the Field Attributes display on which you can define other characteristics of this field.

m — The field displays a message identified by the 6-character MIC and message member identifier you specified on the Image display. If the Image display was left blank where this field will exist, this field displays a message identified by a MIC and message member identifier supplied by the program.

i — The field is an input field. When you complete the Attribute display and press command key 9, SDA shows the Field Attributes display on which you can define other characteristics of this field, such as reverse image or mandatory entry.

b — The field is an input/output field. When you complete the Attribute display and press command key 9, SDA shows the Field Attributes display on which you can define other characteristics of this field.

* — Use this field attribute if you want to define all the characteristics of the field on the Field Attributes display. When you complete the Attribute display and press command key 9, SDA shows the Field Attributes display.

Output data can be displayed by field types b, c, e, and k. Output data can be alphameric, ideographic, or both. However, invalid characters will be displayed for extended ideographic characters of combined ideographic-alphameric data if the first character is alphameric. If the first character must be alphameric, consider breaking the field into an alphameric field and a separate ideographic field.

Note: If you press command key 12 before you press command key 9, the Field Attributes display will not be shown for fields with a field attribute of e, i, k, or b. The Field Attributes display is always shown for fields with a field attribute of *, regardless of whether you press command key 12.

Specifying the End of a Field: You also must show the end of a field. Use a t or a T to mark the end of a field. If only one blank separates the end of one field and the beginning of a second field, the field attribute typed in for the second field marks the end of the first field.

For example, suppose you typed in the following prompt on the Image display:

```
Tax code:
```

To define the field type as a constant, and to show the end of the prompt, add a c at the beginning of the prompt, and a t at the end of the prompt:

```
cTax code:t
```

Suppose you want the constant field to be immediately followed by an output field that is to be displayed in high intensity:

```
Tax code: XX
```

The following shows the characters that you would type on the Attribute display:

```
cTax code:EXXt
```

Notice that you do not have to use a t or a T to show where the prompt *Tax code:* ends. The character E does that for you.

Specifying the Data Type: For all input or input/output fields on your display, you can also type in a secondary attribute. The secondary attribute is a character that is placed in the first position of the input or input/output field that you want to define. The secondary attribute immediately follows the field attribute, and can be a lowercase or an uppercase character.

A complete list of secondary attributes is on the next page. Below are some of the secondary attributes that can be used.

Character	**Data Type**
a (or no entry)	The field can accept alphameric data as input. (See note below.)
s	The field accepts only numbers, a plus sign (+), or a minus sign (-). When the operator presses a field exit key, the data is right-adjusted in the field, and any remaining positions in the field are filled with blanks.
n	The field accepts only numeric data. When the operator presses a field exit key, the data is right-adjusted in the field, and any remaining positions are filled with zeros.

For example, suppose you have a field represented like this:

```
XXXXXXXXXXXX
```

The following shows the characters typed on the Attribute display to make the field an input field that allows alphameric data:

```
iaXXXXXXXXXXXt
```

The following shows the characters typed on the Attribute display to make the field an input/output field that allows numeric, zero filled data:

```
bnXXXXXXXXXXXt
```

Note: If no entry is made for the secondary attribute, the input or input/output field has a data type of alphameric, *unless* the first letter in the field (as specified on the Image display) contains an n, N, s, or S; then, you *must* specify an a or A to make the field alphameric.

The characters a or blank, d, s, m, n, k, e, f, o, x, and r can be used as secondary attributes. Following are the characters and the data types they define:

Character	Data Type
a	The field accepts alphabetic data only.
b or blank	The field can accept alphameric data as input.
d	The field accepts only digits. Commas (,), decimal points (.), plus signs (+), or minus signs (-) will not be accepted.
s	The field accepts only numbers, a plus sign (+), or a minus sign (-). When the operator presses a field exit key, the data is right-adjusted in the field, and any remaining positions in the field are filled with blanks.
m	This field accepts all alphameric data, but on data entry keyboards,when no manual keyboard shifts are active, the keyboard automatically shifts to numeric shift for this field. For example, if the operator presses the letter U key without first pressing the numeric shift key, the digit 1 will appear on the screen.
n	The field accepts only numeric data. When the operator presses a field exit key, the data is right-adjusted in the field, and any remaining positions are filled with zeros.
k	The field accepts Katakana characters as input data.
e	The field accepts either alphameric-Katakana (A/N/K) data, or ideographic data, but not both. The field is initially set up for alphameric-Katakana data.
f	The field accepts either alphameric-Katakana (A/N/K) data, or ideographic data, but not both. The field is initially set up for ideographic data.
o	The field can contain any combination of alphameric, Katakana and ideographic characters.
x	The field accepts only ideographic data. If an x field is an input/output field, the output data should be ideographic data.
r	The field will accept data from the magnetic stripe reader. Use the non-display field attribute for this field. The field can be up to 128 positions long. WSU programs cannot use this secondary attribute.

Command Keys Used with the Attribute Display

The following command keys can be used on the Attribute display:

Command key 1: Causes SDA to show the Format Attributes display.

Command key 2: Returns you to the Image display. All attributes entered up to this point are lost. Use this key if you want to change your format.

Command key 7: Displays the End of Format Options display. You can choose to return to the work you were doing on the Attribute display, or you can discard that work. The End of Format Options display is described in step 5.

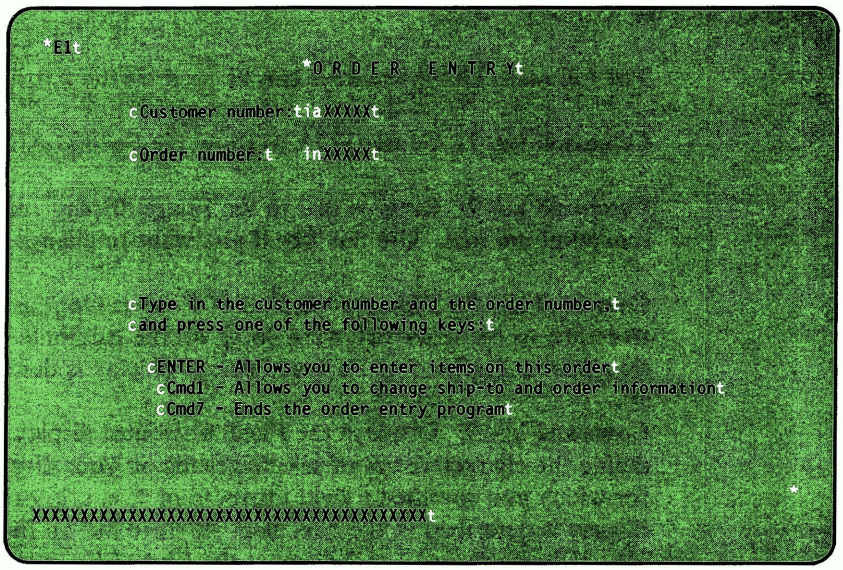
Command key 9: Displays the Field Attributes display, which is used to further define the characteristics of selected fields on your display. The fields are those for which you specified a field attribute of *, e, i, k, or b. The Field Attributes display is described in the next step. If there are no fields with attributes of *, e, i, k, or b, command key 9 displays the End of Format Options display.

Command key 11: Removes or displays the column headings shown at the top of the Attribute display.

Command key 12: If pressed before command key 9 is pressed, the Field Attributes display is not shown for fields that have a field attribute of e, i, k, or b. If pressed again, the Field Attributes display is shown for those field types. You use the Field Attributes display to further define the characteristics of the field.

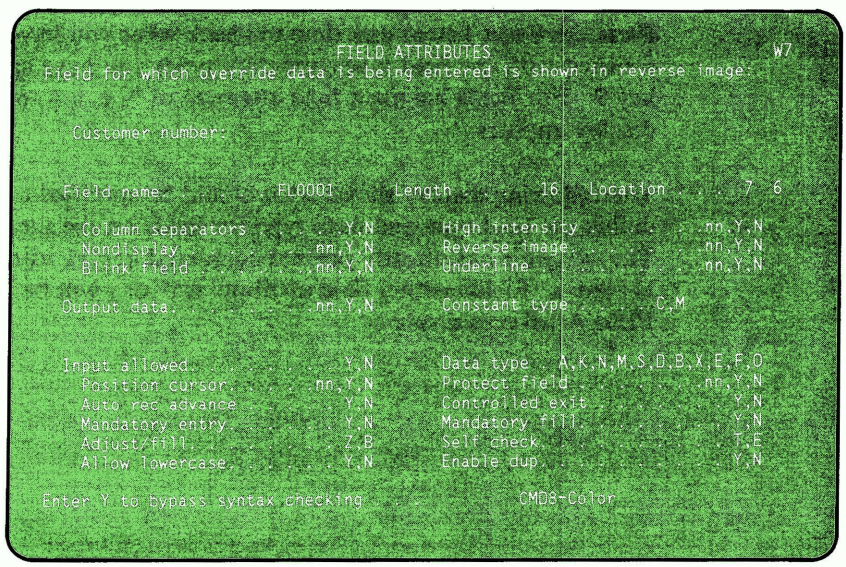
Press the Enter key at any time to check what you have typed in. When you are satisfied with the field types and data types you have specified, press command key 9. For fields having a field attribute of *, e, i, k, or b, the Field Attributes display appears.

The following display shows what would be specified on the Attribute display to define the field type and data type for fields on the the display named ORDDE1. The operator has already pressed command key 11 to remove the column headings. Fields with a field attribute of * or i will be further defined on the Field Attributes display.

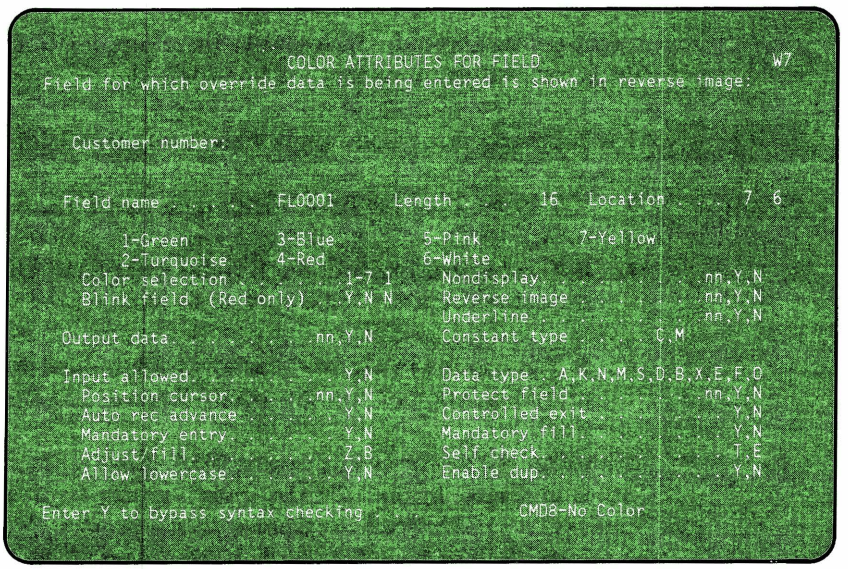


Step 4: Complete the Field Attributes Display for Selected Fields

For each field for which you have specified a field attribute of *, e, i, k, or b, the Field Attributes display is shown:



If you used the Color Attributes screen for one of the fields on your display, then when you press ENTER, you will see the Color Attributes screen to describe the next field:



You will continue to get the Color Attributes screen until you press Cmd 8 to return to the Field Attributes screen. The Cmd 8 key is used to go back and forth between the Color Attributes screen and the Field Attributes screen.

The Field Attributes display is used to define further the characteristics of selected fields on your display. The field that you are defining is shown in reverse image on the top half of the Field Attributes display. SDA uses the information you enter on the Field Attributes display to build the D specification (field definition specifications) for that field.

For most of the prompts on the Field Attributes display you can:

- Type in Y (yes) to cause the prompted characteristic to appear or to occur for this field when your display format is shown by a program.
- Type in N (no) or blank to cause the characteristic not to appear or occur (N is the default value for most of the prompts).
- Type in an indicator in the range 00 through 99 (00 through 89 for WSU display formats). If the indicator is on when the display format is shown by a program, the prompted characteristic appears or occurs for this field. If the indicator is off when the display format is shown by a program, the characteristic does not appear or occur.

SDA shows you the responses that are allowed for each prompt on the Field Attributes display. You do not have to respond to all of the prompts on the Field Attribute display; use only those entries that apply to the field you are defining. For detailed information about the results of entries made on the Field Attributes display, see Appendix C, "Entries on the Field Definition (D) Specifications."

Certain combinations of entries that you make on the Field Attributes display might not be allowed. SDA checks these combinations and blinks the response fields for combinations that are not allowed.

The following restrictions apply when using the Color Attributes for Field display:

- If Y is specified for Blink Field, then Red is the only valid color.
- If Y is entered for both the Reverse Image and Underline prompts, you cannot select white, yellow, blue, or blinking red.
- If Y is entered in the Nondisplay prompt, the only valid colors are green and turquoise, and you cannot specify Reverse Image or Underline.

SDA also checks for syntax errors; SDA displays the response fields with syntax errors in reverse image. If SDA finds a syntax error, but you want to continue anyway, type in Y (yes) in response to the prompt *Enter Y to bypass syntax checking*. Remember, though, that the system might not be able to compile your display format if an improper combination of entries is made.

For 5292 Color Screen Users, SDA identifies errors in the following ways:

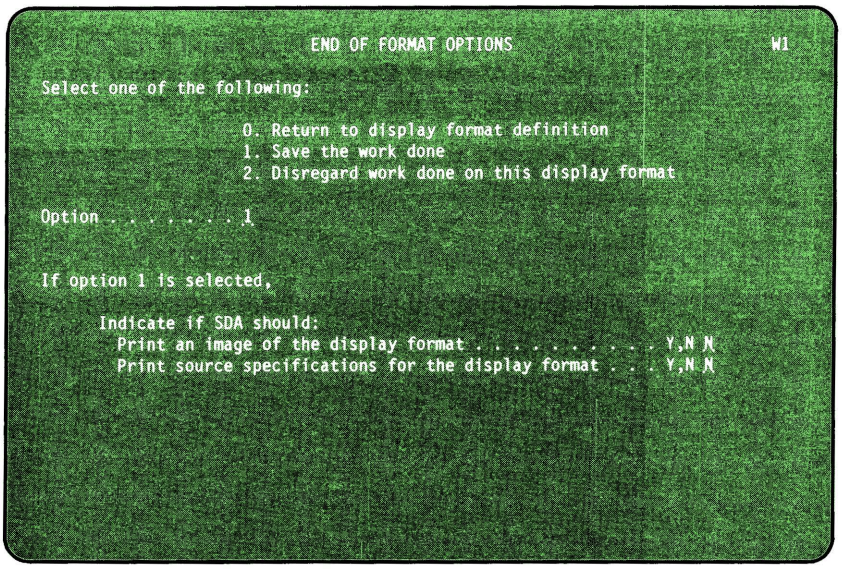
- Relational errors are colored pink.
- Syntax errors are reversed image and colored turquoise.
- Syntax and relational errors for the same field attribute are reversed image and colored pink.

After you have typed in the appropriate responses to the prompts for the field shown on the Field Attributes display, press the Enter key. If there is another field to define, the Field Attributes display reappears with that field shown on the top of the display. Respond to the appropriate prompts and press the Enter key.

After you have defined all the fields, the End of Format Options display is shown.

Step 5: Complete the End of Format Options Display

The End of Format Options display is used to specify whether you want to accept the work just completed, whether you want to return to the Attribute display, or whether you want to ignore the work you have just completed.



Enter option 0, 1, or 2 on the End of Format Options display:

- Option 0 allows you to return to the Attribute display. The work you have completed is not lost; you are returned to it in case you want to check it or change it.

- Option 1 allows you to save the work you have just completed. SDA creates the source specifications for the display format you have designed. Option 1 is the default value for this display. You can request that an image of the display you have designed be printed, or that a list of the source specifications for the display format be printed, or both.

  After you enter option 1, you return to the Format Name List/Format Selection display. The display format you have just completed is shown at the top of the Format Name List/Format Selection display and is marked with an A. You can change the display format you just created, create another display format within the same source member, or you can press command key 3 or command key 7 to display the End of Member Options display.

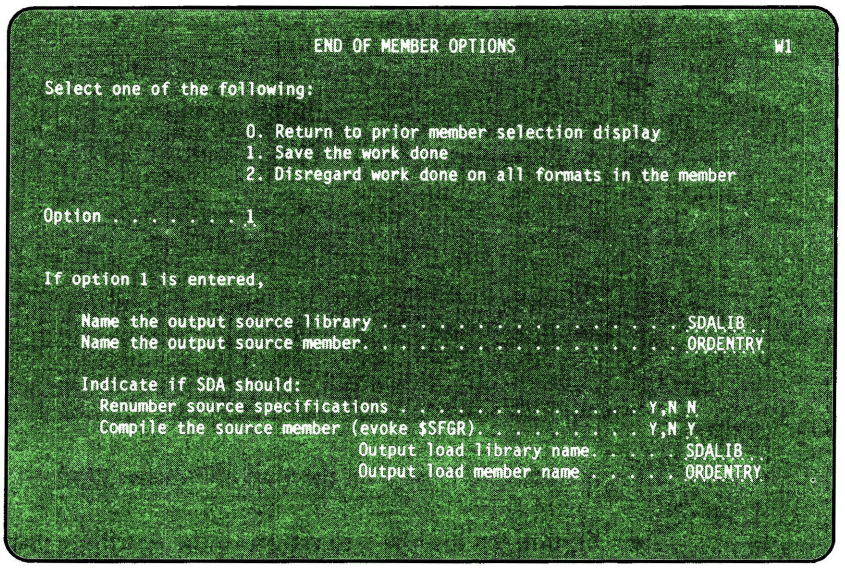
- Option 2 means that you do not want the work completed on the previous displays. SDA does not create the source specifications for the display format that you were designing.

  After you enter option 2, your work is discarded, and you return to the Format Name List/Format Selection display. You can create another display format within the same source member as the one you just discarded, or you can press command key 3 or command key 7 to display the End of Member Options display.

If at any time during the display design process you have used command key 7 to leave the Image display or the Attribute display, you will not be shown option 1 to save the work you have done. You can select option 0 to return to the work you were doing, or you can select option 2 to discard the work you were doing.

Step 6: Complete the End of Member Options Display

The End of Member Options display is shown when you press command key 3 or command key 7 at the Format Name List/Format Selection display.



Select option 0, 1 or 2 on the End of Member Options display:

- Option 0 allows you to return to the Format Name List/Format Selection display if you are not yet finished with working on your display format source member. If you enter option 0, the work you have already completed is not lost; you are returned to it in case you want to check it or change it.

- Option 1 allows you to save all the work done to the current display format and to compile the source specifications to create the display format load member. Option 1 is the default value for this display.

  If you select option 1, respond to the following prompts and press the Enter key:

  Name the output source library: Type in the name of the library that will contain the display format source member.

  Name the output source member: Type in the name of the source member that will contain the display format you have just created.

  Renumber source specifications: Type in Y (yes) or N (no) to indicate whether SDA should give the generated source statements new sequence numbers. The sequence numbers simply give a unique number to each source statement in the display format and do not affect how the display format will work.

  The following prompts appear only if you are using option 2 (*Design display formats*) of the SDA Main Options menu.

Compile the source member (evoke $SFGR): If you want SDA (which calls the $SFGR utility program) to compile the source member and create the load member, type in Y (yes).

Output load library name: Type in the name of the library that is to contain the compiled display format load member.

Output load member name: Type in the name of the load member that is to contain the compiled display format.

If you pressed command key 7 on the Format Name List/Format Selection display, you are returned to the SDA Main Options menu. If you pressed command key 3 on the Format Name List/Format Selection display, you are returned to the Member Name List/Format Selection display. In either case, a message is sent to your display station indicating whether the attempt to compile your display was successful.

- Option 2 means that you do not want any of the work completed on the current display format. If you enter option 2, your work is discarded, and you return to the SDA Main Options menu.

Output Produced by SDA

If you requested that the source specifications be printed, SDA produces a listing that consists of:

- An image of the display format as it will be displayed, except for those attributes that will be controlled by an indicator
- The source specifications
- Any diagnostic or informational messages.

The source specifications are printed in the order they appear in the source member. If an error is found when the source specifications are processed, a message is printed immediately following the statement that caused the error. The System/36 manual *System Messages* lists the printed messages that are produced and provides additional information that you can use to correct problems you might have with your display formats.

Sometimes an error is found that is serious enough to make the display format unusable. Because such an error causes processing to terminate, it is called a **terminal error**. If a terminal error is encountered, the display format load member is not created. You must try to correct the problem and try to rerun SDA. To help you correct specification errors, use the *System/36 WSU/$SFGR Debugging Template*. That template can be placed over the printed source specifications to help you find the entries to the specific columns of the specifications.

Suppose SDA is used to create ORDENTRY, a display format load member that contains four display formats: ORDDE1, ORDDE2, ORDDE3 and ORDDE4. The following shows the output SDA produces for display format ORDDE1. Similar output is produced for each of the other display formats in load member ORDENTRY.

```
NNNNUT1UT R01M00  YYMMDD                IBM SYSTEM/36 SCREEN DESIGN AID          01/03/83  10.22.42          Page  001

      Library Name _________________ SDALIB                Directory Reference Number_____________ 000002
      Source Member Name___________ ORDENTRY               Directory Date_____________________________ 01/03/83
                                                            Directory Time_____________________________ 10.22

        ....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8
     1 **  E1                                                                          **  1
     2 **                          O R D E R   E N T R Y                               **  2
     3 **                                                                              **  3
     4 **          Customer number:  IIIIII                                            **  4
     5 **                                                                              **  5
     6 **          Order number:     IIIIII                                            **  6
     7 **                                                                              **  7
     8 **                                                                              **  8
     9 **                                                                              **  9
    10 **                                                                              ** 10
    11 **                                                                              ** 11
    12 **                                                                              ** 12
    13 **          Type in the customer number and the order number,                   ** 13
    14 **          and press one of the following keys:                                ** 14
    15 **                                                                              ** 15
    16 **            ENTER - Allows you to enter items on this order                   ** 16
    17 **             Cmd1 - Allows you to change ship-to and order information        ** 17
    18 **             Cmd7 - Ends the order entry program                              ** 18
    19 **                                                                              ** 19
    20 **                                                                              ** 20
    21 **                                                                              ** 21
    22 **                                                                              ** 22
    23 ** XXXXX                                                                        ** 23
    24 **                                                                              ** 24
        ....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8

          Format Name. . . . ORDDE1            Format Member Name . . . ORDENTRY
                                               Library Name . . . . . . SDALIB


        SORDDE1
        DFL0001     2 1 3Y  Y          Y     Y          CE1
        DFL0002    21 230Y               Y       Y      CO R D E R   E N T R Y
        DFL0003    16 412Y                              CCustomer number:
        DFL0004     6 430   Y                     Y
        DFL0005    13 612Y                              COrder number:
        DFL0006     6 630   YN   Z                Y
        DFL0007    491312Y                              CType in the customer nuX
        Dmber and the order number,
        DFL0008    361412Y                              Cand press one of the foX
        Dllowing keys:
        DFL0009    471614Y                              CENTER - Allows you to eX
        Dnter items on this order
        DFL0010    571715Y                              CCmd1 - Allows you to chX
        Dange ship-to and order information
        DFL0011    351815Y                              CCmd7 - Ends the order eX
        Dntry program
        DFL0012    4123 1Y               Y     Y        M XXXXX
```

Updating an Existing Display Format

To update an existing display format, whether it is used by a WSU program or by a non-WSU program, you complete the same general sequence of displays and actions:

1. On the SDA Main Options menu, select option 2 (*Design display formats*) or option 3 (*Design display formats for WSU*).

   On the Member Name List/Format Selection and Format Name List/Format Selection displays, fill in the appropriate responses to the prompts shown.

2. On the Update display, redesign (add, change, move, or delete) the appropriate fields on the display, and define the characteristics of each redesigned field (this step is optional).

   On the Format Attributes display, redefine the characteristics of the entire display (this display is optional).

3. On the Field Attributes display, redefine additional characteristics of selected fields on the display (this step is optional).

4. On the End of Format display, specify whether you want to accept the work completed on the display format, print an image of the display format and the source specifications for the display format, return to the work you did on the display format, or discard the work you did on the display format.

5. On the End of Member Options display, specify whether you want to save the work done on the display formats in the source member, continue with the work done on the display formats in the source member, or disregard all work done on the display formats in the source member.

As you follow the steps to update a display format, use the foldout at the end of this chapter titled *An Overview of Updating a Display*. This foldout can help you to follow the path through the SDA displays used to update a display format.

Although the work you will do and the displays are generally the same for options 2 and 3 of the SDA Main Options menu, there are a few prompts that are shown only with option 2 (non-WSU) or option 3 (WSU) display formats. These are explained as they occur.

Be sure you do not update displays for WSU and place them in a display format member to be used by a non-WSU program or update displays for a non-WSU program and place them in a display format member to be used by a WSU program. If you do, you will not be able to use the member for either WSU or non-WSU applications.

Ideographic characters cannot be split across a line boundary. While updating your format you can move the position of the ideographic field or add a new ideographic field so it extends past the end of one line and continues onto the next line. Position the field to start on an even-numbered column. This will ensure that ideographic characters are not split across a line boundary.

To update an existing display format, do the following:

Step 1: Complete the Format Selection Display

On the command display, type in SDA. The SDA Main Options menu appears. To update a display format for a non-WSU program, enter option 2 (*Design display formats*). To update a display format for a WSU program, enter option 3 (*Design display formats for WSU*).

For either option, the Member Name List/Format Selection display is shown. Respond to the prompts on the Member Name List/Format Selection display:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Member Name List/Format Selection display is the current library, or is the last library you specified on this display. If the display format you want to update is in a different library, (1) move the cursor to this field, (2) type in the name of the library, and (3) press the Enter key.

Source format member name: Type in the name of the display format source member that contains the display format that you want to update. You should be able to find the name of the display format source member within the source members listed on the top of the display.

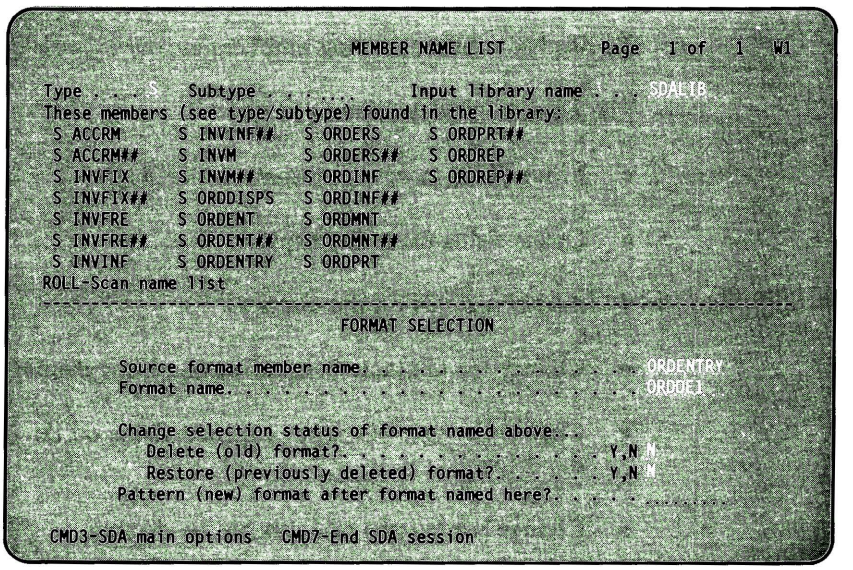
You can continue responding to the prompts on the Member Name List/Format Selection display, or you can press the Enter key. If you press the Enter key now, the Format Name List/Format Selection display is shown. The Format Name List/Format Selection display lists all display formats in the specified source member. If there is more than one page of display format names, use the Roll keys to display those names.

Format name: Type in the name of the display format that you want to update. If the Format Name List/Format Selection display is shown, you should be able to find the name of the display format within the display formats listed on the top of the display.

Do not respond to the remaining prompts; they are used for tasks other than updating a display format, and are described later in this chapter. Press the Enter key when you have finished responding to the prompts described in this step; the Update display appears.

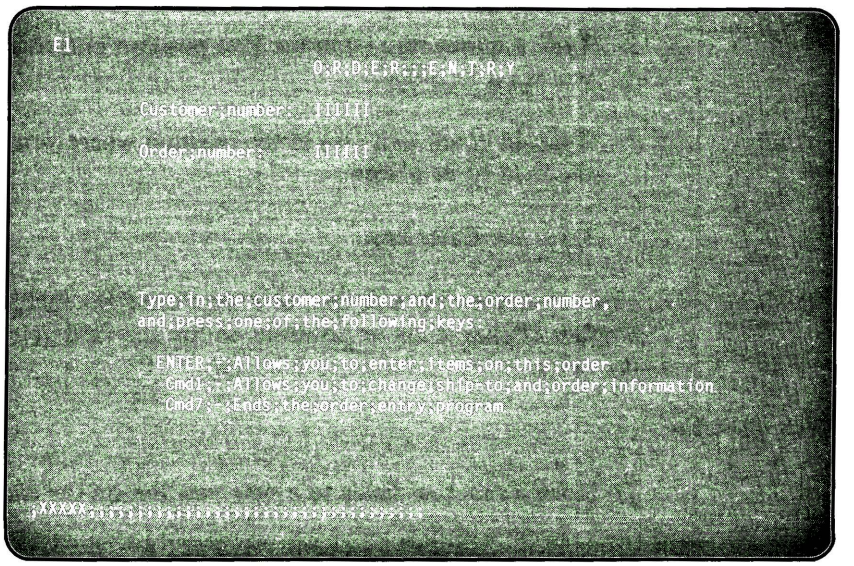
Suppose you want to update the display format named ORDDE1. That display format is in the display format source member named ORDENTRY, which is in

the library named SDALIB. The following shows what you would specify on the Member Name List/Format Selection display:



Step 2: Complete the Update Display

After you have responded to the appropriate prompts on the Format Selection display, the Update display appears. The Update display looks similar to the existing display format. Input fields are represented with I, and output fields are represented with O. For example, in Step 2 of "Creating A New Display Format" you saw what would be typed on the Image display for the new display format named ORDDE1. If you are now updating that display format, the following display appears:



Blanks within output constant fields are represented with a semicolon (;). This allows you to see where a constant field with a large number of blanks starts and ends. The semicolons can be removed by pressing command key 6. If you use

command key 6 to remove the semicolons, no updates can be made to the display. To replace the semicolons and to allow updates to the display, press the Enter key.

To display column heading numbers in row 1, press command key 11.

The Update display allows you to:

- Move fields to new positions on the display
- Delete fields from the display
- Add new fields on the display
- Change the characteristics of fields on the display
- Change the text of output constant fields on the display, or message fields on the display
- Change the lengths of fields on the display
- Change the characteristics of the entire display
- Work with fields that SDA cannot display.

You can do combinations of the actions listed above, such as adding or deleting a field while another field is being moved to a new position on the display. When several requests are made at the same time, they are handled from left to right and from top to bottom. Moves are handled last.

Moving a Field

To move a single field to a new position on the display:

1. Type a minus sign (-) in the first position immediately before the field that you want to move.
2. Type an equal sign (=) in the position where you want the first character of the field to be placed.
3. Press the Enter key.

You can move only one field at a time using the method just described. The number of characters or positions within the field you are moving remains exactly the same.

Moving a Block of Fields

To move a block of fields to a new position on the display:

1. Type a minus sign (-) in the first position immediately before the block of fields you want to move.
2. Type a percent sign (%) following the last position of the block of fields.

3. Type an equal sign (=) where you want the first character of the block of fields to be placed.

4. Press the Enter key.

You can move only one block of fields at a time using the method just described.

Shifting Fields within the Same Line

To shift a field several positions to the right:

1. Type in a greater than sign (>) on the right side of the field for each position that you want the field to be moved. For example, a field that looks like this:

```
Tax code:
```

   can be moved two positions to the right by typing in two greater than signs, like this:

```
Tax code:>>
```

2. Press the Enter key.

To shift a field several positions to the left:

1. Type in a greater than sign (>) on the left side of the field for each position that you want the field to be moved. For example:

```
>>Tax code:
```

   moves the field *Tax code:* two positions to the left.

2. Press the Enter key.

   The number of characters or positions within the field you are moving remains exactly the same.

Deleting a Field

To delete a field on the display, type a D or a d in the first position immediately before the field, and press the Enter key. The field and its corresponding D specification are removed from the display and the display format.

Adding Fields

To add a field to the display:

1. For an output constant field (such as a prompt or a heading), type in the text of the field exactly as it will be displayed. For an input field, output field, or an input/output field, type in representative data (such as Xs or numbers) to show the position and the length of the field. Leave at least one blank before the added field and any other fields that already appear on the display, and at least one blank following the added field.

2. Place a plus sign (+) two positions before the beginning of the added field. For example, if you are adding the output constant field *Tax code:*, type in:

```
Tax code:
```

and place a plus sign two positions before the field, like this:

```
+ Tax code:
```

3. Place a field attribute character in the space between the plus sign and the first character of the added field. The field attribute defines the field type. The field attributes can be typed in lowercase or in uppercase. Lowercase characters mean that the field is displayed in normal intensity, and uppercase characters mean that the field is displayed in high intensity. If you use an asterisk (*), you must define all attributes, including the field intensity, on the Field Attribute display. The field attributes on the following page can be used.

Character	Field Type
c (or blank)	The field is a constant field and is displayed with the data that was typed on the Update display. This field attribute is used for constants such as titles, prompts, legends, and so on.
k	The field is an input/output field. The data that was specified on the Update display is shown in the field. This field attribute is used for input/output fields that have a default value. When you complete the Update display and press command key 9 or the Enter key, SDA shows the Field Attributes display on which you can define other characteristics of this field.
e	The field is an output field. Data to be displayed in the field is supplied by the program when the display format is shown. When you complete the Update display and press command key 9 or the Enter key, SDA shows the Field Attributes display on which you can define other characteristics of this field.
m	The field displays a message identified by the 6-character MIC and message member identifier you specify on the Update display. If the Update display is left blank where this field will exist, this field displays a message identified by a MIC and message member identifier supplied by the program.
i	The field is an input field. When you complete the Update display and press command key 9 or the Enter key, SDA shows the Field Attributes display on which you can define other characteristics of this field, such as reverse image or mandatory entry.
b	The field is an input/output field. When you complete the Update display and press command key 9 or the Enter key, SDA shows the Field Attributes display on which you can define other characteristics of this field.
*	Use this field attribute if you want to define all the characteristics of the field on the Field Attributes display. When you complete the Update display and press the Enter key or command key 9, SDA shows the Field Attributes display.

Note: If you press command key 12 before you press command key 9 or the Enter key, the Field Attributes display will not be shown for fields with a field attribute of e, i, k, or b. The Field Attributes display is always shown for fields with a field attribute of *, regardless of whether you press command key 12.

For example, to define the field *Tax code:* as a constant, add a c at the beginning of the prompt:

```
+cTax code:
```

4. If the added field is an input or input/output field, you can also type in a secondary attribute. The secondary attribute is a character that is placed in the first position of the input or input/output field that you want to add. The secondary attribute immediately follows the field attribute, and can be a lowercase or an uppercase character. The following secondary attributes can be used:

Character	**Data Type**
a (or no entry)	The field can accept alphameric data as input. (See note below.)
s	The field accepts only numbers, a plus sign (+), or a minus sign (-). When the operator presses a field exit key, the data is right-adjusted in the field, and any remaining positions in the field are filled with blanks.
n	The field accepts only numeric data. When the operator presses a field exit key, the data is right-adjusted in the field, and any remaining positions in the field are filled with zeros.

For example, suppose you have added an input field represented like this:

```
XXXXXXXXXXXX
```

The following shows the characters typed on the Update display to make the added field an input field that allows alphameric data:

```
+iaXXXXXXXXXXX
```

The following shows the characters typed on the Update display to make the added field an input/output field that allows numeric, zero filled data:

```
+bnXXXXXXXXXXX
```

Note: A complete list of secondary attributes is on page 6-23. If no entry is made for the secondary attribute, the input or input/output field has a data type of alphameric. However, if the first letter in the field contains an n, N, s, or S, you *must* specify an a to make the field alphameric.

5. Place a percent sign (%) in the space immediately following the added field to mark the end of the field. For example:

```
+bnXXXXXXXXXXX%
```

6. Press the Enter key.

Changing the Characteristics of an Existing Field

If a field already exists on the display, but you want to change or review the characteristics (field attributes) of the field, place an asterisk (*) in the first position immediately preceding the field. When you press command key 9 (or ENTER), either the Field Attributes display or the Color Attributes for Field display (described earlier in this chapter) is displayed. You can update the appropriate entries on the Field Attributes display.

Changing the Text of Fields

To change the text of an output constant field or to change the MIC and message member identifier for a message field:

1. Place an r or R in the position immediately preceding the field to be changed.

2. Type in the replacement data over the output constant field or type in the new MIC and message member identifier over the message field. Your replacement data will be ignored, and blanks will be used if the field did not originally contain constant data or message information. You do not have to replace semicolons with blanks. Any data that is typed in past the end of the original field is ignored. Because the actual length of the field is not changed, the contents of the replace cannot be longer than the field length.

3. Press the Enter key.

For example, suppose an output constant field looks like this (the semicolons show blanks in the field):

```
Type;in;name;of;customer:
```

If you wanted to change it to *Type in name of business:*, you would type in an r before the field and make the appropriate change to the text of the field:

```
rType;in;name;of;business:
```

Any additional characteristics (field attributes) of the field would not be affected by this change. For example, if the original field was to be displayed in reverse image, that characteristic would remain for the changed field.

Changing Lengths of Fields

To change the length of a field:

1. Place a plus sign (+) two positions before the beginning of the field you want to shorten or lengthen.

2. Place a percent sign (%) in the position immediately following the last position of the new length. For example, suppose you have a 10-position input field represented on the Update display:

```
IIIIIIIIII
```

To lengthen the field to 15 positions, place a plus sign two positions before the beginning of the field and a percent sign in the position immediately following position 15 of the field:

```
+ IIIIIIIIII      %
```

To shorten the field to 5 positions, place a plus sign two positions before the beginning of the field and a percent sign in the position immediately following position 5 of the field:

```
+ IIIII%IIII
```

3. Press the Enter key. The field will be lengthened or shortened on the Update display.

If you try to shorten an output constant field, the new field length might not be large enough to hold all the constant characters previously shown on the Update display. In that case, SDA displays a message and places the cursor at the beginning of the field that is too short to hold the constant information. You can then make the field large enough to hold the constant information.

If you need to shorten an output constant field, place an *, r, or R in the space between the plus sign and the first position of the field. The *, r, or R tells SDA to replace any constant information in the field with the constant information that can fit in the new field length. You can use the constant information that currently exists, or you can specify new constant information. For example, if you have the following constant:

```
Customer name:
```

To change the constant field to *Customer:*, type in the following on the Update display and press the Enter key:

```
+rCustomer:%ame:
```

After you press the Enter key, the constant field looks like this:

```
Customer:
```

Changing the Characteristics of the Entire Display

You might need to redefine certain characteristics about your entire display that do not affect individual fields on the display, such as:

- Whether the operator can enter lowercase characters on the display
- Whether data entered on the display is to be returned to the program
- The command and functions keys the operator can use
- Whether the cursor should blink
- Whether the alarm should sound when the format is displayed
- For WSU display formats, what record IDs are to be used for Enter, Review, and Inquiry modes.

To define these kinds of characteristics, press command key 1 when the Update display is shown; the Format Attributes display appears. SDA uses the information you enter on the Format Attributes display to update the S specification (display control specification) for your display format.

SDA shows you the responses that are allowed for each prompt on the Format Attributes display. You are not required to respond to any of the prompts on the Format Attributes display; use only those entries that apply to your display and application. For detailed information about the results of entries made on the Format Attributes display, see Appendix A, "Entries on the Display Control (S) Specification."

After you have typed in the appropriate responses to the prompts on the Format Attributes display, press the Enter key; you are returned to the Update display. You can continue by redefining the characteristics of individual fields on the display.

Working with Fields that SDA Cannot Display

When you update a display format, SDA might find an error in the specification for a field. If that error is serious enough, SDA might not be able to display the field defined by the specification. In that case, SDA displays a message at the bottom of the Update display. That message might indicate:

- That a field cannot be displayed
- That a field has a field length that is not allowed (too large for the display, for example)
- That a field has a position that is not allowed (on an 80-column display, a column greater than 80 or a line greater that 24, or on a 132-column display, a column greater than 132 or a line greater than 27).

To show the Field Attributes display (which defines the D specification) for the first or only incorrect field, place an asterisk (*) in the last column of the last line of the Update display, and press the Enter key. The Field Attributes display for the incorrect field might help to determine what is causing the error. To return to the Update display, press the Enter key.

To show the Field Attributes display for all the incorrect fields, place an asterisk in the last column of the last line of the Update display, and press command key 10. The Field Attributes display is shown for the first incorrect field. You can change the information on the Field Attributes display. You can show the Field Attributes displays for the remaining incorrect fields by pressing the Enter key. You are returned to the Update display when you have viewed all the incorrect fields.

If the error is caused by an incorrect field position, you might be able to display the field by performing the following move operation:

1. Place a plus and a minus sign (+-) in the last two columns of the last line.
2. Place an equal sign (=) in the position where you want the first character of the incorrect field to be placed.

3. Press the Enter key.

Once the field is in a position in which it can be displayed, you can check it, move it, or delete it accordingly. If more than one field cannot be displayed, you can move and display only one field at a time.

Note: Some SDA errors result in pairs of error messages. To display the second message of a pair, press the Error Reset key. If you are using an IBM 3180 Model 2, press the Enter key after the Error Reset key.

To delete a field that SDA cannot display, place a d or D in the last column of the last line of the display and press the Enter key. To delete all fields that SDA cannot display, place a d or D in the last column of the last line of the display and press command key 10.

Command Keys Used with the Update Display

The following command keys can be used on the Update display:

Command key 1: Causes SDA to show the Format Attributes display.

Command key 2: Causes SDA to show your display on the Image display. You must update the display as if you were recreating it as a completely new display. You must redesign your display using the Image display, update the characteristics of the entire display using the Format Attributes display, and update the characteristics of individual fields using the Attributes and Field Attributes displays. These steps are described in "Creating A New Display Format" earlier in this chapter.

Command key 5: Specifies that only uppercase characters can be typed on the Update display, or when pressed again, specifies that both uppercase and lowercase characters can be used.

Command key 6: When the Update display is first shown, all blanks in output constant fields are represented with semicolons (;). Press command key 6 to review the format with the semicolons removed; the specifications for the display format are not changed in any way. If command key 6 is pressed, no updates can be made to the display. To replace the semicolons and to allow updates to the display, press the Enter key.

Command key 7: Displays the End of Format Options display. You can choose to return to the work you were doing on the Update display, or you can discard that work. The End of Format Options display is described in step 4.

Command key 9: If there are fields for which you specified a field attribute of *, e, i, k, or b, command key 9 displays the Field Attributes display, which is used to define further the characteristics of each of those fields. The Field Attributes display is described in the next step.

If you have used command key 9 to define the characteristics of fields for which you specified a field attribute of *, e, i, k, or b, or if there are no such fields, the End of Format Options display appears.

Command key 10: Allows you to work with all the fields SDA cannot display. The operation that SDA does depends on the character in the last column of the last line of the display when command key 10 is pressed.

Command key 11: Removes or displays the column headings shown at the top of the Update display.

Command key 12: If pressed before command key 9 is pressed, the Field Attributes display is not shown for fields that have a field attribute of e, i, k, or b. If pressed again, the Field Attributes display is shown for those field types. The Field Attributes display is always shown for fields with a field attribute of *.

When you are satisfied with the field types and data types you have specified, if there are fields having a field attribute of *, e, i, k, or b, press either command key 9 or the Enter key; the Field Attributes display or the Color Attributes screen appears (go to step 3). If there are no such fields, press command key 9; the End of Format Options display appears (go to step 4).

Step 3: Complete the Field Attributes or Color Attributes for Field Displays

For each field for which you have specified a field attribute of *, e, i, k, or b, the Field Attributes display, is shown. The Field Attributes display is used to further redefine the characteristics of selected fields on your display. If you are creating a color display, you can display the Color Attributes for Field display by pressing command key 8. This screen has the same prompts as the Field Attribute display, but also allows you to specify a color for a particular field. The field that you are defining is shown in reverse image on the top half of the Field Attributes display. SDA uses the information you enter on the Field Attributes display to update the D specification (field definition specifications) for that field.

SDA shows you the responses that are allowed for each prompt on the Field Attributes display. You do not have to respond to all of the prompts on the Field Attributes display; use only those entries that apply to the field you are defining. For detailed information about the results of entries made on the Field Attributes display, see Appendix C, "Entries on the Field Definition (D) Specifications."

Certain combinations of entries that you make on the Field Attributes or the Color Attributes for Field display might not be allowed. SDA checks these combinations and blinks the response fields for combinations that are not allowed.

SDA also checks for syntax errors; SDA displays the response fields with syntax errors in reverse image. If SDA finds a syntax error, but you want to continue anyway, type in Y (yes) in response to the prompt *Enter Y to bypass syntax checking*. Remember that the system might not be able to compile your display format if an improper combination of entries is made.

After you have typed in the appropriate responses to the prompts for the field shown on the Field Attributes display, press the Enter key. If there is another field to define, the Field Attributes display reappears with that field shown on the top of the display. Respond to the appropriate prompts and press the Enter key.

After you have used the Field Attributes display to define all the fields with a field attribute of *, e, i, k, or b, if you pressed command key 9 on the Update display, the End of Format Options display is shown. If you pressed the Enter key on the Update display, the Update display is shown again; press command key 9 to display the End of Format Options display.

Step 4: Complete the End of Format Options Display

The End of Format Options display is used to specify whether you want to accept the work just completed, whether you want to return to the Update display, or whether you want to ignore the work you have just completed. Enter option 0, 1, or 2 on the End of Format Options display:

- Option 0 allows you to return to the Update display. The work you have completed is not lost; you are returned to it in case you want to check it or change it.

- Option 1 allows you to save the work you have just completed. SDA updates the source specifications for the display format. Option 1 is the default value for this display. You can request that an image of the display you have updated be printed, or that a list of the source specifications for the display format be printed, or both.

  After you enter option 1, you return to the Format Name List/Format Selection display. The display format you have just updated is shown at the top of the Format Name List/Format Selection display and is marked with a U. You can again change the display format you just updated, update or create another display format within the same source member, or you can press command key 3 or command key 7 to display the End of Member Options display.

- Option 2 means that you do not want the work completed on the previous displays. SDA does not update the source specifications for the display format.

  After you enter option 2, your work is discarded, and you return to the Format Name List/Format Selection display. You can update or create another display format within the same source member as the one you just discarded, or you can press command key 3 or command key 7 to display the End of Member Options display.

If at any time during the display update process you have used command key 7 to leave the Update display, you will not be shown option 1 to save the work you have done. You can select option 0 to return to the work you were doing, or you can select option 2 to discard the work you were doing.

Step 5: Complete the End of Member Options Display

The End of Member Options display is shown when you press command key 3 or command key 7 at the Format Name List/Format Selection display.

Select option 0, 1, or 2 on the End of Member Options display:

- Option 0 allows you to return to the Format Name List/Format Selection display if you are not yet finished with working on your display format source member. If you enter option 0, the work you have already completed is not lost; you are returned to it in case you want to check it or change it.

- Option 1 allows you to save all the work done to the current display format and to compile the updated source specifications to create the updated display format load member. Option 1 is the default value for this display.

  If you select option 1, respond to the following prompts, and press the Enter key.

  Name the output source library: Type in the name of the library that will contain the updated display format source member.

  Name the output source member: Type in the name of the source member that will contain the display format you have just updated.

  Renumber source specifications: Type in Y (yes) or N (no) to indicate whether SDA should give the updated source statements new sequence numbers. The sequence numbers simply give a unique number to each source statement in the display format and do not affect how the display format will work.

  The following prompts appear only if you are using option 2 (*Design display formats*) of the SDA Main Options menu.

  Compile the source member (evoke $SFGR): If you want SDA (which calls the $SFGR utility program) to compile the source member and create the load member, type in Y (yes).

  Output load library name: Type in the name of the library to contain the compiled display format load member.

  Output load member name: Type in the name of the load member that is to contain the compiled display format.

  If you pressed command key 7 on the Format Name List/Format Selection display, you are returned to the SDA Main Options menu. If you pressed command key 3 on the Format Name List/Format Selection display, you are returned to the Member Name List/Format Selection display. In either case, a message is sent to your display station indicating whether the attempt to compile your display was successful.

- Option 2 means that you do not want any of the work completed on the current display format. If you enter option 2, your work is discarded, and you return to the SDA Main Options menu.

Creating Help Text for Display Formats

To create help text for a display format, you do the following:

1. Design and create the help text as you would any other display format. For detailed information about help formats and how they are used, see Chapter 3, "Additional Considerations for Display Design." For information about creating help formats, see "Creating A New Display Format" earlier in this chapter.

2. Create online documents using DW/36 (a word processing utility). For more information about online documentation support, see Chapter 3, "Additional Considerations for Display Design." For detailed information about creating documents, refer to *Getting Started with DW/36*, GC21-8005.

3. Use option 6 (*Edit source and procedure members*) of the SDA Main Options menu to add the H (help definition specifications) to the display format for which you are supplying help text. The H specifications must be placed between the S specification and the D specifications. For detailed information about the entries on the H specifications, see Appendix B, "Entries on the Help Definition (H) Specifications."

4. Use option 9 (*Compile source format members with $SFGR*) of the SDA Main Options menu to convert the updated display format source member into a display format load member.

Step 1: Create the Help Formats

The application and the display formats for which you want to supply help text should be thoroughly tested and debugged. During the testing of your application and its display formats, you and your operators should determine the kind and extent of help information you will supply.

Help text is displayed to the operator when the Help key is pressed. The help text is defined by a display format called a help format. The help text defined by a help format can apply to the entire application format, or it can apply to smaller and more specific areas on the application format. If several help formats are defined for an application format, the operator can page through the help formats using the Roll keys. When the operator is finished viewing the help format, the Enter key or a command key can be pressed to return to the application format.

A help format is similar to the display format originally displayed by the application program. In fact, a help format is designed and created in exactly the same way as any other display format. The only difference is that it is displayed by the operator by pressing the Help key, and it does not require special coding or operations within the application program.

For detailed information about help formats and how they are used, read Chapter 3, "Additional Considerations for Display Design." After you are familiar with help formats, you can create the help formats for your display formats. You can create the help formats by following the directions in "Creating A New Display Format" earlier in this chapter.

Step 3 describes how you can add the H (help definition) specifications to the display formats used by the application program. The H specifications are used by the system to determine which help format or online document is displayed when the operator presses the Help key on a particular application format.

OR

Step 1: Create Online Documents

Online document support is similar to the application help support in that the help areas are defined via screen format source specifications. When the Help key is pressed, a document is displayed starting from a specified location within the document. You can move around within the online information by paging through (using the Roll keys), or by jumping to a particular section or page (using the command keys). You can also print and leave online information using the command keys. These options and more are described in detail in *Getting Starting With DW/36*, GC21-8005.

The online document support is very similar to application help support in regard to creating help areas and displaying help text via cursor location. The main difference between online document support and application help support is that the help text comes from an online document as opposed to a help display format.

For more information on creating documents, see *Getting Started With DW/36*, GC21-8005.

Step 2: Use DSU or SEU to Add H Specifications to the Application Formats

Every display format is made up of at least two types of source specifications. The first source specification in a display format is called the display control specification, or S specification. The S specification defines information about the entire display format that does not directly relate to individual fields on the format. If you have created or updated a display format, you might have used the Format Attributes display of SDA to define the information found in the S specification.

Each field on a display format is defined by a second type of source specification called the field definition specification, or D specification. The D specifications follow the S specification. If you have created or updated a display format, you have used the Attribute display or the Update display to define the characteristics of individual fields on the display format. You might also have used the Field Attributes display to define those characteristics further. Those SDA displays are used to define the information found in the D specification for a field.

If you have created help formats for an application format, you must add a third type of source specification to the application format. The help definition specification, or H specification, specifies which help formats are displayed for the application format. For each application format for which you have created help formats, you must add the appropriate H specifications. The H specifications are placed between the S and D specifications for each application format having help text.

To add the H specifications to the application format, you must use the development support utility (DSU) or the source entry utility (SEU) to update the application format's source specifications. You can use option 6 (*Edit source and procedure members*) of the SDA Main Options menu to get to DSU (if DSU is loaded on your system), or SEU (if SEU, but not DSU, is loaded on your system).

The use of option 6 and DSU and SEU is described in Chapter 8, "Additional Services Provided by the Screen Design Aid." The specific entries to the H specifications are described in Appendix B, "Entries on the Help Definition (H) Specifications."

Step 3: Compiling the Updated Application Formats

Once you have added the H specifications to the application format's source specifications, you must then recompile the application format. To recompile the application format, use option 9 (*Compile source format members with $SFGR*) of the SDA Main Options menu. The use of option 9 is described in Chapter 8, "Additional Services Provided by the Screen Design Aid."

Deleting a Display Format

To delete a display format from a display format source and load member, do the following:

Step 1: Complete the Format Selection Display

On the command display, type in SDA. The SDA Main Options menu appears. To delete a display format from a display format member for a non-WSU program, enter option 2 (*Design display formats*). To delete a display format from a display format member for a WSU program, enter option 3 (*Design display formats for WSU*).

For either option, the Member Name List/Format Selection display appears. Respond to the prompts on the Member Name List/Format Selection display:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

Subtype:
The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Member Name List/Format Selection display is the current library, or is the last library you specified on this display. If the display format member containing the display format you want to delete is in a different library, (1) move the cursor to this field, (2) type in the name of the library, and (3) press the Enter key.

Source format member name: Type in the name of the display format source member that contains the display format that you want to delete.

You can continue responding to the prompts on the Member Name List/Format Selection display, or you can press the Enter key. If you press the Enter key now, the Format Name List/Format Selection display is shown. The Format Name List/Format Selection display lists all display formats in the specified source member. If there is more than one page of display format names, use the Roll keys to display those names.

Format name: Type in the name of the display format that you want to delete.

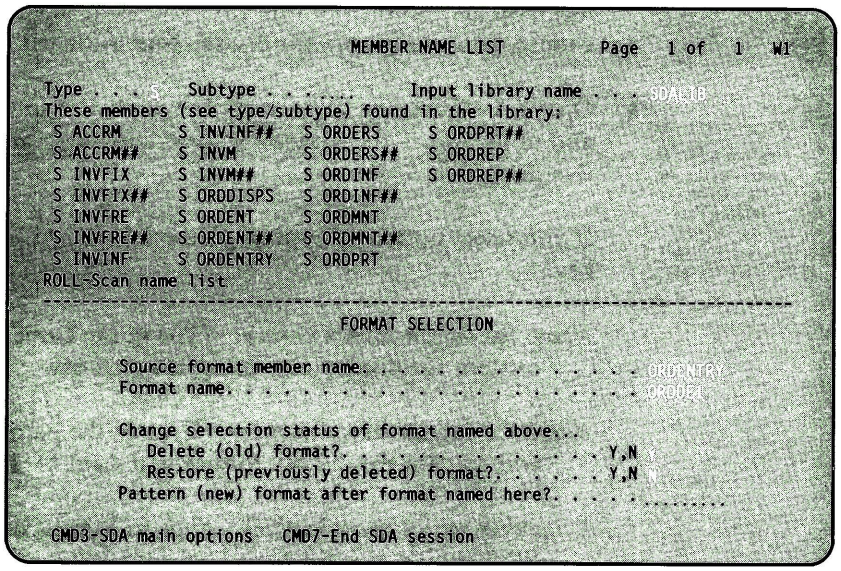
Delete (old) format? To delete the specified display format, type in Y (yes).

Press the Enter key. The specified display format is shown on the top of the Format Selection display and is marked with a D (deleted).

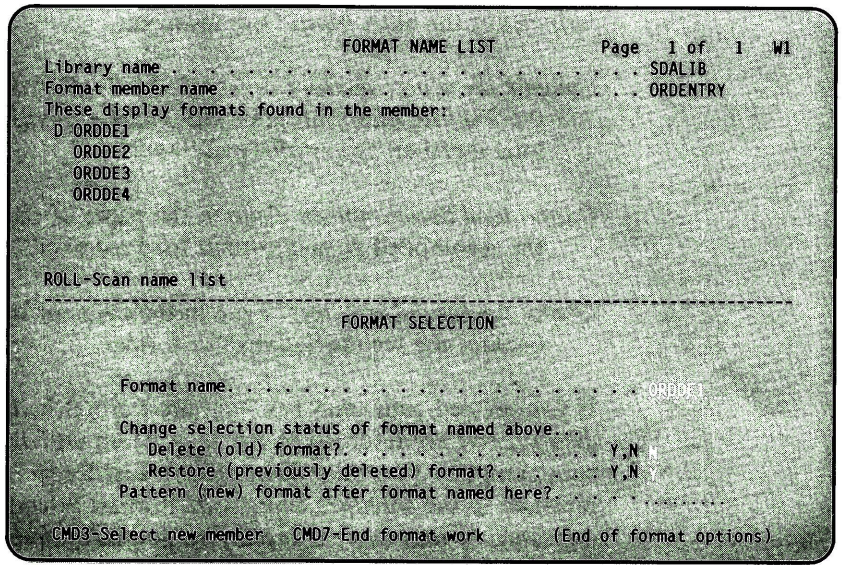
If you choose to keep the deleted display format, type in N (no) to the delete prompt, and type in Y (yes) to the prompt *Restore (previously deleted) format?*. The specified display format is shown on the top of the Format Selection display and is marked with an R (restored). The display format is restored and will not be deleted.

When you have responded to the appropriate prompts on the Format Selection display and have pressed the Enter key, press command key 7; the End of Member Options display appears.

The following display shows what would be specified on the Member Name List/Format Selection display if you wanted to delete the display format named ORDDE1. That display format is in the display format source member named ORDENTRY, which is in the library named SDALIB.



The following display shows what would be specified on the Format Name List/Format Selection display if you wanted to restore ORDDE1 and to prevent it from being deleted.



Step 2: Complete the End of Member Options Display

The End of Member Options display is shown when you press command key 3 or command key 7 at the Format Name List/Format Selection display.

Select option 0, 1, or 2 on the End of Member Options display:

- Option 0 allows you to return to the Format Name List/Format Selection display if you are not yet finished with working on your display format source member. If you enter option 0, the work you have already completed is not

lost; you are returned to it in case you want to check it or change it. If you choose, you can restore the display format that is marked for deletion.

- Option 1 allows you to confirm that you want to delete the display format and to recompile the source specifications. Option 1 is the default value for this display.

  If you select option 1, respond to the following prompts, and press the Enter key:

  Name the output source library: Type in the name of the library that will contain the display format source member.

  Name the output source member: Type in the name of the source member that will contain the display format you want to delete.

  Renumber source specifications: Type in Y (yes) or N (no) to indicate whether SDA should give the generated source statements new sequence numbers. The sequence numbers simply give a unique number to each source statement in the display format and do not affect how the display format will work.

  The following prompts appear only if you are using option 2 (*Design display formats*) of the SDA Main Options menu.

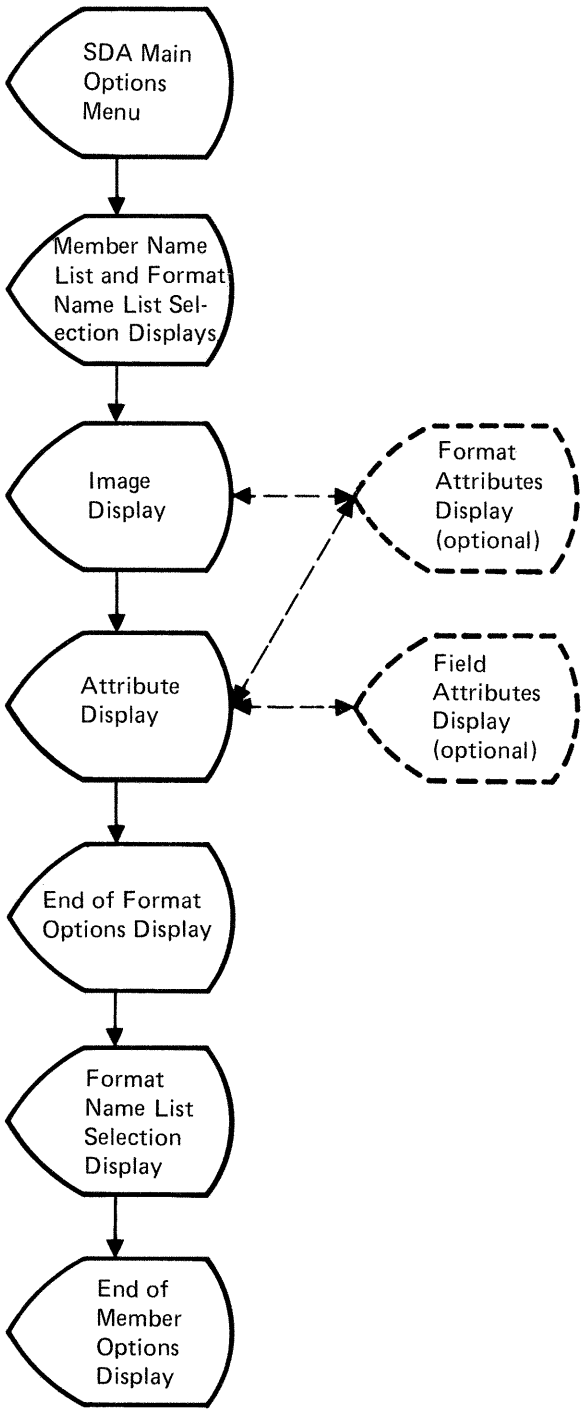
  Compile the source member (evoke $SFGR): If you want SDA (which calls the $SFGR utility program) to compile the source member and create the load member, type in Y (yes).

  Output load library name: Type in the name of the library that is to contain the recompiled display format load member.

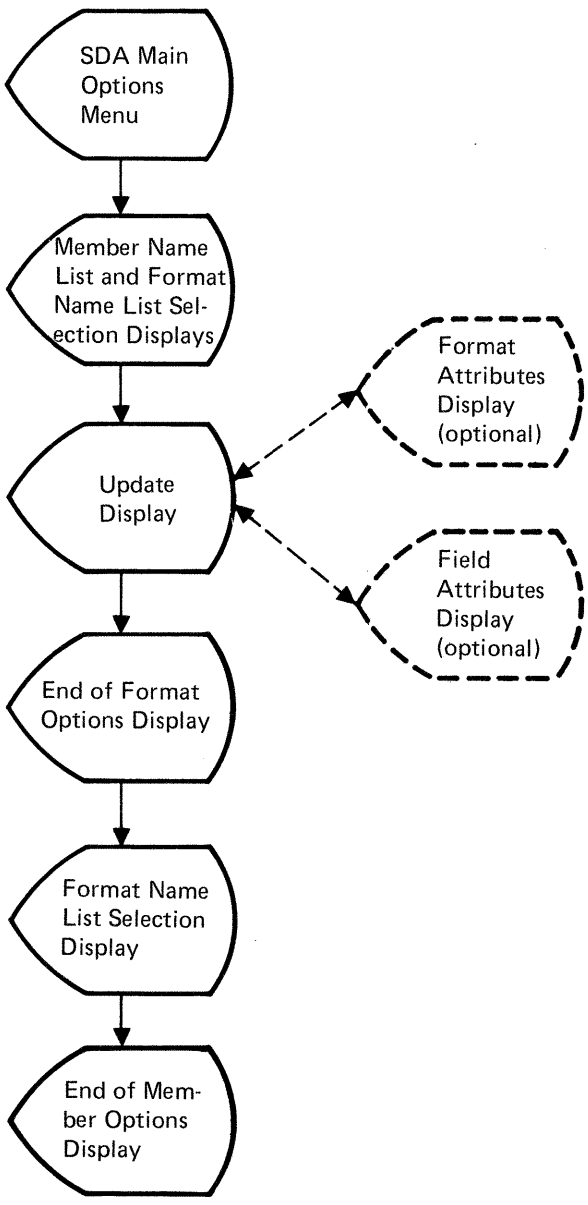
  Output load member name: Type in the name of the load member that is to contain the recompiled display format.

  If you pressed command key 7 on the Format Name List/Format Selection display, you are returned to the SDA Main Options menu. If you pressed command key 3 on the Format Name List/Format Selection display, you are returned to the Member Name List/Format Selection display. In either case, a message is sent to your display station indicating whether the attempt to compile your display was successful.

- Option 2 means that you do not want to delete the display format. If you enter option 2, the previous delete request is ignored, and you return to the SDA Main Options menu.



An Overview of Display Design



An Overview of Updating a Display

Chapter 7. Building RPG Specifications and WSU Programs Using the Screen Design Aid

This chapter will show you how to:

- Build RPG II WORKSTN file description specifications
- Build a WSU program.

The first part of this chapter will assist you in using option 4 to build RPG II WORKSTN file specifications. If you are using option 5 to build a WSU program, the second part will help you.

It is assumed that you have an understanding of RPG II or WSU programming and are using SDA as an aid with that programming. For information regarding RPG II and WSU, read the following System/36 manuals:

- Chapter 6, *Using WORKSTN Files*, in *Programming with RPG II*, SC21-9006
- *Work Station Utility Introduction*, SC21-7904
- *Work Station Utility Guide*, SC21-7905.

Building RPG II WORKSTN File Specifications

You can use SDA to create WORKSTN file specifications, including the input and output specifications that correspond to the input and output fields on the display formats that will be used by an RPG program.

You use SDA to build an RPG II program that corresponds to a specific display format source member. The following specifications will be generated:

- H specification (control), with the program name
- F specification (file description) for a WORKSTN file, with continuation lines if required
- I specification (input) for each input field in the WORKSTN file
- O specification (output) for each execution-time output field in the WORKSTN file.

After you have created the RPG specifications, you can edit the program and add more logic to finish the application program by selecting option 6 of the SDA Main Options menu. Option 6 lets you use the development suppport utility (DSU), an optional program product (if you have DSU loaded on your system) or, the source entry utility (SEU), an optional Utilities Program Product (if you have SEU, but not DSU, loaded on your system).

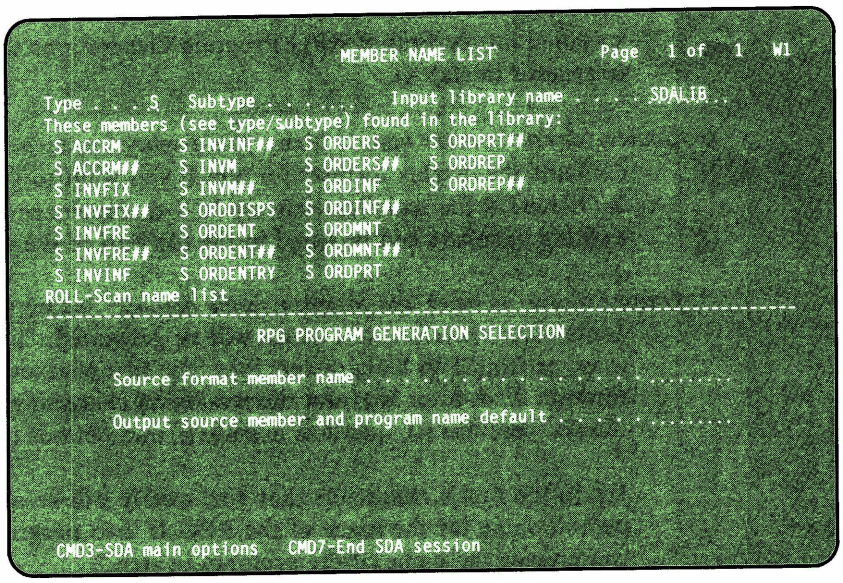
To generate RPG II WORKSTN file specifications for display formats in a display format source member, do the following:

Step 1: Complete the RPG Program Generation Selection Display

On the command display, type in SDA. The SDA Main Options menu appears:

```
                              SDA MAIN OPTIONS                          W1

  Select one of the following:

     MENUS          1. Design menus

     DISPLAYS       2. Design display formats
                    3. Design display formats for WSU

     PROGRAMS       4. Build RPG II WORKSTN file specifications
                    5. Build WSU programs

     SERVICES       6. EDIT     Source and procedure members
                    7. VIEW     Display formats in $SFGR load members
                    8. PRINT    Display formats in source members
                    9. COMPILE  Source format members with $SFGR

  Option . . . . . .

HELP-Cursor selected help   CMD3-Previous menu   CMD7-End SDA session
```

Select option 4, *Build RPG II WORKSTN file specifications.* A display similar to the following is shown:



The previous display is called the Member Name List/RPG Program Generation Selection Display. Respond to the prompts on this display in the following way:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Member Name List/RPG Program Generation Display is the current library, or is the last library you specified on this display. If the display format source member containing the display formats for which you want to generate RPG II file specifications is contained in a different library (1) move the cursor to this field, (2) type in the library's name, and (3) press the Enter key.

The library in which the newly created specifications will be placed is specified on the End of RPG Program Generations Options display (discussed in step 4).

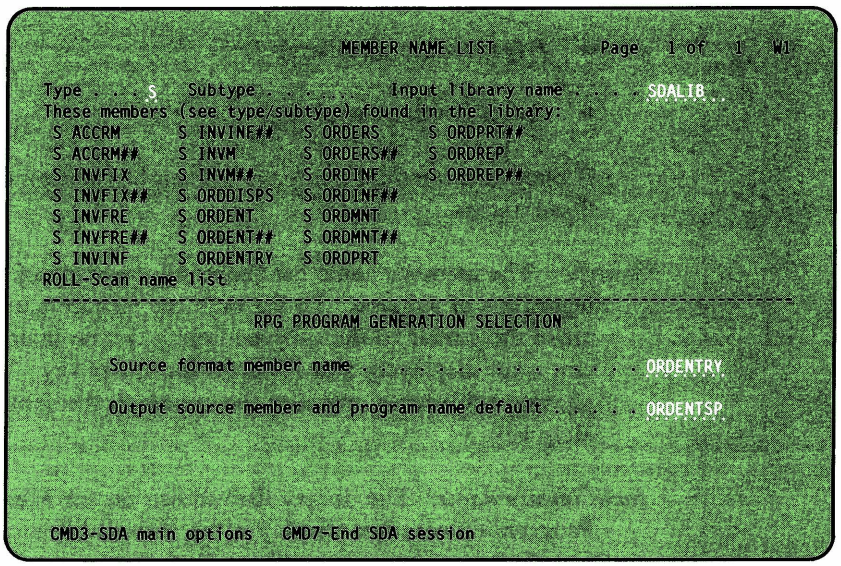
Source format member name: Name the display format source member that contains the display formats for which you want to generate RPG II WORKSTN file specifications; up to 8 characters can be used. The names of existing members can be listed in the top half of the display.

Output source member and program name default: Name the source member to contain the specifications which will be generated. The source member name must be from 1 to 8 characters long; the first character must be alphabetic (A through Z, #, $, or @), and the remaining characters any character except blanks, commas (,), question marks (?), and periods (.).

Up to the first 6 characters that you specify will be used by SDA as the default value for the name of the RPG II load program. If you choose, you can change the name of the program in step 2.

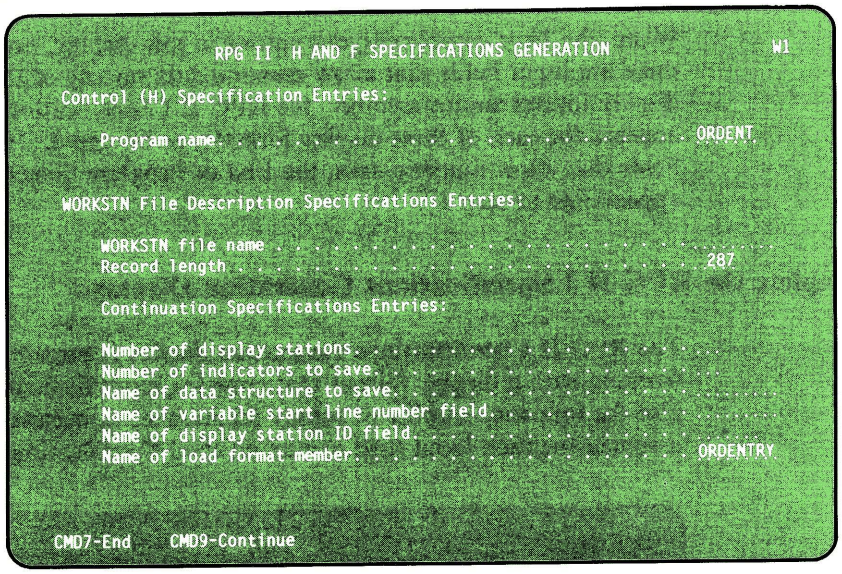
Press the Enter key when you have finished responding to the prompts described in this step; the RPG II H and F Specifications Generation display appears.

Suppose you wanted to generate file specifications for the display formats contained in the display format source member named ORDENTRY, which is in the library named SDALIB. The generated source specifications are to be placed in the member named ORDENTSP; the RPG program name will be ORDENT. The following shows what you would specify on the Member Name List/RPG Program Generation Selection display:



Step 2: Complete the RPG II H and F Specifications Generations Display

After you have responded to the prompts on the Member Name List/RPG Program Generation Selection display, and have pressed the Enter key, the RPG II H and F Specifications Generation display appears:



You use the RPG II H and F Specifications Generation display to specify the name of the RPG program, which is placed in the H (control header) specification. SDA supplies a default value for the program name, which is the first 6 characters of the output source member name you specified in step 1. You can change the name of the program if you choose.

You also use this display to supply the following information about the WORKSTN file, which is placed in the F (file description) specification:

- The name of the WORKSTN file
- The maximum length of input and output records read from and written to the WORKSTN file. SDA supplies a default value that is the maximum of the input records read from and the output records displayed to the display formats.
- The continuation line options for the WORKSTN file:
  - The number of display stations that can be attached to and use the WORKSTN file at one time.
  - The number of indicators to be saved and restored by the display station using the WORKSTN file.
  - The name of the data structure to be saved and restored for each device attached to the WORKSTN file.
  - The name of the field containing the variable start line number, if the start line numbers of the displays are to be controlled by the program.
  - The name of the field containing the display station ID of the display station that supplied the record being processed by the WORKSTN file.

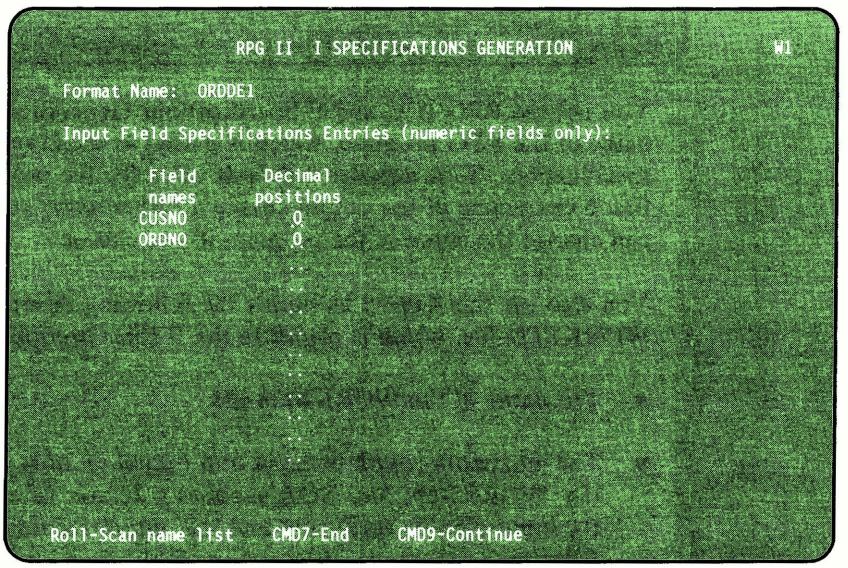
- The name of the display format load member to be used by the program. The system supplies a default value that is the same as the name of the display format source member.

For information about the responses allowed for the various entries in the H and F specifications, see the System/36 manual, *Programming with RPG II.*

When you have completed your entries to this display, press command key 9. If there are input fields that allow numeric data on any of the display formats in the display format source member, the RPG II I Specifications Generation display appears for each of these display formats; go to step 3. If there are no input fields that allow numeric data, the End of Program Generations Options display appears; go to step 4.

Step 3: Complete the RPG II I Specifications Generation Display

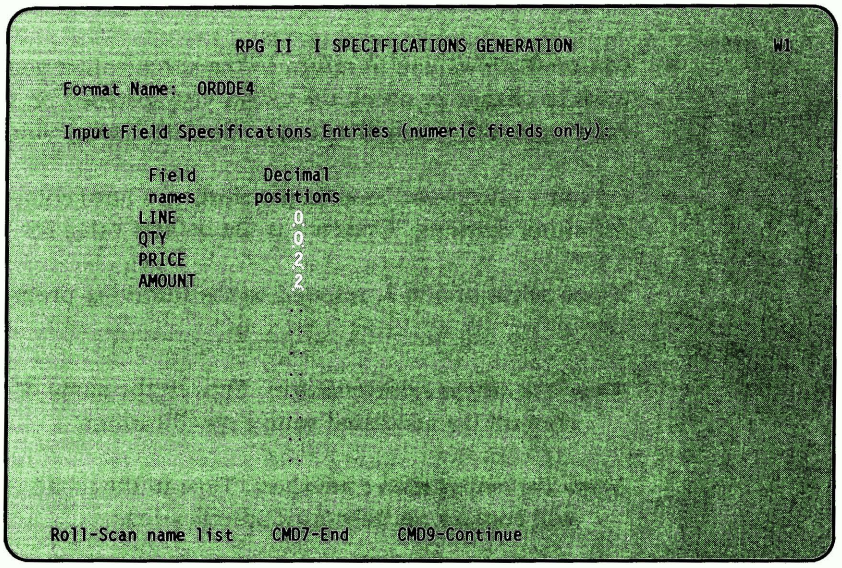
The RPG II I Specifications Generation display is presented only when you are working with a display format that contains input fields that allow numeric data. Use the following display to supply the number of decimal positions to be assumed for each input field named on the I Specifications Generation display:



If there are more numeric input fields on the display format than can be shown on the I Specifications Generation display, you can display all of them by pressing the Roll keys.

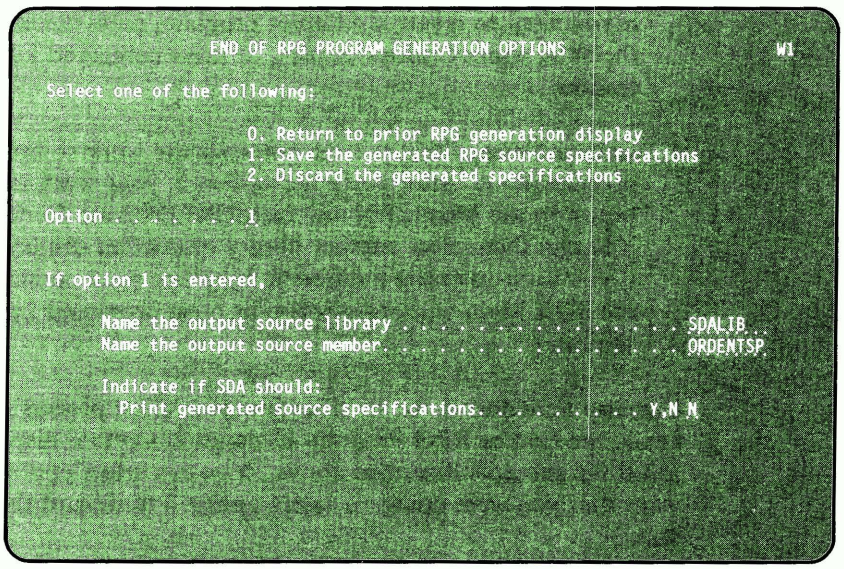
After you have supplied the decimal positions to be assumed for each numeric input field, press command key 9; the End of RPG Program Generation Options display appears.

The following shows what could be entered on the RPG II I Specifications Generation display for display format ORDDE4, which is contained in the display format source member named ORDENTRY:



Step 4: Complete the End of RPG Program Generation Options Display

After you have completed the RPG II H and F Specifications Generation display and, if there are numeric input fields on the display formats, the RPG II I Specifications Generation display, the End of RPG Generation Options display appears:



The End of RPG Program Generation Options display allows you to:

- Return to the previous display to resume work on it
- Save the generated source program specifications
- Discard the generated specifications.

Select option 0, 1, or 2 on the End of RPG Program Generation Options display:

- Option 0 allows you to return to the specification generation displays if you want to change or check the values you specified on those displays. If you enter option 0, you will return to the last display you were working on.

- Option 1 allows you to save the work you have completed on the specification definition displays. Option 1 is the default value for this display.

  If you select option 1, respond to the following prompts, and press the Enter key:

  Name the output source library: Type in the name of the library that will contain the generated source specifications.

  Name the output source member: Type in the name of the source member that will contain the generated specifications.

  Print generated source specifications: If you want SDA to print a listing of the generated source specifications, type in a Y (yes). Remember that this listing is useful when you use the development support utility (DSU) or the source entry utility (SEU) to add the program logic to the source specifications. If you do not want SDA to print a listing of the generated source specifications, type in an N (no).

  After you enter option 1, your work is saved in the specified library, and you return to the Member Name List/RPG Program Generation Selection display. You can then select another library or another display format source member if you want to create a different program, press command key 3 to return to the SDA Main Options display, or press command key 7 to end your SDA session.

- Option 2 means that you do not want the work completed on the specifications. After you enter option 2, your work is discarded, and you return to the Member Name List/RPG Program Generation Selection display. You can then select another library or another display format source member if you want to create a different program, press command key 3 to return to the SDA Main Options display, or press command key 7 to end your SDA session.

If at any time during the specification generation process you pressed command key 7, the End of RPG Program Generation Options display will not show option 1 and the prompts described above. You can select option 0 to return to the work that you were doing, or select option 2 to discard the work that you were doing.

The following shows the program specifications that are generated for the display formats in the display format source member named ORDENTRY:

```
NNNNUT1UT R01M00  YYMMDD                    IBM SYSTEM/36 SCREEN DESIGN AID          01/17/83  07.59.15          Page  001

        Library Name _________________ SDALIB                 Directory Reference Number_____________ 000004
        Source Member Name___________ ORDENTSP                Directory Date_____________________________ 01/17/83
                                                               Directory Time_____________________________ 07.59

                                                                                                  ORDENT
H
FORDENTRYCP  F      287            WORKSTN
F                                                  KFMTS  ORDENTRY
IORDENTRY
I* FORMAT-ORDDE1
I                                                   1   2 DCODE
I                                                   3   80CUSNO
I                                                   9  140ORDNO
I* FORMAT-ORDDE2
I                                                   1   2 DCODE
I                                                   3  27 SNAME
I                                                  28  52 SADDR
I                                                  53  67 SCITY
I                                                  68  69 SSTATE
I                                                  70  780SZIP
I                                                  79  88 CPONO
I                                                  89  90 CSLSNO
I* FORMAT-ORDDE3
I                                                   1   2 DCODE
I                                                   3   8 LINE
I                                                   9  140QTY
I                                                  15  44 DESC
I                                                  45  532PRICE
I                                                  54  632AMOUNT
I* FORMAT-ORDDE4
I                                                   1   92PRICE
I                                                  10  192AMOUNT
OORDENTRYD
O                                          K8 'ORDDE1  '
O                                CUSNO      6
O                                ORDNO     12
O                        99      ERRMSG    60
OORDENTRYD
O                                          K8 'ORDDE2  '
O                                CUSNO      6
O                                ORDNO     12
O                                CNAME     37
O                                SNAME     62
O                                CADDR     87
O                                SADDR    112
O                                CCITY    127
O                                CSTATE   129
O                                CZIP     138
O                                SCITY    153
O                                SSTATE   155
O                                SZIP     164
O                                CPONO    174
O                                CSLSNO   176
O                        99      ERRMSG   224
OORDENTRYD
O                                          K8 'ORDDE3  '
O                                CUSNO      6
O                                ORDNO     12
O                                CNAME     37
O                                SNAME     62
O                                CADDR     87
O                                SADDR    112
O                                CCITY    127
O                                CSTATE   129
O                                CZIP     138
O                                SCITY    153
O                                SSTATE   155
O                                SZIP     164
O                                CPONO    174
O                                CSLSNO   176
O                                LINE     178
O                                LINE     184
O                                QTY      190
O                                DESC     220
O                                PRICE    229
O                                AMOUNT   239
O                        99      ERRMSG   287
OORDENTRYD
O                                          K8 'ORDDE4  '
O                                LINE       2
O                                LINE       8
O                                QTY       14
O                                DESC      44
O                                PRICE     53
O                                AMOUNT    63

                                 ****   E N D   O F   L I S T I N G   ****
```

What Do You Do Next?

The specifications that are generated by following the steps just described do not include all the specifications required for an RPG II program. You must use the development support utility (DSU) or the source entry utility (SEU) to add the specifications that make up the program logic, such as the C (calculation) specifications. You can use option 6 (*Edit source and procedure members*) of the SDA Main Options menu. See Chapter 8, "Additional Services Provided by the Screen Design Aid" for information about using option 6.

Once you have added the program logic to the source specifications, you must also translate or compile the specifications into a form that the computer can use, called a load module or program load member. You can use the RPGONL, RPGC or AUTOC procedure to compile your source specifications. For more information about these procedures and for detailed information about RPG II programs, see *Programming with RPG II.*

Building a WSU Program

You can use option 5, *Build WSU programs*, of the SDA Main Options menu to help you generate the specifications for a WSU source program from an input source member that contains at least one display format designed for WSU. This member can be an old WSU source program. When not already provided, the following specifications are generated:

- J specification (job), with the name of the program subroutine and procedure members, the name of the display format source and load members, and the name of the library into which WSU is to place the generated members
- T specification (transaction file), with the name of the transaction file, the name of the source member containing the file definition specifications for the transaction file, and the name of the library containing the source member
- M specification (master file), with the name of the master file, the name of the source member containing the file definition specifications for the master file, the name of the library containing the source member, and the names of the chain fields used to build the key for master file input and output operations
- C specifications for processing of program fields, display formats, and files.

Before you select option 5 to generate the source specifications for the WSU program, you should first do the following:

1. Design and create the source member containing the file definition specifications for each file to be used by the WSU program. The file definition specifications include the F specification (file description), which describes the physical characteristics and the organization of the file, and the I specifications (input), which describe the format of the records within the file and define the tests that can be applied for record type recognition. The source member can be created and updated using option 6, *Edit source and procedure members*, of the SDA Main Options menu.

The file definition source members are not used by SDA during the generation of the WSU program; the source members are not accessed until the WSU compiler needs them for input. In other words, you can generate the WSU program without the file definition source members.

Regardless of the order in which you create the program and the file definition source members, you must make sure that the use of record type identifying indicators is properly coordinated between the generated program and the file definition source members. A record identifying indicator used on an I specification is sometimes used to designate to SDA an indicator that could be set on when a file record is read and recognized (in this case, the indicator is called a review mode record identifying indicator). At other times, a record identifying indicator is used to designate to SDA a set of field name definitions used to describe the layout of the input and output buffers (in this case, the indicator is called a form identifier).

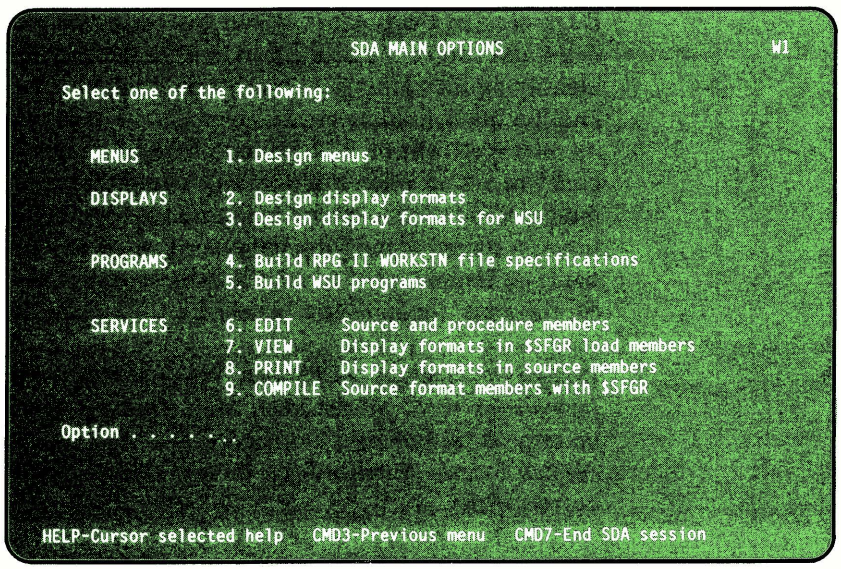
2. Design the displays used by the WSU program; use option 3, *Design display formats for WSU*, of the SDA Main Options menu. If you intend to define enter mode sequences or other features that depend on the placement of the display format specifications, be sure that all display formats are in the correct order.

3. Optionally, add processing segments (C specifications) for the display formats or shared subroutines to the input source member by using the development source utility (DSU), an optional program product, or the source entry utility (SEU), an optional Utilities Program Product. The C specifications might, for example, provide special syntax-checking or value conversion logic. Using SDA, you can get to DSU (if DSU is loaded on your system) or SEU (if SEU, but not DSU, is loaded on your system) by selecting option 6 of the SDA Main Options menu.

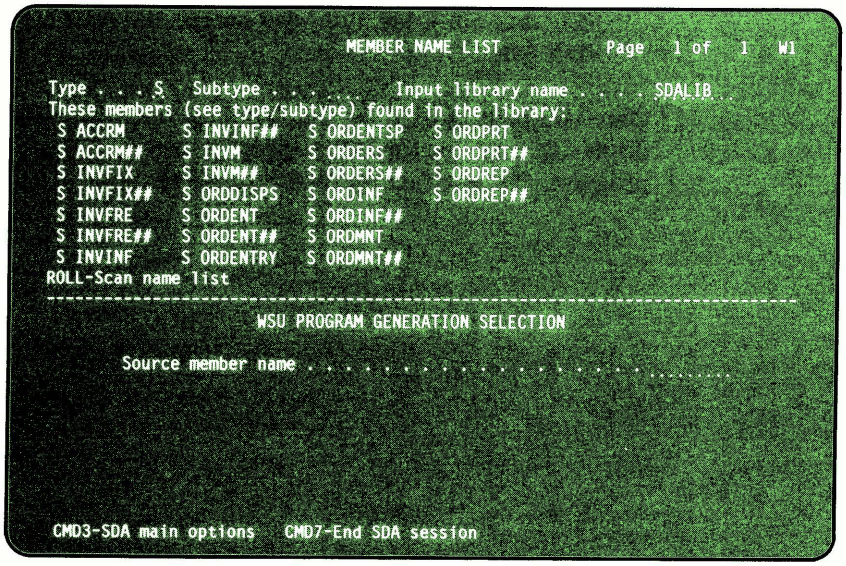
Once you have created the file definition specifications and have designed the display formats for the WSU source program, you can generate and compile the program. To generate the WSU source program, do the following:

Step 1: Complete the WSU Program Generation Selection Display

On the command display, type in SDA. The SDA Main Options menu appears:



Select option 5, *Build WSU programs.* A display similar to the following is shown:



The previous display is called the Member Name List/WSU Program Generation Selection display. Respond to the prompts on this display in the following way:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members)

If there is more than one page of member names, use the Roll keys to display those names.

Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Member Name List/WSU Program Generation Selection display is the current library, or is the last library you specified on this display. If the source member containing the display formats from which you want to generate a WSU program is contained in a different library (1) move the cursor to this field, (2) type in the library's name, and (3) press the Enter key.

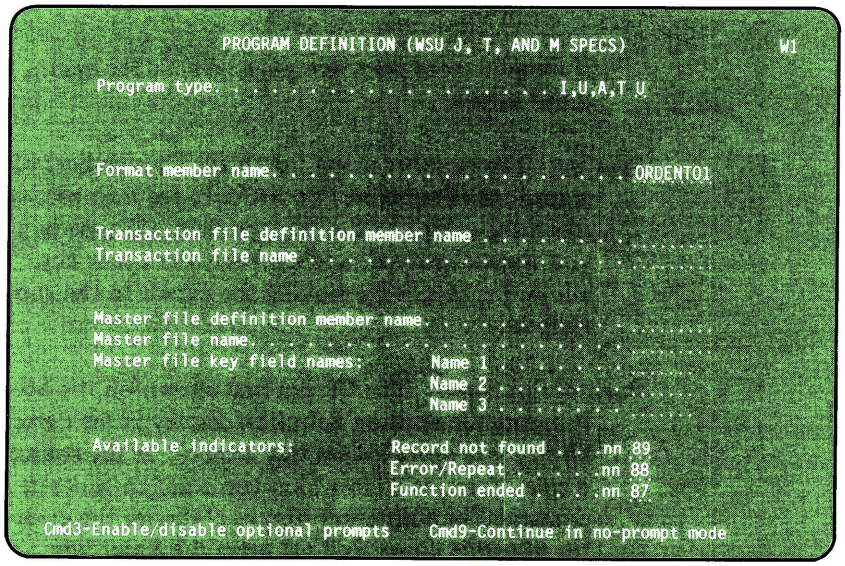
Source member name: Type in the name of the source member that will be used as input for the generation of the WSU program. This input source member contains the display format specifications plus any other WSU specifications you expect to include in the generated WSU program; up to eight characters can be used. The names of existing members can be listed in the top half of the display.

SDA uses a work file to build the program specifications. Any incorrectly placed specifications or C specifications previously generated by SDA will be discarded when they are read from the input source member. Any specifications needed to support requested functions will be merged into the input source member or will be added at the end as subroutines. You can use the contents of this work file as a replacement for the input source member, or you can save the contents of the work file in a new source member.

Press the Enter key when you have finished responding to the prompts described in this step; the Program Definition (WSU J, T, and M Specs) display appears.

Step 2: Complete the Program Definition (J, T, and M Specs) Display

After you have responded to the prompts on the Member Name List/WSU Program Generation Selection display, and have pressed the Enter key, the Program Definition (WSU J, T, and M Specs) display appears:



You can use the Program Definition display to specify:

- The type of WSU source program to be generated
- The name WSU will assign to the display format source and load members
- The names of the transaction or master files that the program uses
- The names of the source members that contain the file definition specifications for the transaction and master files used by the program
- For the master file used by the program, the fields to be used for building key values
- The record not found, error/repeat, and function ended indicators.

Respond to the prompts on the Program Definition display in the following way:

Program type: This field specifies the type of program that will be generated. The program type that you select must be supported by the displays that you are supplying as input. Your type selection indicates which files (master or transaction) will be required by the program and what the operator can do with the records within those files.

Type in one of the following program types:

I The operator can only inspect master file records.

U The operator can update or replace master file records in WSU enter mode.

A The operator can add, update, or replace master file records in WSU enter mode.

T The operator can write transaction file records in WSU enter mode or delete transaction file records.

Format member name: Type in the name assigned to the display format source and load members that WSU creates for the program; a maximum of 8 characters can be used. The first character in the name must be alphabetic (A through Z, #, $, or @); the remaining characters can be any character except blanks, commas (,), question marks (?), and periods (.). This field becomes the format member name entry in the J specification.

The name must not be the same as the name of the input source member you specified on the WSU Program Generation Selection display. SDA automatically supplies a suggested name for you: up to the first 6 characters of the name of the input source member, plus the characters 01.

Transaction file definition member name: Type in the name of the source member that contains the file definition specifications for the transaction file the program is to use. This field becomes the member name entry in the T specification.

A program type of I, U, or A does not require a transaction file. If a transaction file is included, a transaction file record is written automatically whenever a master file record is added or updated.

Transaction file name: Type in the name of the transaction file that the program is to use. This field becomes the file name entry in the T specification. WSU does not require that the transaction file exist on disk before the program is run, but certain types of programs do require an existing file with reviewable records.

Master file definition member name: Type in the name of the source member that contains the file definition specifications for the master file the program is to use.

A program type of T does not require a master file. If a master file is included, reading (but not adding or updating) of master file records is supported. This field becomes the member name entry in the M specification.

Master file name: Type in the name of the master file the program is to use. This field becomes the file name entry in the M specification. WSU requires that the master file exist on disk before the program is run, if the program uses a master file.

Master file key field names: If the program uses a master file, type in the names of up to 3 fields from which a key for master file input and output operations is to be prepared. Each key field name must correspond to a field name entry on a D specification within a display format in the display format source member specified on the Program Definition display. The D specification for

each of the fields must have the correct field length and the appropriate data type.

Available indicators: Type in 3 indicators that can be used to signal special conditions when the program is run. Each indicator must be in the range 01 through 89, and must be unique. SDA supplies 3 suggested indicators. Use these indicators unless you need them for other purposes.

The indicators that you specify will be used to signal various program conditions. Each indicator becomes the conditioning or resulting indicator for a number of C specifications, in addition to its use on other types of specifications:

Record not found: This becomes the not found indicator on the T and the M specifications. This indicator is set on by WSU when a record read from the transaction file or the master file fails all type recognition tests. As a general rule, when this indicator is on, it is time for the operator to request that a record be read.

Error/repeat: This becomes the error indicator entry on the T and M specifications. This indicator is set on by WSU when an error involving the transaction file or the master file has been detected. As a general rule, when this indicator is on, it is time for the operator to correct an error that has been found.

Function ended: For T type programs, or for U or A type programs with a transaction file, this becomes the record form identifier on a C specification that requests a PUT (to transaction file) operation. Under these circumstances, this indicator must be the same as a record identifying indicator in the transaction file definition source member. As a general rule, when this indicator is on, some function (for example, add a record) has ended and it is time for the operator to request a new function.

When the Program Definition display is first shown, several additional prompts are not displayed. These prompts specify the default values for:

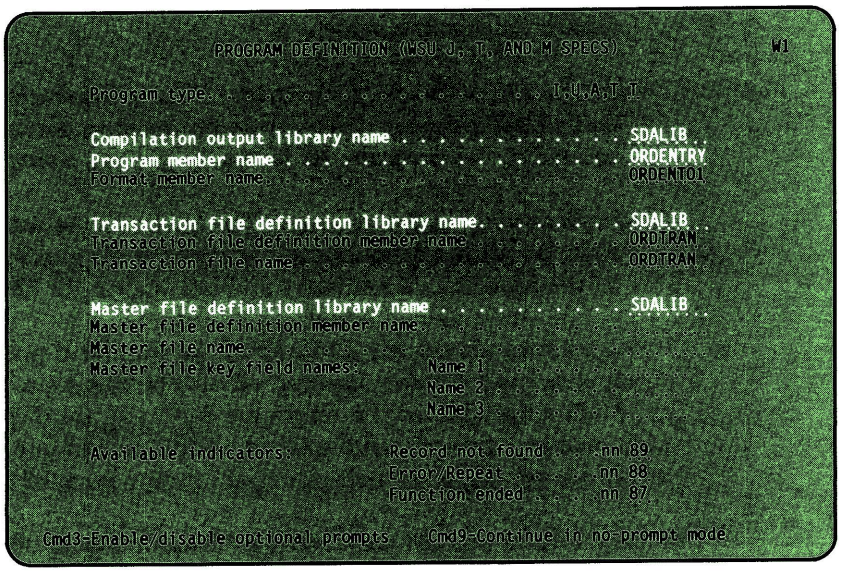
- The library name entry on the J specification (the library that will receive output from the WSU program generation)
- The program name entry on the J specification (the name of the program subroutine and procedure members that WSU generates)
- The library name entries for the T and M specifications (the libraries that contain the file definition source members for the transaction file and the master file).

If these specifications already exist in the input source member, the library name entries on those specifications are used for the response values to the additional prompts. If the specifications do not exist in the input source member, the library named on the WSU Program Generation Selection display is used.

Use command key 3 to display the additional prompts if you want to make sure the correct values are specified for them. For example, you might want to check

that the correct name is specified for the library that SDA assumes contains the file definition source members used by the program, or you might want to check the name of the procedure to be generated by WSU.

The following shows how the Program Definition display appears after you press command key 3:



You can respond to the additional prompts in the following way:

Compilation output library name: This indicates the name of the library that will receive the output from the WSU program generation. If necessary, you can change the library name.

Program member name: This indicates the name assigned to the program subroutine and procedure members to be created. If necessary, you can change the member name.

Transaction file definition library name: This indicates the name of the library that contains the file definition source member for a transaction file that is to be used by the program. If necessary you can change the library name.

Master file definition library name: This indicates the name of the library that contains the file definition source member for a master file that is to be used by the program. If necessary you can change the library name.

If you press command key 3 to display the additional prompts, any additional prompts on the following displays will also be displayed. If you press command key 3 when the additional prompts are displayed, the display is reshown, and the additional prompts are not displayed. Additional prompts on any displays that follow are not displayed until you again press command key 3.

Once you have finished responding to the prompts on the Program Definition display, press either the Enter key or command key 9. What SDA does next depends on the key that you press.

Note: For a program type of T only, the function of the Enter key and command key 9 are identical when used on the Program Definition display. See the description of command key 9 later in this chapter for information on what happens when you specify a program type of T and you press the Enter key or command key 9 on the Program Definition display.

What Happens If You Use the Enter Key?

When you press the Enter key on the Program Definition display, you tell SDA that you want to check the function and operation of those display formats in the input source member that meet one of the following conditions:

- Start a sequence of displays (a Y in column 41 of the S specification of the display format)
- Not one of a sequence of displays (determined by the placement of the display format within the input source member).

If you press the Enter key when you are finished with the Program Definition display, SDA does one of the following:

- For the first display format that meets one of the conditions listed above, the Format Function Definition (WSU S Spec) display appears. Using the Format Function Definition display, you can check or define the function and operation of that display format and any other display formats within the

same sequence. Step 3 describes what to do if the Format Function display appears.

- If a display format that meets one of the conditions listed above is not found in the input source member, the End of WSU Program Generation Options display appears. (It is possible that no display formats are contained in the input source member. In this case, no program is generated.) You can use the End of WSU Program Generation Options display to specify what you want done with any output that SDA has generated. Step 4 describes what to do if the End of WSU Program Generation Options display appears.

- If the character E appears to the right of any of the input fields for the prompts on the Program Definition display, SDA has found an incorrect or incompatible value specified in the input field. For example, the E could indicate a syntax error, such as an incorrect indicator. You can find out what the requirements are for a particular input field by moving the cursor to the field in error and by pressing the Help key. The E might also indicate a value that is incompatible with fields you have specified on this display and others. By examining the program type that you have specified, and the files that are to be used by the program, you should be able to determine what is causing the error.

  Supply the correct values for the prompts on the display and press the Enter key again.

What Happens If You Use Command Key 9?

When you press command key 9 on the Program Definition display, you tell SDA to check the display formats in the input source member that meet one of the following conditions:

- Start a sequence of displays (a Y in column 41 of the S specification of the display format)

- Not one of a sequence of displays (determined by the placement of the display format within the input source member).

If you press command key 9 when you are finished with the Program Definition display, SDA does one of the following:

- If SDA finds a problem with a display format that meets the conditions listed above, or if the display format needs further definition of its function and operation, the Format Function Definition display appears. You can make the necessary corrections to the input fields or further define the function and operation of that display format and any display formats within the same sequence. Step 3 describes what to do if the Format Function display appears.

- If no problems are found with the display formats that meet the conditions listed above, and if the display formats need no further definition of their function and operation, the End of WSU Program Generation Options display appears. Step 4 describes what to do if the End of WSU Program Generation Options display appears.

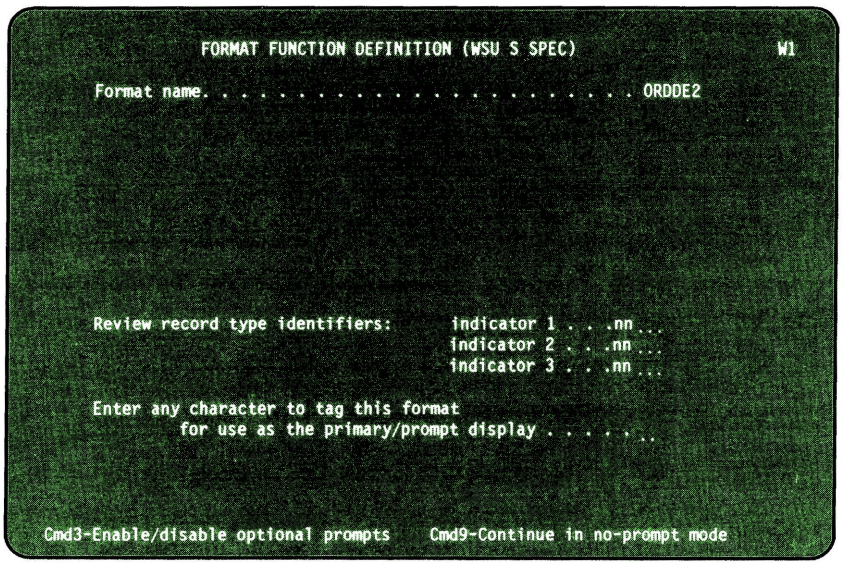
- If the character E appears to the right of any of the input fields for the prompts on the Program Definition display, SDA has found an incorrect or incompatible value specified in the input field. Supply the correct values for the prompts on the display and press command key 9 again.

Step 3: Complete the Format Function Definition (WSU S Spec) Display

The Format Function Definition (WSU S Spec) display appears if one of the following occurs:

- If the Enter key was pressed and the input source member has a display format that is the start of a sequence of displays or is not one of a sequence of displays

- If command key 9 was pressed and SDA finds a problem with a display format that starts a sequence of displays or is not one of a sequence of displays, or a display format of that kind needs further definition of its function and operation.



You use the Format Function Definition display to check or define the function and operation of a display format and any other display formats within the same sequence. Entries made for a display format that starts a sequence of displays apply to all display formats in the sequence. The Format Function Definition display does not appear for display formats following the display format that starts the sequence to which they belong. This means, for example, that no format in a sequence of displays can support review of a record type other than that specified for the display format that starts the sequence.

Respond to the prompts on the Format Function Definition display in the following way:

Format name: This value indicates the format name entry on the S specification of the display format that is being processed. This value cannot be changed.

Review record type identifiers: These values identify the review mode record identifying indicators in the S specification for this display format. Each indicator is in the range 01 through 89 and is used for record recognition and form type identification for the transaction file or master file used by the program. The first indicator named is the primary review mode record identifying indicator on the S specification for this display format and is the default for the form identifier entry for the corresponding files. The primary review mode record identifying indicator also becomes part of the sequence ID for the display format, and can be used by the generated program to control display sequence selection.

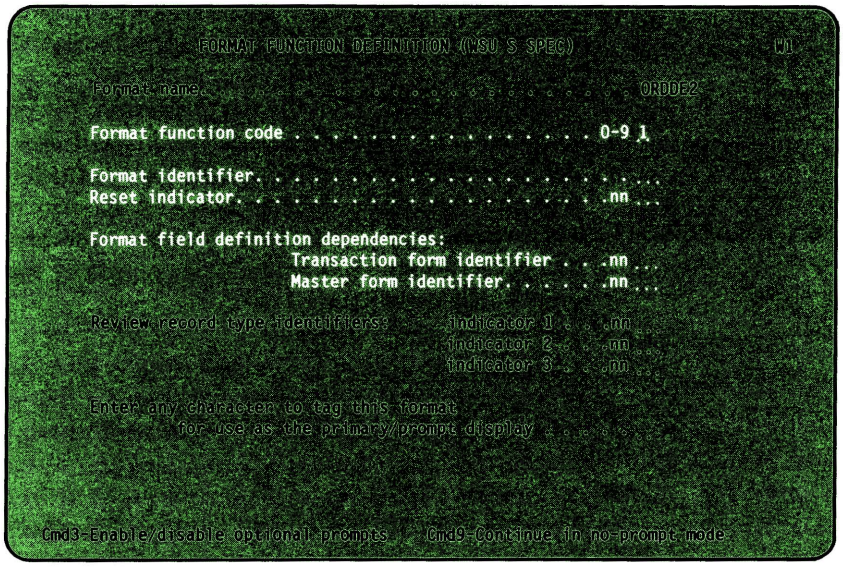
The indicators 1 through 3 might already have values supplied for them if you defined them on the S specification for this display format. Type in the correct indicator or indicators if you need to use them.

Primary/prompt display tag: This is a character to be placed in position 24 of the S specification for this display format. This character causes WSU to assume that the keyboard is to be reset when this display format appears. This character indicates to SDA that this display format should be shown first, or whenever processing for the current display format has ended and another display format is not selected. If these conditions are present, type in any character other than blank or N; SDA supplies a default value of P, unless a primary/prompt display has already been designated.

When the Format Function Definition display is first shown, several additional prompts might not be displayed. These prompts specify:

- The intended program function for this display format and any other display formats within the same WSU enter mode sequence
- The format ID entry on the S specification for this display format
- The form identifying indicators that specify the dependencies this display format has on the field-defining I specifications in the corresponding file definition source members
- A non-record identifying indicator to be associated with this display format and the display formats in the same sequence.

Use command key 3 to display the additional prompts if you want to make sure the correct values are specified for them. The following shows how the Format Function Definition display appears after you press command key 3:



Respond to the additional prompts in the following way:

Format function code: This indicates the intended function and operation of this display format and any other display formats within the same WSU enter mode sequence. This field becomes the entry in position 45 of the S specification. Type in one of the following format function codes:

0 This display format can be selected from the WSU display whenever the operator wants to see the information that it shows. This display format has no input fields.

1 This display format has no SDA-defined function. It does not allow the keyboard to be reset, for example, or it has processing that is driven by a user-coded command key (a command key not used by WSU).

2 This display format is neither review-capable or add-capable. A display format is review-capable if it has at least 1 review mode record identifying indicator that indicates it is the format that is selected when a record of that type is read from the associated transaction or master file. A display format is add-capable if it has at least 1 record form identifier enabled for use where required on a generated C specification with a PUT or PUTN to add a file record.

3 This display format is add-capable but not review-capable. It should have at least 1 record form identifier but no review mode record identifying indicators.

4 This display format is review-capable and add-capable for a transaction file. It must have at least 1 review mode record identifying indicator, and each must also be defined in the F and I specifications for the transaction file.

5 This display format is review-capable and add-capable for a master file. It must have at least 1 review mode record identifying indicator, and each must also be defined in the F and I specifications for the master file.

6 This display format is review-capable and add-capable for a transaction file or a master file. It must have at least 1 review mode record identifying indicator, and each must also be defined in the F and I specifications for the transaction and master files.

7 This display format is review-capable for a transaction file. It must have at least 1 review mode record identifying indicator, and each must also be defined in the F and I specifications for the transaction file.

8 This display format is review-capable for a master file. It must have at least 1 review mode record identifying indicator, and each must also be defined in the F and I specifications for the master file.

9 This display format is review-capable for a transaction file or a master file. It must have at least 1 review mode record identifying indicator, and each must also be defined in the F and I specifications for the transaction and master files.

Format identifier: This becomes the format ID entry on the S specification for this display format. The format ID is used to select this display format from the WSU display. The format ID also becomes part of the sequence ID and can be used by the program generated by SDA to control display sequence selection.

A format ID is required for a display format if you also specify a format function code of 0, 2, or 3, or if a primary/prompt tag is entered.

Type in the format ID for this display format; IDs IJ, IW, ES, EW, EJ, and ES cannot be used.

Reset indicator: This is a non-record identifying indicator to be associated with this display format and any other display formats within the same sequence; this becomes the entry in columns 31 and 32 of the S specification for this display format and any other display formats within the same sequence. When the operator responds with command key 12 to this display format or any display formats within the same sequence, all reset indicators are set off. This indicator is then set on, and any pending output operations are performed. The first display format with the same reset indicator is then selected and displayed. Command key 24 can be used to reselect this display format until the reset indicator is set off.

A reset indicator can be used to allow the operator to select a display format which needs to be accessed quickly, or to bypass the primary/prompt display when using a particular display format to add several records of the same type.

If needed, type in a reset indicator in the range 01 through 89; the reset indicator is optional if you specify a format function code of 2 through 9. A reset indicator cannot be specified if you also specify a format function code of 0 or 1.

Format field definition dependencies: Every field named on a D specification for a display format must be defined within the program. These definitions are provided by the I specifications for the corresponding transaction or master file record types. Form identifiers are used by the WSU program to indicate which fields are used during an input or output operation and to determine the position of those fields within the input or output record.

If a display format will be used to add records, a form identifier is required. The form identifier must correspond to a record form identifying indicator on the I specifications. If a form identifier is to be used on a C specification with a PUT or PUTN operation, SDA requires that the form identifier be a primary review mode record identifying indicator (for the corresponding file) for some display format in the program.

The form identifier can be entered as a format field definition dependency, or the form identifier can be defaulted from a primary review mode record identifying indicator for the corresponding file on the same specification.

If a display format is not used to add records, a form identifier need not be specified unless you want SDA to generate specifications that prevent operators from adding or updating records with field values not appearing on the display from which the add or update request is made.

Transaction form identifier: This becomes the entry in columns 33 and 34 of the S specification for this display format. If the display format is add-capable and the program uses a transaction file, this also becomes the entry in columns 54 and 55 of the C specification used to add or update a transaction file record from this display format or other display formats in the same sequence.

Master form identifier: This becomes the entry in columns 35 and 36 of the S specification for this display format. If the display format is add-capable and the program uses a master file, this also becomes the entry in columns 54 and 55 of the C specification used to add a master file record from this display format or other display formats in the same sequence.

If you press command key 3 to display the additional prompts, any additional prompts on the following displays will also be displayed.

Once you have finished responding to the prompts on the Format Function Definition display, press either the Enter key or command key 9. What SDA does next depends on the key that you press.

What Happens If You Use the Enter Key?

When you press the Enter key on the Format Function Definition display, you tell SDA that you want to check the function and operation of the next display format in the input source member that meets one of the following conditions:

- Starts a sequence of displays (a Y in column 41 of the S specification of the display format)
- Not one of a sequence of displays (determined by the placement of the display format within the input source member).

If you press the Enter key when you are finished with the Format Function Definition display, SDA does one of the following:

- For the next display format that meets one of the preceding conditions, the Format Function Definition (WSU S Spec) display appears. Repeat step 3 for that display format.

- If a display format that meets one of the preceding conditions is not found in the input source member, the End of WSU Program Generation Options display appears. Step 4 describes what to do if the End of WSU Program Generation Options display appears.

- If the character E appears to the right of any of the input fields for the prompts on the Format Function Definition display, SDA has found an incorrect or incompatible value specified in the input field. The error might be a syntax error, such as an incorrect indicator. You can find out what the requirements are for a particular input field by moving the cursor to the field in error and by pressing the Help key. The E might also indicate a value that is incompatible with fields you have specified on this display and others. By examining the format function code that you have specified, you might be able to determine what is causing the error.

  Supply the correct values for the prompts on the display and press the Enter key again.

What Happens If You Use Command Key 9?

When you press command key 9 on the Format Function Definition display, you tell SDA to check the display formats remaining in the input source member that meet one of the following conditions:

- Start a sequence of displays (a Y in column 41 of the S specification of the display format)

- Not one of a sequence of displays (determined by the placement of the display format within the input source member).

If you press command key 9 when you are finished with the Format Function Definition display, SDA does one of the following:

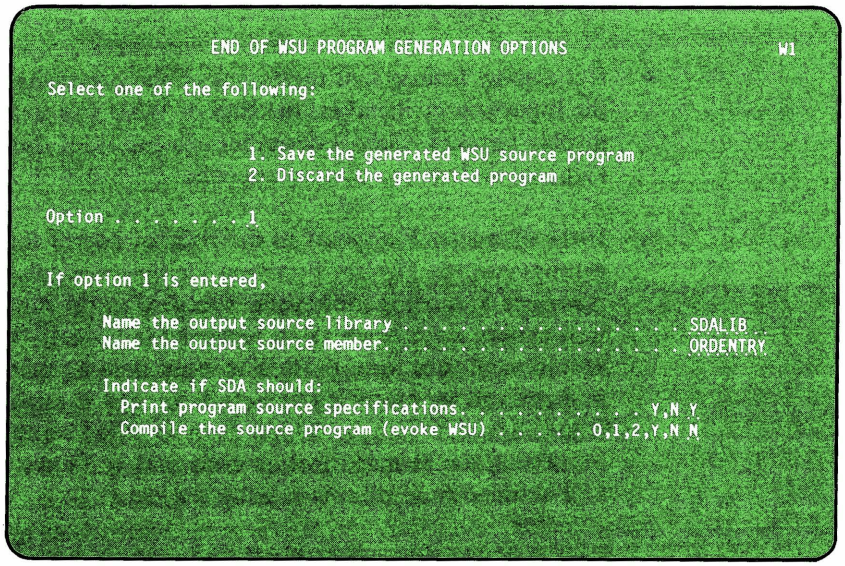
- If SDA finds a problem with a display format that meets one of the preceding conditions, or if the display format needs further definition of its function and operation, the Format Function Definition display appears. Repeat step 3 for that display format.

- If no problems are found with the display formats that meet the preceding conditions, and if the display formats need no further definition of their function and operation, the End of WSU Program Generation Options display appears. Step 4 describes what to do if the End of WSU Program Generation Options display appears.

- If the character E appears to the right of any of the input fields for the prompts on the Format Function Definition display, SDA has found an incorrect or incompatible value specified in the input field. Supply the correct values for the prompts on the display and press command key 9 again.

Step 4: Complete the End of WSU Program Generation Options Display

When no more prompting needs to be done for the display formats in the input source member, the End of WSU Program Generation Options display appears:



Using the End of WSU Program Generation Options display, you can specify what you want done with the source program that SDA has generated.

Select option 1 or 2 on the End of WSU Program Generation Options display:

- Option 1 allows you to save the work you have completed on the Program Definition and Format Function Definition displays. Option 1 is the default value for this display.

  If you select option 1, respond to the following prompts, and press the Enter key:

  Name the output source library: Type in the name of the library that will receive the generated WSU output.

  Name the output source member: Type in the name of the source member to receive the generated output. Do not specify a source member name that is the same as the format member name specified on the Program Definition display.

  If you do not change the default value for the library name or the source member name, the generated WSU specifications will replace the input source member. If you want to keep the input source member intact, you can specify a different library to receive the generated output or specify a different output source member name, or both.

  Print program source specifications: If you want SDA to print a listing of the generated source specifications and any diagnostic notes, type in a Y (yes). If you do not want SDA to print a listing of the generated source specifications and any diagnostic notes, type in an N (no).

Compile the source program (evoke WSU): Type in one of the following to indicate whether you want WSU to compile the output source member:

0 WSU attempts to compile the generated source program and prints a listing that contains the following information:

- Information about the WSU program generation
- Information about the WSU source program
- Diagnostic information
- Undefined indicators
- Field names defined more than once
- Undefined field names
- Main storage requirements
- Disk storage requirements
- The procedure created for running the generated WSU program
- Diagnostic text.

1 WSU attempts to compile the generated source program and prints a listing that shows all of the information printed for value 0, plus the following:

- The indicators used
- Un-referenced indicators
- Message member message identification codes used
- Mode-level data field names used
- Session-level data field names used
- Job-level data field names used
- Program label names used
- Un-referenced field names
- Source to object code cross reference showing message text and DEBUG literals.

2 WSU attempts to compile the generated source program and prints a listing that shows all of the information printed for value 1, plus the following:

- Indicator name cross reference
- Field name and label cross reference.

Y WSU attempts to compile the generated source program and prints a listing that shows all of the information printed for value 1.

N WSU does not attempt to compile the generated source program.

If you indicate that you want WSU to compile the generated output source member, a message is sent to your display station when the compile attempt is completed. If the compile attempt is successful, the display format source member created by WSU will be saved.

- Option 2 means that you do not want the work completed on the Program Definition and Format Function Definition displays. After you enter option 2, your work is discarded, and you return to the Member Name List/WSU Program Generation Selection display. You can then select another library or another input source member if you want to create a different program, press

command key 3 to return to the SDA Main Options display, or press command key 7 to end your SDA session.

If SDA has not been able to generate any output specifications (command key 7 was pressed on the Program Definition display, for example), the End of WSU Program Generation Options display might not show option 1 and the prompts described above, and you must select option 2 to discard the work that you were doing.

Considerations for Using the Compiled WSU Program

When SDA generates the WSU source program, it assigns special functions to some of the command keys. In addition to the command and function keys normally used by WSU, these SDA-assigned command keys can be used by the operator to access program files or to control display selection.

Using the Command Keys to Access Program Files

Depending on the program type you have specified, the format function code of the display format that is displayed, and the files used by the WSU program, the following command keys may be used to access the program files:

Command key 1: Causes the WSU display to be displayed. The WSU display can be used to select a transaction file record to review by entering the record's relative record number.

Command key 3: Resumes enter mode (after a delete function is ended, for example).

Command key 8: Ends the current function and sets record type identifying indicators off. Ends the alternate WSU mode function or goes back to the primary/prompt display. After command key 8 is pressed, a record must be read before an update can occur.

Command key 9: Updates a master file record after it is inspected. A transaction file record is always written for a U or A type of program with a transaction file when a master file record is updated.

Command key 10: Adds a master file record. A transaction file record is always written for a U or A type of program with a transaction file when a master file record is added.

Command key 11: Reads and extracts fields from a master file record for inspection. Command key 11 may be defaulted under the appropriate conditions for those display formats which can be used to enter key values but not to add or update records.

Command key 14: Begins delete mode for the most recently reviewed transaction file record. This record is deleted if the delete function is ended.

Command key 21: Locates or reads, but does not extract fields from, a master file record.

Command key 22: Restores key values saved from a locate or inspect operation and replaces a master file record. Writes a transaction file record.

A replace operation, a write operation, or both, can happen depending on such things as the program type, the format function code, and the specified form identifiers.

Command keys 21 and 22 can be paired to force changes to a master file record (for example, after some mistake, such as inadvertently pressing command key 8 instead of command key 9, that prevents command key 9 from being used to save values that are already typed in).

For add or update operations, a message is displayed after the corresponding key is pressed. This message verifies that an output operation is about to be performed. This message gives the operator a chance to prevent the operation by selecting a new function or to complete the requested function and 'reset' (see the description of command key 12 below). The operation is not completed unless the operator presses the Enter key or command key 12 after the message is displayed. The primary/prompt display is normally shown after the Enter key is used to cause the operation to be completed. Other messages are shown whenever needed to warn the operator to take corrective action, or to indicate that an operation is completed.

Command keys 3 and 14 are assigned by WSU. Other command keys assigned by WSU for accessing transaction file records in alternate modes may also be supported by the program.

Using the Command Keys to Control Display Selection

Display selection can be completely automatic, a result of the way in which the operator accesses file records. For example, the type of record read from a file determines which display to show for inspection or review, and the primary/prompt display is normally shown after any add, update, replace, or write operation is done in enter mode.

The following command keys may also be used to control display selection:

Command key 1: Causes the WSU display to be displayed. The WSU display can be used to select a display format by entering its format ID.

Command key 2: Advances to the next display in the sequence. If used on the last display in the sequence, advances to the first display in the sequence.

Command key 7: Sets the EW indicator for quick but orderly work session exit.

Command key 8: Sets the end function indicator, and causes the immediate selection (unless in an alternate mode) of the primary/prompt display.

Command key 12: Sets reset indicators to activate the display format. Completes any pending output operations, and selects the active display format next instead of the primary/prompt display.

Command key 13: Advances (unless in an alternate mode) to the beginning of the next enter mode sequence that could have been selected from the WSU display.

Command key 19: Sets the RP indicator. Reselects (unless a function ended) the display sequence the operator responded to before the display sequence most recently responded to.

Command key 20: Sets the RP indicator. Reselects (unless a function ended) the display sequence the operator most recently responded to.

Command key 23: Uses record type indicators to select the next display.

Command key 24: Uses reset indicators to select the next display.

Command keys 16 through 18 are assigned by SDA and can also be used to control display selection. The effect of using these command keys depends on the way in which format IDs and primary review mode record identifying indicators are assigned as sequence IDs to the display formats in the program:

- Command key 16 usually selects the current display or the display that starts the current sequence. If the current display allows the operator to change the value in the SDA-defined field VIEWCR, command key 16 can be used to select the first display associated with the specified format ID or primary review mode record identifying indicator.
- Command key 17 selects a display based on the primary review mode record identifying indicator portion of the sequence ID.
- Command key 18 selects a display based on the format ID portion of the sequence ID.

Command keys 2 and 13 are assigned by WSU. Data cannot be entered with these command keys.

How Can You Control the Use of Command and Function Keys?

Command and function keys you do not want the operator to use can be disabled by making the appropriate entries on the S specifications for the display formats used by your program. If you want to define a different function for a command or function key on a particular display format, do one of the following:

- Use a format function code of 1 (processing is driven by the command keys that you define).
- Set off the command key indicator so that it will not be processed by the subroutines that SDA generates.

WSU allows you to define command keys 7 through 12, and command keys 16 through 24. If you define the function of your own command keys, you must provide the C specifications for handling the command key indicators and performing the appropriate operations when the command keys are used.

Chapter 8. Additional Services Provided by the Screen Design Aid

This chapter will show you how to use the additional services provided by SDA. These services allow you to do the following:

- Create or update source and procedure members using the development support utility (DSU), without signing off SDA.
- Create or update source and procedure members using the source entry utility (SEU), without signing off SDA.
- View display formats in a load member.
- Print images of display formats in a source member.
- Compile display format source members.

Creating or Updating Source and Procedure Members Using DSU or SEU

DSU (development support utility) and SEU (source entry utility) are programs that allow you to create or update source members, programs, procedures, menus, and display formats. Through SDA you can access DSU or SEU, but not both:

- If DSU is loaded on your system, you can access DSU through SDA.
- If both DSU and SEU are loaded on your system, you can access only DSU through SDA.
- If only SEU is loaded on your system, you can access SEU through SDA.

When you have both DSU and SEU on your system, you can access SEU by either:

- Using the Inquiry mode to enter SEU without leaving SDA.

  To use Inquiry mode, press the Attn key and select option 1 at the next screen. When the main menu appears, type SEU.

  Note: You can also access DSU through the Inquiry mode.

- leaving SDA and typing SEU at the bottom of any System/36 menu and pressing Help.

To use either DSU or SEU through SDA, select Option 6 (*Edit source and procedure members*) of the SDA Main Options menu

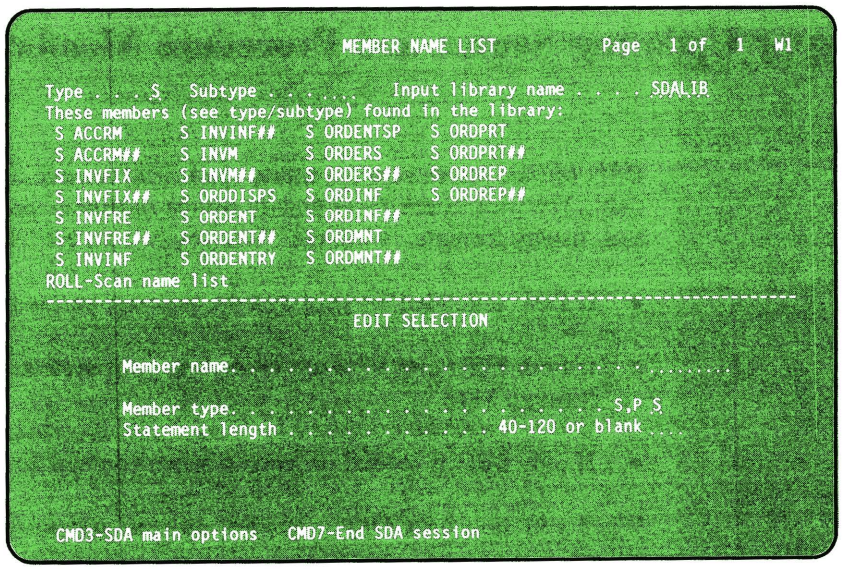
Using DSU or SEU through SDA is particularly useful if you do something with SDA that affects other source and procedure members that you normally would not update using SDA. For example, suppose you use SDA to make a change to a display format used by a COBOL program. If that change (a shortened input or output field, for example) affected the operation of the program, you probably would have to update the program. To update the program, you would use either DSU or SEU to change the program source member. Once you make the change to the program source member, you can return to SDA and continue your work.

If DSU is loaded on your system, you should read the *Development Support Utility Guide*, SC09-1085 to find out how to use DSU before accessing the program from SDA. If SEU is loaded on your system, you should read the *Source Entry Utility Guide* (SC21-7901)

To access either DSU or SEU through SDA, select option 6 of the SDA Main Options menu and complete the Edit Selection display, as described in Step 1 below:

Step 1: Complete the Edit Selection Display

Select option 6 (*Edit source and procedure members*) of the SDA Main Options menu. The Edit Selection display appears:



Respond to the prompts on the Edit Selection display as follows:

Type: The list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)

- O (load members)
- P (procedure members)
- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

Subtype: The list at the top of the display shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Edit Selection display is the current library, or is the last library you specified on this display. If you want to use a different library, (1) move the cursor to this field, (2) type in the name of the library, and (3) press the Enter key.

Member name: Type in the name of the source or procedure member that you want to update or create. If you are updating an old member, you should be able to find the name of that source member listed at the top of the Edit Selection display. If you are creating a new member, its name must be from 1 to 8 characters long; the first character must be alphabetic (A through Z, #, $, or @), and the remaining characters can be any character except blanks, commas (,), question marks (?), and periods (.).

Member type: Type in an S to indicate that you are creating or updating a source member, or type in a P to indicate that you are creating or updating a procedure member.

Statement length: Type in the length of the statements within the source or procedure member that you are creating or updating. The statement length can be in the range 40 through 120. If you leave the statement length blank, DSU or SEU assigns a length for a new member, or uses the statement length already assigned for an existing member.

Press the Enter key. If DSU is on your system, and you are creating or updating a source or procedure member, the DSU Edit display appears. If only SEU is on your system, and you are creating or updating a source or procedure member, the SEU Enter display appears.

Using the Development Support Utility (DSU)

Step 1: Complete the DSU EDIT Display

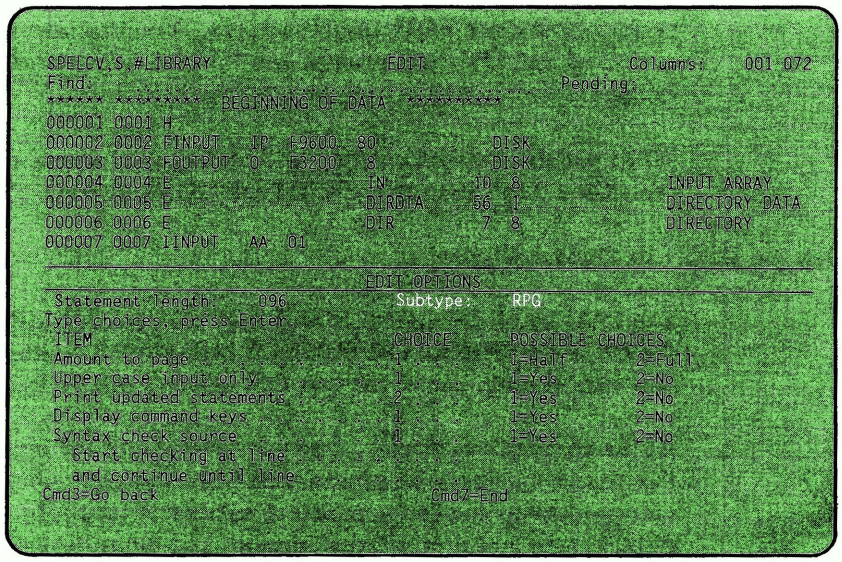
The DSU EDIT display lets you type in source or procedure statements for a new member or update source or procedure statements within an existing member.

If you are creating or updating a procedure or source member, the DSU EDIT display appears. When you are creating a procedure or source member and access DSU, the following DSU EDIT display appears. When you are updating a member, the same DSU EDIT display appears except that any data previously entered also appears in the fields.

```
SPELCV,S,#LIBRARY                    EDIT                    Columns:    001 072
Find:                                                  Pending:
****** ********  BEGINNING OF DATA  **********
000001 0001 H
000002 0002 FINPUT   IP  F9600  80            DISK
000003 0003 FOUTPUT  O   F3200   8            DISK
000004 0004 E                    IN         10  8                INPUT ARRAY
000005 0005 E                    DIRDTA     56  1                DIRECTORY DATA
000006 0006 E                    DIR         7  8                DIRECTORY
000007 0007 IINPUT   AA  01
000008 0008 I                                        1  80 IN
000009 0009 I            DS
000010 0010 I                                        1  80 IN
000011 0011 I                                       17  80 IN64
000012 0012 I                                       33  80 IN48
-------------------------------------------------------------------------------
Cmd1=Go to top                          Cmd2=Go to bottom
Cmd4=Set find/change options            Cmd5=Perform find
Cmd6=Perform change                     Cmd7=End
Cmd8=Reset                              Cmd9=Window right
Cmd10=Window left                       Cmd11=Set include options
Cmd13=Set edit options
Roll=Page
```

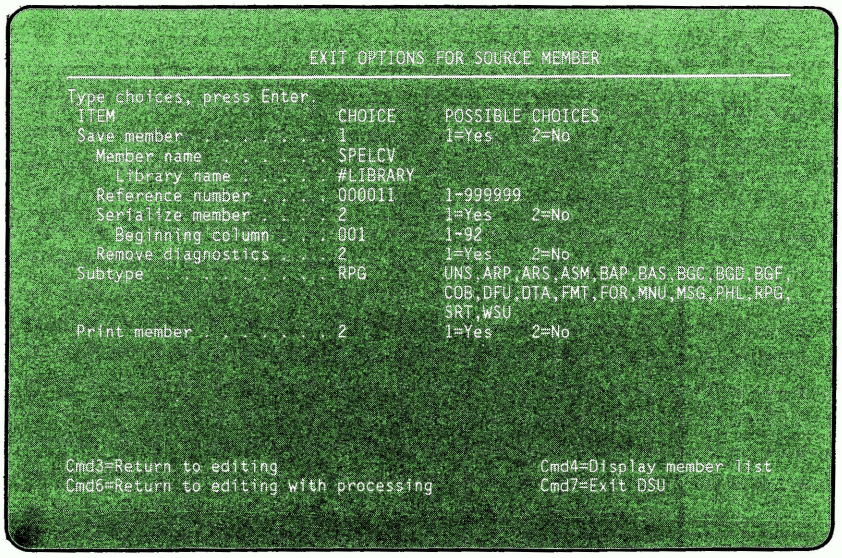
If you are updating an existing member, the Edit display will contain the existing source or procedure statements. To create or update your statements, simply type in the new or revised data directly on the lines you want. You can also use line commands to insert, copy, move or delete your statements. The line commands are entered in the sequence number field (shown as six single apostrophes: ''''''), or six numbers (for example 000001).

You can also tell DSU to prompt you for each line, but before you can do this, you must specify the subtype of the member. If you are updating a member that was created with SEU or created with the DSU procedure, the subtype could already be specified and stored with the member. If you already specified the subtype, simply type the line command P? in the sequence number field (shown as six single quotation marks: ''''''') and press Enter. DSU will prompt you for that line. To see the member subtype, press Cmd 13 and the EDIT OPTIONS display appears. The EDIT OPTIONS display tells you the subtype specified:



If you are creating a DSU member and you want to use the P or prompt line command on the DSU EDIT display, you must specify your member subtype first or DSU will process the subtype as UNS (Unspecified).

If the member subtype is UNS (Unspecified) or if you did not specify the subtype when you began the edit session, select Cmd 7 from the DSU EDIT display. If you are creating a procedure, the EXIT OPTIONS FOR PROCEDURE MEMBER display appears. If you are creating a source member, the EXIT OPTIONS FOR SOURCE MEMBER display appears:



At the EXIT OPTIONS display, type the subtype and your other choices for the options. When you have entered the subtype and other options, press Cmd 6

(Cmd6 = Return to editing with processing). The options you selected are performed and the EDIT display returns. You can now type P as a line command and DSU will prompt you for each line according to the new member subtype.

When you are finished creating or updating your source or procedure member, press Cmd 7 to return to the EXIT OPTIONS display.

Step 2. Complete the DSU Exit Options Display

The DSU EXIT OPTIONS FOR PROCEDURE MEMBERS display is similar to the EXIT OPTIONS FOR SOURCE MEMBERS display. Depending on what you were editing, one of the two Exit displays will appear once you press Cmd 7.

At the Exit options display, type your choices for the options and press Enter. For source members, be sure to specify the member subtype. From the Exit options display you can complete a number of functions such as return to the Edit display, save and process your member and return to the Edit display, go to the DSU Work with Library Members display, or request a printed listing of the statements in the source or procedure member.

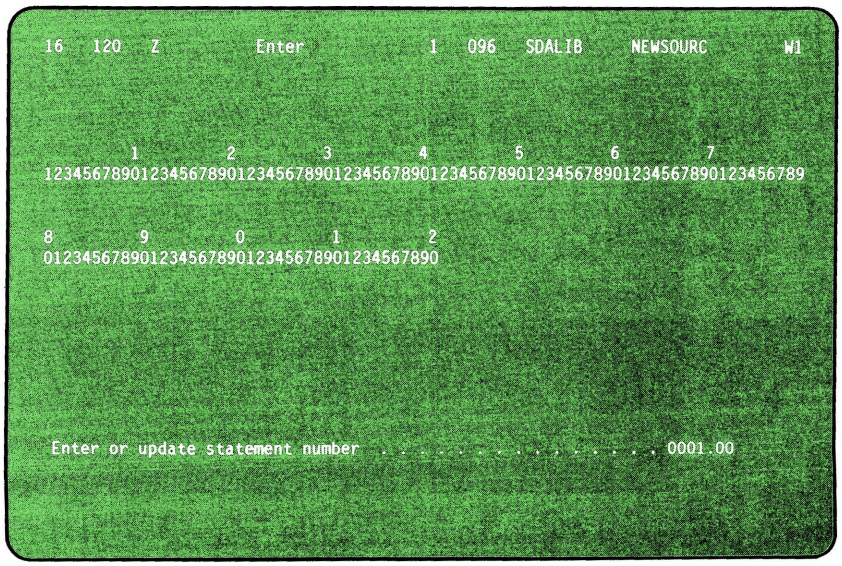
To end the job and return to the SDA Edit Selection display, press Cmd 7.

Using Source Entry Utility (SEU)

Step 1: Complete the SEU Enter Display

SEU shows a display on which you can type in source or procedure statements for a new member or update source statements or procedure statements within an existing member.

If you are creating a new member, SEU shows the following display:



If you are updating an existing member, SEU shows the existing source or procedure statements, and prompts you for the statement number you want to update. SEU also allows you to copy statements, move statements, or delete statements.

You can use command key 3 to select a display format that can help you enter or update source statements in the correct form for the particular application. When you press command key 3, the SEU Select display is shown:

```
                    Select display

  1 Z          17 WSU-J       33 FORTRAN     49
  2 Z-LOWER    18 WSU-E       34 COBOL       50
  3 H          19 WSU-T       35 SDAS        51
  4 U          20 WSU-M       36 SDAH        52
  5 F          21 WSU-S       37 SDAD1       53
  6 G          22 WSU-D       38 SDAD2       54
  7 E          23 WSU-C       39 DOC-H       55
  8 L          24 SFGR-S      40 AUTOR       56
  9 T          25 SFGR-H      41 MESSAGE     57
 10 I          26 SFGR-D      42 SRT-HEAD    58
 11 J          27 D-CONT      43 SRT-RECD    59
 12 C          28 SORTH       44 SRT-CNST    60
 13 O          29 SORTRF      45 SRT-FLD     61
 14 P          30 SORTRC      46 MICRSYS     62
 15 K          31 SORTF       47 MICRSTCK    63
 16 A          32 ASSEM       48             64

  Enter the number of the specification display you want. . . . .
```

Having pressed command key 3, you can select a display format which allows you to, for example, enter COBOL source statements:

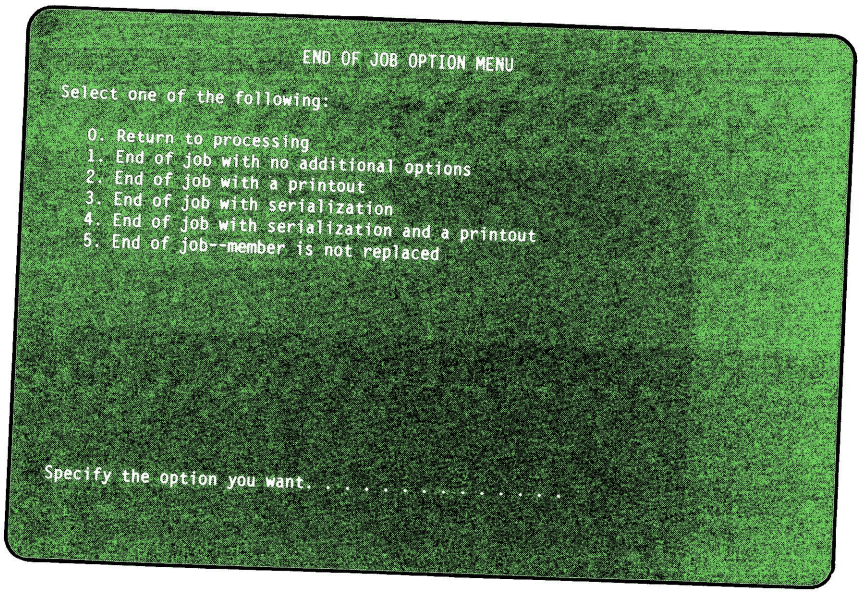
```
16   096   COBOL      Enter            1   096   SDALIB     NEWSOURC        W1


          1  1       2         3         4         5         6         7
123456 7 8901 234567890123456789012345678901234567890123456789012345678901 2

7      8 8        9
34567890 1234567890123456



Enter or update statement number . . . . . . . . . . . . . . . . . 0001.00
```

For more detailed information about using SEU to enter or update source or procedure statements, see the *SEU Guide*.

When you have completed entering or updating source or procedure statements, press command key 7; the SEU End of Job Option Menu appears.

Step 2: Complete the SEU End of Job Option Menu

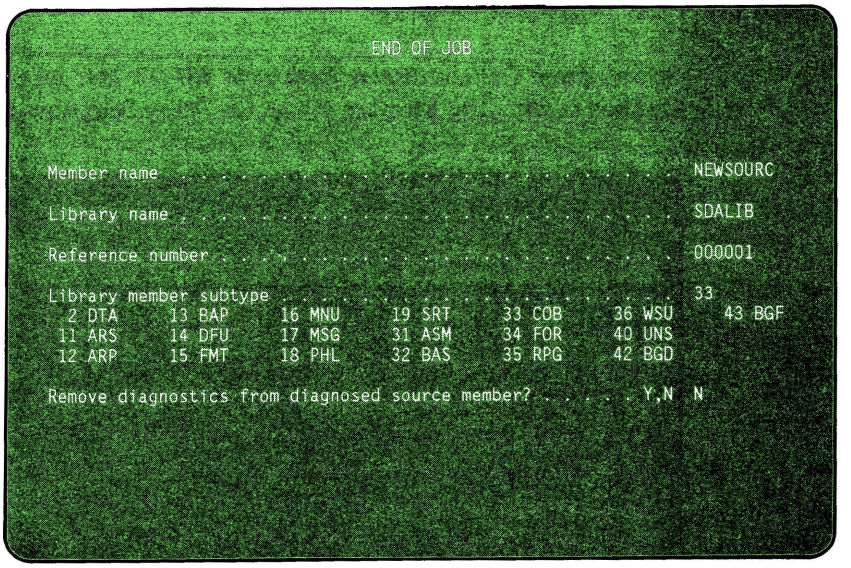
The following display is the SEU End of Job Option Menu for source members. A similar menu is shown for procedure members.



The End of Job Option Menu is used to specify what you want done with the work you have just completed. You can, for example, return to what you were doing, or end the job and get a printed listing of the statements in the source or procedure member. Select the appropriate end of job option and press the Enter key; the SEU End of Job display appears.

Step 3: Complete the SEU End of Job Display

The following display is the SEU End of Job display for source members. A similar display is shown for procedure members.



The SEU End of Job display is used to specify, for example, the name of the source or procedure member, and the library in which the created or updated member will be placed. For source members, you can also specify the member's subtype. For example, if you were working on a COBOL source program, you could specify subtype number 33 (COB).

Respond to the prompts on the SEU End of Job Display, and press the Enter key; you are returned to the Edit Selection display. You can then press command key 3 to return to the SDA Main Options menu, or you can continue to use SEU to enter or update another source or procedure member.

Viewing Display Formats in a Load Member

Option 7 (*View display formats in $SFGR load members*) of the SDA Main Options menu allows you to view display formats that you have already created. Option 7 is useful for checking the displays that you have designed and created before you create the programs that use them. In this way, you might uncover problems with your displays that you can correct by updating the display formats instead of the programs that use them. Using option 7, you can:

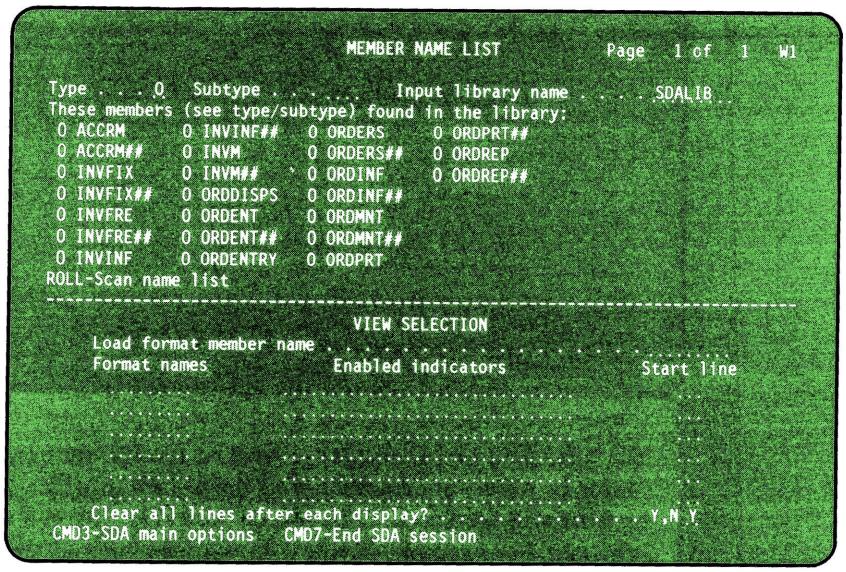
- View, in any order, a sequence of up to six compiled display formats from the same load member, or view all display formats in a load member in the order they are stored within the member.
- View the help displays that correspond to the compiled display formats.
- Select the start line number on which you want a display format to be displayed. You can display a maximum of six different display formats at the same time, and specify a different start line number for each format.

- Turn on specified indicators for each display format and view the results.

To view display formats in a load member, do the following:

Step 1: Complete the View Selection Display

Select option 7 (*View display formats in $SFGR load members*) of the SDA Main Options menu. The Member Name List/View Selection display appears:



The Member Name List/View Selection display is used to specify the display formats you want to view and how you want to view them. Respond to the prompts on the Member Name List/View Selection display:

Type: The member name list at the top of the display lists all load members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Member Name List/View Selection display is the current library, or is the last library you specified on this display. If the display format you want to view is in a different library, (1) move the cursor to this field, (2) type in the name of the library, and (3) press the Enter key.

Load format member name: Type in the name of the display format load member that contains the display formats you want to view.

You can continue responding to the prompts on the Member Name List/View Selection display, or you can press the Enter key. If you press the Enter key now, the Format Name List/View Selection display is shown:

The Format Name List/View Selection display lists all display formats in the specified load member. If there is more than one page of display format names, use the Roll keys to display those names.

Format names: Type in the names of the display formats you want to view in the column below this prompt, in the order you want to view them.

If you are not sure of the display format names, or if you want to view all the display formats in the specified load member, type in ALL. If you have a display format named ALL, only that display format will be displayed.

Enabled indicators: For each display format that you specify, type in the indicators you want to be turned on when SDA shows that display format. If you have typed in ALL in response to the previous prompt, the indicators that you specify are turned on for *all* the display formats that SDA will show.

Specify the indicators individually or as a range of numbers, and separate them with commas. For example, if you want to turn on indicators:

```
02, 05, 10 through 20, 23, 25, and 80 through 99
```

type in:

```
02,05,10-20,23,25,80-99
```

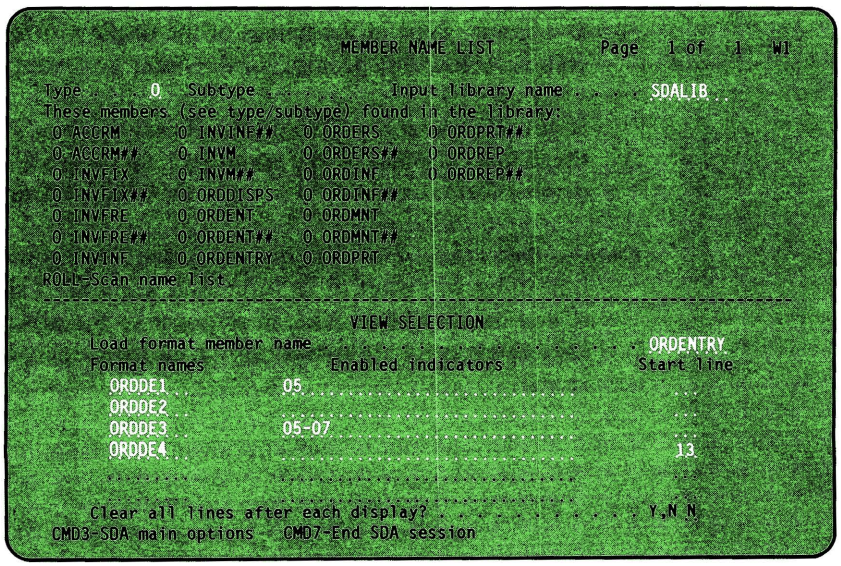
The indicators that you select will be the only indicators turned on when the displays are shown.

Start Line: For display formats with variable start line numbers, specify where the display format will be placed on the display screen (the start line number) when SDA shows it.

Clear all lines after each display? SDA clears the display screen before each display format is presented unless you specify otherwise. If you do not clear the display screen before each display format, you can view a complex display made up of a combination of several separate display formats; however, only the most recently added display format will accept data.

After you have responded to the prompts on the View Selection display, press the Enter key.

The following display shows what would be specified on the Member Name List/View Selection display to view display formats in the load member named ORDENTRY. ORDENTRY is contained in the library named SDALIB. ORDENTRY contains the display formats named ORDDE1, ORDDE2, ORDDE3, and ORDDE4. Indicator number 05 is turned on for ORDDE1, no indicators are turned on for ORDDE2, and indicators 05 through 07 are turned on for ORDDE3. Display format ORDDE4 is to have a start line of 13. (Because ORDDE4 replaces a portion of ORDDE3, you would not want to clear the display screen before ORDDE4 is shown.)



Considerations for Using Option 7

The following must be given special consideration while viewing display formats:

- Use of **command key 7**. Command key 7 *always* ends the viewing sequence, regardless of whether it is enabled by the display format.

- Use of **override fields**. If a display format uses the override fields operation, the display format must be shown a first time with the override disabled (the indicator is off), and then a second time with the override enabled (the indicator is on). Specify N (no) in response to the prompt *Clear all lines after each display?* Unpredictable results will occur if this two-pass procedure is not followed.

- Use of **erase input**. To avoid unpredictable results, disable erase input (the indicator is off) the first time the display format is shown. The display format can then be shown a second time with erase input enabled (the indicator is on). Specify N (no) in response to the prompt *Clear all lines after each display?*

- Viewing displays that have help displays defined for them. When you are viewing a display for which you have used H specifications to define help areas on the display, if a library name is not specified on the H specification for a help area, the help displays for that help area must be contained in the same library as the display you are viewing.

- Viewing System/34 displays. If you have transferred System/34 displays to System/36, these displays must be recompiled using option 2 (*Design display formats*) or option 9 (*Compile source format members with $SFGR*) of the SDA Main Options menu, or using the FORMAT procedure before you can use option 7 to view them.

Note: When using SDA's option 7 to view a series of mixed format displays, and to go from 80-column processing to 132-column processing, you must specify on the S-specification that the 132-column screen is to clear all lines. If you forget to clear all lines and then try to view the format using option 7, the following message appears:

```
SYS-5469 Invalid data was sent to this display station
```

When going from 132-column processing to 80-column processing, you should also specify in the S-specification that the 80-column screen clear all lines.

When you have finished using option 7 to view the displays, remember to go back to the S-specification and enter your original data into the clear all lines prompt and recompile the format.

Step 2: Progress Through the Viewing Sequence

The display formats that you specified on the View Selection display are displayed in the order that you specified them. You can enter data into input fields to check if the proper data type is allowed and to check if the field is formatted correctly when a field exit key is used. If you have created help formats for and have inserted the H specifications into the display formats of the displays you are viewing, you can position the cursor and press the Help key to display the help formats. To view the next display format in the viewing sequence, press the Enter key.

Step 3: End the Viewing Sequence

Press command key 7 to end the viewing sequence; the Format Name List/View Selection display appears. You can choose a new list of display formats, new indicators, and new start lines, or press command key 3 to choose a new library and a new display format load member, or press command key 7 again and return to the SDA Main Options menu.

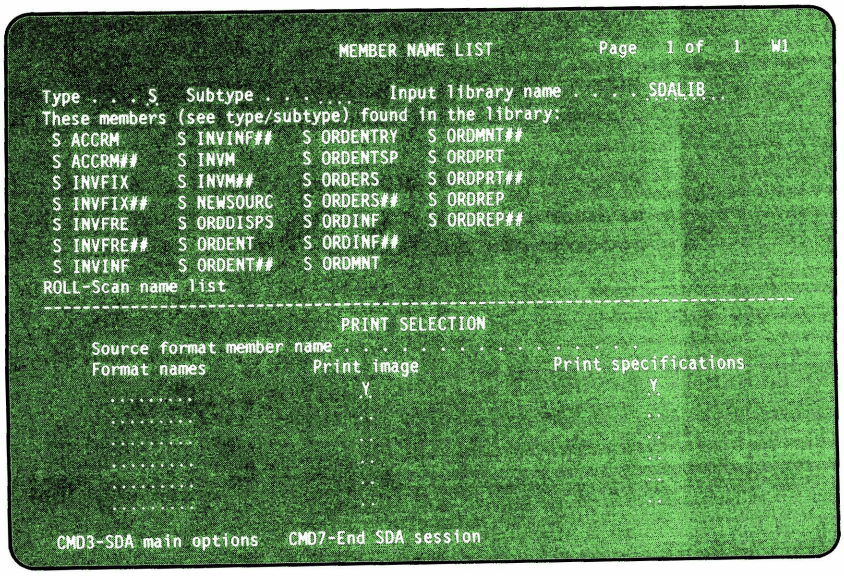
Printing Images of Display Formats in a Source Member

Option 8 (*Print display formats in source members*) of the SDA Main Options menu allows you to use the session printer to:

- Print copies of display formats and choose to print their source specifications
- Print the source specifications for display formats.

Step 1: Complete the Print Selection Display

Select option 8 (*Print display formats in source members*) of the SDA Main Options menu. The Member Name List/Print Selection display is shown:



The Member Name List/Print Selection display is used to specify the display formats that you want to work with. Respond to the prompts on the Member Name List/Print Selection display:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members).

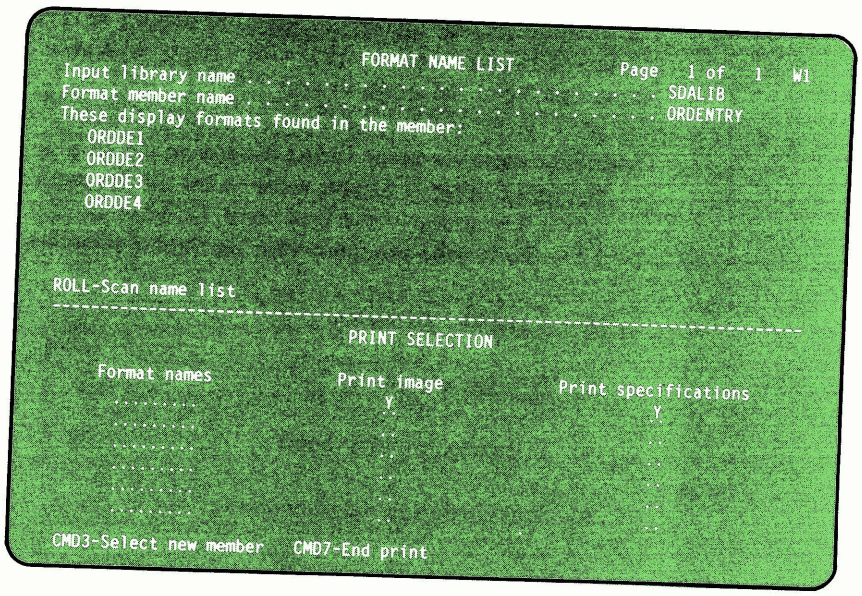
If there is more than one page of member names, use the Roll keys to display those names.

Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Member Name List/Print Selection display is the current library, or is the last library you specified on this display. If the display format you want to print is in a different library, (1) move the cursor to this field, (2) type in the name of the library, and (3) press the Enter key.

Source format member name: Type in the name of the display format source member that contains the display format you want to print.

You can continue responding to the prompts on the Member Name List/Print Selection display, or you can press the Enter key. If you press the Enter key now, the Format Name List/Print Selection display is shown:



The Format Name List/Print Selection display lists all display formats in the specified source member. If there is more than one page of display format names, use the Roll keys to display those names.

Format names: Type in the names of the display formats you want to print in the column below this prompt, in the order you want to print them.

If you are not sure of the display format names, or if you want to print all the display formats in the specified source member, type in ALL. If you have a display format named ALL, only the image of or the specifications for that display format will be printed.

Note: All of the display formats that you select must be designed for WSU programs, or *all* must be designed for non-WSU programs. You cannot mix WSU display formats and non-WSU display formats.

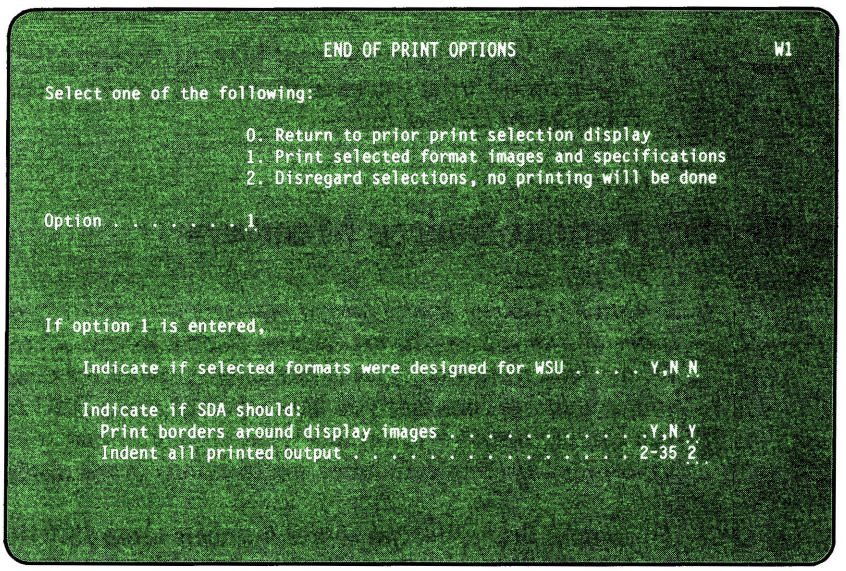
Print image: If you want to print an image of the specified display format, type in Y (yes). If you do not want to print an image, type in N (no).

Print specifications: If you want to print the source specifications of the specified display format, type in Y (yes). If you do not want to print the source specifications, type in N (no).

After you respond to the appropriate prompts, press the Enter key. You can specify a new print request and press the Enter key, or, if print selections were made, press command key 3 or press command key 7 to show the End of Print Options display.

Step 2: Complete the End of Print Options Display

The End of Print Options display appears after you have completed the Print Selection display.



The End of Print Options display is used to specify whether you want to return to the Format Name List/Print Selection display, whether SDA is to go ahead and print your request, or whether SDA is to disregard what you have entered on the Print Selection display. The End of Print Options display is also used to specify whether the display formats you want to print are used for WSU, and to specify how you want the images of the display formats to be printed. Select option 0, 1, or 2 on the End of Print Options display:

- Option 0 allows you to return to the Format Name List/Print Selection display to check or change what you entered on the display.

- Option 1 allows SDA to go ahead with the print operations that you requested on the Print Selection display. Option 1 is the default value for this display.

  If you select option 1, respond to the following prompts:

  Indicate if selected formats were designed for WSU: If the display formats you specified on the Print Selection display were designed for WSU programs, type in Y (yes). If they were not designed for WSU programs, type in N (no).

  Print borders around display images: If you want SDA to print a border that shows line and column numbers around each of the printed images, type in Y (yes). If you do not want a border, type in N (no).

  Indent all printed output: Normally, SDA prints the images starting in column 2. You can change the starting column by specifying a column number from 2 to 35.

After you have responded to the appropriate prompt or prompts, press the Enter key. If command key 7 was pressed on the Format Name List/Print Selection display, you return to the SDA Main Options menu. If command key 3 was pressed on the Format Name List/Print Selection display, you return to the Member Name List/Print Selection display.

- Option 2 means that you want SDA to disregard the print requests that you made on the Print Selection display. If you enter option 2, you return to the SDA Main Options menu.

Compiling Display Format Source Members

Option 9 (*Compile source format members with $SFGR*) of the SDA Main Options menu allows you to convert existing display format source members into display format load members. This is particularly useful for compiling display format source specifications that you have updated using DSU or SEU. For example, you can use option 9 to compile your display format source members after you have added H (help definition) specifications to the display formats.

To compile display format source members using $SFGR, select option 9 of the SDA Main Options menu. The Member Name List/Compile Selection display appears:

The Member Name List/Compile Selection display is used to specify the display format source member that you want to compile, whether SDA is to print the $SFGR output (the source specifications), and whether an existing load member is to be replaced with a newly compiled load member. Respond to the prompts on the Member Name List/Compile Selection display as follows:

Type: The member name list at the top of the display lists all source members in the input library. If you want to list all the members in the input library, (1) move the cursor to the type field, (2) type in a blank, and (3) press the Enter key. To list the members of a particular type, specify one of the following:

- S (source members)
- O (load members)
- P (procedure members)
- R (subroutine members).

If there is more than one page of member names, use the Roll keys to display those names.

Subtype: The member name list shows all members of a particular type, regardless of subtype. To list only the members of a particular subtype, (1) move the cursor to the subtype field, (2) type in an indication of the subtype you want displayed, and (3) press the Enter key. You can get a list of the allowed subtypes by moving the cursor to the subtype field and pressing the Help key.

Input library name: The library first shown on the Member Name List/Compile Selection display is the current library, or is the last library you specified on this display. If the display format source member you want to compile is in a different library, (1) move the cursor to this field, (2) type in the name of the library, and (3) press the Enter key.

Source format member name: Type in the name of the display format source member that you want to compile.

Output library name: Type in the name of the library that will contain the compiled load member. The library name first shown on the Compile Selection display will be the current library, or the last library you specified since you began using SDA. You can use the library already shown, or specify a new library in place of the displayed library name.

Load format member name: Type in the name of the display format load member. The load member name must be from 1 to 8 characters long; the first character must be alphabetic (A through Z, #, $, or @), and the remaining characters any character except blanks, commas (,), question marks (?), and periods (.).

Print $SFGR output? Specify the amount of information you want printed when the load member is compiled. Y (yes) means that you want to print a complete list of all the information from the compile operation:

- The name of the display format source member
- The display format S, H, and D specifications
- Any informational, warning, or terminating errors
- The input and output field descriptions
- A list of the indicators used
- The input and output library names

- The name of the display format load member
- The storage requirements for each format
- The data stream length for each format.

P (partial) means that you want to print only a partial list of the information from the compile operation:

- The name of the display format source member
- Any warning or terminating messages together with the statement causing the message, or any information messages
- The input and output library names
- The name of the display format load member.

N (no) means that you do not want any information printed except for the statements in error and the error messages.

Replace existing load member? If the specified load member already exists in the output library, and you want to replace it with the newly compiled version, type in Y (yes).

Note: You must specify a Y in both *Print $SFGR output* and *Replace existing load member?* to receive a printout.

Once you have responded to the prompts on the Compile Selection display, press the Enter key. SDA then calls the $SFGR utility program to compile the load member, and you are returned to the Compile Selection display. You can select a new source member to compile, or press command key 7 to return to the SDA Main Options menu.

A message is sent to your display station (the display station alarm sounds) when the $SFGR utility program completes the compile operation. That message indicates whether the load member was successfully compiled or whether an error ended the compilation before it was complete. You can display the message when you sign off SDA, or by pressing the ATTN key and selecting option 6 of the Inquiry Options display to display messages.

Chapter 9. Recovering from an Interrupted Screen Design Aid Session

SDA helps you to recover from an unplanned end of an SDA session. You can be interrupted from an SDA session for various reasons, including the following:

- You try to place a newly created or updated member in a library that has insufficient space to contain that member
- The work file that SDA uses is too small to contain the work you are doing
- You press the attention (ATTN) key to enter Inquiry mode, and then select option 2 (Cancel job and close files) or 3 (Cancel job and do not close files) on the Inquiry Options display
- You are signed off your display station by the system operator
- The display station you are working at is turned off by mistake
- A system failure occurs
- An electrical failure occurs.

SDA helps you to recover most of the work from an interrupted session.

What SDA Does To Help You Recover

SDA creates two work files as you use the utility. These work files are named #S2.ww and #SD.ww, where ww is the display station ID of the display station at which you are working. In order for you to recover from an interrupted SDA session, these work files must exist in the proper form. If someone has named a file with either of these work file names, the recovery will not be possible.

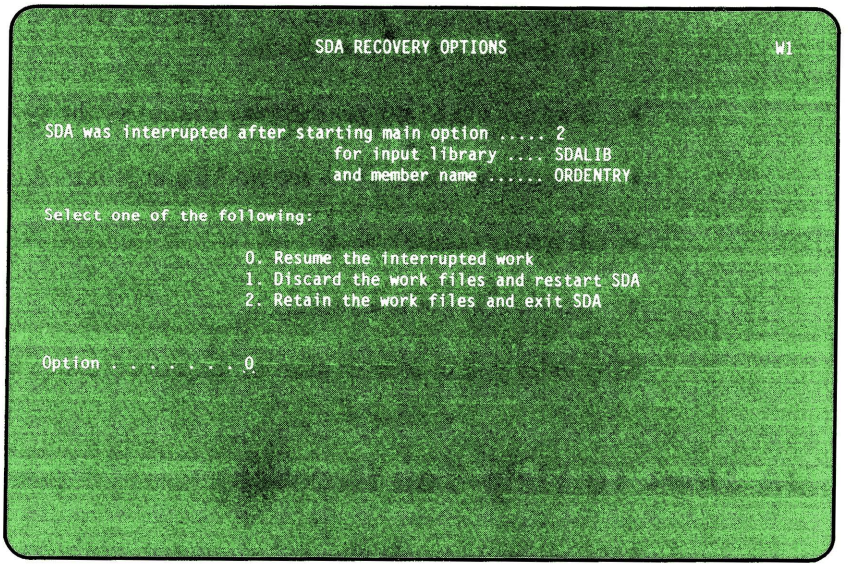
All important parameters that SDA uses are placed in these work files. SDA also notes its progress through any session so it can rebuild all the work done up to the last step of the session before the interruption occurred.

What You Must Do To Recover

When you are ready to try the recovery, you must sign on to the same logical display station as where the interruption happened. A display station is always assigned a display station ID. That ID is shown in the top right corner of the command display. The display station that you work at usually has the same display station ID each time you sign on to it. If your display station has an ID of W3, for example, and you want to recover from an unplanned interruption of SDA, you must sign on to display station W3.

Note: Display station IDs can be changed using the CNFIGSSP procedure. If display station IDs have been changed since the interruption, the display station you were working at might no longer have the same display station ID. You must locate and sign on to the display station that has the ID you were originally using.

When you sign on to the correct display station and run the SDA procedure, you will see the SDA Recovery Options display. The SDA Recovery Options display is shown in place of the SDA Main Options menu whenever you return to SDA after an unplanned interruption.



Because the SDA recovery is based on the display station at which the interruption occurred, someone else could sign on to that display station, try to use SDA, and be shown the SDA Recovery Options display. For that reason, it is best to try to recover your work with SDA immediately after the interruption occurs.

The SDA Recovery Options display tells you the following things about the interrupted session:

- The SDA option that was in use
- The session library
- The library member that was in use.

You are asked to choose between continuing the interrupted work, delaying the recovery, or discarding the interrupted work.

Saving the Interrupted Work

The following options on the Recovery Options display allow you to save the work that you were doing at the time of the interruption.

- Option 0 allows you to resume the work that you were doing. Your session will be resumed at the last definition display or member selection display that you were using. It is possible to save or disregard portions of a recovered SDA session by selecting the appropriate options on the end of task displays.

- Option 2 allows you to postpone the recovery until another time. If you select option 2, the work file is saved, but you will be signed off SDA. You cannot use SDA at this display station until you either have resumed work on the recovered session (option 0) or have discarded the work file and the work that you were doing (option 1).

Discarding the Interrupted Work

Option 1 allows you to discard the work file and the work you were doing at the time of the interrupted session. If you select option 1, you return to the SDA Main Options menu, and you can begin work on a new session. No record of the interrupted work is saved.

Chapter 10. Creating Menus without the Screen Design Aid

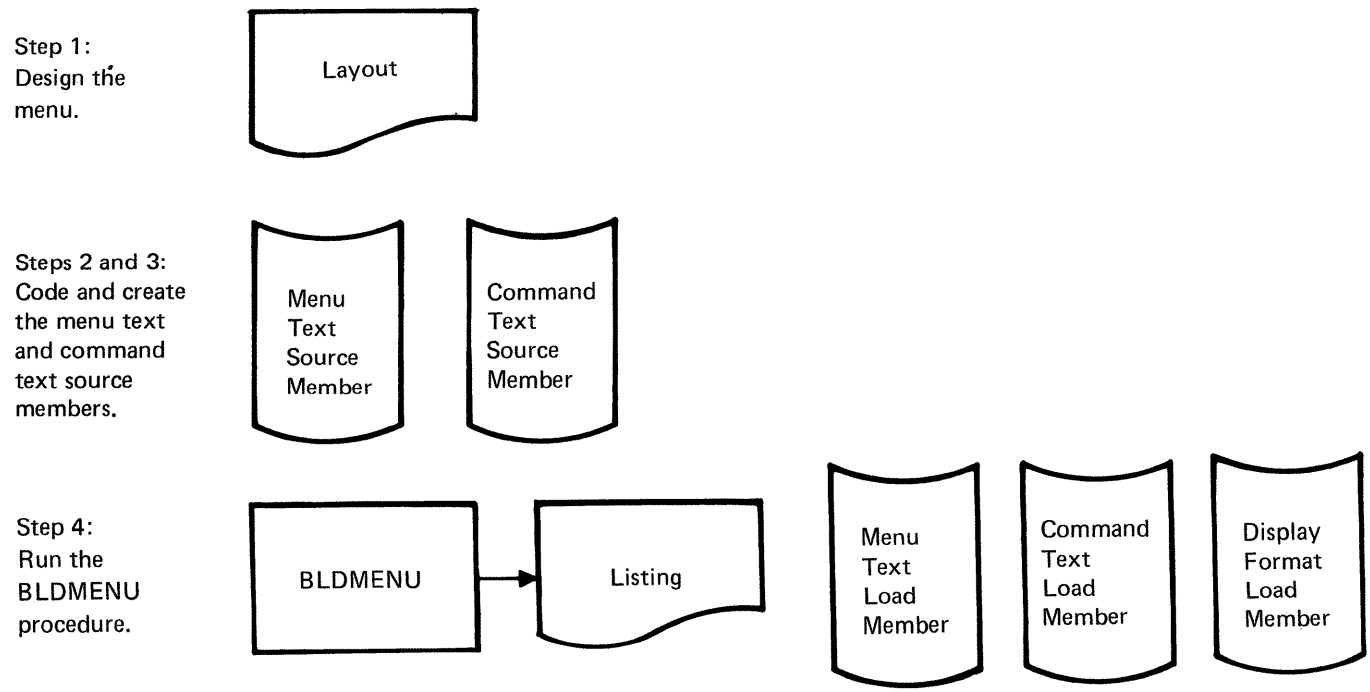
If you choose not to use the screen design aid utility (SDA) to create your menus, or if you do not have SDA on your system, use the BLDMENU procedure. The BLDMENU procedure is an SSP procedure; the BLDMENU procedure runs an SSP utility called the build menu ($BMENU) utility program.

You use the menu text member to tell the system how you want your menu to look. You use the command text member to tell the system what to do for each menu option shown on your menu. Those two source members are created using any one of the following programs:

- Development support utility (DSU), or
- Source entry utility (SEU), or
- The $MAINT SSP utility program.

The source members are then used as input to the BLDMENU procedure. When you run the BLDMENU procedure, the system creates the menu text load member and the command text load member. A display format load member is also created. The load members are used by the system to display your menu and to process the selected menu option.

The following illustration summarizes the steps you must follow when you use the BLDMENU procedure to create your menus.



Step 1: Lay Out the Menu the Way it Will be Displayed

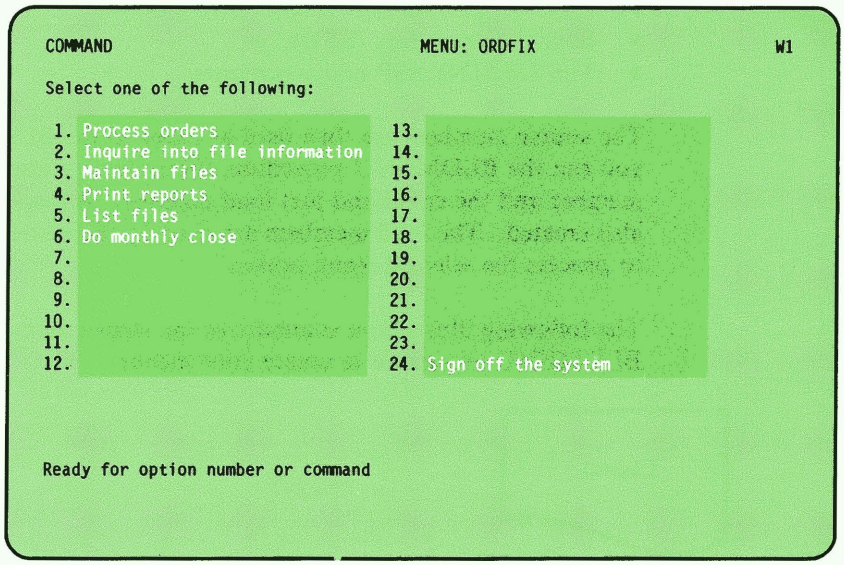
The first step in creating a menu involves the layout of the menu as it will be displayed. You can do the layout on a blank piece of paper. The two types of menus, fixed-format and free-format, provide different formats for the design of your menus.

Laying Out a Fixed-Format Menu

On a fixed-format menu, you are provided 24 possible option numbers for operator selection. You use only as many as are needed for your application. The system determines the placement of all option numbers and their descriptions.

On a fixed-format menu, you are limited to 30 positions of alphameric text (including blanks) for each option description. In ideographic mode, you can enter 30 A/N/K characters, 14 ideographic characters, or a combination of both.

The following shows the areas you can use to provide descriptive text for the operator, and an example of the descriptive text you could provide:



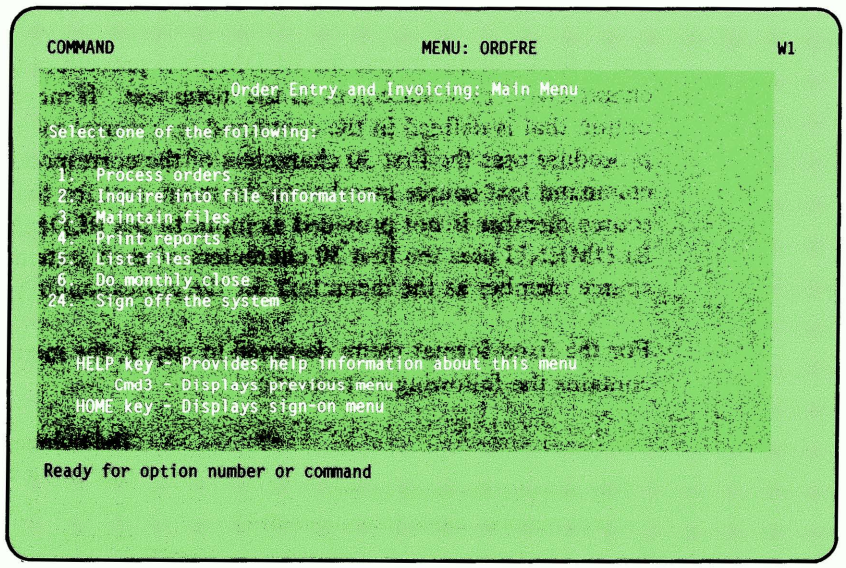
The system determines what will appear on lines 1 through 4. Those lines are reserved for certain control information that shows the display mode, the display station ID, and the menu name. The system also reserves lines 17 through 24 for operator input and system messages.

Laying Out a Free-Format Menu

A free-format menu lets you completely define lines 3 through 20 of the menu. You decide the placement and the number of option numbers available to the operator. The maximum number of positions of text (including blanks) for each line on the menu is 75. That text must appear in columns 2 through 76 of the menu.

Free-format menus can also use text that is A/N/K, ideographic, or both. The text can extend over more than one line. To avoid errors, ensure that each ideographic character string on each line is bracketed by a SO and a SI character. That is, if the last character on one line is ideographic, and the first character on the next line is ideographic, put a SI to end the first line and a SO to start the next line.

The following shows the area you can use for any descriptive text you might want to provide the operator, and an example of the descriptive text that you could provide:



For a free-format menu, the system determines what will appear on lines 1 and 2. Those lines are reserved for the display mode, the display station ID, and the menu name. Lines 21 through 24 are reserved for operator input and system messages.

Step 2: Code the Menu Source Members

Two types of source members are used as input to the BLDMENU procedure:

- The **menu text source member** is optional for fixed-format menus, but is required for free-format menus. The menu text source member defines the text that appears on the menu.

- The **command text source member** is required for both fixed-format and free-format menus. The command text source member contains the command or procedure that is processed when the operator selects an option from the menu.

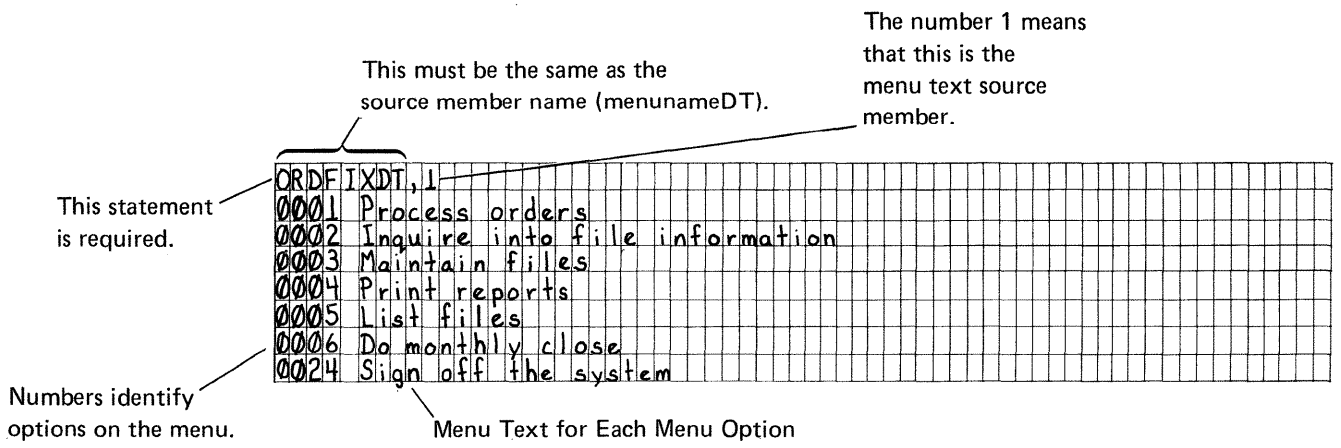
Coding the Menu Text Source Member for a Fixed-Format Menu

The name of the **menu text source member** is the 1- through 6-character, alphameric, name of the menu followed by the characters DT. For example, for menu ORDFIX, the menu text source member is named ORDFIXDT.

Each statement in the menu text source member is identified by a 4-digit number (with leading zeros) and one blank; the 4-digit number corresponds to the descriptive text for an option on the menu. For example, the contents of statement 0004 correspond to option 4 of the menu. You do not have to provide descriptive text for every possible option number.

For a fixed-format menu, the BLDMENU procedure uses only the first 30 characters of each statement as the menu text. If menu text is not defined for an option that is defined in the command text source member, the BLDMENU procedure uses the first 30 characters of the corresponding statement in the command text source member as the menu text for that option. If a menu text source member is not provided as input to the BLDMENU procedure, BLDMENU uses the first 30 characters of each statement in the command text source member as the menu text for the corresponding options.

For the fixed-format menu designed in step 1, the menu text source member contains the following statements:



The first statement of the menu text source member must be in the form **menunameDT,1**: the menu name plus the characters DT identifies the name of the source member; the character 1 means that it is the menu text source member for your menu.

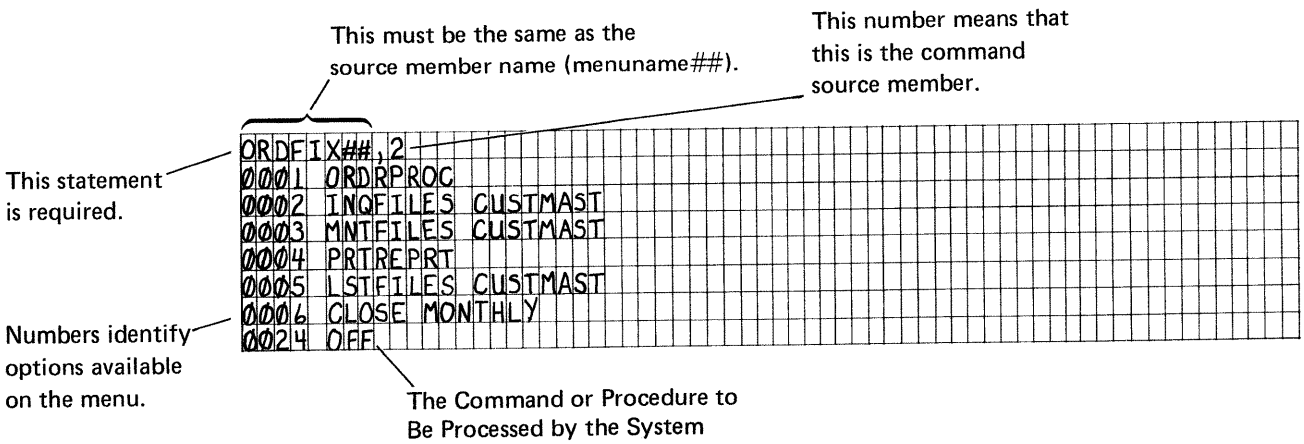
Coding the Command Text Source Member for a Fixed-Format Menu

The name of the **command text source member** must be the name of the menu followed by the characters ##. For example, if the menu being created is called ORDFIX, the name of the command text source member must be ORDFIX##.

Each line in the command text source member defines a command or procedure statement to be processed by the system when the operator selects an option from the menu. The statements in the member correspond to the menu options that

can be selected by the operator. The BLDMENU procedure uses only the first 120 characters of each statement in the command text source member; the command or procedure statements to be processed must not be longer than 120 characters. You do not have to provide a command statement for every possible item number, but you must provide command text for each option for which you supply menu text.

For the fixed-format menu designed in step 1, the command text source member contains the following statements:



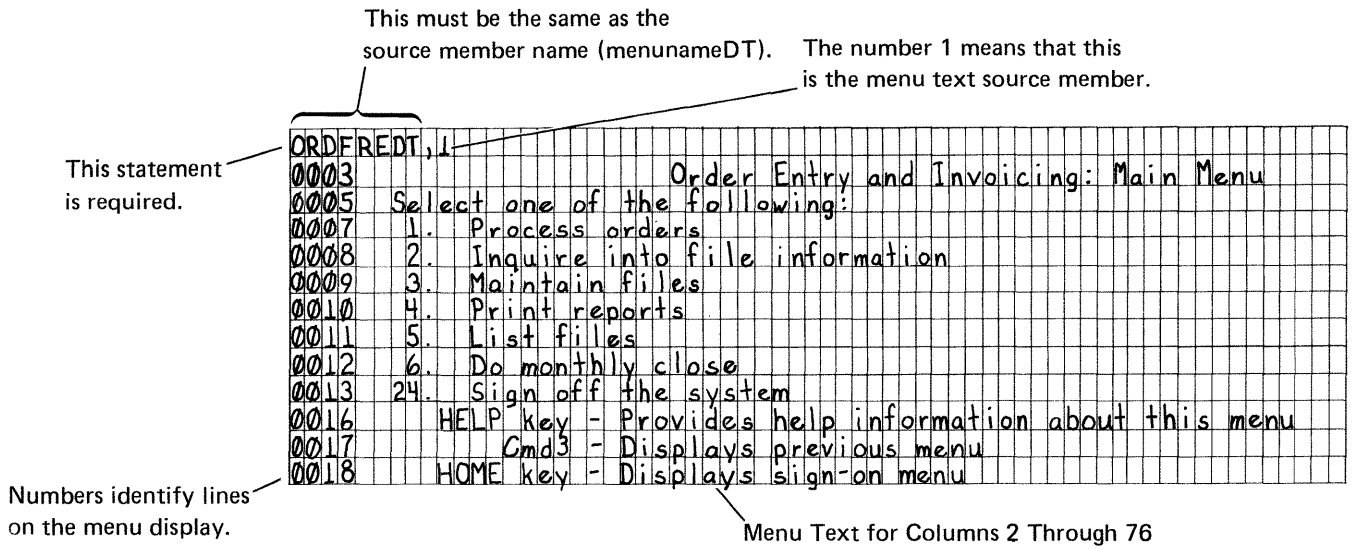
The first statement of the command text source member must be in the form **menuname##,2**: the menu name plus the characters ## identifies the name of the source member; the character 2 means that it is the command text source member for your menu.

Coding the Menu Text Source Member for a Free-Format Menu

Each line on the menu is defined by a corresponding statement in the menu text source member. Each statement defines the contents of columns 2 through 76 (75 possible characters) of a line on the menu. Each statement is identified by a 4-digit number (with leading zeros) and one blank; the 4-digit number corresponds to a line on the menu. For example, the contents of statement 0004 correspond to line 4 of the menu. Blank lines on the menu do not have to be coded in the menu text source member.

Menu text can be used to explain the command or procedure to be processed for each menu option, and it can be used for any other text that might be helpful to the operator. Menu text might include a prompt such as *Select one of the following*, or it might explain the keys that can be used with the menu.

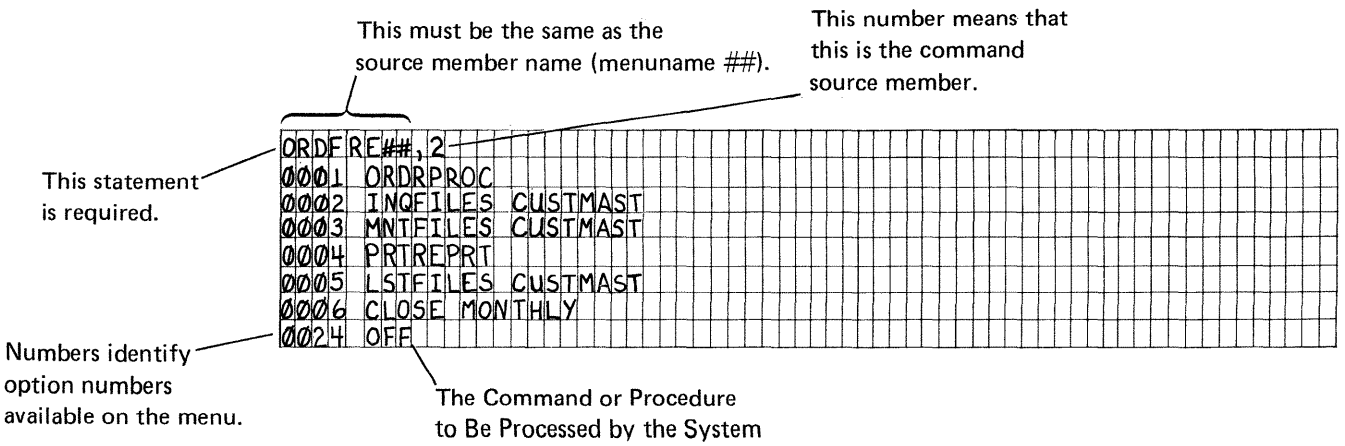
For the free-format menu designed in step 1, the menu text source member contains the following statements:



Coding the Command Text Source Member for a Free-Format Menu

Each statement in the source member defines a command or procedure to be processed by the system when the operator selects an option from the menu. The 4-digit numbers before each statement correspond to the menu options that can be selected by the operator. For example, option number 6 corresponds to statement 0006 of the command text source member.

For the free-format menu designed in step 1, the command text source member contains the following statements:



Defining Help Text for Menus

To define help text for your menus you must use SDA. For more information, see "Creating or Maintaining Menu Help Text," in Chapter 5.

Step 3: Create the Menu Source Members

Use the development support utility (DSU), an optional program product, the source entry utility (SEU), a portion of the optional Utilities Program Product, or the $MAINT SSP utility program to enter the source lines coded in step 2 for the command and menu text source members.

You can access DSU, if it is loaded on your system, by selecting option 6 on the SDA Main menu display or by typing DSU and pressing Help on any System/36 menu. If SEU is loaded on your system, you can access that program in the same way as you would DSU. If you have both DSU and SEU on your system, you can access DSU through SDA, (option 6), but can access SEU only by typing SEU and pressing Help on any System/36 menu. DSU lets you edit more than one line at a time, while SEU lets you edit only one line at a time.

For information about how to use DSU or SEU to create a source member, see Chapter 8, "Additional Services Provided by the Screen Design Aid," and the *Development Support Utility Guide*, SC09-1085.

If you choose not to use DSU or SEU to create the source members, use the $MAINT SSP utility program. The $MAINT program accepts only uppercase characters; therefore, THE DESCRIPTIVE TEXT YOU ENTER FOR YOUR MENUS IS DISPLAYED IN UPPERCASE ONLY.

The $MAINT SSP program requires certain utility control statements. The utility control statements must be entered in order for $MAINT to create a source member. The following shows the statements used to create the menu text source member for ORDFRE. A similar set of statements is used to create the menu text source member for a fixed-format menu.

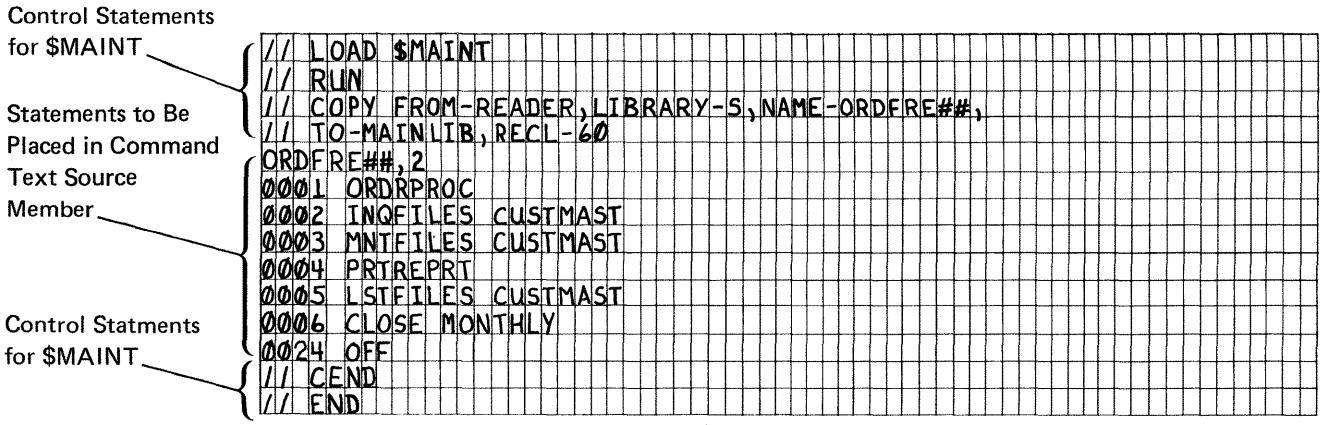
Control Statements for $MAINT

Statements to Be Placed in Menu Text Source Member

Control Statements for $MAINT

```
// LOAD $MAINT
// RUN
// COPY FROM-READER,LIBRARY-S,NAME-ORDFREDT,
// TO-MAINLIB,RECL-80
ORDFREDT,1
0003                          ORDER ENTRY AND INVOICING: MAIN MENU
0005   SELECT ONE OF THE FOLLOWING:
0007     1.  PROCESS ORDERS
0008     2.  INQUIRE INTO FILE INFORMATION
0009     3.  MAINTAIN FILES
0010     4.  PRINT REPORTS
0011     5.  LIST FILES
0012     6.  DO MONTHLY CLOSE
0013    24.  SIGN OFF THE SYSTEM
0016        HELP KEY - PROVIDES HELP INFORMATION ABOUT THIS MENU
0017             CMD3 - DISPLAYS PREVIOUS MENU
0018        HOME KEY - DISPLAYS SIGN-ON MENU
// CEND
// END
```

The following shows the statements used to create the command text source member for the free-format menu named ORDFRE. A similar set of statements would be used to create the command text source member for a fixed-format menu.



For more information about creating a source member using the $MAINT utility program, see the System/36 manual *System Reference*.

Step 4: Run the BLDMENU Procedure

Using the command and menu text source members created in steps 2 and 3, the BLDMENU procedure creates:

- The **menu text load member**, which is created from the menu text source member. The menu text load member, in turn, is used to create the display format load member for the menu. This menu text load member is not required to display a menu and can optionally be removed.
- The **display format load member** for the menu. The display format load member is required and is used by the system to display the menu.
- The **command text load member**, which is created from the command text source member. The command text load member is required for both fixed-format and free-format menus.

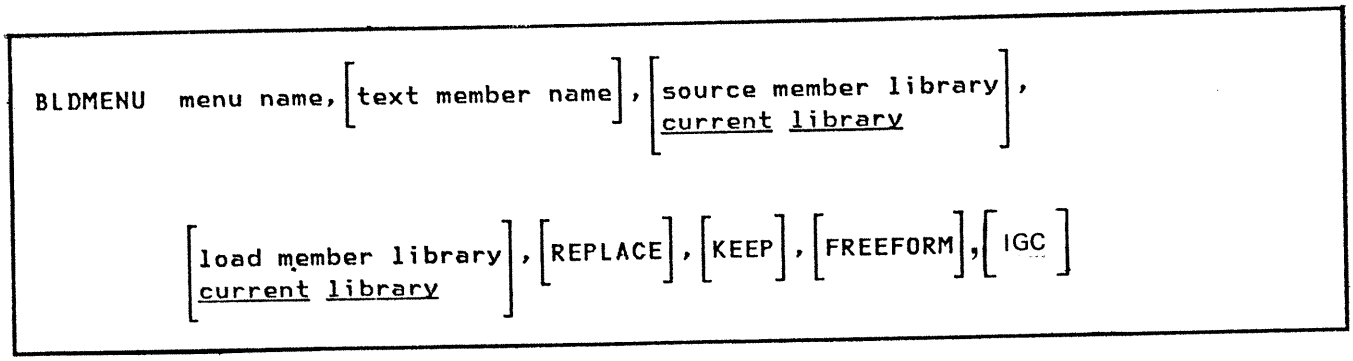
The BLDMENU procedure also produces a printed listing showing information about the menu just created. That listing is discussed later in this chapter.

The BLDMENU procedure requires work space on disk to build the display format load member. If not enough space is available, a message is issued.

The following pages describe the BLDMENU procedure. The $BMENU utility program is run when you enter the BLDMENU procedure. For more

information about the $BMENU utility program, see the *System Reference* manual.

Procedure Format



Parameter Descriptions

menu name specifies the 1- through 6-character name of the menu that you want to create. The menu name that you specify is the name that is given to the display format load member for that menu. You will receive an error message if the menu name has more than 6 characters.

text member name specifies the 1- through 8-character name of the menu text source member, if one exists. The text member name that you specify is the name of the menu text source member that you created in steps 2 and 3. The text member name must be **menu name** followed by the characters **DT**. For example, if the name of the menu is PAYROL, the text member name that you specify must be PAYROLDT.

The text member name parameter is required if you are creating a free-format menu; this parameter is optional if you are creating a fixed-format menu. When creating a fixed-format menu, do not specify FREEFORM. *If the menu text member is not named, the BLDMENU procedure uses the information in the command text source member to generate the descriptive text for the items in the fixed-format menu.*

If you are using the BLDMENU procedure to update a menu that was created using the screen design aid (SDA), a menu text source member with the name menunameDT will not exist. To update such a menu using the BLDMENU procedure, use only the name of the menu for the text member name parameter; do *not* use the name of the menu plus the characters DT. In addition, when you use the BLDMENU procedure to update a menu created using SDA, you *must* specify the KEEP parameter.

source member library specifies the input library that contains the command and menu text source members. If a source member library is not specified, the current library is assumed.

load member library specifies the output library that will contain the display format load member for the menu, the command text load member, and if KEEP is also specified, the menu text load member. If a load member library is not specified, the current library is assumed.

Note: If the source member library and the load member library are not the same, the BLDMENU procedure copies the source members to the load member library when it begins processing. Thus, when the BLDMENU procedure is run, the load member library must have enough space to contain two source members, as well as the three load members created by the BLDMENU procedure. The BLDMENU procedure removes the source members from the library before ending.

REPLACE specifies that:

- If a display format load member with the same name as the menu being created already exists in the output library, the BLDMENU procedure is to remove the existing member from the output library automatically, and replace it with the newly created display format load member.

- If a load member with the same name as the menu being created already exists in the output library, and that load member is *not* a display format load member, the BLDMENU procedure displays an error message. You must then decide whether to replace the existing load member in the output library or to cancel the job.

- If the name of the command text source member or the menu text source member is the same as the name of a source or load member in the output library, the BLDMENU procedure is to replace the existing members in the output library automatically.

If REPLACE is not specified, the following occurs:

- If a load member with the same name as the menu being created already exists in the output library, the BLDMENU procedure displays an error message. You must then decide whether to cancel the job or to remove the existing member from the output library and replace it with the new one.

- If the name of the command text source member or the menu text source member is the same as the name of a source member in the output library, the BLDMENU procedure displays an error message and you must cancel the job.

Note: If a menu is rebuilt while it is being displayed, the display station operator should request the rebuilt menu by entering the MENU operator control command. If this is not done, the old version of the menu is displayed, but it might not have the same command input defined for the new menu.

KEEP specifies that if the text member name parameter is also specified, the menu text load member created by the BLDMENU procedure is to remain in the output library. If KEEP is not specified, the menu text load member is removed from the output library before BLDMENU ends. Removing the

menu text load member from the output library does not affect how your menu is displayed or how your menu will work.

If you use the BLDMENU procedure to update a menu created using SDA, you *must* specify the KEEP parameter.

FREEFORM specifies that a free-format menu is to be created. If FREEFORM is not specified, a fixed-format menu is created. If FREEFORM is specified, a text member name must also be specified.

IGC specifies that the system-generated text (for example, the ENTER NUMBER, COMMAND, OR OCL prompt) should be displayed as ideographic characters and ideographic data can be entered into the input field of the menu screen. The IGC parameter is for the ideographic version of the SSP and is ignored for nonideographic systems.

Notes:

1. *If you try to print output with ideographic headings at a nonideographic printer, blanks are printed in place of the ideographic characters.*

2. *If the menu screen is printed, the READY FOR OPTION NUMBER OR COMMAND prompt contains extraneous blanks between some of the ideographic characters. These blanks are not shown when the menu screen is displayed, however.*

CAUTION
If you build a menu and the IGC parameter is used, the menu cannot be displayed from a nonideographic display station.

Example A: Creating a Fixed-Format Menu

Create the fixed-format menu named ORDFIX. The menu text source member is named ORDFIXDT, and the command text source member is named ORDFIX##. Both source members are stored in the library named MAINLIB. The command text and display format load member are to be stored in MAINLIB. The menu text load member is to be saved also; it is not to be removed from MAINLIB when the BLDMENU procedure ends.

```
BLDMENU ORDFIX,ORDFIXDT,MAINLIB,MAINLIB,,KEEP
```

Example B: Creating a Free-Format Menu

Create the free-format menu named ORDFRE. The menu text source member is named ORDFREDT, and the command text source member is named ORDFRE##. Both source members are stored in the library named MAINLIB. The command text and the display format load member are to be stored in MAINLIB, and the menu text load member is to be removed from MAINLIB before the BLDMENU procedure ends.

```
BLDMENU ORDFRE,ORDFREDT,MAINLIB,MAINLIB,,,FREEFORM
```

Output from the BLDMENU Procedure

The BLDMENU procedure produces a listing that contains the following:

- A partial $SFGR listing
- The option numbers and the corresponding statements from the command text source member
- The actual menu text that will appear on the menu.

Note: For users of the ideographic version of the SSP, if IGC is specified on the BLDMENU procedure, the menu screen will be displayed in Kanji. On this screen, the command line which contains 'Ready for option number or command' is displayed in Kanji. When the menu text display image is printed for the BLDMENU output listing, this command line will contain extraneous blanks between some of the Kanji characters. This is a permanent restriction for the BLDMENU output listing only. These extraneous blanks do not appear when the menu screen is displayed.

Chapter 11. Creating Display Formats and Help without the Screen Design Aid

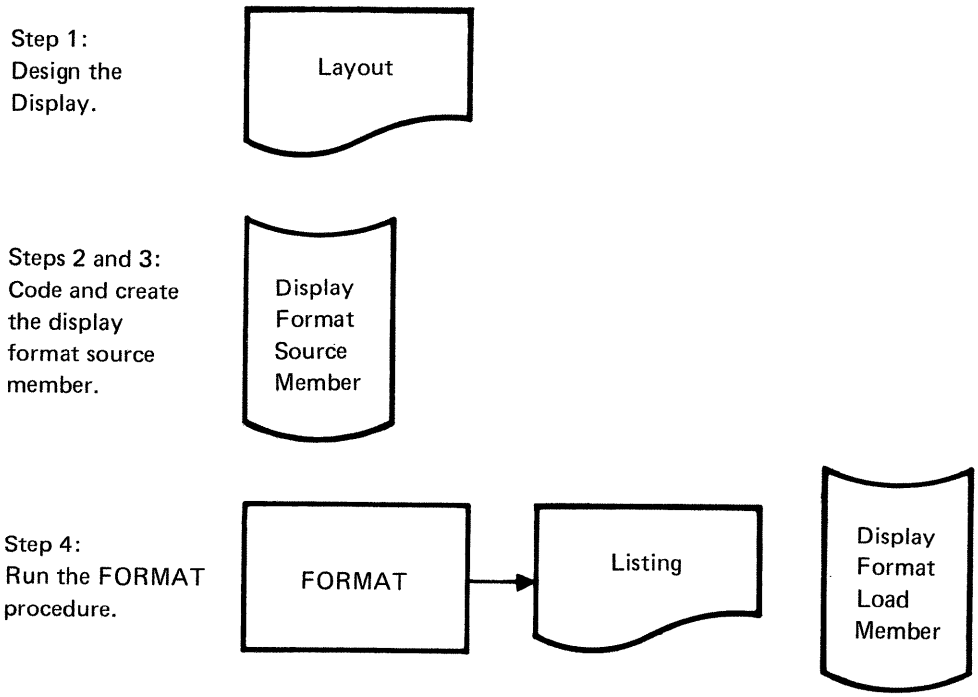
If you choose not to use the screen design aid (SDA) to create your display formats, or if you do not have SDA on your system, use the FORMAT procedure. The FORMAT procedure is an SSP procedure; the FORMAT procedure runs an SSP utility called the screen format generator ($SFGR) utility program.

A display format defines how information is to be displayed at a display station. The display format is built from a set of source statements called display format specifications. The source statements for each display format are entered into a display format source member using one of the following programs:

- The development support utility (DSU), an optional program product, or
- The source entry utility (SEU), a part of the optional Utilities Program Product, or
- The $MAINT utility program.

When you run the FORMAT procedure, the system uses the display format source member to create the display format load member. The display formats contained in that load member are then used by the system to show the displays your programs or procedures will use.

The following illustration summarizes the steps you must follow when you use the FORMAT procedure to create your display formats:

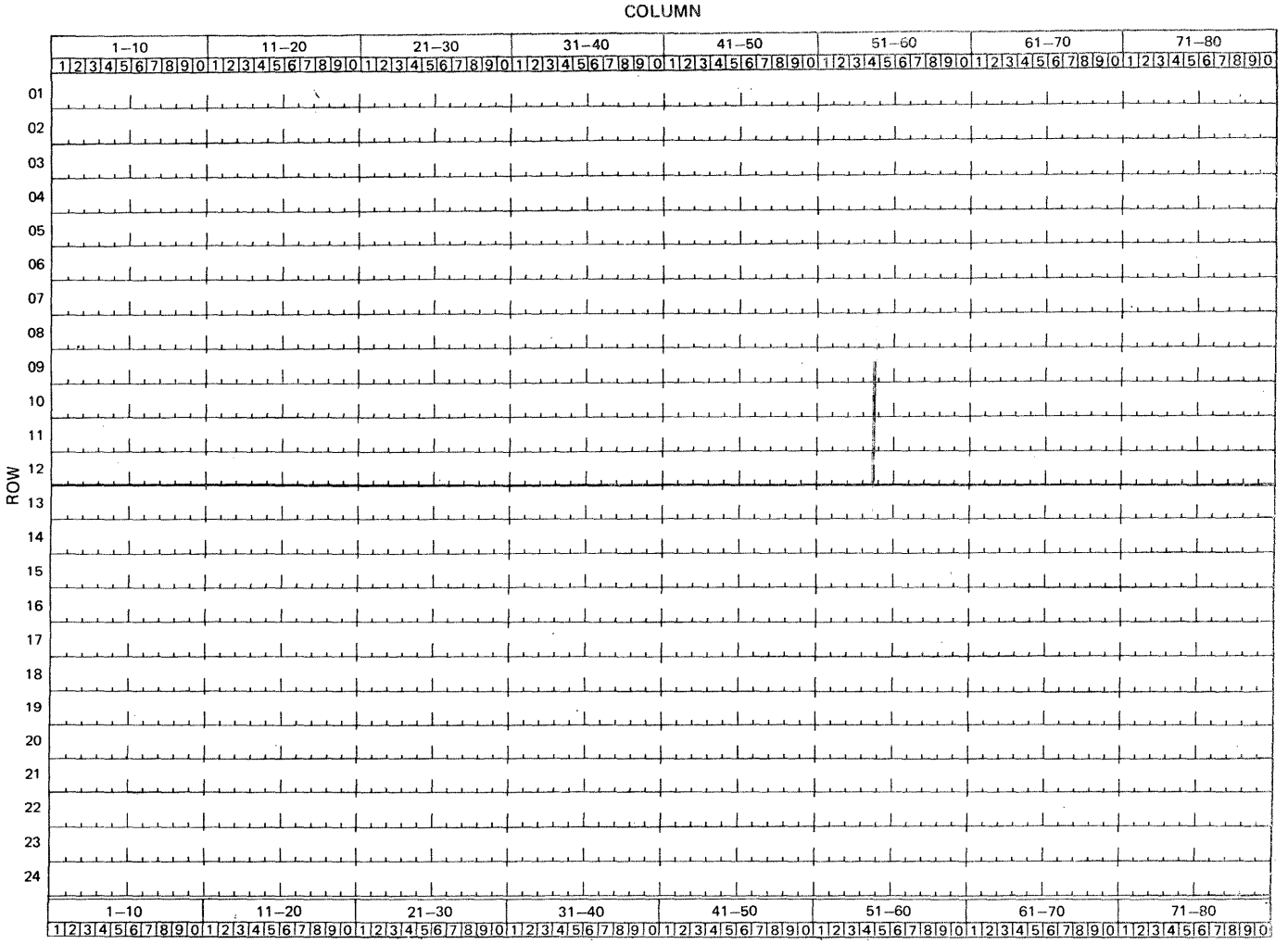


Step 1: Arrange the Display on the Layout Sheet

You can use the *IBM 5251 Display Station Keyboard Template Assignment Sheet and Display Screen Layout Sheet* to lay out your displays as they will appear on the display screen. (If you do not have this form, a blank sheet of paper can be used.)

On the Display Screen Layout Sheet, the 80 columns of the display screen are marked at the top and arranged in groups of 10. The 24 lines of the display screen are marked at the left. This form provides a line-by-line and column-by-column documented plan for each display that you design. In size, it is nearly the same as a 5251 display screen.

Display Screen Layout Sheet



You can use the Display Station Keyboard Template Assignment Sheet as a worksheet for assigning function and command keys used by your program.

IBM®

5250 Information Display System
Keyboard Template Assignment Sheet and
Display Screen Layout Sheet

Format Name _____ Description _____

Job Name _____ Sheet _____ of _____

Originated by _____ Date _____

Display Mode	13	14	15	16	17	18	19	20	21	22	23	24	Clear
	1	2	3	4	5	6	7	8	9	10	11	12	Test Request

Keyboard Template Assignments

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	

Address comments concerning this form to IBM Corporation, Department 245, Rochester, Minnesota 55901.

File No. S5250/S34/S38-89

GX21-9271-1 UM/050*
Printed in U.S.A.

*Number of forms per pad could vary slightly.

When you identify your displays and display formats, you should follow a recognizable naming scheme. In doing so, you can easily keep track of where and how your displays and display formats are used.

The first display in an order entry application is named ORDDE1; that display has an ID of E1. The name of the display format that defines display E1, ORDDE1, is formed by combining the following:

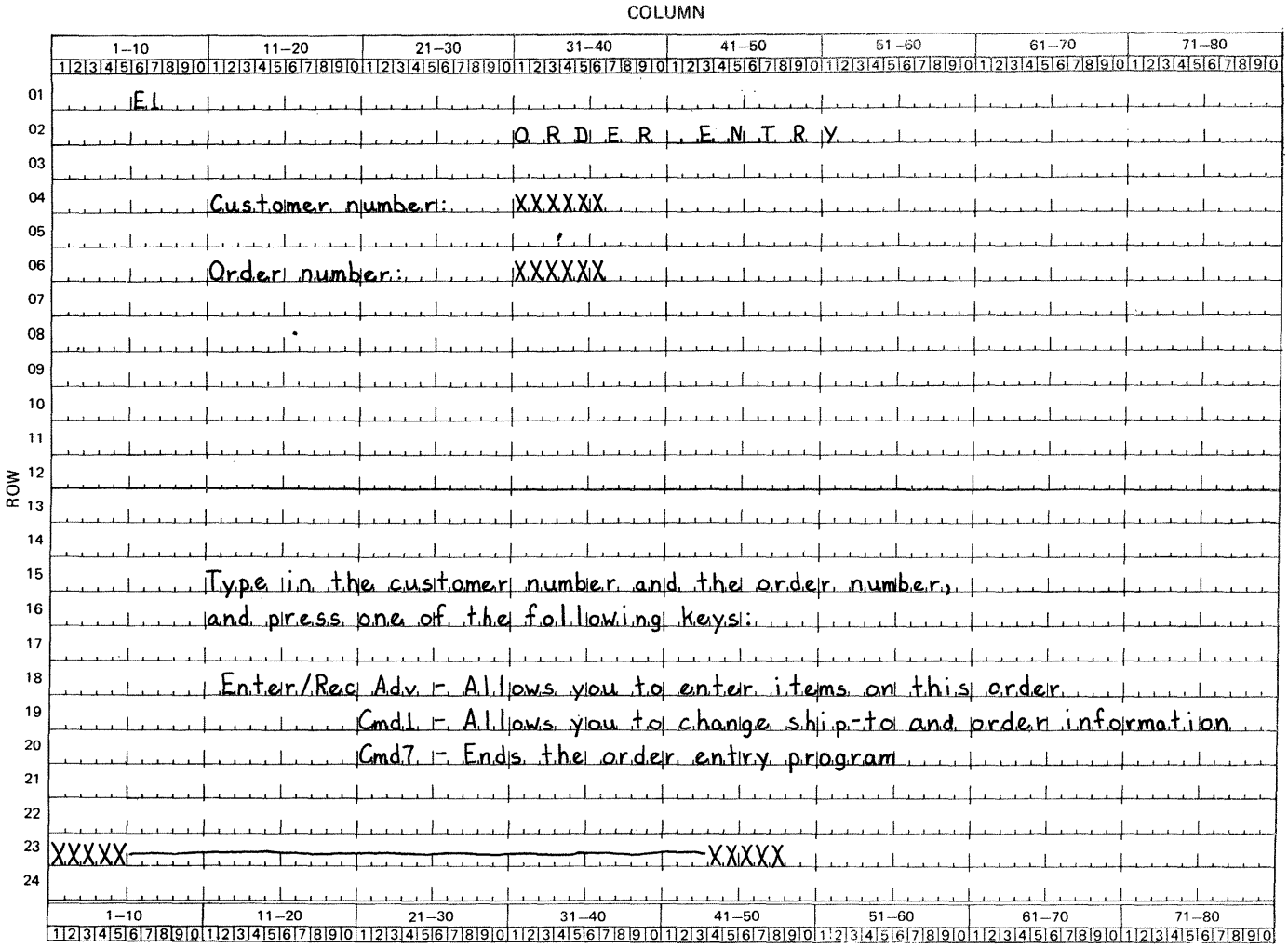
- A 3-character abbreviation of the application (**ORD**er entry).
- A character that identifies it as a display format (**D**isplay).
- The 2-character display ID (**E1**): the first character of the display ID identifies the application (E means order entry); the second character identifies the order of the display within the application.

From display E1, the operator can:

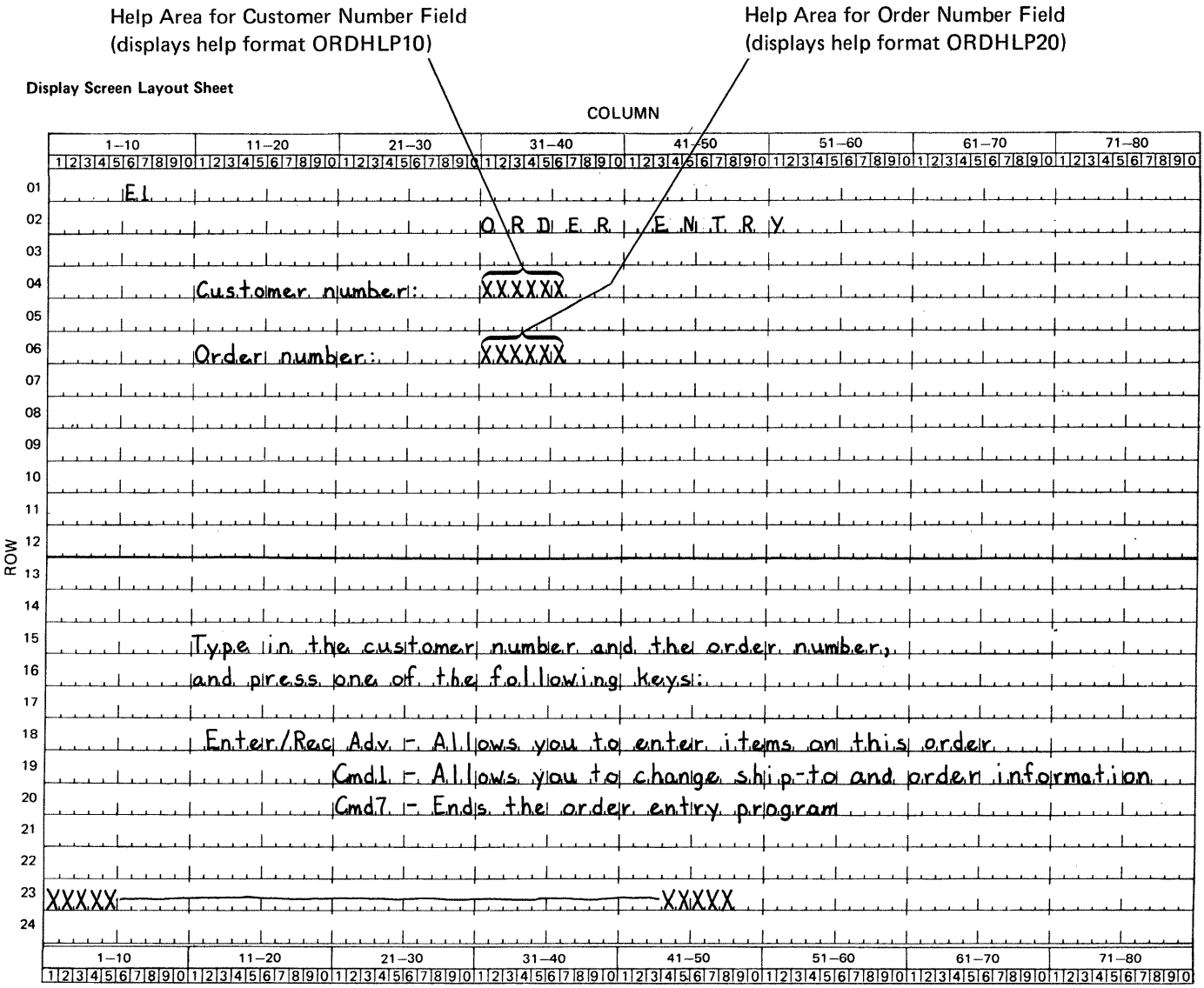
- Type in the customer number and order number, and request the display for entering items ordered by pressing the Enter key
- Type in the customer number and order number, and request to enter additional information by pressing command key 1

- Press the Help key to get information about the display
- Cancel the order entry process by pressing command key 7.

Display Screen Layout Sheet

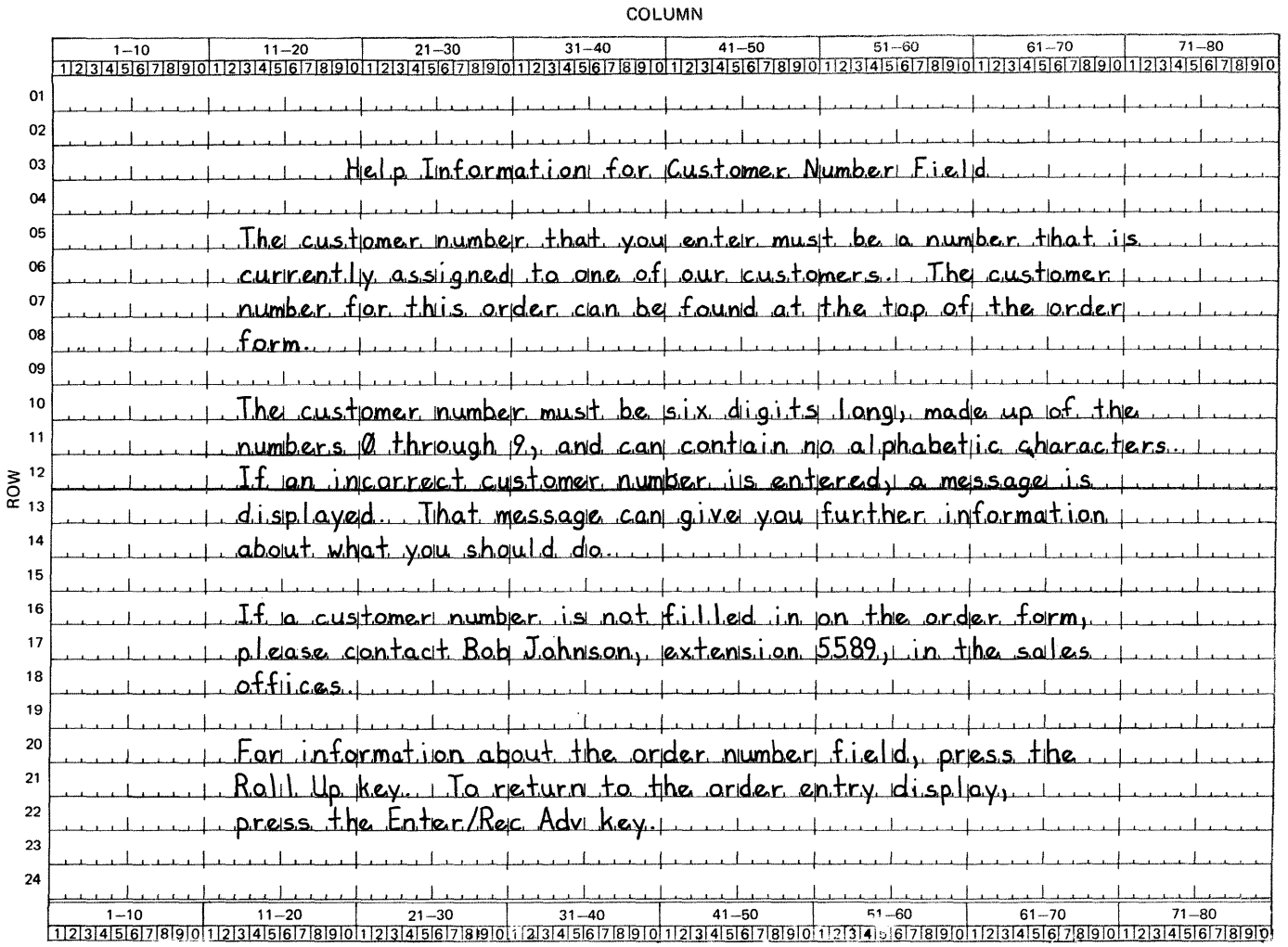


The following example shows the help areas that the programmer will define for display format ORDDE1. When the operator presses the Help key when the cursor is located in one of these help areas, a help format for that area will be displayed. (If online document is specified on the H specification for this help area, a document will be displayed. For more information about online information, see *Getting Started With DW/36* (GC21-8005.)



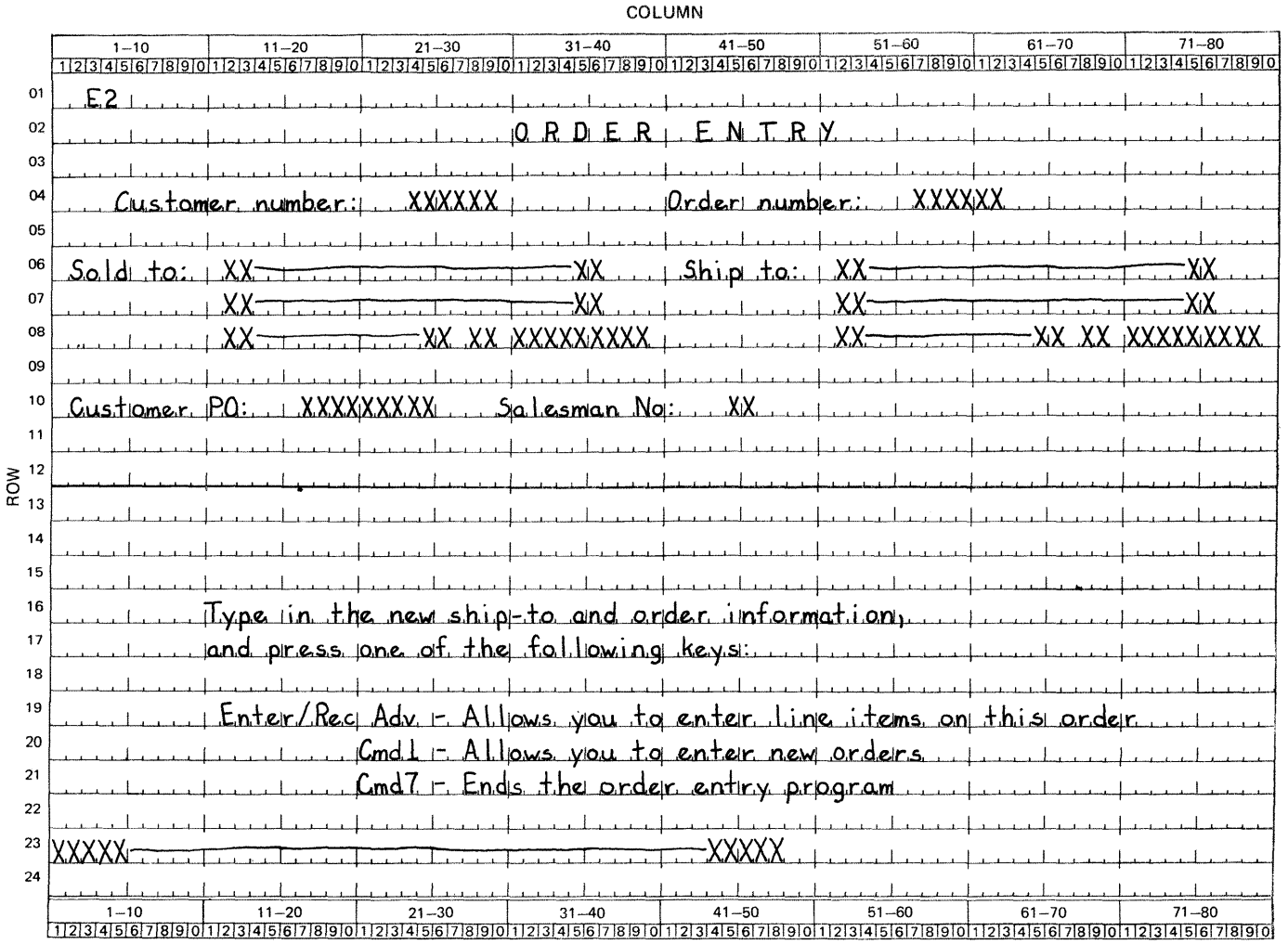
The following shows the layout sheet for the help format ORDHLP10. This help format is displayed when the operator presses the Help key when the cursor is located within the first help area on ORDDE1.

Display Screen Layout Sheet



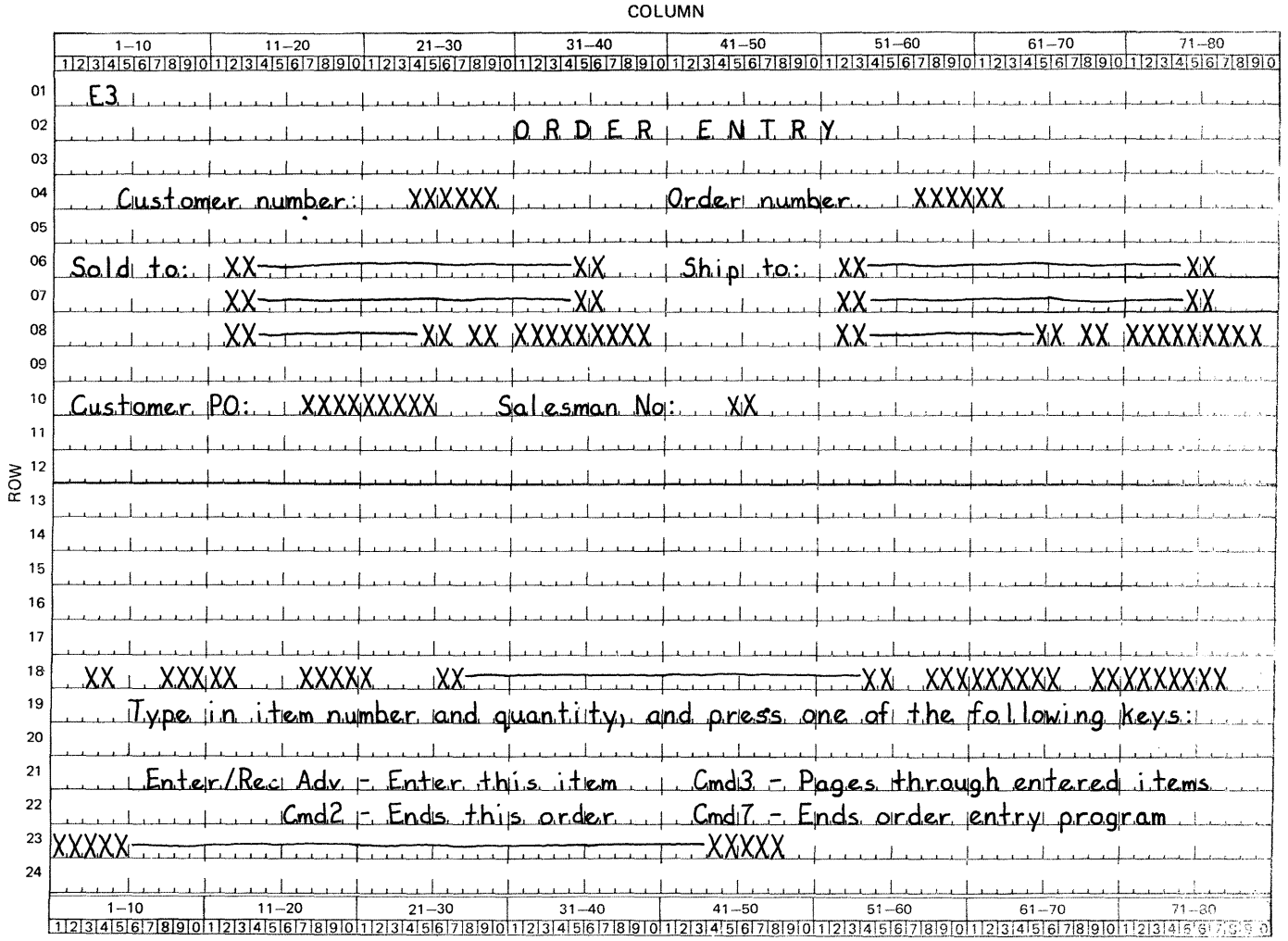
The following shows the completed layout sheet for display E2 (defined by display format ORDDE2), which is displayed only if the operator presses command key 1 from display E1. Ship-to information and miscellaneous order information can be entered from display E2.

Display Screen Layout Sheet



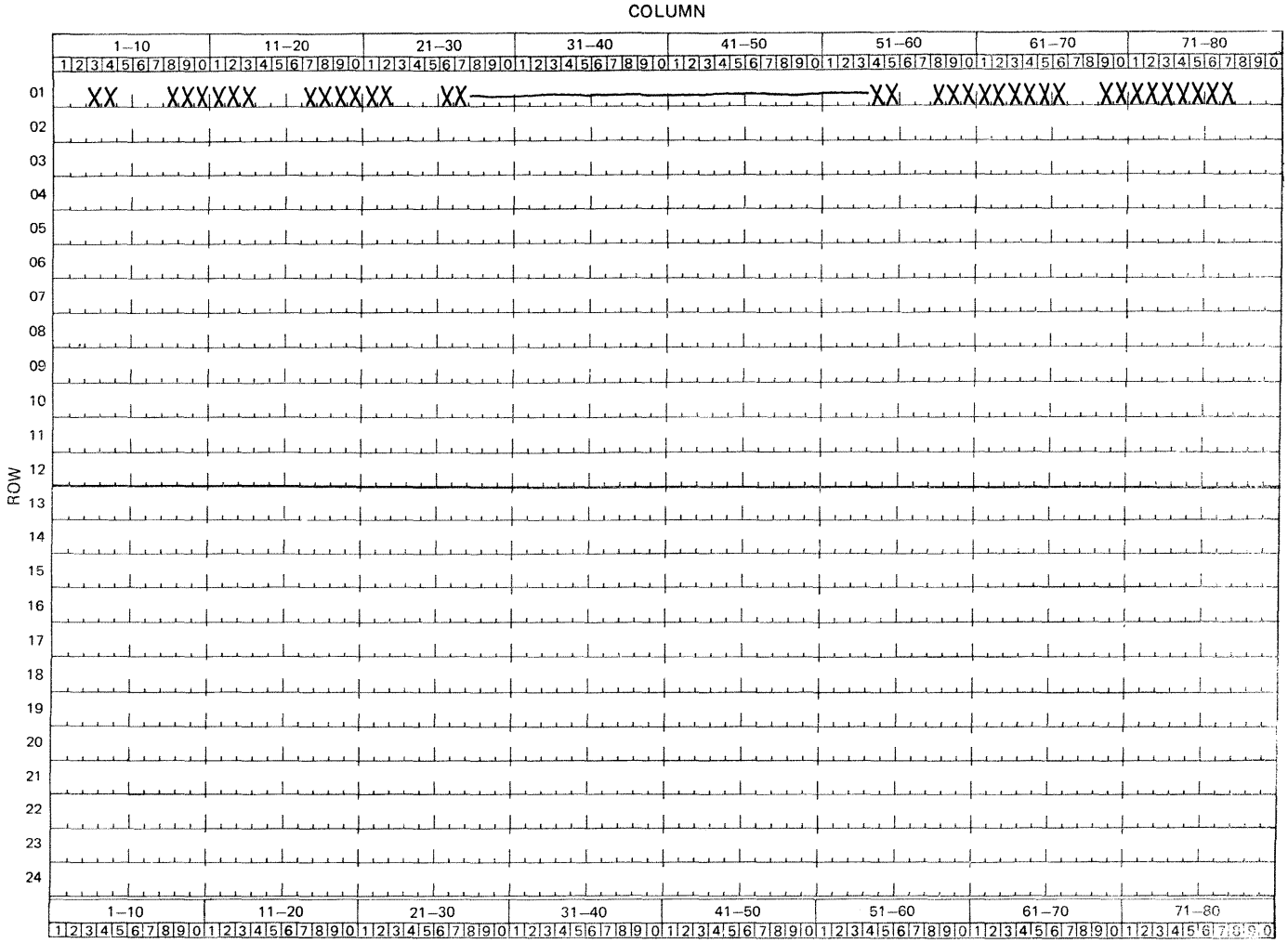
The following shows the completed layout sheet for display E3 (defined by display format ORDDE3). From display E3, the operator enters the individual line items in the order. The operator enters a line item on line 18 of the display. In this application, lines 13 through 17 show the last six lines entered. In addition to being able to enter a new line item, the operator can use this display to step back through the order, to change or remove previously entered line items, or to cancel the order.

Display Screen Layout Sheet



The following shows the completed layout sheet for display E4 (defined by display format ORDDE4). Display E4 is used to show the previously entered lines. Because this display is shown using a variable line number and because it is an output display only, the display ID is not coded with the display. The display ID is still assigned, however, for documentation reasons.

Display Screen Layout Sheet



After the displays are laid out, a list of all the display IDs, the display formats that define the displays, and how the displays are used can be made. Such a list is useful for keeping a record of the displays and helps you in coding the programs that will use them. This list should be kept with the display format and program listings. The following table shows a list of the displays used in the previous example. You should make a similar list when designing your displays and applications.

Display ID	Display Format Name	How Is It Used?
E1	ORDDE1	Order entry start
H1	ORDHLP10	Help format for display format ORDDE1
E2	ORDDE2	Ship-to override and miscellaneous information
E3	ORDDE3	Line item entry
E4	ORDDE4	Line item display (on variable line)

Step 2: Fill Out the Display Format Specifications

Input to the FORMAT procedure is a source member that contains up to 255 display formats. Each display format is a table of records called **display format specifications**. Those specifications describe a display as a whole and describe individual fields or areas within that display. The display format specifications can be coded on the *System/36 Display Format Specifications* form.

When you create a display format using SDA, you can respond to prompts that help you define the characteristics of the entire display or of a particular field within the display. When you use the FORMAT procedure to create a display format, the value that you put in a certain column on the specification form is the same as the response you give to the corresponding prompt in SDA. The only difference between the two is that SDA can automatically supply a value for you that you might otherwise have to fill in on the specification form.

An example of this is a field's location. When you put a field on SDA's 'blank' Image display, SDA knows where the field is located-you are not required to specify the exact line number and column number of the field. When you fill out the specification forms for a display format, however, you must specify the exact line number and column number of the field.

There are three types of specifications:

- Display control specifications, or S specifications
- Help definition specifications, or H specifications (H specifications are optional)
- Field definition specifications, or D specifications.

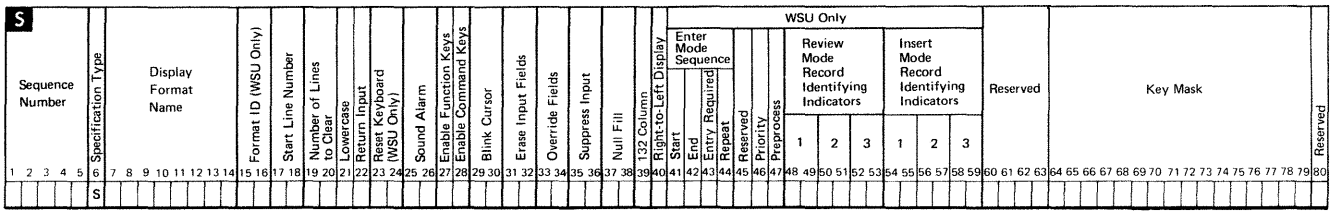
The following pages describe briefly the display format specifications.

Display Control Specifications

The first record coded for each display format is called the **display control, or S, specification**. The display control specification provides information about the entire display format that in general, is unrelated to the specific fields being defined. One display control specification is required and must be the first record in the specifications for each display format.

The portion of the form used to code the S specification looks like this:

Display Control Specification



The S specification identifies, among other things:

- The name of the display format
- The line number of the display screen on which the display will begin
- Whether lowercase letters can be entered by the operator into the display
- Whether an audible alarm will be sounded when the display is shown
- Which function or command keys the operator can use while the display is shown
- Whether the cursor will blink when the display is shown
- How data that is typed into the display is sent to the program or procedure that shows the display
- Whether the display will be shown on a 3180 Model 2 in 80-column mode or 132-column mode.

For more information about the entries made to the S specifications, see Appendix A, "Entries on the Display Control (S) Specification."

Help Definition Specifications

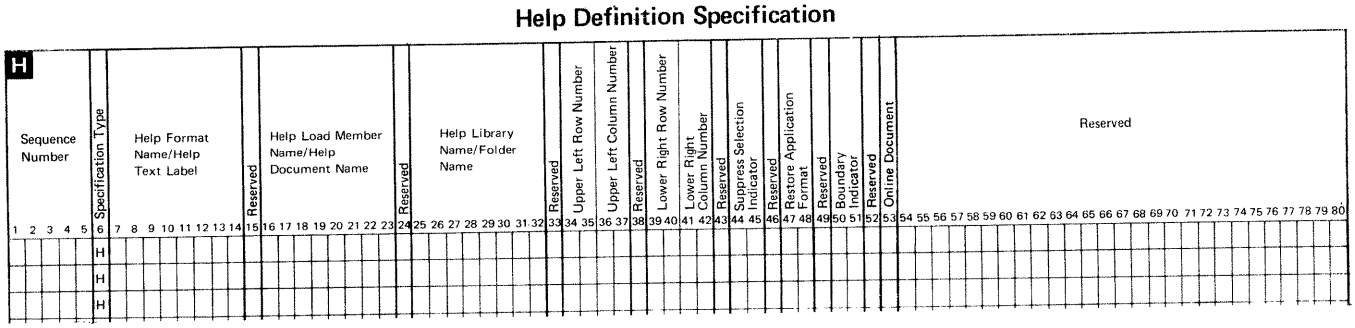
The **help definition, or H, specifications** follow the S specification, if you choose to use them. H specifications are optional; you need not include H specifications in your display formats. The H specifications can be added to the display formats once the formats and the application have been tested.

Each H specification specifies an area on the display screen for which you have defined help text or have provided input to online information. When the

operator presses the Help key while the cursor is within the specified area, a display containing help text for that area is shown. When the operator presses the Help key while the cursor is positioned within the help area and online document is specified, a help document is displayed.

The portion of the form used to code the H specifications looks like this:

Help Definition Specification



There is one H specification for each help area. The H specification identifies, among other things:

- The upper left and lower right corners of the help area
- The name of the display format that defines help text for the help area, or the help text label that defines the location within the help document that is to be displayed
- The load member and the library that contain the help text for a help area, or the document name and the document folder name that contain the document
- Whether the help area will be created when the display is shown
- What will happen when the operator leaves the help text displayed for a help area
- Whether this H specification identifies an online document.

For more information about the entries made to the H specifications see Appendix B, "Entries on the Help Definition (H) Specifications," and for information about help areas and how they are used, see Chapter 3, "Additional Considerations for Display Design."

Field Definition Specifications

The records that follow the display control specification and the optional help definition specifications are called **field definition, or D, specifications**. Each field definition specification completely describes a single field on the display. Each field on the display must be specified by a field definition specification.

The portion of the form used to code the D specifications looks like this:

Field Definition Specification

| D | | |

Display Control Specification

S	Sequence Number	Specification Type	Display Format Name	Format ID (WSU Only)	Start Line Number	Number of Lines to Clear	Lowercase	Return Input	Reset Keyboard (WSU Only)	Sound Alarm	Enable Function Keys	Enable Command Keys	Blink Cursor	Erase Input Fields	Override Fields	Suppress Input	Null Fill	132 Column	Right-to-Left Display	WSU Only: Enter Mode Sequence: Start	Enter Mode Sequence: End	Enter Mode Sequence: Entry Required	Enter Mode Sequence: Repeat	WSU Only: Reserved	WSU Only: Priority	WSU Only: Preprocess	WSU Only: Review Mode Record Identifying Indicators: 1	Review Mode Record Identifying Indicators: 2	Review Mode Record Identifying Indicators: 3	WSU Only: Insert Mode Record Identifying Indicators: 1	Insert Mode Record Identifying Indicators: 2	Insert Mode Record Identifying Indicators: 3	Reserved	Key Mask	Reserved
		S	ORDDE1									Y				99																	AG	

Help Definition Specification

H	Sequence Number	Specification Type	Help Format Name/Help Text Label	Reserved	Help Load Member Name/Help Document Name	Reserved	Help Library Name/Folder Name	Reserved	Upper Left Row Number	Upper Left Column Number	Reserved	Lower Right Row Number	Lower Right Column Number	Reserved	Suppress Selection Indicator	Reserved	Restore Application Format	Reserved	Boundary Indicator	Reserved	Online Document	Reserved
		H	ORDHLP10		ORDENTHP		ORDERLIB		0431			0436										
		H	ORDHLP20		ORDENTHP		ORDERLIB		0631			0636										
		H																				

Field Definition Specification

D	Sequence Number	Specification Type	WSU Field Name	WSU Arrays: Elements per Row or Column	WSU Arrays: Fill Direction	WSU Arrays: Line Skip Factor	WSU Arrays: Horizontal Positions Space Factor	Starting Location: Line Number	Starting Location: Horizontal Position	Output Data	Edit Code (WSU Only)	Input Allowed	Data Type	Mandatory Fill	Mandatory Entry	Self-Check	Adjust/Fill	Position Cursor	Enable Dup	Controlled Field Exit	Auto Record Advance	Protect Field	High Intensity	Blink Field	Nondisplay	Reverse Image	Underline	Column Separators	Reserved	Lowercase	Reserved	Constant Type	Constant Data	Continuation
			Field Name			Field Length																												
		D	DCODE				2	1	3	Y		Y										Y										C E 1		
		D	TITLE				21	23	1	Y																Y						C O R D E R E N T R Y		
		D					16	41	1	Y																						C Customer number:		
		D	CUSNO				6	43	1	Y		Y N		Y		Z							Y				Y							
		D					13	63	1	Y																						C Order number:		
		D	ORDNO				6	63	1	Y		Y N		Y		B							Y				Y							
		D					49	15	1	Y																						C Type in the customer nuX		
		D	mber and the order number,																															
		D					36	16	1	Y																						C and press one of the foX		
		D	llowing keys:																															
		D					55	18	2	Y																						C Enter/Rec Adv - Allows X		
		D	you to enter items on this order																															
		D					57	19	2	Y																						C C mdl - Allows you to chX		
		D	ange ship-to and order information																															
		D					35	20	2	Y																						C C md7 - Ends the order eX		

D	Sequence Number	Specification Type	WSU Field Name	WSU Arrays: Elements per Row or Column	WSU Arrays: Fill Direction	WSU Arrays: Line Skip Factor	WSU Arrays: Horizontal Positions Space Factor	Starting Location: Line Number	Starting Location: Horizontal Position	Output Data	Edit Code (WSU Only)	Input Allowed	Data Type	Mandatory Fill	Mandatory Entry	Self-Check	Adjust/Fill	Position Cursor	Enable Dup	Controlled Field Exit	Auto Record Advance	Protect Field	High Intensity	Blink Field	Nondisplay	Reverse Image	Underline	Column Separators	Reserved	Lowercase	Reserved	Constant Type	Constant Data	Continuation
			Field Name			Field Length																												
		D	ntry program																															
		D	ERRMSG				48	23	1	99																99								
		D																																

Step 3: Enter the Specifications Into a Library Source Member

To enter the display format specifications into a source member, you can use any one of the following programs:

- Development support utility (DSU), a program product, or
- Source entry utility (SEU), a part of the Utilities Program Product, or
- $MAINT utility program, which is part of the SSP.

DSU provides formatted displays in which you can enter the display format specifications coded in step 2. While in DSU, you can use line commands to select the display that will allow you to enter the specific type of display format specification. For more information about how to use DSU to create a source member, see *Development Support Utility Guide*, SC09-1085.

SEU provides formatted displays in which you can enter the display format specifications coded in step 2. While in SEU, you can use command key 3 to select the display that will allow you to enter the specific type of display format specification. For more information about how to use SEU to create a source member, see the *Source Entry Utility Guide* (SC21-7901).

If you use the $MAINT utility program to create the source member that contains your display formats, you must use $MAINT utility control statements. The utility control statements must be entered in order for $MAINT to create the source member. The following is an example using $MAINT to create a display format source member named DISPLAYS, which is to be stored in the library named ORDERLIB.

```
// LOAD $MAINT
// RUN
// COPY FROM-READER,LIBRARY-SOURCE,NAME-DISPLAYS,
// TO-ORDERLIB,RECL-80
```

•
•
•

S, H, and D specifications for the
display formats to be contained in
the source member named DISPLAYS.

•
•
•

```
// CEND
// END
```

Remember that the $MAINT utility program does not allow you to enter your display format specifications in lowercase; therefore, THE PROMPTS OR CONSTANTS SPECIFIED IN THE SPECIFICATIONS ARE ALWAYS

DISPLAYED IN UPPERCASE. Furthermore, you cannot use the $MAINT utility program to update existing source members. For more information about using the $MAINT utility program to create a source member, see the *System Reference* manual.

Step 4: Run the FORMAT Procedure

The FORMAT procedure runs the $SFGR utility program. Using the display format source member created in step 3, the FORMAT procedure can be used to:

- Create a new display format load member containing up to 255 display formats defined in an existing display format source member
- Add one or more display formats to an existing display format load member
- Replace one or more of the display formats in an existing display format load member with new or updated display formats
- Remove a display format from an existing display format load member.

The procedure also produces a printed listing showing information about the display formats just created, added or replaced. (The information found in the printed listing is discussed later in this chapter.)

All display formats used by a program can be placed in one load member (one member can hold a maximum of 255 formats), or they can be placed in more than one member.

The following pages describe the FORMAT procedure.

Procedure Formats

For creating, adding to, or updating a display format load member:

```
FORMAT   [CREATE]  ,load member name,[load member library]  ,source member name,
         [ADD   ]                    [current library   ]
         [UPDATE]

         [source member library]  ,[number of formats]  ,[REPLACE]  ,[HALT  ]  ,
         [current library      ]  ,[1                ]              [NOHALT]

         [PRINT  ]
         [NOPRINT]
         [PARTIAL]
```

For removing a format from a display format load member:

```
FORMAT   DELETE,load member name,[load member library]  ,display format name
                                 [current library   ]
```

Parameter Descriptions

CREATE specifies that a new display format load member is to be created. If a parameter is not specified, CREATE is assumed.

ADD specifies that one or more display formats are to be added to an existing display format load member.

UPDATE specifies that one or more display formats in an existing display format load member is to be replaced.

DELETE specifies that a single display format is to be removed from an existing display format load member (the display format is *not* removed from the corresponding display format source member). If the removed display format is the only format in the display format load member, the entire load member is removed from the specified library.

load member name specifies the name of the display format load member to be created, added to, updated, or have a display format removed from.

load member library specifies the name of the library that is to contain or does contain the display format load member. If a library name is not specified, the current library is assumed.

source member name specifies the name of the source member that contains the display format specifications created in the previous step (step 3).

source member library specifies the name of the library that contains the source member. If a library name is not specified, the current library is assumed.

number of formats specifies the number of display formats defined in the display format source member. The specified number of formats is used to determine the amount of temporary work file space needed by the FORMAT procedure. The larger the number entered, the more temporary disk file space will be used. The maximum number of display formats allowed in a source member is 255. If the number of display formats is not specified, 1 is assumed. The number of formats needs only to be specified if CREATE or ADD is specified.

REPLACE specifies that if a load member already exists with the same name as the display format load member being created, the existing load member is to be replaced by the FORMAT procedure. REPLACE is used only if CREATE is specified; if UPDATE or ADD is specified, REPLACE is ignored.

If REPLACE is not specified, and a duplicate load member exists, a message is displayed. You can then either replace the existing load member or end the job.

HALT specifies that a message is to be displayed that indicates that warning and terminal errors were found during the processing of the display format source member. If the message indicates a warning error, you can either continue the job or cancel the job. If the message indicates a terminal error, you can only cancel the job. If a parameter is not entered, HALT is assumed.

NOHALT specifies that warning and terminal error messages are not to be displayed if the errors are found during the processing of the display format source member. For warning errors, the job step is completed and the display formats are generated. For terminal errors, the job step is ended and the display formats are not generated.

PRINT specifies that the following is to be printed:

- The name of the display format source member
- The display format S, H, and D specifications
- Any informational, warning, or terminal errors
- The input and output field descriptions
- A list of the indicators used
- The input and output library names
- The name of the display format load member
- The storage requirements for each format
- The data stream length for each format.

You use this information when writing the program that uses the display format load member.

If a parameter is not entered, PRINT is assumed.

NOPRINT specifies that if a terminal error is found in the source specifications, only the statement in error and the error message are to be printed.

PARTIAL specifies that the following is to be printed:

- The name of the display format source member
- Any warning or terminal messages together with the statement causing the message, or any information messages
- The input and output library names
- The name of the display format load member.

Example A: Creating a New Display Format Load Member

Create a new display format load member named ORDDISPS (Order entry displays) to be stored in the library named ORDERLIB. The display format specifications are contained in a source member named DISPLAYS, which is contained in the library named ORDERLIB. The source member contains the display format specifications for four displays: ORDDE1, ORDDE2, ORDDE3, and ORDDE4. The FORMAT procedure that you would enter would be:

```
FORMAT CREATE,ORDDISPS,ORDERLIB,DISPLAYS,ORDERLIB,4
```

Example B: Adding a Display Format to an Existing Load Member

Add a display named ORDDE5 to the existing display format load member named ORDDISPS. The display format specifications for ORDDE5 are contained in the source member named NEWSCRN. Both the source member and the load member are contained in the library named ORDERLIB. The FORMAT procedure that you would enter would be:

```
FORMAT ADD,ORDDISPS,ORDERLIB,NEWSCRN,ORDERLIB,1
```

Example C: Updating an Existing Display Format Load Member

Update an existing display format load member named ORDDISPS stored in the library named ORDERLIB. The source member containing the changed display format specifications is named MODSCRNS and is also contained in the library named ORDERLIB. The load member named ORDDISPS is updated to reflect the changes made in the source member. The FORMAT procedure that you would enter would be:

```
FORMAT UPDATE,ORDDISPS,ORDERLIB,MODSCRNS,ORDERLIB
```

Example D: Removing a Display Format from an Existing Load Member

Remove a display format named ORDDE4 from the display format load member named ORDDISPS. The load member is in the library named ORDERLIB. The FORMAT procedure that you would enter would be:

```
FORMAT DELETE,ORDDISPS,ORDERLIB,ORDDE4
```

Output from the FORMAT Procedure

In addition to creating or updating the display format load member, the FORMAT procedure produces lists of:

- Source specifications
- Diagnostic or informational messages
- Indicators used
- Fields that might require output from the user program (in the order in which those fields appear on the display)
- Input fields on the display (in the order in which they appear on the display)
- The display formats created, and their size.

The source specifications are printed in the order they appear in the source member. If an error is found when the source specifications are processed, a message is printed immediately following the statement that caused the error. The *System Messages* manual lists the printed messages produced by the FORMAT procedure and provides additional information that you can use to correct problems you might have with your display formats.

Sometimes an error is found that is serious enough to make the display format unusable. Because such an error causes processing to terminate, it is called a **terminal error**. If a terminal error is encountered, the display format load member is not created. You must try to correct the problem and try to rerun the FORMAT procedure. To help you correct specification errors, use the *System/36 WSU/$SFGR Debugging Template*. That template can be placed over the printed source specifications to help you find the entries to the specific columns of the specifications.

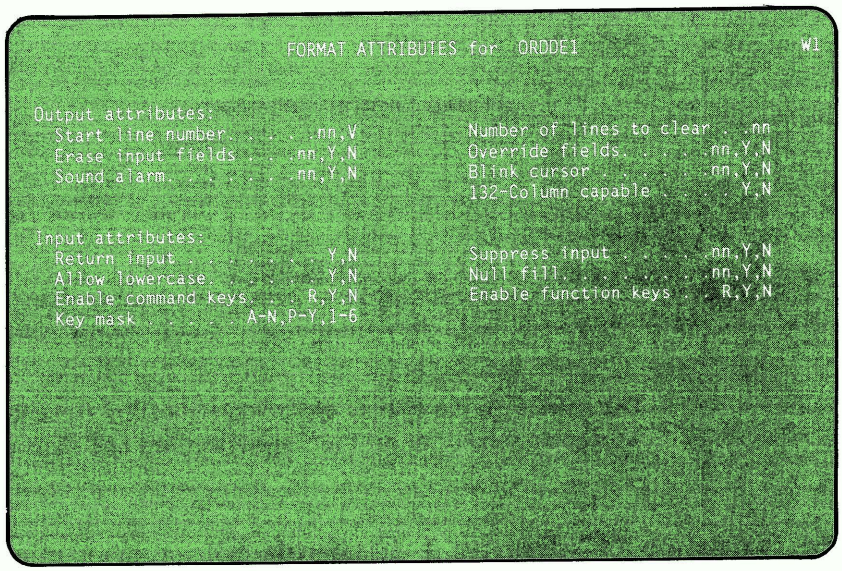
Use the list of indicators when you code the programs that use the display formats you have just created. Remember that those indicators can be turned on and off by your program to control the operation of the display.

The lists of the output and input fields are extremely useful while coding the programs that use the display formats. The user programs must know the format of the data that is to be sent to and received from the display, and the lists produced by the FORMAT procedure determine how you code program statements that control input and output operations. For more information about coding the programs that use display formats, see the reference manual for the specific programming language that you will use.

Appendix A. Entries on the Display Control (S) Specification

The **display control, or S, specification** provides information about the entire display that, in general, is unrelated to the specific fields being defined. One display control specification is required, and it must be the first specification for each display format.

If you use SDA to create or update display formats, you use the Format Attributes display to define the information found in the S specification. The following Format Attributes display defines the S specification for display formats used by non-WSU programs:



The following Format Attributes display defines the S specification for display formats used by WSU programs:

```
                    FORMAT ATTRIBUTES for  ORDDE1                    W1
                      Format ID . . . . . .

Output attributes:
  Start line number. . . . .nn,V . .    Number of lines to clear . .nn . .
  Erase input fields . . .nn,Y,N . .    Override fields. . . . .nn,Y,N . .
  Sound alarm. . . . . .nn,Y,N . .      Blink cursor . . . . . .nn,Y,N . .
  Reset keyboard . . . . . Y,N . .

Input attributes:
  Return input . . . . . Y,N . .        Suppress input . . . . .nn,Y,N . .
  Allow lowercase. . . . . Y,N . .      Null fill. . . . . .nn,Y,N . .
  Enable command keys. . . R,Y,N . .    Enable function keys . . R,Y,N . .
  Key mask . . . . . A-N,P-Y,1-6 . . . . . .

Additional WSU attributes:
  Alternate compiler code . . . . . .
                                        Priority. . 0-3 . .  Preprocess. Y,N . .
  ENTER mode sequence: Start. . . Y,N . .
                       End. . . . Y,N . .  Required. . Y,N . .  Repeat. . . Y,N . .
                                                                  1  2  3
  REVIEW mode record identifying indicators. . . . . nn . . . . . .
  INSERT mode record identifying indicators. . . . . nn . . . . . .
```

If you use the FORMAT procedure to create or update display formats, use the display control specification portion of the *Display Format Specifications* form to code the S specification:

Display Control Specification

| S | | |

Form Type (Column 6)

This entry does not appear on the SDA Format Attributes display.

The character S identifies this record as the display control specification. The form type entry is required and is preprinted on the display control specification form.

Display Format Name (Columns 7 through 14)

Although the display format name is displayed on the top of the SDA Format Attributes display, the display format name cannot be changed using SDA.

This entry gives a unique name to the display format being defined. When naming your display formats, remember the following:

- Display formats used by the *same* user program cannot have the same name.
- Display formats used by *different* programs can have the same name.
- Each display format name in a display format source member must be unique; that is, duplicate names are not allowed in the same member.

The display format name can be any combination of characters except commas (,), single quotes ('), and blanks. The first character of the display format name must be alphabetic: the characters A through Z, or the characters #, $, or @. The number of characters in the display format name must be 8 or less, and must be left-adjusted in the field. For example, if the display format name is FORM02, enter:

```
|F|O|R|M|0|2|  |  |
```

not

```
|  |  |F|O|R|M|0|2|
```

Note: The Interactive Communications Feature (SSP-ICF) uses display format names that begin with $$; therefore, avoid using display format names that begin with $$.

An asterisk (*) in column 7 identifies this record as a comment statement.

Format ID – WSU Only (Columns 15 and 16)

This entry is used only by the work station utility (WSU); it is not used by non-WSU display formats. If you are coding a display format for use by a programming language other than WSU, do not respond to this prompt or make an entry in columns 15 and 16.

This 2-character field allows the operator to select the desired display from the WSU menu and allows you to set indicators that will cause the display to be shown only under certain conditions. For information about the way in which WSU uses the format ID entry, see the *WSU Guide*, SC21-7905.

Start Line Number (Columns 17 and 18)

Specifies the line on the display at which this format begins. Entries allowed for the start line number are:

Blank	Line 1 of the display screen is assumed as the start line number.
1 through 24/27	Specifies the line on the display screen at which this display begins. This number must be less than or equal to the number of lines on a display (24 for an 80-column display, 27 for a 132-column display). The line number must be right-adjusted; a leading zero is not required.
V	If V is specified in column 17, the start line number is variable and is to be defined by the program using this display format. If V is specified and no start line number is defined by the user program, line 1 of the display screen is assumed as the start line number.

All line numbers specified on the field definition specification (D specification or SDA Field Attributes display) and help definition specification (H specification) are relative to the start line number.

Number of Lines to Clear (Columns 19 and 20)

Specifies the number of lines to clear, beginning with the start line number, before this format is displayed. For example, if the start line number is 6, and if 12 lines are to be cleared to display this format, then lines 6 through 17 of the current display are cleared before this format is displayed.

Entries allowed for the number of lines to clear are:

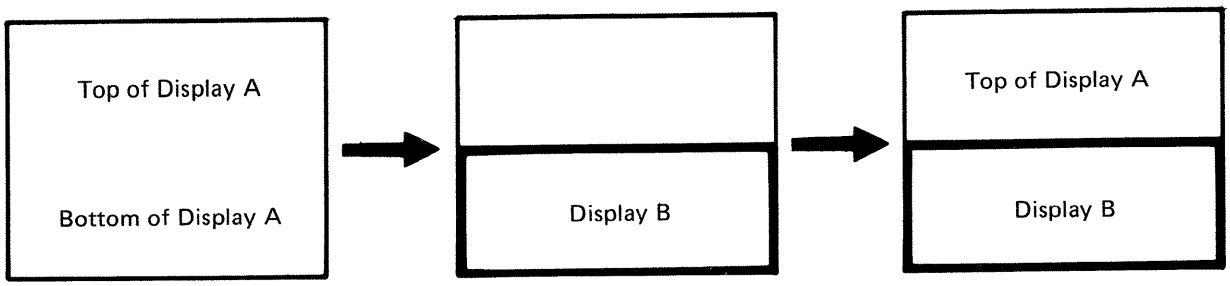
Blank	If columns 19 and 20 are left blank, all lines of the current display are cleared before this format is displayed.

0 through 24/27 Specifies the number of lines to clear on the current display before this format is displayed. The number of lines specified must be less than or equal to the number of lines on a display (24 for an 80-column display, 27 for a 132-column display). The number of lines to clear must be right-adjusted; a leading zero is not required.

If a format does not clear all the lines on the display (that is, a value other than 24, 27, or blanks is specified), be careful of overlaying currently displayed fields and their control characters on lines not cleared by this format. In addition, if a format clears all or a portion of the lines on a display, any help areas within the cleared portion of the display are lost; help formats for those help areas cannot be displayed.

If you clear less than the entire screen when trying to display a format that does not contain any input fields, the previously displayed format input field(s) will remain defined on the display. The cursor will be positioned as described in the D-specification section (position cursor, columns 32-33). Even though your format may have overlayed the input fields, those fields will still allow data entry. Therefore, when displaying a format that does not define input fields, do not clear the lines that contain existing input field(s). As you can see, caution should be used when clearing less than the entire screen.

The following illustrates the use of the start line number and the lines to clear entries to display one format over another:



Display A + Display B (starts at Line 12 and clears Lines 12 through 24 of Display A) = Result

Allow Lowercase (Column 21)

Specifies whether all alphabetic characters typed from the keyboard can be displayed and sent to the user program in lowercase (if the Shift key is not pressed when a character is typed in by the operator) or in uppercase (if the Shift key is pressed when a character is typed in by the operator).

The lowercase entry of the SDA Field Attributes display or column 51 of the D specification *always* takes precedence over the lowercase entry of the S specification. For example, if Y (lowercase allowed) is specified in column 21 of the S specification, but N (uppercase only) is specified in column 51 of the D specification for an input field, only uppercase alphabetic characters can be typed in the input field. See the description of lowercase entry (column 51) of the D specification (Appendix C, "Entries on the Field Definition (D) Specifications") for more information.

Entries allowed for lowercase are:

N (or blank) All alphabetic characters typed in by the operator are displayed and sent to the user program in uppercase.

Y All alphabetic characters typed in by the operator can be displayed and sent to the user program in either lowercase or uppercase.

Return Input (Column 22)

Specifies if the contents of input fields are returned to the user program when the operator enters this display, regardless of whether the operator pressed any data keys. If no entry is made for return input, the contents of all input fields on the display are returned to the user program.

If a format is to be displayed at a remote display station, response time can be improved if you specify N (no) for return input. If you specify N, the contents of input fields are returned *only* if data is entered by the operator. If no data is entered, that information is *not* returned to the system.

Entries allowed for return input are:

Y (or blank) The contents of all input fields are returned to the user program. If mandatory entry (specified on the SDA Field Attributes display or in column 29 of the D specification) is specified for any input field in the format, the operator *must* type data in that field. If the operator presses a command key or the Enter key and does not type data in the mandatory entry field, an error message is displayed. The operator must press the Error Reset key and then type data in the mandatory entry field.

N The contents of all input fields are returned to the user program *only* if the operator presses one or more data keys. If the operator does not type *any* data on the display, the operator does not have to type data into mandatory entry fields. Also, if the operator presses a command key or the Enter key and does not type any data into the display, no data is returned to the user program.

For RPG II programs only, when N is specified for the return input entry, and the operator presses a command key or the Enter key but does not type in data, a record of blanks is returned to the RPG II program.

Reset Keyboard – WSU Only (Columns 23 and 24)

This entry is used only by work station utility (WSU) display formats. If you are coding a display format for use by a programming language other than WSU, do not make an entry for reset keyboard.

This entry allows WSU to process this display. For information about the way in which WSU uses the reset keyboard entry, see the *WSU Guide*.

Sound Alarm (Columns 25 and 26)

Each display station has an audible alarm. You can cause that alarm to briefly sound when this format is displayed. Entries allowed for sound alarm are:

N (or blank) If N is specified in column 25 or if columns 25 and 26 are left blank, the alarm does not sound when the format is displayed.

Y If Y is specified in column 25, the alarm sounds when this format is displayed.

01 through 99 An **indicator** is an internal switch that can be turned on or off by the user program. If an indicator (01 through 99) is specified for sound alarm, the alarm sounds if the specified indicator is on when this format is displayed.

For a WSU display format, indicators 90 through 99 cannot be used.

Enable Function Keys (Column 27)

You can allow the operator to use the function keys on the keyboard to control your program's operations. You use the enable function keys entry to specify whether any of the function keys are **enabled** or **disabled**. If a function key is enabled, the operator can use the key, and the program can determine whether the key was pressed. If a function key is disabled, the operator generally is not allowed to use the key, and the program cannot determine whether the key was pressed.

If a function key is enabled in the display format specifications, that function key must also be enabled by the user program when it identifies that this display format load member will be used. When an enabled function key is pressed, the SSP sends a **return code** to the user program. The user program can test for that return code, and program operations can be based on the code. If the operator

presses a disabled function key, an error message is displayed. The operator can press the Error Reset key, followed by the correct function key.

The *specific* function keys to be enabled or disabled are identified by numbers in a field (on the SDA Format Attributes display or in columns 64 through 79 of the S specification) called the key mask.

Entries allowed for enable function keys are:

Blank	All function keys are enabled. Any numbers in the key mask are ignored.
Y	The function keys identified by the numbers in the key mask are enabled. If the key mask contains no numbers, all function keys are disabled.
N	The function keys identified in the key mask are disabled. If the key mask contains no numbers, all function keys are enabled.
R (retain)	The function key mask that is currently active for the display station is used when this format is displayed.

Enable Command Keys (Column 28)

You can allow the operator to use the command keys on the keyboard to control your program's operations. You use the enable command keys entry to specify whether any of the command keys are enabled or disabled.

If the operator presses an enabled command key, the SSP sends a return code to the user program. The user program can test for that return code, and program operations can be based on the code. If the operator presses a disabled command key, an error message is displayed. The operator can then press the Error Reset key, followed by the correct command key.

The *specific* command keys to be enabled or disabled are identified by alphabetic characters in the key mask.

Entries allowed for enable command keys are:

Blank	All command keys are enabled. Any alphabetic characters in the key mask are ignored.
Y	The command keys identified by alphabetic characters in the key mask are enabled. If the key mask contains no alphabetic characters, all command keys are disabled.
N	The command keys identified by alphabetic characters in the key mask are disabled. If the key mask entry contains no alphabetic characters, all command keys are enabled.
R (retain)	The command key mask that is currently active for the display station is used when this format is displayed.

Blink Cursor (Columns 29 and 30)

This entry specifies if the cursor will blink while this format is displayed. A blinking cursor helps to draw the operator's attention to a particular field on the display.

Entries allowed for blink cursor are:

N (or blank)	If N is specified in column 29 or if columns 29 and 30 are left blank, the cursor does not blink when this format is displayed.
Y	If Y is specified in column 29, the cursor blinks when this format is displayed.
01 through 99	The cursor blinks if the specified indicator is on when this format is displayed. For a WSU display format, indicators 90 through 99 cannot be used.

Erase Input Fields (Columns 31 and 32)

This entry is not used for WSU display formats.

The erase input fields entry allows the user program to blank out the contents of the input fields and input/output fields on a display. The program can unlock the keyboard and erase the input fields by setting on an indicator and then re-displaying the format. When erase input is specified, the format is not retransmitted to the display station after the operator enters the display, except if an override operation is specified on the SDA Format Attributes display or in columns 33 and 34 of the S specification. If *both* erase input and an override operation are specified, both the erase input and override operations are processed.

Use the erase input fields entry when one display format is used for repeated input operations. For such a format, specify an indicator in the erase input fields entry. The first time the program displays the format, the indicator should be off. The program should then turn on that indicator for the next and succeeding times it displays the format. Each time the format is displayed and the indicator is on, the input fields are blanked out, and the operator can use them for entering data. Because the format is not retransmitted to the display station after each input operation, the amount of data sent to the display station is reduced, and response time is improved.

If you request that input fields be erased when this format is displayed, but there are no input fields currently on the display, a display station error occurs; therefore, use the erase input fields entry only after a format that has input or input/output fields has been displayed without erase input.

Entries allowed for erase input fields are:

N (or blank) If N is specified in column 31 or if columns 31 and 32 are left blank, input and input/output fields are not erased when this format is displayed.

01 through 99 Input and input/output fields are erased and the keyboard is reset if the specified indicator is on when this format is displayed; all other fields remain unchanged. If the specified indicator is off when this format is displayed, the input fields are not erased.

Y If Y is specified in column 31, input and input/output fields are erased every time this format is displayed. Ordinarily, Y should not be specified because all entries on the D specifications for the format are ignored when the format is displayed. If you want to erase the input fields, specify an indicator in column 31 and turn that indicator on when the format is displayed.

Special Considerations for the Erase Input Fields Entry

After an erase input fields operation is performed, the following operations will be affected:

Return input: If the operator types in data, data contained in all the input fields are returned to the program. If the operator does not type in data in any input field, input data is *not* returned to the program.

Mandatory entry: The operator is not required to type data in mandatory entry fields if the operator does not type data in *any* input field.

Following an erase input fields operation, another erase input fields operation will cause the following to occur:

- If the operator has pressed the Enter key without typing in data, data contained in the input fields is *not* erased, including mandatory entry input fields.
- If the operator has typed data in *any* input field, then only those input fields in which the operator has typed in data are erased. If the operator types data in any of the input fields, the operator must type data in all mandatory entry input fields; data in the mandatory entry fields is also erased.

Keeping the above considerations in mind, if:

1. A format with return input specified is displayed,
2. Followed by an erase input fields operation,
3. Followed by another erase input fields operation,

the first erase input fields operation erases all input fields; the second erase input fields operation erases only those input fields that have data typed in them since the first erase input fields operation.

Override Fields (Columns 33 and 34)

This entry is not used for WSU display formats.

An override operation allows you to **override** (modify) fields in a format without having to retransmit the same format. This technique is especially important when a program communicates with a remote display station. An override operation can improve response time because it reduces the amount of information transmitted over the communications line.

You may want to override fields in a display if the operator types incorrect data into a field. If the program determines that the operator has typed incorrect data into a field, turn on an indicator specified for the override fields entry and re-display the same format. If the indicator specified in the output data entry for a field (specified on the SDA Field Attributes display or columns 23 and 24 of the D specification) is off, the incorrect data is unchanged. If the override indicator is on, data from the program is displayed.

You can also set on the same indicators for the high intensity or reverse image attributes to draw the operator's attention to the fields in error. Also, consider using the same indicator to condition an error message field that could explain the error in more detail. Once the operator has corrected the error and the program accepts the correct data, have the program set the indicators to off and re-display the format using an override operation to remove any highlighted fields or error messages. All field attributes that are not controlled by indicators are unchanged during an override operation.

Note: If an indicator specified in the protect field entry (specified on the SDA Field Attributes display or in columns 37 and 38 of the D specification) is on, that indicator is ignored during the override operation.

Entries allowed for override fields are:

N (or blank) If N is specified in column 33 or if columns 33 and 34 are left blank, an override operation is not performed for this format. A normal output operation is performed.

01 through 99 During an override operation (the indicator in columns 33 and 34 is on), the following occurs:

- If a field has an indicator specified for the output data entry (the SDA Field Attributes display or in columns 23 and 24 of the D specification) and that indicator is off, the data in that field is unchanged. If data was typed into the field, that data is unchanged. Any field that had a Y (yes), an N (no), or a blank specified for the output data entry is also unchanged.

- If a field has an indicator specified for the output data entry and that indicator is on, the field is displayed with data supplied by the program. Output information is displayed in the *same location in the output record area* as for display without an override operation.

An override operation does not occur if the specified indicator is off when this format is displayed.

Y If Y is specified in column 33, an override operation is performed every time this format is displayed. Ordinarily, Y should not be specified. Instead, if an override operation will be performed for this format, an indicator should be used.

The following summarizes the effect of indicators on output data during an override operation.

		Indicator Specified in the Override Fields Entry	
		OFF	ON
Indicator Specified in the Output Data Entry for the Field	OFF	Output data is constant data specified for the field.	No change occurs to output data on the display.
	ON	Output data comes from the program.	Output data comes from the program.
		Normal Output Operation	Override Operation

Special Considerations for the Override Fields Entry

When you have completed an override fields operation, the return input operation can be affected as follows:

Return Input If you specify N for return input when the override fields indicator in on, the contents of the input field will return to the user program even if the operator does not enter any data.

Suppress Input (Columns 35 and 36)

This entry is not used for WSU display formats.

It is useful to suppress input from the keyboard when several formats are displayed before input is needed by the user program. When multiple formats are sent, specify suppress input on all but the last display, even if the displays do not contain input fields. If you display a format over a portion of another format, data can be entered and read from only the input fields defined by the last format that was displayed.

Entries allowed for suppress input are:

N (or blank) The input fields are read by the SSP when the Enter key is pressed. The input fields will be returned to the user program if the user program requests the input data.

Y or 01 through 99

If Y is specified in column 35 or the specified indicator is on, *and* the keyboard is unlocked when the program displays this format, then the keyboard will remain unlocked, and the operator can type information into the input fields. If the operator presses the Enter key, the keyboard will lock. The input fields will not be read and will not be returned to the user program until (1) another format is displayed with suppress input specified as N or with the specified indicator off, and (2) the operator presses the Enter key at that format.

If Y is specified in column 35 or the specified indicator is on, *and* the keyboard is locked when the program displays this format, *and* the format defines input field(s), then the keyboard will unlock, and the operator can type information into the input fields. If the operator presses the Enter key, the keyboard will lock. The input fields will not be read and will not be returned to the user program until (1) another format is displayed with suppress input specified as N or with the specified indicator off, and (2) the operator presses the Enter key at that format.

If Y is specified in column 35 or the specified indicator is on, *and* the keyboard is locked when the program displays this format, *and* the format does not define input field(s), then the keyboard will remain locked and the operator cannot type information into the input fields. The input fields will not be read and will not be returned to the user program until (1) another format is displayed with suppress input specified as N or with the specified indicator off, and (2) the operator presses the Enter key at that format.

If the specified indicator is off, then the input fields are read by the SSP when the Enter key is pressed. The input fields will be returned to the user program if the user program requests the input data.

Note: Specifying a Y on the S specification for a help format will be processed as if N was specified when the format is displayed. Refer to the section, *Restrictions on Using Help Formats* for more information.

Null Fill (Columns 37 and 38)

When a constant or program supplied data is displayed in an input or input/output field, it is normally left-adjusted, and any remaining character positions in the field are filled with blanks. This means that the operator cannot use the Ins (insert) key to type in additional characters. If null fill is specified for a format, any remaining character positions in the fields on the display are filled with **null**, or 'empty' characters, and the operator can use the Ins key to type in additional characters.

Any null characters (unfilled character positions) in input fields are changed back to blanks when the fields are read by the user program.

Entries allowed for null fill are:

N (or blank) If N is specified in column 37 or if columns 37 and 38 are left blank, blanks are not changed to null characters when this format is displayed.

Y If Y is specified in column 37, the following occurs when this format is displayed:

- All blanks in the initial constant of input fields are changed to null characters.
- All blanks in program-supplied data sent to input fields are changed to null characters.

01 through 99 If an indicator is specified, then:

- All blanks in the initial constant of input fields are changed to null characters.
- If the specified indicator is on when this format is displayed, any blanks in program-supplied data sent to input fields are changed to null characters.

  If the specified indicator is off when this format is displayed, blanks in program-supplied data sent to input fields are not changed to null characters.

For a WSU display format, indicators 90 through 99 cannot be used.

132-Column Format (Column 39)

Entries allowed for 132-column format:

N (or blank) If N is specified in column 39, or if column 39 is left blank, the format is an 80-column format.

Y If Y is specified in column 39, the format is a 132-column format and can only be displayed on a 3180 Display Station.

Right-to-Left Display (Column 40)

This entry is not found on the SDA Format Attributes display, and is not used for WSU display formats. To use this entry for non-WSU display format source specifications, you must use the development support utility (DSU) or the source entry utility (SEU).

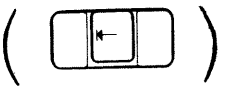
Display station users who are accustomed to recording information in a right-to-left direction can enter data in the display in the same manner. Using column 40 of the S specification, you can specify that fields are processed in a right-to-left direction across the display. When the Field Exit key is pressed, the cursor moves to the next unprotected input field to the left of the current input field. In addition, you can use column 27 (data type) of the D specification to specify that the cursor is to move from right-to-left within an input field.

Notes:

1. *Right-to-left display processing has these special requirements:*

   - *The appropriate right-to-left and national language RPQs must be installed on your System/36.*
   - *The appropriate national language RPQ must be installed on any local or remote display station to be formatted as right-to-left.*

2. *Right-to-left input fields can span two or more lines; however, if input fields do span two or more lines, the cursor might appear to jump from field to field in a way that is confusing to the operator.*

The entry made in column 40 of the S specification controls the cursor movement for the display as a whole. Use column 27 of the D specification to control the cursor movement within individual fields on the display. You can specify one cursor direction without the other: left-to-right fields can be on a right-to-left display, and right-to-left fields can be on a left-to-right display. If necessary, the operator can use the Reverse  key to reverse the direction of the cursor within an input field.

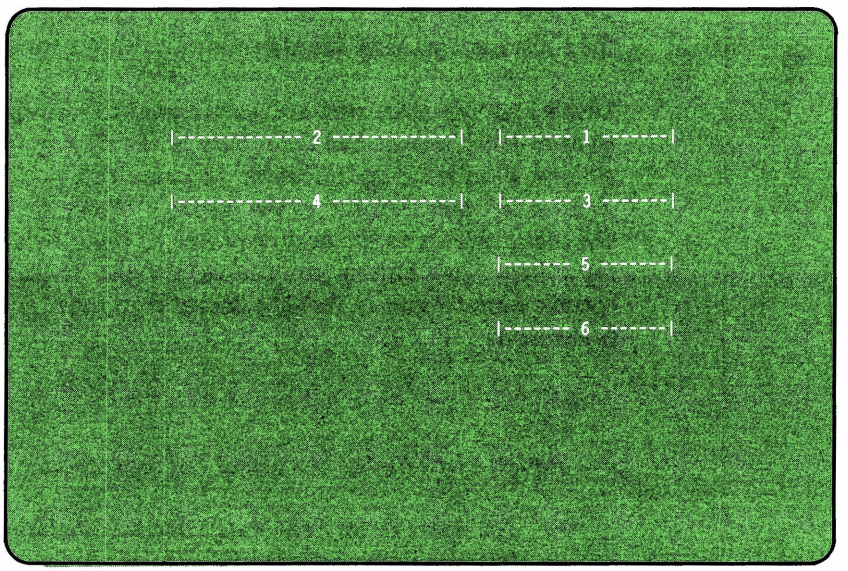
Entries allowed for column 40 (right-to-left display processing) are:

N (or blank) The cursor moves in a left-to-right direction from input field to input field. Input fields are processed in a left-to-right sequence.

Y The cursor moves in a right-to-left direction from input field to input field. Input fields are processed in a right-to-left sequence.

When right-to-left display processing is specified, the cursor is located in the first unprotected input field in the upper right corner of the display. The cursor then moves to the next unprotected input field to the left. When the cursor moves from one line to another line below it, the cursor moves to the first input field to the right, from that input field to the next input field to the left, and so on.

The following illustrates how the cursor moves from input field to input field on a right-to-left display. The numbers show the order in which the cursor moves from input field to input field.



WSU Only (Columns 41 through 59)

Columns 41 through 59 apply only to WSU (work station utility) display formats. If you are coding a display format for use by a programming language other than WSU, do not make an entry in columns 41 through 59. Prompts on the SDA Format Attributes display appear only if you are creating or updating a display format used by a WSU program. For more information about the entries made in columns 41 through 59, see *WSU Guide*.

Enter Mode Sequence – WSU Only (Columns 41 through 44)

These entries specify the position of the display within a primary or secondary sequence.

Priority – WSU Only (Column 46)

This entry specifies the relative expected frequency of this display.

Preprocess – WSU Only (Column 47)

This entry causes WSU to begin processing the C specifications for this display before showing the display. A preprocessed display must have associated C specifications.

Review Mode Record Identifying Indicators – WSU Only (Columns 48 through 53)

These entries specify the type of records in the transaction file that the operator can review with this display.

Insert Mode Record Identifying Indicators – WSU Only (Columns 54 through 59)

These entries specify the type of records in the transaction file after which the operator can insert another record using this display.

Columns 60 through 63

Columns 60 through 63 are not used and must be left blank. A prompt does not appear on the SDA Field Attributes display for this field.

Key Mask (Columns 64 through 79)

The key mask is a string of numbers or alphabetic characters that identify the function and command keys to be enabled (allowed) or disabled (not allowed) when the format is displayed. The key mask cannot contain any embedded blanks. The numbers and alphabetic characters can be specified in any order.

Function Keys

The function keys are identified in the key mask by number:

Function Key	Key Mask Entry
Print	1 (see *Print Key Exception* below)
Roll-Up	2
Roll-Down	3
Clear	4
Help	ↄ (see "Help Key Exception" below)

Function Key	Key Mask Entry
Home key when the cursor is in the home position	6

Note: A display format used by a WSU program can enable only the Roll-Up and Roll-Down keys. The Print, Clear, Help, and Home keys cannot be enabled by a display format used by a WSU program.

When the enable function keys entry in column 27 is Y, the numbers in the key mask identify function keys to be enabled. If the enable function keys entry is Y and the key mask does not contain any numbers, all function keys are disabled. When the enable function keys entry is N, the numbers in the key mask identify function keys to be disabled. If enable function keys entry is N and the key mask does not contain any numbers, all function keys are enabled.

Print Key Exception

When the Print key is enabled by a display format, it can be used like any of the other function keys to control program operations. When the Print key is disabled, it causes the contents of the display to be printed on the printer designated to receive Print key output. For more information about assigning the Print key printer, see *System Reference*.

Help Key Exception

When the Help key is enabled by a display format, it can be used like any of the other function keys to control program operations. If the Help key is disabled and H specifications are defined for this format, the operator can use the Help key to request help information identified in the H specifications. If the Help key is disabled and H specifications are *not* defined for this format, or if the display station is showing an error message, the Help key does its normal system function (for example, display help information for a keyboard error). **Do not** enable the Help key if you **do** want help formats to be displayed.

Command keys

Command keys are identified in the key mask by alphabetic characters:

Alphabetic Character	Command Key	Alphabetic Character	Command Key
A	1	M	13
B	2	N	14
C	3	P	15
D	4	Q	16
E	5	R	17
F	6	S	18

G	7	T	19
H	8	U	20
I	9	V	21
J	10	W	22
K	11	X	23
L	12	Y	24

When the enable command keys entry in column 28 is Y, the alphabetic characters in the key mask identify command keys to be enabled. If the enable command keys entry is Y and the key mask does not contain any alphabetic characters, none of the command keys are enabled. When the enable command keys entry is N, the alphabetic characters in the key mask identify command keys to be disabled. If the enable command keys entry is N and the key mask does not contain any alphabetic characters, none of the command keys are disabled.

For example, if you wanted to enable the Roll-Up, Roll-Down, and Home function keys and all the command keys except for 1 and 15, you would specify the following:

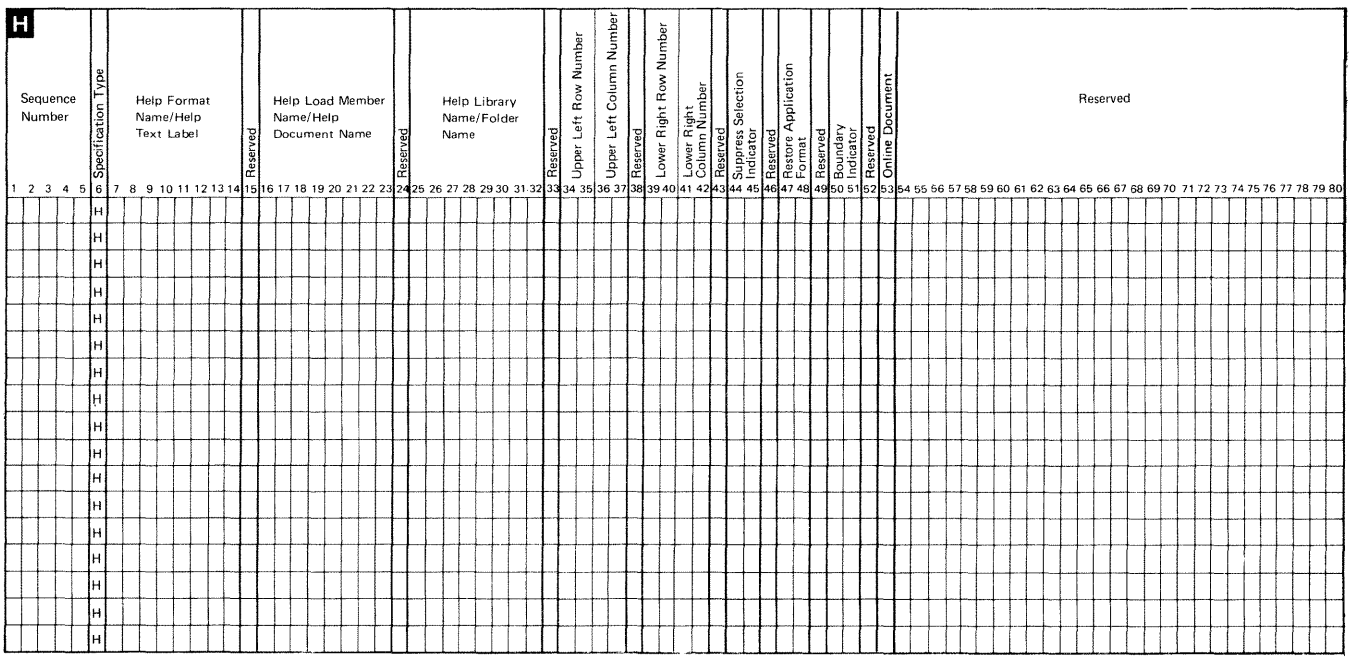
- In column 27, Y for enable function keys
- In column 28, N for enable command keys
- 236AP in columns 64 through 68 for the key mask:
  - The 2 identifies the Roll-Up key.
  - The 3 identifies the Roll-Down key.
  - The 6 identifies the Home key.
  - The A identifies command key 1.
  - The P identifies command key 15.

Appendix B. Entries on the Help Definition (H) Specifications

The **help definition (H) specifications** follow the display control specification, or S specification, and precede the first field definition specification, or D specification. Each H specification specifies an area on the format for which you have either defined help text or provided input to online information. When the operator presses the Help key while the cursor is positioned within the help area, the help text that you have defined is displayed. When the operator presses the Help key while the cursor is positioned within the help area and online document is specified, a help document is displayed. This document is described by the Help Text Label, Help Document Name, and Folder Name. H specifications are optional; you need not define help areas for your display formats. In general, the H specifications can be added to your display formats once the displays and the application have been tested.

The following shows the portion of the *Display Format Specifications* form used for coding the help definition specifications.

Help Definition Specification



The entries in the help definition specification (the H specification) and their meanings are:

Sequence Number (Columns 1 through 5)

Columns 1 through 5 can contain **record sequence** information. Information in these columns is listed when the specifications are listed. You can use columns 1 through 5 to number the records within a display format, although an entry in these columns is not required. Record sequence information is not processed by the FORMAT procedure.

Form Type (Column 6)

The character H identifies this record as a help definition specification. This entry is required and is preprinted on the H specification form.

Help Format Name/Help Text Label (Columns 7 through 14)

Help Format Name

Specifies the name of the first format displayed if the Help key is pressed while the cursor is located in the help area defined in columns 34 through 42 of this H specification. The format name must be exactly 8 characters in length, in the form **axxxxxnn**, where:

a Is an alphabetic character (one of the characters A through Z).

xxxxx Are exactly 5 alphameric characters. You might want to name your help formats with an abbreviation of the application or information that they describe. For example, you could use the characters ORDEH to indicate that the help format describes the order entry application.

nn Are exactly 2 numeric digits in the range 00 through 99. Consider numbering your help formats in steps of 5 or 10 (for example, AORDEH05, AORDEH10, AORDEH15). This allows you to add a new help format between two existing help formats (for example, AORDEH07 between AORDEH05 and AORDEH10).

There can be up to 100 help formats defined for any particular help area. All help formats for a help area must be contained in the same load member specified in columns 16 through 23 of the H specification. These help formats must have the same first 6 characters (axxxxx) as specified in columns 7 through 12. The values nn must be different and must vary in the range 00 through 99. The values nn are used by the system to select the sequence in which the help formats are displayed.

Help Text Label

The help text label is used if online document in column 53 of the H-specification is specified. The help text label identifies the location within the help document that is to be displayed when the help key is pressed and the cursor is located in this help area. The label entered here corresponds to the label entered on a Help text instruction located somewhere within the help document.

The help text label:

- Must be from 1 to 8 characters long
- Must begin with an alphabetic character (A through Z), #, $, or @
- Must not contain a comma (,), single quote ('), or blank ( ).

If the help text label is less than 8 characters long, it must be left-justified within this field; that is, it must start in column 7.

An asterisk (*) in column 7 identifies this record as a comment statement.

Column 15

Column 15 is not used and must be left blank.

Help Load Member Name/Help Document Name (Columns 16 through 23)

Help Load Member Name

This entry specifies the name of the display format load member that contains the help format specified in columns 7 through 14. The specified load member can contain more than one help format for a help area, but all help formats for the same help area must be contained in the same load member. Help formats for different help areas need not be in the same load member.

If the load member name is less than 8 characters, it must be left-adjusted in the field. For example, if the load member name was HLPFOR, you would enter:

```
|H|L|P|F|O|R|  | |
```

not

```
| | |H|L|P|F|O|R|
```

If a load member name is not entered in columns 16 through 23, the help format(s) for this help area must be contained in the format load member

currently in use by the application program. If a load member name is not entered, a library name cannot be specified in columns 25 through 32 of the H-specification.

Help Document Name

The help document name is used if online document in column 53 of the H-specification is specified. The help document name specifies the name of the help document to be displayed when the Help key is pressed while the cursor is in this help area. If the document is not found in the specified folder when the help key is pressed, an error message will be issued.

The document name:

- Must be from 1 to 8 characters long
- Must begin with an alphameric character (A through Z), (0-9), #, $, or @
- Must not contain a question mark (?), single quote ('), slash (/), period (.), hyphen (-), equal sign (=), greater-than sign (>), comma (,), or blank ( )
- Cannot be ALL.

If the document name is less than 8 characters long, it must be left-justified within this field; that is, it must start in column 16.

Column 24

Column 24 is not used and must be left blank.

Help Library Name/Folder Name (Columns 25 through 32)

Help Library Name

Specifies the name of the library that contains the load member specified in columns 16 through 23 of this H-specification. If a load member name is not specified, a library name cannot be specified. If a library name is specified and resource security is active, the operator must have run access to the specified library. See the *System Security Guide*, SC21-9042, for information about assigning access levels to a library.

If the library name is less than 8 characters long, it must be left-adjusted in the field.

If a library name is specified, the system looks in that library for the load member specified in columns 16 through 23. If the load member is not found in the specified library, the system looks in the system library (#LIBRARY). If the load

member is not found in either library when the operator requests help, an error message is displayed.

If a library name is not specified, the system looks for the load member in the current library of the operator that requests help. If the load member is not found in the current library, the system looks in #LIBRARY. If the load member is not found in either library when the operator requests help, an error message is displayed.

Folder Name

The folder name is used if online document in column 53 of the H-specification is specified. The folder name specifies the name of the folder that contains the document specified in columns 16 through 23 of the H-specification. If the specified document name is not found in this folder when the Help key is pressed, an error message will be issued.

The folder name:

- Must be from 1 to 8 characters long.
- Must begin with an alphabetic character (A through Z), #, $, or @.
- Must not contain a question mark (?), single quote (′), slash (/), hyphen (-), equal sign (=), greater-than sign (>), comma (,), or blank ( ). These characters are used as delimiters by procedures and OCL.
- Cannot be ALL or #LIBRARY.

If the folder name is less than 8 characters long it must be left-justified within this field; that is, it must start in column 25.

Column 33

Column 33 is not used and must be left blank.

Upper Left Row and Column (Columns 34 through 37)

Specifies the location, in the form **rrcc**, of the upper left corner of the rectangular help area. The row number, rr, must be a decimal number between 1 and 24 for an 80-column display, or between 1 and 27 for a 132-column display. Leading zeros are not required, but the value must be right-adjusted in columns 34 and 35. The column number is a two-digit number, which represents numbers from 1 to 80 for an 80-column display and 1 to 132 for a 132-column display. Numbers 100 through 132 are represented as:

100-A0
101-A1
102-A2
103-A3
104-A4
105-A5
106-A6
107-A7
108-A8
109-A9
110-B0
111-B1
112-B2
113-B3
114-B4
115-B5
116-B6
117-B7
118-B8
119-B9
120-C0
121-C1
122-C2
123-C3
124-C4
125-C5
126-C6
127-C7
128-C8
129-C9
130-D0
131-D1
132-D2

For formats that are to be displayed on an 80-column display station the row number can be up to 24 and the column number can be up to 80. For formats that are to be displayed on a 132-column display station the row number can be up to 27 and the column number can be up to 132 (D2). Leading zeros are not required, but the value must be right-adjusted in columns 36 and 37. For example, if the upper left corner of the help area was located at row 5, column 10, you would enter:

```
| |5|1|0|
```

If a start line number or V (variable start line) is specified in columns 17 and 18 of the S specification of this format, the row number in columns 34 and 35 of the H specification will be adjusted using the following equation:

Actual row number	=	Start line number specified in columns 17 and 18 of display control specification	+	Row number specified in columns 34 and 35 of help definition specification	-	1

For example, if an upper left row number of 5 was specified in columns 34 and 35 of the H specification, and a start line number of 10 is specified in columns 17 and 18 of the S specification, the actual row number would be 14 (10 + 5 - 1).

If the resulting upper left row number is greater than the number of lines on the display (24/27), then one of the following occurs:

- If a numeric value is specified for the start line number, a terminating error is reported when the format is compiled.
- If V is specified for the start line number and the resulting row number is greater than 24/27, this H specification is ignored when the application format is displayed.

If upper left row and column numbers are not specified, the lower right row and column numbers entry in columns 39 through 42 of the H specification must also be left blank.

By omitting all row and column entries, a **null help area** is defined. An operator can never directly display the help formats associated with a null help area by positioning the cursor and pressing the Help key. Help formats associated with a null help area can be displayed using the Roll-Up and Roll-Down keys.

Column 38

Column 38 is not used and must be left blank.

Lower Right Row and Column (Columns 39 through 42)

Specifies the location, in the form **rrcc**, of the lower right corner of the rectangular help area. The row number, rr, must be a decimal number between 1 and 24 for an 80-column display, or between 1 and 27 for a 132-column display. Leading zeros are not required, but the value must be right-adjusted in columns 39 and 40. The column number is a two-digit number which represents numbers from 1 to 80 for an 80-column display and 1 to 132 for a 132-column display. Leading zeros are not required, but the value must be right-adjusted in columns 41 and 42.

If a start line number or V (variable start line) is specified in columns 17 and 18 of the S specification of this format, the row number in columns 39 and 40 of the

H specification will be adjusted. See the description of the upper left row and column (columns 34 through 37) for additional explanation.

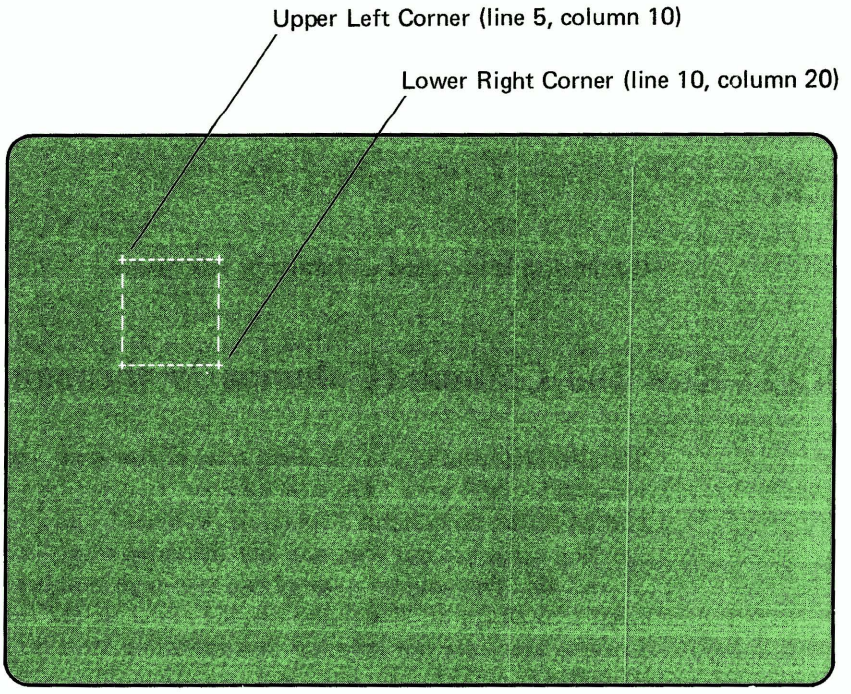
If the resulting lower right row number is greater than the number of lines on the display (24/27), then one of the following occurs:

- If a numeric value is specified for the start line number, a terminating error is reported when the format is compiled.
- If V is specified for the start line number, the number of lines on the display (24/27), is assumed as the lower right row number when this application format is displayed.

If lower right row and column numbers are not specified, the upper left row and column numbers entry in columns 34 through 37 of the H specification must also be left blank.

By omitting all row and column entries, a null help area is defined. If an H specification is not defining a null help area, then the upper left and lower right row and column numbers must define a rectangular area on the display. This means that the lower right row number must be greater than or equal to the upper left row number. Likewise, the lower right column number must be greater than or equal to the upper left column number.

For example, a help area could be defined with an upper left row and column number entry of 0510 and a lower right row and column number entry of 1020. The following shows the help area defined by these row and column numbers:



A help area defined with an upper left row and column number entry of 1020 and a lower right row and column entry of 0510 is invalid.

Column 43

Column 43 is not used and must be left blank.

Suppress Selection Indicator (Columns 44 and 45)

The suppress selection indicator is used to specify whether this H specification is used to create a help area when this format is displayed. Under certain conditions, you might not want to display help formats for a help area defined by an H specification. By turning on the suppress selection indicator for that H specification, the help area is not created and help formats for the help area are not displayed when the operator presses the Help key. Remember that the suppress selection indicator is tested *only* when the format containing this H specification is displayed by the application program.

Entries allowed for columns 44 and 45 are:

Blank — If columns 44 and 45 are left blank, this H specification is used to create a help area when this format is displayed. Help formats for the help area are displayed when the operator presses the Help key.

01 through 99 — If the specified indicator is on when this format is displayed, this H specification is ignored and the help area it defines is not created. Help formats for the help area are *not* displayed when the operator presses the Help key.

If the specified indicator is off when this format is displayed, this H specification is used to create a help area. Help formats for the help area are displayed when the operator presses the Help key.

Do not specify Y or N in columns 44 or 45. If Y or N is specified, an error message is issued when the FORMAT procedure processes this display format.

Column 46

Column 46 is not used and must be left blank.

Restore Application Format (Columns 47 and 48)

This entry specifies whether the application format and any data typed into it is **restored** (redisplayed) when the operator stops viewing the help formats by pressing a command key. If a command key is used to end the viewing of help formats, it must be enabled on the last format displayed before the Help key was pressed.

Entries allowed for columns 47 and 48 are:

Y (or blank) If Y is specified in column 47 or if columns 47 and 48 are left blank, and if the operator stops the viewing of a help format by pressing an enabled command key, the application format and any data typed into it are displayed. The command key is sent back to the program along with any input data that was typed into the application format before the Help key was pressed.

N If the operator stops the viewing of a help format by pressing an enabled command key, the application format and any input data that was typed into it are not displayed. The command key is sent back to the application program along with any input data that the operator typed into the help format before pressing the command key. Input data that was typed into the application format before the Help key was pressed is lost. The application program must clear the display to remove the help format and must redisplay the appropriate application format.

01 through 99 If the specified indicator is on when the application format is displayed and the operator stops viewing a help format by pressing an enabled command key, the application format and any input data that was typed into it are restored. The command key is sent back to the program along with any input data that was typed into the application format before the Help key was pressed.

If the specified indicator is off when the application format is displayed and the operator stops viewing a help format by pressing an enabled command key, the application format and any input data that was typed into it are not restored. The command key is sent back to the application program along with any input data that the operator typed into the help format before the command key was pressed. Input data that was typed into the application format before the Help key was pressed is lost. The application program must clear the display to remove the help format and must redisplay the appropriate application format.

Note: This field must be blank on a document H-specification. Any entry into this field will result in a $SFGR warning error and the entry will be ignored.

Column 49

Column 49 is not used and must be left blank.

Boundary Indicator (Columns 50 and 51)

Normally, if the operator presses the Help key when the cursor is located within a help area, the Roll keys can be used to display all the help formats for all the help areas that you have defined. In some cases, however, you might want to restrict the operator to viewing only a portion of the help formats that you have defined. Using the boundary indicator, it is possible to restrict the amount and nature of help text the operator can display by specifying that the H specification for a certain help area is to be used as an end point for Roll key processing.

Entries allowed for columns 50 and 51 are:

N (or blank) If N is specified in column 50 or if columns 50 and 51 are left blank, then this H specification does not act as a boundary during Roll key processing.

Y This H specification is used as a boundary during Roll key processing.

01 through 99 If the specified indicator is on when the application format is displayed, this H specification is used as a boundary during Roll key processing. If the specified indicator is off when the application format is displayed, this H specification is not used as a boundary during Roll key processing.

Note: This field must be blank on a document H-specification. Any entry into this field will result in a $SFGR warning error and the entry will be ignored.

Column 52

Column 52 is not used and must be left blank.

Online Document (Column 53)

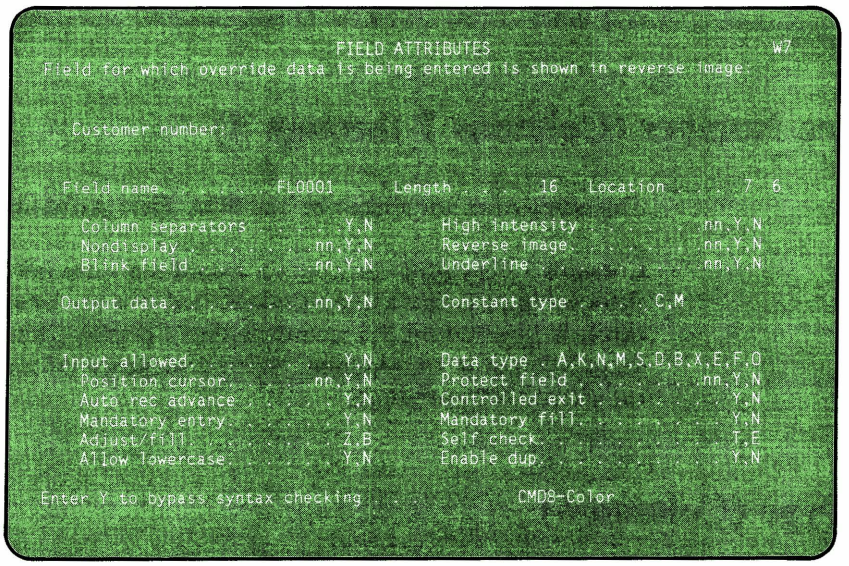
This field is used to indicate that this is a document H-specification. If Y (yes) is specified in column 53, this H-specification will be processed as a document H-specification. When the Help key is pressed while the cursor is within this help area, the document described by the document name field (columns 16-23) and folder name field (columns 25-32) will be opened. The document will be displayed starting with the location identified by the help text label field (columns 7-14).

If this field is omitted (column 53 is blank or N (no) is specified), this H-specification will be processed as a screen format H-specification.

Appendix C. Entries on the Field Definition (D) Specifications

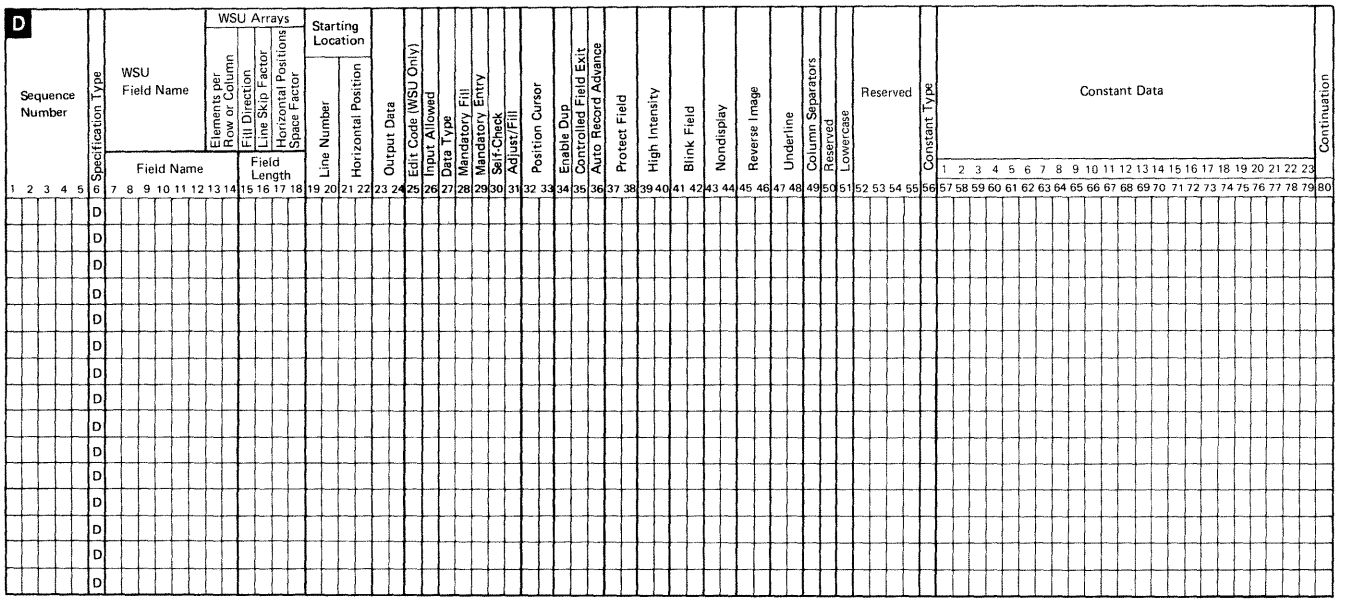
The **field definition, or D, specifications** follow the display control specification and the optional help definition specifications. Each field definition specification completely describes a field on the display. Each field on the display format must be specified by a field definition specification.

If you use SDA to create display formats, you use the Attribute display to define a portion of the information found in the D specification. If you use SDA to update display formats, you use the Update display to redefine a portion of that information. In either case, you can also use the Field Attributes display to define further the information found in the D specification. The following shows the SDA Field Attributes display:



If you use the FORMAT procedure to create or update display formats, use the field definition specification portion of the *Display Format Specifications* form to code the D specifications.

Field Definition Specification



The entries in a field definition specification (specified on the SDA Field Attributes display or on the D specification) and their meanings are:

Sequence Number (Columns 1 through 5)

This entry does not appear on the SDA Field Attributes display.

Columns 1 through 5 can contain record sequence information. Information in these columns is listed when the specifications are listed. You can use columns 1 through 5 to number the records within a display format, although an entry in these columns is not required. Record sequence information is not processed by the FORMAT procedure.

Form Type (Column 6)

This entry does not appear on the SDA Field Attributes display.

The character D identifies this record as a field definition. This entry is required and is preprinted on the D specifications form.

Field Name – Non-WSU Only (Columns 7 through 14)

This entry is for a display format used by a program in a programming language other than WSU. For a display format used by a WSU program, see the WSU-only field name entry (columns 7 through 12).

This entry specifies the name of the field being defined; the field name can have a maximum of 8 characters. The field name is used for your reference only; it is not included in the generated format. The field name you specify need not match the name given to the field by the user program, although it is useful for debugging purposes if these field names are identical.

An asterisk (*) in column 7 identifies this record as a comment statement, unless this record is a continuation of the previous record. If this record is a continuation of the previous record, the character X must be specified in column 80 of the previous record.

Field Name – WSU Only (Columns 7 through 12)

This entry is only for a display format used by a WSU program. This entry specifies the name of the field being defined; the field name can have a maximum of 6 characters. For more information about the field name entry for display formats used by WSU programs, see the *WSU Guide*.

An asterisk (*) in column 7 identifies this record as a comment statement, unless this record is a continuation of the previous record. If this record is a continuation of the previous record, any nonblank character must be specified in column 80 of the previous record.

WSU Arrays – WSU Only (Columns 13 through 18)

Columns 13 through 18 of the D specifications have special purposes for display formats used by WSU programs. These columns are used to define execution-time arrays. Prompts for these entries do not appear on the SDA Field Attributes display; you must use the development support utility (DSU) or the source entry utility (SEU) to add these entries to the display format source specifications. For more information about the entries made for WSU arrays, see the *WSU Guide*.

Field Length – Non-WSU Only (Columns 15 through 18)

Although this entry appears on the SDA Field Attributes as the *Length* field, you cannot change the field length using the Field Attributes display. The field length can be changed through SDA only by using the Update display.

This entry specifies the length of the field that is defined by the D specification. The field length can be any number from 1 through 1919. The field length value must be right-adjusted; leading zeros are not required.

Self-check fields (specified on the SDA Field Attributes display or in column 30 of the D specification) cannot be longer than 32 positions.

Fields in which a message identified by a message identification code and a message member identifier is to be displayed (specified on the Field Attributes display or in column 56 of the D specification) must be 6 positions long or greater.

Note: If the ideographic version of the SSP is being used and the field is defined as data type E, F, or X (specified on the SDA Field Attributes display or in column 27 of the D specification), the field length must be an even number that is equal to or greater than 4.

Line Number (Columns 19 and 20)

Although this entry appears on the SDA Field Attributes display as the first two numbers in the *Location* field, you cannot change the line number using the Field Attributes display. The line number can be changed through SDA only by using a move operation on the Update display.

This entry specifies the line number at which the field begins, relative to the start line number specified in columns 17 and 18 of the S specification. The line number entry must be right-adjusted; a leading zero is not required.

The actual line number at which the field is displayed is affected by the start line number specified in columns 17 and 18 of the S specification. Use the following equation to determine the actual line number at which a field is displayed:

Actual line number	=	Start line number specified for start line number (columns 17 and 18 of S specification)	+	Line number specified for line number (columns 19 and 20 of the D specification)	-	1

For example, if 5 is specified as the start line number and 6 is specified as the line number, the field actually begins at line 10 (5 + 6 - 1). If a start line number is not specified in the S specification, a start line of 1 is assumed; in this case, the line number you specify in columns 19 and 20 will be the actual line number at which the field is displayed.

Horizontal Position (Columns 21 and 22)

Although this entry appears on the SDA Field Attributes display as the last two numbers in the *Location* field, you cannot change the column number using the Field Attributes display. The column number can be changed through SDA only by using a move or shift operation on the Update display.

This entry specifies the column number of the leftmost position in a field.

The column number is a two-digit number, which represents numbers from 1 to 80 for an 80-column display and 1 to 132 for a 132-column display. For formats that are to be displayed on an 80-column display, the row number can be from 1 to 24 and the column number from 1 to 80. For formats that are to be displayed on a 132-column display, the row number can be from 1 to 27 and the column number from 1 to 132. Numbers 100 through 132 are represented as:

100 - A0
101 - A1
102 - A2
103 - A3
104 - A4
105 - A5
106 - A6
107 - A7
108 - A8
109 - A9
110 - B0
111 - B1
112 - B2
113 - B3
114 - B4
115 - B5
116 - B6
117 - B7
118 - B8
119 - B9
120 - C0
121 - C1
122 - C2
123 - C3
124 - C4
125 - C5
126 - C6
127 - C7
128 - C8
129 - C9
130 - D0
131 - D1
132 - D2

The horizontal position entry must be right-adjusted; a leading zero is not required.

The first position of the display (line 1, position 1) is reserved and is used by the system for certain control information; therefore, a field cannot begin in line 1, position 1 (and also line 1, position 2 for SDA). Also, each field is preceded on the left by one nondisplay control character (the character, supplied by the system, does not appear on the display) that defines the characteristics of the field; therefore, at least one space must be allowed between fields to leave room for this control character. If a field begins in position 1 of a line, the control character is located in column 80 of the previous line for an 80-column format and in column 132 of the previous line for a 132-column format.

Note: The horizontal position must be an even number if:

- The ideographic version of the SSP is being used.
- The horizontal position plus the field length (columns 15 through 18 on the D specification) is greater than 81 and the data type is E, F, or O.

Output Data (Columns 23 and 24)

The output data entry allows you to specify if this field is an output field. When used with the input allowed entry (specified on the SDA Field Attributes display or in column 26 of the D specification), the field is an input/output field. When used in combination with other D specification entries, you can specify the type of information or data displayed in this field. If the field is an output field, space *must* be reserved for the field in the user program's output data area. (If M is specified for the constant type on the SDA Field Attributes display or in column 56 of the D specification, only 6 bytes need be reserved for the field in the program.)

Entries allowed for output data are:

N (or blank) If N is specified in column 23 or if columns 23 and 24 are left blank, this field is not an output field.

Y If Y is specified in column 23, the type of information or data that is displayed in the output field depends on the entries you make in the other columns of the field's D specification.

The following table shows the result of the output field depending on the entries you make:

Value in Columns 23-24 (Output Data)	Value in Column 56 (Constant Type)	Contents of Columns 57-79 (Constant Data)	Result (Contents of of Output Field)
Y	Blank	Blank	Output data is supplied by program.
		Data	Data in columns 57 through 79 is displayed.
	C	Blank	Blanks are displayed.
		Data	Data in columns 57 through 79 is displayed.
	M	Blank	Blanks are displayed, or message identified by program is displayed.
		Message member identifier and MIC number	Message identified in columns 57 through 62 is displayed.

01 through 99 If an indicator is specified, the type of information or data that is displayed in the output field depends on the entries you make in the other columns of the field's D specification.

The following table shows the result of the output field depending on the entries you make:

Value in Columns 23-24 (Output Data)	Value in Column 56 (Constant Type)	Contents of Columns 57-79 (Constant Data)	Result (Contents of Output Field)
Indicator 01 - 99	Blank	Blank	If specified indicator is on, output data is supplied by program. If specified indicator is off, blanks are displayed.
		Data	If specified indicator is on, output data is supplied by the program. If specified indicator is off, data in columns 57 through 79 is displayed.
	C[1]	Blank	Blanks are displayed.
		Data	Data in columns 57 through 79 is displayed.
	M	Blank	If specified indicator is on, message identified by program is displayed. If specified indicator is off, blanks are displayed.
		Message member identifier and MIC number	If specified indicator is on, message identified by program is displayed. If specified indicator is off, message identified in columns 57 through 62 is displayed.

[1]When a valid indicator is specified in columns 23-24 (output data) and C is specified in column 56 (constant type), a warning message is issued and Yes is assumed for the output entry. The indicator is ignored for this specification.

If the user program performs an override operation and the specified indicator is on, then data supplied by the user program or the message identified by the user program is displayed in this field. For information about override operations, see the description of the override fields entry (columns 33 and 34 of the S specification) in Appendix A.

If the user program performs an override operation and the specified indicator is off, this field is unchanged.

Indicators 90 through 99 cannot be used for WSU display formats.

If a field is specified as an output field but not as an input field, then data in the field cannot be changed by the operator. If an output field is also defined as an input field, then data in the field can be changed by the operator.

For more information about specifying a constant type, constant data, or messages and message members, see the description of constant type (column 56) and constant data (columns 57 through 79) later in this appendix.

Edit Code – WSU Only (Column 25)

This entry is used only by the work station utility (WSU). If you are coding a display format for use by a programming language other than WSU, do not make an entry in column 25. A prompt for this field appears on the Field Attributes display only if you are creating or updating a display format used by a WSU program.

The edit code entry specifies the type of editing done for data sent to an output field. For information about how WSU uses the edit code entry, see the *WSU Guide*.

Input Allowed (Column 26)

The input allowed entry specifies whether this field is an input field. The type of data that can be entered in this field is identified in the data type entry (also specified on the SDA Field Attributes display or column 27 of the D specification). Entries allowed for input allowed are:

N (or blank) This field is not an input field.

Y This field is an input field.

Data Type (Column 27)

This entry specifies the type of data that can be entered in an input field. Data type cannot be specified for an output field, except data type O when running the ideographic version of the SSP. Entries allowed for the data type are:

B (or blank) This field can contain only alphameric data: the characters A through Z, numbers, and some special characters. This definition is useful for input fields that require values made up of both alphabetic characters and numbers, such as addresses or part numbers.

A This field can contain only alphabetic characters. This definition is useful for input fields that require customer names or cities.

M The field can contain all alphameric data, but on data entry keyboards, the keyboard will automatically shift to numeric shift for this field when manual shift is not active.

N This field can contain only numeric data, blanks, commas, periods, plus signs, or minus signs. This definition is useful for input fields that are made up strictly of numbers, such as account balances or inventory amounts.

For some programming languages (such as RPG II or COBOL), when special characters (commas, plus signs, or minus signs) are

entered in an N-type field, the program might not be able to use those characters. In that case, an error recovery routine should be included in the program that uses this format.

S This field can contain only signed numeric data; the last position of the field is reserved for a sign. Only the decimal digits (0 through 9) can be entered in the field, and a control field exit key must be used to exit from the field. The Field+ and Field Exit keys can be used to enter a positive value. The Field- key can be used to enter a negative value.

An input or input/output field with a data type of S (signed numeric) can be from 2 through 16 characters long. A signed numeric field requires one byte less in the program input or output data area than the field length.

When a negative number is sent as output to a signed numeric field, the minus sign will be displayed along with the number. When the program sends output to a signed numeric field that is also blank fill (B in the adjust/fill entry on the SDA Field Attributes display, or in column 31 of the D specification) any leading zeros are replaced by blanks. When you specify signed numeric data only, adjust/fill and control field exit Y (yes) are assumed.

R The field contains data to be read from the magnetic stripe reader. The field can have a maximum of 128 characters. If you specify data type R, nondisplay must also be specified on the SDA Field Attributes display or in columns 43 and 44 of the D specification.

A data type of R cannot be specified in a display format used by a WSU program.

Z This entry specifies that the cursor moves from right-to-left within this input field. For more information about right-to-left display processing, see the description of column 40 of the S specification.

The SDA Field Attributes display does not allow a Z entry. You must use DSU or SEU to make this entry to the display format source specifications. A data type of Z cannot be specified in a display format used by a WSU program.

D Input data typed in this field can contain only the numeric characters 0 through 9. The Field-key cannot be used in this type of field; all other function keys can be used. A data type of D can be used on remote systems only if the system is attached to a 5294 Workstation Controller. Remote screens attached to a 5251 Model 12 Display Station will allow alphanumeric characters to be entered into a D type field.

K This field can contain Katakana characters.

E This field can contain alphameric (A/N) and Katakana characters or ideographic characters, but not both. The field is initially filled with binary zeros and the display station is set to enter alphameric and Katakana characters. The cursor blinks when it is in the first position of the field to indicate that the operator can switch modes and enter ideographic characters.

F This field can contain alphameric (A/N) and Katakana characters or ideographic characters, but not both. The field is initially filled with ideographic nulls (a *shift-out* character, binary zeros, and a *shift-in* character). The display station is set to enter ideographic characters. The cursor blinks when it is in the first position of the field to indicate that the operator can switch modes and enter alphameric and Katakana characters.

O This field can contain any combination of alphameric, Katakana, and ideographic characters.

X This field can contain only ideographic data.

Notes:

1. *E, F, and X are used only for the ideographic version of the SSP. E, F, X and O cannot be specified for a display format that is to be used by a remote work station attached through a 5251 Model 2 or 12.*

2. *If an E, F, or O field is an input/output field (Y in column 23 of the D specification, or columns 23 and 24 of the D specification specify an indicator that is on when the field is displayed), the output data, whether from the format or from the program, will overlay the alphameric or ideographic nulls and override the coded input attributes of the E, F, and O fields.*

3. *If an X field is an input/output field, the output data from either the format or from the program should be ideographic data.*

Mandatory Fill (Column 28)

When mandatory fill is specified, if at least 1 character is typed in an input field, all positions in the field must be filled with any character that can be entered from the keyboard or a space produced by pressing the space bar.

Entries allowed for mandatory fill are:

N (or blank) This input field does not have to be filled.

Y If at least 1 character is typed in the field, all positions in the field must be filled with characters that can be typed from the keyboard. If you specify mandatory fill, adjust/fill (specified on the SDA Field Attributes display or in column 31 of the D specification) cannot be specified for the same field.

Mandatory Entry (Column 29)

Mandatory entry means that the operator must enter at least 1 character in this input field before input from the display station can be returned to the user program. (Note that input data is not returned to the user program if a mandatory entry is bypassed.) This definition is useful if an application requires that an operator supply data for a particular field. For example, on a list of reasons for a student's withdrawal from a university, mandatory entry can be specified to ensure that at least one reason for the withdrawal is entered.

If mandatory entry is specified, the operator can bypass a mandatory entry field if:

- All input fields on the display are mandatory entry fields, the return input entry (specified on the SDA Format Attributes display or in column 22 of the S specification) is Y (yes), and the operator does not enter data in any of the input fields.
- The return input entry is N (no), and the operator does not enter data in any of the fields.

The operator can use the cursor keys to exit from a mandatory entry field. However, if the operator uses the cursor keys and adjust/fill is also specified, no adjusting will occur.

Entries allowed for mandatory entry are:

N (or blank)	If N (no) or blank is specified, the operator does not have to enter information into the field.
Y	The operator must enter at least 1 character in the field before input from the display station can be returned to the user program.

Self-Check (Column 30)

If **modulus 10** or **modulus 11 self-checking** is specified, the rightmost position of the input field (the self-check digit) is checked by the appropriate check algorithm after the field is entered. Self-check fields cannot be longer than 32 positions. For more information about using self-checking input fields, see Chapter 3, "Additional Considerations for Display Design."

Entries allowed for self-check are:

Blank	If left blank, this input field is not a self-check field.
T	This input field is a modulus 10 self-check field.
E	This input field is a modulus 11 self-check field.

Self-check can be specified for a right-to-left field (see column 40 of the S specification and column 27 of the D specification); however, the position of the

self-check digit remains at the right end of the input field. Therefore, in a right-to-left, self-check field, the *first* digit entered is the self-check digit.

Adjust/Fill (Column 31)

If adjust/fill is specified, information entered into this input field is right-adjusted, and unused character positions are filled with zeros or blanks before the field is sent to the user program. If adjust fill is specified, controlled field exit is assumed: one of the field exit keys must be pressed before the cursor will leave this input field. For more information, see the considerations given below or the description of the controlled field exit entry later in this appendix.

Entries allowed for adjust/fill are:

Blank If column 31 is left blank, right-adjust, blank fill is assumed on input for signed numeric input fields; no adjust, no fill is assumed for all other input fields.

Z Information entered in this field is right-adjusted, and unused positions are filled with zeros before the field is sent to the user program.

B Information entered in this field is right-adjusted, and unused positions are filled with blanks before the field is sent to the user program. For output to a signed numeric field (S specified for the data type entry on the SDA Field Attributes display or in column 27 of the D specification), leading zeros are replaced by blanks.

Considerations for the Adjust/Fill Entry

Some or all of the following considerations may apply to the adjust/fill entry:

- Adjust/fill and mandatory fill (specified on the SDA Field Attributes display or in column 28 of the D specification) cannot be specified for the same field.
- To enter adjust/fill fields, the operator must press the Field+ key for numeric or signed numeric fields, the Field- key for signed numeric fields, or the Field Exit key. The operator can use the Field- key to enter a numeric only field only from a remote display station. Operators can press the Field Advance key to enter an adjust/fill field, but the adjust/fill will not occur. Because these keys produce different results, either a legend on the display should be provided that explains briefly which keys you want the operator to use, or an explanation should be given in the documentation for this application on the use of these keys.
- If adjust/fill is specified for a right-to-left input field, no adjusting occurs when the operator uses a field exit key and the cursor direction is from right to left. An adjust/fill action may result in the loss of data entered to the right of the cursor when the cursor direction is from left to right.

Position Cursor (Columns 32 and 33)

The position cursor entry is used to move the cursor to the first position of an input field. The position cursor entry controls the cursor position only if the keyboard is going from a disabled to an enabled state. (The keyboard is enabled whenever a program displays a format that does not suppress input or whenever an assembler program requests a put with invite operation.)

Moving the cursor to an input field is useful if the program detects an input error. The program can turn on an indicator to move the cursor and to draw the operator's attention to the field that is in error. This same indicator can also be used to control an attention-getting attribute, such as reverse image or high intensity. Once the error is corrected, the indicator can be turned off, and the operator can then continue with normal data entry operations.

If the keyboard is already enabled when this format is displayed, the home position of the cursor is changed, but the cursor position itself is not changed. For example, if a program displays a format without suppressing input, the keyboard is enabled. If a second format that does not clear the entire screen is then displayed and if a cursor position is specified, the cursor position is not changed.

See the description of the protect field entry later in this appendix for special considerations regarding the position cursor entry when the input field is protected.

Entries allowed for position cursor are:

N (or blank) If N is specified in column 32 or if columns 32 and 33 are left blank, the cursor appears in the first position of this field only if all the following conditions are true:

- This field is the first unprotected input field on the display.
- No field has a Y (yes) specified for the protect field entry.
- No other field has specified an indicator that is on for the protect field entry.

Y If Y is specified in column 32, the cursor appears at the first position in this input field, unless other fields have indicators specified in columns 32 and 33 and one or more of these indicators are on when the format is displayed. In that case, the cursor appears in the first position of the first field on this format with its specified indicator on. Y can be specified for only one field in the display.

01 through 99 If an indicator is specified in columns 32 and 33 and that indicator is on when the format is displayed, the cursor appears in the first position of this input field, unless a preceding field on this format has an indicator that is on. In that case, the cursor appears in the first position of the first field on the display with its specified indicator on.

For a WSU display format, indicators 90 through 99 cannot be used.

Enable Dup (Column 34)

This entry is not used for WSU display formats.

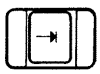
When the Dup (duplicate) key is enabled and pressed, the position of the cursor and the remainder of the field are filled with a special character called the **duplicate character**. The duplicate character is displayed as an overscored asterisk (*), and has a hexadecimal value of 1C. The operator can enter data into the first record and then simply press the Dup key for succeeding records that are to contain the same data. For each succeeding record, the program should remove the duplicate characters and then replace them with the actual data.

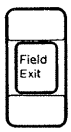
Entries allowed for enable duplicate key are:

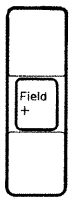
N (or blank)	If N is specified or if column 34 is left blank, the duplicate key is not allowed and will cause an error if it is pressed while the cursor is in this input field.
Y	The duplicate key is allowed and can be pressed while the cursor is in this input field.

Controlled Field Exit (Column 35)

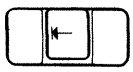
If you specify controlled field exit, one of the field exit keys must be pressed before the cursor will leave this input field. The field exit keys are:

Field Advance 

Field Exit 

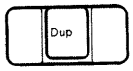
Field+ 

Field-

Field Backspace 

Home

Erase Input

Duplicate 

The operator can use the cursor keys to exit from a controlled exit field; no adjusting will occur.

Entries allowed for controlled field exit are:

N (or blank) If N is specified or column 35 is left blank, the cursor automatically exits from the field when the field is filled. If you specify adjust/fill (on the SDA Field Attributes display or in column 31 of the D specification), an N or blank entry is ignored.

Y One of the field exit keys must be pressed before the cursor will leave this input field.

Auto Record Advance (Column 36)

If automatic record advance is specified, data can be sent to the user program when the operator types it in the input field.

Entries allowed for column 36 are:

N (or blank) If N is specified or column 36 is left blank, data typed in the input fields on this display are not returned to the user program until the operator enters the entire display.

Y Data typed in the input fields on the display are automatically returned to the user program when one of the following occurs:

- The last character in this input field is typed in, and N or blank is specified for controlled field exit.
- The cursor is in this input field, and the Enter, Field Adv, Field Exit, Field+, Field- (if the field is a signed numeric field), or Dup key is pressed.

Protect Field (Columns 37 and 38)

In certain situations, you may not want an operator to enter data in an input field. For example, one operator may have authority to see and change a displayed value; a different operator may have authority only to see that value. By specifying protect field, you can prevent an operator from entering or changing data in an input field; the cursor bypasses, or skips over, the protected field.

Entries allowed for protect field are:

N (or blank)	If N is specified or if columns 37 and 38 are left blank, this input field is not protected, and the operator can type data in this field.
Y	This input field is bypassed whenever the cursor would appear in this field.
01 through 99	If an indicator is specified, this input field field is bypassed if the specified indicator is on. For a WSU display format, indicators 90 through 99 cannot be used.

Considerations for the Protect Field Entry

Protect field can be specified for input fields only. If Y or an indicator is specified for the protect field entry, some or all of the following considerations may apply:

- If an override operation is used, the protect field indicator is ignored.
- The cursor might still appear in a protect field if:
  - The field is protected by an indicator that is on when the format is displayed, *and*
  - The field is the first input field (that does not specify a Y in column 37 for protect field) defined by a D specification in the format, *and*
  - The cursor is not positioned by an indicator to any field that is not protected.

  Remember that although the cursor may appear in a protect field if all of the above is true, the operator cannot type input data into the field.
- If a field is defined as either nondisplay or protected, or both, and column separators are requested, the column separators are displayed on a 5251 Display Station and on a 5291 Display Station; the column separators are *not* displayed on a 5292 Color Display Station.
- If an indicator controls either the nondisplay or protect field attributes, or both, and column separators are requested, the separators are not displayed if the indicator is on when the field is displayed.

High Intensity (Columns 39 and 40)

You can specify that data in an output or input field be displayed in high intensity. Such a definition is useful for displaying important information or for attention-getting purposes.

Entries allowed for high intensity are:

N (or blank) If N is specified in column 39 or if columns 39 and 40 are left blank, the characters in this field are displayed with normal intensity.

Y If Y is specified in column 39, the characters in this field are displayed with high intensity.

01 through 99 The characters in this field are displayed with high intensity if the specified indicator is on and with normal intensity if the specified indicator is off.

For a WSU display format, indicators 90 through 99 cannot be used.

If this format is displayed on a 5292 Color Display Station and high intensity is specified, the field is displayed with white characters. If other field attributes are also specified, the color might be different. For the result of specific attribute combinations, see Figure C-1. For additional information about the control of color, see the *5292 Color Display Station Programmer's Guide to Using Color.*

High intensity, reverse image, and underline cannot all be specified for the same field at the same time. If Y (yes) is specified for all three entries, an error message is displayed when the source member containing these specifications is processed by the FORMAT procedure. You can decide whether to continue with processing, or to end the FORMAT procedure. If at least one of the entries is controlled by an indicator and an attempt is made to display the field with all three attributes requested, the field is displayed as a nondisplay field.

Blink Field (Columns 41 and 42)

If blink field is specified, data displayed in an output field or entered in an input field will blink. Such a definition is useful for urgent, attention-getting purposes, but should be used sparingly.

Entries allowed for blink field are:

N (or blank) If N is specified in column 41 or if columns 41 and 42 are left blank, the characters in this field do not blink when this format is displayed.

Y If Y is specified in column 41, the characters in this field blink when this format is displayed.

01 through 99 The characters in this field blink if the specified indicator is on when this format is displayed. The characters in this field do not blink if the specified indicator is off when this format is displayed.

For a WSU display format, indicators 90 through 99 cannot be used.

If this format is displayed on a 5292 Color Display Station and blink field is specified, the field is displayed with red characters and does not blink. To cause the characters in the field to blink, you must also specify high intensity. If other field attributes are also specified, the color might be different. For the result of specific attribute combinations, see Figure C-1. For additional information about the control of color, see the *5292 Color Display Station Programmer's Guide to Using Color*.

Nondisplay (Columns 43 and 44)

When you specify nondisplay for an output or input field, information sent to the field or information entered in the field is not visible on the display. This entry is useful for display IDs, for information that is to be displayed only to certain operators, or for input fields for which the application requires the operator to enter a secured password or code.

Entries allowed for nondisplay are:

N (or blank) If N (no) is specified in column 43 or if columns 43 and 44 are left blank, the information in this field is displayed.

Y If Y (yes) is specified in column 43, information in this field is not displayed.

01 through 99 Information in this field is not displayed if the specified indicator is on.

For a WSU display format, indicators 90 through 99 cannot be used.

Considerations for the Nondisplay Entry

If Y or an indicator is specified for the nondisplay entry, some or all of the following considerations may apply:

- If nondisplay is specified and high intensity, reverse image, or underline is also specified, the field is defined as nondisplay only.
- If a field is defined as either nondisplay or protected, or both, and column separators are requested, the column separators are displayed on a 5251 Display Station and on a 5291 Display Station; the column separators are *not* displayed on a 5292 Color Display Station.

- If an indicator controls either the nondisplay or protect field attributes, or both, and column separators are requested, the separators are not displayed if the indicator is on when the field is displayed.

Reverse Image (Columns 45 and 46)

Displayed data normally appears as light characters on a dark background. If you specify reverse image for an input or output field, the data in that field appears as dark characters on a light background. The light-colored background extends for the entire length of the field, which makes reverse image a helpful technique in indicating the location and length of an input field.

Entries allowed for reverse image are:

N (or blank) If N is specified in column 45 or if columns 45 and 46 are left blank, the characters in this field appear as light characters on a dark background.

Y If Y is specified in column 45, the characters in this field appear as dark characters on a light background.

01 through 99 If an indicator is specified, the characters in this field appear as dark characters on a light background if the indicator is on when this format is displayed.

For a WSU display format, indicators 90 through 99 cannot be used.

Reverse image, high intensity and underline cannot all be specified for the same field at the same time. If Y (yes) is specified for all three entries, an error message is displayed when the FORMAT procedure processes the source member containing this display format. If at least one of the entries is controlled by an indicator and an attempt is made to display the field with all three attributes requested, the field is displayed as a nondisplay field.

Underline (Columns 47 and 48)

You can use an underline to show the location or length of an input field, or to emphasize information displayed in an output field.

Entries allowed for underline are:

N (or blank) If N is specified in column 47 or if columns 47 and 48 are left blank, the field is not underlined.

Y If Y is specified in column 47, the field is underlined.

01 through 99 The field is underlined if the indicator is on when this format is displayed.

For a WSU display format, indicators 90 through 99 cannot be used.

If this format is displayed on a 5292 Color Display Station and underline is specified, the field is displayed with a blue line beneath the character positions in the field. The color of the characters displayed in the field depends on the other field attributes that are specified. For the result of specific attribute combinations, see Figure C-1. For additional information about the control of color, see the *5292 Color Display Station Programmer's Guide to Using Color.*

Underline, reverse image, and high intensity cannot all be specified for the same field at the same time. If Y (yes) is specified for all three entries, an error message is displayed when the FORMAT procedure processes the source member that contains this display format. If at least one of the entries is controlled by an indicator and an attempt is made to display the field with all three attributes requested, the field is displayed as a nondisplay field.

Column Separators (Column 49)

Column separators are vertical lines or dots that precede and follow each character position in a field. Column separators do not require additional character positions. You can use column separators to show the number of character positions in an input field. If this format is displayed on a 5251 Display Station, the column separators appear as vertical lines on either side of each character position in the field.

If this format is displayed on a 5291 Display Station, the column separators appear as two vertical dots on either side of each character position in the field.

If this format is displayed on a 5292 Color Display Station, the column separators appear as blue dots at the bottom corners of each character position in the field. If blink field is also specified, the column separators do not appear on the display. The color of the characters displayed in the field depends on the other field attributes that are also specified. For the result of specific attribute combinations, see Figure C-1. For additional information about the control of color, see the *5292 Color Display Station Programmer's Guide to Using Color.*

Entries allowed for column separators are:

N (or blank) If N is specified or if column 49 is left blank, column separators do not appear in this field.

Y Each character position in this field is preceded and followed by column separators.

Considerations for the Column Separators Entry

If a field is defined as either nondisplay or protected, or both, and column separators are requested, the column separators are displayed on a 5251 Display Station and on a 5291 Display Station; the column separators are *not* displayed on a 5292 Color Display Station.

If an indicator controls either the nondisplay or protect field attributes, or both, and column separators are requested, the separators are not displayed if the indicator is on when the field is displayed.

Column separators are not controlled by indicators, Any color that requires the use of column separators cannot be program controlled.

Attributes Specified Color Result	Column Separators[1]	Blink Field	High Intensity	Reverse Image	Underline Can Also Be Specified
Green					X
Green, reverse image				X	X
White			X		X
White, reverse image			X	X	
Red		X[2]			X
Red, reverse image		X[2]		X	X
Red, blink		X	X		X
Red, reverse image, blink		X	X	X	
Turquoise, column separators	X				
Turquoise, reverse image column separators	X			X	X
Pink	X[3]	X[2]			X
Pink, reverse image	X[3]	X[2]		X	X
Yellow, column separators	X		X		X
Yellow, reverse image, column separators	X		X	X	
Blue	X[3]	X[2]	X		X
Blue, reverse image	X[3]	X[2]	X	X	
Data in fields with these combinations of attributes are not displayed.			X	X	X
		X	X	X	X
	X		X	X	X
	X	X	X	X	X

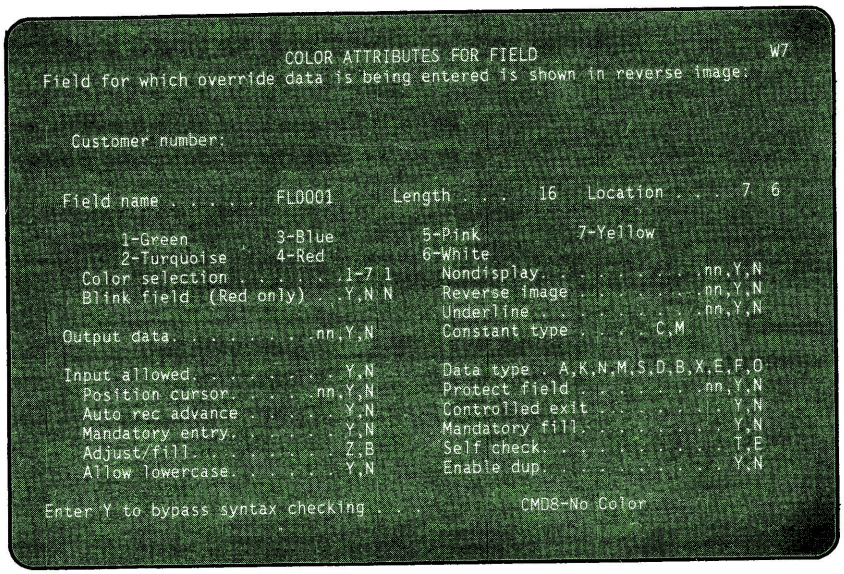
[1]Column separators do not appear when reduced line spacing is used.
[2]Field does not blink.
[3]Column separators do not appear.

Notes:

1. *Underlines and column separators are always blue.*
2. *Underlines do not blink if blink field is also specified.*
3. *Column separators do not appear if blink field is also specified.*
4. *Use the limit color select option of the 5292 Color Display Station to see how a display format designed for color will appear on a single-color display.*

Figure C-1. Using Field Attributes to Control Color on a 5292 Color Display Station

Rather than specify attribute combinations to control color, you can use the SDA Color Attributes for Field display:



Select your options and press the Enter key. The proper combination of color attributes will override any previous color attribute entries entered on the Field Attribute display.

Note: The following restrictions apply when using the Color Attributes screen:

- If Y is specified for Blink Field, then red is the only valid color.
- If Y is entered for both the Reverse Image and Underline prompts, you cannot select white, yellow, blue, or blinking red.
- If Y is entered in the Nondisplay prompt, the only valid colors are green and turquoise, and you cannot specify Reverse Image or Underline.

Column 50

Column 50 is not used and must be left blank.

Lowercase (Column 51)

If lowercase is specified, all alphabetic characters typed into this field are displayed and sent to the user program in lowercase (if the Shift key is not pressed when a character is typed in by the operator) or in uppercase (if the Shift key is pressed when a character is typed in by the operator).

The SDA Field Attributes display entry or the D specification entry for lowercase always takes precedence over the SDA Format Attributes display entry or the S specification entry for lowercase (column 21 of the S specification).

The lowercase entry can be used for input fields only. In addition, a lowercase entry cannot be made for numeric or badge reader input fields.

Use the following chart to determine what can be typed in the input field depending on what is specified in the display format specifications:

Entry in Column 51 of the D Specification	Entry in Column 21 of the S Specification or on the SDA Format Attributes Display: Blank	N	Y
Blank	uppercase only	uppercase only	lowercase or uppercase
N	uppercase only	uppercase only	uppercase only
Y	lowercase or uppercase	lowercase or uppercase	lowercase or uppercase

Columns 52 through 55

Columns 52 through 55 are not used and must be left blank.

Constant Type (Column 56)

You can specify the type of information displayed in an output field when this format is displayed. That information can be a constant defined on the SDA Image display or in columns 57 through 79 of the D specification, or that information can be a message identified by a message identification code and a message member identifier.

Assuming Y is specified for ouput data columns 23 - 24, entries allowed for constant type are:

Blank If column 56 is blank and constant information for this field is defined on the Image display or in columns 57 through 79 of the D specification, then that information is displayed in this field. If column 56 is blank and no constant information is defined, then information sent from the program is displayed.

C If C is specified, the constant information defined on the Image display or in columns 57 through 79 of the D specification is displayed in this field. C is required only if the constant information is all blanks, and you want to display all blanks in the field. For more information on possible combinations, refer to *Output Data (Columns 23 and 24)*.

M If M is specified, a message is displayed in this output field. That message is identified by a message identification code and a message member identifier specified on the SDA Image display, in columns 57 through 79 of the D specification, by the user program, or by the PROMPT OCL statement.

P,F, or D Display formats for WSU programs have these additional constant data types. For information about the uses of these constant data types, see the *WSU Guide*.

For more information about what is displayed in the field, see the description of the output data entry earlier in this appendix.

Constant Data (Columns 57 through 79)

This entry specifies the information to be placed in an output or input/output field when the format is generated or displayed. If you use SDA to create or update display formats, this prompt does not appear on the Field Attributes display. Instead, the information displayed in the field is specified on the Image or Update display.

The information that is displayed in the field depends on the contents of column 56 (constant type) and columns 57 through 79. The output information described below assumes Y is specified for output data columns 23 - 24:

- If C or blank is specified in column 56 (constant type), columns 57 through 79 contain the actual information as it will be displayed in the field. If columns 57 through 79 are blank, blanks or data supplied by the program are displayed in the field.

- If M is specified in column 56 (constant type), the message identified by a a 4-digit message identification code (MIC) in columns 57 through 60 and a 2-character message member identifier in columns 61 and 62 is displayed. The MIC number identifies the message containing the information to be displayed in the field. Depending on the length of the output field, the message text is padded with blanks or truncated (shortened to the length of the field) when the format is displayed.

  The message member identifier identifies the message member that contains the message. The message member identifier can be one of the following:

Identifier	Message Member Containing the Message
U1 or blank	User-1 message member
U2	User-2 message member
P1	Program-1 message member
P2	Program-2 message member
M1	SSP level-1 message member (##MSG1)
M2	SSP level-2 message member (##MSG2)

  If a message identification code is specified but a message member identifier is not, U1 is assumed as the message member.

  If columns 57 through 79 are blank, then the message identified by the user program or by the PROMPT OCL statement is displayed. If no information is entered in columns 57 through 79 and the PROMPT OCL statement is used to show the display format, the system looks at the value of the corresponding parameter in your procedure for an identification of the

message to be displayed. If that parameter is a MIC number, the message identified by that MIC number is displayed in the field. For example, if M is specified in column 56 of the D specification for the third output field on the display, and columns 57 through 79 of the D specification for that field are blank, and the third parameter in your procedure is 0001, then the message with MIC number 0001 is displayed in that third output field.

For information about assigning user-1, user-2, program-1, and program-2 message members, see the description of the MEMBER OCL statement in the System/36 manual *System Reference*.

For more information about what is displayed in the field, see the description of the output data entry earlier in this appendix.

Considerations for the Constant Data Entry

Some or all of the following considerations may apply to the constant data entry:

- If C is not specified in column 56 and columns 57 through 79 are blank, and if the field is an output field (Y specified in column 23 of the D specification), then information from the program output data area is displayed.
- If a message identification code is specified in columns 57 through 79, then only 6 bytes need be reserved for the field in the program output data area.
- M1 and M2 are valid only if SSP-YES is specified on the LOADMBR utility control statement of the $SFGR utility program. The $SFGR utility program is run by the FORMAT procedure. See the description of the $SFGR utility control statements in the *System Reference* for more information.

Continuation (Column 80)

This prompt does not appear on the SDA Field Attributes display. An entry to this column is required only if you are using the D specification coding form and your output constant information exceeds the space provided in columns 57 though 79.

If more than 23 positions of constant data (specified in columns 57 through 79 of the D specification) are required, an entry must also be made in column 80. For a display format used by a program in a language other than WSU, an X must be specified in column 80 to indicate that the next record (or D specification) is a continuation of this record. For a display format used a WSU program, any nonblank character must be specified in column 80. Positions 7 through 79 of the next D specification contain the continued constant data.

A comment, indicated by an asterisk (*) in column 7 of a D specification, cannot follow a D specification with an entry made in column 80.

- For the ideographic version of the SSP, the constant can contain ideographic characters. The *shift out* and *shift in* characters are counted as part of the data. If the constant output consists of more than 10 ideographic characters, an alphameric X must be coded in column 80 and the ideographic data

continued on the next D specification. If a *shift in* character is in column 78 or 79 and if the constant is continued with a *shift out* character in column 7 of the next D specification, the *shift in*/*shift out* pair and the blank or character in column 79, if one exists, are deleted when the constant is concatenated and displayed. If a *shift in* character is in column 78 and if the constant is continued with an alphameric (A/N) or Katakana character in column 7 of the next D specification, the blank or character in column 79 is deleted when the constant is concatenated and displayed. If a *shift out* character appears in column 78 and a *shift in* is in column 79, the *shift out*/*shift in* pair is deleted when the constant is concatenated and displayed. If you are using extended ideographic characters, put a *shift out* character in column 57 of the D specification to cause the ideographic characters to be displayed correctly. You may also specify Open Data Type (O) for the output field: this will cause the ideographic character to be displayed correctly.

Appendix D. Screen Design Aid Problem Determination

If a problem occurs while you are using SDA, the cause of the problem may not be obvious. It is possible that an error in your application or in the system operation could be the cause of an error condition. The problem determination procedure in this appendix can help you solve or circumvent the problem. If you need more information, refer to "Contacting Your Service Representative" on page D-4.

How to Use this Procedure

This procedure is arranged in a sequence of questions that you can answer with a *Yes* or *No*. Based on your answer, you are directed to another question or to a recommendation for action.

Start at Question 1 and follow the question-and-answer sequence, answering each question to which you are directed. If the problem is a condition that requires more detailed procedures, you are referred to those procedures.

Identifying SDA Problems

When a SDA problem occurs, you can use the following series of questions to pinpoint its possible cause:

1. **Did you receive a message indicating an error condition that prevented you from continuing the job?**

   No

   Yes

   Take the actions indicated by the message. If the action requires operator action, call your system operator. If the action requires you to call for help, see "Contacting Your Service Representative" on page D-4.

   When you examine a message for indicated actions, check the following:

   - Second-level message text, which describes the message in more detail. To read the second-level message text, note the message identification number that appears beside the message text and find the message in Chapter 3 of the *Utilities Messages*, SC21-7939 manual.

- User response, if applicable, for possible recovery actions. Possible user responses are described in Chapter 1 of the the *Utilities Messages*, SC21-7939 manual.

  If you still cannot solve your problem after fully examining the message, see "Contacting Your Service Representative" on page D-4.

2. **Are other system users having problems communicating with the system?**

   No **Yes**
   Call your system operator and describe the problem. Have your operator use the procedures in the *System Problem Determination*, SC21-7919 for the 5360 System Unit, or SC21-9063 for the 5362 System Unit or Chapter 13 in *Operating your Computer - 5364*, SC21-9085 for the 5364 System Unit.

3. **Is this the first time you have ever run the job?**

   Yes **No**
   You may have a system problem. Call your system operator, describe your problem, and have the operator use the *System Problem Determination*, SC21-7919 for the 5360 System Unit, or SC21-9063 for the 5362 System Unit or Chapter 13 in *Operating your Computer - 5364*, SC21-9085 for the 5364 System Unit.

4. **Have changes been made to the program since the last time it ran successfully?**

   No **Yes**
   Consider what has been changed. For example: have operating procedures changed, have new device files been used, or have program changes been applied recently?

5. **Are you having a nonprogramming problem, such as spooled output that is not produced or a device that is not working?**

   No **Yes**
   You may have a system problem. Call your system operator and have the operator use the appropriate procedure in the *System Problem Determination*, SC21-7919 for the 5360 System Unit, or SC21-9063 for the 5362 System Unit or Chapter 13 in *Operating your Computer - 5364*, SC21-9085 for the 5364 System Unit.

6. **Are you using the current release of SSP?**

   Yes **No**
   Install the current release of SSP.

7. **Have all IBM-supplied Program Temporary Fixes (PTF's) for the System/36 that apply to the current release of the SSP been installed?**

   Yes **No**
   Install the PTF'S you have received and not yet applied. Run the program again.

8. **Have any non-IBM changes been made to SDA or to SSP?**

   No

   Yes
   If SDA has been changed, install its current release and program changes, and run the program again. If the SSP has been changed, install its current release and program changes.

9. **Was a requested printout produced?**

   Yes

   No
   Check the following:

   - The spool file queue exists.
   - The spooling is active.
   - The spool file is under the correct printer ID.
   - The printer is in a ready state.
   - There are no printer messages waiting to be answered at the console.
   - Your display station is not assigned to another printer. Use the SSP STATUS SESSION operator command to find the printer ID of the session printer for your display station. Compare the printer ID of the printer you are using to the printer ID of the session printer. Either get your printouts from the current session printer, or change the session printer by using the SSP SET procedure.

10. **Can you gain access to a member?**

    Yes

    No
    The member may be in use by another task. Check to see if other workstations are editing or updating your source member. Only one user can access a source member at one time.

11. **On the selection screens, were formats found in the member?**

    Yes

    No
    If no formats are found in a member, check that the member and library names on the selection screen are correct.

12. **On the selection screens, were members called and found?**

    Yes

    No
    If you called members, but no members were found, check that the library name on the selection screen is correct.

13. **Were product procedures called and found?**

    Yes

    No
    If product procedures were called, but not found, check that the procedures are in #LIBRARY and that the library #SDALIB exists.

14. **Does the 132-column capable prompt appear on the S-specification when you are working on a 3180 terminal?**

    Yes **No**
    ↓ Check the terminal configuration. The terminal may be configured for a 5250 terminal instead of a 3180 terminal.

15. **Did you start the format on line 1, but it appears on line 2?**

    Yes **No**
    ↓ If you created the format with the column indicators on line 1, the format will begin on line 2. This may have led you to believe that you started the format on line 1, when you really started it on line 2.

16. **Are your recovery procedures failing?**

    No **Yes**
    ↓ If recovery fails, check to see if the work files have been altered or destroyed. Check to see if a file was created using a name similar to a work file such as #SD.id or #S2.id, where id is the workstation ID. Files with names that are similar to work files will have to be renamed before you can try recovery actions.

If, after following the questions and answers in this section, you or your system operator have not solved the problem, consult the *System Problem Determination*, SC21-7919 for the 5360 System Unit, or SC21-9063 for the 5362 System Unit or Chapter 13 in *Operating your Computer - 5364*, SC21-9085 for the 5364 System Unit before calling the service representative.

Contacting Your Service Representative

If you cannot solve a problem using the problem determination procedures listed in this chapter, and in the *System Problem Determination*, SC21-7919 for the 5360 System Unit, or SC21-9063 for the 5362 System Unit or Chapter 13 in *Operating your Computer - 5364*, SC21-9085 for the 5364 System Unit, you may want to contact your service representative. Before contacting your service representative, complete the tasks listed below:

- Take a task dump at the time of the failure.
- Run the APAR procedure and include the entire history file.
- Obtain a diskette copy of the user screen format source members or menu source members. If the problem occurred while the SDA view function is being used, include a diskette copy of the user's display screen format load member.
- Obtain a diskette copy of the #SD.id work file and the S2.id work files (id is the workstation ID that the job is running in.)
- Obtain the output listing of the SDA-generated SFGR specifications.

- Write a description of the SDA option the user is having trouble with as well as the steps that were being used before the failure occurred.

The procedures for obtaining the above information are explained in the manual *System Problem Determination*, SC21-7919 for the 5360 System Unit, or SC21-9063 for the 5362 System Unit or Chapter 13 in *Operating your Computer - 5364*, SC21-9085 for the 5364 System Unit.

Glossary

$BMENU. See *build menu utility program.*

$MAINT. See *library maintenance utility program.*

$SFGR. See *screen format generator utility program.*

#LIBRARY. See *system library.*

alarm. An audible signal at a display station or printer that is used to get the operator's attention.

allocate. To assign a resource, such as a disk file or a diskette file, to perform a specific task.

alphabetic character. Any one of the letters A through Z. Some program products extend the alphabet to include the special characters #, $, and @.

alphameric. Consisting of both letters and numbers and often other symbols, such as punctuation marks and mathematical symbols.

alphameric-Katakana (A/N/K). A combination of alphameric characters and Katakana characters.

alphanumeric. See *alphameric.*

A/N/K. See alphameric-Katakana

application. (1) A particular data processing task such as inventory control or accounts receivable. (2) A group of related programs that apply to a particular business area, such as the Inventory Control or the Accounts Receivable application.

application program. A program used to perform an application or part of an application.

assembler. A program that converts assembler language statements to an object program.

assembler instruction statement. A statement that controls what the assembler does, rather than what the object program does.

assembler language. A symbolic programming language in which the set of instructions includes the instructions of the machine and whose data structures correspond directly to the storage and registers of the machine.

attribute. A characteristic.

base number. The part of a self-check field from which the check digit is calculated.

BASIC (beginner's all-purpose symbolic instruction code). A programming language designed for interactive systems and originally developed at Dartmouth College to encourage people to use computers for simple problem-solving operations.

bit. Either of the binary digits 0 or 1. See also *byte.*

BLDMENU procedure. An SSP procedure used to translate menu source members into menu load members. The procedure can also be used to update menu members.

block. (1) A group of records that is recorded or processed as a unit. (2) Ten sectors (2560 bytes) of disk storage.

build menu utility program ($BMENU). An SSP utility program used to translate menu source members into menu load members.

byte. The amount of storage required to represent 1 character; in System/36, a byte is 8 bits.

call. (1) To activate a program or a procedure at its entry point. Compare with *load.* (2) In data communications, the action necessary in making a connection between two stations on a switched line.

cancel. To end the current job before the job is completed.

character. A letter, digit, or other symbol.

character key. A keyboard key that allows the user to enter the characters shown on the key. Compare with *command keys* and *function key.*

character string. A sequence of consecutive characters.

check. (1) An error condition. (2) To look for an error.

check digit. The rightmost digit for a self-check field, used to check the accuracy of the field.

clause. In COBOL, a set of consecutive character strings that specify the characteristics of an entry.

close. To end the processing of a file.

COBOL (common business oriented language). A high-level programming language, similar to English, that is used primarily for commercial data processing.

code. (1) Instructions for the computer. (2) To write instructions for the computer. (3) A representation of a condition, such as an error code.

column separator. A vertical line on each side of a position of a field on a display. This line does not occupy a position on the display. An example of a field with column separators is: |A|B|C|

command. A request to perform an operation or a procedure.

command display station. A display station that can request and start jobs, as well as be acquired by a program.

command keys. The 12 keys on the top row of the display station keyboard that are used with the Cmd key (and optionally the shift key) to request up to 24 different actions of program products and user programs. Compare with *character key* and *function key*.

command mode. A mode that allows a display station operator to request or start jobs.

command source or load member. Describes the command to be processed when the operator selects an option on a menu.

comment. Words or statements in a program or procedure that serve as documentation rather than as instructions.

compilation time. The time during which a source program is translated from a high-level language to a machine language program.

compile. To translate a high-level language program into a machine language program.

concatenate. To remove symbols, blanks, or control characters that are separating two characters, and bring the separated characters together without spaces.

constant. A data item with a value that does not change.

constant field. A field that is defined by a display format to contain a value that does not change.

continuation line. A line of a source statement into which characters are entered when the source statement cannot be contained on the previous line or lines.

control command. A command used by an operator to control system or display station operations. A control command does not run a procedure and cannot be used on a procedure.

cursor. A movable symbol (such as an underline) on a display, used to indicate where the next character typed by the operator will appear.

D specification. See *field definition specification.*

data clause. In COBOL, a clause that appears in a data description entry and that provides information describing a particular characteristic of a data item.

data communications. The transmission of data between computers or remote devices over a communications line, or both.

data description entry. In COBOL, an entry in the Data Division that describes the characteristics of a data item.

data file utility (DFU). The part of the Utilities Program Product that is used to create, maintain, display and print disk files.

data item. A unit of information to be processed.

data type. A category that identifies the mathematical and internal representation of data.

decimal. Pertaining to a system of numbers to the base 10; decimal digits range from 0 through 9.

default value. A value stored in the system that is used when no other value is specified.

define-the-file (DTF). A control block containing information that is passed between data management routines and users of the data management routines.

delete. To remove.

Development Support Utility (DSU). A program product that lets the programmer enter and update source and procedure members.

DFU. See *data file utility.*

disk. A storage device made of one or more flat, circular plates with a magnetic surface on which data can be stored.

display. (1) A visual presentation of data on a display screen. (2) To show information on the display screen.

display control specification. A record within the display format specifications, it provides information about the entire display format that, in general, is unrelated to the specific fields being defined. Also known as the S specification.

display format. Data that defines (or describes) a display.

display layout sheet. A form used to plan the location of data on the display.

display text source or load member. Describes the information displayed on a menu.

display screen. The part of the display station on which information is displayed.

display station. An input/output device that includes a display screen on which an operator can enter and receive data, and an attached keyboard from which an operator can enter data.

document. A collection of one of more lines of text that can be named and stored as a member in a folder.

DSU. See *Development Support Utility.*

DTF. See *define-the-file.*

edit. (1) To modify the form or format of data; for example, to insert or remove characters such as for dates or decimal points. (2) To check the accuracy of information that has been entered, and to indicate if an error is found.

enter. To type information and press the Enter key to pass the information to the computer.

field. One or more characters of related information (such as a name or amount).

field definition specification. A record within the display format specifications, which completely describes a field on the display. Each field is described by at least one field definition specification. Also known as the D specification.

fixed-format menu. A menu that is formatted as two 12-item columns. Contrast with *free-format menu.*

folder. A special type of library on disk that contains either documents, profiles, office support information, or data definitions. A folder cannot contain load, procedure, source, or subroutine members.

format. (1) A defined arrangement of such things as characters, fields, and lines; usually used for displays, printouts, or files. (2) To arrange such things as characters, fields, and lines.

FORMAT procedure. An SSP procedure that is used to translate a display format source member into a display format load member. The procedure can also be used to add, update, and remove display formats.

free-format menu. A menu for which the programmer defines the format of a majority of the lines on the menu display. Contrast with *fixed-format menu.*

function key. A keyboard key that requests an action but does not display or print a character. The cursor movement and Help keys are examples of function keys. Compare with *character key* and *command keys.*

H specification. See *help definition specification.*

help definition specification. An optional record within the display format specifications, it describes a rectangular area on the display screen for which the operator can request help information. Also known as the H specification.

help format. A display format that defines the display that is shown when the operator presses the Help key. The help display is identified in the help definition specification.

ideographic character. A two-position symbol, pictogram, or graphic character, used to represent ideas.

ideographic support function. A version of SSP that manages A/N/K- and ideographic-capable display stations, printers, and programs.

indicator. An internal switch that communicates a condition between programs or parts of a program.

informational message. A message that provides information to the operator, but does not require a response.

input. Data to be processed.

input/output (I/O). Pertains to either input or output, or both.

instruction. A statement that specifies an operation to be performed by the computer and the locations in storage of all data involved in that operation.

interactive. Pertains to activity involving requests and replies as, for example, between an operator and a program or between two programs.

Interactive Communications Feature (SSP-ICF). A feature of the SSP that allows a program to communicate interactively with another program or system using BSC and SNA communications as well as communications between programs within the same computer.

job. (1) A unit of work to be done by the system. (2) One or more related procedures or programs grouped into a procedure.

Katakana. A one-position symbol, pictogram, or graphic character used to represent phonetic sounds.

key mask. A string of numbers and alphabetic characters that identify the function keys and command keys that the operator can use to control program operations.

left-adjust. To move the significant contents of a field to the leftmost positions of that field.

library. (1) A named area on disk that can contain programs and related information (not files). A library can contain load members, procedure members, source members, and subroutine members. See also *system library* and *user library*. (2) The set of publications for a system.

library maintenance utility program ($MAINT). An SSP utility program that can be used to create, copy, and list libraries and library members.

library member. A named collection of records or statements in a library. The types of library members are *load member*, *procedure member*, *source member*, and *subroutine member*.

load. To move data or programs into storage.

load member. A library member that contains information that the system can use directly.Contrast with *source member*.

machine instruction. An instruction of the machine language that can be performed by the computer.

machine language. A language that can be used directly by the computer without intermediate processing.

macroinstruction. A single instruction that represents a set of instructions in the same source language.

magnetic stripe reader. A device attached to a display station that reads and checks data from a magnetic stripe on a badge before allowing a user to sign on.

mandatory entry field. A field for which an operator must enter at least 1 character.

mandatory fill field. A field for which an operator must enter nothing or must fill in completely.

menu. A displayed list of items from which the operator can make a selection.

message. Information sent to an operator or a programmer from a program. A message can either be displayed or printed.

message identification code (MIC). A 4-digit number that identifies a record in a message member. This number can be part of the message identifier.

message identifier. A field in the display or printout of a message that directs the user to the description of the message in a message guide or reference manual. This field consists of up to 4 alphabetic characters, followed by a dash, followed by the message identification code.

message member. A library member that defines the text of each message and its associated message identification code.

MIC. See *message identification code*.

modulus 10/modulus 11 checking. Formula used to calculate the check digit for a self-check field.

null character. The character hex 00, used to represent the absence of a printed or displayed character.

numeric. Pertaining to any of the digits 0 through 9.

object program. A set of instructions in machine language. The object program is produced by a compiler from a source program and can be input to the linkage editor.

OCL. See *operation control language*.

open. To prepare a file for processing.

operation. A defined action, such as adding or comparing, performed on one or more data items.

operation control language (OCL). A language used to identify a job and its processing requirements to the SSP.

output. Data that has been processed.

override. (1) A parameter or value that replaces a previous parameter or value. (2) To replace a parameter or value.

parameter. A value supplied to a procedure or program that either identifies or controls the actions of the procedure or program.

printout. Information from the computer that is produced by a printer.

procedure. A set of related OCL statements (and possibly utility control statements) that cause a specific program or a set of programs to be performed.

program. (1) A sequence of instructions for a computer. (2) To write a sequence of instructions for a computer.

prompt. A displayed request for information or operator action.

protected field. A displayed field in which operators cannot enter data.

read-under-format. A programming technique in which a program presents a display, the program ends, and another program reads data entered into the display.

record. A collection of fields that is treated as a unit and is part of a file.

remote. Pertaining to a computer or a device that is connected to another computer or device over a communications line.

right-adjust. To move the contents of a field to the rightmost positions of that field.

RPG. A programming language specifically designed for writing application programs that meet common business data processing requirements.

S specification. See *display control specification*

screen design aid (SDA). The part of the Utilities Program Product that helps the user design, create and maintain displays and menus. Additionally, SDA can generate source specifications for RPG II and WSU programs.

SDA. See *screen design aid.*

self-check field. A field, such as an account number, consisting of a base number and a check digit.

SEU. See *source entry utility.*

shift-in (SI) character. A one-position character that signifies the end of an ideographic character string.

shift-out (SO) character. A one-position character that signifies the start of an ideographic character string.

SI. See shift-in character.

SO. See shift-out character.

source entry utility (SEU). A part of the Utilities Program Product used by the operator to enter and update programs and related information.

source member. A library member that contains information in the form in which it was entered, such as display format specifications. Contrast with *load member.*

source program. A set of instructions that are written in a programming language and that must be translated to machine language before the program can be run.

special character. A character other than an alphabetic or numeric character. For example; *, +, and % are special characters.

specification. A record within the display format specifications that defines the characteristics of the entire display, individual fields on the display, or help areas on the display.

SSP. See *System Support Program Product.*

SSP-ICF. See *Interactive Communications Feature.*

statement. An instruction in a program.

system library. The library, labeled #LIBRARY, that contains the SSP.

System Support Program Product (SSP). A group of IBM licensed programs that manage the running of other programs and the operation of devices. The SSP also contains utility programs that perform common tasks, such as copying data from diskette to disk.

turnaround time. The time interval required to reverse the direction of transmission over a communication line.

unique. The only one.

unprotected field. A displayed field in which operators can enter, change, or remove data.

Utilities Program Product. A licensed program that contains the data file utility (DFU), the source entry utility (SEU), the work station utility (WSU), and the screen design aid (SDA).

utility control statement. A statement that gives a utility program information about the way the program is to perform or the output it is to produce.

utility program. An SSP program that allows you to perform a common task, such as copying data from diskette to disk.

variable. A name used to represent a data item whose value can change while the program is running.

work station. A device that lets you transmit information to or receive information from a computer, or both, as needed to perform your job; for example, a display station or printer.

work station utility (WSU). The part of the Utilities Program Product that allows you to write programs for data entry, editing, and inquiry.

work station data management. The part of the SSP that enables a program to present data on a display screen by providing a string of data fields and a display format name.

WSU. See *work station utility*.

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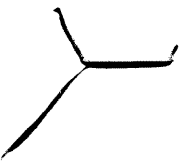

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