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First Edition (September 1994)

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Contents

Notices	vii
Trademarks and Service Marks	vii
About This Book	ix
Who Should Use This Book	ix
Chapter 1. Data File Utility Overview	1
Creating a Program	1
Running a Program	1
Using a Programming Language	2
Describing a File	2
RPG II-Described Files	3
DDS-Described Files	3
IDDU-Described Files	3
DFU Function Keys	3
Definition Function Keys	3
Runtime Function Keys	3
Starting DFU	4
DFU Commands	4
Using the STRDFU Command	4
AS/400 Data File Utility (DFU) Menu	4
Distributed Data Management Support	5
Chapter 2. Creating a DFU Program	7
Data Entry Display Example	7
Procedure for Creating a DFU Program	8
Starting DFU	10
Requesting a DFU Program	10
Selecting a File	11
Specifying Program Characteristics	11
Defining the Audit Report	12
Working with Record Formats	12
Selecting and Sequencing Fields	13
Selecting Fields for Extended Definition	14
Specifying Extended Definitions for Numeric Fields	14
Specifying Validity Checks for Numeric Fields	16
Specifying Extended Field Definitions for Alphanumeric Fields	17
Specifying Validity Checks for Alphanumeric Fields	17
Defining the Second Record Format	18
Displaying the DFU Program Summary	18
Displaying DFU Program Detail	20
Displaying Data File Detail	21
Exiting from DFU Program Definition	21
Changing a Data File	22
Creating a DFU Program for a Nonindexed File	24
Defining General Information for a Nonindexed File	27
Defining Audit Control	27
Selecting a Field for Record Number Storage	27
Working with Record Formats	28
Selecting and Sequencing Fields	28

Exiting from DFU Program Definition	29
Chapter 3. Changing a DFU Program	31
Procedure for Changing a DFU Program	31
Specifying a DFU Program	31
Selecting a Program	32
Working with Record Formats	32
Working with Fields	33
Exiting from DFU Program Definition	33
Displaying a Data File	33
Chapter 4. Running a DFU Program	35
Procedure for Running a DFU Program	35
Run a DFU Program Menu	35
Changing a Data File	36
Selecting a Record Format	37
Displaying Batch Accumulators	38
Displaying Run Status	38
Exiting from Data Entry	40
Displaying Total Accumulators	41
Audit Report Example	41
Chapter 5. Updating Data Using a Temporary Program	43
Procedure for Updating Data Using a Temporary Program	44
Specifying a Data File	44
Exiting from Data Entry	45
Chapter 6. Tailoring a DFU Display	47
Saving the DDS Source	47
Tailoring a DFU Data Entry Display	48
Selecting a Source File	49
Working with Display Records	49
Designing a DFU Display	50
Moving Display Fields	50
Exiting from SDA	52
Saving the DDS Source	52
Creating a DFU Display File	53
Chapter 7. Deleting a DFU Program	55
Procedure for Deleting a DFU Program	55
Specifying a DFU Program for Deletion	55
Confirming Deletion of DFU Programs	55
Chapter 8. Using DFU in the System/36 Environment	57
RPG II-Described Files	57
System/36 Style Runtime Function Keys	58
Creating a DFU Program through the System/36 Environment	60
Example System/36 Data Entry Display	60
Procedure for Creating a DFU Program from the System/36 Environment	61
Creating a DFU Program for an Indexed Data File	62
Creating a DFU Program	62
Selecting RPG II Source Members	62
Defining General Information for an Indexed File	63
Defining Audit Control	63

Selecting System/36 Style Options	64
Working with Record Types	64
Displaying Record Types	65
Selecting and Sequencing Fields	66
Working with Fields	67
Specifying Extended Field Definitions for Alphanumeric Fields	67
Displaying a DFU Program Summary	68
Displaying DFU Program Detail	70
Displaying Data File Detail	71
Exiting from DFU Program Definition	71
Displaying a Data File	72
Appendix A. Additional Considerations	73
Security Considerations	73
Multiple Record Formats	73
Error Suppression	74
Unsupported Data Types	75
Appendix B. Double-Byte Character Set Considerations for DFU Programs	77
Supported DBCS Characters	77
Software Requirements	78
Programming Considerations	78
Appendix C. Differences Between System/38, System/36, and AS/400 DFU	81
DFU Migration	81
Changing Programs Using OCL Procedures	81
Printing Reports	81
Deleting Records	81
Audit Reports	82
Blank Records	82
Key Fields on the Data Entry Display	82
CHGDTA Command	82
Record Backspace (Cmd 5)	82
Bibliography	83
Index	85

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About This Book

This book provides information and examples to help you learn to use the data file utility (DFU) on the Application System/400* (AS/400*) system. The data file utility, which is part of the Application Development* ToolSet/400 package, is used to create programs to maintain data files. It is referred to as *DFU* throughout this guide.

This book contains information on:

- Starting DFU
- DFU options, function keys, commands, and messages
- Creating, changing, running, and deleting DFU programs
- Using DFU in the System/36 environment.

You may need to refer to other IBM manuals for more specific information about a topic. The *Publications Reference*, SC41-3003, provides information on all the publications in the AS/400 library.

For a list of related publications, see the "Bibliography" on page 83.

Who Should Use This Book

This book is intended for application programmers, system programmers, and workstation users who use DFU in an AS/400 environment.

Before using this book, you must know how to use your workstation and have a general knowledge of the AS/400 system. For general information on the AS/400 system, refer to *System Operation*, SC41-3203, and *System Startup and Problem Handling*, SC41-3206. For information on databases and database management, refer to *Database Programming*, SC41-3701, and *Data Management*, SC41-3710.

Chapter 1. Data File Utility Overview

The data file utility (DFU) is a program generator that helps you create programs to enter data, update files, and make file inquiries. You do not need a programming language to use DFU. You create the program by responding to a series of displays. DFU creates the program for you.

DFU provides you with a quick way of updating a file using a temporary program. You do not have to define a DFU program first. DFU also allows you to create database maintenance programs faster than you could by using programming languages (for example, RPG).

DFU programs can perform several jobs. For example, a single DFU program can allow you to enter new records into a file, update fields within existing records, or perform file inquiry tasks.

DFU creates data entry programs from definitions based on the descriptions of existing database files. You must create an Interactive Data Definition Utility (IDDU), Data Description Specifications (DDS), or RPG II description, and then create physical or logical files based on the description. The descriptions are then used during the definition of your DFU program. After you have defined a program, you can recall and run that program as often as required.

Creating a Program

To create a DFU program for data entry, select the record formats and fields you want to use. The data entry displays you request are then created. For example, if you use two record formats, DFU creates two different data entry displays. You can switch between the two formats while you are running your program.

To help you create your program, DFU:

- Reviews available database record formats
- Reviews field specifications for a record
- Reviews definition status
- Shows help text to explain the fields in a definition display

DFU also allows you to print a summary of the defined program that shows all your selected fields and record formats.

Running a Program

While running a DFU program, you can:

- Change, delete, or display a record in a file.
- Add new records to a file by typing data into the displayed fields.
- Change or view records in a file by typing an approximate key value and then using the page keys to locate the desired record.
- Select new record formats (or types, if the file is RPG-defined).
- Retrieve the next or previous record for any record format or type.

- Automatically duplicate one or more fields. This is useful when a data file contains a field that is the same in each record and you do not want to retype the field each time.
- Print the program-specified fields of the current database record when in Display mode.
- Show the status of the DFU program that is running.
- Present the total number of additions, deletions, and changes processed during the current DFU session.
- Print an audit report listing the changes made to a data file.
- Automatically generate key values or Relative Record Numbers (RRN).
- Accumulate the sum of additions and subtractions in a specific field in a record.
- Add a positive or negative integer to the field for each new consecutive record.
- Update records while rolling through the file.
- Change the key value during Change mode while running the DFU program.
- Initialize fields with a default value.
- Hide fields on the data entry display when you specify both Output only and Non-display for the fields.
- See field values displayed in different forms by using an edit word when an edit code does not give the desired editing.
- Validate data entered into fields.

Using a Programming Language

If a programming language (such as RPG or COBOL) is available, you may decide whether you can create and update your data entry program more efficiently with DFU than with the programming language.

Use a programming language if your data entry application requires any of the following:

- Computations on selected fields
- Data checking based on information contained elsewhere in a database file, such as cross referencing fields from other files
- Validation of the relationship between multiple field entries
- Complex formatting requirements

Describing a File

DFU programs can operate on RPG II, DDS, and IDDU-described data files. Use DFU to define data entry displays based on the data descriptions of these files.

Usually, data attributes of a file (such as the names and lengths of records and fields) are specified in application programs themselves. In RPG, this is done in input or output specifications. This method of describing data is program-described data. Data attributes can also be defined externally through DDS or IDDU. These

definitions are not in the application programs, but in file descriptions independent of the program. This is externally described data.

RPG II-Described Files

DFU determines what a file looks like based on file descriptions. In a program-described file, you provide the file description for two RPG II specifications: the F specification and the I specification. DFU uses F and I specifications in a complete RPG II program but ignores the other specifications. The use of RPG II-described data files by DFU programs is allowed only within the System/36 environment. See Chapter 8, “Using DFU in the System/36 Environment,” for more information on using RPG II file descriptions.

DDS-Described Files

Data description specifications (DDS) provide a method of describing data files externally rather than within a program. External file descriptions are associated with the data files themselves; you do not have to specify the location of the description for DFU. For more information on DDS-described files, see the *DDS Reference*, SC41-3712.

IDDU-Described Files

IDDU is an interactive data definition utility that is part of the Operating System/400* (OS/400*) operating system. IDDU provides you with another method for describing the files and data stored on your system. IDDU file descriptions are linked to your file in a similar manner to DDS file descriptions. For more information on IDDU-described files, see *IDDU Use*, SC41-3704.

DFU Function Keys

Use the function keys to request various DFU functions. DFU functions have different assignments, depending on whether you are defining or running a DFU program.

If you define your program for a System/36 environment, you must use the System/36 function keys shown in “System/36 Style Runtime Function Keys” on page 58 when you run that program.

Definition Function Keys

Definition function keys allow you to perform functions while defining a DFU program.

Runtime Function Keys

With the runtime function keys, you can perform functions while running your DFU program.

While you are running a program, not all the function keys available can be shown on one display; only the function keys you use most often appear. To see definitions for all available function keys, place your cursor on either one of the function key lines at the bottom of your display and press Help. Detailed definitions of all the function keys appear in numerical order.

Starting DFU

You can request DFU from the Command Entry display by typing the command for the AS/400 Data File Utility (DFU) menu (STRDFU) or by typing a command with parameters on the command line to access a specific DFU function.

You define, change, and run DFU programs by accessing it through the STRDFU command. If authorized, however, you can also run existing programs directly by using the CHGDTA or DSPDTA commands, or run a temporary program by using the UPDDTA command.

DFU Commands

DFU supports the following commands:

Command	Description
STRDFU	Starts the data file utility
CHGDTA	Changes records in a data file
DSPDTA	Displays records from a data file
UPDDTA	Creates and runs a temporary program to update a data file
DLTDFUPGM	Deletes a DFU program
CRTDFUDSPF	Creates a DFU display file

Using the STRDFU Command

Use the Start DFU (STRDFU) command to request the AS/400 Data File Utility (DFU) menu. You must have user authority to use the STRDFU command. You can specify a single option, or an option plus a suboption, to show a specific DFU prompt. For example, the Display a Data File display appears when you type the following command, selecting option 1 (Run a DFU program) plus suboption 2 (Display a data file):

```
STRDFU (1 2)
```

If you do not specify any options, the AS/400 DFU menu appears.

AS/400 Data File Utility (DFU) Menu

The AS/400 DFU menu allows you to select options to run, create, change, or delete a DFU program, or run a temporary program.

```
AS/400 Data File Utility (DFU)

Select one of the following:

1. Run a DFU program
2. Create a DFU program
3. Change a DFU program
4. Delete a DFU program
5. Update data using temporary program

Selection or command
===> _____

F3=Exit  F4=Prompt  F9=Retrieve  F12=Cancel

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```

For each option, DFU begins a prompting sequence of displays that takes you through all the necessary steps. Chapters 2 through 7 of this manual provide detailed descriptions and an example of each of the options.

Following is a brief description of each option:

1. *Run a DFU program.* This option allows you to select and run an existing DFU program. For more information, see Chapter 4, "Running a DFU Program."
2. *Create a DFU program.* This option allows you to define a new DFU program. For more information, see Chapter 2, "Creating a DFU Program."
3. *Change a DFU program.* This option allows you to change an existing DFU program. For more information, see Chapter 3, "Changing a DFU Program."
4. *Delete a DFU program.* This option allows you to delete an existing DFU program. For more information, see Chapter 7, "Deleting a DFU Program."
5. *Update data using temporary program.* This option allows you to change or add data to a file without having to predefine a DFU program. For more information, see Chapter 5, "Updating Data Using a Temporary Program."

Distributed Data Management Support

DFU supports the AS/400 DDM files on DFU program definition and operation.

Distributed Data Management (DDM) accesses data files that reside on remote IBM systems, allowing you to retrieve, add, update, or delete records in a file on another system. In addition, a remote system can access your system's database for record retrieval. See *Distributed Data Management*, SC41-3307, for a more detailed description of DDM.

Chapter 2. Creating a DFU Program

This chapter shows how to create a data file utility (DFU) program to add, change, and delete records in both indexed data files and nonindexed data files. The chapter also describes the characteristics of the DFU program and the data entry displays used to access data files.

You create DFU programs by specifying formats and fields through the create option of the AS/400 DFU menu.

The data file used in this example is called QORDFILE, which is in a user-defined library called MYLIB.

Note: Make sure the library and data file exist before trying the example. You can create the library by using the Create Library (CRTLIB) command. Copy the data files called QORDHDR, QORDDTL, and QORDFILE supplied with AS/400 DFU, from the QGPL library to MYLIB using the Create Duplicate Object (CRTDUPOBJ) command.

Data Entry Display Example

When you create your DFU program, you can choose either an AS/400 System or a System/36 data entry style from the Define General Information/Indexed File display. The example in this chapter creates a program in the AS/400 data entry style. The following figure shows the data entry display that appears when you run your program:

ORDER MAINTENANCE RECORDS			Mode : ENTRY		
Format : ORDHDR_____			File : QORDFILE		
CUSTOMER NUMBER	ORDER NUMBER (NUMERIC CODE)	ORDER STATUS	ORDER AMOUNT	TOTAL LINES	INVOICE NUMBER
_____	____0_	0_	_____ .00_	__0_	__0_
	ORDER DATE 94/09/09		SHIP VIA _____		
F3=Exit F9=Insert		F5=Refresh F10=Entry		F6=Select format F11=Change	

Note: A display style similar to the one in “Example System/36 Data Entry Display” on page 60 appears if you have requested a System/36 data entry style on the Define General Information/Indexed File display.

The data entry display shown in the preceding figure is in Entry mode, which is the default mode when you run your program against an empty file member. See Chapter 4, "Running a DFU Program" on page 35, for additional information about running a DFU program and using the data entry display.

Procedure for Creating a DFU Program

The following example shows how to create a DFU program for an indexed data file that is described by an external DDS file specification. DFU determines whether you have an indexed or a nonindexed data file, and presents the appropriate displays. You use the same procedure for creating a program for either type of data file; however, DFU may present an additional display (Select Field for Record Number) for a nonindexed file.

In this example, you create a program that uses the following order maintenance application. The application allows an operator to enter and change data within a data file.

<p style="text-align: center;">MM HARDWARE COMPANY 123 Main Street Anywhere</p> <p>Sold To:</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;"> <p>Smith Inc. 3630 King St. Boston, Mass.</p> </div>					
Order Number 120	Date 09/09/94	Order Status 1	Invoice Number 525	Customer Number 60	Ship Via BOAT
Line	Order Quantity	Part Number	Part Description	Unit Amount	Total Amount
1	2	45	SCREWDRIVER	5.25	10.50
2	10	53	1 OZ HAMMER	12.10	121.00
3	3	101	ELECTRIC SAW	52.00	156.00
4	12	325	.5" SCREWS(100)	2.15	25.80
TOTAL AMOUNT					313.30

The following figure shows the DDS file description of the formats and fields that appear in this example for an indexed data file.

```

MEMBER: QORDFILE
... .. 2 ... .. 3 ... .. 4 ... .. 5 ... .. 6 ... .. 7 ... .. 8 ... .. 9 ... .. 0
R ORDHDR          PFILE(ORDHDRPF)
                  TEXT('Order Header Record')
K ORDER
R ORDDTL          PFILE(ORDDTLPF)
                  TEXT('Order Detail Record')
K ORDER

***** END OF SOURCE *****

```

```

MEMBER: QORDHDR
... .. 2 ... .. 3 ... .. 4 ... .. 5 ... .. 6 ... .. 7 ... .. 8 ... .. 9 ... .. 0
R ORDHDR          TEXT('Order Header Record')
CUST              5      COLHDG('CUSTOMER' 'NUMBER')
                  TEXT('Customer number')
                  CHECK(ME)
ORDER             5P 0   COLHDG('ORDER' 'NUMBER')
                  TEXT('Order number')
                  CHECK(ME)
ORDDAT            6P 0   COLHDG('ORDER' 'DATE')
                  TEXT('Date order was entered')
                  EDTWRD(' / / ')
SHPVIA            15     COLHDG('SHIP' 'VIA')
                  TEXT('Ship via')
                  VALUES('BOAT' 'TRAIN' 'TRUCK')
ORDSTS            1P 0   COLHDG('ORDER' 'STATUS')
                  TEXT('Order status: -
1=Open 2=Closed 3=Cancelled')
                  VALUES(1 2 3)
ORDAMT            11P 2  COLHDG('ORDER' 'AMOUNT')
                  TEXT('Order amount')
                  EDTCDE(A)
TOTLIN            3P 0   COLHDG('TOTAL' 'LINES')
                  TEXT('Total items in order')
INVNUM            5P 0   COLHDG('INVOICE' 'NUMBER')
                  TEXT('Invoice number')
K ORDER

***** END OF SOURCE *****

```

```

MEMBER: QORDDTL
... .. 2 ... .. 3 ... .. 4 ... .. 5 ... .. 6 ... .. 7 ... .. 8 ... .. 9 ... .. 0
R ORDDTL          TEXT('Order Detail Record')
ORDER            5P 0      COLHDG('ORDER' 'NUMBER')
                  TEXT('Order number')
                  CHECK(ME)
QTYORD           3P 0      COLHDG('ORDER' 'QUANTITY')
                  TEXT('Order quantity')
                  RANGE(1 999)
PARTNO           6P 0      COLHDG('PART' 'NUMBER')
                  TEXT('Part number')
PARTDESC         15        COLHDG('PART' 'DESCRIPTION')
                  TEXT('Part description')
UNITAMT          7P 2      COLHDG('UNIT' 'AMOUNT')
                  TEXT('Unit amount')
                  EDTCDE(J)
TOTAMT           10P 2     COLHDG('TOTAL' 'AMOUNT')
                  TEXT('Total amount')
                  EDTCDE(N)
K ORDER
* * * * * E N D   O F   S O U R C E * * * * *

```

When you enter the STRDFU command, a menu is displayed from which you select an option to create a DFU program. DFU then begins a prompting sequence through which you define the program.

Note: You can review program or data file details at any time while you are creating your DFU program. Function keys are provided for this purpose. When you are finished reviewing the details, press F3 (Exit) to return to the definition display.

The rest of this chapter describes the displays that appear when you create a DFU program and shows the entries to type into each display for the sample program.

Starting DFU

Do the following to start DFU program definition:

1. Type STRDFU and press Enter. The AS/400 DFU menu appears.
2. Type 2 (Create a DFU program) on the command line, and press Enter. The Create a DFU Program display appears.

Requesting a DFU Program

The Create a DFU Program display prompts you for the name of the DFU program that you want to define and the data file on which the program is to run. In the following example, you create a DFU program (ORDMNT) to add and to update sales orders.

This example assumes you are the first user of DFU and shows the default values.

To request a DFU program:

1. Type `ORDMNT` in the *Program* prompt, and `MYLIB` over the defaults in both *Library* prompts. Leave the *Data file* prompt blank, as shown in the following example:

```
                                Create a DFU Program
Type choices, press Enter.
Program . . . . . ORDMNT_____ Name, F4 for List
Library . . . . . MYLIB_____ Name, *CURLIB
Data file . . . . . _____ Name, F4 for List
Library . . . . . MYLIB_____ Name, *LIBL, *CURLIB
```

2. Move the cursor to the *Data file* prompt, and press `F4` (Prompt) to select the data file for your DFU Program. The Select File display appears.

Selecting a File

The Select File display lists the data files from the specified library. To select the file you want to use for your program from the list:

1. Type `1` (Select) in the *Opt* column beside the `QORDFILE` field to select the file for the sample `ORDMNT` program, and then press `Enter`. The Create a DFU Program display is shown. The selected file `QORDFILE` is in the *Data file* prompt.
2. Press `Enter` again. The Define General Information/Indexed File display appears. If your data file is nonindexed, the Define General Information/Nonindexed File display appears.

Specifying Program Characteristics

On the Define General Information/Indexed File display, you can specify the general characteristics of your program.

To specify the characteristics:

1. Type `ORDER MAINTENANCE RECORDS` in the *Job title* prompt to change the default job title.
2. Type `4` in the *Display format* prompt to change the display format to row oriented.
3. Type `Y` (Yes) in the *Audit report* prompt to produce an audit report, which lists all changes made to a data file. Type `Y` in the *Edit numerics* prompt to format numeric fields. The Define Audit Control display appears because you specified `Y` in the *Audit report* prompt. If you specify `N` in the *Audit report* prompt, the Work with Record Formats display is shown.

```

Define General Information/Indexed File

Type choices, press Enter.

Job title . . . . . ORDER MAINTENANCE RECORDS
Display format . . . . . 4          1=Single, 2=Multiple
                                   3=Maximum, 4=Row oriented

Audit report . . . . . Y          Y=Yes, N=No
S/36 style . . . . . N          Y=Yes, N=No
Suppress errors . . . . . N      Y=Yes, N=No
Edit numerics . . . . . Y      Y=Yes, N=No
Allow updates on roll . . . . . Y Y=Yes, N=No
Keys:
  Generate . . . . . N          Y=Yes, N=No
  Changes allowed . . . . . Y    Y=Yes, N=No

F3=Exit      F12=Cancel      F14=Display definition

```

Defining the Audit Report

The audit report is a printed list of changes made to a data file when you run your DFU program. On this display, you can define the scope of information in the listing.

```

Define Audit Control

Type choices, press Enter.

Print additions . . . . . Y          Y=Yes, N=No
Print changes . . . . . Y          Y=Yes, N=No
Print deletions . . . . . Y      Y=Yes, N=No
Printer:
  Line width . . . . . 132        60-198
  Column spacing . . . . . 1      0-9

```

To define the audit report using the default values for the sample ORDMNT program, press Enter. The Work with Record Formats display appears.

Working with Record Formats

The Work with Record Formats display appears if your data file is a DDS- or IDDU-described file. This display lists the various record formats in your file specification. You can work with one or more formats for processing. If you select more than one record format, DFU presents a new Select and Sequence Fields display and repeats the field definition sequence for each record format you select from this display.

```

Work with Record Formats
File . . . . : QORDFILE          Library . . . . : MYLIB
Type options, press Enter. Press F21 to select all.
  2=Specify  4=Delete

Opt  Format      Multiple
      Format      Records   Defined  Description
-   ORDHDR      N         N        Order Header Record
-   ORDDTL      N         N        Order Detail Record

```

To specify files in the Work with Record Formats display:

1. Type 2 (Specify) next to the ORDHDR format and next to the ORDDTL format.
2. Type Y in the *Multiple Records* column for the ORDDTL format to select it for multiple record processing by the sample ORDMNT program and press Enter. The Select and Sequence Fields display appears.

Selecting and Sequencing Fields

On the Select and Sequence Fields display, you can select the fields and the field order that your DFU program uses for each selected record format. Your field selections appear on the data entry display when you run the program. The displayed information is from the applicable DDS- or IDDU-file descriptions. This display reappears for each selected record format when you finish the definition sequence for the current record format.

1. Type the sequence numbers shown in the following figure for the sample ORDMNT program.

```

Select and Sequence Fields
File . . . . . : QORDFILE          Library . . . . : MYLIB
Record format . . . . . : ORDHDR

Select fields and their sequence or press F21 to select all; press Enter.

Sequence  Field      Attr   Length  Type      Description
1 _____ CUST          5      CHAR     Customer number
2 _____ ORDER        KEY     5,0     PACK     Order number
7 _____ ORDDAT          6,0     PACK     Date order was entered
8 _____ SHPVIA          15     CHAR     Ship via
3 _____ ORDSTS          1,0     PACK     Order status: 1=Open 2=Close
4 _____ ORDAMT          11,2    PACK     Order amount
5 _____ TOTLIN          3,0     PACK     Total items in order
6 _____ INVNUM          5,0     PACK     Invoice number

F3=Exit      F5=Refresh    F12=Cancel   F14=Display definition
F20=Renumbr  F21=Select all
Bottom

```

2. Press Enter. The display reappears with your selected fields right-justified in order of your selection, and a message appears on the last line of the display asking you for confirmation.

- Press Enter to confirm your choices for the sample ORDMNT program. The Work with Fields display appears.

Selecting Fields for Extended Definition

The Work with Fields display appears when you press Enter from the Select and Sequence Fields display. From here you can select the fields that need extended definition and extended validation, and specify alternate headings to appear on the data entry display. If you do not require extended definitions, press Enter. If there are record formats still to be processed (based on selections made on the Work with Record Formats display), the Select and Sequence Fields display for the next record format appears. Otherwise, the Exit DFU Program definition display appears.

If you do not select extended definition, the validation keywords from your DDS file description are used.

```

                                Work with Fields

File . . . . . : QORDFILE      Library . . . . . : MYLIB
Record format . . . . . : ORDHDR

Type options, press Enter. Press F21 to select all.
  2=Specify extended definition
  4=Delete extended definition

Opt  Field          Extended  Heading
    - CUST           N         CUSTOMER_____
    - ORDER          N         ORDER_____
    - ORDSTS         N         ORDER_____
    - ORDAMT         N         ORDER_____
    - TOTLIN         N         TOTAL_____
    - INVNUM         N         INVOICE_____
    - ORDDAT         N         ORDER_____
    - SHPVIA        N         SHIP_____

F3=Exit          F5=Refresh      F12=Cancel
F14=Display definition  F21=Select all

Bottom

```

Now that you have selected the fields you want to include in the program, you can specify extended field definitions for them. To specify an extended field definition, type 2 (Specify) in the *Opt* column next to the ORDER, ORDAMT, ORDDAT, and SHPVIA fields to select them for extended definitions, and press Enter. The Specify Extended Field Definition display is shown.

Specifying Extended Definitions for Numeric Fields

Two extended definition displays exist: one for alphanumeric fields and one for numeric fields. In this example, the Specify Extended Field Definition display for numeric fields appears first because the first field selected for extended definition is the numeric ORDER field. Your display appears as follows.

```

Specify Extended Field Definition
Field . . . . . : ORDER      Record format . . . . : ORDHDR
Type choices, press Enter.
Auto duplicate . . . . . N      Y=Yes, N=No
Accumulate . . . . . N      Y=Yes, N=No
Extended field
  heading . . . . .          ORDER
                          NUMBER
Heading location . . . . . *ABOVE_  *ABOVE, *BEFORE
Initial value . . . . .
Auto-increment . . . . .
Validity checks . . . . . _      2=Change, 4=Delete

F3=Exit      F12=Cancel      F14=Display definition      More...

```

1. Press Page Down (Roll Up) to go to the second part of the Specify Extended Field Definition display. Your display appears as follows:

```

Specify Extended Field Definition
Field . . . . . : ORDER      Record format . . . . : ORDHDR
Type choices, press Enter.
Begin on new line . . . . . N      Y=Yes, N=No
Field exit required . . . . . Y      Y=Yes, N=No
Output only . . . . . N      Y=Yes, N=No
Non-display . . . . . N      Y=Yes, N=No
Default spacing . . . . . Y      Y=Yes, N=No
For choice N=No:
  Number of spaces . . . . . 01      0-40
Edit code . . . . . L      Blank, 1-4, A-D, J-M, . . .
Edit word . . . . .

F3=Exit      F12=Cancel      F14=Display definition      Bottom

```

Note: The edit code (L) is specified here because it is the default for DFU. Edit code L means that a decimal point will be inserted in the correct place if decimal positions are indicated in the field description, negative numeric fields are indicated with a minus sign to the right of the last digit in the field, and unnecessary leading zeros are blanked out.

2. Press Page Up (Roll Down) to return to the first display of the Specify Extended Field Definition display.
3. Type (NUMERIC CODE) in the *Extended field heading* prompt on the line below NUMBER.

4. Type 10 in the *Auto-increment* prompt, and press Field Exit to have the order numbers automatically increased by 10 for each new order when you are in Entry or Insert mode.
5. Type 2 (Change) in the *Validity checks* prompt to change the validity checks that have been specified in the DDS file description.
6. Press Enter and the Specify Validity Checks display appears because you specified 2 (Change) in the *Validity checks* prompt.

Specifying Validity Checks for Numeric Fields

To specify validity checks for numeric fields:

1. Type RG (Range) in the *Relational operator* prompt.
2. Type 0 3000 in the *List of values* prompt to specify that the values for the order number must be in the range between 0 and 3000. The display appears as follows:

Specify Validity Checks

Field : ORDER Record format : ORDHDR

Type choices, press Enter.

Mandatory entry	Y	Y=Yes, N=No
Mandatory fill	N	Y=Yes, N=No
Mod 10 check	N	Y=Yes, N=No
Mod 11 check	N	Y=Yes, N=No
Immediate check for		
Mod 10 or Mod 11	N	Y=Yes, N=No
Relational operator	RG	EQ, NE, LE, NG, . . .
List of values	0 3000	

1 to 20 list values

Press Enter to go to the Specify Extended Field Definition display for numeric fields.

This display appears next because you selected the numeric ORDAMT field for an extended definition on the Work with Fields display.

3. Press Page Down (Roll Up) to go the second part of the Specify Extended Field Definition display.

The edit code A appears in the *Edit code* prompt because it was specified in the DDS file description. By using edit code A the values entered in the ORDAMT field will be displayed with commas and decimal places where necessary. Negative numeric values are shown with a CR symbol to the right of the last digit. Any leading zeros are blanked out.

4. Press Page Up (Roll Down) to go back to the first screen of the Specify Extended Field Definition display.
5. Type Y (Yes) over the default value in the *Accumulate* prompt to select the accumulate function for the ORDAMT field.

The accumulate function maintains a running total of the values you type for a specified field when you run your program. The accumulator total appears at

the end of your data entry session and prints on the audit report if you request that report.

Press Enter to display the Specify Extended Field Definition display for numeric fields.

This display appears next because you specified an Extended Field Definition for the numeric field ORDDAT on the Work with Fields display.

6. Press Page Down (Roll Up) to go to the second part of the Specify Extended Field Definition display. The edit word that you see on this display was specified in the DDS file description.
7. Press Page Up (Roll Down) to go back to the first screen of the Specify Extended Field Definition display.
8. Type *DATE in the *Initial value* prompt to specify an initial date value for this field. The system date will automatically be entered in this field when you enter new records.

Press Enter to go to the Specify Extended Field Definition display for the alphanumeric SHPVIA field.

Specifying Extended Field Definitions for Alphanumeric Fields

On the Specify Extended Field Definition Display for Alphanumeric Fields display, type 2 (Change) in the *Validity checks* prompt, and press Enter. The Specify Validity Checks display appears.

Note: The Specify Extended Field Definition Display has two parts, and is similar to the same display for numeric fields.

Specifying Validity Checks for Alphanumeric Fields

A list of values ('BOAT' 'TRAIN' 'TRUCK') appears on this display if it is specified in the DDS file description.

Type 'PLANE' in the *List of values* prompt to add it to the list of values. The display appears as follows.

```
Specify Validity Checks
Field . . . . . : SHPVIA      Record format . . . . . : ORDHDR
Type choices, press Enter.
Mandatory entry . . . . . N      Y=Yes, N=No
Mandatory fill . . . . . N      Y=Yes, N=No
Name check . . . . . N          Y=Yes, N=No
Extended name check . . . . . N  Y=Yes, N=No
Allow blanks . . . . . N        Y=Yes, N=No
Relational operator . . . . . LS  EQ, NE, LE, NG, . . .
List of values . . . . . 'BOAT' 'TRAIN' 'TRUCK' 'PLANE' _____
_____
_____
_____
1 to 20 list values
```

Press Enter. The Work with Fields display appears.

This display appears because you have finished specifying the extended field definitions.

You must specify two or more values when using the LS relational operator. The values you specify in the *List of values* prompt should each be separated by a blank. You must enclose character strings in single apostrophes.

You have now finished defining the program information for the ORDHDR record format. Because you specified two record formats, the next step is to repeat the definition process for the second record format (ORDDTL).

Defining the Second Record Format

To define record format ORDDTL:

1. Press Enter on the Work with Fields display. The Select and Sequence Fields display for the ORDDTL record format is shown.
2. Press F21 to select all the fields. The display reappears with the selected fields right-justified in numerical order, and a message appears on the last line of the display asking you for confirmation.
3. Press Enter to confirm your choices. The Work with Fields display appears.
4. Type 2 (Specify) next to the ORDER field to select it for an extended definition, and press Enter. The Specify Extended Field Definition display is shown because you selected the numeric ORDER field for an extended definition. This display has two parts. Press Page Down (Roll Up) to display the second part of the display, and press Page Up (Roll Down) to return to the first part of the display.
5. To have this field automatically duplicated when you are in data entry mode, type Y (Yes) in the *Auto-duplicate* prompt, and press Enter. The Work with Fields display is shown.
6. Press F14 (Display definition) to go to the Display DFU Program Summary display to review the DFU program definition for this example.

Displaying the DFU Program Summary

The Display DFU Program Summary display appears as follows.

```

                                Display DFU Program Summary
Program . . . . . :  ORMNT
Library . . . . . :  MYLIB
Data file . . . . . :  QORDFILE
Library . . . . . :  MYLIB
Job title . . . . . :  ORDER MAINTENANCE RECORDS
Display format . . . . . :  Row oriented
Allow updates on roll . . . . . :  Y
Keys:
  Generate . . . . . :  N
  Key changes allowed . . . . . :  Y

                                                                More...

Press Enter to continue.

F3=Exit      F12=Cancel      F15=Print

```

To see the remaining information for the Display DFU Program Summary display, Press Page Down (Roll Up). The display appears as follows:

```

                                Display DFU Program Summary
Program . . . . . :  ORMNT
Library . . . . . :  MYLIB
Data file . . . . . :  QORDFILE
Library . . . . . :  MYLIB
Audit report . . . . . :  Y
  Print additions . . . . . :  Y
  Print changes . . . . . :  Y
  Print deletions . . . . . :  Y
Printer:
  Line width . . . . . :  132
  Column spacing . . . . . :  1
S/36 style . . . . . :  N
Suppress data
  errors . . . . . :  N
  Edit numerics . . . . . :  Y

                                                                Bottom

Press Enter to continue.

F3=Exit      F12=Cancel      F15=Print

```

Press Enter. The Display DFU Program Detail display appears.

Displaying DFU Program Detail

With the Display DFU Program Detail display, you can review the details of the record formats and fields defined so far for your DFU program.

Display DFU Program Detail						
Program :			ORDMNT			Library : MYLIB
Format/Field	Attr	Extended Definition	Length	Type	Description/Heading	
ORDHDR					Order	Header Record
CUST		N	5	CHAR	CUSTOMER	
ORDER	KEY	Y	5,0	PACK	ORDER	
ORDSTS		N	1,0	PACK	ORDER	
ORDAMT		Y	11,2	PACK	ORDER	
TOTLIN		N	3,0	PACK	TOTAL	
INVNUM		N	5,0	PACK	INVOICE	
ORDDAT		Y	6,0	PACK	ORDER	
SHPVIA		Y	15	CHAR	SHIP	
ORDDTL	MLT				Order	Detail Record
ORDER	KEY	Y	5,0	PACK	ORDER	
						More...
Press Enter to continue.						
F3=Exit	F12=Cancel	F15=Print				

Press Page Down (Roll Up) to see the rest of the information on the Display Program Detail display. The display appears as follows:

Display DFU Program Detail						
Program :			ORDMNT			Library : MYLIB
Format/Field	Attr	Extended Definition	Length	Type	Description/Heading	
QTYORD		N	3,0	PACK	ORDER	
PARTNO		N	6,0	PACK	PART	
PARTDESC		N	15	CHAR	PART	
UNITAMT		N	7,2	PACK	UNIT	
TOTAMT		N	10,2	PACK	TOTAL	
						Bottom
Press Enter to continue.						
F3=Exit	F12=Cancel	F15=Print				

Press Enter. The Display Data File Detail display appears.

Displaying Data File Detail

On the Display Data File Detail display, you can review the details of all the record formats and fields defined by the DDS or IDDU specifications for this data file.

Display Data File Detail					
File . . . :			QORDFILE	Library : MYLIB	
Format/Field	Start	Length	Type	Attr	Description
ORDHDR					Order Header Record
CUST	1	5	CHAR		Customer Number
ORDER	6	5,0	PACK	KEY	Order Number
ORDDAT	9	6,0	PACK		Date Order Was Entered
SHPVIA	13	15	CHAR		Ship Via
ORDSTS	28	1,0	PACK		Order Status: 1=open 2=close
ORDAMT	29	11,2	PACK		Order Amount
TOTLIN	35	3,0	PACK		Total Items in Order
INVNUM	37	5,0	PACK		Invoice Number
ORDDTL					Order Detail Record
ORDER	1	5,0	PACK	KEY	Order Number

Press Enter to continue.

F3=Exit F12=Cancel F15=Print

More...

1. Press Page Down (Roll Up) to see the remaining information on the Display Data File Detail display.
You are finished reviewing the program definition and file details.
2. Press Enter to return to the Work with Fields display.
3. Press Enter to continue to the Exit DFU Program Definition display.

Exiting from DFU Program Definition

The Exit DFU Program Definition display allows you to save, to run, or to save and then run your newly defined DFU program. In this example, you save the ORDMNT program and work on records in the QORDFILE file while running the program.

```

Exit DFU Program Definition

Type choices, press Enter.

Save program . . . . . Y          Y=Yes, N=No
Run program . . . . . Y          Y=Yes, N=No
  For choice Y=Yes:
    Type of run . . . . . 1      1=Change, 2=Display
Modify program . . . . . N          Y=Yes, N=No
Save DDS source . . . . . N        Y=Yes, N=No

For Save program Y=Yes:
  Program . . . . . ORD_MNT_____ Name
  Library . . . . . MYLIB_____ Name, *CURLIB, . . .
  Authority . . . . . *LIBCRTAUT Name, *LIBCRTAUT, . . .
  Text . . . . . ORDER MAINTENANCE RECORDS_____

For Save DDS source Y=Yes:
  Source file . . . . . _____ Name
  Library . . . . . *CURLIB_____ Name, *CURLIB, . . .
  Source member . . . . . ORD_MNT_____ Name

F3=Exit      F14=Display definition      F17=Fast path

```

Note: If you want to run the program automatically, press F17 (Fast path). When you press F17 (Fast path), you do not see any other displays before running the program. To choose a specific member, other than the first in the file, press Enter. A display appears prompting you for program, file and member information.

Press Enter to save your program and continue to the Change a Data File display.

Changing a Data File

Use the Change a Data File display to specify the name of the program you want to use for working on a data file. You can use the default data file specified by the program, or specify a different data file by entering the new file name in the *Data file* prompt of this display.

1. On the Change a Data File display, press Enter to accept the defaults. The first data entry display appears. This data entry display is in Entry mode and has the AS/400 display style. Entry mode is the default mode when you add records to a file for the first time or when the file has no records.
2. Type the information shown in the following figure into the data entry display to create a new record for this example:

```

ORDER MAINTENANCE RECORDS
Format . . . . : ORDHDR___

Mode . . . . : ENTRY
File . . . . : QORDFILE

CUSTOMER  ORDER  ORDER  ORDER  TOTAL  INVOICE
NUMBER    NUMBER  STATUS  AMOUNT  LINES  NUMBER
          (NUMERIC CODE)
60___    _120_    1_     _313.30_  _4_    _525_

          ORDER
          DATE
          94/09/09

          SHIP
          VIA
          BOAT_____

F3=Exit      F5=Refresh   F6=Select format
F9=Insert    F10=Entry   F11=Change

```

3. Press Enter to process the new record. DFU adds the record to the QORDFILE data file and clears the display so you can continue adding records.
4. Press F6 (Select format) to go to the Select Record Format display.
5. Type 1 beside the ORDDTL format to select it, and press Enter. The Data Entry Display appears for the ORDDTL record format. You can now enter multiple records on this display, because you specified Y (Yes) in the Multiple Records prompt on the Work with Record Formats display.
6. To add four records to the record format, type the data that appears in the following figure:

```

ORDER MAINTENANCE RECORDS
Format . . . . : ORDDTL___

Mode . . . . : ENTRY
File . . . . : QORDFILE

ORDER  ORDER  PART  PART  UNIT  TOTAL
NUMBER QUANTITY NUMBER DESCRIPTION AMOUNT AMOUNT
_120_  _2_  _45_ SCREWDRIVER _5.25_ _10.50_
_120_  _10_ _53_ 1 OZ HAMMER _12.10_ _121.00_
_120_  _3_  _101_ ELECTRIC SAW _52.00_ _156.00_
_120_  _12_ _325_ .5" SCREWS(100) _2.15_ _25.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_
_0_    _0_  _0_  _____ _0.00_ _0.00_

F3=Exit      F5=Refresh   F6=Select format
F9=Insert    F10=Entry   F11=Change

```

7. Press Enter. DFU adds the records to the QORDFILE data file and clears the display.

8. Press F3 (Exit) to leave the data entry session. The End Data Entry display appears. This display indicates the number of records you have added, changed, or deleted.
9. Leave the default of Y (Yes) in the *End data entry* prompt.
10. Press Enter to end the session. The Display Batch Accumulators display appears, followed by the Display Total Accumulators display. DFU presents the accumulator totals when you exit DFU (if you defined accumulator fields). For this example, you defined the program to keep an accumulator total for the ORDAMT field. If no fields were defined as accumulator fields, the AS/400 Data File Utility (DFU) menu appears directly.
11. Press Enter to continue to the Display Total Accumulators display.
12. Press Enter again to end the session. The AS/400 Data File Utility (DFU) menu appears. The audit report is printed. See “Audit Report Example” on page 41 for a sample audit report. From the DFU Menu, you can perform another DFU operation or exit the utility.

Creating a DFU Program for a Nonindexed File

You use the same method to create a DFU program for a nonindexed (direct or sequential) file as you use for an indexed file. When using a nonindexed file, you can request an additional display that allows you to define a field in which to store a record number. In addition to the new display related only to nonindexed data files, this example shows you how to use the fast path for defining a DFU program quickly. See “Procedure for Creating a DFU Program” on page 8 for an overview of how to access DFU.

This example uses an IDDU described file called ORDIDDU for a program called ORDPGM. The program is similar to the one you created for an indexed file.

Note: If you want to try the example shown in this section, you must first create the IDDU file.

The following figure shows the IDDU file description of the formats and fields that are used in the nonindexed data file for this example:

```

5763SS1 V3R1M0 940909      Data Dictionary Information
Input parameters
  Data dictionary . . . . . : MYLIB
  Definition . . . . . : ORDIDDU
  Creation date . . . . . : 07/01/91
  Definition type . . . . . : *FILE
  File information . . . . . : *BASIC
  Record format information . . . . . : *BASIC
  Field information . . . . . : *BASIC
File Information
  File . . . . . : ORDIDDU
  Number of record formats . . . . . : 2
  Type of file . . . . . : Physical
  Last changed . . . . . : 09/09/94
  Changed by . . . . . : SMITH
  Created . . . . . : 07/01/91
  Created by . . . . . : SMITH
Record Format Information
  Record format . . . . . : ORDDTL2
  Number of fields . . . . . : 7
  Record length . . . . . : 35
  Last changed . . . . . : 09/09/94
  Changed by . . . . . : SMITH
  Created . . . . . : 07/01/91
  Created by . . . . . : SMITH
  Format text . . . . . : ORDER DETAIL
Field Level Information
  Data      Field  Buffer  Buffer      Field
  Field     Type    Length Length  Position  Usage    Column Heading
  RCDTYPE   CHAR      1      1      1        Both    RECORD
                                         TYPE
  Field text . . . . . : RECORD TYPE
  ORDER     PACKED    5 0      3      2        Both    ORDER
                                         NUMBER
  Field text . . . . . : ORDER NUMBER
  QTYORD    PACKED    3 0      2      5        Both    QUANTITY
                                         ORDERED
  Field text . . . . . : QUANTITY ORDERED
  PARTNO    PACKED    6 0      4      7        Both    PART
                                         NUMBER
  Field text . . . . . : PART NUMBER
  PARTDESC  CHAR      15     15     11        Both    PART
                                         DESCRIPTION
  Field text . . . . . : PART DESCRIPTION
  UNITAMT   PACKED    7 2      4      26       Both    UNIT
                                         AMOUNT
  Field text . . . . . : UNIT AMOUNT
  TOTAMT    PACKED   10 2      6     30       Both    TOTAL
                                         AMOUNT
  Field text . . . . . : TOTAL AMOUNT

```

```

5763SS1 V3R1M0 940909      Data Dictionary Information
File . . . : ORDIDDU      Data Dictionary . . . . . : MYLIB
Record Format Information
Record format . . . . . : QORDHDR2
Number of fields . . . . . : 9
Record length . . . . . : 40
Last changed . . . . . : 09/09/94
Changed by . . . . . : SMITH
Created . . . . . : 07/01/91
Created by . . . . . : SMITH
Format text . . . . . : ORDER HEADER
Field Level Information

```

Field	Data Type	Field Length	Buffer Length	Buffer Position	Field Usage	Column Heading
RCDTYPE	CHAR	1	1	1	Both	RECORD TYPE
Field text : RECORD TYPE						
CUST	CHAR	5	5	2	Both	CUSTOMER NUMBER
Field text : CUSTOMER NUMBER						
ORDER	PACKED	5 0	3	7	Both	ORDER NUMBER
Field text : ORDER NUMBER						
ORDDAT	PACKED	6 0	4	10	Both	ORDER DATE
Field text : ORDER DATE						
SHPVIA	CHAR	15	15	14	Both	SHIPPING INSTRUCTIONS
Field text : SHIPPING INSTRUCTIONS						
ORDSTS	PACKED	1 0	1	29	Both	ORDER STATUS
Field text : ORDER STATUS						
ORDAMT	PACKED	11 2	6	30	Both	ORDER AMOUNT
Field text : ORDER AMOUNT						
TOTLIN	PACKED	3 0	2	36	Both	TOTAL LINES
Field text : TOTAL LINES						
INVNUM	PACKED	5 0	3	38	Both	INVOICE NUMBER
Field text : INVOICE NUMBER						

1. Select option 2 (Create a DFU program) from the AS/400 Data File Utility (DFU) menu.
2. Press Enter. The Create a DFU Program display appears.
This display requests the name of the DFU program you want to define and its data file.
3. Type ORDPGM in the *Program* prompt and the library name MYLIB for both *Library* prompts.
4. Type ORDIDDU in the *Data file* prompt.
This file must be linked to an IDDU file definition for DFU to run using this type of definition. Before you can link, you must create an IDDU file definition.
5. Press Enter. The Define General Information/Nonindexed File display appears.

Defining General Information for a Nonindexed File

On the Define General Information/Nonindexed File display, you can define the format of your data entry display.

1. Type over the default entries for the *Job title*, *Store in a field*, and *Heading* prompts. Your display appears as follows:

Define General Information/Nonindexed File

Type choices, press Enter.

Job title	ORDER MAINTENANCE RECORDS	
Display format	2	1=Single 2=Multiple 3=Maximum, 4=Row oriented
Audit report	Y	Y=Yes, N=No
S/36 style	N	Y=Yes, N=No
Suppress errors	N	Y=Yes, N=No
Edit numerics	N	Y=Yes, N=No
Allow updates on roll	Y	Y=Yes, N=No
Record numbers:		
Generate	N	Y=Yes, N=No
Store in a field	Y	Y=Yes, N=No
Heading	ORDER NUMBER	_____

Processing	2	1=Direct 2=Sequential

F3=Exit F12=Cancel F14=Display definition

2. Press Enter to continue to the Define Audit Control display for the sample ORDPGM program. This display appears when you leave the default value Y (Yes) in the *Audit report* prompt.

Defining Audit Control

The audit report is a printed list of changes made to a data file when you run the DFU program. You can define the scope of information you want reported on the listing from this display.

Using the default values for the sample ORDPGM program, press Enter to continue to the Select Field for Record Number display.

Selecting a Field for Record Number Storage

The Select Field for Record Number display appears after you press Enter from the Define Audit Control display or the Define General Information/Nonindexed File display (if you did not select an audit report). DFU presents a list of all fields that qualify for storing a record number. Qualifying fields occur in the same position in all record formats in the file and have the same length and data type. The length of the field cannot exceed eight characters. Select the field you want to use for the record number from the displayed list. Your display appears as follows.

```

                                Select Field for Record Number
File . . . :  ORDIDDU                                Library . . . :  MYLIB
Type option, press Enter.
1=Select
Option      Field      Defined      Start      Length      Type
-           RCDTYPE          1           1           1           CHAR
-           ORDER          7           7           5,0        PACK

```

1. Type 1 (Select) next to the ORDER field to select it for storing the record number in this example.
2. Press Enter to continue to the Work with Record Formats display.

Working with Record Formats

This display lists the various record formats defined in the DDS- or IDDU-described file specification. You can work with one or more formats for processing. If you select multiple record formats, DFU presents a separate field definition display for each record format selected as you proceed through program definition.

Make sure that you have defined record ID codes for each selected record when using multiple-record formats for IDDU. ID codes allow DFU to differentiate between the record formats on a record-by-record basis.

To select ORDDTL2 for processing by the sample ORDPGM program, type 2 (Specify) next to the ORDDTL2 format, and press Enter to continue to the Select and Sequence Fields display.

Selecting and Sequencing Fields

This display allows you to select the fields and the field order that your DFU program uses for the data entry display. The displayed information is from the applicable DDS or IDDU file descriptions. The display reappears for each selected record format when you finish the definition sequence for the current record format.

1. Press F21 to select all the fields. The display reappears with the selected fields in descending numerical order, and a message appears on the last line of the display asking you for confirmation.
2. Press F17 (Fast path) to use defaults for the remaining definition displays for the sample ORDPGM program. None of these fields have extended definitions or special features such as automatic duplication.

The Exit DFU Program Definition display appears.

Note: If you select more than one record format for processing, the Select and Sequence Fields display appears again for the next format.

Exiting from DFU Program Definition

The Exit DFU Program Definition display allows you to save, to run, or to save and then run your newly defined DFU program. You can also return to the definition to make additional modifications to your program.

If you want to run the program, press F17 (Fast path). When you press F17 (Fast path), you do not see any other displays before running the program. To choose a specific member, other than the first in the file, press Enter. A display appears prompting you for program, file, and member information.

To exit from DFU program definition:

1. Press Enter to save your program and continue to the Change a Data File display.

For more information on the Change a Data File display, see “Changing a Data File” on page 22.

2. Press Enter.

The first data entry display appears. Because this example assumes there are no records in the file, the display appears in Entry mode.

From this display you can add new records to the ORDIDDU data file.

3. Press F3 (Exit) to continue to the End Data Entry display.

4. Press Enter to return to the AS/400 Data File Utility menu.

From the AS/400 Data File Utility (DFU) menu, you can create or run another program, or change an existing DFU program as described in Chapter 3, “Changing a DFU Program” on page 31.

Chapter 3. Changing a DFU Program

The Data File Utility (DFU) provides an easy way to change existing DFU programs. You can save the changed program, or rename it and preserve the original program.

This chapter shows how to make a simple change to the ORDMNT program created in Chapter 2, "Creating a DFU Program" on page 7. The QORDFILE used by the sample program is an indexed DDS-described file.

Procedure for Changing a DFU Program

You use the same procedure to change a DFU program that you used to create a program. To view a list of available programs, move your cursor to the *Program* prompt, and press F4 when using the Change a DFU Program display. Program and file lists provide an easy way for you to find and select programs and files to be used by DFU.

The rest of this chapter discusses the displays you use to make a simple change to the ORDMNT program. The example shows the entries to type into each display to produce the changed sample program.

To change a DFU program, perform the following steps:

1. Type STRDFU and press Enter. The AS/400 Data File Utility (DFU) menu appears.
2. Select option 3 (Change a DFU program) and press Enter. The Change a DFU Program display appears.

Specifying a DFU Program

The Change a DFU Program display allows you to specify the name of the existing DFU program you want to change. You can also specify a different data file for the changed program by typing the new data file name on this display. If you specify a different data file for your program, you must consider the following conditions:

- If the original data file was indexed, the new data file must also be indexed.
- If the original data file was nonindexed, the new data file must be nonindexed.
- Record formats and fields in the file must have the same names and attributes as in the original file.
- If you are in the System/36 environment, and if you are changing a program that you originally defined using an RPG II file description and you have since converted the RPG II file description to an IDDU file description that is linked to the new file, DFU attempts to match your record types to the IDDU record formats.

Note: If you change a migrated System/36 DFU program on the AS/400 system, you lose all of your System/36 tailored displays.

The entries in the *Program*, *Library*, and *Data file* prompts default to the values you previously specified in the last program you created.

In this example, use the QORDFILE data file as follows:

1. Type QORDFILE in the *Data file* prompt to change the name of the data file.
2. Move your cursor to the *Program* prompt and blank out the default name.
3. Press F4 with your cursor still in the *Program* prompt. The Select Program display appears.

Selecting a Program

The Select Program display shows the list of programs available in the MYLIB library. To select the ORDER MAINTENANCE RECORDS program for this example, do the following:

1. Type 1 (Select) in the *Opt* column beside the ORDMNT program.
2. Press Enter to return to the Change a DFU Program display with the selected program. The ORDMNT program name appears on the display.
3. Press Enter. The Define General Information/Indexed File display appears. The information shown is based on the values you specified when you created your program. For this example, leave the default values that appear.
4. Press Enter. The Define Audit Control display appears. The information shown is based on the values you specified when you created your program. For this example, leave the default values that appear.
5. Press Enter. The Work with Record Formats display appears.

Working with Record Formats

This display appears if your data file is a DDS- or IDDU-described file. For this example, the display lists the various record formats available in the DDS-described file, QORDFILE. This example uses the same record format as the original program. Even if you want to use the same record format as the original program, you must select the format again to change the program.

You can work with one or more formats for processing. If you select more than one record format, DFU presents a new Select and Sequence Fields display and repeats the field definition sequence for each record format you select from this display.

The *Defined* prompt shows that the ORDHDR format and the ORDDTL format have previously been defined for this program. To select the ORDHDR format for processing by the sample ORDMNT program, do the following:

1. Type 2 (Specify) beside the ORDHDR format, and press Enter. The Select and Sequence Fields display appears.

For this example, it is not necessary to change anything on the Select and Sequence Fields display. DFU renumbers the field sequence numbers starting at 10 and increasing in units of 10. It has not changed the sequence of the fields. Renumbering in this fashion just makes it easier for you to insert new fields without manually renumbering subsequent fields.

2. Leave the default entries and press Enter.
3. Press Enter again to confirm and to continue to the Work with Fields display.

Working with Fields

The ORDER, ORDAMT, ORDDAT, and SHPVIA fields have extended definitions. The presence of an extended definition is designated by a Y in the *Extended Definition* prompt.

To change the extended definitions for fields defined when the DFU program was created, do the following:

1. Type 2 (Specify extended definition) in the *Opt* column next to the ORDER field.
2. Press Enter to continue to the Specify Extended Field Definition display where you can change the extended definition for the ORDER field.
3. Remove the (NUMERIC CODE) from the *Extended field heading* prompt.
4. Press Enter to return to the Work with Fields display.
5. Type 2 (Specify extended definition) in the *Opt* column next to the SHPVIA field to change the extended definition.
6. Press Enter. The Specify Extended Field Definition display appears.
7. Type 2 (Change) in the *Validity checks* prompt to change the validity checks that are specified for this field.
8. Press Enter. The Specify Validity Checks display appears.
9. Type 'CAR' in the *List of values* prompt after 'PLANE'. Be sure to type a space between the two list values.
10. Press Enter to return to the Work with Fields display.
11. Press Enter again to continue to the Exit DFU Program Definition display.

Exiting from DFU Program Definition

To exit from DFU program definition, do the following:

1. Type 2 (Display) over the default setting in the *Type of run* prompt. This example saves the ORDMNT program and then runs the program in Display mode. This gives you a chance to check the data entry display you have just changed. Display mode allows you to look at records in the QORDFILE file, but not change them.
2. Press Enter. The Exit DFU Program Definition display reappears and prompts you to confirm that you want to replace the original program with the changed version.
3. Press Enter to confirm that you want to replace the program with the changed version. The Display a Data File display appears.

Displaying a Data File

The Display a Data File display allows you to specify the data file you want to look at. See Chapter 4, "Running a DFU Program" on page 35 for additional information about running DFU programs. When displayed from the Exit DFU Program Definition display, as for this example, this display contains default entries based on the information you specified on that display.

1. Press Enter. Your data entry display appears as follows.

```
ORDER MAINTENANCE RECORDS          Mode . . . . : DISPLAY
Format . . . . : ORDHDR_____     File . . . . : QORDFILE

ORDER
NUMBER
  _0_
```

2. Press Page Down (Roll Up) to view the records that you have added. Note that the ORDER NUMBER field no longer appears with an extended field heading as it did on the original data entry display. The change that was made to the SHPVIA field is not a visible one on the data entry screen, but you can now enter the extra value (CAR) in the SHPVIA field when you are entering data.
3. Press F3 (Exit) to go to the End Data Display.
The audit control information does not appear on the End Data Display because you cannot make changes to the data file.
4. Press Enter to end this DFU session and to return to the AS/400 Data File Utility (DFU) menu.

Chapter 4. Running a DFU Program

This chapter shows how to run a data file utility (DFU) program. The example shows how to add new records to the QORDFILE file using the ORDMNT program you created in Chapter 2, "Creating a DFU Program" on page 7, and changed in Chapter 3, "Changing a DFU Program" on page 31.

You can perform the following from a data entry display:

- Add new records
- Change existing records
- Delete records
- Refresh the display with the original values
- Automatically duplicate fields from previously displayed records
- Change modes to Insert, Change, or Entry
- Print records from the Display mode
- Display accumulator totals for added, changed, and deleted records
- Check the run status
- Page through records
- Update records on roll
- Change keys in Change mode
- Auto-increment values on the record
- Validate data entered with one or more edit/check algorithms

Procedure for Running a DFU Program

To run a DFU program:

1. Type STRDFU and press Enter. The AS/400 Data File Utility (DFU) menu appears.
2. Select option 1 (Run a DFU program) from the DFU menu, and press Enter. The Run a DFU Program display appears.

Note: You can use the CL commands CHGDTA and DSPDTA to run DFU programs directly in either enter/change/insert mode or in display mode.

Run a DFU Program Menu

This display allows you to select the type of activity you want to perform on a data file using an existing DFU program. You can either change a data file, or display records of a data file.

The DFU program runs in one of four modes: Entry, Change, Insert, or Display. The initial mode of data entry depends on your selection from the Run a DFU Program menu. You can change the mode using an associated function key. The initial mode for option 1 (Change a data file) is Change, provided records exist in the file that can be changed. Otherwise, Entry is the initial mode. Entry mode allows you to add records to a data file. From Display mode, you can only look at data file records, you cannot change them.

Type 1 (Change a data file) on the command line and press Enter. The Change a Data File display appears.

Changing a Data File

To create new records for a data file, do the following:

1. Move your cursor to the *Member* prompt and press F4 to display a list of available members for the QORDFILE data file. The Select Data File Member display appears.

If you specify a different data file, you must make sure that the data file meets the conditions discussed in “Specifying a DFU Program” on page 31.

2. Press F12 (Cancel) to return to the Change a Data File display without processing any selections. You do not need to select a member for this example. DFU already uses the QADZORDF member by default, and you do not have to select it again.
3. Press Enter to continue to the first data entry display. The key field ORDER NUMBER appears, allowing you to type a key value to retrieve the specified database record you want to work with.

This data entry display is in Change mode because you added a record to QORDFILE in Chapter 2, “Creating a DFU Program” on page 7. The data file is no longer empty.

4. Press F10 (Entry) to move into Entry mode to add new records.
5. Type the information shown in the following figure in the data entry display to create a new record for this example.

ORDER MAINTENANCE RECORDS				Mode :	ENTRY	
Format :				File :	QORDFILE	
CUSTOMER	ORDER	ORDER	ORDER	TOTAL	INVOICE	ORDER
NUMBER	NUMBER	STATUS	AMOUNT	LINES	NUMBER	DATE
__30	__110	2_	_____300.00	__2	__200	94/09/09
				SHIP		
				VIA		
				TRUCK _____		
F3=Exit			F5=Refresh	F6=Select format		
F9=Insert			F10=Entry	F11=Change		

6. Press Enter to process the new record. DFU adds the record to the QORDFILE data file and clears off the display so you can add information for another new record.
7. Press F6 to show the Select Record Format display.

11. Press F17 (Display and print accumulators). The Display Batch Accumulators display appears.

Displaying Batch Accumulators

The Display Batch Accumulators display shows a running total of the value for designated accumulator fields since you last requested to look at this display. The previous subtotal is added to a total accumulator each time you access this display.

For example, in the ORDMNT program, you specified the ORDAMT field as an accumulator field when you defined the program. The Display Batch Accumulators display shows the subtotal of the value of the ORDAMT field. Because you created only one record in this example, the subtotal for the ORDAMT field is 300. As you add records, this subtotal increases, and as you delete records this subtotal decreases.

The display appears as follows:

Display Batch Accumulators	
Field	Subtotal
ORDER AMOUNT	300.00

1. Press F12 (Cancel) to return to the data entry display.
2. Press F18 (Auto-increment from last change) to activate the auto-increment function.
3. Press F21 (Status) from the data entry display to display the status of this run job.

Displaying Run Status

The Display Run Status display shows the current status of the DFU program being run. Your display appears as follows.

```

                                Display Run Status

Program . . . . . : ORDMNT
Library . . . . . : MYLIB
Data file . . . . . : QORDFILE
Library . . . . . : MYLIB
Member . . . . . : QADZORDF
Record format . . . . . : ORDHDR
Last format . . . . . : ORDHDR

Current active functions:
Mode . . . . . : ENTRY
Auto dup . . . . . : OFF
Auto advance . . . . . : OFF
Auto-increment . . . . . : ON      From last record

                                Bottom

Press Enter to continue.

F3=Exit      F12=Cancel

```

Press Enter to return to the data entry display.

In this example, you are going to change the SHPVIA value in an existing record in the QORDFILE file:

1. Press F11 (Change) to enter Change mode.
2. Type 110 in the ORDER NUMBER key field, and press Enter. DFU retrieves the record from the file and shows the contents of the record so that you can change it. Your display appears as follows:

```

ORDER MAINTENANCE RECORDS
Format . . . . . : ORDHDR___      Mode . . . . . : CHANGE
                                File . . . . . : QORDFILE

CUSTOMER  ORDER  ORDER  ORDER  TOTAL  INVOICE  ORDER
NUMBER    NUMBER STATUS AMOUNT LINES  NUMBER  DATE
30___    _110_  2_    _____300.00_  _2_  _200_  94/09/09

                                SHIP
                                VIA
                                TRUCK_____

```

3. Type PLANE in the SHIP VIA field.
4. Press Page Down (Roll Up) to update the record. The record is changed in the QORDFILE data file and is advanced to the next record. You can continue to make changes by using the Roll keys to move through the records.
5. Press F3 (Exit) to go to the End Data Entry display and end this session.

Exiting from Data Entry

The End Data Entry display summarizes the changes made to the data file during the current session. You can exit from the DFU data entry program from this display. When you end the data entry session, DFU prints the audit report if you requested it in your DFU program.

The following display shows that you added three records, changed one record, and deleted one record during the current session. The informational message indicates that all records you added, changed, or deleted are printed. This message appears because you selected to print an audit report on the Define General Information/Indexed File display.

```

                                     End Data Entry

Number of records processed

Added . . . . . :          3
Changed . . . . . :          1
Deleted . . . . . :          1

Type choice, press Enter.

End data entry . . . . . Y          Y=Yes, N=No

F3=Exit      F12=Cancel
All records added, changed, or deleted will be printed.
```

To exit from data entry, do the following:

1. Use the default of Y (Yes) in the *End data entry* prompt, and press Enter to end the session.

The Display Batch Accumulators display appears. If you defined accumulator fields, the accumulator totals are displayed when you exit from DFU. For this example, you defined the program to keep an accumulator total for the ORDAMT field. If no fields have been defined as accumulator fields, the AS/400 Data File Utility (DFU) menu appears directly.

In this example, DFU has reset the batch accumulator to zero, because you requested to see the subtotals and have not added more records. Your display appears as follows:

```

                                     Display Batch Accumulators

Field                                     Subtotal
ORDER AMOUNT                             .00
```

2. Press Enter to continue to the Display Total Accumulators display.

You also can press F17 (Display and Print Accumulators) to request the accumulator subtotals anytime during data entry.

Displaying Total Accumulators

This display shows the accumulator totals (the sum of each batch subtotal) for each defined accumulator field. The total accumulators for this example is 300 because you created only one record. Your display appears as follows:

Display Total Accumulators	
Field	Total
ORDER AMOUNT	300.00

To end the session, do the following:

1. Press Enter. The Run a DFU Program display appears.
2. Press F3 (Exit) and the AS/400 Data File Utility (DFU) display appears. The audit report is printed.

From the AS/400 Data File Utility (DFU) menu, you can perform another DFU mode or exit the utility.

Audit Report Example

The audit report for the sample ORDMNT program is displayed in the following figure:

5763SS1		V3R1M0 940909		AUDIT LOG		09/09/94 14:20:09		PAGE 1	
Library/File		MYLIB/QORDFILE							
Member		QADZORDF							
Job Title		ORDER MAINTENANCE RECORDS							
Added		ORDER NUMBER	CUSTOMER NUMBER	ORDER STATUS	ORDER AMOUNT	TOTAL INVOICE LINES	ORDER NUMBER	ORDER DATE	SHIP VIA
		110	30	2	300.00	2	200	94/09/09	TRUCK
		ORDER NUMBER	ORDER QUANTITY	PART NUMBER	PART DESCRIPTION	UNIT AMOUNT	TOTAL AMOUNT		
Added		110	10	44	PLIERS	3.00	30.00	30.00	
Added		110	1	66	ELECTRIC DRILL	35.00	35.00	35.00	
Deleted		110	10	44	PLIERS	3.00	30.00	30.00	
Batch accumulators are displayed		ORDER AMOUNT		300.00					
Changed		ORDER NUMBER	CUSTOMER NUMBER	ORDER STATUS	ORDER AMOUNT	TOTAL INVOICE LINES	ORDER NUMBER	ORDER DATE	SHIP VIA
		110	30	2	300.00	2	200	94/09/09	TRUCK PLANE
Batch accumulators are displayed		ORDER AMOUNT		.00					
Total accumulators are displayed		ORDER AMOUNT		300.00					
		3 Records Added							
		1 Records Changed							
		1 Records Deleted							
* * * * * E N D O F D F U A U D I T R E P O R T * * * * *									

Chapter 5. Updating Data Using a Temporary Program

This chapter shows a quick method for entering data into a data file. You do not have to define a DFU program first. Specify the data file you want to change and DFU defines a temporary program for you based on the externally described file specifications for that data file. When you finish data entry, DFU deletes the temporary program.

Note: The following defaults may differ each time you update data using a temporary program. The Yes and No values from the Define General Information display and the Specify Audit Control display (if *Audit report* was selected on the Define General Information display) are saved in your user profile, so each time you define a new program, the values may change. The user profile is not updated using a temporary program, or by using any of the CI commands (CHGDTA, DSPDTA, UPDDTA, DLTFUPGM, CRTDFUSPF).

The temporary data entry program uses the following defaults for each display, unless they are changed in your user profile:

- Define General Information display
 - *Job title:* WORK WITH DATA IN A FILE
 - *Display format:* Multiple column
 - *Audit report:* Yes
 - *S/36 style:* No
 - *Suppress errors:* No
 - *Allow updates on roll:* Yes
 - *Record numbers heading:* *RECNBR (nonindexed files only)
 - *Processing:* Sequential (nonindexed files only)
 - *Keys-Generate:* No (indexed files only)
 - *Keys-Changes allowed:* Yes (indexed files only)
 - *Generate record numbers:* No (nonindexed files only)
 - *Store record number in a field:* No (nonindexed files only)
- Specify Audit Control display
 - *Print additions:* Yes
 - *Print changes:* Yes
 - *Print deletions:* Yes
 - *Printer line width:* 132
 - *Printer column spacing:* 1
- Work with Record Formats display: All available record formats
- Select and Sequence Fields display
 - *Select and Sequence fields:* Select all
 - *Field headings:* The externally described headings if they exist, otherwise the field names specified in the file specification
- Specify Extended Field Definition display (alphanumeric fields)
 - *Auto duplicate:* No
 - *Allow lowercase:* Yes
 - *Heading location:* *BEFORE
 - *Edit code and Edit word:* As specified in the DDS file description
- Specify Extended Field Definition display (numeric fields)

- *Auto duplicate*: No
 - *Accumulate*: No
 - *Heading location*: *BEFORE
- Any validity specified in the DDS file description

See the online help for more information about these values.

Procedure for Updating Data Using a Temporary Program

Use the following procedure to update data using a temporary program (to add or change records in a data file):

1. Type STRDFU and press Enter. The AS/400 Data File Utility (DFU) menu appears.
2. Type 5 (Update data using temporary program) on the command line of the AS/400 Data File Utility (DFU) menu, and press Enter. The Update Data Using Temporary Program display appears.

Note: You can also use the CL command UPDDTA, which can be run from any command prompt.

Specifying a Data File

The Update Data Using Temporary Program display allows you to specify the name of the data file you want to update. The default data file name was specified when you last changed or created a DFU program. Your display appears as follows.

```

Update Data Using Temporary Program

Type choices, press Enter.

Data file . . . . . QORDFILE____ Name, F4 for List
Library . . . . . MYLIB____ Name, *LIBL, *CURLIB
Member . . . . . QADZORDF____ Name, *FIRST, F4 for List

```

To specify a data file, do the following:

1. Press Enter to display the first data entry display. Your display appears as follows.

```

WORK WITH DATA IN A FILE                               Mode . . . . : CHANGE
Format . . . . : ORDHDR____                             File . . . . : QORDFILE

ORDER NUMBER: _____

```

The temporary program uses all of the fields in the data file specification instead of only those you would select if creating your own program. DFU also creates data entry displays for all record formats specified in the external DDS or IDDU file descriptions.

2. Press F10 (Entry). This changes the mode to Entry and displays the rest of the fields.

See Chapter 4, “Running a DFU Program,” for additional information about running a DFU program.

3. Press F3 (Exit). The End Data Entry display appears.

Exiting from Data Entry

When you end the data entry session, DFU prints the audit report if you requested it in your DFU program. The informational message indicates that all records you added, changed, or deleted are printed.

To exit from data entry, do the following:

1. Leave the default of Y (Yes) in the *End data entry* prompt.
2. Press Enter to end the session. The Update Data Using Temporary Program display appears and the audit report is printed.
3. Press F3 (Exit) to return to the AS/400 Data File Utility (DFU) menu. From the AS/400 Data File Utility (DFU) menu, you can perform another DFU operation or press F3 (Exit) to exit the utility.

Chapter 6. Tailoring a DFU Display

The data file utility (DFU) provides you with a way to tailor DFU data entry displays so they can meet your individual needs. A DFU program is made up of two types of files. There is a program file and a display file, both with the same name. You can save the DDS source for a DFU display file in a source file member and then tailor the DDS source to suit your needs. You can then use the tailored DDS source to create a DFU display file. To tailor the DDS source in order to change the appearance of the DFU data entry displays you use the screen design aid (SDA) or the source entry utility (SEU).

Only experienced users should attempt to tailor their DFU display files. Tampering with the following restrictions is done at your own risk:

- Do not rearrange the fields in the display buffer. For example, you may move the fields around on the SDA work screen, but you cannot change the order of the fields in the display buffer.
- Do not overlap fields or constants.
- Do not add or remove display records, or change the name of a display record.
- Do not change the length of, add, or delete any fields.
- Do not change input, output or both field data types.
- Do not change the indicators specified.
- Do not change the names of input or output fields or record formats.
- Do not overlap fields in one record format with another record format; for example, you must not move a SFL field to the area defined or used by a SFLCTL record.

Note: The CL command CRTDFUDSPF does not perform any syntax checks on the DDS source prior to creating the object.

This chapter shows how to tailor the DDS source using SDA. The examples show how to create a new DFU display file called ORDMNT, using the create DFU display file (CRTDFUDSPF) command. The characteristics of the DFU display file, and the data entry displays used to access data files, are also described.

Saving the DDS Source

In order to tailor your DFU display, you first have to save the DDS source that DFU generates for the data entry display. Once you have saved the DDS source, you can then modify it using SDA or SEU to produce a display that suits your data entry needs.

Note: You need a source physical file in which to store the DDS source you are going to save. To create a source physical file use the CRTSRCPF command and name the file QDDSSRC, in library MYLIB.

The following example shows you how to save the DDS source:

1. Type STRDFU and press Enter. The AS/400 Data File Utility (DFU) menu appears.

2. Type 3 (Change a DFU program) on the command line of the AS/400 Data File Utility (DFU) menu, and press Enter. The Change a DFU Program display appears. The program that is being tailored is the ORDMNT program from Chapter 3, “Changing a DFU Program” on page 31.
3. Press Enter. The Define General Information/Indexed File display appears. If your data file is nonindexed, the Define General Information/Nonindexed File display appears.
4. Press F3 (Exit). The Exit DFU Program Definition display appears. The prompts on this display are filled with values from the DFU program that you are changing.
5. Type Y in the *Save DDS source* prompt, and fill in the name of the source physical file you created (QDDSSRC) in the *Source file* prompt.
6. Type N (No) in the *Run program* prompt.
7. Type MYLIB over the default entry of *CURLIB in the *Library* prompt for the Save DDS source section, and press Enter. The Exit DFU Program Definition display appears.
Note: If you specify Y (Yes) in the *Save DDS source* prompt, you also have to specify Y (Yes) in the *Save program* prompt to ensure that a DFU program exists for the saved DDS.
8. Press Enter to confirm the change of the program and to save the DDS source. The AS/400 DFU menu appears.

You have now saved the DDS source for the display file in a file called ORDMNT. The next step is to go to the actual tailoring of the DDS.

Tailoring a DFU Data Entry Display

Now that you have saved the DDS source for the DFU data entry display you can customize the source to change the appearance of your data entry displays. The example shown in this chapter uses SDA to tailor the data entry display, but you can also use SEU.

Examples of what you can do to tailor your display using SDA are as follows:

- Highlight fields
- Make a field blink
- Show a field in reverse image
- Add constants
- Rearrange the fields on the screen
- Add UIM user help

To tailor your DFU data entry display using SDA:

1. Type STRSDA from any AS/400 command line, and press Enter. The AS/400 SDA menu appears.
2. Type 1 (Design screens) on the command line of the AS/400 SDA menu, and press Enter. The Design Screens display appears.

Selecting a Source File

Type QDSSRC in the *Source file* prompt, MYLIB in the *Library* prompt, ORDMNT in the *Source member* prompt, and press Enter. The Work with Display Records display appears.

Working with Display Records

```

Work with Display Records
File . . . . . : QDSSRC          Member . . . . . : ORDMNT
Library . . . . : MYLIB          Source type . . . : DSPF

Type options, press Enter.
1=Add          2=Edit comments      3=Copy          4=Remove
7=Rename      8=Select keywords    12=Design image

Opt  Order  Record      Type      Related Subfile  Date      DDS Error
---  ---    ---
---  10     B100000     SFL
---  20     C100000     SFLCTL    B100000      09/09/94
---  30     B100001     SFL
---  40     C100001     SFLCTL    B100001      09/09/94
---  50     ERRMSG      SFLMSG
---  60     ERRCTL      SFLCTL    ERRMSG        09/09/94
---  70     FKEYS       RECORD
---

F3=Exit          F12=Cancel      F14=File-level keywords
F15=File-level comments  F17=Subset      F24=More keys

Bottom

```

The records listed on the Work with Display Records display contain the information that DFU uses to set up each data entry display within the DDS source member.

Following is a description of what each of these DFU records is:

- B100000 and B100001 represent subfiles (SFL) that contains the actual fields of the data entry display. Each field you selected on the Select and Sequence Fields display would be in these subfiles (one subfile for each record format).

Note: If there were additional data entry displays, the corresponding subfiles would be named as the above subfiles are, with the last digit on the right of the name increasing by one for each additional subfile. For example, if there was an additional subfile for this sample the name would be B100002.
- C100000 and C100001 represent the control information for subfile B100000 and subfile B100001.

Note: The naming conventions for control files are the same as those for subfiles. For example, if there was an additional control file in this sample it would be named C100002.
- ERRMSG represents the subfile used to issue messages on the message line of the data entry display.
- ERRCTL represents the control information for the subfile ERRMSG.
- FKEYS represents the record format used to display the function key line of the data entry display.

To select a record from the Work with Display Records display, type 12 (Design image) in the Opt column to select record B100000 on the Work with Display Records display, and press Enter. The Design Image work screen appears.

Designing a DFU Display

You design your DFU display on the Design Image work screen. A message appears at the bottom of the Design Image work screen the first time you use it. You use the entire Design Image work screen when designing a display.

Note: None of the fields for subfile B100000 are visible on the work screen yet because they are subject to indicators which have not yet been conditioned ON.

To design a DFU display, do the following:

1. Press F9 to show the Select Additional Records for Display display.
2. Select the record name FKEYS as option 2.

Note: Record C100000 has already been selected for you as an additional record using option 1.

3. Press Enter to return to the Design Image work screen and notice that the function keys are now displayed at the bottom of the work screen because you selected the FKEYS record as an additional record.
4. Press F6 to go to the Condition Work Screen display.
5. Type Y (Yes) in the *Activate indicators* prompt to condition the Work Screen with the specified indicators.
6. Type 4 and 17 in the *Indicators to be turned ON* prompt. The Work Screen appears as if indicators 4 and 17 are the only indicators on.

Note: These indicators are used by DFU to condition the fields during data entry. If you do not turn them on, you will not see the DFU fields on the Work Screen.

7. Press Enter to return to the Design Image work screen.

The work screen contains the DDS that you saved from your DFU program. You can use SDA to change the way the data entry display looks. The following steps will take you through an example of tailoring your DFU display. For more information on using SDA see *ADTS/400: Screen Design Aid*, SC09-1768.

Moving Display Fields

In SDA, you can use minus signs (-) and equal signs (=) to move fields around. The minus sign indicates which field you want to move, and the equal sign indicates the new position for the field.

1. Type a minus sign (-) in the attribute position for the INVOICE field. The attribute position is the position immediately to the left of the first character in the field. Now type an equal sign (=) under the CUSTOMER NUMBER field, and one character to the left of the N in NUMBER. The Design Image work screen appears as follows.

```

ORDER MAINTENANCE RECORDS                               Mode . . . . : 00000000000000
Format . . . . : ORDHDR____                           File . . . . : 0000000000

CUSTOMER  ORDER  ORDER  ORDER      TOTAL  -INVOICE  ORDER
NUMBER   NUMBER STATUS AMOUNT   LINES   NUMBER   DATE
BBBBB   99999-  9-    999,999,999.99CR  999-   99999-   99/99/99

=
                                     SHIP
                                     VIA
                                     BBBB BBBB BBBB BBBB

```

2. Press Enter. The INVOICE field is now directly under the CUSTOMER NUMBER field. The display appears as follows:

```

ORDER MAINTENANCE RECORDS                               Mode . . . . : 00000000000000
Format . . . . : ORDHDR____                           File . . . . : 0000000000

CUSTOMER  ORDER  ORDER  ORDER      TOTAL  NUMBER   ORDER
NUMBER   NUMBER STATUS AMOUNT   LINES   NUMBER   DATE
BBBBB   99999-  9-    999,999,999.99CR  999-   99999-   99/99/99

INVOICE
                                     SHIP
                                     VIA
                                     BBBB BBBB BBBB BBBB

```

3. Use the minus key (-) and the equal key (=) to move other fields on the display so it appears as follows:

```

ORDER MAINTENANCE RECORDS                               Mode . . . . : 00000000000000
Format . . . . : ORDHDR____                           File . . . . : 0000000000

CUSTOMER  ORDER  ORDER  ORDER      TOTAL      ORDER
NUMBER   NUMBER STATUS AMOUNT   LINES      DATE
BBBBB   99999-  9-    999,999,999.99CR  999-      99/99/99

INVOICE
NUMBER
99999-
                                     SHIP
                                     VIA
                                     BBBB BBBB BBBB BBBB

```

Note: Although you can make the Design Image work screen appear as it does in the preceding figure by moving fields with the minus (-) and equal (=) keys, you can also use other SDA features to do more complex tailoring.

4. Press F3 to exit the Design Image work screen. The Exit SDA Work Screen display appears.

Exiting from SDA

To exit from SDA, do the following:

1. Select option 1 (Save work since last Enter and exit work screen) from the Exit SDA Work Screen display, and press Enter. The Work with Display Records display appears. A message at the bottom of the display indicates that the image was updated.
2. Press F3 (Exit). The Save DDS – Create Display File display appears.

Saving the DDS Source

To save your member without creating a display file:

1. Type N (No) in the *Create display file* prompt.

Note: You must not create the display file using the Save DDS – Create Display File display. You must use the CRTDFUDSPF (Create DFU Display File) command.

2. Press Enter to save the DDS source created by SDA in the member you have specified. The Save DDS – Create Display File display appears as follows:

```
Save DDS - Create Display File

Type choices, press Enter.

Save DDS source . . . . . Y          Y=Yes
Source file . . . . . QDSSRC_____ F4 for list
Library . . . . . MYLIB_____ Name, *LIBL ...
Member . . . . . ORDMNT_____ F4 for list
Text . . . . . ORDER MAINTENANCE RECORDS_____

Create display file . . . . . N          Y=Yes
Prompt for parameters . . . . . Y=Yes
Display file . . . . . ORDMNT_____ F4 for list
Library . . . . . MYLIB_____ Name, *CURLIB
Replace existing file . . . . . Y          Y=Yes

Submit create job in batch . . . . . _          Y=Yes

Specify additional
save or create options . . . . . _          Y=Yes

F3=Exit F4=Prompt F12=Cancel
Source was saved in member ORDMNT. Press Enter.
```

When SDA displays a completion message, you have finished your tailoring and saved the DDS source in a display file.

3. Press Enter to return to the Design Screens display.
4. Press F3 to return to the Screen Design Aid menu.
5. Press F3 to exit SDA.

When a DFU program is created a display file is automatically created along with the program. Now that you have saved and tailored the DDS source generated for the DFU display file, the next step is to use the Create DFU Display File (CRTDFUDSPF) command to create your new display file.

Creating a DFU Display File

When a DFU program is created a display file is created along with the program. Now that you have saved and tailored the DDS source generated for the display file, create a new DFU display file with the tailored DDS source using the Create DFU Display File command (CRTDFUDSPF). This command allows you to replace the display file created with the program with a new display file that contains the tailored DDS source. The name of the new display file should be the same as the name of the DFU program it is for; otherwise, DFU will not be able to use the new file. To create a DFU display file, do the following:

1. Type CRTDFUDSPF on any AS/400 command line and press F4 (Prompt). The display appears as follows.

```

                                Create DFU Display File (CRTDFUDSPF)

Type choices, press Enter.

Display file . . . . . _____ Name
  Library . . . . . *CURLIB__ Name, *CURLIB
Source file . . . . . _____ Name
  Library . . . . . *LIBL__ Name, *LIBL, *CURLIB
Source member . . . . . *FILE__ Name, *FILE
Authority . . . . . *CHANGE__ Name, *CHANGE, *ALL, *USE...
Replace . . . . . *YES      *YES, *NO
Print source listing . . . . . *NO      *NO, *YES
Text 'description' . . . . . *SRCMBRTXT

-----

                                                                Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys
```

2. Type the name of the display file in the *Display file* prompt and the library name in the *Library* prompt.
3. Press Enter and the new DFU display file is created.

Now that you have created your new DFU display file, you can re-run your DFU program. The data entry displays that appear are now the ones that you tailored in SDA. To make additional changes to the data entry display after viewing them, repeat the process as outlined in “Tailoring a DFU Data Entry Display” on page 48, and tailor the displays again.

Chapter 7. Deleting a DFU Program

This chapter shows how to delete one or more data file utility (DFU) programs.

Procedure for Deleting a DFU Program

To delete an existing DFU program:

1. Type STRDFU and press Enter. The AS/400 Data File Utility (DFU) menu appears.
2. Select option 4 (Delete a DFU program) and press Enter. The Delete a DFU Program display appears.

Note: You can also use the CL command DLTFUPGM, which can be run from any command prompt.

Specifying a DFU Program for Deletion

The Delete a DFU Program display lets you specify the name of the program you want to delete. Alternatively, you can display a list of programs and delete more than one program. The program and library names you last specified in DFU are used.

1. Move your cursor to the *Program* prompt.
2. Press F4 for a list of available programs in the MYLIB library. The Select Program display appears.

The programs listed on this display depend on what is in your MYLIB library. You can select more than one program for deletion from the Select Program display.

3. Type 1 (Select) beside the programs you want to delete and press Enter. The Confirm Delete of DFU Programs display appears.

Confirming Deletion of DFU Programs

The Confirm Delete of DFU Program display shows all the programs you selected for deletion.

To change your choice of programs to be deleted, press F12 (Cancel) to return to the Select Program display. Otherwise, press Enter to delete all selected programs. DFU returns to the Delete a DFU Program display, which appears as follows:

```
Confirm Delete of DFU Programs

Library . . . . : MYLIB

Press Enter to confirm your choice(s) for 4=Delete.
Press F12 to return to change your choice(s).

Opt   Program      Description
 4    ORDPGM        ORDER MAINTENANCE RECORDS
```

To confirm the deletion, do the following:

1. Press Enter. The Delete a DFU Program display appears.
2. Press F3 (Exit). The AS/400 Data File Utility (DFU) menu appears. From the AS/400 Data File Utility (DFU) menu, you can perform another DFU operation or press F3 (Exit) to exit from the utility.

Chapter 8. Using DFU in the System/36 Environment

Using DFU in the System/36 environment on an AS/400 system is similar to using it on a System/36. This chapter shows how to create a DFU program in the System/36 environment.

The main differences between the two systems are:

- AS/400 command function keys have different functions from those on the System/36. If you specify the System/36 style option when you define your DFU program, the function keys and displays are the same as if the program were defined on a System/36 (when you run your program).
- AS/400 displays and function keys are used when you define a DFU program. System/36 function keys are used when you run the program, if you specify the System/36 style when you define the program.
- To change the program, leave the *Name of DFU program* prompt blank, and specify the name of the program you want to change in the *Name of DFU specification source member* prompt.
- You can use RPG II-described files in the System/36 environment.

The following System/36 DFU functions are available only within the System/36 environment:

- DFU LIST function. The List function is used to print the contents of a file. See *Data File Utility List for the System/36 Environment User's Guide and Reference*, SC09-1362, for details.
- DFU UPDATE function. The Update function is used to change a data file.
- DFU INQUIRY function. The Inquiry function is used to display a data file.
- DFU ENTER function. The Enter function is used to create a new data file.

Use ENTER#, UPDATE#, INQUIRY#, or LIST# to run the program.

RPG II-Described Files

DFU determines what a file looks like based on file descriptions. In the System/36 environment, DFU can use RPG II-, DDS-, or IDDU-described data files. In an RPG II program-described file, you provide the file description on two RPG II specifications: the F specification and the I specification.

Note: For RPG II F and I specifications, character fields with length greater than 60, and binary fields are not picked up during program definition.

To use a program-described data file, you must enter the F and I specifications into a source member. This is the only coding you have to do for DFU. Source member information appears in the same format as you enter it through the text editor. You can use any AS/400 text editor to enter the information into a source member. For example, you can enter the information through the source entry utility (SEU), a part of the Application Development ToolSet/400 licensed program. The following figure shows an SEU display containing the F and I specifications that you need to enter to work through the examples in this chapter.

```

Columns . . . : 1 71          Edit          MYLIB/QS36SRC
SEU==>          INVRPG
FMT F . . . .FfilenameIPEAFBlenRlenLK1AIOvKlocEDevice+ . . . .Exit++ . . . .A . . . U
***** Beginning of data *****
0001.00      FINVRPG UP      0053 06AI 1 DISK
0002.00      IINVRPG      01 42NC 43NC
0003.00      I
0004.00      I              1 6 ORDER
0005.00      I              7 12 ORDATE
0006.00      I              13 17 CUSORD
0007.00      I              18 22 CUST
0008.00      I              23 37 SHPVIA
0009.00      I              P 38 410PRICE
0010.00      I              42 43 SHPTO
0011.00      I              44 53 GOODS
0012.00      IINVRPG      02 42 C
0013.00      I              1 6 ORDER
0014.00      I              7 12 SALDAT
0015.00      I              13 33 SALEMN
0015.00      I              34 53 FILLER
***** End of data *****

F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F10=Cursor
F16=Repeat find  F17=Repeat change  F24=More keys

```

For information on how to use SEU, see *ADTS/400: Source Entry Utility*, SC09-1774.

If the DFU program you create processes an existing file, there may already be F and I specifications in the system for that file. In this case, you do not need to create file specifications for the data file. DFU uses the existing F and I specifications from any existing RPG II source program.

Note: When using the ENTER, UPDATE, INQUIRY, LIST, ENTER#, UPDATE#, INQUIRY#, or LIST# System/36 procedures in the System/36 environment, all data files must reside in library QS36F, and all RPG II source members must reside in file QS36SRC in the library you specify.

System/36 Style Runtime Function Keys

If your DFU program uses System/36 style data entry displays, you can use the System/36 function keys when you run your program. You define the data entry display style on the Define General Information display.

Note: Some of these keys are functional on certain displays only.

The System/36 runtime function keys are described in the following table.

Workstation Key	Name of Function Key	Description
F1	Auto dup	Switches the automatic duplicate function on and off. When on, fields defined for automatic duplication are filled with the last specified value for the field. When off, blank fields are displayed.

Workstation Key	Name of Function Key	Description
F2	Display accumulators	Moves to the Display Batch Accumulators display, shows the current accumulator totals, adds the accumulators to the total accumulators, and resets them to zero.
F3	Select record type	Allows you to select a record type for processing from a list of available record types and returns to the data entry display from which this key was pressed.
F4	Delete	Removes the record physically from the file if no record delete code is specified and if the file is delete capable. Otherwise, the delete code is written into the record to indicate that it is deleted.
F5	Record backspace	Shows the previous display of a multiple display record. This function is not supported.
F6	Print record	Prints the record on the user's defined printer. This function is active in Display mode only.
F7	End of job	Returns to the previous display by way of the End Data Entry display without saving the field values for the currently displayed record.
F9	Insert	Changes the mode to Insert, which allows you to insert records anywhere in the file. If the file is processed sequentially, insert mode is identical to entry mode; that is, records are added at the end of the file.
F10	Entry	Changes the mode to Entry, which allows you to add new records.
F11	Change	Changes the mode to Change, which allows you to change existing records.
F12	Record advance	Places default entries into any unfilled fields in the record and saves the entire record to the data file.
F18	Auto-increment from last change	Turns automatic-increment on from the last record changed. When on, and if you are entering records in Entry mode or returning to Entry mode from Change mode, DFU presents the field value of the last record changed or added, plus the increment value.
F19	Auto-increment from the end of file	Turns automatic-increment on from the end of the file. When on, and if you are entering records in Entry mode or returning to Entry mode from Change mode, DFU presents the field value of the last record in the file, plus the increment value. Note: You can use either F18 or F19, but not both at one time. If you turn on one automatic-increment key, and then turn on the other, the original key is turned off.

Workstation Key	Name of Function Key	Description
F20	Auto record advance	Switches the automatic record advance on and off. The automatic record advance is set to ON mode when the user runs the program. When on, the contents of a display are processed as soon as data is entered into the last field on the display. It is not necessary to press Enter.
F21	Status	Displays the status of data entry including the current data file, library, format or type, and active functions (mode, automatic duplication, auto record advance).

Creating a DFU Program through the System/36 Environment

This section shows how to create a Data File Utility (DFU) program to add and change records in a data file called INVRPG. It defines the characteristics of the DFU program and the data entry displays used to access data files. It also includes two examples of how to create a new DFU program: one for indexed data files and one for nonindexed data files.

The displays for running and deleting programs are similar on both the AS/400 system and System/36. Review Chapter 4, "Running a DFU Program" on page 35, and Chapter 7, "Deleting a DFU Program" on page 55, for details on these procedures.

The DFU program is created from a definition made through the create or change option of the AS/400 Data File Utility (DFU) menu. You can modify existing program definitions to create a new program by saving the modified version under a different name.

Example System/36 Data Entry Display

When you create your DFU program, you can select an AS/400 or System/36 data entry style from the Define General Information display. You can run the program in either style in the System/36 environment. If you select the System/36 style for this example, the following display appears when you run the DFU program.

```

INVENTORY RECORDS                Filename: INVRPG      Mode: Display
Record Type: 01                   Last record type: 01  Auto-dup: OFF
OUR ORDER NUMBER (ALPHAMERIC XC CODE): _____

DATE:                             _____
CUST. ORD. NO.:                    _____
CUSTOMER NO.:                      _____
SHIP VIA.:                          _____
SHIP TO:                            _____
PRICE OF ORDER:                     _____

```

Procedure for Creating a DFU Program from the System/36 Environment

After you enter the DFU command, DFU displays a menu from which you can select options to create, change, delete, or run a DFU program. After your selection to create a program for this example, DFU begins a prompting sequence through which you define the program. The displays that appear for creating and for changing DFU programs are the same.

Notes:

1. You can also use the System/36 commands Enter, Update, and Inquiry to define DFU programs from the System/36 environment. You can use the System/36 commands ENTER#, UPDATE#, and INQUIRY# to run DFU programs from the System/36 environment. See the *System/36 Environment Reference* manual for descriptions of these commands. See the *System/36 Environment Programming* book, SC41-3730, for details on using the System/36 environment.
2. You must use the System/36 LIST command to access the DFU LIST function. You can also use the System/36 command LIST# to run DFU LIST programs from the System/36 environment. See the *Data File Utility List for the System/36 Environment User's Guide and Reference* book for more information.
3. All data files referenced through the operation control language (OCL) from the System/36 environment must exist in library QS36F. DFU uses OCL to access files in the System/36 environment.
4. To change the program, leave the *Name of DFU program* prompt blank, and specify the name of the program you want to change in the *Name of DFU specification source member* prompt.

You can review the program or the data file definitions and default entries any time while you are creating or changing a DFU program. Command function keys are provided for this purpose. DFU returns to the definition display after you finish reviewing program or data file details.

The remainder of this chapter discusses the displays that appear when you define a DFU program in the System/36 environment. The examples show the prompt entries you enter into each display to produce the sample DFU program.

Perform the following steps to define a DFU program:

1. To sign on to the System/36 environment, type STRS36 and press Enter.
This command puts you into the System/36 environment and allows you to enter System/36 style commands.
2. Type DFU and press Enter. The AS/400 Data File Utility (DFU) menu appears.
3. Select option 2 (Create a DFU program) from the AS/400 Data File Utility (DFU) menu, and press Enter. The Create a DFU Program display appears.
4. Type data in the displays shown for this function as described in this chapter.

Creating a DFU Program for an Indexed Data File

This example shows you how to create a DFU program for an indexed RPG II-described data file. DFU determines whether or not you have an indexed or a nonindexed data file and the appropriate displays appear for you. You use the same procedure for creating a program for either type of data file. DFU may, however, present an additional display (Select Field for Record Number) when you create a program for a nonindexed file.

Use the BLDFILE procedure to create a file that matches the RPG II F and I specification shown in “RPG II-Described Files” on page 57 to do this example.

Creating a DFU Program

The Create a DFU Program display appears when you select option 2 (Create a DFU program) from the AS/400 Data File Utility (DFU) menu. This display requests the name of the DFU program being defined and the data file on which the program will run. Because you entered DFU using the System/36 procedure DFU, the display also prompts you for RPG II source member information.

Your display appears as follows. It can, however, contain different values. This example assumes that you put the F and I specifications in MYLIB.

```
                                Create a DFU Program

Type choices, press Enter.

Program . . . . . _____ Name, F4 for List
Library . . . . . _____ Name, *CURLIB

Data file . . . . . _____ Name, F4 for List
Library . . . . . QS36F_____ Name, *LIBL, *CURLIB

If the data file is program described, type information, press Enter.

Source member . . . . . _____ Name, F4 for List
Source file . . . . . QS36SRC_____ Name, F4 for List
Library . . . . . MYLIB_____ Name, *LIBL, *CURLIB

F3=Exit   F4=Prompt   F12=Cancel
```

Move your cursor to the *Source member* prompt and press F4. A list of the available source members for this data file appears.

Selecting RPG II Source Members

The Select RPG II Source Member display appears when you press F4 from the *Source member* prompt of any display that has this prompt. For this example, this display appears when you press F4 from the Create a DFU Program display.

The Select RPG II Source Member display shows you a list of available source members. To select the member you want to process from this list:

1. Type 1 (Select) in the *Opt* column next to the SRCMBR member to select it for processing for this example. This member contains the F and I specifications shown in the SEU display in “RPG II-Described Files” on page 57.
2. Press Enter to return to the Create a DFU Program display with the selected source member.
3. Type INVNTRY in the *Program* prompt, INVRPG in the *Data file* prompt, and the library names MYLIB and QS36F over the default entries in the *Library* prompts.
4. Press Enter to continue to the Define General Information/Indexed File display.

Note: If your data file is nonindexed, the Define General Information/Nonindexed File display appears.

Defining General Information for an Indexed File

The Define General Information/Indexed File display appears if you press Enter from the Create a DFU Program display and if your data file is indexed. This display allows you to define the format of your data entry display and to choose whether or not to print an audit report.

To change the entry for the sample program, do the following:

1. Type INVENTORY RECORDS over the default job title. Your display appears as follows:

```

Define General Information/Indexed File

Type choices, press Enter.

Job title . . . . . INVENTORY RECORDS
Display format . . . . . 2          1=Single, 2=Multiple
                                   3=Maximum, 4=Row oriented

Audit report . . . . . Y           Y=Yes, N=No
S/36 style . . . . . Y           Y=Yes, N=No

```

2. Press Enter to continue to the Define Audit Control Display. This display appears when you use the default setting of Y (Yes) for the *Audit report* prompt. Otherwise, if you type N (No) in the *Audit report* prompt, the Work with Record Types display appears.

Defining Audit Control

The Define Audit Control display appears if you type Y (Yes) in the *Audit report* prompt on the Define General Information/Indexed File display. The audit report is a printed list of changes made to a data file when you run your DFU program. This display allows you to define the scope of information you want reported on the listing.

If you type Y (Yes) next to a reportable change on the Define Audit Control display, DFU prints a copy of each changed record for the specified print category (additions, changes, or deletions). If you have accumulator fields, you also receive a printout of accumulator totals on your audit report. If you do not specify to print any of the audit control options but indicate that you want an audit report on the Define General Information/Indexed Files display, you receive a printout of accumulator totals only (if you have defined accumulators).

1. Leave the default values for the sample INVNTRY program.
2. Press Enter to continue to the Select S/36 Style Options display.

Selecting System/36 Style Options

The Select S/36 Style Options display appears when you leave Y (Yes) in the *S/36 style* field on the Define General Information/Indexed File display. You can select S/36 style options that you want to appear in your DFU data entry program. Your display appears as follows:

Select S/36 Style Options

Type choices, press Enter.

Use delete codes	Y	Y=Yes, N=No
For choice Y=Yes:		
Delete code	_	
Position	00007	1 to Record length
Blank fill numeric fields	Y	Y=Yes, N=No

F3=Exit F12=Cancel F14=Display definition

Specify a character in the *Delete code* prompt, and press Enter to continue to the Work with Record Types display. For RPG II files, this display appears instead of the Work with Record Formats display (as would appear if your file is DDS or IDDU described).

Working with Record Types

The Work with Record Types display appears if your data file is an RPG II-described file. This display lists the various record types defined in the RPG II-described file. You can work with one or more types for processing. If you work with multiple record types, DFU presents a separate field definition display for each record type selected as you go through program definition.

Note: Make sure that you define record ID codes for each selected record when using multiple record types for RPG II. ID codes allow DFU to differentiate between the record types on a record-by-record basis.

1. Type 8 (Display attributes) in the *Opt* column next to record type 01 to display the RPG II attributes of record type 01. Your display appears as follows:

```

                                Work with Record Types
File . . . . : INVRPG                      Library . . . . : QS36F
Type options, press Enter. Press F21 to select all.
  2=Specify  4=Delete  8=Display attributes

Opt Record Type  Defined
  8         01      N
  -         02      N

```

2. Press Enter to continue to the Display Record Type display.

Displaying Record Types

The Display Record Type display appears when you type 8 (Display attributes) in the *Opt* field next to a record type on the Select Record Type display and press Enter. You can review the RPG II specifications for a record type. Look at the values in the RPG II specification that determine whether or not a record in the data file belongs to this record type. See the *System/36-Compatible RPG II User's Guide and Reference*, SC09-1818, for additional information about record identification codes.

Your display appears as follows:

```

                                Display Record Type
File . . . . . : INVRPG                      Library . . . . : QS36F
Record type . . . . . : 01

Or/And  Position  Not  Type  Character
      AND         42   X   CHAR
                   43   X   CHAR

                                Bottom

Press Enter to continue.

F3=Exit      F12=Cancel      F14=Display definition

```

1. After you have reviewed the information, press Enter to return to the Work with Record Types display.
2. Type 2 (Specify) in the *Opt* column next to record type 01, and press Enter to work with record type 01. The Select and Sequence Fields display appears.

Selecting and Sequencing Fields

You can select the fields and the field order that your DFU program uses for the data entry display. The displayed information is from the applicable RPG II file definition. This display reappears for each selected record type when you finish the definition sequence for the current record type.

To select all of the displayed fields from the record type, press F21 (Select all). If you change the sequence of the displayed fields, the screen reappears in ascending sequential order when you press Enter. Press Enter again to confirm your changes and to continue to the next definition display. If you do not change any information, the Work with Fields display appears when you press Enter.

If you do not want to define new field headings or extended definitions for the fields you select from this display, press F17 (Fast path) to bypass the Work with Fields and Specify Extended Field Definition displays for the current record type. If there are still record types to process, the Select and Sequence Fields display reappears for the next selected record type. Otherwise, the Exit DFU Program Definition display appears.

To use F17 (Fast path), select the fields you want for your data entry display and press Enter to confirm your selections. Then press F17 (Fast path).

The Fast path uses the following defaults:

- *Auto duplicate:* No
- *Allow lowercase:* No
- *Accumulate:* No
- *Initial value:* No
- *Auto-increment:* No
- *Begin on new line:* No
- *Output only:* No
- *Alphanumeric characters:* No
- *Mandatory entry:* No
- *Mandatory fill:* No
- *Name checking:* No
- *Modulus 10 checking:* No
- *Modulus 11 checking:* No
- *Run tests against relational operators and list of values:* No
- *Field headings:* The RPG II field names
- *Blanks allowed:* Yes
- *Default spacing:* Yes
- *Heading location:* *BEFORE
- *Double-byte characters:* O

To select the field order for your data entry display, do the following:

1. Type the sequence numbers shown in the following figure for the sample INVNTRY program, and press Enter.

```

                                Select and Sequence Fields
File . . . . . : INVRPG          Library . . . . . : QS36F
Record type . . . . . : 01

Select fields and their sequence or press F21 to select all; press Enter.

Sequence  Field      Attr   Length  Type      Description
1_____ ORDER      KEY    6       CHAR
2_____ ORDATE
3_____ CUSORD    5       CHAR
4_____ CUST      5       CHAR
5_____ SHPVIA   15      CHAR
6_____ PRICE    7,0    PACK
7_____ SHPTO    2       CHAR
_____ GOODS    10     CHAR

                                Bottom
F3=Exit      F5=Refresh   F12=Cancel   F14=Display definition
F20=Renumbr  F21=Select all

```

2. Press Enter again to confirm. The Work with Fields display appears.

Working with Fields

You can select the fields that need extended definition and specify alternative headings to appear on the Data Entry display. If you do not require extended definitions, press Enter. If there are record types still to be processed (based on selections made on the Select Record Types display), the Select and Sequence Fields display for the next record type appears. Otherwise, the Exit DFU Program Definition display appears.

To select a field for extended definition, do the following:

1. Type 2 (Specify extended definition) in the *Opt* column next to the ORDER field.
2. Press Enter to continue to the Specify Extended Field Definition display. There are two types of extended definition displays: one for alphanumeric fields, and one for numeric fields. For this example, only the Specify Extended Field Definition display for alphanumeric fields appears because you selected only the alphanumeric ORDER field for extended definition.

Note: If you have not selected fields for extended definition and there are no other record types to process, the Exit DFU Program Definition display appears instead of an extended definition display.

Specifying Extended Field Definitions for Alphanumeric Fields

Extended field definitions allow you to define additional features for selected alphanumeric fields. You can select the automatic duplication feature of DFU, choose whether or not to allow lowercase characters to be entered in this field on the data entry display, and specify extended field headings. For RPG II-described files, you can also specify double-byte character set attributes for a field if you have DBCS capable DFU.

The Specify Extended Field Definition display appears for each alphanumeric field you select for extended definition on the Work with Fields display. A field's alphanumeric type (CHAR) is displayed on the Select and Sequence Fields display. The type (alphanumeric or numeric) determines whether or not this display or the Specify Extended Field Definition display for numeric fields appears.

For this example, the only field selected for an extended definition is the alphanumeric ORDER field.

To specify an extended field definition, do the following:

1. Type the text shown in the following figure in the *Extended field heading* prompt:

```

                                Specify Extended Field Definition
Field . . . . . : ORDER                      Record type . . . . . 01
Type choices, press Enter.
Auto duplicate . . . . . N                    Y=Yes, N=No
Allow lowercase . . . . . N                    Y=Yes, N=No
Extended field
  heading . . . . . OUR ORDER NUMBER
                    (ALPHAMERIC XC CODE)
Heading location . . . . . *BEFORE            *ABOVE, *BEFORE
Initial value . . . . .
Validity checks . . . . . _                    2=Change, 4=Delete

                                                More...

F3=Exit      F12=Cancel    F14=Display definition
  
```

2. You are finished defining your DFU program. Press F14 (Display definition) to see the Display DFU Program Summary display to review your DFU program definition.

Displaying a DFU Program Summary

You can review the information you have specified so far for the DFU program. Undefined prompts appear with their default values. Summary information appears on two displays. Press Enter on the Display DFU Program Summary display to go to the Program Summary report display.

Your display appears as follows:

```

                                Display DFU Program Summary
Program . . . . . : INVNTRY
  Library . . . . . : MYLIB
Data file . . . . . : INVRPG
  Library . . . . . : QS36F
Job title . . . . . : INVENTORY RECORDS
Display format . . . . . : Multiple
Allow updates on roll . . . . . : N
Keys:
  Generate . . . . . : N
  Changes allowed . . . . . : N

RPG source file . . . . . : QS36SRC
  Library . . . . . : MYLIB
RPG source member . . . . . : SRCMBR
                                More...

Press Enter to continue.

F3=Exit      F12=Cancel      F15=Print

```

To review the information, do the following:

1. Press Page Down (Roll Up) to go to the second part of the Display DFU Program Summary display. Your display appears as follows:

```

                                Display DFU Program Summary
Program . . . . . : INVNTRY
  Library . . . . . : MYLIB
Data file . . . . . : INVRPG
  Library . . . . . : QS36F
Audit report . . . . . : Y
  Print additions . . . . . : Y
  Print changes . . . . . : Y
  Print deletions . . . . . : Y
Printer:
  Line width . . . . . : 132
  Column spacing . . . . . : 1
S/36 style . . . . . : Y
Suppress data
  errors . . . . . : N
  Edit numerics . . . . . : N
                                Bottom

Press Enter to continue.

F3=Exit      F12=Cancel      F15=Print

```

The display of summary information for a nonindexed file appears as shown in the following figure.

```

                                Display DFU Program Summary
Program . . . . . : INVNTRY
Library . . . . . : MYLIB
Data file . . . . . : QINVFILE
Library . . . . . : QS36F
Job title . . . . . : INVENTORY MAINTENANCE RECORDS
Display format . . . . . : Multiple
Allow updates on roll . . . . . : N
Record numbers:
  Generate . . . . . : N
  Field . . . . . :
  Heading . . . . . : *RECNR

Processing . . . . . : Sequential
RPG source file . . . . . : QS36SRC
Library . . . . . : MYLIB
RPG source member . . . . . : SRCMBR

Press Enter to continue.

F3=Exit      F12=Cancel    F15=Print
More...

```

2. Press Page Down (Roll Up) to view the second part of the Display DFU Program Summary display.
3. Press Enter to review the DFU Program Detail display.

Displaying DFU Program Detail

You can review the details of the record types and fields defined so far for the DFU program.

Your display appears as follows:

```

                                Display DFU Program Detail
Program . . . . . : INVNTRY                      Library . . . . . : MYLIB

Type/Field  Attr      Extended Definition Length Type      Description/Heading
01
ORDER       KEY       N           6 CHAR    OUR ORDER NUMBER
ORDATE      N           6 CHAR    ORDATE
CUSORD      N           5 CHAR    CUSORD
CUST        N           5 CHAR    CUST
SHPVIA      N           15 CHAR   SHPVIA
PRICE       N           7,0 PACK   PRICE
SHPTO       N           2 CHAR    SHPTO

Press Enter to continue.

F3=Exit      F12=Cancel    F15=Print
Bottom

```

Press Enter to review the Display Data File Detail display.

Displaying Data File Detail

You can review the details of the record types and fields defined by the RPG II specifications for this data file.

This display shows all of the fields in the file specification, not just your selected fields. For this example, your display appears as follows:

Display Data File Detail					
File . . . :		INVRPG	Library . . . :		QS36F
Type/Field	Start	Length	Type	Attr	Description
01					
ORDER	1	6	CHAR	KEY	
ORDATE	7	6	CHAR		
CUSORD	13	5	CHAR		
CUST	18	5	CHAR		
SHPVIA	23	15	CHAR		
PRICE	38	7,0	PACK		
SHPTO	42	2	CHAR		
GOODS	44	10	CHAR		
02					
ORDER	1	6	CHAR	KEY	
Press Enter to continue.					More...
F3=Exit	F12=Cancel	F15=Print			

When you have finished reviewing the program definition and file details, do the following:

1. Press F3 (Exit) to return to the Specify Extended Field Definition display.
2. Press Enter twice. The Exit DFU Program Definition display appears.

Exiting from DFU Program Definition

The Exit DFU Program Definition display is the final display in the definition sequence. You can save, or save and then run, your newly defined DFU program. You can also return to the definition sequence to make additional modifications to your program.

The following example saves the INVNTRY program and then runs the program in Display mode, which allows you to check the data entry displays you have just defined. Display mode allows you to look at records in the INVRPG data file but not change them.

Note: Option 9=Create appears in the *Type of run* prompt only if you used the OCL ENTER procedure.

To exit from DFU program definition, do the following:

1. Type 2 (Display) over the default setting in the *Type of run* prompt. Your display appears as follows:

```

                                Exit DFU Program Definition

Type choices, press Enter.

Save program . . . . . Y           Y=Yes, N=No
Run program . . . . . Y           Y=Yes, N=No
  For choice Y=Yes:
    Type of run . . . . . 2       1=Change, 2=Display
Modify program . . . . . N         Y=Yes, N=No

```

See “Exiting from DFU Program Definition” on page 21 for a description of the information on this display.

2. Press Enter to save your program and continue to the Display a Data File display. This display appears because you selected to run the program in Display mode (option 2 (Display) in the *Type of run* prompt). This is also the first display that appears when you run a DFU program by using the DSPDTA command.

Displaying a Data File

The Display a Data File display allows you to specify the name of the data file you want to look at. See Chapter 4, “Running a DFU Program” on page 35, for additional information about running DFU programs. When displayed from the Exit DFU Program Definition display, as for this example, this display contains default entries based on the information you specified on that display.

For this example, your display appears as follows:

```

                                Display a Data File

Type choices, press Enter.

Program . . . . . INVNTRY      Name, F4 for List
Library . . . . . MYLIB       Name, *LIBL, *CURLIB

Data file . . . . . INVRPG     Name, *SAME, F4 for List

  Library . . . . . QS36F     Name, *LIBL, *CURLIB
  Member . . . . . *FIRST     Name, *FIRST, F4 for List

```

Press Enter. The first data entry display appears as follows:

```

INVENTORY RECORDS                Filename: INVRPG      Mode: DISPLAY
Record Type: 01
OUR ORDER NUMBER (ALPHAMERIC XC CODE) _____

```

To run the DFU program in the same way as on the AS/400 system, use System/36 function keys to perform DFU functions instead of AS/400 function keys. To display specific records, type a key field value and press Enter. That record appears. You can also use Page Up (Roll Down) and Page Down (Roll Up) to page through records.

Appendix A. Additional Considerations

This appendix describes the following additional considerations for using the Data File Utility (DFU):

- DFU command and file security control
- Responding to file changes
- Error suppression
- Unsupported data types

Security Considerations

Default security settings for the AS/400 allow any user access to:

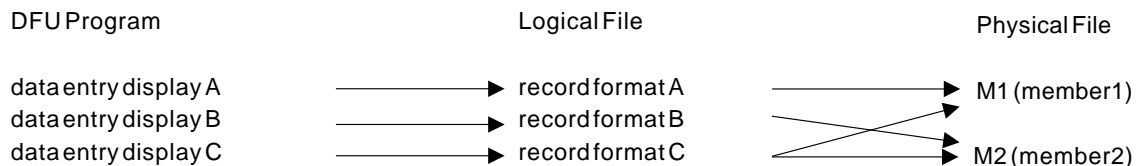
- DFU commands (STRDFU, CHGDTA, DSPDTA, UPDDTA, DLTFUPGM, CRTDFUDSPF)
- DFU applications (programs and display files) that you create by running STRDFU
- Data files accessed by DFU applications

You must change the *USE authority of DFU commands if you need to restrict access to DFU. Application and data file owners must set the *PUBLIC authority to avoid unwanted access.

For more information on how to restrict access to CL commands, DFU applications, and data files, refer to the *Security – Reference*, SC41-3302, and to the *CL Reference*, SC41-3722.

Multiple Record Formats

A single DFU data entry display can add records to only one physical file member. If a DFU data entry display is defined on a logical file record format, the DFU data entry display can add records if the logical file record format is linked to **only one** physical file member. An example is shown below:



Except for data entry display C because it is linked to two physical file members, all data entry displays can add records.

Note: DFU does not support predefined joined files.

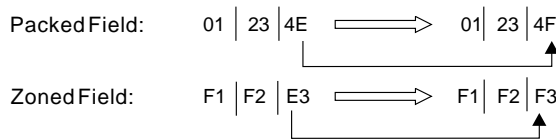
The relationship between logical file record formats and physical file members is defined by the DTAMBRS parameter of the CRTLF (Create Logical File) command and the ADDLFM (Add Logical File Member) command. See the *CL Reference* for a description of these commands.

Error Suppression

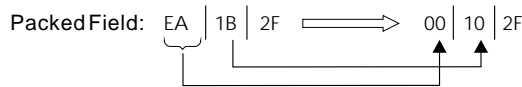
It is unlikely your data file will contain data errors as a result of working with DFU. Your file could, however, have errors if you made an invalid change to a field from outside of DFU. If you request error suppression when you define your program, DFU attempts to suppress any decimal data errors so that the record can still be displayed.

DFU uses the following method for suppressing errors in all fields containing invalid data:

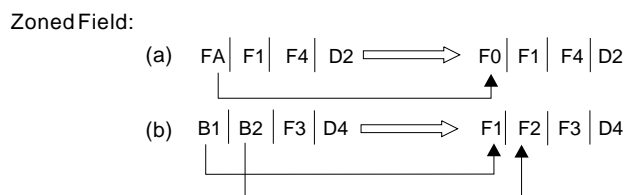
- In a packed or zoned field, an invalid sign is forced to a positive sign value as follows:



- In a packed field, any hex digit (other than the sign digit) field that is greater than hex 9 is forced to hex 0 as follows:



- In a zoned field, any hex digit in the numeric half-byte of each byte that is greater than hex 9 is forced to hex 0. Any hex digit in the zone half-byte of each byte less than hex F (except the sign half-byte) is forced to hex F. Examples of these circumstances follow:



If error suppression is successful, DFU shows the corrected data on your data entry display. The corrected fields are written back to the data file only if you subsequently change the corrected field on the data entry display. For example, imagine that fields A and B are zoned fields that contain an invalid hex 40. DFU suppresses the error by changing the hex 40 to zero. The zero is what shows on your data entry display. If you change the zero (error suppressed hex 40) in field A to valid data but do not change the zero (error suppressed hex 40) in field B, then only field A is written back to the data file. The original contents of field B (hex 40) are undisturbed.

If error suppression was not selected, or if your record contains invalid data in a nonnumeric field, the record is not displayed and you receive an error message.

Unsupported Data Types

AS/400 DFU does not support the following data types:

- Floating point field
- Any hex fields in *HEX format

Appendix B. Double-Byte Character Set Considerations for DFU Programs

This appendix discusses double-byte character set (DBCS) considerations, including the following:

- DBCS characters supported on AS/400
- Software requirements
- Programming considerations

Supported DBCS Characters

DBCS on the AS/400 system consists of the following types of characters:

- Kanji (Japanese)
- Katakana (Japanese)
- Hiragana (Japanese)
- Hangeul (Korean)
- Jamo (Korean)
- Hanja (Korean)
- Traditional Chinese
- Simplified Chinese
- Alphabetic and numeric (A through Z, a through z, and 0 through 9)*
- Roman numerals (I through X)*
- Greek
- Cyrillic*
- Special symbols*
- Additional characters defined through the character generator utility (CGU).

Characters marked with an asterisk (*) are supplied by IBM in the Japanese basic DBCS. Many frequently used Japanese Kanji characters are also included in this basic DBCS. Additional Japanese Kanji characters and user-defined characters not included in the Japanese basic DBCS comprise the Japanese extended double-byte character set, and are called extension characters. Extension characters require additional processing to be displayed and printed, basic characters do not.

Double-byte character sets differ from alphanumeric character sets in the following ways:

- The Japanese alphanumeric character set consists of only Roman (A-Z) and Katakana alphabets, and numerals (0-9).
- The Korean alphanumeric character set consists of the uppercase and lowercase Roman (A-Z, a-z) and Korean Jamo alphabets, and numerals (0-9).
- The traditional and simplified Chinese alphanumeric character sets consist of the uppercase and lowercase Roman (A-Z, a-z) alphabet and numerals (0-9).

Note: Alphanumeric characters are also included in the DBCS. When using DBCS versions of alphanumeric characters, however, the characters are considered DBCS.

- DBCS data, when displayed and printed, usually is twice as wide as alphanumeric data.
- DBCS characters each use two bytes of storage plus shift-out (SO) and shift-in (SI) characters required at the ends of a DBCS string. Alphanumeric characters use one byte.

Software Requirements

You can create DFU programs containing DBCS fields on both single-byte and double-byte workstations, but you can run them in change mode on a DBCS workstation. DFU programs containing DBCS fields that are run on single-byte workstations are automatically put into DISPLAY mode.

To program in DFU with DBCS characters, start each DBCS character string with an SO character and end it with an SI character.

With open fields, you can mix alphanumeric and DBCS characters. DBCS characters must be within the SO and SI characters.

Printing audit reports with DBCS fields on a single-byte printer produces an error message. The DBCS data does not appear on the report.

Programming Considerations

Part of the ideographic Japanese character (IGC) feature is the ability to use Katakana (single byte) characters. Alphanumeric characters and Katakana characters are one position each. DBCS characters are two positions each.

A string of DBCS characters begins with a shift-out character of one position, followed by DBCS characters of two positions each, followed by a shift-in character of one position. This configuration means each DBCS character string is an even number of positions at least four positions long for a single DBCS character. The following shows a string of three DBCS characters, where the first and fifth characters represent the shift-out and shift-in characters respectively. This example requires eight character positions: one for the shift-out character, two for each DBCS character, and one for the shift-in character.



In DFU, you can select DBCS fields on the Select and Sequence Fields display as shown in the following figure.

```

                                Select and Sequence Fields
File . . . . . : DBCSFILE      Library . . . . . : MYLIB
Record format . . . . . : KATAREC

Select fields and their sequence or press F21 to select all; press Enter.

Sequence  Field      Attr   Length  Type   Description
-----  -
         DBCSCHR    KEY      6   DBCS   DBCS FIELD

F3=Exit      F5=Refresh      F12=Cancel      F14=Display definition
F20=Renumbr  F21=Select all

Bottom

```

The DBCSCHR field is designated as a DBCS field. Depending on the definition, you can type either DBCS or single-byte characters into this field on the data entry display. You can also specify extended definitions for DBCS fields selected from the Define Fields display. If you have DBCS-capable DFU, your display is as follows:

```

                                Specify Extended Field Definition
Field . . . . . : DBCSCHR      Record format . . . . . : KATAREC

Type choices, press Enter.

Auto duplicate . . . . . N      Y=Yes, N=No
Allow lowercase . . . . . N      Y=Yes, N=No
Extended field
  heading . . . . . DBCS
                   FIELD
Heading location . . . . . *BEFORE *ABOVE, *BEFORE
Initial value . . . . .
Validity checks . . . . . -      2=Change, 4=Delete
Double-byte character
  attribute . . . . . J      J=DBCS Only
                           O=DBCS Open
                           E=Either DBCS
                           G=DBCS Graphic

More...

F3=Exit      F12=Cancel      F14=Display definition

```

The value in the *Double-byte character attribute* prompt may differ from the one on your display, depending on the value that is specified in the DDS file description. A description of the DBCS-specific information on the Specify Extended Field Definition display is as follows.

Double-byte character attribute. Allows you to specify whether or not a DBCS character can be entered into this field prompt on the data entry display. Select one of the following values:

J DBCS Only: This field accepts DBCS characters only.

The field must be at least 4 bytes long and of even length. DBCS characters are 2 bytes long and are delimited with shift-out (SO) and shift-in (SI) characters. If you omit the leading SO character, the entire string is deleted up to the next SI character. You cannot delete the SI character unless you delete the SO character.

O DBCS Open: This field accepts both DBCS and alphanumeric characters at the same time.

E Either DBCS (default): This field accepts either all DBCS or all alphanumeric characters but not both types together in the same field.

The field must be at least 4 bytes long and of even length. DBCS characters are 2 bytes long and are delimited with SO and SI characters. If you omit the leading SO character, the entire string is deleted up to the next SI character. You cannot delete the SI character unless you delete the SO character.

G DBCS Graphic: This field can contain DBCS data only.

The field can range in length from 1 to 16 383 characters. The character string does not contain SO and SI characters.

In DBCS mode, the following are DBCS:

- DFU prompts
- DFU informational messages
- Output page headings

DFU supports data description specifications (DDS) extensions for DBCS support in database files only.

Appendix C. Differences Between System/38, System/36, and AS/400 DFU

Some operations and treatment of records and files differ between systems and environments. You should note the following differences if you are accustomed to using the System/36 or System/38, or are using the AS/400 system in a different environment.

DFU Migration

The AS/400 DFU migration aid works with R-modules (DFU subroutine members), and O-modules (DFU screen load members). You must, therefore, compile your DFU source into System/36 R-modules before running the migration aid.

On System/36, you can define a DFU program for inquiry purposes only. This means that the DFU inquiry program cannot update records or insert records into a file. On the AS/400 system, however, DFU does not distinguish between inquiry and update programs. This causes DFU inquiry programs to become update-capable when migrated to the AS/400 system. You can use this System/36 inquiry program to update the file on the AS/400 system. To limit this System/36 inquiry program to only inquiry, selectively limit the use of the CHGDTA command. The *Security – Reference* manual contains information on selectively limiting the use of specific commands.

Changing Programs Using OCL Procedures

To change a DFU program using the OCL procedures ENTER, UPDATE, or INQUIRY from the System/36 environment, do not delete the program before trying to change it. DFU bases the change on the program object itself. To change the program, leave the *Name of DFU program* prompt blank, and specify the name of the program you want to change in the *Name of DFU specification source member* prompt.

Printing Reports

In the AS/400 environment, you must use Query to print reports instead of DFU LIST. For further details, see *Query/400 Use*, SC41-3210. If you are in the System/36 environment, you can use DFU LIST.

Deleting Records

System/36 marks records as deleted by placing a specified character in the record. Unless delete codes are specified, the AS/400 system physically deletes the record.

Audit Reports

System/36 DFU produces a summarized report on the number of records processed in the data file by specifying the number of records created, updated, and deleted. In AS/400 DFU the report also includes information on how each record has been processed, with the field heading shown above the values used in each field. The library name, file name, and member name are also shown.

Blank Records

When you use the BLDFILE command to create a file in System/36, the records of the file are created with blanks. System/36 treats all blank records (X'40') as empty. If you create a file on the AS/400 system with externally described data, the numeric fields are filled with zeros, and the records do not appear empty to DFU.

Key Fields on the Data Entry Display

In data entry in INQUIRY mode on the System/36, DFU shows two field prompts related to the key: *Current key and Next key*. The AS/400 system shows only one key field. This one key provides both functions depending on the current mode. For example, if you type a key and press Enter during Change mode, the requested record appears.

CHGDTA Command

In the System/38 environment, the CHGDTA command starts the System/38 DFU product. In the AS/400 environment, the CHGDTA command starts the AS/400 DFU product.

Record Backspace (Cmd 5)

On the System/36, if you press the Record Backspace function key when in entry or insert mode, the previously processed record is displayed. The mode changes to update mode and you can change the record. When you have changed the record, press Enter to return to the previous mode.

AS/400 DFU does not support this function. To achieve a similar result in the AS/400 environment, press F11 (Change) to go to the Change mode. Type the key for the record you want to update and press Enter. The record you want to update appears. You can now change this record.

Bibliography

The following publications are listed with their full titles and base order numbers. When these publications are referred to in the text, a shortened version of the title is used.

The related Application Development ToolSet/400 publications are:

- *ADTS/400: Advanced Printer Function*, SC09-1766
- *ADTS/400: Character Generator Utility*, SC09-1769
- *ADTS/400: File Compare and Merge Utility*, SC09-1772
- *ADTS/400: Interactive Source Debugger*, SC09-1897
- *ADTS/400: Programming Development Manager*, SC09-1771
- *ADTS/400: Report Layout Utility*, SC09-1767
- *ADTS/400: Screen Design Aid*, SC09-1768
- *ADTS/400: Screen Design Aid for the System/36 Environment*, SC09-1893
- *ADTS/400: Source Entry Utility*, SC09-1774
- *Introducing Application Development ToolSet/400 and the AS/400 Server Access Programs*, SC09-1939

The orderable features of 5763-PW1 are:

- *ADTS/400: Application Development Manager/400 Introduction and Planning Guide*, GC09-1807
- *ADTS/400: Application Development Manager/400 User's Guide*, SC09-1808

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Index

Special Characters

- *CURLIB parameter 33
- *DATE keyword 17
- *LIBL parameter 33

A

- accessing data files on remote systems 5
- accessing DFU
 - See requesting DFU
- additional information 83
- attributes 2
- audit report
 - creation 12
 - description 12, 27
 - generation 27, 40
 - sample listing 41
- authority for DFU functions 73
- Auto dup function key 58
- Auto record advance function key 60
- Auto-increment from last change function key 59
- Auto-increment from the end of file function key 59

B

- Batch Accumulators display 38
- books, related 83

C

- Change a Data File display
 - description 22, 36
 - example entries 36
 - prompts 36
- Change a DFU Program display 31
- Change Data (CHGDTA) command 4
- Change function key 59
- change mode 35
- changed records 40
- changing
 - DFU programs 31
 - record formats during data entry 36
- CHGDTA command 4
- COBOL versus DFU 2
- coding source members 57
- Command Entry display 4
- commands 4
- complex formatting 2
- computations on selected fields 2
- Confirm Delete of DFU Programs display 55

- confirming deletion 55
- considerations when using DFU 73
- Create a DFU Program display
 - example entries 11
 - RPG II-described files 62
- Create DFU Display File (CRTDFUDSPF)
 - command 4, 52
 - creating
 - DFU programs
 - example 7
 - indexed files 8
 - nonindexed files 24
 - overview 1, 7
 - procedure 10
 - RPG II data files 60, 62
 - multiple records 23
- CRTDFUDSPF command 4, 52

D

- data
 - attributes 2
 - changing record formats 36
 - checking 2
 - complex formatting 2
 - ending the session 39, 40
 - entry
 - default program display 45
 - display for a changed program 33
 - display for RPG II data files 60
 - example displays 7
 - fields 1
 - record formats 1
 - files
 - DDS-described 2
 - IDDU-described 2
 - RPG II-described 2
 - run status 38
 - sample data 22, 36
 - sample prompts 36
- data description specification (DDS)
 - file description example 8
 - overview 3
- data file utility (DFU)
 - AS/400 Data File Utility (DFU) menu 4
 - definition ix
 - programs
 - available for selection 32
 - changing 31
 - characteristics 7
 - characteristics for RPG II 60
 - creating 7
 - default for direct data entry 43

data file utility (DFU) (continued)

programs (continued)

- defining 1
- deleting 55
- description 1
- necessity to change 58
- purpose 1
- running 35
- System/36 environment 60
- Run a DFU Program menu
 - description 35
 - example entries 35

DBCS

See double-byte character set (DBCS)

DDS

See data description specification (DDS)

DDS specification 3**Define Audit Control display**

- description 12, 27
- example entries 12
- prompts 12
- RPG II-described files 63

defining formatting requirements 11, 27**definition function keys 3****Delete a DFU Program display 55****Delete DFU Program (DLTDFUPGM) command 4****Delete function key 59****deleted records 40****deleting**

- DFU programs 55
- records 37

describing the data file 2**Design Image work screen 50****DFU**

See data file utility (DFU)

display

- mode 35
- style 7

Display a Data File display

- description 33
- prompts 33
- RPG II-described files 72

Display accumulators function key 59**Display Data (DSPDTA) command 4****Display Data File Detail display**

- description 21
- prompts 21
- RPG II-described files 71

Display DFU Program Detail display

- description 20
- prompts 20
- RPG II-described files 70

Display DFU Program Summary display

- description 18
- prompts 19
- RPG II-described files 68

Display Record Type display 65**Display Total Accumulators display**

- description 41
- prompts 41

displays

changing a program

- Change a DFU Program 31
- Display a Data File 33
- Exit DFU Program Definition 33
- Select Program 32
- Work with Fields 33
- Work with Record Formats 32

creating a program

- Change a Data File 22
- Create a DFU Program 62
- Define Audit Control 12, 27
- Define General Information/Indexed File 11
- Define General Information/Nonindexed 27
- Display a Data File 72
- Display Data File Detail 21, 71
- Display DFU Program Detail 20, 70
- Display DFU Program Summary 18, 68
- Display Record Type 65
- Exit DFU Program Definition 21, 29
- Select and Sequence Fields 13, 28
- Select Field for Record Number 27
- Specify Extended Field Definition 14, 67
- Specify Extended Field Definition (Numeric) 16
- Work with Fields 14
- Work with Record Formats 12, 28
- Work with Record Types 64

deleting a program

- Confirm Delete of DFU Programs 55
- Delete a DFU Program 55
- Select Program 55

running a program

- Change a Data File 36
- Display Batch Accumulators 38
- Display Total Accumulators 41
- End Data Entry 40
- Run a DFU Program menu 35
- Run Status 38
- Select Data File Member 36
- Select Record Format 37

running a temporary program 45

tailoring a DFU program display

- Create DFU Display File (CRTDFUDSPF) 53
- Create Display File 52
- Design Image work screen 50
- Design Screens 49
- Exit DFU Program Definition 48
- Exit SDA Work Screen 52
- Work with Display Records 49

distributed data management (DDM) 5**DLTDFUPGM command 4**

double-byte character set (DBCS)

- character example 78
- character types 77
- differences from alphanumeric 77
- fields 79
- programming considerations 78
- software requirements 78

DSPDTA command 4**E****End Data Entry display**

- description 40, 45
- example entries 45
- prompts 24, 40

End of Job function key 59**ending**

- data entry 39, 40
- DFU program definition 21, 29

Entry function key 59**entry mode 35****Exit DFU Program Definition display**

- description 21, 29
- prompts 22
- RPG II-described files 71

extended field definitions 14, 33**externally-described data 2****F****F specification 57****fields**

- accumulator 38, 41
- automatic duplication 16

file specifications

- creating the RPG source member 57
- DDS 3
- IDDU 3
- input and output 2
- record type 65
- RPG II 3

files

- accumulator field changes
 - subtotals of 38
 - totals of 41
- changes made to a data file 27
- data
 - describing 2
 - description 5
 - description 1

function keys

- AS/400 runtime
 - Auto-increment from last change 59
 - Auto-increment from the end of file 59
- System/36 runtime
 - Auto dup 58
 - Auto record advance 60

function keys (continued)

- System/36 runtime (continued)
 - Change 59
 - Delete 59
 - Display accumulators 59
 - End of job 59
 - Entry 59
 - Insert 59
 - Print record 59
 - Record advance 59
 - Record backspace 59
 - Select record type 59
 - Status 60
- using 3, 58

G**General Information/Indexed display**

- description 11
- example entries 11
- RPG II-described files 63

General Information/Nonindexed display 27**I****I specification 57****IBM manuals, related 83****IDDU**

- See interactive data definition utility (IDDU)

indexed files 11**Insert function key 59****insert mode 35****interactive data definition utility (IDDU)**

- file description example 25
- specifications 3

K**keywords 14, 17****M****main DFU menu 4****manuals, related 83****modes 35****multiple record formats 73****multiple records processing 23****N****naming program to delete 55****new records created 40****nonindexed files**

- creating a program for 24
- defining formatting requirements 27

P

parameters

*CURLIB 33

*LIBL 33

password 4

Print Record function key 59

processing

multiple records 23

new records 36

program-described data 2

programming languages versus DFU 2

programs

See data file utility (DFU)

publications, related 83

R

record

deleting 37

formats

changing during data entry 36

selecting 12, 28

number

choosing field to store 27

qualifying fields 27

selecting 32

Record advance function key 59

Record backspace function key 59

related publications 83

remote systems 5

requesting DFU

AS/400 Data File Utility (DFU) menu 4

Command Entry display 4

options 5

procedure 4

reviewing program definition

data file detail 21

program detail 20

program summary 18

RPG II

data files

F specifications 3, 57

file descriptions 57

I specifications 3, 57

System/36 environment 3

using a text editor 57

specifications 3

RPG versus DFU 2

Run Status display 38

running DFU programs

available functions 35

check status 38

ending sessions 39, 40

example 35

features 1

running DFU programs (continued)

overview 1, 35

procedure 1, 35

processing new records 36

selecting type of run 35

runtime function keys 3

S

saving DDS source 48

security control 73

Select and Sequence Fields display

description 13, 28

example entries 13, 28

for DBCS capable DFU 78

prompts 13

RPG II-described files 66

Select Data File Member display

description 36

prompts 36

Select Field for Record Number display

description 27

example entries 28

prompts 28

Select File display 11

Select Program display

description 32

example entries 32

example entries to delete a program 55

for deleting a program 55

Select Record Format display 37

Select record type function key 59

Select S/36 Style Options display 64

selecting fields

for data entry 13, 28

for extended definition 14, 33

order 13, 28

shift-in (SI) character 78

shift-out (SO) character 78

sign on 4

Source Entry Utility (SEU) 57

source member creation 57

Specify Extended Definition display

alphanumeric

description 14

example entries 15

prompts 16

RPG II-described files 67

numeric

description 16

example entries 16

fields 18

Specify Validity checks display

prompts for alphanumeric fields 17

prompts for numeric fields 16

Start DFU command 4
Status function key 60
status of data entry 38
STRDFU command 4
subtotals of changes 38
System/36 environment
 accessing 57
 creating DFU programs 60
 differences from the AS/400 system 57
 procedure for creating a program 61

T

tailoring a DFU display
 Create Display File 52
 customizing the data entry display 48
 procedure 48
 saving the DDS source 47
text editors
 source entry utility (SEU) 57
 using 58
total number of changes 41

U

unsupported data types 75
Update Data (command) 4
Update Data Using Temporary Program display 44
updating data using temporary programs
 End Data 45
 example 43
 overview 43
 procedure 44
UPDDTA command 4

V

validating multiple field entries 2
viewing data file records 33

W

Work with Fields display
 description 14
 example entries 14
 prompts 14
 RPG II-described files 67
Work with Record Formats display
 description 12, 28, 32
 example entries 13, 28, 32
 prompts 13
Work with Record Types display
 description 64
 example entries 64, 65