Query Management Facility™

Installing and Managing QMF on OS/390

Version 7

GC27-0719-00

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Note

Before using this information and the product it supports, be sure to read the general information in "Appendix G. Notices" on page 535.

Second Edition (September 2000)

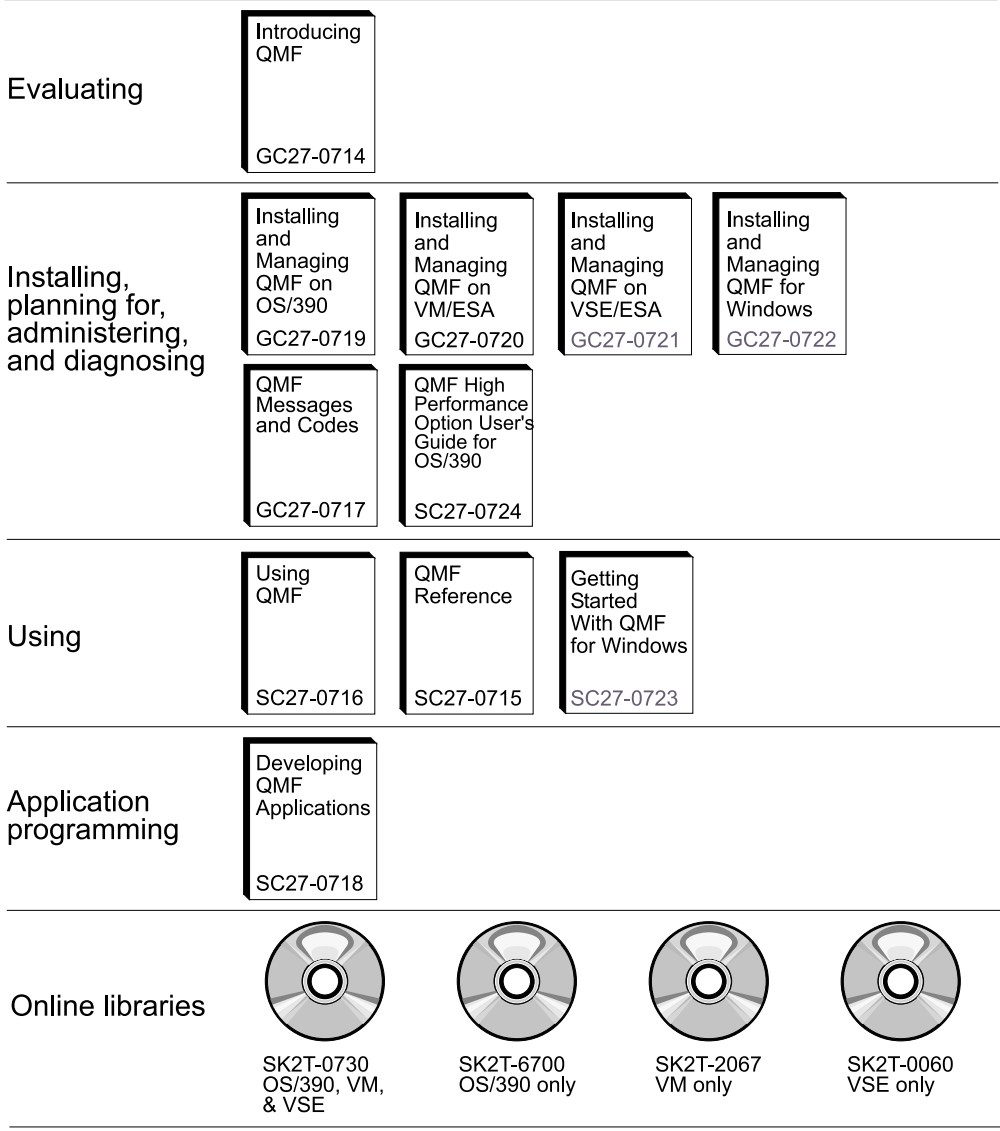
This edition applies to Query Management Facility, a feature of Version 7 Release 1 of DB2 Universal Database Server for OS/390 (DB2 UDB for OS/390), 5675-DB2, and to all subsequent releases and modifications until otherwise indicated in new editions.

This edition replaces GC26-9575-00.

Contents

The QMF Library

You can order manuals either through an IBM representative or by calling 1-800-879-2755 in the United States or any of its territories.



About This Book

This book is intended to help database administrators and systems programmers install and manage the Query Management Facility (QMF) product under the Operating System/390 (OS/390)®.

Who Should Read This Book

This book is written for OS/390 system programmers responsible for installing and managing QMF for use with the DATABASE 2™ for OS/390 (DB2 UDB for OS/390) relational database. It is also designed for network administrators responsible for installing and managing network applications.

What You Should Know before You Begin

You should be familiar with the components that make up your specific operating environment. These components can include:

- Operating System/390 (OS/390).
- Multiple Virtual Storage/Enterprise System Architecture (MVS/ESA)™ operating system.
- Time Sharing Option (TSO), an environment that supports QMF and its related products. TSO can help you with many administrative tasks, including running DB2 utilities, using the QMF IMPORT command to create QMF procedures and queries, and running QMF commands from CLISTs through the QMF command interface.
- Interactive System Productivity Facility (ISPF), a dialog manager for QMF.
- Customer Information Control System (CICS)®, a general-purpose data communication and online transaction processing system. CICS/MVS® provides the interface between QMF and MVS/ESA™.
- Graphical Data Display Manager (GDDM)®, which makes it possible for QMF to display panels on the user's screen and create charts.
- DATABASE 2 (DB2)™, the database manager for QMF.

  DB2 also provides a number of utilities that you can run in batch or through DB2I (the DB2 interactive facility).
- Data Extract (DXT)™, a facility that can supply the DB2 load utility with data.
- System Modification Program Extended (SMP/E)

- SPUFI, a facility that enables you to compose and run interactive SQL queries. You can run SPUFI through DB2I to modify the QMF control tables, use the system catalog, and drop, create, or modify the structures of DB2 objects.

  Important:

  1. SPUFI queries running under QMF can affect the performance of QMF.
- Assembler programming language, which you need if you plan to modify the IBM®-supplied governor exit routine or write one of your own. You might also use HLASM or assembler if you plan to create your own edit codes in assembler for QMF forms.
- PL/I, which you might use if you plan to create your own edit codes in PL/I for QMF forms.
- VS COBOL II and COBOL/370™, which you might use if you plan to create your own edit codes in COBOL for QMF forms.

Publications that discuss these products are listed in the bibliography at page "Bibliography" on page 553.

Additionally, you might want to become familiar with some of the end-user functions provided by QMF. The QMF end-user functions are explained in *Using QMF*. Order numbers for this and other QMF publications are listed on page xiii and on the back cover of this book.

How to Use This Book

The administration and customizing tasks in this book assume that QMF was installed according to the installation procedures described in this book. If you decide to customize some default aspects of the installation, see "Appendix E. How QMF and GDDM Programs Are Defined to CICS" on page 529.

Most of the administration and customizing tasks are done using the QMF product itself. Therefore, before you begin the tasks in this book, ensure that the installation verification procedure (IVP) has been run. If not, run the IVP yourself to ensure that QMF is properly installed and configured for your site's needs. The IVP is the final step of the QMF installation process.

Most of these tasks require that you have DB2 database administrator (DBA) authority. If the program installer follows the default procedure in this book, the user ID Q is defined for you during QMF installation. This user ID has DBA authority.

Many chapters in this book include a section called "Quick start". Use these sections to get an overview of how to accomplish a certain task. After you

read the quick start section to understand all the steps involved in the task, see the page indicated if you need more information on how to perform each step.

Conventions and Terminology Used in This Book

To keep the installation task as simple as possible, many of the full IBM product names and titles are shortened. Each product is referred to by its generic, rather than specific, name. For example, DB2 for OS/390 is DB2.

Prerequisite and Related Information

In addition to this guide, keep the following documents ready during the installation:

- *QMF Program Directory*
- *QMF Preventive Service Planning (PSP)* bucket

QMF Program Directory describes changes to the install process after this book is published. You'll find it packed in the shipping carton with your installation tape.

You should also read *QMF Preventive Service Planning* which is shipped with the IBM Software Distribution (ISD) tape and contains additional information concerning installation. PSP documentation is described further in "Read the Program Directory and Apply Service" on page 25. "Part 2. Managing QMF for OS/390" on page 149 explains how to migrate objects from earlier versions and releases of QMF.

For a list of QMF publications, see "The QMF Library" on page xiii. Publications from other IBM product families are found in the "Bibliography" on page 553.

How National Language Feature Information Is Represented

QMF is available in several different languages, each of which is provided by a National Language Feature (NLF).

NLFs enable users to enter QMF commands, view help and other information, and perform QMF tasks in languages other than English. NLFs are installed as separate features of QMF. For more information about NLF installation, see "Chapter 10. Planning and Installing a QMF NLF" on page 103.

All tasks discussed in this book can be performed for the base QMF product (English language) and for any NLF. For the most part, the procedures for both the base and NLF sessions are the same; however, any special considerations for NLF users are preceded by the phrase: **if you're using an NLF**.

Some names of programs and phases shown in this book have an *n* symbol in them, indicating that the name can vary. If you're using an NLF, replace all *n* symbols you see in this book with the one-character national language identifier (NLID) from Table 1 that matches the NLF you installed. The table also shows the names by which QMF recognizes each language.

Table 1. NLIDs representing QMF base (English) and National Language Features (NLFs)

NLF	NLID	Name QMF uses for this NLF
Brazilian Portuguese	P	PORTUGUES
Danish	Q	DANSK
English	E	ENGLISH
French	F	FRANCAIS
German	D	DEUTSCH
Italian	I	ITALIANO
Japanese	K	NIHONGO
Korean	H	HANGEUL
Simplified Chinese	R	S-CHINESE
Spanish	S	ESPANOL
Swedish	V	SVENSKA
Swiss French	Y	FRANCAIS (SUISSE)
Swiss German	Z	DEUTSCH (SCHWEIZ)
Uppercase English	U	UPPERCASE

The uppercase feature (UCF) uses the English language, but converts all text to uppercase characters. The uppercase characters allow users working with Katakana terminals to use the product and get English online help and messages. Terminals equipped with Katakana support include IBM 3277, 3278, and 3279 terminals, as well as IBM 5550 Multistations.

How to Send Your Comments

Your feedback is important in helping to provide the most accurate and high-quality information.

Send your comments from the Web

Visit the Web site at:

`http://www.ibm.com./qmf`

The Web site has a feedback page that you can use to enter and send comments.

Send your comments by e-mail

to comments@vnet.ibm.com. Be sure to include the name of the product, the version number of the product, the name and part number of the book (if applicable). If you are commenting on specific text, please include the location of the text (for example, a chapter and section title, a table number, a page number, or a help topic title).

Complete the readers' comment form

at the back of the book and return it by mail, by fax (800-426-7773 for the United States and Canada), or by giving it to an IBM representative.

How to Order QMF Books

You can order QMF documentation either through an IBM representative or by calling 1-800-879-2755 in the United States or any of its territories.

For a list of QMF books, see "The QMF Library" on page xiii.

Part 1. Installing QMF on OS/390

Chapter 1. Introducing QMF and the Install Process

This chapter introduces the QMF host product. It also provides an overview of how QMF connects to the DB2 Universal Database for OS/390 (DB2 UDB for OS/390), DB2 UDB for OS/390, DB2 Universal Database, Database2 for VM or VSE (DB2 for VSE or VM), and DATABASE 2 for AS/400 (DB2 for AS/400) databases, and of how QMF is installed.

Introducing QMF

QMF is a query and report writing program that allows users to access databases and to generate reports or charts based on the data they contain.

QMF runs under MVS/Enterprise System Architecture (MVS/ESA), and primarily accesses data through DB2 UDB for OS/390. QMF works with both the Time-Sharing Option Extensions (TSO/E) and the online transaction manager under the control of the Customer Information Control System (CICS). CICS users can start QMF from within CICS and access data through the CICS/DB2 attachment.

In a host environment, QMF uses the IBM Graphical Data Display Manager (GDDM) to display panels, although you can display application panels with Interactive System Productivity Facility (ISPF). Figure 1 shows how these products relate to QMF in a host-only configuration.

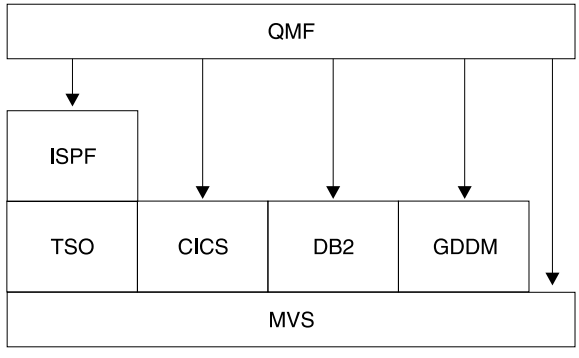


Figure 1. QMF in a Host-Only configuration.

QMF works with the following objects:

Data Information represented by alphanumeric characters contained in tables and formatted in reports.

Query Specifies the data you want and the action you want to perform.

Form Describes how retrieved data should be tailored into a report or chart.

Procedure
Contains one or more QMF commands that can be run as a group.

Profile
Contains information about how to process the user's session.

How QMF Can Access Data in Other Databases

You can use QMF to connect to any of the DB2 UDB for OS/390, DB2 for VSE or VM, DB2 for AS/400, or DB2 Universal Database databases within a distributed network during QMF initialization or from within a QMF session. After successfully connecting to a location, you can access the data and QMF objects in that database in the same way you would access data and objects locally. For more information on the SQL CONNECT command, see the *DB2 UDB for OS390 SQL Reference*

QMF supports two methods of data access:
- Distributed Relational Database Architecture (DRDA)™ remote unit of work
- DB2 UDB for OS/390-to-DB2 UDB for OS/390 distributed unit of work

DRDA is IBM's approach to distributed technology. Within DRDA there are different types of support such as remote unit of work, distributed unit of work, and distributed request. In the DRDA environment, QMF supports only remote unit of work.

DB2 UDB for OS/390-to-DB2 UDB for OS/390 distributed unit of work allows you to access other DB2 UDB for OS/390 subsystems using a communications method specific to DB2 UDB for OS/390. DB2 UDB for OS/390 refers to this type of connection as *system-directed access.*

Both types of access are based on the definition of a *unit of work,* which is a single logical transaction. A *logical transaction* consists of a sequence of SQL statements in which either all of the operations are successfully performed or the sequence as a whole is considered unsuccessful.

Remote Unit of Work

This type of distributed access lets a user or application program read or update data at *one* remote location per unit of work.

When connected to a location, you can access the data and QMF objects at that location in the same way as you would access a local database.

DB2 UDB for OS/390 Distributed Data Facility (DDF) adopted DRDA's data structure beginning with DB2 UDB for OS/390 Version 2 Release 3; DB2 for

VSE or VM adopted DRDA's® structure in Version 7 Release 1. With remote unit of work, DB2 UDB for OS/390 can act as a server or requester (depending on the level of support from the partner system) for any remote database management system that implements DRDA.

If you use the startup program parameter DSQSDBNM or the QMF CONNECT command to specify a remote location to connect to, all subsequent QMF commands that access the database are directed to that location. (The CONNECT TO message appears on the QMF Home Panel if DDF is installed.)

Figure 2 illustrates QMF with remote unit of work.

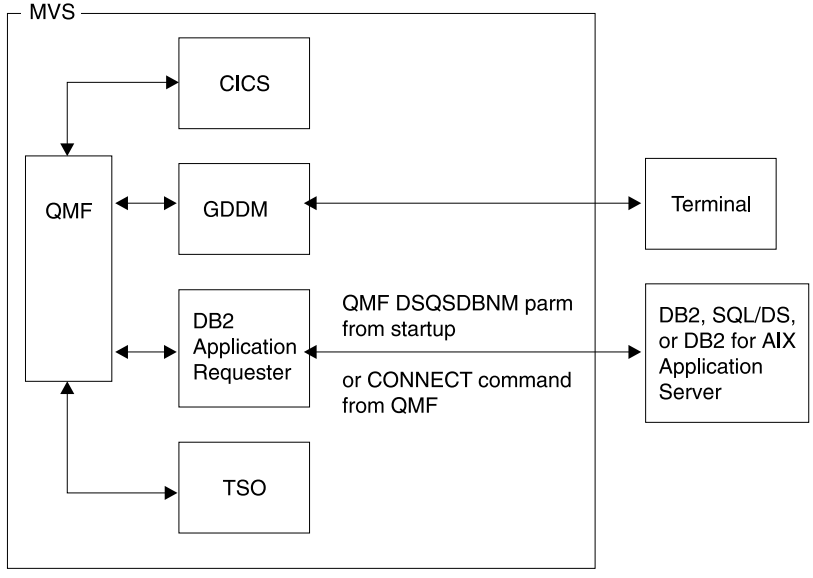


Figure 2. QMF using remote unit of work

DB2 UDB for OS/390-to-DB2 UDB for OS/390 Distributed Unit of Work

This is a very early version of distributed unit of work, first introduced in DB2 UDB for OS/390 Version 2 Release 2. It allows you to access other DB2 UDB for OS/390 subsystems using a communications method that is private to DB2 UDB for OS/390. With this method you can connect to one location and run one query per unit of work. DB2 UDB for OS/390-to-DB2 UDB for OS/390 distributed unit of work uses an alias or a three-part name to determine the location of the subsystem and to connect to it. QMF, however, requires a minimum level of DB2 UDB for OS/390 Version 2 Release 3 to support this type of data access. Figure 3 on page 8 shows a DB2 UDB for OS/390-to-DB2 UDB for OS/390 access connection.

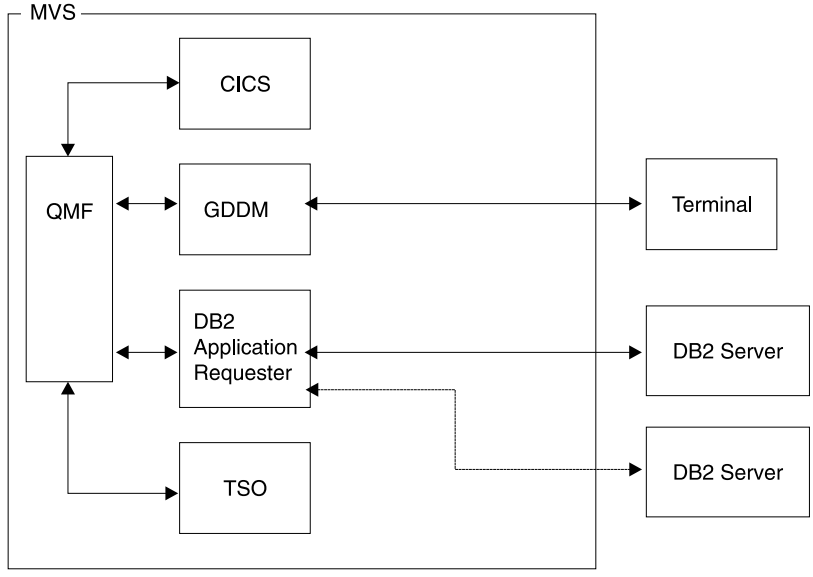


Figure 3. DB2 UDB for OS/390-to-DB2 UDB for OS/390 connection

Overview of the Database Installation Process

Installing QMF on OS/390 involves these object groups:

- QMF target and distribution libraries
- QMF application plan and packages
- QMF control tables, catalog views, and sample tables

DB2 UDB for OS/390 Requirements for QMF

QMF is a DB2 UDB for OS/390 application program that uses standard interfaces to the database. To use QMF, you must install it into at least one DB2 UDB for OS/390 subsystem. Depending upon the design of your data network, you might need to install QMF into more DB2 UDB for OS/390 subsystems.

Prerequisite DB2 UDB for OS/390 Knowledge

Because QMF is a DB2 UDB for OS/390 application, to install QMF effectively you need to understand many of the same concepts as you would to perform a DB2 UDB for OS/390 install. For example, you need to understand:

- CREATE, INSERT, and GRANT SQL statements

  You'll use these statements during the QMF installation. These statements are described in more detail in *DB2 UDB for OS390 SQL Reference*
- The terms *application plan*, *DBRM*, *package*, and *bind*

These terms are described in *DB2 UDB for OS390 Application Programming and SQL Guide*

- Databases, table spaces, tables, and views

  You need to understand the basic relationships among these terms. For concept information about these terms, see *DB2 UDB for OS390 Administration Guide* , Volume 2.

- The DB2 UDB for OS/390 security mechanism

  You need to understand what SYSADM and DBADM authority is and how to grant and revoke authority. You also need to understand the meaning of granting authority to PUBLIC. These topics are described in *DB2 UDB for OS390 Administration Guide* , Volume 2.

- The ID of the DB2 subsystem where you plan to install QMF

  For information on subsystems IDs, see *DB2 UDB for OS390 Administration Guide* , Volume 2.

Install QMF to Access Distributed Data

You should be familiar with the terms:

- *Application requester*
- *Application server*
- *Current location (current server)*
- *Distributed unit of work*
- *Local DB2 UDB for OS/390*
- *Location name*
- *Remote unit of work*

For definitions and MORE information about these terms, see the *DB2 UDB for OS390 SQL Reference*

DB2 UDB for OS/390 Objects Created by QMF Install

A DB2 UDB for OS/390 system that is accessed by QMF contains a number of DB2 UDB for OS/390 object types that are created for QMF during installation.

If you do not plan to install QMF into a distributed data environment, or if you plan to install QMF into a DB2 UDB for OS/390-to-DB2 UDB for OS/390 distribution unit of work environment, you need to install all of the following objects on each of the subsystems accessed by QMF:

- QMF installation plans and packages
- QMF control tables
- QMF catalog views
- Table space for QMF SAVE DATA and IMPORT TABLE commands
- QMF sample tables
- QMF packages
- QMF application plan

For more information about these object types, see "Appendix B. QMF Objects Residing in DB2" on page 505.

Database Authorization ID Q

Although the DB2 UDB for OS/390 authorization ID of Q owns all control tables, sample tables, and catalog views in QMF, you do not require this authorization ID to install QMF. Without it, however, you need SYSADM authority.

If your authority (as installer) is revoked, the authorities granted during the installation process are also revoked, unless those privileges are also granted by some other authority. Therefore, you must install QMF using an ID that retains the necessary authority.

Road Maps for the QMF Installation Process

This section lists the QMF install options types and the DB2 UDB for OS/390 objects created under each install option. For more information about these objects, see "Appendix B. QMF Objects Residing in DB2" on page 505.

- Initial installation or migration
  - Preliminary: Read the program directory and complete the worksheets.
  - Complete the SMPE installation as described in the program directory.
  - Begin full database install.
- Full database installation
  - Do STEPS 1 and 2.
  - To install in BATCH mode, proceed to STEPS 3 through 16, or
  - To install in FOREGROUND mode, do STEP 3.

  This type of installation creates the following at the local DB2 UDB for OS/390, which is the subsystem where the QMF application plan is bound:
  - QMF target and distribution libraries
  - Two installation packages
  - One QMF installation plan
  - QMF control tables
  - QMF catalog views
  - Table space for QMF SAVE DATA and IMPORT TABLE commands
  - QMF sample tables
  - QMF application packages
  - One QMF application plan

  You need to perform a full install when:
  - It is the initial installation of QMF.
  - It is the only installation of QMF.
  - You need to access more than one local DB2 UDB for OS/390 subsystem from QMF. Perform this type of installation for each additional local DB2 UDB for OS/390 installation.

- Server database installation
  - Do STEPS 1 and 2.
  - To install in BATCH mode, proceed to steps 8 through 16, or
  - To install in FOREGROUND mode, do step 3.

  This type of installation creates:
  - Two installation packages at the DB2 UDB for OS/390 application server
  - One QMF installation plan (using the application server name as the CURRENTSERVER location) at the local DB2 UDB for OS/390 subsystem
  - QMF control tables
  - QMF catalog views
  - Table space for QMF SAVE DATA and IMPORT TABLE commands
  - QMF sample tables
  - QMF application packages

  You need to perform a server database install when you plan to access data that is defined in a different DB2 UDB for OS/390 database. You can run this type of installation on any DB2 UDB for OS/390 subsystem that's accessible from your local DB2 UDB for OS/390 subsystem. Perform the installation from the local DB2 UDB for OS/390 subsystem.

  For information about installing QMF for a Workstation Database Server, see "Chapter 7. Tailoring QMF for Workstation Database Servers" on page 81.
- Requester database installation
  - Do steps 1 and 2.
  - To install in BATCH mode, run steps 8, 15, and 16, or
  - To install in FOREGROUND mode, run step 3.

  This type of installation creates:
  - Two installation packages at the local DB2 UDB for OS/390 subsystem
  - One QMF installation plan
  - One QMF package (DSQIRDBR)
  - One QMF application plan
  - QMF run-time libraries

  You need to perform a requester database install when you need to access other databases using remote unit of work and you are planning to use this DB2 UDB for OS/390 subsystem as the local DB2 UDB for OS/390 subsystem when running QMF. You can establish a QMF application requester on a DB2 UDB for OS/390 subsystem that is defined on the same OS/390 system where the QMF run-time libraries are installed.

Setting up QMF for Remote Unit of Work

The simplest way to set up DB2 UDB for OS/390 subsystems to use remote unit of work from QMF is to first run a full QMF installation, and then run a

full database installation for each additional DB2 UDB for OS/390 subsystem on the same OS/390 system. After a DB2 subsystem (that supports remote unit of work) receives a full database installation, you can use that subsystem as either an application requester or application server for QMF. However, if you plan to use only a particular DB2 UDB for OS/390 subsystem as either an application requester or as an application server, you might want to install only those objects that are required.

Attention: QMF CONNECT command only works when the instances of QMF being connected are the same release.

Accessing Data Using Remote Unit of Work

If you plan to use the DSQSDBNM startup program parameter or the QMF CONNECT command (both of these imply remote unit of work access) to connect to a remote location from QMF, you must first determine which DB2 UDB for OS/390 subsystems function as application requesters and application servers for QMF.

- A subsystem that functions only as an application requester for QMF requires the QMF plan, one of the QMF packages (DSQIRDBR), and one of the QMF installation programs bound into that subsystem. These objects are created by the requester or full database installation option.
- A subsystem that functions as an application server for QMF requires the QMF packages, installation programs, control tables, catalog views, table space for SAVE DATA, and sample tables. Use the full or server database installation options to create these objects.
- A subsystem that functions as both an application requester and an application server requires the same objects as an application server alone. Use the full database installation option to create these objects.

Setting up QMF for DB2 UDB for OS/390-to-DB2 UDB for OS/390 Distributed Unit of Work

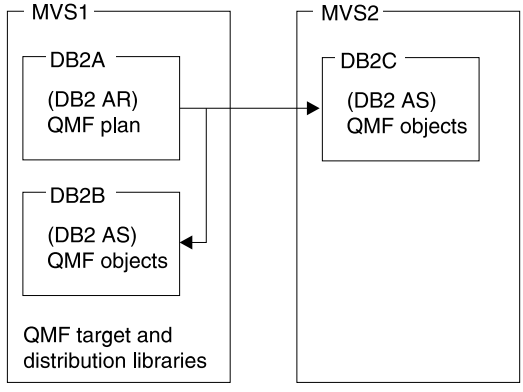
DB2 UDB for OS/390-to-DB2 UDB for OS/390 distributed unit of work access to remote data is mostly transparent to QMF. Therefore, the install process you choose depends on whether you also plan to use remote unit of work. If so, then install QMF into the appropriate subsystems. When using both remote unit of work and DB2 UDB for OS/390-to-DB2 UDB for OS/390 distributed unit of work, the locations that you can access using three-part names are those that are accessible to the current server (if the current server is a DB2 location).

Example

The following example illustrates one way you can use the requester and server database installation options to install QMF in a remote unit of work environment:

Sample System Configuration and Requirements

- The OS/390 operating system MVS1 has two DB2 UDB for OS/390 (Version 2 Release 3) subsystems: DB2A and DB2B. This system is a TSO system; DB2A is an application requester, and DB2B is an application server.
- The OS/390 operating system MVS2 has one DB2 UDB for OS/390 (Version 2 Release 3) subsystem, DB2C. This system is the BATCH; DB2C is an application server, which is accessible to the TSO users on MVS1.
- QMF needs to be installed into DB2A as an application requester, and into DB2B and DB2C as application servers. Authorized users on DB2A can access data stored at DB2B and DB2C without logging on to different OS/390 operating systems.



QMF objects are control tables, sample tables, views, and application packages.

Installation Sequence for the Sample Configuration:

1. On MVS1, install QMF target and distribution libraries.
2. On MVS1, use the requester database install option to install QMF into DB2A and customize the QMF run-time libraries.
3. On MVS1, use the server database install option to install QMF into DB2B. Use DB2A as the local DB2 and DB2B as the application server.
4. On MVS1, use the server database install option to install QMF into DB2C. Use DB2A as the local DB2 UDB for OS/390 and DB2B as the application server. You do not need to log on to MVS2, because the remote installation is run at MVS1.

Chapter 2. Planning for QMF

This chapter describes the hardware, program products, and direct access storage device (DASD) required to install and run QMF. It provides planning worksheets for easy reference during the install.

Hardware Requirements

QMF runs on any processor supported by the operating system. QMF can access all the DASD devices supported by OS/390 and DB2 UDB for OS/390 and all terminals supported by the Graphical Data Display Manager (GDDM).

If you plan to use the national language character set, you need a workstation that supports the national language characters.

Prerequisite Software

The following table lists the program products with the minimum release levels required to support QMF for MVS Version 7. Later releases that are not available at the QMF Version 7 announcement time are not supported unless specifically stated otherwise.

Table 2. Prerequisite software for QMF for OS/390 Version 7

Prerequisite software for QMF for OS/390		
Required software	**Version and release**	**Number**
MVS/ESA SP JES2 or	Version 4 Release 2	5695–047
MVS/ESA SP JES3	Version 4 Release 2	5695–048
MVS/Data Facility Product (DFP)	Version 3 Release 1	5665-XA3
Database 2(DB2)	Version 3 Release 1	5685–DB2
GDDM-MVS	Version 2 Release 3	5665-356
For installation only:		
Interactive System Product Facility (ISPF)-MVS	Version 3 Release 5	5685–504
System Modification Program Extended (SMP/E)	Version 1 Release 8	5668-949
For the TSO environment:		
TSO/Extensions (TSO/E)	Version 2 Release 4	5685-025
For the CICS environment:		

Table 2. Prerequisite software for QMF for OS/390 Version 7 (continued)

Prerequisite software for QMF for OS/390		
Required software	**Version and release**	**Number**
CICS/ESA or	Version 4 Release 1.1	5655-018
CICS/ESA or	Version 3 Release 1	5683-083
CICS/MVS	Version 2 Release 1.1	5665–403

Table 2. Prerequisite software for QMF for OS/390 Version 7

Prerequisite software for QMF for OS/390		
Required software	**Version and release**	**Number**
MVS/ ESA SP JES2 or	Version 5 Release 2	5645–001
MVS/ESA SP JES3	Version 5 Release 2.1	5645-001
DFSMSdfp	Version 1 Release 3	5645-001
Database2 (DB2)	Version 3 Release 1	5685-DB2
GDDM/MVS	Version 3 Release 1.1	5645-001
For installation only:		
Interactive System Product Facility (ISPF)-MVS	Version 4 Release 2.0	5645-001
System Modification Program Extended (SMP/E)	Version 1 Release 8.1	5645-001
For the TSO environment:		
TSO/Extensions (TSO/E)	Version 2 Release 5	5645-001
For the CICS environment:		
CICS/ESA or	Version 3 Release 3	5683–083
CICS/ESA	Version 4 Release 1.1	5655–018

Table 2. Prerequisite software for QMF for OS/390 Version 7

Prerequisite software for QMF for MVS/XA		
Required software	**Version and release**	**Number**
MVS/SP-JES2 or	Version 2 Release 2	5740–XC6
MVS/SP-JES3	Version 2 Release 2.1	5665-291
MVS/XA Data Facility Product (DFP)	Version 2 Release 1	5665-XA2
GDDM/MVS	Version 2 Release 1	5665-403
For installation only:		

Table 2. Prerequisite software for QMF for OS/390 Version 7 (continued)

Prerequisite software for QMF for MVS/XA		
Required software	**Version and release**	**Number**
Interactive System Product Facility (ISPF)-MVS	Version 2 Release 3	5665-319
System Modification Program Extended (SMP/E)	Version 1 Release 8	5668-949
For the TSO environment:		
TSO/Extensions (TSO/E)	Version 2 Release 1	5685-025
For the CICS environment:		
CICS/MVS	Version 2 Release 1	5665–403

The following table lists the program products with the minimum release levels required to support optional functions for QMF for OS/390 Version 7. Later releases that are not available at the QMF Version 7 announcement time are not supported unless specifically stated otherwise.

Table 3. Prerequisite software for optional functions for QMF for OS/390 Version 7

Product	**Version and release**	**Number**
ISPF-related functions — QMF Document Interface, default editor for QMF EDIT command, display printed report application (DPRE), ISPF command, and DXT/End User Dialogs bridge support:		
ISPF for MVS	Version 3 Release 5	5685-054
Logic in procedures, report calculations and conditions, form column definition, and use of the IBM-supplied command synonyms (DPRE, ISPF, BATCH, LAYOUT):		
TSO/Extensions (TSO/E)	Version 2 Release 4	5685-025
Charts (Interactive Chart Utility:		
GDDM Presentation Graphics Facility (PGF)	Version 2 Release 1.1	5668–812
QMF Document Interface. The following editor is required:		
Personal Services/TSO (PS/TSO)	Release 1	5665–346
Data Extract (DXT). End User Dialogs and the QMF EXTRACT COMMAND:		
Data Extract (DXT)	Version 2 Release 5	5668–788
QMF High Performance Option (HPO):		
ISPF for MVS	Version 3	5685–054
QMF for Windows:		
Microsoft Windows** or	Version 3 Release 1	

Table 3. Prerequisite software for optional functions for QMF for OS/390 Version 7 (continued)

Product	Version and release	Number
Microsoft Windows** for Workgroups or	Version 3 Release 1 or Release 1.1	
Microsoft Windows 95 or		
Microsoft Windows NT		
IBM APPC Networking Services for Windows, or	Version 1	
Microsoft SNA Server, or	Version 2	
Novell Netware for SAA, or	Version 2	
Attachmate EXTRA! APPC Client	Version 3 Release 11	
Callable Interface Programs written in the callable interface can be written in:		
IBM C/370 Compiler and	Version 2	5688–187
C/370 Library	Version 2	5688–188
IBM HLASM	Version 1 Release 1 or Release 2	5696–234
VS COBOL II Compiler and Library	Version 1 Release 4	5688–023
VS COBOL II Compiler, Library and Debugging Facility	Version 1 Release 4	5668–958
AD/Cycle COBOL/370	Version 1 Release 1	5688–197
IBM COBOL for MVS and VM	Version 1 Release 2	5688–197
AD/Cycle C/370 Compiler	Version 1 Release 1	5688–216
VS FORTRAN (REXX and the SAA callable interface for FORTRAN are not supported in the QMF/CICS environment.)	Version 2 Release 5	5668–806
OS PL/I	Version 2 Release 3	5668–909
IBM PL/I for MVS and VM	Version 1 Release 1.1	5688-265
REXX: TSO Extensions (TSO/E) (REXX and the SAA callable interface for FORTRAN are not supported in the QMF/CICS environment.)	Version 2 Release 1	5685–025

Table 3. Prerequisite software for optional functions for QMF for OS/390 Version 7 (continued)

Product	Version and release	Number
REXX(REXX and the SAA callable interface for FORTRAN are not supported in the QMF/CICS environment.)	In VM/ESA	
Assembler H	Version 2 Release 1	5668–962
IBM C/C++ for MVS/ESA (In conjunction with Language Environment for MVS and VM (MVS feature)).	Version 3	5655–121
User Edit Routines can be written in:		
IBM HLASM	Version 1	5696–234
VS COBOL II Compiler and Library	Version 1 Release 4	5688–023
COBOL/370 Compiler and Library	Version 1 Release 1	5688–197
IBM COBOL for MVS and VM	Version 1 Release 2	5688–197
VS COBOL II Compiler and Library	Version 1 Release 3.1	5688–023
VS COBOL II Compiler, Library and Debugging Facility	Version 1 Release 3.1	5668–958
OS PL/I	Version 2 Release 3	5668–909
IBM PL/I for MVS and VM	Version 1 Release 1.1	5688-265
Assembler H or standard assembler	Version 2 Release 1	5668–962
Governor Exit Routine		
IBM HLASM	Version 1	5696–234
Assembler H or standard assembler	Version 2 Release 1	5668–962
Remote Unit of Work (OS/390)		
Connection to remote DB2 on OS/390 DRDA Application Server:		
At the local DB2 for OS/390 location:		
DB2 for MVS	Version 3 Release 1	5685–DB2
QMF for OS/390	Version 7	5675-DB2
At the remote DB2 database:		
DB2 for MVS	Version 3 Release 1	5685–DB2

Table 3. Prerequisite software for optional functions for QMF for OS/390 Version 7 (continued)

Product	Version and release	Number
QMF for OS/390	Version 7	5675-DB2
Connection to remote DB2 on VM DRDA Application Server:		
At the local DB2 for MVS/ESA location:		
DB2 for MVS	Version 3 Release 1	5685–DB2
QMF for OS/390	Version 7	5675-DB2
At the remote DB2 for VM/ESA or VSE/ESA database:		
SQL/DS for VM	Version 3 Release 5	5688–103
SQL/DS for VM	Version 3 Release 3	5706–255
Connection to remote DB2 on VSE DRDA Application Server:		
At the local DB2 for OS/390 location:		
DB2 for MVS	Version 3 Release 1	5685–DB2
QMF for OS/390	Version 7	5675-DB2
At the remote DB2 for VM or VSE database:		
SQL/DS	Version 3 Release 5	5688–103
DB2 for VSE	Version 6	5648–061
Connection to DB2 PE, DataJoiner, Common Server:		
At the local DB2 for OS/390 location:		
DB2 for MVS	Version 3 Release 1 with PTF UP75959 and PTF UN54601	5685–DB2
QMF for OS/390	Version 7	5675-DB2
At the remote database configured for APPC communications:		
DB2 Parallel Edition for AIX or	Version 1 Release 2	5765–328
DataJoiner for AIX or	Version 1 Release 2	84H1212
DB2 for Windows NT	Version 2 Release 1	53H7474
DB2 for OS/2 or	Version 2 Release 1	41H2114
DB2 for AIX or	Version 2 Release 1	41H2128
DB2 for HP-UX or	Version 2 Release 1	10H2366

Table 3. Prerequisite software for optional functions for QMF for OS/390 Version 7 (continued)

Product	Version and release	Number
DB2 for Solaris or	Version 2 Release 1	
DB2 for SCO OpenServer or	Version 2 Release 1	79H5359
DB2 for SINIX	Version 2 Release 1	79H4133

Products Required to Support Remote Unit of Work

Remote unit of work (RUW) support is not available in all environments in which QMF operates. For example, when running QMF in VSE/ESA, you cannot connect to another location. However, the QMF objects stored in a VSE DB2 database can be accessed by other QMF requesters in a Distributed Relational Database Architecture (DRDA) network. To see if RUW is supported in your operating environment, see the documentation for the database you are using.

Planning Your Storage Requirements

QMF storage requirements are as follows:

- QMF modules that can run in a 31-bit addressing mode require 2.8 MB.
- QMF modules that must run in a 24-bit addressing mode require 52 KB.
- Minimum storage for users to execute QMF queries and hold QMF report data is between 0.5 and 1.0 MB. Your specific requirements can be larger depending on the size of your report and the report formatting options used.

As an example, if you run in a standard TSO environment with ISPF and GDDM, you need about 6.0 MB of storage.

You can further reduce the size of the region by placing ISPF and GDDM into the pageable link pack area (PLPA), which increases the common area accordingly.

Moving Modules to Enhance Performance

After installation, the library QMF710.SDSQLOAD contains the load modules for the QMF program.Table 4 shows the modules you can move into link pack area libraries to enhance performance.

Table 4. Modules that can reside in the PLPA or EPLPA

Module	Description
DSQQMFE DSQQMF DSQCSUB DSQCTOPX DSQCCI DSQCCISW DSQCBST DSQCELTT DSQCEBLT DSQCIX	QMF uses the modules in this set when you invoke QMF. DSQCTOPX and DSQCCI can be placed only in the PLPA.
DSQUEDIT DSQUXIA DSQUXIC DSQUXILE DSQUXIP	These modules are related to the user EDIT routines. Unless you expect heavy use, do not move them into the link pack area.
DSQCIB COBOL DSQCICX C/370 DSQCIA assembler DSQCIFE FORTRAN DSQCIF FORTRAN DSQCIPX PL/1 DSQCIPL PL/1 DSQCIR RPG DSQCIX REXX	The QMF callable interface uses the modules in this set, which are reentrant and can be placed in the EPLPA. However, callable interface modules are small and are normally link-edited with the user's application module.
DSQUEGV3	This is a governor module.

Table 5 on page 23 describes the modules that can't be placed in the PLPA or EPLPA.

Table 5. TSO Modules that can't reside in the PLPA or EPLPA

Module	Description
DSQCI	QMF uses this module when QMF is invoked.
DSQUEGV1	This module is a governor routine.
DSQCMAPB DSQ0BINS DSQ0BSQL DSQCTO80 DSQCFR80	These modules are QMF installation and service updates.

In CICS

QMF runs as a conversational transaction in CICS where there are multiple users of QMF in the same CICS address space. Each user that runs a QMF transaction requires at least 1.0 MB of storage from the CICS region. You can allocate all but 24 KB to storage above 16 MB. You can place a single copy of the QMF module, up to 2.7 MB, in the EPLPA or within the CICS region above 16 MB, and you can place 52 KB in PLPA or within the CICS region below 16 MB.

Estimating SMP/E Storage

System Modification Program Extended (SMP/E) is the basic tool that you use to install QMF. With SMP/E, you install into two types of libraries:

- Target libraries, which contain the executable code making up the running system.
- Distribution libraries, which contain the master copy of all the system elements.

Estimated DASD space (in cylinders) for the SMP/E data sets is shown in Table 6.

Table 6. DASD space for SMP/E data sets

DDname	3380	3390	9345
SMPSCDS	1	1	1
SMPCSI	8	8	8
SMPLOG	1	1	1
SMPMTS	1	1	1
SMPPTS	1	1	1
SMPSTS	1	1	1

Estimating Space for Distribution Libraries

The QMF distribution libraries and their estimated DASD space (in tracks) are shown in Table 7.

Table 7. DASD space for QMF distribution libraries

DSNAME	Content	3380	3390	9345
QMF710.ADSQOBJ	QMF object modules	11	11	9
QMF710.ADSQMACE	QMF install procedures	15	15	13
QMF710.ADSQDBMD	Database request modules	1	1	1
QMF710.ADSQPMSE	QMF ISPF panels	1	1	1

Estimating Target Library Size

Table 8 shows estimates for your required DASD space (in cylinders) for the target libraries.

Table 8. DASD space for QMF target libraries

DSNAME	Content	3380	3390	9345
QMF710.SDSQLOAD	QMF load modules	8	8	7
QMF710.SDSQSAPE	IVP, sample queries	17	17	15
QMF710.SDSQDBRM	QMF DBRMs	1	1	1
QMF710.SDSQPLBE	ISPF panels for QMF	1	1	1
QMF710.SDSQCLTE	Sample QMF CLIST	2	2	2
QMF710.SDSQSLBE	Sample ISPF skeletons	1	1	1
QMF710.SDSQMLBE	Sample ISPF messages	1	1	1
QMF710.SDSQEXCE	TSO/E REXX procs	1	1	1
QMF710.SDSQUSRE	Sample user exit routines	1	1	1

After you allocate space for your libraries, you can use SMP/E to install QMF.

Planning for Multiple Releases

Although QMF uses SMP/E to install the product, SMP/E does not allow you to have multiple releases of a product in the same SMP/E data sets. Therefore, you must do one of the following:

- Create another set of SMP/E data sets for QMF Version 7 Release 1.
- Back up QMF. Your backup must include:
  - QMF distribution and target libraries
  - SMP/E data sets

  If you attempt to install into the same target, distribution, and SMP/E libraries without backing up QMF, SMP/E deletes the previous QMF

release information from SMP/E during installation. You might have problems either falling back to the earlier QMF release or running the earlier QMF release during the migration period.

Estimating Space for User Data Sets

Estimated DASD space required (in cylinders) for the QMF user libraries is shown in Table 9.

Table 9. DASD space for QMF user data sets

DSNAME	Content	3380	3390	9345
QMF710.DSQMAPE	GDDM map group files	1	1	1
QMF710.DSQCHART	GDDM samples chart files	1	1	1
QMF710.DSQUCFRM	GDDM/CICS samples chart forms files (expanded in VSAM format)	1	1	1
QMF710.DSQPVARE	QMF message help panels (expanded in sequential format)	N/A	6	6
QMF710.DSQPNLE	QMF message help panels (expanded in VSAM format)	N/A	10	9
QMF710.GDDM.ADMG	GDDM/CICS data set (in VSAM format)	1	1	1

Read the Program Directory and Apply Service

Before beginning the installation process, read the *QMF Program Directory* for supplementary data. You'll find it in the shipping carton with the QMF tape. Because the *Program Directory* is updated between releases of QMF, it contains useful information, including descriptions of program temporary fixes (PTFs) and authorized program analysis reports (APARs), as well as modifications to this book.

Ensure that the service level of your system is current. Call your IBM Software Service Support, or use IBMLink™ (ServiceLink) in the United States or EMEA DIAL in Europe, to request the latest PTFs for QMF and its prerequisite products. Additionally, request QMF's preventive service planning (PSP) bucket, SUBSET: QMFMVS under UPGRADE QMF710. The PSP bucket contains general hints, HIPER APARs, and documentation changes. Subscribers who have access to either Information/Access or ServiceLink can download the information directly.

Planning for QMF under CICS

You need to complete installation, tailoring, and testing of CICS and GDDM before you install QMF.

Tailoring CICS for QMF

Because QMF is a large conversational transaction, QMF processing takes longer than the average CICS transaction. Therefore, you might want to isolate QMF transaction processing in a CICS region dedicated to QMF transactions.

Depending on the amount of storage available below 16 MB, there is an upper limit on how many users can run QMF in the same CICS region. To support additional QMF users, use multiple CICS regions and the Multiple Region Option.

You might want to route the QMF transaction from one CICS system (for example, Terminal Owning Region) to the CICS system designated to process QMF transactions (for example, Application Owning Region). If you do, use either multiple transaction IDs or dynamic transaction routing. Both methods are described in the *CICS/OS390 Intercommunication Guide*.

Tailoring GDDM for QMF

During QMF installation, QMF modifies GDDM's ADMF file. Additionally, you must define GDDM resources, such as programs and transactions, to CICS. For details on how to install and tailor GDDM, see *GDDM Installation and System Management* for Version 2.3, and *GDDM/MVS Installation, Testing, and Servicing* for Version 3.1.

Changing GDDM 2.3 Default Parameters

If you are using GDDM Version 2.3, ensure that the IOSYNCH parameter in the ADMADFC external defaults module is set to YES.

Run the Installation Verification Procedure (IVP) for GDDM

Run the IVP for GDDM. The IVP minimizes QMF installation problems and ensures that you are installing QMF onto a clean system.

Planning for QMF for DB2 UDB for OS/390 for AIX®

Customizing QMF to work with a DB2 UDB for OS/390 for AIX server requires some changes both on the host and at the server.

From OS/390, QMF uses the distributed data facility (DDF) of DB2 UDB for OS/390 to access distributed data that resides in a DB2 UDB for OS/390 for AIX database. The DDF of DB2 UDB for OS/390 is a VTAM® application that uses LU 6.2 communications protocols to communicate with other database management systems or applications that support Distributed Relational

Database Architecture (DRDA). Information about connecting distributed database systems for access to data from QMF on OS/390 is in *DB2 UDB for OS390 Administration Guide* , Volume 1.

From DB2 UDB for OS/390, the communications database (CDB) tables are used to control access between remote database management systems. If you plan to use DB2 UDB for OS/390 as a server only, you do not need to populate the CDB; default values are used. However, if you intend to request data from remote databases, you must update the CDB tables. These topics are described in *DB2 UDB for OS390 Administration Guide* , Volume 2 and *DB2 UDB for OS390 SQL Reference*

At the DB2 UDB for OS/390 for AIX server, you must issue a CREATE DATABASE command before you install QMF into that database. Verify that APPC communications are defined and operational between the DB2 UDB for OS/390 for OS/390 DRDA application requester and the DB2 UDB for OS/390 for AIX DRDA application server. For more information about installing your DB2 UDB for OS/390 for AIX server, refer to the installation instructions for that DB2 UDB for OS/390 for AIX server.

For more information about the installation from OS/390, of QMF objects into DB2 UDB for OS/390 for AIX, and about the prerequisites for the installation, see “Chapter 7. Tailoring QMF for Workstation Database Servers” on page 81.

Complete the Worksheets

Table 10, Table 11 on page 28, and Table 12 on page 29 display the parameters you need to provide values for during the QMF installation. Use them as worksheets.

Table 10. QMF Installation Parameters (Version 7 Worksheet-Part 1)

PARAMETER	VALUE
Location name	
Target Library Prefix (Default = QMF710)	
Distribution Library Prefix (Default = QMF710)	
Target Library Volume (Default = xxxxxx)	
Distribution Library Volume (Default = xxxxxx)	
SMP/E Data Set Prefix (Default = IMSVS)	

Table 10. QMF Installation Parameters (Version 7 Worksheet-Part 1) (continued)

PARAMETER	VALUE
Local DB2 UDB for OS/390 Subsystem ID (Default=DSN)	
Local DB2 UDB for OS/390 Release Level (Default=V3R1)	
Local DB2 UDB for OS/390 Exit Library (Default=DSN710.SDSNEXIT)	
Local DB2 UDB for OS/390 Load Library (Default=DSN710.SDSNLOAD)	
Communications database installed at local DB2 UDB for OS/390	yes or no
Gather the following information if the communications database is installed at the local DB2 UDB for OS/390 subsystem:	
Scope of installation	F (Full database), S (Server database), or R (Requester database)
Gather the following information, if the scope of the database install is not "S"(Server database):	
Customize QMF runtime libraries	yes or no
QMF application plan ID (Default=QMF710)	

Table 11. QMF Installation Parameters (Version 7 Worksheet-Part 2)

PARAMETER	VALUE
Gather the following information if the scope of the database install is "S" (Server database):	
DB2 UDB for OS/390 server location in remote DB2 UDB for OS/390 subsystem? (Default=NO)	yes or no
Gather the following information, if the scope of the database install is "F"(Full database), or the scope of the database install is "S"(Server database), and the server database is the same as the local subsystem.	
DB2 UDB for OS/390 user catalog (ICF) (Default=DSNC7101.USER.CATALOG)	
DB2 UDB for OS/390 user catalog password	
QMF tablespace catalog alias (Default=QMFDSN)	
QMF tablespace catalog password (for QMF control tables)	

Table 11. QMF Installation Parameters (Version 7 Worksheet-Part 2) (continued)

PARAMETER	VALUE
QMF tables volume	
DB2 UDB for OS/390 default punctuation	, (comma) or . (period)
Previous QMF level (migration installs only)	V2R4, V3R1, V3R1M1, V3R2, V3R3 or NONE
Gather the following information when the scope of the database install is "S" (Server database) and the server database is different from the local DB2 UDB for OS/390 subsystem.	
DB2 UDB for OS/390 server location name	
DB2 UDB for OS/390 server in another operating system?	yes or no
DB2 UDB for OS/390 user catalog (ICF) for server (Default=DSNC7101.USER.CATALOG)	
DB2 UDB for OS/390 user catalog password	
QMF tablespace catalog alias at server (Default=QMFDSN)	
QMF tablespace catalog password (for QMF control tables)	
QMF tables volume at server	
DB2 UDB for OS/390 default punctuation at server	, (comma) or . (period)
Previous QMF level at server (migration installs Only)	V2R4, V3R1, V3R1M1, V3R2, V3R3 or NONE

Table 12. QMF Installation Parameters (Version 7 Worksheet-Part 3)

PARAMETER	PRIMARY	SECONDARY
Gather the following information, if the previous QMF level is not NONE, and the scope of the database install is not "R".		

Table 12. QMF Installation Parameters (Version 7 Worksheet-Part 3) (continued)

PARAMETER	PRIMARY	SECONDARY
QMF control table tablespace Sizes: (in 1K units) Table Space name Default size (primary, secondary) - Q.OBJECT_DIRECTORY (see Note) (200,20) - Q.OBJECT_REMARKS " (200,20) - Q.OBJECT_DATA " (5000,200) - Q.PROFILES " (100,20) - Q.ERROR_LOG " (100,20) - Q.COMMAND_SYNONYMS " (100,20) - Q.RESOURCE_TABLE " (100,20) - Q.DSQ_RESERVED (100,20) - SAVE DATA (Optional) " (100,20)	 _____ _____ _____ _____ _____ _____ _____ 100___ _____	 _____ _____ _____ _____ _____ _____ _____ _20___ _____
Table Index Sizes: (in 1K units) Table Index name Default size (primary, secondary) - Q.OBJECT_DIRECTORYX (see Note) (100,20) - Q.OBJECT_REMARKSX " (100,20) - Q.OBJECT_OBJDATAX " (100,20) - Q.PROFILEX (100,20) - Q.COMMAND_SYNONYMSX " (100,20)	 _____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Determine the following, if applicable:		
Install QMF jobs in the foreground or tailor the JCL files yourself and run each job in batch?	foreground or batch	
Do you have fixed or variable-length CLIST libraries?	variable or fixed	
Do you have fixed or variable-length EXEC libraries?	variable or fixed	
Do you want SAVE DATA table space created?	yes or no	

Note: Control tables and indexes are provided only on the initial installation of QMF.

Chapter 3. Providing Input Parameters

In this chapter you customize a CLIST with input parameters specific to your installation. Next you run the job that updates the members with your parameter information.

Before performing the steps in this chapter, you must first install QMF in your OS/390 environment using SMP/E as documented in the *QMF Program Directory*.

Step 1—Provide QMF Installation Parameters

In this step you'll loop through a series of QMF installation panels. The panels prompt you for the QMF and DB2® for OS/390 information that you described on the worksheets on Table 10 on page 27 through Table 12 on page 29.

Before You Start

Before starting this step, consider the following requirements:

1. To do this step, *you must be in an active ISPF session*.
2. From the command line of your ISPF session, enter (`PANELID`), to turn your panel IDs on.
3. If you changed the default QMF target names (as originally specified in DSQ1EJAL), you must either alter the DSQ1EINS, DSQ1EIN1, and DSQ1EIN2 CLISTs, or skip to Chapter 4. Submitting QMF Batch Install Jobs.

   The tailoring portion of DSQ1EINS changes members in the SDSQSAPE and SDSQEXCE data sets. We recommend that you make a backup copy of SDSQSAPE and SDSQEXCE before invoking DSQ1EINS. The backups can be deleted when once the QMF installation is complete.
4. If you are performing one of the database-only installs (full, server, or requester), ensure that the QMF target libraries you are using for the installation *cannot be accessed* by users of other databases during installation.
5. If you are looping back through these procedures, be aware that the installation step "Converting CLIST Records" on page 49 changes SDSQCLTE from FB to VB. Manually change it to FB to run DSQ1EINS.

Starting the Installation Panels

1. Enter the following:

   ```
   TSO EXEC 'prefix.SDSQCLTE(DSQ1EINS)' 'QMFPRE(prefix)'
   ```

where *prefix* is the QMF target library prefix from your worksheets.

This process generates one of the following:

- The Install QMF — Main Menu, as shown in Figure 4, when you have completed and saved installation parameters.
- The Install QMF — Local DB2 UDB for OS/390 Parameters panel, as shown in Figure 5 on page 34, when there is no record of installation parameters.

You'll return to the main install menu, in a looping manner, after

```
DXYEIN00                 INSTALL QMF -- MAIN MENU
ISPF Command ===>



   Currently working on installation into DB2 UDB for OS/390 subsystem DSN

   You can now re-specify the install parameters, tailor the installation
   files, install QMF with the tailored files in foreground, quit and run
   the tailored install files in batch, or quit and return here later.


   ENTER CHOICE HERE        ===>               ("P" - INPUT PARAMETERS,
                                                "T" - TAILOR INSTALL FILES,
                                                "I" - INSTALL IN FOREGROUND,
                                                "X" - EXIT INSTALL DIALOGS)



   PRESS:  ENTER to continue    PF01 for help    PF03  to end
```

Figure 4. Install main menu

successfully completing the input parameter at least once. The main menu offers you four options:

P Installation parameters

T Tailor install files

Tailors all the required install data sets for QMF. This option lets you edit jobs to:

- Format the QMF GDDM maps and panel file
- Bind the QMF application plan to DB2 UDB for OS/390
- Create a SAVE DATA table space (optional)
- Delete the sample tables (migration installation only)
- Install the QMF sample tables
- Tailor the QMF plan ID and DB2 UDB for OS/390 subsystem name for the QMF callable interface (REXX EXEC DSQSCMDE)
- Set up the Installation Verification Procedures (IVP)

If you previously tailored files in SDSQSAPE and SDSQEXCE and want to keep them, back them up before you select the **T** option, because the input parameter procedures write over that information. This step is described further in "Step 2—Tailor the Jobs" on page 43.

I Install in foreground (optional)

This option lets you submit your jobs in an online environment. You may also choose to submit your jobs manually, as discussed in "Chapter 4. Submitting QMF Batch Install Jobs" on page 47.

X Exit install dialogs, to end the series of panels

Also on this panel, you see the last-used DB2 UDB for OS/390 subsystem name. You can ignore that DB2 UDB for OS/390 name if you choose the P option, because the DB2 UDB for OS/390 name and other QMF install parameters might be overridden in the subsequent panels. Likewise, you can customize QMF install parameters for an additional DB2 UDB for OS/390 subsystem by ignoring the DB2 UDB for OS/390 subsystem name on the panel and proceeding to the next panel by entering **P**.

2. Choose the P option to obtain the first parameter input panel.

As you enter the information on each panel, QMF saves your input in the QMF710.SDSQCLTE library under your chosen database name.

If you leave this step before completing the last input parameter panel, your input is not saved. The last panel asks you for job card information used to tailor the installation. If you plan to install in the foreground, rather than through batch, you do not need to provide job card information; just enter x in the indicated spot on the panel.

After you supply the last installation parameter, you return to the main menu. If you want to review or modify the parameters, enter P and proceed through the input panels again. When you are satisfied with your installation parameters, continue with the next step. (If you prefer, you can leave the installation process at this point and return later; your installation parameters are saved.)

Specifying Local DB2 UDB for OS/390 Parameters

The panel displayed in Figure 5 on page 34 displays if you haven't yet saved any install parameters. You also receive it if you choose the **P** option from the main menu.

Use the information from your worksheets, Table 10 on page 27 and Table 11 on page 28, to fill in the panel.

```
DXYEIN10                  INSTALL QMF -- LOCAL DB2 PARAMETERS
ISPF Command ===>


   LOCAL DB2 SUBSYSTEM ID    ===> DSN

   LOCAL DB2 RELEASE LEVEL   ===>     ("31" FOR V3R1, ETC)

   LOCAL DB2 EXIT LIBRARY    ===>

   LOCAL DB2 LOAD LIBRARY    ===>


   COMMUNICATIONS DATABASE(CDB) INSTALLED AT LOCAL DB2  ===>     ("Y","N")



   PRESS:  ENTER to continue    PF01 for help    PF03  to end
```

Figure 5. Local DB2 UDB for OS/390 parameters

The following options are available on this panel:

Local DB2 UDB for OS/390 subsystem ID
Specify the DB2 UDB for OS/390 subsystem ID where the QMF application plan is bound (required; default is DSN).

Local DB2 UDB for OS/390 release level
Specify the DB2 UDB for OS/390 release level of the local subsystem (required; no default).

Local DB2 UDB for OS/390 exit library
Specify the exit library for the local DB2 UDB for OS/390 subsystem (required; no default).

Local DB2 UDB for OS/390 load library
Specify the DB2 UDB for OS/390 load library for the local subsystem (required; no default).

Communications database (CDB) installed at local DB2 UDB for OS/390
Specify whether the DB2 UDB for OS/390 communications database is installed at the local DB2 UDB for OS/390 subsystem (required; no default).

Specifying the Scope of Database Install

The panel displayed in Figure 6 on page 35 displays if you indicated that the communications database is installed at the local DB2 UDB for OS/390 subsystem on the previous panel.

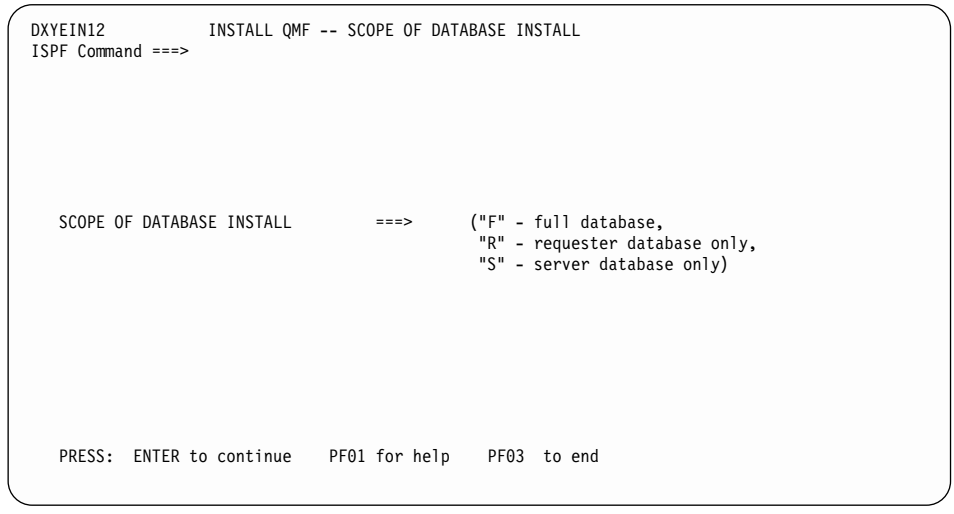


Figure 6. Database install scope

Specify the scope of the database installation. For details about these options see “Road Maps for the QMF Installation Process” on page 10.

If you are installing QMF 6 for the first time, select the full database install option.

Specifying QMF Parameters for a Local DB2 UDB for OS/390 Subsystem

The panel displayed in Figure 7 on page 36 displays for full database and requester database installations.

```
DXYEIN11          INSTALL QMF -- QMF PARAMETERS AT LOCAL DB2
ISPF Command ===>



   CUSTOMIZE QMF RUNTIME LIBRARIES           ===> Y            ("Y" or "N")

     - Install QMF panels
     - Install QMF/GDDM map groups
     - Install QMF/GDDM sample charts forms
     - Make QMF REXX EXECs available
     - Make QMF CLISTs available



   QMF APPLICATION PLAN ID AT LOCAL DB2      ===> QMF710




   PRESS:  ENTER to continue    PF01 for help    PF03  to end
```

Figure 7. QMF parameters at local DB2 UDB for OS/390

The following options are available on this panel:

Customize QMF runtime libraries
Specify YES if the QMF runtime libraries require customizing. You need to customize these libraries only once per operating system (required; no default).

QMF application plan ID at local DB2 UDB for OS/390
Specify the QMF application plan name to be bound at the local DB2 UDB for OS/390 subsystem (required; no default).

Specifying Remote Server Location

The panel displayed in Figure 8 on page 37 displays if you indicated *S* for server database, on the “Scope of database install” panel.

```
DXYEIN14              INSTALL QMF -- DB2 SERVER SYSTEM
ISPF Command ===>




   DB2 SERVER LOCATION IN REMOTE DB2 SUBSYSTEM   ===> N       ("Y" OR "N")

   (If the DB2 server location is different from
    the requester location, the DB2 server is remote.)
```

Figure 8. DB2 UDB for OS/390 remote server panel

The following option is available on this panel.

DB2 UDB for OS/390 server location in remote DB2 UDB for OS/390 system

Specify whether the server database is different from the local DB2 UDB for OS/390 subsystem (required; no default).

Specifying DB2 UDB for OS/390 and QMF Parameters

You receive the panel displayed in Figure 9 on page 38 if the scope of the install is either F (full database), or S (server database), where the server database is the same as the local DB2 UDB for OS/390 subsystem.

```
DXYEIN16            INSTALL QMF -- DB2 AND QMF PARAMETERS
ISPF Command ===>

   DB2 USER CATALOG                ===>

   DB2 USER CATALOG PASSWORD           ===>


   QMF TABLESPACES CATALOG ALIAS       ===> QMFDSN

   QMF TABLESPACES CATALOG PASSWORD    ===>

   QMF TABLESPACES VOLUME       ===>         ( VOLUME SERIAL NUMBER
                                             OR "AST",
                                             AST stands for *)

   PREVIOUS QMF LEVEL                  ===>              ("V2R4","V3R1","V3R1M1",
                                                          "V3R2","V3R3","V6R1","NONE")

   PRESS:  ENTER to continue    PF01 for help    PF03  to end
```

Figure 9. DB2 UDB for OS/390 and QMF parameters

Fill in the following parameters:

DB2 UDB for OS/390 user catalog
Specify the ICF catalog that QMF install uses to create the QMF catalog alias (the VCAT name) (required; no default).

DB2 UDB for OS/390 user catalog password
Specify the password to access the DB2 UDB for OS/390 user catalog, which enables the QMF installation to create the QMF catalog alias in this user catalog (optional).

QMF tablespaces catalog alias
Specify the VCAT name for all the QMF table spaces. The VSAM data sets that associate with these QMF table spaces have the high-level qualifier of this alias value. If you are migrating from a previous level of QMF, use the same alias value as the previous release (required; no default).

QMF tablespaces catalog password
Specify the password for all the QMF control table spaces and index spaces created by the installation (optional).

QMF tablespaces volume
Specify a volume serial number where the QMF table spaces reside (required; no default).

Default punctuation
Specify the symbol for a decimal point in DB2 UDB for OS/390 (required; no default).

Previous QMF level
Specify the release level of QMF that you are migrating from (required; if you do not have any previous release level in the database, enter NONE).

Specifying Remote Server Parameters

The panel displayed in Figure 10 displays only when the server is different from the local DB2 UDB for OS/390 system.

```
DXYEIN15           INSTALL QMF -- REMOTE SERVER PARAMETERS
ISPF Command ===>

   DB2 SERVER LOCATION NAME                ===>
   DB2 SERVER ON A REMOTE OS/390 SYSTEM    ===>         ("Y" OR "N")
   DB2 USER CATALOG FOR SERVER    ===>
   DB2 USER CATALOG PASSWORD               ===>

   QMF TABLESPACES CATALOG ALIAS AT SERVER  ===> QMFDSN
   QMF TABLESPACES CATALOG PASSWORD         ===>
   QMF TABLESPACES VOLUME      ===>        ( VOLUME SERIAL NUMBER
                                             OR "AST",
                                             AST stands for *)

   DEFAULT PUNCTUATION AT SERVER            ===> .       ("," OR ".")
   PREVIOUS QMF LEVEL INSTALLED AT SERVER   ===>         (V2R4,V3R1,V3R3,
                                                          V3R1M1,V3R2,NONE)
   ROUTE XEQ JCL STATEMENT TO SERVER SYSTEM (REQUIRED IF SYSTEM IS REMOTE)
     FOR JES2, USE THE FORMAT: /*ROUTE XEQ <NODEID>.<USERID>
     FOR JES3, USE THE FORMAT: //*ROUTE XEQ <NODEID>.<USERID>
   ===>

   PRESS:  ENTER to continue    PF01 for help    PF03  to end
```

Figure 10. Remote server parameters

Fill in the following parameters:

DB2 UDB for OS/390 server location name
Specify the DB2 UDB for OS/390 location name for the remote server database (required; no default).

DB2 UDB for OS/390 server in another operating system
Specify whether the remote server database is in a different operating system than the requester database system (required; no default).

DB2 UDB for OS/390 user catalog for server
Specify the ICF catalog that QMF install uses to create the QMF catalog alias (QMF VCAT name) (required; no default).

DB2 UDB for OS/390 user catalog password
Specify the password to access the DB2 UDB for OS/390 user catalog so that the QMF installation creates a QMF catalog alias in this user catalog (optional).

QMF tablespaces catalog alias at server
Specify the VCAT name for all the QMF table spaces. The VSAM data sets that associate with these QMF table spaces have the high-level qualifier of this alias value. If you are migrating from a previous level of QMF, use the same alias value as the previous release (required; no default).

QMF tablespaces catalog password
Specify the password for all the QMF control table spaces and index spaces created by the installation (optional).

QMF tablespaces volume for server
Specify a volume serial number where the QMF table spaces reside (required; no default).

Default punctuation at server
Specify the symbol for a decimal point (required; no default).

Previous QMF level installed at server
Specify the release level of QMF that you are migrating from (required; if you do not have any previous release level in the database, enter "NONE").

ROUTE XEQ JCL statement to server system
Specify the ROUTE JCL to send certain install jobs to the remote system for execution (required, if you have indicated that the server system is different from the requester system).

Specifying Space Parameters for QMF Table Spaces

The panel displayed in Figure 11 on page 41 displays when the install scope is F (full database), or S (server database) install, and there is no previous QMF release level in the database.

```
DXYEIN17       INSTALL QMF -- QMF TABLESPACES SPACE PARAMETERS
ISPF Command ===>

   Specify the sizes (in 1K units) for the following tablespaces


       TABLESPACE FOR QMF
       CONTROL TABLE:        PRIMARY        SECONDARY
       ------------------    -------        ---------
       Q.OBJECT_DIRECTORY    ===> 200       ===> 20
       Q.OBJECT_REMARKS      ===> 200       ===> 20
       Q.OBJECT_DATA         ===> 5000      ===> 200
       Q.PROFILES            ===> 100       ===> 20
       Q.ERROR_LOG           ===> 100       ===> 20
       Q.COMMAND_SYNONYMS    ===> 100       ===> 20
       Q.RESOURCE_TABLE      ===> 100       ===> 20
      "SAVE DATA" TABLESPACE ===> 100       ===> 20



   PRESS:  ENTER to continue    PF01 for help    PF03  to end
```

Figure 11. QMF table spaces space parameters

Specify the primary and secondary allocations for the QMF control table space. QMF uses these values to allocate all the VSAM files for these table spaces. Depending on the size of your installation, you might need to increase or decrease the default sizes to allow free space for expansion. Figure 11 shows the default sizes in 1K units.

Specifying Parameters for QMF Index Spaces

The panel displayed in Figure 12 on page 42 displays when the install scope is F (full database) or S (server database) install, and there is no previous QMF release level in the database.

```
DXYEIN18       INSTALL QMF -- QMF INDEXSPACES SPACE PARAMETERS
ISPF Command ===>

   Specify the sizes (in 1K units) for the following table indexes


      TABLE INDEX            PRIMARY        SECONDARY
      -----------            -------        ---------
      Q.OBJECT_DIRECTORYX    ===> 100       ===> 20
      Q.OBJECT_REMARKSX      ===> 100       ===> 20
      Q.OBJECT_OBJDATAX      ===> 100       ===> 20
      Q.PROFILEX             ===> 100       ===> 20
      Q.COMMAND_SYNONYMX     ===> 100       ===> 20









   PRESS:  ENTER to continue    PF01 for help    PF03  to end
```

Figure 12. QMF index spaces space parameters

The default sizes in 1K units are listed in Figure 12.

Specify the primary and secondary allocations for the QMF index spaces. QMF uses these values when allocating all the VSAM files for these table spaces. Depending on the size of your installation, you might need to increase or decrease the default sizes to allow free space for expansion.

Specifying the Job Card

The panel displayed in Figure 13 on page 43 is the last panel for the P option, installation parameters.

```
DXYEIN19                    INSTALL QMF -- JOBCARD
ISPF Command ===>

   Modify the Job cards below to represent your installation requirements.
   The "USER" and "PASSWORD" parameters must be specified in systems using
   RACF.  Since part of this install involves creating objects in DB2, you
   will need DB2 SYSADM authority.  Please see the "QMF Installation Guide
   for OS/390" for more detail.

   If you will be performing the installation in foreground rather than
   batch, and you DO NOT want the batch (JCL) files tailored, enter an
   'X' here:  ===>


   JOB CARD INFORMATION (used for batch (JCL) tailoring)
   ===> //QMFINSTL JOB (ACCT),NAME,
   ===> //          CLASS=A,MSGCLASS=A,MSGLEVEL=(1,1),
   ===> //          USER=Q,PASSWORD=Q
   ===> //*

   PRESS:  ENTER to continue    PF01 for help    PF03  to end
```

Figure 13. Job card

QMF uses this job card information to submit all of the remaining install jobs for your installation. When you complete this panel, you return to the *Install QMF — Main Menu*. You can review your selections by choosing **P**, or continue on to tailoring the job.

Step 2—Tailor the Jobs

Choose **T** on the main menu to tailor the jobs. This step updates the existing SDSQSAPE and SDSQEXCE members with the installation parameters settings you provided in “Step 1—Provide QMF Installation Parameters” on page 31.

During this step:

- A message tells you that the system is tailoring the JCL and copy files for the installation path you selected during “Step 1—Provide QMF Installation Parameters” on page 31.
- The QMF callable interface REXX EXEC QMF710.SDSQEXCE(DSQSCMDE) is modified for full database and requester installations to update the default values for the parameters: QMF plan ID and DB2 UDB for OS/390 subsystem name.

At the end of this step, you return to *Install QMF — Main Menu*. You can then proceed with the installation of QMF.

Attention: Do not manually edit any of the install JCL or control files in the QMF710.SDSQSAPE library,

unless instructed to do so. The CLISTs that tailor these files depend on the sequence and format of the lines in these files.

If you choose to submit your job by batch, you are instructed to verify that the tailoring process worked correctly. Always return to the *Install QMF — Main Menu* for tailoring, if the jobs don't match your intentions.

Your next step is to choose to install QMF either in the foreground, or manually by batch. To choose a foreground install, select **I** on the *Install QMF — Main Menu* and follow the instructions in "Step 3—Install QMF in the Foreground". To choose a manual install, select **X** on the *Install QMF — Main Menu* and follow the instructions in "Chapter 4. Submitting QMF Batch Install Jobs" on page 47.

When you choose **I**, a panel displays that requests installation options. When you have entered the information, a message tells you that the installation is proceeding.

Step 3—Install QMF in the Foreground

When you select **I** on the *Install QMF — Main Menu* to submit the jobs in the foreground, they install under your current LOGON ID. Ensure your LOGON ID has SYSADM authority as described in "Database Authorization ID Q" on page 10.

If you are installing QMF into a remote DB2 UDB for OS/390 server, do the following before you run the foreground installation:

- ***If you are installing QMF for the first time:***

  Use the full database installation option to install QMF into the local DB2 UDB for OS/390 subsystem.

  If you install QMF into a server that is not in the local DB2 UDB for OS/390 subsystem, before you invoke this CLIST in the foreground, submit the required job to allocate the VSAM data set.

  For an initial install, submit the job QMF710.SDSQSAPE(DSQ1TBAJ).

- ***If you are migrating from QMF Version 2:***

  If you are migrating from QMF Version 2 Releases 2, 3, or 4, use the full database installation to migrate QMF to the local DB2 UDB for OS/390.

  1. Issue the -STOP command in QMF710.SDSQSAPE(DSQ1SPDB) to stop the index space at the server.
  2. Submit QMF710.SDSQSAPE(DSQ1TBA1).

3. Issue the -START command in QMF710.SDSQSAPE(DSQ1STDB) to start the index space at the server.

- ***If you are migrating from QMF Version 3:***

  No action is required.

Foreground installation is now complete. Continue the installation by skipping to one of the following:

- "Chapter 5. Tailoring QMF for TSO" on page 63
- "Chapter 6. Tailoring QMF for CICS" on page 71
- "Chapter 7. Tailoring QMF for Workstation Database Servers" on page 81

Chapter 4. Submitting QMF Batch Install Jobs

This chapter describes how to install QMF in a batch environment.

Step 4—Install QMF Panels

DSQ1EPNL uses two data sets (DSQPVARE and DSQPNLE) that were created in “Chapter 2. Planning for QMF” on page 15 when running DSQ1EJAL.

DSQ1EPNL copies expanded versions of QMF panels to the panel file, QMF710.DSQPNLE.

1. Edit QMF710.SDSQSAPE(DSQ1EPNL).
2. Verify or change the following values in the instream procedure of the job:

```
//DSQ1PNL PROC RGN='2048K',  Job-step region size
//     QMFTPRE='QMF710'      Prefix for QMF target libraries
//     LKEY='E'                                 Language identifier
```

3. Submit job QMF710.SDSQSAPE(DSQ1EPNL).
4. Check for a return code of 0.

Step 5—Install QMF/GDDM Map Groups

DSQ1EMAP copies expanded versions of certain GDDM map groups to a map-group library named QMF710.DSQMAPE. The map groups are copied from the source library QMF710.SDSQSAPE.

1. Edit DSQ1EMAP.
2. Verify and change if necessary these parameters in the instream procedure of the job:

```
//DSQ1MAP PROC RGN='2048K',   Job-step region size
//     QMFTPRE='QMF710',      Prefix for QMF target libraries
//     MAPID=
```

3. Submit job QMF710.SDSQSAPE(DSQ1EMAP).
4. Check for a return code of 0.

Step 6—Install QMF/GDDM Sample Chart Forms

DSQ1CHRT copies expanded versions of GDDM chart-form files from the library QMF710.SDSQSAPE to the library QMF710.DSQCHART.

1. Edit DSQ1CHRT.
2. Verify or change the default values for the input parameters in the job’s instream procedure.

```
//DSQCHRT PROC RGN='2048K',  Job-step region size
//    QMFTPRE='QMF710',      Prefix for QMF target libraries
//    CHART=
```

3. Submit job QMF710.SDSQSAPE(DSQ1CHRT).
4. Check for a return code of 0.

Step 7—Convert REXX EXEC and CLIST Records

This step converts REXX EXEC and CLIST records from fixed to variable length. You use two jobs for the conversion:

- DSQ1EJVE converts QMF REXX EXEC records from fixed length to variable length.
- DSQ1EJVC converts QMF CLIST records from fixed length to variable length.

Converting REXX EXEC Records

The QMF EXEC library contains fixed-length records. It can be concatenated to only the other EXEC libraries that have fixed-length records. If they have variable-length records, you must create a copy of the QMF library with variable-length records.

1. Check the following:
   - If the other EXEC libraries have fixed-length records, skip this step.
   - If the other EXEC libraries have variable-length records, continue with this step.

   Later in the install, you allocate the QMF EXEC library (QMF710.SDSQEXCE.VB) as a SYSEXEC data set. To do this, the library is normally concatenated to other EXEC libraries.

   Example

   In the following JCL (from DSQ1EINV), the library QMF710.SDSQEXCE is concatenated to an EXEC library named SYS2.EXEC:

   ```
   //SYSEXEC  DD DSN=SYS2.EXEC,DISP=SHR
   //         DD DSN=QMF710.SDSQEXCE,DISP=SHR
   ```

   For more information, see *Developing QMF Applications* .
2. Edit QMF710.SDSQSAPE(DSQ1EJVE).

   Change the serial number of the volume for the copy of the library.

   ```
   //DSQTEVB.SYSUT2 DD DISP=(NEW,CATLG),UNIT=SYSDA,
   //    SPACE=(8800,(400,50,25)),VOL=SER=XXXXXX,
   //    DCB=(RECFM=VB,LRECL=84,BLKSIZE=8800)
   ```
3. Change the job statement to conform to your installation.

```
//DSQ1EJVE JOB (ACCT),NAME,
//    CLASS=A,MSGCLASS=A,MSGLEVEL=(1,1),
//    USER=Q,PASSWORD=Q
```

4. Verify and change, if necessary, the value of the QMFTPRE parameter in the instream procedure of the job.

```
//DSQTEVB PROC RGN='2048K',
//    QMFTPRE='QMF710',   Prefix for QMF libraries
//    CLIST=                                    Leave blank;
//*                                    used when the procedure is called
```

5. Submit job QMF710.SDSQSAPE(DSQ1EJVE).
6. Check for a return code of 0.

   If the job fails, you can correct the error and rerun it.

Converting CLIST Records

The QMF CLIST library contains fixed-length records. It can be concatenated to only the other CLIST libraries that have fixed-length records. If they have variable-length records, you must create a copy of the QMF library with variable-length records.

1. Check the following:
   - If the other CLIST libraries have fixed-length records, skip this step.
   - If your installation uses variable-length records CLIST libraries, continue with this step. It creates a CLIST library that contains variable-length records named QMF710.SDSQCLTE.VB. Use this new CLIST for your SYSPROC concatenation. (QMF710.SDSQCLTE should remain fixed-block because both the QMF install process and SMP/E require a fixed-block CLIST for processing updates.)

   Later in the install, you need to allocate the QMF CLIST library (QMF710.SDSQCLTE) as a SYSPROC data set. To do this, the library is normally concatenated to other CLIST libraries.

Example

In the following JCL (from DSQ1EINV), the library QMF710.SDSQCLTE is concatenated to a CLIST library named SYS2.CLIST:

```
//SYSPROC  DD  DSN=SYS2.CLIST,DISP=SHR
//         DD  DSN=QMF710.SDSQCLTE,DISP=SHR
```

2. Edit QMF710.SDSQSAPE(DSQ1EJVC).
3. Verify or change the job statement to conform to your installation.

```
//DSQ1EJVC JOB (ACCT),NAME,
//      CLASS=A,MSGCLASS=A,MSGLEVEL=(1,1),
//      USER=Q,PASSWORD=Q
```

4. Verify or change the value of the QMFTPRE parameter in the job's instream procedure.

```
//DSQTIVB PROC RGN='2048K',
//    QMFTPRE='QMF710',   Prefix for QMF libraries
//    EXEC=                                    Leave blank;
//*                                      used when the procedure is called
```

5. Change the serial number of the volume for the copy of the library.

```
//DSQTIVB.SYSUT2 DD DISP=(NEW,CATLG),UNIT=SYSDA,
//     SPACE=(8800,(400,50,25)),VOL=SER=XXXXXX,
//     DCB=(RECFM=VB,LRECL=84,BLKSIZE=8800)
```

6. Submit job QMF710.SDSQSAPE(DSQ1EJVC).
7. Check for a return code of 0.

Preparing QMF as a DB2 Universal Database for OS/390 Application

In this series of steps, you:

- Create DB2 UDB for OS/390 resources.
- Make these resources available to DB2 UDB for OS/390.
- Bind QMF to DB2 UDB for OS/390.

Some of these resources are already available if you have an earlier release of QMF installed in the DB2 UDB for OS/390 subsystem.

If you are installing QMF into a DB2 for OS/390 V7 or higher database, be sure that the database Application Encoding installation parameter for bind of plans and packages is set to either EBCDIC or an EBCDIC ccsid.

In "Step 8—Binding QMF Install Programs to DB2 UDB for OS/390" on page 51 you perform editing and bind two DB2 UDB for OS/390 application programs. In the remaining steps, you run TSO batch jobs (through the program IKJEFT01) and use the output of "Step 8—Binding QMF Install Programs to DB2 UDB for OS/390" on page 51 to run DB2 UDB for OS/390 statements. Most components for these steps are members of the library QMF710.SDSQSAPE or QMF710.SDSQLOAD, where they were placed by SMP/E. For all these steps that run TSO batch, check the step's completion code in the system messages. Completion messages can be found in the SYSTSPRT or the SYSTERM output, as indicated. SYSPRINT provides additional diagnostic information for IBM support.

Each substep can be restarted, because all of the changes to the DB2 UDB for OS/390 database remain uncommitted until the end of the job.

Step 8—Binding QMF Install Programs to DB2 UDB for OS/390

This step binds programs DSQCBSQL and DSQCBINS to DB2 UDB for OS/390. The paralleling application plan from the bind is named DSQIN710.

1. Edit QMF710.SDSQSAPE(DSQ1BSQL).
2. Verify and change if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQ1BSQL PROC RGN='2048K',        Job-step region size
//     QMFTPRE='QMF710',            Prefix for QMF target libraries
//     DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 UDB for OS/390 library name
//     DB2LOAD='DSN710.SDSNLOAD'   DB2 UDB for OS/390 program library name
```

   The job does its work through a series of DB2 UDB for OS/390 statements. The statements are members of the library QMF710.SDSQSAPE.

3. Submit job QMF710.SDSQSAPE(DSQ1BSQL).
4. Check that you received a return code of 0.

   Do not proceed if the return code is other than zero. Examine SYSTSPRT for error messages. Perform corrective actions and then re-run this job.

   If you are doing a Requester database installation, go to "Step 15—Bind QMF Application Plan to DB2 UDB for OS/390" on page 61; otherwise, continue to the next step.

Step 9—Create QMF Control Tables

This step creates eight QMF control tables and six catalog views. For more information about these tables and views, see "Appendix B. QMF Objects Residing in DB2" on page 505.

Converting QMF Control Table Indexes to Type 2:

If you are running DB2 for MVS/ESA Version 4 or above, the QMF control table indexes will be migrated or created as TYPE 2 indexes. To determine the TYPE of your QMF indexes you can run the following query:

```
SELECT  NAME,CREATOR,TBNAME,TBCREATOR,INDEXTYPE FROM  SYSIBM.SYSINDEXES
     WHERE CREATOR = 'Q'
```

If INDEXTYPE is equal to ' ' (blank), then the migration jobs will alter the indexes to change them to TYPE 2. After migration to TYPE 2 indexes, the indexes are left in recover pending state. The index changes do not take place until the indexes are recovered, loaded, or reorganized. Run the DB2 utility REBUILD INDEX (or RECOVER INDEX if you are using DB2 V5 or earlier) to complete conversion of the QMF indexes.

"If you want to fall back to DB2 R310, you will need to convert the indexes back to TYPE 1 prior to falling back. You may use 'ALTER INDEX' SQL

statement. Refer to *DB2 UDB for OS390 SQL Reference* for the syntax. The QMF control table indexes are listed in Table 69 on page 506.

Tips for Remote Unit of Work

If you want to access tables and views at remote DB2 UDB for OS/390 locations, you must run the install job to create the QMF catalog views at each remote location.

Which job you run depends upon whether you are migrating from an earlier QMF version, or not. It also varies according to what QMF version and release is in the DB2 UDB for OS/390 subsystem you have selected for QMF V7R1.

QMF level in DB2 UDB for OS/390 subsystem
Follow this procedure

QMF 7
"Step 10—Create a Table Space for the QMF IVP" on page 57. You do not need to alter any of the control tables, so you can skip this step and proceed to the next step.

QMF 3.x
"Migrating from QMF Version 3 Release 3.0, 2.0, 1.1, 1.0"

QMF 2.4
"Migrating from QMF Version 2.4" on page 53

QMF is new
"Creating Control Tables without a Previous QMF Release" on page 55

Migrating from QMF Version 3 Release 3.0, 2.0, 1.1, 1.0

Run this step if the DB2 UDB for OS/390 subsystem you selected for QMF Version 7 currently contains any release of QMF Version 3

DSQ1TBJ0 migrates QMF 3.x control tables to QMF Version 7 level

Skip this step if you are not migrating from Version 3.

1. Edit QMF710.SDSQSAPE(DSQ1TBJ0).
2. Verify that the installation parameters in the instream procedure of the job match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
//DSQ1TBJ0 PROC RGN='2048K',        Job-step region size
//     QMFTPRE='QMF710',            Prefix for QMF target libraries
//     DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 UDB for OS/390 library name
//     DB2LOAD='DSN710.SDSNLOAD'   DB2 UDB for OS/390 program library name
```

3. Submit job QMF710.SDSQSAPE(DSQ1TBJ0).
4. Check that you received a return code of 0 or 4. Review SYSTERM for completion messages.

Do not proceed if the return code is other than zero or four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Migrating from QMF Version 2.4

Run this step if the DB2 UDB for OS/390 subsystem you selected for QMF Version 7 currently contains QMF Version 2 Release 4.

This install step contains three jobs:
- DSQ1TBD1 stops the index space
- DSQ1TBA1 allocates VSAM files
- DSQ1TBJ0 recreating Control Tables

Stopping the Index Space (DSQ1TBD1)

This job stops the QMF profile index space so that this index space can be redefined in the next step.

1. Determine whether the server is in the local DB2 UDB for OS/390. Run this job only if the server **is** in the local DB2 UDB for OS/390.

   Issue the -STOP command in QMF710.SDSQSAPE(DSQ1TBD1) to stop the index space at the server.

2. Edit QMF710.SDSQSAPE(DSQ1TBD1).
3. Verify the installation parameters in the instream procedure of the job match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
//DSQ1TBD1 PROC RGN='2048K',        Job-step region size
//     QMFTPRE='QMF710',            Prefix for QMF target libraries
//     DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 UDB for OS/390 library name
//     DB2LOAD='DSN710.SDSNLOAD'   DB2 UDB for OS/390 program library name
```

4. Submit QMF710.SDSQSAPE(DSQ1TBD1).
5. Check that you received a return code of 0. Review SYSTERM for completion messages.

   Do not proceed if the return code is other than zero. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Allocating the VSAM Files (DSQ1TBA1)

This job allocates VSAM files for the QMF index space for Q.PROFILEX. The job works through a series of IDCAMS statements.

1. Tailor DSQ1TBA1 for distributed data.

   If DB2 UDB for OS/390 is Version 2 Release 3 and the server system is remote (that is, not in local system), you must insert a /*ROUTE XEQ JCL statement for JES2 and //*ROUTE XEQ JCL statement for JES3 after the jobcard. These statements are required because you must allocate the alias and VSAM data sets at the remote server system by executing this job through the ROUTE card at that remote server system.

2. Edit QMF710.SDSQSAPE(DSQ1TBA1).
3. Verify the installation parameters in the instream procedure of the job match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
//DSQ1TBA1 PROC RGN='2048K',  Job-step region size
//          QMFTPRE='QMF710'  Prefix for the target libraries
```

4. Submit QMF710.SDSQSAPE(DSQ1TBA1).
5. Check for a return code of 0.

   Examine SYSPRINT for error messages. You might receive the following error message on the DELETE and PURGE of the cluster. You can ignore the message:

```
IDG3012I Entry QMFDSN.DSNDBC.DSQDBCTL.PROFILEX I001,A001.
```

Recreating Control Tables

DSQ1TBJ0 alters a control table, drops and recreates a control table index, creates the Q.DSQ_RESERVED table space and control table, and creates the QMF catalog views. The job works through a series of DB2 UDB for OS/390 statements and has several members.

1. Edit QMF710.SDSQSAPE(DSQ1TBJ0).
2. Verify the installation parameters in the instream procedure of the job matches your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
//DSQ1TBD1 PROC RGN='2048K',        Job-step region size
//     QMFTPRE='QMF710',            Prefix for QMF target libraries
//     DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 UDB for OS/390 library name
//     DB2LOAD='DSN710.SDSNLOAD'   DB2 UDB for OS/390 program library name
```

3. Determine whether your user catalog is password protected. If it is, add the password clause to the STOGROUP statement in member DSQ1VSTB.

```
CREATE STOGROUP PASSWORD(password)
```

4. Submit QMF710.SDSQSAPE(DSQ1TBJ0).
5. Check that you received a return code of 0 or 4. Review SYSTERM for completion messages.

   Do not proceed if the return code is other than zero or four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Recover Indexes Converted to Type 2

If your indexes were altered to TYPE 2 as a result of running DSQ1TBJ0, they must be recovered, loaded or reorganized.

If you are uncertain whether indexes need to be rebuilt, follow these steps:

1. Review the output of job DSQ1TBJ0. If the final return code was 4, search the job output for the string `ALTER INDEX`. If you find any occurances of `ALTER INDEX`, then you must perform the next step.

2. Run the following DB2 command:

```
-DISPLAY DATABASE (DSQDBCTL) SPACENAM (*)
```

   If any indexes (TYPE=IX) show a STATUS of RECP or RW,RECP, then you must rebuild the indexes.

Depending on your DB2 for OS/390 release, the following DB2 utility job streams must be run:

V5 and lower

```
RECOVER INDEX(ALL) TABLESPACE DSQDBCTL.DSQTSCT1
RECOVER INDEX(ALL) TABLESPACE DSQDBCTL.DSQTSCT2
RECOVER INDEX(ALL) TABLESPACE DSQDBCTL.DSQTSCT3
RECOVER INDEX(ALL) TABLESPACE DSQDBCTL.DSQTSPRO
RECOVER INDEX(ALL) TABLESPACE DSQDBCTL.DSQTSSYN
```

V6 and above

```
REBUILD INDEX (Q.OBJECT_DIRECTORYX)
REBUILD INDEX (Q.OBJECT_REMARKSX)
REBUILD INDEX (Q.OBJECT_OBJDATAX)
REBUILD INDEX (Q.PROFILEX)
REBUILD INDEX (Q.COMMAND_SYNONYMSX)
```

Creating Control Tables without a Previous QMF Release

Run this step if the DB2 UDB for OS/390 subsystem for QMF does not contain an earlier release of QMF.

This step contains two install jobs:

- DSQ1TBAJ allocates alias. (Skip this if your system already has the alias defined.)
- DSQ1TBLJ creates and loads QMF control tables and catalog views.

Allocating Alias and VSAM Files

DSQ1TBAJ allocates the alias for the QMF control tables and views. The job does its work through a series of IDCAMS statements and includes one step.

1. Edit QMF710.SDSQSAPE(DSQ1TBAJ).
2. Verify the installation parameters in the instream procedure of the job and the job steps match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
//DSQ1TBAJ PROC RGN='2048K',  Job-step region size
//         QMFTPRE='QMF710',  Prefix for QMF target libraries
```

3. Tailor the job for distributed data, if applicable.

   If DB2 UDB for OS/390 is at Version 2 Release 3 and the server system is remote (that is, not in local system), you must insert a /*ROUTE XEQ JCL statement for JES2 and //*ROUTE XEQ JCL statement for JES3 after the jobcard. These statements are required because you must allocate the alias

and VSAM data sets at the remote server system by executing this job through the ROUTE card at that remote server system.

DSQ1TBLR

The job step defines the alias for QMF in the DB2 UDB for OS/390 VSAM catalog. It contains this statement:

```
DEFINE ALIAS   -
 (NAME('QMFDSN') RELATE('DSNC7101.USER.CATALOG'))
```

4. Verify that this statement matches your tailoring specifications.
5. Submit QMF710.SDSQSAPE(DSQ1TBAJ).
6. Check for a return code of 0.

   If the first step fails, examine SYSPRINT for error messages and rerun the job after you correct the error. If the second step fails, restart DSQ1VSTA. If you receive an SQLCODE 203 on the location, then see the section "Appendix A. What if It Didn't Work?" on page 499.

Creating and Loading QMF Control Tables and Catalog Views

DSQ1TBLJ creates and loads QMF control tables and catalog views by working through a series of DB2 UDB for OS/390 statements.

1. Edit QMF710.SDSQSAPE(DSQ1TBLJ).
2. Verify the installation parameters in the instream procedure of the job and the job steps match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

   ```
   //DSQ1TBLJ PROC RGN='2048K',        Job-step region size
   //     QMFTPRE='QMF710',            Prefix for QMF target libraries
   //     DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 UDB for OS/390 library name
   //     DB2LOAD='DSN710.SDSNLOAD'   DB2 UDB for OS/390 program library name
   ```

3. Determine whether your user catalog is password protected. If it is, add the password clause to the STOGROUP statement in member DSQ1VSTB.

   ```
   CREATE STOGROUP PASSWORD(password)
   ```

4. Verify that the installation parameter for the QMF Catalog Alias (default **QMFDSN**), matches your tailoring specifications in the following members:
   - DSQ1VSTD
   - DSQ1TBLB
   - DSQ1TBLI
   - DSQ1TBLU
   - DSQ1TBLE
   - DSQ1TBLN
   - DSQ1TBLG
5. Submit QMF710.SDSQSAPE(DSQ1TBLJ).
6. Check that you received a return code of 0 or 4. Review SYSTERM for completion messages.

Do not proceed if the return code is other than zero or four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Step 10—Create a Table Space for the QMF IVP

DSQ1STGJ creates a table space, named DSQDBDEF.DSQTSDEF, for the QMF installation verification procedure (IVP). Before it creates the table space, it creates the storage group (DSQSGDEF) and the database (DSQDBDEF) for this table space. After installation, you can use this table space for the tables your users create.

If the table space already exists in the DB2 UDB for OS/390 subsystem you selected for QMF Version 7, skip this step. If you attempt to create a second table space, you receive an error message indicating that the object already exists.

1. Edit QMF710.SDSQSAPE(DSQ1STGJ).
2. Verify that the installation parameters in the instream procedure of the job match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
//DSQ1STGJ PROC RGN='2048K',        Job-step region size
//     QMFTPRE='QMF710',            Prefix for QMF target libraries
//     DB2EXIT='DSN710.SDSNEXIT',   Exit DB2 UDB for OS/390 library name
//     DB2LOAD='DSN710.SDSNLOAD'    DB2 UDB for OS/390 program library name
```

3. Edit member DSQ1STGC.
4. Determine whether your user catalog is password protected. If it is, add the password clause to the STOGROUP statement in member DSQ1STGC.

```
CREATE STOGROUP PASSWORD(password)
```

5. Verify that the installation parameters in the instream procedure of the job match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
CREATE STOGROUP DSQSGDEF
   VOLUMES (DSNVOL)      QMF tables volume
   VCAT QMFDSN;          QMF catalog alias
```

   The GRANT statements in this member allow *everyone* to create tables in the IVP table space. You can restrict this authority to certain users. You must include the installer if the installer is to run the IVP. If the program is run under the installer's authorization ID (the assumption), the installer automatically has the authority.
6. Submit QMF710.SDSQSAPE(DSQ1STGJ).
7. Check that you received a return code of 0. Review SYSTERM for completion messages.

Do not proceed if the return code is other than zero. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Establishing the QMF Sample Tables

In the next two steps you establish the QMF sample tables.

"Step 11—Delete Earlier Sample Tables" drops copies of sample tables created for a previous release of QMF.

"Step 12—Create the QMF Sample Tables" creates the QMF sample tables.

If you are migrating QMF from an earlier release, perform these steps. If you are installing QMF for the first time into a database, perform only "Step 12—Create the QMF Sample Tables".

Step 11—Delete Earlier Sample Tables

The step deletes existing QMF sample tables from an earlier QMF version. It does not drop the six DB2 UDB for OS/390 views that were created in QMF Version 2.

1. Edit QMF710.SDSQSAPE(DSQ1EDSJ).
2. Verify that the installation parameters in the instream procedure of the job match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
//DSQ1EDSJ PROC RGN='2048K',        Job-step region size
//     QMFTPRE='QMF710',            Prefix for QMF target libraries
//     DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 UDB for OS/390 library name
//     DB2LOAD='DSN710.SDSNLOAD'   DB2 UDB for OS/390 program library name
```

3. Submit QMF710.SDSQSAPE(DSQ1EDSJ)
4. Check that you received a return code of 0. Review SYSTERM for completion messages.

   Do not proceed if the return code is other than zero. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Step 12—Create the QMF Sample Tables

DSQ1EIVS creates the QMF sample tables. For more information about these tables, see "Appendix B. QMF Objects Residing in DB2" on page 505.

Distributed database tip

Samples tables are authorized to PUBLIC AT ALL LOCATIONS so that users can use three-part names to reference sample tables in another DB2 UDB for OS/390 subsystem.

QMF users at locations within the network are authorized to use all the sample tables created at the location into which you are installing QMF.

1. Edit QMF710.SDSQSAPE(DSQ1EIVS).
2. Verify that the installation parameters in the instream procedure of the job match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
//DSQ1EIVS PROC RGN='2048K',        Job-step region size
//     QMFTPRE='QMF710',            Prefix for QMF target libraries
//     DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 UDB for OS/390 library name
//     DB2LOAD='DSN710.SDSNLOAD'   DB2 UDB for OS/390 program library name
//     CDS='2',                      punctuation for decimal point
//     CDP='4'                       default is period (comma is CDS 6
//*                                                      CDP 7)
```

3. If you are migrating from another level of QMF, comment out job step 1.

```
//*STEP1   EXEC PGM=IKJEFT01,REGION=&RGN
```

4. Edit member QMF710.SDSQSAPE(DSQ1VSTC).

   This file creates a storage group, database, and table space for the sample tables.

5. Verify that the following parameters are correct:

```
CREATE STOGROUP DSQ1STBG
   VOLUMES (DSNVOL)   QMF tables volume
   VCAT QMFDSN;       QMF Catalog Alias in VCAT
```

6. Determine whether or not your user catalog is password protected. If it is, add the password clause to the STOGROUP statement in member DSQ1VSTC.

```
CREATE STOGROUP PASSWORD(password)
```

7. Submit job QMF710.SDSQSAPE(DSQ1EIVS).
8. Check that you received a return code of 0. Review SYSTERM for completion messages.

   Do not proceed if the return code is other than zero. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Step 13—Bind QMF Packages

DSQ1BINJ binds the QMF packages into DB2 UDB for OS/390.

1. Edit QMF710.SDSQSAPE(DSQ1BINJ).
2. Verify that the installation parameters in the instream procedure of the job match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
//DSQ1BINJ PROC RGN='2048K',        Job-step region size
//     QMFTPRE='QMF710',            Prefix for QMF target libraries
//     DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 UDB for OS/390 library name
//     DB2LOAD='DSN710.SDSNLOAD'   DB2 UDB for OS/390 program library name
```

3. Submit QMF710.SDSQSAPE(DSQ1BINJ).
4. Check for a return code of 4 or less.

   Do not proceed if the return code is higher than four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and if you need to rerun prior step(s), you will need to free QMF plans and packages first, then restart from step 8.

Step 14—Bind Communications Package to DB2 UDB for OS/390

If you are not using the DB2 UDB for OS/390 communications package, skip this step.

DSQ1BICD binds the DB2 UDB for OS/390 communications package to QMF.

1. Edit QMF710.SDSQSAPE(DSQ1BICD).
2. Verify that the installation parameters in the instream procedure of the job match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
//DSQ1BICD PROC RGN='2048K',       Job-step region size
//    QMFTPRE='QMF710',            Prefix for QMF target libraries
//    DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 UDB for OS/390 library name
//    DB2LOAD='DSN710.SDSNLOAD'   DB2 UDB for OS/390 program library name
```

3. Submit job QMF710.SDSQSAPE(DSQ1BICD).
4. Check for a return code of 4 or less.

   Do not proceed if the return code is higher than four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Step 15—Bind QMF Application Plan to DB2 UDB for OS/390

Before you start QMF, you must bind it to DB2 UDB for OS/390. Before you bind QMF to DB2 UDB for OS/390, all of the DB2 UDB for OS/390 resources that QMF needs must be available to the authorization ID under which QMF is bound. At this point in the installation process, all of the essential DB2 UDB for OS/390 resources should be available.

DSQ1BINR is the job that does the binding; it binds the QMF application to DB2 UDB for OS/390 at the local DB2 UDB for OS/390.

1. Edit QMF710.SDSQSAPE(DSQ1BINR).
2. Verify that the installation parameters in the instream procedure of the job match your tailoring specifications. If they don't, return to "Step 2—Tailor the Jobs" on page 43 and correct your installation parameters.

```
//DSQ1BINR PROC RGN='2048K',       Job-step region size
//    QMFTPRE='QMF710',            Prefix for QMF target libraries
//    DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 UDB for OS/390 library name
//    DB2LOAD='DSN710.SDSNLOAD'   DB2 UDB for OS/390 program library name
```

3. Submit job QMF710.SDSQSAPE(DSQ1BINR).
4. Check for a return code of 4 or less.

   Do not proceed if the return code is higher than four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

At this point, you are ready to tailor QMF for TSO or CICS.

- For TSO, read "Chapter 5. Tailoring QMF for TSO" on page 63.
- For CICS, read "Chapter 6. Tailoring QMF for CICS" on page 71.

Chapter 5. Tailoring QMF for TSO

This chapter describes the tailoring of QMF for TSO. It includes the following steps:

Step 16—Create a TSO Logon Procedure

DSQ1EINV is an IBM-supplied sample TSO procedure.

Starting QMF in TSO

TSO users can start QMF using one of two methods. ISPF users can start QMF with the ISPF SELECT service and the ISPSTART commands. Without ISPF, users can use the DSQQMFE module. For more information on ISPF dialogs, see *Interactive System Productivity Facility for OS/390 Dialog Management Services and Examples.*

As the QMF installer, you must have a TSO logon procedure. When you log on to TSO as installer and start the Terminal Monitor Program (TMP), it invokes the TSO logon procedure.

The TMP is the principal interface between user and terminal during the user's TSO sessions. Your installation might be using either its own TMP or the standard one supplied by IBM. If the TMP is not the standard one, some of the following discussion might not apply.

Besides invoking the TMP, a logon procedure allocates resources for its users at the start of a TSO session. QMF users need more resources than the minimum set that all TSO users require. By using a logon procedure, you ensure that you are providing these additional resources to establish an adequate TSO environment.

The TSO logon procedure starts when a user logs on to TSO. After the procedure runs, you have the option of also running a logon CLIST.

The sample logon procedure allocates resources for someone who uses TSO solely as a means to reach QMF. For users who want to do more with their TSO sessions, more resources might be required.

Some of the resources that are allocated in the logon procedure can also be allocated in a CLIST that invokes QMF.

Preparing the TSO Logon Procedure

1. Edit QMF710.SDSQSAPE(DSQ1EINV).
2. Locate the region parameter and ensure that it meets the minimum storage requirements as described in "Planning Your Storage Requirements" on page 21.

   ```
   //DSQ1EINV  EXEC PGM=IKJEFT01,TIME=1440,DYNAMNBR=30,REGION=4096K
   ```

3. Review the program load libraries.
   a. Determine whether you want to allocate the program modules through the STEPLIB statement or through a CLIST.

      The sample includes the load libraries for ISPF, ISPF-PDF, QMF, DB2 UDB for OS/390, and GDDM. Not all of these libraries need to appear in the STEPLIB statement. Some can be allocated later through a CLIST. Before you start QMF, a CLIST can allocate the ISPF and QMF libraries as ISPLLIB data sets.

   b. Tailor for ISPF, if appropriate.

      If you are running with ISPF, you can make the STEPLIB allocation with the ISPF ISPLLIB DD statement.

   c. Determine whether you want to run concurrent versions of QMF on the same DB2 UDB for OS/390 subsystem.

      If you plan to run concurrent versions of QMF with different plan IDs on the same DB2 UDB for OS/390 database, you cannot use the same QMF load library in the same procedure. The following list indicates the load module library names for QMF versions.

      QMF Version
      Load Module Library Name
      Version 7
      QMF710.SDSQLOAD
      Version 7
      QMF610.SDSQLOAD
      Version 3 Release 3.0
      QMF330.DSQLOAD
      Version 3 Release 2.0
      QMF320.DSQLOAD
      Version 3 Release 1.1
      QMF311.DSQLOAD
      Version 3 Release 1.0
      QMF310.DSQLOAD
      Version 2 Release 2.4
      QMF240.DSQLOAD
      Version 2 Release 3.0
      QMF230.DSQLOAD
      Version 2 Release 2.0
      QMF220.DSQLOAD

```
//*********************************************************
//*        PROGRAM LOAD LIBRARIES                         *
//*********************************************************
//STEPLIB  DD  DSN=QMF710.SDSQLOAD,DISP=SHR      * QMF MODULES  *
//         DD  DSN=ISR.V4R1M0.ISRLOAD,DISP=SHR   * PDF MODULES  * Opt. for non-ISPF users
//         DD  DSN=ISP.V4R1M0.ISPLOAD,DISP=SHR   * ISPF MODULES * Opt. for non-ISPF users
//         DD  DSN=DSN710.SDSNEXIT,DISP=SHR      * DB2 MODULES  *
//         DD  DSN=DSN710.SDSNLOAD,DISP=SHR      * DB2 MODULES  *
//         DD  DSN=GDDM230.SADMMOD,DISP=SHR      * GDDM MODULES *
```

4. Allocate SDSQEXCE to either SYSEXEC or SYSPROC.

   Use the DDNAME established by your installation for the TSO search order for EXECs. This search order is affected by settings in the TSO defaults modules IRXTSPRM and IRXISPRM, the TSO EXECUTIL command, and the TSO ALTLIB command. If you do not know your installation's search order for REXX EXECs, allocate SDSQEXCE to both SYSEXEC and SYSPROC.

```
//*********************************************************
//*        DATASETS USED BY TSO                           *
//*********************************************************
//SYSPROC  DD  DSN=SYS2.CLIST,DISP=SHR            * CLIST Library
//         DD  DSN=QMF710.SDSQCLTE,DISP=SHR
//SYSEXEC  DD  DSN=SYS2.EXEC,DISP=SHR
//         DD  DSN=QMF710.SDSQEXCE,DISP=SHR
//SYSHELP  DD  DSN=SYS1.HELP,DISP=SHR
//EDT      DD  DSN=&EDIT,UNIT=SYSDA,SPACE=(1688,(40,12))
```

5. Tailor ISPF libraries, if appropriate.

   ISPF libraries are optional. If you use ISPF-related functions, allocate these libraries.

```
//*********************************************************
//*        DATASETS USED BY ISPF                          *
//*********************************************************
//ISPPLIB  DD  DSN=QMF710.SDSQPLBE,DISP=SHR    * Panel libraries
//         DD  DSN=ISR.V4R1M0.ISRPLIB,DISP=SHR
//         DD  DSN=ISP.V4R1M0.ISPPLIB,DISP=SHR
//ISPMLIB  DD  DSN=QMF710.SDSQMLBE,DISP=SHR    * Message Libraries
//         DD  DSN=ISR.V4R1M0.ISRMLIB,DISP=SHR
//         DD  DSN=ISP.V4R1M0.ISPMLIB,DISP=SHR
//ISPSLIB  DD  DSN=QMF710.SDSQSLBE,DISP=SHR    * ISPF Skeleton Libraries
//         DD  DSN=ISR.V4R1M0.ISRSLIB,DISP=SHR
//         DD  DSN=ISP.V4R1M0.ISPSLIB,DISP=SHR
//ISPTLIB  DD  DSN=ISR.V4R1M0.ISRTLIB,DISP=SHR * Table Input Libraries
//         DD  DSN=ISP.V4R1M0.ISPTLIB,DISP=SHR
//ISPPROF  DD  UNIT=SYSDA,SPACE=(TRK,(9,1,4)), * User's ISPF Profile Library
//         DCB=(LRECL=80,BLKSIZE=8800,RECFM=FB,DSORG=PO)
```

6. Verify GDDM data sets.

   These are allocated to ddnames beginning with ADM.

   a. Ensure ADMGGMAP is allocated properly.

      The ADMGGMAP library must be allocated.

   b.

      Allocate separate libraries for all users who want to save their own chart forms. Create the new library with a DD statement like this:

```
//DSQUCFRM  DD DSN=aaaaaaaa,DISP=(NEW,CATLG),
//             UNIT=xxxx,VOL=SER=yyyy,
//             SPACE=(400,(200,50,25)),
//             DCB=(LRECL=400,BLKSIZE=400,RECFM=F)
```

Provide the DSN, UNIT, VOL, and SPACE parameters but do not change the DCB parameters.

1) Locate the entry for DSQUCFRM in DSQ1EINV.
2) Replace aaaaaaa with the name of the user's library.
3) Duplicate and customize this entry for each user library.

c. Replace xxxx in the DD statements for ADMCDATA, ADMGDF, and ADMSYMBL with the name of the data set created during GDDM installation. If these data sets do not exist, define them using the following statements:

```
//ADMCDATA DD DSN=xxxx,DISP=(NEW,CATLG),
//  UNIT=xxxx,SPACE=(TRK,(5,1,10)),
//  DCB=(RECFM=F,LRECL=400,BLKSIZE=400,DSORG=PO)
```

```
//*********************************************************
//*        QMF/GDDM DATA SETS                             *
//*********************************************************
//ADMGGMAP  DD  DSN=QMF710.DSQMAPE,DISP=SHR   * GDDM Map Group
//ADMCFORM  DD  DSN=QMF710.DSQCHART,DISP=SHR  * QMF-Supplied Chart Forms
//DSQUCFRM  DD  DSN=aaaaaaa,DISP=SHR          * Saves User-Defined ICUFORMS
//ADMCDATA  DD  DSN=xxxx,DISP=SHR
//ADMGDF    DD  DSN=xxxx,DISP=SHR
//ADMSYMBL  DD  DSN=xxxx,DISP=SHR
```

7. Tailor for QMF preferences.

   Data sets DSQDEBUG, DSQUDUMP, and SYSUDUMP all currently default to a printer. You can tailor the definition to send the information instead to a data set.

   DSQUDUMP, DSQDEBUG, and DSQPRINT all require a DCB parameter. For DSQPRINT, add 1 to LRECL for the print control character.

```
//*********************************************************
//*        DATASETS USED BY QMF                           *
//*********************************************************
//DSQPNLE   DD  DSN=QMF710.DSQPNLE,DISP=SHR                      * Panel Definition File
//DSQPRINT  DD  SYSOUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330)  * Print Output
//DSQDEBUG  DD  SYSOUT=A,DCB=(RECFM=FBA,LRECL=121,BLKSIZE=1210)  * Trace Output
//DSQEDIT   DD  UNIT=SYSVIO,DCB=(RECFM=FBA,LRECL=79,BLKSIZE=4029), * Edit Transfer File
//  DISP=NEW,SPACE=(CYL,(1,1))
//DSQUDUMP  DD  SYSOUT=A,DCB=(RECFM=VBA,LRECL=125,BLKSIZE=1632)  * Snap Dump Output
//SYSUDUMP  DD  SYSOUT=A
//DSQSPILL  DD  DSN=&&SPILL,DISP=(NEW,DELETE),                   * User's Spill File
//  UNIT=SYSVIO,SPACE=(CYL,(1,1),RLSE),
//  DCB=(RECFM=F,LRECL=4096,BLKSIZE=4096)
```

Data Extract (DXT)™ Considerations

With administrative help, a user can start DXT dialogs. One way of doing this would be to add JCL to your users' TSO logon procedure. A better way is to modify two CLISTs that IBM supplies with QMF.

Step 17—Start QMF

After logging on to TSO with a logon procedure, you are in the TSO READY mode. From this mode, you can start QMF with or without ISPF.

Starting QMF with ISPF

1. Start QMF from an application program using the callable interface, or issue the ISPSTART command with or without parameters. The following examples show how to use ISPSTART to override the default values for the database subsystem name (DSN) and the plan ID (QMF710).
   - With parameters—Choose the appropriate command for your type of install.

     If you are installing QMF into another DB2 UDB for OS/390 subsystem, the value for ssid must be changed to your subsystem ID value.
     - Full installs:

       ```
       ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(DSQSSUBS=ssid,DSQSPLAN=planid,  ...)
       ```

     - Server installs:

       ```
       ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE)
       ```

     - Requester installs:

       ```
       ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(DSQSSUBS=ssid,DSQSPLAN=planid,
              DSQSDBNM=<location>,...)
       ```

     The QMF Home panel is displayed. After the QMF session ends, you are returned to the TSO READY mode.

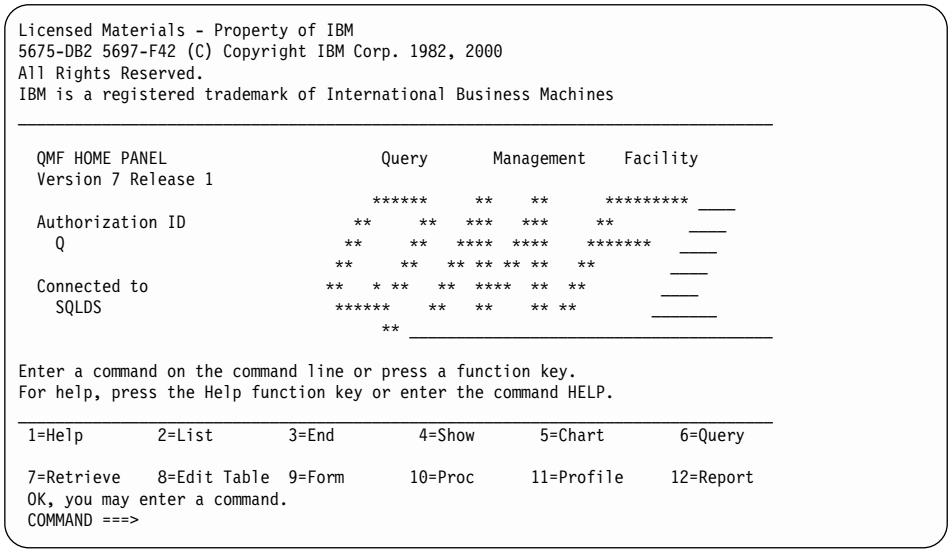


Figure 14. QMF Home Panel

- Without parameters:

  ```
  ISPSTART
  ```

  You should now see the ISPF Master Application menu. From here, you can select QMF. After the QMF session ends, the ISPF Master Applications menu returns. The following section explains how to customize the ISPF selections menus to include QMF.

Customizing the ISPF Selection Menus

ISPF supplies a master application menu as part of its installation process. You can invoke QMF from the ISPF Master Application menu or from any other selection menu that you want to use. Figure 15 on page 69 shows an example of how to code the ISPF Master Application menu to include QMF. The line for QMF is option 2.

You can change the program parameters you pass from TSO to QMF by using the QMF callable interface REXX procedure QMF710.SDSQEXCE(DSQSCMDE). Another method of passing program parameters is through the ISPF service call that QMF uses.

```
%------------------------  MASTER APPLICATION MENU  --------------------
%SELECT APPLICATION ===>_OPT     +
%                                                          +USERID   -
%                                                          +TIME     -
%   1 +SPF        - SPF PROGRAM DEVELOPMENT FACILITY       +TERMINAL -
%   2 +QMF        - QMF QUERY MANAGEMENT FACILITY          +PF KEYS  -
%
%
%
%
%
%
%
%
%
%
%   P +PARMS      - SPECIFY TERMINAL PARAMETERS AND LIST/LOG DEFAULTS
%   X +EXIT       - TERMINATE USING LIST/LOG DEFAULTS
%
+PRESS%END KEY+TO TERMINATE +
%
)INIT
)PROC
  &SEL = TRANS( TRUNC (&OPT,'.')
                1,'PANEL(ISR@PRIM) NEWAPPL'
                2,'PGM(DSQQMFE) NEWAPPL(DSQE)'
            /*                              */
            /* ADD OTHER APPLICATIONS HERE */
            /*                              */
                P,'PANEL(ISPOPT)'
                X,'EXIT'
              ' ',' '
                *,'?' )
)END
```

Figure 15. QMF Dialog on ISPF Master Application Menu

Starting QMF in TSO

To reach QMF, you can use an application program and the callable interface (see *Developing QMF Applications* for further details), or you can enter the following statement:

```
DSQQMFE DSQSSUBS=dbname,DSQSPLAN=planid,...
```

where (...) represents additional parameter values being passed to QMF.

You can also start QMF with the following TSO call commands:

- For full or server installs:

  ```
  CALL 'QMF710.SDSQLOAD(DSQQMFE)' 'DSQSSUBS=dbname,DSQSPLAN=planid,...'
  ```

- For requester installs:

```
CALL 'QMF710.SDSQLOAD(DSQQMFE)' 'DSQSSUBS=dbname,DSQSPLAN=planid,
      DSQSDBNM=<location>...'
```

For more information on starting QMF, see *Installing and Managing QMF for MVS*.

Step 18—Set up QMF Batch Job to Run Batch IVP (Optional)

In this step you set up a batch job for the batch-mode IVP. If you do not want to run this test, you can skip the step. If you want to run this test, you must wait until "Step 35—Run the Batch-Mode IVP (Optional)" on page 97. If you attempt to run the test earlier, the test fails because the procedure Q.DSQ1EBAT is not yet available.

To create a batch job:

1. Make a copy of the sample logon procedure (DSQ1EINV).
2. Add a JOB statement.

   If you are working in a RACF® environment, make the value of the USER parameter the logon ID of the installer. For example, if the installer is JONES, the job statement might look like this:

   ```
   //BATCH  JOB  USER=JONES,PASSWORD=password
   ```

   where *password* is JONES' password.
3. Delete the SYSTERM and SYSIN DD statements.
4. Add the following statements to the end of the logon procedure:

   ```
   //SYSTSPRT DD  SYSOUT=A
   //SYSTSIN  DD  *
         PROFILE PREFIX(JONES)
         ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(M=B,I=Q.DSQ1EBAT,S=ssid)
   /*
   ```

   The first control card within the second JCL statement is optional. Use it if your installation does not have RACF. Replace JONES with the logon ID of whoever is running the step.

   The second control card within the second JCL statement invokes QMF in batch mode (DSQSMODE=B). Replace `ssid` with the subsystem ID of the database subsystem into which you installed QMF. If you do not specify a subsystem ID, the default, `DSN`, will be used. When invoked in this way, QMF invokes the procedure Q.DSQ1EBAT. After it invokes the procedure, control returns to TSO, which terminates the job because it finds no more TSO statements in SYSTSIN.

Proceed to "Chapter 9. Testing Your QMF Install" on page 91.

Chapter 6. Tailoring QMF for CICS

This chapter describes the steps required to tailor QMF for CICS.

Before performing the tailoring process for QMF in CICS, you must fully install and tailor DB2 UDB for OS/390 and GDDM for CICS. For more details, see *GDDM Installation and System Management* and *DB2 UDB for OS390 Administration Guide*

Step 19—Describe QMF to DB2 UDB for OS/390 in CICS

This step ensures that you complete all the prerequisite steps before you tailor QMF for CICS.

1. Ensure that you install the DB2 UDB for OS/390-to-CICS connection and the DB2 UDB for OS/390 attachment facility for CICS.

   QMF uses the CICS/DB2 Attachment Facility to access DB2 UDB for OS/390 data in the CICS environment. QMF-specific information for these products is described in *DB2 UDB for OS390 Administration Guide*
2. Verify that the plan ID and authorization IDs for a QMF transaction ID are in the resource control table (RCT).

   Users invoking a QMF transaction operate under the authorization of the associated RCT entry. (For a sample RCT, see member DSQ1ERCT in the QMF sample library QMF710.SDSQSAPE.)

   If your RCT includes RACF information, the authorization ID must be a valid RACF ID.
3. Regenerate your RCT as described in *DB2 UDB for OS390 Administration Guide*

   For a complete description of the resource control table, see *DB2 UDB for OS390 Administration Guide*

All QMF programs are bound during installation; therefore, it isn't necessary to separately bind for CICS.

Step 20—Link-Edit QMF with DFHEAI and DFHEAI0

This step uses two jobs, DSQ1ELNK and DSQ1EGLK, to link-edit QMF with the CICS interface modules, DFHEAI and DFHEAIO. Because QMF uses the CICS command level application programming interface when operating under CICS, you must link-edit before you can run any QMF programs.

Link-Edit QMF with CICS Command Interface Modules

DSQ1ELNK link-edits QMF with the CICS command interface modules, DFHEAI and DFHEA10, located in the LOADLIB data set generated by CICS.

Important: To include CICS interface modules DFHEAI and DFHEAI0, you must run this step each time you apply QMF service.

1. Edit QMF710.QMFSAMPE(DSQ1ELNK).
2. Verify that the installation parameters in the instream procedure of the job, and the job steps, match your tailoring specifications.

```
//DSQ1ELNK PROC REG=4096K,        Job Step Region
//      QMFTPRE='QMF710',         DSN Prefix for QMF product
//      CLOAD='CICS.LOADLIB',     Name of CICS LOADLIB
//      OUTC='*                   Print SYSOUT class
```

3. Submit QMF710.QMFSAMPE(DSQ1ELNK).
4. Check for a return code of 0. If the return code is not 0, correct the problem and rerun DSQ1ELNK.

Translate, Assemble, and Link-Edit the QMF-Supplied Governor

DSQ1EGLK performs the translate, assemble, and link-edit for the QMF-supplied governor.

1. Edit QMF710.QMFSAMPE(DSQ1EGLK).
2. Verify that the installation parameters in the instream procedure of the job, and the job steps, match your tailoring specifications.

```
//DSQ1EGLK PROC SUFFIX=1$,        CICS ASM Translator suffix
//      QMFTPRE='QMF710',         DSN Prefix for QMF product
//      CMACS='CICS.MACLIB',      Name of CICS MACLIB
//      CLOAD='CICS.LOADLIB',     Name of CICS LOADLIB
//      A=,                        A=A for CICS Aligned MAP
//      ASMBLR=IEV90,             Assembler Program Name
//      REG=4096K,                Job step region
//      OUTC='*',                 Print SYSOUT class
//      WORK='SYSDA'              Work unit
```

3. Submit QMF710.QMFSAMPE(DSQ1EGLK).
4. Check for a return code of 0 on all jobs except LINKPROG, which can have a return code of 4. If the return code is not 0 or 4, correct the problem and rerun this job.

Step 21—Define and Load QMF/GDDM Data Sets

This step defines and loads a number of data sets.

- DSQ1EADM loads QMF/GDDM map sets to the GDDM ADMF data set.
- DSQ1BFRM creates QMF/GDDM charts and the QMF trace data set.

Load QMF/GDDM Map Sets to the GDDM ADMF Data Set

Important: This job replaces any existing QMF maps. Ensure that you back up ADMF if you want to keep any existing QMF maps.

1. Edit QMF710.SDSQSAPE(DSQ1EADM).
2. Verify that the installation parameters in the instream procedure of the job, and the job steps, match your tailoring specifications.

```
//DSQ1EADM PROC RGN='2048K',      Job-step region size
//            QMFTPRE='QMF710',   QMF prefix name for target libraries
//            GDDMADM='GDDM.ADMF' GDDM ADMF data set name
```

3. Submit QMF710.SDSQSAPE(DSQ1EADM).
4. Check for a return code of 0. If the return code is not 0, correct the problem and rerun DSQ1EADM.

Create QMF/GDDM Charts and the QMF Trace Data Set

If you are migrating to QMF Version 7 from a previous QMF release, skip this step.

DSQ1BFRM creates QMF/GDDM charts and the QMF trace data set.

1. Edit QMF710.SDSQSAPE(DSQ1BFRM).
2. Locate the installation parameters in the instream procedure of the job and ensure that they match your specifications.

```
//DSQ1BFRM PROC QMFTPRE='QMF710',     DSN Prefix for QMF Product
//            GDDMADM='GDDM.ADMF',    GDDM ADMF Data Set Name
//            CHRTVOL='QMFVOL',       QMF/GDDM Charts Volume
//            TRCVOL='QMFVOL'         Trace Data Set Volume
```

3. Edit DSQ1CFRM COPY, which is referenced on the SYSIN of DSQ1BFRM.
4. Tailor the VSAM control statement for your installations.

```
DEFINE CLUSTER (NAME(QMF710.DSQUCFRM) -
                  VOLUMES(QMFVOL) -     QMF/GDDM Charts volume
                  UNIQUE -
                  RECSZ(400 400) -
                  CONTROLINTERVALSIZE(2048) -
                  KEYS(20 0)) -
                DATA -
                  (RECORDS(1000 300)) -
                CATALOG(VSAMUSERCAT)    VSAM user catalog
```

5. Submit QMF710.SDSQSAPE(DSQ1BFRM).
6. Check for a return code of 0. If the return code is not 0, determine which steps ran correctly:
   - If some of DSQ1CFRM ran, edit DSQ1CFRM and remove the steps that ran successfully. Otherwise, you'll receive error messages indicating that the objects are already there.

- If all of DSQ1CFRM ran and the trace file is allocated, edit DSQ1BFRM and remove the last job step to create the QMF trace data set, DSQDEBUG.

Step 22—Update CICS Control Tables

Choose the procedure that matches your current version of CICS.

- "Update CICS Control Tables (CICS Version 2)"
- "Update CICS Control Tables (CICS Version 3 or later)" on page 76

Update CICS Control Tables (CICS Version 2)

Before you can run QMF under CICS Version 2, you must define QMF programs and transactions to CICS by modifying the following CICS control tables:

- Destination control table (DCT)
- File control table (FCT)
- Program control table (PCT)
- Processing program table (PPT)

QMF simplifies this task by providing CICS control table statements as members of QMF sample library QMF710.SDSQSAPE. To run QMF successfully in a CICS environment, you must include these members into every CICS system that runs QMF.

CICS documentation is the authoritative source for information on how to set up the CICS tables. For details, see *CICS/OS390 Resource Definition (Macro)* and *CICS/OS390 Resource Definition (Online)* Some CICS information can be specified online, rather than through tables.

DCT (Destination Control Table)

DSQ1CDCS and DSQ1CDCT in QMF710.SDSQSAPE describe the QMF trace data set to CICS.

1. Edit your CICS source for DFHDCT.
2. Find the local entry for TYPE=SDSCI and add a copy statement for DSQ1CSCS as shown in the following example:

```
*-------------------------------------------------------------------
*    LOCAL ENTRIES FOR TYPE=SDSCI SHOULD BE PLACED BELOW THIS BOX
*-------------------------------------------------------------------
          COPY DSQ1CDCS
```

3. Install the QMF trace facility.

   Find where local entries are specified and add a copy statement (DSQ1CDCT) for TYPE=EXTRA, as shown in the following example:

```
*-------------------------------------------------------------------
*    OTHER LOCAL ENTRIES SHOULD BE PLACED BELOW THIS BOX
*-------------------------------------------------------------------
          COPY DSQ1CDCT
```

4. Assemble and link-edit the member to create a new DFHDCT module.

Ensure the job completes with a return code of 0. If you receive higher return codes, check the list output and correct the error.

FCT (File Control Table)

QMF710.SDSQSAPE(DSQ1EFCT) describes the QMF panel data set and the QMF-supplied ICU forms data set.

1. Edit your CICS source for DFHFCT.
2. Locate your DFHFCT TYPE=SHRCTL macros and ensure that you specify a VSAM CI size of 32K or that LSRPOOL=NONE.

   The QMF panel data set requires a VSAM CI size of 32K. QMF does not explicitly define an LSRPOOL; instead it allows the LSRPOOL to default to the CICS default of 1. If the LSR pool in your installation is smaller than 32K, specify an LSRPOOL that supports a VSAM CI size of 32K or specify LSRPOOL=NONE.
3. Add a local entry for the QMF panel file with a copy statement for DSQ1EFCT as shown in the following example:

```
*-------------------------------------------------------------------
*    LOCAL ENTRIES SHOULD BE PLACED BELOW THIS BOX
*-------------------------------------------------------------------
          COPY DSQ1EFCT
```

4. Assemble and link-edit the member to create a new DFHFCT module.

Ensure the job completes with a return code of 0. If you receive higher return codes, check the list output and correct the error.

PCT (Program Control Table)

QMF710.SDSQSAPE(DSQ1EPCT) describes QMF transactions to CICS.

1. Edit your CICS source for DFHPCT.
2. Add a local entry for QMF transactions with a copy statement for DSQ1EPCT as shown in the following example:

```
*-------------------------------------------------------------------
*    LOCAL ENTRIES SHOULD BE PLACED BELOW THIS BOX
*-------------------------------------------------------------------
          COPY DSQ1EPCT
```

3. Assemble and link-edit the member to create a new DFHPCT module.

Ensure the job completes with a return code of 0. If you receive higher return codes, check the list output and correct the error.

PPT (Processing Program Table)

QMF710.SDSQSAPE(DSQ1EPPT) describes QMF programs to CICS.

1. Edit your CICS source for DFHPPT.

2. Add a local entry for QMF transactions with a copy statement for DSQ1EPPT as shown in the following example:

```
*-------------------------------------------------------------------
*    LOCAL ENTRIES SHOULD BE PLACED BELOW THIS BOX
*-------------------------------------------------------------------
          COPY DSQ1EPPT
```

3. Assemble and link-edit the member to create a new DFHPPT module.

Ensure the job completes with a return code of 0. If you receive higher return codes, check the list output and correct the error.

Update CICS Control Tables (CICS Version 3 or later)

Before you run QMF under CICS/ESA®, you must describe QMF to CICS. To do this, you must modify both control table statements and a job that updates the CICS system definitions (CSDs).

CICS documentation is the authoritative source for information on how to set up the CICS tables. For details, see *CICS/OS390 Resource Definition (Macro)* and *CICS/OS390 Resource Definition (Online)*

DCT (Destination Control Table)

DSQ1CDCS and DSQ1CDCT in QMF710.SDSQSAPE describe the QMF trace data set to CICS.

1. Edit your CICS source for DFHDCT.
2. Find the local entry for TYPE=SDSCI and add a copy statement for DSQ1CSCS as shown in the following example:

```
*-------------------------------------------------------------------
*    LOCAL ENTRIES FOR TYPE=SDSCI SHOULD BE PLACED BELOW THIS BOX
*-------------------------------------------------------------------
          COPY DSQ1CDCS
```

3. Install the QMF trace facility.

   Find where local entries are specified and add a copy statement (DSQ1CDCT) for TYPE=EXTRA, as shown in the following example:

```
*-------------------------------------------------------------------
*    OTHER LOCAL ENTRIES SHOULD BE PLACED BELOW THIS BOX
*-------------------------------------------------------------------
          COPY DSQ1CDCT
```

4. Assemble and link-edit the member to create a new DFHDCT module.

Ensure the job completes with a return code of 0. If you receive higher return codes, check the list output and correct the error.

Update the CSD

DSQ1ECSD creates a new LIST called QMF, which is defined in the CSD. CICS offers a utility program (DFHCSDUP) to update the CSD with a batch

job. Use DFHCSDUP to update all QMF/CICS control tables except the RCT and DCT. For other RCT considerations, see "Step 19—Describe QMF to DB2 UDB for OS/390 in CICS" on page 71.

1. Use the RDO `VIEW Lsrpool(name)` command to check the current definitions of the LSRPOOL.

   The QMF panel data set requires a VSAM CI size of 32K. QMF does not explicitly define an LSRPOOL entry. Instead, QMF defaults to the CICS default of 1. If the LSRPOOL in your installation is smaller than 32K, specify an LSRPOOL that supports a VSAM CI size of 32K through DFHCSDUP.
2. Edit QMF710.SDSQSAPE(DSQ1ECSD).
3. Verify or change the installation parameters in the instream procedure of the job to match your tailoring specifications.

```
//DSQ1ECSD PROC REG=2048K,          Job Step Region
//      QMFTPRE='QMF710',           DSN Prefix for QMF
//      CLOAD='CICS.LOADLIB',       Name of CICS Program Lib
//      CCSD='CICS.DFHCSD',         Name of CICS CSD file
//      OUTC='*'                    Print sysout class
```

4. Submit the job and check that the job ran with a return code of 0. If you receive higher return codes, check the list output and correct the error.

   Note: For CICS V4 and later you can ignore the following error:

   ```
   E 'RESSECNUM' is not valid and is ignored
   ```

   from the DEFINE FILE(DSQPNLE) statement or the DEFINE FILE(DSQUCFRM) statement. Any other errors should be corrected.

Step 23—Tailor the QMF Profile

The ENVIRONMENT column of the Q.PROFILE table enables a single AUTHID to have different profiles depending on the environment (TSO or CICS). When installed under TSO, QMF initially assigns everything in the ENVIRONMENT column the value of NULL. Next, a new row is added with an AUTHID of SYSTEM and an ENVIRONMENT entry of CICS.

If you use the same AUTHID in CICS and TSO, and you use command synonyms that contain TSO commands, change all NULL entries to TSO entries as shown:

```
UPDATE Q.PROFILES SET ENVIRONMENT='TSO' WHERE ENVIRONMENT = NULL
```

After you issue this statement, QMF uses the SYSTEM row for the CICS environment.

Step 24—Update CICS Startup Job Stream

In this step, you update the DD statements that must be in the CICS startup job stream.

1. Ensure that the library containing the link-edited RCT is accessible to OS/390 through the normal library search order (STEPLIB, JOBLIB, link library).

```
//STEPLIB  DD DSN=CICS.SDFHAUTH,DISP=SHR
//         DD DSN=DSN710.SDSNEXIT,DISP=SHR
//         DD DSN=DSN710.SDSNLOAD,DISP=SHR
```

   In this example, DFHSIP, which loads from CICS.LOADLIB1, must receive control in an authorized state. You must individually APF-authorize each concatenated library.

   DSN.SDSNLOAD is the library containing the link-edited RCT, it must also be authorized.

   If your CICS release is 4.1 or later:: DB2 does not need the DB2 program libraries in the DFHRPL DD statement. But, QMF does an EXEC CICS LOAD for DSNHDECP upon initialization, therefore, QMF requires SDSNEXIT or SDSNLOAD (wherever your customized DSNHDECP module is located) be in the DFHRPL DD concatenation. Be sure to place these DB2 libraries AFTER the CICS program libraries.

2. Place the load library containing QMF, GDDM, and DB2 UDB for OS/390 modules in the CICS module load library list, DFHRPL.

```
//DFHRPL  DD  ...
//        DD  DSN=QMF710.SDSQLOAD,DISP=SHR
//        DD  DSN=GDDM.SADMMOD,DISP=SHR
//        DD  DSN=DSN.SDSNEXIT,DISP=SHR
//        DD  DSN=DSN.SDSNLOAD,DISP=SHR
```

   Be sure to use the correct DB2 UDB for OS/390 release level when connecting from CICS (QMF loads DSNHDECP and DSNCLI).

3. Ensure access to the following data sets that are required by GDDM and QMF:

```
//*         GDDM DATA SETS
//ADMF      DD DSN=GDDM.ADMF,DISP=SHR        QMF Map Group
//ADML      DD SYSOUT=A
//ADMS      DD SYSOUT=A
//ADMT      DD SYSOUT=A
//*         QMF DATA SETS
```

```
//DSQPNLE   DD DSN=QMF710.DSQPNLE,DISP=SHR   QMF Panel File
//DSQDEBUG  DD DSN=QMF710.DSQDEBUG,DISP=SHR  Trace and Error Messages
//DSQUCFRM  DD DSN=QMF710.DSQUCFRM,DISP=SHR  User-Defined ICU Forms
```

4. Shut down and restart CICS to incorporate your changes to the CICS tables and to the CICS startup job. Then continue on to “Chapter 9. Testing Your QMF Install” on page 91.

Chapter 7. Tailoring QMF for Workstation Database Servers

In this chapter all of the following DB2 products are referred to collectively as the DB2 DRDA AS. Where necessary a more specific reference is made to one of the following products:

- DB2 Universal Database™ V5 (UDB for AIX, UDB for OS/2, DB2 for NT, ...)
- DB2 Common Server V2.1 (DB2 for AIX, DB2 for OS/2, DB2 for NT, ...)
- DB2 Parallel Edition V1.2
- DataJoiner® V1.2

QMF support for a DB2 DRDA AS is optional. You need to perform the steps described in this chapter only if you intend to connect QMF to any of the previously described DB2 DRDA Application Servers.

Before you install QMF into a DB2 DRDA AS from OS/390, you need to make the following preparations for DB2 Common Server, DB2 Parallel Edition, or DataJoiner:

- Create an installation ID on the platform of the DB2 DRDA AS and make it a member of the SYSADM GROUP.
- Create the database on the platform of the DB2 DRDA AS using the following command:

  ```
  "db2 create database" <database-name>
  ```

  Note: Normally you will want the database created to have authentication SERVER, which is the default. However due to password handling restrictions with IBM Communications Manager (on OS/2) and Microsoft® SNA Server (on Windows NT®) it is necessary to change the database to have authentication CLIENT. Refer to the appropriate DB2 Command Reference manual for the specific system commands to use for setting database authentication.
- On the platform of the DB2 DRDA AS, locally connect to the installation ID and verify that its authority level is SYSCRTL or SYSADM, using the commands:

  ```
  "db2 connect to" <database-name>
            "user" <sysadm-id> "using" <password>

  "db2 get authorizations"
  ```
- (Optional) Grant additional administrative authorities to groups, users, or PUBLIC, as needed. If you install QMF into DB2 for VM or VSE server

from OS/390, you need to create public and private dbspaces. QMF needs some of the public dbspaces for tables, queries, procedures, forms, and data.

The following steps apply to QMF migration and to first time QMF installation.

For all these steps, check the step's completion code in the system messages. Completion messages can be found in the SYSTSPRT or the SYSTERM output, as indicated. SYSPRINT provides additional diagnostic information for IBM support.

Step 25—Bind QMF Install Programs to DB2 DRDA AS

This step binds programs DSQCBSQL and DSQCBINS to the DB2 DRDA AS. The application plan associated with these packages is DSQSI610.

1. Edit QMF710.SDSQSAPE(DSQ1BDJ1).
2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQBIND PROC RGN='2048K',    Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change <ssid> to your DB2 for OS/390 subsystem ID.
4. Change <location> to the location name of the DB2 DRDA AS database application server as defined in the DB2 for OS/390 communications database.
5. (Optional) Review the Comments in the JOB for further tailoring opportunities.
6. Submit job QMF710.SDSQSAPE(DSQ1BDJ1).
7. Check Procstep BIND for a return code of 0. Examine SYSTSPRT for error messages. Do not proceed if the return code is other than zero. Perform corrective actions if required and then re-run this JOB.

Step 26—Create QMF Control Tables in a DB2 DRDA AS

This step creates the QMF control tables in DB2 DRDA AS.

1. Edit QMF710.SDSQSAPE(DSQ1EDJ2).
2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQEXSQL PROC RGN='2048K',   Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change <ssid> to your DB2 for OS/390 subsystem ID.
4. (Optional) Review the Comments in the JOB for further tailoring opportunities.
5. Submit job QMF710.SDSQSAPE(DSQ1EDJ2).
6. Check Stepname DSQCTBL for a return code of 0 or 4. Review SYSTERM for completion messages.

   Do not proceed if the return code is other than zero or four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Step 27—Bind QMF Application Programs to a DB2 DRDA AS

This step binds QMF application programs to DB2 DRDA AS. After successful completion of this step, QMF Version7.1 can connect to the DB2 DRDA AS.

1. Edit QMF710.SDSQSAPE(DSQ1BPKG).
2. Verify and change, if necessary, the default values for the parameters in the job's instream procedure:

```
//DSQBIND PROC RGN='2048K',    Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change <ssid> to your DB2 UDB for OS/390 subsystem ID.
4. Change to your DB2 UDB for OS/390 application requester local subsystem id.
5. Change <location> to the location name of the DB2 DRDA AS database application server as defined in the DB2 UDB for OS/390communications database.
6. (Optional) Review the Comments in the JOB for further tailoring opportunities.
7. Submit job QMF710.SDSQSAPE(DSQ1BPKG).
8. A return code of 0 or 4 indicates a successful run of this job. Review SYSTSPRT, SYSTERM and SYSPRINT outputs for clues to errors for return codes greater than 4. Perform corrective actions and then re-run this job.

Step 28—Create QMF Sample Tables in a DB2 DRDA AS

This step creates the QMF sample tables in DB2 DRDA AS.

1. Edit QMF710.SDSQSAPE(DSQ1EDJ4).
2. Verify and change, if necessary, the default values for the installation parameters in the both of the job's instream procedures:

```
//DSQEXSQL PROC RGN='2048K',   Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
```

```
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name

//DSQINSQL PROC RGN='2048K',   Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change <ssid> to your DB2 UDB for OS/390 subsystem ID.
4. (Optional) Review the Comments in the JOB for further tailoring opportunities.
5. Submit job QMF710.SDSQSAPE(DSQ1EDJ4).
6. Check Stepname DSQSINS for a return code of 0 or 4. Review SYSTERM for completion messages.

   If the return code is other than 0 or 4, examine SYSTSPRT and SYSPRINT for error messages. Perform corrective actions and then re-run this JOB.

Deleting QMF from a DB2 DRDA AS

This section describes how to delete QMF from a DB2 DRDA AS.

Deleting QMF

This step should be run only if you are re-installing QMF into a DB2 DRDA AS application server that already contains QMF.

Attention: This step removes all QMF control tables and packages from the DB2 DRDA AS. QMF 6 is not able to connect to the DB2 DRDA AS after running this step.

1. Edit QMF710.SDSQSAPE(DSQ1EDX1).
2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQEXSQL PROC RGN='2048K',   Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change <ssid> to your DB2 for OS/390 subsystem ID.
4. (Optional) Review the Comments in the JOB for further tailoring opportunities.
5. Submit job QMF710.SDSQSAPE(DSQ1EDX1).
6. Check Stepname DSQCDROP for a return code of 0 or 4. Review SYSTERM for completion messages.

   If the return code is other than 0 or 4, examine SYSTSPRT and SYSPRINT for error messages. Perform corrective actions and then re-run this JOB.

Deleting QMF Sample Tables from a DB2 DRDA AS

This step should be run only if you are re-installing QMF into a DB2 DRDA AS application server that already contains QMF.

This step drops all the QMF sample tables from the DB2 DRDA AS.

1. Edit QMF710.SDSQSAPE(DSQ1EDX2).
2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQEXSQL PROC RGN='2048K',   Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change <ssid> to your DB2 UDB for OS/390 subsystem ID.
4. (Optional) Review the Comments in the JOB for further tailoring opportunities.
5. Submit job QMF710.SDSQSAPE(DSQ1EDX2).
6. Check Stepname DSQCDROP for a return code of 0 or 4. Review SYSTERM for completion messages.

   If the return code is other than 0 or 4, examine SYSTSPRT and SYSPRINT for error messages. Perform corrective actions and then re-run this JOB.

Starting QMF Against A DB2 DRDA AS

Assuming you have started QMF under TSO or CICS, you should change the QMF parameters on your START command, if you want to start QMF under DB2 DRDA AS. Specify the following:

```
(DSQSSUBS=<ssid>,DSQSDBNM=<location>
```

where <ssid> is your DB2 UDB for OS/390 subsystem ID and <location> is your DB2 DRDA AS location name.

You are ready to continue on to "Chapter 9. Testing Your QMF Install" on page 91.

Chapter 8. Tailoring QMF for DB2 for AS/400® Servers

Beginning with Version 7 Release 1, QMF supports connectivity from a QMF application requester to a DB2 for AS/400 Version 4 Release 4 (or higher) server. This support is optional. You need to perform the steps in this chapter only if you intend to connect QMF to a DB2 for AS/400 Version 4 Release 4 (or higher) server. Before you install QMF into a DB2 for AS/400 server, you will need to make the following preparations.

- From the DB2 for AS/400 Query Manager execute the following SQL in the server: `CREATE COLLECTION Q` using a userid that has administrative authority. This should be the security officer or a userid having *ALLOBJ authority.
- Ensure that users of QMF have *USE authority for Q *LIB.

The following steps apply to a first time QMF installation and may be rerun as necessary to correct errors.

Step 29—Bind QMF Install Programs to DB2 for AS/400

This step binds programs DSQCBSQL and DSQCBINS to the DB2 for AS/400. The application plan associated with these packages is DSQSI710.

1. Edit QMF710.SDSQSAPE(DSQ1BAS1).
2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQBIND PROC RGN='2048K',    Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change to your DB2 for OS/390 subsystem ID.
4. Change to the location name of the DB2 for AS/400 database server as defined in the DB2 for OS/390 communications database.
5. (Optional) Review the comments in the job for further tailoring opportunities.
6. Submit job QMF710.SDSQSAPE(DSQ1BAS1).
7. Check the return code of the job. Examine SYSTSPRT for error messages. Do not proceed if the return code is other than zero. Perform corrective actions if required and then re-run the job.

Step 30—Create QMF Control Tables in a DB2 for AS/400 Server

This step creates the QMF control tables in DB2 for AS/400 server.

1. Edit QMF710.SDSQSAPE(DSQ1EAS2).
2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQEXSQL PROC RGN='2048K',   Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change to your DB2 for OS/390 subsystem ID.
4. (Optional) Review the Comments in the job for further tailoring opportunities.
5. Submit job QMF710.SDSQSAPE(DSQ1EAS2).
6. Check Stepname DSQCTBL for a return code of 0 or 4. Review the complete job output for error messages.

   Do not proceed if the return code is other than zero or four. After reviewing the complete job output, perform corrective actions and rerun the job.

Step 31—Bind QMF Application Programs to a DB2 for AS/400 Server

This step binds QMF application programs to DB2 for AS400. After successful completion of this step, QMF Version7.1 can connect to the DB2 for AS/400 server.

1. Edit QMF710.SDSQSAPE(DSQ1BPKG).
2. Verify and change, if necessary, the default values for the parameters in the job's instream procedure:

```
//DSQBIND PROC RGN='2048K',    Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change to your DB2 UDB for OS/390 subsystem ID.
4. Change to your DB2 UDB for OS/390 application requester local subsystem id.
5. Change <location> to the location name of the DB2 for AS/400 database application server as defined in the DB2 UDB for OS/390communications database.
6. (Optional) Review the Comments in the job for further tailoring opportunities.
7. Submit job QMF710.SDSQSAPE(DSQ1BPKG).

8. A return code of 0 or 4 indicates a successful run of this job. Review SYSTSPRT, SYSTERM and SYSPRINT outputs for clues to errors for return codes greater than 4. Perform corrective actions and then re-run this job.

Step 32—Create QMF Sample Tables in a DB2 for AS/400 Server

This step creates the QMF sample tables in DB2 for AS/400.

1. Edit QMF710.SDSQSAPE(DSQ1EAS4).
2. Verify and change, if necessary, the default values for the installation parameters in the both of the job's instream procedures:

```
//DSQEXSQL PROC RGN='2048K',   Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name

//DSQINSQL PROC RGN='2048K',   Job-step region size
//  QMFTPRE='QMF710',          Prefix for QMF target libs
//  DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//  DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change to your DB2 UDB for OS/390 subsystem ID.
4. (Optional) Review the Comments in the job for further tailoring opportunities.
5. Submit job QMF710.SDSQSAPE(DSQ1EAS4).
6. Check Stepname DSQSINS for a return code of 0 or 4. Review SYSTERM for completion messages.

   If the return code is other than 0 or 4, examine SYSTSPRT and SYSPRINT for error messages. Perform corrective actions and then re-run this JOB.

Starting QMF Against A DB2 for AS/400 Server

Assuming you have started QMF under TSO or CICS, you should change the QMF parameters on your START command, if you want to start QMF under DB2 for AS/400. Specify the following:

```
(DSQSSUBS=<ssid>,DSQSDBNM=<location>
```

where <ssid> is your DB2 UDB for OS/390 subsystem ID and <location> is your DB2 for AS/400 location name.

You are ready to continue on to "Chapter 9. Testing Your QMF Install" on page 91.

Chapter 9. Testing Your QMF Install

This chapter describes the final steps in the install process.

The chapter includes the steps:
- "Step 33 (for TSO)—Run the IVP"
- "Step 33 (for CICS)—Run the IVP" on page 93
- Step 34—Install the QMF Application Queries and Application Objects (TSO)
- Step 35—Run the Batch-Mode IVP (Optional)
- Step 36—Clean up after Install
- Step 37—Accept the Permanent Libraries
- Step 38—Clean up Security

Step 33 (for TSO)—Run the IVP

This step leads you through the final testing of QMF, called the installation verification procedure (IVP). To test QMF for OS/390 installation, you need to start QMF and issue a few QMF commands. Most of the QMF product installation is tested by simply starting QMF. If you plan to run QMF in batch mode, there is a separate IVP, which follows the interactive IVP.

1. Complete all the installation and tailoring for the base product, as outlined in this book.
2. Ensure you have proper authority.

   If you start the QMF transaction with the authorization ID of Q, you already have the necessary DB2 UDB for OS/390 authority. If you do not use the authorization ID Q, you need, at a minimum, the authority granted by the following SQL statements:

   ```
   GRANT SELECT ON Q.PROFILES TO authid
   GRANT SELECT ON Q.ERROR_LOG TO authid
   GRANT ALL ON Q.OBJECT_DIRECTORY TO authid
   GRANT ALL ON Q.OBJECT_DATA TO authid
   GRANT ALL ON Q.OBJECT_REMARKS TO authid
   ```

   where *authid* is your primary authorization ID.

   You must also have enough DB2 UDB for OS/390 authority to exercise the IVP's SAVE DATA command. If you created the receiving database and table space, you already have this authority. If not, you need, at a minimum, the authority granted by the following SQL statements:

   ```
   GRANT CREATETAB ON DATABASE dbname TO authid
   GRANT USE OF TABLESPACE dbname.table space TO authid
   ```

where:*dbname* is the database name, *table space* is the table space name, and *authid* is your primary authorization ID.

If you chose the default values when you created the table space and database in "Step 10—Create a Table Space for the QMF IVP" on page 57, the database is named DSQDBDEF, and the table space DSQTSDEF. If not, the names might be from the IVP on an earlier QMF release.

3. Start QMF

   Use the logon procedure or CLIST to invoke QMF, as in "Step 17—Start QMF" on page 67.

   The QMF Home panel displays.

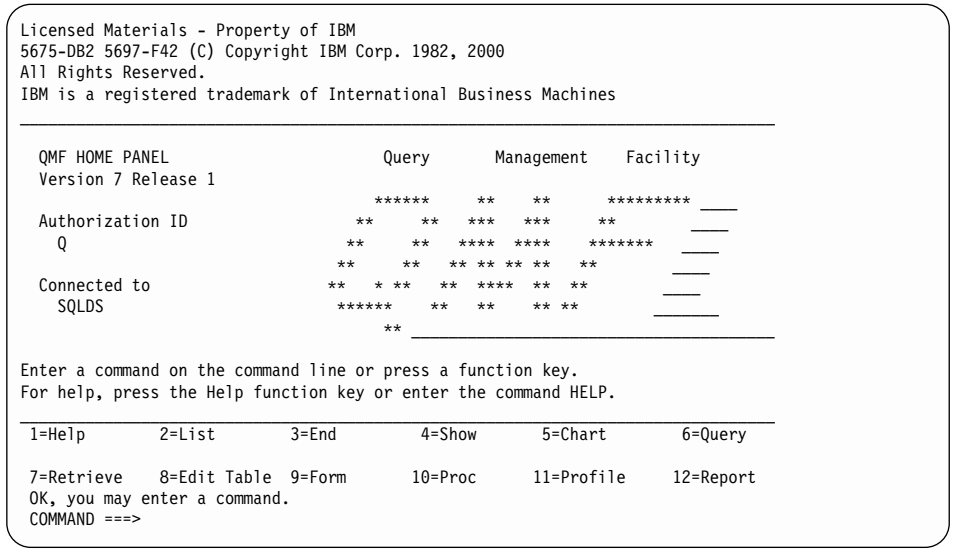


Figure 16. QMF Home panel

If the location name has not been defined for the database, *Connected to <location_name>* will not appear on the QMF Home panel.

Be sure you are connected to the Workstation Database Server or DB2 for OS/390 database in which you just installed QMF. If necessary, you can use the QMF CONNECT command to connect to the correct location.

If QMF does not start correctly, you might receive an error message. See "Appendix A. What if It Didn't Work?" on page 499 for descriptions of common error conditions and corrective actions. Correct the problem and begin the IVP again.

4. Press the Help function key from the Home panel to validate the existence of help panels.
5. Exit from the help panel by pressing either F3 or F12.
6. Obtain a list of QMF-supplied sample tables.

   Type the QMF command `LIST TABLES (OWNER=Q)` on the command line and press Enter.

   If you press F8, additional panels are shown. Return to the QMF Home panel by pressing the Cancel function key. End the QMF session by pressing F12.

The installation verification for interactive mode is now complete.

Step 33 (for CICS)—Run the IVP

This step leads you through the final testing of QMF, called the installation verification procedure (IVP). To test that you have installed QMF for MVS/CICS properly, you need to start QMF and issue a few QMF commands. Most elements of the QMF product installation are tested by starting QMF.

Before You Start QMF

1. Complete all the installation and customization steps outlined in this book.
2. Start the database connection, if not already started.
3. Verify that the QMF Trace Facility is installed by checking the transient data queue (DSQD). From a clear CICS screen, enter:

   ```
   CEMT INQUIRE QUEUE(DSQD)
   ```

   You should see a screen similiar to this:

```
 STATUS:    RESULTS   - OVERTYPE to MODIFY
  Que(DSQD)                  Ext Ena Ope
```

`Ena Ope` indicates that the queue is open and enabled. If you do not see that DSQD is enabled and open, you need to review your modifications to the CICS DCT. Verify that the QMF trace file was installed correctly. See “Step 22—Update CICS Control Tables” on page 74 for details.

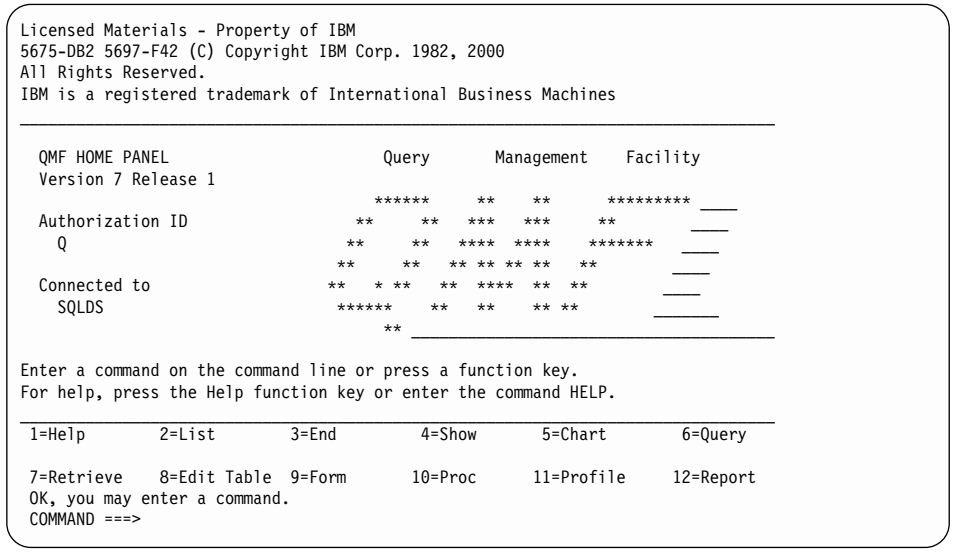
Start and Test QMF

This procedure starts the QMF for MVS/CICS product and tests that the product is properly installed. If you receive an error message during any part of the procedure, it indicates that QMF did not start properly. Under these circumstances, start by investigating some of the more common problems as described in "Appendix A. What if It Didn't Work?" on page 499.

1. Sign on to the CICS system that is connected to QMF.
2. Press the Escape function key to begin a native CICS session.
3. Start QMF by issuing the CICS transaction, QMFE. Also specify the use of the temporary storage queue (DSQSDBQT) so that you can view any warning messages online. To start QMF with the temporary storage queue name, DSQD, specify:

   ```
   QMFE DSQSDBQT=TS,DSQSDBQN=DSQD
   ```

   You should see the QMF Home panel.



4. Verify existence of QMF online help.

   Press the Help function key. You should see this Help panel:

```
Licensed Materials - Property of IBM
5645-DB2 5648-A70 (C) Copyright IBM Corp. 1982, 1998
All Rights Reserved.
IBM is a registered trademark of International Business Machines
+-------------------------------------------------------------------------------+
|                        Help: Query Management Facility                        |
|                                                                               |
| Select a topic.                                                               |
|                                                                 1  to 7  of 14 |
|     1. What's new in Version 7                                                |
|     2. Profile                                                                |
|     3. QMF commands                                                           |
|     4. Prompted Query                                                         |
|     5. SQL (Structured Query Language)                                        |
|     6. Table Editor                                                           |
|     7. Forms                                                                  |
+-------------------------------------------------------------------------------+
| F1=Help  F3=Exit  F7=Backward  F8=Forward  F9=Keys  F12=Cancel                |
+-------------------------------------------------------------------------------+


OK, HELP performed. Please proceed.
```

Exit from the Help panel by pressing either PF3 or PF12.

5. Obtain a list of QMF-supplied sample tables.

   Type the QMF command `LIST TABLES (OWNER=Q)` on the command line and press Enter. Depending on whether you previously installed QMF, the tables that have the owner Q might vary from the following screen:

```
+-------------------------------------------------------------------------------+
|                                  Table List                                   |
|                                                                               |
| Action   Name               Owner                                             |
|                                                           1  to  7 of 36      |
|          APPLICANT          Q                                                 |
|          COMMAND_SYNONYMS   Q                                                 |
|          DSQ_RESERVED       Q                                                 |
|          DSQEC_ALIASES      Q                                                 |
|          DSQEC_COLS_LDB2    Q                                                 |
|          DSQEC_COLS_RDB2    Q                                                 |
|          DSQEC_QMFOBJS      Q                                                 |
|          DSQEC_TABS_LDB2    Q                                                 |
|          DSQEC_TABS_RDB2    Q                                                 |
|          INTERVIEW          Q                                                 |
|          ORG                Q                                                 |
|          PARTS              Q                                                 |
+-------------------------------------------------------------------------------+
| F1=Help  F4=Command  F5=Describe  F6=Refresh  F7=Backward  F8=Forward         |
| F9=Clear  F10=Comments  F11=Sort  F12=Cancel                                  |
+-------------------------------------------------------------------------------+
OK, yout database object list is displayed.
```

If you press PF8, additional panels are shown. Return to the QMF Home panel by pressing the Cancel function key. End the QMF session by pressing PF12.

The installation verification is now complete. You can browse the temporary storage queue to determine if there are any QMF warning messages using the CICS transaction:

```
CEBR DSQD
```

If your IVP ran without any errors, your TS queue DSQD is empty.

Step 34—Install the QMF Application Queries and Application Objects (TSO)

This step updates sample queries and procedures for QMF applications. These applications include Displaying Printed Reports (DPRE), layout, and the document interface. The optional batch IVP uses these sample queries and procedures as part of the test.

After QMF is successfully installed and tested, you can use it to create the QMF-supplied sample queries, procedures, and command synonyms.

You complete this step by running one or two QMF procedures:

Procedure
Description

DSQ1ESQD
Deletes the sample queries and procedures from a previous QMF release

DSQ1ESQI
Adds the new sample queries and procedures to the QMF database

1. Delete the current sample queries and procedures.

   If there is no existing QMF release on the system, or if the previous release is in another DB2 UDB for OS/390 subsystem, skip this step. (There is nothing to delete.)

   a. Begin a QMF session.
   b. Connect to the Workstation Database Server or DB2 for OS/390 server in which you just installed QMF.
   c. Enter the following command from within QMF:

      ```
      IMPORT PROC FROM 'QMF710.SDSQSAPE(DSQ1ESQD)'
      ```

      where *QMF710* is the prefix for the QMF data sets. If you used another prefix, change the name accordingly.
   d. Run the procedure.

2. Add the sample queries and procedures to your QMF database.

   Enter the following command in a QMF session:

   ```
   IMPORT PROC FROM 'QMF710.SDSQSAPE(DSQ1ESQI)'
   ```

where *QMF710* is the prefix for the QMF data sets. If you used another prefix, change the name accordingly.

3. Check that you receive a message that says the objects were installed correctly.

   If a failure occurs, rerun the first execution step to delete any partially created objects. Then run the second step.

Step 35—Run the Batch-Mode IVP (Optional)

Skip this step if your installation doesn't use batch-mode QMF.

This step tests batch-mode IVP by running the batch-mode job that you created in "Step 18—Set up QMF Batch Job to Run Batch IVP (Optional)" on page 70. The job begins a background TSO session in which QMF runs the procedure Q.DSQ1EBAT. The procedure conducts the batch-mode IVP and tests the following batch-mode operations:

- Reaching and starting QMF
- Importing, saving, running, and erasing a query
- Saving, retrieving, and erasing a new table
- Printing a query
- Exporting a query, then erasing it with the QMF TSO command

The IVP is successful when it runs without error and prints the following query:

```
DELETE FROM &NAME
   WHERE OWNER = USER AND NAME = 'QMF_IVPQUERY'
```

1. Examine the JCL.

   The resources QMF needs in batch mode and those it needs interactively are basically the same. You can create the batch job out of the sample TSO logon procedure. Be certain that your batch job allocates DSQPRINT. Output from the QMF PRINT command goes into this file.

2. Examine the QMF procedure Q.DSQ1EBAT.

   You created Q.DSQ1EBAT with the sample queries and procedures. It was saved with SHARE=YES. You can therefore examine and edit it on the screen. If you are not using QMF710 as the prefix for the QMF data sets, you must change the procedure's IMPORT commands, which retrieve queries from the QMF sample library.

   If you change the procedure, you must save it under your own logon ID. If you do, be sure to specify SHARE=YES. Then, if you started QMF as an ISPF dialog, you must change the ISPSTART statement in the batch IVP JCL to reflect the new ownership of the procedure. For example, if your logon ID is JONES, the modified statement looks like this:

   ```
   ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(DSQSMODE=B,DSQSRUN=JONES.DSQ1EBAT)
   ```

3. Run the job.

4. Check the printed output, the table Q.ERROR_LOG, and the DSQDEBUG data set for errors. If an error is recorded in Q.ERROR_LOG or DSQDEBUG, you can use the HELP command to see the corresponding message help panel.

   If the job fails, you can correct the error and rerun it.

Step 36—Clean up after Install

If you do not have a previous release of QMF installed, skip this step.

Attention: This step removes your previous release of QMF. Do not perform this step until you are certain that the earlier version is no longer needed.

Choose one of these procedures:

- Freeing an Earlier Application Plan

  This step removes the previous release when QMF Version 7 and the release are in the same DB2 UDB for OS/390 subsystem.
- QMF Version 7.1 and a Previous Release Are in Different DB2 UDB for OS/390 Subsystems

  This step removes the previous release when QMF Version 7 and the release are in different DB2 UDB for OS/390 subsystems.

After running either of these two substeps, you can delete the libraries of the previous QMF release. Table 13 on page 99 lists these libraries with their default prefixes. The names at your installation might not be the ones shown.

Attention: Pay special attention to the prefix to avoid deleting a Version 6 data set.

Table 13. Libraries to be deleted from earlier QMF releases

V2R4 data sets	V3RxMy data sets
QMF240.DSQOBJ	QMF3xy.ADMFE
QMF240.DSQMACE	QMF3xy.CICS.DFHTEMP
QMF240.DSQPMSE	QMF3xy.DSQPMSE
QMF240.DSQDBRMD	QMF3xy.DSQDBRMD
QMF240.DSQSAMPE	QMF3xy.DSQSAMPE
QMF240.DSQMAPE	QMF3xy.DSQMAPE
QMF240.DSQCLSTE	QMF3xy.DSQCLSTE
QMF240.DSQEXECE	QMF3xy.DSQEXECE
QMF240.DSQUSERE	QMF3xy.DSQUSERE
QMF240.DSQPLIBE	QMF3xy.DSQPLIBE
QMF240.DSQSLIBE	QMF3xy.DSQSLIBE
QMF240.DSQMLIBE	QMF3xy.DSQMLIBE
QMF240.DSQLOAD	QMF3xy.DSQLOAD
QMF240.DSQDBRM	QMF3xy.DSQDBRM
QMF240.DSQTLIBE	QMF3xy.DSQTLIBE
QMF240.DSQCHART	QMF3xy.DSQCHART
	QMF3xy.DSQMACE
	QMF3xy.DSQOBJ
	QMF3xy.DSQPNLE
	QMF3xy.DSQPVARE
	QMF3xy.DSQUCFRM

Freeing an Earlier Application Plan

Run this step only when QMF Version 7 and the previous release are on the same DB2 UDB for OS/390 subsystem.

1. Edit QMF710.SDSQSAPE(DSQ1JFPL).
2. Change the job statement to conform to your site's conventions.
3. Verify, or change if necessary, the values of the parameters in the instream procedure of the job.

```
//DSQ1JFPL PROC RGN='2048K',                Job-step region size
//            QMFTPRE='QMF710',             QMF prefix
//            DB2EXIT='DSN710.SDSNEXIT',    DB2 UDB for OS/390 exit library
//            DB2LOAD='DSN710.SDSNLOAD'     DB2 UDB for OS/390 program library
```

4. Edit QMF710.SDSQSAPE(DSQ1DEL1).
5. Replace DSN with the name of the DB2 UDB for OS/390 subsystem, and replace QMF330 with the name of the application plan of the previous release.

```
DSN SYSTEM(DSN)
FREE PLAN(QMF330)
```

Table 14. QMF release defaults

Previous Release	Default
QMF Version 3.3	QMF330
QMF Version 3.2	QMF320
QMF Version 3.1.1	QMF311
QMF Version 3.1	QMF310
QMF Version 2.4	QMF240

6. Submit the job QMF710.SDSQSAPE(DSQ1JFPL).

   If the job fails, you can correct the error and rerun it.

QMF Version 7.1 and a Previous Release Are in Different DB2 UDB for OS/390 Subsystems

Run this step only if QMF Version 7 and the earlier release are on different DB2 UDB for OS/390 subsystems. The step frees the earlier application plan and drops various DB2 UDB for OS/390 entities that belong to the earlier QMF release.

Attention: This job removes all traces of QMF from the DB2 UDB for OS/390 subsystem and should be run only if the current release of QMF does not exist in the DB2 UDB for OS/390 subsystem.

1. Edit QMF710.SDSQSAPE(DSQ1DELA).
2. Change the job statement to conform to your site's conventions.
3. Verify, or change if necessary, the values of the parameters in the instream procedure of the job.

```
//DSQ1DELA PROC RGN='2048K',                Job-step region size
//            QMFTPRE='QMF710',             QMF prefix
//            DB2EXIT='DSN710.SDSNEXIT',    DB2 UDB for OS/390 exit library
//            DB2LOAD='DSN710.SDSNLOAD'     DB2 UDB for OS/390 program library
```

4. Edit member QMF710.SDSQSAPE(DSQ1DEL1).
5. Replace DSN with the name of the DB2 UDB for OS/390 subsystem and replace QMF311 with the name of the application plan of the previous release.

```
DSN SYSTEM(DSN)
FREE PLAN(QMF320)
```

Table 15. QMF release defaults

Previous Release	Default
QMF Version 3.3	QMF330
QMF Version 3.2	QMF320
QMF Version 3.1.1	QMF311
QMF Version 3.1	QMF310
QMF Version 2.4	QMF240
QMF Version 2.3	QMF230
QMF Version 2.2	QMF220

6. Edit member QMF710.SDSQSAPE(DSQ1DEL2).

   This member contains SQL statements to drop views, table spaces, databases, and storage groups.

   If the previous QMF release doesn't have the receiving table space for the users' SAVE DATA commands and the IVP ("Step 17" on page 57), delete the following statement:

   ```
   DROP STOGROUP DSQSGDEF
   ```

   QMF710

7. Edit member QMF710.SDSQSAPE(DSQ1DEL13)

   This member contains statements to delete user managed datasets for QMF control tables. No need to runt his step if it is DB2 managed.

8. Submit job QMF710.SDSQSAPE(DSQ1DELA).

   If the job fails, you can correct the error and rerun it.

If you are performing a requester or server database installation, go to "Step 38—Clean up Security".

Step 37—Accept the Permanent Libraries

DSQ1EJAC runs the SMP/E ACCEPT job, which makes the libraries permanent.

Attention: If you have QMF Version 7 installed in the same DB2 UDB for OS/390 subsystem as a previous release, do not accept the permanent libraries until your local acceptance testing is complete. You can accept the libraries at any time after successful execution of the IVP.

Step 38—Clean up Security

The JCL currently contains a valid user ID and password, which creates a security exposure. Correct this exposure as soon as possible. One possible solution is to edit the JCL and blank out the password value.

The installation control files contain passwords for the DB2 UDB for OS/390 catalog as well as for all the QMF control table spaces. Delete these passwords or restrict access to them. They are in QMF710.SDSQCLTE(xxxxINST), where "xxxx" is the DB2 UDB for OS/390 subsystem ID.

Chapter 10. Planning and Installing a QMF NLF

A QMF NLF is the software that provides you with a QMF environment tailored to a specific language.

Example
When a user operates QMF in a German-language environment, QMF commands, keywords, windows, and messages are displayed in German.

In general, QMF functions available in the base English-language session can be performed in a NLF session, and vice-versa.

This chapter parallels the installation steps required for the base QMF product. Where there are significant procedural differences, this chapter explains the procedures for installing the NLF. Where there are job, library, or program name differences, this chapter provides the proper names, but the procedures to follow are explained in the QMF Program Directory.

A module, library, or job name may contain a *n*, representing the National Language Identifier. The *n* symbol is replaced with the actual NLF ID before the product is shipped; you do not need to replace the symbol. (See Table 20 on page 106 for a list of the FMID values for each NLF.)

Profile table and NLF

When you install an NLF, three rows are added to the QMF profile table (Q.PROFILES) to support the NLF. These rows are inserted with a user ID of SYSTEM for the TSO, CICS, and CMS environments. A unique row is added for each NLF that you install.

The NLF must be installed in each DB2 subsystem you want to use it in. The JCL and control statements for the NLF are shipped on the IBM software distribution (ISD) tape for that feature.

Notes:

1. You must accept the QMF 7 base product immediately *before* you install a QMF NLF.
2. This installation assumes that QMF is sharing the DB2 SMP/E data sets.

Planning for QMF NLF

This section describes hardware and program product requirements, SMP/E requirements, distribution libraries, target libraries, and user data sets for the NLF.

Hardware and Program Product Requirements

Make sure that your GDDM and ISPF environments, as well as your controllers, terminals, and keyboards, are set up to display the national characters for the national language feature you are installing.

SMP/E Requirements

Additional DASD space is required for the SMP/E data sets, the distribution libraries, the target libraries, and the user data sets. The DASD space shown here for the distribution, target, and user libraries for a QMF NLF is in *addition* to what is required for installing the base QMF product. See "Estimating SMP/E Storage" on page 23 for SMP/E requirements for installing base QMF. QMF and its features are added to the SMP/E data sets.

SMP/E Data Sets for QMF NLF

Additional estimated DASD space required (in cylinders) for the SMP/E data sets is shown in Table 16.

Table 16. Additional DASD space for SMP/E data sets (cylinders)

DDNAME	3380	3390	9345
SMPSCDS	1	1	1
SMPLOG	1	1	1
SMPMTS	1	1	1
SMPPTS	1	1	1
SMPSTS	1	1	1
SMPCSI	8	8	8

Distribution Libraries for QMF NLF

The QMF 7 distribution libraries for the NLF are:

- QMF710.ADSQMACn, which contains QMF NLF installation procedures, IVP, sample queries, and QMF procedures.
- QMF710.ADSQPMSn, which contains ISPF panels for QMF NLF

The QMF NLF distribution libraries and the additional estimated DASD space required (in cylinders) is shown in Table 17 on page 105.

Table 17. Additional DASD space for QMF NLF distribution libraries (cylinders)

DSNAME	Content	3380	3390	9345
QMF710.ADSQMACn	QMF NLF install procs	15	13	15
QMF710.ADSQPMSn	QMF NLF ISPF panels	1	1	1

Target libraries for QMF NLF

Estimated additional DASD space required (in cylinders) for the QMF NLF target libraries is shown in Table 18.

Table 18. Additional DASD space for QMF NLF target libraries (cylinders)

DSNAME	3380	3390	9345
QMF710.SDSQSAPn	17	15	17
QMF710.SDSQPLBn	1	1	1
QMF710.SDSQCLTn	2	1	2
QMF710.SDSQMLBn	1	1	1
QMF710.SDSQEXCn	1	1	1
QMF710.SDSQUSRn			

QMF NLF User Data Sets

Estimated DASD space required (in cylinders) for the QMF NLF user data sets is shown in Table 19.

Table 19. DASD space for QMF NLF user data sets (cylinders)

DSNAME	Content	3380	3390	9345
QMF710.DSQMAPn	GDDM map group files	1	1	1
QMF710.DSQPVARn	QMF message help panels (expanded in sequential format)	6	6	N/A
QMF710.DSQPNLn	QMF message help panels (expanded in VSAM format)	10	9	N/A

IBM Software Distribution (ISD) Tape

To install a QMF NLF, you first read in information from the IBM ISD tape. The tape contains the following:

- SMP/E control statements
- JCLIN for QMF 7 NLF
- JCL for installation-verification procedures

- Programs in load module format
- Panels and other items used by QMF 7 NLF

The ISD tape has an SMP/E (RELFILE) format. The format is fully described in *OS/390 System Modification Program Extended Reference*.

FMID

A function modification identifier (FMID) identifies QMF NLF to SMP/E. The language identifier and FMID for each NLF are provided in Table 20.

Table 20. Language ID and FMID

National Language Feature	Language ID	QMF 7 FMID
U/C English	U	JSQ7751
Simplified Chinese	R	JSQ7753
Danish	Q	JSQ7755
French	F	JSQ7756
German	D	JSQ7757
Italian	I	JSQ7758
Japanese Kanji	K	JSQ7759
Korean Hangeul	H	JSQ775A
Brazil Portuguese	P	JSQ775B
Spanish	S	JSQ775C
Swedish	V	JSQ775D
Swiss French	Y	JSQ775E
Swiss German	Z	JSQ775F
Canadian French	C	JSQ775G

SMP/E associates all modifications of a program to a system release level (SREL) of that program. The system release level for QMF is P115.

All the files on the tape, except the first, are IEBCOPY unloaded partitioned data sets and correspond to the NLF distribution libraries. The first data set contains SMP/E control statements for NLF. This tape contains all the procedures and data required for installation.

The Installation Process

The installation steps are outlined on the following pages. To fully understand the installation steps, you should read the discussion in Chapter 2 of this book. Also, refer to the NLF program directory.

The NLF JCL and control statements are shipped on the ISD tape. The following figures show the steps required to install QMF 7 in a DB2 subsystem with or without an earlier QMF NLF release.

The NLF requires the use of the QMF 7 sample library, QMF710.SDSQSAPE, and the load module library, QMF710.SDSQLOAD.

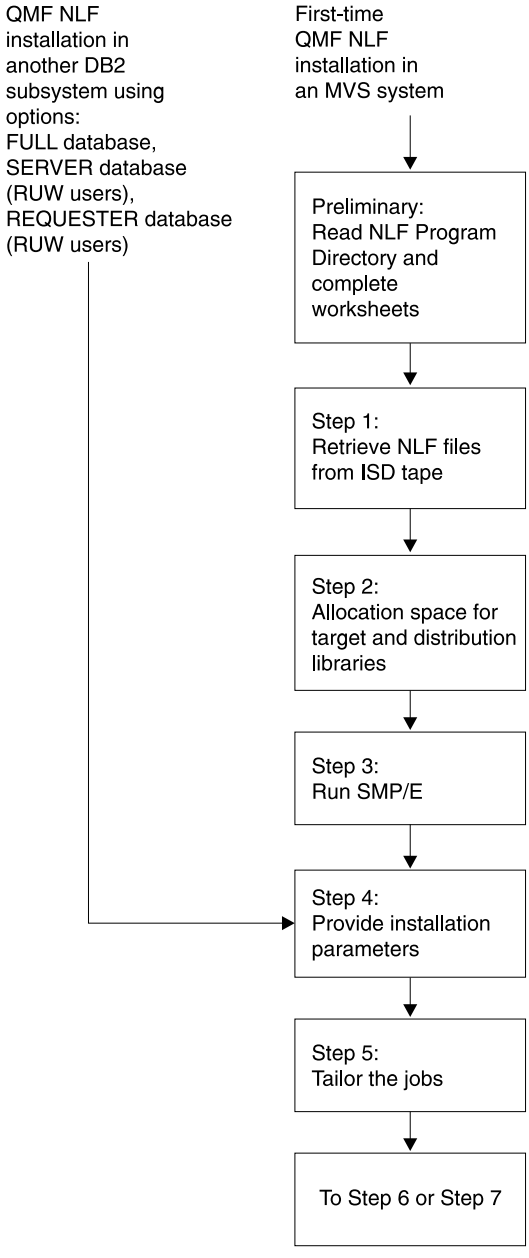


Figure 17. Installation steps for QMF NLF -- Part 1

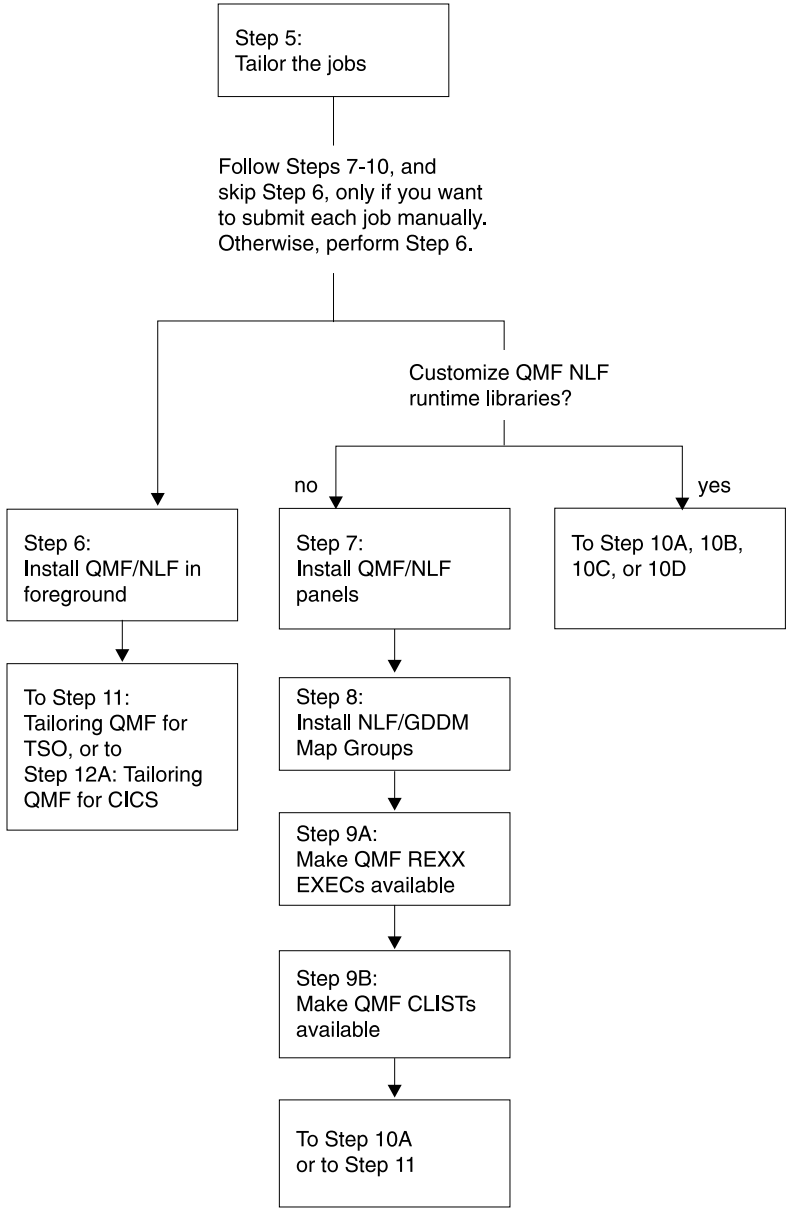


Figure 18. Installation Steps for QMF NLF -- Part 2

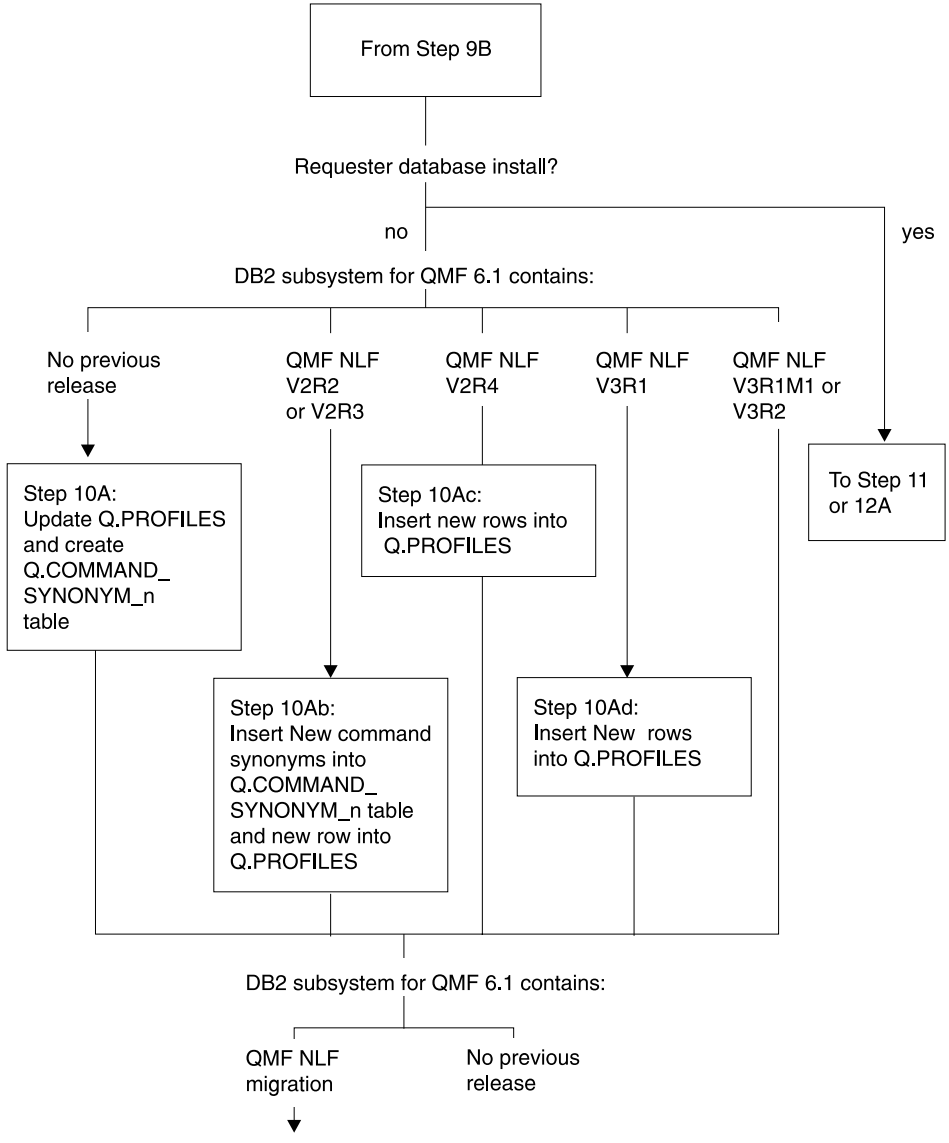


Figure 19. Installation Steps for QMF NLF -- Part 3

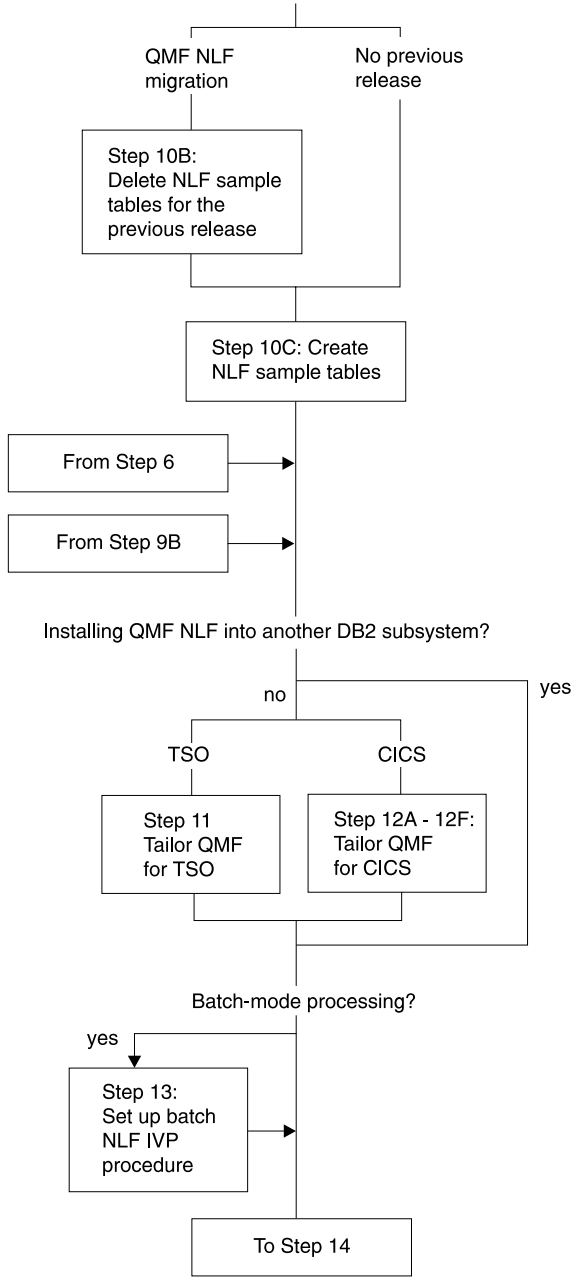


Figure 20. Installation Steps for QMF NLF -- Part 4

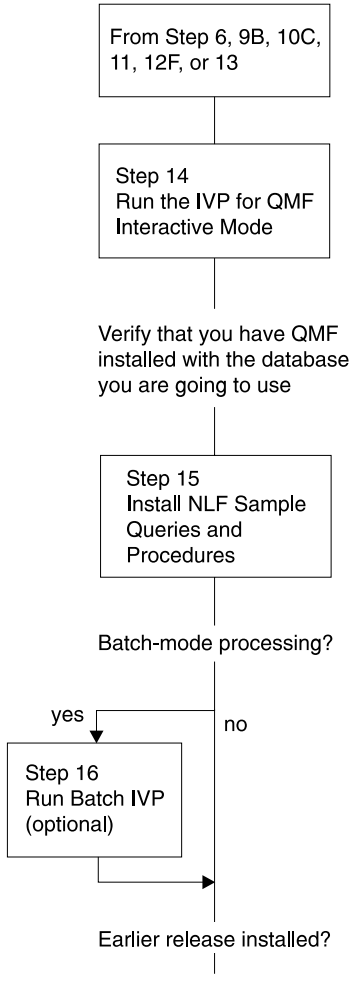


Figure 21. Installation Steps for QMF NLF -- Part 5

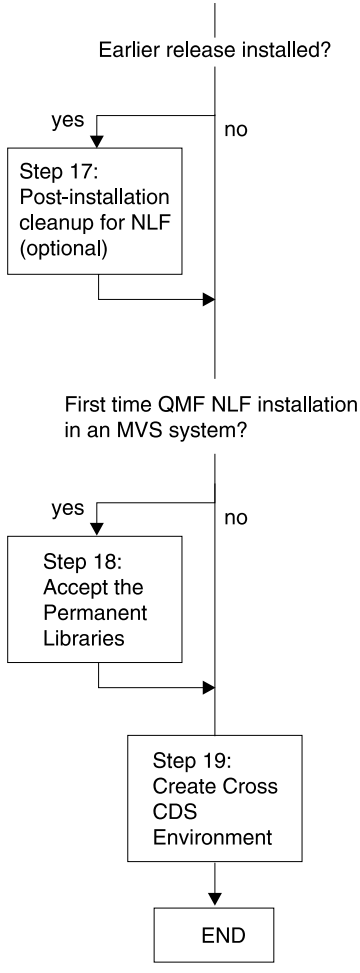


Figure 22. Installation Steps for QMF NLF -- Part 6

Preliminary: Read the Program Directory and Complete NLF Worksheet

Before beginning the installation process, read the NLF program directory for supplementary data. Because the program directory is updated between releases of QMF NLF, it may contain useful information, including descriptions of PTFs and APARs, as well as modifications to this book that may have occurred since its publication date. Table 21 on page 114 shows the information that you will have to provide during QMF NLF installation. You can use it as your own worksheet.

Table 21. QMF NLF Installation Parameters (Version 7 Worksheet-Part 1)

PARAMETER	VALUE
Target Library Prefix (Default = QMF710)	
Distribution Library Prefix (Default = QMF710)	
Target Library Volume (Default = xxxxxx)	
Distribution Library Volume (Default = yyyyyy)	
SMP/E Data Set Prefix (Default = IMSVS)	
Local DB2 Subsystem ID (Default=DSN)	
Local DB2 Release Level (Default=V3R1)	
Local DB2 Exit Library (Default=DSN710.SDSNEXIT)	
Local DB2 Load Library (Default=DSN710.SDSNLOAD)	
Communications database installed at local DB2	yes or no
Gather the following information, if the communications database is installed at the local DB2:	
Scope of Install	F (full database), S (server database), or R (requester database)
Gather the following information, if the scope of the database install is not “S”:	
Customize QMF runtime libraries	yes or no
QMF application plan ID (Default=QMF710)	
Gather the following information, if the scope of the database install is “F”, or “S”.	
QMF tablespace catalog alias (Default=QMFDSN)	
QMF tablespace catalog password (for QMF control tables)	
QMF tablespaces volume	
DB2 default punctuation	, (comma) or . (period)
Previous QMF NLF Level (Migration Installs Only)	2.2, 2.3, 2.4, 3.1, 3.1.1, 3.2, 3.3 or NONE

Table 22. QMF NLF Installation Parameters (Version 7 Worksheet-Part 2)

PARAMETER	PRIMARY	SECONDARY
Gather the following information, if the the scope of the database install is not “R”.		

Table 22. QMF NLF Installation Parameters (Version 7 Worksheet-Part 2) (continued)

PARAMETER	PRIMARY	SECONDARY
QMF Control Table tablespace Sizes: (in 1K units) Table Space name Default size (primary, secondary) - Q.COMMAND_SYNONYMS_n (100,20) (see note)	_____	_____
Sizes: (in 1K units) Table Index name Default size (primary, secondary) - Q.COMMAND_SYNONYMSX_n (100,20) (see note)	_____	_____
Determine the following, if applicable:		
Install QMF NLF jobs in the foreground or tailor the JCL files yourself and run each job in batch?	foreground or batch	
Do you have fixed or variable-length CLIST libraries?	variable or fixed	
Do you have fixed or variable-length EXEC libraries?	variable or fixed	
Do you want SAVE DATA table space created?	yes or no	

Before performing the following steps, you must first install QMF NLF in your OS/390 environment using SMP/E as documented in the QMF NLF Program Directory.

Step 1—Provide QMF NLF Installation Parameters

In this step, you provide information that describes your QMF and DB2 environments. You are presented with a series of QMF Installation Dialog panels that let you “fill-in” the required data. Use the information that you provided in the worksheet, Table 21 on page 114.

Preparation

Before starting this step, consider the following requirements:

1. To do this step, you must be in an active ISPF session.
2. If you have not used the QMF target library names as originally specified in DSQ1nJAL (i.e., no user changes other than allowed variables, such as QMFTPRE), you must either alter the DSQ1nINS, DSQ1nIN1, and DSQ1nIN2 CLISTS, or skip to “Steps 4-8—Submit Jobs Manually” on page 124.

3. If you are installing QMF into another database, ensure that the QMF target libraries you are using for the installation CANNOT BE ACCESSED by users of other databases during installation.
4. Fixed-block SDSQCLTn and SDSQEXCn are required for Steps 1 thru 3.

Execution

Enter the following:

```
TSO EXEC 'prefix.SDSQCLTn(DSQ1nINS)' 'QMFPRE(prefix)'
```

where *prefix* is the QMF target library prefix you provided in the worksheet.

Obtain the parameter input panels, in one of the following ways:

- If this is the "first time" that you provide installation parameters, you are presented with the first parameter input panel *automatically*.
- If this step has been completed successfully at least once, you are presented with an initial panel offering you four options:

  P installation parameters

  T tailor install files

  I install in foreground

  X exit install dialogs

  Choose the **P** option to obtain the first parameter input panel.

As you enter the information on each panel, your input is saved in the QMF710.SDSQCLTn library under the database name that you chose.

If you leave this step before completing the last panel, your input will not be saved. The last panel asks you for job card information used to tailor the installation. If you plan to install in the foreground, you do not need to provide job card information; just enter x in the indicated spot on the panel.

When you have supplied the last installation parameter, the Main menu is displayed. If you want to review or modify the parameters, enter **P** and proceed through the input panels again.

If you are satisfied with your installation parameters, continue with the next step. (If you prefer, you can leave the installation process at this point and return later; your installation parameters are saved.) Use the information from your worksheets to work through the panels.

Main menu: The main menu is displayed if you saved any install parameters. Otherwise, it is the first panel you see when you invoke the install.

This menu lets you provide installation parameters, tailor jobs, install QMF NLF in the foreground, or exit install dialogs.

```
                          INSTALL QMF NLF -- MAIN MENU
ISPF COMMAND ===>



    CURRENTLY WORKING ON INSTALLATION INTO DB2 SUBSYSTEM DSN

    YOU CAN NOW RE-SPECIFY THE INSTALL PARAMETERS, TAILOR THE INSTALLATION
    FILES, INSTALL QMF WITH THE TAILORED FILES IN FOREGROUND, QUIT AND RUN
    THE TAILORED INSTALL FILES IN BATCH, OR QUIT AND RETURN HERE LATER.


    ENTER CHOICE HERE        ===>               ("P" - INPUT PARAMETERS,
                                                 "T" - TAILOR INSTALL FILES,
                                                 "I" - INSTALL IN FOREGROUND,
                                                 "X" - EXIT INSTALL DIALOGS)



    PRESS:  ENTER TO CONTINUE    PF01 FOR HELP    PF03  TO END
```

Figure 23. Dialog main menu

Note: The last-used DB2 subsystem name is displayed on this panel.

The following options are available on this panel:

P Customizes QMF NLF install parameters, which are described in the following panels.

If you want to customize QMF NLF install parameters for another DB2 subsystem, you can ignore the DB2 subsystem name displayed in this panel and proceed to the next panel by entering “P”.

T Tailors all the required NLF install data sets for QMF 7.

These panels are not displayed in this manual.

I Installs QMF NLF in foreground. This option lets you submit your the jobs (steps 4 through 8) in an online environment. These panels are not displayed in this manual.

X Exits the install dialogs.

Local DB2 parameters: This panel is displayed first if you have not saved any install parameters. Otherwise, it is displayed only if you have chosen the “P” option.

```
                    INSTALL QMF NLF -- LOCAL DB2 PARAMETERS
ISPF COMMAND ===>

    LOCAL DB2 SUBSYSTEM ID    ===>

    LOCAL DB2 RELEASE LEVEL   ===>         ("31" FOR V3R1)

    LOCAL DB2 EXIT LIBRARY    ===>

    LOCAL DB2 LOAD LIBRARY    ===>


    COMMUNICATIONS DATABASE(CDB) INSTALLED AT LOCAL DB2  ===>     ("Y","N")




    PRESS:  ENTER TO CONTINUE    PF01 FOR HELP    PF03  TO END
```

Figure 24. Local DB2 parameters

The following options are available on this panel:

LOCAL DB2 SUBSYSTEM ID
Specify the DB2 subsystem ID in which QMF application plan was bound (required; default is DSN).

LOCAL DB2 RELEASE LEVEL
Specify the DB2 release level of the local DB2 subsystem (required; no default).

LOCAL DB2 EXIT LIBRARY
Specify the DB2 exit library for the local DB2 subsystem (required; no default).

LOCAL DB2 LOAD LIBRARY
Specify the DB2 load library for the local DB2 subsystem (required; no default).

COMMUNICATIONS DATABASE(CDB) INSTALLED AT LOCAL DB2
Specify, if the DB2 communications database is installed at the local DB2 subsystem (required; no default).

Scope of Database Install: This panel is displayed if the DB2 release level is "23" and the communications database is installed with the local DB2.

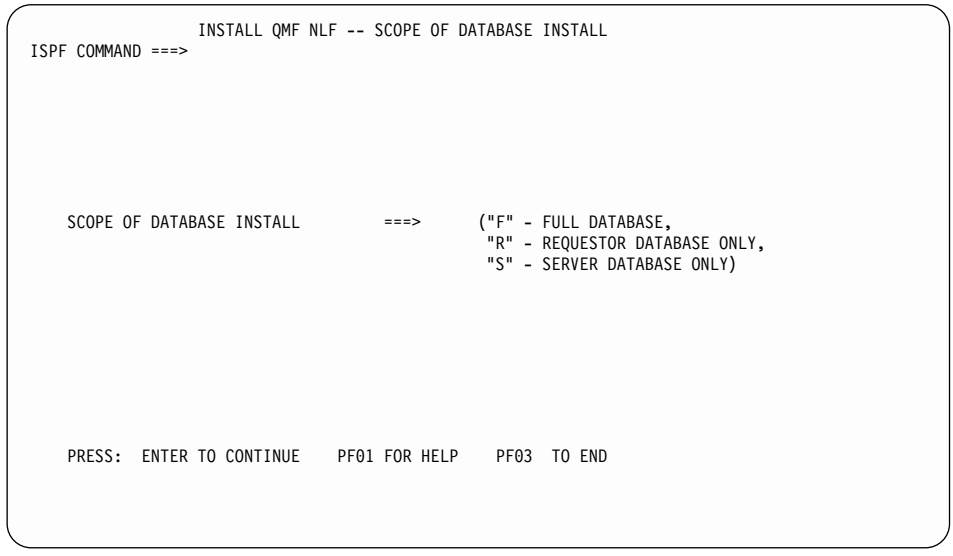


Figure 25. Database install scope

The following option is available on this panel:

SCOPE OF DATABASE INSTALL
Specify the scope of the database install. The allowable options are FULL database, REQUESTER database, and SERVER database. See "Road Maps for the QMF Installation Process" on page 10 for more information on these options.

If you are installing QMF 7 NLF for the first time, select the FULL database install option.

QMF Parameters at Local DB2: This panel is displayed if this is not a SERVER database install.

```
                INSTALL QMF NLF -- QMF PARAMETERS AT LOCAL DB2
ISPF COMMAND ===>



    CUSTOMIZE QMF RUNTIME LIBRARIES           ===>              ("Y" OR "N")

      - INSTALL QMF PANELS
      - INSTALL QMF/GDDM MAP GROUPS
      - INSTALL QMF/GDDM SAMPLE CHARTS FORMS
      - MAKE QMF REXX EXECS AVAILABLE
      - MAKE QMF CLISTS AVAILABLE



    QMF APPLICATION PLAN ID AT LOCAL DB2      ===>




    PRESS:  ENTER TO CONTINUE    PF01 FOR HELP    PF03  TO END
```

Figure 26. QMF parameters at local DB2

The following options are available on this panel:

CUSTOMIZE QMF RUNTIME LIBRARIES
Specify, provided the QMF NLF runtime libraries require customization. You only need to customize these libraries once per operating system (required; no default).

QMF APPLICATION PLAN ID AT LOCAL DB2
Specify the QMF application plan name that was bound at the local DB2 subsystem (required; no default).

DB2 and QMF Parameters: This panel is displayed next.

```
                  INSTALL QMF NLF -- DB2 AND QMF PARAMETERS
ISPF COMMAND ===>


    QMF TABLESPACES CATALOG ALIAS      ===>

    QMF TABLESPACES CATALOG PASSWORD   ===>

   QMF TABLESPACES VOLUME      ===>        ("SYSxxx" OR "AST",
                                            x is from 0 to 9,
                                            AST stands for *)

    DEFAULT PUNCTUATION                 ===>             ("," OR ".")

    PREVIOUS QMF LEVEL                  ===>            ("V2R2","V2R3","V2R4",
                                                         "V3R1","V3R1M1",
                                                         "V3R2","V3R3","V6R1"
                                                         "NONE")


    PRESS:  ENTER TO CONTINUE    PF01 FOR HELP    PF03  TO END
```

Figure 27. DB2 and QMF parameters

The following options are available on this panel:

QMF TABLESPACES CATALOG ALIAS
Specify the VCAT name for all the QMF NLF table spaces. The VSAM data sets that associate with these QMF NLF table spaces have the high level qualifier of this alias value. If you are migrating from a previous level of QMF, you should use the same alias value as the previous release (required; no default).

QMF TABLESPACES CATALOG PASSWORD
Specify the password for all the QMF NLF control table spaces and index spaces that are created by the installation (optional).

QMF TABLESPACES VOLUME
Specify a volume serial number within which the QMF NLF table spaces reside (required; no default).

DEFAULT PUNCTUATION
Specify the symbol for a decimal point in DB2 for QMF NLF (required; no default).

PREVIOUS QMF LEVEL
Specify the release level of QMF NLF that you are migrating from (required; if you do not have any previous release level in the database, enter NONE).

Space Parameters for QMF Indexspaces: This panel is displayed if there is no previous QMF NLF release level installed in the database.

```
             INSTALL QMF NLF -- QMF INDEXSPACES SPACE PARAMETERS
ISPF COMMAND ===>

    SPECIFY THE SIZES (IN 1K UNITS) FOR THE FOLLOWING TABLE INDEXES




       TABLE INDEX            PRIMARY        SECONDARY
       -----------            -------        ---------

       Q.COMMAND_SYNONYMX_n   ===>           ===>







    PRESS:  ENTER TO CONTINUE    PF01 FOR HELP    PF03  TO END
```

Figure 28. QMF indexspaces space parameters

Note: The default sizes in 1 KB units are listed above.

Specify the primary and secondary allocations for the QMF index spaces. These values are used when QMF allocates all the VSAM files for these table spaces. Depending on the size of your installation, you may need to increase or decrease the default sizes to allow free space for expansion.

Jobcard: This panel is always displayed as the last panel for the “P” option.

```
                          INSTALL QMF NLF -- JOBCARD
ISPF COMMAND ===>

    MODIFY THE JOB CARDS BELOW TO REPRESENT YOUR INSTALLATION REQUIREMENTS
    THE "USER" AND "PASSWORD" PARAMETERS MUST BE SPECIFIED IN SYSTEMS USING
    RACF. USE A USERID WITH THE APPROPRIATE AUTHORITY FOR THE DATABASE. SEE
    THE "QUERY MANAGEMENT FACILITY: INSTALLATION GUIDE FOR MVS" PUBLICATION
    FOR MORE DETAIL.


    IF YOU WILL BE PERFORMING THE INSTALLATION IN FOREGROUND AND DO NOT
    THE JCL FILES TO BE TAILORED, ENTER AN 'X' HERE.  ===>


    JOB STATEMENT INFORMATION:
    ===> //QMFINSTL JOB (ACCT),NAME,
    ===> //          CLASS=A,MSGCLASS=A,MSGLEVEL=(1,1),
    ===> //          USER=Q,PASSWORD=Q
    ===> //*

    PRESS:  ENTER TO CONTINUE    PF01 FOR HELP    PF03  TO END
```

Figure 29. Jobcard

This jobcard is used to submit all the QMF install jobs at your installation.

Step 2—Tailor the Jobs

When you are satisfied with your installation parameters, select the **T** option on the "**P T I**" panel. The following will happen:

- A message tells you that the system is tailoring the JCL for the installation path you selected in "Step 1—Provide QMF NLF Installation Parameters" on page 115.
- QMF710.SDSQEXCn(DSQSCMDn), the QMF callable interface REXX EXEC, is modified to update the default values for parameters `planid` and `DB2 subsystem name`, unless you are performing a server database installation.

At the conclusion of this step, the "**P T I**" panel is displayed. You can then proceed with the installation of QMF NLF.

If you plan to tailor online, you should not alter the install JCL and control files sequence. This is so, because this CLIST requires the JCL and control files to be in a particular sequence. If you alter the sequence of JCL or control files, you must modify this CLIST.

Installing QMF NLF

You can install the tailored jobs in either of the following two ways:

- Install the jobs in the foreground ("Step 3—Install QMF NLF in the Foreground" on page 124)

- Submit each job manually (starting with "Step 4—Install QMF Panels") This option enables you to meet the needs of your installation environment. It lets you modify certain installation parameter values that are provided by default.

Step 3—Install QMF NLF in the Foreground

If you want to install QMF NLF in the foreground, select the **I** option on the "**P T I**" panel. A dialog panel is then displayed, requesting installation options. After you enter the information, a message tells you that installation is proceeding.

DB2 Authority

When you submit the jobs in the foreground, they are installed under your current LOGON ID. If your LOGON ID has "Q" as its authorization ID, you will need, as a minimum, DB2 authority granted by the following SQL statements:

```
GRANT USE OF BUFFERPOOL BP0 TO Q
GRANT CREATESG TO Q
GRANT SELECT ON SYSIBM.SYSTABLES TO Q WITH GRANT OPTION
GRANT SELECT ON SYSIBM.SYSTABAUTH TO Q WITH GRANT OPTION
GRANT SELECT ON SYSIBM.SYSCOLUMNS TO Q WITH GRANT OPTION
```

If your LOGON ID has an authorization other than "Q", you need the authority granted by the following SQL statement:

```
GRANT SYSADM TO authid
```

where *authid* is the primary authorization ID. You are now done with Step 3. Continue installation with one of the following:

- "Step 8—Tailor NLF/QMF for TSO" on page 134
- "Step 9—Tailor NLF/QMF for CICS" on page 136

If you are installing QMF NLF into another DB2 subsystem:

- Using full or server database, go to "Step 7A—Update QMF Control Tables" on page 128.
- Using requester database, go to "Step 8—Tailor NLF/QMF for TSO" on page 134 or "Step 9A—Add NLF/QMF Transaction ID to DB2 RCT" on page 136.

Steps 4-8—Submit Jobs Manually

The following steps describe how to install QMF in a batch environment.

Step 4—Install QMF Panels

This step copies the expanded version of QMF panels to the panel file, QMF710.DSQPNLn.

Preparation

The job for this step is in QMF710.SDSQSAPn(DSQ1nPNL). If the tailoring performed in "Step 3—Install QMF NLF in the Foreground" on page 124 was not sufficient, change the JOB statement to conform to your installation. You may also have to change the values of two parameters in the job's instream procedure:

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
The prefix for the QMF target libraries (**QMF710**)

RGN The job step region size (**2048K**)

Execution

Run job DSQ1nPNL in library QMF710.SDSQSAPn.

Rerunning the Job

Before rerunning the job, do the following:

- Delete the members, if any, that were added to the target library.
- Recover the used space by compressing the library.
- Fix the errors that caused the failure.

Step 5—Install NLF/GDDM Map Groups

QMF uses the GDDM screen mapping functions. This step expands the NLF/GDDM map group files located in the sample library (default name is QMF710.SDSQSAPn) to the target map group library (default name is QMF710.DSQMAPn).

Preparation

The job for this step is QMF710.SDSQSAPn(DSQ1nMAP). If the tailoring performed in "Step 3—Install QMF NLF in the Foreground" on page 124 was not sufficient, change the JOB statement to conform to your installation requirements. You may also have to change the values of two parameters in the job's instream procedure:

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
The prefix for the QMF target libraries (**QMF710**)

RGN The job step region size (**2048K**)

Execution

Run job DSQ1nMAP (in the library QMF710.SDSQSAPn).

Rerunning the Job

Before rerunning the job, do the following:

- Delete the members, if any, that were added to the target library.
- Recover the used space by compressing the library.
- Fix the errors that caused the failure.

Step 6—Converting REXX EXEC or CLIST Records

This step converts QMF REXX EXEC or QMF CLIST records from fixed to variable length.

Step 6A—Converting QMF REXX EXEC Records: Fixed Length to Variable

Note: You must have TSO/E Version 2 (or later) installed to use REXX EXECs in an OS/390 environment.

Later in this procedure, you will need to allocate the QMF EXEC library (QMF710.SDSQEXCn) as a SYSEXEC data set. To do this, the library should be concatenated to other EXEC libraries.

Example

In the following JCL the library QMF710.SDSQEXCn is concatenated to an EXEC library named SYS2.EXEC.

```
//SYSEXEC  DD DSN=SYS2.EXEC,DISP=SHR
//         DD DSN=QMF710.SDSQEXCn,DISP=SHR
```

The QMF EXEC library contains fixed-length records. It can only be concatenated to the other EXEC libraries that have fixed-length records. If they have variable-length records, you must create a copy of the QMF library with variable-length records. Check the following:

- If the other EXEC libraries have fixed-length records, skip this step.
- If the other EXEC libraries have variable-length records, continue with this step. (Later you'll use the created copy (QMF710.NEW.SDSQEXCn) of the QMF EXEC library in the SYSEXEC concatenations.)

For more information, see *Developing QMF Applications.*

Preparation: The job for this step is QMF710.SDSQSAPn(DSQ1nJVE). Change 'xxxxxx' in the DSQTEVB.SYSUT2 statement to the serial number of the volume for the copy of the library. If the tailoring performed in "Step 2—Tailor the Jobs" on page 123 was not sufficient, you may want to do the following:

- Change the job statement to conform to your installation.

- Change, if necessary, the value of the QMFTPRE parameter in the job's instream procedure. This value is the prefix for the QMF libraries (default is QMF710).
- Leave the EXEC procedure parameter blank — it is used by the job when the procedure is called.
- Change, if necessary, the name of this library.

Execution: Run job DSQ1nJVE.

Rerunning the Job: If the job fails, you can correct the error and rerun it.

Step 6B—Converting QMF CLISTs Records: Fixed Length to Variable

Later in this procedure, you will need to allocate the QMF CLIST library (QMF710.SDSQCLTn) as a SYSPROC data set. To do this, the library should be concatenated to other CLIST libraries.

Example

In the following JCL the library QMF710.SDSQCLTn is concatenated to a CLIST library named SYS2.CLIST.

```
//SYSPROC  DD  DSN=SYS2.CLIST,DISP=SHR
//         DD  DSN=QMF710.SDSQCLTn,DISP=SHR
```

The QMF CLIST library contains fixed-length records. It can only be concatenated to the other CLIST libraries that have fixed-length records. If they have variable-length records, you must create a copy of the QMF library with variable-length records. Check the following:

- If the other CLIST libraries have fixed-length records, skip this step.
- If the other CLIST libraries have variable-length records, continue with this step. (Later you'll use the created copy (QMF710.NEW.SDSQCLTn) of the QMF CLIST library in the SYSPROC concatenations.)

Preparation: The job for this step is QMF710.SDSQSAPn(DSQ1nJVC). Change 'xxxxxx' in the DSQTIVB.SYSUT2 statement to the serial number of the volume for the copy of the library. If the tailoring performed in "Step 2—Tailor the Jobs" on page 123 was not sufficient, you may want to do the following:

- Change the job statement to conform to your installation.
- Change, if necessary, the value of the QMFTPRE parameter in the job's instream procedure. This value is the prefix for the QMF libraries (default is QMF710).
- Leave the 'CLIST' procedure parameter blank - it is used by the job when the procedure is called.

- Change, if necessary, the name of this library.

Execution: Run job DSQ1nJVC.

Rerunning the Job: If the job fails, you can correct the error and rerun it.

If you are doing a requester database install, go to "Step 8—Tailor NLF/QMF for TSO" on page 134 or "Step 9A—Add NLF/QMF Transaction ID to DB2 RCT" on page 136.

Step 7A—Update QMF Control Tables

The substep (7Aa, 7Ab, 7Ac, 7Ad) you perform depends on the type of migration installation you are running:

- If no previous QMF NLF release is installed, do "Substep 7Aa—Without a Previous QMF NLF Release".
- If you are running a QMF NLF 2.2 or 2.3 migration, do "Substep 7Ab—With QMF NLF 2.2 or 2.3" on page 129.
- If you are running a QMF NLF 2.4, do "Substep 7Ac—With QMF NLF 2.4" on page 130.
- If you are running a QMF NLF 3.1, do "Substep 7Ad—With QMF NLF 3.1" on page 131.
- If QMF NLF 3.1.1, QMF NLF 3.2, or QMF NLF 3.3 is in this DB2 subsystem, skip to "Step 7B—Delete Earlier QMF NLF Sample Tables" on page 132.

For all these steps that run TSO batch, check the steps completion code in the system messages. Completion messages can be found in the SYSTSPRT or the SYSTERM output, as indicated. SYSPRINT provides additional diagnostic information for IBM support.

Substep 7Aa—Without a Previous QMF NLF Release

Perform this step if you do not have a previous QMF NLF installed.

On this step, you do the following:

- Add NLF entries in the Q.PROFILES table. The job is QMF710.SDSQSAPn(DSQ1nUPO).
- Create, for the NLF environment, a command synonyms table named Q.COMMAND_SYNONYM_n. The job is QMF710.SDSQSAPn(DSQ1nCCS).

Preparation: Change the JOB statements for DSQ1nUPO and DSQ1nCCS to fit your installation. The value of the USER parameter in the job statement is currently "Q" for the owner of the QMF tables. Change this value to your primary authorization ID if your authorization ID is not Q.

Also make the necessary changes to the following parameter values in the job's instream procedure:

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
Prefix of the QMF target libraries (**QMF710**)
DB2EXIT
Name of the DB2 exit library (**DSN710.SDSNEXIT**)
DB2LOAD
Name of the DB2 program library (**DSN710.SDSNLOAD**)
RGN Job step region size (**2048K**)

DB2 Authority: If you are the user "Q", run the following query to give you enough authority to run the jobs:

```
GRANT CREATETAB ON DATABASE DSQDBCTL TO Q
```

You may need the query if the database DSQDBCTL was not created by the user Q.

If you are not the user "Q", run the following queries, to give you enough authority to run the jobs:

```
GRANT INSERT, UPDATE ON TABLE Q.PROFILES TO authid
GRANT CREATETAB ON DATABASE DSQDBCTL TO authid
```

where *authid* is your primary authorization ID.

Execution: Run the appropriate jobs:
- DSQ1nUPO, to add a line to Q.PROFILES
- DSQ1nCCS, to run required SQL statements

Review SYSTERM for completion messages. If errors occur then examine SYSTSPRT and SYSPRINT for error messages.

Rerunning the Job: If the job fails, you can correct the error and rerun it.

Substep 7Ab—With QMF NLF 2.2 or 2.3

Perform this step only if you are migrating from QMF NLF 2.2 or 2.3.

This job adds your NLF equivalents of the IRM and LAYOUT command synonyms to the Q.COMMAND_SYNONYM_n table, and update the Q.PROFILES control table.

Preparation: The job used in this step is QMF710.SDSQSAPn(DSQ1nICS). Change the job statement to conform to your installation. Also, make the necessary changes to the following parameters in the job's instream procedure:

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
The prefix name of the QMF target libraries (**QMF710**)
DB2EXIT
Name of the DB2 exit library (**DSN710.SDSNEXIT**)
DB2LOAD
Name of the DB2 program library (**DSN710.SDSNLOAD**)
RGN Job-step region size (**2048K**)

DB2 Authority: If you are the user "Q", you have the necessary authority to run the job.

If you are not the user "Q", run the following query, to get the necessary authority:

```
GRANT INSERT ON TABLE Q.COMMAND_SYNONYM_n TO authid
```

where *authid* is your primary authorization ID.

Execution: Run job QMF710.SDSQSAPn(DSQ1nICS).

Review SYSTERM for completion messages. If errors occur then examine SYSTSPRT and SYSPRINT for error messages.

Rerunning the Job: If the job fails, you can correct the error and rerun it.

Substep 7Ac—With QMF NLF 2.4

Perform this step only if you are migrating from QMF NLF V2R4.

This job updates the Q.PROFILES control table.

Preparation: The job used in this step is QMF710.SDSQSAPn(DSQ1nUP1). Change the job statement to conform to your installation. Change, if necessary, the installation parameter values in the job's instream procedure:

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
The prefix name of the QMF target libraries (**QMF710**)
DB2EXIT
Name of the DB2 exit library (**DSN710.SDSNEXIT**)
DB2LOAD
Name of the DB2 program library (**DSN710.SDSNLOAD**)
RGN Job-step region size (**2048 KB**)

DB2 Authority: If you are the user Q, you have the necessary authority to run the job.

If you are not the user Q, run the following query to get the necessary authority:

```
GRANT INSERT ON TABLE Q.PROFILES TO authid
```

where *authid* is your primary authorization ID.

Execution: Run job QMF710.SDSQSAPn(DSQ1nUP1).

Review SYSTERM for completion messages. If errors occur then examine SYSTSPRT and SYSPRINT for error messages.

Rerunning the Job: If the job fails, you can correct the error and rerun it.

Substep 7Ad—With QMF NLF 3.1

Perform this step only if you are migrating from QMF NLF V3R1.

This job updates the Q.PROFILES control table.

Preparation: The job used in this step is QMF710.SDSQSAPn(DSQ1nUP2). Change the job statement to conform to your installation's requirements. Change, if necessary, the installation parameter values in the job's instream procedure:

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
The prefix name of the QMF target libraries (**QMF710**)
DB2EXIT
Name of the DB2 exit library (**DSN710.SDSNEXIT**)
DB2LOAD
Name of the DB2 program library (**DSN710.SDSNLOAD**)
RGN Job-step region size (**2048K**)

DB2 Authority: If you are the user Q, you have the necessary authority to run the job.

If you are not the user Q, run the following query, to get the necessary authority:

```
GRANT INSERT ON TABLE Q.PROFILES TO authid
```

where *authid* is your primary authorization ID.

Execution: Run job QMF710.SDSQSAPn(DSQ1nUP2).

Review SYSTERM for completion messages. If errors occur then examine SYSTSPRT and SYSPRINT for error messages.

Rerunning the Job: If the job fails, you can correct the error and rerun it.

Step 7B and 7C—Establish the QMF NLF Sample Tables

Skip both steps 7B and 7C if either of the following apply:

- The NLF is the upper case feature (UCF).
- You already have the sample tables installed from an earlier Version 2 (any release) of QMF NLF.

These two steps establish the QMF NLF sample tables. The first step drops previously created tables, the second step installs new ones. In the event of a failure, you can restart both of these steps because database changes are not committed until the job run by the step ends.

Step 7B—Delete Earlier QMF NLF Sample Tables

Do this step if you are installing QMF 7 NLF into a DB2 subsystem that also contains a previous release of QMF NLF. Otherwise, skip to "Step 7C—Create the NLF Sample Tables" on page 133.

This step deletes the sample tables that were created when the earlier version was installed. The QMF NLF sample tables have been modified for QMF 7 NLF.

Preparation

The job used in this step is QMF710.SDSQSAPn(DSQ1nDSJ). If the tailoring performed in "Step 3—Install QMF NLF in the Foreground" on page 124 was not sufficient, change the job statement to conform to your installation's requirements. Change, if necessary, the installation parameter values in the job's instream procedure:

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
The prefix name of the QMF target libraries (**QMF710**)
DB2EXIT
Name of the DB2 exit library (**DSN710.SDSNEXIT**)
DB2LOAD
Name of the DB2 program library (**DSN710.SDSNLOAD**)
RGN Job-step region size (**2048K**)

Make no other modifications to the job.

DB2 Authorization

If you are not the user "Q", run the following query to grant you the necessary authority:

```
GRANT SYSADM TO authid
```

where *authid* is your primary authorization ID.

Execution

Run job DSQ1nDSJ (in the library QMF710.SDSQSAPn). Review SYSTERM for completion messages. If errors occur then examine SYSTSPRT and SYSPRINT for error messages.

Rerunning the Job

If the job fails, you can correct the error and rerun it. It may, however, fail because the tables it attempts to drop have already been dropped.

Step 7C—Create the NLF Sample Tables

This step creates the NLF sample tables.

Note: QMF NLF users at locations within the network are authorized to use all the sample tables created at the location into which you are installing the QMF NLF.

Preparation

The job for this step is QMF710.SDSQSAPn(DSQ1nIVS). If the tailoring performed in step 3 was not sufficient, change the job statement to fit your installation requirements. Change, if necessary, the values for the installation parameters in the job's instream procedure:

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
The prefix for the QMF target libraries (**QMF710**)

DB2EXIT
Name of the DB2 exit library (**DSN710.SDSNEXIT**)

DB2LOAD
Name of the DB2 program library (**DSN710.SDSNLOAD**)

RGN Job-step region size (**2048K**)

CDS, CDP
Identify the punctuation mark for the decimal point used in decimal fractions. This must match the DECPOINT option that was specified when DB2 was installed:

- For a period, leave the current values as they are.
- For a comma, change CDS to **6** and CDP to **7**.

For more information on the DECPOINT option, see *DB2 UDB for OS390 Installation Guide.*

DB2 Authority

If you are the user "Q", you need, as a minimum, DB2 authority granted by the following SQL statements:

```
GRANT SELECT ON SYSIBM.SYSTABLES TO Q WITH GRANT OPTION
GRANT SELECT ON SYSIBM.SYSTABAUTH TO Q WITH GRANT OPTION
GRANT SELECT ON SYSIBM.SYSCOLUMNS TO Q WITH GRANT OPTION
```

If you are not the user "Q", run the following query to give you the necessary authority:

```
GRANT SYSADM TO authid
```

where *authid* is your primary authorization ID.

Execution

Run job DSQ1nIVS (in the library QMF710.SDSQSAPn). Review SYSTERM for completion messages. If errors occur then examine SYSTSPRT and SYSPRINT for error messages.

Rerunning the Job

If the job fails, you can correct the error and rerun it.

If you are installing QMF NLF into another database, go to "Step 12—Set Up NLF Batch Job to Run Batch IVP (Optional)" on page 142.

You are now ready to tailor NLF/QMF for TSO or CICS.

- For information on tailoring QMF NLF for TSO, see the next section.
- For information on tailoring QMF NLF for CICS, see "Step 9—Tailor NLF/QMF for CICS" on page 136.

Step 8—Tailor NLF/QMF for TSO

To create a TSO logon procedure for NLF, first make a copy of the TSO logon procedure for the QMF base product.

Except for the following changes to the TSO logon procedure, the procedure for tailoring NLF/QMF for TSO is that outlined in "Chapter 5. Tailoring QMF for TSO" on page 63.

- The following NLF libraries should be concatenated in front of the QMF base libraries.
  - The statement to concatenate to the ADMGGMAP DD statement is:

    ```
    //ADMGGMAP  DD DSN=QMF710.DSQMAPn,DISP=SHR
    ```

  - The statement to concatenate to the ISPPLIB DD statement is:

    ```
    //ISPPLIB  DD DSN=QMF710.SDSQPLBn,DISP=SHR
    ```

  - The statement to concatenate to the ISPMLIB DD statement is:

    ```
    //ISPMLIB  DD DSN=QMF710.SDSQMLBn,DISP=SHR
    ```

  - The statement to concatenate to the SYSPROC DD statement is:

```
//SYSPROC  DD DSN=QMF710.SDSQCLTn,DISP=SHR
```

– The statement to concatenate to the SYSEXEC DD statement is:

```
//SYSEXEC  DD DSN=QMF710.SDSQEXCn,DISP=SHR
```

– The statement to concatenate to the DSQPNLn DD statement is:

```
//DSQPNLn  DD DSN=QMF710.DSQPNLn,DISP=SHR
```

- The statement to start QMF with ISPF looks like the following:

```
ISPSTART PGM(DSQQMFn) NEWAPPL(DSQn) PARM(DSQSSUBS=dbname,...)
```

The ISPF Master Application Menu should be changed as shown in the following figure (DSQQMFn is the NLF program).

```
%------------------------  MASTER APPLICATION MENU  --------------------
%SELECT APPLICATION ===>_OPT     +
%                                                          +USERID   -
%                                                          +TIME     -
%   1 +SPF        - SPF PROGRAM DEVELOPMENT FACILITY       +TERMINAL -
+   2 +QMF        - QMF QUERY MANAGEMENT FACILITY          +PF KEYS  -
%   3 +QMFn       - QMF NATIONAL LANGUAGE FEATURE
%
%
%
%
%
%
%   P +PARMS      - SPECIFY TERMINAL PARAMETERS AND LIST/LOG DEFAULTS
%   X +EXIT       - TERMINATE USING LIST/LOG DEFAULTS
%
+PRESS%END KEY+TO TERMINATE +
%
)INIT
)PROC
  &SEL = TRANS( TRUNC (&OPT,'.')
                1,'PANEL(ISR@PRIM) NEWAPPL'
                2,'PGM(DSQQMFE) NEWAPPL(DSQE)'
                3,'PGM(DSQQMFn) NEWAPPL(DSQn)'
           /*                              */
           /* ADD OTHER APPLICATIONS HERE */
           /*                              */
                P,'PANEL(ISPOPT)'
                X,'EXIT'
              ' ',' '
                *,'?' )
)END
```

Figure 30. QMF Dialog on ISPF Master Application Menu for NLF

- The statement to start QMF without ISPF looks like the following:

```
DSQQMFn DSQSPLAN=planid,DSQSSUBS=dbname,...
```

where DSQQMFn is the NLF program.

Step 9—Tailor NLF/QMF for CICS

You can run this step after the QMF product has been tailored for CICS as described in "Chapter 6. Tailoring QMF for CICS" on page 71. If you are migrating from QMF 3.1, you need to run all the steps except "Step 9Da—Update CICS Control Tables (CICS V2 Only)" on page 137. (For information on CICS migration considerations, see *Installing and Managing QMF for OS/390*.)

Step 9A—Add NLF/QMF Transaction ID to DB2 RCT

The database plan ID and authorization ID for a transaction are specified in the DB2 resource control table (RCT). For example, to specify a transaction ID of "QMFn" and an authorization ID of "DEPT1", add the following statement:

```
DSNCRCT TYPE=ENTRY,TXID=QMFn,PLAN=QMF710,AUTH=DEPT1
```

QMF ships a sample RCT entry located in QMF710.SDSQSAPn(DSQ1nRCT).

After the RCT is updated with information describing the QMF transaction to DB2, you must then re-generate your RCT.

Step 9B—Link-Edit with DFHEAI and DFHEAI0

QMF uses the CICS command-level application programming interface to operate under CICS. It is therefore necessary to link-edit QMF with the EXEC interface modules DFHEAI and DFHEAI0 before you can run any QMF programs. To include CICS interface modules DFHEAI and DFHEAI0, you must run this step each time you apply QMF service.

Substep 9Ba—Link-Edit QMF with CICS Command Interface Modules

This job link-edits QMF NLF modules with CICS command level support modules DFHEAI and DFHEAI0.

Preparation: The job used in this step is QMF710.SDSQSAPn(DSQ1nLNK). Change the job statement to conform to your installation. Change, if necessary, the values for the installation parameters in the job's instream procedure:

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
The prefix name of the QMF target libraries (**QMF710**)
REG The job-step region size (**4096**)
OUTC The job output class (*****)
CLOAD
The name of the CICS load library (**CICS.LOADLIB**)

After completing this job, examine the listing and ensure that all modules have been link-edited successfully.

Note: You must rerun this job if any of the modules are changed by PTF.

Substep 9Bb—Translate, Assemble and Link-Edit the QMF Supplied Governor

Preparation: The job used in this step is QMF710.SDSQSAPn(DSQ1nGLK). Change the job statement to conform to your installation. Change, if necessary, the values for the installation parameters in the job's instream procedure:

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
The prefix name of the QMF target libraries (**QMF710**)
REG The job-step region size (**4096**)
OUTC The job output class (*****)
CLOAD
The name of the CICS load library (**CICS.LOADLIB**)
CMACS
The name of the CICS macro library (**CICS.MACLIB**)
SUFFIX
The CICS ASM Translator suffix (**1$**)
ASMBLR
The name of the Assembler (**IEV90**)
WORK
The name of the work volume unit (**SYSDA**)

Step 9C—Load QMF/GDDM Map Sets to the ADMF Data Set

Preparation: The job used in this step is QMF710.SDSQSAPn(DSQ1nADM). Change the job statement to conform to your installation. Change, if necessary, the values for the installation parameters in the job's instream procedure.

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
The prefix name of the QMF target libraries (**QMF710**)
REG The job-step region size (**2048**)
GDDM
The name of the GDDM ADMF data set (**GDDM.ADMF**)

Step 9Da—Update CICS Control Tables (CICS V2 Only)

Before you can run the NLF/QMF feature under CICS, QMF entries must be defined as follows:

FCT (File Control Table): Describes the QMF panel file that contains NLF/QMF help and screen definitions. Add or copy member DSQ1nFCT (in library QMF710.SDSQSAPn) into existing FCT entries on your CICS system.

PCT (Program Control Table): Describes the QMF transaction name for this NLF/QMF. Add or copy member DSQ1nPCT (in library QMF710.SDSQSAPn) into existing PCT entries on your CICS system.

PPT (Processing Program Table): Describes the QMF programs that contain NLF/QMF constants and messages. Add or copy member DSQ1nPPT (in library QMF710.SDSQSAPn) into existing PPT entries on your CICS system.

After you include or copy members into your CICS system, assemble and link-edit.

Step 9Db—Update CICS Control Tables (CICS ESA Only)

Before you can run the NLF/QMF feature under CICS, QMF entries must be defined in the CICS system definition file (CSD).

Preparation: The job used in this step is QMF710.SDSQSAPn(DSQ1nCSD). Change the job statement to conform to your installation. Change, if necessary, the values for the installation parameters in the job's instream procedure:

Parameter name
Description of value (Default in parenthesis)

QMFTPRE
The prefix name of the QMF target libraries (**QMF710**)
REG The job-step region size (**2048**)
OUTC The job output class (*****)
CLOAD
The name of the CICS load library (**CICS.LOADLIB**)
CCSD The name of the CICS CSD data set (**CICS.DFHCSD**)

Step 9E—Update CICS Region Job Stream

The QMF panel file must be added to the existing JCL that is used to start the CICS region containing QMF. Add the following statement:

```
//DSQPNLn DD DSN=QMF710.DSQPNLn,DISP=SHR
```

where *n* is the NLF character.

Step 9F—Run the IVP

Run the IVP as indicated in "Step 33 (for CICS)—Run the IVP" on page 93, changing the following names:

- QMF320.DSQSAMPE to QMF710.SDSQSAPn
- DSQ1EIVC to DSQ1nIVC

where *n* is the NLF character.

Step 10—Tailoring QMF NLF for a Workstation Database Server (Optional)

QMF support for Workstation Database Server is optional. You need to perform the steps described in this step only if you intend to run a Workstation Database Server as an application server for your QMF NLF.

Before you install a QMF NLF into a Workstation Database Server from OS/390, you need to verify that you have followed the steps needed to install the QMF base product into your Workstation Database Server database. The installation of a QMF NLF requires that the outbound Workstation Database Server ID has SYSADM authority. For more information about installing QMF into a Workstation Database Server, see "Chapter 7. Tailoring QMF for Workstation Database Servers" on page 81.

For all these steps that run TSO batch, check the steps completion code in the system messages. Completion messages can be found in the SYSTSPRT or the SYSTERM output, as indicated. SYSPRINT provides additional diagnostic information for IBM support.

Step 10A—Create QMF NLF Control Tables in a Workstation Database Server

This step creates QMF NLF command synonym tables and profile rows in a Workstation Database Server.

1. Edit QMF710.SDSQSAPE(DSQ1nDJ2).
2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQ1TBJ4 PROC RGN='2048K',              Job-step region size
//             QMFTPRE='QMF710',          Prefix for QMF target libraries
//             DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//             DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change *DSN* in SYSTEM(DSN) to your DB2 UDB for OS/390 subsystem ID.
4. Submit job QMF710.SDSQSAPE(DSQ1nDJ2).
5. Check for a return code of 0 or 4. Review SYSTERM for completion messages.

   Do not proceed if the return code is other than zero or four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Step 10B—Create QMF NLF Sample Tables in a Workstation Database Server

This step creates the QMF NLF sample tables in a Workstation Database Server.

1. Edit QMF710.SDSQSAPE(DSQ1nDJ4).
2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQ1TBJ4 PROC RGN='2048K',              Job-step region size
//            QMFTPRE='QMF710',           Prefix for QMF target libraries
//            DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 library name
//            DB2LOAD='DSN710.SDSNLOAD'   DB2 program library name
```

3. Change *DSN* in SYSTEM(DSN) to your DB2 UDB for OS/390 subsystem ID.
4. Submit job QMF710.SDSQSAPE(DSQ1nDJ4).
5. Check for a return code of 0 or 4. Review SYSTERM for completion messages.

   Do not proceed if the return code is other than zero or four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Deleting QMF NLF from a Workstation Database Server

This section describes how to delete QMF NLF from a Workstation Database Server.

Deleting QMF from a Workstation Database Server: This step should be run only if you are re-installing QMF into a Workstation Database Server that already contains QMF.

Attention: This step will delete the QMF NLF command synonym tables and system profile rows from a Workstation Database Server.

1. Edit QMF710.SDSQSAPE(DSQ1nDX1).
2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQ1TBJ4 PROC RGN='2048K',              Job-step region size
//            QMFTPRE='QMF710',           Prefix for QMF target libraries
//            DB2EXIT='DSN710.SDSNEXIT',  Exit DB2 library name
//            DB2LOAD='DSN710.SDSNLOAD'   DB2 program library name
```

3. Change *DSN* in SYSTEM(DSN) to your DB2 UDB for OS/390 subsystem ID.
4. Submit job QMF710.SDSQSAPE(DSQ1nDX1).
5. Check for a return code of 0 or 4. Review SYSTERM for completion messages.

   Do not proceed if the return code is other than zero or four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Deleting QMF NLF Sample Tables from a Workstation Database Server: This step should be run only if you are re-installing the QMF NLF into a Workstation Database Server that already contains the QMF NLF.

This step will drop and create all QMF NLF sample tables and tablespace from a Workstation Database Server.

1. Edit QMF710.SDSQSAPE(DSQ1nDX2).

2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQ1TBJ4 PROC RGN='2048K',              Job-step region size
//             QMFTPRE='QMF710',          Prefix for QMF target libraries
//             DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
//             DB2LOAD='DSN710.SDSNLOAD'  DB2 program library name
```

3. Change *DSN* in SYSTEM(DSN) to your DB2 UDB for OS/390 subsystem ID.
4. Submit job QMF710.SDSQSAPE(DSQ1nDX2).
5. Check for a return code of 0 or 4. Review SYSTERM for completion messages.

   Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Step 11—Tailoring QMF NLF for a DB2 for AS/400 Server (optional)

QMF support for DB2 for AS/400 Database Servers is optional. You need to perform the steps described in this step only if you intend to run a DB2 for AS/400 Database Server as an application server for your QMF NLF. Before you install a QMF NLF into a DB2 for AS/400 Database Server from OS/390, you need to verify that you have followed the steps needed to install the QMF base product into your DB2 for AS/400 Database Server database.

For all these steps that run TSO batch, check the step's completion code in the system messages. Completion messages can be found in the SYSTSPRT or the SYSTERM output, as indicated. SYSPRINT provides additional diagnostic information for IBM support.

Create QMF NLF control table updates in a DB2 for AS/400 server.

1. Edit QMF710.SDSQSAPE(DSQ1nAS2).
2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQ1nAS2 PROC RGN='2048K', Job-step region size
 // QMFTPRE='QMF710', Prefix for QMF target libraries
 // DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
 // DB2LOAD='DSN710.SDSNLOAD' DB2 program library name
```

3. Change in SYSTEM() to your DB2 for OS/390 subsystem ID.
4. Carefully read the comments in the job and make any changes necessary.
5. Submit job QMF710.SDSQSAPE(DSQ1nAS2).
6. Check for a return code of 0 or 4. Review SYSTERM for completion messages. Do not proceed if the return code is other than zero or four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Create QMF NLF Sample Tables in a DB2 for AS/400 Server

1. Edit QMF710.SDSQSAPE(DSQ1nAS4).

2. Verify and change, if necessary, the default values for the installation parameters in the job's instream procedure:

```
//DSQ1nAS4 PROC RGN='2048K', Job-step region size
// QMFTPRE='QMF710', Prefix for QMF target libraries
// DB2EXIT='DSN710.SDSNEXIT', Exit DB2 library name
// DB2LOAD='DSN710.SDSNLOAD' DB2 program library name
```

3. Change in SYSTEM() to your DB2 for OS/390 subsystem ID.
4. Carefully read the comments in the job and make any changes necessary.
5. Submit job QMF710.SDSQSAPE(DSQ1nAS4).
6. Check for a return code of 0 or 4. Review SYSTERM for completion messages. Do not proceed if the return code is other than zero or four. Examine SYSTSPRT or SYSPRINT for error messages. Perform corrective actions and then re-run this job.

Step 12—Set Up NLF Batch Job to Run Batch IVP (Optional)

For the NLF, you must modify the TSO logon procedure described in "Step 18—Set up QMF Batch Job to Run Batch IVP (Optional)" on page 70. Modify the ISPSTART command at the end of that procedure as follows:

```
ISPSTART PGM(DSQQMFn) NEWAPPL(DSQn) PARM(DSQSMODE=B,DSQSRUN=Q.DSQ1nBAT)
```

Step 13—Running the IVP for QMF Interactive Mode

See "Step 33 (for TSO)—Run the IVP" on page 91 and "Step 33 (for CICS)—Run the IVP" on page 93 for information on running the IVP. The NLF IVP (DSQ1nIVP) (found in the library QMF710.SDSQSAPn) is used to verify the NLF. This procedure (DSQ1nIVP) imports a query from the QMF English sample library (*prefix*.SDSQSAPE), where *prefix* is the prefix for the QMF data sets.

The procedures were written assuming that this prefix is QMF710. If this is not your prefix, change QMF710 to match your prefix wherever it appears in the DSQ1nIVP procedure.

```
IMPORT PROC FROM 'QMF710.SDSQSAPn(DSQ1nIVP)'
RUN PROC
```

Step 14—Installing the National Language Sample Queries and Procedures

After the QMF NLF is installed and verified, use it to install the translated versions of the sample queries and procedures. You do this in two steps:

- "Step 14A—Deleting the Existing Sample Queries and Procedures" on page 143
- "Step 14B—Installing the National Language Sample Queries and Procedures" on page 143

Step 14A—Deleting the Existing Sample Queries and Procedures

Skip this step if you do not have a previous release of the QMF NLF with the same language identifier installed at your location.

To delete the existing sample queries and procedures, import and run the QMF procedure DSQ1nSQD (from the QMF 7 sample library, QMF710.SDSQSAPn), using translated QMF commands where appropriate. This procedure (DSQ1nSQD) imports a query from the QMF English sample library (*prefix*.SDSQSAPE), where *prefix* is the prefix for the QMF data sets.

The procedures were written assuming that this prefix is QMF710. If this is not your prefix, change QMF710 to match your prefix wherever it appears in the DSQ1nSQD procedure.

```
IMPORT PROC FROM 'QMF710.SDSQSAPn(DSQ1nSQD)'
RUN PROC
```

You may see the Database Status panel when you perform this step. You are not required to perform any action because of it.

DB2 Authorization: If you are the user Q, you already have the necessary authority.

If you are not the user Q, run the following query to give you the necessary authority:

```
GRANT UPDATE ON Q.OBJECT_DIRECTORY TO authid
GRANT UPDATE ON Q.OBJECT_REMARKS TO authid
GRANT UPDATE ON Q.OBJECT_DATA TO authid
```

where *authid* is your primary authorization ID.

Restarting this step: If the job fails, you can proceed to the next step.

Step 14B—Installing the National Language Sample Queries and Procedures

To install the National Language sample queries and procedures, import and run the QMF procedure in QMF710.SDSQSAPn (DSQ1nSQI), using translated QMF commands where appropriate. This procedure (DSQ1nSQI) imports a query from the QMF English sample library (*prefix*.SDSQSAPE), where *prefix* is the prefix for the QMF data sets.

The procedures were written assuming that this prefix is QMF710. If this is not your prefix, change QMF710 to match your prefix wherever it appears in the DSQ1nSQI procedure.

```
IMPORT PROC FROM 'QMF710.SDSQSAPn(DSQ1nSQI)'
RUN PROC
```

If you are not the user Q, see Step 34—Install the QMF Application Queries and Application Objects (TSO) for the necessary GRANT queries you must run.

This step also installs the batch mode IVP and sample application procedures.

DB2 Authorization: If you are the user "Q," you already have the necessary authority.

If you are not the user Q, run the following query to give you the necessary authority:

```
GRANT UPDATE ON Q.OBJECT_DIRECTORY TO authid
GRANT UPDATE ON Q.OBJECT_REMARKS TO authid
GRANT UPDATE ON Q.OBJECT_DATA TO authid
```

where *authid* is your primary authorization ID.

Restarting this step: If a failure occurs during this job, correct the error and run procedure DSQ1nSQD, which deletes any previously created sample queries. Then rerun procedure DSQ1nSQI.

Step 15—Running the Batch-Mode IVP (Optional)

See "Step 35—Run the Batch-Mode IVP (Optional)" on page 97 for information on running the batch IVP. Start the batch IVP by using the national language program, DSQQMFn, instead of DSQQMFE. This step uses the QMF 7 batch IVP.

Step 16—Post-installation Cleanup

See "Step 36—Clean up after Install" on page 98 for information on cleanup activities following installation.

Skip this step if you do not already have an earlier release of the QMF NLF installed.

You may want to delete libraries of an earlier QMF NLF release. These are listed in the following figure with their default prefixes.

Attention: Pay special attention to the prefix to avoid deleting a QMF 7 data set.

V2R2 Data Sets	V2R3 Data Sets	V2R4 Data Sets	V3R1 Data Sets
QMF220.DSQMACn	QMF230.DSQMACn	QMF240.DSQMACn	QMF310.DSQMACn
QMF220.DSQPMSn	QMF230.DSQPMSn	QMF240.DSQPMSn	QMF310.DSQPMSn
QMF220.DSQSAMPn	QMF230.DSQSAMPn	QMF240.DSQSAMPn	QMF310.DSQSAMPn
QMF220.DSQMAPn	QMF230.DSQMAPn	QMF240.DSQMAPn	QMF310.DSQMAPn
QMF220.DSQCLSTn	QMF230.DSQCLSTn	QMF240.DSQCLSTn	QMF310.DSQCLSTn
QMF220.DSQPLIBn	QMF230.DSQPLIBn	QMF240.DSQEXECn	QMF310.DSQEXECn
QMF220.DSQSLIBn	QMF230.DSQSLIBn	QMF240.DSQUSERn	QMF310.DSQUSERn
QMF220.DSQMLIBn	QMF230.DSQMLIBn	QMF240.DSQPLIBn	QMF310.DSQPLIBn
QMF220.DSQTLIBn	QMF230.DSQTLIBn	QMF240.DSQSLIBn	QMF310.DSQSLIBn
		QMF240.DSQMLIBn	QMF310.DSQMLIBn
		QMF240.DSQTLIBn	QMF310.DSQTLIBn

V3R1M1 Data Sets	V3R2 Data Sets	V3R3 Data Sets	V6R1 Data Sets
QMF311.DSQMACn	QMF320.DSQMACn	QMF330.DSQMACn	QMF610.ADSQMACn
QMF311.DSQPMSn	QMF320.DSQPMSn	QMF330.DSQPMSn	QMF610.ADSQPMSn
QMF311.DSQSAMPn	QMF320.DSQSAMPn	QMF330.DSQSAMPn	QMF610.SDSQSAPn
QMF311.DSQMAPn	QMF320.DSQMAPn	QMF330.DSQMAPn	QMF610.SDSQPLBn
QMF311.DSQCLSTn	QMF320.DSQCLSTn	QMF330.DSQCLSTn	QMF610.SDSQCLTn
QMF311.DSQEXECn	QMF320.DSQEXECn	QMF330.DSQEXECn	QMF610.SDSQMLBn
QMF311.DSQUSERn	QMF320.DSQUSERn	QMF330.DSQUSERn	QMF610.SDSQEXCn
QMF311.DSQPLIBn	QMF320.DSQPLIBn	QMF330.DSQPLIBn	QMF610.SDSQUSRn
QMF311.DSQSLIBn	QMF320.DSQSLIBn	QMF330.DSQSLIBn	QMF610.DSQMApn
QMF311.DSQMLIBn	QMF320.DSQMLIBn	QMF330.DSQMLIBn	
QMF311.DSQTLIBn	QMF320.DSQTLIBn	QMF330.DSQTLIBn	

Figure 31. Libraries to be deleted from earlier QMF NLF releases

Step 17—Accept the Permanent Libraries

Do this step if this is a first-time QMF NLF install for language *n* in an OS/390 system.

The job name for this step is DSQ1nJAC, which invokes procedure DSQ1nJSM or the SMP/E procedure used at your installation. See “Step 37—Accept the Permanent Libraries” on page 101 for information on running the SMP/E ACCEPT step.

Step 18—Create a Cross-CDS Environment

Skip this step if no maintenance changes were made to modules common to base QMF 7 and the NLF. This step allows SMP/E to keep track of changed modules.

This step contains an SMP/E job to update the JCLIN data in the SMP/E environment. This job is located in member DSQ1nCDS (in library QMF710.SDSQSAPn). The input to this job is located in member DSQ1nJCL (in library QMF710.SDSQSAPn).

Chapter 11. Binding QMF 7.1 Packages at a Remote Server

In order for a QMF Version 7 Release 1 requester installation to be able to communicate to a server, QMF 7.1 packages must be present at the server. If a complete QMF 7.1 new or migration installation was performed at the server, communications can be started and nothing further needs to be done. But, for those servers containing QMF 3.3 or above where migration is not a current option, you can run the job DSQ1BPKG found in the QMF710.SDSQSAPE dataset. This job binds QMF 7.1 packages at any server specified (provided QMF 3.3 or higher is detected at the server). Read, tailor and submit job DSQ1BPKG to perform the binds. Check the job output for error messages and re-run as necessary.

Scenerio for use: Local DB2 for OS/390 subsystem, DB2G is migrated from QMF 3.3 to QMF 7.1. QMF users in subsystem DB2G regularly communicate with a DB2 for VM server, SQLV61A, which contains QMF 3.3. The DB2 for VM DBA cannot perform a QMF migration to 7.1 at the VM server. In order for the QMF 7.1 installation in DB2G to communicate with QMF on SQLV61A, job DSQ1BPKG must be run to bind packages at the DB2 for VM server.

Part 2. Managing QMF for OS/390

Chapter 12. Required Storage

Use this section to ensure that you have enough storage for the queries and reports each QMF user might create. For information on prerequisite hardware software and requirements for library space, VSAM space, and DB2 database space, see “Part 1. Installing QMF on OS/390” on page 1.

QMF Storage Requirements

Before you start using QMF, you need to make sure that there is enough storage to accommodate QMF programs and the QMF reports users create.

The OS/390 region must be large enough to accommodate:

All QMF modules: 2.8 MB 31-bit storage, total

The environment needs to accommodate:

Storage for users to execute queries and hold QMF report data: 0.5 MB to 1 MB storage per user

You may require more than 1 MB of storage if you use competing options for a report, or if a query results in the return of a large amount of data. For more information about how to adjust for these differences, see “DSQSBSTG (Adjusting Storage for Report Data)” on page 180.

You can allocate storage for both purposes above 16 MB.

OS/390 Storage

About user storage: 0.5 to 1 MB is needed to run QMF. Additional storage is required for other applications. For example, if you run in a standard TSO environment with ISPF and GDDM, you need approximately 6 MB.

Most of the QMF modules are reentrant and can be loaded into EPLPA. One 52K module must run in 24-bit mode below 16 MB. This module is also reentrant and can be loaded into PLPA.

CICS/MVS Region

If you have OS/390 default storage allocated to run, 32 MB is available above 16 MB when you specify a CICS region of less than 16 MB. You need to

specify a region less than 16 MB for the CICS environment that is running QMF transactions. You need at least 60 MB of available storage above 16 MB to run 50 QMF transactions. Any region specification larger than 16 MB causes two allocations. Below 16 MB, the entire private area is allocated. This does not leave sufficient local system queue area (LSQA) for CICS to process. Use the OS/390 system exits, IEALIMIT or IEFUSI, to change the region size. Use one of the exits to increase the region above 16 MB to a value greater that 32 MB.

If you run QMF with the default OS/390 region limited to 32 MB located above 16 MB, you can run approximately 26 QMF transactions.

CICS/ESA Region

In CICS 3.1, dynamic storage area (DSA) can be allocated above and below 16 MB. The DSA above 16 MB is called extended DSA (EDSA). The DSA size is specified in the CICS system initialization table parameters DSASZE and EDSASZE. The CICS default value for EDSASZE, 1536KB, might be too small to support QMF users. We recommend that you increase EDSASZE to the range of 16 to 50 MB, depending on the number of concurrent QMF users. One formula to use is 16 MB plus 1 MB for each QMF concurrent user. For more information on this subject, see *CICS for VSE/ESA System Definition and Operations Guide*

Chapter 13. Starting QMF

This chapter discusses the various ways you can start QMF. You can start QMF running in ISPF, TSO, CICS, native OS/390 as a batch job, or from the QMF server.

For information about starting QMF from the callable interface, see *Developing QMF Applications*

Before You Start QMF

Before you start QMF, you need to decide which environment you want QMF to run in. The method used to start QMF depends upon the environment from which QMF is started.

Establishing the Environment

Before you start QMF, you need to establish the CICS and DB2, or QMF and DB2 environment.

Connecting CICS and DB2

In the CICS environment, QMF is a conversational transaction. The QMF programs and transaction ID are defined to CICS in the processing program table (PPT) and program control tables (PCTs) during installation or during QMF customization.

QMF uses the CICS/DB2 Attachment Facility to access DB2 data in the CICS environment. The CICS/DB2 Attachment Facility uses the Resource manager interface to access DB2 data, requiring a task switch for each database fetch. For more information about the CICS connection with DB2, see *DB2 UDB for OS390 Administration Guide.*

Connecting TSO and DB2

The call attachment facility (CAF) provides the connection between QMF and DB2. Ensure that the CAF interface or DSNALI load module is available. For more information about the QMF connection with DB2, see the *DB2 UDB for OS390 Administration Guide.*

Quick Start

Table 23 outlines ways you can set up QMF to start.

The *n* symbol in each example represents the national language identifier (NLID). Substitute the NLID from Table 1 on page xviii that corresponds to the national language in which you want to start QMF. For example, to start an English QMF session, enter QMFE.

For more information on any of the tasks listed, see the page shown at the right of the table.

Table 23. Options for starting QMF

To do this task:	See:
To set up QMF to start from an ISPF menu option, add QMF to the existing ISPF JCL. The user then selects the QMF option from the ISPF master application menu, and QMF starts.	Page 161
To set up QMF to start with the PGM form of the ISPSTART command, enter: `ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(....)`	Page 164
To set up QMF to start in batch mode in ISPF, enter: `ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(...DSQSMODE=B, DSQSRUN=aaa.bbb)` You can also start QMF in batch mode using an CLIST (or EXEC).	Page 165
To set up QMF to start directly with the DSQQMFE module, enter: `DSQQMFE DSQSBSTG=123456,DSQSIROW=0,DSQSRUN=SAM.PROG1`	Page 168
To set up QMF to start using TSO CALL command, enter: `CALL 'QMF710.SDSQLOAD(DSQQMFE)' 'DSQSMODE=I,DSQSSUBS=DB2T'`	Page 168
To set up QMF to start in a batch TSO environment, enter: `DSQQMFE ...DSQSMODE=B,DSQSRUN=aaa.bbb`	Page 169
To set up QMF to run in native OS/390 as a batch job, enter: `//RUN QMF  EXEC PGM=DSQQMFE,PARM='DSQSMODE=B,DSQSRUN=aaa.bbb'`	Page 171
To start QMF from a cleared screen, enter: `QMFn` Follow `QMFn` with values for the QMF program parameters explained in "Chapter 14. Customizing Your Start Procedure" on page 177.	Page 172
To start QMF from a CICS application use the command: `EXEC CICS START TRANSID('QMFN') FROM('...') TERMID('NAME')` Enclose values for the QMF program parameters in single quotes, following the FROM keyword. You can use any QMF program parameter in a CICS application. A terminal ID (TERMID) is required for interactive sessions; it is optional for noninteractive sessions.	
To create a TSO EXEC to start QMF, you need to ensure that the program modules and data files are available to QMF, and that GDDM and DB2 for VM or VSE considerations have been met.	Page 170

Setting up QMF to Run under ISPF

You can let users start QMF using ISPF services. You can add JCL to the ISPF environment that defines QMF resources. You can do this in three ways:

- ISPF has an initial dialog to which you can add QMF.
- Replace the initial dialog with one that starts QMF directly.
- Create a CLIST to start QMF as a program dialog.

You can use any of the methods to start the others. For example, you can run an initial dialog from a CLIST.

Using JCL: If you use JCL that points to the QMF program location, the JCL must always be in an initial dialog.

To run QMF under ISPF, you must start the QMF program dialog using the ISPF SELECT service. When a TSO call or a TSO command is used, the results can be unpredictable.

Restrictions:

1. You cannot run QMF as a command dialog. For example, the following statements are not valid:

   ```
   ISPEXEC SELECT CMD(DSQQMFE) NEWAPPL(DSQE)
   ISPSTART CMD(DSQQMFE) NEWAPPL(DSQE)
   ```

2. If QMF is started as an initial dialog, you cannot enter QMF from a split screen or create a split screen QMF session.

Starting QMF from a Menu Option

If you choose to set up a menu option to start QMF, the menu must point to QMF, but can also point to QMF resources. Figure 32 on page 162, which shows a sample definition for the ISPF master application menu, illustrates how to add an option to the menu. In this definition, Option 2 was added for reaching QMF through a CLIST.

```
)BODY
%------------------------  MASTER APPLICATION MENU  --------------------
%SELECT APPLICATION ===>_OPT     +
%                                                          +USERID   -
%                                                          +TIME     -
%   1 +SPF        - SPF PROGRAM DEVELOPMENT FACILITY       +TERMINAL -
%   2 +QMF        - RUN QMF UNDER THE ABC SUBSYSTEM        +PF KEYS  -
%
%
%
%
%
%
%
%
%
%   DSQSPLAN +PARMS      - SPECIFY TERMINAL PARAMETERS AND LIST/LOG DEFAULTS
%   X +EXIT       - TERMINATE USING LIST/LOG DEFAULTS
%
+PRESS%END KEY+TO TERMINATE +
%
)INIT
)PROC

  &SEL = TRANS( TRUNC (&OPT,'.')
                1,'PANEL(ISP@PRIM) NEWAPPL'
                2,'PGM(DSQQMFE) NEWAPPL(DSQE) PASSLIB PARM(DSQSSUBS=ABC)'
           /*                              */
           /* ADD OTher APPLICATIONS HERE */
           /*                              */
                P,'PANEL(ISPOPT)'
                X,'EXIT'
              ' ',' '
                *,'?' )
)END
```

Figure 32. Sample Master Application Menu

Tip: The direct menu approach to starting QMF can be much faster than the CLIST approach. If you allocate all user resources through TSO logon procedures, then the CLIST you create for the menu option has no resources to allocate. This leaves it with a single function, starting QMF, and you can do this without a CLIST.

You can add more than one option to your menu. Suppose, for example, that ABC is an experimental DB2 subsystem, while DSN is the production subsystem. Then you can add two options to your menu: one for each subsystem. You might have each option call a different CLIST, or you might create one CLIST with a positional parameter for the subsystem. The added lines in the menu's) PROC section might look like this:

```
2,'PGM(DSQQMFE) NEWAPPL(DSQE) PASSLIB PARM(DSQSSUBS=DB2SSFDX)'
3,'PGM(DSQQMFE) NEWAPPL(DSQE) PASSLIB PARM(DSQSSUBS=DB2SSFDY)'
```

Using LIBDEF Statements

To use the ISPF LIBDEF service for QMF programs and DB2 programs, first allocate the program libraries to a unique QMF DDNAME of ″DSQLLIB″. Then specify DDNAME ″DSQLLIB″ as the ID value in the LIBRARY option on the ISPF LIBDEF statement.

For example, to allocate QMF and DB2 product libraries you code a TSO allocate and ISPF LIBDEF statement :

```
ALLOC FI(DSQLLIB) DA('QMF710.SDSQLOAD', 'DSN610.SDSNEXIT','DSN610.SDSNLOAD') SHR REUSE

LIBDEF ISPLLIB LIBRARY  ID(DSQLLIB)
```

To allocate program libraries using the ISPF LIBDEF service you would write a CLIST similar to the following:

```
/*************************************************************/
/*   Allocate QMF and DB2 Programs to DSQLLIB                */
/*************************************************************/
ALLOC FI(DSQLLIB) SHR REUSE               +
           DA('QMF710.SDSQLOAD',                +
                'DSN610.SDSNEXIT',                +
                'DSN610.SDSNLOAD')
/*************************************************************/
/*   Allocate   QMF libraries used for GDDM                  */
/*************************************************************/
ALLOC FI(ADMGGMAP)  DA('QMF710.DSQMAPE')     SHR REUSE
ALLOC FI(ADMCFORM)  DA('QMF710.DSQCFORM')  SHR REUSE
ALLOC FI(DSQUCFRM)  DA('QMF710.DSQUCFRM')  SHR REUSE
ALLOC FI(ADMGDF)       DA('QMF710.CHARTLIB')     SHR REUSE
/*************************************************************/
/*   Allocate  QMF product datasets                          */
/*************************************************************/
ALLOC FI(DSQPRINT)   SYSOUT(Z)  LRECL(133)  RECFM(F B A)  BLKSIZE(1330)
ALLOC FI(DSQPNLE)    DA('QMF710.DSQPNLE')   SHR  REUSE
ALLOC FI(DSQDEBUG) SYSOUT(Z)  LRECL(121)  RECFM(F B A)  BLKSIZE(1210)
ALLOC FI(DSQUDUMP) SYSOUT(Z)  LRECL(125)  RECFM(V B A)  BLKSIZE(1632)
ALLOC FI(DSQSPILL)    NEW UNIT(SYSDA) SPACE(1,1) CYLINDERS
ALLOC FI(DSQEDIT)      NEW UNIT(SYSDA)
/*************************************************************/
/*   Issue ISPF LIBDEF for QMF libraries used for ISPF       */
/*************************************************************/
ISPEXEC  LIBDEF   ISPLLIB  LIBRARY  ID(DSQLLIB)
ISPFEXE  LIBDEF   ISPPLIB  DATASET  ID('QMF710.SDSQPLBE')
ISPFEXE  LIBDEF   ISPSLIB  DATASET  ID('QMF710.SDSQSLBE')
ISPFEXE  LIBDEF   ISPMLIB  DATASET ID('QMF710.SDSQMLBE')
/*************************************************************/
/*   Start QMF dialog using PASSLIB                          */
/*************************************************************/
ISPEXEC  SELECT  PGM(DSQQMFE)     NEWAPPL(DSQE)   PASSLIB
```

```
/*************************************************************/
/*   Free ISPF LIBDEF for QMF libraries used for ISPF        */
/*************************************************************/
ISPEXEC  LIBDEF  ISPLLIB  LIBRARY  ID( )
ISPEXEC  LIBDEF  ISPPLIB  LIBRARY  ID( )
ISPEXEC  LIBDEF  ISPSLIB  LIBRARY  ID( )
ISPEXEC  LIBDEF  ISPMLIB  LIBRARY  ID( )
FREE        FI(DSQLLIB)
/*************************************************************/
/*   Free    QMF product datasets                            */
/*************************************************************/
FREE   FI(DSQPRINT)
FREE   FI(DSQPNLE)
FREE   FI(DSQDEBUG)
FREE   FI(DSQUDUMP)
FREE   FI(DSQSPILL)
FREE   FI(DSQEDIT)
/*************************************************************/
/*   Free    QMF libraries used for GDDM                     */
/*************************************************************/
FREE   FI(ADMGGMAP)
FREE   FI(ADMCFORM)
FREE   FI(DSQUCFRM)
FREE   FI(ADMGDF)
```

The preceding CLIST assumes that ISPF is already running and has other ISPF resources already allocated.

Allocating an ISPLLIB Data Set

You can allocate the QMF program library using ISPLLIB. Add the QMF library to your exixting allocations for ISPLLIB. For example:

```
ALLOC DA('QMF710.SDSQLOAD',            +
          '.............  other allocations ...'    DDNAME(ISPLLIB)
```

Starting QMF with the ISPSTART Command

If you develop a CLIST to enable users to start QMF as an ISPF dialog from outside ISPF, such a CLIST, called in TSO READY mode, can allocate resources for the upcoming session, then start QMF. To do this, you can enter the following statement from the command line in the READY mode, or in a CLIST (or EXEC):

```
ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(...)
```

ISPSTART is an ISPF command. Here, it starts QMF as the new ISPF application DSQE. The QMF program DSQQMFE must be run with an application ID of DSQE. (In other words, the National Language ID for each must be the same.)

The optional PARM operand, which passes parameter values to the QMF program DSQQMFE, might look like this:

```
PARM(DSQSBSTG=256000,DSQSIROW=50,DSQSRUN=SAM.PROG1)
```

For more information about parameters, see “Chapter 14. Customizing Your Start Procedure” on page 177.

You can start QMF with the PGM form of the ISPSTART command.

PGM is the object of the ISPSTART command; with PGM, you specify the QMF program DSQQMFE. To do this, enter the following statement from the command line in TSO or include it as a statement in an EXEC:

```
ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE)
              PARM(DSQSBSTG=n1,...)
```

Starting QMF in Batch Mode in ISPF

You can start QMF running in batch mode. You might want to start QMF in batch mode to save resources and time.

You can start QMF using ISPF with or without using a CLIST

- Without a CLIST

  To start QMF without a CLIST, place the following statement in the SYSTSIN data set of your JCL.

  ```
  ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(...DSQSMODE=B,DSQSRUN=aaa.bbb)
  ```

- With a CLIST

  To start QMF from a CLIST, place the following statement in the SYSTSIN data set of your JCL:

  ```
  ISPSTART CMD(clist_name) NEWAPPL
  ```

  where *clist_name* is the name of the CLIST that starts QMF.

In both examples, PARM establishes the appropriate operating mode (DSQSMODE=B), identifies the procedure to be run (DSQSRUN=aaa.bbb) and can include variables for that procedure.

The ellipsis following PARM (...) represents optional parameter values that the user might want to include in addition to the required values for the DSQSMODE and DSQSRUN parameters. The name of the procedure, as indicated in Figure 33, should contain the authorization ID of the owner. For example, assume that a procedure was named PROCA and owned by the user authorization ID JONES.

```
ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(DSQSMODE=B,DSQSRUN=JONES.PROCA)
```

Figure 33. Starting QMF in batch mode in ISPF with the user and procedure names

After the procedure runs, QMF ends and returns control to ISPF. ISPF can then continue with another procedure or command. At ISPF’s termination,

TSO then runs the next TSO command in SYSTSIN. When all commands in SYSTSIN have been run, the job step ends.

Examples of Starting QMF under ISPF

The following are some examples of starting and passing parameters to QMF:

- Starting ISPF from a CLIST and specifying QMF as the initial dialog:

```
ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(DSQSIROW=150,DSQSRSTG=0)
```

  This statement passes a value of 150 for DSQSIROW (number of rows fetched before first display of report), and passes a value of 0 for DSQSRSTG (amount of reserved storage).

- Starting from a CLIST operating within ISPF:

```
ISPEXEC SELECT PGM(DSQQMFE) NEWAPPL(DSQE) PARM(DSQSSUBS=DB2SSFDX)
```

  This statement passes the name DB2SSFDX for the DB2 subsystem.

- Starting from an ISPF menu:

```
)PROC

  &SEL = TRANS( TRUNC (&OPT,'.')
                1,'PGM(DSQQMFE) NEWAPPL(DSQE) PARM(DSQSDBCS=YES)'
                .
                .
                .
```

  This code passes YES for DSQSDBCS whenever a user selects option 1.

- Starting from a CLIST and specifying an initial procedure:

```
ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(DSQSRUN=Q.IPROC(&&&&TABLE=Q.STAFF))
```

  This statement uses the DSQSRUN parameter:
  – To specify an initial procedure, Q.IPROC, to run when QMF starts
  – To pass a value, Q.STAFF, to the procedure for the variable &TABLE

  The DSQSRUN parameter as specified in the previous example results in the following QMF command:

```
RUN Q.IPROC(&TABLE=Q.STAFF
```

Setting up QMF to Run under TSO

In TSO, a user can start QMF in the following ways:

- By using the DSQQMFE program in a CLIST or EXEC.
- By using the TSO CALL command.
- In a batch TSO environment.

Defining a TSO ID

When you start QMF under TSO, you assign authorization IDs through the DB2 exit routine, DSN3@ATH. (IBM also supplies a default exit routine.) The routine returns a list of the assigned authorization IDs if given the user's TSO logon ID.

Choosing the Type of Identifier

You can assign multiple authorization IDs:

- A single *SQL authorization ID*
- A single *primary authorization ID* with one or more *secondary authorization IDs*

The SQL authorization ID must be either a primary or a secondary authorization ID. Both the primary and secondary IDs are fixed for the duration of the user's session.

Authorization IDs are names containing no more than eight characters. The first character must be a letter and the remaining seven characters may consist of letters or digits. For rules for these names, see *DB2 UDB for OS390 SQL Reference*.

Authorization IDs are the sources of all DB2 privileges. A user begins a QMF or SPUFI session with one or more assigned authorization IDs. Each authorization ID can possess any number and any kind of DB2 privileges. For example, JONES is one of the user A's authorization IDs, and JONES has the SELECT privilege on the table SMITH.TABLEA. Thus, user A also has the SELECT privilege on SMITH.TABLEA, and can run a SELECT query on that table.

QMF under TSO

If you choose to use the default exit routine DSN3@ATH without modification:

- A user's primary and SQL authorization IDs match the user's TSO logon ID
- No secondary authorization IDs are assigned

Using DD statements in the logon procedure: DD statements in a logon procedure can allocate resources for the user. (Additional resources are not required for the ISPF/PDF editor, which is available only if QMF is started as an ISPF dialog).

You can provide new QMF users with a TSO logon procedure that is called when the user logs on. This cataloged procedure calls the Terminal Monitor Program (TMP).

The TMP is the principal interface between user and terminal during a TSO session. If your installation uses its own TMP, rather than the one supplied by IBM, some of the following discussion might not apply. You can develop CLISTs or EXECs that users run to start QMF. Within these CLISTs or EXECs, you can allocate many of the required data sets through TSO ALLOCATION statements. In particular, you can allocate data sets unique to the user.

The following statement within a CLIST allocates a unique library for its user's CHART forms. The name of the allocated library begins with the user's TSO logon ID, represented by the variable &SYSUID:

```
ALLOC DDNAME(DSQUCFRM) DSNAME('&SYSUID..CHARTLB.DATA') OLD
```

You can also use TSO FREE statements in a CLIST or EXEC to deallocate data sets after the QMF session terminates.

Starting QMF Directly with the DSQQMFE Module

You can start QMF running under TSO by entering DSQQMFE either 1) from the command line in the READY mode, or 2) in a CLIST or EXEC:

```
DSQQMFE DSQSBSTG=123456,DSQSDBUG=ALL,DSQSIROW=0,DSQSRUN=SAM.PROG1
```

In this example, the parameter string following DSQQMFE is optional.

When QMF is started in TSO independently of ISPF, the following return codes are valid:

0 Execution successful
4 Warning condition occurred
8 Error condition occurred
16 Severe error occurred

Starting QMF Using TSO CALL Command

You can also use the TSO CALL command to start QMF. Specify the name of the QMF load library, and pass the optional program parameters following the data set name, as in the following example:

```
CALL 'QMF710.SDSQLOAD(DSQQMFE)' 'DSQSMODE=I,DSQSSUBS=DB2T'
```

The QMF load library becomes a TASKLIB for the duration of the CALL command. However, you need to give QMF access to the DB2 and GDDM libraries in order to LOAD program interfaces to those products. DB2 and

GDDM libraries, in most cases, are not part of TASKLIB. If DB2 and GDDM libraries are not available, QMF terminates with an error.

The return codes when QMF is started using TSO CALL independent of ISPF are the same ones documented in “Starting QMF Directly with the DSQQMFE Module” on page 168.

Starting QMF in a Batch TSO Environment

To start QMF without using ISPF services, place the following statement in the SYSTSIN data set of your JCL:

```
DSQQMFE  ...DSQSMODE=B,DSQSRUN=aaa.bbb
```

where 'DSQSMODE=B' establishes the appropriate operating mode and 'DSQSRUN=aaa.bbb' identifies the procedure to be run. The procedure can include a variable as the procedure name. (It should contain the authorization ID of the owner.)

The ellipsis represents optional parameter values that the user can include in addition to the required DSQSMODE and DSQSRUN parameters.

Examples of starting QMF under TSO

The following are some examples of starting and passing parameters to QMF operating independently of ISPF:

- Starting from TSO READY mode:

  ```
  DSQQMFE DSQSBSTG=50000,DSQSDBUG=NONE,DSQSMODE=B
  ```

  This statement turns on L2 tracing (DSQSDBUG=NONE), passes a value of 50000 for DSQSBSTG (maximum storage for reports), and passes a value of B (batch) for DSQSMODE (mode of operation).
- Starting from a CLIST and specifying an initial procedure:

  ```
  DSQQMFE DSQSRUN=Q.IPROC(&&TABLE=Q.STAFF)
  ```

  This statement uses the DSQSRUN parameter:
  - To specify an initial procedure, Q.IPROC, to run when QMF starts
  - To pass a value, Q.STAFF, to the procedure for the variable &TABLE

  The DSQSRUN parameter as specified in the previous example results in the following QMF command:

  ```
  RUN Q.IPROC(&TABLE=Q.STAFF
  ```

Creating a TSO EXEC

To create a TSO EXEC to start QMF, you need to ensure that the program load libraries and data sets are available to QMF, and that GDDM and DB2 considerations have been met.

Verify Program Load Libraries

The DB2 database and the load libraries for ISPF, ISPF/PDF, QMF, DB2, and GDDM must be available from the STEPLIB statement or through a CLIST before starting QMF. Figure 34 lists the load libraries.

```
//*********************************************************
//*        PROGRAM LOAD LIBRARIES                         *
//*********************************************************
//STEPLIB  DD  DSN=QMF710.SDSQLOAD,DISP=SHR      * QMF MODULES  *
//         DD  DSN=ISR.V4R1M0.ISRLOAD,DISP=SHR   * PDF MODULES  * Opt. for non-ISPF users
//         DD  DSN=ISP.V4R1M0.ISPLOAD,DISP=SHR   * ISPF MODULES * Opt. for non-ISPF users
//         DD  DSN=DSN710.SDSNEXIT,DISP=SHR      * DB2 MODULES  *
//         DD  DSN=DSN710.SDSNLOAD,DISP=SHR      * DB2 MODULES  *
//         DD  DSN=GDDM230.SADMMOD,DISP=SHR      * GDDM MODULES *
```

Figure 34. Program load libraries for ISPF, ISPF/PDF, QMF, DB2, and GDDM

TSO Considerations

Use whichever ddname is established by your installation for the TSO search order for EXECs. This search order is affected by settings in the TSO defaults modules IRXTSPRM and IRXISPRM, the TSO EXECUTIL command, and the TSO ALTLIB command. Figure 35 lists the datasets used by TSO. If you do not know your installation's search order for REXX EXECs, allocate SDSQEXCE to both SYSEXEC and SYSPROC.

```
//*********************************************************
//*        DATASETS USED BY TSO                           *
//*********************************************************
//SYSPROC  DD  DSN=SYS2.CLIST,DISP=SHR           * CLIST Library
//         DD  DSN=QMF710.SDSQCLTE,DISP=SHR
//SYSEXEC  DD  DSN=SYS2.EXEC,DISP=SHR
//         DD  DSN=QMF710.SDSQEXCE,DISP=SHR
//SYSHELP  DD  DSN=SYS1.HELP,DISP=SHR
//EDT      DD  DSN=&EDIT,UNIT=SYSDA,SPACE=(1688,(40,12))
```

Figure 35. Datasets Used by TSO

Verify QMF Data Sets

The following list of data sets is used by QMF. These files are allocated to ddnames beginning with DSQ. If you want to allocate them differently, you must modify the invocation EXEC.

DSQPNLE
QMF panel file

DSQUDUMP
QMF snap dump output

DSQDEBUG
QMF trace dump output

DSQPRINT
Print data output

DSQSPILL
Spill data file

DSQEDIT
Edit transfer file

QMF710.SDSQLOAD
QMF load library

Verify GDDM Data Sets

The GDDM data sets are allocated to the following ddnames:

ADMGGMAP
GDDM map group for QMF-mapped panels

ADMCFORM
QMF-supplied chart forms

DSQUCFRM
Saves user-defined ICUFORMS

Figure 36 lists the QMF/GDDM data sets.

```
//*********************************************************
//*        QMF/GDDM DATA SETS                             *
//*********************************************************
//ADMGGMAP  DD  DSN=QMF710.DSQMAPE,DISP=SHR   * GDDM Map Group
//ADMCFORM  DD  DSN=QMF710.DSQCHART,DISP=SHR  * QMF-Supplied Chart Forms
//DSQUCFRM  DD  DSN=aaaaaaa,DISP=SHR          * Saves User-Defined ICUFORMS
//ADMCDATA  DD  DSN=xxxx,DISP=SHR
//ADMGDF    DD  DSN=xxxx,DISP=SHR
//ADMSYMBL  DD  DSN=xxxx,DISP=SHR
```

Figure 36. QMF/GDDM datasets

Setting Up QMF to Run in Native OS/390 as a Batch Job

You can have your users start QMF in native OS/390 as a batch job. You need to create a JCL that defines where the spill file is, where the panels are stored, the panels file names, and the names and locations of other tables and QMF objects. For more information on how these objects are used, see “Chapter 16. Establishing QMF Support for End Users” on page 215.

Starting QMF

To issue a QMF command, you must specify the name of an initial QMF procedure. In Figure 37, it is `I=X`, where `X` is the name of the QMF procedure.

QMF starts, then runs procedure X. When procedure X completes, QMF terminates. The QMF return code is returned in register 15, and you can test it in JCL using the standard JCL condition code testing.

```
//RUNQMF   EXEC PGM=DSQQMFE,PARM='M=B,I=X,P=QMF710,S=DSN'
//*********************************************************
//*        Program load libraries
//*********************************************************
//STEPLIB  DD  DSN=QMF710.SDSQLOAD,DISP=SHR
//         DD  DSN=DSN710.SDSNEXIT,DISP=SHR
//         DD  DSN=DSN710.SDSNLOAD,DISP=SHR
//         DD  DSN=GDDM.GDDMLOAD,DISP=SHR
//*********************************************************
//*        QMF/GDDM maps                                  *
//*********************************************************
//ADMGGMAP DD  DSN=QMF710.DSQMAPE,DISP=SHR
//*********************************************************
//*        Datasets used by QMF                           *
//*********************************************************
//DSQPRINT DD  SYSOUT=*,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330)
//DSQDEBUG DD  SYSOUT=*,DCB=(RECFM=FBA,LRECL=121,BLKSIZE=1210)
//DSQUDUMP DD  SYSOUT=*,DCB=(RECFM=VBA,LRECL=125,BLKSIZE=1632)
//DSQSPILL DD  DSN=&&SPILL,DISP=(NEW,DELETE),
//  UNIT=SYSDA,SPACE=(TRK,(100),RLSE),
//  DCB=(RECFM=F,LRECL=4096,BLKSIZE=4096)
```

Figure 37. JCL to run a QMF procedure in native OS/390 batch

Attention: If you are used to running with TSO batch, you should be aware that data set names used in QMF procedures must be fully qualified. The TSO prefix and suffix are not available in native OS/390.

Setting up QMF to Run under CICS

After QMF is tailored for CICS, you start the QMF transaction (default is QMFE) from the CICS screen as follows:

```
QMFE parameters
```

where QMFE is the transaction ID defined in the PCT for QMF, and `parameters` represents the desired program parameters.

You can also write an application program to issue the CICS START command and specify program parameters, as in the following example:

```
EXEC CICS START TRANSID(QMFE) FROM (parameters) TERMID('id')
```

where parameters are QMF program parameters.

A terminal ID (TERMID) is required for an interactive session (when DSQSMODE = I), and is optional for a noninteractive session (when DSQSMODE = B). If the terminal ID specifies the terminal where the calling CICS application is running, the QMF session starts when the CICS application finishes. If you do specify a terminal ID, the terminal must exist and be available. Also ensure the ID is defined as either a local or a remote terminal on the system in which the START command is issued.

Using the CICS/DB2 Attachment Facility

When you start QMF under CICS, you perform DB2 sign-on processing through the DB2 exit routine, DSN3@SGN. (IBM also supplies a default exit routine.) The routine returns a list of the assigned authorization IDs if given the ID obtained as directed by the AUTH entry for the transaction in the CICS resource control table (RCT).

QMF uses the CICS Attachment Facility to access DB2 data in the CICS environment. For information about connecting the CICS Attachment Facility, see the *DB2 UDB for OS390 Administration Guide*. The QMF-specific information is described here.

The plan ID and authorization IDs for a transaction ID are specified in the RCT. Use statements similar to these:

```
DSNCRCT TYPE=ENTRY,TXID=QMFE,PLAN=QMF710,AUTH=DEPT1
DSNCRCT TYPE=ENTRY,TXID=QMFQ,PLAN=QMF710,AUTH=Q
```

Users invoking the QMFE transaction operate under the primary authorization ID DEPT1. Similarly, the QMF administrator can use the QMFQ transaction and operate with the primary authorization ID Q. If RACF is installed on your system, the authorization ID must be a valid RACF ID. The transaction IDs must also be defined in the partition control table (PCT).

The QMF programs are link-edited and bound during installation, and no additional steps are necessary for CICS.

The CICS Attachment Facility uses the Resource Manager interface to access DB2 data. There is a task switch for each database fetch. To maintain an acceptable response for all users, you might want to limit the number of rows that a query can fetch. For more information about using the governor to set limits, see “Chapter 21. Controlling QMF Resources Using a Governor Exit Routine” on page 383.

QMF under CICS

If you choose to use the default exit routine DSN3@SGN without modification, the primary and SQL authorization IDs are the same as the ID that was obtained by the AUTH entry for the transaction in the CICS RCT.

Examples of Starting QMF under CICS

The following are some examples of starting QMF while running under CICS.

- Starting from a cleared CICS screen:

  ```
  QMFE DSQSIROW=150,DSQSBSTG=500000,DSQSPILL=NO
  ```

  This statement passes a value of 150 for DSQSIROW (rows fetched before screen display), passes a value of 500 000 for DSQSBSTG (maximum storage for reports), and turns off the QMF spill file (DSQSPILL=NO).

- Starting from a cleared CICS screen and specifying an initial procedure:

  ```
  QMFE DSQSRUN=Q.IPROC(&&TABLE=Q.STAFF)
  ```

  This statement uses the DSQSRUN parameter:
  - To specify an initial procedure, Q.IPROC, to run when QMF starts
  - To pass a value, Q.STAFF, to the procedure for the variable &TABLE

  The DSQSRUN parameter as specified in the previous example results in the following QMF command:

  ```
  RUN Q.IPROC(&TABLE=Q.STAFF
  ```

Setting up QMF to Run from SRPI as a Server

You can set up QMF to run from SRPI. You might want to use the SRPI method if you require only network definitions for 3270 terminal emulation screens of the user workstations.

SRPI's primary requirement is 3270 emulation, which is provided with Communications Manager/2. SRPI is also provided on the host side in the operating system. TSO users should also have *TSO/E Version 2 Guide to the Server-Requester Programming Interface*.

Some of the ways you can attach a workstation to an OS/390 system using the SRPI connection method are:

- Locally, using the IBM token ring network
- Using distributed function (DFT) mode to an IBM 3174 Establishment Controller
- Remotely, using synchronous data link control (SDLC)

If you are using ACF/VTAM® in the connections, you should ensure that a VTAM logmode is used, and defined with the extended data stream (EDS) bit set.

Chapter 14. Customizing Your Start Procedure

This chapter describes the various methods you can use to pass parameters to the program to help you customize a user's QMF session.

For information about passing parameters in a callable interface or in a REXX EXEC, see *Developing QMF Applications*

Summary of Program Parameters

The following table displays the long and short forms of parameters and indicates the appropriate environments for each parameter. Parameters that are only used in CICS do not have a short form.

Table 24. Program parameters

Long Form	Short Form	Environment	Description
DSQSBSTG	B	TSO,CICS	Maximum storage for reports
DSQSDBCS	K	TSO,CICS	DBCS support of non-DBCS device
DSQSDBNM	D	TSO,CICS	Name of initial database location
DSQSDBQN	—	CICS	Name of storage specified by DSQDBQT
DSQSDBQT	—	CICS	Type of trace storage
DSQSDBUG	T	TSO,CICS	Trace — ALL or NONE
DSQSIROW	F	TSO,CICS	Rows fetched from the database
DSQSMODE	M	TSO,CICS	Interactive or batch mode
DSQSPILL	L	TSO,CICS	Use of the spill file
DSQSPLAN	P	TSO	Name of QMF application plan
DSQSPRID	U	TSO	Profile key — TSOID or PRIMEID
DSQSRSTG	R	TSO	Amount of reserved storage
DSQSRUN	I	TSO,CICS	Name of QMF procedure to run
DSQSSPQN	—	CICS	Name of QMF spill file
DSQSSUBS	S	TSO	Name of DB2 subsystem

Quick Start

Table 25 shows how to use the program parameters to customize aspects of the QMF session. The command syntax in the examples applies to starting QMF with the DSQQMFE module in TSO and starting QMF from a cleared screen in CICS. If you start QMF using a different method, see the command syntax in "Chapter 13. Starting QMF" on page 159.

The *n* symbol in each example represents the national language identifier (NLID). Substitute the NLID from Table 1 on page xviii that corresponds to the national language in which you want to start QMF. For example, to start an English QMF session, enter QMFE.

For more information on any of the tasks listed, see the page shown at the right of the table.

Table 25. Passing parameters

To do this task:	See:

To set limits on the amount of storage used for QMF queries and reports, use the DSQSBSTG parameter if you want any limit other than 0 or 500 000 bytes for CICS. For example, to specify a limit of 1 000 000 bytes:
`DSQQMFn B=1000000`
`QMFn B=1000000`
	Page 180

To set limits on the amount of storage used for QMF queries and reports, use the DSQSRSTG parameter if you want any limit other than 0. For example, to specify a limit of 1 000 000 bytes: `DSQQMFn R=1000000` **Note to CICS users** CICS ignores the DSQSRSTG parameter.	Page 182

To use temporary storage (a spill file) as extra storage for report data, use the DSQSPILL parameter. For example, enter:
`DSQQMFn L=YES`
`QMFn L=YES`
The default is NO when running in CICS, Otherwise, it is YES.
	Page 183

To name the CICS spill file something other than DSQSnnnn (where nnnn is the CICS terminal ID), use the DSQSSPQN parameter. For example, to indicate the name MYSPILL, enter: `QMFn DSQSSPQN=MYSPILL`	Page 190

Table 25. Passing parameters (continued)

To do this task:	See:

To allow QMF to retrieve any number of rows other than 100 before QMF displays the first screen of the report, use the DSQSIROW parameter. For example, to allow QMF to retrieve 200 rows before displaying the first screen, enter:
`DSQQMFn F=50`
`QMFn F=200`
	Page 190

To log QMF activity in the trace data, including activity before the user's profile is established, use the DSQSDBUG parameter. For example, enter:
`DSQQMFn T=ALL`
`QMFn T=ALL`
	Page 192

To indicate that you want to use temporary storage (TS) rather than transient data (TD) queues for CICS trace data, use the DSQSDBQT parameter. For example, enter: `QMFn DSQSDBQT=TS`	Page 193
To name the queue for CICS trace data (whether temporary storage or transient data) something other than DSQD, use the DSQSDBQN parameter. For example, to get a temporary storage queue named MYTRACE, enter: `QMFn DSQSDBQN=MYTRACE`	Page 194

To specify a database location to connect to when starting QMF other than the default location, use the DSQSDBNM parameter. For CICS, specify:
`DSQQMFn D=DBNAME`
`QMFn D=DBNAME`
 	
For TSO, specify:
`DSQQMFn D=DBNAME`
	Page 195

To run QMF without user interaction (either with or without a terminal), use the DSQSMODE parameter and specify an initial procedure using the DSQSRUN parameter. You might also choose to use the DSQSDBNM parameter to ensure you connect to the database location you want. For example, to do some noninteractive QMF work using the Q user ID and an example procedure named STARTPROC, enter:
`DSQQMFn M=B,D=DBNAME,I=STARTPROC.AUTHID`
`QMFn M=B,D=DBNAME,I=STARTPROC.AUTHID`
	Page 195

To use a DB2 subsystem other than DSN, use the DSQSSUBS parameter. `DSQQMFn S=DSP` **Note to CICS users** CICS ignores the DSQSSUBS parameter.	Page 196

To run an initial procedure when QMF starts, use the DSQSRUN parameter. For example, to run a procedure called STARTPROC, enter:
`DSQQMFn I=STARTPROC`
`QMFn I=STARTPROC`
	Page 197

Table 25. Passing parameters (continued)

To do this task:	See:
To name the QMF application plan something other than QMF710, use the DSQSPLAN parameter. For example, enter: `DSQQMFn P=MYPLAN` **Note to CICS users** CICS ignores the DSQSPLAN parameter.	Page 203
To use the TSOID profile key rather than PRIMEID, use the DSQSPRID parameter. For example, enter: `DSQQMFn U=TSOID`	Page 203
To use an initialization program to specify values for program parameters other than the default values set by QMF, use the DSQSCMD parameter. For example, enter: `DSQQMFn DSQSCMD=NULL`	Page 204

To print DBCS data from non-DBCS terminals, use the DSQSDBCS parameter. For example, enter:
`DSQQMFn K=YES`
`QMFn K=YES`
	Page 204

Customizing Report Storage and Report Performance

When a user performs a QMF task that retrieves data from the database, the data is returned in a default report that is stored in virtual storage. This section explains QMF program parameters that help you customize:

- The maximum amount of storage used for report data
- Spill storage used when virtual storage for reports is full
- How many rows of data are retrieved before QMF displays the first screen of the report

DSQSBSTG (Adjusting Storage for Report Data)

Parameter name

DSQSBSTG

Short form

B

Valid values

From 0 to 99 999 999 bytes

Default

500 000 bytes for CICS, 0 bytes for ISPF, TSO, SRPI, APPC, or native OS/390

The value of DSQSBSTG provides QMF with an upper limit (in bytes) on the storage available for report generation. It is a positive whole number ranging in value from 0 through 99 999 999. If DSQSBSTG is specified with a nonzero value less than a QMF-determined minimum (15 to 32 KB, depending on the environment), it is increased to that minimum.

In all but CICS, when DSQSBSTG has a value of 0, this parameter is not used; instead, DSQSRSTG is used to specify storage. However, if both DSQSBSTG and DSQSRSTG are specified, DSQSBSTG is used. For information on DSQSRSTG, see the discussion in "DSQSRSTG (Adjusting Reserved Storage Used for Applications)" on page 182. The default for TSO, SRPI, APPC, native OS/390, or ISPF is 0.

In CICS, when DSQSBSTG has a value of 0, the minimum amount of storage as determined by the QMF program is used for report data. When specifying a value of 0, you might be able to display a large report. The default is recommended for the majority of QMF transactions running in CICS. The default for CICS is 500 000.

Choosing the Right Amount of Virtual Storage for Each Session

QMF consists of several load modules. The main module (about 2.8 MB) can run in 31-bit mode above 16 MB and can be located in the extended pageable link pack area (EPLPA). A small support module (about 52 KB) must be run in 24-bit mode below 16 MB. This module can reside in the pageable link pack area (PLPA). By using EPLPA and PLPA, each OS/390 region executing QMF can share QMF programs.

Each QMF region requires at least 1.5 MB of virtual storage. Additional storage generally provides improved performance, because QMF can keep more data records in virtual storage.

TSO Performance Tradeoffs: You can use the DSQSPILL parameter to provide users with a spill file, which is the virtual I/O (UNIT=SYSVIO) or other DASD storage. If the spill file is full, QMF continues to retrieve data into virtual storage in amounts specified by the DSQSBSTG or DSQSRSTG parameters. The user doesn't receive any notification if there is insufficient storage, and QMF can complete report processing. Thus, if you do not provide enough space, performance might be poor even using a spill file, because QMF must return to the database many times to retrieve all the requested data. For this reason, IBM recommends that you ensure your users have enough virtual storage for the QMF work they need to do.

You might also consider using a governor exit routine to limit rows retrieved from the database, so that less virtual storage is used for queries and reports. For more information about governor exit routines, see "Chapter 21. Controlling QMF Resources Using a Governor Exit Routine" on page 383.

Choosing the Right Amount of Virtual Storage for Each CICS User

Each QMF transaction generally requires at least 1 MB of CICS extended dynamic storage to execute queries and produce reports. Some queries might take more or less storage depending on the amount of data that is being processed and the QMF formatting options used on the report. All but 24 KB can be allocated to extended dynamic storage. For example, to support 50 QMF transactions, at least 50 MB of working storage is required, of which 1.2 MB are allocated to dynamic storage below 16 MB.

The QMF transaction consists of several load modules. The main module (about 2.8 MB) can run in 31-bit mode above 16 MB and can be located in the EPLPA. A small support module (about 52 KB) must be run in 24 bit mode below 16 MB. This module can reside in the PLPA. Each CICS region that allows execution of QMF transactions has access to QMF programs.

If a QMF transaction runs out of storage, CICS waits for storage to become available, then the QMF transaction continues processing.

CICS Performance Tradeoffs

You can use the DSQSPILL parameter to provide users with a spill file. If the spill file is full, the QMF transaction is suspended until there is enough storage to satisfy the storage request. For this reason, IBM recommends that you ensure your users have enough virtual storage for the QMF work they need to do.

You might also consider using a governor exit routine to limit rows retrieved from the database, so that less virtual storage is used for queries and reports. For more information about governor exit routines, see “Chapter 21. Controlling QMF Resources Using a Governor Exit Routine” on page 383.

DSQSRSTG (Adjusting Reserved Storage Used for Applications)

Parameter name

DSQSRSTG

Short form

R

Valid values

From 0 to 99 999 999 bytes

Default

0

The DSQSRSTG parameter is the default for all but CICS.

Note to CICS users

CICS ignores the DSQSRSTG parameter.

However, you can use the DSQSBSTG parameter if you want a more explicit specification of your report storage.

The value of this parameter is a positive whole number ranging in value from 0 through 99 999 999, with a default of 0. The value can affect other programs and the generation of reports.

The first time a user generates a report during a session, QMF determines how much storage is available in the QMF address space. The method that is used to arrive at the total storage acquired for QMF reports depends on both DSQSBSTG and DSQSRSTG:

- If DSQSBSTG is not specified, or is specified as 0, QMF subtracts the amount of DSQSRSTG from the total available storage to determine the maximum amount to use for QMF reports. The remaining storage is available for other programs, including OS/390 system services, TSO commands, REXX, ISPF, and any other non-QMF user requirements.
- If DSQSBSTG is specified, then its value is used to determine how much storage is acquired for QMF reports, and DSQSRSTG is not used.

DSQSRSTG Value of 0

You can specify 0 as the value for both DSQSBSTG and DSQSRSTG. In this case, the DSQSRSTG parameter is used and no storage is reserved for other system services. This value is probably adequate for users who never use OS/390 system services, TSO commands, REXX, ISPF or other non-QMF services during QMF sessions. But a user who does use an OS/390 system service or a TSO command and has DSQSTSTG=0 and DSQSBSTG=0, runs the risk of failing and possibly causing an abend (eg., abend878, abendb0a, abendb78,....), because QMF does not reserve any storage for those services. And even the most casual users might unknowingly use a non-QMF program when they issue installation-defined QMF commands. Such commands are performed by QMF applications, which generally make extensive use of such non-QMF programs. Take this into account when selecting values for DSQSRSTG and DSQSBSTG.

Small Value for DSQSBSTG or Large Value for DSQSRSTG

Requesting minimal storage for report processing can adversely affect performance when a user is handling a report. If enough storage is not available for the corresponding DATA object, QMF must use a spill file for excess rows of DATA. The input/output operations required for the spill file usually degrade performance.

DSQSPILL (Acquiring Extra Storage)

Parameter name

DSQSPILL

Short form

L

Valid values
YES or NO
Default
NO (no spill file is used) for CICS; YES (a spill file is used) for TSO

Because large amounts of report data in storage might affect the operation of other programs, QMF allows you to allocate a spill file.

A spill file can improve performance in an interactive QMF session. Buffers in memory can store data so that QMF doesn't need to return to the database for multiple copies of the same data. Data the user needs to view several times need not be retrieved from the database several times; the spill file can instead be used to store it.

In CICS, set the DSQSPILL parameter to YES to activate the spill file:

```
QMFn L=YES
```

In non-CICS, the spill file is activated automatically unless you specify NO:

```
DSQQMFn L=NO
```

Data is written to the spill file until:

- You use the RESET DATA command to reset the data object.
- You replace the data object by running another query.
- Your query has finished (all rows requested have been retrieved) and the data object is complete.
- Storage you defined for the spill file is full. The spill file is DFHTEMP in CICS and DSQSPILL in non-CICS.
- In CICS, the data retrieved into the spill file exceeds 32 767 rows, the maximum amount a CICS temporary storage queue can hold. (Each row can hold 4K of data.)

Allocating a Spill File for Non-CICS Users

You can allocate a spill file through a DD statement in the user's logon procedure, JCL, or CLIST. An example of this appears in the sample procedure, where the spill file is allocated through the DD statement, DSQSPILL. The statement looks like this:

```
//DSQSPILL  DD DSN=&&SPILL,DISP=(NEW,DELETE),
//             UNIT=SYSVIO,SPACE=(TRK,(1,9),RLSE),
//             DCB=(RECFM=F,LRECL=4096,BLKSIZE=4096)
```

The statement:

- Allocates the spill file as a temporary data set, unique to the user's session.
- Allocates the spill file to virtual I/O (UNIT=SYSVIO). You can instead allocate the spill file to other DASD storage.

- Specifies the DSQSPILL file with fixed-length records, one record for each block. The records must *always* be unblocked. (A block is the size of an OS/390 page: 4096 bytes.)

The statement's SPACE operand can minimize spill file storage requirements during a session:

- The small primary extent keeps the space held by the spill file to a single track during sessions when a spill file is not needed.
- The much larger secondary extents are used only when a spill file is required.
- The RLSE keyword lets QMF release all secondary extents when the user's DATA object is reset. This happens, for example, when the user begins a new report.

To allocate a spill file in a CLIST, use the following example:

```
ATTR SPILL RECFM(F) LRECL(4096) BLKSIZE(4096)
ALLOC FILE(DSQSPILL) UNIT(SYSVIO) SPACE(1,19) RELEASE +
  NEW DELETE USING(SPILL)
```

If the user waits to do this until a report is being generated, the spill file is not used for that report. Only when the underlying DATA object has been replaced (for example, through a DISPLAY command) is the spill file used during the session.

For information on calculating the appropriate spill file size, see "Estimating the Space Required for a Spill File".

Estimating the Space Required for a Spill File

If the data written to the spill file goes over the set limit (becoming full or unusable), QMF does not use the data from the spill file, but instead retrieves it again from the database, using virtual storage to hold it. You can exceed CICS or TSO DASD storage. In CICS, temporary storage for the spill file is limited to 32 767 buffers of size 4 KB each.

To accommodate QMF's storage requirements, ensure the CICS temporary storage file DFHTEMP or the TSO DASD storage is large enough to hold the individual spill files for all concurrent QMF users, in addition to any other transaction requirements for auxiliary temporary storage.

Use the following procedure to calculate the amount of space required for an individual spill file. Then enlarge DFHTEMP according to how many individual spill files you'll need to accommodate all concurrent users of QMF.

1. **Calculate the width (W) of one row of the largest table that can appear in the data object** by adding field widths in bytes (use Table 26 on page 186). See Table 27 on page 187 for sample calculations.

- All the rows of an individual table are the same width, regardless of the data each row contains. A row cannot be wider than 32,768 bytes.
- Defined columns do not get written to the spill file.

2. **If W is 4096 or less**, calculate the number of rows per page (R) using `R = 4096/W`, and round the result down to the next lowest integer.

   When W is 4096 or less, QMF fits as many rows as it can into a page, without spanning pages.

3. **If W is greater than 4096**, calculate the number of pages per row (P), using `P = W/4096`, and round up to the next highest integer.

   When W is greater than 4096, QMF uses the minimum number of pages to hold a row, spanning pages regardless of column boundaries. Each row begins at the start of a page.

4. **Calculate the number of pages required for the spill file**, according to the value of W:
   - If W is 4096 or less, calculate the number of pages required for the spill file by *dividing* the number of rows in the table by R.
   - If W is greater than 4096, calculate the number of pages required for the spill file by *multiplying* the number of rows in the table by P.

Table 26. Lengths of types of fields (use to estimate spill file size)

Field Type	Field Length in Bytes
CHAR(n)	n+2
DATE	12
DECIMAL(n,m)	(n+1)/2+2, n odd (n+2)/2+2, n even
FLOAT(21)	10
FLOAT(53)	10
GRAPHIC(n)	n*2+2
INTEGER	6
SMALLINT	4
TIME	10
TIMESTAMP	28
VARCHAR(n)	n+4
LONG VARCHAR	(depends on other field lengths)
LONG VARGRAPHIC	(depends on other field lengths)
VARGRAPHIC(n)	n*2+4

If a row contains LONG VARCHAR or LONG VARGRAPHIC fields, space is first allotted for all other fields. Then the remaining space is divided by the number of fields, and each LONG VARCHAR or LONG VARGRAPHIC field is truncated to that length.

Table 27 shows a sample calculation for a spill file.

Table 27. Sample row width calculation for a spill file

Content of Row	Calculation	Contribution to Width
Two SMALLINT columns	2 x 4 =	8 bytes
One INTEGER column		6 bytes
One DECIMAL(3,2) column	(3+1)/2+2 =	4 bytes
One DECIMAL(6,0) column	(6+2)/2+2 =	6 bytes
One FLOAT column		10 bytes
One CHAR(10) column	10 + 2 =	12 bytes
One VARCHAR(16) column	16 + 4 =	20 bytes
Total width of row		59 bytes

The following sample calculations provide two ways to calculate the spill file space.

When R=4096/540 = 7 multiple rows/buffer:

```
600 000 rows    1 track    1 cylinder
------------ * --------- * ---------- = 571 cylinders
     7         10 blocks   15 tracks
```

When R=6000, 2 buffers/row:

```
6000 rows * 2 blocks/row *  1 track     1 cylinder
                           --------- *  ---------- = 800 cylinders
                           10 blocks    15 tracks
```

Using a Spill File in a Noninteractive QMF Session

A spill file is most useful for improving performance in an interactive QMF session, when the DSQSMODE parameter is set to I. If you are running QMF noninteractively (the DSQSMODE parameter is set to B), using a spill file can also improve performance when multiple passes of the data are required to produce the report. A spill file might also be necessary to complete the data object, as when a RUN QUERY command is followed by a SAVE DATA command.

When QMF is running in batch, the QMF program parameter DSQSPILL(YES/NO) should be set based on the work to be done. If the job is

producing a large data object for printing, then allocating a spill file can have a negative effect on performance. In most cases when running in batch, DSQSPILL=NO is the best choice.

Multiple passes of the data are required when:

- You need to print several reports with different formats for the same data.
- You use PCT, CPCT, TCPCT, or TPCT edit codes with the report.
- You print a report that requires QMF to split the pages, because the report is wider than the print width.

For more information on noninteractive QMF sessions, see "DSQSMODE (Specifying an Interactive or Noninteractive QMF Session)" on page 195.

QMF Reference explains each of the QMF forms used to format reports and provides examples of how to use the forms.

Solving Some Spill File Problems

Creating a spill file for your users can solve the user's storage problem, but can cause other problems. You might encounter problems with DASD space or create problems for other users.

Too Little Space on a DASD Volume: If a number of users with the same logon procedure for QMF are experiencing spill file problems, and their common logon procedure allocates all their spill files to a single specific DASD volume, then the problems encountered by your users might be caused by too little space on this volume. If they are, you might solve them by changing the spill file DD statement in their logon procedure. The new DD statement might make a nonspecific volume reference instead of the current reference to a specific volume.

Creating Spill File Problems for Others: You might solve a user's spill file problems by increasing the spill file's secondary allocation. But in doing this, you might create spill file problems for others. If you must greatly increase the secondary allocation, consider moving the user's spill file to a volume not used for the spill files of others.

A user can create spill file problems for others without being aware of it. The user might, for example, scroll to the bottom of a large table and overflow the spill file but do nothing to bring about the incomplete data condition. This would be true if the user failed to issue certain types of commands between the time the table was first displayed and the time it was replaced by another. In the interim, the user's spill file might hold space unnecessarily that other users sorely need.

Performance Problems: If you are not using conditional formatting or column definitions (which use REXX and have additional performance considerations), the performance you observe is the result of accessing data in the database.

If you have sufficient storage available to QMF after your data is retrieved a first time, QMF does not need to reaccess the database to obtain rows a second time.

If you have memory constraints and defined a DSQSPILL file, part of the processing time is writing the data to DSQSPILL so it can be fetched later.

The performance is affected by several things:

- The value of DSQSIROW (initial number of rows to fetch). This primarily affects the initial display of the report only.
- Whether you do something that requires multiple passes of the data. (Certain usage codes, such as PCT, require that all the data be read before the first report screen displayed.) This primarily affects the initial display of the report only.
- The amount of memory required to hold one row of data. The effect of this is usually small.
- Whether, when multiple passes are required, the data is fetched from the database the second time (not all data fits in memory and DSQSPILL), or from memory and DSQSPILL, or just from virtual memory.
- Whether you are scrolling backward or forward. Successive FORWARD commands usually perform best. BACKWARD commands might require starting over at the start of the answer set. This depends on the amount of memory, how far backward you want to scroll, the complexity of the report, and other factors.

  For very large answer sets with small memory and insufficient DSQSPILL allocation, the entire answer set might be read from row 1 to the new current row, every time the BACKWARD command is used.

The best performance is attained when there is sufficient memory to hold all data and DSQSPILL is not used.

Although it might not reduce the total amount of resource consumed to process your data, if you are able to get the complete answer set into virtual memory before the first display (DSQSIROW is large), the database locks are released and scrolling around the displayed report performs fastest. This slows the display of the first report screen. Releasing the locks might have the effect of improving performance for other users.

DSQSSPQN (Specifying the Name of the CICS Spill Storage)

Parameter name
DSQSSPQN
Short form
(no short form)
Valid values
Any name that follows CICS naming conventions for queues
Default
DSQSnnnn (nnnn is the CICS terminal ID)

When you choose to use a spill file, you can also specify a name for the CICS temporary storage queue to use for QMF spill data. For example, to specify the name MYDATA:

```
QMFn DSQSSPQN=MYDATA
```

If you start a noninteractive QMF session from within a CICS application and you choose not to specify a CICS terminal ID, you need to code the DSQSSPQN parameter. You must explicitly specify a value for DSQSSPQN, or QMF does not start.

DSQSIROW (Controlling the Number of Report Rows Retrieved for Display)

Parameter name
DSQSIROW
Short form
F
Valid values
Any number from 0 through 99 999 999
Default
A minimum of 100 rows retrieved before first screen of report is displayed

Use DSQSIROW to specify the maximum number of rows QMF retrieves into the data object before displaying the first screen of the report to the user. DSQSIROW applies only to the initial load of a new data object, created by:

- Executing queries that use SQL SELECT statements
- Displaying a database table with the QMF DISPLAY command

To determine the proper value for this parameter, use step 1 of the algorithm in “Estimating the Space Required for a Spill File” on page 185 to estimate the size of a *block* of rows for the largest table a user is likely to query. A block is the number of rows that fit into one 4096-byte buffer.

After every block of rows is retrieved, QMF compares the total number of retrieved rows to the value of DSQSIROW to determine whether to display the first screen of data. For example, suppose a block in your installation is 62

rows and you set DSQSIROW to 50. QMF retrieves 62 rows of data and, upon comparing 62 to 50, stops retrieving rows and displays the first screen of data.

Some report formatting options, such as percent (%) usage codes and ACROSS reports, require that all the data be retrieved before QMF displays the first screen. QMF ignores the DSQSIROW value in these situations. See *QMF Reference* for more information about these formatting options.

Performance with Small DSQSIROW Values

If you use too small a value for DSQSIROW, QMF might not be able to complete the data object before the first screen of data is displayed. An incomplete data object causes *share* locks on the data, which can prevent other users' attempts to update the data. DB2 maintains an EDM pool to service its requesters. While a data object is incomplete, the requester contends with all other requesters for EDM resources.

Many users might be affected if a QMF control table or a part of the system catalog is locked. You can release the locks in one of the following ways:

- Use the BOTTOM command to retrieve the remaining rows into the data object, then release the locks.
- Use the RESET DATA command to release these locks and clear the data object, whether or not all requested rows were retrieved.
- Use any SAVE command (for example, SAVE DATA or SAVE FORM) to retrieve and save the remaining rows into the data object, then release the locks.

See "Resetting the Data Object to Improve Performance" on page 475 for a list of commands that complete the data object.

To get the best performance in a noninteractive session (when the DSQSMODE parameter is set to B), use a value of zero for DSQSIROW unless you want to minimize the number of open read locks while QMF is retrieving or formatting data. See "DSQSMODE (Specifying an Interactive or Noninteractive QMF Session)" on page 195 for more information about noninteractive QMF sessions.

Do not use DSQSIROW to limit the number of rows that QMF displays on the screen. Although you can specify a small value, QMF retrieves enough rows to fill the screen display in an interactive session.

Performance with Large DSQSIROW Values

If you use too large a value for DSQSIROW, QMF might take a long time to display the first screen of data. If you set DSQSIROW higher than you set the DSQSBSTG parameter, for example, QMF might display a message indicating that there is insufficient storage available to satisfy the user's request.

In CICS, when storage for the region is full, QMF waits for virtual storage to become available to finish retrieving rows for the database. In TSO and batch, QMF stops retrieving rows or terminates when storage is full. When you plan your values for DSQSBSTG and DSQSIROW, remember that, in CICS, QMF might time out waiting for storage to become available.

Tracing QMF Activity at the Start of a Session

QMF provides a trace facility that helps you trace user activity and any errors that might occur during a user's session. The program parameters explained in this section help you control:

- The level of detail at which QMF activity is traced, including activity before the user's profile is established
- Where trace data is stored

DSQSDBUG (Setting the Level of Trace Detail)

Parameter name
DSQSDBUG
Short form
T
Valid values
ALL or NONE
Default
NONE (no trace data)

Use DSQSDBUG to specify the level of detail at which you want to trace QMF activity. If you specify NONE, no trace is performed unless you load a profile with a saved value of ALL. If you specify ALL, ALL overrides the profile values and remains at ALL.

The tracing you set with this parameter is effective until the user issues a `SET PROFILE (TRACE=value` command to change it, or, in the case of NONE, until the profile is loaded. For more information on valid trace values, see "Getting the Right Level of Detail in Your Trace Output" on page 482.

Set DSQSDBUG to ALL when you want to trace QMF activity at the highest level of detail, including program initialization errors and other errors that might occur before the user's profile is established:

```
DSQQMFn T=ALL
QMFn T=ALL
```

For CICS, when you use a value of ALL, ensure the type of storage queue you choose is large enough to hold the trace output. "DSQSDBQT (Specifying the Type of CICS Storage for Trace Data)" on page 193 explains how to specify the CICS queue type when you start QMF.

When you set DSQSDBUG to NONE, the level of detail in the trace output depends on whether the QMF session is running interactively or noninteractively:

- In either an interactive or a noninteractive session, only system error tracing is done during initialization, before the user's profile is established. The only way to turn off this initial tracing is to not allocate or define storage for the trace data.
- In a noninteractive session, all messages and commands are traced at the most detailed level.

"DSQSMODE (Specifying an Interactive or Noninteractive QMF Session)" on page 195 explains interactive and noninteractive sessions in more detail.

After QMF starts, you can turn tracing off by using the command `SET PROFILE (TRACE=NONE`. You can also set more specific levels of trace detail using this command, by replacing `NONE` with various values that represent different QMF functions. See "Using the QMF Trace Facility" on page 480 for more information.

DSQSDBQT (Specifying the Type of CICS Storage for Trace Data)

Parameter name

DSQSDBQT

Short form

(no short form)

Valid values

TD or TS

Default

TD (transient data queue)

Use DSQSDBQT to indicate the type of CICS storage you want to use for trace data. Specify the value TS to use a CICS auxiliary temporary storage queue for tracing:

```
QMFn DSQSDBQT=TS
```

IBM recommends that you use temporary storage (TS) for message-level tracing. For other types of tracing, such as ALL, consider using a transient data queue if you think the trace output might exceed 32 767 rows of data (the limit for CICS temporary storage queues).

A transient data queue named DSQD is predefined for you during QMF installation. If you use the DSQSDBQN parameter to name the transient data queue something other than DSQD, you must predefine the queue to CICS before you use it for the first time.

For more information on specifying the amount of detail in the QMF trace and viewing trace data, see "Using the QMF Trace Facility" on page 480.

DSQSDBQN (Specifying the Name of the CICS Storage for Trace Data)

Parameter name
DSQSDBQN

Short form
(no short form)

Valid values
Any name that follows CICS naming conventions for queues

Default
DSQD

DSQSDBQN specifies the name of the transient data or temporary storage queue that holds trace data. A transient data queue named DSQD is predefined for you in the CICS DCT.

If you specify transient data for DSQSDBQT and you want to name the queue something other than DSQD, define the queue in the CICS DCT if it is not yet available.

Ensure the queue name conforms to CICS specifications for the type of queue specified by DSQSDBQT. TD queues have names from 1 to 4 characters. TS queues have names from 1 to 8 characters.

You do not need to predefine temporary storage queues to CICS. For example, the following statement dynamically allocates a temporary storage queue named MYTRACE to hold trace data for the QMF session:

```
QMFn DSQSDBQN=MYTRACE,DSQSDBQT=TS
```

QMF issues CICS ENQ and DEQ commands around single trace entries in the queue, so that a single queue can be used by more than one user. See “Viewing QMF Trace Data” on page 484 for information on how to view the trace after it is written to the queue.

Controlling Initial Activities During a Session

This section explains program parameters that help you control initial QMF activities, such as:

- Specifying a location for the connection to the database
- Starting a noninteractive session
- Naming the DB2 subsystem used by TSO
- Running an initial procedure that does the predetermined amount of work defined in the procedure and then exits QMF
- Naming the QMF application plan
- Specifying the TSO profile key

DSQSDBNM (Specifying the Location to Connect to When Starting QMF)

Parameter name

DSQSDBNM

Short form

D

Valid values

Any valid database name

Default

For CICS, the default database that is currently being used by CICS; otherwise, it is the default database for the subsystem that is being used.

You can use DSQSDBNM to specify the location to which you are initially connected for a QMF session. This location can be a remote database. You can specify DSQSDBNM in all operating environments.

If you are setting up for a remote unit of work: The maximum length in characters of the DSQSDBNM value depends on the type of the application requester that initiates the remote unit of work connections. The lengths for each requester type are shown in Table 28.

Table 28. Maximum Length of DSQSDBNM Value Based on Requester Type

Requester type	Maximum Length
UDB for OS/390	16
DB2 for VM and VSE	18

DSQSMODE (Specifying an Interactive or Noninteractive QMF Session)

Parameter name

DSQSMODE

Short form

M

Valid values

B (noninteractive) or I (interactive)

Default

I (B if started through the callable interface)

Some query and report-writing tasks users need to perform might not require interaction with QMF. For example, a salesperson might use the same QMF

procedure every few days to query a set of tables for account status. Although the data changes, the procedure and tasks required to access the data remain the same.

Using the QMF program parameter DSQSMODE, you can save resources and time by starting a noninteractive session to perform your QMF work. Your terminal is then free for you to do other work while the transaction is running.

Use a value of B to start a noninteractive session:

```
DSQQMFn M=B,I=STARTPROC
```

Because a noninteractive session displays no QMF panels, use the DSQSRUN (I) parameter to run an initial procedure that does the required QMF work and exits the program. “DSQSRUN (Naming a Procedure to Run when QMF Starts)” on page 197 explains this parameter in more detail.

Additionally, use the DSQSDBNM parameter to specify an ID and password for the database connection if you do not want to use the default database location.

DSQSSUBS (Naming the DB2 Subsystem Used by QMF)

Note to CICS users

CICS ignores the DSQSSUBS parameter.

Parameter name
DSQSSUBS

Short form
S

Valid values
Name of the DB2 subsystem that QMF uses

Default
DSN

The value of this parameter is the name of the DB2 subsystem that QMF uses. If the name is other than DSN (the default), you *must* pass it to QMF through this parameter.

The name is found in member IEFSSNxx of SYS1.PARMLIB.

Data sharing environment consideration:
In a data sharing environment, you can use the DB2 group attachment name in place of a DB2 subsystem name as a ″generic″ attachment name.

DSQSRUN (Naming a Procedure to Run when QMF Starts)

Parameter name
DSQSRUN

Short form
I

Valid values
Any valid procedure name (see *QMF Reference*)

Default
No initial procedure is run

Use the DSQSRUN parameter to pass the name of a QMF procedure that runs as soon as QMF starts. In a noninteractive session, use this procedure to perform the QMF work you need to do, then exit the program.

For example, to run an initial procedure named STARTPROC, enter:

```
DSQQMFn I=STARTPROC
```

Qualify the procedure name with the SQL authorization ID of its owner if other users are using it to start QMF. For example, if user JONES owns the STARTPROC procedure, enter:

```
DSQQMFn I=JONES.STARTPROC
```

When you pass the name of an initial procedure, QMF issues a RUN PROC command, which runs the procedure you name.

Important: QMF does not allow blanks in the user ID and procedure syntax. For example, QMF doesn't recognize:

```
DSQQMFn I=JONES. STARTPROC
```

To use a procedure name with an imbedded blank, you must enclose the name in quotes:

```
DSQQMFn I=JONES.'START PROC'
```

Use DSQSRUN to help you:

- Automate noninteractive QMF work so you can conserve resources normally used when running interactively.

- Allow users to perform interactive QMF work within the confines of a predefined procedure, then exit when they are finished with the work specified in the procedure.

Running an Initial Procedure Noninteractively

To conserve resources, you can run a procedure noninteractively by using a value of B for the DSQSMODE parameter and naming a procedure using the DSQSRUN parameter. For example, suppose that every Monday morning, you need to produce an inventory status report. Each Sunday night you need to run a query that retrieves data from the same columns of a table called INVENTORY. Your query might look something like the following query. For this example, we'll call this query INVENTORY_QUERY:

```
SELECT * FROM INVENTORY
WHERE STOCK < 20
```

The procedure you use to run this query and print the status report might look something like the following CICS and TSO procedures. For these examples, we'll call this QMF procedure INVENTORY_PROC:

```
RUN QUERY INVENTORY_QUERY
PRINT REPORT
EXIT
```

The procedure includes an EXIT command because, when QMF is running noninteractively, no user is present to end the QMF session. EXIT ends the QMF session and frees the resources being held by QMF. Always use an EXIT command in an initial procedure that runs noninteractively.

Because the tasks involved in creating the report do not change (only the data changes), you can use the DSQSRUN parameter to query the INVENTORY table off-shift Sunday night and print the report:

```
QMFn I=INVENTORY_PROC,M=B
```

Performing Interactive QMF Work with an Initial Procedure

You can use an initial procedure in an interactive QMF session to predefine data access tasks for end users, making it easy for them to access only the data they need. For example, suppose a QMF end user has the responsibility of producing an inventory status report every Monday morning. The user might know the value that indicates low stock but might not know exactly how to produce the status report. In this case, you might put a variable in the query so that the user needs to enter only the value that indicates low stock. We will call this query INVENTORY_QUERY:

```
SELECT * FROM INVENTORY
WHERE STOCK < &LOWSTOCK
```

Because the user might want to view the data before printing it, your INVENTORY_PROC procedure might not include the EXIT command:

```
RUN QUERY INVENTORY_QUERY
```

You can then use the DSQSRUN parameter without specifying the DSQSMODE parameter, so that you start an interactive session for the user:

```
QMFn I=INVENTORY_PROC
```

The INVENTORY_PROC procedure prompts the user for the `&LOWSTOCK` variable value. For additional examples of how to use variables with an initial procedure, see “Passing Variable Values to an Initial Procedure”. *QMF Reference* explains variables in more detail.

As soon as the user provides the value, QMF displays the report and the user can then view the report and issue a QMF PRINT command to print it.

For interactive sessions, instruct users to enter EXIT on the command line when they are finished viewing the report. The initial procedure runs repeatedly until an EXIT command is issued. Thus, pressing the End function key from the report panel reruns the initial procedure; it does not display the QMF Home panel.

Additionally, when you use the DSQSRUN parameter, ensure that the DSQEC_RERUN_IPROC global variable is set to 0 and that the current object is not the QMF Home panel. *Developing QMF Applications* provides more information on this global variable, as well as information about how to write procedures that help users perform QMF activities specified in predefined procedures and applications.

Passing Variable Values to an Initial Procedure

When you supply the name of an initial procedure on the DSQSRUN parameter, you can also supply values for variables contained in the procedure. You can specify one or more variables and their values following the procedure name on the DSQSRUN parameter.

Follow these rules when you specify variables for DSQSRUN:

- Put parentheses around the variable parameter list, as shown in the examples in this section.
- Precede the variable name with an ampersand, and ensure the string is in a *variable_name=value* format.
- Ensure the combined total of characters for the procedure name and the variable parameter list is 98 characters or less.
- Separate the variable parameter specifications using a single comma, one or more blanks, or a combination of a comma and blanks.

Table 29 lists environments and the number of ampersands required to use a variable in each environment.

Table 29. Required number of ampersands preceding program variables

Environment	Number of additional ampersands	Example
CICS	0	&variable=value
SRPI	0	&variable=value
APPC	0	&variable=value
TSO without ISPF	0	&variable=value
TSO with ISPF	1	&&variable=value
TSO without ISPF using CLIST	2	&&&variable=value
TSO with ISPF using CLIST	3	&&&&variable=value

When you specify the name of an initial procedure, QMF issues a RUN PROC command that runs the procedure. When you use variables in your procedure, the values you supply for these variables must conform to the syntax used for passing variables on a RUN command. For information about this syntax, see *QMF Reference*.

For example, suppose you frequently need two pieces of information about employees in your organization. One piece of information is the name of the employee, and the other varies. You might define a query that includes NAME and uses a variable for the other column. Figure 38 shows an example query and procedure. The figure also shows how to pass a value for the variable when you enter the DSQSRUN parameter, and shows the RUN PROC command that QMF issues.

Query (named JONES.QUERY2)

```
SELECT NAME, &COL
FROM Q.STAFF
```

Procedure (named JONES.PROC2)

```
RUN QUERY JONES.QUERY2 (&&COL=&COL
```

DSQSRUN parameter

```
QMFn I=JONES.PROC2(&COL=YEARS)
```

Resulting RUN command

```
RUN PROC JONES.PROC2 (&COL=YEARS)
```

Figure 38. Passing a QMF column name using DSQSRUN

Figure 39 shows a similar example, but instead of passing one column name to the procedure, it allows you to pass several, which return the employee's name, the department, and the employee's salary.

Query (named JONES.QUERY3)

```
SELECT &COLS
FROM Q.STAFF
```

Procedure (named JONES.PROC3)

```
RUN QUERY JONES.QUERY3 (&&COLS=&COLS
```

DSQSRUN parameter

```
QMFn I=JONES.PROC3(&COLS=((DEPT,NAME, SALARY))
```

Resulting RUN command

```
RUN PROC JONES.PROC3(&COLS=((DEPT,NAME,SALARY)))
```

Figure 39. Passing several QMF column names using DSQSRUN

The next four examples show how to pass information you normally supply after the WHERE keyword in a query. (See *QMF Reference* for more information about the WHERE keyword.)

These examples contain character strings, for which special syntax is required because of how QMF evaluates the values when it processes the RUN PROC command. Special characters (comma, blank, parentheses, quotes, apostrophe or single quote, and equal sign) can also be included in the string, as shown.

For example, if you need to know the names and employee numbers of all the managers in your organization, you might run a query like the one in Figure 40. When you pass the character string MGR on the DSQSRUN parameter, be sure to enclose the value in single quotes.

Query (named JONES.QUERY4)

```
SELECT JOB, NAME, ID
FROM Q.STAFF
WHERE JOB=&JOB
```

Procedure (named JONES.PROC4)

```
RUN QUERY JONES.QUERY4 (&&JOB=&JOB
```

DSQSRUN parameter

```
QMFn I=JONES.PROC4(&JOB='MGR')
```

Resulting RUN command

```
RUN PROC JONES.PROC4 (&JOB='MGR')
```

Figure 40. Passing a string within single quotes using DSQSRUN

Figure 41 on page 202 shows how to pass variable values that contain commas. Enclose the value SAN JOSE, CA in single quotes because it contains a comma.

Query (named JONES.QUERY5)

```
SELECT *
FROM Q.APPLICANT
WHERE ADDRESS=&CITY
```

Procedure (named JONES.PROC5)

```
RUN QUERY JONES.QUERY5 (&&CITY=&CITY
```

DSQSRUN parameter

```
QMFn I=JONES.PROC5(&CITY='SAN JOSE,CA')
```

Resulting RUN command

```
RUN PROC JONES.PROC5 (&CITY='SAN JOSE,CA')
```

Figure 41. Passing a comma within a string using DSQSRUN

Figure 42 shows how to pass variable values that contain single quotes (for example, an apostrophe in a name). When you pass the value on the DSQSRUN parameter, be sure to enclose the value in single quotes and use two single quotes for the apostrophe instead of one.

Query (named JONES.QUERY6)

```
SELECT *
FROM Q.STAFF
WHERE NAME=&NAME
```

Procedure (named JONES.PROC6)

```
RUN QUERY JONES.QUERY6 (&&NAME=&NAME
```

DSQSRUN parameter

```
QMFn I=JONES.PROC6(&NAME='O''BRIEN')
```

Resulting RUN command

```
RUN PROC JONES.PROC6 (&NAME='O''BRIEN')
```

Figure 42. Passing an apostrophe as part of a string using DSQSRUN

Figure 43 shows how to pass values for variables in two different parts of the query.

Query (JONES.QUERY7)

```
SELECT *
FROM Q.STAFF
WHERE DEPT IN &DEPT
AND JOB  = &JOB
```

Procedure (named JONES.QUERY7)

```
RUN JONES.QUERY7 (&&DEPT=&V1 &&JOB=&V2
```

DSQSRUN parameter

```
QMFn I=JONES.PROC7(&V1=(((10,38))) &V2='MGR')
```

Resulting RUN command

```
RUN PROC JONES.PROC7(&V1=(((10,38))) &V2='MGR')
```

Figure 43. Passing multiple variable parameters and values using DSQSRUN

DSQSPLAN (Naming the QMF Application Plan)

Note to CICS users

CICS ignores the DSQSPLAN parameter.

Parameter name
DSQSPLAN
Short form
P
Valid values
Name of the QMF application plan
Default
QMF710

You can change the name of the QMF application plan using the DSQSPLAN parameter. The default value for the DSQSPLAN parameter is QMF710. If the QMF application plan is not QMF710, you must pass the correct name to QMF through this parameter.

DSQSPRID (Specifying the TSO Profile Key)

Parameter name
DSQSPRID
Short form
U
Valid values
PRIMEID or TSOID
Default
PRIMEID

This parameter specifies whether to use the TSO logon ID or the DB2 primary authorization ID for:

- The CREATOR column value to use when selecting the user's profile row from Q.PROFILES
- The default resource group for the user if the RESOURCE_GROUP column of the user's profile row is null or blank

Releases of QMF prior to Version 3 Release 1 always use the TSO logon ID for the cases listed.

You can use this parameter when you are migrating from Version 2 Release 4 or later, have TSO logon IDs different from their primary authorization IDs, and do not want to replace the CREATOR column values with the primary authorization IDs.

DSQSDBCS (Setting Printing for Double-byte Character Set Data)

Parameter name
DSQSDBCS
Short form
K
Valid values
YES or NO
Default
NO

If you use the Uppercase or Japanese NLF, you might need to print double-byte character set (DBCS) data. You can set the DSQSDBCS program parameter to YES to print DBCS data from non-DBCS terminals.

For example, suppose a user you support uses an IBM 3279 display terminal and needs to print a table (DBCSTABLE) whose nonnumeric columns contain DBCS data. The following statement starts the Uppercase NLF from a cleared CICS screen and allows the user to print DBCSTABLE using a command such as `PRINT DBCSTABLE (PRINTER=DBCSPRT`.

```
QMFU K=YES
```

For more information on how to establish a GDDM nickname for the DBCSPRT printer, see “Chapter 17. Enabling Users to Print Objects” on page 287.

Setting Default Start Values Using the REXX Program DSQSCMD

Parameter name
DSQSCMD
Short form
(no short form)
Valid values
NULL or
Default
DSQSCMDE

You can specify default values for the program parameters using an initialization program. IBM supplies the REXX program DSQSCMD for this purpose. DSQSCMD can change the default program parameter values supplied by QMF and can execute across environments.

The parameter values you specify when you start QMF override the values set in the REXX program DSQSCMD. The parameter values you specify when a workstation session is started override the values set in DSQSCMD.

DSQSCMD is valid only as a start function keyword on the START command when QMF is started from an application program using the callable interface.

For TSO, QMF calls the REXX program DSQSCMDE (see Figure 44) to provide values for the program parameters. This IBM-supplied program supplies default values; by adjusting these values, you can tailor the QMF environment for your installation.

If you do not want to provide a parameter value in DSQSCMDE, you can use 'NULL'.

General-Use Programming Interface

```
/*REXX ---------------------------------------------------------------*/
/* DSQSCMDE:                                                         */
/*                                                                   */
/*  COPYRIGHT: LICENSED MATERIALS - PROPERTY OF IBM                  */
/*             5645-DB2, 5648-A70 (C) COPYRIGHT IBM CORP.            */
/*             1989, 1998. (PUBLISHED)                               */
/*             ALL RIGHTS RESERVED.                                  */
/*             US GOVERNMENT USERS RESTRICTED RIGHTS -               */
/*             USE, DUPLICATION OR DISCLOSURE RESTRICTED             */
/*             BY GSA ADP SCHEDULE CONTRACT WITH IBM CORP.           */
/*                                                                   */
/*  STATUS: VERSION 7 RELEASE 1 LEVEL 0                              */
/*                                                                   */
/*  This REXX program returns default QMF program parameters.        */
/*  Values returned by this program can be substituted with          */
/*  values specified on the QMF START command.                       */
/*                                                                   */
/*-------------------------------------------------------------------*/
     Trace Off
 /*  Signal ON ERROR        Immediate exit upon any error condition */

 PARSE UPPER SOURCE CSYS .
```

Figure 44. Example REXX program DSQSCMDE (Part 1 of 3)

```
/*-------------------------------------------------------------------*/
/*  Customer should tailor the QMF environment by adjusting any      */
/*  of the following variable values. Each variable value is         */
/*  commented indicating the environment(s) in which it is           */
/*  effective.                                                       */
/*                                                                   */
/*  IMPORTANT:                                                       */
/*     A value must be specified for each one of the following       */
/*     variables. Also each variable can only contain a single       */
/*     value and must NOT contain a blank. Use  the term NULL        */
/*     instead of a blank value.                                     */
/*-------------------------------------------------------------------*/
 DSQADPAN = "1"                  /* CMS and TSO                    */
 DSQALANG = "E"                  /* CMS and TSO                    */
 DSQSBSTG = "NULL"               /* CMS and TSO                    */
 DSQSDBCS = "NO"                 /* CMS and TSO                    */
 DSQSDBNM = "NULL"               /* CMS and TSO                    */
 DSQSDBUG = "NONE"               /* CMS and TSO                    */
 DSQSIROW = "100"                /* CMS and TSO                    */
 DSQSMODE = "BATCH"              /* CMS and TSO                    */
 DSQSPILL = "NULL"               /* CMS and TSO                    */
 DSQSRSTG = "0"                  /* CMS and TSO                    */
 DSQSRUN  = "NULL"               /* CMS and TSO                    */

 DSQSDCSS = "QMF710E"            /* CMS only                       */

 DSQSPLAN = "QMF710"             /* TSO only                       */
 DSQSPRID = "PRIMEID"            /* TSO only                       */
 DSQSSUBS = "DSN"                /* TSO only                       */

/*-------------------------------------------------------------------*/
/* Return variables to the QMF start function.                       */
/*                                                                   */
/* IMPORTANT:  Sequence of variables in RETURN statement must NOT    */
/*             be altered.                                           */
/*-------------------------------------------------------------------*/
```

Figure 44. Example REXX program DSQSCMDE (Part 2 of 3)

```
IF CSYS = CMS THEN DO
  RETURN DSQSMODE DSQSRUN  DSQALANG DSQSIROW DSQSRSTG  ,
         DSQSDBCS DSQSDBUG DSQSDCSS DSQSBSTG DSQSPILL  ,
         DSQSDBNM DSQADPAN
END
ELSE DO
  RETURN DSQSMODE DSQSRUN  DSQALANG DSQSIROW DSQSRSTG  ,
         DSQSDBCS DSQSDBUG DSQSPLAN DSQSSUBS DSQSBSTG  ,
         DSQSPRID DSQSPILL DSQSDBNM DSQADPAN
END


ERROR:                 /* Immediate exit upon any error condition */
EXIT 12
```

Figure 44. Example REXX program DSQSCMDE (Part 3 of 3)

End of General-Use Programming Interface

Chapter 15. The QMF Session Control Facility

The session control facility provides a method for initializing a QMF session by executing a specific QMF procedure when QMF is started. The name of the QMF procedure is Q.SYSTEM_INI. With this facility, the Q.SYSTEM_INI procedure can run any QMF command or any stored query that the user is authorized to run, prior to the user seeing the QMF home screen.

Installing or Removing Q.SYSTEM_INI

Create and save the Q.SYSTEM_INI procedure into the database like any other QMF procedure. The procedure must be named ″SYSTEM_INI″ and be saved under the authorization ID of ″Q″. This QMF procedure should be shared among all QMF users. You can make the procedure sharable by specifying the SAVE command option ″SHARE=YES″. It's also a good idea to add a comment describing the procedure. For example:

```
SAVE PROC AS Q.SYSTEM_INI  (SHARE=YES,COMMENT='QMF System Initialization Procedure')
```

Importing the default System Initialization Procedure

QMF provides you with a procedure to import the default QMF system initialization procedure correctly under authorization ID of ″Q″ and shared between all QMF users.

Before running this procedure, ensure that the QMF command language is set to English. To do so, set the QMF global variable DSQEC_NLFCMD_LANG to 1. When the procedure is done you can return to the presiding language by setting QMF global variable DSQEC_NLFCMD_LANG to 0.

Issue the following command:

```
IMPORT PROC FROM 'QMF710.SDSQSAPE(DSQ1EINI)'
```

Now press the Run key or issue the RUN PROC command to run the procedure. The DSQ1EINI PROC imports the QMF default system initialization procedure from a data set called 'QMF710.SDSQSAPE(DSQ0BINI)'. The sample PROC is saved in the database as Q.SYSTEM_INI PROC with SHARE=YES.

You can import your own version of the Q.SYSTEM_INI PROC using DSQ1EINI. You might want to export the current Q.SYSTEM_INI PROC to an

OS/390 data set to edit, or you can just create a PROC in an OS/390 data set from scratch. In either case, when you are ready to import your own version, enter the command:

```
IMPORT PROC FROM 'QMF710.SDSQSAPE(DSQ1EINI)'
```

This displays the DSQ1EINI PROC. From there, edit the PROC to change the name of the OS/390 data set that will be IMPORTed to your OS/390 data set. Now press the Run key or issue the RUN PROC command to run the procedure. The DSQ1EINI PROC imports the OS/390 data set specified on the PROC screen and ensures it is called Q.SYSTEM_INI with SHARE=YES. It replaces any Q.SYSTEM_INI PROC that already exists.

When Does the Q.SYSTEM_INI Procedure Run?

The Q.SYSTEM_INI procedure runs just before the QMF initial procedure specified by the DSQSRUN parameter and just after QMF has completed initialization. All of the QMF functions available to QMF procedures are also available for use by the Q.SYSTEM_INI procedure.

Using Q.SYSTEM_INI

Your QMF session procedure Q.SYSTEM_INI, can be as simple as setting some QMF global variables or profile values or as complex as a complete front end to QMF. Each user can have their own session procedure called from, but not replacing Q.SYSTEM_INI.

Example Shipped with QMF

The sample Q.SYSTEM_INI proc provided with QMF makes SHARE=YES the default for all users.

```
--
--  QUERY                D S Q 0 B I N I
--   MANAGEMENT          ---------------
--    FACILITY
--
--  Q M F    S Y S T E M    I N I T I A L I Z A T I O N    P R O C
--  -----    -----------    --------------------------    -------
--
--  FUNCTION: PROVIDE AN EXAMPLE QMF SYSTEM INITIALIZATION PROCEDURE
--            THAT CAN BE ADDED AFTER QMF INSTALLATION. YOU MAY MOD-
--            IFY OR REPLACE THIS PROCEDURE WITH YOUR OWN VERSION.
--
--            THE PROCEDURE MUST BE STORED IN THE DATABASE UNDER THE
--            NAME OF Q.SYSTEM_INI BEFORE IT WILL RUN AUTOMATICALLY.
--                    ------------
--
--  THE COMMAND BELOW IS AN EXAMPLE OF ESTABLISHING A NEW DEFAULT
--  FOR THE SHARE OPTION OF THE SAVE COMMAND THAT WILL APPLY TO ALL
--  QMF USERS. (REMOVE THE LEADING COMMENT SYMBOLS "--" TO ACTIVATE
--  IT.)
--
-- SET GLOBAL ( DSQEC_SHARE=1  -- MAKE SHARE=YES THE DEFAULT FOR ALL
```

Note: The actual example shipped with QMF may vary from the above example.

Figure 45. The Q.SYSTEM_INI shipped with QMF

Q.SYSTEM_INI is located in the QMF product as DSQ0BINI.

User Session Procedure Example

The session procedure can call another procedure. The procedure being called can be a user procedure that is created, owned and updated by a QMF user. You can use the same named procedure for different users if each user has a unique SQLID. When each user starts QMF they are running under their own SQLID. That SQLID is the default object owner when the object owner is not otherwise specified when accessing a QMF object or database object. For example, the QMF session procedure Q.SYSTEM_INI, could set global variables or company wide global variables and then call a user session procedure. In the following example, the user session procedure is called USER_INI.

```
PROC                  Q.SYSTEM_INI                        LINE    1

-- This QMF procedure example shows how to setup  QMF session defaults for
-- every QMF user and then calls a user procedure called USER_INI that will set
-- individual QMF session defaults
--
   QMF SET GLOBAL (DSQEC_NLFCMD_LANG=1)   -- Process English Commands
   QMF RESET PROC                         --  Hide Contents of this PROC
   QMF SET PROFILE (WIDTH=80,LENGTH=66)   --  Set Default Report Page Size
   QMF SET PROFILE (SPACE=COMMON)         --  Set Default Space for Save Data Command
   QMF SET GLOBAL (DSQDC_LIST_ORDER=5D)   --  Object List Sorted by Date Modify
   QMF SET GLOBAL (DSQEC_RESET_RPT=1)     --  Prompt for Report Completion
   RUN USER_INI                           --  Run Users Session Procedure
   QMF END                                --  Display QMF Home screen first
   QMF SET GLOBAL (DSQEC_NLFCMD_LANG=0)   -- Return to Presiding Language
```

Figure 46. Q.SYSTEM_INI example that calls a user defined procedure

```
 PROC               WILLIAMS.USER_INI                          LINE
1

 -- This QMF procedure example shows how to setup QMF session defaults for
 -- A QMF user. The following settings replace any settings set by the
 -- SYSTEM_INI proc.

--
    QMF SET GLOBAL (DSQEC_NLFCMD_LANG=1)   -- Process English Commands
    QMF RESET PROC                         --  Hide Contents of this PROC
    QMF SET PROFILE (SPACE=MYSPACE)        --  Store data in MYSPACE.
    QMF SET PROFILE (PRINTER=MYROOM)       --  Print reports at My Printer
    QMF SET GLOBAL (DSQDC_LIST_ORDER=3A)   --  Object List Sorted by Object Name
    QMF SET GLOBAL (DSQEC_RESET_RPT=2)     --  Always ResetReports
    QMF SET GLOBAL (DSQEC_SHARE = 1)       --  Always Share My QMF Objects
    QMF SET GLOBAL (DSQEC_NLFCMD_LANG=0)   -- Return to Presiding Language
```

Figure 47. User session procedure example: user.USER_INI

Procedure that Displays an Object list

The following is an example of a SYSTEM_INI procedure that displays a list of objects instead of the QMF Home screen:

```
PROC                  Q.SYSTEM_INI                        LINE    1


-- This QMF procedure example shows how to set up QMF session defaults for
-- every QMF user to display a list of objects instead of the QMF Home
-- screen.
--
   QMF SET GLOBAL (DSQEC_NLFCMD_LANG=1)   -- Process English Commands
   QMF RESET PROC                         --  Hide Contents of this procedure
   QMF SET GLOBAL (DSQDC_LIST_ORDER=3A)   --  Object List sorted by object name
   QMF SET GLOBAL (DSQEC_NLFCMD_LANG=0)   -- Return to Presiding Language
   QMF LIST ALL                           --  LIST OBJECTS FOR ENGLISH
```

Figure 48. Using Q.SYSTEM_INI to display a list of objects rather than the QMF Home screen

Security and Sharing Session Procedure

The QMF session procedure Q.SYSTEM_INI and other objects used or called by this procedure take on the same security as any other QMF object or database object does during a QMF session. The Q.SYSTEM_INI procedure is not special, other than QMF tries to execute it each time a QMF session is started. If the procedure doesn't exist, then QMF doesn't try to run it.

If the Q.SYSTEM_INI procedure exists but is restricted or not shared, the result is the same as with any other QMF procedure object. If the SQLID starting QMF is ″Q″, the procedure can run. Any SQLID other than ″Q″ receives a message that it is not authorized to run the procedure ″Q.SYSTEM_INI″.

Diagnosis Considerations

The QMF session procedure Q.SYSTEM_INI is run in the same environment as any other QMF procedure. All of the diagnosis procedures used for existing QMF procedures can also be used for the Q.SYSTEM_INI procedure. In addition to normal procedure execution, consider that this procedure is run before the QMF startup procedure named in the DSQSRUN parameter when QMF is started. If you have session controls in the procedure specified by the DSQSRUN parameter, consider moving them to the Q.SYSTEM_INI procedure.

You can use the QMF L2 tracing option to see commands and messages issued. Session procedure commands and messages are distinghished from others. See “Using the QMF Trace Facility” on page 480 for more information on QMF trace options.

Chapter 16. Establishing QMF Support for End Users

After you start QMF and the Home panel is displayed, you can use QMF facilities to help you customize support for end users. This chapter discusses how to set up QMF so that your end users are able to access QMF and work with data in the database.

QMF Code Page Considerations

QMF receives information from and presents information to the terminal screen through services provided by the GDDM product. To prepare GDDM device support, specify the code page to use with QMF, or tailor GDDM session defaults, see the *GDDM System Customization and Administration*.

The role of the Q AUTHID

QMF installation automatically grants SYSADM authority to the user ID Q. The user Q owns and manages these QMF resources:

- All QMF control tables.
- The sample queries.
- The sample tables shipped with QMF. (For descriptions of the sample tables, see *QMF Reference*.)
- Default views for the database object list, explained in "Customizing a User's Database Object List" on page 241.

For the discussions and procedures throughout this book, we assume you're administering QMF using the Q user ID or another ID with SYSADM authority.

Quick Start

Use the steps in Table 30 to guide you in setting up and maintaining the QMF environment for users. If you need more information, see the page shown at the right of the table.

Table 30. Establishing QMF support for end users

To do this task:	See:
Ensure users have a QMF profile either by allowing them to use the SYSTEM row of the Q.PROFILES table or by inserting a unique row into Q.PROFILES based on the user's SQL authorization ID.	Page 216

Table 30. Establishing QMF support for end users (continued)

To do this task:	See:
Provide access to the QMF application plan and packages, using SQL GRANT statements to grant EXECUTE privileges.	Page 227
Provide access to database and QMF objects your users need to work with, using SQL GRANT statements for tables and views, and the SHARE parameter of the QMF SAVE command for QMF queries, forms, and procedures.	Page 228
Customize a user's database object list, using the DSQEC_TABS_LDB2, DSQEC_TABS_RDB2, DSQEC_ALIASES, DSQEC_COLS_LDB2, and DSQEC_COLS_RDB2 global variables.	Page 241
Customize the document editing interface in ISPF, using the IBM-supplied macro.	Page 276
Enable users to create tables (if necessary) by assigning a private table space or by granting DB2 RESOURCE authority and assigning a public table space.	Page 246
Enable users to support a chart using the Interactive Chart Utility (ICU) of GDDM.	Page 251
Maintain your users' queries, forms, and procedures by updating and reorganizing the QMF object control tables (Q.OBJECT_DIRECTORY, Q.OBJECT_DATA, and Q.OBJECT_REMARKS).	Page 253
When necessary, enlarge the table space for the QMF object control tables using the DB2 DBS utility UNLOAD and RELOAD commands. Recreate indexes and any views you defined on the tables.	Page 258
Maintain your users' database tables and views by updating and reorganizing DB2 system tables.	Page 264

Creating User Profiles to Enable User Access to QMF

All QMF users need access to a *user profile*, which determines how QMF handles individual input of specific users. Use the profile to control certain aspects of a user's environment, such as where printer output is routed or whether terminal input is converted to uppercase.

Each aspect of a user's QMF session maps to a value in a column of the Q.PROFILES control table. Each row of the Q.PROFILES table is an individual user profile. "Reading the Q.PROFILES Table" on page 218 shows the Q.PROFILES table in detail and discusses possible profile values.

Establishing a Profile Structure for Your Installation

Provide users with a profile using one of these methods:

- Allow users to use the default QMF profile, which is the row of the Q.PROFILES table where the CREATOR column has a value of SYSTEM.

  The Q.PROFILES table is shipped with default profile values predefined in this row. The defaults used by this SYSTEM profile are discussed in

"Reading the Q.PROFILES Table" on page 218. You can change these values to create a generic profile that meets the needs of your site.

- Create a unique row in Q.PROFILES for the user, as shown in "Adding a New User Profile to the Q.PROFILES Table". Set the CREATOR column of Q.PROFILES to the primary authorization ID of the user and customize other column values according to individual needs. If you start QMF in TSO with a DSQSPRID value of TSOID, the CREATOR column is the user's TSO logon ID.

You can create unique profiles for some users at your installation and allow other users to use the SYSTEM default profile; you can also delete the SYSTEM profile for security and tracking reasons, thus preventing those who don't have unique profiles from using QMF.

Adding a New User Profile to the Q.PROFILES Table

You can use SQL INSERT queries or the QMF Table Editor (described in *Using QMF*) to add new user profiles to the Q.PROFILES table. Figure 49 shows sample SQL that creates unique profiles for users with SQL authorization IDs of JONES (base QMF, or English) and SCHMIDT (German NLF). Use the TRANSLATION column of Q.PROFILES, as shown in Figure 49 to distinguish between an English and an NLF environment.

The values shown in Figure 49 are examples of profile values you can use. See Table 31 on page 219 for other valid profile values.

Base QMF (English)

```
INSERT INTO Q.PROFILES
(CREATOR, LANGUAGE, SPACE, TRANSLATION,
PFKEYS, SYNONYMS, RESOURCE_GROUP,
ENVIRONMENT)
VALUES ('JONES', 'PROMPTED', 'SAVEIT'
'ENGLISH', 'PFKEYS', 'COMMAND_SYNONYMS'
'NONPRIME', 'CICS')
```

German NLF

```
INSERT INTO Q.PROFILES
(CREATOR, LANGUAGE, SPACE, TRANSLATION,
PFKEYS, SYNONYMS, RESOURCE_GROUP,
ENVIRONMENT)
VALUES ('SCHMIDT', 'MENUE', 'STUT2BER'
'DEUTSCH', 'DEUTASTEN'
'COMMAND_SYNONYM_D', 'SCHICHT'
'CICS')
```

Figure 49. Creating a user profile

Important: Always specify a TRANSLATION value when inserting a row into Q.PROFILES, or the TRANSLATION value defaults to a null value and the profile row is automatically ignored. Figure 49 shows only a subset of all possible profile values. Use "Reading the Q.PROFILES Table" on page 218 for guidance in specifying additional values.

To enroll many users, set up a template query that describes a standard profile and uses a substitution variable value for any value that commonly changes (such as the value for the CREATOR column) with each new user you enroll. For more information on using substitution variables, see *QMF Reference* .

If you're using an NLF: You can establish different profiles for the same user according to the national language environment. A user can have a profile with one set of values in one national language, and a profile with a different set of values in another national language.

Preventing Users without Unique Profiles from Using QMF

It can be difficult to track individual resource use if several people use QMF under the common, default SYSTEM profile. To restrict use of QMF to users who have unique profiles, delete the SYSTEM rows of Q.PROFILES. Figure 50 shows SQL statements that delete the rows. You can also use the Table Editor, as explained in *Using QMF*.

Base QMF (English)
German NLF

```
DELETE FROM Q.PROFILES
        DELETE FROM Q.PROFILES
WHERE CREATOR='SYSTEM'
        WHERE CREATOR='SYSTEM'
AND TRANSLATION='ENGLISH'
        AND TRANSLATION='DEUTSCH'
```

Figure 50. Restricting use of QMF to users who have unique profiles

Important: For both base QMF and NLF environments, always specify a TRANSLATION value when deleting rows from Q.PROFILES, or more rows (across different national language environments) might be deleted than you intend. Additionally, always use a WHERE clause, or all rows of Q.PROFILES are deleted.

After you delete the SYSTEM row of Q.PROFILES, create a unique profile for *every* QMF user; otherwise, your users won't be able to use QMF. An example of creating a unique profile is shown in Figure 49 on page 217.

Reading the Q.PROFILES Table

Table 31 on page 219 shows the columns of the Q.PROFILES control table. Each column of the table represents an aspect of a user's QMF session you can customize. The defaults shown are for the English QMF environment.

If you're using an NLF: Default values might be different for the English environment and some NLFs. For example, do not assume that the default for all NLFs is UPPER because the English default is UPPER. The default value for the CASE field in the German NLF is MIXED, and might also vary for other NLFs. For the default values for each NLF, see the translated version of the Q.PROFILE table. (Replace the n symbol with an NLID from Table 1 on page xviii.)

The Q.PROFILES table has the index Q.PROFILEX, with the attributes UNIQUE and CLUSTER. The keyed columns are CREATOR, TRANSLATION, and ENVIRONMENT. No three rows can have identical values for these three columns.

Table 31. Structure of the Q.PROFILES table

Column Name	Data Type and Length	Nulls Allowed	Function and Possible Values
CREATOR	CHAR (8)	No	**Function:** Specifies the authorization ID (the user) who owns the profile. **Values:** SYSTEM (default), primary authorization ID, or TSO logon ID, if DSQSPRID is set to TSOID. The SYSTEM row is shipped with Q.PROFILES for English and each NLF; users who don't have unique profile rows can use the SYSTEM row.
CASE	CHAR (18)	Yes	**Function:** Specifies whether terminal input is converted to uppercase. **Values:** UPPER (default), STRING, or MIXED. See *QMF Reference* for descriptions of these values. CASE might have a different default for NLF users.
DECOPT	CHAR (18)	Yes	**Function:**Specifies what separators QMF puts in numeric report columns. **Values:**PERIOD (default), COMMA, and FRENCH. See *QMF Reference* for more information. DECOPT is translated and might have a different default for NLF users.

Table 31. Structure of the Q.PROFILES table (continued)

Column Name	Data Type and Length	Nulls Allowed	Function and Possible Values
CONFIRM	CHAR (18)	Yes	**Function:** Controls display of confirmation panels. **Values:** YES (default) if you want confirmation panels displayed before database changes; NO if you don't.
WIDTH	CHAR (18)	Yes	**Function:** Controls number of printed columns per page. **Values:** 22 to 999. Default = 132.
LENGTH	CHAR (18)	Yes	**Function:** Controls number of printed lines per page. **Values:** 1 to 999, or CONT if you want no page breaks. Default = 60.
LANGUAGE	CHAR (18)	Yes	**Function:** Controls which query language QMF uses when creating a new query after a RESET QUERY command is issued. **Values:** SQL (default), QBE (for Query-by-Example), or PROMPTED (for Prompted Query).

Table 31. Structure of the Q.PROFILES table (continued)

Column Name	Data Type and Length	Nulls Allowed	Function and Possible Values
SPACE	CHAR (50)	Yes	**Function:** Specifies a table space that holds tables created using SAVE DATA and IMPORT commands. In DB2 Parallel Edition, this value refers to a NODEGROUP name. However, QMF refers to it as a TABLESPACE name. Operation is not affected. DataJoiner does not utilize tablespaces and the value for the SPACE option is ignored in a DataJoiner context; operation continues as if a blank value were present. **Values:** Specifies a table space that holds tables created using SAVE DATA and IMPORT commands. In DB2 Parallel Edition, this value refers to a NODEGROUP name. However, QMF refers to it as a TABLESPACE name. Operation is not affected. DataJoiner does not utilize tablespaces and the value for the SPACE option is ignored in a DataJoiner context; operation continues as if a blank value were present.

Table 31. Structure of the Q.PROFILES table (continued)

Column Name	Data Type and Length	Nulls Allowed	Function and Possible Values
TRACE	CHAR (18)	Yes	**Function:** Controls the level of detail in trace output. **Values:** ALL traces all functions at the most detailed level. A character string of function codes and numbers indicates the level of tracing for individual QMF functions. NONE (default) inhibits normal levels of tracing. The default varies depending on the value for DSQSMODE. For example, when DSQSMODE is B, the trace level is L2, otherwise it is NONE. See "Using the QMF Trace Facility" on page 480 for more information on the QMF trace facility. See "DSQSDBUG (Setting the Level of Trace Detail)" on page 192 to specify a trace value when QMF starts. Only the values ALL and NONE are translated in NLFs.
PRINTER	CHAR (8)	Yes	**Function:** Controls where printer output is routed. **Values:** Use a null (default) or blank value to route print output to CICS temporary storage or transient data queues, or to the data set with the ddname DSQPRINT. Use a GDDM nickname to direct output to a GDDM-defined printer. See "Chapter 17. Enabling Users to Print Objects" on page 287 for information on choosing and specifying values.
TRANSLATION	CHAR (18)	No	**Function:** Indicates English or NLF environment **Values:** English (default) or the name of an NLF. The right-hand column of Table 1 on page xviii shows the translated names you need to use in this column.

Table 31. Structure of the Q.PROFILES table (continued)

Column Name	Data Type and Length	Nulls Allowed	Function and Possible Values
PFKEYS	VARCHAR (31)	Yes	**Function:** Indicates the table or view (if any) where user's customized function key definitions are stored. **Values:** Any valid DB2 table or view name. If blank or null (default), QMF's default keys are used. "Chapter 19. Customizing QMF Function Keys" on page 321 describes how to create this table.
SYNONYMS	VARCHAR (31)	Yes	**Function:** Indicates the table or view (if any) where user's customized command definitions are stored. **Values:** Any valid DB2 table or view name. If blank or null (default), no customized definitions are used. "Chapter 18. Customizing QMF Commands" on page 305 describes how to create this table. For NLF users, the IBM-supplied table is named Q.COMMAND_SYNONYM_n, where n is the National Language ID.
RESOURCE_GROUP	CHAR (16)	Yes	**Function:** Controls how the governor exit routine limits user's resources or commands. **Values:** Any valid resource group name. If blank or null (default), QMF attempts to use the user's authorization ID here, and the user's session is not governed (unless the authorization ID is a valid resource group name). See "Chapter 21. Controlling QMF Resources Using a Governor Exit Routine" on page 383 for more information.
MODEL	CHAR (8)	Yes	**Function:** Specifies the model for data access. **Values:** Always use the value REL for this column, indicating relational data.

Table 31. Structure of the Q.PROFILES table (continued)

Column Name	Data Type and Length	Nulls Allowed	Function and Possible Values
ENVIRONMENT	CHAR (8)	Yes	**Function:** Indicates the operating environment. **Values:** This value is CICS, CICSMVS, or TSO if you access the profiles through OS/390. If profiles are stored in DB2 but are being accessed from a VM DB2 UDB for OS/390 application requester, the value can be CMS.

Reminder: If you allocate output from DSQPRINT to go to the HOLD queue, to release the output to the OUTPUT queue for printing, you must issue the following TSO command:

```
FREE DDNAME(DSQPRINT)
```

Providing the Correct Profile for the User's Operating Environment

When QMF is started, it determines which users are authorized to establish a QMF session by searching the CREATOR, ENVIRONMENT, and TRANSLATION columns of the Q.PROFILES table. You need to add the correct values to the user's profile to ensure that QMF recognizes them and starts.

QMF searches for specific profile values in the following order:

1. CREATOR=*userid*, ENVIRONMENT=*current operating environment*
2. If running in CICS, CREATOR=*userid*, ENVIRONMENT=CICS
3. CREATOR=*userid*, ENVIRONMENT=NULL
4. CREATOR=SYSTEM, ENVIRONMENT=*current operating environment*
5. If running in CICS, CREATOR=SYSTEM, ENVIRONMENT=CICS
6. CREATOR=SYSTEM, ENVIRONMENT=NULL

userid is the authorization ID of the user trying to log on to QMF. DB2 uses this ID to determine if the user is authorized to use the database.

Current operating environment is CICS, CICS, OS/390, TSO, or CMS, when QMF is being started from CICS, TSO, or CMS, respectively.

QMF must find values for CREATOR and ENVIRONMENT that match one of the pairs in the preceding list, or QMF initialization ends in an error before the QMF Home panel is displayed.

Updating User Profiles

You can change the values in a user's profile by using either the SET PROFILE command or SQL UPDATE statements.

Using the SET PROFILE Command

Using this command is quicker than using SQL UPDATE statements, because you can enter it from the QMF command line with minimal typing.

Values set using SET PROFILE remain effective only until the user's session ends; use the SAVE PROFILE command to save values you changed. For more information on the SET PROFILE command and its parameters, see *QMF Reference*.

Because no special SQL privileges are required to use this command, your users can easily update their own profiles. However, they cannot use SET PROFILE to update fields you might use to customize their QMF sessions. These fields are PFKEYS, SYNONYMS, and RESOURCE_GROUP. You can use SQL UPDATE statements or the QMF Table Editor to update these Q.PROFILES fields. The Table Editor is explained in *Using QMF*.

Using SQL UPDATE Statements

SQL UPDATE statements can be used to update all fields of the Q.PROFILES table, including SYNONYMS, PFKEYS, and RESOURCE_GROUP. See Table 31 on page 219 for descriptions of these columns, including consequences of not specifying their values.

For more information about how to choose values for these columns, see:

- "Chapter 18. Customizing QMF Commands" on page 305
- "Chapter 19. Customizing QMF Function Keys" on page 321
- "Chapter 21. Controlling QMF Resources Using a Governor Exit Routine" on page 383

Use an SQL UPDATE query similar to the one in Figure 51 to update existing user profiles. This example changes the name of the table that stores a user's command synonyms. On the left is an example query for user JONES in base (English) QMF; on the right is the same query for user SCHMIDT in the German NLF.

```
Base QMF (English)
        German NLF
UPDATE Q.PROFILES
        UPDATE Q.PROFILES
SET SYNONYMS='COMMAND_SYNONYMS'
        SET SYNONYMS='GUMMOW.XYZ'
WHERE CREATOR='JONES' AND
        WHERE CREATOR='SCHMIDT' AND
TRANSLATION='ENGLISH'
        TRANSLATION='DEUTSCH'
```

Figure 51. Updating user profiles using UPDATE query on Q.PROFILES table

Important: When running UPDATE, DELETE, and INSERT queries on the Q.PROFILES table, *always* include the TRANSLATION column in the query; otherwise, QMF applies the changes you make in *all* language environments.

Updating the SYSTEM Profile

You can change the default values provided in the SYSTEM row of Q.PROFILES. However, any user who needs different values than those you assigned for the SYSTEM row must have a unique profile row.

For example, suppose that your system has two resource groups defined, named PRIME and NONPRIME. Suppose PRIME is the default value for the RESOURCE_GROUP field of the SYSTEM row in Q.PROFILES. You must formally enroll the users who are in the NONPRIME group by giving them unique profile rows as shown in the example in Figure 49 on page 217.

Deleting Profiles from the Q.PROFILES Table

Periodically, you might need to delete obsolete user profiles from the Q.PROFILES table. Delete a user profile from Q.PROFILES when you are sure that objects created by the primary authorization ID or the TSO logon ID in that profile have been either deleted or safely transferred to other users:

- For how to perform these tasks for QMF queries, forms, and procedures, see “Maintaining QMF Objects Using QMF Control Tables” on page 253.
- For instructions for database tables and views, see “Maintaining Tables and Views Using DB2 Catalog Tables” on page 264.

Use a query similar to the one shown in Figure 52 to delete a user profile.

```
Base QMF (English)
        German NLF
DELETE FROM Q.PROFILES
        DELETE FROM Q.PROFILES
WHERE CREATOR='JONES'
        WHERE CREATOR='SCHMIDT'
AND TRANSLATION='ENGLISH'
        AND TRANSLATION='DEUTSCH'
```

Figure 52. Deleting a QMF user profile

If you’re using an NLF: Include a value for the TRANSLATION column if you want to delete the user profile in a single NLF environment. If you don’t specify a value for TRANSLATION, QMF deletes the profile in *all* NLF environments.

If the user whose profile you deleted had a private table space, use the SQL DROP TABLE SPACE statement from the SQL query panel if the space contains nothing you want to save. Also, you can use the SQL DROP TABLE statement or QMF ERASE commands if you want to delete specific QMF or database objects. *DB2 UDB for OS390 SQL Reference* explains the DROP statement. *QMF Reference* explains the ERASE command.

Controlling Access to the QMF Application Plan and Packages

All QMF users need access to the QMF application plan and packages built by DB2 during QMF installation. The plan and packages enable QMF to run as a DB2 application program. For more information about the application plan and packages, see *Installing and Managing QMF on OS/390*

Providing Access to the Application Plan and Packages

You can enable users to use QMF by granting the EXECUTE privilege to PUBLIC or to individual users with the SQL GRANT query. For example, to grant access to user JONES:

```
GRANT EXECUTE on plan QMF_PLAN
to JONES
```

If you provide access to the QMF plan and packages by individual, you must execute an SQL GRANT statement for each new user.

If you restrict access by individual user, you limit use of the plan and packages to selected DB2 primary or secondary authorization IDs. The difference in refinement shows up when two or more primary authorization IDs have use of the same secondary authorization ID. If you use restricted enrollment to QMF through the profile, then only the primary authorization IDs that have rows in Q.PROFILES have access to QMF. If you restrict access to QMF based on granting EXECUTE privilege to specific authorization IDs, then anyone who has these authorization IDs as their primary or secondary authorization IDs has access to QMF.

Revoking User Access to the QMF Application Plan and Packages

After you dispose of a user's queries, forms, and procedures, you need to remove the user's access to the QMF application plan and packages if you granted the access individually. You can run the following queries:

```
REVOKE EXECUTE on plan 'QMF_PLAN'
FROM 'JONES'

REVOKE EXECUTE on package 'QMF_PACKAGE'
FROM 'JONES'
```

Revoke the EXECUTE authority on all packages used by QMF.

If the user's EXECUTE privilege was granted more than once, you need to revoke each grant individually using the following queries:

```
REVOKE EXECUTE on plan 'QMF_PLAN'
FROM 'JONES' by all

REVOKE EXECUTE on package 'QMF_PACKAGE'
FROM 'JONES' by all
```

You must have SYSADM authority to revoke a GRANT.

If the user you are removing is a former QMF administrator who granted access to the QMF plan and packages to other users, removing access from the administrator also removes access for those users.

If other users share the same authorization ID of the former user, do not revoke access to the plan and packages from the authorization ID. If you do, the users sharing the authorization ID are no longer able to use QMF.

Controlling Access to QMF and Database Objects

QMF objects, such as queries and procedures, and functions such as the Table Editor, allow users to access and manipulate data stored in tables in the database. Because this data might be sensitive, you might need to control users' access to certain objects:

- You can use SQL GRANT and REVOKE statements from QMF's SQL query panel to control access to tables and views, as discussed in "Granting and Revoking SQL Privileges" on page 238. "SQL Privileges Required to Access Objects" on page 236 explains privileges required to use specific QMF commands or functions on objects.
- You can use the SHARE parameter of the QMF SAVE command to control access to queries, forms, and procedures, as discussed in "Sharing QMF Objects with Other Users" on page 240.

DB2 Privileges Required to Access Objects

The DB2 privileges required to run QMF queries, the Table Editor, and QMF commands are the privileges needed to run the underlying SQL statements. The underlying SQL statements are listed in "SQL Privileges Required to Access Objects" on page 236.

Distributing DB2 privileges is a two-step process:

1. Assigning the user a set of authorization IDs
2. Assigning DB2 privileges to the authorization IDs

To assign and revoke privileges:

- Assign authorization IDs through a DB2 exit routine.
- Assign DB2 privileges through SQL GRANT queries.

- Undo previous grants through SQL REVOKE queries.

Not every query run in a QMF session requires DB2 privileges. Those that don't are called *static queries* and are in the QMF code. QMF uses these queries, for example, to update its own control tables. Users who have nothing to do with QMF administration need no DB2 privileges on these tables.

The privilege to run *dynamic queries* comes exclusively from the user. Dynamic queries include all queries run with the RUN command. They also include certain queries formulated on behalf of the user by QMF. For example, the user issues the DISPLAY command to see the contents of a table.

DB2 privileges required for QMF commands, for prompted and QBE queries, and for the Table Editor are the same as those listed for SQL in "SQL Privileges Required to Access Objects" on page 236.

Granting and Revoking DB2 Privileges

You provide DB2 privileges by running GRANT queries that give one or more DB2 privileges to one or more authorization IDs. For example, the following query grants the SELECT and UPDATE privileges on the table SMITH.TABLEA to the authorization IDs JONES and JOHNSON:

```
GRANT SELECT, UPDATE ON TABLE SMITH.TABLEA TO JONES, JOHNSON
```

Run REVOKE queries to withdraw grants of DB2 privileges. You can always withdraw grants for which your SQL authorization ID is the grantor. For example, in a QMF session, the user's current SQL authorization ID is JONES. JONES had previously granted the SELECT privilege on the table SMITH.TABLEA to BAKER. The following query withdraws this grant of the privilege:

```
REVOKE SELECT ON TABLE SMITH.TABLEA FROM BAKER
```

If you revoke a privilege from a grantee, but find that the grantee still has the privilege, the grantee has this privilege through grants from another user.

Granting to PUBLIC

You can make grants to PUBLIC and to individuals. Granting a privilege to PUBLIC makes it available to all local users.

To make an object available to remote and local users for DB2 subsystems that have distributed data enabled, grant authority to PUBLIC AT ALL LOCATIONS. For example, the following queries give the SELECT privilege on the table Q.STAFF:

```
GRANT SELECT ON TABLE Q.STAFF TO PUBLIC
GRANT SELECT ON TABLE Q.STAFF TO PUBLIC AT ALL LOCATIONS
```

Q.STAFF is one of the sample tables of QMF. This, and similar queries for the other sample tables, are run during QMF installation, so that everyone has SELECT privilege on the sample tables.

Granting Privileges to Users

The privilege to run a GRANT query must come from the grantor; that is, from the user's current SQL authorization ID. The grantor must have every privilege being granted and must have each privilege *with the GRANT option*. For example, BAKER wants to grant the SELECT and UPDATE privileges on the table SMITH.TABLEA to JONES. To do this, BAKER must have the SELECT and UPDATE privileges with the GRANT option on the same table.

A GRANT query can include the expression WITH GRANT OPTION. When it does, the privileges are granted with the GRANT option. Without the GRANT option, users cannot grant authority to others. For example, the following queries grant the SELECT privilege on SMITH.TABLEA to JONES and JOHNSON. After the queries are run, only JOHNSON can grant the privilege to others.

```
GRANT SELECT ON TABLE SMITH.TABLEA TO JONES
GRANT SELECT ON TABLE SMITH.TABLEA TO JOHNSON WITH GRANT OPTION
```

You might have received your DB2 privilege through an SQL GRANT query, from SYSADM authority, or because you own the created object. Any DB2 privilege you have might be the result of a chain of grants, beginning with a grant from someone with *installation SYSADM* authority. Installation SYSADM authority is the highest DB2 authority that anyone can possess. During DB2 installation, one or two authorization IDs receive this authority. Users operating with this authority can then grant lesser privileges to others, to be granted in turn to others, and so on.

Granting Specific Privileges

To grant a specific privilege, one of your authorization IDs must have the privilege to do so, and this ID must be your current SQL authorization ID. If this ID is not your current SQL authorization ID, run the SET CURRENT SQLID query.

Granting Table Privileges

The most commonly used privileges for a table are SELECT, INSERT, UPDATE, and DELETE. When you grant the SELECT privilege on a table, the grantee can select data from it in a SELECT query or subquery. When you grant the INSERT, UPDATE, or DELETE privilege on a table, the user can modify the table's data.

If you own a given table, you have all the table privileges with the GRANT option.

Granting View Privileges

View access can be granted to screen-sensitive data, to read only, and to create.

Views as Screening Tools: You can use views in place of the tables they represent to screen sensitive data from the viewers. For example, you want to create a view based on the table, SMITH.STAFF, which contains personnel information. Each row in the table represents an employee. For each row, you want the view to show the employee's name, department, job classification, and years of service. You do not want it to show the employee's salary and commission.

You create such a view with the following query:

```
CREATE VIEW VIEWA AS
  SELECT NAME, DEPT, JOB, YRS
    FROM SMITH.STAFF
```

View Owners and Underlying Objects: Granting a privilege for a view begins with the owner of the view. In this book, the owner of the view is assumed to be the creator. The privileges the owner can grant depend on the privileges the owner has on the *underlying objects* of the view. These are the tables and views that are named in the FROM clause of the view's defining query. For example, the underlying object of the view created with this query is the table SMITH.STAFF:

```
CREATE VIEW VIEWA AS
  SELECT NAME, DEPT, JOB, YRS
    FROM SMITH.STAFF
```

View Privileges and Read Only Views: The view privileges are SELECT, INSERT, UPDATE, and DELETE. With the SELECT privilege, a person can use the view just like a table in SELECT queries and subqueries. With the other privileges, a person can modify the data in the table that the view represents.

The owner of a view has the SELECT privilege on the view, but might not have other privileges. The other privileges might be lacking if the owner of the view did not have the privilege on the underlying object. Alternatively, the privileges might be lacking because the view is *read only*.

A view is read only, if the defining query is a join. Queries other than joins can also appear in read only views. For more on read only views, see the description of CREATE VIEW queries in *DB2 UDB for OS390 SQL Reference*

Privilege to Create a View: To create a view, the user's SQL authorization ID must have the SELECT privilege on each of the underlying objects of the view. No other privilege is needed.

If the owner of a view loses the SELECT privilege on one or more of the underlying objects, the view is dropped from the system. Any views using that view as an underlying object are also dropped, and so on.

Granting View Privileges: A person with the GRANT option on some view privilege can grant that privilege to others using the GRANT option. The grantee needs no privilege at all on the underlying objects. This fact makes views useful for screening data: with no privilege on the underlying objects, users granted the SELECT privilege on a view can see only the view. If users need SELECT privilege on the underlying objects, they can bypass the view and query these objects directly.

Privileges of the Owner of the View: The owner normally creates one or more tables, and then one or more views of these tables. For each of these views, the owner has SELECT privilege with the GRANT option. If a view is not read only, the owner also has INSERT, UPDATE, and DELETE privileges with the GRANT option. The owner can then grant these privileges to others.

Views with Other Types of Underlying Objects: The owner of both the tables and views has a complete set of privileges, with the GRANT option, on the underlying objects. When the underlying objects include views, or objects not owned by the owner of the view, the privileges the owner holds on the underlying objects might vary widely.

In this situation, the following rules apply:

- The owner of a view always has the SELECT privilege on the view. The owner has this privilege with the GRANT option if the owner has the SELECT privilege with the GRANT option on each of the underlying objects of the view.
- The owner of a view has the INSERT, UPDATE, or DELETE privileges on the view if both of the following are true:
  - The view is not read only. This implies that the view has a single underlying object.
  - The owner of the view has the same privilege on the single underlying object.

Authority to Maintain a Database

Suppose that, after creating a database, you want someone to maintain it. With proper DB2 authority, you can grant that user DBADM authority over the database. With this authority, the user can perform maintenance tasks, such as:

- Create and drop table spaces and tables from the database
- Create and drop indexes for the tables of the database
- Run utilities for maintaining the tables and indexes

The holder of this authority also has a full set of privileges on the database tables, no matter who actually owns them. For example, if you want authorization ID JONES to have the power to maintain the database DBASEA, run this query:

```
GRANT DBADM ON DATABASE DBASEA TO JONES
```

You can run this query if your SQL authorization ID has SYSADM authority or is the owner of the database.

DBADM authority on a database also has these privileges:
- CREATETS privilege, which lets you create table spaces for the database
- CREATETAB privilege, which lets you create tables in the database

If you can grant DBADM authority on a database, you can also grant lesser privileges. Moreover, anyone having DBADM authority with the GRANT option on the database can do the same. For example, if you want the authorization ID JONES to have the power to grant lesser privileges on database DBASEA, run this query:

```
GRANT DBADM ON DATABASE DBASEA TO JONES WITH GRANT OPTION
```

Granting the Appropriate Privilege: SAVE and IMPORT Commands

Use IMPORT sparingly in CICS, because it can affect the performance of other users in the same address space. Also, QMF uses OS QSAM services GET/PUT. This can lock out other QMF users in the same CICS region during I/O operations.

QMF must have the DB2 privileges to run the queries that result from SAVE and IMPORT commands. The privilege must come from the user, as if the user were running the queries through the RUN command. For example, a user must have the INSERT privilege on a table or an authority implying the INSERT privilege before QMF can run the INSERT queries on that table.

Determining What Privileges are Needed: The privileges needed depend in part on whether the user is creating his or her own tables or tables for other users.

When users create tables for others, the qualifier (the owner of the object) must be the user's primary or secondary authorization ID. In creating a table for another user, other privileges might let the appropriate CREATE table query run, but might not let INSERT queries run. For a description of this problem, see "Granting and Revoking SQL Privileges" on page 238.

When users create their own tables after the table structure is created, the users automatically have the necessary INSERT privilege. All that is needed is the privilege to run the CREATE TABLE query. The minimum privilege to do this depends on which table space option was chosen:

Explicit option
The user needs at least CREATETAB privilege on the database and USE privilege on the receiving table space.

Implicit option
The user needs at least CREATETAB and CREATETS privilege on the database.

The user of the default database, DSNDB04, might already have some of these privileges. During DB2 installation, the CREATETAB and CREATETS privileges for the default database were granted to PUBLIC. Thus, a user of the default database, operating under the implicit table space option, automatically has the minimum authority to create tables. If, instead, this user operates under the explicit table space option, only the USE privilege must be granted.

Important: The database might be the DB2 default database (DSNDB04). However, it should not be one of the databases used exclusively by DB2 itself: DSNDB01, DSNDB03, or DSNDB05.

Granting the Necessary Privileges: Through one or more of the following queries, you can grant the privileges that your user lacks:

```
GRANT CREATETAB ON DATABASE &dbname TO &authid
GRANT CREATETS  ON DATABASE &dbname TO &authid
GRANT USE OF TABLESPACE &dbname.&tbspname TO &authid
```

where:
&dbname
Specifies the name of the database.
&authid
Specifies the user's authorization ID.
&tbspname
Specifies the name of the receiving table space.

Do not enclose these values in quotation marks. For example, if you want to grant USERA the CREATETAB privilege on the database DATABSE2, run this query:

```
GRANT CREATETAB ON DATABASE DATABSE2 TO USERA
```

You have authority to run these queries if you have the privileges they grant, and you hold these privileges with the GRANT option. This is true if you have SYSADM or SYSCTRL (for DB2 2.3) authority or if you have DBADM, DBCTRL, or DBMAINT authorities with the GRANT option.

Revoking the Grants of Others

If your SQL authorization ID has SYSADM authority, you can revoke the grants of others. This gives you a way of revoking privileges, even if they

result from multiple grants. For example, BAKER has the SELECT privilege on the table SMITH.TABLEA. JONES wants to remove this privilege from BAKER, but doesn't know who the grantors are. JONES, who has SYSADM authority, has the authority to run the following query:

```
REVOKE SELECT ON TABLE SMITH.TABLEA FROM BAKER BY ALL
```

BY ALL removes every grant of the privilege.

Revoking a Grant to PUBLIC

You can withdraw a grant of privilege from PUBLIC, just as you can from a single authorization ID. Doing so, however, does not remove this privilege from those who gained the privilege from another source.

You cannot remove a table privilege from the owner of a table. Nor can you remove an implied database privilege, such as CREATETAB, from someone with, for example, DBADM authority over a database. For more on what you can and can't do with a REVOKE query, see *DB2 UDB for OS390 Administration Guide* See also the description of the REVOKE command in *DB2 UDB for OS390 SQL Reference*

What Can Happen When Too Many Users Can Grant DB2 Authority

Revoking a DB2 privilege might withdraw it from more users than you intended. This is known as the *cascade effect*, because some authorities depend on the existence of others. For example, a privilege held because of a single grant is lost if the grantor loses that privilege. BAKER has the SELECT privilege with the GRANT option on SMITH.TABLEA. BAKER grants this privilege to JOHNSON and JONES. For JOHNSON and JONES, this is the only source of this privilege. A REVOKE query now removes this privilege from BAKER. As a result, the query removes this privilege from JOHNSON and JONES.

The loss of privileges can spread to many users, especially if some of those who lost privileges had granted privileges to others. With this loss of privileges might come other losses as well:

- The owner of a view loses the view if the owner loses the SELECT privilege on one of the underlying objects. Views for which the lost view is an underlying object are also lost, and so on.
- A DB2 application plan can become invalid if the authorization ID under which it was bound loses a privilege that the plan needs for the operation of the program. For example, this might be the SELECT privilege on a table. When this happens, no one can run the program.

Both the cascade effect and ineffective revoking of grants are more likely when many users have the ability to grant DB2 privileges.

SQL Privileges Required to Access Objects

Before users can use certain SQL statements with tables or views, you need to grant them the SQL privileges they need. For example, if user JONES enters `DISPLAY TABLE SALES_TOTALS` but does not have the SQL SELECT privilege for the SALES_TOTALS table, QMF displays the following message:

```
You lack the authorization needed for this DISPLAY command.
```

To prevent JONES from getting this kind of error message, grant him the SQL SELECT privilege on the SALES_TOTALS table.

Different SQL privileges are required, depending on whether the user is executing a QMF command, running a prompted or QBE query, or using the Table Editor.

Whenever a SELECT query is issued through QMF, either through one of the QMF query interfaces or as a result of commands, such as DISPLAY TABLE or PRINT TABLE, QMF adds FOR FETCH ONLY to the query to improve performance when accessing remote data. Therefore, FOR FETCH ONLY should not be added to SQL queries run through QMF.

SQL Privileges Required for QMF Commands

Using Table 32, locate the QMF command your users need to use and grant them the required SQL privilege on the table or view they're working with. See "Granting and Revoking SQL Privileges" on page 238 for examples of SQL GRANT statements.

Table 32. QMF commands and their SQL equivalents

This QMF command:	**Requires this SQL privilege on objects referenced by the command:**
DISPLAY table / view	SELECT
DRAW table / view	SELECT
EDIT TABLE table / view	The necessary privileges depend on the Table Editor mode. See "SQL Privileges Required for the Table Editor" on page 237 for this information.
EXPORT TABLE table / view	SELECT
IMPORT TABLE table / view	If the table exists, SELECT, DELETE, and INSERT. To include a comment, you must have either ownership of the table or DBADM authority for the table's database. If the table does not exist, you must have either the CREATETAB privilege or DBADM authority for the database or the USE privilege for the table space specified in the SPACE field of your user's profile.
PRINT table / view	SELECT
RUN query	Whatever privileges are used in the query

Table 32. QMF commands and their SQL equivalents (continued)

This QMF command:	Requires this SQL privilege on objects referenced by the command:
RUN procedure	Whatever privileges are used in the commands in the procedure
SAVE DATA	If the table exists, SELECT, DELETE, and INSERT. To include a comment, you must have either ownership of the table or DBADM authority for the table's database. If the table does not exist, you must have either the CREATETAB privilege or DBADM authority for the database or the USE privilege for the table space specified in the SPACE field of your user's profile.
LIST table / view	SELECT

Not all users can use the SAVE command to create a new table. For more information, see "Enabling Users to Create Tables in the Database" on page 246.

For more information on SQL privileges, such as SELECT, INSERT, UPDATE, or DELETE, see *DB2 UDB for OS390 SQL Reference*

SQL Privileges Required for Prompted and QBE Queries

Using Table 33, locate the type of query your users need and grant them the SQL privilege on the table or view against which the query runs.

Table 33. QMF query types and their SQL equivalents

Users using this type of query:	Need this SQL privilege:
PROMPTED	SELECT
QBE I.	INSERT
QBE P.	SELECT
QBE U.	UPDATE
QBE D.	DELETE

For more information on prompted or QBE queries, see *Using QMF* .

SQL Privileges Required for the Table Editor

Using Table 34, locate the Table Editor function your users need to use and grant them the SQL privilege on the table or view they need to edit.

Table 34. Table Editor commands and their SQL equivalents

Users using this Table Editor function:	Need this SQL privilege on tables or views being edited:
ADD	INSERT
SEARCH	SELECT

Table 34. Table Editor commands and their SQL equivalents (continued)

Users using this Table Editor function:	Need this SQL privilege on tables or views being edited:
CHANGE	UPDATE
DELETE	DELETE

For more information on the Table Editor, see *Using QMF*.

Granting and Revoking SQL Privileges

Users automatically own any objects they create and save in the database (unless they create a table with a different owner). The owner of an object automatically has all SQL privileges on objects he or she owns, and can grant (or revoke) these privileges to other users. Anyone with DB2 administrator authority can grant or revoke SQL privileges for any object in the database. The user Q has this authority, and is predefined to DB2 during QMF installation.

When granting or revoking privileges on objects you do not own, qualify the object with the SQL authorization ID of the owner:

```
JONES.ORDER_BACKLOG
```

SQL authorization IDs can be implicit qualifiers. Queries can contain unqualified table, view, and index names. QMF commands can contain unqualified query, procedure, and form names. In these cases, the user's SQL authorization ID serves as the implicit qualifier. For example, a user is operating with JONES as the current SQL authorization ID. During the session, the user issues the command:

```
RUN QUERYA (FORM=FORMA
```

which runs the following SQL query:

```
SELECT * FROM TABLEA
```

The RUN command refers to the query JONES.QUERYA and the form JONES.FORMA. The SELECT command refers to the table JONES.TABLEA.

If you create a table, view, index, or alias with an unqualified name, your current SQL ID becomes the owner of the object. That ID must have the privileges needed to create the object.

If you create a table, view, index, or alias with a qualified name, then the qualifier must be your primary or secondary authorization IDs; however, if your current SQL ID has at least DBCTRL authority, you can use any qualifier for a table or index; if it has SYSADM authority, you can also use any qualifier for a view or alias.

For more information on the specific authority needed, see *DB2 UDB for OS390 Administration Guide*

Using the SQL GRANT Statement

Use the SQL GRANT statement to grant SQL SELECT, UPDATE, INSERT, and DELETE privileges. For example, suppose user JONES needs to issue the following command:

```
EDIT TABLE ORDER_BACKLOG (MODE=CHANGE
```

Assuming you are the owner of the table, use the statement in Figure 53 to grant JONES the SQL UPDATE privilege he needs to edit the ORDER_BACKLOG table in change mode:
WITH GRANT OPTION indicates that JONES can grant to other users any of

```
GRANT UPDATE ON ORDER_BACKLOG TO JONES WITH GRANT OPTION
```

Figure 53. Granting SQL privileges to a single QMF user

the SQL privileges you granted him for the ORDER_BACKLOG table.

If you need to run GRANT queries often, use QMF variables in place of parts of the query that frequently change, such as UPDATE, ORDER_BACKLOG, and JONES. Variables are explained in *QMF Reference*. You might also consider using a QMF procedure to do the task if there is more than one query. *Using QMF* explains how to create procedures.

Use the keyword PUBLIC to grant SQL privileges to *all* QMF users. For example, use the statement in Figure 54 to grant INSERT authority on the ORDER_BACKLOG table to *all* users, and allow each of those users to grant INSERT authority to other users:

```
GRANT INSERT ON ORDER_BACKLOG TO PUBLIC WITH GRANT OPTION
```

Figure 54. Granting an SQL privilege to all QMF users

For more information on the GRANT statement, see *DB2 UDB for OS390 SQL Reference*

Important: If you grant more than one person INSERT, UPDATE, or DELETE privileges on a database object, and two or more users try to access that object at the same time, there might be contention for resources, causing performance or other problems. If a user is editing a table required during QMF initialization, that table can be locked to prevent QMF from starting for other users.

Using the SQL REVOKE Statement

Use the SQL REVOKE statement to remove privileges:

```
REVOKE UPDATE ON ORDER_BACKLOG FROM JONES
```

Figure 55. Revoking an SQL privilege from a QMF user

Use the PUBLIC keyword to revoke privileges from all QMF users.

DB2 privileges have a *cascading* structure; privileges revoked from a user are automatically revoked from any additional users to whom that user granted them.

For more information on the REVOKE statement, see *DB2 UDB for OS390 SQL Reference*.

Sharing QMF Objects with Other Users

You or any QMF user can enable access to QMF queries, forms, and procedures by using the SHARE parameter of the QMF SAVE command.

Specify SHARE=YES when saving an object to allow any other user to display the query and use it in a QMF command that does not replace or erase it. For example, the command in Figure 56 saves the current query as ORDER_QUERY and allows any other user to display and run it:

```
SAVE QUERY AS ORDER_QUERY (SHARE=YES
```

Figure 56. Sharing a QMF object

The default is defined by the global variable DSQEC_SHARE. See the *QMF Reference* for more information.

The owner of an object can change its shared status at any time, using a DISPLAY command followed by a SAVE command, as shown in Figure 57:

```
DISPLAY ORDER_QUERY
SAVE QUERY AS ORDER_QUERY (SHARE=NO
```

Figure 57. Changing the shared status of a QMF object

For more information on the SAVE command, see *QMF Reference*.

Allowing Uncommitted Read

If you want your QMF session to allow uncommitted read, you can specify a value for the global variable DSQEC_ISOLATION in the Q.SYSTEM_INI procedure.

Uncommitted read can be useful in a distributed environment. However, allowing uncommitted read can introduce non-existent data into a QMF report. Do not allow uncommitted read if your QMF reports must be free of non-existent data.

Values can be:

'**0**' Isolation level UR, Uncommitted Read.

'**1**' Isolation level CS, Cursor Stability. This is the default.

For QMF 6 the use of the value '0' is only effective with the following database servers (those supporting the SQL with-clause):

- DB2 for OS/390 V4 or higher
- DB2 for VM V5 or higher

Setting Standards for Creating Objects

The objects in your installation might be shared among many users, so they should have names that indicate what the object is and how it should be used. Encourage users to provide comments that describe for other users the purpose of queries, forms, procedures, and tables. Tables and views require more maintenance and administration, so consider establishing special guidelines for creating these objects.

For information on how to create comments for QMF and database objects using the SAVE command, see *QMF Reference*.

Customizing a User's Database Object List

QMF users periodically need to list objects they have saved in the database or to view comments that show them what purpose a table serves or what type of data a column in the table contains. The QMF LIST and DESCRIBE commands perform these functions.

When a user issues a LIST or DESCRIBE command for a table, QMF uses a view defined on a set of DB2 catalog tables to obtain information about the table. The name of this view is stored in the global variables DSQEC_TABS_LDB2 or DSQEC_TABS_RDB2. When users issue these commands for a column within a table, QMF uses the global variables DSQEC_COLS_LDB2 or DSQEC_COLS_RDB2 to obtain the name of the view.

QMF provides a set of default views, loaded during installation, that return only the tables and column information the user is authorized to see. Because processing for authorization takes extra time and resources, QMF also allows you to customize the table lists and column information by creating your own views.

Using the Default Object Lists

QMF provides the following default views and automatically assigns them to the user Q during installation into DB2 for MVS/ESA databases:

Q.DSQEC_TABS_LDB2
Q.DSQEC_TABS_RDB2
Q.DSQEC_COLS_LDB2
Q.DSQEC_COLS_RDB2
Q.DSQEC_ALIASES

QMF also supplies SQL default views that you might need in a remote unit of work environment:

Q.DSQEC_TABS_SQL
Q.DSQEC_COLS_SQL

The view Q.DSQEC_TABS_LDB2 selects only the list of tables and views from the current location in DB2 for MVS/ESA, and workstation database servers. Figure 58 shows the view provided for DB2 for MVS/ESA.

```
CREATE VIEW Q.DSQEC_TABS_LDB2
  (OWNER,TNAME,TYPE,SUBTYPE,MODEL,RESTRICTED,REMARKS,
   CREATED,MODIFIED,LAST_USED,LABEL,LOCATION,OWNER_AT_LOCATION,
   NAME_AT_LOCATION)
AS SELECT DISTINCT
  CREATOR,NAME,'TABLE',TYPE,' ',' ',REMARKS,' ',' ',' ',
  LABEL,LOCATION,TBCREATOR,TBNAME
  FROM SYSIBM.SYSTABLES, SYSIBM.SYSTABAUTH
  WHERE CREATOR = TCREATOR AND NAME=TTNAME AND GRANTEETYPE = ' ' AND
       GRANTEE IN (USER,'PUBLIC',CURRENT SQLID,'PUBLIC*')
```

Figure 58. Default view that provides a list of tables for the LIST command

To use a view you have created (for example, QMFADM.LOCAL_DB2_TABLES) and override the default view, issue a command like this one:

```
SET GLOBAL (DSQEC_TABS_LDB2 = QMFADM.LOCAL_DB2_TABLES
```

The view Q.DSQEC_TABS_RDB2 selects only the list of tables and views in a remote DB2 location accessed through a 3-part name or the LOCATION option of LIST. The user's current location must be DB2. Figure 59 on page 243 shows the type of information the view provides.

```
CREATE VIEW Q.DSQEC_TABS_RDB2
  (OWNER,TNAME,TYPE,SUBTYPE,MODEL,RESTRICTED,REMARKS,
   CREATED,MODIFIED,LAST_USED,LABEL,LOCATION,OWNER_AT_LOCATION,
   NAME_AT_LOCATION)
AS SELECT DISTINCT
  CREATOR,NAME,'TABLE',TYPE,' ',' ',REMARKS,' ',' ',' ',
  LABEL,LOCATION,TBCREATOR,TBNAME
  FROM SYSIBM.SYSTABLES, SYSIBM.SYSTABAUTH
  WHERE CREATOR = TCREATOR AND NAME=TTNAME AND GRANTEETYPE = ' ' AND
       GRANTEE IN (USER,CURRENT SQLID,'PUBLIC*')
```

Figure 59. Default view that provides a list of tables for the LIST command

To use a view you have created (for example, QMFADM.REMOTE_DB2_TABLES) and override the default view, issue a command like this one:

```
SET GLOBAL (DSQEC_TABS_LDB2 = QMFADM.REMOTE_DB2_TABLES
```

If you are a remote user: You do not have access to objects defined only as PUBLIC at the relevant remote location.

The view Q.DSQEC_ALIASES selects only the list of aliases for a list of tables, or the column information for an alias in DB2 for MVS/ESA, or DB2 Common Servers. Figure 60 shows the view provided for DB2 for MVS/ESA.

```
CREATE VIEW Q.DSQEC_ALIASES
  (OWNER,TNAME,TYPE,SUBTYPE,MODEL,RESTRICTED,REMARKS,
   CREATED,MODIFIED,LAST_USED,LABEL,LOCATION,OWNER_AT_LOCATION,
   NAME_AT_LOCATION)
AS SELECT
  CREATOR,NAME,'TABLE',TYPE,' ',' ',REMARKS,' ',' ',' ',
  LABEL,LOCATION,TBCREATOR,TBNAME
  FROM SYSIBM.SYSTABLES
  WHERE CREATOR IN (USER,CURRENT SQLID) AND TYPE = 'A'
```

Figure 60. Default view that provides a list of aliases for the LIST command

To use a view you have created (for example, QMFADM.DB2_ALIASES) and override the default view, issue a command like this one:

```
SET GLOBAL (DSQEC_ALIASES = QMFADM.DB2_ALIASES
```

The view Q.DSQEC_COLS_LDB2 selects only the column information for a table that exists at the current DB2 for MVS/ESA or workstation database server location. Figure 61 on page 244 shows the view provided for DB2 for MVS/ESA.

```
CREATE VIEW Q.DSQEC_COLS_LDB2
  (OWNER, TNAME, CNAME, REMARKS,LABEL)
AS SELECT DISTINCT
  TBCREATOR, TBNAME, NAME, REMARKS, LABEL
FROM SYSIBM.SYSCOLUMNS, SYSIBM.SYSTABAUTH
  WHERE TCREATOR = TBCREATOR AND TTNAME = TBNAME AND GRANTEETYPE = ' '
    AND GRANTEE IN (USER,'PUBLIC',CURRENT SQLID,'PUBLIC*')
```

Figure 61. Default view that provides column information for the DESCRIBE command

To use a view you have created (for example, QMFADM.LOCAL_DB2_COLUMNS) and override the default view, issue a command like this one:

```
SET GLOBAL (DSQEC_COLS_LDB2 = QMFADM.LOCAL_DB2_COLUMNS
```

The view Q.DSQEC_COLS_RDB2 selects only the column information from a table on another DB2 location. The user's current location must be DB2. Figure 62 shows the type of information the view provides.

```
CREATE VIEW Q.DSQEC_COLS_RDB2
  (OWNER, TNAME, CNAME, REMARKS,LABEL)
AS SELECT DISTINCT
  TBCREATOR, TBNAME, NAME, REMARKS, LABEL
FROM SYSIBM.SYSCOLUMNS, SYSIBM.SYSTABAUTH
  WHERE TCREATOR = TBCREATOR AND TTNAME = TBNAME AND GRANTEETYPE = ' '
    AND GRANTEE IN (USER,CURRENT SQLID,'PUBLIC*')
```

Figure 62. Default view that provides column information for the DESCRIBE command

To use a view you have created (for example, QMFADM.REMOTE_DB2_COLUMNS) and override the default view, issue a command like this one:

```
SET GLOBAL (DSQEC_COLS_RDB2 = QMFADM.REMOTE_DB2_COLUMNS
```

If you're a remote user: You do not have access to objects defined only as PUBLIC at the relevant remote location.

The views shipped with QMF can return multiple identical rows if SYSIBM.SYSTABAUTH has multiple entries authorizing the user or PUBLIC to a given table. When used by the QMF LIST or DESCRIBE commands, rows with duplicate OWNER and TNAME (for the table view) or duplicate OWNER, TNAME, and CNAME (for the column view) are ignored.

Changing the Default List

Using the QMF-provided default views for your table lists and column information might increase processing time, because DB2 gathers authorization information from the SYSIBM.SYSTABAUTH and

SYSIBM.SYSCOLAUTH tables. If you don't need the extra security provided by these authorization checks, consider creating your own views that generate a list of objects stored in the database.

Use a query similar to the one in Figure 63 to create your own view. This query eliminates duplicate rows in the view and, although DB2 spends more time before returning rows to QMF, there is less data transfer between the database and the user machine, producing better performance. You can name your customized view any name that is valid in QMF. See *QMF Reference* for information on QMF naming conventions.

```
CREATE VIEW Q.DATABASE_OBJECTS
  (OWNER,TNAME,TYPE,SUBTYPE,MODEL, RESTRICTED, REMARKS,
   CREATED,MODIFIED,LAST_USED,LABEL,LOCATION,OWNER_AT_LOCATION,
   NAME_AT_LOCATION)
AS SELECT CREATOR,TNAME,
'TABLE',TABLETYPE,' ',' ',REMARKS,
   ' ',' ',' ',TLABEL,' ',' ',' '
FROM SYSIBM.SYSTABLES
   WHERE TNAME IN (SELECT TTNAME
                   FROM SYSIBM.SYSTABAUTH
                    WHERE TCREATOR = A.CREATOR
                      AND GRANTEETYPE = ' &'
                      AND GRANTEE IN (USER, 'PUBLIC'))
```

Figure 63. Customizing your object lists using global variables

If you want to create a view that shows only the tables for which a user has privileges, but does not require a join, consider defining a view that selects only from SYSIBM.SYSTABAUTH, but does not return values for REMARKS or LABEL.

For other administrators, consider creating another view similar to the default QMF view, but that selects only from SYSIBM.SYSTABLES for table list or SYSIBM.SYSCOLUMNS for column list. Then the administrators can name this view in the DSQEC_COLS_LDB2 or DSQEC_COLS_RDB2 global variables and access descriptive information for any columns in the database.

Follow these rules if you're creating a list view of your own:

- The view must have the same view column names as the corresponding QMF-supplied view. The column names in the CREATE VIEW statement of the alternative view can be in any order.
- All columns must have a data type of CHAR or VARCHAR. QMF returns errors upon finding other data types.
- Do not exceed the following maximum lengths for columns in the view:
  - 18 characters for TNAME, CNAME, and NAME_AT_LOCATION
  - 254 characters for REMARKS

  - 30 characters for LABEL
  - 1 character for RESTRICTED
  - 16 characters for LOCATION
  - 8 characters for OWNER, TYPE, SUBTYPE, MODEL, and OWNER_AT_LOCATION
- Always supply values for OWNER, TNAME, TYPE, and CNAME. These columns cannot be null.

DSQEC_TABS_LDB2, DSQEC_TABS_RDB2, DSQEC_ALIASES, DSQEC_COLS_LDB2, and DSQEC_COLS_RDB2 are part of a set of global variables that help you control aspects of a user's QMF session. For more information on using global variables in procedures, see *Using QMF*. For a list of global variables and information on using them in applications, see *Developing QMF Applications* .

Object List Storage Requirement

For the LIST command, there are two sets of storage requirements for each row of the object list.

- The QMF internal RPT record collection requires:
  - Object OWNER key information, 50 bytes
  - REMARKS, up to 254 bytes
  - TABLE with a LABEL, up to 30 bytes
  - ALIAS, 42 bytes
  - Object information for QUERY, PROC, and FORM, 63 bytes
- The storage to hold displayed data and control information requires 130 bytes plus the actual number of bytes for REMARKS, up to 254 bytes and the actual number of bytes for the LABEL associated with a table, up to 30 bytes.

Enabling Users to Create Tables in the Database

A QMF user can create a table using any of these methods:

- SQL CREATE TABLE statement

  Enter the SQL CREATE TABLE statement from a QMF SQL query panel or run it from a saved query.
- QMF DISPLAY TABLE (or DISPLAY *viewname*) command, followed by the SAVE DATA command

  All SQL privileges on the underlying table or view are required. If the name you specify on the SAVE DATA command is the name of an existing table, QMF replaces or appends the existing data object. The SAVE command might be rejected if the table attributes don't match. For more information on the SAVE DATA command, see *QMF Reference* and the online help.

- QMF IMPORT TABLE or IMPORT VIEW command

  All SQL privileges on the table or view being imported are required. If the name the user specifies on the IMPORT command is the name of a table that already exists, QMF replaces or appends the data in the existing table. The IMPORT command might be rejected if the table attributes don't match. For more information on the IMPORT command, see *QMF Reference* and the online help.

Depending on the needs of your installation, you might need to create tables for your users or enable them to create their own tables. Both methods are shown in Table 35 on page 248.

Table 35. Creating tables in the database

If you're creating tables for your users:	If users are creating tables themselves:
Step 1 Create a table space and define it to DB2 before its first use. Use *DB2 UDB for OS390 Administration Guide* to help you decide on assigning authorities to create table spaces.	**Step 1** Use *DB2 UDB for OS390 Administration Guide* to grant a user DB2 CREATETS authority or DB2 CREATETAB authority. Create a table space (if you have only given them CREATETAB authority) and define it to DB2 before its first use.
Step 2 To create the table, issue either an SQL CREATE TABLE statement, a QMF DISPLAY command followed by a SAVE DATA command, *or* an IMPORT TABLE command. See *Using QMF* for examples of creating tables.	**Step 2** Assign the table space in the user's QMF profile, using an SQL UPDATE statement for the SPACE field. Updating profiles is explained in "Updating User Profiles" on page 224. You can update the SYSTEM profile if you need to change its default values.
Step 3 Create one or more indexes on the tables you create, to improve DB2 performance. See *DB2 UDB for OS390 SQL Reference* for information on the CREATE INDEX statement and details on logical design of tables.	**Step 3** Grant CREATETAB authority to users creating their own tables in table spaces, or assign CREATETS authority and allow users to create table spaces for their own use. Users automatically have all SQL privileges on tables and table spaces they create.
Step 4 Fill the tables with data. Use the DB2 LOAD Utility, QMF IMPORT commands (for transferring small tables), or other methods. *DB2 UDB for OS390 Uitility Guide and Reference* explains how to use the LOAD Utility. *Using QMF* explains exporting and importing objects in QMF.	**Step 4** Provide education on the SQL CREATE TABLE statement, QMF SAVE DATA and IMPORT commands, and other guidelines your site has for creating tables. See *QMF Reference* for more information on these commands.
Step 5 Grant DB2 and SQL privileges for the tables to users who need them, as discussed in "SQL Privileges Required to Access Objects" on page 236.	**Step 5** Grant DB2 and SQL privileges on any table or view on which users issue SAVE DATA or IMPORT commands to create new tables. Grant at least the SELECT privilege, or QMF can't read the data to create a new table. SQL privileges for QMF functions and commands are discussed starting in "SQL Privileges Required to Access Objects" on page 236.

For more information on the CREATE TABLE, CREATE INDEX, and other SQL statements related to creating tables, see *DB2 UDB for OS390 SQL Reference*

Choosing and Assigning a Table Space for the User

A table space can be either assigned to or created by the user. Any QMF user with CREATETAB authority can create tables in an assigned table space. If the table space is owned, only the owner can create tables in it unless they assign authority to others. For additional guidance on table spaces, see *DB2 UDB for OS390 Administration Guide*

When creating a table space, you must choose between the two options: explicit and implicit.

Explicit

With this option, all the tables created by the user's SAVE and IMPORT commands appear in a single table space created with an SQL CREATE TABLESPACE command. In DB2 terminology, this table space is "explicitly created". For example,

```
UPDATE Q.PROFILES
  SET SPACE='DBASE1.TSPACE1'
  WHERE CREATOR='USERA' AND TRANSLATION='ENGLISH'
```

Implicit

With this option, each table created by the user's SAVE and IMPORT commands goes into a table space created exclusively for that table by DB2. In DB2 terminology, this table space is "implicitly created". Such table spaces have the default LOCKSIZE, BUFFERPOOL, STOGROUP, and space attributes, and have names derived from their table names. For example,

```
UPDATE Q.PROFILES
  SET SPACE='DATABASE DBACE1'
  WHERE CREATOR='USERA' AND TRANSLATION='ENGLISH'
```

For information on the default attributes, see the description of the CREATE TABLESPACE query in *DB2 UDB for OS390 SQL Reference*

For information on the table spaces, see *DB2 UDB for OS390 Administration Guide*

You need to consider the following factors when you decide between the options for the table space.

Table sizes

The default attributes for implicitly created table spaces might not be suitable for the intended tables. The default values for the space parameters (PRIQTY and SECQTY) are intended for small sample and

summary tables. If the user's tables are large, the explicit table space option is probably the better choice.

If the table space is too small, the new table remains in the table space but is empty. The table space must therefore be enlarged, before the SAVE or IMPORT command can run successfully. Procedures to do this are described in *DB2 UDB for OS390 Administration Guide*

Maintenance

When you use the QMF Explicit Table Space Option, you simplify maintenance if you take advantage of segmented table spaces. Implicitly created table spaces can also simplify maintenance.

For example, if the user creates various temporary tables and then erases them, creating and erasing these tables in a simple table space (not segmented) causes a rapid buildup of dead space that would soon have to be removed by reorganizing the table space. In contrast, when a table is dropped in a segmented table space, its segments become immediately available for reuse when the drop is committed. It is not necessary to wait for reorganization of the table space. An implicitly created table space is erased automatically when the table it contains is erased.

Resource contention

To avoid resource contention, use either the explicit table space option with a segmented table space, or the implicit table space option.

With a segmented table space, when a table is locked, the lock does not interfere with access to segments of other tables. Having a number of tables in a single simple table space, each used by more than one user, might cause resource contention, but placing the tables in a segmented or separate table space might avoid the resource contention.

Integrity and security

You might have to grant the user certain DB2 privileges that the user would not otherwise need. With the explicit table space option, you can limit these added privileges to the creation of tables in the chosen database. With the implicit table space option, you must grant the user the privilege to create table spaces for the database, and you cannot restrict this privilege to table spaces created with the SAVE and IMPORT commands.

Convenience

An explicitly created table space is already available for user created tables. It is created during QMF installation and used for the installation verification procedure. The table space is named DSQTSDEF, and its database is DSQDBDEF. You might find that this table space is large enough to hold the tables of your users.

Many users should use this table space only if the tables are primarily read only.

Choosing the Type of Table Space

You can choose from three types of table spaces for your users.

Simple
Segmented
Partitioned

For more information about the types of table spaces, see *DB2 UDB for OS390 Administration Guide*

Granting a User DB2 CREATETAB Authority

You need to grant DB2 CREATETAB authority to any user who needs to create tables in a database. To grant a user CREATETAB authority, issue the SQL statement shown in Figure 64, where *userid1*, *userid2*, and *userid3* represent SQL authorization IDs. (Figure 64 shows the SQL statement used for DB2 for MVS/ESA.)

```
GRANT CREATETAB on database DBASEA TO userid1, userid2, userid3, ...
```

Figure 64. SQL statements to grant CREATETAB authority to more than one user

A user with CREATETAB authority can create tables in a table space. Users with CREATETS authority can create a table space for their own use.

If you want to allow a user to create tables, but need to maintain control over how much resource is used, assign a table space for the user rather than granting CREATETS authority. That way, you can control the size of the table space and the amount of resource used.

See *DB2 UDB for OS390 Administration Guide* for more information on creating a table space and a discussion of DB2 authority levels.

Enabling Users to Support a Chart

QMF creates charts using the Interactive Chart Utility (ICU) supplied by the GDDM-PGF product. Chart formats are templates for various types of charts (such as pie charts or histograms) that don't contain data. When a user creates a chart, QMF associates the data used with the chart format. Then, when the user enters a QMF DISPLAY CHART or EXPORT CHART command, the chart format and the data are merged to produce graphics data file (GDF) data.

Supporting a Chart in TSO and ISPF

From a single report, users can specify different chart forms, such as scatter charts, pie charts, and bar charts. Users can use IBM-supplied chart forms or create their own. In addition, they can save newly created chart forms, if they have libraries in which to store them.

To create a library to hold a user's saved chart forms:

1. Create the new library with a DD statement like this:

```
//DSQUCFRM  DD DSN=aaaaaaaa,DISP=(NEW,CATLG),
//             UNIT=xxxx,VOL=SER=yyyy,
//             SPACE=(400,(200,50,25)),
//             DCB=(LRECL=400,BLKSIZE=400,RECFM=F)
```

   Provide the DSN, UNIT, VOL, and SPACE parameters but do not change the DCB parameters.

2. Allocate the library for the user's QMF sessions, using the ddname DSQUCFRM. You might allocate the data set through the user's TSO logon procedure, or you might allocate it through a CLIST that the user calls to reach QMF. For example:

```
ALLOC DSNAME(aaaaaaaa) DDNAME(DSQUCFRM) SHR
```

The IBM-supplied chart forms are in the library QMF710.DSQCHART. Allocate this library to the ddname ADMCFORM. Both this library and the user's library are searched for user specified chart forms, but the new library is searched first. When the user saves a chart form, it always goes into the new library, never into QMF710.DSQCHART.

This arrangement gives each user access to both the IBM-supplied chart forms and those the user saved. It also prevents replacement of the IBM-supplied chart forms.

Supporting a Chart in CICS

QMF users can create charts from their reports through the interactive chart utility (ICU), a feature of GDDM. From a single report, users can specify different chart forms, such as scatter charts, pie charts, and bar charts. Users can use IBM-supplied chart forms or create their own. In addition, they can save newly created chart forms, provided they have libraries in which to store them. For information on loading GDDM function for chart support after installation, see "Adding Charting Function after QMF Installation" on page 530.

During QMF installation, a data set is created to hold IBM-supplied charts. This data set is described to CICS by an FCT or CSD file entry with the name DSQUCFRM. This data set is normally allocated to the CICS region during CICS start up and is available to all CICS users. The DSQUCFRM data set is the default chart library used to store chart forms when using the ICS from

QMF. You can store chart forms into other chart libraries by using the advanced form of the ICU panel directory. Each chart library must be described to CICS and accessed by the CICS region that is executing QMF. You describe the chart library with an FCT or file entry in the CSD data set. For a description on how to use the advanced ICU panel directory, see *GDDM Presentation Graphics Feature Interactive Chart Utility User's Guide*

In addition to the ICU, QMF provides an export chart command. This command is used to save the whole chart in graphic data format (GDF). When you export a chart, the GDF data is stored into the GDDM ADMF library. You can also save the whole chart in GDF using the ICU facility of GDDM.

Maintaining QMF Objects Using QMF Control Tables

Periodically, you need to condense and reorganize the QMF control tables that store QMF queries, forms, and procedures. Regular maintenance of the QMF control tables might involve tasks such as transferring objects to new owners or enlarging the table space for the tables when it is no longer large enough to hold existing QMF objects.

All QMF queries, forms, and procedures are stored among three QMF control tables:

- The Q.OBJECT_DIRECTORY table, which is described in "Reading the Q.OBJECT_DIRECTORY Table" on page 254
- The Q.OBJECT_DATA table, which is described in "Reading the Q.OBJECT_DATA Table" on page 255
- The Q.OBJECT_REMARKS table, which is described in "Reading the Q.OBJECT_REMARKS Table" on page 256

Keep QMF and the database running efficiently by periodically listing, displaying, or deleting QMF objects from these tables and reorganizing them when necessary. You might also need to use the information in these tables to transfer an object from one owner to another.

Workstation database server users

DB2 Common Server has an additional control table, Q.OBJECT_DATA2. QMF users must have INSERT privilege to this table. When all database activity is complete, this table should contain no records. If any records remain, they might be removed.

You need to assign STATS and REORG privileges to a user who is monitoring or reorganizing the control tables.

Reading the Q.OBJECT_DIRECTORY Table

This table contains a row for each QMF query, form, and procedure in the database. The table has the index Q.OBJECT_DIRECTORYX, with attributes UNIQUE and CLUSTER. The keyed columns are OWNER and NAME. No two rows can have identical values for these columns.

The Q.OBJECT_DIRECTORY table has the structure shown in Table 36:

Table 36. Structure of the Q.OBJECT_DIRECTORY table

Column name	Data type	Length (bytes)	Nulls allowed?	Function/values
OWNER	CHAR	8	No	Shows the authorization ID of the creator of the object.
NAME	VARCHAR	18	No	Shows the name of the object.
TYPE	CHAR	8	No	Shows the type of object: FORM, PROC, or QUERY.
SUBTYPE	CHAR	8	Yes	Shows SQL, QBE, or PROMPTED when TYPE is QUERY. Null or blank if TYPE is not QUERY.
OBJECTLEVEL	INTEGER	4	No	QMF uses this number to reconstruct an object from its defining text in the Q.OBJECT_DATA table.
RESTRICTED	CHAR	1	No	YES if the object has not been shared (using the SHARE parameter of the QMF SAVE command); NO if the object has been shared with other users.
MODEL	CHAR	8	Yes	This value is always REL for QMF for OS/390 V7R1, indicating relational data.
CREATED	TIMESTAMP		Yes	Shows the timestamp value for when an object was created. The value is recorded after SAVE or IMPORT commands.
MODIFIED	TIMESTAMP		Yes	Shows the timestamp value for when an object was last modified. The value is recorded after SAVE or IMPORT commands.
LAST_USED	TIMESTAMP		Yes	Shows the date value for when an object was last used. The value is updated only once a day.

Reading the Q.OBJECT_DATA Table

This table contains one or more rows for each query, form, and procedure in the database. Each row contains all or part of the defining text for one of these objects. Objects are reconstructed from this text by combining the text with the corresponding format number in the OBJECTLEVEL column of the Q.OBJECT_DIRECTORY table.

The Q.OBJECT_DATA table has the index Q.OBJECT_OBJDATAX, with attributes UNIQUE and CLUSTER. Keyed columns are OWNER, NAME, and SEQ.

The table has the structure shown in Table 37:

Table 37. Structure of the Q.OBJECT_DATA table

Column name	Data type	Length (bytes)	Nulls allowed?	Function/values
OWNER	CHAR	8	No	Shows the authorization ID of the creator of the object.
NAME	VARCHAR	18	No	Shows the name of the object.
TYPE	CHAR	8	No	Shows the type of object: FORM, PROC, or QUERY.
SEQ	SMALLINT	2	No	Indicates the sequence that this text occupies within the entire text of the object. For example, if this row is the first row of text in the object, SEQ is 1; if it is the second, SEQ is 2, and so on.
APPLDATA	LONG VARCHAR FOR BIT DATA (see note)	3600 (see note)	Yes	Contains all or part of text that defines the object. Text appears in an internal QMF format. The OBJECTLEVEL column in Q.OBJECT_DIRECTORY defines this format. **Attention:** The APPLDATA column must *never* be subjected to code page (CCSID) conversion.

Note: With DataJoiner V1.2.1 and DB2 for AIX, Parallel Edition V1.2, the data type and length for APPLDATA are VARCHAR(3600) for bit data. This is a permanent restriction for V1 SQL databases.

Workstation database server users

For DB2 Common Server, there is a similar table, Q.OBJECT_DATA2. This table is required for internal QMF processing of a SAVE or IMPORT command.

Reading the Q.OBJECT_REMARKS Table

This table contains one row for each query, form, and procedure in the database. The row contains comments entered using the QMF SAVE command when the object was created or last replaced. (See the description of the SAVE command in *QMF Reference*.)

The Q.OBJECT_REMARKS table has the index Q.OBJECT_REMARKSX, with the attributes UNIQUE and CLUSTER. Keyed columns are OWNER and NAME.

The table has the structure shown in Table 38:

Table 38. Structure of the Q.OBJECT_REMARKS table

Column name	Data type	Length (bytes)	Nulls allowed?	Function/values
OWNER	CHAR	8	No	Shows the authorization ID of the user who created the object
NAME	VARCHAR	18	No	Shows the name of the object.
TYPE	CHAR	8	No	Shows the type of the object: FORM, PROC, or QUERY.
REMARKS	VARCHAR	254	Yes	Contains the comment that was saved with the object when it was created or replaced.

Listing QMF Queries, Forms, and Procedures

To get the information you need to help you maintain the QMF environment, you need to list the queries, forms, and procedures that QMF users have saved in the database. With administrator authority you can list QMF objects you do not own using the query in Figure 65.

```
SELECT D.NAME, D.TYPE, D.SUBTYPE, D.RESTRICTED, R.REMARKS
  FROM Q.OBJECT_DIRECTORY D,
       Q.OBJECT_REMARKS R
  WHERE D.OWNER = 'userid'
    AND D.OWNER = R.OWNER
    AND D.NAME  = R.NAME
  ORDER BY D.TYPE, D.SUBTYPE, D.RESTRICTED
```

Figure 65. Listing queries, forms, and procedures owned by a particular user

This query returns a list of objects sorted by type (FORM, PROC, QUERY) and further by subtype (SQL, QBE, or PROMPTED) if TYPE is query. Enclose the value you supply for `userid` in single quotation marks. Objects of each

type are further sorted by whether they've been shared by the owner. Shared status is reflected in the RESTRICTED column of the Q.OBJECT_DIRECTORY table.

Displaying QMF Queries, Forms, and Procedures

If listing the objects doesn't provide enough information in the REMARKS column, try displaying the object by one of the following methods:

- Running the following query to share the user's objects, then displaying them from your own ID:
  Enclose the value you supply for `userid` in single quotes.

```
UPDATE Q.OBJECT_DIRECTORY
   SET RESTRICTED = 'N'
   WHERE OWNER = 'userid'
```

Figure 66. Sharing another user's objects with all users

  Important: Run this query only if you don't need to track which of the user's objects are restricted and which are not. After you run this query, you can set RESTRICTED back to Y, but then you cannot tell which objects were originally restricted.

- Issuing the QMF DISPLAY command for each object you want to display.

Transferring Ownership of Queries, Forms, and Procedures

Use the queries shown in Figure 67 to transfer QMF objects from one user to another. Ensure you run all three queries.

Important: First make sure that the new owner has no objects saved with the name of the object you're transferring, or QMF replaces the existing object with the object you transfer.

```
UPDATE Q.OBJECT_DIRECTORY      UPDATE Q.OBJECT_REMARKS        UPDATE Q.OBJECT_DATA
SET OWNER = 'newuserid'        SET OWNER = 'newuserid'        SET OWNER = 'newuserid'
WHERE OWNER = 'olduserid'      WHERE OWNER = 'olduserid'      WHERE OWNER = 'olduserid'
AND NAME IN namelist           AND NAME IN namelist           AND NAME IN namelist
```

Figure 67. Transferring QMF objects to another user

In the queries shown in Figure 67, `namelist` is a list of the object names to be transferred; the list must be set off by parentheses, with each name separated by a comma and surrounded by single quotes. For example:

```
('QUERY1','QUERY2','FORMA','PROCB')
```

For queries or procedures that name objects qualified with the old SQL authorization ID, be sure to change the qualifier. For example, if you transfer

MYQUERY from BAXTER to JONES, change the name from BAXTER.MYQUERY to JONES.MYQUERY.

Use an SQL query like the one in Figure 66 on page 257 to change the RESTRICTED column value to Y if you decide you want to share the object after transferring it.

Deleting Obsolete Queries, Forms, and Procedures

Use the SQL in Figure 68 to delete *all* of a particular user's QMF queries, forms, and procedures. Ensure you run all three queries, because the internal representation of each object spans the three QMF control tables Q.OBJECT_DIRECTORY, Q.OBJECT_DATA, and Q.OBJECT_REMARKS. Surround values you supply for the user ID variables with single quotes.

Unpredictable results can occur if the tables are not properly updated.

```
DELETE FROM Q.OBJECT_DIRECTORY    DELETE FROM Q.OBJECT_REMARKS      DELETE FROM Q.OBJECT_DATA
WHERE OWNER = 'olduserid'         WHERE OWNER = 'olduserid'         WHERE OWNER = 'olduserid'
```

Figure 68. Deleting unnecessary objects from the QMF control tables

You can also delete obsolete objects by using the date and time sorting capabilities in Q.OBJECT_DIRECTORY. You can select every object where the date last used was before 06/01/95 and delete all the appropriate rows from the three control tables.

Importing Queries, Forms, and Procedures in OS/390 Data Sets

If a user has QMF objects that have been exported to OS/390 data sets, you can bring them back with the QMF IMPORT command.

If the exported objects are RACF protected, you need RACF read access to import objects from them. To obtain this access, see your RACF administrator.

Enlarging the Table Space for the QMF Object Control Tables

Periodically, QMF objects might become too numerous for the table space that contains the QMF object control tables Q.OBJECT_DIRECTORY, Q.OBJECT_DATA, and Q.OBJECT_REMARKS.

Before you enlarge the table space, you must determine its space requirements. One factor in your estimate can be the amount of space currently used.

If the space is DB2 managed, you can get this information by doing the following:

1. Run the STOSPACE utility on the table space's storage group.
2. Run the following query:

```
SELECT SPACE
  FROM SYSIBM.SYSTABLEPART
  WHERE TSNAME='tttttttt' AND DBNAME='DSQDBCTL'
```

where tttttttt is the table space name. The result (SPACE) gives the number of kilobytes of storage currently allocated to the table space.

If the space is user managed, you can use the TSO LISTCAT command for the space information, if you know the data set name.

To enlarge the table space for the QMF object control tables:

1. Make an image copy of the table space.

   You can use this for restoration if the procedure fails.

2. Create a storage group for the table space.

   Do this only if the table space has user managed data sets, and no storage group is already available.

   To determine the type of data set management used for the table space, run the following query:

   ```
   SELECT STORTYPE
     FROM SYSIBM.SYSTABLEPART
     WHERE TSNAME='DSQTSCT3' AND DBNAME='DSQDBCTL'
   ```

   This should produce a one-line result for the table space (DSQTSCT3). (See Table 39). In the result, STORTYPE has the value E or I.

   E Indicates that the data sets for the table space are user managed (no associated storage group).

   I Indicates that the data sets for the table space are DB2 managed.

Table 39. Table spaces for control tables that store QMF objects

Table space name	Contents	Default size
DSQTSCT1	Q.OBJECT_DIRECTORY table	256 pages
DSQTSCT2	Q.OBJECT_REMARKS table	256 pages
DSQTSCT3	Q.OBJECT_DATA	5120 pages

Table 40. Node groups for control tables that store QMF objects using a DB2 Parallel Edition V1R2 database

NODEGROUP Name	Used for	Characteristics
DSQTSCTL	For all QMF control tables except as described elsewhere in this table.	Can be distributed across multiple nodes. Growth potential is low.

Table 40. Node groups for control tables that store QMF objects using a DB2 Parallel Edition V1R2 database (continued)

NODEGROUP Name	Used for	Characteristics
DSQTSOBJ	The QMF OBJECT control tables where PROC, Query, and FORM objects are stored.	Can be distributed across multiple nodes. Growth potential is high.
DSQTSDEF	The default SAVE DATA space as initialized in the QMF Profile.	Should be defined to be restricted to a single node to avoid complications.
DSQTSAMP	The QMF Sample tables.	Candidate for distributing across multiple nodes.

3. Stop the database.

   Use the command `-STOP DATABASE(DSQDBCTL)`.

4. Change the table space description.

   - If the table space data sets are user managed, issue a DB2 statement of the following form:

     ```
     ALTER TABLESPACE DSQDBCTL.tttttt
       USING STOGROUP ssssss PRIQTY pppp SECQTY ssss
     ```

     where `tttttt` is the table space name. The statement changes the table space from user managed to DB2 managed and names a storage group (`ssssss`) for the management. The quantities `pppp` and `ssss` are the new primary and secondary allocation sizes (in kilobytes) for the enlarged table space.

   - If the table space data sets are DB2 managed, execute a DB2 statement like the following:

     ```
     ALTER TABLESPACE DSQDBCTL.tttttt
       PRIQTY pppp SECQTY ssss
     ```

     where `tttttt` is the table space name. `pppp` and `ssss` are the new primary and secondary allocation sizes, in kilobytes, for the enlarged table space.

5. Move the table space data.

   Simply changing the table space description does not effect enlargement. You must instead do something that causes the table space to be refilled.

6. Start the database with the statement:

   ```
   -START DATABASE(DSQDBCTL)
   ```

You can also use the DB2 LOAD utility to enlarge a table space.

For more information on enlarging table spaces, see *DB2 UDB for OS390 Uitility Guide and Reference*

Note: QMF Version 7 creates DB2 managed table space data sets if QMF was not previously installed.

Maintaining a DB2 Subsystem

Note about DB2 platforms

Except where noted, this section provides information about DB2 for MVS/ESA.

You can maintain multiple databases with multiple table spaces.

Workstation database Server users

Each server (a named location) is a single database. You can maintain multiple table spaces in that single database.

You might assign specialized administration tasks to users to be performed under their own authorization IDs. You might give these users just enough DB2 authority to run the queries and utilities required for their tasks. For example, a person would need:

- The INSERT privilege on the table Q.PROFILES to insert QMF profiles for new users
- DBADM authority on a given database to administer the associated tables, indexes, and table spaces
- STATS and REORG privileges on the database for the Q.OBJECT tables to monitor these tables and, if necessary, reorganize them

Managing Data Sets

The data sets for the table spaces and indexes might be user or DB2 managed. How these data sets are managed determines what you must do to enlarge table spaces and indexes. Table space enlargement is discussed in “Enlarging the Table Space for the QMF Object Control Tables” on page 258.

DB2 Common Server users

QMF table spaces are defined as system managed space (SMS).

Storage Groups for DB2 Managed Data Sets

Prior to Version 3.2, DB2 managed the space for the control table indexes and table spaces. This required the use of a storage group for each table space and index. A storage group is a named set of DASD volumes from which space can be drawn for the objects that the storage group supports. For each control table with an index, the index and the table space share a common storage group, as Table 41 indicates.

Workstation database server users

Storage groups do not apply.

Table 41. Control table storage groups

Table	Table space	Storage group
Q.PROFILES	DSQTSPRO	DSQSGPRO
Q.ERROR_LOG	DSQTSLOG	DSQSGLOG
Q.OBJECT_DIRECTORY	DSQTSCT1	DSQSGCT1
Q.OBJECT_REMARKS	DSQTSCT2	DSQSGCT2
Q.OBJECT_DATA	DSQTSCT3	DSQSGCT3

VSAM Clusters for User Managed Data Sets

You need a VSAM cluster for each table space and each index to manage the control-table data sets. You define these clusters using VSAM statements, and link the resulting clusters to DB2 with SQL CREATE queries. The link between a cluster and its DB2 object is in the name of the cluster and the name of the ICF (Integrated Catalog Facility) in which the cluster is cataloged.

Maintaining the Control Tables

Most control-table maintenance cannot be done under QMF, because QMF relies on these tables for its operations. You can issue your maintenance queries in batch-mode TSO through the DSN processor, or interactively through the SPUFI facility of DB2I.

Workstation database server users

Additionally, you can use the DB2 Command Line Processor from the local operating system environment of the database.

You can find information on these subjects in *DB2 UDB for OS390 Administration Guide*

No one should be using QMF during maintenance work. To ensure this, apply the DB2-STOP DATABASE command to one of the table spaces containing a control table. You can then do maintenance operations on the other control tables and indexes. You can do either of the following:

- Include the DB2-STOP DATABASE command as the first in your input to DSN if you are working in batch-mode TSO.
- Issue the DB2-STOP DATABASE command from the DB2I commands panel if you are using DB2I.

For a description of the DB2-STOP DATABASE command, see *DB2 UDB for OS390 Uitility Guide and Reference*

Monitoring and Reorganizing the Control Tables

You should forestall maintenance problems by monitoring the condition of the control tables through the DB2 system catalog. For more information, see *DB2 UDB for OS390 Administration Guide*

Running the RUNSTATS Utility: You periodically run the RUNSTATS utility on the control tables and indexes to add current statistics to certain DB2 system tables. You then query these tables and examine these statistics to decide whether reorganization is required.

If reorganization is required, do the following:

1. Run the REORG utility.
2. Rerun the RUNSTATS utility.
3. Query the updated system tables again to see if the reorganization improved the statistics.

At its most effective, reorganization can minimize the space requirements for the control tables and indexes and increase the efficiency of QMF operations.

DB2 UDB for OS390 Administration Guide suggests that you rebind your most critical applications after reorganization so that the most efficient search paths can be selected. This suggests that the QMF application plan be rebound after each such reorganization.

Determining Index Use

QMF query performance can be affected if the QMF application plan is bound when Q.OBJECT_DATA has very few entries. Under these circumstances, the index on Q.OBJECT_DATA is not being used by the optimizer. (The optimizer is a DB2 function that determines the best ways to access a row in a table.) Instead, a table space scan is performed, affecting future performance when Q.OBJECT_DATA contains many entries. You need to rebind the plan so that the index is used.

To determine whether the index on Q.OBJECT_DATA is being used, run the following query:

```
SELECT BCREATOR, BNAME
  FROM SYSIBM.SYSPLANDEP
    WHERE DNAME='QMF710'
      AND BTYPE='I'
```

This query selects the owner (BCREATOR) and name (BNAME) of any indexes that the QMF application plan is dependent upon. Although QMF710 is the default plan name, use the name used during QMF installation.

If the result does not indicate an entry for Q.OBJECT_OBJDATAX (Q.OBJECT_DATAX, if you are migrated from QMF V2R2), do the following:

1. Run RUNSTATS on table space DSQDBCTL.DSQTSCT3.
2. Rebind the QMF application plan.

Switching Buffer Pools

For performance reasons, you might want to change the buffer pool for a table space containing a control table or for a control table index. For example, if your installation is strongly QMF oriented, you might switch the buffer pools for the control table indexes and table spaces to BP1, and reserve BP1 for their exclusive use.

You change buffer pools through ALTER TABLESPACE and ALTER INDEX queries. For descriptions of these queries and the authorities needed to run them, see *DB2 UDB for OS390 SQL Reference* You can choose BP0, BP1, or BP2 for your new buffer pool, but not BP32K.

There are other parameters whose values you can change with ALTER TABLESPACE and ALTER INDEX queries. Of these, only the DSETPASS parameters can be changed without damaging the operability of QMF.

Maintaining Tables and Views Using DB2 Catalog Tables

Anyone with DBA authority can access the DB2 catalog tables to list, display, transfer, or delete tables and views. For complete information on using these DB2 catalog tables, see *DB2 UDB for OS390 SQL Reference*

Important: Certain tables in the system catalog have columns containing binary data. Such columns have character data types but don't contain character data. Retrieving data from these columns can cause an incoherent display, because some of the column "characters" can give unexpected signals to the screen manager. For more information about system catalog tables, see *DB2 UDB for OS390 SQL Reference*

Listing Tables and Views

The query in Figure 69 returns a list of tables with columns TABLETYPE (T indicates a table, V indicates a view), TNAME (table name), TABLE SPACENAME, and REMARKS.

```
SELECT TABLETYPE, TNAME, TABLE SPACE NAME, REMARKS
  FROM SYSIBM.SYSTABLES
  WHERE CREATOR = 'userid'
  ORDER BY TABLETYPE, TNAME
```

Figure 69. Listing DB2 tables and views owned by a particular user

Transferring Ownership of a Table or View

Transferring ownership of a table or view is not recommended.

Deleting a Table or View from the Database

Use the SQL DROP TABLE statement or the QMF ERASE command to delete tables or views from the database. Only the creator of the table or someone with DBA authority can delete it.

When you delete the row of the SYSIBM.SYSTABLES table that defines the table, all views, synonyms, and indexes associated with the table are also deleted. Before you drop a table from the database, ensure that no other user relies on it (for example, for command synonym or function key definitions).

For more information on erasing tables, see *DB2 UDB for OS390 Administration Guide*

Supporting Locally Defined Date/Time Formats

Note to CICS users

Locally defined date/time formats are not supported in CICS.

To define local formats, your installation creates two formatting routines. One of these, named DSNXVDTX, formats dates. The other, named DSNXVTMX, formats times. Creating these routines is a DB2 administration task. If you yourself must do it, see information on locally defined formats in *DB2 UDB for OS390 Administration Guide*

Specifying the Format

When creating a report, a user can specify the local format for either type of data: TDL for dates; TTL for times. QMF does the formatting by calling the appropriate routine. You must ensure QMF can load both DSNXVTMX and DSNXVDTX.

Making the Edit Routine Available

You can make these routines available by placing their load library in the STEPLIB concatenation of your users' JCL. Make certain that this library is searched before the DB2 program library. If the program library is searched first, QMF loads and uses two IBM-supplied "stubs" from the DB2 library. These stubs are meant to be used when no local formats are defined: They do no formatting at all. For example, the formatting routines are in the library XYZ.FORMAT. The library is properly placed in the STEPLIB statement in Figure 70, where the DB2 program library is DSN230.SDSQLOAD.

```
//STEPLIB DD DSN=ISP.V2R2M0.ISPLOAD,DISP=SHR
//        DD DSN=ISR.V2R2M0.ISRLOAD,DISP=SHR
//        DD DSN=QMF710.SDSQLOAD,DISP=SHR
//        DD DSN=XYZ.FORMAT,DISP=SHR          (local formatting library)
//        DD DSN=DSN230.DSNLOAD,DISP=SHR      (DB2 program library)
//        DD DSN=GDDM.OSPID.GDDMLOAD,DISP=SHR
```

Figure 70. Making the edit routine available

Accessing the DXT End User Dialogs (ISPF Only)

QMF's EXTRACT command accesses IBM's Data Extract (DXT) End User Dialogs. With these services, users can extract data from many different sources and load that data into DB2 tables. Possible data sources include IMS™, VSAM, physical sequential data sets, and tables from other DB2 systems.

If you plan to support the EXTRACT command, ensure that:

- Version 2 Release 5 of DXT dialogs is operating at your installation.
- All potential users of the QMF EXTRACT command have been enrolled for DXT dialogs, and have been educated in its use.

For detailed information about DXT, see the appropriate DXT book listed in the bibliography at page "Bibliography" on page 553.

Another way to load data into tables is to use the DB2 Loader for sequential sources of data. See *DB2 UDB for OS390 SQL Reference* for more information about the DB2 Loader.

Supporting the EXTRACT Command

To support the EXTRACT command, you must:

- Allocate data sets to each user of that command.
- Deallocate these data sets after the user ends the command.

The data sets can be in DXT libraries that are common to all users, or can be data sets created for the individual users enrolled in DXT.

The data sets are described in the *Data Extract: Planning and Administration Guide for Dialogs* If you are enrolling DXT dialog users, you need that document. If you are not, all you need to know about the process is included in the following discussion.

Allocating Resources

QMF can support English, Kanji, and Uppercase (UCF) DXT dialogs. Each requires different DXT data sets, all of which can be allocated with ISPF LIBDEF statements (see "Allocating and Deallocating Resources Using CLISTs" on page 268 for more information about using LIBDEF).

If you choose some other method of allocation, you can skip the following topics on modifying the CLISTs. The unmodified CLISTs won't interfere with the method you choose.

Allocating DXT Data Sets

Table 42 shows the data sets required for several DXT Version 2 Release 5 dialogs. The table identifies the data sets and their associated ddnames. For any given ddname, the data sets in the table are in addition to any data sets that were already allocated for that ddname.

The names shown in the table are the default names provided by DXT. Your installation might be using different names for these data sets.

In the table, each *n* is the language key. For DXT dialogs, the language keys are E (English), K (Kanji), and U (uppercase English).

Table 42. Data sets needed for DXT Version 2.5

DDNAME	Default Data Set Name
ISPLLIB	DXT250.DVRLOAD
ISPPLIB	DXT250.DVRPLIBn
ISPMLIB	DXT250.DVRMLIBn
ISPSLIB	*userid*.DXT250.DVRJEDIn DXT250.DVRSLIBn
ISPTLIB	*userid*.DXT250.DVRTLIBn DXT250.DVRTADMn
ISPTABL	*userid*.DXT250.DVRTLIBn

Table 42. Data sets needed for DXT Version 2.5 (continued)

DDNAME	Default Data Set Name
DVRDJEDI	*userid*.DXT250.DVRJEDIn or DXT250.DVRJEDIn (See note)
DVRDJED0	*userid*.DXT250.DVRJEDIn
DVRDIMEX	*userid*.DXT250.DVRIMEXn
DVREUADD	DXT250.DVRTADMn
DVRSTABL	DXT250.DVRTLIBn (See note)

Note: The library DXT250.DVRTLIBn applies only if your installation uses the DXT dialogs object-sharing capability.

Allocating and Deallocating Resources Using CLISTs

Important: If you are not familiar with the ISPF LIBDEF statement, see *ISPF V2 MVS Dialog Management Services* before reading further.

To allocate the needed data sets, you can do either of the following:

- Add JCL to your users' TSO logon procedures.
- Use two IBM-furnished CLISTs.

  QMF calls one of these CLISTs just before issuing an EXTRACT command, and the other just after the command executes. With appropriate modifications, the first CLIST can allocate the added resources; the second can deallocate them. Figure 71 on page 270 shows a CLIST that you can use to do the necessary allocation. This method is superior to adding JCL to your users' TSO logon procedures because it ensures that the DXT data sets are allocated only when they can be used.

Preparing the Allocation CLIST

This CLIST is the member, DSQABX1L, of the library QMF710.SDSQCLTE. QMF calls this CLIST through the ISPF SELECT service whenever a user issues the EXTRACT command. The following modifications on DSQABX1L might be necessary before it can allocate:

1. Change the PROC statement.

   The original PROC statement is:

   ```
   PROC 0 DXTPRE(DXT250) LKEY(E) OBJSHR(NO)
   ```

   Because QMF does not pass parameters to the CLIST, you must ensure that the values for the following three keyword parameters are correct:

   DXTPRE

   Identifies the prefix for the DXT libraries. The original value, DXT250, appears in Table 42.

LKEY Identifies the language environment. It contains the language key described at page 267. The original value, E, specifies the English-language environment.

OBJSHR
Can be YES or NO. The original value, NO, indicates that DXT object sharing is not in effect.

2. Remove the third executable statement.

   This is the statement `EXIT CODE(0)`, the last statement in the CLIST. It ensures that the CLIST does nothing if you aren't supporting the EXTRACT command or are making the allocations in some other manner.

3. Modify the code as necessary.

   Figure 71 on page 270 shows how the CLIST generates the data set names for its LIBDEF statements. These data set names are the defaults for DXT V2R5 dialogs. Modify the code, if necessary, to produce the names used at your installation, but do *not* modify the logic or the return codes for failed allocations.

```
PROC 0  DXTPRE(DXT240) LKEY(E) OBJSHR(NO)                              00001000
CONTROL NOFLUSH NOPROMPT NOMSG                                         00002000
EXIT CODE(0)                        /* EXIT IF ALREADY ALLOCATED     */ 00003000
/*********************************************************************/ 00004000
/*                                                                   */ 00005000
/*     CLIST NAME: DSQABX1L                                          */ 00006000
/*                                                                   */ 00007000
/*     DESCRIPTIVE NAME: DXT/END USER DIALOGS LIBRARY ALLOCATIONS    */ 00008000
/*                       CLIST FOR THE QMF-DXT BRIDGE                */ 00009000
/*                                                                   */ 00010000
/*      COPYRIGHT: 5645-DB2, 5648-A70 (C) COPYRIGHT IBM CORP.        */ 00011000
/*                 1982, 1998                                        */ 00012000
/*                 (Published)                                       */ 00013000
/*                 LICENSED MATERIAL - PROGRAM PROPERTY OF IBM       */ 00014000
/*                 ALL RIGHTS RESERVED                               */ 00015000
/*                 U.S. GOVERNMENT USERS RESTRICTED RIGHTS           */ 00016000
/*                 - USE, DUPLICATION OR DISCLOSURE RESTRICTED BY    */ 00017000
/*                   GSA ADP SCHEDULE CONTRACT WITH IBM CORP.        */ 00018000
/*                                                                   */ 00019000
/*     STATUS: VERSION 7 RELEASE 1 LEVEL 0                           */ 00020000
/*                                                                   */ 00021000
/*     FUNCTION:                                                     */ 00022000
/*        THIS CLIST IS CALLED PRIOR TO CALLING THE DXT PRODUCT. THIS*/ 00023000
/*        CLIST ALLOWS THE USER TO ALLOCATE DXT LIBRARIES PRIOR TO   */ 00024000
/*        STARTING THE DXT PRODUCT. IF YOU ALLOCATED DXT LIBRARIES   */ 00025000
/*        PRIOR TO STARTING QMF YOU SHOULD NOT HAVE TO MODIFY THIS   */ 00026000
/*        CLIST. IN WHICH CASE THE CLIST SIMPLY EXITS WITH A ZERO    */ 00027000
/*        RETURN CODE.                                               */ 00028000
/*                                                                   */ 00029000
/*        IF YOU DID NOT ALLOCATE DXT LIBRARIES PRIOR TO STARTING    */ 00030000
/*        THE QMF PRODUCT YOU WILL NEED  TO ALLOCATE THEM USING THIS */ 00031000
/*        CLIST. IF YOU ALLOCATE DXT LIBRARIES USING  THIS CLIST YOU */ 00032000
/*        WILL NEED TO CHANGE CLIST "DSQABX1F" WHICH IS EXECUTED     */ 00033000
/*        UPON COMPLETION OF THE DXT PRODUCT.                        */ 00034000
/*                                                                   */ 00035000
/*     INPUT:  DXTPRE - CONTAINS THE PREFIX NAME FOR DXT LIBRARIES.  */ 00036000
/*                      THIS PARAMETER IS NOT PASSED TO THIS CLIST   */ 00037000
/*                      BY QMF. IT MUST BE SET IN THE PROC STATEMENT.*/ 00038000
/*                                                                   */ 00039000
/*             LKEY   - CONTAINS THE LANGUAGE KEY THAT IS USED AS    */ 00040000
/*                      A SUFFIX FOR DXT LIBRARY NAMES. THE LKEY OF  */ 00041000
/*                      "E" IS USED FOR ENGLISH.                     */ 00042000
/*                      THIS PARAMETER IS NOT PASSED TO THIS CLIST   */ 00043000
/*                      BY QMF. IT MUST BE SET IN THE PROC STATEMENT.*/ 00044000
/*                                                                   */ 00045000
```

Figure 71. CLIST to allocate DXT data sets (DSQABX1L) (Part 1 of 3)

```
/*             OBJSHR - ENTER VALUE "YES" OR "NO". IF YOU HAVE TAKEN */ 00046000
/*                      ADVANTAGE OF THE DXT DIALOGS OBJECT SHARING  */ 00047000
/*                      CAPABILITY SPECIFY THE VALUE "YES". IF YOU   */ 00048000
/*                      ARE NOT USING OBJECT SHARING SPECIFY THE     */ 00049000
/*                      VALUE "NO".                                  */ 00050000
/*                      THIS PARAMETER IS NOT PASSED TO THIS CLIST   */ 00051000
/*                      BY QMF. IT MUST BE SET IN THE PROC STATEMENT.*/ 00052000
/*                                                                   */ 00053000
/*     OUTPUT: NONE                                                  */ 00054000
/*                                                                   */ 00055000
/*     EXIT CONDITIONS: NONE                                         */ 00056000
/*                                                                   */ 00057000
/*       ABEND CODE: VALUE - NONE                                    */ 00058000
/*                                                                   */ 00059000
/*     EXTERNAL REFERENCES:                                          */ 00060000
/*       ROUTINES: NONE                                              */ 00061000
/*       DATA AREAS: NONE                                            */ 00062000
/*                                                                   */ 00063000
/*     CHANGE ACTIVITY: NONE                                         */ 00064000
/*                                                                   */ 00065000
/*********************************************************************/ 00066000
/*-END-OF-SPECIFICATION-*********************************************/ 00067000
 ISPEXEC CONTROL ERRORS RETURN         /* RETURN ISPF ERRORS TO CLIST*/ 00068000
     IF &LASTCC ¬= 0 THEN EXIT CODE(1)                                 00069000
/*********************************************************************/ 00070000
/* ALLOCATE DXT LIBRARIES USING ISPF LIBDEF. DXT LIBRARIES ARE NAMED */ 00071000
/* "&DXTPRE.NAME" AND USER LIBRARIES ARE NAMED "&USERID.&DXPRE.NAME" */ 00072000
/*********************************************************************/ 00073000
 SET &USERID = &SYSUID                 /* SET CURRENT USERID         */ 00074000
 SET &LIBS = &STR('&DXTPRE..DVRLOAD')                                  00075000
 ISPEXEC LIBDEF ISPLLIB DATASET ID(&STR(&LIBS))                        00076000
     IF &LASTCC ¬= 0 THEN EXIT CODE(2)                                 00077000
 SET &LIBS = &STR('&DXTPRE..DVRPLIB&LKEY.')                            00078000
 ISPEXEC LIBDEF ISPPLIB DATASET ID(&STR(&LIBS))                        00079000
     IF &LASTCC ¬= 0 THEN EXIT CODE(3)                                 00080000
 SET &LIBS = &STR('&DXTPRE..DVRMLIB&LKEY.')                            00081000
 ISPEXEC LIBDEF ISPMLIB DATASET ID(&STR(&LIBS))                        00082000
     IF &LASTCC ¬= 0 THEN EXIT CODE(4)                                 00083000
 SET &LIBS = &STR('&USERID..&DXTPRE..DVRJEDI&LKEY.')                   00084000
 SET &LIBS = &STR(&LIBS , '&DXTPRE..DVRSLIB&LKEY.')                    00085000
 ISPEXEC LIBDEF ISPSLIB DATASET ID(&STR(&LIBS))                        00086000
     IF &LASTCC ¬= 0 THEN EXIT CODE(5)                                 00087000
 SET &LIBS = &STR('&USERID..&DXTPRE..DVRTLIB&LKEY.')                   00088000
 SET &LIBS = &STR(&LIBS , '&DXTPRE..DVRTADM&LKEY.')                    00089000
 ISPEXEC LIBDEF ISPTLIB DATASET ID(&STR(&LIBS))                        00090000
     IF &LASTCC ¬= 0 THEN EXIT CODE(6)                                 00091000
 ISPEXEC LIBDEF ISPTABL DATASET ID('&USERID..&DXTPRE..DVRTLIB&LKEY.')  00092000
     IF &LASTCC ¬= 0 THEN EXIT CODE(7)                                 00093000
```

Figure 71. CLIST to allocate DXT data sets (DSQABX1L) (Part 2 of 3)

```
IF &OBJSHR = NO THEN +                                                    00094000
 DO                                                                       00095000
  ISPEXEC LIBDEF DVRDJEDI DATASET ID('&USERID..&DXTPRE..DVRJEDI&LKEY.') 00096000
      IF &LASTCC ¬= 0 THEN EXIT CODE(8)                                   00097000
 END                                                                      00098000
ELSE +                                                                    00099000
 DO                                                                       00100000
  ISPEXEC LIBDEF DVRDJEDI DATASET ID('&DXTPRE..DVRJEDI&LKEY.')           00101000
      IF &LASTCC ¬= 0 THEN EXIT CODE(8)                                   00102000
 END                                                                      00103000
 ISPEXEC LIBDEF DVRDJEDO DATASET ID('&USERID..&DXTPRE..DVRJEDI&LKEY.')  00104000
     IF &LASTCC ¬= 0 THEN EXIT CODE(9)                                    00105000
 ISPEXEC LIBDEF DVRDIMEX DATASET ID('&USERID..&DXTPRE..DVRIMEX&LKEY.')  00106000
     IF &LASTCC ¬= 0 THEN EXIT CODE(10)                                   00107000
 ISPEXEC LIBDEF DVREUADD DATASET ID('&DXTPRE..DVRTADM&LKEY.')            00108000
     IF &LASTCC ¬= 0 THEN EXIT CODE(11)                                   00109000
IF &OBJSHR = YES THEN +                                                   00110000
 DO                                                                       00111000
  ISPEXEC LIBDEF DVRSTABL DATASET ID('&DXTPRE..DVRTLIB&LKEY.')           00112000
      IF &LASTCC ¬= 0 THEN EXIT CODE(12)                                  00113000
 END                                                                      00114000
 EXIT CODE(0)                                                             00115000
```

Figure 71. CLIST to allocate DXT data sets (DSQABX1L) (Part 3 of 3)

Preparing the Deallocation CLIST

The CLIST in Figure 72 on page 274 is the member DSQABX1F of the library QMF710.SDSQCLTE. QMF calls this CLIST through the ISPF SELECT service after the EXTRACT command runs. The following modifications of DSQABX1F might be necessary before it can deallocate:

1. Change the PROC statement.

   The original PROC statement is:

   ```
   PROC 0 QMFPRE(QMF710) LKEY(E) OBJSHR(NO)
   ```

   Because QMF does not pass parameters to the CLIST, be sure that the values for the following three keyword parameters are correct:

   QMFPRE
   Establishes a value in the CLIST for the variable &QMFPRE. This value is the first qualifier in a number of Version 3 Release 1 data set names. The original value, QMF710, is the installation default for QMF Version 7. If this qualifier is different at your installation, you might want to change the value for QMFPRE. Whether you need to do this depends on how you deallocate the data sets, as explained in the next steps.

   LKEY Identifies the language environment. Use the same value for LKEY that you did in the allocating CLIST (page 269).

OBJSHR

Indicates whether DXT object sharing is in effect. Use the same value for OBJSHR that you did in the allocating CLIST.

2. Remove the third executable statement.

   This is the statement `EXIT CODE(0)`. It ensures that the CLIST does nothing if you either aren't supporting the EXTRACT command or are making the allocations in some other manner.

3. If necessary, change the branching statement and modify the code.

   The third statement after the comments in the prolog is the branching statement `GOTO A`. Following this statement are two blocks of code: section A and section B. Both blocks deallocate the DXT data sets, but do so in different ways. If you choose section B to do the deallocation, you must change the branching statement to `GOTO B`.

   Section A nullifies every LIBDEF statement that the allocation CLIST issued. This deallocates the DXT data sets, but it might also deallocate data sets that the user needs after the EXTRACT command ends. Such data sets were allocated with LIBDEF statements before the user issued the EXTRACT command. If the user needs data sets that were allocated with LIBDEF statements issued before the EXTRACT command, then change the branching statement so that section B is invoked.

   For a data set to fit this description, a LIBDEF statement for its ddname must appear in this CLIST and in its allocating companion. For example, the following LIBDEF statement adds a panel library, ABC.XYZ, to the libraries already allocated to the ddname ISPPLIB:

   ```
   ISPEXEC LIBDEF ISPPLIB DATASET(ABC.XYZ)
   ```

   In the allocation CLIST, this allocation disappears when the CLIST runs its LIBDEF statement for ISPPLIB. To restore it, you need to reissue the original LIBDEF statement in the deallocating CLIST. If this is the only allocation to restore, you might still use section A: just change the LIBDEF statement for ISPPLIB in that section.

   The LIBDEF statements in section B reallocate QMF libraries to the ISPF ddnames. Change these statements to whatever is needed if you choose to use section B.

   LIBDEF statements cannot deallocate data sets that were allocated through the TSO logon procedure or through TSO ALLOCATE statements. Therefore, you can always use section A if all the data sets needed for a QMF session are allocated in that way.

```
PROC 0  QMFPRE(QMF710) LKEY(E) OBJSHR(NO)                              00001000
CONTROL NOFLUSH NOPROMPT NOMSG                                         00002000
EXIT CODE(0)                        /* EXIT IF ALREADY ALLOCATED     */ 00003000
/*********************************************************************/ 00004000
/*                                                                   */ 00005000
/*     CLIST NAME: DSQABX1F                                          */ 00006000
/*                                                                   */ 00007000
/*     DESCRIPTIVE NAME: DXT/END USER DIALOGS LIBRARY FREE           */ 00008000
/*                       CLIST FOR THE QMF-DXT BRIDGE                */ 00009000
/*                                                                   */ 00010000
/*     COPYRIGHT: LICENSED MATERIALS - PROPERTY OF IBM               */ 00011000
/*                5675-DB2, 5697-F42 (C) COPYRIGHT IBM CORP.         */ 00012000
/*                1982, 2000. (PUBLISHED)                            */ 00013000
/*                ALL RIGHTS RESERVED.                               */ 00014000
/*                US GOVERNMENT USERS RESTRICTED RIGHTS -            */ 00015000
/*                USE, DUPLICATION OR DISCLOSURE RESTRICTED          */ 00016000
/*                BY GSA ADP SCHEDULE CONTRACT WITH IBM CORP.        */ 00017000
/*                                                                   */ 00018000
/*     STATUS: VERSION 7 RELEASE 1 LEVEL 0                           */ 00019000
/*                                                                   */ 00020000
/*     FUNCTION:                                                     */ 00021000
/*        THIS CLIST IS CALLED WHEN THE DXT PRODUCT HAS ENDED. THIS  */ 00022000
/*        CLIST IS USED TO FREE ANY ALLOCATIONS MADE BY THE CLIST    */ 00023000
/*        "DSQABX1L" AND REALLOCATE QMF LIBRARIES IF THE "LIBDEF"    */ 00024000
/*        FUNCTION WAS USED TO ALLOCATE DXT PRODUCT LIBRARIES.       */ 00025000
/*                                                                   */ 00026000
/*        IF YOU ALLOCATED ALL OF YOUR DXT LIBRARIES BEFORE YOU      */ 00027000
/*        STARTED QMF OR ISPF, YOU SHOULD NOT MODIFY THIS CLIST.     */ 00028000
/*        THE CLIST THAT IS DISTRIBUTED BY THE QMF PRODUCT EXITS     */ 00029000
/*        AND PERFORMS NO LIBRARY ALLOCATION.                        */ 00030000
/*                                                                   */ 00031000
/*        IF YOU DID NOT ALLOCATE YOUR QMF LIBRARIES BY USING THE    */ 00032000
/*        "LIBDEF" FUNCTION, BUT DID ALLOCATE DXT LIBRARIES USING    */ 00033000
/*        "DSQABX1L", YOU WILL NEED TO FREE THE DXT LIBRARY          */ 00034000
/*        ALLOCATIONS. SEE SECTION "A"                               */ 00035000
/*                                                                   */ 00036000
/*        IF YOU ALLOCATED QMF LIBRARIES USING "LIBDEF", YOU MUST    */ 00037000
/*        USE THIS CLIST TO RE-ALLOCATE THE QMF LIBRARIES BECAUSE    */ 00038000
/*        THEY WERE REPLACED BY DXT LIBRARY DEFINITIONS WHEN CLIST   */ 00039000
/*        "DSQABX1L" WAS EXECUTED. SEE SECTION "B"                   */ 00040000
/*                                                                   */ 00041000
/*     INPUT   QMFPRE - CONTAINS THE PREFIX NAME FOR QMF LIBRARIES.  */ 00042000
/*                      THIS PARAMETER IS NOT PASSED TO THIS CLIST   */ 00043000
/*                      BY QMF. IT MUST BE SET IN THE PROC STATEMENT.*/ 00044000
/*                                                                   */ 00045000
/*             LKEY   - CONTAINS THE LANGUAGE KEY THAT IS USED AS    */ 00046000
```

Figure 72. CLIST to deallocate DXT data sets (DSQABX1F) (Part 1 of 3)

```
/*                     A SUFFIX FOR QMF LIBRARY NAMES. THE LKEY OF  */ 00047000
/*                     "E" IS USED FOR ENGLISH.                     */ 00048000
/*                     THIS PARAMETER IS NOT PASSED TO THIS CLIST   */ 00049000
/*                     BY QMF. IT MUST BE SET IN THE PROC STATEMENT.*/ 00050000
/*                                                                  */ 00051000
/*            OBJSHR - ENTER VALUE "YES" OR "NO". IF YOU HAVE TAKEN */ 00052000
/*                     ADVANTAGE OF THE DXT DIALOGS OBJECT SHARING  */ 00053000
/*                     CAPABILITY SPECIFY THE VALUE "YES". IF YOU   */ 00054000
/*                     ARE NOT USING OBJECT SHARING SPECIFY THE     */ 00055000
/*                     VALUE "NO".                                  */ 00056000
/*                     THIS PARAMETER IS NOT PASSED TO THIS CLIST   */ 00057000
/*                     BY QMF. IT MUST BE SET IN THE PROC STATEMENT.*/ 00058000
/*                                                                  */ 00059000
/*     OUTPUT: NONE                                                 */ 00060000
/*                                                                  */ 00061000
/*     EXIT CONDITIONS: NONE                                        */ 00062000
/*                                                                  */ 00063000
/*       ABEND CODE: VALUE - NONE                                   */ 00064000
/*                                                                  */ 00065000
/*     EXTERNAL REFERENCES:                                         */ 00066000
/*       ROUTINES: NONE                                             */ 00067000
/*       DATA AREAS: NONE                                           */ 00068000
/*                                                                  */ 00069000
/*     CHANGE ACTIVITY:                                             */ 00070000
/*                                                                  */ 00071000
/*     CHANGE DATE:                                                 */ 00072000
/*                                                                  */ 00073000
/********************************************************************/ 00074000
/*-END-OF-SPECIFICATION-*********************************************/ 00075000
 ISPEXEC CONTROL ERRORS RETURN         /* RETURN ISPF ERRORS TO CLIST*/ 00076000
     IF &LASTCC ¬= 0 THEN EXIT CODE(1)                                00077000
 GOTO A                                                               00078000
/********************************************************************/ 00079000
/* SECTION A:  FREE DXT LIBRARIES                                   */ 00080000
/********************************************************************/ 00081000
A: ISPEXEC LIBDEF ISPLLIB                                             00082000
   ISPEXEC LIBDEF ISPPLIB                                             00083000
   ISPEXEC LIBDEF ISPMLIB                                             00084000
   ISPEXEC LIBDEF ISPSLIB                                             00085000
   ISPEXEC LIBDEF DVRDJEDI                                            00086000
   ISPEXEC LIBDEF DVRDJEDO                                            00087000
   ISPEXEC LIBDEF DVRDIMEX                                            00088000
   ISPEXEC LIBDEF DVREUADD                                            00089000
   IF &OBJSHR = YES THEN +                                            00090000
     ISPEXEC LIBDEF DVRSTABL                                          00091000
   EXIT CODE(0)                                                       00092000
```

Figure 72. CLIST to deallocate DXT data sets (DSQABX1F) (Part 2 of 3)

```
/*********************************************************************/ 00093000
/* SECTION B:  ALLOCATE QMF LIBRARIES USING ISPF LIBDEF              */ 00094000
/*********************************************************************/ 00095000
B: SET &LIBS = &STR('&QMFPRE..SDSQLOAD')                               00096000
   ISPEXEC LIBDEF ISPLLIB DATASET ID(&STR(&LIBS))                      00097000
     IF &LASTCC ¬= 0 THEN EXIT CODE(2)                                 00098000
   SET &LIBS = &STR('&QMFPRE..SDSQPLB&LKEY.')                          00099000
   ISPEXEC LIBDEF ISPPLIB DATASET ID(&STR(&LIBS))                      00100000
     IF &LASTCC ¬= 0 THEN EXIT CODE(3)                                 00101000
   SET &LIBS = &STR('&QMFPRE..SDSQMLB&LKEY.')                          00102000
   ISPEXEC LIBDEF ISPMLIB DATASET ID(&STR(&LIBS))                      00103000
     IF &LASTCC ¬= 0 THEN EXIT CODE(4)                                 00104000
   SET &LIBS = &STR('&QMFPRE..SDSQSLBE')                               00105000
   ISPEXEC LIBDEF ISPSLIB DATASET ID(&STR(&LIBS))                      00106000
     IF &LASTCC ¬= 0 THEN EXIT CODE(5)                                 00107000
   ISPEXEC LIBDEF DVRDJEDI                                             00108000
   ISPEXEC LIBDEF DVRDJEDO                                             00109000
   ISPEXEC LIBDEF DVRDIMEX                                             00110000
   ISPEXEC LIBDEF DVREUADD                                             00111000
   IF &OBJSHR = YES THEN +                                             00112000
     ISPEXEC LIBDEF DVRSTABL                                           00113000
   EXIT CODE(0)                                                        00114000
```

Figure 72. CLIST to deallocate DXT data sets (DSQABX1F) (Part 3 of 3)

Customizing the Document Editing Interface for Users

The document interface is an IBM-supplied macro for the ISPF/PDF and PS/TSO editors. Using this macro, a user operating outside QMF can begin a QMF session. In that session, the user can insert a QMF report into a document while the document is being edited. The report can be created before the editing session begins. More importantly, the user can create the report at the time the GETQMF macro is issued, in a QMF session that the macro started.

Before your users can use this macro, you must:

- Ensure that each user has the proper QMF resources.

  The resources are the QMF libraries. In the sample TSO logon procedure, these have names of the form:

  ```
  QMF710.DSQ...
  ```

  For a discussion of what resources are required, see “Chapter 12. Required Storage” on page 157.

  You can operate the ISPF/PDF and PS/TSO editors without these resources; however, the document interface cannot successfully begin a QMF session.

- Change certain document interface components.

  Some of these changes are required, while others are optional. This section discusses the changes, both required and optional. To use the document interface, you should also see *Using QMF*.

  If you're using an NLF: You also want to customize the NLF version of the document interface.

Changing the Application

Change the application by changing one or more of its components. The components that you can change are members of certain QMF libraries:

- The CLISTs and macros are members of QMF710.SDSQCLTE.
- The other components are members of QMF710.SDSQSAPE.

Renaming the Document Interface Macro

The macro component, DSQAED1P, is the macro that users call to use the document interface.

To use the macro:

- Rename a copy of the macro, preferably to GETQMF. This is the name used for the macro in this publication and in *Using QMF*.
- Place the renamed copy in QMF710.SDSQCLTE; that is, in the library containing the original.

If you're using an NLF: The main macro is the member DSQA*n*D1P of the library QMF710.DSQCLST*n*. Like the main English-language macro, it can be renamed with no effect on the other components. Choose a name other than GETQMF if your users' JCL supports both the English-language and NLF environments. You might consider changing it to GETQMF*n*, for example.

Placing the Q.DSQAED1S Procedure in the Database

The Q.DSQAED1S procedure is in the member DSQAED1S of the QMF710.SDSQSAPE library. The process of placing the procedure in the database depends on the version of DB2.

As the user Q, you can easily place Q.DSQAEDIS in the database by entering the following QMF command:

```
IMPORT PROC DSQAED1S FROM 'QMF710.SDSQSAPE(DSQAED1S)'  (SHARE=YES
```

If you are not the user Q, but have one of the following:

- SYSADM authority
- SYSCTRL authority
- Q as one of your secondary authorization IDs

you can still easily place DSQAED1S in the database by entering the following QMF commands from the query panel:

```
SET CURRENT SQLID = 'Q'
IMPORT PROC DSQAED1S FROM 'QMF710.SDSQSAPE(DSQAED1S)'  (SHARE=YES
```

A user other than Q who has neither SYSADM (or SYSCTRL) authority nor Q as one of the user's secondary authorization IDs, needs to use the procedure described in "Transferring Ownership to Q".

If you're using an NLF: Change the NLID in the member DSQAnD1S of the QMF710.SDSQSAPn library.

Transferring Ownership to Q

If you cannot use QMF as the user Q, you can still issue the commands in the previous section. However, you must first transfer ownership of the procedure from your authorization ID to Q. You can do this as follows:

1. Create the following query:

   ```
   UPDATE Q.&T
    SET OWNER = 'Q'
    WHERE NAME = &N AND OWNER = USER
   ```

2. Run the following commands:

   ```
   RUN  QUERY ( &T=OBJECT_DIRECTORY, &N='DSQAED1S'
   RUN  QUERY ( &T=OBJECT_DATA, &N='DSQAED1S'
   RUN  QUERY ( &T=OBJECT_REMARKS, &N='DSQAED1S'
   ```

   Each command updates one of the Q.OBJECT tables and requires the UPDATE privilege on these tables.

If the queries fail to run, an object named Q.DSQAED1S might already be in the database. If so, rename that object or delete it before you attempt to transfer ownership again. One of the following two queries can rename or delete the object for you. You must run the three RUN QUERY commands on whichever query you choose.

- To rename the object, use the following query, replacing *newname* with the new name of the object:

  ```
  UPDATE Q.&T
   SET NAME = 'newname'
   WHERE NAME = &N AND OWNER = 'Q'
  ```

- To delete the object, use the following query:

  ```
  DELETE FROM Q.&T
    WHERE NAME = &N AND OWNER = 'Q'
  ```

Changing the Data Components

There are five data components, all in the library QMF710.SDSQSAPE. Unlike the CLISTs and macros, these components contain neither logic nor executable commands. Instead, they contain information that can appear in messages or in the users' reports.

Because the document interface assumes that these components are in a single library, you can modify them in either of the following ways:

- You can retain the changed components in QMF710.SDSQSAPE.

  If you do, change the names of the original components, and give the changed components the original names.
- You can place the changed components in a new library.

  If you do, you must copy all the other data components from the old library into the new library.

If you use the second method, you must make the change to the macro DSQAED1P discussed in "Changing DSQAnD1P" on page 280.

The Message Component

One of the five data components is named DSQAED0L. This component contains:

- The messages that can appear on a user's screen while the user is operating the document interface
- Keywords for certain QMF commands

Do *not* change this component.

If you're using an NLF: Change the NLID in the member DSQA*n*D0L of the QMF710.DSQSAMP*n* library.

The DCF Components

The DCF (Document Composition Facility) is a licensed IBM text processing system that supports the use of computers in preparing print documentation.

If your installation uses DCF, you might want to change the remaining four DCF components. For more on DCF, see *Document Composition Facility: SCRIPT/VS Text Programmer's Guide*

A user can tell the document interface that the current document is formatted by DCF. In response, the document interface adds DCF control statements to the user's inserted report. Wherever these statements appear, they consist of all the records in one or another of the DCF components. You can change any or all of the records in a component. The components, and what they supply, are as follows:

DSQABD01: Supplies statements inserted just before the report. In the IBM-supplied component, these are:

```
.* QMF Document Interface heading control:
.SA
.RH SUP
.RF SUP
.HS 0
.FS 0
.TM 0.5I
.BM 0
.DC CONT OFF
.FO OFF
```

DSQABD02: Supplies statements inserted just after each page footing. In the IBM-supplied component, the single furnished statement is:

```
.* QMF Document Interface page footing control:
```

DSQABD03: Supplies statements inserted just before each page heading. In the IBM-supplied component, these are:

```
.PA NOSTART
.* QMF Document Interface page heading control:
```

DSQABD04: Supplies statements inserted just after the end of the report. In the IBM-supplied component, these are:

```
.* QMF Document Interface footing control:
.RE
.* QMF REPORT END
```

Changing the CLISTs and Macros

As mentioned earlier, these components are all in the library QMF710.SDSQCLTE. If you change the CLISTs or macros, change a copy, not the original, and place it in another library. A DD statement for the new library must appear among the statements for SYSPROC in your users' JCL. If it isn't there already, insert one before the statement for QMF710.SDSQCLTE. Otherwise, the original components are used, instead of the ones you modified. For example, if you place the modified components in the library XYZ.NEWCLIST, then the DD statements for SYSPROC might look like this:

```
//SYSPROC  DD DSN=SYSUT2.CLIST,DISP=SHR
//         DD DSN=XYZ.NEWCLIST,DISP=SHR
//         DD DSN=QMF710.SDSQCLTE,DISP=SHR
```

Changing DSQAnD1P

This is the macro that you renamed GETQMF. You can also do the following to the macro:

- Change the following statements:

  ```
  SET &SAMPLIB = QMF710.DSQSAMP&LANGCHAR
  SET &BASELIB = QMF710.SDSQSAPE
  ```

&SAMPLIB
Identifies the library containing the data components of the document interface

&BASELIB
Identifies the QMF sample library

When &LANGCHAR has the value E, both variables name the same library—QMF710.SDSQSAPE. If the libraries have different names, change the names assigned: &SAMPLIB and &BASELIB.

- Change the statement:

```
ALLOC FI(DSQPRINT) SYSOUT RECFM(F B A) LRECL(133) BLKSIZE(1330)
```

A user can call the document interface in an interactive QMF session. When this is done, the document interface can reallocate DSQPRINT. This statement restores DSQPRINT to the default. If this is not what you want, replace this statement with one that restores DSQPRINT to the value you want.

Changing DSQABD1Q

This CLIST allocates data sets for the session started with the document interface. Make whatever modifications you think necessary to the CLIST code. For example, you might need to add allocations for data sets peculiar to your installation.

Some of these allocations include GDDM data sets. The document interface does not itself use these data sets, but you might find this allocation necessary.

The variable &LANGCHAR has the value E. This value indicates a library containing English-language components, as opposed to components for an Uppercase Feature application, for example.

To support LIBDEF allocations, activate LIBDEF service and tailor filenames as necessary:

```
/*****************************************************************@82*/
 /* Remove the Following "GOTO NOLIBDEF" statement to allocate     @82*/
 /* ISPF libraries using the ISPF LIBDEF service.                  @82*/
 /*****************************************************************@82*/
   GOTO NOLIBDEF

 /*****************************************************************@82*/
 /* ALLOCATE QMF ISPF LIBRARIES USING LIBDEF                       @82*/
 /*****************************************************************@82*/
 SET PNAME = 'QMF710.DSQPLIB&LANGCHAR'     /* ISPF Panel Library      */
 SET MNAME = 'QMF710.DSQMLIB&LANGCHAR'     /* ISPF Message Library    */
```

```
SET SNAME = 'QMF710.DSQSLIB&LANGCHAR'     /* ISPF Skeleton Library   */
SET LNAME = 'QMF710.SDSQLOAD'              /* QMF Modules             */
ISPEXEC LIBDEF ISPPLIB DATASET ID(&PNAME)
```

Changing DSQABD1P to Support LIBDEF

If you allocated QMF libraries using the LIBDEF function, modify DSQABD1P to free the use of LIBDEF allocated libraries. Uncomment the following statements in DSQABD1P:

```
/*************************************************************/
/* FREE ISPF LIBDEFs                                    @82*/
/* You might or might not need to free libdefs here.        */
/* If you do, then remove comments from LIBDEF statements.  */
/*************************************************************/
/* ISPEXEC LIBDEF ISPPLIB DATASET ID()                      */
/* ISPEXEC LIBDEF ISPMLIB DATASET ID()                      */
/* ISPEXEC LIBDEF ISPSLIB DATASET ID()                      */
/* ISPEXEC LIBDEF ISPLLIB DATASET ID()                      */
/* FREE FI(DSQLLIB)                                         */
```

Changing DSQABD1C

You can modify this component in the following ways:

- Change the statement:

  ```
  ALLOC FI(DSQPRINT) UNIT(SYSDA) SPACE(5,2) TRACKS +
   RECFM(F B A) LRECL(&PRINTREC) BLKSIZE(&EVAL(&PRINTREC*10))
  ```

  This statement allocates a data set for the user's report. The user then fills the data set through the QMF PRINT command. You might need to change the statement's SPACE operand if your users create extremely large reports.

- Change the statement:

  ```
  ISPEXEC SELECT PGM(DSQQMF&LANGCHAR)
                 PARM(I=&PROCNAME)
                 NEWAPPL(DSQ&LANGCHAR)
  ```

  With the statement in its present form, the subsystem for DB2 must be named DSN, and the application plan for QMF must be named QMF710. If not, you must add information to the PARM operand of the statement. For example, the subsystem and application plan are named ABC and QMFXXX. Then the modified statement might look like this:

  ```
  ISPEXEC SELECT PGM(DSQQMF&LANGCHAR)
                 PARM(I=&PROCNAME,S=ABC,P=QMFXXX)
                 NEWAPPL(DSQ&LANGCHAR)
  ```

  The modified statement overrides default values for two of QMF's program parameters.

  For a discussion of program parameters, see "Chapter 14. Customizing Your Start Procedure" on page 177.

Customizing the QMF EDIT Command

With the EDIT command, you can modify QMF queries and procedures with an editor. One of these editors can be ISPF/PDF (provided that QMF is started under ISPF).

The following procedure assumes that you use an editor that can be called by a CLIST operating under ISPF. The EDIT TABLE command calls the Table Editor, and does not require a text editor.

To make an editor available for the EDIT command:

1. Write a CLIST to call the editor and pass the name of the data set to be edited as a positional parameter. For example, with the following command, QMF calls the CLIST, XYZEDIT, to edit the data set, USERA.XYZDATA.TEXT:

   ```
   XYZEDIT 'USERA.XYZDATA.TEXT'
   ```

2. Place the CLIST in a command library allocated to everyone with access to the editor. Place it in a library that is part of the concatenation for the data set SYSPROC. One possible choice is the QMF library, QMF710.SDSQCLTE, which must be available to all QMF users.
3. For individual users, allocate and catalog a data set for objects to be edited. This data set is refilled every time the user calls the editor with the EDIT command. Give the data set the following characteristics:
   - A physical sequential organization (DSORG=PS)
   - Fixed-length, 79-byte records (LRECL=79)
   - A blocking factor of 51 (BLKSIZE=4029)
4. In the JCL for each user, allocate the data set cataloged for that user in step 3. Allocate it with the ddname DSQEDIT. Write DISP=OLD for the disposition of the data set.
5. Advise users how to specify the EDIT command. The command has the following format:

   ```
   EDIT yyyy (EDITOR=xxxx)
   ```

   where *yyyy* is either PROC or QUERY, and *xxxx* is the name of the CLIST created to call the editor. For more on the EDIT command, see *QMF Reference*.
6. You can edit your QMF SQL query or QMF procedure in a different ISPF application ID by using an EXEC or CLIST as the editor name on the QMF EDIT command.

   If you specify the program development facility (PDF) editor to edit an SQL query or QMF procedure, QMF executes the PDF editor in the QMF application ID DSQE, or DSQ*n* where *n* is the NLF character. In addition, QMF sets the function keys and location of the command line to fit the QMF product.

If you need to use a different set of function keys or have existing PDF macros or specialized PDF editor screens, you can use them by executing the PDF editor in an application ID other than DSQ*. To do this, execute two small REXX programs or CLISTs. The first program simply routes execution to the second program, which then invokes the editor running in the desired ISPF application ID with the desired function key or other special setup requirements such as an edit invocation macro or a unique edit panel.

The REXX program example in Figure 73 shows how to edit the SQL query or QMF procedure using the edit transfer data set, as defined by DDNAME(DSQEDIT), when QMF is started. The PDF application ID ISP is used in this example.

```
Edit Program 1 (MYEDIT)

   /* REXX   QMF Edit program 1                */
   /*        Transfer to ISP application ID    */
   Address ISPEXEC "SELECT CMD(MYEDIT2) NEWAPPL(ISP)"
   Exit 0


Edit Program 2 (MYEDIT2)

   /* REXX   QMF Edit program 2                */
   /*        Invoke PDF Editor using DDNAME    */
   Address ISPEXEC "LMINIT DATAID(EDT) DDNAME(DSQEDIT)"
   Address ISPEXEC "EDIT   DATAID("EDT")"
   Address ISPEXEC "LMFREE DATAID("EDT")"
   Exit 0
```

Figure 73. Editing using the edit transfer data set

The REXX programs must be allocated to a valid concatenation of either SYSPROC or SYSEXEC before execution. To execute from QMF, enter the following QMF EDIT command on the QMF command line:

```
EDIT QUERY (E=MYEDIT)
```

Important: If you edit a procedure or query, and the resulting object is too large to fit in QMF's work area, QMF truncates the object and displays an error message. QMF saves the entire object, however, in a file associated with the ddname QMFEDIT. To bring the object into QMF, the user needs to issue a RESET DATA command. This information, including the file name of the saved object, is provided in the message help for the error message associated with this condition.

Enabling English Support in an NLF Environment

Every NLF has a complete set of translated verbs, keywords, messages, and panels for QMF. The global variable DSQEC_NLFCMD_LANG allows you to change the language in which the user enters commands.

Set DSQEC_NLFCMD_LANG to 1 to allow users to enter commands only in English.

The default value, 0, allows users to enter commands and keywords only in the national language of the current session, except for the following commands:

SET
GET
INTERACT
MESSAGE
START

QMF allows you to enter these commands in either English or the NLF, regardless of how you set DSQEC_NLFCMD_LANG.

Use the DSQEC_FORM_LANG variable to enable users working in an NLF environment to store their form objects in the English language. The LANGUAGE option on the SAVE, EXPORT, and IMPORT commands allows users to specify the national language of the saved form. The values for this option are ENGLISH and SESSION, and are controlled by the global variable DSQEC_FORM_LANG.

Set DSQEC_FORM_LANG to 0 to use the language of the current session as the national language of the saved form.

The default value is 1, which specifies English as the language of the saved form.

If the user specifies the LANGUAGE keyword on the IMPORT or EXPORT command, that value overrides the current value of the DSQEC_FORM_LANG variable.

To change the national language displayed during a QMF session, the QMF user must end the current QMF session and begin another. You cannot change the language from within the QMF session.

Using Global Variables to Define the Currency Symbol

If you require a currency symbol that is not represented on the keyboard, you can specify the currency symbol by using the HEX value in a Procedure with Logic. For example, the following PROC will set the currency symbol to HEX '9F':

```
/*   */
"SET GLOBAL (DSQDC_CURRENCY =" '9F'X
```

If trailing blanks are needed for the currency symbol, you can put the currency symbol in single quotes as follows:

```
SET GLOBAL (DSQDC_CURRENCY = 'FR '
```

You can use the command in either the command line or in a linear PROC.

Chapter 17. Enabling Users to Print Objects

QMF end users frequently need to print data they retrieve from the database. This data might be in the format of a report, a chart, a database table, or some other QMF or database object.

How you set up printing for your end users depends on what type of printer you have and which QMF objects you need to print. This chapter helps you decide whether it's most efficient for you to handle printing using QMF services or Graphical Data Display Manager (GDDM) services. It also provides instructions on how to print objects using either method.

If you need to print double-byte character set (DBCS) data, you can use the DSQSDBCS program parameter when you start QMF to allow users to print DBCS data from non-DBCS terminals. See "DSQSDBCS (Setting Printing for Double-byte Character Set Data)" on page 204 for more information.

Quick Start

Use Table 43 to guide you in printing QMF objects to a print or display device. If you need more information on any of the steps, see the page listed at the right of the table.

If you receive errors during printing, see "Troubleshooting Common Problems" on page 470 to help you solve the problem.

Table 43. Printing QMF objects

To do this task:	See:
Use the QMF PRINT command or a command synonym to print a QMF object. How QMF prints the object depends on what type of object you're trying to print.	Pages 288, 301, and 301
Choose either QMF services or GDDM services to handle printing, or combine the two to suit your needs. GDDM can print to any device that supports the display of graphics. In TSO, and native OS/390 batch, QMF prints using DSQPRINT. In CICS, QMF prints to temporary storage queues or transient data queues. QMF allows printing only to devices that support the American National Standards Institute (ANSI) code of carriage control characters.	Page 289
To print using GDDM services: Define a GDDM nickname for your printer and update the GDDM defaults module ADMADFC (for CICS) or ADMADFT (for TSO, and native OS/390 batch) with the nickname. For TSO, and native OS/390 batch, you can also modify ddname ADMDEFS. Update CICS resource definition tables so CICS can link the nickname with a physical device.	Page 290

Table 43. Printing QMF objects (continued)

To do this task:	See:
To print using QMF services: In TSO, and native OS/390 batch, allocate DSQPRINT using a DD statement that points to the data set or output class QMF uses for printing.	Page 298
To print using QMF services: In CICS, define a transient data queue or use a temporary storage queue to receive output.	Page 299
Update the LENGTH and WIDTH values in the user's profile to specify a page size. To activate GDDM services for printing, provide a valid nickname for the PRINTER field in Q.PROFILES.	Page 302

Printing Objects

The rules for printing QMF and database objects vary, depending on the type of object. Table 44 summarizes the requirements for each object.

Table 44. Summary of print requirements for QMF and database objects

Object type	Nickname required	GDDM gets control	Where output is routed
Chart	Yes	GDDM ICU always gets control when the PRINT command is issued.	Output is controlled by GDDM. For more information, see *GDDM System Customization and Administration* for GDDM 3.1 or *GDDM Installation and System Management for OS/390* for GDDM 2.3.
Form	Yes	GDDM always gets control when the PRINT command is issued.	Output is controlled by GDDM. For more information, see *GDDM System Customization and Administration* for GDDM 3.1 or *GDDM Installation and System Management for OS/390* for GDDM 2.3.
QBE query	No	Only if the nickname is supplied on the PRINT command or in profile.	Output goes to the device associated with the GDDM nickname or the ddname DSQPRINT.
Procedure	No	Only if the nickname is supplied on the PRINT command or in profile.	Output goes to the device associated with the GDDM nickname or the ddname DSQPRINT.
Profile	No	Only if the nickname is supplied on the PRINT command or in profile.	Output goes to the device associated with the GDDM nickname or the ddname DSQPRINT.

Table 44. Summary of print requirements for QMF and database objects (continued)

Object type	Nickname required	GDDM gets control	Where output is routed
Prompted query	Yes	GDDM always gets control when the PRINT command is issued.	Output is controlled by GDDM. For more information, see *GDDM System Customization and Administration* for GDDM 3.1 or *GDDM Installation and System Management for OS/390* for GDDM 2.3.
Report	No	Only if the nickname is supplied on PRINT command or in profile.	Output goes to the device associated with the GDDM nickname or the ddname DSQPRINT.
SQL query	No	Only if the nickname is supplied on the PRINT command or in profile.	Output goes to the device associated with the GDDM nickname or the ddname DSQPRINT.
Table	No	Only if the nickname is supplied on the PRINT command or in profile.	Output goes to the device associated with the GDDM nickname or the ddname DSQPRINT.

Deciding Whether to Use QMF or GDDM Services for Printing

Whether you print using GDDM services or QMF services depends on what type of objects you need to print and what types of printers and other resources are available to you. Use this section to help you decide which method suits your needs.

- If you need to print charts, forms, or prompted queries, use GDDM.

  QMF uses GDDM services to display these objects; GDDM must be used to print these objects as well. If you don't use GDDM services, you can print only reports, tables, QBE and SQL queries, procedures, and the QMF profile.

- If your site is set up to route output to named printers, use GDDM services for printing.

  GDDM allows you to link a name with a physical device. If you do not use GDDM and use exclusively QMF services, you need to print objects by specifying the type and name of the storage queue through which those objects are routed to the printer.

- In CICS, if you need to handle routing automatically (rather than writing a program to route output), use GDDM or define transient data queues for use with QMF.

  GDDM does the routing for you by using the transient data queue definitions you define to CICS. QMF takes care of the routing in the same way if you're using transient data queues to hold your output.

If you print to temporary storage, you need to write a program to send the temporary storage queue to the printer or display the printed output online with the CICS-supplied transaction CEBR.

- In CICS, if you need to print more than 32 767 rows of output, use GDDM or define transient data queues for use with QMF.

  Temporary storage queues cannot handle more than 32 767 rows of data.

Both QMF and GDDM handle printer input asynchronously, which means that QMF can return messages indicating that the object is printed before it is actually printed.

Using GDDM Services to Handle Printing

Important: The explanations in this section apply only if you're using the GDDM default values shipped with the GDDM product. For more information on changing these values, see one of the following:

- *GDDM Installation and System Management for OS/390* (for GDDM 2.3)
- *GDDM System Customization and Administration* (for GDDM 3.1)

To use GDDM services for printing QMF objects, you need to:

1. Choose a GDDM nickname for the print device, as explained in "Choosing a GDDM Nickname for Your Printer".

   Nicknames enable you to predefine complex print or display devices to simplify the work of your end users. Nicknames define device characteristics that indicate to GDDM how to format and distribute the report. Nicknames can define both local and remote devices.
2. Update the GDDM defaults module, ADMADFC (for CICS) or ADMADFT (for TSO, and native OS/390 batch), with the specifications of your nickname.
3. For TSO, and native OS/390 batch, you can allocate the ddname ADMDEFS. Updating the GDDM defaults module is explained in "Updating the GDDM Defaults Module with the Nickname" on page 296. Allocating the ddname ADMDEFS is explained in "Allocating the Nickname File for TSO, and native OS/390 batch" on page 296.
4. Update CICS resource definitions with the values in the nickname specification, so that CICS can link the nickname with the physical device it manages. This is explained in "Using Nicknames in CICS" on page 296.
5. Update the PRINTER field of the user's row in the Q.PROFILES table, as explained in "Updating User Profiles to Enable GDDM Printing" on page 302.

Choosing a GDDM Nickname for Your Printer

In TSO, and native OS/390 batch, when a user enters a printer name on the PRINTER keyword of the QMF PRINT command, GDDM first searches the

ADMDEFS data set and then the defaults module, ADMADTC, for a matching nickname that defines how and where to direct the output.

In CICS, GDDM searches only the defaults module, ADMADTC. GDDM uses nicknames to recognize all the devices with which it can communicate (including terminals).

Choosing the Right Type of GDDM Device

The printer nickname you use depends on the type of device:

- **Family 1 devices** specify auxiliary devices attached to a workstation using GDDM-PCLK or GDDM-OS/2® Link. A Family 1 device can also include display devices, such as 3270 data-stream terminals.
- **Family 2 devices** include devices such as IBM 3270 terminals and queued printers.
- **Family 3 devices** are system printers that support the ANSI code of carriage control characters.
- **Family 4 devices** are advanced function printers for which you need to use the ADMOPUT and ADMOPUJ utilities (in TSO, and native OS/390 batch only) to print output. These utilities are provided by GDDM.

This chapter explains how to define nicknames for Family 1, 2, and 3 devices. For more information on how to set up a nickname for a Family 4 printer and use the ADMOPUT and ADMOPUJ utilities, see *GDDM System Customization and Administration* for GDDM 3.1 or *GDDM Installation and System Management for OS/390* for GDDM 2.3. These publications also provide more information on each type of GDDM device.

Creating the Nickname Specification

To create a nickname in TSO, and native OS/390 batch, you can add the nickname to your ddname ADMDEFS data set. GDDM looks at this data set first. If the nickname is not found, GDDM looks in the external default module, ADMADFT, in which you define a GDDM ADMMNICK specification.

To create a nickname in CICS, first define a GDDM ADMMNICK specification in the GDDM external default module ADMADFC. This specification indicates the device characteristics to GDDM, such as the number of lines per page the printer can handle, and how the printer is managed by CICS.

Use the format shown in Figure 74 on page 292 for your ADMMNICK specification.

```
ADMMNICK NAME=nickname,TOFAM=family_type,DEVTOK=device_token(,TONAME=name)
```

Figure 74. Using the ADMMNICK specification to define a nickname

TONAME is used only in CICS.

- Use NAME to indicate a 1-character to 8-character printer nickname to use with the QMF PRINT command. For example, if MYPRTR is the nickname, users can enter the command: `PRINT REPORT (PRINTER=MYPRTR`. NAME can be a single name, a list of names separated by commas, or a name with a leading or trailing **?** used as a wildcard to send output to multiple printers that have similar names.
- Use TOFAM to indicate the type of device you're using. GDDM recognizes four families of devices, and handles each differently.
- Use DEVTOK to indicate a valid GDDM device token, which uniquely identifies a device and its print configuration (for example, a 3820 printer that prints 60 rows by 85 columns, 6 lines per inch). For a list of valid device tokens, see:
  GDDM System Customization and Administration for GDDM 3.1
  GDDM Installation and System Management for OS/390 for GDDM 2.3
- In CICS, the TONAME field points to entries in the TCT or DCT so that CICS is able to properly manage communication between GDDM and the printer. Use TONAME to point to the name of a 1-character to 4-character printer definition name with a value that depends on the type of device:
  - If the nickname defines a Family 1 or 2 printer, TONAME points to a matching entry in the CICS terminal control table (TCT), which defines the printer to CICS. In the matching entry, the TRMIDNT field has the same value as TONAME.

    If you define the printer to CICS using CICS resource definition online (RDO) to update the CICS system definition (CSD) file, the TERMINAL attribute has the same value as TONAME.
  - If the nickname defines a Family 3 printer, TONAME points to a matching entry in the CICS destination control table (DCT), which defines the printer to CICS. In the matching entry, the DESTID field has the same value as TONAME.

A unique label can be added to the syntax. For example, GDDMPRT1 is a possible label for the nickname definition:

```
GDDMPRT1 ADMMNICK NAME=MYPRINT,TOFAM=3,DEVTOK=ADMKSYSP
```

Example Nickname for a Family 1 or 2 GDDM Printer

To define the nickname GRAPHIC for a Family 1 or 2 GDDM printer, you might use an ADMMNICK specification similar to the one in Figure 75 on page 293. This specification is for a Family 2 GDDM printer (use `TOFAM=1` for a

Family 1 GDDM printer). It uses the device token R87S, an example of a token for a remotely attached 3287 printer.

```
ADMMNICK NAME=GRAPHIC,TOFAM=2,DEVTOK=R87S,TONAME=GRAP
```

Figure 75. Using the ADMMNICK specification to define a nickname for a Family 2 printer

After you create your nickname in TSO, and native OS/390 batch, a temporary data set is created as a result of running the QMF PRINT command and specifying a nickname that already exists. This data set is `userid.ADMPRINT.REQUEST.#nnnnn`, where `nnnnn` is a sequence number. You can then print the data set using the ADMOPUT utility. You can also use the ADMOPUJ utility to write your print job to the JES spool.

If you use either of the GDDM print utilities (ADMOPUT or ADMOPUJ) to print QMF objects using GDDM nicknames, the QMF-supplied GDDM map groups must be made available to the GDDM print utility. The ADMGGMAP DD statement contains the name of the data set (QMF710.DSQMAPE) that holds the map groups:

```
//ADMGGMAP DD DSN=QMF710.DSQMAPE,DISP=SHR
```

Without this statement, any attempt to print a form on a Family 2 printer ends in an error. For more information on the GDDM print utilities, see *GDDM Installation and System Management* if you're using GDDM Version 2 Release 3 or *GDDM System Customization and Administration* if you're using GDDM Version 3 Release 1.

Important: In CICS, after you create the ADMMNICK specification, link the name with a physical device by updating the TCT, as shown in the example in Figure 78 on page 297. Make sure TONAME in the ADMMNICK specification and TRMIDNT in the TCT have matching values.

You can also use CICS RDO facilities to update the CSD online. If you define the printer this way, make sure the TERMINAL attribute in the CSD and TONAME in the ADMMNICK specification have matching values.

Example Nickname for a Family 3 GDDM Printer

To define the nickname 370PRINT for a Family 3 GDDM printer, you might use an ADMMNICK specification similar to the one in Figure 76.

```
ADMMNICK NAME=370PRINT,TOFAM=3,DEVTOK=R87S,TONAME=370P
```

Figure 76. Using the ADMMNICK specification to define a nickname for a Family 3 printer

After you create your nickname in TSO, and native OS/390 batch, a ddname ADMLIST is created. You can then send the formatted file to the printer you have chosen.

After you create the ADMMNICK specification in CICS, link the name with a physical device by updating the DCT, as shown in the example in Figure 80 on page 298. Make sure TONAME in the ADMMNICK specification and DESTID in the DCT have matching values.

Example Nickname for a Family 4 GDDM Printer (TSO, and native OS/390 batch Only)

To define the nickname 3900PRNT for a Family 4 GDDM printer, you might use an ADMMNICK specification similar to the one in Figure 77.

```
ADMMNICK NAME=3900PRNT,TOFAM=4,DEVTOK=R87S
```

Figure 77. Using the ADMMNICK specification to define a nickname for a Family 4 printer

After you create your nickname, the ddname ADMIMAGE is created. You can spool the file to PSF/MVS automatically through JES. For more information about Family 4 printing, see *GDDM System Customization and Administration*

Defining Multiple Nicknames with One Definition

You can use a single nickname to define multiple printer addresses by including the wildcard **?** in your nickname definition, like this:

```
ADMMNICK TOFAM=3,NAME=MYPRINT?,PROCOPT=((PRINTCTL,0))
```

The nickname MYPRINT? allows you to route print output to printers named MYPRINT1, MYPRINT2, MYPRINTA, and so on. For example, when you enter:

```
PRINT REPORT (PRINTER=MYPRINT2
```

GDDM uses the nickname definition for the MYPRINT? nickname to create a data set and direct the output from the PRINT command to the data set with ddname MYPRINT2.

Examples of Nickname Definitions

This section shows examples of nicknames you might use for Family 1, 2, or 3 devices. For examples on defining nicknames for Family 4 devices, see the following manuals:

- *GDDM System Customization and Administration* for GDDM 3.1
- *GDDM Installation and System Management for OS/390* for GDDM 2.3
- **3800, 3812, or 3820 printer, 6 lines per inch:** Use the following definition to define the nickname GDDMPRT1 for a Family 3 printer:

  ```
  GDDMPRT1 ADMMNICK TOFAM=3,DEVTOK=S3800N6,NAME=MYPRINT1
  ```

- **3800, 3812, or 3820 printer, 8 lines per inch:** Use the following definition to define the nickname GDDMPRT2 for a Family 3 printer:

  ```
  GDDMPRT2 ADMMNICK TOFAM=3,DEVTOK=S3800N8,NAME=MYPRINT2
  ```

- **Non-3800 system printer, 132 columns, 8 lines per inch:** Use the following definition to define the nickname GDDMPRT3 for a Family 3 printer:

  ```
  GDDMPRT3 ADMMNICK TOFAM=3,DEVTOK=S1403W8,NAME=MYPRINT3
  ```

- **A remotely attached 3287 (suitable for printing charts):** Use the following definition to define the nickname GDDMPRT4 for a Family 2 printer:

  ```
  GDDMPRT4 ADMMNICK TOFAM=2,DEVTOK=R87,NAME=MYPRINT4
  ```

- **Any destination without print control options:** Use the following definition to define the nickname GDDMPRT5 for a Family 3 printer:

  ```
  GDDMPRT5 ADMMNICK TOFAM=3,PROCOPT=((PRINTCLTL,)),NAME=MYPRINT5
  ```

  The PROCOPT parameter specifies processing options using a print control (PRINTCTL) keyword, which allows you to specify a number of print control options. For example, you can use PRINTCTL to specify a page heading to be printed, the number of copies to print, and the width of margins. The zero in this example suppresses page headings.

  Attention: If the print data set has RECFM=F, GDDM printing changes the DCB of the data set from RECFM=F to RECFM=V.

  For a list of print control options and how to use them, see *GDDM System Customization and Administration*

- **A PC printer using GDDM-PCLK (for DOS users):** Use the following definition to define the nickname PCPRINT for a Family 1 printer:

  ```
  GDDMPRT6 ADMMNICK TOFAM=1,FAM=0,NAME=PCPRINT,TONAME=*,ADMPCPRT
  ```

  where * indicates the user's current device or the default value.

  To print to a workstation printer connected to DOS, GDDM-PCLK must be installed on your workstation.

- **A PC printer using GDDM-OS/2 Link (for OS/2 users):** Use the following definition to define the nickname GDDMOS2P for a Family 1 printer:

  ```
  GDDMPRT7 ADMMNICK TOFAM=1,FAM=0,NAME=PMPRINT,TONAME=*,ADMPMOP
  ```

  where * indicates the user's current device or the default value.

  To print to a workstation printer connected to OS/2, GDDM-OS/2 Link must be installed on your workstation.

Updating the GDDM Defaults Module with the Nickname

In CICS, the ADMMNICK nickname specifications reside in the GDDM external defaults module ADMADFC, which is supplied with the GDDM product. In TSO, and native OS/390 batch, the external defaults module is ADMADFT.

The default modules also contain default values for the GDDM product. The modules are stored as members of the SADMSAM data set.

To update the modules with your nickname specification:

1. Edit the source file to add the nickname.
2. Enter your ADMMNICK specification after the ADMMDFT statements in the module.
3. Reassemble and link-edit the changed default module.

For more information on the defaults modules, see:

- *GDDM System Customization and Administration* for GDDM 3.1
- *GDDM Installation and System Management for OS/390* for GDDM 2.3

Testing the Nickname Definitions in External Default Files (TSO, and native OS/390 batch Only)

Test your nickname definitions by placing them in an *external default file* and printing with them until you are satisfied they are working correctly. Then you can assemble them into *external default modules.*

GDDM uses external default modules more efficiently than a data set to find a given nickname. You should also use external default modules if you plan to use CICS and TSO, or native OS/390 batch.

The decision to use external default files or modules affects a user's JCL, because an external default file requires a DD statement, while an external default module must be a member of a STEPLIB library. Your GDDM administrator can advise you on the JCL changes.

Allocating the Nickname File for TSO, and native OS/390 batch

For TSO, and native OS/390 batch, the ddname of the nickname data set is ADMDEFS. You should allocate it when you start your QMF session. To add the ddname ADMDEFS to the user's logon procedure:

```
//ADMDEFS DD DSN=LOCAL.GDDM.NICKNAME,DISP=SHR
```

Using Nicknames in CICS

In CICS, the nicknames are incorporated into user default specifications and assembled into the external defaults module ADMADFC.

After you update the ADMADFC module, you need to update the CICS resource definitions so that CICS can link the nickname with a physical device it manages.

Linking a Family 2 Nickname with a Physical Device

QMF supports the use of GDDM nicknames for reports and requires nicknames for printing QMF charts, forms, and prompted queries. If you have printers described to CICS using VTAM and TCT entries, you must describe the printer as queued (GDDM Family 2 device). When using a Family 2 device, your ADMMNICK specification for TONAME points to a CICS TCT entry, as opposed to a DCT entry for Family 3 devices.

For example, for this nickname specification:

```
ADMMNICK NAME=GRAPHIC,TOFAM=2,DEVTOK=R87S,TONAME=GRAP
```

you can update the CICS TCT using a macro similar to the example shown in Figure 78.

```
GRAP     DFHTCT TYPE=TERMINAL,
                ACCMETH=VTAM,
                TRMIDNT=GRAP,
                TRMTYPE=SCSPRT,
                    . . .
                    . . .
                    . . .
```

Figure 78. Defining to CICS a nickname for a Family 2 GDDM printer

Linking a Family 3 Nickname with a Physical Device

To use Family 3 devices, set up a GDDM nickname table as shown in Figure 79.

```
GDDMPRT  ADMMNICK TOFAM=3,   FAMILY (SYSTEM PRINTER)           X
            NAME=SYSPRT,     PRINTER NAME (NICKNAME)           X
            DEVTOK=S1403W6,  DEVICE TOKEN (1403)               X
            TONAME=SYSP      TONAME MUST MATCH CICS DCT ENTRY
```

Figure 79. Defining to CICS a nickname for a Family 3 GDDM printer

GDDM Installation and System Management for OS/390 for GDDM 2.3 and *GDDM System Customization and Administration* for GDDM 3.1 describe the process of incorporating the nicknames into the user default specifications and assembling the user default specifications into external defaults module ADMADFC.

The TONAME parameter must have a matching entry in the CICS DCT as shown in Figure 80.

```
* THE GDDM NICKNAME IS SYSPRT AND THE
* LONGEST RECORD THAT CAN BE PRINTED
* IS 256.

     DFHDCT TYPE=SDSCI,DSCNAME=ADMSYSP,                          X
           RECFORM=VARBLK,                                       X
           RECSIZE=260,BLKSIZE=6050,TYPEFLE=OUTPUT
                .
                .
*  ENTRY FOR GDDM NICKNAME SYSPRT
SYSP     DFHDCT TYPE=EXTRA,DESTID=SYSP,DSCNAME=ADMSYSP,RSL=1
```

Figure 80. Adding a TONAME entry to the CICS DCT

You also need to add the ddname ADMSYSP to the CICS start-up JCL, as follows:

```
//ADMSYSP  DD SYSOUT=A
```

How QMF Interfaces with Your GDDM Nickname

QMF interfaces with GDDM nicknames through the standard interface provided by GDDM, which issues a call that allows QMF to open a GDDM print file.

The following defaults are provided by QMF on the DSOPEN call when the PRINT command begins:

- The device type is set to Family 2
- The device token is set to *****
- No processing options are in place (PROCOPT is set to zero)
- The only entry in the name list is the nickname

The print operation is carried out one page at a time using the ASCPUT and FSFRCE GDDM services. When printing is complete, QMF closes the print operation with a DSDROP statement.

Using QMF Services for Printing in TSO, and native OS/390 batch

You can use DSQPRINT to print a report, table, SQL or QBE query, procedure, or your profile.

DSQPRINT is a special printer destination that QMF uses when you don't supply a printer name on the command line or in the user profile to print a report, table, SQL or QBE query, procedure, or the profile. DSQPRINT must be allocated with a DD statement that points to the data set or output class QMF uses for printing. The DD statement becomes part of your QMF startup EXEC, CLIST, or JCL.

To add your printed output to a user-owned data set, allocate DSQPRINT using either the following JCL:

```
//DSQPRINT DD DSN=&SYSUID..PRINT.DATA,DISP=MOD
```

or the following CLIST:

```
ALLOC DDNAME(DSQPRINT) SYSOUT(A) LRECL(133) RECFM(F B A) BLKSIZE(1330)
FREE DDNAME(DSQPRINT)
```

To route your output to a printer, allocate DSQPRINT using the following syntax:

```
//DSQPRINT DD SYSOUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330)
```

If you're using ISPF: You can use the QMF-supplied DPRE (Display Printed Report) command synonym to view the effects of the width and length values you specified—without having to print the report. This is applicable only while using DSQPRINT. For more information on DPRE, see "Displaying Printed Reports (DPRE) in TSO" on page 306 and *QMF Reference*.

Using QMF Services for Printing in CICS

To use QMF services to handle printing, specify the type of storage you want to use and provide CICS with a name for the storage.

Choosing Between Temporary Storage Queues and Transient Data Queues

CICS temporary storage queues are limited to 32 767 rows of output. They route data only to local print destinations. If you use temporary storage, you need to write a program that routes the data from the queue to the transient data queue, or view the report online with the CICS-supplied transaction CEBR.

CICS transient data queues are limited only by the amount of storage associated with the CICS DCT before CICS is started. You can define the transient data queue as an intrapartition or extrapartition data queue. You can use transient data queues to print data to a data set or SYSOUT class. Some intrapartition data queues are limited to 32 767 rows.

Using the PRINT Command to Route Output to Queues

You can specify on the QMF PRINT command both the name of the queue and the type of storage defined for that queue. For example, to print a report to a temporary storage queue named XYZ, enter this command:

```
PRINT REPORT (QUEUET=TS,QUEUEN=XYZ
```

To print from a transient data queue named XYZ, you can enter the following command. Ensure that the transient data queue is defined to CICS before its first use.

```
PRINT REPORT (QUEUET=TD,QUEUEN=XYZ
```

QUEUET and QUEUEN are abbreviations for QUEUETYPE and QUEUENAME.

QMF issues an ENQ statement on the queue name to prevent writing to the queue if another program is using it. If the name is already enqueued by another application, CICS indicates to QMF that the queue is unavailable at that time. Use the SUSPEND (S) keyword to tell QMF what to do when the queue is unavailable. Use the value YES (or Y) to hold the report until the queue is available, then write to it. For example:

```
PRINT REPORT (QUEUET=TS,QUEUEN=XYZ,S=YES
```

The value NO is the default and cancels the PRINT command, returning a message to the user.

Using Global Variables to Define Queues for Printing

If you don't specify a value on the PRINT command, QMF uses values stored in the global variables DSQAP_CICS_PQNAME and DSQAP_CICS_PQTYPE.

Set the global variable DSQAP_CICS_PQTYPE to TS if you're using temporary storage queues for printing, and TD if you're using transient data queues. TS is the default.

Use the global variable DSQAP_CICS_PQNAME to define the name of the temporary storage or transient data queue. Names for transient data queues can be from 1 to 4 bytes. Names for temporary storage queues can be from 1 to 8 bytes. The default temporary storage queue name is DSQPnnnn, where *nnnn* is the user's 4-byte CICS terminal ID. For example, DSQPA085 is a valid name.

Printing from a CICS Temporary Storage Queue

If you set up your environment to route print output to temporary storage queues, you need to write a transaction that routes the output from the queue to a printer. The QMF user can then start the print transaction by using the CICS command. Any subsequent print command from the same terminal uses the same queue name, appending the previous report.

Viewing a Report from a CICS Temporary Storage Queue

You can view a report with the CICS-supplied transaction CEBR.

Defining a Synonym for the Print Function Key for TSO, and native OS/390 batch

You can customize your system so you can print an object without exiting QMF. You can use a local print utility by simply pressing the Print function key, if you define a command synonym for printing and customize your Print function key.

1. Create a REXX EXEC or CLIST to locally print the current object. Here is a sample, using the QMF callable interface:

   ```
   /* PRTQMF REXX EXEC for local DSPRINT */
   CALL DSQCIX "PRINT PROC (PRINTER=MYPRINT1"
   DSPRINT '&SYSUID..MYPRINT1.DATA'
   ```

   This example assumes you have a MYPRINT1 nickname defined and that it directs print output to a data set called MYPRINT1.DATA.

   Some QMF users prefer to bypass the print command and simply export the object for local printing. In this case your EXEC looks something like:

   ```
   /* PRTQMF REXX EXEC for local print utilities called DSPRINT */
   CALL DSQCIX "EXPORT PROC TO MYPROC"
   DSPRINT '&SYSUID..MYPROC.PROC'
   ```

2. Create a QMF command synonym for printing. Here is a sample query that creates a command synonym PRTQMF to execute the PRTQMF EXEC:

   ```
   INSERT INTO COMMAND_SYNONYMS (VERB, SYNONYM_DEFINITION, REMARKS)
   VALUES('PRTQMF','TSO PRTQMF','Print QMF Proc')
   ```

3. You can now customize a function key on the procedure panel to use this command synonym. You need to customize for each panel. A query to customize function key 4 on the procedure panel looks like this:

   ```
   INSERT INTO PFKY_TABLE (PANEL,ENTRY_TYPE,NUMBER,PF_SETTING)
   VALUES('PROC','K', 4, 'PRTQMF')
   ```

   This example assumes that the user's profile has the PFKEYS column value set to PFKY_TABLE, the name of the function key customization table. (After running the query, QMF must be restarted to implement the function key change.)

Defining a Synonym for the Print Function Key for CICS

You can customize to allow a user to print an object (in the following example, a report) without exiting QMF.

Use this technique to invoke a local print utility when the Print function key is pressed.

1. Create a QMF procedure called PRT_QMF. This sends the object to temporary storage, then starts a transaction that prints the object.

```
PRINT REPORT (QUEUENAME=QMFREPT,QUEUETYPE=TS)
CICS QMFP (FROM='QMFREPT')
```

2. Create a QMF command synonym for printing. Here is a sample query that creates a command synonym PRTQMF to execute the PRTQMF EXEC:

   ```
   INSERT INTO COMMAND_SYNONYMS (VERB, SYNONYM_DEFINITION, REMARKS)
   VALUES('PRTQMF','RUN PRT_QMF','Print QMF Report')
   ```

3. You can now customize a function key on the report panel to use this command synonym. You need to customize a key for each panel. A query to customize function key 4 on the report panel looks like this:

   ```
   INSERT INTO PFKY_TABLE (PANEL,ENTRY_TYPE,NUMBER,PF_SETTING)
   VALUES('REPORT','K', 4, 'PRTQMF')
   ```

   This example assumes the user's profile has the PFKEYS column value set to PFKY_TABLE, the name of the function key customization table. (After the query runs, QMF must be restarted to implement the function key change.)

Updating User Profiles to Enable GDDM Printing

When a user enters a QMF PRINT command, QMF references the LENGTH, WIDTH, and PRINTER fields of the user's row in the Q.PROFILES table. Use these fields of the profile to specify the size and destination for the user's output.

To activate GDDM services for printing, specify a default GDDM printer nickname in the PRINTER column of the profile. Ensure the values you supply for LENGTH and WIDTH are the same as the width and length specified by the device token in the ADMMNICK specification. Also ensure the printer name you use matches one of the entries in the ADMADFC defaults module for CICS or the ADMADFT defaults module for TSO, and native OS/390 batch, or QMF displays an error message.

If you don't specify a printer name in the profile and the user tries to print a chart, form, or prompted query without specifying a printer name, QMF displays the message `Please supply a nickname for your printer`. Pressing Enter displays a prompt for a printer name. Instruct users to enter a printer name that matches one of the entries in the nickname file.

If the PRINTER field in the user's profile does not contain a GDDM nickname, QMF services are used for printing. You can specify defaults for LENGTH and WIDTH even if PRINTER is blank.

If you specified a default GDDM printer name in your profile but you want to use QMF services for printing, supply a blank value for the PRINTER keyword to override the GDDM printer nickname in the user's profile:

```
PRINT REPORT (PRINTER=' '
```

Chapter 18. Customizing QMF Commands

QMF command synonyms help you customize the base set of QMF commands by allowing you to define your own terms and link them to QMF, CICS, or TSO commands. A synonym might simply be another word for a QMF, CICS, or TSO command, or it might be a term that does the work of several commands.

After you create a command synonym, QMF end users can enter the synonym on the command line in the same way they normally enter a QMF command.

Quick Start

Follow the steps in Table 45 to create a command synonym. If you need more information on any step, see the page listed at the right.

Table 45. Creating synonyms for QMF commands

To do this task:	See:
Use the default synonyms provided with QMF to display a printed report, run a batch query or procedure, customize a report layout, or leave QMF in interactive mode and bridge to ISPF.	Page 305
Create a command synonym table that has the columns VERB, OBJECT, and SYNONYM_DEFINITION. The table links the synonyms you choose with the commands or procedures they represent.	Page 308
Enter synonyms and their definitions into the table. VERB and OBJECT store your synonym; SYNONYM_DEFINITION is the command or procedure that runs when you enter the synonym. Follow the guidelines for valid verbs, object names, and synonym definitions.	Page 310
Activate the synonyms for users. Update the SYNONYMS field of the user's row in Q.PROFILES with the name of the synonym table. Then instruct users to reconnect to the database to activate the new synonyms.	Page 316
Minimize maintenance of your site's command synonym tables by creating a single synonym table for all users or by creating different types of views on the synonym table.	Page 318

Using the Default Synonyms Provided with QMF

QMF provides four applications that can be used as installation-defined commands. After installation, these synonyms appear in the Q.COMMAND_SYNONYMS table. Users with access to this table can call these applications by entering the appropriate synonym, as if it were a QMF command.

Workstation database server users
These synonyms appear, after installation, in the table Q.COMMAND_SYN_TSO.

Display Printed Report
Synonym is DPRE. Displays the user's current report in its printed form. For information on customizing DPRE, see "Displaying Printed Reports (DPRE) in TSO".

Batch Query/Procedure
Synonym is BATCH. Lets the user run a query or procedure in batch mode. For more information on this application, see "Using the QMF Batch Query/Procedure Application (BATCH) in ISPF" on page 454.

Layout Form
Synonym is LAYOUT. Lets the user tailor reports without running a query. For information on the Layout command syntax and an example of how to use this application, see *QMF Reference*.

Bridge to ISPF
Synonym is ISPF. Lets the user temporarily leave interactive mode QMF and "bridge" to an ISPF/PDF session. After the session is ended, the user returns to QMF, at the point where the ISPF command was issued. For more on the ISPF application, see *Using QMF*and *Developing QMF Applications*.

ISPF considerations: The synonym ISPF is valid only if QMF is started under ISPF. If QMF is not started under ISPF, you can access ISPF by entering TSO ISPSTART.

Displaying Printed Reports (DPRE) in TSO

You might notice that a printed report doesn't look exactly as it did on a screen. For example, the displayed report is treated as a single page, even with one or more page breaks in the printed report.

The differences between the printed report and its displayed version are largely cosmetic: the facts and figures on the screen and those on the printed page are the same. However, the differences can be important. (For more detailed information about the differences, see *Using QMF*.) Because of this, IBM supplies the QMF application called DPRE to display the report as it will look when printed. After QMF is installed, the application can be invoked using a command stored in the Q.COMMAND_SYNONYMS table. The application is shared for everyone's use.

DPRE components are:
- A procedure named Q.DSQAER1P in the database
- A CLIST named DSQABR13 in the library named QMF710.SDSQCLTE

Using DPRE

To use DPRE, you load the DATA object with the report data and the FORM object with the appropriate form, then issue the command:

```
DPRE
```

The application then generates the printer output and displays it through the ISPF browse facility. After you finish browsing, the printer output disappears.

If you're using an NLF: Issue the translated command synonym for DPRE to display printed reports. For example, the translated German command synonym for DPRE is AGB. For the translated command synonym for DPRE in the other language environments, see the Q.COMMAND_SYNONYM_*n* control table or the translated online help for the command.

Report Parameters: The LENGTH parameter for the report being browsed is taken from PROFILE. The WIDTH parameter specified in PROFILE is used if it is less than 132 (lrecl); otherwise, a width of 132 (lrecl) is used because this is the length specified in the TSO allocate statement for DSQPRINT. If 132 is too small, the TSO allocate statement for DSQPRINT can be changed to accommodate a larger width.

Performance Considerations: The design of QMF encourages users to develop their printed reports by alternately modifying the FORM panels and displaying REPORT, until the report suits the user's needs. With DPRE, the user can instead alternate changing the FORM panel and browsing the tentative report with DPRE. Users should be aware, however, that the second method of development is expensive relative to the first, and should be used sparingly when resources are at a premium.

For a large report, all the rows of the report are fetched before the report is displayed.

Responding to Errors: DSQPRINT is the ddname for the data set that receives output from QMF PRINT commands in which PRINTER=' ' is either expressed or implied. When a user runs DPRE, DSQPRINT is redefined as the data set that holds the material to be browsed. If an error stops the run, this definition might still be in effect.

Customizing DPRE

Important: When making modifications to any file, first rename it and be sure to keep backup copies of original and modified files.

You can change the two areas in DPRE:

- Handling the BROWSE data set

  The application reallocates DSQPRINT as a sequential data set created for the user. This data set contains the printed form of the report for the user to browse. You can change the name of this data set and its disposition.

- Modifying the function keys for DPRE

  To modify the function keys for DPRE, you must edit the QMF PROC Q.DSQAER1P and QMF710.SDSQCLTE(DSQABR13). For example, if you want to change the DPRE application function key 12 from CURSOR to RETRIEVE, you need to do both of the following:

  – In Q.DSQAER1P, change the value on the PF12CON line from CURSOR to RETRIEVE.

  – In the CLIST DSQABR13, change the value for both ZPF12 and ZPF24 from CURSOR to RETRIEVE.

- Reallocating DSQPRINT

  After a user finishes browsing the report, DSQPRINT must be reallocated to what it was before the application was called. The following statements in the application do this for you. They are in the procedure DSQAER1P.

```
ADDRESS TSO "ATTR DSQDPRA LRECL(133) RECFM(F B A) BLKSIZE(1330)"
ADDRESS TSO "ALLOC    DDNAME(DSQPRINT) SYSOUT(A) USING(DSQDPRA)"
```

  You can change the ALLOC statement. For example, you can change the output class for DSQPRINT from A to C. You might want to do this if output class C handles confidential printouts and most QMF reports at your installation are confidential. The modified ALLOC statement looks like this:

```
ADDRESS TSO "ALLOC    DDNAME(DSQPRINT) SYSOUT(C) USING(DSQDPRA)"
```

Creating a Command Synonym Table

When a user starts a QMF session, QMF loads a command synonym table whose name you specify in the synonyms field of the user's profile. When you enter a command, QMF first checks the synonym table for a match. If there is no match, QMF assumes the command is a base QMF command. When you enter the letters *QMF* in front of any command, QMF automatically assumes the command is a base QMF command and does not check the synonym table for a match.

Use the following procedure to create a command synonym table. Then see "Entering Command Synonym Definitions into the Table" on page 310 for instructions on entering your synonyms and their definitions.

1. If necessary, acquire or add a table space to hold the command synonym table. "Choosing and Assigning a Table Space for the User" on page 249 shows how to choose or create a table space. If you don't have an available table space, create one for your table with a query like the following:

```
CREATE TABLESPACE DSQTSSN1
    IN DSQDBCTL
       USING STOGROUP DSQSGSYN
          PRIQTY 100
          SECQTY  20
          LOCKSIZE PAGE
          BUFFERPOOL BP0
          CLOSE NO
```

Figure 81. Creating a table space

   Running this query creates the table space DSQTSSN1. The storage group and database for this table space are also those for the table space containing Q.COMMAND_SYNONYMS.

   You might be able to use DSQDBCTL.DSQTSSYN as a table space. The Q.COMMAND_SYNONYMS table resides in DSQDBCTL.DSQTSSYN.

2. From the QMF SQL query panel, run an SQL CREATE TABLE statement similar to the one in Figure 82 to create the table. Substitute your own table name in place of COMMAND_SYNONYMS and your own table space name for TBSPACE1. Type the other portions of the query exactly as shown.

   The VERB and OBJECT columns store your synonym. The

```
CREATE TABLE COMMAND_SYNONYMS
  ( VERB               CHAR(18)     NOT NULL,
    OBJECT             VARCHAR(31),
    SYNONYM_DEFINITION VARCHAR(254) NOT NULL,
    REMARKS            VARCHAR(254) )
  IN TBSPACE1
```

Figure 82. Creating a command synonym table

   SYNONYM_DEFINITION column stores the command or procedure that runs when you enter the synonym.

   The columns can be in any order, and you can add a column for comments so users know what function each synonym performs.

3. Add comments to the DB2 system catalog using the following example for the COMMAND_SYNONYMS table created with the query in Figure 82 on page 309.

   ```
   COMMENT ON TABLE COMMAND_SYNONYMS IS 'SYNONYMS FOR R AND D'
   ```

   The phrase SYNONYMS FOR R AND D appears in the REMARKS column of the DB2 system catalog.

   You don't need to add comments about your new table to the DB2 system catalog, but if you do, one comment might be about the table, others might describe the columns. For example, suppose that COMMAND_SYNONYMS has a column named AUTHID that distinguishes private from public synonyms. To add a comment to explain this, run a query:

   ```
   COMMENT ON COLUMN COMMAND_SYNONYMS.AUTHID
     IS 'PRIVATE SYNONYM: USE AUTH ID. PUBLIC SYNONYM: USE NULL'
   ```

   By running a subsequent COMMENT ON query, you can replace the current one. For more on COMMENT ON queries, see *DB2 UDB for OS390 SQL Reference*

4. Create an index to maximize performance at initialization time, when QMF processes the command synonym table. Use a statement similar to the following:

   ```
   CREATE UNIQUE INDEX SYNONYMS_INDEX
     ON COMMAND_SYNONYMS (VERB, OBJECT)
   ```

   Index both the VERB and OBJECT columns with the UNIQUE keyword to prevent duplicate synonym definitions. If you choose not to use the UNIQUE keyword, QMF allows duplicate synonyms in the table; QMF uses the first synonym it locates in the table and displays a warning message on the QMF Home panel after initialization.

Entering Command Synonym Definitions into the Table

After you create a command synonym table, use an SQL INSERT statement similar to the one in Figure 83 to enter your synonyms into the table. You can also use the Table Editor to update the table, as explained in *Using QMF*. You can also use a text editor to create your synonyms in a TSO file and then enter them into the table with the DB2 LOAD utility. For information about this utility, see *DB2 UDB for OS390 Administration Guide*

```
INSERT INTO COMMAND_SYNONYMS (VERB,OBJECT,SYNONYM_DEFINITION)
  VALUES('COMPUTE', 'MONTHLY_SALES', 'RUN PROC JONES.SALES_FIGURES')
```

Figure 83. Creating a command synonym definition

After it is activated according to the procedure in “Activating the Synonyms” on page 316, the synonym COMPUTE MONTHLY_SALES runs a QMF linear procedure called SALES_FIGURES, owned by user JONES.

The query in Figure 84 shows an example of a synonym that has no entry in the object column:

```
INSERT INTO COMMAND_SYNONYMS (VERB,SYNONYM_DEFINITION)
  VALUES('EXECUTE','RUN QUERY')
```

Figure 84. Creating a command synonym definition

After it is activated, the synonym EXECUTE runs the query currently in the QMF temporary storage area.

The synonyms in Figures 83 and 84 follow guidelines that allow QMF to process each synonym correctly. The rest of this section explains these guidelines, which you need to follow to ensure that QMF correctly processes your entries for the VERB, OBJECT, and SYNONYM_DEFINITION columns in the table.

Choosing a Verb

Every command synonym definition must have a verb. Only the object name is optional.

The verb is your own word for the QMF RUN command, CICS command, or TSO command stored in the SYNONYM_DEFINITION column. For example, you might create the synonym COMPUTE for the QMF base verb RUN if your company has financial analysts who run only procedures that return financial results.

Rules for the VERB Column

Ensure entries in the VERB column of the synonym table:

- Are 1 to 18 characters long.
- Do not contain blanks.
- Do not include the verb *QMF* (other base QMF commands are allowed).
- Have an alphabetic or national character as the first character. (In English, national characters are #, @, and $.)

Characters after the first letter can be alphabetic, national characters, decimal digits, or the underscore. No other characters are allowed.

The following examples demonstrate these rules. QMF ignores rows that have invalid entries in the VERB column, and displays a warning message.

Valid Verbs:

Invalid Verbs:

COMPUTE
DO SALES (Blanks not allowed unless surrounded by double quotes)
DISPLAY
ADJ%AGE (% not allowed)
PRINT
PRINT_PRODUCTIVITY_TOTALS (more than 18 characters)

Using Base QMF Verbs as Command Synonym Verbs

You can use base QMF commands, such as PRINT, as synonyms. For example, you might choose to define a synonym that automatically routes print output to a GDDM-defined printer.

When you define a synonym that is also a base QMF command, instruct users to precede the command with the letters *QMF* when they want to use the base QMF command. For example, the synonym DISPLAY might represent a synonym definition that executes the QMF command RUN PROC SALES_REPORT. The SALES_REPORT procedure runs a query and prints a report on a GDDM-defined printer. Users who forget to enter *QMF* in front of DISPLAY might get a formatted, printed report of data they didn't necessarily want. Using base verbs in verb-object synonyms has a similar impact.

Some base QMF commands must be followed by a parameter. For example, you need to follow the IMPORT command with an object type, such as TABLE. If you are using a verb such as IMPORT in a verb-object pair, choose an object name that is not one of these parameters to prevent users from inadvertently running the synonym. For other base commands you use, see the syntax diagrams in *QMF Reference* to find out if the command requires a parameter.

Choosing an Object Name

An object name is optional in a command synonym. When you do use an object name, however, ensure users specify *both* the verb and the object name; otherwise, QMF can't find a match in the synonym table. Entries in the OBJECT column must follow these rules:

- Must be 1 to 18 characters long.
- Must conform to the rules for naming DB2 tables.
- Must be surrounded by double quotes if the object name has blanks or other special characters. (Both QMF and the database manager remove the double quotes when the name is processed.)

The following examples show valid and invalid objects.

Valid Objects:
Invalid Objects:
PFKEYS
80CAT (first character is numeric)

MONTH_2_REPORT
ADJ%AGE (% not allowed)
"User x"."Net Sales"
JANUARY_PRODUCTIVITY (over 18 characters)
"Net Sales"
JONES GROSS (double quotes required for blanks)

If you're using fully qualified table names: Object names can look like fully qualified table names; this is consistent with the QMF language. However, QMF objects other than tables cannot be referenced by three-part names. For example, the object name in the following QMF command has a fully qualified table name:

```
DISPLAY FORM.BACKUP
```

Choosing the Synonym Definition

The synonym definition is the QMF command or procedure that runs when the user enters the command synonym. An entry in the SYNONYM_DEFINITION column can include:

- A RUN command that calls a QMF procedure or query. For example, RUN PROC JONES.SALES_DATA might be a synonym definition for the command synonym COMPUTE MONTHLY_SALES.
- A TSO command that calls a CLIST.
- A CICS command that starts another CICS transaction.

Your synonym definition can even include both types of commands if the definition runs a QMF linear procedure.

For information about developing complex applications to run in a command synonym, see *Developing QMF Applications*

Using a Linear Procedure in the Synonym Definition

A linear procedure is a QMF procedure that executes QMF commands sequentially. Your synonym definition can include a linear procedure that does the work of several QMF commands. For example, the procedure in Figure 85 on page 314 performs the following tasks:

1. Runs the following query, called SALES_DATA, which creates a report that shows all the customers handled by sales representative number 20:

```
SELECT QUANTITY, CUSTNO
FROM Q.SALES
WHERE SALESREPNO = 20
```

2. Routes the report from QMF to TSO virtual storage or a CICS temporary queue. In Figure 85, XYZ is the name of the temporary storage queue.
3. Runs a CICS or TSO procedure to route the report from virtual storage to a predefined print destination. In Figure 85, RPTX is the transaction name. It runs asynchronously with QMF to route output to a destination named REPORTX.

Your definition for a synonym that runs this procedure might look similar to

```
-- Procedure name: SALES_PROC
 RUN QUERY SALES_DATA
 PRINT REPORT (QUEUENAME=XYZ,QUEUETYPE=TS)
 CMS RPTX (FROM=('REPORTX, XYZ'))
```

Figure 85. Sample procedure to run using a command synonym

the one in Figure 86:

```
                                SYNONYM
VERB           OBJECT           DEFINITION
-----------    ---------------  ------------------
SHOW           SALES            RUN PROC SALES_PROC
```

Figure 86. Using a command synonym to run a linear procedure

If you're using an NLF: Make sure that the QMF commands in the queries, forms, and other objects included in the procedure are translated before you use the command synonym that calls the procedure. Also ensure these components are suitable for the NLF you're using. Unless your procedure sets the DSQEC_NLFCMD_LANG variable to 1, ensure the commands are translated before you use the command synonym. The DSQEC_NLFCMD_LANG variable is discussed in "Enabling English Support in an NLF Environment" on page 285.

Using Variables in the Synonym Definition

You can use variables in the synonym definition to pass values for like-named variables present in objects (such as queries) named in the definition. For example, Figure 87 on page 315 shows a definition that passes the value Q.STAFF for the table name, which is evaluated when MYQUERY runs.

```
                        SYNONYM
VERB        OBJECT      DEFINITION
----------  ---------   ------------------------------------
EXECUTE     -           RUN QUERY MYQUERY (&&TABLENAME=Q.STAFF
```

Figure 87. Using variables in command synonym definitions

MYQUERY might look something like:

```
SELECT * FROM &TABLENAME
```

Ampersands are doubled in a variable name in the synonym definition because they become single ampersands when QMF executes the RUN command.

Use double ampersands in the synonym definition for all variables except the variable &ALL. &ALL is a special QMF variable that allows you to enter variable values when you enter the synonym, rather than including them in the synonym definition. When you use the variable &ALL in a synonym definition, QMF uses as variable values any information you enter to the right of the synonym. You can use the &ALL variable to show where the information is located within the synonym definition.

The synonym definition in Figure 88 shows an example of a synonym defined using &ALL.

```
                        SYNONYM
VERB        OBJECT      DEFINITION
----------  ---------   ------------------------
SHOW_INFO   -           RUN QUERY STAFFQUERY (&ALL)
```

Figure 88. Using the variable &ALL in a command synonym definition

The query named STAFFQUERY might look something like the following:

```
SELECT * FROM Q.STAFF
WHERE DEPT=&DEPT and JOB=&EMPLOYEE_JOB
```

After activating the SHOW_INFO synonym defined in the preceding example, you can enter the following statement from the QMF command line to display information about all the managers in Department 10:

```
SHOW_INFO &DEPT=10 &EMPLOYEE_JOB='MGR'
```

Rules for &ALL: When you use the variable &ALL in a synonym definition:

- Use &ALL only once in a synonym definition.
- Always write &ALL in uppercase.
- Never follow &ALL with a number or letter.

- Any value you substitute for &ALL must be syntactically correct when QMF evaluates the entire command. For more information on syntax of QMF commands, see *QMF Reference*.

If a user does not supply a value following the command synonym, QMF substitutes a null value for &ALL. In the synonym definition shown in Figure 88 on page 315, QMF prompts the user for values for the &DEPT and &EMPLOYEE_JOB variables if the user enters SHOW_INFO by itself on the command line.

Keying Information into the SYNONYM_DEFINITION Column

Follow these rules when keying your synonym definitions into the synonym table:

- Add single quotes around a variable in your synonym definition.

  Single quotes around a variable eliminate the need for the user to add quotes to the command synonym when running a query. For example, &ALL has single quotes in this synonym definition:

  ```
  RUN MYQUERY (&&NAMEVALUE='&ALL'
  ```

  If you search for the name O'BRIEN, you do not need to enter `'O'BRIEN'`, because QMF does this for you.
- Enter base verbs and keywords in uppercase.

  Literal information in the synonym definition is not converted to uppercase.
- Qualify all object names if their owners are different from the SQL authorization ID of the user who uses the synonym.

  QMF leaves names unqualified when searching for a synonym that contains the object name specified. For example, if your synonym definition includes a query named MY_SALES owned by user ID JONES, ensure that the object name in the synonym definition reads JONES.MY_SALES. Otherwise, JONES is the only user that can use that command synonym.
- Use only capital letters for letters that lie outside of delimited identifiers.

  If QMF converts user input (the synonym) to uppercase and the synonym definition is in lowercase, QMF can't find the synonym definition that matches the synonym the user entered. The CASE value of the user's QMF profile controls whether input is converted to uppercase. Use the SET PROFILE command to change the CASE value. This command is explained in *QMF Reference*.

Activating the Synonyms

To activate the command synonym table for your users:

1. Update the SYNONYMS field of the user's profile with the proper command synonym table name.

For example, to assign the COMMAND_SYNONYMS table to the user JONES in the English language and the table GUMMOW.XYZ to the user SCHMIDT in the German NLF environment, use the query in Figure 89:

```
Base QMF (English)
        German NLF
UPDATE Q.PROFILES
        UPDATE Q.PROFILES
SET SYNONYMS='COMMAND_SYNONYMS'
        SET SYNONYMS='GUMMOW.XYZ'
WHERE CREATOR='JONES'
        WHERE CREATOR='SCHMIDT'
AND TRANSLATION='ENGLISH'
        AND TRANSLATION='DEUTSCH'
AND ENVIRONMENT='CMS'
        AND ENVIRONMENT='CMS'
```

Figure 89. Activating a user's QMF command synonyms

Important: Always specify a value for TRANSLATION when you're updating Q.PROFILES, or you might change more rows than you intend.

The query in Figure 89 applies to users who are already enrolled in QMF. You can use a similar query to update the SYSTEM profile. If you are enrolling a new user, use an INSERT query similar to the one shown in Figure 49 on page 217.

2. Grant the SQL SELECT privilege to PUBLIC so that assigned users can access the synonyms. For example:

   ```
   GRANT SELECT ON COMMAND_SYNONYMS TO PUBLIC
   ```

   If you are using a view of a synonym table rather than the table itself, grant SELECT on only the view to prevent users from accessing synonyms not meant for their use. Views are discussed in "Minimizing Maintenance of Command Synonym Tables" on page 318.

3. Instruct users to end the current QMF session and start another to activate the new synonyms.

Command synonyms follow the same rules for abbreviation as QMF commands. Any abbreviation must indicate a unique QMF command or command synonym. For example, the minimum valid abbreviation for the synonym EXECUTE is EXE. If you enter only EX, QMF can't distinguish the command synonym EXECUTE from the base QMF command EXPORT. See *QMF Reference* for the proper abbreviations for QMF commands.

Minimizing Maintenance of Command Synonym Tables

The command synonym table is initialized before the QMF Home panel is displayed. If you notice that QMF initialization time is increasing, you might need to reorganize the command synonym table. To monitor the table's statistics, refer to *DB2 UDB for OS390 Administration Guide*

To minimize the time you spend maintaining users' command synonym tables, consider either assigning one synonym table to all users or assigning a variety of different views of the same table. Both methods are discussed in this section.

Assigning One Synonym Table to all Users

The more command synonym tables you create for individual users, the more time you spend on maintenance. One way to reduce maintenance is to create a single command synonym table and assign it to every user. The query in Figure 90 assigns to every user of base (English) QMF a table named COMMAND_SYNONYMS.

```
UPDATE Q.PROFILES
  SET SYNONYMS='Q.COMMAND_SYNONYMS'
  WHERE TRANSLATION='ENGLISH' and ENVIRONMENT='CMS'
```

Figure 90. Assigning a single command synonym table to all QMF users

Assigning Views of a Synonym Table to Individual Users

To enable users to have synonyms unique to their needs and still keep table maintenance at an acceptable level, consider creating several views of one synonym table, and assigning the views to individual users or groups of users. There are three types of views you can create.

Synonyms for Public or Private Use

If you have few synonyms that are used by individuals, consider creating and assigning a view that flags each synonym for either public use (by all users) or private use (by individual users):

1. Add an AUTHID column to the synonym table when you create the table. A null value in the AUTHID column indicates a public synonym; a user ID in the AUTHID column indicates a private synonym. You can have many entries for the same synonym, each assigned to a different user.
2. Use a query similar to that in Figure 91 on page 319 to create a view on the synonym table. This query allows a user (indicated by `userid` in the figure) to use all public synonyms in the table and any synonyms assigned privately to his or her SQL authorization ID.

```
CREATE VIEW SYNVIEW (VERB,OBJECT,SYNONYM_DEFINITION)
  AS SELECT VERB, OBJECT, SYNONYM_DEFINITION
     FROM COMMAND_SYNONYMS
     WHERE AUTHID='userid' OR AUTHID IS NULL
```

Figure 91. Creating a view that controls individual and public use of synonyms

Synonyms for Public or Group Use

If you support a large group of end users, consider creating and assigning a view that flags certain synonyms to be used by certain groups of users.

The synonym table used to create the view contains a single row for each synonym that belongs to a user group, and a single row for each public synonym. AUTHID is either null or has a value that uniquely identifies the user group.

1. Add an AUTHID column to the synonym table if it doesn't have one.
2. Use a query similar to the one in Figure 92 to create the view on the synonym table. The example in the figure shows a view created for a group of users that have a common user ID, DEPTD02. All users in the DEPTD02 group can use all public synonyms in the table and any synonyms assigned specifically to the group.

```
CREATE VIEW GROUPVIEW (VERB,OBJECT,SYNONYM_DEFINITION)
  AS SELECT VERB, OBJECT, SYNONYM_DEFINITION
     FROM COMMAND_SYNONYMS
     WHERE AUTHID='DEPTD02' OR AUTHID IS NULL
```

Figure 92. Creating a view that controls group and public use of synonyms

Synonyms Paired with an Authorization Table

Consider creating a separate table that holds in one column SQL authorization IDs and in the other column the values of a key. If the keyed value for a particular SQL authorization ID matches a keyed value in a row of the command synonym table, the synonym described in that row is available to the user.

Use a query similar to the one in Figure 93 on page 320 to implement this method of maintaining command synonyms. The query creates a view called KEYVIEW on the table COMMAND_SYNONYMS, incorporating in the view only the synonyms that have keyed matches between COMMAND_SYNONYMS and the auxiliary table, KEYTABLE.

```
CREATE VIEW KEYVIEW (VERB,OBJECT,SYNONYM_DEFINITION)
  AS SELECT VERB, OBJECT, SYNONYM_DEFINITION
     FROM COMMAND_SYNONYMS
     WHERE AUTHID IS NULL OR AUTHID IN
        (SELECT KEYS FROM KEYTABLE WHERE USER=userid)
```

Figure 93. Creating a view that uses an extra table to control use of synonyms

Chapter 19. Customizing QMF Function Keys

The default settings and labels for function keys on each QMF panel describe a common set of QMF tasks that end users are likely to perform. Because every site's needs are unique, however, QMF provides a way for you to customize both the label that displays on the screen and the command QMF executes when a user presses the key.

Quick Start

Follow the steps in Table 46 to customize a user's function keys. If you need more information on any step, see the page listed at the right.

Table 46. Customizing QMF function keys

To do this task:	See:
Choose the panels and function keys you want to customize. You can change function key settings on all panels except table editor panels and database status panels. Your flexibility in customizing the keys depends on what type of panel you choose.	Page 321
Create a table to hold the customized definitions of your function keys. Include at least four columns: PANEL, ENTRY_TYPE, NUMBER, and PF_SETTING. These columns have information about the command QMF issues when the key is pressed and the label text that is displayed beside the key number on the screen.	Page 324
Insert your customized key definitions into the function key table. To insert a definition, reference the panel ID of the panel you're customizing; the QMF command issued when the key is pressed; the text displayed on the screen next to the number of the key; and where the key is positioned on the screen.	Page 325
Activate the new function key definitions by updating the PFKEYS field of the user's row in Q.PROFILES with the name of the function key table you created.	Page 332

Choosing the Keys You Want to Customize

QMF function keys appear on two types of panels: primary panels, which are full-screen panels such as FORM.MAIN and REPORT; and secondary panels, which appear as window dialog panels. Help, prompt, and Prompted Query panels are examples of secondary panels.

The tables in "Default Keys on Full-Screen Panels" on page 322 show the default QMF function key labels and commands for both full-screen and window panels; use them to decide which function keys you want to change.

Customizing QMF Function Keys

You cannot customize function keys on Table Editor panels. On other panels, you can choose QMF or installation-defined commands to associate with any function key label you modify.

Default Keys on Full-Screen Panels

Key	Executed Command
Backward	BACKWARD
Cancel	CANCEL
Change	CHANGE
Chart	DISPLAY CHART or SHOW CHART
Check	CHECK
Clear	CLEAR
Command	SHOW COMMAND
Comments	SWITCH COMMENTS
Delete	DELETE
Describe	DESCRIBE
Draw	DRAW
Edit Table	EDIT TABLE
End	END
Enlarge	ENLARGE
Form	DISPLAY FORM or SHOW FORM
Forward	FORWARD
Help	HELP
Insert	INSERT
Left	LEFT
List	LIST
Print	PRINT
Proc	DISPLAY PROC or SHOW PROC
Profile	DISPLAY PROFILE
Query	DISPLAY QUERY or SHOW QUERY
Reduce	REDUCE
Refresh	REFRESH
Report	DISPLAY REPORT or SHOW REPORT
Retrieve	RETRIEVE
Right	RIGHT

Key	Executed Command
Run	RUN QUERY or RUN PROC
Save	SAVE PROFILE
Show	SHOW
Show Field	SHOW FIELD
Show SQL	SHOW SQL
Sort	SORT
Specify	SPECIFY
Specify View	SPECIFY VIEW

Default Keys on Window Panels

Key	Executed Command
Attribute	SPECIFY ATTRIBUTES
Backward	BACKWARD
Cancel	CANCEL
Clear	CLEAR
Command	SHOW COMMAND
Comments	SWITCH COMMENTS
Condition	SPECIFY CONDITION
Delete	DELETE
Describe	DESCRIBE
End	END
Exit	END
Forward	FORWARD
Help	HELP
Index	HELP INDEX
Keys	HELP KEYS
List	LIST
Menu	HELP MENU
More Help	HELP MORE
Next Column	NEXT COLUMN
Next Definition	NEXT DEFINITION
Previous Column	PREVIOUS COLUMN
Previous Definition	PREVIOUS DEFINITION

Key	Executed Command
Refresh	REFRESH
Show Entity	SHOW ENTITY
Show Field	SHOW FIELD
Show View	SHOW VIEW
Sort	SORT
Specify Attributes	SPECIFY ATTRIBUTES
Specify Condition	SPECIFY CONDITION
Switch	HELP SWITCH

On the global variable list panel, RESET GLOBAL is the command executed when the Delete function key is pressed.

For more information on the commands associated with these function keys, see *QMF Reference*.

Creating the Function Key Table

After you decide which function keys you want to customize, follow these steps to create a table that links your customized function key definitions with the appropriate panels:

1. Use an SQL CREATE TABLE statement similar to the one shown in Figure 94 to create the table. Substitute your own name for MY_PFKEYS and your own table space for TBSPACE1.

```
CREATE TABLE MY_PFKEYS
  (PANEL                CHAR(18)       NOT NULL,
   ENTRY_TYPE           CHAR(1)        NOT NULL,
   NUMBER               SMALLINT       NOT NULL,
   PF_SETTING           VARCHAR(254),
   REMARKS              VARCHAR(254))
   IN TBSPACE1
```

Figure 94. Creating a function key table

   See "Choosing and Assigning a Table Space for the User" on page 249 for information on acquiring a dbspace to hold the table. See *DB2 UDB for OS390 Administration Guide* for information on creating a new table space.

2. Add comments to the DB2 system catalog using an SQL statement similar to the following:

   ```
   COMMENT ON TABLE MY_PFKEYS IS 'PF KEYS RESERVED FOR FINANCIAL ANALYSTS'
   ```

The phrase PF KEYS RESERVED FOR FINANCIAL ANALYSTS appears in the REMARKS column of the DB2 system catalog. For more information on adding comments to the system catalog, see *DB2 UDB for OS390 Administration Guide*

You don't need to add comments about your new table to the DB2 system catalog, but if you do, one comment might be about the table; others might describe the columns. For example, suppose that MY_PFKEYS has a column named AUTHID that distinguishes private from public function keys. To add a comment to explain this, run a query:

```
COMMENT ON COLUMN MY_PFKEYS.AUTHID
  IS 'PRIVATE PFKEY: USE AUTH ID. PUBLIC PFKEY: USE NULL'
```

By running a subsequent COMMENT ON query, you can replace the current one. For more on COMMENT ON queries, see *DB2 UDB for OS390 SQL Reference*

3. Create an index using an SQL statement similar to the following:

```
CREATE UNIQUE INDEX MY_PFKEYSX
  ON MY_PFKEYS (PANEL, ENTRY_TYPE, NUMBER)
```

Use the UNIQUE keyword to index the PANEL, ENTRY_TYPE, and NUMBER columns to ensure that no two rows of the table can be identical.

If you choose not to use the UNIQUE keyword, QMF allows duplicate key definitions. QMF displays warning messages on the Home panel if it finds more than one key definition for the same key, and writes information about the warning messages to the user's trace data. Multiple key definitions for window panels cause no messages; QMF uses the last definition it finds.

Entering Your Function Key Definitions into the Table

You can use SQL INSERT statements or the QMF Table Editor to insert customized key definitions into the function key table. Each function key definition spans two rows in the table:

- One row specifies the command QMF issues when a user presses the key.
- The other row specifies the label text that appears on the screen.

Enter both rows for each key you want to customize. A function key command without an associated label doesn't appear on the user's screen. Similarly, a label with no associated command is inactive.

The next two sections discuss the values you need to enter for each row.

Linking a Command with a Function Key

Each function key on a QMF panel is linked with a QMF command that executes when the function key is pressed. To ensure your customized function keys also work this way, make sure one of the two rows you enter into the table has the values shown in Table 47.

Table 47. Values to customize your function key table

Column	Value	Information
PANEL	ID of the QMF panel you're customizing	"Full-Screen Panel Identifiers" on page 329 shows the IDs you need to use for full-screen panels. "Window Panel Identifiers" on page 330 shows the IDs you need to use for specific window panels. If you want to define the same set of keys to appear on every panel in a class of window panels, use the *class ID* shown at the bottom of the tables. For example, to customize the Specify panel of a Forms window, use the panel ID FOSPEC if you want the Specify panel to have different keys than the rest of the panels in the forms class. Otherwise, use the panel ID FOXXXX, which characterizes all panels in that class. Changes you make using a class ID apply to *all* panels customized by that class ID. Help and prompt windows don't have a set of unique IDs; they can be customized only by using class IDs.
ENTRY_TYPE	K	K indicates that this row defines the command QMF issues when the key is pressed.
NUMBER	Number of the function key you're customizing	If you're changing the definition for F5, enter a 5 in this column.
F_SETTING	Text of the command that runs when the key is pressed	Make sure this command is appropriate for the panel on which it appears. For example, the ENLARGE command is appropriate for only the QUERY panel in a QBE query. Because QMF doesn't check if the command is appropriate for the panel until the user presses the key, test each of your new function keys before your end users need them. Enter the command in uppercase, because QMF does not convert terminal input to uppercase when it retrieves the commands associated with function keys. The command won't run if this value is lowercase and the CASE field of the user's profile has the value UPPER. Ensure that each panel you customize has a key set to END or CANCEL. Without a key defined to one of these commands, users might not be able to exit the panel.

If you're using an NLF: Ensure the underlying command has the correct national language translation; additionally, it's helpful if the label text for each key is written in the language of the NLF you're using.

Labeling the Function Key and Positioning It on the Screen

The function keys on each QMF panel have labels next to the function key numbers. To ensure the label appears on the screen, you need to add a second row to the table. In this row, make sure the columns of the function key table have the following values:

Table 48. Values to label your function key table

Column	Value	Information
PANEL	ID of the QMF panel you're customizing	This is the same ID you used for the first row of the definition, explained in "Linking a Command with a Function Key" on page 326.
ENTRY_TYPE	L	L indicates that the row defines the label associated with the function key.
NUMBER	Number of the row where the key appears on the display, if you are customizing a full-screen panel	If you are customizing a window or help panel, NUMBER represents the number of the function key (as it does in the first row you added to the table in "Linking a Command with a Function Key" on page 326). For example, on the Home panel, F5 appears in row 1 and F12 appears in row 2.
F_SETTING	Text of the function key labels	For full-screen panels, QMF displays on the screen exactly what you enter in this column, and does not adjust for spacing. For example, if you're customizing the QMF Home panel, you need to enter all the keys that appear on that panel, whether or not you customized them. QMF does not automatically fill in the default key settings for keys you choose not to customize. See Figure 95 on page 328 for an example. For window panels, you need to type only the label of the key in this column. See Figure 96 on page 329 and Figure 97 on page 329 for examples.

Examples of Key Definitions

Use the examples in this section to see how to enter a complete function key definition for each type of QMF panel. The examples show how to update a full-screen panel, a window panel, and a help panel.

The examples shown use panel IDs from the tables in "Identifying the Panel You Want to Customize" on page 329. Use these tables to get the proper values for the PANEL column of the function key table.

Important: Ensure that each customized secondary panel has a key set to the CANCEL command to enable the user to exit the panel.

Entering a Definition for a Key on a Full-Screen Panel

Use the SQL queries shown in Figure 95 to change F2 on the Home panel from EDIT TABLE to IMPORT. Identify the Home panel with the panel ID HOME, and indicate with the number 2 (in the first query shown) that you want to customize the command executed when a user presses F2.

```
INSERT INTO MY_PFKEYS (PANEL,ENTRY_TYPE,NUMBER,F_SETTING)
  VALUES('HOME', 'K', 2, 'IMPORT')

INSERT INTO MY_PFKEYS (PANEL,ENTRY_TYPE,NUMBER,F_SETTING)
  VALUES('HOME','L',1,'1=Help     2=Import     3=End     4=Show     5=Chart     6=Query')
```

Figure 95. Changing a function key for a QMF command on the Home panel

The QMF Home panel now displays Import for F2:

```
Type command on command line or use PF keys. For help, press PF1 or type HELP.
_____________________________________________________________________________
1=Help        2=Import      3=End        4=Show        5=Chart       6=Query
7=Retrieve    8=Edit Table  9=Form       10=Proc       11=Profile    12=Report
OK, cursor positioned.
COMMAND ===>
```

In the F_SETTING column of the second query, be sure to type exactly what appears in the top row of keys on the Home panel, even if you haven't customized each key. For example, if you specify only the word Import in the F_SETTING column for the second query, the Home panel looks like this:

```
Type command on command line or use PF keys. For help, press PF1 or type HELP.
_____________________________________________________________________________
Import
7=Retrieve    8=Edit Table  9=Form       10=Proc       11=Profile    12=Report
OK, cursor positioned.
COMMAND ===>
```

Entering a Definition for a Key on a Window Panel

The SQL queries in Figure 96 on page 329 add a F3 key to the Tables panel in Prompted Query. The function key executes the CANCEL command, and is labeled CancelMe.

```
INSERT INTO MY_PFKEYS (PANEL,ENTRY_TYPE,NUMBER,F_SETTING)
  VALUES('QPTABL', 'K', 3, 'CANCEL')
INSERT INTO MY_PFKEYS (PANEL,ENTRY_TYPE,NUMBER,F_SETTING)
  VALUES('QPTABL', 'L', 3, 'CancelMe')
```

Figure 96. Changing a function key on the Specify panel of Prompted Query

Entering a Key Definition for a Help or Prompt Panel

The SQL queries in Figure 97 add a F13 key to all help panels. The function key executes the CANCEL command, and is labeled CancelMe.

All help and prompt panels are customized using a single class ID. Because

```
INSERT INTO MY_PFKEYS (PANEL,ENTRY_TYPE,NUMBER,F_SETTING)
  VALUES('HEXXXX', 'K', 13, 'CANCEL')
INSERT INTO MY_PFKEYS (PANEL,ENTRY_TYPE,NUMBER,F_SETTING)
  VALUES('HEXXXX', 'L', 13, 'CancelMe')
```

Figure 97. Changing a function key on a help panel or prompt panel

any changes you make to one panel in the class appear on *all* panels that are defined with that class ID, ensure changes you make to one help or prompt panel are appropriate for all the help and prompt panels in that class.

Identifying the Panel You Want to Customize

Use the tables in this section to help you determine what ID to enter in the PANEL column of your function key table. The panel ID appears in the upper left corner of the panel, when the global variable DSQDC_SHOW_PANID is set to 1, using the following command:

```
SET GLOBAL (DSQDC_SHOW_PANID=1
```

Full-Screen Panel Identifiers

The full-screen panel identifiers for the QMF English base are listed in Figure 98 on page 330. For the list of valid full-screen panel ids in a QMF NLF, type in the QMF command: HELP DSQ22957 from within any panel of the QMF NLF. Valid full-screen panel ids for each QMF NLF are listed in the language-specific versions of the DSQ22957 message. Enter the identifiers in the PANEL column of the function key table exactly as they are shown here or in the message text.

```
PROMPTED QUERY      FORM.BREAK1      FORM.COLUMNS
SQL QUERY           FORM.BREAK2      FORM.CONDITIONS
QBE QUERY           FORM.BREAK3      FORM.DETAIL
PROC                FORM.BREAK4      FORM.FINAL
PROFILE             FORM.BREAK5      FORM.MAIN
REPORT              FORM.BREAK6      FORM.OPTIONS
GLOBALS             FORM.CALC        FORM.PAGE
HOME
```

Figure 98. Full-screen panel identifiers for QMF English base

Window Panel Identifiers

Use the tables in this section to reference window panel IDs. If you set the global variable DSQDC_SHOW_PANID to display the panel IDs, you'll notice that each ID shown in these tables is prefaced by 4 characters when it appears on the screen.

Window panels not named in the tables do not have unique panel IDs, and can be customized using the class ID shown at the bottom of each table. All class IDs have the character string XXXX in them. These characters are not variable characters; they are actually part of the ID.

Command Windows

Panel Identifier	Title or Description
COENTR	Command Entry
COXXXX	Command Window Class

Forms Windows

Panel Identifier	Title or Description
FOALIG	Alignment
FODFIN	Definition
FOSPEC	Specify
FOXXXX	Form Window Class

Global Variable Windows

Panel Identifier	Title or Description
GLADVA	Add Variables
GLSHVA	Show Variables

Panel Identifier	Title or Description
GLXXXX	Global Variables Window Class

Help and Prompt Windows

Panel Identifier	Title or Description
HEXXXX	Help Window Class
PRXXXX	Prompt Window Class

Location Windows

Panel Identifier	Title or Description
PLLOCA	Location Window List

Object List Windows

Panel Identifier	Title or Description
OBDESC	Object Description
OBLIAC	Object List: Action
OBLIMU	Object List: Multi-selection
OBLISI	Object List: Single-selection
OBSORT	Object List Sort
OBXXXX	Object List Window Class

Prompted Query Windows

Panel Identifier	Title or Description
QPCDCH	Condition Connector - Change
QPCDIT	Condition Connector
QPCOCH	Column - Change
QPCODE	Column Description
QPCOFI	Column Summary Function Items
QPCOFU	Column Summary Functions
QPCOLI	Column Names List
QPCOLU	Columns
QPDUCH	Duplicate Rows - Change
QPDUPL	Duplicate Rows

Panel Identifier	Title or Description
QPEXPR	Expression
QPJOCO	Join Columns
QPJOTA	Join Tables
QPROBE	Rows - Between
QPROCH	Rows - Change (left side)
QPROCT	Rows - Containing
QPROC1	Rows - Comparison Operators 1
QPROC2	Rows - Comparison Operators 2
QPROEN	Rows - Ending With
QPROEQ	Rows - Equal To
QPROGQ	Rows - Greater Than or Equal To
QPROGR	Rows - Greater Than
QPROLQ	Rows - Less Than or Equal To
QPROLS	Rows - Less Than
QPROST	Rows - Starting With
QPROWS	Rows (Row Conditions)
QPSHFI	Show Field
QPSHSQ	Show SQL
QPSOCH	Sort - Change
QPSORT	Sort
QPSPEC	Specify
QPTABL	Tables
QPXXXX	PQ Window Class

Activating New Function Key Definitions

To enable users to use the customized function key definitions you created:

1. Update the PFKEYS field of the user's profile with the name of your function key definitions table.

   For example, use a query like the one in Figure 99 on page 333 to assign to English QMF user JONES the table MY_PFKEYS, and to German NLF user SCHMIDT the table MEIN_FKY. Always include a value for the TRANSLATION and ENVIRONMENT columns in a query that updates the Q.PROFILES table.

```
Base QMF (English)
        German NLF
UPDATE Q.PROFILES
        UPDATE Q.PROFILES
SET PFKEYS = 'MY_PFKEYS'
        SET PFKEYS = 'MEIN_PFKY'
WHERE CREATOR='JONES'
        WHERE CREATOR='SCHMIDT'
AND TRANSLATION = 'ENGLISH'
        AND TRANSLATION = 'DEUTSCH'
AND ENVIRONMENT = 'CICS' (or 'TSO')
        AND ENVIRONMENT = 'CICS' (or 'TSO')
```

Figure 99. Making customized function keys accessible to a user

2. Grant the SQL SELECT privilege to users who need to access the table.

   To allow any user to whom the table is assigned to use it, grant the SELECT privilege to PUBLIC. For example:

   ```
   GRANT SELECT ON MY_PFKEYS TO PUBLIC
   ```

   To minimize maintenance of function keys at your site, you can assign a view of the table. Grant the SELECT privilege on only the view to prevent users from accessing function keys not meant for their use.

   The procedures for assigning views of a function key table are the same as those for command synonym tables, discussed in "Minimizing Maintenance of Command Synonym Tables" on page 318. Use the strategies discussed in that section to decide whether to assign a table or a view to individual users or groups of users.
3. Instruct users to end the current QMF session and start another to activate the new function keys.

Testing and Problem Diagnosis for the Function Key Table

After you have activated the new function key definition by inserting the function key table name into your Q.PROFILES entry, the new definitions are ready to be tested. The new definitions dol not take effect until one of two conditions is met.

- You close QMF and then start a new QMF session.
- From within QMF, you reconnect to QMF by entering the CONNECT TO *locname* command, where *locname* is the same location name that you see on the QMF home panel.

If you see the message ″Warning messages have been generated″ after you perform one of these two actions, exit QMF and examine your QMF trace data (DSQDEBUG) output. The trace provides messages that you can use to fix

problems. If you do not see the new function key definitions after reconnecting to QMF, it is possible that the Q.SYSTEM_INI proc or other user controlled features is covering up a possible ″Warning messages have been generated″ message. In this case exit QMF and review the DSQDEBUG trace output.

If the QMF trace data shows no errors, issue the SHOW GLOBALS command and check the global variable DSQAP_PFKEY_TABLE. If this global variable does not contain the name of the newly created or modified function key table, review your Q.PROFILES row entry.

Chapter 20. Creating Your Own Edit Codes for QMF Forms

Note: This chapter contains General Use Programming Interface and Associated Guidance Information.

QMF *forms* help users control the format of data returned from the database. Use edit codes in the EDIT column of the MAIN and COLUMNS panels of the QMF form to format report data in different ways. For example, use a decimal edit code for a column that returns salary data. This edit code formats the numeric data into a decimal with a currency symbol.

If the edit codes supplied with QMF do not meet the report editing needs of your site, you can use the information in this chapter to create your own edit codes to be used in the EDIT column of the FORM.MAIN and FORM.COLUMNS panels. *QMF Reference* shows the edit codes supplied with QMF.

This chapter also shows you how to write an edit exit routine in assembler, PL/I, or COBOL to format the data described by your edit code. QMF provides both a standard interface to your edit exit routine and a sample edit exit program you can use as a starting point for writing your own.

QMF running in CICS requires 31-bit addressing.

Before you begin the tasks in this chapter, consider reviewing the sections of *QMF Reference*that describe QMF's functions for report formatting and edit codes.

Quick Start

Use the steps in Table 49 to guide you in creating a user edit exit routine. If you need more information on any step, see the page listed at the right of the table.

Table 49. Creating a user edit exit routine

To do this task:	See:
Decide what you want your routine to do and choose an edit code that identifies the routine. Use either Uxxxx or Vxxxx for your edit code, where *xxxx* is zero to four letters with no embedded blanks or null values.	Page 336
Request that your exit routine format the data by using fields of the IBM-supplied interface control block.	Page 338

Table 49. Creating a user edit exit routine (continued)

To do this task:	See:
Accept parameters from and return formatted results to the exit routine using the standard input and output fields provided in the interface control block.	Page 340
Request that control be passed to your edit exit routine when QMF terminates by setting a termination switch in a field of the interface control block. You might pass control to the edit exit routine if the routine needs to perform cleanup activities, such as releasing storage.	Page 344
To write your edit exit routine in HLASM or assembler, start with the sample assembler program provided by IBM. After you write your program, translate, assemble, and link-edit the program and define it to CICS, or assemble and link-edit the program for TSO.	Page 344
To write your edit exit routine in PL/I, start with the sample PL/I program provided by IBM. After you write your program, translate, compile, and link-edit the program and define it to CICS, or compile and link-edit the program for TSO.	Page 352
To write your edit exit routine in IBM COBOL for MVS and VM, COBOL/370 or VS COBOL II, start with the sample COBOL program provided by IBM. After you write your program, translate, compile, and link-edit the program and define it to CICS, or compile and link-edit the program for TSO.	Page 366

Choosing an Edit Code

Create either a Uxxxx or Vxxxx edit code to be handled by your edit exit routine. For U codes, data passed to the edit routine has the internal database representation of the source data. For V codes, numeric data is converted to a character string, and this character string is passed to the edit program.

Both codes can indicate processing for either character or numeric data. U and V must be uppercase. Replace *xxxx* with zero to four characters (letters, digits, or special characters) that can be entered from a terminal; embedded blanks or nulls are not allowed. The following examples show valid U-type and V-type edit codes:

```
U1    UAB42     V_1    VX%5
```

When the source data is character, codes of either type are equally easy to process. If the formatting requires arithmetic operations, consider using U codes for numeric sources; otherwise, use V codes. If the data type is extended floating point, ensure that the programming language supports it. For example, VS COBOL II doesn't handle extended floating point data. In this case, IBM recommends using V codes.

For V codes containing numeric data, QMF converts the data to character format and then calls the user edit routine. The length of the converted number varies depending upon its original data type, as shown in Table 50.

Table 50. How QMF converts numeric data according to data type

If data type of original numeric data is:	QMF converts it to this length:
Small integer	5
Integer	11
Decimal	Equal to the precision of the original data (raised to an odd number if the original data is even)
Floating point	15 or more depending on the base 10 exponent
Extended floating point	30 or more depending on the base 10 exponent

You need not restrict an edit code to the processing of numeric data, or to the processing of character data. The sample edit routines supplied with QMF process one edit code for both numeric and character data.

If the CASE field of a user's profile has the value UPPER or STRING, QMF converts all input entered from the terminal to uppercase, and the edit code might not be recognized. If your edit code is written to accept edit codes in mixed case, enter the edit codes when case is set to mixed.

Handling DATE, TIME, and TIMESTAMP Information

If your installation supports date/time data types, you can format columns with data types of DATE, TIME, and TIMESTAMP. This enables your users to use local date/time exit routines. For more information about these data types, see *Using QMF*

Your edit routine can format data from these columns, just as it can format data from columns of the other data types. The one difference is that the value to be formatted, which appears in the control block field ECSINPT, is always passed as a character string, whether the code to be processed is a U code or a V code. The format of the string is described in Table 51 on page 338.

Table 51. Formatting DATE, TIME, and TIMESTAMP data

Data type	Form of the string
DATE data	yyyy-mm-dd where: **yyyy** Specifies the year. It is always a four-digit number. **mm** Specifies the month (01 for January, ... 12 for December). It is always a two-digit number that can contain a leading zero. **dd** Specifies the day of the month. It is always a two-digit number that can contain a leading zero. The dashes (-) represent true dashes. For example, 1990-12-12 is the date December 12, 1990.
TIME data	hh.mm.ss where: **hh** Specifies the hour (based on a 24-hour clock, from 00 to 23). It is always a two-digit number that can contain a leading zero. **mm** Specifies the minute. It is always a two-digit number that can contain a leading zero. **ss** Specifies the second. It is always a two-digit number that can contain a leading zero. The periods represent true periods. For example, 13.08.36 is 1:08 P.M. and 36 seconds in the notation commonly used in the United States.
TIMESTAMP data	yyyy-mm-dd-hh.mm.ss.nnnnnn where: **yyyy-mm-dd** Specifies the date in the same way it does for DATE data. **hh.mm.ss** Specifies the time of day in the same way it does for TIME data. **nnnnnn** Specifies a six-digit number that extends the count of seconds (ss) down to the nearest microsecond. For example, 1990-12-12-13.08.36.123456 is 1:08 P.M. and 36.123456 seconds on December 12, 1990, in the notation commonly used in the United States.

For the data types available, see the ECSINTYP field in Table 52 on page 341.

Calling Your Exit Routine to Format the Data

Figure 100 on page 339 shows how QMF and your edit exit routine work together to format data using the edit codes you define.

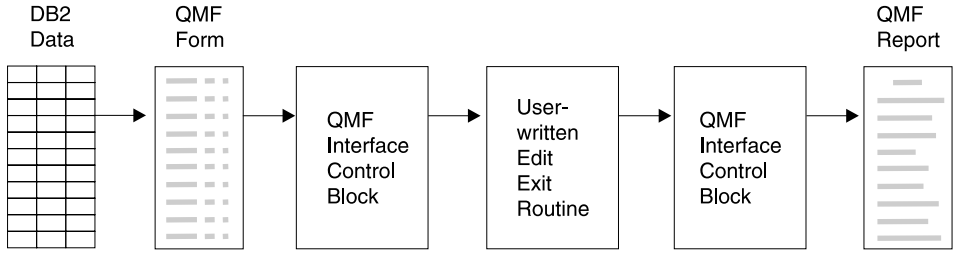


Figure 100. How a user edit routine works with QMF

When you enter your own code in a column of FORM.MAIN or FORM.COLUMNS, QMF passes certain characteristics of the data into the first interface control block shown in Figure 100. These characteristics reside in specific fields of the control block, which are discussed in "Fields of the Interface Control Block" on page 341. QMF also passes into the input area the data to be formatted and an output area that holds the formatted result.

IBM supplies six different versions of a sample edit exit routine in QMF710.SDSQSAPE.

Language	TSO, and native OS/390 batch	CICS
COBOL	DSQUXDTC	DSQUXCTC
PL/I	DSQUXDTP	DSQUXCTP
Assembler	DSQUXDTA	DSQUXCTA

The sample program supports two edit codes:

VSS Adds dashes to a social security number or a character string.

UDN Transforms a department number into its department name, using a table internal to the program.

The sample program is commented so you can more easily see how a user edit routine works. You can use the sample as a template for creating your own program.

QMF supplies a user edit routine in the form of a relocatable module for TSO, SRPI, APPC, and native OS/390 (DSQUEDIT) and a reentrant module for CICS (DSQUECIC), which are located in the QMF library QMF710.SDSQLOAD. Delete or rename the QMF-supplied module when you are ready to use your edit routine. Figure 101 on page 340 shows the general structure of the edit routines.

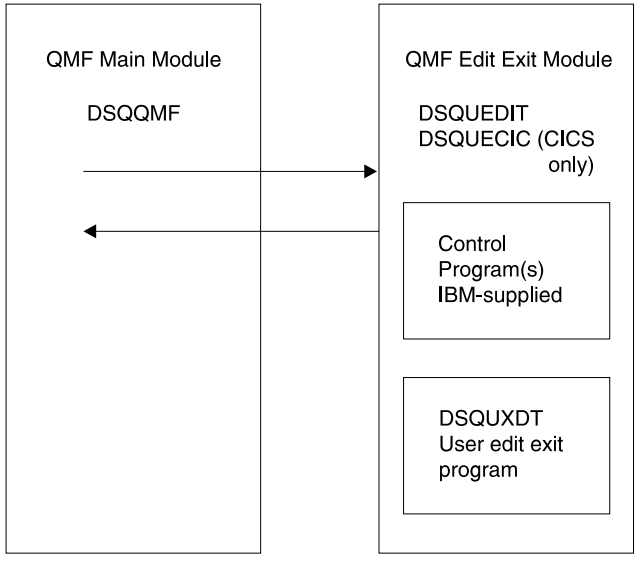


Figure 101. General program structure for edit routines

Passing Information to and from the Exit Routine

To format the data returned from the database, QMF calls your edit exit routine and passes information through fields of the interface control block. Information is also passed to and from the exit routine using the input and output areas, which contain the database data to be formatted and information about where to put the formatted result.

The data to be formatted can be a column value, the result of a built-in function, a defined column, a calculation, or a value represented by a variable in a heading, a footing, or a final-summary line.

Upon receiving control for formatting, your edit routine takes the parameters in the following list.

- The interface control block.
- The value of ECSINPT, the data from the input area to be formatted.
- The value of ECSRSLT, the output area containing the formatted result. ECSRSLEN contains the amount of storage actually passed to this output area on each call. The result cannot be column wrapped.

Important: Do not use more memory in the output area than is indicated in the ECSRSLEN field, or you will see QMF error DSQ60439 - User edit program memory overwrite.

User edit programs may require modifications. To correct this application error, do one of the following:

- Increase the WIDTH of the COLUMN by modifying the edit code in the FORM to the correct length expected on the report.
- Check the length of ECSRSLEN to determine if your program should PAD or TRUNCATE the results passed back to QMF.

ECSINPT, ECSRSLT, and ECSRSLEN are fields of the interface control block, explained in Table 52.

Fields of the Interface Control Block

Use the fields of the interface control block to pass information to and from your exit routine. Although there are separate interface control blocks that work with assembler, PL/I, or COBOL, the fields of the interface control block are standard regardless of the programming language your edit exit routine is written in. These fields are shown in Table 52. Unless otherwise stated, each field relates to all formatting calls.

These same fields appear in each sample program (one for each programming language supported) shipped with QMF. You can include these field names in your own source program. The QMF production disk contains the sample programs.

Table 52. Fields of the QMF interface control block

Name	Contents
ECSDECPT	Contains the current decimal point symbol as determined by the DECOPT option of PROFILE (period or comma).
ECSECODE	Contains the user edit code.
ECSERRET	Contains a zero at the point of call. Set this to a nonzero return code to record an error. Use one of the values on the following list for an error of the indicated type: **Number** — **Error** **99101** Unrecognized edit code **99102** Improper input data type for edit code **99103** Invalid input value for item to be formatted **99104** Item to be formatted is too short **99105** Not enough room for result in ECSRSLT (result is too wide for the space allotted) The error codes listed (and their associated messages and help panels) are specific to the error. For any other code, a general error message, with a general backup help panel, is displayed.

Table 52. Fields of the QMF interface control block (continued)

Name	Contents
ECSFREQ	Holds E for a formatting call, T for a termination call.
ECSINLEN	Contains the length, in bytes, of the value to be formatted.
ECSINNUL	Holds an N if the value to be formatted is null.
ECSINPRC	Contains the precision of the value to be formatted. Applies only to U-type codes when the data type is DECIMAL, or to V-type codes when the character string to be formatted was derived from numeric data.
ECSINSCL	Contains the scale of the value to be formatted. Applies only to U-type codes when the data type is DECIMAL, or to V-type codes when the character string to be formatted was derived from numeric data.
ECSINSGN	Holds the sign of a converted numeric value (blank or -). Applies only to V codes when the character string to be formatted was derived from numeric data.
ECSINTYP	Indicates, in database terms, how the value to be formatted is represented. Applies to edit codes of every type. Values can be: **384** DATE data type **388** TIME data type **392** TIMESTAMP data type **448** VARCHAR data type **452** CHAR data type **456** LONG VARCHAR data type **464** VARGRAPHIC data type **468** GRAPHIC data type **472** LONG VARGRAPHIC data type **480** FLOAT data type **484** DECIMAL data type **496** INTEGER data type **500** SMALLINT data type **940** Extended floating point data type The extended floating point data type is not supported by the database (or by COBOL); it is limited to functions such as AVERAGE and STDEV. Extended floating point values are precise to more than 30 digits.
ECSNAME	Contains the name of the control block, which is DXEECS. Serves as an eye catcher in storage dumps.
ECSRQMF	Set this to T to request a termination call.
ECSRSLEN	Contains the length of the output area, in bytes. (Value is taken from the column WIDTH in the FORM)
ECSTHSEP	Contains the thousands separator as determined by the DECOPT option of PROFILE (blank or a comma).

Table 52. Fields of the QMF interface control block (continued)

Name	Contents
ECSUSERS	A 256-byte scratchpad area where your exit routine can record information that persists from one call to the next. On the first call after the edit routine is loaded, this field contains binary zeros.

Fields that Characterize the Input Area

Restriction: This section does not apply to values from DATE, TIME, and TIMESTAMP columns. For information on values for those types, see "Handling DATE, TIME, and TIMESTAMP Information" on page 337.

During a session, the subprogram DSQUXDT might need to service many different edit codes. If it does, consider making your routine an executive routine, which does nothing but analyze the edit codes passed to it and then invokes an appropriate routine to do the actual formatting. The design makes the source code easier to read and easier to modify when new user edit codes are devised.

In addition to the fields in the interface control block, your edit exit routine receives, in the input field, information about the data to be formatted.

The value to be formatted appears in the field ECSINPT. How it is represented depends on two factors:

- Whether the value to be formatted is numeric or character, as determined by the ECSINTYP field.
- Whether the edit code is a U code or a V code, as determined by the ECSECODE field.

How U-Type Edit Codes Are Represented in the Input Area

Numeric values are represented in internal database format. For example, if ECSINTYP is equal to 496 (INTEGER data type), the value is a full-word integer. If it is 484 (DECIMAL data type), the value is in decimal format. Scale and precision for decimal format are in the ECSINSCL and ECSINPRC fields. Length (in bytes) is in the ECSINLEN field.

Numeric data from defined columns, calculations, and summary values is returned as extended floating point values, a data type not explicitly supported by DB2. The length (16 bytes) is in the ECSINLEN field.

Character or graphic values are represented in their internal, character-string format, with one exception: for variable-length strings (for example,

VARCHAR data type), only the string itself appears and not the preceding length field. For all character values, the string length (in bytes) is in the ECSINLEN field.

How V-Type Edit Codes Are Represented in the Input Area

Numeric values are represented by a numeric character string. The length is contained in the field ECSINLEN. Leading or trailing zeros fill out the string if required.

The string contains no sign or decimal point. Instead, the sign appears as a blank or a minus sign in the field ECSINSGN, and the position of the decimal point is in the field ECSINSCL. For example, suppose that the string in ECSINPT is 12345, that ECSINSGN is blank, and that ECSINSCL is equal to 3; then the value represented is +12.345.

Character or graphic values are represented in their character string. For all character values, the string length (in bytes) is in the ECSINLEN field.

Fields that Characterize the Output Area

The ECSRSLT field receives the formatted output in the form of a character string that completely fills the field. Upon input, this field is always blank. The length of this field (in bytes) is in the ECSRSLEN field. QMF blanks out ECSRSLT before calling the edit routine.

Passing Control to the Exit Routine When QMF Terminates

Use the ECSRQMF field of the control block to indicate that you want your exit routine to receive control whenever QMF terminates. The ECSRQMF value should be updated the first time the edit exit routine receives control.

When your edit exit routine receives control upon termination of QMF, the parameters passed to the routine are the control block, the input area, and the output area. Only the control block contains usable information.

Writing an Edit Routine in HLASM or Assembler

You can write an edit routine in assembler for TSO, SRPI, APPC, CICS, and native OS/390.

Writing an Edit Routine in Assembler for TSO, SRPI, APPC, and Native OS/390

The QMF edit exit interface for assembler in TSO, SRPI, APPC, or native OS/390 consists of these parts:

- Interface control block, which is shipped with QMF as DXEECSA
- Control program, which is shipped with QMF as DSQUXIA
- Your edit exit program, which is named DSQUXDT

Figure 102 shows the program structure of an assembler edit exit routine for TSO, SRPI, APPC, or native OS/390.

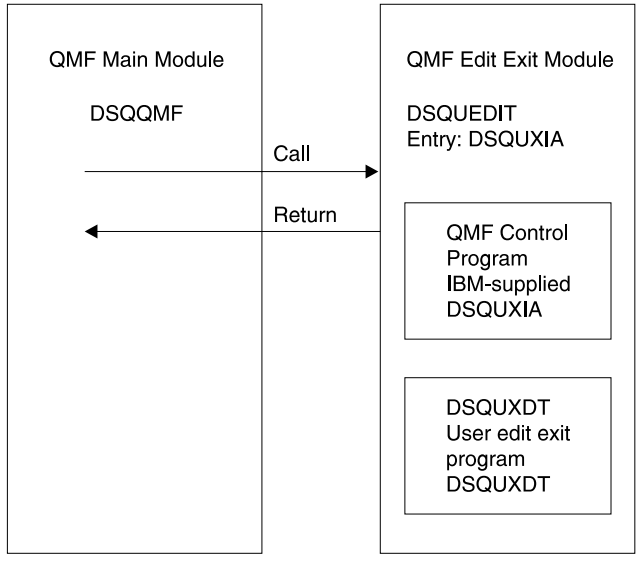
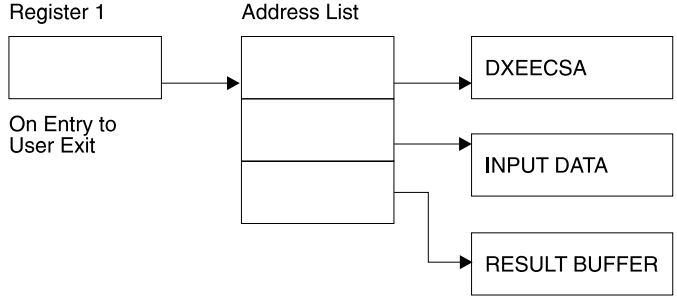


Figure 102. Program structure of an assembler edit exit routine for TSO, SRPI, APPC, or native OS/390

How an Assembler Edit Routine Interacts with TSO, SRPI, APPC, and Native OS/390

The user edit program is called as a subroutine in TSO, SRPI, APPC, and native OS/390, using a standard assembler CALL statement. On entry to your edit exit program, the following conditions exist:

- Register 1 contains the address of a standard parameter list.



- Register 13 contains the address of a standard SAVE area.
- Register 14 contains the caller's (QMF) return address.

An assembler DSECT for DXEECS is shipped with QMF as DXEECSA, located in library QMF710.SDSQSAPE. Include this DSECT in your program using the assembler COPY statement.

Return control to QMF in the standard convention by restoring registers to their value at the time of the call and then returning to the address in register 14.

Assembling Your Program

During the assembly, QMF edit exit interface control block DXEECSA, located in QMF sample library QMF710.SDSQUSRE in TSO, SRPI, APPC, or native OS/390, must be available in a macro library.

Link-Editing Your Program

Create a new QMF edit exit module DSQUEDIT by including your edit program DSQUXDT with the IBM-supplied control module DSQUXIA, which is located in the QMF module library QMF710.SDSQLOAD. The IBM-supplied control module DSQUXIA must be specified as the entry point.

The module DSQUEDIT can be executed in either 24-bit or 31-bit addressing mode. QMF runs in 31-bit addressing mode and automatically switches to 24-bit addressing mode if the edit exit module DSQUEDIT has a 24-bit addressing mode.

We recommend 31-bit addressing mode.

Example Statements for Assembling and Link-Editing (TSO, SRPI, APPC, or Native OS/390)

The following are example statements for assembling and link-editing your job for TSO, SRPI, APPC, or native OS/390:

```
//sampasm    JOB
//STEP1      EXEC PROC=ASMHCL
//* Provide Access to QMF Edit Macro DXEECSA
//C.SYSLIB   DD  DSN=QMF710.SDSQUSRE,DISP=SHR
//C.SYSIN    DD  *
          .
          Your program or copy of QMF sample DSQUXDTA
          .
/*
//* Provide Access to QMF Interface Module
//L.QMFLOAD  DD DSN=QMF710.SDSQLOAD,DISP=SHR
//L.SYSIN    DD  *
          INCLUDE QMFLOAD(DSQUXIA)
          ENTRY DSQUXIA
          MODE  AMODE(31) RMODE(ANY)
          NAME  DSQUEDIT(R)
/*
```

Example Program

The IBM-supplied example edit program in assembler, named DSQUXDTA, is located in QMF sample library QMF710.SDSQSAPE. The example program is

heavily commented; it can be browsed online, printed, or modified to meet your needs. If you plan to use this program, copy it to your program library and change its name to DSQUXDT.

Writing an Edit Routine in Assembler for CICS

The QMF edit exit interface for assembler in CICS consists of these parts:

- Interface control block, which is shipped with QMF as DXEECSA
- CICS prolog and epilog macros, which are shipped with CICS as DFHEIENT and DFHEIRET
- CICS command interface modules, which are shipped with CICS as DFHEAI and DFHEAI0
- Your edit exit program, which is named DSQUECIC

Figure 103 shows the program structure of an assembler edit exit routine for CICS.

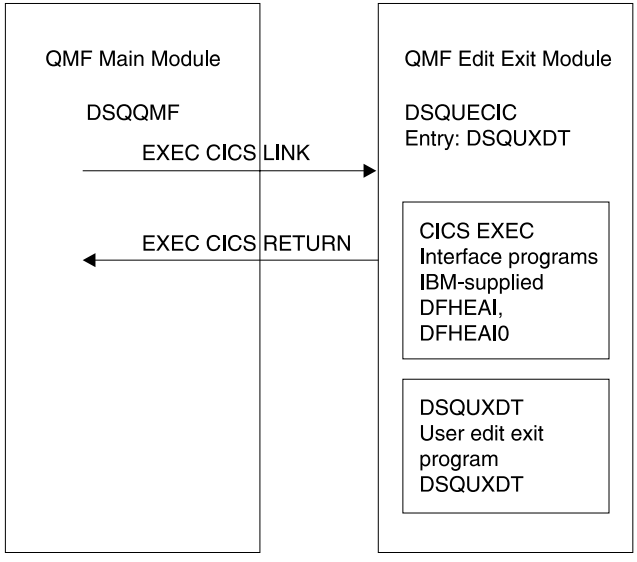
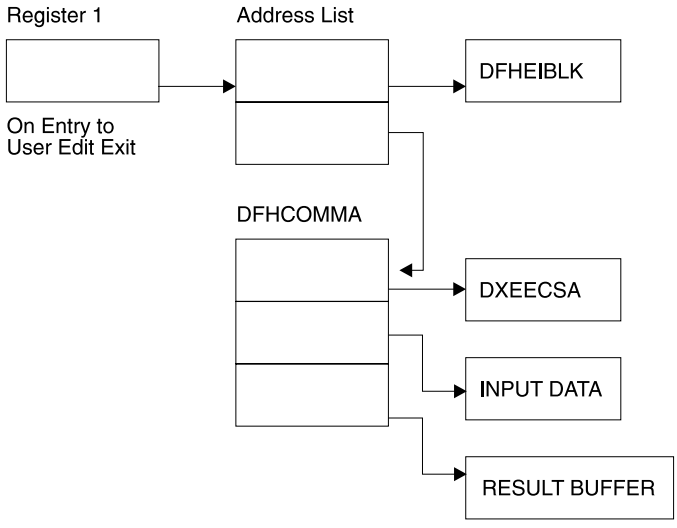


Figure 103. Program structure of an assembler edit exit routine for CICS

How an Assembler Edit Routine Interacts with CICS

The user edit program is called by using the standard CICS LINK command interface. Your program is executing on a different program level than the main QMF program. On entry to your edit exit program, the following conditions exist:

- Register 1 contains the address of a standard CICS parameter list suitable for processing by CICS supplied macros DFHEIENT and DFHEIRET.



- Register 13 contains the address of a standard CICS working storage area as described by CICS supplied macro DFHEISTG.

An assembler DSECT for DXEECS is shipped with QMF as DXEECSA, located in library QMF710.SDSQSAPE. Include this DSECT into your program using the assembler COPY statement.

Return control to QMF by using the standard CICS RETURN command.

Translating Your Program

You must translate your program using the CICS translator for assembler. When you translate your program, CICS normally supplies the standard CICS prologue (DFHEIENT) which sets up addressability, saves registers in the standard CICS working storage area, and provides a standard CICS epilogue (DFHEIRET).

Return control to QMF by using the CICS RETURN command; for example, EXEC CICS RETURN.

Assembling Your Program

During assembly, QMF edit exit interface control block DXEECSA, located in QMF sample library QMF710.SDSQUSRE, and the CICS macro library must be available.

Link-Editing Your Program

Create a new QMF edit exit module DSQUECIC by including your edit program DSQUXCTA with EXEC CICS interface control modules DFHEAI

and DFHEAI0, which are located in the CICS module library as distributed by the CICS product. The EXEC CICS module DFHEAI must be the first module in the edit exit module and the entry point must be DSQUECIC.

The module DSQUECIC must be executable in 31-bit addressing mode.

Example Statements for Translating, Assembling and Link-Editing (CICS)

The following are example statements for translating, assembling, and link-editing your job for CICS.

```
 //SAMPASM  JOB ...
//* Add a parameter PROGLIB to procedure DFHEITAL
//*      PROGLIB=&PROGLIB,
//TRNCOMLK EXEC PROC=DFHEITAL,PROGLIB='QMF710.SDSQLOAD'
//TRN.SYSIN DD *
      .
      Your program or modified copy of QMF sample DSQUXCTA
      .
/*
//* Provide access to QMF Edit Macro DXEECSA
//ASM.SYSLIB DD  DSN=QMF710.SDSQUSRE,DISP=SHR
//LKED.SYSIN  DD  *
    INCLUDE SYSLIB(DFHEAI)
    INCLUDE CICSLOAD(DFHEAI0)
    ORDER DFHEAI,DFHEAI0
    ENTRY DSQUECIC
    MODE AMODE(31) RMODE(ANY)
    NAME DSQUECIC(R)
/*
```

Example Program

The IBM-supplied example edit program, named DSQUXCTA, is located in QMF sample library QMF710.SDSQSAPE. The example program is heavily commented; you can print it, browse it online, or modify it to meet your needs. If you plan to use this program, copy it to your program library and change its name to DSQUECIC.

How an Assembler Edit Routine Interacts with QMF

The interface control block between QMF and the user edit interface DSQUEDIT is DXEECS. It contains the user's edit code, identifies the source data and the target location for the edited result, and provides a scratchpad area for the user edit routine's use. The control block is persistent between calls to the user edit routine. The scratchpad area is not modified by QMF after the initial invocation of the exit routine.

Figure 104 on page 350 shows the DXEECS control block for assembler.

```
************************************************************************ 00001000
*                                                                      * 00002000
*        CONTROL BLOCK NAME: DXEECS (ASSEMBLER VERSION)                * 00003000
*                                                                      * 00004000
*        FUNCTION:                                                     * 00005000
*                                                                      * 00006000
*            THIS IS THE INTERFACE CONTROL BLOCK BETWEEN QMF AND        * 00007000
*            THE USER EDITING INTERFACE, DSQUEDIT (TSO/CMS), OR        * 00008000
*            DSQUECIC (CICS).                                          * 00009000
*                                                                      * 00010000
*            IT CONTAINS THE USER'S EDIT CODE, IDENTIFIES THE SOURCE   * 00011000
*            DATA AND THE TARGET LOCATION FOR THE EDITED RESULT        * 00012000
*            AND PROVIDES A SCRATCHPAD AREA FOR THE USER EDIT          * 00013000
*            ROUTINE'S USE.                                            * 00014000
*                                                                      * 00015000
*            THIS CONTROL BLOCK IS PERSISTENT BETWEEN CALLS TO THE     * 00016000
*            USER EDIT ROUTINE.                                        * 00017000
*                                                                      * 00018000
*            THE SCRATCHPAD AREA WILL NOT BE MODIFIED BY QMF AFTER     * 00019000
*            THE INITIAL INVOCATION OF THE EXIT ROUTINE.               * 00020000
*                                                                      * 00021000
*                                                                      * 00022000
*        STATUS: VERSION 7 RELEASE 1 LEVEL 0                           * 00023000
*                                                                      * 00024000
*        INNER CONTROL BLOCKS: NONE                                    * 00025000
*                                                                      * 00026000
*        CHANGE ACTIVITY:                                              * 00027000
*                                                                      * 00028000
*        CHANGE DATE:                                                  * 00029000
*                                                                      * 00030000
************************************************************************ 00031000
*                                                                        00032000
DXEECS   DSECT                                                          00033000
ECSNAME  DS    CL8           -- CONTROL BLOCK IDENTIFICATION            00034000
         SPACE                                                          00035000
ECSEDCTL DS    XL40          -- EDIT CONTROL                            00036000
         ORG   ECSEDCTL                                                 00037000
ECSFREQ  DS    CL1           ----- FUNCTION REQUEST                     00038000
ECSFEDIT EQU   C'E'          -------- EDIT FUNCTION                     00039000
ECSFTERM EQU   C'T'          -------- TERMINATE FUNCTION                00040000
*                                      (TO FREE RESOURCES... QMF         00041000
*                                       WILL CALL THE USER EDIT          00042000
*                                       ROUTINE FOR THIS FUNCTION        00043000
*                                       ONLY IF THE USER EDIT ROUTINE    00044000
*                                       HAS PREVIOUSLY REQUESTED IT.     00045000
*                                       SEE ECSRQMF BELOW.)              00046000
ECSPAD10 DS    CL3           ----- RESERVED FIELD                       00047000
ECSECODE DS    CL5           ----- EDIT CODE FROM FORM OBJECT           00048000
```

Figure 104. User edit routine field definitions for assembler DXEECS control block (Part 1 of 3)

```
ECSPAD20 DS    CL3          ----- RESERVED FIELD                        00049000
ECSDECPT DS    CL1          ----- SYMBOL FOR DECIMAL POINT              00050000
*                                  (AS DEFINED BY DECIMAL OPTION IN     00051000
*                                  CURRENT PROFILE OBJECT               00052000
ECSTHSEP DS    CL1          ----- SYMBOL FOR THOUSANDS SEPARATOR        00053000
*                                  (AS DEFINED BY DECIMAL OPTION IN     00054000
*                                  CURRENT PROFILE OBJECT               00055000
ECSPAD30 DS    CL6          ----- RESERVED FIELD                        00056000
ECSQMF   DS    CL20         ----- AREA RESERVED FOR QMF'S USE           00057000
         SPACE                                                          00058000
ECSINDTA DS    XL16         -- DESCRIPTION OF THE INPUT DATA            00059000
         ORG   ECSINDTA                                                 00060000
ECSINTYP DS    F            ----- DATA TYPE OF THE INPUT AS IT          00061000
*                                  EXISTS IN THE DATA BASE.             00062000
ECSFLT   EQU   480          ------- FLOATING POINT DATA TYPE CODE       00063000
ECSDEC   EQU   484          ------- DECIMAL DATA TYPE CODE              00064000
ECSINT   EQU   496          ------- INTEGER DATA TYPE CODE              00065000
ECSSINT  EQU   500          ------- SMALL INTEGER DATA TYPE CODE        00066000
ECSVCHR  EQU   448          ------- VARCHAR DATA TYPE CODE              00067000
ECSFCHR  EQU   452          ------- (FIXED) CHARACTER DATA TYPE CODE    00068000
ECSLCHR  EQU   456          ------- LONG VARCHAR DATA TYPE CODE         00069000
ECSVG    EQU   464          ------- VARGRAPHIC DATA TYPE CODE           00070000
ECSFG    EQU   468          ------- (FIXED) GRAPHIC DATA TYPE CODE      00071000
ECSLG    EQU   472          ------- LONG VARGRAPHIC DATA TYPE CODE      00072000
ECSDATE  EQU   384          ------- DATE DATA TYPE CODE                 00073000
ECSTIME  EQU   388          ------- TIME DATA TYPE CODE                 00074000
ECSTS    EQU   392          ------- TIMESTAMP DATA TYPE CODE            00075000
ECSFLTX  EQU   940          ------- EXTENDED FLOATING PT CODE           00076000
*                                                                       00077000
ECSINLEN DS    F            ----- LENGTH OF INPUT DATA                  00078000
ECSINPRC DS    H            ----- PRECISION OF INPUT DATA IF IT IS      00079000
*                                  DECIMAL DATA TYPE (U-TYPE EDIT CODE) 00080000
*                                  OR IF IT WAS ANY NUMERIC DATA TYPE   00081000
*                                  (V-TYPE EDIT CODE)...                00082000
*                                   ZERO OTHERWISE                      00083000
ECSINSCL DS    H            ----- SCALE OF INPUT DATA IF IT IS          00084000
*                                  DECIMAL DATA TYPE (U-TYPE EDIT CODE) 00085000
*                                  OR IF IT WAS ANY NUMERIC DATA TYPE   00086000
*                                  (V-TYPE EDIT CODE)...                00087000
*                                   ZERO OTHERWISE                      00088000
ECSINSGN DS    CL1          ----- SIGN OF CONVERTED NUMERIC DATA        00089000
*                                  (V-TYPE EDIT CODE ONLY)...           00090000
ECSPLUS  EQU   C' '         -------- POSITIVE SIGN                      00091000
ECSMINUS EQU   C'-'         -------- NEGATIVE SIGN                      00092000
*                                                                       00093000
ECSINNUL DS    CL1          ----- NULL INPUT DATA INDICATOR             00094000
ECSNULL  EQU   C'N'         -------- INPUT DATA IS NULL                 00095000
*                                                                       00096000
```

Figure 104. User edit routine field definitions for assembler DXEECS control block (Part 2 of 3)

```
ECSPAD40 DS    CL10          ----- RESERVED FIELD                        00097000
         SPACE                                                          00098000
ECSRSDTA DS    XL16          -- DESCRIPTION OF THE RESULT BUFFER        00099000
         ORG   ECSRSDTA                                                 00100000
ECSRSLEN DS    F             ----- LENGTH OF RESULT AREA                00101000
*                                  (EQUIVALENT TO COLUMN WIDTH IN THE   00102000
*                                  FORM OBJECT                          00103000
ECSPAD50 DS    CL12          ----- RESERVED FIELD                       00104000
         SPACE                                                          00105000
ECSUCTL  DS    XL16          -- USER CONTROL AREA                       00106000
         ORG   ECSUCTL                                                  00107000
ECSERRET DS    F             ----- EDIT ROUTINE ERROR RETURN CODE       00108000
ECSERR01 EQU   99101         -------- UNRECOGNIZED EDIT CODE            00109000
ECSERR02 EQU   99102         -------- IMPROPER INPUT DATA TYPE          00110000
ECSERR03 EQU   99103         -------- INVALID INPUT DATA VALUE          00111000
ECSERR04 EQU   99104         -------- INPUT DATA LENGTH IS TOO SHORT    00112000
ECSERR05 EQU   99105         -------- RESULT BUFF LENGTH IS TOO SHORT   00113000
*                                                                       00114000
ECSRQMF  DS    CL1           ----- REQUEST FOR QMF                      00115000
ECSRTERM EQU   C'T'          -------- REQUEST INVOCATION FOR            00116000
*                                     TERMINATION FUNCTION              00117000
*                                                                       00118000
ECSPAD60 DS    CL11          ----- RESERVED FIELD                       00119000
         SPACE                                                          00120000
ECSUSERS DS    CL256         -- USER SCRATCH PAD AREA                   00121000
         SPACE 2                                                        00122000
ECSINPT  DSECT               -- EDIT ROUTINE INPUT DATA                 00123000
ECSINPTC DS    CL32767       ----- CHARACTER STRING                     00124000
         ORG   ECSINPTC                                                 00125000
ECSINSIN DS    H             ----- SMALL INTEGER                        00126000
         ORG   ECSINPTC                                                 00127000
ECSININT DS    F             ----- INTEGER                              00128000
         ORG   ECSINPTC                                                 00129000
ECSINFLT DS    D             ----- FLOATING POINT                       00130000
         SPACE 2                                                        00131000
ECSRSLT  DSECT               -- EDIT ROUTINE RESULT BUFFER              00132000
ECSRSLTC DS    CL32767       ----- CHARACTER STRING                     00133000
```

Figure 104. User edit routine field definitions for assembler DXEECS control block (Part 3 of 3)

Writing an Edit Routine in PL/I

You can write an edit routine in PL/I for TSO or CICS.

Writing an Edit Routine in PL/I for TSO, SRPI, APPC, or Native OS/390 without Language Environment (LE)

The QMF edit exit interface for PL/I in TSO, SRPI, APPC, or native OS/390 consists of these parts:

- Interface control block, which is shipped with QMF as DXEECSP
- Control program, which is shipped with QMF as DSQUXIP

- Control program, which is shipped with QMF as DSQUPLI
- Your edit exit program, which is named DSQUXDT

Figure 105 shows the program structure of a PL/I edit exit routine in TSO, SRPI, APPC, or native OS/390.

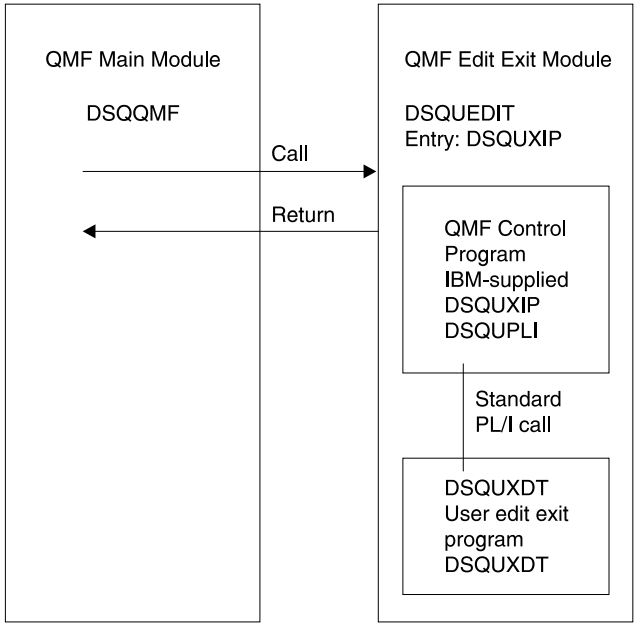


Figure 105. Program structure of a PL/I edit exit routine in TSO, SRPI, APPC, or native OS/390 without LE

How a PL/I Edit Routine Interacts with TSO, SRPI, APPC, or Native OS/390

The user edit program is called as a PL/I external procedure using a standard PL/I CALL statement. The following parameters are provided in the indicated order:

1. DXEECS
2. Input data
3. Output data

An example procedure statement specifying parameters is as follows:

```
DSQUXDT:
  PROCEDURE(DXEECSF,ECSINPTF,ECSRSLTF) OPTIONS(REENTRANT);
```

A PL/I data structure is shipped with QMF as DXEECSP, located in library QMF710.SDSQSAPE. Include this data structure in your program.

Return control to QMF using a standard RETURN statement.

Compiling DSQUXDT and DSQUPLI

During the compile, QMF edit exit interface control block DXEECSP, located in QMF sample library QMF710.SDSQUSRE, must be available in a macro library.

Compile both programs with no STAE or SPIE macros. To do this, add the following statement to your PL/I program:

```
DCL PLIXOPT CHAR(15) VAR INIT('NOSTAE,NOSPIE') STATIC EXTERNAL;
```

Compile DSQUPLI with the MAIN option. Your edit exit program DSQUXDT must **not** specify MAIN.

Link-Editing Your Program

Create a new QMF edit exit module DSQUEDIT by including your edit program DSQUXDT with the IBM-supplied control modules DSQUXIP and DSQUPLI, which are located in the QMF module library QMF710.SDSQLOAD. The module DSQUXIC must be specified as the entry point.

The module DSQUEDIT can be executed in either 24-bit or 31- bit addressing mode. QMF runs in 31-bit addressing mode and automatically switches to 24-bit addressing mode if the edit exit module DSQUEDIT has a 24-bit addressing mode.

We recommend 31-bit addressing mode.

Example Statements for Compiling and Link-Editing (TSO, SRPI, APPC, or Native OS/390)

The following are example statements for assembling and link-editing your job for TSO, SRPI, APPC, or native OS/390.

```
//samPLI     JOB
//STEP1      EXEC IEL1CL
//* Provide Access to QMF Edit Macro DXEECSP
//PLI.SYSLIB   DD  DSN=QMF710.SDSQUSRE,DISP=SHR
//PLI.SYSIN    DD  *
          .
          Your program or copy of QMF sample DSQUXDTP
          .
/*
//* Provide Access to QMF Interface Module
//LKED.QMFLOAD  DD DSN=QMF710.SDSQLOAD,DISP=SHR
//LKED.SYSIN    DD  *
          INCLUDE QMFLOAD(DSQUXIP)
          INCLUDE QMFLOAD(DSQUPLI)
          ENTRY DSQUXIP
          MODE  AMODE(31) RMODE(ANY)
          NAME  DSQUEDIT(R)
/*
```

Example Program

The IBM-supplied example edit exit program in PL/I, named DSQUXDTP, is located in QMF sample library QMF710.SDSQSAPE. The example program is heavily commented; it can be browsed online, printed, or modified to meet your needs. If you plan to use this example program, copy it to your program library and change its name to DSQUXDT.

Writing an Edit Routine in PL/I for TSO, SRPI, APPC, or Native OS/390 with Language Environment (LE)

The QMF edit exit interface for PL/I in TSO, SRPI, APPC, or native OS/390 with LE consists of these parts:

- Interface control block, which is shipped with QMF as DXEECSP
- Control program, which is shipped with QMF as DSQUXILE
- Dynamic loaded LE preinitialization service program, which is named CEEPIPI
- Your edit exit program, which is named DSQUXDT

Figure 106 shows the program structure of a PL/I edit exit routine in TSO, SRPI, APPC, or native OS/390.

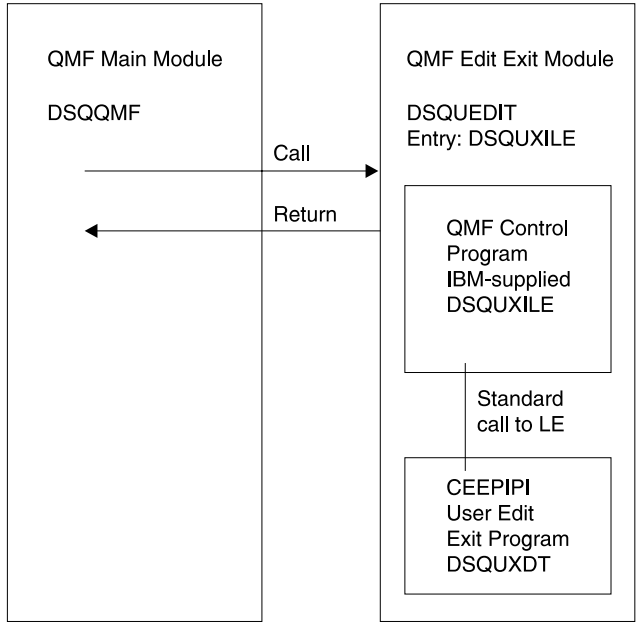


Figure 106. Program structure of a PL/I edit exit routine in TSO, SRPI, APPC, or native OS/390 with LE

How a PL/I Edit Routine Interacts with TSO, SRPI, APPC, or Native OS/390 with LE

The user edit program is called as an LE subroutine. The following parameters are provided in the indicated order:

1. DXEECS
2. Input data
3. Output data

An example procedure statement specifying parameters is as follows:

```
DSQUXDT:
  PROCEDURE(DXEECSF,ECSINPTF,ECSRSLTF) OPTIONS(REENTRANT);
```

A PL/I data structure is shipped with QMF as DXEECSP, located in library QMF710.SDSQSAPE. Include this data structure in your program.

Return control to QMF using a standard RETURN statement.

Compiling DSQUXDT

During the compile, QMF edit exit interface control block DXEECSP, located in QMF sample library QMF710.SDSQUSRE, must be available in a macro library.

Compile the program with no STAE or SPIE macros. To do this, add the following statement to your PL/I program:

```
DCL PLIXOPT CHAR(15) VAR INIT('NOSTAE,NOSPIE') STATIC EXTERNAL;
```

Compile DSQUPLI with the MAIN option. Your edit exit program DSQUXDT must **not** specify MAIN.

Link-Editing Your Program

Create a new QMF edit exit module DSQUEDIT by including your edit program DSQUXDT with the IBM-supplied control module DSQUXILE, located in the QMF module library QMF710.SDSQLOAD. The module DSQUXILE must be specified as the entry point.

The module DSQUEDIT can be executed in either 24-bit or 31- bit addressing mode. QMF runs in 31-bit addressing mode and automatically switches to 24-bit addressing mode if the edit exit module DSQUEDIT has a 24-bit addressing mode.

We recommend 31-bit addressing mode.

Example Statements for Compiling and Link-Editing (TSO, SRPI, APPC, or Native OS/390)

The following are example statements for assembling and link-editing your job for TSO, SRPI, APPC, or native OS/390.

```
//samPLI     JOB
//STEP1      EXEC PLIXCL
//* Provide Access to QMF Edit Macro DXEECSP
//PLI.SYSLIB   DD  DSN=QMF710.SDSQUSRE,DISP=SHR
//PLI.SYSIN    DD  *
          .
          Your program or copy of QMF sample DSQUXDTP
          .
/*
//* Provide Access to QMF & LE Interface Module
//LKED.QMFLOAD  DD DSN=QMF710.SDSQLOAD,DISP=SHR
//LKED.SYSLIB        DD DSN=SYS1.SCEELKED,DISP=SHR
//LKED.SYSIN    DD  *
          INCLUDE QMFLOAD(DSQUXILE)
          ENTRY DSQUXILE
          MODE  AMODE(31) RMODE(ANY)
          NAME  DSQUEDIT(R)
/*
```

Example Program

The IBM-supplied example edit exit program in PL/I, named DSQUXDTP, is located in QMF sample library QMF710.SDSQSAPE. The example program is heavily commented; it can be browsed online, printed, or modified to meet your needs. If you plan to use this example program, copy it to your program library and change its name to DSQUXDT.

Writing an Edit Routine in PL/I for CICS

The QMF edit exit interface for PL/I in CICS consists of these parts:

- Interface control block, which is shipped with QMF as DXEECSP
- CICS command interface modules, which are shipped with CICS as DFHPL1OI
- Your edit exit program, which is named DSQUECIC

Figure 107 on page 358 shows the program structure of a PL/I edit exit routine in CICS.

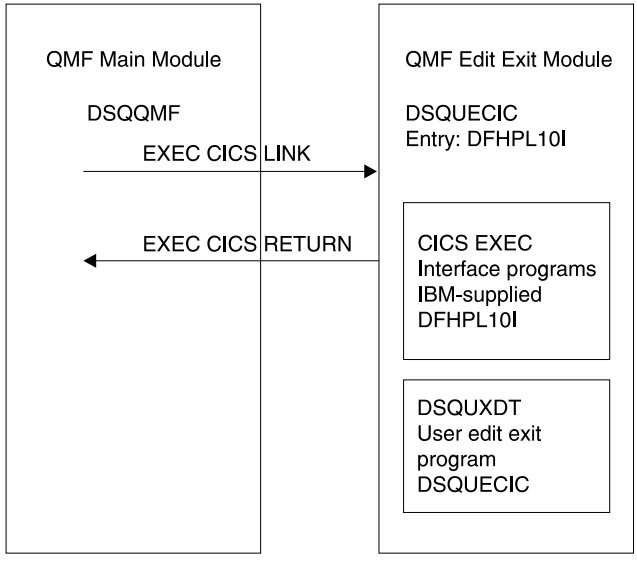
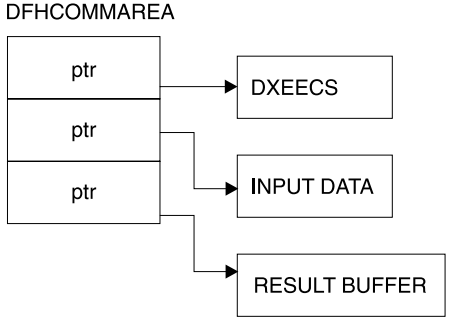


Figure 107. Program structure for PL/I edit exit routine in CICS

How a PL/I Edit Routine Interacts with CICS

The user edit program is called by using the standard CICS LINK command interface. Your program is executing on a different program level than the main QMF program. The user edit program must be translated using the CICS translator for PL/I.

The CICS communications area DFHCOMMAREA is used to provide addresses to the user edit routine program parameters, DXEECS, input data, and output data as shown in the following diagram.



After translation, the CICS translator provides a procedure statement that describes the CICS environment block DFHEIBLK. Provide a parameter that is a pointer to the CICS communications block DFHCOMMAREA such as the following example:

```
DSQUECIC:
  PROCEDURE(DFHCOMMP) OPTIONS(REENTRANT,MAIN);
```

QMF provides addresses to the user edit routine control block DXEECS, input data, and output data in the CICS communications area DFHCOMMAREA. Provide your own description of the DFHCOMMAREA in the PL/I program as follows:

```
/*****************************************************************/
/*  CICS DFHCOMM ARE DESCRIPTION OF EDIT EXIT PARAMETERS         */
/*****************************************************************/
DECLARE
  DFHCOMMP PTR;
DECLARE
  1  DFHCOMM BASED(DFHCOMMP),
     02 DFHCOMM_ECSPTR PTR,
     02 DFHCOMM_INPTR  PTR,
     02 DFHCOMM_OUTPTR PTR;
```

To provide addressability to the user edit routine control block DXEECS, input data area ECSINPT, and the result data area ECSRSLT, set the addresses of these data areas to the values located in DFHCOMMAREA as in the following example:

```
ECSPTR   = DFHCOMM_ECSPTR;    /* ADDRESS OF DXEECS:
                                 EDIT CODE SPECIFICATIONS       */
ECSINPTP = DFHCOMM_INPTR;     /* ADDRESS OF INPUT DATA          */
ECSRSLTP = DFHCOMM_OUTPTR;    /* ADDRESS OF RESULT AREA         */
```

A PL/I data structure is shipped with QMF as DXEECSP, located in library QMF710.SDSQSAPE. Include this structure in your program.

Return control to QMF using a standard CICS RETURN command such as the following:

```
EXEC CICS RETURN;
```

Translating Your Program

Translate your program using the CICS translator for PL/I. During translation, CICS normally supplies an input parameter and data structure definition for the CICS environment control block EIB.

Compiling Your Program

QMF edit exit interface control block DXEECSP, located in QMF sample library QMF710.SDSQUSRE, must be available in a macro library during the compile.

You must compile your program with no STAE or SPIE macros. To do this you should add the following statement to your PL/I program:

```
DCL PLIXOPT CHAR(15) VAR INIT('NOSTAE,NOSPIE') STATIC EXTERNAL;
```

Specify PL/I compiler option SYSTEM(CICS).

Link-Editing Your Program

Create a new QMF edit exit module DSQUECIC by including the EXEC CICS interface control module DFHPL1OI, located in the CICS module library as distributed by the CICS product, and your edit exit program. Be sure to allocate PL/I libraries required for link-edit.

The module DSQUECIC must be executable in 31-bit addressing mode.

Example Statements for Translating, Compiling, and Link-Editing (CICS)

The following are example statements for translating, compiling, and link-editing your job for CICS.

```
//SAMPLI   JOB ...
//* Add a parameter PROGLIB to procedure DFHEITPL
//*      PROGLIB=&PROGLIB,
//TRNCOMLK EXEC PROC=DFHEITPL,PROGLIB='QMF710.SDSQLOAD'
//TRN.SYSIN DD *
      .
      Your program or modified copy of QMF sample DSQUXCTP
      .
/*
//* Provide access to QMF Edit Macro DXEECSP
//PLI.SYSLIB DD  DSN=QMF710.SDSQUSRE,DISP=SHR
//LKED.SYSIN  DD  *
    REPLACE  PLISTART
    INCLUDE  CICSLOAD(DFHPL1OI)
    REPLACE  PLISTART
    ORDER    DFHPL1OI
    ENTRY    DFHPL1OI
    MODE     AMODE(31),RMODE(ANY)
    NAME     DSQUECIC(R)
/*
```

CICS Program Definition

When QMF is installed, the QMF edit exit program is installed with a program language of assembler. To use the PL/I edit exit program, you must change the program language of module DSQUECIC to PL/I using the CICS program control table (PCT) macro or resource definition online (RDO).

Example Program

The IBM-supplied example edit program, named DSQUXCTP, is located in QMF sample library QMF710.SDSQSAPE. The example program is heavily commented; it can be browsed online, printed, or modified to meet your needs. If you plan to use this program, copy it to your program library and change its name to DSQUECIC.

How a PL/I Edit Routine Interacts with QMF

The interface control block between QMF and the user edit interface DSQUEDIT is DXEECS. It contains the user's edit code, identifies the source data and the target location for the edited result, and provides a scratchpad area for the user edit routine's use. The control block is persistent between calls to the user edit routine. The scratchpad area is not modified by QMF after the initial invocation of the exit routine.

Figure 108 on page 362 shows the DXEECS control block for assembler.

```
/*****************************************************************/ 00001000
/*                                                               */ 00002000
/*      CONTROL BLOCK NAME: DXEECS   (PLI VERSION)               */ 00003000
/*                                                               */ 00004000
/*      FUNCTION:                                                */ 00005000
/*                                                               */ 00006000
/*          THIS IS THE INTERFACE CONTROL BLOCK BETWEEN QMF AND   */ 00007000
/*          THE USER EDITING ROUTINE INTERFACE, DSQUEDIT (TSO/CMS). */ 00008000
/*          OR DSQUECIC (CICS).                                  */ 00009000
/*                                                               */ 00010000
/*          IT CONTAINS THE USER'S EDIT CODE, IDENTIFIES THE SOURCE */ 00011000
/*          DATA AND THE TARGET LOCATION FOR THE EDITED RESULT    */ 00012000
/*          AND PROVIDES A SCRATCHPAD AREA FOR THE USER EDIT      */ 00013000
/*          ROUTINE'S USE.                                       */ 00014000
/*                                                               */ 00015000
/*          THIS CONTROL BLOCK IS PERSISTENT BETWEEN CALLS TO THE */ 00016000
/*          USER EDIT ROUTINE.                                   */ 00017000
/*                                                               */ 00018000
/*          THE SCRATCHPAD AREA WILL NOT BE MODIFIED BY QMF AFTER */ 00019000
/*          THE INITIAL INVOCATION OF THE EXIT ROUTINE.          */ 00020000
/*                                                               */ 00021000
/*                                                               */ 00022000
/*      STATUS: VERSION 7 RELEASE 1 LEVEL 0                      */ 00023000
/*                                                               */ 00024000
/*      INNER CONTROL BLOCKS: NONE                               */ 00025000
/*                                                               */ 00026000
/*      CHANGE ACTIVITY:                                         */ 00027000
/*                                                               */ 00028000
/*      CHANGE DATE:                                             */ 00029000
/*                                                               */ 00030000
/*****************************************************************/ 00031000
                                                                    00032000
DECLARE                                                             00033000
  1 DXEECS BASED(ECSPTR),          /* EDIT ROUTINE INFORMATION    */ 00034000
    3 ECSNAME  CHARACTER(8),       /* CONTROL BLOCK IDENTIFICATION */ 00035000
                                                                    00036000
    3 ECSEDCTL,                    /* EDIT CONTROL                */ 00037000
      5 ECSFREQ  CHARACTER(1),     /* FUNCTION REQUEST               00038000
                                      (CODES ARE DEFINED BELOW)   */ 00039000
      5 ECSPAD10 CHARACTER(3),     /* RESERVED FIELD              */ 00040000
      5 ECSECODE CHARACTER(5),     /* EDIT CODE FROM FORM OBJECT  */ 00041000
      5 ECSPAD20 CHARACTER(3),     /* RESERVED FIELD              */ 00042000
      5 ECSDECPT CHARACTER(1),     /* SYMBOL FOR DECIMAL POINT       00043000
                                      (AS DEFINED BY DECIMAL OPTION  00044000
                                       IN CURRENT PROFILE OBJECT) */ 00045000
      5 ECSTHSEP CHARACTER(1),     /* SYMBOL FOR THOUSANDS SEPARATOR 00046000
                                      (AS DEFINED BY DECIMAL OPTION  00047000
                                       IN CURRENT PROFILE OBJECT) */ 00048000
      5 ECSPAD30 CHARACTER(6),     /* RESERVED FIELD              */ 00049000
```

Figure 108. User edit routine field definitions for PL/I DXEECS control block (Part 1 of 4)

```
   5 ECSQMF   CHARACTER(20),     /* AREA RESERVED FOR QMF'S USE  */ 00050000
                                                                   00051000
 3 ECSINDTA,                     /* DESCRIPTION OF THE INPUT DATA*/ 00052000
   5 ECSINTYP FIXED BINARY(31),  /*    DATA TYPE OF THE INPUT AS    00053000
                                      IT EXISTS IN THE DATA BASE   00054000
                                      (SEE CODES DEFINED BELOW) */ 00055000
   5 ECSINLEN FIXED BINARY(31),  /*    LENGTH OF INPUT DATA      */ 00056000
   5 ECSINPRC FIXED BINARY(15),  /*    PRECISION OF INPUT DATA IF   00057000
                                          IS IT DECIMAL DATA TYPE  00058000
                                          (U-TYPE EDIT CODE) OR    00059000
                                          IF IT WAS ANY NUMERIC    00060000
                                          DATA TYPE (V-TYPE EDIT   00061000
                                          CODE)...                 00062000
                                           ZERO OTHERWISE       */ 00063000
   5 ECSINSCL FIXED BINARY(15),  /*    SCALE OF INPUT DATA IF       00064000
                                          IS IT DECIMAL DATA TYPE  00065000
                                          (U-TYPE EDIT CODE) OR    00066000
                                          IF IT WAS ANY NUMERIC    00067000
                                          DATA TYPE (V-TYPE EDIT   00068000
                                          CODE)...                 00069000
                                           ZERO OTHERWISE       */ 00070000
   5 ECSINSGN CHARACTER(1),      /*    SIGN (V-TYPE EDIT ONLY)      00071000
                                          SEE VALUES DEFINED       00072000
                                          BELOW                */ 00073000
   5 ECSINNUL CHARACTER(1),      /*    NULL INPUT DATA INDICATOR    00074000
                                          SEE VALUE DEFINED        00075000
                                          BELOW                */ 00076000
   5 ECSPAD40 CHARACTER(10),     /* RESERVED FIELD               */ 00077000
 3 ECSRSDTA,                     /* DESCRIPTION OF THE RESULT       00078000
                                    BUFFER                       */ 00079000
   5 ECSRSLEN FIXED BINARY(31),  /*    LENGTH (EQUIVALENT TO        00080000
                                          COLUMN WIDTH IN THE      00081000
                                          FORM OBJECT)          */ 00082000
   5 ECSPAD50 CHARACTER(12),     /* RESERVED FIELD               */ 00083000
                                                                   00084000
 3 ECSUCTL,                      /* USER CONTROL AREA            */ 00085000
   5 ECSERRET FIXED BINARY(31),  /* EDIT ROUTINE ERROR RETURN CODE  00086000
                                     (SEE CODES DEFINED BELOW)   */ 00087000
   5 ECSRQMF  CHARACTER(1),      /* REQUEST FOR QMF                 00088000
                                     (SEE CODE(S) DEFINED BELOW  */ 00089000
   5 ECSPAD60 CHARACTER(11),     /* RESERVED FIELD               */ 00090000
                                                                   00091000
 3 ECSUSERS CHARACTER(256);      /* USER SCRATCH PAD AREA        */ 00092000
```

Figure 108. User edit routine field definitions for PL/I DXEECS control block (Part 2 of 4)

```
                                                                    00093000
DECLARE                          /* INPUT DATA PARAMETER...      */ 00094000
  ECSINPT  CHARACTER(32767)      /* CHARACTER INPUT DATA         */ 00095000
           BASED(ECSINPTP),                                         00096000
  ECSINSIN FIXED BINARY(15)      /* SMALL INTEGER INPUT DATA     */ 00097000
           BASED(ECSINPTP),                                         00098000
  ECSININT FIXED BINARY(31)      /* INTEGER INPUT DATA           */ 00099000
           BASED(ECSINPTP),                                         00100000
  ECSINFLT FLOAT BINARY(53)      /* FLOATING POINT INPUT DATA    */ 00101000
           BASED(ECSINPTP);                                         00102000
                                                                    00103000
DECLARE                          /* RESULT BUFFER PARAMETER...   */ 00104000
  ECSRSLT CHARACTER(32767)       /* EDIT ROUTINE RESULT BUFFER   */ 00105000
          BASED(ECSRSLTP);                                          00106000
                                                                    00107000
DECLARE                                                             00108000
 (ECSPTR,                        /* MUST CONTAIN DXEECS ADDRESS  */ 00109000
  ECSINPTP,                      /* MUST CONTAIN ECSINPT ADDRESS */ 00110000
  ECSRSLTP                       /* MUST CONTAIN ECSRSLT ADDRESS */ 00111000
     ) POINTER;                                                     00112000
                                                                    00113000
                                                                    00114000
DECLARE (                        /* DATA TYPE CONSTANTS:         00115000
                                      (SEE ECSINTYP ABOVE)       */ 00116000
  ECSINT    INITIAL(496),        /*   INTEGER                    */ 00117000
  ECSSINT   INITIAL(500),        /*   SMALL INTEGER              */ 00118000
  ECSFLT    INITIAL(480),        /*   FLOATING POINT             */ 00119000
  ECSVCHR   INITIAL(448),        /*   VARYING CHARACTER          */ 00120000
  ECSFCHR   INITIAL(452),        /*   FIXED CHARACTER            */ 00121000
  ECSLCHR   INITIAL(456),        /*   VERY LONG CHARACTER        */ 00122000
  ECSVG     INITIAL(464),        /*   VARYING GRAPHIC            */ 00123000
  ECSFG     INITIAL(468),        /*   FIXED GRAPHIC              */ 00124000
  ECSLG     INITIAL(472),        /*   VERY LONG GRAPHIC          */ 00125000
  ECSDEC    INITIAL(484),        /*   DECIMAL                    */ 00126000
  ECSDATE   INITIAL(384),        /*   DATE                       */ 00127000
  ECSTIME   INITIAL(388),        /*   TIME                       */ 00128000
  ECSTS     INITIAL(392),        /*   TIMESTAMP                  */ 00129000
  ECSFLTX   INITIAL(940)         /*   EXTENDED FLOATING POINT    */ 00130000
       )  FIXED BINARY(31) STATIC;                                  00131000
                                                                    00132000
                                                                    00133000
DECLARE (                        /* FUNCTION REQUEST CONSTANTS     00134000
```

Figure 108. User edit routine field definitions for PL/I DXEECS control block (Part 3 of 4)

```
                                    (SEE ECSFREQ ABOVE)        */ 00135000
  ECSFEDIT  INITIAL('E'),          /*   EDIT                    */ 00136000
  ECSFTERM  INITIAL('T')           /*   TERMINATE                  00137000
                                       (TO FREE RESOURCES...      00138000
                                        QMF WILL CALL THE USER    00139000
                                        EDIT ROUTINE FOR THIS     00140000
                                        FUNCTION ONLY IF THE      00141000
                                        USER EDIT ROUTINE HAS     00142000
                                        PREVIOUSLY REQUESTED      00143000
                                        IT.)                   */ 00144000
        ) CHARACTER(1) STATIC;                                    00145000
                                                                  00146000
                                                                  00147000
DECLARE (                          /* PLUS/MINUS SIGN CONSTANTS    00148000
                                      (SEE ECSINSGN ABOVE)        */ 00149000
  ECSPLUS   INITIAL(' '),          /*   INPUT DATA IS POSITIVE    */ 00150000
  ECSMINUS  INITIAL('-')           /*   INPUT DATA IS NEGATIVE    */ 00151000
        ) CHARACTER(1) STATIC;                                    00152000
                                                                  00153000
                                                                  00154000
DECLARE (                          /* NULL INDICATION CONSTANT     00155000
                                      (SEE ECSINNUL ABOVE)        */ 00156000
  ECSNULL   INITIAL('N')           /*   INPUT DATA IS NULL        */ 00157000
        ) CHARACTER(1) STATIC;                                    00158000
                                                                  00159000
                                                                  00160000
DECLARE (                          /* REQUEST-FOR-QMF CONSTANTS    00161000
                                      (SEE ECSRQMF ABOVE)         */ 00162000
  ECSRTERM  INITIAL('T')           /*   REQUEST QMF TO INVOKE      00163000
                                       USER EDIT ROUTINE FOR      00164000
                                       TERMINATION FUNCTION       */ 00165000
        ) CHARACTER(1) STATIC;                                    00166000
                                                                  00167000
                                                                  00168000
DECLARE (                          /* QMF-DEFINED ERROR RETURN CODE 00169000
                                      CONSTANTS                   00170000
                                      (SEE ECSERRET ABOVE)        */ 00171000
  ECSERR01  INITIAL(99101),        /* UNRECOGNIZED EDIT CODE     */ 00172000
  ECSERR02  INITIAL(99102),        /* IMPROPER INPUT DATA TYPE FOR */ 00173000
                                   /* REQUESTED EDIT EDIT CODE   */ 00174000
  ECSERR03  INITIAL(99103),        /* INVALID INPUT DATA VALUE   */ 00175000
                                   /* RECEIVED                   */ 00176000
  ECSERR04  INITIAL(99104),        /* LENGTH OF INPUT DATA IS TOO */ 00177000
                                   /* SHORT                      */ 00178000
  ECSERR05  INITIAL(99105)         /* LENGTH OF RESULT BUFFER IS */ 00179000
                                   /* TOO SHORT                  */ 00180000
        ) FIXED BINARY(31) STATIC;                                00181000
```

Figure 108. User edit routine field definitions for PL/I DXEECS control block (Part 4 of 4)

Writing an Edit Routine in COBOL

You can write an edit routine in COBOL for TSO, SRPI, APPC, native OS/390, or CICS.

In this section, COBOL refers to VS COBOL II, COBOL/370, and COBOL for OS/390 and VM unless otherwise stated.

Writing an Edit Routine in COBOL for TSO, SRPI, APPC, or Native OS/390 without Language Environment (LE)®

The QMF edit exit interface of COBOL in TSO, SRPI, APPC, and native OS/390 consists of these parts:

- Interface control block, which is shipped with QMF as DXEECSC
- Control program, which is shipped with QMF as DSQUXIC
- Your edit exit program, which is named DSQUXDT

Figure 109 shows the program structure of a COBOL edit exit routine in TSO, SRPI, APPC, or native OS/390.

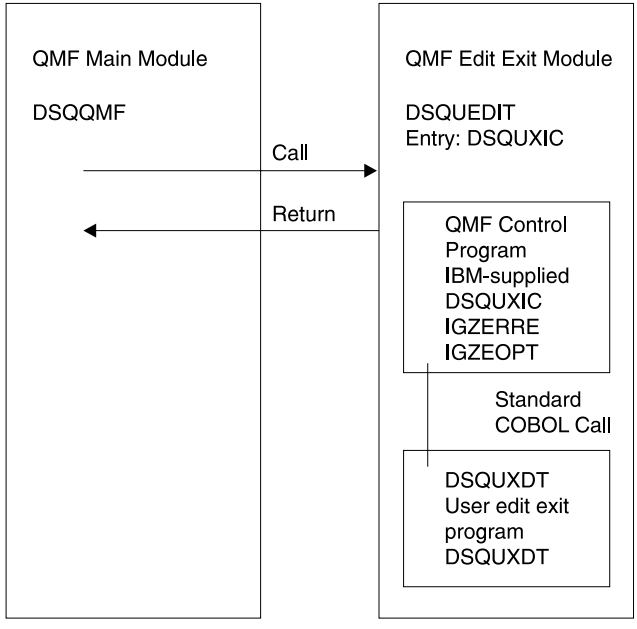


Figure 109. Program structure of a COBOL edit exit routine in TSO, SRPI, APPC, or native OS/390

How a COBOL Edit Routine Interacts with TSO, SRPI, APPC, and Native OS/390

The user edit program is called as a COBOL subprogram using a standard COBOL CALL statement. The following parameters are provided in the indicated order:

1. DXEECS
2. Input data
3. Output data

An example procedure statement specifying parameters is as follows:

```
PROCEDURE DIVISION
     USING DXEECS, ECSINPT, ECSRSLT.
```

Return control to QMF using standard subprogram GOBACK statement.

Compiling DSQUXDT

Compile DSQUXDT (the edit exit program you have written). During the compile, QMF edit exit interface control block DXEECSC, located in QMF sample library QMF710.SDSQUSRE, must be available in a macro library.

Select COBOL compiler options as follows:

COBOL II

Specify compiler options RENT, RES, NODYNAM, OBJECT, and LIB.

COBOL/370 or **IBM COBOL for OS/390 and VM**

Specify compiler options OBJECT, LIB, RENT, and NODYNAM.

QMF distributes the user edit routine control block DXEECSC using quotes as literal delimiters. You must use the QUOTE compiler option if you use the DXEECSC control block as distributed by IBM.

After compiling DSQUXDT, place the resulting load module in the QMF710.SDSQLOAD library.

Using the Language Environment Run Time Library

When you use the Language Environment run time library with QMF user edit exit programs, consider the following:

- QMF does not require a new compile.
- LINK EDIT is required for any QMF user edit exit program that will be used with LE run time libraries.
- The QMF assembler driver, DSQUXIC calls IGZERRE. See your IBM COBOL documentation for more information.

Assembling the Run Time Options Module

When you assemble the run time option macro IGZOPT, you must specify the COBOL run time option STAE=NO. (For the Language Environment options module, use TRAP=OFF in place of STAE=NO.) Include the resulting object module IGZEOPT in the QMF edit exit module DSQUEDIT.

Link-Editing Your Program

You create a new QMF edit exit module DSQUEDIT by including your edit exit program DSQUXDT with the IBM-supplied control module DSQUXIC, which is located in the QMF module library QMF710.SDSQLOAD. The module DSQUXIC must be specified as the entry point.

The module DSQUEDIT can be executed in either 24-bit or 31- bit addressing mode. QMF runs in 31-bit addressing mode and automatically switches to 24-bit addressing mode if the edit exit module DSQUEDIT has a 24-bit addressing mode.

Note: 31-bit addressing mode is recommended.

Example Statements for Compiling and Link-Editing (TSO, SRPI, APPC, or Native OS/390)

The following are example statements for compiling and link-editing your job for TSO, SRPI, APPC, or native OS/390).

For COBOL II:

```
//samCOBOL   JOB
//* Assemble run time option macro
//STEP1 EXEC PGM=IEV90,PARM='DECK,NOLOAD'
//SYSPRINT DD SYSOUT=A
//SYSUT1 DD UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT2 DD UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT3 DD UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSPUNCH DD DSN=&&TEMPOBJ(IGZEOPT),DISP=(,PASS),UNIT=SYSDA,
// SPACE=(TRK,(1,1,1)),DCB=(BLKSIZE=3120,LRECL=80,DSORG=PO)
//* Provide Access to Cobol run time option macro
//SYSLIB DD DSN=SYS1.MACLIB,DISP=SHR
//SYSIN DD *
      IGZOPT SYSTYPE=OS,STAE=NO
      END
//*
//STEP2      EXEC PROC=COB2UCL
//* Provide Access to QMF Edit Macro DXEECSC
//COB2.SYSLIB   DD  DSN=QMF710.SDSQUSRE,DISP=SHR
//COB2.SYSIN    DD  *
          .
          Your program or copy of QMF sample DSQUXDTC
          .
/*
//* Provide Access to QMF Interface Module
//LKED.QMFLOAD  DD DSN=QMF710.SDSQLOAD,DISP=SHR
//* Make sure COBOL library is concatenated after &&TEMPOBJ
//LKED.SYSLIB   DD DSN=&&TEMPOBJ,DISP=(OLD,PASS)
                 DD DSN=COB2LIB,DISP=(OLD,PASS)
//LKED.SYSIN    DD  *
          INCLUDE QMFLOAD(DSQUXIC)
          INCLUDE SYSLIB(IGZEOPT)
          INCLUDE SYSLIB(IGZERRE)
```

```
          ENTRY DSQUXIC
          MODE  AMODE(31) RMODE(ANY)
          NAME  DSQUEDIT(R)
/*
```

For COBOL/370 or IBM COBOL for OS/390 and VM:

```
//samCOBOL   JOB
//* Assemble run time option macro
//STEP1 EXEC PGM=IEV90,PARM='DECK,NOLOAD'
//SYSPRINT DD SYSOUT=A
//SYSUT1 DD UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT2 DD UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT3 DD UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSPUNCH DD DSN=&&TEMPOBJ(IGZEOPT),DISP=(,PASS),UNIT=SYSDA,
// SPACE=(TRK,(1,1,1)),DCB=(BLKSIZE=3120,LRECL=80,DSORG=PO)
//* Provide Access to Cobol run time option macro
//SYSLIB DD DSN=SYS1.MACLIB,DISP=SHR
//SYSIN DD *
      IGZOPT SYSTYPE=OS,STAE=NO
      END
//*
//STEP2      EXEC PROC=IGYWCL
//* Provide Access to QMF Edit Macro DXEECSC
//COBOL.SYSLIB  DD  DSN=QMF710.SDSQUSRE,DISP=SHR
//COBOL.SYSIN   DD  *
          .
          Your program or copy of QMF sample DSQUXDTC
          .
/*
//* Provide Access to QMF Interface Module
//LKED.QMFLOAD  DD DSN=QMF710.SDSQLOAD,DISP=SHR
//LKED.SYSLIB   DD ...
                 DD DSN=&&TEMPOBJ,DISP=(OLD,PASS)
//LKED.SYSIN    DD  *
          INCLUDE QMFLOAD(DSQUXIC)
          INCLUDE SYSLIB(IGZEOPT)
          INCLUDE SYSLIB(IGZERRE)
          ENTRY DSQUXIC
          MODE  AMODE(31) RMODE(ANY)
          NAME  DSQUEDIT(R)
/*
```

Example Program

The IBM-supplied example edit exit program in COBOL, named DSQUXDTC, is located in QMF sample library QMF710.SDSQSAPE. The example program is heavily commented; it can be browsed online, printed, or modified to suit your needs. If you plan to use this program, copy it to your program library and change its name to DSQUXDT.

Writing an Edit Routine in COBOL for TSO, SRPI, APPC, or Native OS/390 with Language Environment (LE)

The QMF edit exit interface of COBOL in TSO, SRPI, APPC, and native OS/390 consists of these parts:

- Interface control block, which is shipped with QMF as DXEECSC
- Control program, which is shipped with QMF as DSQUXILE
- Your edit exit program, which is named DSQUXDT
- LE Preinitialization Service program, which is named CEEPIPI

Figure 110 shows the program structure of a COBOL edit exit routine in TSO, or native OS/390 batch.

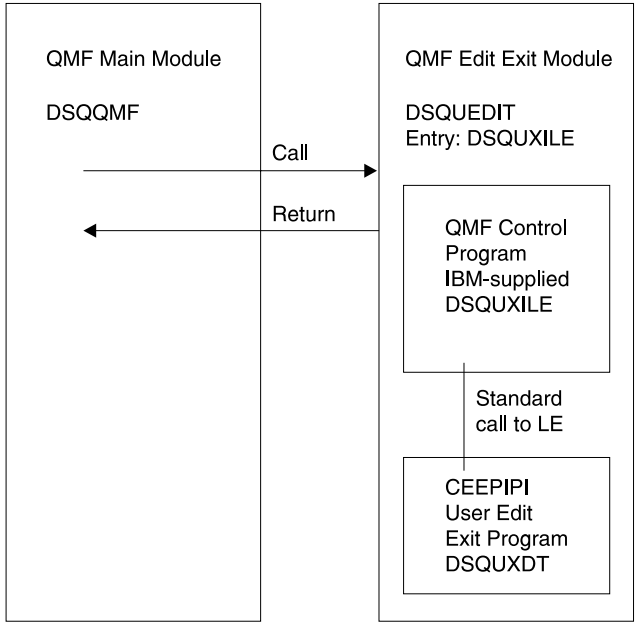


Figure 110. Program structure of a COBOL edit exit routine in TSO, SRPI, APPC, or native OS/390 with LE

How a COBOL Edit Routine Interacts with TSO, SRPI, APPC, and Native OS/390 in LE

The user edit program is called as an LE subroutine. The following parameters are provided in the indicated order:

1. DXEECS
2. Input data
3. Output data

An example procedure statement specifying parameters is as follows:

```
PROCEDURE DIVISION
     USING DXEECS, ECSINPT, ECSRSLT.
```

A COBOL data structure is shipped with QMF as DXEECSC, located in library QMF710.SDSQSAPE. Include this data structure in your program.

Return control to QMF using a standard subprogram GOBACK statement.

Compiling DSQUXDT

During the compile, QMF edit exit interface control block DXEECSC, located in QMF sample library QMF710.SDSQUSRE, must be available in a macro library.

Compile program with the following compile options:

```
OBJECT, LIB, RENT, RES, and NODYNAM.
```

QMF distributes the user edit routine control block DXEECSC using quotes as literal delimiters. You must use the QUOTE compiler option if you use the DXEECSC control block as distributed by IBM.

Link-Editing Your Program

Create a new QMF edit exit module DSQUEDIT by including your edit program DSQUXDT with the IBM-supplied control QMF module DSQUXILE (located in the QMF module library QMF710.SDSQLOAD).

The module DSQUXILE must be specified as the entry point.

The module DSQUEDIT can be executed in either 24-bit or 31- bit addressing mode. QMF runs in 31-bit addressing mode and automatically switches to 24-bit addressing mode if the edit exit module DSQUEDIT has a 24-bit addressing mode.

Note: 31-bit addressing mode is recommended.

Example Statements for Compiling and Link-Editing (TSO, SRPI, APPC, or Native MVS)

The following are example statements for compiling and link-editing your job for TSO, SRPI, APPC, or native MVS):

```
//samCOBOL   JOB
//STEP1     EXEC PROC=IGYWCL
//* Provide Access to QMF Edit Macro DXEECSC
//COBOL.SYSLIB  DD  DSN=QMF710.SDSQUSRE,DISP=SHR
//COBOL.SYSIN   DD  *
```

Your program or copy of QMF sample DSQUXDTC:

```
/*
//* Provide Access to QMF Interface Module
//LKED.QMFLOAD  DD DSN=QMF710.SDSQLOAD,DISP=SHR
//LKED.SYSLIB   DD ...
//                DD DSN=&&TEMPOBJ,DISP=(OLD,PASS)
//                DD DSN=SYS1.SCEELKED,DISP=SHR
//LKED.SYSIN    DD  *
          INCLUDE QMFLOAD(DSQUXILE)
          ENTRY DSQUXILE
          MODE  AMODE(31) RMODE(ANY)
          NAME  DSQUEDIT(R)
/*
```

Example Program

The IBM-supplied example edit exit program in COBOL, named DSQUXDTC, is located in QMF sample library QMF710.SDSQSAPE. The example program is heavily commented; it can be browsed online, printed, or modified to meet your needs. If you plan to use this example program, copy it to your program library and change its name to DSQUXDT.

Writing an Edit Routine in COBOL for CICS

The edit exit interface for COBOL in CICS consists of these parts:

- Interface control block, which is shipped with QMF as DXEECSC
- CICS command interface module, which is shipped with CICS as DFHECI
- Your edit exit program, which is named DSQUECIC

Figure 111 shows the structure of a COBOL edit exit routine in CICS.

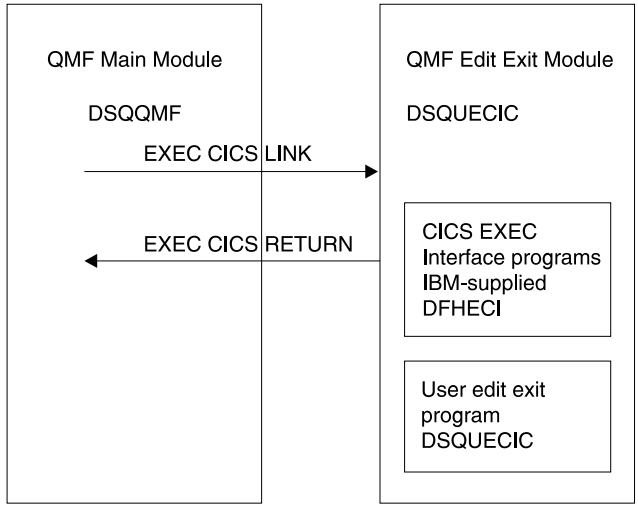
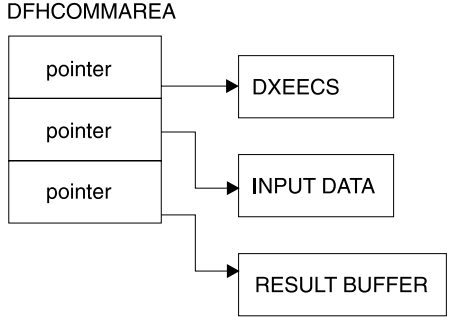


Figure 111. Program structure for a COBOL edit exit routine in CICS

How a COBOL Edit Routine Interacts with CICS

The user edit program is called by using the standard CICS LINK command interface. Your program is executing on a different program level than the main QMF program. The user edit program must be translated using the CICS translator for COBOL. The CICS communications area DFHCOMMAREA is used to provide addresses to the user edit routine program parameters, DXEECS, input data, and output data as shown in the following diagram.



After translation, the CICS translator provides a procedure statement that describes the CICS environment block DFHEIBLK and the CICS communications block, DFHCOMMAREA, like the following example:

```
PROCEDURE DIVISION USING DFHEIBLK DFHCOMMAREA.
```

QMF provides addresses to the user edit routine control block DXEECS, input data, and output data in the CICS communications area DFHCOMMAREA. Provide your own description of the DFHCOMMAREA in the COBOL program linkage section as follows:

```
LINKAGE SECTION.

 01  DFHCOMMAREA.
     02 ECSADR   POINTER.
     02 ECSINADR POINTER.
     02 ECSRLADR POINTER.
```

To provide addressability to the user edit routine control block DXEECS, input data area ECSINPT, and the result data area ECSRSLT, set the addresses of these data areas to the values located in the DFHCOMMAREA as in the following example:

```
SETUP SECTION.

    SET ADDRESS OF DXEECS   TO ECSADR.
    SET ADDRESS OF ECSINPT  TO ECSINADR.
    SET ADDRESS OF ECSRSLT  TO ECSRLADR.
```

A COBOL copy book is shipped with QMF as DXEECSC, located in library QMF710.SDSQSAPE. Include this copy book in your program.

Return control to QMF using a standard CICS RETURN command such as the following:

```
EXEC CICS

     RETURN

END-EXEC.
```

Translating Your COBOL Program

Translate your program using the CICS translator for COBOL. When you translate your program, CICS normally supplies the standard procedure and linkage sections. Replace the standard CICS communications area DFHCOMMAREA by providing a structure as specified in the previous linkage section example.

Compiling

QMF edit exit interface control block DXEECSC, located in QMF sample library QMF710.SDSQUSRE, must be available in a macro library during the compile.

Specify COBOL compiler options RENT, RES, and NODYNAM, and run time options NOSTAE and NORTEREUS.

QMF distributes the user edit routine control block DXEECSC, using quotes as literal delimiters. You must use the QUOTE compiler option if you use the DXEECSC control block as distributed by IBM.

Link-Editing

You create a new QMF edit exit module DSQUECIC by including your edit exit program DSQUXCTC with the EXEC CICS interface control module DFHECI, located in the CICS module library, as distributed by the CICS product. DFHECI must be the first module in the edit exit module and the entry point must be module DSQUECIC. Be sure to allocate COBOL libraries required for link-edit.

The module DSQUECIC must be executable in 31-bit addressing mode.

Example Statements for Translating, Compiling, and Link-Editing (CICS)

The following are example statements for translating, compiling, and link-editing your job for CICS.

```
//SAMCOBOL JOB ...
//* Add a parameter PROGLIB to procedure DFHEITVL
//*      PROGLIB=&PROGLIB,
//TRNCOMLK EXEC PROC=DFHEITVL,PROGLIB='QMF710.SDSQLOAD',
//      PARM.TRN='QUOTE',
```

```
//      PARM.COB='RENT,RES,NODYNAM,OBJECT,LIB,LIST,MAP,QUOTE'
//TRN.SYSIN DD *
      .
      Your program or modified copy of QMF sample DSQUXCTC
      .
/*
//* Provide access to QMF Edit Macro DXEECSC
//COB.SYSLIB DD  DSN=QMF710.SDSQUSRE,DISP=SHR
//LKED.SYSIN  DD  *
    INCLUDE SYSLIB(DFHECI)
    ORDER DFHECI
    ENTRY DSQUECIC
    MODE AMODE(31) RMODE(ANY)
    NAME DSQUECIC(R)
/*
```

CICS Program Definition

When QMF is installed, the QMF edit exit program is installed with a program language of assembler. To use the COBOL edit exit program, you must change the program language of module DSQUECIC to COBOL using the CICS program control table (PCT) macro or resource definition online (RDO).

Literal Delimiters: Quotes or Apostrophes

You must use either quotes (") or apostrophes (') to delimit literals in a COBOL program. You can specify the delimiter of your choice to the CICS translation process and the COBOL compiler by specifying “QUOTE” or “APOST”. Make sure the APOST or QUOTE option in effect for the COBOL compiler matches that of the CICS translator.

The edit control block DXEECSC and the sample COBOL program DSQUXCTC, as distributed by QMF, use quotes (") to delimit literals. If your installation or program uses apostrophes (') instead, you have to change DXEECSC or copy the structure to your program, changing quotes to apostrophes.

Example Program

The IBM-supplied example edit exit program, named DSQUXCTC, is located in QMF sample library QMF710.SDSQSAPE. The example program is heavily commented; it can be browsed online, printed, or modified to suit your needs. If you plan to use this program, copy it to your program library and change its name to DSQUECIC.

How a COBOL Edit Routine Interacts with QMF

The interface control block between QMF and the user edit interface DSQUEDIT is DXEECS. It contains the user’s edit code and provides a scratchpad area for the user edit routine’s use. The control block is persistent between calls to the user edit routine. The scratchpad area is not modified by QMF after the initial invocation of the exit routine.

Figure 112 shows the DXEECS control block for assembler.

```
*************************************************************** 00001000
*                                                             * 00002000
*  CONTROL BLOCK NAME: DXEECS   (COBOL VERSION)               * 00003000
*                                                             * 00004000
*  FUNCTION:                                                  * 00005000
*                                                             * 00006000
*      THIS IS THE INTERFACE CONTROL BLOCK BETWEEN QMF AND     * 00007000
*      THE USER EDITING INTERFACE, DSQUEDIT (TSO/CMS), OR     * 00008000
*      DSQUECIC (CICS).                                       * 00009000
*                                                             * 00010000
*      IT CONTAINS THE USER'S EDIT CODE, IDENTIFIES THE SOURCE * 00011000
*      DATA AND THE TARGET LOCATION FOR THE EDITED RESULT     * 00012000
*      AND PROVIDES A SCRATCHPAD AREA FOR THE USER EDIT       * 00013000
*      ROUTINE'S USE.                                         * 00014000
*                                                             * 00015000
*      THIS CONTROL BLOCK IS PERSISTENT BETWEEN CALLS TO THE  * 00016000
*      USER EDIT ROUTINE.                                     * 00017000
*                                                             * 00018000
*      THE SCRATCHPAD AREA WILL NOT BE MODIFIED BY QMF AFTER  * 00019000
*      THE INITIAL INVOCATION OF THE EXIT ROUTINE.            * 00020000
*                                                             * 00021000
*                                                             * 00022000
*  NOTE: THIS FILE IS DESIGNED TO BE COPIED INTO THE LINKAGE  * 00023000
*        SECTION OF THE USER EDIT ROUTINE.                    * 00024000
*                                                             * 00025000
*                                                             * 00026000
*  STATUS: VERSION 7 RELEASE 1 LEVEL 0                        * 00027000
*                                                             * 00028000
*  INNER CONTROL BLOCKS: NONE                                 * 00029000
*                                                             * 00030000
*  CHANGE ACTIVITY: NEW CONTROL BLOCK                         * 00031000
*                                                             * 00032000
*  CHANGE DATE:                                               * 00033000
*                                                             * 00034000
*************************************************************** 00035000
                                                               00036000
 01  DXEECS.                                                  00037000
     02 ECSNAME        PICTURE X(8).                         00038000
*                     -- CONTROL BLOCK IDENTIFICATION         00039000
                                                               00040000
     02 ECSEDCTL.                                            00041000
*                     -- EDIT CONTROL                         00042000
                                                               00043000
        03 ECSFREQ     PICTURE X(1).                         00044000
*                     -- FUNCTION REQUEST                     00045000
```

Figure 112. User edit routine field definitions for COBOL DXEECS control block (Part 1 of 5)

```
           88 ECS-EDIT-FUNCTION      VALUE "E".                   00046000
           88 ECS-TERMINATE-FUNCTION VALUE "T".                   00047000
      *                    ---- TERMINATE FUNCTION TO FREE RESOURCES. 00048000
      *                         QMF WILL CALL THE USER EDIT ROUTINE   00049000
      *                         FOR THIS FUNCTION ONLY IF THE USER    00050000
      *                         EDIT ROUTINE HAS PREVIOUSLY REQUESTED 00051000
      *                         IT. (SEE ECSRQMF BELOW.)              00052000
        03 ECSPAD10    PICTURE X(3).                                 00053000
      *                 -- RESERVED FIELD                           00054000
        03 ECSECODE    PICTURE X(5).                                 00055000
      *                 -- EDIT CODE FROM FORM OBJECT               00056000
        03 ECSPAD20    PICTURE X(3).                                 00057000
      *                 -- RESERVED FIELD                           00058000
        03 ECSDECPT    PICTURE X(1).                                 00059000
      *                 -- SYMBOL FOR DECIMAL POINT                 00060000
      *                 -- (AS DEFINED BY DECIMAL OPTION IN         00061000
      *                 -- CURRENT PROFILE OBJECT                   00062000
        03 ECSTHSEP    PICTURE X(1).                                 00063000
      *                 -- SYMBOL FOR THOUSANDS SEPARATOR           00064000
      *                 -- (AS DEFINED BY DECIMAL OPTION IN         00065000
      *                 -- CURRENT PROFILE OBJECT                   00066000
        03 ECSPAD30    PICTURE X(6).                                 00067000
      *                 -- RESERVED FIELD                           00068000
        03 ECSQMF      PICTURE X(20).                                00069000
      *                 -- AREA RESERVED FOR QMF'S USE              00070000
                                                                     00071000
     02 ECSINDTA.                                                   00072000
      *                 -- DESCRIPTION OF THE INPUT DATA            00073000
                                                                     00074000
        03 ECSINTYP    PICTURE S9(9) COMPUTATIONAL.                  00075000
      *                 -- DATA TYPE OF THE INPUT AS IT             00076000
      *                 -- EXISTS IN THE DATA BASE.                 00077000
           88 ECS-FLOATING-POINT     VALUE IS +480.                 00078000
           88 ECS-DECIMAL            VALUE IS +484.                 00079000
           88 ECS-INTEGER            VALUE IS +496.                 00080000
           88 ECS-SMALL-INTEGER      VALUE IS +500.                 00081000
           88 ECS-VARCHAR            VALUE IS +448.                 00082000
           88 ECS-FIXED-CHAR         VALUE IS +452.                 00083000
           88 ECS-LONG-VARCHAR       VALUE IS +456.                 00084000
           88 ECS-VARG               VALUE IS +464.                 00085000
           88 ECS-FIXED-G            VALUE IS +468.                 00086000
           88 ECS-LONG-VARG          VALUE IS +472.                 00087000
           88 ECS-DATE               VALUE IS +384.                 00088000
           88 ECS-TIME               VALUE IS +388.                 00089000
           88 ECS-TIMESTAMP          VALUE IS +392.                 00090000
           88 ECS-EXT-FLOATING-POINT VALUE IS +940.                 00091000
        03 ECSINLEN    PICTURE S9(5) USAGE IS COMPUTATIONAL.         00092000
      *                 -- LENGTH OF INPUT DATA                     00093000
        03 ECSINPRC    PICTURE S9(2) USAGE IS COMPUTATIONAL.         00094000
```

Figure 112. User edit routine field definitions for COBOL DXEECS control block (Part 2 of 5)

```
*                    -- PRECISION OF INPUT DATA IF IT IS        00095000
*                    -- DECIMAL DATA TYPE (U-TYPE EDIT CODE)    00096000
*                    -- OR IF IT WAS ANY NUMERIC DATA TYPE      00097000
*                    -- (V-TYPE EDIT CODE)...                   00098000
*                    --   ZERO OTHERWISE.                       00099000
        03 ECSINSCL    PICTURE S9(2) USAGE IS COMPUTATIONAL.     00100000
*                    -- SCALE OF INPUT DATA IF IT IS            00101000
*                    -- DECIMAL DATA TYPE (U-TYPE EDIT CODE)    00102000
*                    -- OR IF IT WAS ANY NUMERIC DATA TYPE      00103000
*                    -- (V-TYPE EDIT CODE)...                   00104000
*                    --   ZERO OTHERWISE.                       00105000
        03 ECSINSGN    PICTURE X(1).                             00106000
*                    -- SIGN OF CONVERTED NUMERIC DATA          00107000
*                    -- (V-TYPE EDIT CODE ONLY)...              00108000
           88 ECS-POSITIVE  VALUE " ".                          00109000
           88 ECS-NEGATIVE  VALUE "-".                          00110000
                                                                00111000
        03 ECSINNUL    PICTURE X(1).                             00112000
*                    -- NULL INPUT DATA INDICATOR               00113000
           88 ECS-NULL-DATA VALUE "N".                          00114000
                                                                00115000
        03 ECSPAD40    PICTURE X(10).                            00116000
*                    -- RESERVED FIELD                          00117000
                                                                00118000
     02 ECSRSDTA.                                               00119000
*                    -- DESCRIPTION OF THE RESULT BUFFER        00120000
                                                                00121000
        03 ECSRSLEN    PICTURE S9(5) USAGE IS COMPUTATIONAL.     00122000
*                    -- LENGTH OF RESULT AREA                   00123000
*                    -- (EQUIVALENT TO COLUMN WIDTH IN THE      00124000
*                    --  FORM OBJECT                           00125000
        03 ECSPAD50    PICTURE X(12).                            00126000
*                    -- RESERVED FIELD                          00127000
                                                                00128000
     02 ECSUCTL.                                                00129000
*                    -- USER CONTROL AREA                       00130000
                                                                00131000
        03 ECSERRET    PICTURE S9(9) USAGE IS COMPUTATIONAL.     00132000
*                    -- EDIT ROUTINE ERROR RETURN CODE          00133000
*                         (SEE QMF-DEFINED ERROR CODES BELOW).  00134000
        03 ECSRQMF     PICTURE X(1).                             00135000
*                    -- REQUEST FOR QMF                         00136000
*                        (SEE CODE(S) DEFINED BELOW.)           00137000
        03 ECSPAD60    PICTURE X(11).                            00138000
*                    -- RESERVED FIELD                          00139000
                                                                00140000
     02 ECSUSERS.                                               00141000
```

Figure 112. User edit routine field definitions for COBOL DXEECS control block (Part 3 of 5)

```
*                    -- USER SCRATCH PAD AREA                  00142000
                                                               00143000
        03 ECSUSERS-ARRAY                                      00144000
                     PICTURE X(1)                              00145000
                     OCCURS 256 TIMES.                         00146000
                                                               00147000
                                                               00148000
********           -- EDIT ROUTINE INPUT DATA                  00149000
 01  ECSINPT.                                                 00150000
     02 ECSINPTC       PICTURE X(32767).                       00151000
     02 ECSINPT-ARRAY  REDEFINES ECSINPTC                      00152000
                       PICTURE X(1)                            00153000
                       OCCURS 32767 TIMES.                     00154000
     02 ECSINPT-INTEGER-OVL                                    00155000
                       REDEFINES ECSINPTC.                     00156000
        03 ECSINPT-INTEGER                                     00157000
                       PICTURE S9(9)                           00158000
                       USAGE IS COMPUTATIONAL.                 00159000
        03 FILLER       PICTURE X(1)                           00160000
                       OCCURS 32763 TIMES.                     00161000
     02 ECSINPT-SMALL-INTEGER-OVL                              00162000
                       REDEFINES ECSINPTC.                     00163000
        03 ECSINPT-SMALL-INTEGER                               00164000
                       PICTURE S9(4)                           00165000
                       USAGE IS COMPUTATIONAL.                 00166000
        03 FILLER       PICTURE X(1)                           00167000
                       OCCURS 32765 TIMES.                     00168000
     02 ECSINPT-FLOATING-POINT-OVL                             00169000
                       REDEFINES ECSINPTC.                     00170000
        03 ECSINPT-FLOATING-POINT                              00171000
                       USAGE IS COMPUTATIONAL-2.               00172000
        03 FILLER       PICTURE X(1)                           00173000
                       OCCURS 32759 TIMES.                     00174000
                                                               00175000
                                                               00176000
********           -- EDIT ROUTINE RESULT BUFFER               00177000
 01  ECSRSLT.                                                 00178000
     02 ECSRSLT-ARRAY  PICTURE X(1)                           00179000
                       OCCURS 1 TO 32767 TIMES                 00180000
                                DEPENDING ON ECSRSLEN.         00181000
                                                               00182000
```

Figure 112. User edit routine field definitions for COBOL DXEECS control block (Part 4 of 5)

```
*****************************************************************  00183000
*                                                               *  00184000
* THE DATA DEFINITIONS BELOW ARE FOR DOCUMENTATION              *  00185000
* PURPOSES ONLY SINCE COBOL DOES NOT ALLOW LINKAGE              *  00186000
* SECTION DATA DEFINITIONS TO HAVE VALUE CLAUSES                *  00187000
*                                                               *  00188000
*****************************************************************  00189000
                                                                    00190000
********               -- QMF-DEFINED VALUES FOR ECSERRET         00191000
*                             (SEE ABOVE).                        00192000
*77  ECS-UNKNOWN-EDIT-CODE                                        00193000
*                     PICTURE S9(9) VALUE IS +99101              00194000
*                                   USAGE IS COMPUTATIONAL.      00195000
*77  ECS-IMPROPER-DATA-TYPE                                       00196000
*                     PICTURE S9(9) VALUE IS +99102              00197000
*                                   USAGE IS COMPUTATIONAL.      00198000
*77  ECS-INVALID-DATA-VALUE                                       00199000
*                     PICTURE S9(9) VALUE IS +99103              00200000
*                                   USAGE IS COMPUTATIONAL.      00201000
*77  ECS-INPUT-DATA-TOO-SHORT                                     00202000
*                     PICTURE S9(9) VALUE IS +99104              00203000
*                                   USAGE IS COMPUTATIONAL.      00204000
*77  ECS-RESULT-BUFFER-TOO-SHORT                                  00205000
*                     PICTURE S9(9) VALUE IS +99105              00206000
*                                   USAGE IS COMPUTATIONAL.      00207000
                                                                    00208000
                                                                    00209000
********               -- POSSIBLE REQUEST-FOR-QMF CODES          00210000
*                             (SEE ECSRQMF ABOVE).                00211000
*77  ECS-CALL-FOR-TERMINATE                                       00212000
*                     PICTURE X(1)  VALUE IS "T".                00213000
```

Figure 112. User edit routine field definitions for COBOL DXEECS control block (Part 5 of 5)

Handling Double-Byte Character Set Data

Double-byte character set (DBCS) data can appear in character columns or in columns with a graphic data type (GRAPHIC, VARGRAPHIC, and LONG VARGRAPHIC). If you need to devise edit routines that process this type of data, read this section.

Among the characters represented by the Japanese DBCS are Latin characters and Katakana characters. A Latin character has these characteristics:

- The first (leftmost) byte of the character has the value X'42'.
- The second byte of the character contains the EBCDIC equivalent.

A Katakana character has these characteristics:

- The first byte of the character contains X'43'.
- The second byte contains the EBCDIC equivalent.

Edit Codes for DBCS Data

You can use either Uxxxx or Vxxxx edit codes for DBCS data. The data that the edit routine receives is the same.

What the Edit Routine Receives

The data to be formatted is in the field ECSINPT, and the length of that data, in bytes, is in ECSINLEN. What you find in ECSINPT depends to some extent on where the data originates. More precisely, it depends on whether the column containing that data is a character column or one with a graphic data type.

Data from Graphic Columns

If the data to be formatted is from a column with a graphic data type, then the text in ECSINPT consists of this data preceded by one shift character and followed by another. Both shift characters are single bytes. For DBCS terminals, shift characters mark the start and end of a string of DBCS characters.

So denotes the shift character that introduces a DBCS string, and Si denotes the one that marks its end. So has the value X'0E'. Si has the value X'0F'.

The shift characters are included in the data length recorded in ECSINLEN. Thus, the length appearing in ECSINLEN is always greater by two than the length of the actual data. Because the data is presumably a string of DBCS characters, its length (in bytes) is always an even number.

Data from Character Columns

If the data to be processed comes from a character column, then the data in ECSINPT is just a copy of the column data. Unlike data from a graphic column, this data can hold single-byte characters and shift characters, as well as DBCS characters. To locate DBCS characters, you must search for the So and Si characters that bracket the DBCS strings. If there are no So or Si characters in ECSINPT, the string contains no DBCS data. For example, ECSINPT contains the following string:

```
ccccSodedededededededeSiccSodedededededeSi
```

Here, c, d, and e stand for any possible byte, and So and Si are shift bytes. From the placement of the shift bytes, you can see that every occurrence of c represents a single-byte character, and that every occurrence of de represents a DBCS character.

Single-byte characters can represent Latin letters, Arabic numerals, and special characters such as plus signs and parentheses. For Japanese DBCS, they can also be Katakana characters. Some bytes meant to represent lowercase Latin

might be displayed as Katakana symbols. You might have to devise edit codes that distinguish between columns containing lowercase English and those containing Katakana.

Ensuring the Edit Routine Returns the Right Results

Return the results in the ECSRSLT field, with trailing blanks for unused bytes. Make the results readable to the user's screen. This means that the resulting DBCS and EBCDIC characters must have the appropriate representations, and that the beginning and end of any string of DBCS characters are marked by So and Si characters.

Overflowing the ECSRSLT Field

Be careful not to overflow the ECSRSLT field, whose length is contained in the ECSRSLEN field. If your results do not fit, truncate them on the right. If the last character represented in the truncated results is a DBCS character, be certain to retain its rightmost byte, and to follow that character with an Si character.

Printing the Report Column

QMF copies the ECSRSLT field into the corresponding report column. The result is exactly as wide as the report column. If you don't specify ALIGNMENT for data, the data is aligned exactly as you typed it.

How the report device represents what you return depends on the specific device. For some terminals, the following rules apply:

- If the report is displayed on the screen, the Si and So characters embedded in a user's results also appear on the terminal.
- The Si and So characters appear either as blanks or as special symbols. There is one special symbol for Si and another for So.
- Blanks appear instead of the symbols unless the user presses a certain combination of keys.

For other devices, the rules can be slightly different.

Instructions for using DBCS characters in the online help say not to use certain DBCS characters in queries and QMF commands. The same restriction *does not* apply to the formatted data returned by an edit routine. Any legitimate DBCS character can be returned in the ECSRSLT field.

Chapter 21. Controlling QMF Resources Using a Governor Exit Routine

Note: This chapter contains General Use Programming Interface and Associated Guidance Information.

A governor exit routine helps you limit end-user activity and control use of computer resources at your installation. IBM supplies a governor exit routine with QMF, with default limits for the amount of time spent running a QMF command or for the number of rows a user can retrieve from the database. You can use this default exit routine, or use assembler to modify the routine or write one of your own.

You can use the DB2 governor with the QMF governor to monitor the processor time used when dynamically running SELECT, INSERT, UPDATE, and DELETE queries. You can also use the DB2 governor independently.

You can also use the QMF OS/390 High Performance Option/Manager (HPO/Manager) to manage and control QMF session activity. With HPO/Manager you also have a real-time user interface to QMF session activity and a query analyzer that estimates a query's resource use before it is run. The HPO/Manager overrides the QMF governor. For more information about the HPO feature, see *QMF High Performance Option User's Guide for OS/390*.

Quick Start

Use the steps in Table 53 to guide you in setting up and using a governor exit routine. If you need more information on any step, see the page listed at the right of the table.

Table 53. Using a governor exit routine

To do this task:	See:
To prompt users when the number of database rows retrieved reaches 25 000, and cancel data retrieval when the number reaches 100 000, turn the governor on by setting the INTVAL field of Q.RESOURCE_VIEW to 0 (where RESOURCE_GROUP=SYSTEM and RESOURCE_OPTION=SCOPE). Then update the RESOURCE_GROUP field of the user's profile to SYSTEM, and reconnect to the database.	Page 386

Table 53. Using a governor exit routine (continued)

To do this task:	See:
To prompt users when 6 minutes of processor time has elapsed and cancel data when 24 minutes of processor time has elapsed, turn the governor on by setting the INTVAL field of Q.RESOURCE_VIEW to 0 (where RESOURCE_GROUP=SYSTEM and RESOURCE_OPTION=SCOPE). Then update the RESOURCE_GROUP field of the user's profile to SYSTEM, and reconnect to the database. This prompt option is not available in CICS.	Page 386
To set up the governor exit routine to use time limits other than the default values of 6 or 24 minutes of processor time, or database row limits other than the defaults of 25 000 and 100 000, add new rows to Q.RESOURCE_TABLE that define the points at which you want to warn the user (optional) and cancel data retrieval. Turn the governor on and update the user's profile as explained in step 383. This time option is not available in CICS.	Page 390
To limit activities other than the number of rows retrieved from the database, use assembler to modify the IBM-supplied governor exit routine or write a routine of your own.	Page 394
In CICS, if you modify the IBM-supplied governor exit routine or write your own routine, translate, assemble, and link-edit the routine.	Page 423
In TSO, and native OS/390 batch, if you modify the IBM-supplied governor exit routine or write your own routine, assemble, and link-edit the routine.	Page 425
To monitor the processor time used when dynamically running SELECT, INSERT, UPDATE, and DELETE queries, use the DB2 governor in conjunction with the QMF governor. Set the maximum processor time in a resource limit specification table (RLST).	Page 426

Using the IBM-Supplied Governor Exit Routine

The governor exit routine supplied for CICS (DSQUEGV3) controls how many rows a user can retrieve from the database. The governor exit routine supplied for TSO, and native OS/390 batch (DSQUEGV1) controls how many rows a user can retrieve from the database or the processor time used. The governor exit routines are shipped with two predefined values for the number of rows:

- A row prompt value warns users when the number of rows retrieved reaches 25 000, at which time the user sees the message shown in Figure 113 on page 385.

```
DSQUn00 QMF governor prompt:
   Command has fetched 25000 rows of data.

==> To continue QMF command press the "ENTER" key.
==> To cancel QMF command type "CANCEL" then press the "ENTER" key
==> To turn off prompting type "NOPROMPT" then press the "ENTER" key
```

Figure 113. Message displayed when a resource limit is approaching. The n symbol in the figure represents an NLID from Table 1 on page xviii

Important: Database activity is not suspended when a cancellation prompt is displayed. DB2 continues to fetch rows and use processor time.

- A row limit value cancels data retrieval when 100 000 rows have been retrieved, if the user presses the Enter key in response to the message in Figure 113. When the IBM-supplied governor cancels data retrieval, the user sees the message shown in Figure 114.

```
Row limit exceeded!  Your command canceled by QMF governor.
```

Figure 114. Message displayed when a resource limit is exceeded

When running a procedure, you might get a message that your procedure was canceled, rather than the message in Figure 114. For example, if your procedure contains a command that requires the report to complete (such as ERASE), you receive the message shown in Figure 115.

```
Procedure canceled.
```

Figure 115. Message displayed when a procedure is canceled

Users using the SYSTEM profile, discussed in “Establishing a Profile Structure for Your Installation” on page 216, are already set up to use these default values of 25 000 and 100 000. To activate the default values for users with unique profiles, see “Activating the Default Limits” on page 386.

TSO, and native OS/390 batch have two additional predefined values (a time limit and a time prompt value) for the time spent running a QMF command:

- A time prompt value warns users when the processor time for the cycle reaches 6 minutes, at which time the user sees the message shown in Figure 116 on page 386.

```
DSQUn00 QMF governor prompt:
   Command has executed for 6 minutes

==> To continue QMF command press the "ENTER" key.
==> To cancel QMF command type "CANCEL" then press the "ENTER" key
==> To turn off prompting type "NOPROMPT" then press the "ENTER" key
```

Figure 116. Message displayed when a resource limit is approaching. The n symbol in the figure represents an NLID from Table 1 on page xviii

- A time limit value cancels the command when 24 minutes of processor time are used during the cycle.

If you want to define your own limits for when the user is warned and when data retrieval is canceled, see "Defining Your Own Resource Limits" on page 390.

Activating the Default Limits

Follow this procedure to set up the governor exit routine to warn a user when the number of rows retrieved from the database reaches 25 000 and to cancel the QMF activity when the number of rows retrieved reaches 100 000:

1. Run the query shown in Figure 117 from the SQL query panel.

```
UPDATE Q.RESOURCE_VIEW
SET INTVAL=0
WHERE RESOURCE_OPTION='SCOPE' AND
      RESOURCE_GROUP='SYSTEM'
```

Figure 117. Activating default values for the IBM-supplied governor

2. Set a value of SYSTEM for the RESOURCE_GROUP field of the user's profile. For example, the UPDATE statements in Figure 118 on page 387 activate default values for user JONES (using English QMF) and user SCHMIDT (using German QMF).

   Important: Always specify a value for the TRANSLATION column, or you might change more rows in Q.PROFILES than you intend.

```
Base QMF (English)
        German NLF
UPDATE Q.PROFILES
        UPDATE Q.PROFILES
SET RESOURCE_GROUP = 'SYSTEM'
        SET RESOURCE_GROUP = 'SYSTEM'
WHERE CREATOR='JONES' AND
        WHERE CREATOR='SCHMIDT' AND
TRANSLATION='ENGLISH'
        TRANSLATION='DEUTSCH'
```

Figure 118. Updating a user's resource group

Important: If you start QMF with a DSQSPRID parameter value of TSOID, the resource group name is the user ID.

For more information on how to create a new user profile in the Q.PROFILES table, see "Creating User Profiles to Enable User Access to QMF" on page 216.

3. Instruct users to end the current QMF session and start another to activate the new values.

"How a Governor Exit Routine Controls Resources" explains how the governor uses the information in the Q.RESOURCE_VIEW and the Q.PROFILES table to control resources.

If you want to define row limits other than the defaults of 25 000 and 100 000, read "How a Governor Exit Routine Controls Resources". Then see the procedure in "Defining Your Own Resource Limits" on page 390.

How a Governor Exit Routine Controls Resources

The governor uses two types of information to control resources.

- Information about the resource limits you set for a user, defined in a resource control table called Q.RESOURCE_TABLE.
- Information about the state of the user's session, which tells the governor how close the user's activity is coming to the resource limits defined for the resource group the user is in. This information is passed to the governor exit routine in the IBM-supplied control blocks DXEGOVA and DXEXCBA.

How the Governor Knows What the Resource Limits Are

Each row of the IBM-supplied Q.RESOURCE_TABLE contains:

- The name of a resource group (RESOURCE_GROUP), which characterizes one or more users whose activities you want to govern in the same manner.
- The name of the resource (RESOURCE_OPTION) you want to limit for the group of users named in RESOURCE_GROUP.

- Values (INTVAL, FLOATVAL, or CHARVAL) that define the limit for the resource option. Resource options can have integer values, floating-point values, or character values.

Table 54 on page 394 shows the structure of the Q.RESOURCE_TABLE as it is shipped by IBM. Q.RESOURCE_TABLE has the index Q.RESOURCE_INDEX. Keyed columns are RESOURCE_GROUP and RESOURCE_OPTION.

If you're migrating from an older QMF release: The older QMF releases do not include Q.RESOURCE_INDEX.

The Q.RESOURCE_TABLE is shipped by IBM with a predefined resource group called SYSTEM. The SYSTEM resource group has three predefined resource options for CICS, as shown in Figure 119. The group has three additional time options for TSO, and native OS/390 batch. Use the CHARVAL column to indicate the limits defined in each row, as shown.

RESOURCE GROUP	RESOURCE OPTION	INTVAL	FLOATVAL	CHARVAL
SYSTEM	SCOPE	-	-	INDICATE WHETHER GOVERNOR IS ACTIVE
SYSTEM	ROWLIMIT	100000	-	CANCEL AFTER FETCHING 100000 ROWS
SYSTEM	ROWPROMPT	25000	-	PROMPT USER AFTER FETCHING 25000 ROWS
SYSTEM	TIMELIMIT	1440	-	CANCEL AFTER 24 MINUTES CPU
SYSTEM	TIMEPROMPT	360	-	PROMPT USER AFTER 6 MINUTES CPU
SYSTEM	TIMECHECK	900	-	15 MINUTES INTERVAL BETWEEN TIME CHECK

Figure 119. Default resource group and options for the IBM-supplied governor exit

SCOPE = 0
Activates governing for a particular resource group.

Any non-zero value for SCOPE, including a null, deactivates governing for the resource group.

ROWLIMIT = 100000
If the user decides to continue when warned, the governor exit routine cancels data retrieval activities after 100 000 rows are retrieved. (Retrieval is for FETCH only.) ROWLIMIT is dependent on the buffer size; therefore, more than 100 000 rows can be retrieved if the buffer holds a number of rows not divisible by 100 000.

ROWPROMPT = 25000
Warns the user when 25 000 database rows have been retrieved.

The three additional options provided in TSO, and native OS/390 batch are:

TIMELIMIT = 1440

If the user decides to continue when warned, the governor exit routine cancels the command after 24 minutes of processor time have elapsed. TIMELIMIT is checked at TIMECHECK intervals; therefore, more than 24 minutes of processor time can elapse if the TIMECHECK interval is set at an interval not divisible by 24. TIMELIMIT is evaluated after a TIMECHECK interval is processed.

Processor time: *Processor time* refers to the jobstep time plus the SBR (Service Request Block) time.

TIMEPROMPT = 360

Warns the user when 6 minutes of processor time have elapsed. Evaluated after a TIMECHECK interval is processed.

TIMECHECK = 900

Specifies 15 minutes of real time between time checks or prompting or canceling.

IBM also supplies a view of this table, called Q.RESOURCE_VIEW, that includes all five columns of Q.RESOURCE_TABLE. Each time QMF calls the governor exit routine, QMF passes to the routine the resource control information stored in Q.RESOURCE_VIEW. The governor exit routine uses this resource information to help determine when the user reaches a resource limit.

How the Governor Knows When You Reach a Resource Limit

On a call to the governor exit routine, QMF queries Q.RESOURCE_VIEW, which shows what resource limits are defined in the resource control table for the resource group to which the user belongs. To determine the resource group, QMF checks the value of the RESOURCE_GROUP field of the user's row in the Q.PROFILES table and checks Q.RESOURCE_VIEW for a matching value.

QMF uses two control blocks, DXEGOVA and DXEXCBA, to pass information to the governor exit routine. The DXEGOVA control block contains information from Q.RESOURCE_VIEW about the limits you set for each user. The DXEXCBA control block contains information about the activities the user is performing in the current QMF session, which tells the governor how close the user is coming to the resource limits.

Figure 120 on page 390 shows how the governor limits use of resources.

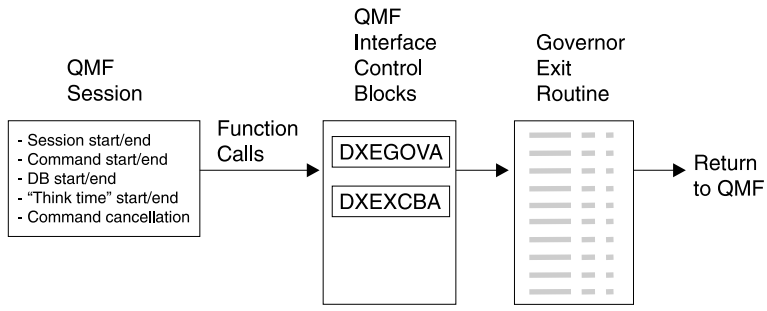


Figure 120. How a governor exit routine works with QMF

QMF calls the governor exit routine at a number of different points within the QMF session, as shown in Figure 120. These calls are called *function calls*. For more information about function calls, see "Points at Which QMF Calls the Governor" on page 398.

What Happens When You Reach a Resource Limit

When the resource control information QMF passes to the governor exit routine indicates that a resource limit has been reached, the IBM-supplied governor exit routine calls the QMF cancellation service to cancel the QMF activity the user tried to perform, and the user sees the message in Figure 114 on page 385.

If you use the default limits for number of rows as discussed in Activating the Default Limits, the IBM-supplied governor exit routine also displays a warning before canceling the activity, as shown in Figure 113 on page 385. See "Defining Your Own Resource Limits" for how to activate this warning if you are not using the default values for the number of rows retrieved.

The IBM-supplied governor exit routine resets its count of the number of rows upon returning control to QMF, so that the number of rows is not cumulative across calls to the governor.

Defining Your Own Resource Limits

This section explains how to create a new resource group, for which the resource is the number of rows retrieved from the database. If you want to define resource limits other than the number of rows, you need to modify the IBM-supplied governor exit routine or write an exit routine of your own. See "Modifying the IBM-Supplied Governor Exit Routine or Writing Your Own" on page 394 for more information on the facilities you can use.

Use the following procedure to add a resource group to the resource control table. This procedure adds a resource group named GROUP1, where the governor prompts a user in GROUP1 when the number of rows reaches 10 000, and cancels the user's activity when the number of rows reaches 15 000

or (for TSO, and native OS/390 batch) when 1000 seconds have elapsed. The procedure also shows an example of how to add a user to a resource group.

1. Run the query in Figure 121 to set the number of rows at which the user is warned of the approaching resource limit.

   If you don't want to warn users when they are approaching their limit for the number of rows, skip to step 2.

```
INSERT INTO Q.RESOURCE_VIEW (RESOURCE_GROUP,RESOURCE_OPTION,INTVAL)
    VALUES('GROUP1','ROWPROMPT',10000)
```

Figure 121. Activating prompting for row limit

2. Run the query in Figure 122 to set the number of rows at which the governor cancels the user's activity.

```
INSERT INTO Q.RESOURCE_VIEW (RESOURCE_GROUP,RESOURCE_OPTION,INTVAL)
    VALUES('GROUP1','ROWLIMIT',15000)
```

Figure 122. Activating cancellation of activities when user reaches row limit

3. Run the query in Figure 123 to set the processor time that elapses before the user is warned of the approaching resource limit.

   If you don't want to warn users when they are approaching their limit for the time elapsed, skip to step 4.

```
INSERT INTO Q.RESOURCE_VIEW (RESOURCE_GROUP,RESOURCE_OPTION,INTVAL)
    VALUES('GROUP1','TIMEPROMPT',300)
```

Figure 123. Activating prompting for time limit

4. Run the query in Figure 124 to set the processor time that can elapse before the governor cancels the user's activity.

```
INSERT INTO Q.RESOURCE_VIEW (RESOURCE_GROUP,RESOURCE_OPTION,INTVAL)
    VALUES('GROUP1','TIMELIMIT',1000)
```

Figure 124. Activating cancellation of activities when user reaches time limit

5. Run the query in Figure 125 on page 392 to set the real time between intervals when the governor checks the user's activity.

```
INSERT INTO Q.RESOURCE_VIEW (RESOURCE_GROUP,RESOURCE_OPTION,INTVAL)
    VALUES('GROUP1','TIMECHECK',800)
```

Figure 125. Activating time interval check

6. Run the query shown in Figure 126 to turn on governing for the GROUP1 resource group.

   SCOPE is a resource option that activates or deactivates governing. Each

```
INSERT INTO Q.RESOURCE_VIEW (RESOURCE_GROUP,RESOURCE_OPTION,INTVAL)
   VALUES('GROUP1','SCOPE',0)
```

Figure 126. Turning on the governor for a particular resource group

   resource group in the Q.RESOURCE_TABLE must have a RESOURCE_OPTION called SCOPE, and SCOPE must have a corresponding INTVAL of zero, or the resource group is not governed. Set INTVAL to 1 to deactivate governing.

7. Run a query similar to the one in Figure 127 to add user JONES to the GROUP1 resource group in the English QMF environment.

```
UPDATE Q.PROFILES
  SET RESOURCE_GROUP='GROUP1'
  WHERE CREATOR='JONES' AND
  TRANSLATION='ENGLISH'
```

Figure 127. Updating a user's resource group

   If you're using an NLF: Use a similar query to update a user's profile in an NLF environment, but use a TRANSLATION value from Table 1 on page xviii.

8. Instruct the user whose profile you updated to end the current QMF session and start another to activate the new values.

Creating Your Own Resource Control Table

You can create your own table or rename the Q.RESOURCE_TABLE. You can also include additional columns in the table you create, if Q.RESOURCE_VIEW is the view defined in this table, and if the table includes all of the columns shown in Table 54 on page 394.

Figure 128 on page 393 shows an example of SQL statements you might use to create a table called MY_RESOURCES. Substitute your own table, column, and table space names in the query. Before creating a new table, ensure you erase the Q.RESOURCE_TABLE from the database, because Q.RESOURCE_VIEW is defined in this table:

```
DROP TABLE Q.RESOURCE_TABLE
```

Dropping the Q.RESOURCE_TABLE also drops Q.RESOURCE_VIEW from the database, so you need to recreate both the table and the view, as shown in Figure 128 and Figure 129.

When you drop the view, you automatically *invalidate the QMF application plan*. For this reason, you should work outside QMF when you drop and recreate the resource table and view. Choose a time when QMF is inactive, and use DB2's DB2I facility. DB2I lets you carry out the work interactively.

If you do not use the IBM-supplied table space, then you must create your own. If you rebind the QMF authorization plan explicitly, you also need the BIND privilege on the plan. You can find information on the needed authority for each of your SQL commands in *DB2 UDB for OS390 SQL Reference*

```
CREATE TABLE MY_RESOURCES
  (GROUP_NAME    CHAR(16) NOT NULL,
   CONSTRAINT    CHAR(16) NOT NULL,
   INTEGER       INTEGER,
   FLOAT_VALUE   FLOAT,
   CHARACTER     VARCHAR(80))
IN TBSPACE1
```

Figure 128. Creating a resource control table or renaming Q.RESOURCE_TABLE

Always recreate Q.RESOURCE_VIEW if you decide to use a table other than Q.RESOURCE_TABLE or decide to give Q.RESOURCE_TABLE a different name, because QMF queries the *view*, not the table, to obtain resource control information to pass to the governor exit routine.

To recreate Q.RESOURCE_VIEW after you create the Q.RESOURCE_TABLE, grant the SELECT privilege on Q.RESOURCE_VIEW to PUBLIC. You might then test the new view using SPUFI. Finally, rebind the QMF authorization plan.

Figure 129 shows how to redefine Q.RESOURCE_VIEW as a view on the new table, MY_RESOURCES. Substitute your own table and column names for those in the figure.

```
CREATE VIEW Q.RESOURCE_VIEW
  (RESOURCE_GROUP, RESOURCE_OPTION, INTVAL, FLOATVAL, CHARVAL)
  AS SELECT GROUPNAME, CONSTRAINT, INTEGER, FLOAT_VALUE, CHARACTER
  FROM MY_RESOURCES
```

Figure 129. Redefining the Q.RESOURCE_VIEW

Table 54. Structure of the Q.RESOURCE_TABLE table

Column name	Data type	Length (bytes)	Nulls allowed?	Function/values
RESOURCE_GROUP	CHAR	16	No	Contains the name of the resource group. Update the RESOURCE_GROUP field of the user's row in Q.PROFILES to activate governing for that user.
RESOURCE_OPTION	CHAR	16	No	Your own name for a resource you want to monitor.
INTVAL	INTEGER		Yes	Reflects resource limit for resource options that have integer values. For example, number of rows retrieved from the database is a resource that has an integer value.
FLOATVAL	FLOAT		Yes	Reflects resource limit for resource options that have floating point values. FLOATVAL is null for the IBM-supplied governor.
CHARVAL	VARCHAR	80	Yes	Reflects resource limit for resource options that have character values. For example, you might establish a DAY_OF_WEEK resource option and assign MONDAY to CHARVAL so that QMF users can log on to QMF only on Mondays. CHARVAL is used as a comment column in the IBM-supplied governor.

Modifying the IBM-Supplied Governor Exit Routine or Writing Your Own

If you decide to govern resources other than the number of rows returned from the database or the processor time expired, you need to modify the IBM-supplied governor exit routine or write your own by doing the following:

1. Establish addressability to the exit routine for the points at which QMF calls the routine. "How and When QMF Calls the Governor Exit Routine" on page 398 explains this step.
2. Pass resource control information to the governor exit routine and store this information. "Passing Resource Control Information to the Governor Exit" on page 406 explains this step.
3. Establish addressability to the QMF cancellation service to cancel activities. "Canceling User Activity" on page 421 explains this step.

4. Establish addressability to the QMF message service to provide messages for activities that have been canceled. “Providing Messages for Canceled Activities” on page 422 explains this step.
5. For CICS, translate, assemble, and link-edit your governor exit routine, whether you modified the IBM-supplied governor exit routine or wrote your own. “Translating, Assembling, and Link-Editing Your Governor Exit Routine in CICS” on page 423 explains this step.
6. For TSO, and native OS/390 batch, assemble, and link-edit your governor exit routine, whether you modified the IBM-supplied governor exit routine or wrote your own. “Assembling and Link-Editing Your Governor Exit Routine in TSO, and native OS/390 batch” on page 425 explains this step.

Program Components of the Governor Exit Routine

Before you begin modifying or writing your own governor exit routine, you need to know the names of the governor exit routine components and what purpose each component serves.

Table 55 on page 396 shows these components, whose names vary according to which language you installed (English or an NLF). Replace the *n* symbol in the following names with the NLID (from Table 1 on page xviii) that matches the NLF you're using. In the component names, a 1 represents TSO, and native OS/390 batch, and a 3 represents CICS.

Table 55. IBM-supplied governor components

Member Name	Library	Function

Table 55. IBM-supplied governor components

TSO, and native OS/390 batch		

Table 55. IBM-supplied governor components

DSQUnGV1	QMF710.SDSQLOAD	Load module for TSO, and native OS/390 batch
DSQUnGV1	QMF710.SDSQUSRn	Source code for governor exit routine for TSO, and native OS/390 batch
DXEUnGV1	QMF710.SDSQUSRn	Contains text and related definitions for the governor prompts and cancelation messages in TSO, and native OS/390 batch

Table 55. IBM-supplied governor components

CICS

Table 55. IBM-supplied governor components

DSQUnGV3	QMF710.SDSQLOAD	Load module for CICS
DSQUnGV3	QMF710.SDSQUSRn	Source code for governor exit routine for CICS
DXEUnGV3	QMF710.SDSQUSRn	Contains text and related definitions for the governor cancelation message in CICS
DXEUnGM	QMF710.SDSQUSRn	Contains BMS map for the governor prompts in CICS.

Table 55. IBM-supplied governor components

Common

Table 55. IBM-supplied governor components

DXEGOVA	QMF710.SDSQUSRn	DSECT for the DXEGOVA control block.
DXEXCBA	QMF710.SDSQUSRn	DSECT for the DXEXCBA control block.

You can find these members on the QMF production disk.

If you're using an NLF: You can govern resources in an NLF session as well as an English QMF session, by using different versions of the module DSQU*n*GVx for each language environment. For example, if you have both English and German installed, use the module DSQUEGV1 for English in TSO, and native OS/390 batch and the module DSQUDGV1 for German in TSO, and native OS/390 batch.

You can share the resource control table (Q.RESOURCE_TABLE or one you create yourself) and the Q.RESOURCE_VIEW between language environments, just as the Q.PROFILES table can contain profiles for English or any NLF.

How TSO, SRPI, APPC, and Native OS/390 Interact with the Governor Exit Routine

At the start of a user's session, QMF issues a LOAD command to bring the governor into the user's virtual storage. For performance reasons, an assembler call interface is used between QMF and the governor exit routine. The governor exit routine must provide fast performance because, depending on which resources you are trying to control, it might be called on every row retrieved from the database.

Throughout this chapter, the load module library QMF710.SDSQLOAD is assumed to be in a library concatenated to the user's STEPLIB data set. Assembling and link-editing this module are discussed in "Assembling and Link-Editing Your Governor Exit Routine in TSO, and native OS/390 batch" on page 425.

Figure 130 shows the program structure of a governor exit routine.

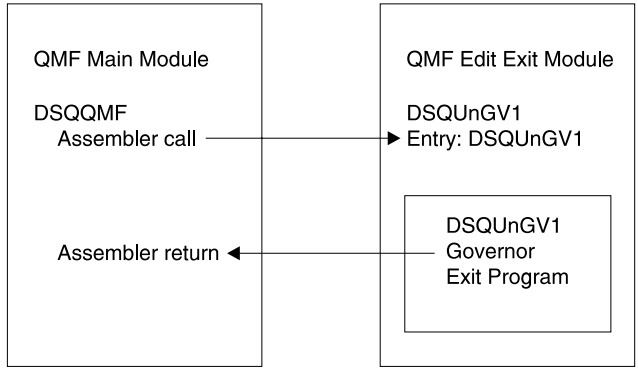


Figure 130. TSO, SRPI, APPC, or native OS/390 processing that interacts QMF with the governor exit

How CICS Interacts with the Governor Exit Routine

At the start of a user's session, QMF issues an EXEC CICS LOAD command to bring the governor into the user's virtual storage. For performance reasons, an assembler call interface is used between QMF and the governor exit routine. The governor exit routine must provide fast performance because, depending on which resources you are trying to control, it might be called on every row retrieved from the database. Assembling and link-editing this module are discussed in "Translating, Assembling, and Link-Editing Your Governor Exit Routine in CICS" on page 423.

The CICS control block interface to the governor exit consists of the following parts:

- Interface control blocks DXEXCBA and DXEGOVA, which are shipped with QMF
- CICS-supplied prolog and epilog macros DFHEIENT and DFHEIRET, which are shipped with CICS
- Command interface modules DFHEAI and DFHEAI0, which are shipped with CICS
- The governor exit program, which is named DSQU*n*GV3

Figure 131 shows the program structure of a governor exit routine.

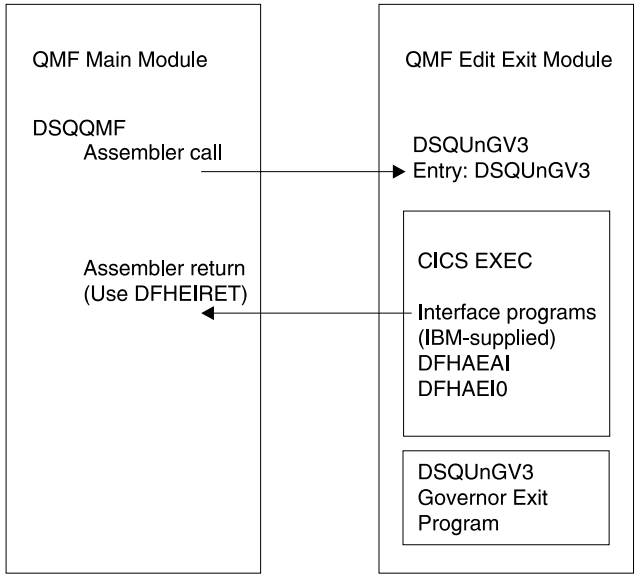


Figure 131. CICS processing that interacts QMF with the governor exit

The governor exit routine executes on the same program level as the main QMF program.

The entry point to the governor exit routine is DSQU*n*GV3. When it calls the governor exit routine, QMF always branches to the address returned by CICS as the result of an EXEC CICS LOAD command.

If the load fails or the module doesn't support 31-bit addressing mode, QMF issues a warning message, disables the governor exit, and continues the session without the governor. Assembling and link-editing this module are discussed in "Translating, Assembling, and Link-Editing Your Governor Exit Routine in CICS" on page 423.

How and When QMF Calls the Governor Exit Routine

QMF issues standard assembler CALL statements to the governor exit routine. The term *function calls* describes the points during the QMF session when these CALL statements are issued.

Points at Which QMF Calls the Governor

Function calls to the governor exit routine either precede or follow a specific type of QMF activity. For example, QMF passes control to the governor exit before and after running a command.

When it calls the governor, QMF always branches to an entry point named DSQU*n*GVx. Therefore, you cannot use the entry point to determine the type of exit. Use instead the control-block field GOVFUNCT. Its value is a positive integer that identifies the type of exit.

- **At the beginning and end of a QMF session**

  QMF calls the governor exit routine during initialization for a QMF session, after the governor exit routine is loaded into the user's virtual storage. The governor initializes itself for the session using the resource control information contained in rows passed from QMF's query of Q.RESOURCE_VIEW.

  The governor exit routine is also called just before the session ends, when it can perform whatever is needed to discontinue its activities for the user's session. For example, it can release virtual storage.

- **After a new connection is made to the database**

  When a user issues the CONNECT command, the Q.PROFILES table and the resource control table are re-initialized. The governor is called because the resource control values might have changed if a different CONNECT ID was used. All unfinished database operations are completed before the connection is made.

  Although the governor exit routine cannot cancel a connection to the database, you can write statements in your own routine that cancel the user's session on the next activity, if the resource information passed to the governor indicates that the user is not allowed to use QMF.

- **Before and after running a command**

  QMF calls the governor before and after running all commands. There can be several calls for the start of commands before a call for the completion of a command. For example, a RUN PROC command results in two "start command" calls and two "end command" calls when there is a RUN QUERY command embedded in the procedure.

- **Before database activity starts and when it ends**

  QMF calls the governor just before it begins a variety of database operations, such as PREPARE, OPEN, and FETCH; QMF also calls the governor upon completing any database activity.

  When QMF retrieves data, it fits the maximum number of rows possible into a buffer that has a minimum size of 4K. QMF calls the governor once upon retrieving the first row into the buffer and once upon either filling the buffer or reaching the end of the table, whichever comes first.

  QMF also calls the governor when SQL, QBE, or prompted queries are submitted using RUN QUERY, or when QMF is running queries started by a command. For example, a SAVE DATA command might result in DELETE, CREATE, and INSERT queries. The governor is called before and after each of these operations. If there is an incomplete data object when a command is entered, there might be governor calls for database activity

while the data object is being completed. See "Solving Performance Problems" on page 475 for more information on handling problems associated with completing the data object.

The following QMF commands always force database activity:

- DISPLAY table commands
- The EDIT TABLE command for the Table Editor
- The ERASE command for a table
- The EXPORT TABLE command
- The IMPORT command to a table
- The PRINT command for a table or view
- The RUN command for queries
- The SAVE DATA command (which forces an implicit CREATE TABLE query)
- Scrolling commands that result in fetching data when a report is being displayed
- Data retrieval operations (fetch operations)

- **Before and after the user makes a choice**

  At various points in a session, QMF waits for users to make decisions. The time QMF spends waiting is known as *think time*.

  QMF calls the governor before performing an operation that leads to think time, such as displaying a panel for a user-entered selection. As soon as the user enters a response and ends the period of think time, QMF calls the governor.

  Any of the following activities lead to think time:

  - Displaying a QMF panel between running commands
  - Displaying help panels
  - Displaying confirmation prompt panels; for example, when the user is about to erase something by issuing the SAVE command that replaces the object
  - Displaying command prompt panels; for example, when the user enters `DISPLAY ?`
  - Displaying the LIST prompt panel
  - Displaying ICU and EXTRACT panels
  - Running the EDIT PROC and EDIT QUERY functions

- **An initiation of an abnormal ending**

  QMF calls the governor just before it initiates an abnormal ending. The governor can perform the cleanup necessary before the abend processing begins. The actions might be similar to those during the session end.

For the IBM-supplied governor exit routine, QMF uses the GOVFUNCT field of the DXEGOVA control block to pass information about the type of function call. The fields of this control block are explained in Table 56 on page 407. Each type of function call has a specific value for the GOVFUNCT field. These values are shown in Figure 137 on page 405.

What Happens Upon Entry to the Governor Exit Routine

QMF calls the governor exit routine by branching to the address of the entry point DSQUnGV1 or DSQU*n*GV3.

Branching to the CICS entry point DSQUnGV3: Entry to the governor exit routine in CICS follows the standard CICS linkage conventions:

- Register 1 contains a CICS parameter list suitable for processing by CICS-supplied macros DFHEIENT and DFHEIRET. Figure 132 shows the contents of Register 1 on a call to the governor.

  DFHEIBLK is the address of the CICS communications area. DFHCOMMA contains two pointers, one to the DXEXCBA control block and the other to the DXEGOVA control block.

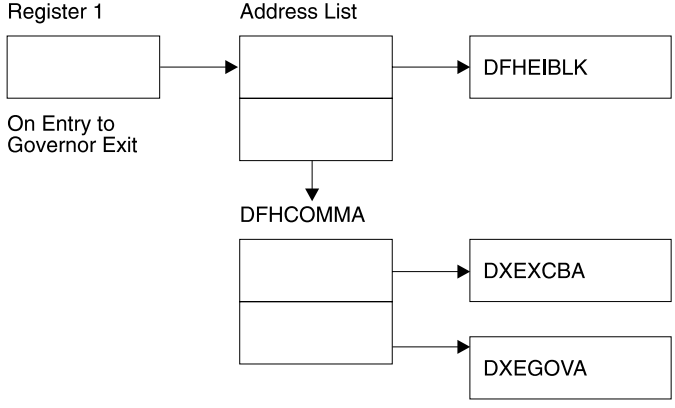


Figure 132. Contents of Register 1 on a call to the governor exit routine

- Register 13 contains the address of a standard CICS working storage area as described by CICS DSECT (DFHEISTG).
- Register 14 contains the return address.

Because the governor program runs on the same program level as QMF, use caution when using any EXEC CICS commands that change the environment (for example, CICS HANDLE CONDITION). If you need to use the CICS HANDLE CONDITION, use EXEC CICS PUSH and EXEC CICS POP to save and restore them.

Begin the governor program with code similar to that shown in Figure 133 .

```
DSQUEGV3 TITLE 'QMF GOVERNOR EXIT ROUTINE'
DFHEISTG DSECT
DSQUEGV3 DFHEIENT CODEREG=(12),DATAREG=(13),EIBREG=(10)
         B     FDENTRY              BRANCH AROUND CONSTANTS
*
MODNAME  DC    C'DSQUEGV3'          MODULE NAME
         DC    C' '
         DC    C'&SYSDATE '         DATE OF ASSEMBLY
         DC    C'&SYSTIME '         TIME OF ASSEMBLY
         DS    0H
*
FDENTRY  DS    0H
         L      R01,4(R01)          GET ADDRESS OF DFHCOMMA
         L     XCBPTR,8(R01)        GET ADDRESS OF QMF EXIT CTL BLK
         L     GOVPTR,12(R01)       GET ADDRESS OF QMF GOV  CTL BLK
         USING DXEXCBA,XCBPTR
         USING DXEGOVA,GOVPTR
         LA    WORKPTR,GOVUSERS     GET ADDRESS OF GOVERNOR WORK AREA
         USING WORK,WORKPTR
*
⋮
    GOVPTR   EQU   R03              PTR TO DXEGOV CONTROL BLOCK
    XCBPTR   EQU   R02              PTR TO DXEXCB CONTROL BLOCK
    WORKPTR  EQU   R04              PTR TO GOVERNOR SCRATCH PAD AREA
```

Figure 133. Sample code at the start of a governor (for CICS)

The code in Figure 133 first branches around a block of constants that can serve as eye catchers in a dump of virtual storage. The constants name the entry point and the applicable version of QMF. They also show the date and time that the code was assembled.

The code establishes base registers for the program, DXEXCB, DXEGOV, and a scratchpad area named GOVUSERS. The scratchpad area is preserved by QMF between calls to the governor. A DSECT named WORK describes this scratchpad area in the code for the IBM-supplied governor.

When processing is complete, the governor returns control to QMF using the standard CICS return as specified by the CICS macro DFHEIRET.

Attention: Do not use the command EXEC CICS RETURN. This ends the QMF session without releasing QMF resources.

The governor program ends with code similar to Figure 134.

```
.
.
.
*
         XR    R15,R15           ZERO RETURN CODE
         DFHEIRET RCREG=15
*
```

Figure 134. Endcode for the governor program

Branching to the TSO, SRPI, APPC, or native OS/390 entry point DSQUnGV1: Standard IBM linkage conventions are used to call the entry point named DSQUEGV1. This is true regardless of which type of call is made. On a call, QMF passes the following information:

- Register 1 contains the address of the parameter list.

  The parameter list contains two full-word addresses; one for the control block DXEXCBA; the other for the control block DXEGOVA.

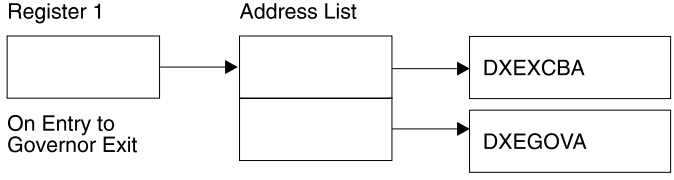


Figure 135. Contents of Register 1 on a call to the governor exit routine

- Register 13 contains the address of the QMF SAVE area.
- Register 14 contains the return address from the call.
- Register 15 contains the address of the entry point, which is always DSQUEGV1.

After the governor is called, it might begin with code like that shown in Figure 136 on page 404. The code sample is from the IBM-supplied governor.

```
DSQUEGV1 CSECT
         USING *,R15
         B     FDENTRY              BRANCH AROUND CONSTANTS
         DC    C'DSQUEGV1'          MODULE NAME
         DC    C' '
         DC    C'&SYSDATE '         DATE OF ASSEMBLY
         DC    C'&SYSTIME '         TIME OF ASSEMBLY
         DS    0H
*
FDENTRY  STM   R14,R12,12(R13)      SAVE THE REGISTERS
         BALR  R12,0                INITIALIZE BASE REGISTER
         DROP  R15
         LA    R02,MAINSV           CHAIN THE SAVE AREAS
         ST    R02,8(R13)
         ST    R13,MAINSV+4
         LR    R13,R02
*
         L     R01,4(R01)           GET ADDRESS OF DFHCOMMA
         L     XCBPTR,0(R01)        GET ADDRESS OF QMF EXIT CTL BLK
         L     GOVPTR,4(R01)        GET ADDRESS OF QMF GOV CTL BLK
         USING DXEXCBA,XCBPTR
         USING DXEGOVA,GOVPTR
         LA    WORKPTR,GOVUSERS     SCRATCH PAD ADDRESS
         USING WORK,WORKPTR
⋮
MAINSV   DS    18F                  SAVE AREA
XCBPTR   EQU   R02                  PTR TO DXEXCBA CONTROL BLOCK
GOVPTR   EQU   R03                  PTR TO DXEGOVA CONTROL BLOCK
WORKPTR  EQU   R04                  PTR TO SCRATCH_PAD AREA
```

Figure 136. Sample code at the start of a governor (for TSO, SRPI, APPC, or native OS/390)

The code in Figure 136 first branches around a block of constants that can serve as eye catchers in a dump of virtual storage. The constants name the entry point and the applicable version of QMF. They also show the date and time that the code was assembled.

The code establishes base registers for the program, DXEXCB, DXEGOV, and a scratchpad area named GOVUSERS. The scratchpad area is preserved by QMF between calls to the governor. A DSECT named WORK describes this scratchpad area in the code for the IBM-supplied governor.

After processing a call, the governor returns control to QMF in the standard way; that is, you must use the standard epilog and prolog. In the IBM-supplied governor, the following code does this:

```
         L     R13,4(R13)        RESTORE CALLER'S SAVE AREA ADDRESS
         LM    R14,R12,12(R13)   RESTORE CALLER'S REGISTERS
         XR    R15,R15           ZERO RETURN CODE
         BR    R14               RETURN TO CALLER
```

Establishing Addressability for Function Calls

Because QMF always branches to an entry point named DSQU*n*GV1 or DSQU*n*GV3 when it calls the governor, you can't use these entry points to determine the type of function call; instead, use the GOVFUNCT field of the DXEGOVA control block.

In the IBM-supplied governor exit routine, GOVFUNCT contains a character value that identifies the type of function call. This character value, in turn, equates to a 1-byte binary integer from 1 to 10. For example, on a function call for the start of a QMF session, the value of GOVFUNCT is GOVINIT, which equates to a numeric value of X'1'.

Both character and numeric values for each type of function call are shown in Figure 137. (If you need more information about the activity that occurs at each function call, see "Points at Which QMF Calls the Governor" on page 398.)

```
GOVINIT  EQU   1            -------- INITIALIZATION OF SESSION
GOVTERM  EQU   2            -------- TERMINATION OF SESSION
GOVSCMD  EQU   3            -------- START COMMAND
GOVECMD  EQU   4            -------- END COMMAND
GOVCONN  EQU   5            -------- CONNECT COMMAND
GOVSDBAS EQU   6            -------- START DATA BASE
GOVEDBAS EQU   7            -------- END DATA BASE
GOVSACTV EQU   8            -------- SUSPEND QMF ACTIVITY
GOVRACTV EQU   9            -------- RESUME QMF ACTIVITY
GOVABEND EQU   10           -------- QMF ABEND OPERATION
```

Figure 137. Character and numeric values for the GOVFUNCT field of DXEGOVA

GOVABEND is not called when running in CICS.

To improve performance in your own exit routine, you can follow the convention the IBM-supplied governor uses, and equate the values of GOVFUNCT with binary numbers by using a branch table. QMF uses the branch table to find the addresses to branch to for each type of function call.

Figure 138 shows an example of some code that identifies branch addresses for the IBM-supplied governor.

```
         XR    R07,R07               ZERO REGISTER 7
         IC    R07,GOVFUNCT          IDENTIFY EXIT TYPE
         SLL   R07,2                 DETERMINE BRANCH TABLE OFFSET
         LA    R15,FUNBTAB(R07)      GET BRANCH TABLE ADDRESS
         L     R15,0(R15)            GET BRANCHING ADDRESS
         BALR  R14,R15               BRANCH TO THE APPROPRIATE CODE
            . . .
            . . .
            . . .
            . . .
FUNBTAB  DS    0F
         DC    A(BYPASS)          VALUE "0"  - UNUSED
         DC    A(INIT)            VALUE "1"  - QMF INITIALIZATION
            . . .
            . . .
            . . .
         DC    A(SUSPEND)         VALUE "10" - QMF ABEND IN PROCESS
```

Figure 138. Identifying the type of function call and branching to the appropriate address

Passing Resource Control Information to the Governor Exit

If you have not done so already, read the following sections, which describe how to set up resource control information in a format the governor can use:

- "How a Governor Exit Routine Controls Resources" on page 387
- "Defining Your Own Resource Limits" on page 390

QMF passes resource control information using two control blocks named DXEGOVA and DXEXCBA. These are shown in Figure 139 on page 410 and Figure 141 on page 418. Their addresses are passed to the governor on every function call. The DSECT DXEXCBA (shipped as DXEXCBA) and the DSECT DXEGOVA (shipped as DXEGOVA) are located in the SDSQUSRE MACLIB. Include these DSECTs in your program using the assembler COPY statement.

Structure of the DXEGOVA Control Block

The DXEGOVA control block passes to the governor exit routine information about a user's resource constraints. This information is located in a resource control view called Q.RESOURCE_VIEW. See "How the Governor Knows What the Resource Limits Are" on page 387 for more information on how this view is used.

Table 56 on page 407 provides the name of each field in the DXEGOVA control block, with its data type and purpose. Each data type is listed as it appears in the DS statement that defines the field in the DSECT. For example, for the GOVOROWS field, the letter F indicates that this field contains a full-word integer. The DS statement for GOVOROWS appears as `GOVOROWS DS  F`.

The layout of the control blocks and the information they contain is the same for QMF support in all operating environments. Therefore, some of the information shown in the control blocks might not apply to QMF in the OS/390 environment because it is used in only VM/ESA® or VSE/ESA™ operating environments.

Table 56. Fields of the DXEGOVA interface control block to the governor

Field	Data Type	Purpose
GOVCADDR	A	Contains the address to branch to for canceling an activity. The code to use this field appears in "Canceling User Activity" on page 421.
GOVFUNCT	XL1	Indicates the type of function call. Possible values are: • GOVINIT (session initialization); GOVTERM (session termination) • GOVSCMD (start command); GOVECMD (end command) • GOVCONN (connect command) • GOVSDBAS (start database retrieval operation); GOVEDBAS (end database retrieval operation) • GOVSACTV (suspend QMF activity for user think time); GOVRACTV (resume QMF activity) • GOVABEND (start of an abnormal ending) Code to use this field appears in "Establishing Addressability for Function Calls" on page 405.
GOVGROUP	CL16	Contains the name of the user's resource group. This value does not change during a QMF session. For more on resource groups, read "How the Governor Knows What the Resource Limits Are" on page 387.
GOVNAME	CL8	Contains the name of the control block (DXEGOVA). This value does not change during a session. It can serve as an eye catcher in a dump of virtual storage.
GOVOROWS	F	Contains the number of rows for the user's resource group in the resource control table. This value does not change during a session, and can be zero.

Table 56. Fields of the DXEGOVA interface control block to the governor (continued)

Field	Data Type	Purpose
GOVRESC	10XL128	Contains information from the resource control table. This information is divided into 10 contiguous blocks of storage that are structured like DSECT GOVRESCT. A block contains information about one of the rows for the user's resource group in the QMF resource control table. • If the resource group has less than 10 rows, unused blocks are those at the end of the field. • If the resource group has more than 10 rows, use the field named GOVNEXTR (in the GOVRESCT DSECT) to access additional rows. All blocks are part of a chain, as described in "Addressing the Resource Control Table" on page 411. The value of this field does not change during a session.
GOVRESCT	DSECT	Describes the block of storage containing information on one of the user's rows of the resource control table. All such blocks are linked together in a chain discussed in "Addressing the Resource Control Table" on page 411. The following fields are within the block: **GOVOPTN(CL16)** Contains the value in the RESOURCE_OPTION column of the resource control table. Blocks in the chain are ordered alphabetically on the content of this field. **GOVNULLI(H)** Null indicator for INTVAL column. **GOVINTVL(F)** Value of INTVAL column. **GOVNULLF(H)** Null indicator for FLOATVAL column. **GOVFLOAT(D)** Value of FLOATVAL column. **GOVNULLC(H)** Null indicator for CHARVAL column. **GOVCHLEN(H)** Length of data in CHARVAL column. **GOVCHAR(CL80)** Value in CHARVAL column. **GOVNEXTR(A)** Points to the block of data for the next resource table row. Contains zero if this is the last row. Any null indicator in the structure is zero when its corresponding column value isn't null. If the column value is null, the indicator is not zero.
GOVSQLCA	A	Address of the SQL communications area (SQLCA), which holds information about the SQL SELECT query on the resource control view (Q.RESOURCE_VIEW).

Table 56. Fields of the DXEGOVA interface control block to the governor (continued)

Field	Data Type	Purpose
GOVSQLRC	F	Return code from the SQL SELECT query on the resource control view (Q.RESOURCE_VIEW). If it is nonzero, the query failed and no rows are passed to the governor.
GOVUSERS	CL2048	Scratchpad area, retained between session calls. QMF does not change this value.

Figure 139 on page 410 shows the structure of the DXEGOVA control block.

```
************************************************************************ 00001000
*                                                                      * 00002000
*        CONTROL BLOCK NAME: DXEGOVA                                   * 00003000
*                                                                      * 00004000
*        FUNCTION:                                                     * 00005000
*                                                                      * 00006000
*            THIS IS THE INTERFACE CONTROL BLOCK BETWEEN QMF AND        * 00007000
*            THE GOVERNOR EXIT ROUTINE.                                * 00008000
*                                                                      * 00009000
*        STATUS: VERSION 7 RELEASE 1 LEVEL 0                           * 00010000
*                                                                      * 00011000
*        INNER CONTROL BLOCKS: NONE                                    * 00012000
*                                                                      * 00013000
*        CHANGE ACTIVITY: NA                                           * 00014000
*                                                                      * 00015000
*        CHANGE DATE: NA                                               * 00016000
*                                                                      * 00017000
************************************************************************ 00018000
*                                                                        00019000
DXEGOVA  DSECT                                                          00020000
         DS    0D                                                       00021000
GOVNAME  DS    CL8           -- CONTROL BLOCK IDENTIFICATION            00022000
         SPACE                                                          00023000
GOVEXCTL DS    XL72          -- EXIT CONTROL                            00024000
         ORG   GOVEXCTL                                                 00025000
GOVFUNCT DS    XL1           ----- FUNCTION CODE                        00026000
GOVINIT  EQU   1             -------- INITIALIZATION OF SESSION         00027000
GOVTERM  EQU   2             -------- TERMINATION OF SESSION           00028000
GOVSCMD  EQU   3             -------- START COMMAND                     00029000
GOVECMD  EQU   4             -------- END COMMAND                       00030000
GOVCONN  EQU   5             -------- CONNECT COMMAND                   00031000
GOVSDBAS EQU   6             -------- START DATA BASE                   00032000
GOVEDBAS EQU   7             -------- END DATA BASE                     00033000
GOVSACTV EQU   8             -------- SUSPEND QMF ACTIVITY             00034000
GOVRACTV EQU   9             -------- RESUME QMF ACTIVITY              00035000
GOVABEND EQU   10            -------- QMF ABEND OPERATION              00036000
GOVPAD10 DS    CL7           ----- RESERVED FIELD                       00037000
         SPACE                                                          00038000
GOVCADDR DS    A             ----- ADDR TO BRANCH TO FOR CANCELLATION   00039000
         SPACE                                                          00040000
GOVOROWS DS    F             ----- NUMBER OF OPTION ROWS RETRIEVED      00041000
         SPACE                                                          00042000
GOVSQLRC DS    F             ----- RESOURCE TABLE SQL RETURN CODE       00043000
         SPACE                                                          00044000
GOVSQLCA DS    A             ----- ADDRESS OF SQLCA FOR ERROR CONDITION 00045000
         SPACE                                                          00046000
GOVGROUP DS    CL16          ----- GROUP NAME                           00047000
GOVPAD20 DS    CL32          ----- RESERVED FIELD                       00048000
```

Figure 139. The DXEGOVA control block (Part 1 of 2)

```
         SPACE                                                          00049000
GOVUCTL  DS    XL304          -- USER CONTROL AREA                     00050000
         ORG   GOVUCTL                                                 00051000
GOVUSERS DS    CL2048         ----- USER SCRATCH PAD AREA              00052000
GOVPAD30 DS    CL48           ----- RESERVED FIELD                     00053000
         SPACE                                                         00054000
         DS    0D                                                      00055000
GOVRESC  DS    10XL128        -- RESOURCE CONTROL TABLE                00056000
         ORG   GOVRESC                                                 00057000
GOVRESCT DSECT                -- RESOURCE CONTROL TABLE MAPPING        00058000
         DS    0D                                                      00059000
GOVOPTN  DS    CL16           ----- RESOURCE OPTION                    00060000
GOVNULLI DS    H              ----- INTEGER NULL INDICATOR             00061000
GOVPAD40 DS    CL2            ----- RESERVED FIELD                     00062000
GOVINTVL DS    F              ----- INTEGER OPTION REPRESENTATION      00063000
GOVNULLF DS    H              ----- FLOATING POINT NULL INDICATOR      00064000
GOVPAD50 DS    CL6            ----- RESERVED FIELD                     00065000
GOVFLOAT DS    D              ----- FLOATING POINT OPTION REPRESENTATION 00066000
GOVNULLC DS    H              ----- CHARACTER NULL INDICATOR           00067000
GOVCHLEN DS    H              ----- LENGTH OF THE CHARACTER OPTION     00068000
GOVCHAR  DS    CL80           ----- CHARACTER OPTION REPRESENTATION    00069000
GOVNEXTR DS    A              ----- POINTER TO NEXT RESOURCE CONTROL ROW 00070000
```

Figure 139. The DXEGOVA control block (Part 2 of 2)

Addressing the Resource Control Table

The GOVGROUP field of the DXEGOVA control block holds the value of the RESOURCE_GROUP column of Q.RESOURCE_VIEW, the view defined on the resource control table.

All information about the user's resource options is stored in blocks; there is one block for each of the user's resource options you decide to monitor.

The first block defines the first resource option and is stored in the DXEGOVA control block as the DSECT GOVRESCT. This DSECT is shown in the last part of Figure 139. The address of this DSECT is defined in the DXEGOVA field GOVRESC. You can establish addressability to the GOVRESC field in your own routine using the address of the GOVRESCT DSECT.

Negative half-word integers in the DSECT represent null values entered for INTVAL, CHARVAL, or FLOATVAL in the Q.RESOURCE_VIEW; zero or positive half-words indicate a value in that column of Q.RESOURCE_VIEW.

The blocks that store the resource control information form a chain in which a pointer in one block points to the beginning of the next block (the next resource option) in the chain. For example, the GOVNEXTR DS statement in the GOVRESCT DSECT in Figure 139, contains the address of the next block

in the chain of resource control information. Each block in the chain has a GOVNEXTR DS statement. In the final block, the GOVNEXTR DS statement contains zeros to mark the end of the user's resource control information.

Figure 140 shows a part of the code for the IBM-supplied governor that processes the blocks of resource control information. In this code, GOVRESC points to the GOVRESCT DSECT.

```
         L     R08,GOVOROWS      GET NUMBER OF RESOURCE TABLE ROWS
         LTR   R08,R08           ANY RESOURCE TABLE ROWS?
         BZ    ENDRESST          NO, SKIP RESOURCE INITIALIZATION
         LA    R05,GOVRESC       GET ADDRESS OF 1ST RESOURCE ROW
         USING GOVRESC,R05       BASE RESOURCE RECORD ENTRY
LOOK4RES DS    0H                MAIN LOOP THRU RESOURCE ROWS
         LTR   R05,R05           ANY MORE RESOURCE TABLE ROWS?
         BZ    ENDRESST          NO, END RESOURCE INITIALIZATION
⋮
         L     R05,GOVNEXTR      GET ADDRESS ON NEXT RESOURCE ROW
         B     LOOK4RES          BEGIN NEXT ITERATION
ENDRESST DS    OH                -- BRANCH HERE WHEN FINISHED READING ALL ROWS

         . . .
         . . .
         . . .
         . . .

DXEGOVA  DSECT

         .  .  .
         .  .  .
         .  .  .

GOVRESC  DS    10XL128           -- RESOURCE CONTROL TABLE
         ORG   GOVRESC
GOVRESCT DSECT                   -- DSECT FOR RESOURCE ROW
         .  .  .
         .  .  .
         .  .  .
GOVNEXTR DS    A                 -- POINTER TO NEXT RESOURCE ROW
         .  .  .
         .  .  .
         .  .  .
```

Figure 140. Resource initialization

Structure of the DXEXCBA Control Block

The DXEXCBA control block passes to the governor exit routine information about the state of the QMF session upon entry to the governor. The governor combines this information with information on resource limits (contained in DXEGOVA) to determine when the resource limits are exceeded and when to cancel the user's activity.

For example, you can define a resource option that does not allow user JONES to use the EDIT TABLE command. You can then write your governor exit routine so that, if the XCBQRYP field of the DXEXCBA control block indicates an EDIT TABLE command, the governor exit calls the QMF cancellation service to cancel the command.

Table 57 provides the name of each field in the control block, with its data type and purpose. Each data type is listed as it appears in the DS statement that defines the field in the DSECT.

The layout of the control blocks and the information they contain is the same for QMF support in all operating environments. Therefore, some of the information shown in the control blocks might not apply to QMF in the OS/390 environment because it is used in only VM/ESA or VSE/ESA operating environments.

Table 57. Fields of the DXEXCBA interface control block to the governor

Field	Data Type	Purpose
XCBACTIV	CL1	Indicates the current type of database activity. Applies only when rows are being retrieved for the current data object. Does not apply when rows are retrieved for an IMPORT command. Possible values are: **1** OPEN being run **2** FETCH being run **3** PREPARE being run **4** DESCRIBE being run **5** CLOSE being run This field changes whenever the type of database activity changes. You can use the value when the governor receives control asynchronously as the result of a timer.
XCBAIACT	CL1	Tells whether the current command is running interactively: **1** Interactive **0** Noninteractive (batch) Interactive commands display prompt and status panels. This field changes value on any function call for the start of the command; it is reset to zero when the command completes.
XCBAUTH	CL8	Contains the user's SQL authorization ID.
XCBCAN	CL1	Indicates whether the user or the governor requested cancelation of the current command. The field is set to 1 if cancelation is requested. Zero indicates that no cancelation was requested. The value changes at the point at which the cancelation is requested. This field is reset to zero before the function call for the command's termination.
XCBCLOC	CL18	Contains the current location name.

Table 57. Fields of the DXEXCBA interface control block to the governor (continued)

Field	Data Type	Purpose
XCBCMDL	F	Contains the length of the string containing the command to be run. This is the string addressed by XCBCMDP field. This field changes values when XCBCMDL changes values.
XCBCMDP	A	Points to the string containing the command to be run. This field is reset when QMF validates a command at some point before the function call for the start of the command. The field is reset to zeros before the function call when the command completes. If a command synonym is being run, it appears here.
XCBCVERB	CL18	Holds the verb of the current command. This field changes value on the function call for the start of a command. The value does not change between calls.
XCBDBMG	CL1	Identifies the database manager. This value is set to 1 for DB2 for VM or VSE and to 2 for DB2 for OS/390.
XCBEMODE	CL1	Indicates the current mode of the QMF session: **1** Interactive **2** Noninteractive (batch or server) This value does not change during a session. See "DSQSMODE (Specifying an Interactive or Noninteractive QMF Session)" on page 195 for more information on starting a noninteractive session.
XCBERRET	F	Contains the return code to be used in the default cancelation message. For more information on this message, see "Providing Messages for Canceled Activities" on page 422.
XCBINCI (ISPF only)	CL1	Tells whether the current command is being run through the command interface. The field is set to 1 if it is, and 2 if it isn't. For more information about the command interface, see *Developing QMF Applications*
XCBINPRC	CL1	Tells the governor where a command is being run: 1 indicates it is running in a procedure or LIST command; 0 indicates it is being run another way.
XCBKPARM	CL1	Tells the governor how the DSQSDBCS program parameter is set. The value does not change during a session. Possible values are: 0 for Latin letters; 1 for double-byte character set (DBCS) data. See "DSQSDBCS (Setting Printing for Double-byte Character Set Data)" on page 204 for more information about this parameter.
XCBLOGM	CL1	Indicates if QMF should log a message in the QMF trace data set. Use a value of 1 to log the message, and 0 to not log the message. Message logging is described in "Providing Messages for Canceled Activities" on page 422. Using the QMF trace facility is described in "Using the QMF Trace Facility" on page 480.

Table 57. Fields of the DXEXCBA interface control block to the governor (continued)

Field	Data Type	Purpose
XCBMGTXT	CL78	Contains the text for a message. The message can be logged in the QMF trace data, displayed on the screen, or both. For more information on how this field is used, see “Providing Messages for Canceled Activities” on page 422.
XCBMSGNO (ISPF only)	CL8	Contains the message ID for an ISPF message definition that can be used to log a message in the DSQDEBUG data set, viewed on your screen, or both. For more information on its use, see “Providing Messages for Canceled Activities” on page 422.
XCBNAME	CL8	Contains the control block name (DXEXCBA). Can serve as an eye catcher in a dump of virtual storage. This value does not change during a session.
XCBNLANG	CL1	Identifies NLFs being used. (For a list of NLIDs used, see Table 1 on page xviii.) Value does not change during a session.
XCBPANEL (ISPF only)	CL8	Contains the panel ID for the message Help panel for a cancelation message. For more information on the use of XCBPANEL, see “Providing Messages for Canceled Activities” on page 422.
XCBPLAN	CL8	Contains the application plan ID for QMF. The value does not change during a session. This field does not apply in CICS.
XCBQCE	F	Contains the decimal equivalent of the value of the SQLDERRD(4) field in the SQLCA returned from DBMS. The integer part of this decimal appears in the database status (“relative cost estimate”) panel. The value is set to zero on the function call when the command finishes running. The field contains zeros if the operation is not a data retrieval query. The query cost estimate is not available from DB2 Parallel Edition V1.2 or DataJoiner v1.2.1. In these environments the value is set to 1.
XCBQERR	CL1	Tells whether a QMF error occurred since the previous function call: 0 indicates no error occurred; 1 indicates an error occurred.
XCBQMF	CL10	Identifies the current release of QMF. This value is `QMF V7R1`, and does not change during a session.

Table 57. Fields of the DXEXCBA interface control block to the governor (continued)

Field	Data Type	Purpose
XCBQRYP	A	Contains the address of a copy of the query that QMF passes to the database for execution. The governor inspects the query upon a call to start database activity (before any data retrieval) and determines whether to cancel the activity. The address is set to zero either at the beginning of the session or when the data object is reset or imported to temporary storage. This field contains information only when data retrieval is requested through one of the following commands; no information is provided for queries on OS/390 DB2 system tables or QMF control tables. **DISPLAY TABLE** EDIT TABLE **ERASE TABLE** EXPORT TABLE **IMPORT TABLE** PRINT TABLE **RUN QUERY** SAVE DATA
XCBREFR	CL1	Indicates whether QMF refreshes the screen after returning from the governor; 1 indicates a refresh; 0 indicates no refresh. If your governor displays any screen information, set this field to 1.
XCBRELN	CL2	Identifies the QMF release level. For QMF for OS/390 V7R1, this is 11. The value does not change during a session.
XCBRGRP	CL16	Contains the name of the user's resource group. This value does not change during a session.
XCBROWSF	F	Reflects the number of rows retrieved into the data object. Initially zero, this field changes value whenever more rows are retrieved. All data retrieval is counted whether data is retrieved from the database, sequential files, CICS temporary storage, or CICS transient data queues. QMF does not reset this field, but the governor can. For example, if your governor exit routine monitors the number of database rows retrieved, you can set this field to zero on the function call for the end of the command that began the data retrieval.

Table 57. Fields of the DXEXCBA interface control block to the governor (continued)

Field	Data Type	Purpose
XCBSYST	CL1	Identifies the current operating system. The value does not change during a session, and is usually set to 3, indicating TSO, or native OS/390 batch. Possible values are: **1** CMS (VM/SP) **3** TSO, or native OS/390 batch (MVS/XA™ or MVS/ESA) **4** CMS (VM/XA or VM/ESA) **5** CICS (VSE/ESA, MVS/ESA, or MVS/XA) For information on why the other values here can be valid for QMF for OS/390 6, see "Providing the Correct Profile for the User's Operating Environment" on page 224.
XCBTRACE	CL1	Contains a value for the level of detail at which user exit activity is traced. Possible values are 0 (least detail), 1, or 2 (most detail). Using this value in a governor is discussed in "Providing Messages for Canceled Activities" on page 422. At the start of a session, the value of the TRACE field from the user's QMF profile is used here. After that, the value changes only when the user changes the value of the TRACE option. For more information on tracing, see "Using the QMF Trace Facility" on page 480.
XCBUSER	CL8	Contains the user's TSO logon ID (for TSO or SRPI), the user parameter on the job statement (for native OS/390 batch), or the user ID that is sent in the APPC connection (for APPC). This field is not used in CICS; it contains blanks.
XCBUSERS	CL2048	Scratchpad area in which you can store results you want the governor to save from one call to the next. It is initially set to blanks. QMF does not change this value.

Figure 141 on page 418 shows the structure of the DXEXCBA control block.

```
************************************************************************ 00001000
*                                                                      * 00002000
*        CONTROL BLOCK NAME: DXEXCBA                                   * 00003000
*                                                                      * 00004000
*        FUNCTION:                                                     * 00005000
*                                                                      * 00006000
*            THIS IS THE INTERFACE CONTROL BLOCK BETWEEN QMF AND        * 00007000
*            EXIT ROUTINES.                                            * 00008000
*                                                                      * 00009000
*        STATUS: VERSION 7 RELEASE 1 LEVEL 0                           * 00010000
*                                                                      * 00011000
*        INNER CONTROL BLOCKS: NONE                                    * 00012000
*                                                                      * 00013000
*        CHANGE ACTIVITY:                                              * 00014000
*                                                                      * 00015000
*                                                                      * 00016000
************************************************************************ 00017000
*                                                                        00018000
DXEXCBA  DSECT                                                          00019000
         DS    0D                                                       00020000
XCBNAME  DS    CL8           -- CONTROL BLOCK IDENTIFICATION            00021000
         SPACE                                                          00022000
XCBEXCTL DS    XL190         -- EXIT CONTROL                            00023000
         ORG   XCBEXCTL                                                 00024000
XCBAUTH  DS    CL8           ----- AUTHORIZATION ID                     00025000
XCBUSER  DS    CL8           ----- USER ID                              00026000
XCBPLAN  DS    CL8           ----- PLAN ID                              00027000
         SPACE                                                          00028000
XCBQMF   DS    CL10          ----- CURRENT VERSION/RELEASE              00029000
         SPACE                                                          00030000
XCBRELN  DS    CL2           ----- QMF RELEASE LEVEL                    00031000
         SPACE                                                          00032000
XCBTRACE DS    CL1           ----- QMF EXIT TRACE LEVEL                 00033000
XCBTOFF  EQU   C'0'          -------- NO TRACING                        00034000
XCBTPART EQU   C'1'          -------- PARTIAL TRACING                   00035000
XCBTFULL EQU   C'2'          -------- FULL TRACING                      00036000
         SPACE                                                          00037000
XCBSYST  DS    CL1           ----- OPERATING SYSTEM                     00038000
XCBSYSTX EQU   C'3'          -------- MVS/ESA or XA (TSO,APPC, native)  00039000
XCBSYSTV EQU   C'4'          -------- CMS/VM/ESA                        00040000
XCBSYSTY EQU   C'5'          -------- CICS (OS/390 or VSE)              00041000
         SPACE                                                          00042000
XCBPAD10 DS    CL4           ----- RESERVED FIELD                       00043000
         SPACE                                                          00044000
XCBNLANG DS    CL1           ----- CURRENT NATIONAL LANGUAGE            00045000
         SPACE                                                          00046000
XCBKPARM DS    CL1           ----- SETTING OF K PARAMETER               00047000
XCBKPARN EQU   C'0'          -------- LATIN                             00048000
```

Figure 141. The DXEXCBA control block (Part 1 of 3)

```
XCBKPARY EQU   C'1'          -------- DBCS                                00049000
         SPACE                                                           00050000
XCBDBMG  DS    CL1           ----- DATA BASE MANAGER                      00051000
XCBDBMGS EQU   C'1'          -------- DB2 FOR VM/VSE                     00052000
XCBDBMGD EQU   C'2'          -------- DB2 FOR OS/390                     00053000
XCBDBMGW EQU   C'3'          -------- WORKSTATION DB2                    00054000
         SPACE                                                           00055000
XCBEMODE DS    CL1           ----- CURRENT EXECUTION MODE                00056000
XCBIACTV EQU   C'1'          -------- INTERACTIVE MODE                   00057000
XCBBATCH EQU   C'2'          -------- BATCH MODE                         00058000
         SPACE                                                           00059000
XCBAIACT DS    CL1           ----- CURRENT INTERACT MODE                 00060000
XCBAIACY EQU   C'1'          -------- INTERACTIVE EXECUTION              00061000
XCBAIACN EQU   C'0'          -------- NOT INTERACTIVE EXECUTION          00062000
         SPACE                                                           00063000
XCBINCI  DS    CL1           ----- CURRENT COMMAND INTERFACE STATE       00064000
XCBINCIY EQU   C'1'          -------- COMMAND INTERFACE ACTIVE           00065000
XCBINCIN EQU   C'0'          -------- COMMAND INTERFACE NOT ACTIVE       00066000
         SPACE                                                           00067000
XCBINPRC DS    CL1           ----- PROCEDURE OR LIST CMD EXEC STATE      00068000
XCBPRCY  EQU   C'1'          -------- RUNNING A PROCEDURE OR LIST CMD    00069000
XCBPRCN  EQU   C'0'          -------- NOT RUNNING PROCEDURE OR LIST CMD  00070000
         SPACE                                                           00071000
XCBCVERB DS    CL18          ----- CURRENT COMMAND VERB                  00072000
         SPACE                                                           00073000
XCBCAN   DS    CL1           ----- CANCEL CURRENT COMMAND INDICATOR      00074000
XCBCANN  EQU   C'0'          -------- NO CANCELLATION                    00075000
XCBCANY  EQU   C'1'          -------- CANCELLATION IN PROGRESS           00076000
         SPACE                                                           00077000
XCBACTIV DS    CL1           ----- TYPE OF DATA BASE ACTIVITY            00078000
XCBOPEN  EQU   C'1'          -------- OPEN                               00079000
XCBFETCH EQU   C'2'          -------- FETCH                              00080000
XCBPREP  EQU   C'3'          -------- PREPARE                            00081000
XCBDESCR EQU   C'4'          -------- DESCRIBE                           00082000
XCBCLOSE EQU   C'5'          -------- CLOSE                              00083000
XCBEXEC  EQU   C'6'          -------- EXECUTE                            00084000
XCBEXECI EQU   C'7'          -------- EXECUTE IMMEDIATE                  00085000
XCBPAD20 DS    CL9           ----- RESERVED FIELD                        00086000
         SPACE                                                           00087000
XCBRGRP  DS    CL16          ----- RESOURCE GROUP NAME                   00088000
XCBPAD30 DS    CL22          ----- RESERVED FIELD                        00089000
         SPACE                                                           00090000
XCBCMDP  DS    A             ----- POINTER TO ORIGINAL COMMAND STRING    00091000
*                            -------- WILL NOT CONTAIN PROMPT VALUES     00092000
         SPACE                                                           00093000
XCBCMDL  DS    F             ----- ORIGINAL COMMAND STRING LENGTH        00094000
         SPACE                                                           00095000
XCBQCE   DS    F             ----- QUERY COST ESTIMATE VALUE             00096000
```

Figure 141. The DXEXCBA control block (Part 2 of 3)

```
         SPACE                                                          00097000
XCBROWSF DS    F             ----- DATA BASE ROWS FETCHED FROM SOURCE   00098000
*                            -------- SET BY QMF; EXIT MAY RESET        00099000
         SPACE                                                          00100000
XCBQERR  DS    CL1           ----- QMF ERROR INDICATOR                  00101000
XCBQERRN EQU   C'0'          -------- NO QMF ERROR DETECTED             00102000
XCBQERRY EQU   C'1'          -------- QMF ERROR DETECTED                00103000
XCBCLOC  DS    CL18          ----- CURRENT LOCATION NAME                00104000
XCBPAD40 DS    CL41          ----- RESERVED FIELD                       00105000
         SPACE                                                          00106000
XCBQRYP  DS    A             ----- POINTER TO SQL QUERY                 00107000
*                            -------- QUERY LENGTH IS FIRST HALFWORD    00108000
         SPACE                                                          00109000
XCBUCTL  DS    XL432         -- USER CONTROL AREA                       00110000
         ORG   XCBUCTL                                                  00111000
XCBERRET DS    F             ----- EXIT ERROR RETURN CODE               00112000
XCBMGTXT DS    CL78          ----- EXIT ERROR MESSAGE TEXT              00113000
XCBMSGNO DS    CL8           ----- ISPF MESSAGE NUMBER                  00114000
XCBPANEL DS    CL8           ----- ISPF MESSAGE HELP PANEL              00115000
XCBLOGM  DS    CL1           ----- LOG MESSAGE INDICATOR                00116000
XCBLOGMN EQU   C'0'          -------- QMF SHOULD NOT LOG MESSAGE        00117000
XCBLOGMY EQU   C'1'          -------- QMF SHOULD LOG MESSAGE            00118000
XCBREFR  DS    CL1           ----- REFRESH SCREEN INDICATOR             00119000
XCBREFRN EQU   C'0'          -------- QMF DOES NOT HAVE TO REFRESH SCR  00120000
XCBREFRY EQU   C'1'          -------- QMF SHOULD REFRESH SCREEN         00121000
XCBPAD50 DS    CL28          ----- RESERVED FIELD                       00122000
         SPACE                                                          00123000
XCBUSERS DS    CL2048        -- USER SCRATCH PAD AREA                   00124000
XCBPAD60 DS    CL48          ----- RESERVED FIELD                       00125000
```

Figure 141. The DXEXCBA control block (Part 3 of 3)

Storing Resource Control Information for the Duration of a QMF Session

You can use the information passed to the governor on the first call of a session for subsequent calls to the governor routine. You can use the 2048-byte scratchpad areas provided in the DXEGOVA and DXEXCBA control blocks to obtain the necessary storage to hold the resource control information. These fields can contain any information you need to store. The information persists from one call to the governor to the next (if a CONNECT call doesn't change it).

The IBM-supplied governor uses the code shown in Figure 142 on page 421 to address GOVUSERS, the scratchpad area in the DXEGOVA control block. You can use similar code to address the XCBUSERS scratchpad area in the DXEXCBA control block, by replacing GOVUSERS in the following example with XCBUSERS.

```
LA    WORKPTR,GOVUSERS
USING WORK,WORKPTR
```

Figure 142. Establishing addressability to the governor scratchpad area

In Figure 142, WORK is the name of a DSECT, and WORKPTR is equated to general register 4. The WORK DSECT contains the definition for the fields that hold the information in the scratchpad areas.

The governor might also issue GETMAIN macros to obtain needed storage.

Canceling User Activity

When users reach their resource limits, you can call the QMF cancellation service to cancel user activity. For example, your governor exit routine might cancel the following:

- A QMF session during a function call at the start of a QMF session
- The current command during a number of different function calls, and any commands that start database activity
- Asynchronous commands when a timer is active (in TSO, SRPI, APPC, or native OS/390)

The code for canceling either of the first two activities is contained in the source program DSQU*n*GV1 or DSQU*n*GV3. To have your governor call the QMF cancelation service to cancel an activity, branch to the address that appears in the DXEGOVA control block field named GOVCADDR. Figure 143 shows the statements that establish addressability to the QMF cancellation service. Before you use these statements to pass control from the governor exit routine to QMF, ensure that Register 13 points to a save area for the governor so that QMF can restore the state of the governor upon returning control.

```
L R15,GOVCADDR
BALR R14,R15
```

Figure 143. Calling the QMF cancellation service

The cancellation routine returns control to the point addressed by Register 14 (in this case, the command that follows the BALR command). Register 15 contains a return code of 0 if QMF accepted the request to cancel, and a return code of 100 if the governor requested a cancel when QMF was inactive.

To cancel QMF commands using asynchronous processing in TSO, SRPI, APPC, or native OS/390, the IBM-supplied governor uses a timer macro, which returns control to a timer routine. The timer routine tests whether to cancel the current command. If the command is to be canceled, it carries out the cancellation. The tests are based on processor time and the number of

rows fetched for the current DATA object. The tests can also be based on the user's response to a cancellation prompt.

The timer routine is the CSECT named TIMEX in the source code for the IBM-supplied governor. The source code is the member DSQU*n*GV1 of the library QMF710.SDSQUSRE.

Making an asynchronous cancellation call is very much like pressing PA1. Cancellation might not be immediate, and it might be impossible. Before the cancellation takes place, control can return to the governor.

Providing Messages for Canceled Activities

You can use the QMF message service to display a message to users after their commands are canceled, by using the following fields of the DXEXCBA control block:

XCBMGTXT
Contains the message text.

XCBERRET
Contains the error return code.

XCBMSGNO
Contains the message ID for an ISPF message definition if QMF was invoked under ISPF in TSO.

XCBPANEL
Contains the panel ID for an ISPF message help panel if QMF was invoked under ISPF in TSO.

Upon entry to the governor, XCBMGTXT contains blanks, and XCBERRET contains binary zeros. The value of XCBERRET determines what message is displayed on the screen:

- If you want to use the message `OK, command canceled`, leave the zero value in XCBERRET.
- If you want to use the message `A governor exit cancel occurred with return code xxxxx`, use a nonzero value for XCBERRET; this nonzero value appears in the message in place of `xxxxx`.

If QMF initialization is canceled by the governor exit, the preceding messages for XCBMGTXT and XCBERRET appear in the user's trace data rather than on the screen.

Set XCBLOGM to 1 to log a message in the user's trace data for any function call in your own governor exit routine. If the value of XCBERRET is nonzero, the IBM-supplied governor logs cancellation messages in the user's trace data by setting the XCBLOGM field of the DXEXCBA control block to a value of 1.

An ISPF message definition can contain long message text and can designate a panel ID. To use the long text for a message and the designated panel for Help, fill XCBMSGNO with the message ID of the message definition and leave XCBMGTXT and XCBPANEL blank. If no HELP panel was designated in the message definition, the user receives no message Help.

To override the long-message specification in a message definition, place the new message text in XCBMGTXT. To override the panel specification, place the new panel ID in XCBPANEL. Placing a panel ID in XCBPANEL also provides message Help when the message definition doesn't specify a panel.

Leave XCBMSGNO blank if there is no relevant ISPF message definition. Then place the message text in XCBMGTXT, and the HELP panel ID, if any, in XCBPANEL. Leaving XCBPANEL blank, in this case, leaves the user without message help.

The trace facility writes messages to the DSQDEBUG data set at a level of detail determined by the value of the XCBTRACE field of the DXEXCBA control block. Use a value of zero for XCBTRACE if you don't want messages to be logged (although initialization errors are logged unless you don't allocate a trace data set). Use a value of 1 or 2 in the U-setting of the trace option to get trace output. For additional details on using the QMF trace facility, see "Using the QMF Trace Facility" on page 480.

The governor can also log messages in the ISPF log file if QMF was invoked under ISPF in TSO. It can do this through the ISPF LOG service discussed in *ISPF V2 MVS Dialog Management Services*

Messages do not appear on screen if the command is run in batch or noninteractively from a QMF application.

The IBM-supplied governor does not log messages for termination function calls.

Translating, Assembling, and Link-Editing Your Governor Exit Routine in CICS

Whether you're modifying the IBM-supplied governor exit routine or writing a routine of your own, you need to translate, assemble, and link-edit the routine. Use the sample link-edit statements shown in this section to help you.

Translating Your Governor Exit Program for CICS

Translate your program using the CICS translator for assembler. When you translate your program, CICS supplies the standard CICS prolog (DFHEIENT), which establishes addressability and saves registers in the standard CICS working storage area. The standard prolog also provides a standard CICS epilog (DFHEIRET).

Assembling Your Governor Exit

QMF supports only assembler-language programming for a governor. This is the language, for example, in which the IBM-supplied governor is coded; the code was written for HLASM or Assembler H. You can review this code by printing certain members of the QMF710.SDSQUSRE library. For details, see "Program Components of the Governor Exit Routine" on page 395.

Link-Editing Your Governor Exit Routine

Place the load module for the governor in a library available to all your QMF users. IBM recommends the library QMF710.SDSQLOAD, which contains the load modules for QMF. This library must be concatenated with DFHRPL in CICS.

Name the module DSQU*n*GV3. These are the names of the IBM-supplied modules. Placing your own governor module in the QMF710.SDSQLOAD library replaces the IBM-supplied module, because that module is a member of that library.

To avoid replacing the IBM-supplied module, you can rename it or move it to another library. Or you can place the module for your own governor in a different library in DFHRPL. For the last of these alternatives, be sure that your module's new library is ahead of QMF710.SDSQLOAD in the concatenation sequence. If it is not, QMF calls the IBM-supplied module instead of your own.

Be sure that the entry point for this module is DSQU*n*GV3. If, as is likely, your source code begins with a CSECT statement with this label, there is nothing extra to do. If not, specify the entry name on the END statement for the assembler code, or place it in an ENTRY statement in the linkage editor input.

When link-editing, you must include the CICS command interface control modules DFHEAI and DFHEAI0. You must also place the control modules at the beginning of the governor load module. In CICS, the governor must run with AMODE(31) and RMODE(ANY).

```
INCLUDE SYSLIB(DFHEAI)
INCLUDE SYSLIB(DFHEAI0)
ORDER DFHEAI,DFHEAI0
ENTRY DSQUEGV3
MODE  AMODE(31),RMODE(ANY)
NAME  DSQUEGV3(R)
```

Assembling and Link-Editing Your Governor Exit Routine in TSO, and native OS/390 batch

Whether you're modifying the IBM-supplied governor exit routine or writing a routine of your own, you need to translate, assemble, and link-edit the routine. Use the sample link-edit statements shown in this section to help you.

Assembling Your Governor Exit

QMF supports only assembler-language programming for a governor. This is the language, for example, in which the IBM-supplied governor is coded; the code was written for HLASM or Assembler H. You can review this code by printing certain members of the QMF710.SDSQUSRE library. For details, see "Program Components of the Governor Exit Routine" on page 395.

Link-Editing Your Governor Exit Routine

Place the load module for the governor in a library available to all your QMF users. IBM recommends the library QMF710.SDSQLOAD, which contains the load modules for QMF itself. This library can be part of the concatenation for STEPLIB.

Name the module DSQU*n*GV1. These are the names of the IBM-supplied modules. Placing your own governor module in the QMF710.SDSQLOAD library replaces the IBM-supplied module, because that module is a member of that library.

To avoid replacing the IBM-supplied module, you can rename it or move it to another library. Or you can place the module for your own governor in a different library in STEPLIB. If you place your module in a different library, be sure that your module's new library comes before QMF710.SDSQLOAD in the concatenation sequence. If it is not, QMF calls the IBM-supplied module instead of your own.

Be sure that the entry point for the new module is DSQU*n*GV1. If your source code begins with a CSECT statement with the DSQU*n*GV1 label, there is nothing extra to do. If your source code does not begin with the DSQU*n*GV1 label, specify the entry name on the END statement for the assembler code, or place it in an ENTRY statement in the linkage editor input.

Your own routine can run in either 31- or 24-bit addressing mode. If your routine requires OS/390 services that need 24-bit addressing mode (such as TPUT), then QMF handles the transfer from QMF running in 31-bit mode to the governor routine running in 24-bit mode and back to QMF in 31-bit mode.

```
ENTRY DSQUEGV1
MODE  AMODE(31),RMODE(ANY)
NAME  DSQUEGV1(R)
```

The QMF-supplied governor (DSQUEGV1) must run with AMODE(24) and RMODE(24).

```
ENTRY DSQUEGV1
MODE  AMODE(24),RMODE(24)
NAME  DSQUEGV1(R)
```

Using the DB2 Governor

DB2 has its own governor, which operates independently of the QMF governor. This section tells you what the DB2 governor does, and how you can use it for additional resource control. For more information on the DB2 governor, read the section on improving resource utilization in *DB2 UDB for OS390 Administration Guide* In DB2 publications, this governor is commonly called the *Resource Limit Facility*. You can control all access to the database and distributed access with the DB2 governor.

Monitoring the Resources

The DB2 governor monitors the processor time consumed running certain queries. The queries it monitors are the dynamically run SELECT, INSERT, UPDATE, and DELETE queries. In a QMF session, this includes all queries of these types that are run in the following ways:

Using the QMF RUN command
The queries run might be SQL, QBE, or prompted queries. For QBE and prompted queries, the governor monitors the equivalent SQL queries.

Using other QMF commands
In support of other commands, QMF creates and runs SQL queries on behalf of the user. For example, among these queries are the SELECT queries that QMF runs in response to DISPLAY table commands.

Running the Table Editor
In support of the Table Editor, QMF creates and runs SQL queries on behalf of the user. For example, among these queries are the SELECT queries that QMF runs in response to SEARCH commands.

For more information on each of these queries, refer to “SQL Privileges Required to Access Objects” on page 236.

Differences Between Governors

You can supplement the operations of the QMF governor with the DB2 governor. Before you do, you should know how the governors differ.

- The DB2 governor limits its monitoring to the types of queries mentioned in the previous section. It does not monitor, for example, the processor time spent in running a CREATE or DROP query.
- The DB2 governor limits its monitoring to processor time. It does not count row fetches, as the QMF governor does.

- Processor time for the DB2 governor includes only the time consumed by DB2. In contrast, the QMF governor includes the time QMF spends running a command—manipulating a spill file, for example, or displaying the first page of the results of running a SELECT query.
- When a user runs a SELECT query, the DB2 governor monitors all the time DB2 spends running the query, beginning with the PREPARE statement and continuing through the row fetches and the closing of the cursor. The QMF governor ends its monitoring after the first page of the results are displayed. Any subsequent row fetch is treated as part of the scrolling command that caused the fetch to occur.
- The DB2 governor makes no provision for a cancellation prompt; its only control parameter for a given QMF session is maximum processor time.

When the Maximum Processor Time is Exceeded

When a query exceeds the maximum processor time, the DB2 governor ends the query and returns an SQL error code of -905. QMF then knows that the governor canceled the query. How QMF treats this information depends on where in a QMF session the governor canceled the query:

During QMF Initialization

When it begins a user's session, QMF runs several queries that the DB2 governor monitors. If any of these queries are canceled, QMF ends the session. Before the session ends, QMF writes an explanatory record in the user's DSQDEBUG data set.

The session end might occur during periods when QMF sessions aren't allowed. To enforce this restriction, people who attempt to use QMF during such a period of time might be assigned a maximum processor time of zero. This causes the cancellation of any monitored query.

After QMF Initialization

After initialization, QMF treats the cancellation of a query just as it treats any other error in running the query. Suppose, for example, that the governor cancels an INSERT query for which the user issued a RUN command. Then the inserts, if any, are undone, and the query panel is displayed with an error message. If the user then asks for message help, a panel explaining the governor's action is displayed.

Suppose instead that a cancellation takes effect while the user is scrolling through a report. Then it is likely that a row fetch caused the cancellation. The cancellation leaves the DATA object incomplete. Because DB2 closes the cursor, the DATA object cannot be completed.

Applying the DB2 Governor to QMF

Before it can govern a QMF session, the DB2 governor needs input. Input in this case is the maximum processor time. The DB2 governor gets this input from a row in a *resource limit specification table*. In DB2 terminology, this table is an *RLST*. Such a table can be modified by anyone with appropriate DB2

authority (INSERT, UPDATE, and so on). By adding rows to one or more RLSTs, you can control the operation of the DB2 governor for your QMF users.

Selecting an RLST

Consider a DB2 subsystem into which QMF is installed. When the subsystem is started, it is associated with a specific RLST. This RLST then provides the DB2 governor input for all the subsystem users, including those who begin QMF sessions.

Different RLSTs can be associated at different times with the same DB2 subsystem. For example, your installation might use different RLSTs for different shifts. The RLST for one shift makes it impossible to use QMF during that shift. Any attempt to start a QMF session ends during QMF initialization, and a message appears in the DSQDEBUG data set.

Adding Rows to an RLST

You (or someone with appropriate DB2 authority) can add rows to an RLST for your QMF users. A row contains:

- An authorization ID
- The name of a DB2 application plan
- A value for the maximum processor time
- The LU name of the site where the request originated (for DB2 2.2 and above)

For example, you might add rows for a few individual users and a row that applies to everyone else. The rows for the individual users contain their primary authorization IDs and the name of the QMF application plan. The row for the other users contains the QMF plan name and blanks for the authorization ID.

Contact your DB2 administrator for information about what you can and cannot do with the RLSTs, and the structures of the tables. Each RLST has required columns with prescribed names and data types, but your installation might have added more columns. For general information on these tables, see *DB2 UDB for OS390 Administration Guide*

Chapter 22. Customizing a Remote Database Connection

You can customize a remote database connection to allow your users to query relational data on remote systems and build reports or charts to present the data on their local system. You can establish connections to any of the DB2 databases within a distributed network. (QMF users cannot connect to OS/400® locations.) You can establish this connection during QMF initialization or from within a QMF session. You can establish connections between *like* (for example, DB2 for OS/390 to DB2 for OS/390) and *unlike* (for example, DB2 for OS/390 to DB2 for VM or VSE) locations.

QMF enables you to access remote data through the distributed database solutions as implemented by both DB2 for OS/390 and DB2 for VM and VSE. Those solutions are based on Distributed Relational Database Architecture (DRDA). DRDA is an open set of protocols and formats enabling transparent access to local and remote data belonging to like or unlike relational database management systems (RDBMSs).

When your users are connected to a remote location, all the SQL statements within their applications are directed to that database for processing. They can access the data and QMF objects at that location's database in the same way they access data and objects without a remote unit of work connection. QMF continues to use programs that reside at the same system in which QMF is executing. This type of distributed connection is called *remote unit of work*. (For a schematic diagram, see Figure 144 on page 431.)

Quick Start

Table 58 outlines how you can customize a remote database connection for your users.

For more information on any of the tasks listed, see the page shown at the right of the table.

Table 58. Customizing a remote database connection

To do this task:	See:
Determine the type of database connections your users need depending on which database they need to access.	Page 430
Verify the connections required for remote unit of work.	Page 433
Prepare the remote location for access by your users.	Page 434

Table 58. Customizing a remote database connection (continued)

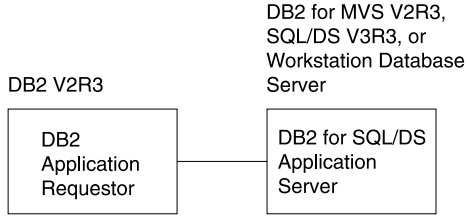
To do this task:	See:
Enable your users to access a remote database by preparing the user profiles and the database location involved.	Page 439
Enable access to your location for other administrators to set up remote unit of work from their location to yours.	Page 445

Determining the Remote Database Connection Needed

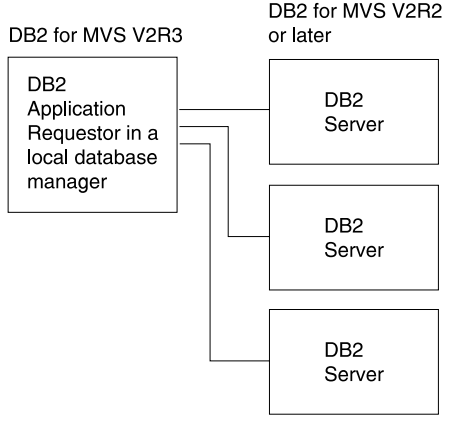
You can set up two types of database connection for DB2. You can use remote unit of work connections to DB2 for OS/390 or DB2 for VM or VSE, or you can use distributed unit of work for DB2 to DB2.

Remote unit of work and DB2-only distributed unit of work can be used together. (For a diagram, see Figure 144 on page 431.)

Remote unit of work



DB2-only distributed unit of work



Remote unit of work and DB2-only distributed unit of work

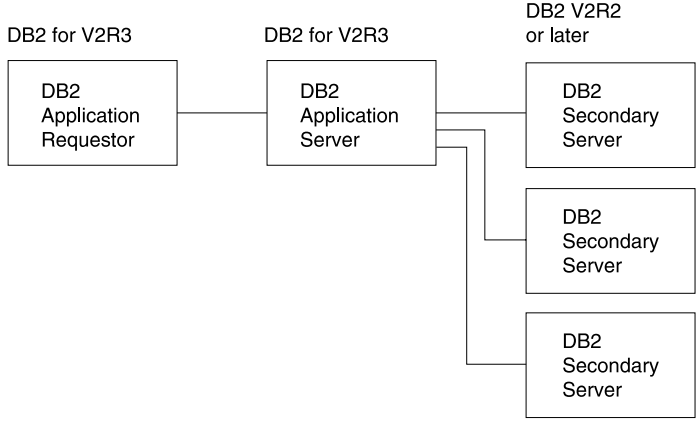


Figure 144. Distributed connection types using remote unit of work and distributed unit of work from QMF/OS/390

Notes:

1. The application requester is the database management system (DBMS) code that handles the QMF end of the distributed connection. The local DB2 subsystem to which QMF attaches is known as the application requester for QMF because DB2's application requester is installed within the local database manager.
2. The application server is the DBMS code that supports requests from application requesters and in QMF is called the current location.
3. The database server supports requests sent by the application server, and it uses Distributed Relational Database (DRDA) database support protocols and ensures data consistency between DRDA databases.
4. The secondary server is similar to the database server, except that it does not use DRDA database support protocols.

See the *DRDA Connectivity Guide* for more information.

Connecting with Remote Unit of Work

Using remote unit of work, you can connect to and access relational data at a remote DB2 for OS/390 location or a remote DB2 for VM or VSE location. The remote location is called the *server*. When connected to the server, you can access the data and QMF objects at that location as you would access the data and objects without a remote unit of work connection.

Connecting with DB2-to-DB2 Distributed Unit of Work (DB2 for OS/390 Only)

You can set up a DB2-to-DB2 connection using *distributed unit of work*. With distributed unit of work, the application program need not connect to a different database when it accesses data from another location. Instead, the application specifies the other location within a three-part name in a query or QMF command.

Specifying a Table or View with a Three-Part Name in DB2

If you are connected to a DB2 subsystem that has distributed data support, you can specify a table or view with a three-part name. QMF remains connected to a single DB2 location, and this location sends all SQL statements that use three-part names (or aliases for them) to the DB2 location referred to in the three-part name. That location then processes the SQL statement.

Restrictions: The following restrictions apply when referring to a table or view using a three-part name:

- From a remote DB2 server, you cannot reference a local DB2 object using a three-part name.
- When DB2 for VM or VSE is the current location:

- The location in the three-part name must match the *current location* name (the name of the application server to which the QMF session is currently connected).
- QMF commands, prompted query, and QBE do not support three-part names.
- Workstation database servers do not support three-part names.

Directing a Query Using Three-Part Names

Establishing a connection to a specified location constitutes most of remote-unit-of-work support. If that connection is made, QMF functions largely as it did before remote-unit-of-work support. Consequently, three-part name support is still provided. If the current location is a DB2 location that supports three-part names, SQL statements using three-part names can direct a query to yet another DB2 location.

A DB2 network can consist of DB2 V2R2, V2R3, and V3R1 subsystems. You can use three-part names to direct SQL statements to any of those subsystems. However, you can establish a remote-unit-of-work connection with a DB2 subsystem only at V2R3 or later.

Verifying the Connections Necessary for Remote Unit of Work

To ensure that the users can access a remote system, connections between the local and remote systems must be in place.

Checking DB2 Connections

To connect from DB2 to a remote system, you need to ensure that the remote systems have been defined.

When a DB2 application requests data from a remote system, DB2 searches the DB2 communications database to find out about the remote system. You need to check that the following items are available to DB2:

- Logical unit (LU) name and transaction program name (TPN).

  VTAM must contain the LU name for each server.
- Network security information required by the remote site.
- Session limits and mode names used to communicate with the remote site.

For the DB2 application server to process distributed database requests, check for the following information:

- The application server is defined to the local communication subsystem.
- Each potential secondary server destination is defined.
- The necessary security is in place.

For more information about the DB2 connections necessary for remote unit of work, see *DRDA Connectivity Guide*

Checking DB2 for VM Connections

To connect from DB2 for VM to a remote system, you need to ensure that the remote systems have been defined (their LU names are registered).

When a DB2 for VM application requests data from a remote system, DB2 searches the CMS communications directory to find information about the remote system. You need to check that the following items are available to DB2 :

- Gateway name—local logical unit (LU) name
- Remote LU name
- Remote transaction program name (TPN)
- Conversation security level required by the application server
- User ID identifying application requester at the application server
- Password authorizing application requester at the application server
- Mode name describing session characteristics to use to communicate with the application server
- Remote data base name (DBNAME)

For the DB2 application server to process distributed database requests, check for the following information:

- The application server is defined to the local communication subsystem.
- The necessary security is in place.

For more information about the DB2 for VM connections necessary for remote unit of work, see *DRDA Connectivity Guide*

Preparing a Non-DB2 for OS/390 Location for Access by QMF OS/390 Users

For users to access the remote location, you must:

- Install the QMF control tables
- Bind the QMF database packages into the remote location
- Create command synonym tables
- Prepare QMF to support the DPRE command
- Prepare QMF to support other commands
- Create function key tables, if necessary
- Update QMF governor control tables, if necessary
- Install the National Language feature in the QMF server, if necessary

Tip on naming conventions: Develop consistent naming conventions for the objects stored in a location. Your users then know where any particular object is located. If

you establish and use a naming convention as described, you and your users can easily:

- List all objects of the same application at a given location
- List all objects of the same application in all locations

Creating Command Synonym Tables

You need to create command synonym tables in the remote locations to provide your users with commands that work remotely. The commands operate in the environment at which the users are logged on; therefore, users logged on in TSO and connected to a remote DB2 for VM or VSE database can use only QMF commands that are defined as TSO commands.

You can create a Q.COMMAND_SYN_TSO table in the non-OS/390 location, to be used when your TSO users are connected to that location.

You create this table in the same way you create any other command synonym table. Be sure to include the name of the synonym table in the Q.PROFILES table. For more information about using the Q.PROFILES table, see “Reading the Q.PROFILES Table” on page 218.

Sample Remote Server Command Synonym Table for the TSO Environment

If you have QMF installed in a workstation database server, this synonym table is provided for you. If QMF is installed in a DB2 for VM or VSE server, this synonym table is not provided.

Figure 145 on page 436 shows examples of how to define a command synonym table in a DB2 for VM or VSE remote data base server to support a TSO command environment.

```
  CREATE TABLE Q.COMMAND_SYN_TSO
              ("VERB"                 CHAR(18)        NOT NULL,
               "OBJECT"               VARCHAR(31),
               "SYNONYM_DEFINITION"   VARCHAR(254)    NOT NULL,
               "REMARKS"              VARCHAR(254))
            IN DSQTSSYN;
  COMMENT ON TABLE Q.COMMAND_SYN_TSO  IS
     'QMF TSO COMMAND SYNONYM TABLE';
  COMMENT ON COLUMN Q.COMMAND_SYN_TSO.VERB IS
     'NAME OF THE VERB';
  COMMENT ON COLUMN Q.COMMAND_SYN_TSO.OBJECT IS
     'NAME OF THE OBJECT';
  COMMENT ON COLUMN Q.COMMAND_SYN_TSO.SYNONYM_DEFINITION   IS
     'DEFINITION OF SYNONYM';
  COMMENT ON COLUMN Q.COMMAND_SYN_TSO.REMARKS   IS
     'OPTIONAL COMMENTS ABOUT SYNONYM';

CREATE UNIQUE INDEX Q.COMMAND_SYN_TSOX ON Q.COMMAND_SYN_CMS
           ("VERB" ASC, "OBJECT" ASC);

GRANT SELECT ON Q.COMMAND_SYN_TSO TO PUBLIC;

INSERT INTO Q.COMMAND_SYN_TSO
  VALUES('ISPF',NULL,'CMS DSQAEZ1P P('&ALL'')',
                     'QMF DISPLAY PRINTED REPORT APPLICATION');
INSERT INTO Q.COMMAND_SYN_TSO
  VALUES('ISPF',NULL,'CMS DSQAEZ1P_P('&ALL'')',
                     'QMF ISPF BRIDGE APPLICATION');
INSERT INTO Q.COMMAND_SYN_TSO
  VALUES('BATCH',NULL,'CMS DSQABB11 PNAME(DXYEABMP)',
                     'QMF BATCH APPLICATION');
INSERT INTO Q.COMMAND_SYN_TSO
  VALUES('LAYOUT',NULL,'TSO DSQAEL0A',
                     'QMF LAYOUT APPLICATION');
```

Figure 145. Sample command synonym table

Preparing QMF to Support the DPRE Command

To allow remote users to issue the DPRE command at a remote location, you must copy the TSO procedure to the non-DB2 for OS/390 DRDA application server or copy the CMS procedure to the non-DB2 for VM DRDA application server. The DPRE command procedure for CMS is Q.DSQAER2P; for TSO, it is DSQAER1P.

To copy the procedures:

1. Connect to one location.
2. Display the procedure.
3. Connect to the other location.
4. Save the procedure.

Preparing QMF to Support Other Commands

You must have a command synonym table at your current location to define QMF Command Synonyms for the commands that use objects there. The following types of commands use objects at your current location:

- Commands that refer to QMF objects (CONVERT QUERY)
- Commands that read information from tables (DRAW)
- Commands that modify tables (EDIT TABLE)
- Commands that list tables you are authorized to use at that location (LIST TABLES)
- Commands that display a list (LIST TABLES)

Some commands use programs or files from the location in which QMF is executing, requiring a command synonym table at a remote location. The type of commands that run at the remote location are:

- System-specific
- IMPORT/EXPORT commands

Because of this, your users need a command synonym table for each location, and you must add all the commands (and the objects referenced by them) from the Q.COMMAND_SYNONYMS table to the database where the commands run.

Creating Function Key Tables

If you have customized function keys for your local users, you must copy the function key tables to the remote location.

To provide the tables:

1. Display the table.
2. Connect to the other database.
3. Type the SAVE DATA command.
4. Create any indexes.
5. Grant SELECT authority.

Updating QMF Governor Control Tables

If necessary, update QMF governor control tables at the remote location. The governor limitations at the remote location are the limits used during remote work, because those are the resources being accessed.

Installing the National Language Feature in the QMF Server

If you're using an NLF, add the National Language feature to the QMF remote location, because it must be at both the requester and the server. For the users to access the National Language feature, you must:

1. Prepare Q.PROFILES for NLF.
2. Create a command synonym table for NLF.

Code Page Support

DB2 for OS/390 and DB2 for VM and VSE can all handle character translation between application requesters and servers that are on different systems and use different code pages.

To process character strings coming from an unlike database, you must set up the CCSID conversion rules properly for both the application requester and the application server. Define the proper CCSID translation pair at the server for the application server to recognize the character string sent from the application requester.

The decision to translate depends on whether an entire string (for example, data from a CHAR or VARCHAR column) must be translated.

For CHAR or VARCHAR columns:

- If the column is defined FOR BIT DATA, then its contents are not translated.
- If the column is defined FOR SBCS DATA or FOR MIXED DATA, then its contents are translated.

For more information on the FOR BIT DATA, FOR SBCS DATA, and FOR MIXED DATA parameters, see *DB2 UDB for OS390 SQL Reference*.

Restricting Use of the APPLDATA Column

QMF uses the VARCHAR column APPLDATA (of Q.OBJECT_DATA) to hold the definitions of its procedures, queries, and forms. The definitions of QMF objects contain some data that must not be translated. Therefore, the APPLDATA column is not classified as containing translatable character data, and is defined as FOR BIT DATA.

Avoiding Use of Some Special Characters

Between systems on which QMF can execute and access data, the number of characters that require translation depends on the code pages used at the application requester and server locations. The list of characters that require translation includes the not sign (¬), and the vertical bar (|), as well as any other characters that require translation between the code pages of your requester and server locations.

Because the characters in QMF objects do not get translated, if code pages in the application requester and server are different, avoid using ¬ and |.

Enabling Your Users to Access a Remote Database

QMF 6 supports remote unit of work access between different databases. You can go between different DB2 for VM or VSE databases, between different DB2 for OS/390 databases, or between DB2 for VM or VSE and DB2 for OS/390 databases.

Updating a User's Profile

You need to update users' Q.PROFILES tables if they need access to a remote workstation. Update the Q.PROFILES table as explained in "Creating User Profiles to Enable User Access to QMF" on page 216.

Some profile values are attributes of your QMF session (query type and the LANGUAGE parameter, for example), others (SPACE parameter, for example) are related to the current location.

You can set up different rows in a single profile table for a specific user (for access from CMS, TSO, SRPI, APPC, native OS/390, or CICS). You can do this with the ENVIRONMENT column to give values that apply to the QMF operating environment, with the values that must be unique for the location on which the profile is stored.

Specifying Access for Current SQL Authorization ID

Your users' CURRENT SQLID is not in effect after a connection to a different location. So, if they need to use the same CURRENT SQLID with multiple DB2 application servers from a single QMF session, they might have to reset the CURRENT SQLID after they connect to each server. For more information, see *QMF Reference*.

Workstation database server Users
CURRENT SQLID is not available with DB2 common Server.

Connecting to the Local Database

You need to check that QMF is connected to a database under TSO, SRPI, APPC, native OS/390, or CICS.

Connecting from TSO, SRPI, APPC, or Native OS/390

QMF bridges to DB2 through the Call Attach Facility (CAF). The start program parameter DSQSSUBS specifies the DB2 subsystem ID (the "local DB2") that QMF uses when performing the CAF CONNECT. The DSQSSUBS parameter is also discussed in "DSQSSUBS (Naming the DB2 Subsystem Used by QMF)" on page 196.

Connecting from CICS

QMF bridges to DB2 through the CICS/DB2 Attachment Facility. The relationship between CICS transactions and DB2 is described in the resource control table (RCT). This table determines the DB2 subsystem (the "local DB2") to attach to.

Connecting to the Remote Database

You can provide your users with different methods of connecting to a remote location from a QMF session. You can set up one or more of the following methods:

- Using the program parameter DSQSDBNM

  Use this parameter to connect to a remote location when you initialize a QMF session. This parameter is required (at the startup time) if your application requester is DB2 for OS/390 and application server is DB2 for VM or VSE. For more information on the DSQSDBNM parameter, see "DSQSDBNM (Specifying the Location to Connect to When Starting QMF)" on page 195.

- Using the QMF CONNECT command

  Use this command to connect to a remote location during the QMF session.

  This command lets you connect to a different location within your distributed network during a QMF session.

  You can issue the command from:
  - The callable or command interface
  - The command line
  - Within a procedure (linear or with logic)

  For more information on the QMF CONNECT command, its parameters, and considerations for using the command, see the *QMF Reference*.

  For more information on procedures and the callable or command interface, see *Developing QMF Applications*.

- You can also create a procedure to establish the connection and add a command to a command synonym table to run the procedure. Your users can then enter the command to connect to remote database.

Running in CICS at a Remote Database

If you are running in DB2 Version 2 Release 3, when QMF is running in CICS and the current location is not the local DB2, all references to the database from QMF must be read-only. Consequently, all attempts to change the database are denied. Examples of such attempts include:

- Commands that cause changes (for example, SAVE *object*)
- SQL or QBE queries that cause changes (for example, INSERT, and I.)
- Error logging to Q.ERROR_LOG

If attempts are made to change the database:

- If you issue either a command or a query, you receive a message indicating that the data is read-only.
- If an error occurs that requires logging, it is logged only in the DSQDEBUG data set, not in Q.ERROR_LOG.

Specifying a Location Name

QMF uses SQL to access a relational database. In remote unit of work, the application requester takes a CONNECT request and establishes a connection with the remote database management system. In distributed unit of work, the application requester "receives" the SQL request and routes it to the appropriate distributed unit of work server.

QMF uses the term *location name* to denote the DRDA application server to which it is connected. You can use the location name to connect to a remote database. You can also use the location name to qualify a table name. For example, an SQL table named `SAN_JOSE.JONES.TABLE5` is managed by the database management system (DBMS), whose location name is *SAN_JOSE*.

In DB2 for OS/390

The location name refers to an entire subsystem. Servers that are accessible to a DB2 subsystem are defined in the communication database.

If you're using three-part names: When you are using both remote unit of work and distributed unit of work, the locations you can access with three-part names are accessible to the current application server, which must be a DB2 location.

In workstation database servers

The location name refers to a single database.

In DB2 for VM or VSE

The location name refers to an entire DB2 database machine and is cataloged in the CMS communications directory.

Where Data Must be Located for User Access

Commands and queries that access data, such as DISPLAY TABLE *tablename*, are directed to the current location, unless the current location is DB2 and *tablename* is a three-part name (or an alias for that name) that refers to a DB2 subsystem other than the current location.

Working with QMF Objects

QMF objects (queries, procedures, and forms) that are retrieved from or stored into the database must reside at the current location; that is, the location you

are connected to. This is identical to QMF without remote-unit-of-work support: objects reside at the same location as tables that are accessed without three-part names.

To ensure that when you save data, procedures, queries, and forms at the current location, you have sufficient storage space, do the following at that location: Routinely monitor your default tablespace (if you connect to a DB2 for OS/390 location) or default dbspace (if you connect to a DB2 for VM or VSE location), and the QMF object tables (Q.OBJECT_DIRECTORY, Q.OBJECT_DATA, and Q.OBJECT_REMARKS).

Some QMF objects stored in the database might refer to programs that QMF must invoke. These programs include:

- User edit routines
- REXX programs in support of procedures with logic and report calculations
- Local date and time routines invoked in support of local date and time edit codes
- QMF procedures that contain CMS, CICS, or TSO commands

  These procedures must be written to ensure that no attempt is made to execute CMS commands in an TSO environment, or to execute TSO commands in a CMS environment.
- An EXEC or CLIST that causes a program to execute QMF commands through the callable or command interface

These programs must reside at the same system in which QMF is executing (the system that you log on to), because these programs might contain operating system commands that cannot be run successfully or with the expected results by that system. Consequently, that system might be different from the system in which the database (and hence the QMF objects) resides. For an example of this, see *Using QMF* and *Developing QMF Applications.*

You might want to use QMF objects when the application requester and application server are on systems with different code pages. For important restrictions, see “Code Page Support” on page 438.

Working with Tables

You cannot use a three-part name in data definition statements. However, if you first connect to a location with remote unit of work, you can issue data definition statements such as CREATE and GRANT at that location. You can grant privileges on a table that resides at the current server to users at other locations by using the GRANT clause PUBLIC AT ALL LOCATIONS.

Preventing SQL Errors

SQL errors generally involve the difference between the SQL supported by the like DBMS for your operating environment and the SQL you need to use

when connected to an unlike DBMS. To avoid such errors, remember to use the SQL supported by the application server

For example, if QMF is executing in OS/390 and your current location is DB2 for VM, the syntax you use in an SQL query must be the syntax supported by DB2 for VM. Using the IN clause for the CREATE TABLE command, the following (DB2 for VM) syntax is acceptable:

```
CREATE TABLE ... IN DSP3
```

The corresponding syntax in DB2 for VM is unacceptable:

```
CREATE TABLE ... IN DATABASE DSQ3
```

The SQL statement completion information (the SQLCODE) contains the information returned by the current location. If you are using QMF on OS/390, you might be accustomed to the SQL syntax and information returned by DB2.

If you want QMF query portability, use SQL syntax supported by SAA. This allows the greatest degree of portability between DRDA application implementations.

The following database management issues can affect QMF:

- Some application requester environments can limit the SQL statements available to the application. For example, a DB2 application requester running under CICS is not allowed to update resources at a remote application server.
- An application program must be sensitive to where tables, views, and QMF objects reside within the network, because remote unit of work is limited to a single database management system within a single unit of work.

  Restriction: You cannot issue a join for two tables stored at different locations.
- The user edit routines and governor exit modules residing at the location where QMF is operating are used for your QMF sessions.
- After connecting to a location, the profile, resource control table, synonyms, and function keys are initialized to the values at that location.

Translating User IDs

Because the user ID of a database user might be translated to another user ID when the user connects to another location, the database administrator might need to define a translated user ID.

Translating Names

When you connect to a location (DB2 for OS/390 or DB2 for VM or VSE), your primary user ID might be translated. To understand how translation is set up, refer to your DBMS manuals or contact your database administrator.

Why Name Translation Might be Necessary: Your one-to-eight character user ID must be unique within a particular operating system, but might not be unique throughout the Systems Network Architecture (SNA) network.

To eliminate naming conflicts, distributed database systems support the following *name translation* schemes:

Outbound name translation
: Allows the application requester to translate the end user's name before sending it to the destination in the SNA network.

Inbound name translation
: Allows the application server to translate the end user's name it receives from its SNA partner.

DSQSPRID (in TSO)

When you connect to a DB2 location, the underlying database system can force name translation. This affects your primary authorization ID on that system. So, if the location to which you are connected has restricted enrollment, be sure your primary authorization ID in the connected system has a corresponding 'CREATOR =' value in the Q.PROFILES table at that location.

In most cases, your primary authorization ID is the CREATOR column value used to select your profile row in Q.PROFILES. However, if you start QMF with a DSQSPRID program parameter value of TSOID, the CREATOR column must be your TSO logon ID.

The Value to Use for DSQSPRID: If you are using QMF to connect to remote locations from TSO, use your primary authorization ID, rather than the TSO logon ID, when reading a row from Q.PROFILES. Use a DSQSPRID program parameter value of PRIMEID. (PRIMEID is the default, if you do not specify a value for the DSQSPRID program parameter when starting QMF.) Then, if translation occurs, QMF selects the correct profile row based on the primary authorization ID at the remote location.

If you use a DSQSPRID value of TSOID, QMF uses your TSO logon ID (for the system where QMF is operating) to read Q.PROFILES. If you must use TSOID, you need a profile row with the CREATOR column value set to your TSO logon ID. (For more information on the program parameter DSQSPRID see "DSQSPRID (Specifying the TSO Profile Key)" on page 203.

For information about the control table Q.PROFILES, see Table 31 on page 219 .)

Important: A DSQSPRID value of TSOID is used primarily for migration from earlier QMF releases for users with primary authorization IDs different from the TSO logon IDs. PRIMEID is the recommended value for DSQSPRID.

Deleting QMF Users from Each Remote QMF Location

After deleting a user's objects from the local QMF, you need to delete the user's objects from each remote location accessed by that user. If you are the QMF administrator for the other remote locations, you can delete the remote objects in the same way you deleted the local objects. If you are not the QMF administrator for the remote locations, you need to request the other administrator to delete the objects for the user ID.

Enabling Administrator Access to Your Location

If there are different QMF administrators for each QMF location, you must enable some access to your location for other administrators, so they can set up remote unit of work from their location.

You must:

- Grant them select authority on QMF requester control tables
- Install the governor routine into the QMF requester to prevent remote users from using all your resources

Chapter 23. Customizing QMF to Run as a Batch Program

As a QMF administrator, you might need to advise and assist batch mode users. You might also want to run your own procedures in batch mode. This chapter describes how you can use the QMF batch mode in TSO, ISPF, native OS/390, or CICS. For ISPF, the QMF batch facility executes QMF in the TSO terminal monitor program (TMP).

To enable your users to use batch mode, you need to give them the proper authority. Your users can then use batch mode to run procedures independently of a session and issue commands interactively while the procedure is running. The batch procedure might not run immediately; it might wait to run after the user's QMF session ends.

You and your users can create batch procedures to be run and saved in the database. A procedure can invoke queries or other procedures and can execute most other QMF commands. For more information about writing batch procedures, see *Using QMF*

QMF also supplies the QMF BATCH application to simplify running batch jobs in TSO. For more information about this application, see "Using the QMF Batch Query/Procedure Application (BATCH) in ISPF" on page 454.

If you're using an NLF: Users at a multilingual installation can choose the language environment for their batch QMF sessions, just as they can for their interactive sessions.

Quick Start

Table 59 outlines ways to customize the batch processing program.

For more information on any of the tasks listed, see the page shown at the right of the table.

Table 59. Customizing the batch processing program

To do this task:	See:
To enable your users to run in batch mode in TSO, authorize their logon IDs and DB2 authorization IDs if RACF is in effect, or authorize the IDs using the PROFILE PREFIX statement.	Page 448
To send a job to run in TSO batch, you must use a spool and punch the batch job to the specified batch machine.	Page 449

Table 59. Customizing the batch processing program (continued)

To do this task:	See:
To run batch using JCL in TSO, you must start the job with a statement similar to: //BATCH JOB USER=LMN,PASSWORD=ABC,NOTIFY=LMN	Page 450
To debug a batch procedure in TSO, use the L1 and L2 trace codes discussed in "Determining the Problem Using Diagnosis Aids" on page 477.	Page 453
To use the QMF BATCH application in TSO, you must ensure that the users have the authority to use TSO FIB commands.	Page 454
To run QMF in native OS/390, use the JCL provided here.	Page 464
To enable your users to run in batch mode in CICS, authorize their QMF accounts using the Q.PROFILES table.	Page 466
To debug a batch procedure in CICS, use the QMF command and message trace facility to route the information to a temporary or transient data queue.	Page 453

Enabling Your Users to Use Batch Mode in TSO

This section assumes that you know how to run background jobs from TSO. For more information about running background jobs that have been initiated in the foreground, see *TSO Extensions Command Language Reference*

If a user runs a procedure with the RUN command, the user cannot execute QMF commands except to cancel the procedure or the session. Thus, running a procedure using the RUN command might tie up considerable session time.

Alternatively, given the proper TSO authority, the user might run the procedure in batch mode. In this mode, the procedure runs independently of the user's session, so that the user can continue to issue commands.

TSO users with the proper authority can submit jobs to the background. They can then continue their sessions without waiting for those jobs to be run. Such jobs can run QMF procedures in batch mode. Preparing and running background jobs is therefore an essential part of running QMF procedures in batch mode.

Authority to Operate in Batch Mode

To submit a batch job, you need to know what QMF and DB2 authority is needed.

Determining the logon ID and DB2 primary authorization ID your job is running under.

- If your installation uses RACF, the logon ID is the value of the USER parameter on your JOB statement. The DB2 primary authorization ID is the one corresponding to that logon ID.

- If your installation does not use RACF, the logon ID and primary authorization ID are determined as described in "The PROFILE PREFIX Statement" on page 452.

The logon ID and authorization ID play the same role as when you use QMF interactively. As a result, the procedure runs only if the following conditions are satisfied:

- You can operate QMF interactively using the logon ID for the batch run.
- The authorization ID corresponding to the logon ID owns the procedure to be run, or that procedure is shared.

In running the procedure's commands, the authorization ID works interactively. However, not every QMF command that can be run interactively can be run in batch mode. For more information about which commands are appropriate for the batch environment, see *Using QMF*

Users with authority to use QMF interactively, and who can run jobs in the background, can also use it in batch mode, while users who do not have authority cannot use it in batch mode.

RACF Security Considerations

If RACF is a part of your security, you can prevent users from running jobs under other user's logon IDs. A user who runs such a job can access all the DB2 data that the other user has access to, including data that the user running the job is not authorized to see.

Sending a Job to OS/390 Using the TSO SUBMIT Command

You or your users must create the QMF procedure to be run and save it in the database. The procedure might issue queries or run other procedures and might run most other QMF commands. Through the TSO command of QMF, the procedure might also call CLISTs or online programs. For more information on writing procedures for batch, see *Using QMF*

After you save the procedure, you or your users must create a JCL file for the job that runs the procedure. The JCL for this job calls TSO for batch operations. It must allocate resources that TSO and QMF need, including a data set containing statements that TSO is to run. One of these statements must start a QMF session.

For more about JCL in general, see "JCL to Execute a QMF Batch Job under TSO" on page 450. For more information about starting a batch-mode QMF session, see "Chapter 13. Starting QMF" on page 159.

Submit the job to the background through the TSO SUBMIT command. SUBMIT is one of the FIB (foreground-initiated background) commands through which the user runs, monitors, and manipulates background jobs.

Issuing a FIB command requires the proper TSO authority. (Granting this authority is a TSO administration task.) For more on FIB commands and their uses, see *TSO Extensions Command Language Reference*

The SUBMIT command can be run:
- During the user's QMF session by using the TSO command of QMF
- In TSO READY mode or in a CLIST that tailors the JCL of the job

The tailoring can be based on parameters whose values are passed to called CLIST.

Any error encountered while running a procedure can:
- Terminate the procedure
- Back out an uncommitted DB2 unit of recovery

The JOB statement for the job can specify that a message be sent to the user when the job is done. The message appears on the user's screen. The user need not end a QMF session to receive the message.

After the run is ended, the user can examine the printer output for errors. With the proper JCL, this output is routed to data sets that the user can examine with an editor. One of these data sets might contain a record of the confirmation and error messages and, if desired, a record of the QMF commands that have run. For more information on this data set and on controlling its content, see "Debugging a Procedure" on page 453.

JCL to Execute a QMF Batch Job under TSO

Batch-job JCL is very much like a TSO logon JCL, because QMF is run in batch mode through batch-mode TSO. The JCL statements you can use in batch mode are discussed in this section.

The JOB Statement

Begin your JCL with a JOB statement like this:

```
//BATCH   JOB  USER=LMN,PASSWORD=ABC,NOTIFY=LMN
```

The statement shown might not be adequate for every installation, because it contains neither accounting information nor the user's name. The operands shown specify that:
- The logon ID is LMN.
- The logon password is ABC.
- The terminal message is sent to user LMN when the job ends.

You can include other operands; among these are the MSGLEVEL and MSGCLASS operands that control the level of detail and the routing of the JCL and system messages.

Attention: Without RACF, the PASSWORD parameter is ignored, creating a security exposure.

The EXEC Statement

You can use an EXEC statement for a JOB step to run batch-mode QMF similar to the following:

```
//SAMPLE  EXEC PGM=IKJEFT01,TIME=1440,DYNAMNBR=30,REGION=3072K
```

This statement:

- Calls TSO (PGM=IKJEFT01)
- Specifies an adequate number of allowable dynamic allocations (DYNAMNBR=30)
- Specifies a sufficiently large region for QMF (REGION=3072K)

The DD Statements

You can use the same DD statements both for running QMF interactively and for batch mode. You must remove the statements for SYSPRINT, SYSTERM, and SYSIN.

You might add the operand HOLD=YES to one or more of the SYSOUT DD statements and then manipulate their output with the OUTPUT command of TSO. (This is another FIB command.) Using the OUTPUT command, you can route the output of the SYSOUT DD statement to your screen.

You also need DD statements for the SYSTSPRT and SYSTSIN data sets.

SYSTSPRT: This data set contains the message output from TSO and ISPF. For this data set write:

```
//SYSTSPRT DD SYSOUT=A
```

SYSTSIN: SYSTSIN holds the TSO statements that run during the job step. To include these statements in your JCL, write the following:

```
//SYSTSIN DD *
   EXEC CLISTA
   PROFILE PREFIX(LMN)
   ISPSTART PGM(DSQQMFE) NEWAPPL(DSQE) PARM(DSQSMODE=B,DSQSRUN=LMN.PROCA)
:
/*
```

Figure 146. Adding the TSO statements from SYSTSIN

TSO runs these statements in their order of appearance in SYSTSIN:

- The first statement runs a CLIST named CLISTA, which might do allocations of QMF libraries.

- The second sets the user's dsname prefix to LMN.
- The ISPSTART statement invokes batch-mode QMF with ISPF and runs the procedure LMN.PROCA.

For more information on using the ISPSTART command in batch mode, see "Starting QMF in Batch Mode in ISPF" on page 165.

The PROFILE PREFIX Statement

The PROFILE PREFIX statement in Figure 146 on page 451 sets the user's dsname prefix to LMN, which is assumed in the example to be the user's logon ID.

Where to Place the Statement: Place the PROFILE PREFIX statement before the first ISPSTART statement that starts QMF. Issuing the PROFILE PREFIX statement within QMF is ineffective.

How PROFILE PREFIX Can Change a Profile: By itself, the QMF SET PROFILE command makes no permanent changes to the user's QMF profile. In contrast, the PROFILE PREFIX statement can make permanent changes to the user's TSO profile, depending on your installation's setup. If it does, a user might want to restore the dsname prefix. The initial value of the prefix setting is in the ISPF system variable ZPREFIX.

Making the PROFILE PREFIX Effective: For the PROFILE PREFIX statement to be effective, the DSQSPRID parameter must be set to TSOID. A similar statement (one setting the user's prefix to the user's logon ID) might be needed in other jobs running QMF in batch mode for the following reasons:

- To identify the user to QMF when RACF is not used

  At installations where RACF is not used, QMF assumes that the user's logon ID is equal to the user's dsname prefix; if this prefix is null, QMF assumes that the logon ID is BATCH. Thus, by setting the dsname prefix to the user's logon ID, the PROFILE PREFIX statement provides the user's logon ID to QMF.

  The primary authorization ID that DB2 assigns the user in this case is the value specified by the DB2 installation parameter UNKNOWN AUTHID. The logon ID is used in trace output recorded in the DSQDEBUG data set. Either the primary authorization ID or the logon ID is used for reading from the profile and assigning a default resource group, depending on the setting of the DSQSPRID parameter. See the discussion of this parameter in "Chapter 14. Customizing Your Start Procedure" on page 177.
- To avoid problems with data set names

  You can encounter problems when a QMF procedure uses both the fully qualified and the incomplete forms of a data set's name in the QMF IMPORT/EXPORT commands. For example, a procedure running under the logon ID LMN issues the following two commands:

```
EXPORT QUERY TO 'LMN.QUERYX.QUERY'
 .             .             .
IMPORT QUERY FROM QUERYX
```

The EXPORT command uses the logon ID (LMN) as the first qualifier for the export file name. Later, the IMPORT command imports this file.

If the user's dsname prefix is ABC instead of LMN, the file referenced in the IMPORT statement is named 'ABC.QUERYX.QUERY' instead of 'LMN.QUERYX.QUERY'. This is because the prefix is used for the first qualifier of a data set name when, as in the example IMPORT command, the name isn't fully qualified.

Thus, the procedure can't find the file it previously exported. The PROFILE PREFIX statement avoids this problem by setting the dsname prefix to the user's logon ID (in this case, 'LMN').

Running QMF Batch in the Foreground Using TSO or ISPF

To start QMF in batch mode in the foreground, you can use any of the methods to start QMF that were discussed in "Chapter 13. Starting QMF" on page 159. For example, from the TSO READY mode, you can issue the following statement to start QMF from a CLIST:

```
ISPSTART CMD(clist_name) NEWAPPL
```

where `clist_name` is the name of the CLIST that starts QMF. This CLIST must contain a statement of the form:

```
ISPEXEC SELECT PGM(DSQQMFE) NEWAPPL(DSQE)
                    PARM(...DSQSMODE=B,DSQSRUN=aaa.bbb)
```

Here the ISPSTART statement runs in the foreground, not the background. You cannot do other things with TSO while waiting for the CLIST to end.

When the CLIST actually ends, you are back in TSO READY mode. Before the CLIST ends, you might see a display of the ISPF Disposition Prompt panel if your procedure terminates before you specify permanent disposition parameters for the TSO console, log, and list files. To avoid displaying this panel, specify permanent disposition parameters for these files. A value of D (specifying "delete") for each is probably adequate. If you do not know how to specify these dispositions, ask an ISPF expert or use ISPF help.

Debugging a Procedure

You can use the trace codes and the HELP command to diagnose problems with a batch mode procedure. In fact, L2 tracing is the default for procedures run in batch mode. To change the trace setting, you need a SET command in your procedure. For example, to specify L1 tracing instead of L2, add the following statement at the start of the procedure:

```
SET PROFILE (TRACE=L1
```

With either L1 or L2 tracing, a log is produced in the DSQDEBUG data set. Within this log is a series of message records: one for each message that QMF issued while the procedure was being run.

With L2 tracing in effect, the log also contains a record for each QMF command run by the procedure (and its subordinates).

If the procedure terminates prematurely, an error message is written to the DSQDEBUG data set. You can then use the HELP command to display the corresponding message help panel.

For information on problem diagnosis for interactive sessions, see "Determining the Problem Using Diagnosis Aids" on page 477.

Using the QMF Batch Query/Procedure Application (BATCH) in ISPF

The QMF batch query/procedure application is designed to minimize the amount of effort involved and knowledge required to run a query or procedure in batch mode. To use the application, you must start QMF under ISPF.

If you're using an NLF: You need to assign the translated synonym to the users. They then issue the translated command synonym for BATCH. Refer to "Chapter 18. Customizing QMF Commands" on page 305 for the procedure on how to assign synonyms.

Assigning Authority to Use the Application

Any QMF user can use the application, because starting it consists of running a shared procedure. The application creates the procedure and JCL for the user's batch job. But it is not able to submit the job unless the user has authority to use the TSO FIB (foreground-initiated background) commands. Granting this authority to the user is a TSO administration task.

The batch job is run under the user's TSO logon ID, so the commands issued by the batch procedure are run under the user's authorization ID. The same rules apply to a batch job and to the user running the job interactively:

- If the query, procedure, or form to be run is not owned by the user, it must be shared by its owner.
- For any table referenced in the query (assuming a retrieval query), the user must have SQL SELECT privilege.
- If the query or procedure results are to be saved in a new table, the user's SAVE command must be "enhanced." (See "Enabling Users to Create Tables in the Database" on page 246.)

Using the Application

Before starting the application, the user must have available the query or procedure to be run, and, if necessary, a form to format the report. Each of these objects can be either in the database or in temporary storage. If the objects are in the database, they can be owned by others, provided they are shared.

After the user fills in the appropriate fields and presses ENTER, the application composes a batch job and submits it to the background. After the job has run, the NOTIFY parameter on the JOB statement directs an appropriate message to the user's terminal.

While the prompt panel is displayed, the user can:
- Display the application's help panels by pressing the Help function key
- Terminate the application by pressing the End function key

(The function key settings appear at the bottom of the prompt panel.)

If you're using an NLF: Issue the translated command synonym for BATCH to run a query or procedure in batch mode. For example, the translated German command synonym for BATCH is STAPEL. For the translated command synonym for BATCH in the other language environments, see the Q.COMMAND_SYNONYM_*n* control table.

Starting the Application

The application must be started while its user is operating under QMF. When started, the application prepares a batch job for the user and submits it to the background. The job is prepared from information the user enters on a prompt panel. It runs a single query or procedure of the user's choice. Assuming the batch job is a select query, the job can also:
- Save the data object that is created by running the query
- Format the report object using a form of the user's choice
- Print the report
- Write the report into a permanent data set
- Send the report to one or more other users

The advantage of using the application lies in its prompt panel, where the user outlines what the job should do and leaves the details of how to do it to the application. The user doesn't need a knowledge of JCL or QMF procedures.

To use the batch application, enter:

```
BATCH
```

which results in the display of the prompt panel in Figure 147.

Filling in the Prompt Panel

A user can get help filling out the prompt panel by pressing function key 1, which results in the display of the first of three help panels.

```
QMF BATCH              QUERY/PROC BATCH PROMPT

OBJECT NAME    ===>                              Name of query or procedure
Current OBJECT ===>  NO                       Use object in temporary storage?
QUERY or PROC  ===>  QUERY
PROC arguments ===>
FORM  NAME     ===>                              Form to be used with query
Current FORM   ===>  NO                         Use form in temporary storage?
BATCH NAME     ===>                           Name of QMF batch execution proc
DB2 SUBSYSTEM       ===>                        DB2 PLAN  ===>
LOGON PASSWORD      ===>                        TSO logon password
LOGGING             ===>  YES                   Log messages and commands?
SAVE DATA           ===>                        Name of data to be saved
REPORT DATASET      ===>
   NEW DATASET      ===>                        Is the data set new?
   VOLUME           ===>                        Optional if NEW or uncataloged
   REPORT WIDTH     ===>  133                   Width of report line
VIEW REPORT         ===>  YES                   Should report be printed?
OUTPUT CLASS        ===>  A                     Class for PRINT and TRACE
DISTRIBUTION        Enter userids and nodes to send report.
      USERID        ===>                  NODE     ===>
                    ===>                           ===>

PF1=Help PF3=End  Enter=Process batch request
```

Figure 147. The QMF batch prompt panel

Required Entry Fields

Certain fields on the batch prompt panel are mandatory. Messages are displayed prompting the user to enter values for these required fields if the Enter key is pressed before values are provided. The cursor is then positioned on the field requiring input. Table 60 describes the required fields.

Table 60. BATCH application required entry fields

Field	Description
OBJECT NAME	A value is required for the name of the query or procedure to be run in batch mode. If the query or procedure is currently in temporary storage, it is saved in the database using this name. If the name is that of an existing object, the new object replaces the old one. (The name must be unqualified.) If the object is in the database, enter the name under which it was saved. (The name must be qualified if the object is owned by someone else and shared.) Save this object using CONFIRM=NO as a profile setting.
QUERY or PROC	The object type to be run in batch; must be either QUERY or PROC.

Table 60. BATCH application required entry fields (continued)

Field	Description
BATCH NAME	A value is required for the name of the QMF procedure to be run in batch mode. (The name is not qualified.) If you are submitting multiple queries, you need to modify the BATCH NAME field for each query or the new batch job replaces the old job. This procedure contains the appropriate QMF commands depending upon the user's input. The user's query or procedure, specified in the QUERY or PROC field, is run from this procedure. The procedure is saved using the SHARE=YES keyword option. It must be able to be run by the batch machine. Save this procedure using CONFIRM=NO as a profile setting.

Optional Entry Fields

Table 61 describes the remaining (optional) entry fields on the panel. Where a value of YES or NO is expected, a default YES or NO normally appears on the screen. If a user blanks out a value in a YES/NO field, the user is prompted for an entry.

Table 61. BATCH application optional entry fields

Field	Description
Current OBJECT	If the batch query or procedure is currently in temporary storage, the user enters YES in this field. The query or procedure is then saved to be run later in batch. If the query or procedure is in the database, enter NO. The default value for this field is NO.
Arguments to the REXX procedure named in the OBJECT NAME field.	
FORM NAME	To run the batch query using a form, the user must specify the name of a form in this field. If the form to be used: • Is the default form, leave the field empty. • Is in the database, the form is saved using this name. The name must be qualified if the form is owned by someone else and shared. • Is the current form, enter a name under which it can be saved. The name must be unqualified, because the form is saved under your own authorization ID. This form is saved using CONFIRM=NO as a profile setting. If you enter the name of an existing form, the new form replaces the old.

Table 61. BATCH application optional entry fields (continued)

Field	Description
Current FORM	If the batch form is the current form, the user enters YES in this field. The form is then saved for use later in batch. If the form is in the database, enter NO. The default value for this field is NO.
DB2 SUBSYSTEM	Enter the name of the DB2 subsystem that QMF uses; it has the same value as program parameter DSQSSUBS.
DB2 PLAN	Enter the name of the QMF application plan; it has the same value as program parameter DSQSPLAN.
LOGON PASSWORD	Enter your logon password; it does not appear on the screen.
LOGGING	The default value for this field is YES. This means that the default trace level in batch mode is L2, which traces messages and commands. If the user doesn't want tracing at the L2 level, NO should be specified. Tracing does not continue in the batch procedure beyond the SET PROFILE (TRACE=NONE command, which is then in the generated user procedure.
SAVE DATA	If the user wants the data resulting from running a query or procedure to be saved, a value must be given for this field. The DATA is saved as a new table using this name and the CONFIRM=NO keyword option.
REPORT DATASET	If you want the report to be written to a permanent data set, enter the name of that data set here. The name must be fully qualified. If you do not want this done, leave the field empty. This data set name is passed to OS/390 JCL and must conform to the OS/390 naming conventions. Fully qualified names do not require quotation marks if the name does not contain any special characters other than period, @, #, $. If quotation marks are used, OS/390 assumes that special characters are used and does not catalog the data set in the system catalog.
NEW DATASET	You must enter something in this field if you entered a data set name in REPORT DATASET. Enter YES to show that this data set does not currently exist. Enter NO to show that the data set does currently exist.
VOLUME	You can optionally fill this field if you entered YES in the NEW DATASET field. Enter the serial number of a volume on which the new data set can reside. The volume must be one that can be used on a unit of the SYSDA class, as defined by your installation.

Table 61. BATCH application optional entry fields (continued)

Field	Description
REPORT WIDTH	If you entered YES in the NEW DATASET field, you must fill in this field. Its value becomes the logical record length (LRECL) of the new data set. If the width of your report is less than or equal to the LRECL, use the default value of 133.
VIEW REPORT	This field must contain YES or NO. YES indicates print the job; NO indicates don't print the job.
OUTPUT CLASS	Enter the output class for the printed output from your job. The printed output includes: • The system messages • The report (DSQPRINT), if it was printed • The trace output (DSQDEBUG) • An abend dump (DSQUDUMP), if one was produced If your installation provides for it, you can choose an output class that holds the printed output for routing to your terminal.
DISTRIBUTION USERID and NODE	If the user wants the resulting report to be sent to other users, the user must enter their user IDs and nodes in these fields. To use the fields, you need to name a data set for the report output in the REPORT DATASET field. On the same line, enter a user's logon ID in one of the USERID fields and the user's node in the corresponding NODE field. In this way, you can specify up to two recipients for the report. The report is sent using the TSO TRANSMIT command. You need not fill in the NODE field for a given user if that information is in your NAMES.TEXTLIST data set. The node ID you write might correspond to an entire list of names in this file, allowing you to send the report to more than just two people.

Modifying the Batch Application

You can modify the batch application by making changes to its components or creating new components for the customized application. IBM recommends that you create new components, so you don't risk losing your changes when maintenance is performed.

The Applicable QMF Components

To modify the batch application, you need to be aware of the following components in the QMF libraries:

- The CLISTs DSQABB11 and DSQABB12 in the QMF710.SDSQCLTE library

When users call the batch application with the BATCH command, they actually call DSQABB11. The purpose of this CLIST is to call DSQABB12 through the ISPF SELECT service as a new application. Most of the logic in the application is in DSQABB12.

- ISPF message definitions in the members DSQBE00, DSQBE01, and DSQBE02 of the QMF710.SDSQMLBE library

  These messages appear on the user's screen after the application ends. The application generates these messages using the QMF MESSAGE command.
- Various ISPF panel definitions in the QMF710.SDSQPLBE library, which serve a variety of purposes:
  - DXYEABMP is the application's prompt panel.
  - DXYEABM1, DXYEABM2, and DXYEABM3 are the help panels for the prompt panel.
  - DXYEAB12, DXYEAB13, DXYEAB14, and DXYEAB15 furnish message help for the application's error messages.
- Certain file-tailoring models in the QMF710.SDSQSLBE library:
  - DSQABB1J models the JCL for the batch job. This models a procedure that runs a query in batch mode.
  - DSQABB1P and DSQABB1S model QMF procedures. They model a procedure that submits the JCL for the job.

Possible Changes to the Application

You can make the following changes to the application:

- Allow users to choose the DB2 subsystem.

  Within the model file DSQABB1J is the ISPSTART statement to call batch-mode QMF. This statement does not provide a value for the DSQSSUBS parameter of QMF. As a result, the DB2 subsystem under which QMF is to run is assumed to have the name DSN. If you want QMF to run in a DB2 subsystem with a different name, add DSQSSUBS=xxx to the PARM operand of the ISPSTART command (where *xxx* is the appropriate subsystem name).
- Allow the user to specify a GDDM nickname for the printed report.
- Add extra logic to enforce your installation's rules.

  For example, you might offer the user a list of acceptable volumes when the user creates a new data set for the report output.
- Change the JCL produced by the application to conform to your installation.

  You can do either of the following:
  - Add accounting information to the JOB statement.
  - Change the name of QMF application plan in the ISPSTART statement of the SYSTSIN data set.

You might also have to make additional changes such as:
- Adding a field or fields to the prompt panel (DXYEABMP)
- Changing the help panels for the prompt panel
- Adding new error messages to DSQBE00, DSQBE01, or DSQBE02
- Changing some of the logic in DSQABB12

Important: Users who call the batch application should not maintain a data set named userid.DSQ1EBFT.PROC, where *userid* is the user's TSO logon ID. If such a data set is maintained, the QMF batch application might not run correctly.

Example of Modifying the Application

The following example shows one way you can modify the BATCH application.

Modify the batch application with all users having the same PROFILE PREFIX, and assume that all users have unique user IDs. Add the user IDs to the data set names using &SYSUID and &ZUSER.

You need to make three modifications to DSQABB1S SKELETON. Figure 148 on page 462 shows the required changes. The old lines are commented out. The new replacement lines follow them.

```
)CM ------------------------------------------------------------------
)CM FILE:  DSQABB1S
)CM DESCRIPTION:  THIS SKELETON CREATES DSQABB1S, THE PROC WHICH
)CM                    SAVES THE CURRENT FORM  (IF SPECIFIED)
)CM                    IMPORTS AND SAVES THE PROC WHICH RUNS THE QUERY
)CM                    SENDS THE QMF INVOCATION JOB TO OS/390 BATCH
)CM                    RESETS THE PROC ITEM
)CM                    FREES ISPFILE USED FOR FILE TAILORING
)CM                    DISPLAYS THE QUERY PANEL
)CM ------------------------------------------------------------------

)SEL &FAN = &YES
&SAVE &FORM &AS &FNAME (&SHARE=&YES, &CONFIRM=&NO
)ENDSEL

)CM &IMPORT &PROC &FROM '&ZPREFIX..DSQ1EBFT.&PROC.' (&MEMBER = DSQABB1P
&IMPORT &PROC &FROM '&ZPREFIX..&ZUSER..DSQ1EBFT.&PROC.' (&MEMBER = DSQABB1P
&SAVE &PROC &AS &PNAME (&CONFIRM=&NO
)CM TSO SUBMIT '&ZPREFIX..DSQ1EBFT.&PROC.(DSQABB1J)'
TSO SUBMIT '&ZPREFIX..&ZUSER..DSQ1EBFT.&PROC.(DSQABB1J)'

TSO FREE FILE(ISPFILE) DELETE
&RESET &PROC
)CM &IMPORT &PROC &FROM DSQABB
&IMPORT &PROC &FROM &ZUSER..DSQABB

)SEL &ITM = &QUERY
&DISPLAY &QUERY
)ENDSEL
```

Figure 148. Modifying the DSQABB1S SKELETON

Make the five modifications to DSQABB12 CLIST as commented in Figure 149 on page 463.

```
/*************************************************************/      00088000
/*  ALLOCATE USERID.DSQ1EBFT.PROC TO BE USED FOR ISPF          */      00089000
/*  FILE TAILORING OUTPUT.                                     */      00090000
/*************************************************************/      00091000
 FREE FILE(ISPFILE)                                                  00092000
/* ALLOC DDNAME(ISPFILE) DSNAME(DSQ1EBFT.&PROC) OLD                  00093000
 ALLOC DDNAME(ISPFILE) DSNAME(&SYSUID..DSQ1EBFT.&PROC) OLD           00093000
 IF &LASTCC ¬= 0 THEN      +                                         00094000
   DO                                                                00095000
   FREE ATTRLIST(ATTRPDS)                                            00096000
   ATTR ATTRPDS LRECL(80) RECFM(F B) BLKSIZE(800) DSORG(PO)          00097000
/* ALLOC DDNAME(ISPFILE) DSNAME(DSQ1EBFT.&PROC) NEW SPACE(5,2) +     00098000
/* TRACKS DIR(10) USING(ATTRPDS) CATALOG                             00099000
   ALLOC DDNAME(ISPFILE) DSNAME(&SYSUID..DSQ1EBFT.&PROC) NEW +       00098000
   SPACE(5,2) TRACKS DIR(10) USING(ATTRPDS) CATALOG                  00099000
   END                                                               00100000
 IF &RC = 8 THEN  +                                                  00101000
   DO                                                                00102000
.
.
.
/*************************************************************/      00203000
/*EXPORT CURRENT CONTENTS OF PROC PANEL                      */      00204000
/*************************************************************/      00205000
 ISPEXEC SELECT PGM(DSQCCI)   +                                      00206000
/* PARM( &EXPORT &PROC &TO DSQABB (&CONFIRM = &NO )                  00207000
 PARM( &EXPORT &PROC &TO &SYSUID..DSQABB (&CONFIRM = &NO )          00207000
 IF &LASTCC ¬= 0 THEN DO                                             00208000
     ISPEXEC SELECT PGM(DSQCCI) +                                    00209000
                    PARM(SET GLOBAL (DSQEC_NLFCMD_LANG = &LOCLANG )) 00210000
     SET &MSG = &DSQB.023                                            00211000
     ISPEXEC SELECT PGM(DSQCCI) PARM( &MESSAGE &MSG )                00212000
     SET &RCDE = 8                                                   00213000
     GOTO CLEANUP                                                    00214000
 END                                                                 00215000
.
.
.
```

Figure 149. Modifying DSQABB12 CLIST (Part 1 of 2)

```
/*************************************************************/          00244000
/* IMPORT AND RUN FILE TAILORED SKELETON                     */          00245000
/*************************************************************/          00246000
 ISPEXEC SELECT PGM(DSQCCI)                        +                     00247000
/* PARM( &IMPORT &PROC &FROM DSQ1EBFT (&MEMBER = DSQABB1S )              00248000
 PARM( &IMPORT &PROC &FROM &SYSUID..DSQ1EBFT (&MEMBER = DSQABB1S )      00248000
 IF &LASTCC ¬= 0 THEN         +                                         00249000
⋮
CLEANUP: FREE FILE(ISPFILE) DELETE                                      00274000
   DONE: SET &ZPLACE  = &SAVEPLC                                        00275000
         SET &ZPFCTL  = &SAVEPFC                                        00276000
         SET &ZPF01   = &STR(&SAVEPF01)                                 00277000
         SET &ZPF13   = &STR(&SAVEPF13)                                 00278000
         SET &ZPF03   = &STR(&SAVEPF03)                                 00279000
         SET &ZPF15   = &STR(&SAVEPF15)                                 00280000
         SET &ZPF10   = &STR(&SAVEPF10)                                 00281000
         SET &ZPF22   = &STR(&SAVEPF22)                                 00282000
         SET &ZPF11   = &STR(&SAVEPF11)                                 00283000
         SET &ZPF23   = &STR(&SAVEPF23)                                 00284000
         ISPEXEC VPUT (ZPLACE ZPFCTL ZPF01 ZPF13) PROFILE               00285000
         ISPEXEC VPUT (ZPF03 ZPF15 ZPF10 ZPF22 ZPF11 ZPF23) PROFILE     00286000
/*       DELETE DSQABB.&PROC                                           00287000
         DELETE &SYSUID..DSQABB.&PROC                                  00287000
         EXIT CODE(&RCDE)                                              00288000
```

Figure 149. Modifying DSQABB12 CLIST (Part 2 of 2)

Running QMF Batch in Native OS/390

In addition to running QMF batch in TSO and ISPF, you can run QMF as a native OS/390 batch job. You can use the JCL shown in Figure 150 on page 465 to run QMF as a batch job in native OS/390.

```
/*************************************************************/       00299000
//QMFBAT   JOB                                                       00300000
//S1       EXEC PGM=DSQQMFE,PARM='M=B,I=yourQMFproc'                 00301000
//*                                                                  00302000
//*  Program libraries required when running in batch                00303000
//*                                                                  00304000
//STEPLIB  DD  DSN=QMF710.SDSQLOAD,DISP=SHR                          00305000
//         DD  DSN=DSN.SDSNEXIT,DISP=SHR                             00306000
//         DD  DSN=DSN.SDSNLOAD,DISP=SHR                             00307000
//         DD  DSN=GDDM.ADMLOAD,DISP=SHR                             00308000
//*                                                                  00309000
//*  QMF/GDDM maps are required when running in batch                00310000
//*                                                                  00311000
//ADMGGMAP DD  DSN=QMF710.DSQMAPE,DISP=SHR                           00312000
//*                                                                  00313000
//*                                                                  00314000
//*  Datasets used by QMR                                            00315000
//*                                                                  00316000
//DSQPRINT DD  SYSOUT=A,DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330)       00317000
//DSQDEBUG DD  SYSOUT=A,DCB=(RECFM=FBA,LRECL=121,BLKSIZE=1210)       00318000
//DSQUDUMP DD  SYSOUT=A,DCB=(RECFM=VBA,LRECL=125,BLKSIZE=1632)       00319000
//DSQSPILL DD  DSN=&&SPILL,DISP=(NEW,DELETE),                        00320000
//  UNIT=SYSDA,SPACE=(TRK,(100),RLSE),                               00321000
//  DCB=(RECFM=F,LRECL=4096,BLKSIZE=4096)                            00322000
//*                                                                  00323000
/*************************************************************/       00324000
```

Figure 150. JCL to run QMF as a native OS/390 batch job

When you run QMF in native OS/390, remember the following things:

- TSO is not available.
- Some QMF functions require TSO or ISPF; they will not work when you run QMF in native OS/390.
- You must use the fully qualified data set name to export or import files. The default user ID suffix is not available.
- You cannot use procedures with logic (REXX PROCS). To run QMF with REXX in a non-TSO address space, you need to use IRXJCL, as illustrated in Figure 151 on page 466.

The REXX program listed in Figure 151 on page 466 uses the QMF callable interface to start QMF and run QMF commands in batch mode.

```
//QMFBATCH JOB REGION=8M,
//  MSGCLASS=H,TIME=(2,30),USER=&SYSUID,NOTIFY=&SYSUID,CLASS=A
//ROBQMF1   EXEC PGM=IRXJCL
//STEPLIB  DD  DSN=DSN.DB2A.SDSNLOAD,DISP=SHR
//         DD  DSN=DSN.DB2A.SDSNEXIT,DISP=SHR
//         DD  DSN=QMFDEV.QMF710.SDSQLOAD,DISP=SHR
//ADMGGMAP  DD  DSN=QMFDEV.QMF710.DSQMAPE,DISP=SHR
//SYSEXEC   DD  DSN=ROBIN.QMF710.SDSQEXCE,DISP=SHR
//DSQPRINT  DD  SYSOUT=*,DCB=(RECFM=FBA,LRECL=137,BLKSIZE=1330)
//DSQDEBUG  DD  SYSOUT=*,DCB=(RECFM=FBA,LRECL=121,BLKSIZE=1210)
//DSQUDUMP  DD  SYSOUT=A,DCB=(RECFM=VBA,LRECL=125,BLKSIZE=1632)
//SYSUDUMP  DD  SYSOUT=*
//SYSTSPRT  DD  SYSOUT=*
//DSQSPILL  DD  DSN=&&SPILL,DISP=(NEW,DELETE),
//  UNIT=VIO,SPACE=(CYL,(1,1),RLSE),
//  DCB=(RECFM=F,LRECL=4096,BLKSIZE=4096)
//SYSTSIN DD *
/* REXX */
CALL DSQCIX "START (DSQSMODE=BATCH"
SAY DSQ_MESSAGE_ID DSQ_MESSAGE_TEXT
IF DSQ_RETURN_CODE = DSQ_SEVERE THEN EXIT DSQ_RETURN_CODE
CALL DSQCIX "RUN PROC REXXPP"
SAY DSQ_MESSAGE_ID DSQ_MESSAGE_TEXT
IF DSQ_RETURN_CODE = DSQ_SEVERE THEN EXIT DSQ_RETURN_CODE
CALL DSQCIX "EXIT"
SAY DSQ_MESSAGE_ID DSQ_MESSAGE_TEXT
EXIT DSQ_RETURN_CODE
/*
```

Figure 151. REXX program to start and run QMF in batch mode

Enabling Your Users to Use Batch Mode in CICS

In CICS, QMF runs interactively as a conversational transaction. All resources needed by QMF are available throughout the user session. To conserve resources, you might want to run QMF procedures that can be used to generate a report. The procedures can be run noninteractively.

The QMF transaction can be run from a terminal or as a transaction running without a terminal.

Running Batch from a Terminal

You can run QMF from a terminal to produce a report. For example, you can write the procedure in Figure 152 on page 467 to produce a report located in CICS auxiliary storage. (QMF treats as comments lines that begin with "--" in QMF procedures.)

```
-- Procedure name: STATRPT1_PROC
--
-- Example QMF procedure to create an auxiliary CICS
-- temporary storage queue named STATRPT1
--
   RUN   QUERY STATRPT1_QUERY (FORM=STATRPT1_FORM)
   PRINT REPORT (QUEUENAME=STATRPT1,QUEUETYPE=TS)
--
-- End of procedure
```

Figure 152. Producing a report located in CICS auxiliary storage

Execute the QMF transaction as described here to run this procedure in batch mode:

```
QMFE M=BATCH,I=STATRPT1_PROC
```

QMF runs this transaction without displaying any screens. Upon successful completion of the procedure, the report is located in CICS storage queue STATRPT1. You can then view the report using the CICS-supplied transaction CEBR:

```
CEBR STATRPT1
```

Running Batch without a Terminal

A QMF transaction can also be run without a terminal. A terminal used to run a batch job is locked until QMF completes the transaction. To run a QMF procedure in batch mode without a terminal, you can use the EXEC CICS START command. The following example runs the QMF procedure STATRPT1_PROC:

```
EXEC CICS START TRANSID(QMFE) FROM(M=BATCH,I=STATRPT1_PROC)
```

When this transaction completes, the CICS storage queue STATRPT1 can be browsed using the CICS-supplied transaction CEBR.

Debugging a Procedure

QMF provides a command-level and message-level trace facility. This facility is useful when there is a problem running a QMF procedure in batch mode. QMF command-level and message-level tracing is automatically active when running QMF in batch mode. You can route this message trace to CICS auxiliary temporary storage or the transient data queue. For more information on how to route message trace, see “DSQSDBQN (Specifying the Name of the CICS Storage for Trace Data)” on page 194 and “DSQSDBQT (Specifying the Type of CICS Storage for Trace Data)” on page 193.

For example, to run the previous procedure and send the command and message trace to a CICS auxiliary storage queue with the name QMFMSG, issue a CICS START command similar to the following:

```
EXEC CICS START TRANSID(QMFE)
     FROM(M=BATCH,I=STATRPT1_PROC,DSQSDBQN=QMFMSG,DSQSDBQT=TS)
```

Multiple QMF transactions can issue messages to the same trace area. QMF issues a CICS ENQ command on the queue name while it writes a trace entry. Each entry is marked with the terminal ID and task ID of the QMF transaction that created the trace entry.

When routing QMF trace to CICS auxiliary storage, do not set full component-level trace because doing so fills up temporary storage quickly. Transient data (the default) is recommended when doing other than message-level tracing.

Termination Return Codes

Termination return codes for QMF are:

0 Normal termination

8 Abnormal termination

Chapter 24. Troubleshooting and Problem Diagnosis

Use this chapter to help solve problems your users might have while using QMF. "Troubleshooting Common Problems" on page 470 provides possible solutions to common problems, while "Determining the Problem Using Diagnosis Aids" on page 477 provides explanations of diagnosis aids that help you solve more complex problems.

Quick Start

Use the steps in Table 62 to guide you in troubleshooting common errors and diagnosing more complex problems. If you need more information on any step, see the page listed at the right.

Table 62. Troubleshooting common errors and diagnosing problems

For information on this problem:	See:
If you encounter GDDM or QMF errors while printing, it's likely you did not supply a printer name, defined the name or allocated the device incorrectly, or encountered an I/O error.	Page 472
If you see warning messages on the QMF Home panel, QMF probably encountered errors during initialization trying to read or load tables or routines.	Page 470
If the report display seems incoherent, you might need to convert raw binary data (from the table that generates the report) to character data before displaying the report.	Page 474
If you're getting slow response, you likely need to either reset the data object or increase your storage. You might also have a problem with REXX caused by the REXX search order and the process of going from QMF to REXX many times.	Page 475
If the problem is none of the above, determine which QMF, TSO, ISPF, SRPI, APPC, OS/390, or CICS diagnostic aids can help you further diagnose the problem.	Page 477
To determine the problem using QMF message support, use the message number on the help panel to determine more information about the error, such as the QMF function that issued it.	Page 478
To determine the problem using the QMF trace facility, turn the trace on by setting the DSQSDBUG program parameter, displaying the user's profile and changing the value of the TRACE option, or using the command `SET PROFILE (TRACE=value`. The level of detail for the DSQSDBUG parameter is either ALL or NONE. You can also specify a selected trace level just before running your trace. For example, you can enter SET T=C2D2L2 on the command line.	Page 480
To determine the problem using OS/390 diagnostic facilities, identify QMF in an OS/390 dump, using information in this book.	Page 487

Table 62. Troubleshooting common errors and diagnosing problems (continued)

For information on this problem:	See:
To determine the problem using CICS diagnostic facilities, identify QMF in a CICS transaction dump, using information in this book and in *CICS Problem Determination Guide*	Page 487
To determine the problem using the QMF interrupt facility in TSO, create and read an interrupt.	Page 489
To determine the problem using reports from the Q.ERROR_LOG table, run a SELECT query on the table, specifying the SQL authorization ID that experienced the error and the approximate date and time of the error.	Page 491
To report a problem to IBM, use IBM's ServiceLink facility (if you have it) or call your IBM Support Center.	Page 492

Troubleshooting Common Problems

Use this section to help determine how to solve initialization errors, printing errors, warning messages on the display, incoherent report displays, and slow response times or other performance problems.

Handling Initialization Errors

If you cannot start QMF, there are several common fixes:

- Determine if all QMF users at your shop cannot get into QMF, or is it just one user.
- Check whether there are any messages on the terminal screen, and look up the explanation for the DSQDEBUG file message in *QMF Messages and Codes*.
- If nothing appears on the screen and nothing is in DSQDEBUG, go into SPUFI and issue a SELECT * FROM Q.ERROR_LOG and see if any entries appear during the time you were trying to access QMF.
- QMF initializes DB2 and GDDM during QMF initialization. If any DSN (DB2) and ADM (GDDM) error messages appear, look them up in the messages and codes book for the appropriate product.

  Check that the DB2 database is initialized and working properly. If all users are getting a type of ADMxxxx message upon start up, check that the base GDDM product is working correctly by running the GDDM IVPs.
- Users should still look on the screen for more messages, and in DSQDEBUG and Q.ERROR_LOG for more information. If there are no other messages, have the user try to run the TSO command PROFILE MSGID WTPMSG and restart QMF.

Handling Warning Messages

If errors occur during QMF initialization (or after issuing the CONNECT command), you might see this message on the QMF Home panel:

```
Warning messages have been generated
```

Errors that cause this kind of message do not stop QMF. They indicate that QMF is having a problem loading or reading any of the following:

- Command synonym table
- Function key definitions table
- Resource control table (for governor exit routine)
- User edit exit routine
- Governor exit routine
- Module level trace control

For command synonyms, function keys, and resource control tables, ensure that:

- The user has the SQL SELECT privilege for that table. If this might be the problem, issue an SQL GRANT statement according to instructions in "SQL Privileges Required to Access Objects" on page 236.
- The table conforms to the proper structure:
  - The structure for command synonym tables is shown in "Chapter 18. Customizing QMF Commands" on page 305
  - The structure for function key tables is shown in "Chapter 19. Customizing QMF Function Keys" on page 321
  - The structure for the resource control table is shown in Table 54 on page 394
- All rows of the table contain valid data. If this might be the problem, see:
  - "Entering Command Synonym Definitions into the Table" on page 310 for information on valid command synonym definitions
  - "Entering Your Function Key Definitions into the Table" on page 325 for information on valid function key definitions
  - Table 54 on page 394 for information on valid resource control information
- All rows in the tables are unique.

More information about the error is logged in the user's trace data. In TSO, SRPI, APPC, and native OS/390, the trace data is stored in DSQDEBUG. In CICS, the trace data is stored in a transient data queue named DSQD, unless you changed the type or name using the DSQSDBQT or DSQSDBQN program parameter when you started the QMF session.

To view the information in the trace data, first press the Help key to display a panel containing the message number. Then browse or print the user's trace data according to the instructions in "Viewing QMF Trace Data" on page 484. Search the trace data for the numeric portion of the message number to see information about the error.

Handling GDDM Errors During Printing

If a GDDM error occurred during printing, QMF displays this message:

```
GDDM error using nnnnnnnn.  See message help for details.
```

The character string nnnnnnnn in the message represents a GDDM printer nickname. Press the Help key to display the help panel, which contains an explanation of the error. This section discusses some common errors and what you can do to fix them.

DSQ50623

GDDM error. ADM0307 E FILE 'ADMPRINT.REQU—QUEUE' NOT FOUND. Severity 8. Function DSOPEN. * CMD=PRINT**

If you see a message like this, QMF can't find a nickname definition for the printer name the user specified. You need to set up a nickname definition for the printer name, or supply one that is already defined. See "Choosing a GDDM Nickname for Your Printer" on page 290 for additional information.

DSQ50623

GDDM error. ADM0314 E UNABLE TO OPEN 'MYPRINT'. DD STATEMENT MISSING. Severity 8. Function DSOPEN. * CMD=PRINT**

If you see a message like this, QMF was able to find a DD statement for the output. You need to provide a DD statement to your QMF startup EXEC, CLIST, or JCL to specify what to do with output from the nickname. Sample JCL is shown in Figure 80 on page 298.

DSQ50623

GDDM error. ADM0482 E DEVICE NAME LIST '31E' IS INVALID FOR FAMILY 1. Severity 8. Function DSOPEN. * CMD=PRINT**

If you see a message like this, your nickname definition is incorrect. The device token you supplied is not a valid token for the type of GDDM printer for which you created the nickname. See "Choosing a GDDM Nickname for Your Printer" on page 290 for information on how to create an ADMMNICK specification for a GDDM printer. For a list of valid device tokens for each family of GDDM printers, see *GDDM System Customization and Administration* for 3.1 or *GDDM Installation and System Management for OS/390* for 2.3.

DSQ50631

GDDM error. ADM0904 E ALPHANUMERIC FIELDS ARE NOT SUPPORTED FOR THIS DEVICE. Severity 8. Function ASDFLD. * CMD=PRINT**

If you see a message like this, the output the user is trying to print is not valid for the type of printer defined by the GDDM nickname. Certain types of output, such as QMF charts, are restricted to specific

families of GDDM printers. For more information on what families of printers handle your type of output, see *GDDM System Customization and Administration* for 3.1 or *GDDM Installation and System Management for OS/390* for 2.3.

DSQ90551

GDDM error. ADM0055 E SPINIT, AT '82F810C2'X ADM0050 E DEFAULTS ERROR. INVALID SYNTAX OR VALUE AT '...JIP,ADMMNICK'

You might see a message like this when starting QMF. The message indicates that you made a syntax error somewhere in the ADMMNICK specification for the nickname. See "Choosing a GDDM Nickname for Your Printer" on page 290 for examples of syntax for the ADMMNICK specification. After you fix the syntax error, reload the ADMADFC GDDM defaults module.

DSQ50633

GDDM error ADM0327 E 'TD WRITEQ' ERROR CODE '08000000'X, ON 'SYSP'. Severity 8. Function FSFRCE. * CMD=PRINT**

A message like this indicates that the temporary storage or transient data queue (SYSP) to which QMF is attempting to print is closed, or that a DD statement is missing from your startup JCL. Contact your CICS administrator for help with this problem (either modifying the JCL and restarting CICS or opening the queue).

Handling QMF Errors During Printing

The following information helps you to solve errors that can occur during printing.

What happens	What it means	What to do
You issue the PRINT command from the command line or a function key and see the message: `GDDM printer nickname is required for PRINTER.`	The object you are trying to print needs a printer name, and no printer name default exists in your profile.	Press the Enter key again to display a prompt panel on which you can enter a printer name and other print parameters. You can set a printer name default in your profile to avoid being prompted.
You issue several PRINT commands but find that only the last object is printed.	Your output data set does not have a disposition of MOD, so each PRINT operation reopens the data set and overwrites the previous contents.	Change the disposition of your output data set to MOD. You cannot use the disposition MOD with a member of a regioned data set.

What happens	What it means	What to do
You print a QMF object and see unexpected control characters in the printed output or data set.	The device token or PROCOPT you are using does not match the device on which you are actually printing.	Supply the correct device token, or reduce control characters to a minimum by one of these techniques: • For a report, table SQL or QBE query, procedure, or profile, specify PRINTER=' ' to bypass GDDM printing. • For other objects, use `PROCOPT=((PRINTCTL,0))` with no device token.
When printing a report, table, SQL or QBE query, procedure, or profile, you see the message: `File DSQPRINT did not open.`	No printer name default exists in your profile, and no DSQPRINT data set or system output is currently allocated.	Allocate DSQPRINT before issuing a print command.

Reminder: If you allocate ouput from DSQDEBUG to go to the HOLD queue, to release the output to the OUTPUT queue you must issue the following TSO command:

```
FREE DDNAME(DSQDEBUG)
```

Handling Display Errors

If a user who attempts to display a report finds that the report has several display control characters in it, data in one or more of the table columns from which the report is derived might be binary (rather than character) data. QMF provides three ways of handling these control characters:

- Using the HEX function
- Using the QMF-provided hex and bit edit codes in the QMF form
- Handling binary data through user-written edit routines

Using the HEX Function

The HEX function is an SQL scalar function that converts its argument to a string of legitimate characters. The resulting string is the value of the argument in hexadecimal notation. For example, the function argument ABC produces the string C1C2C3 in hexadecimal notation.

Instruct users to use the word HEX in their queries in front of any columns that might contain binary data. For example, the following statement converts binary data in column A of the table SMITH.TABLEA.

```
SELECT HEX(A) FROM SMITH.TABLEA
```

Using QMF-Provided Hex and Bit Edit Codes

Two edit codes (and their wrapping versions) for character data allow QMF to display binary data in character columns: X and XW (for hex display), B and BW (for bit display). For more information on using these edit codes, see *QMF Reference*.

Handling Binary Data with User-Written Edit Routines

Using the HEX function or the hex and bit edit codes can be a good way to handle binary data. For example, assume that each bit represents a data item and displays in natural language form of the value. If the fifth bit represents gender rather than hex values, a user edit code routine can cause a value of `Male` or `Female` to be displayed.

You can create your own edit code and write an edit exit routine in COBOL, PL/I, or assembler to convert the binary data to the character string you want. You might consider predefining some QMF forms for users that use the new edit codes you create. See “Chapter 20. Creating Your Own Edit Codes for QMF Forms” on page 335 for more information.

Solving Performance Problems

If your users notice slow performance in running queries or formatting reports, the problem might be that QMF is attempting to retrieve all the database rows requested during one command before starting another. It’s also possible that the user does not have enough virtual storage to retrieve all the requested rows. This section explains what you can do to solve each kind of problem.

Resetting the Data Object to Improve Performance

Suppose that, after viewing parts of a report, a user attempts to run an UPDATE query and waits an unusually long time for the query to return results. Because QMF finishes one database task before starting another, QMF might be attempting to complete the report (retrieve the rest of the rows into the DATA object) before running the UPDATE query. These commands cause QMF to complete the report before the command can run:

CONNECT
DISPLAY *tablename* or QMF object (from the database)
DRAW *tablename*
EDIT TABLE
ERASE
EXPORT (from the database)
IMPORT (to the database)
LIST
PRINT (from the database)
REFRESH (of a database object list)
RESET QUERY (with LANGUAGE=PROMPTED and modifying query)
RUN (an object in the database)
RUN QUERY
SAVE (data, form, procedure, or profile)

Any query run by the user that drops, creates, or modifies a DB2 object forces the completion of the DATA object. During this processing time, the keyboard can also seem to be locked because QMF does not read the keyboard until it has completed the DATA object.

Depending on the setting of the global variable DSQEC_RESET_RPT, you might need to instruct users to issue a RESET DATA command as soon as they finish viewing the necessary parts of the report to prevent performance problems caused by trying to run these commands before QMF completes the report. See the *QMF Reference* for more information.

A user who attempts to execute certain commands during the insufficient storage condition receives an "incomplete DATA" prompt. This is caused by any command that forces QMF to "complete" the current DATA object. (A DATA object is complete when all its rows have been fetched by QMF and none have been discarded without copying to the DSQSPILL file.) To resolve this problem, the prompt offers the user two choices: Either reset the DATA object, or withdraw the command.

If QMF encounters a system error while the insufficient storage condition is in effect, it might reset the user's current DATA object.

Increasing the User's Report Storage

Users might also experience slow performance if they do not have enough virtual storage to accommodate a large report. For example, if you set the DSQSRSTG (for TSO, SPRI, APPC, or native OS/390) at a very high rate or DSQSBSTG parameter at a very low value and the user runs a query that retrieves hundreds of thousands of rows, QMF can only maintain a small amount of data in user memory. The user might find performance slow for formatting complex reports or scrolling the report.

To maximize report performance, ensure you specify an adequate amount of virtual storage for the user, using the DSQSBSTG or DSQSRSTG parameter. These parameters are discussed in "DSQSBSTG (Adjusting Storage for Report Data)" on page 180. To provide the best performance, use a value that accommodates the largest report the user is likely to have.

You can also define a spill file for the user, as discussed in "DSQSPILL (Acquiring Extra Storage)" on page 183. However, using primarily virtual storage for QMF operations provides better performance. Users who rely on a spill file and have little virtual storage might notice slow performance for large reports. For CICS, because a spill file can hold a maximum of 32 767 rows of size 4K each, setting DSQSBSTG higher ensures that QMF completes the report.

Even with a spill file, a user can encounter the incomplete data condition. If this occurs often, you might want to find if there is an additional problem.

QMF performance might also slow down if QMF needs a data row (as a result of a SCROLL BACKWARD command) and that data is not in the spill file or in virtual storage, the data cursor is reopened and the row is again retrieved from the database.

Increasing the Storage Group's Volume Space

If the problem is caused by a lack of available space on the volumes of a control table storage group, add more volumes to this storage group with the DB2 ALTER STOGROUP query. For a description of this query, see *DB2 UDB for OS390 SQL Reference*

Increasing the Size of the CICS Region

If a QMF transaction runs out of virtual storage in the CICS region, the transaction might time out waiting for storage to become available. Ensure you size the CICS region according to the recommended values in "QMF Storage Requirements" on page 157. These recommendations are in addition to any storage required by additional products installed.

Using REXX Function Packages

When using REXX in reports, your response time might slow while the report writer switches between QMF and REXX multiple times. To reduce the input and output time, you can put your REXX procedures in a REXX function package.

For more information about REXX performance, see *IBM Compiler and Library for REXX/370: UserÆs Guide and Reference*

Determining the Problem Using Diagnosis Aids

If you weren't able to solve your problem using the troubleshooting techniques discussed in "Troubleshooting Common Problems" on page 470, use this section to find out which QMF and CMS diagnosis aids can help you determine the problem.

Choosing the Right Diagnosis Aid for the Symptoms

Use Table 63 on page 478 to help you determine which diagnosis aids you need for the symptoms you're experiencing. The diagnosis aids are listed across the top of the table, and symptoms are listed on the side. For example, if you experience a problem while using a governor exit routine, you can use the QMF trace facility, CICS or TSO status information, and QMF messages and help to determine the problem.

Table 63. Types of problems and the best diagnosis aids to use for them

	QMF msg. no.	QMF trace	CICS or OS/390 dump	CICS or OS/390 status info	Help message	Non-QMF Msg. No.	Error Log Output
Abend	x		x	x			
Batch session	x	x		x		x	x
Callable interface	x	x	x	x		x	
Display panel	x	x			x	x	x
Document interface	x	x			x	x	x
Error messages	x	x			x	x	x
Governor exit routine	x	x	x	x	x	x	
Incorrect output	x	x			x	x	x
Initialization	x	x		x	x	x	x
Installation	x				x	x	x
Interrupt facility	x	x			x	x	x
Loop		x		x		x	x
Performance	x	x		x		x	x
Printing	x	x		x	x	x	x
QMF command	x	x			x	x	x
SQL error codes	x	x			x	x	x
Termination	x	x		x	x	x	x
User edit routine	x	x	x	x		x	

Diagnosing Your Problem Using QMF Message Support

QMF issues various types of messages during a user's session, indicating either that QMF successfully completed the user's request or that an error occurred. All QMF messages have a message number of the form DSQnnnnn, where nnnnn is a 5-digit number. These numbers are listed in *QMF Messages and Codes* , which provides more information about how you can solve the problem.

To obtain the message number and more information about the error, press the Help key to display a message help panel. Each help panel has a panel number associated with it. If you report the problem to IBM, your IBM Support Center representative might need this number. To make sure the number displays, set the global variable DSQDC_SHOW_PANID to 1:

```
SET GLOBAL (DSQDC_SHOW_PANID=1
```

Determining Which QMF Function Issued an Error Message

You can use the QMF message number, which begins with DSQ, to determine which QMF component issued the message. This information can help you isolate the problem to a specific QMF function.

The QMF functions and their associated ranges of message numbers are shown in Table 64. The trace IDs are the same IDs you use to trace QMF activity for each function, as discussed in "Getting the Right Level of Detail in Your Trace Output" on page 482.

Table 64. QMF functions and the message numbers they issue

Function	Trace ID	Message Numbers
Database Services	I	DSQ10000 - DSQ19999 DSQ30000 - DSQ39999
Dialog Command Processing	D	DSQ20000 - DSQ29999
Display Services	E	DSQ40000 - DSQ49999
Common Services and Systems Interface	C	DSQ50000 - DSQ59999
Report Formatting	F	DSQ60000 - DSQ69999
Charting	P	DSQ70000 - DSQ79999
Full-screen Windows	G	DSQ80000 - DSQ89999

In addition to the message numbers in Table 64, the following ranges of message numbers might be generated during QMF initialization:

DSQI0001 - DSQI0100
DSQ90000 - DSQ99999

Handling System Error Messages

A system error might indicate a system problem, a resource problem, or an unexpected condition. These might be problems within QMF, the database manager, or possibly some other software component. System errors are indicated by the following message:

```
Sorry, a system error occurred.  Your command may not have been
executed.
```

You can press the Help key to display more information about the message, or see *QMF Messages and Codes*

All uncommitted changes to the database are rolled back when a system problem stops QMF. Error information about the system problem is written to the trace data, which is the only source of information for a system problem that stops QMF. See "Viewing QMF Trace Data" on page 484 for instructions

on viewing the trace data. The Q.ERROR_LOG table contains information about a system error only if the error occurred while the database was still running.

Handling SQL Return Codes

In some cases, the message QMF displays might map to an SQL return code. For example, suppose a user receives QMF message DSQ10422. This message maps to the SQL return code -30060, which has the text:

```
YOU ARE NOT AUTHORIZED TO ACCESS specific location.
```

`specific location` in the message is a placeholder, called a token, for a real database value. The token is located in the SQL communications area (SQLCA) that QMF receives from DB2.

To find the value of the token:

1. Run a QMF I2 or ALL trace using the procedures described in "Using the QMF Trace Facility". Keep the trace data online so you can search it easily.
2. Convert the SQL return code to a hexadecimal number. For example, the SQL return code -30060 is -746C in hexadecimal.
3. Locate the hexadecimal number in the trace data. It is in a trace block called SQLCA.
4. Browse the right side of the trace (the eye catcher field) to gather the tokens. See *IBM DATABASE 2 Reference* for SQLCA mappings of the tokens.
5. When you find the right token, see the operation and recovery information in *DB2 UDB for OS390 Administration Guide* to solve the problem that caused the SQL return code.

Using the QMF Trace Facility

QMF provides a facility that traces QMF activity during a user's session. Trace output from the facility can help you analyze errors such as incorrect or missing output, performance problems, or loops. This section shows you how to allocate storage for the trace output, how to start the facility and determine the level of tracing detail, and how to view the trace data for diagnosis.

Allocating the Trace Data Set

Certain procedures in this book rely on abend information as well as trace information that QMF records in the DSQDEBUG data set.

Allocating for TSO, SRPI, APPC, or native OS/390: Trace information is recorded in the DSQDEBUG data set, and you can find abend dump information in the DSQUDUMP and SYSUDUMP data sets. Make sure that these data sets are allocated *before* you begin the QMF session. The data sets are automatically allocated by the LOGON procedure for the user ID under which you intend to operate.

Check with TSO administration if you are not sure whether these data sets are automatically allocated before a QMF session. If they are not, issue the following TSO statements before you invoke QMF for your diagnostic session.

```
ATTR DEBUG RECFM( F B A) LRECL(121)
ATTR DUMP  RECFM( F B A) LRECL(125)
ALLOC DDNAME(DSQDEBUG) SYSOUT(A) USING(DEBUG)
ALLOC DDNAME(DSQUDUMP) SYSOUT(A) USING(DUMP)
ALLOC DDNAME(SYSUDUMP) SYSOUT(A)
```

Figure 153. Allocating the data sets for TSO

Allocating for CICS: The trace is recorded in the DSQDEBUG data set. This data set should be allocated in the CICS startup JCL. The trace can be shared between all users in the same CICS address space.

Starting the Trace Facility

1. Allocate a data set with a *ddname* of DSQDEBUG.

   The trace facility writes trace results into the DSQDEBUG data set, which can be printed or displayed. This data set is used for trace purposes only.

2. Decide on your tracing options.

   With these options, you control what is traced and the level of detail. For more information on choosing trace options, see “Getting the Right Level of Detail in Your Trace Output” on page 482.

   Specify a value of ALL on the DSQSDBUG program parameter when you start QMF, as explained in “DSQSDBUG (Setting the Level of Trace Detail)” on page 192. This value traces QMF activity at the highest level of detail, including program failures that might occur during QMF initialization.

   You need to use a transient data queue to hold the output if it exceeds 32 767 rows. “DSQSDBQT (Specifying the Type of CICS Storage for Trace Data)” on page 193 and “DSQSDBQN (Specifying the Name of the CICS Storage for Trace Data)” on page 194 explain how to specify a type and name for the queue to hold the trace output.

3. Specify these options to QMF Trace.

   During a QMF session, some set of tracing options is always in effect. You can override current trace options in several different ways:

   - Instruct the user to enter the following QMF command:

     ```
     SET PROFILE (T=value
     ```

     where value is ALL or a string that indicates QMF functions and their levels of detail in the trace output. The levels of detail are explained in “Getting the Right Level of Detail in Your Trace Output” on page 482.

- Use SQL UPDATE statements for the TRACE field in the user's profile, which has the same effect as the previous method. Instruct the user to reconnect to the database to initialize the new values. For example, user JONES with password MYPW can enter:

  ```
  CONNECT JONES (PA=MYPW
  ```

- Users who do not have DB2 CONNECT authority can end the current QMF session and begin another to initialize the values.

4. Access the trace data set when you have a warning or a system error during QMF initialization.

   Looking at DSQDEBUG helps you understand the reason for the error. For more information on how to access the DSQDEBUG data set, see "Viewing QMF Trace Data" on page 484.

5. Interpret the trace output.

   You can display or print the DSQDEBUG file for analysis. For more information on printing or displaying trace output, see "Viewing QMF Trace Data" on page 484.

Getting the Right Level of Detail in Your Trace Output

If you want to trace all QMF functions at the most detailed level, use a value of ALL for the trace.

If you want to trace individual QMF functions, update the TRACE column of Q.PROFILES with a character string that has letters for the QMF functions you want to trace and numbers for the level of detail you want in the trace data for each function. You need to pair each letter with a number:

The value 1 traces a function at a medium level of detail.
The value 2 traces a function at the highest level of detail.

Only the functions you specify in the character string are traced. The letter for each QMF function is shown in the following list.

Trace ID	QMF Function
A	Application Support Services
C	Common Services and Systems Interface
D	Dialog Command Processing
E	Display services for parts of QMF such as Prompted Query, QBE, Table Editor, global variable lists, and database object list
F	Report formatting
G	QBE, Prompted Query, and table editor full-screen windows
I	Database services
L	Message and command logging

P Charting (Interactive Chart Utility)

R Storage management functions

U User exits, such as user edit exit routines or a governor exit routine

For example, to trace message and command logging at the most detailed level, application support services at a medium level, and common services and systems interfaces at the most detailed level, use this command:

```
SET PROFILE (T=L2A1C2
```

Use the L1 and L2 trace records to precisely record user activities during a QMF session. A value of L1 writes records for all messages issued by QMF; L2 writes all the L1 records, plus additional records describing the execution of QMF commands. Use the L2 trace code to log each command a user issued and how QMF responded to that command. Figure 154 shows an example of a RUN QUERY command that failed because the user named columns that were not in the table.

```
------------------------------------------------------------------------
----------       ****** 93/12/15  20:39 ******     -----------------
USERID: KRIS
AUTHORIZATION-ID: KRIS
COMMAND TEXT:
RUN QUERY
------------------------------------------------------------------------
------------------------------------------------------------------------
----------       ****** 93/12/15  20:39 ******     -----------------
USERID: KRIS
AUTHORIZATION-ID: KRIS
MESSAGE NUMBER: DSQ12405
MESSAGE TEXT:
Column name DATE is not in table STAFF.
&O1:  DATE
&O2:  STAFF
&O9:  -205
------------------------------------------------------------------------
```

Figure 154. Using the L2 trace code to trace a user's commands and messages

Within the DSQDEBUG data set, the messages appear chronologically. When commands are included, they also appear chronologically and are intermixed with the messages. A message is associated with the command that precedes it in the data set.

QMF messages have variables for parts of the message that change, such as a table or column name. You can use the trace data to help a user decipher a message that includes variables. For example, the message shown in Figure 154 appears in *QMF Messages and Codes*as:

```
Column &01 is not in table &02.
```

The bottom half of Figure 154 on page 483 shows that the value for &01 in the message is DATE and that the value for &02 is STAFF. Substitute these values into the message to help a user solve the problem.

These variables might also appear in the definition of the help panels associated with the error message. Use the variable values from the trace data together with the help command to reconstruct the message help panel.

Tracing at the Module Level

Important: Perform a trace at the module level only under IBM Service Level 2 guidance.

You can turn on a trace for certain modules using the SET PROFILE command and the module DSQUTRAC. For example, you can trace the formatter buffer manager without tracing the line manager or the summary manager. The values for module-level tracing are:

The value 3 provides a detailed trace for specific programs in a component, and traces entry and exit for all other programs in the component.

The value 4 traces a module only.

To create a module-level trace, list the modules you want traced in the DSQUTRAC module. Then assemble and link-edit the module. After the module is created, you must make it available. You can then run the following command:

```
SET PROFILE (TRACE F4
```

Viewing QMF Trace Data

DSQDEBUG holds the information recorded by the trace facility. It must be allocated *before* you start QMF if tracing is to be used. You can allocate the data set to print or display it.

In CICS, depending on the number of users and the levels of detail at which their sessions are traced, the trace data might be very long.

Printing or Displaying in TSO: The DSQDEBUG data set might have been allocated automatically through your LOGON profile in a TSO environment. Even so, you can reallocate it if the original allocation does not fill your needs (for example, the original allocation might define DSQDEBUG as a PRINT file when you really want to display it).

To allocate (or reallocate) for printing, issue the following statements, which define DSQDEBUG as a PRINT file:

```
FREE FILE(DSQDEBUG)
ATTR DEBUG RECFM( F B A) LRECL(121)
ALLOC DDNAME(DSQDEBUG) SYSOUT(A) USING(DEBUG)
```

The allocation contains fixed-length, 121-character records whose first byte is an ANSI carriage-control character. The trace information is formatted with 120 characters to the line, not including the ANSI control character.

Reminder: If you allocate output from DSQDEBUG to go to the HOLD queue, to release the output to the OUTPUT queue, you must issue the following TSO command:

```
FREE DDNAME(DSQDEBUG)
```

You can also issue the following statements to allocate (or reallocate) DSQDEBUG as a sequential data set that can be displayed using an online editor. The data set consists of fixed-length, 81-character records whose first byte is an ANSI carriage-control character. The trace information is formatted with 80 characters to a line, not including the ANSI control character.

```
FREE FILE(DSQDEBUG)
ATTR DEBUG RECFM( F B A) LRECL(81)
ALLOC DDNAME(DSQDEBUG) DSNAME(DEBUG.LIST) NEW KEEP
```

Printing or Displaying in CICS: The trace is recorded in the DSQDEBUG data set. Allocate this data set in the CICS startup JCL.

If you have a warning or a system error during QMF initialization, you must look at the QMF trace data set to understand the reason for the error. In CICS, the trace data set is described as an extra region data set. The trace data set is described in CICS tables by a DCT TYPE=SDSCI command and a DCT TYPE=EXTRA command, as in Figure 155.

```
* TRACE DATA SET
      DFHDCT TYPE=SDSCI,DSCNAME=DSQDEBUG,
            RECFORM=VARBLK,
            RECSIZE=121,
            BLKSIZE=6050,
            TYPEFILE=OUTPUT
*
*
      TITLE 'DSQDCT - CICS DESTINATION CONTROL TABLE'
*
* TRACE DATA SET
*
DSQD  DFHDCT TYPE=EXTRA,DESTID=DSQD,DSCNAME=DSQDEBUG,RSL=1
```

Figure 155. Description of the trace data set in the CICS environment

QMF trace data from all the QMF users in a single CICS region are written to a single trace data set. Each trace entry contains the terminal ID of the user that recorded it.

To look at the trace data set while the CICS region is active, you must close the trace data set using the CICS queue ID DSQD. You can use this ID while using the CICS-supplied transaction CEMT. After the trace data set is closed, you can print or browse it.

While the trace data set is closed, no other records are written by CICS users. In this state, QMF continues to operate without recording trace records. To make the QMF trace available again, you can use the CICS-supplied transaction CEMT to open the trace data set using the CICS queue ID DSQD.

Determining the QMF Service Level

The service level information is displayed:

- When T=ALL is specified on invocation (or from Q.PROFILES)
- When SET (TRACE ALL was specified as a command
- When an abend occurs

You can determine the QMF service level using the following procedure:

1. Enter the SET PROFILE command (T=ALL.
2. Enter the SET PROFILE command (T=NONE.
3. Exit QMF.
4. Look at the DSQDEBUG file.

The resulting trace shows the program with its version, date, and time. The trace can also show an Authorized Program Analysis Report (APAR) number if the module has a Program Temporary Fix (PTF) applied, as in the following trace example:

```
** DSQFQWRM: ENTERED FROM DSQFMCTL ***
   V7R1.00   00/01/30  12:00  PNxxxxx
```

APAR PNxxxxx is the most recent APAR for which service was applied.

Turning Off the Trace Facility

After you capture diagnostic details using the trace facility, you might want to turn tracing off, because the storage queue for the trace data can fill up very quickly.

To turn tracing off, issue the following command from within QMF:

```
SET PROFILE (T=NONE
```

If you leave tracing on until you end the QMF session, when you start QMF the next time, the tracing is set to NONE by default. The program parameter

DSQSDBUG, explained in “DSQSDBUG (Setting the Level of Trace Detail)” on page 192 , controls this tracing when QMF is started.

Diagnosing Abends

You might need to diagnose abends using diagnostic facilities in TSO, OS/390, or CICS facilities available in your environment. (In CICS, abend information is recorded in the DFHDMPx data set. This data set should be allocated in the CICS startup JCL.) Most QMF programs contain a stamp that you can use to help identify them in diagnostic output. Figure 156 shows an example.

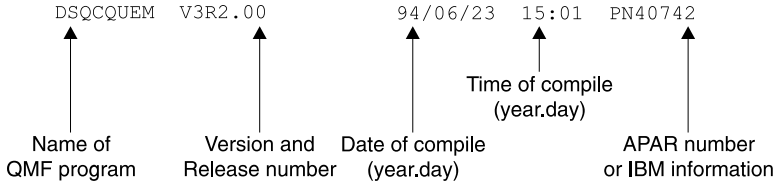


Figure 156. Example of a stamp that identifies a QMF program

Using OS/390 Diagnostic Facilities

To diagnose an abend in OS/390, you might need to use procedures in *MVS Diagnosis: Tools and Service Aids* , or you might be able to use the QMF abend handler.

When QMF starts, it establishes an abend handler. If QMF fails, the abend handler gets control, records the error, and cleans up the environment. After completion, the abend handler returns to the operating system, and allows it to continue with the abnormal termination process.

If an abend occurs while processing the user edit code or while executing the governor, additional areas appear in the dump to assist with problem diagnosis.

For the user edit code, DXEECS, the input area, and the result area are added to the output.

For the governor, DXEXCBA and DXEGOV are added to the output.

Using CICS Diagnostic Facilities

To diagnose an abend in QMF, you might need to use procedures in *CICS Problem Determination Guide* Because another program might have caused QMF to abend, these procedures can help you find much of the information you need in a CICS dump of the transaction. A transaction dump shows detailed activity of the programs that were running in the CICS region at the time of the abend.

The program that caused the abend might be QMF or it might be another program. You can use the CICS Execution Diagnostic Facility (CEDF) to help you diagnose a QMF abend if the QMF diagnostic facilities explained in this chapter do not contain enough information about the cause of the error.

Identifying QMF in CICS Diagnostic Output: If you use CICS diagnostic facilities to help you diagnose an abend in QMF, the following information might help you identify QMF programs in CICS output.

- QMF program names begin with the prefix DSQ.
- QMF is an assembler-language program and issues standard assembler calls, not CICS LINK statements.
- QMF issues standard EXEC CICS statements for all system services when running in CICS.
- QMF uses an internal call interface to the GDDM product.
- QMF issues standard EXEC SQL statements to the database.
- QMF does not issue any EXEC CICS ABEND commands.

Defining the Display for a CICS Abend Message: In some cases, such as if QMF abends or when the operator cancels the transaction, CICS sends a message to the user's terminal indicating the abnormal ending. Because QMF is a full-screen application that uses GDDM to provide display services, you need to define to CICS how you want the abend message displayed.

Using the CICS Resource Definition Online (RDO) facility, set diagnostic display attributes of the CICS error message in the CICS TYPETERM definition. A TYPETERM is a partial terminal definition that makes it easy for you to define many terminal displays with one definition. Figure 157 on page 489 shows an example of diagnostic display attributes you might use.

The definition shown in Figure 157 on page 489 displays the message at the bottom of the screen, beneath the QMF message line. The message appears in red, underlined, and with a higher intensity than the rest of the screen display. This definition is useful if you defined the QMF transaction to time out when the user does not enter input for a certain amount of time. In this type of transaction timeout, the QMF display remains on the screen, so the message is readable only at the bottom of the screen.

```
DIAGNOSTIC DISPLAY
 ERRLastline    : Yes              No | Yes
 ERRIntensify   : Yes              No | Yes
 ERRColor       : Red              NO | Blue | Red | Pink | Green
                                   | Turquoise | Yellow | NEutral
 ERRHilight     : Underline        No | Blink | Reverse | Underline
```

Figure 157. TYPETERM specification for CICS diagnostic display

Using the QMF Interrupt Facility in TSO

In TSO, the QMF interrupt handler can be activated even though a QMF command is inactive. To interrupt QMF, press the PA1 key.

You need to refresh the screen to see the QMF procedure panel. To do this, press the PA2 key.

Use the QMF interrupt facility to gather information about a problem. Using the interrupt facility, you can produce an abend dump, or cause trace information to be displayed or written into the DSQDEBUG data set.

You use the interrupt facility under the logon ID of the user whose problem you are diagnosing. First, however, you must recreate the problem, unless you were there when it occurred.

Creating an Interrupt

The first step in using the interrupt facility is to create an attention interrupt. For most system configurations, you can create an attention interrupt by pressing either the Attn key or a combination of the Reset and PA1 keys. If these combinations do not work for you, see the appropriate publications for your current system configuration to obtain more information on creating the interrupt.

The interrupt facility responds by displaying the following message:

```
DSQ50546 QMF command interrupted!    Clear screen and press enter.
```

Figure 158. QMF interrupt handler prompt 1

Displaying Trace Information after Creating an Interrupt

After the interrupt message appears, press the Clear and Enter keys, as the message instructs you to do. The following message appears:

```
DSQ50547 QMF command interrupted!    Do one of the following:
==> To continue QMF command,           type  'CONT'.
==> To cancel QMF command,             type  'CANCEL'.
==> To enter QMF debug,                type  'DEBUG'.
```

Figure 159. QMF interrupt handler prompt 2

Make your choice by typing CONT, CANCEL, or DEBUG, then press the Enter key:

- Enter CONT to return control to wherever you were before you caused the interrupt, as if the interrupt had never occurred.
- Enter CANCEL to stop any command that is running at the time of the interrupt. The keyboard is unlocked, and QMF awaits your next command. Note that it is not always possible to cancel a command.
- Enter DEBUG to get diagnostic information as shown in Figure 160:

```
-- OK, QMF debug entered. QMF CSECT trace is:
   DSQDSUPV -> DSQDSUPX -> DSQEADAP -> DSQEMAIN -> DSQEINPT -> ENDTRACE
==> To continue QMF command,           type 'CONT'
==> To cancel QMF command,             type 'CANCEL'
==> To abnormally terminate QMF,       type 'ABEND'
==> To set QMF trace,     type 'TRACEALL' or 'TRACENONE'
```

Figure 160. Diagnostic information captured by typing DEBUG on the interrupt screen.

The trace information on the second line of this example tells you that, at the time of the interrupt, control was in CSECT DSQEINPT, and that control had reached this CSECT by passing successively through the CSECTs DSQDSUPV, DSQDSUPX, DSQEADAP, and DSQEMAIN.

Respond to the debug panel shown in Figure 160 by entering CONT, CANCEL, ABEND, TRACEALL, or TRACENONE, according to the following descriptions. Then press the Enter key.

- Enter CONT to return control to wherever you were before you caused the interrupt, as if the interrupt never occurred.
- Enter CANCEL to stop any command that is running at the time of interrupt. The keyboard is unlocked, and QMF awaits your next command. However, note that it is not always possible to cancel a command.
- Enter ABEND to abnormally terminate QMF and produce an abend dump (if a DSQUDUMP data set was allocated for the session).
- Enter TRACEALL to cause QMF to start adding the most detailed level of tracing output to the DSQDEBUG data set. Control returns to wherever it was at the time of interrupt.

- Enter TRACENONE to cause QMF to stop adding any trace output to the DSQDEBUG data set. Control returns to wherever it was at the time of interrupt.

Using Error Log Reports from the Q.ERROR_LOG Table

The Q.ERROR_LOG table is a QMF control table that logs information about resource problems and problems caused by possible software defects. The structure of the table is shown in Table 65.

Table 65. Structure of the Q.ERROR_LOG table

Column name	Data type	Length (bytes)	Nulls allowed?	Function/values
DATESTAMP	CHAR	8	no	The date on which the error occurred. It is in the form yyyymmdd.
TIMESTAMP	CHAR	5	no	The time at which the error occurred. It is in the form hh:mm, where hh is the hour and mm is the minute.
USERID	CHAR	8	no	The logon ID or, in CICS, the terminal ID of the user who experienced the error.
MSG_NO	CHAR	8	no	The QMF message number that was issued with the error.
MSGTEXT	VARCHAR	254	no	Text of the message. SQL errors might have data from the SQLCA in this column.

A long error message might need more than one row of the table to represent it. If it does, the values of every column except the MSGTEXT column repeat. Within the MSGTEXT column, each row carries a fragment of the message. A fragment begins with 1), 2), 3), and so on, to indicate its relative position in the message.

To help diagnose problems, you can query the Q.ERROR_LOG table for information about errors. You need to know the terminal ID of the user who experienced the problem and the approximate time the problem occurred. Figure 161 on page 492 shows the format of the query.

```
SELECT TIMESTAMP, MSG_NO, MSGTEXT
  FROM Q.ERROR_LOG
  WHERE USERID = 'terminal_id'  (for CICS)
  WHERE USERID = 'user_id'      (for other than CICS)
    AND DATESTAMP = 'date'
    AND TIMESTAMP BETWEEN 'time1' AND 'time2'
ORDER BY TIMESTAMP, MSG_NO, MSGTEXT
```

Figure 161. Querying the error log for problem information

Be sure to use valid formats for the date and times you supply. These formats are shown in Table 65 on page 491.

Reporting a Problem to IBM

Before you report a problem to IBM, check IBM's Software Support Facility (SSF) to see if the problem has already been reported. For many reported problems, IBM support center representatives prepare an Authorized Program Analysis Report (APAR), which includes useful information about how to solve the problem.

If you have access to the SSF through *ServiceLink* or some other facility, read "Using ServiceLink to Search for Previously Reported Problems" for instructions on how to develop a string of search keywords that help you find the problem. If you do not have access to ServiceLink, you can go directly to "Working with Your IBM Support Center" on page 495.

Using ServiceLink to Search for Previously Reported Problems

Search the SSF by constructing a string of search words that describeyour problem. Every string of search words for QMF OS/390 6 begins with the component ID 566872101 and a release number (shown in Table 66) that matches the QMF national language environment in which you experienced the problem.

Table 66. Release numbers for QMF base product and NLFs

NLF	ID
Brazilian Portuguese	65A
Danish	654
English	610
French	655
German	656
Italian	657
Japanese	658
Korean	659

Table 66. Release numbers for QMF base product and NLFs (continued)

NLF	ID
Simplified Chinese	653
Spanish	65B
Swedish	65C
Swiss French	65D
Swiss German	65E
Uppercase English	651

The flowchart in Figure 162 on page 494 shows how to develop your search words as you determine each characteristic of the problem.

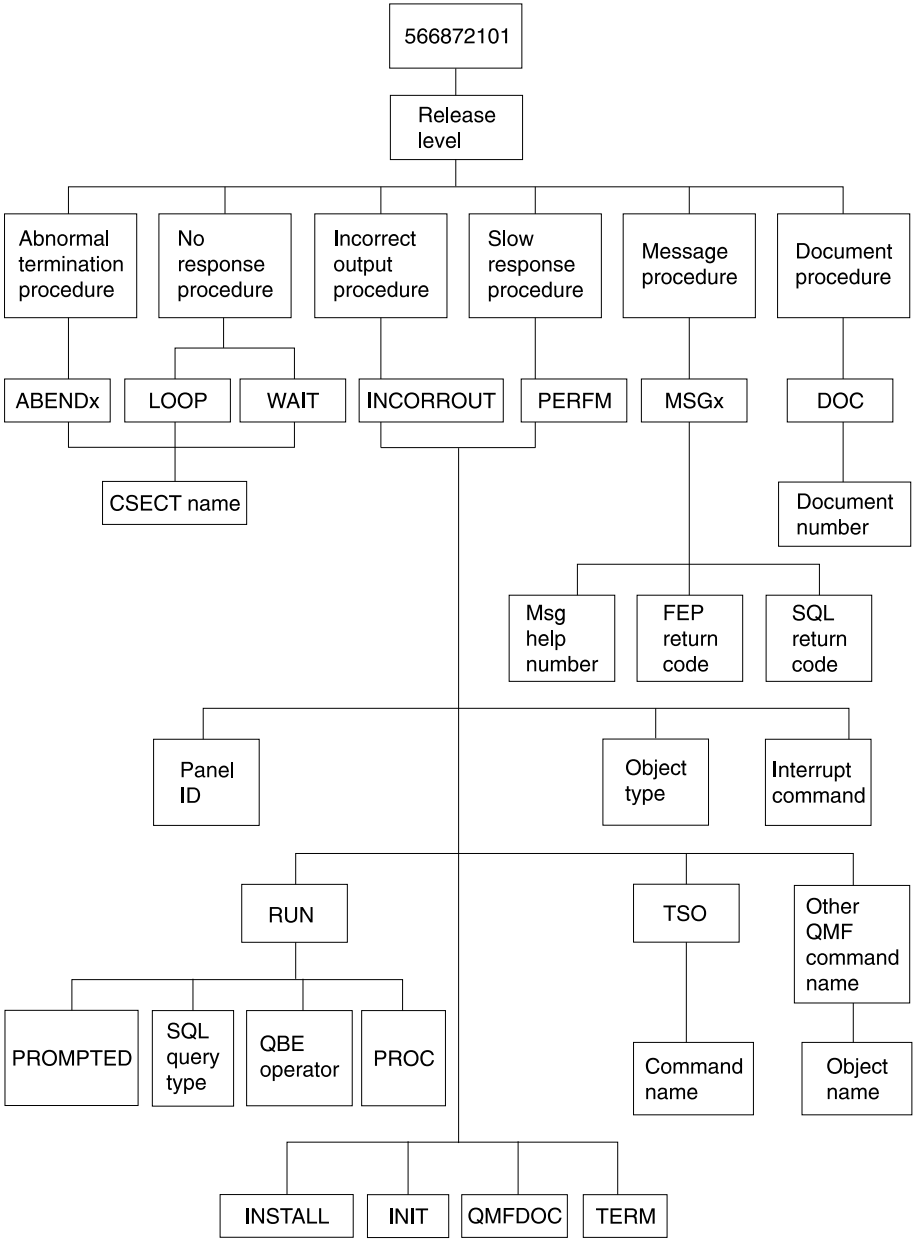


Figure 162. Chart of keyword types. Move from the top to the bottom of this chart to determine your keywords.

For example, if the problem you are searching for is an abend type of 0C4 that occurred in the DSQFDTBL control section (CSECT) when a user was running an English QMF session, use this search phrase:

To find the CSECT name, look in the section of the trace output that has the heading ABEND CSECT NAME. The CSECT name is set off by asterisks. See “Using the QMF Trace Facility” on page 480 for more information on how to use the QMF trace facility.

For more information on searching the SSF for known QMF problems, see *ServiceLink User’s Guide*

Working with Your IBM Support Center

If you’re having trouble diagnosing the problem and have used the diagnosis aids explained in this chapter, contact your IBM Support Center to report the problem.

To help diagnose the problem, your support center representative might need some information that provides more details about the problem. For example, if you call to report an abend in QMF, you might need to supply some information

about CSECTs of the program that you suspect might have caused the error. In many cases, you can find this type of information using the trace facility, which is explained in “Using the QMF Trace Facility” on page 480. The IBM representative might also need documentation produced by other diagnosis aids shown in Table 63 on page 478. This documentation can help the representative recreate the problem.

Part 3. Appendixes

Appendix A. What if It Didn't Work?

During the installation process, you'll receive messages. Some of these are informational messages that you can safely ignore. Others are warning or error messages that require corrective action. This section describes some of the most common errors that occur during installation. This list is not meant to replace the messages and codes manuals for QMF or other products. If you do not find the message on this list, consult the appropriate messages and codes manual.

Error Messages You Might See

You might get one or more of the following error messages.

ABENDASRA

- On QMF startup.
  - Ensure the GDDM link-edit ran successfully.
  - Ensure the GDDM IVPs are successful in the region base.
  - Ensure QMF correctly link-edits.
  - Ensure the region allocates the QMF Version 7 LOADLIBs and map groups.
- In module DSQQMFE CSECT ADM.

  The problem is probably a GDDM failure. Verify that GDDM is correctly installed and tailored for CICS. Verify that GDDM is located in the same CSI zone as CICS.
- In module DSQQMFE CSECT DSQEGINT.

  Verify that GDDM is customized for CICS and that the PPT entry exists for the GDDM module ADMASPLC.
- In module DSQQMFE CSECT DSQIELI.

  Verify that the PPT entry exists for the DB2 UDB for OS/390 interface module DSQIELI.
- In module DSQCBST CSECT DSQCMCVP.

  After QMF Service has been applied, verify that an OS/390 LLA REFRESH has been done in case QMF CODE is in the Lookaside Library.
- ABEND0C1 with FFFFFFFE in R15.

  Rerun DSQ1ELNK, especially after applying QMF maintenance.
- On exit of QMF.

  Check that the governor is linked correctly. Review job DSQ1EGLK.
- With ABEND0C4 and DFHSM0102.

This error occurs when running a query or when pressing the Help function key. Ensure that the FCT for DSQPNLE has RECFM=V.

- On issuing HELP or RUN commands.

  The QMF data set DSQPNLE, which contains help and other screen text, either was not installed correctly or it was not allocated to the job that started the CICS region.

  – Verify that the FCT entry is defined correctly, as described in "FCT (File Control Table)" on page 75.

  – Verify that a DD statement for DSQPNLE exists in the job stream that starts the CICS region. DD statements are described in "Step 24—Update CICS Startup Job Stream" on page 78.

  You should also look for console error messages related to the DSQPNLE data set.

AEY9 ABEND

The DB2 UDB for OS/390 attachment facility is not active in the CICS region. Start the attachment facility using the DSNC transaction.

AZTS ABEND

Ensure that GDDM is running with IOSYNCH=YES.

DSNT302I

Invalid name `profilex`. Normal message produced by DSQ1TBJ2. Ignore the message.

DSQ10297

Invalid subsystem ID. This error can occur on ISPF startup or when using the callable interface. Check your ISPF startup parameters to ensure that s=xxxx or DSQSSUBS=xxxx. See "Starting QMF with ISPF" on page 67 for more details.

DSQ10493

This message indicates a database authorization error. Verify that the DB2 UDB for OS/390 resource control table (RCT) contains an entry for the transaction ID that you're using to start QMF. For example, if you are using the CICS transaction ID QMFE to start QMF, code an entry of:

```
DSNCRCT TYPE=ENTRY,TXID=QMFE,PLAN=QMF710,AUTH=DEPT1
```

In this example, the authorization ID is DEPT1, and the plan ID is QMF710.

DSQ36805

SQLCODE 805. This error occurs during startup. Record all the tokens returned from the SQLCODE 805 and follow the directions in *DB2 UDB for OS390 Message and Codes,* for the -805.

DSQI004I

GDDM error.

DSQI0026

This message usually occurs on startup. Ensure that the QMFE transaction is entered from a clear screen.

G050 ABEND

Verify that the release level of GDDM that you tailored for CICS matches the release level of GDDM that you are using in the job stream to start the CICS region.

IDC3012I

Entry QMFCAT.DSNDBC.DSQDBCTL.PROFILEX.I0001.A001.

IDC3009I

**VSAM catalog return code is 8 - reason code is IGGOCLAS3-42.

IDC0551I

**Entry QMFCAT.DSNDBC.DSQDBCTL.PROFILEX.I001 A001 not deleted.

These are normal messages that occur during the delete and purge of the VSAM cluster, when running DSQ1VSTP. Ignore the messages.

IEW0342

Library does not contain module xxxxxxxx.

QMF is attempting to replace a module that does not yet exist. You receive this message for each load module link-edited.

IEW0461

You receive this warning message because of one of these reasons:

- The symbol printed is an unresolved external reference.
- NCAL is specified.
- The reference is marked for restricted NO=CALL or NEVERCALL.

This message occurs for three load modules (DSQUXIA, DSQUXIC, and DSQUXIP). These modules are the sample assembler, COBOL, and PL/I user exits. Ignore these messages.

DSQ22843

Ensure that GDDM is running with IOSYNCH=YES.

If the QMF IVP fails with the message `A GDDM graphics printer nickname is required for printer`, there is an error in your GDDM nicknames definition.

The QMF IVP includes a step to print a query, which requires a GDDM nickname. If you use GDDM nicknames at your installation, change the

PRINT QUERY statement in the IVP procedure to PRINT QUERY (PRINTER = *gddmnickname*. The procedure for creating GDDM printer nicknames is discussed in "Chapter 17. Enabling Users to Print Objects" on page 287. If you do not use GDDM nicknames at your installation, replace the PRINT in the IVP procedure with PRINT PROFILE. QMF prints the profile without using nicknames.

Warning Messages

Warning messages after you start QMF might be caused by:

- Same AUTHID as TSO

  If you use the same database AUTHID in TSO and CICS, you can use a QMF command synonym table that contains TSO commands. Although this warning does not affect running QMF, such command synonyms are not available during the CICS session.

  To allocate a unique profile for the CICS session and eliminate the warning message, see the discussion in "Step 23—Tailor the QMF Profile" on page 77.

- Other factors

  When a warning message is issued, the cause of the warning is written to the QMF trace data set, DSQDEBUG. The ddname DSQDEBUG is described in the job stream that started the CICS region.

What if I Didn't Get an Error Message?

Sometimes you can tell that there is a problem without receiving an error message. The most common type of this error is incorrect output. For example, the QMF Home panel does not read Version 7 Release 1, but instead points to another release. In this case, make sure your ADMGGMAP ddname points to the QMF710.DSQMAPn data set. For further details on troubleshooting in general and incorrect output specifically, see "Chapter 24. Troubleshooting and Problem Diagnosis" on page 469.

Access to QMF Trace Data Set DSQDEBUG

If you have a warning or system error during QMF initialization, you must look at the QMF trace data set to understand the reason for the error. In CICS, the trace data set is described as an extra partition data set. The trace data set is described in the CICS tables by a DCT TYPE=SDSCI and a DCT TYPE=EXTRA, as shown in Figure 163 on page 503.

```
      TITLE 'DSQDCTSD - QMF SDSCI ENTRIES'
* TRACE DATA SET
      DFHDCT TYPE=SDSCI,DSCNAME=DSQDEBUG,
            RECFORM=VARBLK,
            RECSIZE=121,
            BLKSIZE=6050,
            TYPEFILE=OUTPUT
*
      TITLE 'DSQDCT - CICS DESTINATION CONTROL TABLE'
*
* TRACE DATA SET
*
DSQD  DFHDCT TYPE=EXTRA,DESTID=DSQD,DSCNAME=DSQDEBUG,RSL=1
```

Figure 163. Description, in a CICS table, of the trace data set

QMF trace data from all the QMF users in a single CICS region is written to a single trace data set. Each trace entry contains the terminal ID of the user that recorded it.

To look at the trace data set while the CICS region is active, you must close the trace data set using the CICS queue ID DSQD. You can do this using the CICS-supplied transaction CEMT. When the trace data set is closed, you can print or browse it from ISPF on TSO. When the trace data set is closed, no other records can be written by CICS users. QMF continues to operate in this state without recording trace records. To make the QMF trace available again, you can use the CICS-supplied transaction CEMT to open the trace data set using the CICS queue ID DSQD.

Appendix B. QMF Objects Residing in DB2

The following tables show a DBA the QMF 7 objects that reside in the database. The tables are intended to summarize all the database objects that are needed to run QMF 7 in the DB2 subsystem. These tables are not intended as replacements for the Installation jobs outlined in this book, but merely as a guide if database object recovery is needed.

Attention: The information in this section represents what is stored in a DB2 for OS/390 database server, not what is stored in a Workstation Database Server.

General QMF Database Objects

Table 67 shows the general QMF database objects.

Table 67. QMF database objects

Object Name	Object Type	DDL Member	Notes
DSQSGCTL	STOGROUP	DSQ1VSTB	Database DSQDBCTL resides in this STOGROUP.
DSQDBCTL	DATABASE	DSQ1TBLB	All QMF control tables reside in this database.
DSQSGDEF	STOGROUP	DSQ1STGC	Used in the IVP and also as stogroup for default SAVE DATA database/table space parameter. (Default Q.PROFILES SPACE parameter.)
DSQDBDEF	DATABASE	DSQ1STGC	Used in the IVP and also as database for default SAVE DATA database parameter. (Default Q.PROFILES SPACE parameter.)
DSQTSDEF	TABLE SPACE	DSQ1STGC	Used in the IVP and also as table space for default SAVE DATA table space parameter. (Default Q.PROFILES SPACE parameter.)

VSAM Clusters

Table 68 on page 506 shows the VSAM clusters shipped with QMF.

QMF Objects Residing in DB2

Table 68. VSAM clusters

Cluster Name	Object that Cluster is Needed for
QMFDSN.DSNDBC.DSQDBCTL.DSQTSCT1.I0001.A001	DSQTSCT1
QMFDSN.DSNDBC.DSQDBCTL.DSQTSCT2.I0001.A001	DSQTSCT2
QMFDSN.DSNDBC.DSQDBCTL.DSQTSCT3.I0001.A001	DSQTSCT3
QMFDSN.DSNDBC.DSQDBCTL.DSQTSPRO.I0001.A001	DSQTSPRO
QMFDSN.DSNDBC.DSQDBCTL.DSQTSLOG.I0001.A001	DSQTSLOG
QMFDSN.DSNDBC.DSQDBCTL.DSQTSGOV.I0001.A001	DSQTSGOV
QMFDSN.DSNDBC.DSQDBCTL.DSQTSSYN.I0001.A001	DSQTSSYN
QMFDSN.DSNDBC.DSQDBCTL.OBJECTRD.I0001.A001	Q.OBJECT_DIRECTORYX
QMFDSN.DSNDBC.DSQDBCTL.OBJECTRR.I0001.A001	Q.OBJECT_REMARKSX
QMFDSN.DSNDBC.DSQDBCTL.OBJECTRO.I0001.A001	Q.OBJECT_OBJDATAX
QMFDSN.DSNDBC.DSQDBCTL.PROFILEX.I0001.A001	Q.PROFILEX
QMFDSN.DSNDBC.DSQDBCTL.COMMANDR.I0001.A001	Q.COMMAND_SYNONYMSX

QMF Control Tables

Table 69 shows the control tables shipped with QMF. For more information about the control tables, see *Installing and Managing QMF for OS/390*.

Table 69. QMF control tables

Table	Index	View	Table Space	DDL Member
Q.OBJECT_DIRECTORY	Q.OBJECT_DIRECTORYX	none	DSQTSCT1	DSQ1TBLI
Q.OBJECT_REMARKS	Q.OBJECT_REMARKSX	none	DSQTSCT2	DSQ1TBLI
Q.OBJECT_DATA	Q.OBJECT_OBJDATAX	none	DSQTSCT3	DSQ1TBLI
Q.PROFILES	Q.PROFILEX	none	DSQTSPRO	DSQ1TBLU
Q.ERROR_LOG	none	none	DSQTSLOG	DSQ1TBLE
Q.COMMAND_SYNONYMS	Q.COMMAND_SYNONYMSX	none	DSQTSSYN	DSQ1TBLN
Q.RESOURCE_TABLE	Q.RESOURCE_INDEX	Q.RESOURCE_VIEW	DSQTSGOV	DSQ1TBLG
Q.DSQ_RESERVED	none	none	DSQTSRDO	DSQ1TBLH DSQ1TBDB

Default List Views

You might have customized the default list views. Table 70 describes the default views shipped with QMF.

Table 70. Default list views

View Name	DDL Member
Q.DSQEC_TABS_LDB2	DSQ1BVDB
Q.DSQEC_COLS_LDB2	DSQ1BVDB
Q.DSQEC_QMFOBJS	DSQ1BVDB
Q.DSQEC_TABS_RDB2	DSQ1BVDB
Q.DSQEC_COLS_RDB2	DSQ1BVDB
Q.DSQEC_ALIASES	DSQ1BVDB

QMF Plans

Table 71 describes the plans shipped with QMF.

Table 71. QMF plans

Plan Name	Bind job	Notes
QMF710	DSQ1BINR	General QMF plan
DSQIN610	DSQ1BSQL	QMF plan used for installation jobs only

QMF Packages

Table 72 describes the package shipped with QMF.

Table 72. QMF packages

Package Name	Bind Job
DSQB*	DSQ1BINJ

Note: For the job that runs the particular DDL member, see the index.

NLF Parts

For the NLF parts, if you're using an NLF, replace all *n* symbols with the one-character national language identifier (NLID) that matches the NLF you installed.

QMF Objects Residing in DB2

Table 73 describes the NLF object shipped with QMF.

Table 73. QMF NLF object

Object Name	Object Type	DDL Member	Notes
DSQSGSY*n*	STOGROUP	DSQ1*n*SYS	This is the stogroup for the Q.COMMAND_SYNONYMX_*n* index.

Table 74 describes the NLF table shipped with QMF.

Table 74. QMF NLF table

Table	Index	DDL member in SDSQSAPn
Q.OBJECT_SYNONYM_*n*	Q.COMMAND_SYNONYMX_*n*	DSQ1*n*SYC

QMF Sample Tables

Table 75 describes the sample tables.

Table 75. Sample tables

Table	Contains information about:
Q.ORG	The company organization
Q.STAFF	The company personnel
Q.APPLICANT	New candidates for hire
Q.PRODUCTS	The company's products
Q.SALES	Sales and commissions
Q.PROJECT	Projects undertaken, by department
Q.INTERVIEW	Interviews of new hires
Q.SUPPLIER	Vendor information
Q.PARTS	Product parts data

Appendix C. Fallback

Fallback is the process of migrating a user back to the earlier release of QMF. *Cleanup* is the process of removing the earlier release from OS/390. Cleanup is described in "Step 36—Clean up after Install" on page 98 and is not discussed here.

Fallback isn't necessary unless the two versions of QMF are running from the same DB2 subsystem.

Re-Establishing the Earlier Profiles

The ENVIRONMENT column, absent in QMF Version 2.4, does not affect the Version 7 profile. The same holds true for all the columns added since Version 2.2.

Note: If logon IDs are different from primary authorization IDs and the CREATOR values were updated to use the primary authorization IDs, then they must be restored to the logon IDs as part of fallback.

Using QMF Version 7 Objects under Earlier Releases

This is largely preventive. While there is still a chance for fallback, make certain that your users understand the compatibility rules given previously in this appendix.

If you fall back to the earlier QMF release, some objects created under QMF Version 7 cannot be used in the earlier environment. Consider this when planning for a possible fallback. The following list contains the restrictions that apply when you use some Version 7 objects in earlier releases.

- Forms

  Form objects that are saved or exported from Version 7 and displayed or imported to earlier releases of QMF, can be expected to execute normally. However, form objects saved or exported from Version 7 cannot be used in Version 2.4 or earlier.

  Before they can be used in earlier applications, forms exported from Version 7 that use break field numbers (or the object level in the header record) require the Form Application Migration Aid.

- Queries

  Some restrictions apply to Version 7 queries for fallback to earlier releases:

  - SQL queries: You can export SQL queries from Version 7 and import them on earlier releases, and they execute normally. However, SQL queries saved on Version 7 cannot be used in Version 2.4 or earlier.
  - Prompted queries: You can display and import Version 7 prompted queries in earlier releases provided they do not contain variables, or expressions with more than the old 55 or 65 character limit.
  - QBE queries: Queries created with QBE (Query-by-Example) saved or exported in Version 7 can be displayed or imported in earlier releases and execute normally.
- Procedures

  Procedure objects exported from Version 7 can be imported into earlier releases, and they can be run if the new QMF commands or command syntax are not used. Procedure objects saved with Version 7 cannot be displayed with earlier releases unless you first export them from Version 7 and import them into the earlier release. Procedures with logic, that is, procedures that contain REXX logic, cannot be displayed or imported in releases earlier than Version 3.
- Procedures or applications containing QMF commands that cannot be run under the earlier release

  These commands might fail to run for a number of reasons. See "Using QMF Version 7 Commands Under Earlier Releases" for details.
- Applications that call the callable interface

  Applications call the callable interface in their CLISTs and programs to call QMF. The callable interface was introduced for Version 2.4, so applications running with earlier versions of QMF cannot use it.

For specific differences between an earlier QMF release and QMF Version 7, compare the two releases of *QMF Reference*.

Using QMF Version 7 Commands Under Earlier Releases

Version 7 procedures and applications might run incorrectly under an earlier QMF release because they contain commands that the earlier release cannot run. Some commands:

- Do not exist in the earlier release.
- Contain options that operate differently in the earlier release. For example, the DRAW command has the same syntax as before, but now produces different results. All keywords now have double quotes; therefore, the users no longer have to add the quotes, and any tools used to provide double quotes are no longer necessary.

31-Digit Decimal Support

If you are using QMF Version 3.1 (or later) and are operating in DB2 Version 2.3 (or later), you have 31-digit decimal support. Some expressions might produce unusual or unacceptable results when migrated from 15-digit to 31-digit decimal form.

Appendix D. Migration between QMF OS/390 Releases

If your installation was using an earlier release of QMF before it installed Version 7, your users might still be operating an earlier release of QMF. You need to help them operate the new release. You might need to:

- Grant them access to the QMF Version 7 application plan.
- Provide them with an appropriate QMF profile.
- Make objects created earlier (queries and forms, for example) available for QMF sessions under the new release.

What Do We Mean by Migration?

Migration is the process of carrying out the steps described in the previous section. The migration is essentially the same when moving from the following QMF releases:

- Version 2 Release 2
- Version 2 Release 3
- Version 2 Release 4
- Version 3 Release 1
- Version 3 Release 1 Modification 1
- Version 3 Release 2

This appendix assumes that QMF Version 7 was installed according to the instructions in this book. If it was not, or if some of the settings have been changed, parts of the discussion might not apply.

In discussing migration, some terms have been shortened. 'V7R1', for example, means 'Version 7'. In the same way 'V2R2', 'V2R3', 'V2R4', and 'V3R1' stand for the earlier releases. To link them to the appropriate QMF release, these terms precede other words, for example:

- A 'V3R1 user' is a person using QMF Version 3.1.
- A 'V2R4 form' is a form created under QMF Version 2.4.
- A 'V2R2 database' is a DB2 database in which QMF Version 2.2 is installed.

What Do We Mean by Fallback?

Fallback is the process of migrating users from QMF Version 7 to an earlier release. If you are interested only in fallback, turn to "Fallback" on page 525. Cleanup is described in "Step 36—Clean up after Install" on page 98 and is not discussed here.

Migration between QMF OS/390 Releases

Version 3 (and later) forms and the forms for earlier QMF versions have different internal representations. When one of the earlier forms is converted to a Version 3 (or later) form, it no longer can be used with an earlier version of QMF.

Applications developed to work with QMF Version 2.4 (or earlier) forms might also not work if they reference the object level in the header record or break field numbers.

To prevent users from accidentally converting a version 2 or earlier form to a Version 7 form (a mistake a user might make by replacing the old form while running under QMF Version 7), you can save both the earlier version and a Version 7 version with different names until it is clear that one version is no longer needed. For example, the following commands convert work area forms to Version 7 forms:

```
SAVE FORM AS FORM1
EXPORT FORM TO FORM2
```

If your installation falls back to the earlier QMF release, urge your users to recreate their Version 7 objects under the earlier release *before* QMF Version 7 is withdrawn.

Note: REXX is not supported in CICS.

Granting Access to the QMF Version 7 Application Plan and Packages

This procedure is the same for all the earlier releases of QMF. If the grants are still in effect, skip this section:

If during QMF installation, access to the QMF application plan (QMF710) was not granted to PUBLIC or to the user being migrated, run the following queries. (You need EXECUTE privilege on the QMF plan and packages with the GRANT option.)

```
GRANT EXECUTE ON PLAN QMF710 to authid
```

where *authid* is the authorization ID of the user being migrated. If you substitute PUBLIC for *authid*, you give everyone EXECUTE authority on the plan and the package.

For more information on this subject, see “Controlling Access to the QMF Application Plan and Packages” on page 227.

DB2 Subsystems and Migration

When you migrate users, the new and old versions of QMF might be on the same DB2 subsystem or on two different subsystems.

- If the two releases of QMF are on the same DB2 subsystem, read "Migrating QMF on the Same DB2 Subsystem".
- If the two releases of QMF are not on the same DB2 subsystem, read "Migrating QMF across Different DB2 Subsystems" on page 517.

Migrating QMF on the Same DB2 Subsystem

Read this section to migrate when both releases of QMF are on the same DB2 subsystem.

Providing a QMF Profile

At the start of a QMF session, a user's QMF profile comes from some row of the Q.PROFILES table. With both releases of QMF in the same DB2 subsystem, the two releases use the same Q.PROFILES table.

If a user has a primary authorization ID different from the TSO logon ID, the DSQSPRID parameter should have a value of TSOID when you start QMF. Otherwise, insert a user row in Q.PROFILES with CREATOR set to the primary authorization ID.

For QMF Version 3.1.1 Users: There are no new columns in the Q.PROFILES table if you are migrating from Version 3.1.1.

For QMF Version 3.1 Users: There are no new columns in the Q.PROFILES table if you are migrating from Version 3.1.

For QMF Version 2.4 Users: The Q.PROFILES table now has one more column, ENVIRONMENT, which carries a profile parameter that applies to only the new release. This column has a single default value for its entry, as shown in Table 76 on page 516. The new column has no effect on the execution of Version 2.4; the new column is invisible to the Version 3 releases.

Important: The new column is not invisible unless QMF Version 2.4 users have installed the fix for APAR PL77029.

For QMF Version 2.2 and Version 2.3 Users: The Q.PROFILES table now has two more columns, MODEL and ENVIRONMENT, which carry profile parameters that apply to only the new release. These columns have single default values for their entries, as shown in Table 76 on page 516. The two new columns have no effect on the execution of QMF Version 2.2 and Version 2.3; the new columns are invisible to these releases.

Important: The new columns are not invisible unless users have installed the fix for APAR PL77028.

MODEL and ENVIRONMENT columns added to existing rows contain NULLS. Through SET or SAVE PROFILE, users can supply only the MODEL

column. You need to assign the ENVIRONMENT column.

Table 76. Columns added to the Version 2.3 profiles table

Column Name	Purpose
MODEL	Identifies each user's conceptual view of the data that Prompted Query utilizes to access the data. Default value is REL. For more information on this column, read Appendix F. QMF Control Tables and Table Spaces Used by QMF.
ENVIRONMENT	Identifies the execution environment of the QMF session. For more information on this parameter, see Appendix F. QMF Control Tables and Table Spaces Used by QMF.

Migrating Q.OBJECT_DIRECTORY

Version 3.2 added three new columns to the Q.OBJECT_DIRECTORY table. If you are migrating from an older release of QMF, these three columns have no effect on the previous tables. Table 77 shows the three new columns.

Table 77. Columns added to the Version 3.2 Q.OBJECT_DIRECTORY table

Column name	Data type	Length (bytes)	Nulls allowed?	Function/values
CREATED	TIMESTAMP		Yes	Shows the timestamp value for when an object was created. The value is recorded after SAVE or IMPORT commands.
MODIFIED	TIMESTAMP		Yes	Shows the timestamp value for when an object was last modified. The value is recorded after SAVE or IMPORT commands.
LAST_USED	DATE		Yes	Shows the date value for when an object was last used. The value is updated only once a day.

Migrating DPRE in ISPF from Version 2.4

If you are migrating from QMF Version 2.4 to QMF Version 7 and you plan to run both QMF Version 2.4 and Version 7 on the same database, you need to use the QMF Version 2.4 version of DPRE for both versions of QMF. To provide the QMF Version 2.4 version after installing QMF Version 7:

1. Rename or save the QMF Version 7 version of DSQABR13 for use when upgrading DPRE to Version 7 level.
2. Move the following CLISTs from QMF Version 2.4 library QMF240.DSQCLSTE to the QMF Version 7 library QMF710.SDSQCLTE:
   DSQABR11
   DSQABR12
   DSQABR13

3. From a QMF Version 2.4 session that has an authorization ID of Q, IMPORT and save the Version 2.4 version of QMF procedure Q.DSQAER1P. To do this, issue the QMF command:

```
IMPORT PROC Q.DSQAER1P FROM 'QMF240.DSQSAMPE(DSQAER1P)'
```

When you are no longer using QMF Version 2.4, restore DPRE to the Version 7 level as follows:

1. Restore the QMF Version 7 version of DSQABR13 that was saved or renamed in step 1 above to QMF Version 7 library QMF710.SDSQCLTE
2. From a QMF Version 7 session that has an authorization ID of Q, IMPORT and save the Version 7 version of QMF procedure Q.DSQAER1P. To do this issue the QMF command:

```
IMPORT PROC Q.DSQAER1P FROM 'QMF710.SDSQSAPE(DSQAER1P)'
```

Making Objects from the Earlier Release Available Under QMF Version 7

If both releases of QMF are on the same DB2 subsystem, all the DB2 objects (tables and views, for example), are available under QMF Version 7 if they are available under the earlier release. All the queries, forms, and procedures are also available, but some might be unusable under QMF Version 7. This topic is discussed in "Migrating QMF Objects" on page 520.

Migrating QMF across Different DB2 Subsystems

This section describes how to migrate when both releases of QMF are in different DB2 subsystems.

When the DB2 subsystems are different, migration is complicated by the fact that QMF objects in the database for the earlier QMF release aren't available to Version 7 users. Nor are these objects in the QMF Version 7 database available to users of the earlier QMF release.

The tables and views required by QMF must be made available in the new subsystem.

Providing a QMF Profile

The installation process creates a new Q.PROFILES table when QMF Version 7 is in a different DB2 subsystem.

For QMF Version 3.1.1 Users: There are no new columns in the Q.PROFILES table if you are migrating from Version 3.1.1.

For QMF Version 3.1 Users: There are no new columns in the Q.PROFILES table if you are migrating from Version 3.1.

For QMF Version 2.4 Users: The new Q.PROFILES table has an additional column, ENVIRONMENT.

For QMF Version 2.2 and Version 2.3 Users: The new Q.PROFILES table has two additional columns, MODEL and ENVIRONMENT.

For QMF Version 2.4, Version 2.3, or Version 2.2 Users: The newly created table contains a single SYSTEM row. The values assigned to the columns appear in Table 78. For details on these columns and their meanings, see Table 31 on page 219.

Table 78. Installation-supplied SYSTEM row values

Column	Value
CREATOR	SYSTEM
CASE	UPPER
DECOPT	PERIOD
CONFIRM	YES
WIDTH	132
LENGTH	60
LANGUAGE	SQL
SPACE	DSQDBDEF.DSQTSDEF
TRACE	NONE
PRINTER	blank
TRANSLATION	ENGLISH
PFKEYS	Zero-length string
SYNONYMS	Q.COMMAND_SYNONYMS
RESOURCE_GROUP	SYSTEM
MODEL	REL
ENVIRONMENT	Null

If CICS is installed, there is an additional SYSTEM row, in which SYNONYMS is set to null and ENVIRONMENT is set to CICS.

With only the SYSTEM row in the table, users begin their Version 7 sessions with the QMF profile provided by this row. This profile can differ from profiles on earlier QMF releases. You can recreate the earlier profiles with a series of INSERT queries, but users can also do this for themselves with SET or SAVE PROFILE.

Users cannot, however, change the values of the PFKEYS, SYNONYMS, and RESOURCE_GROUP parameters with SET or SAVE PROFILE. You must do this with an UPDATE query on the Q.PROFILES table. For an example of this, see “Activating New Function Key Definitions” on page 332.

The PFKEYS, SYNONYMS, and RESOURCE_GROUP parameters play key roles in customizing the QMF environment. For a brief description of each, see Table 76 on page 516.

Migrating Q.OBJECT_DIRECTORY

Version 3.2 added three new columns to the Q.OBJECT_DIRECTORY table. If you are migrating from an older release of QMF, these three columns have no effect on the previous tables. Table 79 shows the three new columns.

Table 79. Columns added to the Version 3.2 Q.OBJECT_DIRECTORY table

Column name	Data type	Length (bytes)	Nulls allowed?	Function/values
CREATED	TIMESTAMP		Yes	Shows the timestamp value for when an object was created. The value is recorded after SAVE or IMPORT commands.
MODIFIED	TIMESTAMP		Yes	Shows the timestamp value for when an object was last modified. The value is recorded after SAVE or IMPORT commands.
LAST_USED	DATE		Yes	Shows the date value for when an object was last used. The value is updated only once a day.

Making Objects from the Earlier Release Available Under QMF Version 7

DB2 tables and QMF objects can be exported from a subsystem under an earlier QMF release and then imported under QMF Version 7.

To migrate DB2 tables, any user with the proper DB2 authority can:

1. Unload the tables using a DB2-supplied application program, DSNTIAUL. For more on this program, see *DB2 UDB for OS390 Administration Guide*
2. Load the unloaded tables into the Version 7 DB2 subsystem using the DB2 loader. For details on using the loader see *DB2 UDB for OS390 Administration Guide*

If you have DXT installed, you can also use DXT for unloading and loading tables. DXT is an IBM licensed program product. For more information on DXT, see *Data Extract: General Information*

If the two versions of QMF are on different OS/390 systems, use the available networking facilities to send the exported objects and unloaded tables to the system containing QMF Version 7.

To migrate QMF queries, forms, procedures, and applications, make sure you read the following section, “Migrating QMF Objects” on page 520.

Views and Synonyms

If you use QMF to export tables from a database and import them to a different database, you must create any views, indexes, synonyms, and authorizations on that table at the new database.

Migrating QMF Objects

This section describes migration considerations for QMF objects. Most objects created under earlier releases of QMF can be used under QMF Version 7. (For information about migrating back to an earlier release of QMF, see “Fallback” on page 525.)

Queries and Forms

All queries and forms created under earlier releases of QMF can be used under QMF Version 7.

Procedures

Procedure objects that were saved or exported in Version 2.4 can be displayed or imported under Version 7, and they can be run if the abbreviations for commands and options (if any are used) are valid in Version 7. Version 2.4 procedures containing commands or applications requiring ISPF run only if QMF Version 7 is started as an ISPF dialog. Procedures written in English and saved or exported in QMF Version 2.4 can be imported and run without modification in a Version 7 NLF session (a QMF session where English is not the presiding language) if the command language global variable is set to accept English commands.

Some procedures from earlier releases won’t work properly if they issue commands with verbs that are also verbs for installation-defined commands. To ensure this doesn’t happen under QMF Version 7, users can add `QMF` before all commands. This identifies these commands as standard QMF commands instead of installation-defined commands. It lets these procedures run under QMF Version 7 (or any QMF Version 2 or Version 3 release). For more information on installation-defined commands, read “Chapter 18. Customizing QMF Commands” on page 305.

Migrating Applications

Version 2.4 applications containing commands requiring ISPF run only if Version 7 is started as an ISPF dialog. Applications that issue commands written in English and that run with Version 2.4 can be run without modification in a Version 7 NLF session (a QMF session where English is not the presiding language) if the command language global variable has been set to accept English commands.

Callable interface considerations

If you want to use the LIBDEF function in your QMF applications that were link edited prior to QMF Version 7 and that use the callable interface, you must re-link edit your application using the QMF Version 7 interface module.

Form Application Migration Aid

If your applications written for earlier versions of QMF refer to break field IDs, you might need to use the form application migration aid to use those applications with QMF Version 7.

With the form application migration aid, applications that contain Version 2.4 break numbers can be used with QMF Version 7. The form application migration aid *does not* allow you to export QMF Version 3 FORMs and use them in QMF Version 2.4 or earlier releases.

This aid, shipped with QMF Version 7, changes the break numbers in a version 7 form back to those used in early versions. Because the changes to the break field IDs are enough to keep applications from working properly, the object level field in the header record has been changed from 3 to 4. For more information about header records, see *Developing QMF Applications.*

The form application migration aid runs when a user or application issues the EXPORT FORM command, which automatically triggers a command synonym for the aid. Because it requires REXX EXECs, the REXX interpreter must be available and QMF must be operating as an ISPF dialog.

Encourage application developers to:

1. Change applications that reference the break fields of the old numbering scheme to the new field numbers used in QMF Version 3.
2. Remove the command synonym for the migration aid from command synonym tables when all their applications are changed.

To set up the migration aid, run the following SQL INSERT query on the QMF command synonyms table, Q.COMMAND_SYNONYMS, and any other synonym tables that use the applications requiring the migration aid.

```
INSERT INTO Q.COMMAND_SYNONYMS (VERB, OBJECT, SYNONYM_DEFINITION, REMARKS)
  VALUES ('EXPORT', 'FORM', 'TSO DSQAEF0A', 'Version 7 Form Migration Aid')
```

Delete this entry from your command synonyms tables as soon as you have adjusted your applications to conform to the new externalized form.

Delete this entry with a query such as the following:

```
DELETE FROM Q.COMMAND_SYNONYMS
  WHERE VERB='EXPORT'
  AND OBJECT='FORM'
  AND SYNONYM_DEFINITION='TSO DSQAEF0A'
```

In the previous INSERT and DELETE queries, the keywords EXPORT, FORM, and DSQAEF0A are subject to NLS translation, so this query must be translated accordingly.

Running QMF under ISPF on OS/390

With QMF Version 7, review how you allocate resources for a QMF session, and how you start it. You can run QMF Version 7 and a previous version of QMF from the same ISPF session with ISPF LIBDEF. You cannot however, run more than one QMF session at a time or have more than one set of QMF libraries allocated at a time.

You can also use different versions of the database without ending your ISPF session by allocating the your DB2 libraries to DSQLLIB. Then use ISPF LIBDEF to make the libraries that you allocated to DSQLLIB available to ISPF.

With this version of QMF running under ISPF, QMF first looks for a program from DSQLLIB. If the program is not found in DSQLLIB or DSQLLIB is not allocated, QMF looks for a program as it has in past releases.

Other Migration Considerations

This section describes other migration considerations for QMF, including special considerations for the environment that is being used for QMF.

31-Digit Decimal Support

If you are using QMF Version 3.1 (or later) and are operating in DB2 Version 2.3 (or later), you have 31-digit decimal support. If you migrate from an earlier version of QMF, or from an earlier database version, you might want to determine which tables are impacted by 31-digit decimal support. The following query retrieves a list of the user tables that might be impacted by the DB2 tables:

```
SELECT DISTINCT(TBNAME)
FROM SYSIBM.SYSCOLUMNS
  WHERE COLTYPE IN ('INTEGER', 'SMALLINT', 'FLOAT', 'DECIMAL', 'DATE', 'TIME',
                    'TIMESTAMP')
ORDER BY TBNAME
```

Governor

If a user wants to use the Version 2.4 IBM-supplied governor with QMF Version 3 and the V2R4 governor sets XCBPANEL to DXYEMU00 or DXYEMU01, the user must do one of the following:

- If the user wants to use the Version 2.4 governor and to run the QMF Version 3 product without ISPF, the user must remove statements that set XCBPANEL from the governor exit. (QMF Version 3 provides a window help panel as the default instead of an ISPF panel.)
- If the user wants to use an unaltered version of the IBM-supplied governor shipped with QMF Version 2.4, the user should use the QMF governor

shipped with QMF Version 3, and should add ISPF panels DXYEMU00 and DXYEMU01 to the QMF Version 3 ISPF panel library.

Governor in CICS

If you are using a modified or replacement version of the QMF Version 3.1 governor, you need to change the interface. The governor interface for Version 3.1.1 and later was changed to pass standard CICS parameters to the governor in the DFHCOMMA area, instead of through the first and second parameters.

If you plan to use the IBM-supplied governor, replace it with the new version.

If you have modified the IBM-supplied governor, or have re-written it, you must make a minor change to the way you access the address of the DXEGOVA and DXEXCBA control information. (For specifics, see "Passing Resource Control Information to the Governor Exit" on page 406.) The governor continues to function as before, and its contents are unchanged.

User Edit Routine in CICS

The user edit routine, as documented in QMF Version 3.1 APAR PN07713, is part of the base QMF Version 3.1.1 and later products. If you created your user edit exit module DSQUECIC following the instructions in PN07713, it can be used without change in QMF Version 3.1.1 or later.

User Edit Routine in TSO, and native OS/390 batch

For QMF Version 7, you need to relink your user edit code. For more information about relinking your user edit code, see "Chapter 20. Creating Your Own Edit Codes for QMF Forms" on page 335.

Callable Interface in CICS

If you are migrating from QMF Version 3.1 or later, the interface between the QMF-supplied function call and the main QMF program has changed from a CALL interface to an EXEC CICS LINK interface. The new interface provides better isolation from the user program and the QMF product. Because the interface has changed, it is necessary to relink-edit your programs that use the callable interface.

Printing in CICS

In QMF Version 3.1, when no printer is specified on the PRINT command, output is held in CICS auxiliary temporary storage, replacing the previous report. In Version 3.2 and later, the report is not replaced. If CICS auxiliary temporary storage already exists, QMF appends the report to the existing temporary storage queue.

Export/Import Support for CICS on OS/390

QMF Version 3.1.1 support for export/import in the CICS/MVS environment uses TSO file support. This level of support is not recommended when running in a CICS environment. In fact, some error conditions can cause the

entire CICS region to abnormally terminate. In QMF Version 3.2 and later, this problem is corrected; TSO file system support is replaced by support for CICS temporary or transient data.

When running QMF in CICS, you must set the execution key of the QMF module DSQCBST to CICS (EXECkey=CICS) if you plan to use the QMF EXPORT or IMPORT commands and CICS storage protection (SIT STGPROT=YES) is being used. This avoids abnormal terminations (ABENDASRA or ABEND0C4) in IGG0191I conditions.

Migration Considerations and Support

QMF provides a migration capability that allows you to choose between the recommended use of CICS temporary storage or transient data queues and the volatile use of TSO data sets. After QMF Version 7 is installed, the default use of CICS temporary storage and transient data queues, is active. If you do not want to use the TSO data sets, there are no migration considerations.

If you do want to use the TSO data sets, then you must disable the QMF export/import control module, DSQCTLXI. To do this, use the CICS-supplied CEMT transaction. For example:

```
CEMT SET PROGRAM(DSQCTLXI) DISABLE
```

DSQCTLXI can also be disabled by removing it from the CICS CSD or PCT table. After you disable DSQCTLXI, all QMF sessions running in CICS use the TSO data set support for export and import commands.

After support for CICS temporary storage or transient data queues is disabled, you can reactivate that support by using CEMT or by adding a program entry to the CICS CSD or PCT table, if it was removed. To use CEMT, enter the following command:

```
CEMT SET PROGRAM(DSQCTLXI) ENABLE
```

Migrating from Version 2

QMF Version 3 contains a new DD statement and dataset, DSQPNLE, and ISPTLIB is no longer used.

The message tool is no longer shipped with the product. To see a message help panel, issue the following command on the QMF command line:

```
HELP msgno
```

For more information on messages, see *QMF Messages and Codes* .

The QMF demonstration application for function key customization is no longer shipped with QMF.

The QMF ISPF panel library data set, SDSQPLBE (formerly DSQPLIBE), has decreased in size of members from about 2500 members to about 70 members due to QMF's conversion from ISPF panels to GDDM mapped panels.

The following views, available in QMF Version 2, do not exist in Version 3:

- Q.AUTH_LIST
- Q.COLUMN_LIST
- Q.TABLE_LIST
- Q.QUERY_LIST
- Q.PROC_LIST
- Q.FORM_LIST
- Q.AMFTABLE_LIST

For information about how to obtain these object lists in Version 3, see "Customizing a User's Database Object List" on page 241.

Fallback

Fallback is the process of migrating a user back to the earlier release of QMF. *Cleanup* is the process of removing the earlier release from OS/390. Cleanup is described in "Step 36—Clean up after Install" on page 98 and is not discussed here.

Fallback isn't necessary unless the two versions of QMF are running from the same DB2 subsystem.

Re-Establishing the Earlier Profiles

The ENVIRONMENT column, absent in QMF Version 2.4, does not affect the Version 7 profile. The same holds true for all the columns added since Version 2.2.

Note: If logon IDs are different from primary authorization IDs and the CREATOR values were updated to use the primary authorization IDs, then they must be restored to the logon IDs as part of fallback.

Using QMF Version 7 Objects under Earlier Releases

This is largely preventive. While there is still a chance for fallback, make certain that your users understand the compatibility rules given previously in this appendix. If you haven't looked at these rules already, read "Migrating QMF Objects" on page 520.

If you fall back to the earlier QMF release, some objects created under QMF Version 7 cannot be used in the earlier environment. Consider this when planning for a possible fallback. The following list contains the restrictions that apply when you use some Version 7 objects in earlier releases.

- Forms

Form objects that are saved or exported from Version 7, and displayed or imported to earlier releases of QMF, can be expected to execute normally. However, form objects saved or exported from Version 7 cannot be used in Version 2.4 or earlier.

Before they can be used in earlier applications, forms exported from Version 7 that use break field numbers (or the object level in the header record) require the Form Application Migration Aid, as described in "Form Application Migration Aid" on page 521.

- Queries

  Some restrictions apply to Version 7 queries for fallback to earlier releases:

  – SQL queries: You can export SQL queries from Version and import them on earlier releases, and they execute normally. However, SQL queries saved on Version 7 cannot be used in Version 2.4 or earlier.

  – Prompted queries: You can display and import Version 7 prompted queries in earlier releases provided they do not contain variables, or expressions with more than the old 55 or 65 character limit.

  – QBE queries: Queries created with QBE (Query-by-Example) saved or exported in Version 7 can be displayed or imported in earlier releases and execute normally.

- Procedures

  Procedure objects exported from Version 7 can be imported into earlier releases, and they can be run if the new QMF commands or command syntax are not used. Procedure objects saved with Version 7 cannot be displayed with earlier releases unless you first export them from Version 7 and import them into the earlier release. Procedures with logic, that is, procedures that contain REXX logic, cannot be displayed or imported in releases earlier than Version 3.

- Procedures or applications containing QMF commands that cannot be run under the earlier release

  These commands might fail to run for a number of reasons. See "Using QMF Version 7 Commands Under Earlier Releases" for details.

- Applications that call the callable interface

  Applications call the callable interface in their CLISTs and programs to call QMF. The callable interface was introduced for Version 2.4, so applications running with earlier versions of QMF cannot use it.

For specific differences between an earlier QMF release and QMF Version 7, compare the two releases of *QMF Reference*.

Using QMF Version 7 Commands Under Earlier Releases

Version 7 procedures and applications might run incorrectly under an earlier QMF release because they contain commands that the earlier release cannot run. Some commands:

- Do not exist in the earlier release.
- Contain options that operate differently in the earlier release. For example, the DRAW command has the same syntax as before, but now produces different results. All keywords now have double quotes; therefore, the users no longer have to add the quotes, and any tools used to provide double quotes are no longer necessary.

31-Digit Decimal Support

If you are using QMF Version 3.1 (or later) and are operating in DB2 Version 2.3 (or later), you have 31-digit decimal support. Some expressions might produce unusual or unacceptable results when migrated from 15-digit to 31-digit decimal form.

Appendix E. How QMF and GDDM Programs Are Defined to CICS

Installing and Managing QMF on OS/390 provides the jobs necessary to define QMF programs to CICS and load GDDM definitions and chart formats for QMF panels. If you need to modify the default installation, use this section to find out how QMF programs are defined and how GDDM definitions are loaded during QMF installation.

How QMF Programs Are Defined to CICS/MVS

During QMF installation, the default transaction ID QMF*n* is defined for QMF, where *n* is a national language identifier from Table 1 on page xviii. The transaction ID is defined in either the CICS program control table (PCT) or the system definition (CSD) file. If you need to, you can change this default transaction ID:

- To update the CSD, see *CICS/MVS Resource Definition (Online)*
- To update the PCT, see *CICS/MVS Resource Definition (Macro)*

Resident QMF Programs

During QMF installation, the following programs are defined as resident in CICS:

DSQQMF
DSQQMFn
DSQCBST
DSQCnLTT
DSQCnBLT

CICS/MVS treats programs with RMODE(ANY) as permanently resident, because of the large amount of virtual storage available above the 16MB line. Programs defined as resident are loaded during CICS system initialization. Nonresident programs are loaded on the first reference to the program.

The first QMF transaction to start causes certain GDDM programs to be loaded. See “How Nonresident GDDM Programs Affect QMF” on page 530 for more information.

How Nonresident Programs Affect Performance

If several users use QMF, removing QMF programs from resident storage might affect QMF and CICS performance, because QMF must be loaded each time a user starts the program. However, if the needs of your installation require that you remove these programs from resident storage, change the definition for QMF programs from resident to nonresident.

You can specify RESIDENT=NO on the CEDA DEFINE PROGRAM command to interactively change the program definition in the CSD, or specify RES=NO on the DFHPPT TYPE=ENTRY macro to change the value in the program processing table (PPT). See *Installing and Managing QMF on VSE/ESA* for information on the PPT entries for the QMF groups in the CSD.

For more information on the performance implications of nonresident programs, see *CICS/MVS Performance Guide*

How GDDM Definitions Are Loaded During QMF Installation

OS/390 uses GDDM services for printing and displaying QMF screens. The VSAM panel file DSQPNLn contains text for QMF screens and is described to CICS during QMF installation. QMF also uses the GDDM-PGF product to create charts of many types, such as scatter, pie, histogram, and others.

How Nonresident GDDM Programs Affect QMF

GDDM programs are not predefined as resident. When you tailor GDDM for CICS, consider making GDDM programs resident, because certain GDDM programs are loaded when QMF is started, whether or not you use QMF's charting functions. See *CICS/MVS Performance Guide* for more information on how to decide which programs should be resident. For more information on tailoring GDDM for CICS, see:

GDDM Installation and System Management for OS/390 (for GDDM 2.3)
GDDM System Customization and Administration (for GDDM 3.1)

Adding Charting Function after QMF Installation

If you install GDDM-PGF after you install QMF, you need to fully install and tailor GDDM-PGF for CICS, rather than merely restoring the product to a sublibrary.

If you use GDDM 3.1, you need to install GDDM-PGF 2.1.2.
If you use GDDM 2.3, you need GDDM-PGF 2.1.1.

After you install GDDM-PGF and tailor it, you can verify the installation by running the CICS ADMC transaction, which is predefined by GDDM during GDDM tailoring for CICS. No further customization of the chart formats is necessary; these formats were defined for you during QMF installation.

Using Transaction Routing to Control Resource Use

To protect high-speed transactions in your system from potential long-running QMF queries that might consume extra resources, consider isolating execution of QMF transactions to a single region, using multiregion operations or intersystem communications. Define one CICS terminal-owning region and route QMF transaction requests to other regions by using multiple transaction IDs or dynamic routing exits. Both methods are described in the *CICS/OS390 Intercommunication Guide*

See “Customizing Report Storage and Report Performance” on page 180 for information on how QMF uses temporary storage in the CICS region.

Appendix F. QMF Control Tables and Table Spaces Used by QMF

QMF uses the control tables shown in Table 80 to manage QMF users and the objects they create. The table space sizes given for each block are in pages, where each page is one 4096-byte block. See the page listed at the right of the table if you need information on the table's structure and more detailed information on how QMF uses it.

Table 80. List of QMF control tables and table spaces used by QMF

Control table name	Table space	Table space size (in 1K units)	Table content	More information:
Q.PROFILES	DSQTSPRO	100 primary 20 secondary	Contains QMF profiles that hold information about individual users' access to resources and data during a QMF session.	Pages 216 to 228
Q.OBJECT_DIRECTORY	DSQTSCT1	200 primary 20 secondary	Contains general information about all QMF queries, forms, and procedures in the database.	Page 254
Q.OBJECT_DATA	DSQTSCT3	5000 primary 200 secondary	Contains queries, forms, and procedures represented in an internal QMF format.	Page 255
Q.OBJECT_REMARKS	DSQTSCT2	200 primary 20 secondary	Contains comments that were saved when queries, forms, and procedures were created (or replaced).	Page 256
Q.COMMAND_SYNONYMS	DSQTSSYN	100 primary 20 secondary	Contains information on the command synonyms.	Page 305
Q.RESOURCE_TABLE	DSQTSGOV	100 primary 20 secondary	Contains resource control information passed to the governor exit routine.	Page 383

Table 80. List of QMF control tables and table spaces used by QMF (continued)

Control table name	Table space	Table space size (in 1K units)	Table content	More information:
Q.ERROR_LOG	DSQTSLOG	100 primary 20 secondary	Contains information on system, resource, and "unexpected condition" errors. This information is more detailed than that found in error messages.	Page 491
Q.DSQ_RESERVED	DSQTSRDO	100 primary 20 secondary	Contains information used by QMF during initialization. **Important: Do not modify this table.**	This table is not discussed in this book.

All the control tables are located in the DSQDBCTL database.

In addition to the table spaces shown above for the QMF control tables, QMF uses table space DSQ1STBT for the QMF sample tables, and DSQTSDEF to store data from the QMF SAVE DATA or IMPORT TABLE commands. Both table spaces have a default size of 128 pages.

For more information about the QMF sample tables and the SAVE DATA or IMPORT TABLE commands, see *Using QMF*.

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Glossary of Terms and Acronyms

This glossary defines terms as they are used throughout the QMF library. If you do not find the term you are looking for, refer to the index in this book, or to the *IBM Dictionary of Computing*.

abend. The abnormal termination of a task.

ABENDx. The keyword for an abend problem.

Advanced Peer-to-Peer Networking. A distributed network and session control architecture that allows networked computers to communicate dynamically as equals. Compare with Advanced Program-to-Program Communication (APPC). An implementation of the SNA synchronous data link control LU 6.2 protocol that allows interconnected systems to communicate and share the processing of programs.

Advanced Program-to-Program Communication (APPC). An implementation of the SNA synchronous data link control LU 6.2 protocol that allows interconnected systems to communicate and share the processing of programs.

aggregation function. Any of a group of functions that summarizes data in a column. They are requested with these usage codes on the form panels: AVERAGE, CALC, COUNT, FIRST, LAST, MAXIMUM, MINIMUM, STDEV, SUM, CSUM, PCT, CPCT, TPCT, TCPCT.

aggregation variable. An aggregation function that is placed in a report using either the FORM.BREAK, FORM.CALC, FORM.DETAIL, or FORM.FINAL panels. Its value appears as part of the break footing, detail block text, or final text when the report is produced.

alias. In DB2 UDB for OS/390, an alternate name that can be used in SQL statements to refer to a table or view in the same or a remote DB2 UDB for OS/390 subsystem. In OS/2, an alternate name used to identify a object, a database, or a network resource such as an LU. In QMF, a locally defined name used to access a QMF table or view stored on a local or remote DB2 UDB for OS/390 subsystem.

APAR. Authorized Program Analysis Report.

APPC. Advanced Program-to-Program Communication

application. A program written by QMF users that extends the capabilities of QMF without modifying the QMF licensed program. Started from a QMF session by issuing a RUN command for a QMF procedure, an installation-defined command, or a CMS or TSO command that invokes an EXEC or CLIST, respectively.

application requester. (1) A facility that accepts a database request from an application process and passes it to an application server. (2) In DRDA, the source of a request to a remote relational database management system.

The application requester is the DBMS code that handles the QMF end of the distributed connection. The local DB2 UDB for OS/390 subsystem to which QMF attaches is known as the application requester for QMF, because DB2 UDB for OS/390's application requester is installed within the local database

manager. Therefore, an entire DB2 UDB for OS/390 subsystem (including data) is associated with the application requester, but the SQL statements are processed at the current location. This subsystem is called the “local DB2 UDB for OS/390”.

With DB2 for VM and VSE the application requester runs in the same virtual machine as QMF; that is, no database is inherently associated with the DB2 for VM and VSE application requester.

application server. The target of a request from an application requester. (1) The local or remote database manager to which the application process is connected. The application server executes at the system containing the desired data. (2) In DRDA, the target of a request from an application requester. With DB2 UDB for OS/390, the application server is part of a full DB2 UDB for OS/390 subsystem.

With DB2 for VM and VSE, the application server is part of a DB2 for VM and VSE database machine.

application-support command. A QMF command that can be used within an application program to exchange information between the application program and QMF. These commands include INTERACT, MESSAGE, STATE, and QMF.

area separator. The barrier that separates the fixed area of a displayed report from the remainder of the report.

argument. An independent variable.

base QMF environment. The English-language environment of QMF, established when QMF is installed. Any other language environment is established after installation.

batch QMF session. A QMF session running in the background. Begins when a specified QMF procedure is invoked and ends when the procedure ends. During a background QMF session, no user interaction and panel display interaction are allowed.

bind. In DRDA, the process by which the SQL statements in an application program are made known to a database management system over application support protocol (and database support protocol) flows. During a bind, output from a precompiler or preprocessor is converted to a control structure called a package. In addition, access paths to the referenced data are selected and some authorization checking is performed. (Optionally in DB2 UDB for OS/390, the output may be an application plan.)

built-in function. Generic term for scalar function or column function. Can also be “function.”

calculation variable. CALCid is a special variable for forms that contains a user-defined calculated value. CALCid is defined on the FORM.CALC panel.

callable interface. A programming interface that provides access to QMF services. An application can access these services even when the application is running outside of a QMF session. Contrast with command interface.

chart. A graphic display of information in a report.

CICS. Customer Information Control System.

client. A functional unit that receives shared services from a server.

CMS. Conversational Monitor System.

column. A vertical set of tabular data. It has a particular data type (for example, character or numeric) and a name. The values in a column all have the same data characteristics.

column function. An operation that is applied once to all values in a column, returns a single value as a result, and is expressed in the form of a function name followed by one or more arguments enclosed in parentheses.

column heading. An alternative to the column name that a user can specify on a form. Not saved in the database, as are the column name and label.

column label. An alternative descriptor for a column of data that is saved in the database. When used, column labels appear by default on the form, but they can be changed by users.

column wrapping. Formatting values in a report so that they occupy several lines within a column. Often used when a column contains values whose length exceeds the column width.

command interface. An interface for running QMF commands. The QMF commands can only be issued from within an active QMF session. Contrast with callable interface.

command synonym. The verb or verb/object part of an installation-defined command. Users enter this for the command, followed by whatever other information is needed.

command synonym table. A table each of whose rows describes an installation-defined command. Each user can be assigned one of these tables.

commit. The process that makes a data change permanent. When a commit occurs, data locks are freed enabling other applications to reference the just-committed data. See also “rollback”.

concatenation. The combination of two strings into a single string by appending the second to the first.

connectivity. The enabling of different systems to communicate with each other. For example, connectivity between a DB2 UDB for OS/390 application requester and a DB2 for VM and VSE application server enables a DB2 UDB for OS/390 user to request data from a DB2 for VM and VSE database.

conversation. A logical connection between two programs over an LU 6.2 session that allows them to communicate with each other while processing a transaction.

correlation name. An alias for a table name, specified in the FROM clause of a SELECT query. When concatenated with a column name, it identifies the table to which the column belongs.

CP. The Control Program for VM.

CSECT. Control section.

current location. The application server to which the QMF session is currently connected. Except for connection-type statements, such as CONNECT (which are handled by the application requester), this server processes all the SQL statements. When initializing QMF, the current location is indicated by the DSQSDBNM startup program parameter. (If that parameter is not specified, the local DB2 UDB for OS/390 subsystem

current object. An object in temporary storage currently displayed. Contrast with saved object.

Customer Information Control System (CICS). An IBM licensed program that enables transactions entered at remote terminals to be processed concurrently by user-written application programs. It includes facilities for building, using, and maintaining databases.

DATA. An object in temporary storage that contains the information returned by a retrieval query. Information represented by alphanumeric characters contained in tables and formatted in reports.

database. A collection of data with a given structure for accepting, storing, and providing on demand data for multiple users. In DB2 UDB for OS/390, a created object that contains table spaces and index spaces. In DB2 for VM and VSE, a collection of tables, indexes, and supporting information (such as control information and data recovery information) maintained by the system. In OS/2, a collection of information, such as tables, views, and indexes.

database administrator. The person who controls the content of and access to a database.

database management system. A computer-based system for defining, creating, manipulating, controlling, managing, and using databases. The database management system also has transaction management and data recovery facilities to protect data integrity.

database manager. A program used to create and maintain a database and to communicate with programs requiring access to the database.

database server. (1) In DRDA, the target of a request received from an application server (2) In OS/2, a workstations that provides database services for its local database to database clients.

date. Designates a day, month, and year (a three-part value).

date/time default formats. Date and time formats specified by a database manager installation option. They can be the EUR, ISO, JIS, USA, or LOC (LOCAL) formats.

date/time data. The data in a table column with a DATE, TIME, or TIMESTAMP data type.

DB2 UDB for OS/390. DB2 Universal Database for OS/390 (an IBM relational database management system).

DB2 for AIX. DATABASE2 for AIX. The database manager for QMF's relational data.

DBCS. Double-byte character set.

DBMS. Database management system.

default form. The form created by QMF when a query is run. The default form is not created if a saved form is run with the query.

destination control table (DCT). In CICS, a table containing a definition for each transient data queue.

detail block text. The text in the body of the report associated with a particular row of data.

detail heading text. The text in the heading of a report. Whether or not headings will be printed is specified in FORM.DETAIL.

dialog panel. A panel that overlays part of a Prompted Query primary panel and extends the dialog that helps build a query.

distributed data. Data that is stored in more than one system in a network, and is available to remote users and application programs.

distributed database. A database that appears to users as a logical whole, locally accessible, but is comprised of databases in multiple locations.

distributed relational database. A distributed database where all data is stored according to the relational model.

Distributed Relational Database Architecture. A connection protocol for distributed relational database processing that is used by IBM and vendor relational database products.

distributed unit of work. A method of accessing distributed relational data in which users or applications can, within a single unit of work, submit SQL statements to multiple relational database management systems, but no more than one RDBMS per SQL statement.

DB2 UDB for OS/390 introduced a limited form of distributed unit of work support in its V2R2 called system-directed access, which QMF supports.

DOC. The keyword for a document problem.

double-byte character. An entity that requires two character bytes.

double-byte character set (DBCS). A set of characters in which each character is represented by two bytes. Languages such as Japanese, Chinese, and Korean, which contain more symbols that can be represented by 256 code points, require double-byte character sets. Because each character requires two bytes, the typing, display, and printing of DBCS characters requires hardware and programs that support DBCS. Contrast with single-byte character set.

DRDA. Distributed Relational Database Architecture.

duration. An amount of time expressed as a number followed by one of seven keywords: YEARS, MONTHS, DAYS, HOURS, MINUTES, SECONDS, MICROSECONDS.

EBCDIC. Extended Binary-Coded Decimal Interchange Code.

echo area. The part of the Prompted Query primary panel in which a prompted query is built.

EUR (European) format. A format that represents date and time values as follows:
- Date: dd.mm.yyyy
- Time: hh.mm.ss

extended syntax. QMF command syntax that is used by the QMF callable interface; this syntax defines variables that are stored in the storage acquired by the callable interface application and shared with QMF

example element. A symbol for a value to be used in a calculation or a condition in a QBE query.

example table. The framework of a QBE query.

fixed area. That part of a report that contains fixed columns.

fixed columns. The columns of a report that remain in place when the user scrolls horizontally. On multiple-page, printed reports, these columns are repeated on the left side of each page.

form. An object that contains the specifications for printing or displaying a report or chart. A form in temporary storage has the name of FORM.

function key table. A table containing function key definitions for one or more QMF panels, along with text describing the keys. Each user can be assigned one of these tables.

gateway. A functional unit that connects two computer networks of different network architectures. A gateway connects networks or systems of different architectures, as opposed to a bridge, which connects networks or systems with the same or similar architectures.

GDDM. Graphical Data Display Manager.

global variable. A variable that, once set, can be used for an entire QMF session. A global variable can be used in a procedure, query, or form. Contrast with run-time variable.

Graphical Data Display Manager. A group of routines that allows pictures to be defined and displayed procedurally through function routines that correspond to graphic primitives.

grouped row. A row of data in a QBE target or example table that is summarized either by a G. or a built-in function.

HELP. Additional information about an error message, a QMF panel, or a QMF command and its options.

host. A mainframe or mid-size processor that provides services in a network to a workstation.

HTML. Hypertext Markup Language. A standardized markup language for documents displayed on the World Wide Web.

ICU. Interactive Chart Utility.

INCORROUT. The keyword for incorrect output.

index. A collection of data about the locations of records in a table, allowing rapid access to a record with a given key.

initial procedure. A QMF procedure specified by the DSQSRUN parameter on the QMF start command which is executed immediately after QMF is invoked.

initialization program. A program that sets QMF program parameters. This program is specified by DSQSCMD in the callable interface. The default program for interactive QMF is DSQSCMD*n*, where *n* is the qualifier for the presiding language ('E' for English).

installation-defined command. A command created by an installation. QMF will process it as one of its own commands or as a combination of its commands.

installation-defined format. Date and time formats, also referred to as LOCAL formats, that are defined (or built) by the installation.

interactive execution. Execution of a QMF command in which any dialog that should take place between the user and QMF during the command's execution actually does take place.

interactive session. Any QMF session in which the user and QMF can interact. Could be started by another interactive session by using the QMF INTERACT command.

interactive switch. A conceptual switch which, when on, enables an application program to run QMF commands interactively.

invocation CLIST or EXEC. A program that invokes (starts) QMF.

ISO (International Standards Organization) format. A format that represents date and time values as follows:
- Date: yyyy-mm-dd
- Time: hh.mm.ss

ISPF. Interactive System Productivity Facility.

IXF. Integration Exchange Format: A protocol for transferring tabular data among various software products.

JCL. Job control language for OS/390.

job control. In VSE, a program called into storage to prepare each job or job step to be run. Some of its functions are to assign I/O devices to symbolic names, set switches for program use, log (or print) job control statements, and fetch the first phase of each job step.

JIS (Japanese Industrial Standard) format. A format that represents date and time values as follows:
- Date: yyyy-mm-dd
- Time: hh:mm:ss

join. A relational operation that allows retrieval of data from two or more tables based on matching columns that contain values of the same data type.

keyword parameter. An element of a QMF command consisting of a keyword and an assigned value.

like. Pertaining to two or more similar or identical IBM operating environments. For example, like distribution is distribution between two DB2 UDB for OS/390's with compatible server attribute levels. Contrast with "unlike".

literal. In programming languages, a lexical unit that directly represents a value. A character string whose value is given by the characters themselves.

linear procedure. Any procedure *not* beginning with a REXX comment. A linear procedure can contain QMF commands, comments, blank lines, RUN commands, and substitution variables. See also "procedure with logic."

linear syntax. QMF command syntax that is entered in one statement of a program or procedure, or that can be entered on the QMF command line.

line wrapping. Formatting table rows in a report so they occupy several lines. The row of column names and each row of column values are split into as many lines as are required by the line length of the report.

local. Pertaining to the relational database, data, or file that resides in the user's processor. See also "local DB2 UDB for OS/390", and contrast with *remote*.

local area network (LAN). (1) Two or more processors connected for local resource sharing (2) A network within a limited geographic area, such as a single office building, warehouse, or campus.

local data. Data that is maintained by the subsystem that is attempting to access the data. Contrast with remote data.

local DB2 UDB for OS/390. With DB2 UDB for OS/390, the application requester is part of a DB2 UDB for OS/390 subsystem that is running in the same MVS system as QMF. Therefore, an entire DB2 UDB for OS/390 subsystem (including data) is associated with the application requester, but the SQL statements are processed at the current location. This subsystem is where the QMF plan is bound.

When QMF runs in TSO, this subsystem is specified using DSQSSUBS startup program parameter. When QMF runs in CICS, this subsystem is identified in the Resource Control Table (RCT). The local DB2 UDB for OS/390 is the subsystem ID of the DB2 UDB for OS/390 that was started in the CICS region.

location. A specific relational database management system in a distributed relational database system. Each DB2 UDB for OS/390 subsystem is considered to be a location.

logical unit (LU). A port through which an end user accesses the SNA network to communicate with another end user and through which the end user accesses the functions provided by system services control points.

Logical Unit type 6.2 (LU 6.2). The SNA logical unit type that supports general communication between programs in a distributed processing environment.

LU. Logical unit.

LU 6.2. Logical Unit type 6.2.

LOOP. The keyword for an endless-loop problem.

MSGx. The keyword for a message problem.

Multiple Virtual Storage. Implies the MVS/ESA product

MVS/ESA. Multiple Virtual Storage/Enterprise System Architecture (IBM operating system).

NCP. Network Control Program.

Network Control Program (NCP). An IBM licensed program that provides communication controller support for single-domain, multiple-domain, and interconnected network capability.

NLF. National Language Feature. Any of several optional features available with QMF that lets the user select a language other than US English.

NLS. National Language Support.

node. In SNA, an end point of a link or a junction common to two or more links in a network. Nodes can be distributed to host processors, communication controllers, cluster controllers, or terminals. Nodes can vary in routing and other functional capabilities.

null. A special value used when there is no value for a given column in a row. *Null* is not the same as zero.

null value. See *null*.

object. A QMF query, form, procedure, profile, report, chart, data, or table. The report, chart, and data objects exist only in temporary storage; they cannot be saved in a database. The table object exists only in a database.

object name. A character string that identifies an object owned by a QMF user. The character string can be a maximum of 18 bytes long and must begin with an alphabetic character. The term "object name" does not include the "owner name" prefix. Users can access other user's objects only if authorized.

object panel. A QMF panel that can appear online after the execution of one QMF command and before the execution of another. Such panels include the home, report, and chart panels, and all the panels that display a QMF object. They do not include the list, help, prompt, and status panels.

online execution. The execution of a command from an object panel or by pressing a function key.

owner name. The authorization id of the user who creates a given object.

package. The control structure produced when the SQL statements in an application program are bound to a relational database management system. The database management system uses the control structure to process SQL statements encountered during statement execution.

panel. A particular arrangement of information, grouped together for presentation in a window. A panel can contain informational text, entry fields, options the user can choose from, or a mixture of these.

parameter. An element of a QMF command. This term is used generically in QMF documentation to reference a *keyword parameter* or a *positional parameter*.

partner logical unit. In SNA, the remote system in a session.

PERFM. The keyword for a performance problem.

permanent storage. The database where all tables and QMF objects are stored.

plan. A form of package where the SQL statements of several programs are collected together during bind to create a plan.

positional parameter. An element of a QMF command that must be placed in a certain position within the command.

primary panel. The main Prompted Query panel containing your query.

primary QMF session. An interactive session begun from outside QMF Within this session, other sessions can be started by using the INTERACT command.

procedure. An object that contains QMF commands. It can be run with a single RUN command. A procedure in temporary storage has the name of PROC. See also "linear procedure" and "procedure with logic."

procedure termination switch. A conceptual switch that a QMF MESSAGE command can turn on. While on, every QMF procedure to which control returns terminates immediately.

procedure with logic. Any QMF procedure beginning with a REXX comment. In a procedure with logic, you can perform conditional logic, make calculations, build strings, and pass commands back to the host environment. See also “linear procedure.”

profile. An object that contains information about the characteristics of the user’s session. A stored profile is a profile that has been saved in permanent storage. A profile in temporary storage has the name PROFILE. There can be only one profile for each user.

prompt panel. A panel that is displayed after an incomplete or incorrect QMF command has been issued.

Prompted Query. A query built in accordance with the user’s responses to a set of dialog panels.

protocol. The rules governing the functions of a communication system that must be followed if communication is to be achieved.

PSW. Program status word.

PTF. Program temporary fix.

QBE (Query-By-Example). A language used to write queries graphically. For more information see *Using QMF*

QMF administrative authority. At minimum, insert or delete priviledge for the Q.PROFILES control table.

QMF administrator. A QMF user with QMF administrative authority.

QMF command. Refers to any command that is part of the QMF language. Does **not** include installation-defined commands.

QMF session. All interactions between the user and QMF from the time the user invokes QMF until the EXIT command is issued.

qualifier. When referring to a QMF object, the part of the name that identifies the owner. When referring to a TSO data set, any part of the name that is separated from the rest of the name by periods. For example, ‘TCK’, ‘XYZ’, and ‘QUERY’ are all qualifiers in the data set name ‘TCK.XYZ.QUERY’.

query. An SQL or QBE statement, or a statement built from prompting, that performs data inquiries or manipulations. A saved query is an SQL query, QBE query, or Prompted Query that has been saved in a database. A query in temporary storage, has the name QUERY.

RDBMS. Relational database management system

relational database. A database perceived by its users as a collection of tables.

relational database management system (RDBMS). A computer-based system for defining, creating, manipulating, controlling, managing, and using relational databases.

remote. Pertaining to a relational DBMS other than the local relational DBMS.

remote data. Data that is maintained by a subsystem other than the subsystem that is attempting to access the data. Contrast with local data.

remote data access. Methods of retrieving data from remote locations. The two remote data access functions used by QMF are *remote unit of work* and DB2 UDB for OS/390-only distributed unit of work, which is called *system-directed access*.

remote unit of work. (1) The form of SQL distributed processing where the application is on a system different from the relational database and a single application server services all remote unit of work requests within a single logical unit of work. (2) A unit of work that allows for the remote preparation and execution of SQL statements.

report. The formatted data produced when a query is issued to retrieve data or a DISPLAY command is entered for a table or view.

REXX. Restructured extended executor.

rollback. The process that removes uncommitted database changes made by one application or user. When a rollback occurs, locks are freed and the state of the resource being changed is returned to its state at the last commit, rollback, or initiation. See also *commit*.

row. A horizontal set of tabular data.

row operator area. The leftmost column of a QBE target or example table.

run-time variable. A variable in a procedure or query whose value is specified by the user when the procedure or query is run. The value of a run-time variable is only available in the current procedure or query. Contrast with global variable.

sample tables. The tables that are shipped with QMF. Data in the sample tables is used to help new QMF users learn the product.

saved object. An object that has been saved in the database. Contrast with current object.

SBCS. Single-byte character set.

scalar. A value in a column or the value of a literal or an expression involving other scalars.

scalar function. An operation that produces a single value from another value and is expressed in the form of a function name followed by a list of arguments enclosed in parentheses.

screen. The physical surface of a display device upon which information is presented to the user.

scrollable area. The view of a displayed object that can be moved up, down, left, and right.

server. A functional unit that provides shared services to workstations over a network.

session. All interactions between the user and QMF from the time the user logs on until the user logs off.

single-byte character. A character whose internal representation consists of one byte. The letters of the Latin alphabet are examples of single-byte characters.

SNA. Systems Network Architecture.

SNAP dump. A dynamic dump of the contents of one or more storage areas that QMF generates during an abend.

sort priority. A specification in a retrieval query that causes the sorted values in one retrieved column to determine the sorting of values in another retrieved column.

SQL. Structured Query Language.

SQLCA. Structured Query Language Communication Area.

SSF. Software Support Facility. An IBM online database that allows for storage and retrieval of information about all current APARs and PTFs.

stored object. An object that has been saved in permanent storage. Contrast with current object.

string. A set of consecutive items of a similar type; for example, a character string.

Structured Query Language. A language used to communicate with DB2 UDB for OS/390 and DB2 for VSE or VM. Used to write queries in descriptive phrases.

subquery. A complete SQL query that appears in a WHERE or HAVING clause of another query (the main query or a higher-level subquery).

substitution variable. (1) A variable in a procedure or query whose value is specified either by a global variable or by a run-time variable. (2) A variable in a form whose value is specified by a global variable.

substring. The part of a string whose beginning and length are specified in the SUBSTR function.

System Log (SYSLOG). A data set or file in which job-related information, operational data, descriptions of unusual occurrences, commands, and messages to and from the operator may be stored.

Systems Network Architecture. The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through and controlling the configuration and operation of networks.

table. A named collection of data under the control of the relational database manager. A table consists of a fixed number of rows and columns.

Table Editor. The QMF interactive editor that lets authorized users make changes to a database without having to write a query.

table name area. The leftmost column of a QBE example table.

tabular data. The data in columns. The content and the form of the data is specified on FORM.MAIN and FORM.COLUMNS.

target table. An empty table in which example elements are used to combine columns, combine rows, or include constant values in a report.

temporary storage. An area where the query, form, procedure, profile, report, chart, and data objects in current use are stored. All but the data object can be displayed.

temporary storage queue. In CICS, a temporary storage area used for transfer of objects between QMF and an application or a system service.

time. Designates a time of day in hours and minutes and possibly seconds (a two- or three-part value).

thread. The DB2 UDB for OS/390 structure that describes an application's connection, traces its progress, provides resource function processing capability, and delimits its accessibility to DB2 UDB for OS/390 resources and services. Most DB2 UDB for OS/390 functions execute under a thread structure.

three-part name. A fully-qualified name of a table or view, consisting of a location name, owner ID, and object name. When supported by the application server (that is, DB2 UDB for OS/390), a three-part name can be used in an SQL statement to retrieve or update the specified table or view at the specified location.

timestamp. A date and a time, and possibly a number of microseconds (a six- or seven-part value).

TP. Transaction Program

TPN. Transaction program name

transaction. The work that occurs between 'Begin Unit of Work' and 'Commit' or 'Rollback'.

transaction program. A program that processes transactions in an SNA network. There are two kinds of transactions programs: application transaction programs and service transaction programs.

transaction program name. The name by which each program participating in an LU 6.2 conversation is known. Normally, the initiator of a connection identifies the name of the program it wants to connect to at the other LU. When used in conjunction with an LU name, it identifies a specific transaction program in the network.

transient data queue. In CICS, a storage area, whose name is defined in the Destination Control Table (DCT), where objects are stored for subsequent internal or external processing.

TSO. Time Sharing Option.

two-phase commit. A protocol used in distributed unit of work to ensure that participating relational database management systems commit or roll back a unit of work consistently.

unit of work. (1) A recoverable sequence of operations within an application process. At any time, an application process is a single unit of work, but the life of an application process may involve many units of work as a result of commit or rollback operations. (2) In DRDA, a sequence of SQL commands that the database manager treats as a single entity. The database manager ensures the consistency of data by verifying that either all the data changes made during a unit of work are performed or none of them are performed.

unlike. Refers to two or more different IBM operating environments. For example, unlike distribution is distribution between DB2 for VM and VSE and DB2 UDB for OS/390. Contrast with *like*.

unnamed column. An empty column added to an example table. Like a target table, it is used to combine columns, combine rows, or include constant values in a report.

USA (United States of America) format. A format that represents date and time values as follows:
- Date: mm/dd/yyyy
- Time: hh:mm xM

value. A data element with an assigned row and column in a table.

variation. A data formatting definition specified on a FORM.DETAIL panel that conditionally can be used to format a report or part of a report.

view. An alternative representation of data from one or more tables. It can include all or some of the columns contained in the table or tables on which it is defined. (2) The entity or entities that define the scope of the data to be searched for a query.

Virtual Storage Extended. An operating system that is an extension of Disk Operating System/ Virtual Storage. A VSE consists of (1) VSE/Advanced Functions support and (2) any IBM-supplied and user-written programs that are required to meet the data processing needs of a user. VSE and the hardware it controls form a complete computing system.

VM. Virtual Machine (IBM operating system). The generic term for the VM/ESA environment.

VSE. Virtual Storage Extended (IBM operating system). The generic term for the VSE/ESA environment.

WAIT. The keyword for an endless-wait-state problem.

window. A rectangular portion of the screen in which all or a portion of a panel is displayed. A window can be smaller than or equal to the size of the screen.

Workstation Database Server. The IBM family of DRDA database products on the UNIX and Intel platforms (such as DB2 Universal Database (UDB), DB2 Common Server, DB2 Parallel Edition, and DataJoiner.)

wrapping. See “column wrapping” and “line wrapping”.

Bibliography

The following lists do not include all the books for a particular library. To get copies of any of these books, or to get more information about a particular library, contact your IBM representative.

For a list of QMF publications, see “The QMF Library” on page xiii.

APPC Publications

Communicating with APPC and CPI-C: A Technical Overview
Networking with APPC: An Overview

CICS Publications

CICS Transaction Server for OS390

CICS/OS390 User’s Handbook
CICS/OS390 Application ProgrammerÆs Reference
CICS/OS390 Application Programming Guide
CICS/OS390 DB2 Guide
CICS/OS390 Resource Definition (Macro)
CICS/OS390 Resource Definition (Online)
CICS/OS390 Problem Determination Guide
CICS/OS390 System Definition Guide
CICS/OS390 Intercommunication Guide
CICS/OS390 Performance Tuning Handbook

CICS for VSE

- *CICS for VSE/ESA User’s Handbook*
- *CICS for VSE/ESA Application Programmer’s Reference*
- *CICS for VSE/ESA Application Programming Guide*
- *CICS for VSE/ESA Resource Definition (Macro)*
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COBOL Publications

VS COBOL II Application Programming Guide for VSE
COBOL/VSE Language Reference
COBOL/VSE Programming Guide

DATABASE 2 Publications

DB2 UDB for OS390

DB2 UDB for OS390 Installation Guide
DB2 UDB for OS390 Administration Guide
DB2 UDB for OS390 SQL Reference
DB2 UDB for OS390 Command Reference
DB2 UDB for OS390 Application Programming and SQL Guide
DB2 UDB for OS390 Message and Codes
DB2 UDB for OS390 Uitility Guide and Reference
DB2 UDB for OS390 Call Level Interface Guide and Reference
DB2 UDB for OS390 Reference for Remote DRDA Requesters and Servers

DB2 for VSE & VM

DB2 Server for VM Installation Guide
DB2 Server for VSE Installation Guide
DB2 Server for VSE & VM Database Administration
DB2 Server for VM System Administration
DB2 Server for VSE System Administration
DB2 Server for VSE & VM Operation
DB2 Server for VSE & VM SQL Reference
DB2 Server for VSE & VM Application Programming
DB2 Server for VSE & VM Interactive SQL Guide and Reference
DB2 Server for VSE & VM Database Services Utility
DB2 Server for VM Message and Codes
DB2 Server for VSE Message and Codes
DB2 Server for VSE & VM Diagnostic Guide and Reference
DB2 Server for VSE & VM Performance Tuning Handbook

DB2 for AS/400

DB2 for AS/400 SQL Reference
DB2 for AS/400 SQL Programming

Parallel Edition

DB2 Parallel Edition Administration Guide and Reference

DB2 Universal Database

DB2 Universal Database Command Reference
DB2 Universal Database SQL Reference
DB2 Universal Database Message Reference

DataJoiner

DataJoiner Application Programming and SQL Reference Supplement

DCF Publications

DCF and DLF General Information

DRDA Publications

DRDA Every Manager's Guide
DRDA Connectivity Guide

DXT Publications

DXT Guide to Dialogs
Data Extract: Planning and Administration Guide for Dialogs
Data Extract: UserÆs Guide
Learning to Use DXT

Graphical Data Display Manager (GDDM) Publications

GDDM General Information
GDDM Base Programming Reference
GDDM Base Programming Guide
GDDM Guide for Users
GDDM Installation and System Management for VSE
GDDM Messages

HLASM Publications

IBM High-Level Assembler Programmer's Guide for OS/390, VM and VSE
IBM High-Level Assembler Language Reference for OS/390, VM and VSE

ISPF/PDF Publications

OS/390

Interactive System Productivity Facility for OS/390 Installation and Customization
Interactive System Productivity Facility for OS/390 Dialog Management Guide
Interactive System Productivity Facility for OS/390 Dialog Management Services and Examples

VM

ISPF for VM Dialog Management Services and Examples

OS/390 Publications

Utilities

OS/390 Administration: Utilities
OS/390 Extended Architecture Utilities

JCL

OS/390 Extended Architecture JCL Reference
OS/390 Extended Architecture JCL User's Guide
OS/390 JCL Reference
OS/390 JCL Users Guide

Pageable Link Pack Area (PLPA)

OS/390 Extended Architecture Initialization and Tuning
OS/390 SPL: Initialization and Tuning

VSAM

OS/390 VSAM Administration Guide
OS/390 VSAM Catalog Administration Access Method Services

TSO

OS/390 TSO Primer
OS/390 User's Guide

SMP/E

OS/390 System Modification Program Extended Messages and Codes
OS/390 System Modification Program Extended Primer
OS/390 System Modification Program Extended Reference
OS/390 System Modification Program Extended User's Guide

PL/I Publications

PL/I VSE Language Reference
PL/I VSE Programming Guide

REXX Publications

OS/390 environment

IBM Compiler and Library for REXX/370: UserÆs Guide and Reference
TSO Extensions REXX/MVS Reference

VM environment

Procedures Language VM/REXX Reference
Procedures Language VM/REXX User's Guide

ServiceLink Publications

ServiceLink User's Guide

VM Publications

Virtual Machine Planning Guide and Reference
Virtual Machine CMS Command and Macro Reference

VSE Publications

VSE Planning Guide
VSE Guide to System Functions
VSE System Utilities
VSE Guide for Solving Problems

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