



User Manual

MDXREF

Application Analysis Tool
from
Midrange Dynamics

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MDXREF - Table of Contents

1	OVERVIEW OF THE MDXREF MANUAL	4
1.1	Common Function Keys and their usage throughout MDXREF	4
2	SETUP MDXREF	4
2.1	Authorizing Users to run MDXREF	4
2.2	Setting the License Key	4
2.3	System Settings	5
2.3.1	Setting the JVM to be used for MDXREF Java Modules	6
2.4	Email Settings	7
2.4.1	Email Addresses	8
2.4.2	Email Log	8
2.4.3	MDSTRMAIL - Running MDMAIL SMTP Client	9
2.4.4	MDENDMAIL - Ending MDMAIL SMTP Client	9
3	BUILDING THE MDXREF DATABASE	10
3.1	Application/Level Selection	10
3.2	Add Application Level	12
3.3	Libraries to cross-reference	13
3.4	Table Object Definitions	16
3.4.1	Table Object Definition Listing	16
3.4.2	Table Object Definition Detail	17
3.4.3	Table Object Description Definition Detail	19
3.4.4	Table Object Reference Listing	20
3.4.5	Table Object Reference Definition Detail	21
3.5	X-Analysis Libraries for Level	23
3.6	XREFBLDLIB – Update Xref Info for a Level or Library API	24
3.7	XREFRMVLIB – Remove Xref Info for a Library API	24
3.8	MDXUPDOBJ – Update Xref Info for an Object API	25
3.9	MDXUPDSRC – Update Xref Info for Source API	25
4	USING THE MDXREF NAVIGATION SCREENS	26
4.1	Object/Source Search Display	26
4.1.1	Function Keys specific to Screen 1	27
4.2	Object Listing	28
4.3	Valid Object Options in MDXREF	29
4.3.1	A – Display the object attributes	29
4.3.2	C – List the Copybooks used	29
4.3.3	C – Compare File Data (for physical files only)	29
4.3.4	D – Display the object description	31
4.3.5	E – Exported Procedures	31
4.3.6	F – Full Name	31
4.3.7	F – Process Flow Reports	32
4.3.8	I – Imported Procedures	32
4.3.9	J – Journal Analysis report (for Physical files only)	32
4.3.10	L – Linked Objects / Linked Files	36
4.3.11	M – ILE Modules bound by a Program or Service Program	37
4.3.12	P – All Relational Dependencies Report	37
4.3.13	P – Process Flow Reports	38
4.3.14	Q – Query the contents of a file or data area	39
4.3.15	S – View the source member from which the object was compiled	40
4.3.16	S – View a source member contained in a source file	40
4.3.17	V – Service Information	40
4.3.18	X – XREF Refresh for Object	40
4.3.19	1 – Display list of Objects using File or Module	41
4.3.20	2 – Display list of Files used by Object	43
4.3.21	3 – Display list of Objects calling selected Object	43
4.3.22	4 – Display list of Objects called	43
4.3.23	5 – Display list of Fields in File	44



4.3.24	6 – Display Key Structure/Selection Rules for File	45
4.3.25	7 – Display Join Field Information for File	46
4.3.26	9 – Display CPYF/OVRDBF Information for File	47
4.4	Source Listing	47
4.5	Valid Source Options in MDXREF	48
4.5.1	C – Compare Source Members	48
4.5.2	D – Source Member Description	49
4.5.3	P – Programs using Source	49
4.5.4	S – View Contents of Source Member	49
5	REPORT MENU	50
5.1	Object Library Comparison	50
5.2	Source Library Comparison	52
5.3	Search for duplicate Objects between 2 Environments	54
5.4	Check usage of a Library	55
5.5	Search for Fields	56
5.5.1	Field Search	56
5.5.2	Field Search Results	58
5.6	Search for Query Definitions	59
5.7	Process Flow Reports for Level	60
5.7.1	Generate Process Flow Report	60
5.7.2	Generate Object Catalog	62
5.7.3	Generate File Usage Report	62
6	REPORTING	63
6.1	MDRUNRPT – Run MD Report command	64
6.2	MDEXPSPLF – Export Spooled File command	66



1 Overview of the MDXREF Manual

The purpose of this manual is to provide a fundamental understanding of how to use the **MDXREF** product from Midrange Dynamics. **MDXREF** is a tool that runs directly on the IBMi (iSeries, AS/400) to help you easily navigate through your software application source/objects and their relationships to each other.

1.1 Common Function Keys and their usage throughout MDXREF

Enter – process all entered information on the current screen. For example, from the first screen, press Enter to then display all objects that match the filter values entered on the first screen.

F3 - exit MDXREF from Screen 1; otherwise, exit to previous process within MDXREF.

F4 - browse a list of possible values for a field upon which the cursor is located. Most entry-capable Fields may be browsed in MDXREF.

F5 – refresh the information in the list

F11 – view the output generated by reports within MDXREF or work with all spooled files for your user profile.

F15 – available on all screens that display a list. F15 creates an electronic report based on the selection values in the listing screen. F11 can then be pressed to view/print/export the output.

F21 – provides a command line for the entry of IBMi commands

2 Setup MDXREF

2.1 Authorizing Users to run MDXREF

MDSEC is included with MDXREF and is used to administer the list of authorized MDXREF users. MDSEC administration can be performed by using command MDSEC.

To modify the list of authorized users, you must have either *SECADM or *SECOFR authority, or have been granted administration authority within MDSEC.

MDXREF is controlled by MDSEC application md.

Administrators will require General Access + codes 1, 3, 4, 11, 12, 13, 14 and 15 which are all contained in the default definition for MDSEC User Role MD_ADMXREF.

General users of MDXREF will require General Access + code 1 which are contained in the default definition for MDSEC User Role MD_USER.

Refer to the MDSEC documentation for complete instructions.

2.2 Setting the License Key

A unique 16-character license key is required to fully run products from Midrange Dynamics. The key is based partly upon the serial number and partition ID of the licensed IBMi partition. Midrange Dynamics will provide you with the license key for your IBMi at the time of purchase.

If you replace your existing IBMi, or the existing License Key has expired, please contact Midrange Dynamics and a new License Key will be provided. You will be automatically prompted for the license key at install time or whenever the existing key is no longer valid. You can also view/change the key at any time from the MDSEC menu.



2.3 System Settings

```

MDCSYSI                               System Settings                               04.09.08
SCRN1                                  10:37:42

Location Title . . . . . COMPANY NAME
Location ID . . . . . COMP1 (0-9, A-Z)
Send Prefix . . . . . 6 0-9, A-Z

Java Connect User Profile . . MDCONNECT *NONE, Profile
Sign Objects . . . . . Y Y/N

Default CCSID . . . . . 1148

Temporary Library Prefixes:
RFP Backup . . . . . SAV Example SAV123456 MDCMS ONLY
RFP Installation . . . . . CMS CMS123456
RFP Receipt . . . . . MD0 MD01123456
RFP Rollback . . . . . MDR MDRB123456

MD Build Date . . . . . 4.11.10
MD Installation Date . . . . 4.11.10

F3=Exit F4=Browse

```

The system settings can be managed from MDSEC menu option 11.

Location Title

The title to be displayed at the top of nearly all MD Product screens to help the user identify which system they are currently working on.

Location ID

A 10-Character ID to uniquely identify this system. The ID for this system must match the ID defined in the OS/400 location settings for any partition that will be connecting to this system.

Send Prefix

A 1-Character ID to uniquely identify distributions from this system. This is used to avoid conflicts in case multiple systems send Promotions to the same remote system. The temporary receiving library on the remote system will use this character in the 4th position of the library name.

Java Connect User Profile

The technical user profile on this system to be used to run MDXREF java modules.

Java is used in MDXREF for Excel and PDF report generation, sending emails, and Zip compression. F4 may be used to browse user profiles.

*NONE – java modules should not be used on this system. Recommended only if a JVM with minimum version of 1.4 is not present on the system.

Sign Objects (MDCMS Only)

Y – Sign Objects as they are being installed to ensure that they are not manually changed during the promotion process

N – Do not sign objects. Recommended only if the necessary IBM Java Encryption Libraries are not present on the system.



Default CCSID (MDCMS Only)

The Coded Character Set to use by default when communicating with this system using MDOpen or MDWorkflow. This ensures that characters are displayed in the form and order that is expected for the user's locale within those clients. If certain users require a different CCSID, that value can be defined for the user in MDSEC. F4 may be used to browse the list of CCSIDs defined for use in MDCMS.

Temporary Library Prefixes (MDCMS Only)

The prefix string to add to the front of each type of temporary library in MDCMS. The prefix may be changed so that conflicts can be avoided when multiple instances of MDCMS exist on the same system.

MD Build Date

The date that this version of MDXREF was built by Midrange Dynamics

MD Install Date

The date that this version of MDXREF was installed onto this system

2.3.1 Setting the JVM to be used for MDXREF Java Modules

MDXREF uses Java for various processes relating to Excel generation, PDF generation, SMTP, and Zipping. In order to carry out these processes, a JVM (minimum 1.4) must be installed on each system partition where MDXREF will be used. If PDF generation will be utilized, the JVM must be a minimum of 1.5.

Data area MDSEC(instance)/MDJAVAHOME designates which installed JVM is to be used.

The valid values for this data area are:

*DFT – use the default JVM

*PROFFILE – load the JVM based on the settings in property file /mdcms/JAVA/mdcms.properties
A pathname pointing to a JVM (for example: /QOpenSys/QIBM/ProdData/JavaVM/jdk50/32bit)

If a JVM is not available on the system, *NONE can be specified for the Java Connect User in the System Settings (MDSEC Menu Option 11). This will disable all java-related functionality, while still allowing all MDXREF core functionality to be performed.



2.4 Email Settings

MDCSMTP	COMPANY NAME	04.09.08
SCRN1	Email Settings	10:37:42
SMTP Hostname . . .	<u>mail.company.com</u>	
SMTP Port	<u>25</u>	
SMTP User	<u>as400@company.com</u>	
Password	<u> </u>	
Repeat Password .	<u> </u>	
email Address . .	<u>as400@company.com</u>	
SMTP Auth Reqd .	<u>Y</u> Y/N	
SMTP Logging . .	<u>Y</u> Y/N	
Use SMTPS	<u>N</u> Y/N	
ZIP Attachments .	<u>300</u> *ALWAYS, *NEVER, minimum size in KB	
MDWorkflow URL .	<u>http://company.com:8080/mdWorkflow</u>	
F3=Exit	F8=Addresses	F10=Log

The Email settings can be managed from MDSEC menu option 12.

SMTP Hostname

The IP address or domain name of the SMTP server which will send emails to recipients

SMTP Port

The SMTP server Port number, which normally is 25 for SMTP and 465 for SMTPS

SMTP User

The ID of the user to connect to the SMTP server

Password

The password for the SMTP user

email Address

The sender address to use for the system

SMTP Auth Reqd

Y – The SMTP Server requires user authorization to occur

N – The SMTP Server does not require user authorization to occur

SMTP Logging

Y – A QPRINT console log will be kept for the MDMAIL SMTP client job

N – A console log will not be kept

Use SMTPS

Y – Connect to the SMTP Server using SMTP Secure (SSL)

N – Connect to the SMTP Server in unsecured mode



ZIP Attachments

*ALWAYS – attached files will be always be zipped to reduce the size of the emails

*NEVER – attached files will never be zipped

n KB – an attached file will only be zipped if it is larger than the entered number of Kilobytes

MDWorkflow URL

The context path for links to the MDWorkflow application. This must include http or https, the server address, port number if not 80 and the name of the web application.

This URL is used within MDMAILF email bodies to allow the user to navigate directly to a specific RFP and is used when generating Project, Task or Subtask mails out of MDWorkflow.

2.4.1 Email Addresses

The email addresses of the recipients can be maintained by pressing F8 from the Email Settings screen. If DDM connections are defined, the updates will be synced to all locations.

User ID

The user profile of the user. If the user does not have a profile on the system, any other ID of up to 10 characters can be used.

Name

The Name to be recipient to be displayed in the mail header

Address

The email address of the recipient

2.4.2 Email Log

Each time the MDMAIL job is used to send an email, a log entry will be written to MDSEC file MDDEMLL with the following information:

Date

Time

Job

Recipients

Subject

Attachments

Error Message

F10 can be pressed from the Email Settings screen to view/search log entries



2.4.3 MDSTRMAIL - Running MDMAIL SMTP Client

In order for MDWorkflow, the MDMAIL API or the MDMAILF API to send an email, the MDMAIL SMTP client must be running. Command MDSEC(Instance)/MDSTRMAIL can be added to a scheduled job for a fixed starting time.

MDSTRMAIL Parameters

Environment ID	The name of the MDXREF instance (or suffix) - *DFT refers to MDXREF being used in library MDXREF. For a different library suffix, this would be entered for the environment ID.
Submit Job	*YES – a job named MDMAIL(instance) will be submitted to the entered Job Queue *NO – the MDMAIL process will run within the current job
Job Queue	*DFT – submit to the queue defined for the MDMAIL service *JOBQ – submit to the default queue for the running job profile The name of the job queue to submit MDMAIL to
Job Queue Library	The library of the job queue to submit MDMAIL to or *LIBL if the job queue is located in the current library list
Time of Day to auto-end Job	*DFT – end at the time defined for the MDMAIL service *NEVER – the MDMAIL job shouldn't end automatically – it should run until the job is forcibly ended or command MDENDMAIL is invoked. A specific time to end in format HH:MM:SS

2.4.4 MDENDMAIL - Ending MDMAIL SMTP Client

The MDMAIL job can be ended at any time using command MDSEC(Instance)/MDENDMAIL. Once MDENDMAIL is run, MDMAIL will cleanly stop within 30 seconds.

MDENDMAIL Parameters

Environment ID	The name of the MDXREF instance (or suffix) - *DFT refers to MDXREF being used in library MDXREF. For a different library suffix, this would be entered for the environment ID.
----------------	---



3 Building the MDXREF Database

Before information can be used in MDXREF, it must be retrieved using the Build process. The amount of time that the Build requires depends on the size of the libraries involved in the Build. On a typical production IBMi, the Build would require ~20 minutes to complete the database for 1000 files and 2500 programs.

The entire database, individual applications, individual libraries, or individual objects can then be rebuilt at any time if a manual change to the objects occurs. If **MDCMS** is used to change objects, then MDXREF is automatically updated and a rebuild is not required.

The Build process is invoked by pressing **F9** from MDXREF Screen titled **Cross-Reference Display** (MDC2KXF). If **F9** is not allowed for you, then administration authorization has not been granted to you through **MDSEC**. See the *Authorizing Users to run MDXREF* on page **Error! Bookmark not defined.** for more details.

3.1 Application/Level Selection

```

MDCINXF                               Company Name                16.03.15
SCRN1                                  Application/Level Selection  18:42:55

Filter by Lvl: __  Library: _____

Type options, press Enter.
  L=Libraries  P=Periodic Update  T=Table Defs  X=XREF Level  2=Edit  4=Delete
Pos:
Opt  Appl Lvl  Description                               Oldest Build  Tab  XA
  _   ACCT 10  Test Env                               16.03.15      Y
  _   ACCT 50  Prod Env                               not built     Y

                                                                 Bottom

F3=Exit  F4=Browse  F5=Refresh  F6=Add Level
  
```

Opt

L	view/edit the list of libraries to include for the Application Level
P	create a scheduled job to periodically update all libraries listed with the Application Level. The ADDJOBSCDE command is invoked with the necessary parameters to create the job. The update may be scheduled through this job to occur daily, weekly, or monthly. In order to edit or delete the scheduled job, use the command WRKJOBSCDE.
T	view/edit the Table Object Definitions. Table Object Definitions allow for cross-referencing between soft components (table records) and objects
X	Perform a one-time build or rebuild of the MDXREF database for all libraries listed within the selected Application Level. You will then be prompted for the job queue and scheduled date/time for the build job.
2	Edit the Description for the Application Level. If MDXREF is installed as part of MDCMS, the level must be edited from the MDCMS Setup menu.
4	Delete the Application Level and all cross-referencing information for the level. If MDXREF is installed as part of MDCMS, the level must be deleted from the MDCMS Setup menu.
9	Link X-Analysis Data Libraries to MDXREF Levels. X-Analysis is an application modelling



product from Fresche Legacy. If a link exists, then when MDCMS installs an object into the Application Level, the information for that object will be refreshed in that instance of X-Analysis. This option is only applicable if MDCMS is installed.

Appl

An Application is an In-House or 3rd party Software Product that resides on the IBMi.

Lvl

A Level is a coherent grouping of libraries, or application environment, that a cross-reference is to be built over. This usually resembles the library list of an application's job at runtime. For example, the application ACCT may have a level 10 for test libraries and 90 for production libraries.

Oldest Build

The oldest build date for the list of libraries referenced by the level

Tab

Y=One or more Table Definitions exist for the given Appl/Lvl

XA

Y=One or more X-Analysis Libraries are linked to the given Appl/Lvl

Function Keys:

F4 – Browse list of referenced libraries once cursor is placed on Filter by Library field

F5 – Refresh the list

F6 – Add a new Application Level. If MDXREF is installed as part of MDCMS, the level must be added from the MDCMS Setup menu.



3.2 Add Application Level

If MDXREF is installed as a standalone product, F6 can be pressed from the Level Listing to create an Application Level.

MDCINXF	COMPANY NAME	21.04.13
SCRN3	Add Application Level	13:15:20
Application: _____		
Level: _____		
Description: _____		
Enter=Confirm F4=Browse F12=Previous		

Appl

An Application is an In-House or 3rd party Software Product that resides on the IBMi.
Press F4 to add and/or select an Application code

Lvl

A Level is a 2-Digit value representing a coherent grouping of libraries, or application environment, that a cross-reference is to be built over. This usually resembles the library list of an application's job at runtime. For example, the application ACCT may have a level 10 for test libraries and 90 for production libraries.

Description

Description for level shown on screens and reports throughout MDXREF

Library

A library may be added to the library list by entering the name of the library on a blank line. F4 may be pressed to browse the list of user libraries on the system. Multiple libraries may be simultaneously selected from the browse screen.

***AJSE** – Advanced Job Scheduler Job entries can be included in the Cross-Reference database by including library *AJSE.

***GIT** – Source that is stored in Git repositories can be directly inspected for SQL and system object references. The definition of the Git repositories and the types of source to inspect are maintained from MDOpen->Settings->Git Repositories.

Having *GIT registered as a library in MDXREF provides a means to have all defined Git repositories re-checked for references on a scheduled or on-demand basis.

***IFS** – Build a list of all folders and files in the IFS file system. This information can then be viewed from MDOpen, the MD Plug-in for Eclipse/Rational Developer for i (RDi).

If only the files and subfolders of a specific folder should be refreshed, this can be performed directly from the MDXREF IFS view in MDOpen by right-clicking on a folder and selecting option Refresh.

In addition to building the contents of the IFS folders, referencing from java and php files to database objects is also added. A java or php file will only be considered if the file resides in a folder or subfolder within the path of an MDCMS attribute of type *IFS.

***IWS** - REST and SOAP Web Services that are deployed to the IBM Integrated Web Services Server can be added to the Cross-Reference database by including library *IWS. This will list each deployed service for each existing IWS Server along with the attribute of REST or SOAP and the reference to the ILE program or Service Program that the service invokes.

***ROBOT** – If the Help/Systems job scheduling product, ROBOT/Schedule, is installed on the system, it's jobs can be included in the Cross-Reference database by including library *ROBOT.

***SCDE** – Job Scheduled entries can be included in the Cross-Reference database by including library *SCDE.

***SVN** – Source that is stored in SVN (Subversion) repositories can be directly inspected for SQL and system object references. The definition of the SVN repositories and the types of source to inspect are maintained from MDOpen->Settings->SVN Repositories.

Having *SVN registered as a library in MDXREF provides a means to have all defined SVN repositories re-checked for references on a scheduled or on-demand basis.

Status

PEND	The Cross-Reference build job has been submitted and will process the library once the prior libraries in the list have been built
FAILED	The Cross-Reference build job ended abnormally and should be resubmitted
ACTIVE	The Cross-Reference build job is actively cross referencing the library
BUILT	The Library has been completely cross-referenced

Last XREF

The most recent date that a full cross reference build has been performed on the library. If all changes to the library are made by MDCMS, the data will still be accurate even if the build date is quite old.



Elapsed Time

The amount of time in hours:minutes:seconds that MDXREF required to process that library. If the status is ACTIVE, then it is the amount of time that has elapsed so far.

Function Keys:

F4 – Browse list of libraries to select one or more for this Application Level

F8 – If MDCMS is installed to maintain the applications, the library list defined for the job description for the application and level may be retrieved by pressing F8. Any libraries not already in the build list are then added to the end of the list and all libraries are resorted based on the order of the libraries in the job description.



3.4 Table Object Definitions

Table Object Definitions provide the ability to describe objects and references defined in Tables. Such Soft Component tables are typically found in 4GLs, Case Tools, Middleware processes and Table-Driven menus.

The values of a field in a table can be identified as an Object and a 2nd field in the same or different table can be identified as the object description. Each Object generated by the definition is presented in the MDXREF screens and reports with object type *RT(table id).

Any number of additional table fields can be identified as object or file references. All tables can be linked by object name or join field values and SQL conditions can be defined.

3.4.1 Table Object Definition Listing

MDCTBLO	COMPANY NAME		21.04.13
SCRN1	Table Object Definitions		13:55:14
Filters:			
Appl	Lvl	Table ID	Description
MD	10		
Type options, press Enter.			
2=Edit	3=Copy	4=Delete	5=Display
D=Desc Def	R=Reference Defs	X=XREF	
Opt	Appl	Lvl	Table ID
-	MD	10	OPEN
-	MD	10	WFLW
			Description
			File
			Library
			MDOpen Functions
			MDDRFUN
			MDREPT
			MDWorkflow Functions
			MDDRFUN
			MDREPT
			Bottom
F3=Exit	F4=Browse	F5=Refresh	F6=Add

This screen displays the current list of Table Definitions. It is accessed by option T from the Level listing or Library listing. It also allows the user to add, edit or remove definitions from the listing if they are authorized to MDSEC Code 4 for the application.

Filters

The rows that are listed can be limited to those rows that match the values in the filters. F4 can be used to select a value from a list for all except the Description filter.

The Description filter will list a row where the filter value appears anywhere within the Table description.

Opt

2	Edit a Table Object definition
3	Create a new Table Object definition based on the values of the selected definition. If the new Table ID is the same as the existing Table ID, the Description and Reference definitions will also be copied and the library name will be automatically updated. Otherwise, only the Object definition is copied.
4	Delete a Table Object definition
5	Display a Table Object definition
D	View/Edit the Description definition for the objects
R	View/Edit the Reference definitions for the objects
X	Build the Cross-Reference information for the specific Table Object Definition



Function Keys:

- F4** – Browse list of valid values for a filter field
- F5** – Refresh the list
- F6** – Add a new Table Object definition

3.4.2 Table Object Definition Detail

MDCTBLO	MD Dev	5.06.17
SCRN2	Edit Table Object Definition	11:08:39
Appl/Level . . .	MD 12	
Table ID . . .	OPEN	
Description . . .	<u>MDOpen Functions</u>	
File	<u>MDDRFUN</u>	*CONSTANT = 1 Object with fixed Name
Library	<u>MDREPT8</u>	
Object	<u>MDFUN</u>	
Join Field . . .	<u>MDPGM</u>	
Condition	<u>MDFUN NOT LIKE "W%"</u>	
Enter=Confirm F4=Browse F8=Test Definition F12=Previous		

This screen contains the parameters to describe a Table Object.

Application

The MDXREF Application to contain the Table Object definition

Level

The MDXREF Application Level to contain the Table Object definition

Table ID

The Table ID is a 4-character code to uniquely identify the Table Object Definition for the Level. The resulting objects are assigned the Object Type *RT(Table ID) and the Object Attribute RT(Table ID)

Description

A description of the Table Object Definition. If a Description definition is not defined for the Table ID, the description is also displayed in the MDXREF screens for the resulting objects.

File

The File name and Library of the Table that contains the Object names.

*CONSTANT – results in one Object named in the Object field



Object

If a file is defined, this field contains the SQL syntax for the resulting object names of the table objects.

The name can be any combination of field names that exist in the file plus any constants. Use SQL word CONCAT to combine values, function SUBSTR to use a portion of a field, and function DIGITS to convert a numeric value to an alphanumeric value.

Constants should be surrounded by the double-quote (") value.

Any other SQL accepted syntax and functions may also be used here or for any field variable within the Table Definitions configuration.

If *CONSTANT is used for the file, this field contains the name of the object (without quotes).

Join Field

If the Object definition file uses a separate field to join the definition to the file containing the Description definition or Reference Definition, this field (or SQL result column) can be entered here.

Condition

A valid SQL condition (without the WHERE clause) can be defined to limit the records in the file to those matching the condition.

Function Keys:

F4 – Browse list of valid values for a field

F8 – immediately run a test to ensure that the definition produces the expected results



3.4.3 Table Object Description Definition Detail

MDCTBLD		MD Dev		5.06.17
SCRN1		Table Object Description Definition		11:25:57
Appl Lvl	Table ID	Description	File	Library
MD	12	OPEN	MDDRFUN	MDREPT8
File	<u>MDDRTXT</u>			
Library . .	<u>MDREPT8</u>			
Description .	<u>MDTEXT</u>			
Join Field .	<u>MDKEY1</u>			
Join Target .	<u>J</u> J=Object Join Field, N=Object Name Field			
Condition . .	<u>MDTYPE = "S"</u>			
Enter=Confirm F4=Browse F8=Test Definition F12=Previous F22=Delete Def				

This screen contains the parameters to attach a Description to each object for a Table ID. If a description definition isn't created, then the description of the table definition itself is used for the resulting objects in MDXREF.

File

The File name and Library of the Table that contains the Object descriptions

Description

The SQL result column that contains the descriptions.

Join Field

The SQL result column used to join the definition to the file containing the Object definition

Join Target

J – The join field for the Description definition is joined to the join field for the Object definition
 N – The join field for the Description definition is joined to the Object Name field for the Object definition

Condition

A valid SQL condition (without the WHERE clause) can be defined to limit the records in the file to those matching the condition.

MDXREF takes the Description value from the first row found

Function Keys:

- F4** – Browse list of valid values for a field
- F8** – immediately run a test to ensure that the definition produces the expected results
- F22** – Delete the existing Description Definition from the Table ID



3.4.4 Table Object Reference Listing

MDCTBLR				MD Dev			5.06.17
SCRN1				Table Reference Definitions			11:30:26
	Appl	Lvl	Table ID	Description		File	Library
	MD	12	OPEN	MDOpen Functions		MDDRFUN	MDREPT8
Type options, press Enter.							
2=Edit 3=Copy 4=Delete 5=Display							
Opt	Def	File	Library	Reference Object		Reference Library	Reference Obj Type
_	1	MDDRFUN	MDREPT8	MDPGM		"*LIBL"	"*PGM"
							Bottom
F3=Exit		F5=Refresh		F6=Add			

This screen displays the current list of Table Object Reference definitions. It is accessed by option R for a Table ID.

Object Reference definitions provide a way to create references in MDXREF between Soft Components (Table Objects) and actual Library Objects or other Soft Components.

If a resulting Reference Object Type is *FILE, it will be shown in MDXREF as a file used by the Table Object. If the Type is anything else, it will be shown in MDXREF as being called by the Table Object.

Opt

2	Edit a Table Reference definition
3	Create a new Table Reference definition based on the values of the selected definition.
4	Delete a Table Reference definition
5	Display a Table Reference definition

Function Keys:

F5 – Refresh the list

F6 – Add a new Table Object definition



3.4.5 Table Object Reference Definition Detail

MDCTBLR	MD Dev	5.06.17
SCRN2	Edit Table Reference Definition	11:31:29
Appl: MD	Lvl: 12 Table ID: OPEN	Def: 1
File	MDDRFUN	*CONSTANT = 1 Object with fixed Name
Library . .	MDREPT8	
Ref Obj Name.	MDPGM	
Ref Obj Lib .	"*LIBL"	
Ref Obj Type.	"*PGM"	
Join Field .		
Join Target .	_ J=Object Join Field, N=Object Name Field	
Condition . .		
Enter=Confirm F4=Browse F8=Test Definition F12=Previous		

This screen contains the parameters to generate references of each object for a Table ID.

File

The File name and Library of the Table that contains the Object references

*CONSTANT – a single object is referenced for each table object with a fixed name, library and type defined as constants (without quotes) in the reference fields.

Ref Obj Name

The SQL syntax to generate the names of the referenced objects for the table definition.

Ref Obj Lib

The SQL syntax to generate the names of the referenced objects for the table definition.

*CMD – the Ref Obj Name result contains a command string. In this case, MDXREF will parse the command string to extract the object name, library and type.

Ref Obj Type

The SQL syntax to generate the types of the referenced objects for the table definition.

This field should be blank if the Ref Obj Lib is *CMD.

Join Field

The SQL Result column used to join the definition to the file containing the Object definition

Join Target

J – The join field for the Reference definition is joined to the join field for the Object definition
 N – The join field for the Reference definition is joined to the Object Name field for the Object definition



Condition

A valid SQL condition (without the WHERE clause) can be defined to limit the records in the file to those matching the condition.

Function Keys:

F4 – Browse list of valid values for a field

F8 – immediately run a test to ensure that the definition produces the expected results



3.6 XREFBLDLIB – Update Xref Info for a Level or Library API

If objects for an Application Level, or an individual Library in the Level, are being modified outside of MDCMS, then this API can be built into the modification process or scheduling tool to keep the information for objects up-to-date.

XREFBLDLIB Parameters

APL	MDXREF Application
LVL	MDXREF Level
LIB	Library to update in MDXREF A specific Library *ALL - all libraries defined for Level *TABLE – all table definitions for Level
REORG	Reorganize Data upon completion *NO – not reorganized (recommended) *YES – reorganized – should only be selected if no one is using MDXREF at the time of the process
ENV	The Instance ID of MDXREF for the setting of the library list of the update job. Leave blank for the default instance.

3.7 XREFRMVLIB – Remove Xref Info for a Library API

This command can be used to remove a library and its Cross-Reference information from MDXREF, when such removal should happen automatically from within a process.

XREFRMVLIB Parameters

APL	MDXREF Application
LVL	MDXREF Level
LIB	Library defined for Level
REORG	Reorganize Data upon completion *NO – not reorganized *YES – reorganized – should only be selected if no one is using MDXREF at the time of the process (recommended)
ENV	The Instance ID of MDXREF for the setting of the library list of the update job. Leave blank for the default instance.



3.8 MDXUPDOBJ – Update Xref Info for an Object API

If individual objects are being modified outside of MDCMS, then this API can be built into the modification process to keep the information for objects up-to-date.

MDXUPDOBJ Parameters

LIB	Object Library Name or *LIBL to get library name from current list
OBJ	Object Name
TYP	Object Type
ENV	The Instance ID of MDXREF for the setting of the library list of the update job. Leave blank or *DFT for the default instance.

3.9 MDXUPDSRC – Update Xref Info for Source API

If source members are being modified outside of MDCMS, then this API can be built into the modification process to keep the information for source members up-to-date.

MDXUPDSRC Parameters

LIB	Source Library Name
FILE	Source File Name
MBR	Source Member or *ALL to refresh MDXREF for all members in the source file
ENV	The Instance ID of MDXREF for the setting of the library list of the update job. Leave blank or *DFT for the default instance.



4 Using the MDXREF Navigation screens

MDXREF is invoked by typing MDXREF at a command line and pressing Enter. It may also be invoked from the **MDCMS** main menu if that product was included with **MDXREF**.

4.1 Object/Source Search Display

```

MDC2KXF                                COMPANY NAME                                14.04.13
SCRN1                                  MDXREF Object/Source Search                        10:37:00

Type choices, press Enter.

Object:
Name . . . . . *ALL                               *ALL, name, *gen*eric*
Library . . . . *ALL                               *ALL, library, *gen*eric*
Type . . . . . *ALL                               *ALL, *ILEPRC, *SOURCE, type
Attribute . . . *ALL                               *ALL, attribute, *gen*eric*
Description . . *ALL                               *ALL, *gen*eric*

SQL:
Name . . . . . *ALL                               *ALL, name, *gen*eric*
Type . . . . . *ALL                               *ALL, *NONE, type

Application . . . *ALL                             *ALL, Appl
Level . . . . . _                               Level
1st in Libl Only . N                             Y/N

F3=Exit          F4=Browse          F6=Messages          F8=Submitted Jobs
F9=Build Database F10=Reports         F11=View Output     F21=Sys Command
  
```

This is the first screen that is always seen when you begin MDXREF. Pressing Enter with the defaults in place will result in the display of all objects in the MDXREF database. Otherwise, change the value of one or more of the entry fields to limit the display.

When the user re-enters the MDXREF display, the prior search criteria is reused.

Building the MDXREF database: Before objects will be available to list, the desired object libraries will need to be added to the MDXREF database. Also, the existing database may be rebuilt at any time. This is recommended if any objects are manually added, changed, or deleted within a library that is included in the database. If **MDCMS** is used in order to handle object changes, the MDXREF database is automatically updated as changes occur. **Press F9 to build or rebuild the MDXREF database.** See the section *Building the MDXREF Database* for further help with this process.

Entry fields on the initial Search Screen

Object Name

The object listing may be filtered to show only objects with a specific system name or, with the use of the wildcard value '*', objects matching a given pattern.

Object Library

The object listing may be filtered to show only objects located in a specific library or, with the use of the wildcard value '*', objects located in libraries matching a given pattern.



Object Type

The object listing may be filtered to show only objects of a specific type. Press F4 to view a list of all object types found within the MDXREF database.

*ILEPRC – use this value to view the list of ILE Procedures (procedures imported or exported by ILE modules or service programs) matching the search criteria instead of listing objects.

*SOURCE – use this value to view the list of source members matching the search criteria instead of listing objects.

Object Attribute

The object listing may be filtered to show only objects of a specific attribute or, with the use of the wildcard value '*', objects with attributes matching a given pattern. Press F4 to view a list of all object attributes found within the MDXREF database.

Object Description

The object listing may be filtered to show only objects with a specific description or, with the use of the wildcard value '*', objects with a description matching a given pattern. The search for object descriptions is not case sensitive.

SQL Name

The object listing may be filtered to show only objects with a specific SQL name or, with the use of the wildcard value '*', SQL names matching a given pattern.

SQL Type

The object listing may be filtered to show only objects of a specific SQL type. Press F4 to view a list of all SQL types found within the MDXREF database.

*NONE – use this value to view only objects that are not created by SQL statements.

Application

The listings may be filtered to show only the object libraries pertaining to a specific application.

Level

The listings may be filtered to show only the object libraries pertaining to a specific level. A blank value indicates all levels will be considered.

1st in Libl Only

N – every occurrence of an object/type combination, or every occurrence of a source name/source member combination, will be listed.

Y – only the first occurrence of an object/type combination, or the first occurrence of a source name/source member combination, will be listed. The order of occurrences is based on the sort sequence of the library list for the application level.

The value of Y is only permitted when a distinct application and level value is entered in the filters.

4.1.1 Function Keys specific to Screen 1

F9 – Build or rebuild the MDXREF database for one or more applications.

See the *Building the MDXREF Database* section on page 10 for more details.

F10 – Reports. A menu is displayed which provides access to various analysis reports.

See the *Report Menu* section for more details.



4.2 Object Listing

MDC2KXF	COMPANY NAME				21.04.13
SCRN2	Object Listing				18:06:51
All Applications					
pos					
Opt	Obj Name	Type	Library	Attribute	Description
	ADDSHARE	*CMD	QGPL	CMD	Add Share for Folder
	ADDSHARE	*PGM	QGPL	CBL	Shared Folder Maintenance
	ADM	*JOB	QGPL	JOB	Admin Prod
	ADMIN	*CMD	MDADMT8	CMD	Admin command
	ADMIN	*PGM	MDADMT8	CLP	MD Admin
	ADMIND	*FILE	MDADMT8	DSPF	Administration Menu
	ADMT8	*JOB	QGPL	JOB	Admin Test
	BETA70	*JOB	QGPL	JOB	
	BLD10	*JOB	QGPL	JOB	
	BUDEMO	*FILE	QGPL	PF-DTA	list of demo libraries to backup
	BUDEMO	*PGM	QGPL	CLP	Backup Demo Environment to IFS
	BUMM	*CMD	QGPL	CMD	MD: Save libraries to savefiles
	BUMM	*PGM	QGPL	CLP	Backup MMORGAN to IFS
	BUPROD	*FILE	QGPL	PF-DTA	list of prod libraries to backup
	BUPROD	*PGM	QGPL	CLP	Backup Prod Environment to IFS
					More...
F4=Browse F9=SQL Info F11=View Output F15=Print F21=Sys Command					

This screen displays all objects that match the filters entered in the Search Screen. This list is sorted by Object Name, Object Type and Library. If the listing is for a specific application and level, the library sorting is based on the sort sequence for the library list, otherwise, it is based on the alphanumeric value of the library name.

pos

Enter a value at this prompt to position the listing to the first object name that is >= the position value.

Opt

Placing a valid value in the option field to the left of an object will result in an analysis display for that object. The possible values available are based on the type and attribute of the object. Press **F4** when the cursor is placed on the Opt field in front of the appropriate object in order to view all possible options for that object.

F9=SQL Info / Obj Info

Pressing F9 toggles the view between system information and SQL information. When in SQL mode, the SQL type and SQL name are shown instead of the Object Type and Object Description.

4.3 Valid Object Options in MDXREF

The options available for an object differ depending upon the object attribute. To list all options for an attribute, press F4 on the option prompt in front of the object in question.

4.3.1 A – Display the object attributes

Valid for many object types. This option is a shortcut to the IBMi DSPFD, DSPPGM, DSPMOD, DSPSRVPGM, or DSPCMD command.

If the selected object had the library entry of '*LIBL' and the object exists in more than one library within the cross-reference database, the user is prompted to select the desired library from a list before the object description displayed.

4.3.2 C – List the Copybooks used

Valid for CLP, COBOL and RPG programs (ILE or OPM) and modules if the source for those objects is managed by MDCMS

This option lists all source members that are used as copybooks in the program or module.

4.3.3 C – Compare File Data (for physical files only)

Valid option for physical files only.

This option allows you to view the content differences between 2 file members on a record-by-record and field-by-field level.

When 'C' is entered, the following screen is displayed for entering the file information.

```

MDC2KXF                                COMPANY NAME                                MDXREF
SCRN10                                  MD Data Comparison Report                    10/27/11
                                                                                   12:02:45

      Basis File . . . . . CUSTOMERS
      Library   . . . . . PRODLIB
      Member    . . . . . CUSTOMERS

      Comparison File . . . CUSTOMERS
      Library    . . . . . *LIBL
      Member     . . . . . *FIRST

Enter=Select Fields   F4=Browse   F7=Load Def   F9=Save Def   F11=View Output
  
```



Basis File

The basis file and library was selected on the prior screen where the 'C' was entered. If the file has multiple members, a member name may be entered. F4 may be pressed to select a member from the list.

Comparison File

Enter the name of the file to compare to. The file structure of the comparison file does not have to be the same as the basis file. If the library is left as *LIBL, a list of cross-referenced libraries where the file exists will be displayed. If the file has multiple members, a member name may be entered. F4 may be pressed to select a file, library, or file member.

Function Keys:

Enter – Display the field listing screen based on the files entered for the comparison.

F4 – Browse the list of valid entries for a field by first placing the cursor on the field.

F7 – Load the parameters from a saved Comparison Report definition

F9 – Save the entered parameters as a report definition. The saved definition may then be reused in the future from within MDXREF or from a command line. See the chapter on MDRUNRPT for more information about running reports from a command line.

F11 – view the results of this comparison or any other MDXREF report

F12 – Cancel/end comparison analysis.

The following screen is displayed for controlling the sort and selection of records by the comparison job. All fields that have the same name and type (numeric/alphanumeric only) are displayed.

```

MDCCFDC                MD Data Comparison Report                10/27/11
SCRN1                   Field/Record Selection                  12:02:45

Basis File: CUSTOMERS  Comparison File: CUSTOMERS
Library.: PRODLIB      Library.....: TESTLIB
Member....: CUSTOMERS  Member.....: CUSTOMERS

Type options, press Enter.
C=Comparison Field  K=Key Field

Find Field: _____ F16

Opt  Field Name  Len Typ Dec  Description  Minimum  Maximum
K    CPDAR       3  P         Customer ID 1  110      900
K    CPDAL       3  P         Customer ID 2  _____
K    CPDAR       7  P         Customer Ref ID  _____
K    CPDALG      3  P         Customer Type  _____
C    CPDAAR      30  A         Customer Name  B         C
C    CPDAAM      30  A         Customer Address 1  _____
C    CPDAAM      30  A         Customer Address 2  _____
_    CPDAAR      30  A         Customer Address 3  _____
More...

F5=Refresh  F9=Save Def  F11=View Output  F13=Unselect All  F17=Top  F18=Bottom
  
```

Find Field

This is used in conjunction with **F16** to find a specific field in the listing.

Opt

C – Comparison field. The field's data will be compared and listed when a difference is found.

K – Key field. The field will be used to sort and join the 2 file members. It is best if the fields necessary to make a record unique are selected as Key fields. Up to 50 key fields may be selected.

If the field option is blank, the field will be ignored for key and comparison purposes, but a minimum/maximum may still be entered for the field to limit records.



Minimum/Maximum

The set of records to compare may be limited by entering a range of values for 1 or more fields.

Function Keys:

Enter – Submit comparison job to batch. A message will be sent at the end of the job specifying whether or not differences were found. The results of the comparison, if differences are found, will be written to the output file at the very end of the job. The file may be viewed by pressing F11 from any MDXREF screen.

F3 – Cancel comparison analysis.

F5 – Refresh the listing. The fields are sorted by key fields, then compare fields, then unused fields.

F9=Save Def - Save the entered parameters as a report definition. The saved definition may then be reused in the future from within MDXREF or from a command line. See the chapter on MDRUNRPT for more information about running reports from a command line.

F11=View Output – View Output from XREF reports or spooled files.

F13 – Select/Unselect comparison fields. This is a toggle to set all 'C', or compare, fields to blank or vice-versa.

F16 - Find Field - If a value is entered in the Find Field prompt, located near the top of the screen, the next field in the list matching that value is displayed. The search for the matching field begins 1 line past where the cursor is currently located. If the cursor is not located in the list, the search starts at the first currently displayed line in the list. '*' may be used as a wild-card value before and/or after the search string. For example, if the user enters 'P350*', the search will look for the next field in the list starting with 'P350'. If the user enters '*P350', the search will look for the next field in the list ending with 'P350'. If the user enters '*P350*', the search will look for the next field in the listing containing the string 'P350'. If the search reaches the bottom of the list without a match, it will restart at the top of the list.

F17 – reposition the cursor to the first field in the list.

F18 – reposition the cursor to the last field in the list.

4.3.4 D – Display the object description

Valid for all system objects. This option is a shortcut to the IBMi DSPOBJD command.

The most important information that this option displays is:

- when an object was created
- who created the object
- the last time that the object was used
- the # of days that the object has been used

If the selected object had the library entry of '*LIBL' and the object exists in more than one library within the cross-reference database, the user is prompted to select the desired library from a list before the object description displayed.

4.3.5 E – Exported Procedures

Display the list of all procedures exported by the ILE Module or Service Program

4.3.6 F – Full Name

Table Definition entries and SQL entities can be up to 80 characters in length within MDXREF. Option F can be used in order to display the full name for such components.

4.3.7 F – Process Flow Reports

See that the section titled P – Process Flow Reports below.

4.3.8 I – Imported Procedures

Display the list of all procedures imported by the ILE Module.

4.3.9 J – Journal Analysis report (for Physical files only)

Valid option for Physical files only.

This option allows you to view the journal records for a physical file in a customizable and easy-to-read format. When 'J' is entered, the following screen is displayed for entering the primary record and journal receiver selection information.

```

MDCJRN2                                COMPANY NAME                                10/27/11
SCRN1                                  MD Journal Analysis Report                                15:02:01

File: PFJOURNAL  Library: PRODLIB      Journal Images: *BOTH

Search Range:          Date      Time
Start . . . . . 10/27/11  150134  Date/Time, *PM *Pn D, *CM, *CD
End . . . . . 10/27/11  150201

Filters:
User . . . . . *ALL          *ALL, User
Job . . . . . *ALL          *ALL, Job
Program . . . . . *ALL       *ALL, Program
Action . . . . . *ALL       *ALL, INSERT, UPDATE, DELETE

Journal . . . . . MYJOURNAL
Library . . . . . MYLIBRARY
From Receiver . . . *CURCHAIN      *CURCHAIN, *CURRENT, Receiver
Library . . . . .
To Receiver . . . . blank, Receiver
Library . . . . .

F3=Exit  F4=Browse  F7=Load Def  F9=Save Def  F11=View Output
    
```

Search Range:

Start Date/Time

Enter the start date and time of journal entries to be considered. The default start date/time is either the date/time of the first entry for the selected file, or the creation date/time of the selected file, whichever is younger.

Special Values

*CM	The current calendar month
*CD	The current day
*PM	The prior calendar month
*Pn D	n number of days prior to today. Example – enter *P3 to select journal transactions for the prior 3 days



End Date/Time

Enter the end date and time of journal entries to be considered. The default end date and time is the current date/time. If a special value is used for the Start Date, then the End Date/Time are not applicable.

User Filter

Enter the profile id of a user to limit journal entries to records updated by that user.

Job Filter

Enter the name of a job to limit journal entries to records updated by that job.

Program Filter

Enter the name of a program to limit journal entries to records updated by that program.

Action Filter

Enter INSERT, UPDATE, or DELETE to limit journal entries to records with that action.

Journal

The Journal Name and library in which the transactions should be searched. This will default to the currently active journal for the physical file.

From Receiver

The starting journal receiver name and library for the Journal

Special Values

*CURCHAIN	The currently active chain of receivers for the journal
*CURRENT	The currently attached receiver for the journal

To Receiver

The ending journal receiver name and library for the Journal – if a special value is entered for the starting receiver, or only one receiver should be included, leave this blank.

Function Keys:

Enter – Display the field listing screen based on the file.

F3/F12 – Cancel journal analysis.

F4 – Browse the list of valid entries for a field by first placing the cursor on the field. The User and Program fields are enabled for the browse function on this panel.

F7 – Load the parameters from a saved Journal Analysis Report definition

F9 – Save the entered parameters as a report definition. The saved definition may then be reused in the future from within MDXREF or from a command line. See the chapter on MDRUNRPT for more information about running reports from a command line.

F11=View Output – View Output from XREF reports and spooled files.



The following screen is displayed for controlling the selection of fields and records for the journal analysis report:

```

MDCJRN2                                COMPANY NAME                                10/27/11
SCRN2                                  Journal Report Field/Record Selection          11:32:18

File.....: PARTNER                    Program.: *ALL
Library.: FLSCSCHPF                   User.....: *ALL                               Find Field _____ F16

Type options, press Enter.
1=Select Field

Opt  Field Name   Len Typ Dec  Description                Value Range, *NOVAL  Mod
      Minimum    Maximum          Req
  1  *RRN         10  S      Relative Record number    _____          _____  N
  1  CPDAR         3  P      Customer ID 1              110                900                N
  1  CPDAL         3  P      Customer ID 2              _____          _____          N
  1  CPDAR         7  P      Customer Ref ID            _____          _____          N
  1  CPDALG        3  P      Customer Type              *NOVAL              _____          N
  1  CPDAAR        30  A      Customer Name              B                  C                    N
  1  CPDAAM        30  A      Customer Address 1         _____          _____          N
  -  CPDAAR        30  A      Customer Address 3         _____          _____          N
                                          More ...

F5=Refresh   F9=Save Def   F11=Output   F13=Select All   F17=Top   F18=Bottom
  
```

Find Field

This is used in conjunction with **F16** to find a specific field in the listing.

Opt

1 – Select Field. Display the field as a column in the journal analysis report.

Even If the field is not selected, the Value Range and Mod Req criteria can be used for the field.

Value Range

The transactions to include may be limited by entering a range of values for 1 or more fields. A blank entry for Minimum means there is no minimum and a blank entry for Maximum means there is no maximum. If transactions should be selected for a specific value, enter it in the minimum and maximum fields.

Special Values

*NOVAL	transactions should only be selected when the value is empty (spaces for alphanumeric fields or zeroes for numeric fields)
---------------	---

The transactions must fit within the range for ALL fields in order to be included in the list (AND condition).



Mod Req

Include a transaction only if it modified a field's value

Values

N	not required that the field's value was modified by the transaction
Y	the field's value must have been modified by the transaction from any value to any other value
F	the field's value must have been modified from a value within the entered Value Range to a value outside of the entered Value Range
T	the field's value must have been modified from a value outside of the entered Value Range to a value within the entered Value Range

If this flag is used for 2 or more fields, a transaction must have modified a minimum of 1 of those fields in order to be included in the list (OR condition).

Function Keys:

Enter – Submit job to batch. A message will be sent at the end of the job specifying whether or not journal entries were found. The journal entries will be written to the output file at the very end of the job.

F3/F12 – return to entry selection screen.

F5 – Refresh the listing. The fields are sorted by selected fields, then non-selected fields in record format order.

F9=Save Def – Save the entered parameters as a report definition. The saved definition may then be reused in the future from within MDXREF or from a command line. See the chapter on MDRUNRPT for more information about running reports from a command line.

F11 = Output - View Output or spooled files.

F13 – Select/Unselect fields. This is a toggle to set all '1', or selected, fields to blank or vice-versa.

F16 - Find Field - If a value is entered in the Find Field prompt, located near the top of the screen, the next field in the list matching that value is displayed. The search for the matching field begins 1 line past where the cursor is currently located. If the cursor is not located in the list, the search starts at the first currently displayed line in the list. '*' may be used as a wild-card value before and/or after the search string. For example, if the user enters 'P350*', the search will look for the next field in the list starting with 'P350'. If the user enters '*P350', the search will look for the next field in the list ending with 'P350'. If the user enters '*P350*', the search will look for the next field in the listing containing the string 'P350'. If the search reaches the bottom of the list without a match, it will restart at the top of the list.

F17 – reposition the cursor to the first field in the list.

F18 – reposition the cursor to the last field in the list.

4.3.10 L – Linked Objects / Linked Files

Valid option for files, modules, programs and service programs only.

This option provides a direct method of indicating when files are used or linked by another object when that reference isn't automatically known by MDXREF.

Examples of use:

- Link a primary file with all other files that need to be considered when the primary file changes, due to a shared record format.
- Link a module to a file that is used via dynamic SQL

When there are substantial numbers of instances where MDXREF isn't automatically aware of references, and the updates to such references should happen whenever changes occur, then Table Definitions can be used instead to manage the references.

However, using option L is much quicker and easier to configure a small number of such references.

When 'L' is entered, the following screen is displayed for entering linked information between files and objects.

```

MDCOLNK                MD T 8.1 dev                16.11.17
SCRN1                   Manually Linked Objects    11:12:31
Filters
File . . . MDAPAR      Object . . _____      Object Type . _____
Library . TEST80_10    Library . _____

Type options, press Enter.
2=Edit 3=Copy 4=Delete 5=View

Opt File      Library  Objects
_ MDAPAR     TEST80_10  ADDSHARE, ADM, CHARTAB

F3=Exit  F5=Refresh  F6=Add

Bottom

```

This screen lists the existing linked object definitions based on the filters at the top of the screen. The file/library filter is pre-filled when option L is entered for a file and the Object/Type filter is pre-filled when option L is entered for a module, program or service program.

The filter values can be removed or modified to adjust the listing.

Press F6 to add a new file to be linked to a number of objects, or use options 2-5 to manage existing links.

When adding a file, you will first be prompted for the name of the file and the file library. If the file is qualified for a specific library, it must exist to be stored. If *LIBL is used for the library, then the file can be any name.

After the entry of the file, a list of object names, libraries and types can be entered that should be linked to the file.

4.3.11 M – ILE Modules bound by a Program or Service Program

Valid for programs and service programs.

This option lists all modules that are bound by the program. The PEP flag designates which module contains the Program Entry Procedure (PEP) for the program.

4.3.12 P – All Relational Dependencies Report

Valid option for files only.

This option will result in a formatted report listing all files, programs, queries, etc... that use the file. In addition, if a file uses the base file, all files, programs, queries, etc... are also included for that file.

For example, option 'P' is entered for physical file ORDERS. There are 5 logical files over this physical file along with 48 programs and 10 queries that use this physical file. Additionally, there are 120 programs that use one or more of the logical files. All of these dependencies would be included in the report.

When 'P' is entered, the following screen is displayed for entering report filters.

MDC2KXF	COMPANY NAME	MDXREF
SCRN6	MD All Relational Dependencies Report	10/27/11
	All Applications	12:02:45
Library: BT		
Object.: ORDERS		
Filter Dependencies by		
Library....:	_____	Name, Generic*
Name.....:	_____	Name, Generic*
Attribute..:	_____	
Object Type:	_____	
Usage.....:	_____	
Enter=Confirm F4=Browse F11=View Output F12=Previous		

Filter Dependencies by:

Library

The report may be filtered to show only objects in a specific library or, with the use of '*', libraries beginning with a specific character string.

Name

The report may be filtered to show only a specific object or, with the use of '*', objects beginning with a specific character string.

Attribute

The report may be filtered to show only objects with a specific attribute. For example, enter RPG to show only RPG programs.

Object Type

The report may be filtered to show only objects of a specific type. For example, enter *PGM to show only programs.

Usage

The report may be filtered to show only objects that use a file in a certain way. For example, enter I/O to show only objects that read and write to a file.

4.3.13 P – Process Flow Reports

Valid option for menus, commands, functions, materialized query tables, modules, procedures, programs, scheduled jobs, table objects and views.

When 'P' is entered, the following screen is displayed for specifying reporting choices:

MDC2KXF	COMPANY NAME	MDXREF
SCRN7	MD Process Flow Reports	10/27/13
	All Environments	12:05:38
Starting Object Name	MDCDATR	
Starting Object Library	MDBUILD	
Starting Object Type	*MODULE	
Generate Process Flow Report	—	Y/N
Generate Object Catalog	—	Y/N
Generate File Usage Report	—	Y/N
Object Filter Definition	_____	definition
Maximum Call Stack Depth	<u>52</u>	1-256
File Usage Report Filters:		
File Name	_____	name, generic*
File Attribute	_____	attribute
File Usage	_____	usage
File Filter Definition	_____	definition
Enter=Confirm F4=Browse F11=View Output F12=Previous		

4.3.13.1 Generate Process Flow Report

Create a report that shows each distinct call stack possible from the initial object. Each column in the report represents the depth of the object in that stack, meaning that the object in column 1 is called by the initial object and it then calls the object in column 2 which calls the object in column 3, etc.

If an object in the stack had previously been listed in the report, and that object calls other objects, it will be listed with *REPEAT as the value in the proceeding column.

4.3.13.2 Generate Object Catalog

Create a report that alphabetically lists every object invoked in the Process Flow Report. In addition to the name of the object, the library, type, attribute, description, create date, create time, source change date and source change time are also listed.

4.3.13.3 Generate File Usage Report

Create a report that alphabetically lists every file that is used within the process flow as well as which objects use the file and how the file is used.

4.3.13.4 Object Filter Definition

A filter definition can be selected in order to omit certain libraries or objects from the Process Flow reports. Press F4 to create, modify or select a Filter Definition.

4.3.13.5 Maximum Call Stack Depth

The depth of the reported stack can be limited to between 1 and 256 columns

4.3.13.6 File Usage Report Filters

The File Usage Report can be further filtered by the following parameters:

File Name

The report may be filtered to show only a specific file or, with the use of '*', files beginning with a specific character string.

File Attribute

The report may be filtered to show only files with a specific attribute. For example, enter LF to show only logical files.

File Usage

The report may be filtered to show only objects that use a file in a certain way. For example, enter I/O to show only objects that read and write to a file.

File Filter Definition

A filter definition can be selected in order to omit certain libraries or files from the Usage report. Press F4 to create, modify or select a Filter Definition.

4.3.14 Q – Query the contents of a file or data area

Valid for physical, logical, and message files as well as for data areas.

For data files, this option is a shortcut to the IBMi RUNQRY command with record selection ability turned on. The user may simply press enter from the record selection screen to see all records in the file, or the user may enter conditions in order to limit the records that are displayed. Press F1 from the record selection screen to view the IBM help topics for RUNQRY.

If the selected file had the library entry of '*LIBL' and the file exists in more than one library within the cross-reference database, the user is prompted to select the desired library from a list before the query screen is displayed.

If the selected file has more than 1 member, the user is prompted to select the desired member from a list before the query screen is displayed.

For message files, this option is a shortcut to the WRKMSGF command in display-only mode.

4.3.15 S – View the source member from which the object was compiled

Valid for programs, modules, files, SQL elements, queries, and commands. MDXREF starts an SEU or IFS session in view-only format.

MDXREF determines the name and location of the source based on the following conditions in the order listed:

- 1) For *QMQRV or *QRYDFN objects, the source is retrieved from the query object
- 2) The location of the last installation of the source for the object in MDCMS, if MDCMS is used
- 3) The MDCMS location of the source for the object, according to the attribute definition, if MDCMS is used
- 4) The location the source was found in the last time that someone used option S for the Library/Object/Type combination.
- 5) The source location according to the object description
- 6) The source member with the same name of the object in the first found library based on the library sort sequence for the applications(s) and level(s) that the object library belongs to.

If the source wasn't found, then the user is prompted for the location of the source.

4.3.16 S – View a source member contained in a source file

Valid for files with attribute PF-SRC. MDXREF starts an SEU session in view-only format.

If 'S' is entered in front of a source file, MDXREF will list all members contained within the source file. The list can be generically filtered by name or description. Enter a 1 in front of a member to view the source code for that member.

4.3.17 V – Service Information

This option displays object service information formatted to reflect Object Stamping information applied during the installation of an object in MDCMS. F9 can be pressed to change the display to the standard IBM *SERVICE screen.

4.3.18 X – XREF Refresh for Object

Valid for all objects.

If an object has been manually changed or deleted since the last build of the MDXREF application database, the object's MDXREF information may be refreshed by using option 'X'.

If the selected object had the library entry of '*LIBL' and the object exists in more than one library within the cross-reference database, the user is prompted to select the desired library from a list before the object's information is refreshed.



4.3.19 1 – Display list of Objects using File or Module

Valid option for Files or ILE Modules only.

This option will display a list of all objects that use the specific file as well as how the file is used by the object. Alternatively, this display will list all programs or service programs that use a specific ILE module. The following is an example of option 1.

```

MDC2KXF                MD T 8 6.1                26.01.17
SCRN3                  Objects Using File         14:22:01
                      Appl: TEST Lvl: 10
Library.: TEST80_10   Filter by Name: _____ Type: _____
File Name: MDAPAR     Library: _____ Attr: _____
                      Description: _____ Usage: _____

pos
Opt Obj Name  Type  Library  Attribute  USG Description
--  -
_   MDA003    *PGM  TEST80_50 CBL        I/O Admin: Partners
_   MDA005    *PGM  TEST80_50 CBL        INP Admin: Profit Distribution Par
_   MDA006    *PGM  TEST80_50 CBLLE     INP Admin: Invoices
_   MDA007    *PGM  TEST80_50 CBL        INP Admin: Invoice Partner Profits
_   MDA008    *PGM  TEST80_50 CBLLE     INP Admin: Payments
_   MDA009    *PGM  TEST80_50 CBLLE     INP Admin: Transfers
_   MDA010    *PGM  TEST80_50 CBLLE     INP Admin: Balances
_   MDA011    *PGM  TEST80_50 CBLLE     INP Admin: Credits
_   MDA012    *PGM  TEST80_50 CBL        INP Admin: Earnings
_   MDA016    *PGM  TEST80_50 CBL        INP Admin: Annual Maint Forecast

Bottom
F4=Browse  F11=View Output  F9=SQL Info  F15=Print  F21=Sys Command
  
```

The listed referenced objects are sorted by Object Name, Object Type and Library. If the listing is for a specific application and level, the library sorting is based on the sort sequence for the library list, otherwise, it is based on the alphanumeric value of the library name.

If the parameter "1st in Libl Only" on the initial screen is set to Y, then only the first occurrence of an Object Name/Type combination will be listed.

If a specific application and level was specified on the initial screen, then any reference for library value *LIBL will be replaced by the first found library for the Object Name/Type combination.

Filter by Name

Enter part or all of an object name to filter the list to objects containing the entered value somewhere within the name.

Filter by Type

Enter an object type in this field to view only objects with the entered type. For example, enter *PGM here to view only program types.

If in SQL Info mode, then enter one of the valid SQL types (*SQLCST, *SQLFUN, *SQLIDX, *SQLMQT, *SQLPRC, *SQLSEQ, *SQLTAB, *SQLTRG, *SQLVAR or *SQLVW).

Filter by Library

Enter part or all of a library name to filter the list to objects containing the entered value somewhere within the library name.



Filter by Attribute

Enter part or all of an object attribute to filter the list to objects containing the entered value somewhere within the attribute.

Filter by Description

Enter part or all of an object description to filter the list to objects containing the entered value somewhere within the description.

Filter by SQL Name

If in SQL Info mode, then enter part or all of an SQL long name for an object to filter the list to objects containing the entered value somewhere within the SQL long name.

Filter by Usage

Enter a usage value (from the list below) in this field to view only objects with the entered usage. For example, enter DBR here to view only logical files over a specific physical file.

pos

Enter a value at this prompt to position the listing to the first object name that is \geq the position value.

Usage List

- CHG – A file format is altered.
- CPY – The contents of a file are copied to another file.
- CRT – A file is created.
- CST – A constraint applied to the file
- DBR – Database Relation such as Logical file over Physical file or View over View
- DDS – A file format is copied into the source for a program
- DEL – A file is deleted
- HST – A file is a History Table for a linked Temporal Table
- INP – An object uses a file for input only.
- I/O – A program uses a file for input and output.
- OUT – A program uses a file for output only.
- OVR – A file is overridden to another file.
- REF – A printer or display file contains field(s) that reference field(s) in the file.
- SPC – A file is used within a CL program by a FMTDTA or OPNQRYF command.
- TRG – A trigger applied to the file or program invoked by the trigger

Option

All options that are available from the Object browse screen are also available from this screen. In principle, a person may continue running MDXREF options 1 – 4 until they hit the end of their application.

4.3.20 2 – Display list of Files used by Object

Valid for many types of objects

This option will display a list of all files that are used by the specific object as well as how the file is used.

Everything in Option 1 applies to Option 2. See the section for option 1 for more details.

4.3.21 3 – Display list of Objects calling selected Object

Valid for many types of objects

This option will display a list of all objects that call or somehow invoke the selected object.

For example, if a '3' was entered in front of program JORDCB1, a list would be displayed showing all programs that call JORDCB1, all commands that invoke JORDCB1, or all menus that JORDCB1 is called from.

Everything in Option 1 applies to Option 3 (except usage). See the section for option 1 for more details.

SQL object types *SQLFUN and *SQLPRC can be the called object types used by calling object types *SQLFUN and *SQLPRC.

4.3.22 4 – Display list of Objects called

Valid for many types of objects

This option will display a list of all objects that are called by the selected object.

For example, if a '4' was entered in front of program JORDCB1, a list would be displayed showing all programs that JORDCB1 calls, all user commands that JORDCB1 invokes, all menus that JORDCB1 starts, or all queries that JORDCB1 runs.

Everything in Option 1 applies to Option 4 (except usage). See the section for option 1 for more details.

Additionally, for menus, the option number of the first occurrence of a called object is displayed. For ROBOT jobs, the command sequence number of the first occurrence of a called object is displayed.

SQL object types *SQLMQT, *SQLVW, *SQLFUN and *SQLPRC can be the calling object types of object types *SQLFUN and *SQLPRC.



4.3.23 5 – Display list of Fields in File

Valid option for physical and logical files only

This option will display a list of all fields and their attributes for a file. If the selected file had the library entry of '*LIBL' and the file exists in more than one library within the cross-reference database, the user is prompted to select the desired library from a list before the fields are displayed.

The list is initially sorted by field position, but may be sorted by field name by pressing **F8**. The following is an example of the Field display.

```

MDC2KXF                COMPANY NAME                MDXREF
SCRN4                   Fields in File                10/27/16
                                                            10:37:00

Library.: MDCMST8                Start Pos.: _____
File Name: MDDCMSD                Description: _____

Type options, press Enter.
  1=Source containing Field

Opt  Field Name      Len Typ Dec   Pos  Description              Format
-   MDREQN           11  P      1   Request Number           RDDCMSD
-   MDAGP            4  A      7   Application              RDDCMSD
-   MDLVL            2  P     11   Level                   RDDCMSD
-   MDRFP            7  P     13   RFP Number              RDDCMSD
-   MDCSQ            2  P     17   Compile Seq             RDDCMSD
-   MDCSQO           5  P     19   Compile SubSeq         RDDCMSD
-   MDUSER           10 A     22   User                   RDDCMSD
-   MDOBJN           80 A     32   Object                 RDDCMSD
-   MDOBJT           7  A    112   Object Type            RDDCMSD
-   MDOBJA           10 A    119   Object Attribute       RDDCMSD
-   MDRSN            1  A    129   Reason                 RDDCMSD
More...

F8=Sort by Pos  F9=SQL Name  F11=View Output  F15=Print  F21=Sys Command

```

Start Pos/Pos to Field

Enter a value at this prompt to restart the listing at a new point based on the sort column

Description Filter

Entering a text string at this prompt will result in a listing of all fields with a description containing the text string. For example, enter ASSET to see all fields with asset somewhere in the description. The search is not case sensitive.

Opt

1 – Source containing Field – this option causes MDXREF to collect the source for all objects either directly using the file or a logical over the file, along with all copybooks used by dependent programs. It then inspects the code for any non-commented lines containing the field and then presents the results.

Len

The total length of the field. This value is the number of digits or characters, not bytes.

Typ

The type of field. Common types: A = alphanumeric; P = packed numeric; S = zoned numeric

Pos

The byte # in a file record where the field begins.

Dec

The number of decimal places after the '.' for numeric fields.

Function Key:

F8 - toggle the sorting of the field list between name sort and starting position sort

F9 - toggle between the display of the field description and the SQL Name for the field

4.3.24 6 – Display Key Structure/Selection Rules for File

Valid option for physical and logical files only.

This option will display the list of field keys and their attributes for a file. Also, if for a logical file, all select/omit rules will also be listed.

If the selected file had the library entry of '*LIBL' and the file exists in more than one library within the cross-reference database, the user is prompted to select the desired library from a list before the fields are displayed.

The key structure listing is sorted by the key order in the file's access path and is displayed in the color green. Any select/omit rules follow the key structure and are displayed in the color yellow. The following is an example of the Key Structure/Selection Rules display.

```

MDC2KXF                COMPANY NAME                MDXREF
SCRN4                  Keys/Selections for File     10/27/11
                                                            10:37:02

Library.: ACCTLIB      Unique: N
File Name: ASSETF

Type options, press Enter.
 1=Source containing Field

Field Name   Len Typ Dec   Pos   Description           Sort/Rule
ABANUM      11  A   4     Asset number           ASCENDING
ABANSR       3  P   15    Asset sequence number  DESCENDING
ABCSTD       5  A   31    '018'                 SELECT EQ

F9=SQL Name  F11=View Output  F15=Print  F21=Sys Command

Bottom
  
```

Unique

MDXREF lists whether or not the key structure for the file is defined as being UNIQUE. If a structure is unique, only 1 record in the file may exist for each distinct set of key values.

Opt

1 – Source containing Field – this option – causes MDXREF to collect the source for all objects either directly using the file or a logical over the file, along with all copybooks used by dependent programs. It then inspects the code for any non-commented lines containing the field and then presents the results.

Len

The total length of the key/selection field. This value is the number of digits or characters, not bytes.

Typ

The type of field. Common types: A = alphanumeric; P = packed numeric; S = numeric

Start Pos

The byte # in a file record where the field begins.

Sort/Rule

ASCENDING – The key is sorted in ascending order

DESCENDING – The key is sorted in descending order

SELECT EQ – select records where field equals value in Description. This may also be an OMIT GT, etc... See the IBMi documentation for a full list of possible selection rules.

Function Key:

F9 - toggle between the display of the field description and the SQL Name for the field

4.3.25 7 – Display Join Field Information for File

Valid option for logical files only.

This option will display the list of join fields and duplicate sequencing fields for a join file.

If the selected file had the library entry of '*LIBL' and the file exists in more than one library within the cross-reference database, the user is prompted to select the desired library from a list before the fields are displayed.

The listing is sorted in the same order that the join fields were defined. Fields used to order duplicate records are designated with the To Field name *DUPSEQ.

The following is an example of the Key Structure/Selection Rules display.

MDC2KXF	COMPANY NAME				MDXREF
SCRN12	Join Fields for File				11/27/11
					10:37:00
Library.: ACCTLIB					
File Name: ASSETF3 Asset file for join					
From Field	File	Library	To Field	File	Library
OSOBNR	ASSETF	ACCTLIB	OFOBNR	CUSTOMERF	ACCTLIB
OSOBLF	ASSETF	ACCTLIB	OFOBLF	CUSTOMERF	ACCTLIB
OFTYP	ASSETF	ACCTLIB	*DUPSEQ		
					Bottom
F11=View Output		F12=Previous		F15=Print	
				F21=Sys Command	

From Field/File/Library

One side of the join of 2 physical files.

To Field/File/Library

The other side of the join of 2 physical files. If the To Field specifies *DUPSEQ, then the From Field is used to sort duplicate records in the join file.



4.3.26 9 – Display CPYF/OVRDBF Information for File

Valid option for files only.

This option will display the list of all CL programs or robot commands that perform an override or a CPYF from the selected file to another file. CL programs will only be listed if the source is specified as Observable.

4.4 Source Listing

```

MDCXRFS                                COMPANY NAME                                21.04.13
SCRN1                                  Source Member Listing                            18:33:40
      Position To                          All Applications                                Filter By
Member: _____                      File: _____
                                           Content: _____

Type options, press Enter.
  C=Compare  D=Description  P=Programs using Source  S=View Source

Opt Member      File          Library      Attribute  Description
-  MDA001      MACBL        MDSRCP74    CBL        Admin: Customers
-  MDA001      QCBLSRC      MDADMT8     CBL        Admin: Customers
-  MDA001D     MADDS        MDSRCP74    DSPF       Admin: Customers
-  MDA001D     QDDSSRC     MDADMT8     DSPF       Admin: Customers
-  MDA002      MACBL        MDSRCP73    CBLLE     Admin: Customer Licenses
-  MDA002      QCBLSRC      MDADMT8     CBLLE     Admin: Customer Licenses
-  MDA002D     MADDS        MDSRCP73    DSPF       Admin: Customer Licenses
-  MDA002D     QDDSSRC     MDADMT8     DSPF       Admin: Customer Licenses
-  MDA003      MACBL        MDSRCP72    CBL        Admin: Partners
-  MDA003      QCBLSRC      MDADMT8     CBL        Admin: Partners
-  MDA003D     MADDS        MDSRCP72    DSPF       Admin: Partners
-  MDA003D     QDDSSRC     MDADMT8     DSPF       Admin: Partners
                                           More...

F4=Browse  F11=View Output  F12=Previous  F15=Print  F21=Sys Command
  
```

This screen displays all source members that match the filters entered in the Search Screen. The Type in the Search Screen must be *SOURCE. This list is sorted by Member Name.

Position to Member

Enter a value at this prompt to restart the listing at a new point.

Filter By File

Enter the name of a source file here to further limit the list to source members residing in the file

Filter By Content

Enter a string to be searched for within the source members. The string is not case sensitive and may occur anywhere within the member's code.

Warning – it can take a long time to process the search if the list of members that meet all other filter criteria is large. A status message is displayed to show the progress of the search.



4.5 Valid Source Options in MDXREF

The options available for an object differ depending upon the object attribute. To list all options for an attribute, press F4 on the option prompt in front of the object in question.

4.5.1 C – Compare Source Members

Compare the contents of one source member to the contents of a second source member Place option C in front of one source member and press Enter. The following screen will prompt for the second source member:

```

MDCXRFS                                COMPANY NAME                21.04.13
SCRN2                                  Compare Source Members      18:37:40

Source File . . . . . QCPYSRC
Library . . . . . MDSECT
Member . . . . . EXAMPCLP

                                Compare With

Location . . . . . *LOCAL
Source File . . . . . QCPYSRC
Library . . . . . MDSECT
Member . . . . . EXAMPCLP

F4=Browse   F11=View Output   F12=Previous   F21=Sys Command

```

Location

*LOCAL indicates that the source file is located on the current system. Otherwise the location is a network address defined in the MDCMS Synchronization Settings. Press F4 to select the location from a list.

Source File

The name and library of the source file containing the other source member. Press F4 to select from a list

Member

The name of the source member to compare with

If there are differences between the members, the differences will be shown in parallel in a split screen. Press F16 to forward through the source to the next difference and F3 to exit the comparison results screen.



4.5.2 D – Source Member Description

Details pertaining to the source member, including the Attribute, Text, Creation date/time and Change date/time.

4.5.3 P – Programs using Source

List all programs or modules that use the source as a copybook

The primary source for those objects must be managed by MDCMS for MDXREF to be aware of the copybook references.

The primary source used to compile the object is not considered a copybook and is not listed on this screen.

4.5.4 S – View Contents of Source Member

View the source member in SEU

5 Report Menu

The report menu is accessed by pressing **F10=Reports** on the Cross-Reference Display (MDC2KXF/SCRN1). The menu gives the user access to various analysis reports that are not necessarily relevant to a specific object. A description of each report is listed below.

5.1 Object Library Comparison

Function: To compare the objects in one library to the objects in another library.

The following object differences are listed in the Object Comparison Report:

- Object existence
- Object Attribute
- Object Description
- Files used by the object as well as how the files are used (Input, Output, etc.)
- Objects called or invoked by the object
- Modules bound by ILE or Service Programs
- Field differences in physical or logical files
- Key structure differences in physical or logical files

The following screen is displayed to get the report parameters.

MDC2KXF	COMPANY NAME	MDXREF
SCRN8	MD Object Comparison Report	10/27/11
		12:07:05
Basis Library . . . _____		
Compare to Library _____		
Location *LOCAL		

Comparison Type . . <u>1</u>	1=Basis Library Objects only	
	2=All Objects	
Compare Src Date . . _	Y/N	
Filter Objects by:		
Name _____	Name, Generic*	
Attribute _____		
Object Type _____		
Enter=Confirm	F4=Browse	F11=View Output F12=Previous

Basis Library

A library on the local system. A current MDXREF build for the library must exist in order for the results to be accurate. Press F4 to select the library from a list.

Compare to Library

A library on either the local system or on a remote system. A current MDXREF build for the library must exist on its system in order for the results to be accurate. A remote library comparison is only possible if MDCMS is also installed. Press F4 to select the library from a list.



Location

The location of the library. *LOCAL indicates that the library is located on the current system. Otherwise the location is a network address defined in the MDCMS Synchronization Settings. Press F4 to select the location from a list.

Comparison Type

1. Report only on differences found for objects that exist in the basis library. For example, the basis library could be a product update library received from a vendor with 8 objects in it. The compare to library could then be your production library with 2000 objects in it. Only the 8 objects in the update library would be reviewed and reported upon.
2. All objects from both libraries are reported upon.

Compare Src Date

Include comparison, Y/N, for Source Date information of object.

Filter Objects by

Name

Attribute

Object Type

Enter information into one or more of the filter fields to limit the report to objects that match the filters.

5.2 Source Library Comparison

Function: To compare the source members in one library to the source members in another library.

The following differences are listed in the Source Comparison Report:

- Member existence
- Member contents
- Object Attribute
- Member Description
- Change Date/Time, if MDXREF is unable to compare contents

The following screen is displayed to get the report parameters.

MDC2KXF	COMPANY NAME	MDXREF
SCRN13	MD Source Comparison Report	21.04.13 19:00:42
Basis Library . . _____		
Compare to Library _____		
Location *LOCAL		

Comparison Type . _	1=Basis Library Members only 2=All Members	
Include when Same. _	Y=Yes N=No O=Only	
Filter Members by:		
Name _____	Name, Generic*	
Source File . . . _____	Name, Generic*	
Attribute _____	Name, Generic*	
Enter=Confirm F4=Browse F11=View Output F12=Previous		

Basis Library

A library on the local system. A current MDXREF build for the library must exist in order for the results to be accurate. Press F4 to select the library from a list.

Compare to Library

A library on either the local system or on a remote system. A current MDXREF build for the library must exist on its system in order for the results to be accurate. A remote library comparison is only possible if MDCMS is also installed. Press F4 to select the library from a list.

Location

The location of the library. *LOCAL indicates that the library is located on the current system. Otherwise the location is a network address defined in the MDCMS Synchronization Settings. Press F4 to select the location from a list.



Comparison Type

1. Report only on differences found for member that exist in the basis library. For example, the basis library could be a product update library received from a vendor with 8 members in it. The compare to library could then be your production library with 2000 members in it. Only the 8 members in the update library would be reviewed and reported upon.
2. All members from both libraries are reported upon.

Include when Same

Include each member in the list, even if it is identical to the member in the comparison library

Y – Yes, include all members

N – No, include only members with differences

O – Yes, include only members without differences

Filter Members by

Name

Source File

Attribute

Enter information into one or more of the filter fields to limit the report to members that match the filters.



5.3 Search for duplicate Objects between 2 Environments

Function: to report on the duplication of objects between 2 sets of libraries.

This report job does NOT use the information contained within the MDXREF database to look for object duplicates. The job retrieves the information from the libraries directly.

An object is considered a duplicate if it has the same name and object type as an object in the comparison library list.

The following screen is displayed to get the report parameters.

```

MDC2KXF                      COMPANY NAME                      MDXREF
SCRN9                          MD Duplicate Object Report                10/27/11
                                                                12:07:05

      Basis Libraries: _____ Compare to Libraries: _____
                        _____ or _____
                        _____ *USRLIBL _____
                        _____ or _____
                        _____ *ALLUSR _____
                        _____

      Comparison Type: 1  1=Duplicate Objects
                        2=Objects unique to Basis Libl
                        3=Objects unique to Compare Libl
                        4=All the Above

      Filter Objects by
      Name.....: _____ Name, Generic*
      Attribute..: _____
      Object Type: _____

Enter=Confirm      F4=Browse      F11=View Output      F12=Previous
  
```

Basis Libraries/Compare to Libraries

The 2 lists of libraries used in the comparison. For the libraries to be compared to, the special value of *USRLIBL (for all user libraries in the active job) or *ALLUSR (for all user libraries on the system) may be entered.

Comparison Type

1. Report only the objects that are found in both sets of libraries.
2. Report only objects that are found only in the Basis library list.
3. Report only objects that are found only in the Compare to library list.
4. Report all objects in both library lists

Filter Objects by

Enter information into one or more of the filter fields to limit the report to objects that match the filters.



5.4 Check usage of a Library

Function: to report on whether or not any objects within a library have been used since a specified date.

The following screen is displayed to get the report parameters.

MDC2KXF	COMPANY NAME	MDXREF
SCRN11	MD Library Usage Report	10/27/11
		22:14:48
Library: _____		
Report Type: <u>1</u>	1=only unused Objects 2=only used Objects 3=All Objects	
Minimum last used Date: <u>10/27/10</u>		
List Dependencies: <u>Y</u>	Y/N	
Filter Objects by		
Name.....:	_____	Name, Generic*
Attribute..:	_____	
Object Type:	_____	
Enter=Confirm	F4=Browse	F11=View Output
		F12=Previous

Library

The library to inspect. It is NOT necessary that the library is cross-referenced.

Comparison Type

1. Report only the objects that haven't been used since the minimum date
2. Report only objects that that have been used since the minimum date
3. Report all objects in the library

Filter Objects by

Enter information into one or more of the filter fields to limit the report to objects that match the filters.



5.5 Search for Fields

Function: to search for, and report on, all physical or logical files that contain a specific field or field attribute. Additionally, to inspect source code for the usage of specific fields.

5.5.1 Field Search

```

MDCIPFS                                COMPANY NAME                                07/24/14
SCRN1                                  MDXREF Field Search                            15:25:13

Type choices, press Enter.

Field Name . . . . . _____ *gen*eric*
Field Description . . _____ *NONE, *gen*eric*
Field Alt. Name . . _____ *NONE, *gen*eric*
Ref. Field Name . . _____ *NONE, *gen*eric*
Field Type . . . . . _

                                Minimum  Maximum
Field Length . . . . _____
Decimal Places . . _____

File Name . . . . . _____ *gen*eric*
File Library . . . _____ *gen*eric*
Include LF Files . . _____ Y

Application . . . . _____
Level . . . . . _____

F3=Exit   F4=Browse   F5=Refresh   F11=View Output   F21=Sys Command

```

The search screen provides a number of search criteria. When Enter is pressed, all fields that meet ALL entered criteria will be listed.

Field Name

The system name for the field

* may be used as a generic wildcard anywhere within the value

Field Description

The description text for a field

*NONE – include only fields that don't have a description defined

* may be used as a generic wildcard anywhere within the value

Field Alt. Name

The alternate or SQL name for the field

*NONE – include only fields that don't have an alternate name

* may be used as a generic wildcard anywhere within the value

Ref. Field Name

The name of the reference field providing attributes for the field

*NONE – include only fields that don't use a reference field

* may be used as a generic wildcard anywhere within the value



Field Type

The type of field

Options for Field Type:

C=Any Character Type (A, G, H, 5)

N=Any Numerical Type (B, F, S, P)

A=Character

B=Binary

E=DBCS Either

F=Floating Point

G=DBCS Graphic

H=Hexadecimal

J=DBCS Only

L=Date

O=DBCS Open

P=Packed decimal

S=Zoned decimal

T=Time

Z=Timestamp

5=Binary character

Field Length

Enter the minimum and/or maximum lengths of fields to be included in the search results. For packed numeric fields, the decimal length is considered rather than the byte length.

Decimal Places

Enter the minimum and/or maximum number of decimal places that a field must have in order to be included in the search results.

File Name

The system name for the file

* may be used as a generic wildcard anywhere within the value

File Library

The system name of the library containing the files

* may be used as a generic wildcard anywhere within the value

Include LF Files

Y – Include Logical files in the search. Otherwise, only Physical files will be included.

Application

The MDXREF Application containing the files

Level

The MDXREF Level containing the files



5.5.2 Field Search Results

The Field Search Result listing screen displays each distinct Library, File and Field that meet the search criteria.

Opt

1 – Source containing Field – this option causes MDXREF to collect the source for all objects either directly using the file or a logical over the file, along with all copybooks used by dependent programs. It then inspects the code for any non-commented lines containing the field and then presents the results.

Function Keys:

F9 – toggle the display between the field description and the alternate field name

F15 – generate report in MD Output of all field search results



5.6 Search for Query Definitions

Function: to report on all query definitions that meet the entered criteria.

To accurately track the running of queries using the RUNQRY command, an optional logging program – MDXREF/MDLQLOG – has been created to log the usage of a query (what, when and by who) each time the command RUNQRY is performed. To use this functionality, just run the following command: **CHGCMD CMD(QSYS/RUNQRY) VLDCKR(MDXREF/MDLQLOG)**.

NOTE: Be sure to run the command for all QSYS-Language libraries each time the operating system is upgraded.

The following screen is displayed to get the report parameters.

MDC2KXF	COMPANY NAME	MDXREF
SCRN11	Query Search	10/27/11
Filters (blank = all):		22:26:12
Query Name _____	*Generic*	
Library _____	*Generic*	
Description _____	*Generic*	
Creator _____	*Generic*	
Creation Date:		
Minimum _____		
Maximum _____		
Usage Date:		
Minimum _____		
Maximum _____		
File Used _____	*Generic*	
File Library _____	*Generic*	
Field Used _____	*Generic*	
Field Type _____	Condition, Display, Group, Sort	
F3=Exit	F5=Refresh	F6=Messages
F8=Submitted Jobs	F11=View Output	

Filters

Enter information into one or more of the filter fields to limit the report to queries that match the filters.



5.7 Process Flow Reports for Level

Function: to report on the flow of all execution objects for an application level.

MDC2KXF	COMPANY NAME	MDXREF
SCRN7	MD Process Flow Reports	10/27/13
	Appl: __ Lvl: __	12:05:38
Starting Object Name	*ALL	
Starting Object Library	_____	library, generic*
Starting Object Type	_____	type
Generate Process Flow Report	__	Y/N
Generate Object Catalog	__	Y/N
Generate File Usage Report	__	Y/N
Object Filter Definition	_____	definition
Maximum Call Stack Depth	<u>52</u>	1-256
File Usage Report Filters:		
File Name	_____	name, generic*
File Attribute	_____	attribute
File Usage	_____	usage
File Filter Definition	_____	definition
Enter=Confirm F4=Browse F11=View Output F12=Previous		

5.7.1 Generate Process Flow Report

Create a report that shows each distinct call stack possible for the entered application/level. A call stack starting point is any command, menu or program in the level that isn't called by something else.

Each column in the report represents the depth of the object in that stack, meaning that the object in column 1 is a starting point and it calls the object in column 2 which calls the object in column 3, etc.

If an object in the stack had previously been listed in the report, and that object calls other objects, it will be listed with *REPEAT as the value in the proceeding column.

5.7.1.1 Process Flow Report Filters

The Process Flow Report can be further filtered by the following parameters:

Appl

The application code

Lvl

The application level

Starting Object Library

The report may be filtered to consider commands, menus and programs as starting points only if they reside in the specified library or libraries.



Starting Object Type

The report may be filtered to consider either only *AJSE, *CMD, *IWS, *MENU, *PGM, *RBTJOB, *SCDE or *SQLPRC object types as starting points.

Object Filter Definition

A filter definition can be selected in order to omit certain libraries or objects from the Process Flow reports. Press F4 to create, modify or select a Filter Definition.

Maximum Call Stack Depth

The depth of the reported stack can be limited to between 1 and 256 columns

5.7.2 Generate Object Catalog

Create a report that alphabetically lists every object invoked in the Process Flow Report. In addition to the name of the object, the library, type, attribute, description, create date, create time, source change date and source change time are also listed.

5.7.3 Generate File Usage Report

Create a report that alphabetically lists every file that is used within the process flow as well as which objects use the file and how the file is used.

5.7.3.1 File Usage Report Filters

The File Usage Report can be further filtered by the following parameters:

File Name

The report may be filtered to show only a specific file or, with the use of '*', files beginning with a specific character string.

File Attribute

The report may be filtered to show only files with a specific attribute. For example, enter LF to show only logical files.

File Usage

The report may be filtered to show only objects that use a file in a certain way. For example, enter I/O to show only objects that read and write to a file.

File Filter Definition

A filter definition can be selected in order to omit certain libraries or files from the Usage report. Press F4 to create, modify or select a Filter Definition.



6 Reporting

Reports (MD Output) generated within MDSEC, MDXREF and MDCMS can be viewed, printed, exported or emailed by pressing **F11** from most screens.

MDCOUTF	MD Production 6.1				10.03.12			
SCRN1	MD Output				17:47:05			
	User	Report	Object					
Filter by:	<u>MMORGAN</u>	_____	_____					
Type options, press Enter.								
	3=Copy to PF	4=Delete	5=Display	6=Print	E=Export			
Opt	User	Date	Time	Report	Object	Library	Length	Width
—	MMORGAN	24.02.11	17:36:18	PGMSRCH	MDDCLWD	MDCMST	107	80
—	MMORGAN	31.03.11	9:10:05	RFPHIST			142	92
—	MMORGAN	14.04.11	21:34:18	LIBCOMP	MDCMS	MDCMST	28	120
—	MMORGAN	23.05.11	20:50:20	COMPARE	MDDCMSE	MDCMST	121	315
—	MMORGAN	23.05.11	20:53:01	JOURNAL	MDACST	MDADM	15	643
—	MMORGAN	23.05.11	21:01:39	PGMSRCH	MDDCMSD	MDCMST	200	80
—	MMORGAN	29.09.11	9:23:16	PROJECT			25	92
—	MMORGAN	15.11.11	22:27:49	FLDLIST	MDDTASK	MDCMST	56	112
—	MMORGAN	22.02.12	13:42:05	JOURNAL	MDAINV	MDADM	41	130
—	MMORGAN	5.03.12	16:03:41	RFPHIST			27	92
							Bottom	
F3=Exit	F4=Browse	F5=Refresh	F7=Spooled Output	F17=Top	F18=Bottom			

Filters

Enter a value into a filter field to limit the listing to items matching the filter(s). Possible values may be selected by pressing **F4=Browse** while the cursor is positioned on the filter field.

Options

3=Copy to PF – Copy the detail contents of the report into a formatted table (DDS Physical File). This provides a simple means to extract information out of the MD database for use in SQL, Queries or programs.

4=Delete – permanently delete the report

5=Display – view the report contents directly in the screen

6=Print – print the report contents to a spooled file

E=Export – Export the report to a CSV, PDF, TXT or XLSX formatted file. The file can be placed in IFS or emailed to one or more recipients. See the parameters for command MDRUNRPT for more information.

Function Keys:

F4=Browse – Browse possible values for a filter field

F5=Refresh

F7=Spooled Output – Display and manage spooled files

F17=Top – Position Cursor to the first entry in the list

F18=Bottom – Position Cursor to the last entry in the list



6.1 MDRUNRPT – Run MD Report command

Certain reports within MDSEC, MDXREF and MDCMS allow for saved report definitions to be run directly from a command line. This gives the users the ability to schedule reports to be run on a periodic basis and to have the output automatically printed or exported. This is also helpful during Project testing to allow the same parameters to be quickly used after each phase of a test.

The following screen is displayed to get the report run parameters.

```

                                Run MD Report (MDRUNRPT)

Type choices, press Enter.

Report Name . . . . . _____ COMPARE, JOURNAL, MDSEC...
User Profile . . . . . _____ User Profile
Report Definition . . . . . _____

-----
MDCMS Instance . . . . . *DFT          *DFT, *SAME, Instance
Print result to spooled file . . *NO          *YES, *NO
Copy result to physical file . . *NO          *YES, *NO
Export result to IFS file . . . . *NO          *YES, *NO
Email result . . . . . *NO          *YES, *NO
Filename . . . . . _____

-----
Append Timestamp to filename . . *YES         *YES, *NO
Directory . . . . . _____

-----
Report Format . . . . . XLSX          CSV, PDF, TXT, XLSX
csv Field Delimiter . . . . . ', '      Field Delimiter
Address to receive Email . . . . *NONE

-----
User to receive Email . . . . . *NONE      User ID
Group to receive Email . . . . . *NONE      Group ID

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

```

Use **F9=All parameters** to see all available parameters for command.

Report Name

COMPARE – the MDXREF Data Comparison Report

JOURNAL – the MD Journal Analysis Report

MDSEC – the MDSEC Authorization Report

NOTCMS – the MDCMS Audit Report listing object changes made outside of MDCMS

PROJECT – the MDCMS Project Report

PRJTASK – the MDCMS Project Task Report

RFPHIST – the MDCMS Audit Report listing object changes made within MDCMS

User Profile

The name of the user profile that defined the report definition

Report Definition

The name of the report definition

Print result to spooled file

*NO – the resulting report will not be automatically printed to a spooled file

*YES – the resulting report will be automatically printed to a spooled file



Copy result to physical file

- *NO – the resulting report will not be automatically exported to a physical file
- *YES – the resulting report will be automatically exported to a physical file (table)

Export result to IFS file

- *NO – the resulting report will not be automatically exported to an IFS file
- *YES – the resulting report will be automatically exported to an IFS file

Email result

- *NO – the resulting report will not be automatically emailed to recipients
- *YES – the resulting report will be automatically emailed to recipients

Copy to Physical file

The name of the physical file (table) to contain the detail contents of the report. Each column in the report will be placed in a separate formatted field. If the file already exists, it will be replaced.

Copy to Library

The IBM i library that is to contain the Physical file

Filename

If the results are to be exported or emailed, this is the name of the IFS file to receive the results. The file type (.CSV, .PDF, .TXT or .XLSX) will be automatically appended to the end of the name.

Timestamp

- *NO – a timestamp will not be appended to the file name
- *YES – a timestamp in the format of YYYYMMDD_HHMMSS will be appended to the file name

Directory

If the results are to be exported, this is the name of the IFS directory to receive the results. The directory path should begin with the root character "/".

Report Format

CSV – the exported report will be placed in a comma separated value file which can then be opened in Microsoft excel or similar spreadsheet programs.

PDF - the exported report will be converted to PDF. JVM 1.6 or higher is required

TXT – the exported report will be placed in a text file with the same layout as the on-line report.

XLSX – the exported report will be converted to the excel format. JVM 1.6 or higher is required

csv Field Delimiter

The character to be used to separate fields in a csv file

Address to receive Email

A specific email address to receive the report

User to receive Email

A user id to receive the report - the address for the user will be retrieved from the MDSEC email address table.

Group to receive Email

All users for the entered group id to receive the report – this parameter requires MDWorkflow groups to be present.



6.2 MDEXPSPLF – Export Spooled File command

The MDEXPSPLF command provides the functionality to export any spooled file to a text or PDF file.

The following screen is displayed to get the parameters.

```

MD Export Spool File (MDEXPSPLF)

Type choices, press Enter.

Spool Name . . . . . _____ Spool Name
Job Name . . . . . *CURRENT Job Name
Job Number . . . . . _____ Job Number
Job User . . . . . _____ Job User
Spooled file number . . . . . *LAST *LAST, 1-999999
MDCMS Instance . . . . . *DFT *DFT, Instance
Format . . . . . PDF PDF, TXT
File Name . . . . . _____

Append Timestamp to filename . . *YES *YES, *NO
Report Title . . . . . _____

Page Layout . . . . . *DFT *DFT, AUTOMATIC, LANDSCAPE. . .
Page Size . . . . . *DFT *DFT, A3, A4, A5, B5...
Add Page Number to each Page . . *NO *YES, *NO
Export result to IFS file . . . > *YES *YES, *NO
Email result . . . . . > *YES *YES, *NO
Directory . . . . . _____

Address to receive Email . . . . *NONE

User to receive Email . . . . . *NONE User ID
Group to receive Email . . . . . *NONE Group ID

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

```

Spool Name

The name of a spooled file

Job Name

The name of the job that generated the spooled file or *CURRENT to look for the spooled file in the current job

Job Number

The number of the job that generated the spooled file

Job User

The user profile of the job that generated the spooled file Report Header

Spooled File Number

The number of the spooled file within the job or *LAST to use the most recently generated spooled file of the given name for the given job.

MDCMS Instance

A 1-4 character string of the suffix for an existing instance of MDXREF or *DFT to use MDXREF



Format

PDF – the spooled file will be converted to the PDF format. JVM 1.5 is required
TXT – the spooled file will be converted to a text file

File Name

If the results are to be exported or emailed, this is the name of the IFS file to receive the results. The file type (.pdf or .txt) will be automatically appended to the end of the name.

Append Timestamp to filename

*NO – a timestamp will not be appended to the file name
*YES – a timestamp in the format of YYYYMMDD_HHMMSS will be appended to the file name

Report Title

The title to place in the header of the PDF file and in the subject line of the email

Page Layout

Values for PDF format:

*DFT – the layout defined in data area MDSEC(instance)/MDPDFLAYOUT
AUTOMATIC – the layout is determined automatically based on the width of the spooled file
LANDSCAPE – the paper is rotated so that the wide edge is horizontal
PORTRAIT – the paper is rotated so that the wide edge is vertical

Page Size

Values for PDF format:

*DFT – the size defined in data area MDSEC(instance)/MDPDFSIZE
A3, A4, A5, B5, LEGAL, LETTER

Add Page Number to each Page

*NO – a page number will not be added to each page
*YES – a page number will be added to each page in the bottom right corner

Export result to IFS file

*NO – the resulting report will not be automatically exported to an IFS file
*YES – the resulting report will be automatically exported to an IFS file

Email result

*NO – the resulting report will not be automatically emailed to recipients
*YES – the resulting report will be automatically emailed to recipients.

Directory

If the results are to be exported, this is the name of the IFS directory to receive the results. The directory path should begin with the root character “/”.

Address to receive Email

A specific email address to receive the report

User to receive Email

A user id to receive the report - the address for the user will be retrieved from the MDSEC email address table.

Group to receive Email

All users for the entered group id to receive the report – this parameter requires that MDWorkflow groups are present.