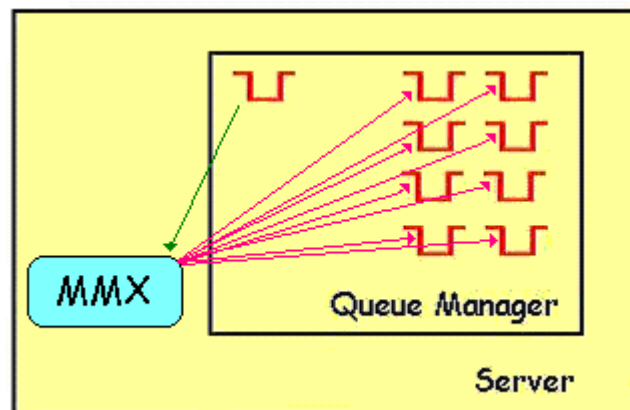


Message Multiplexer (MMX)

Operation and Installation Manual



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1 Introduction

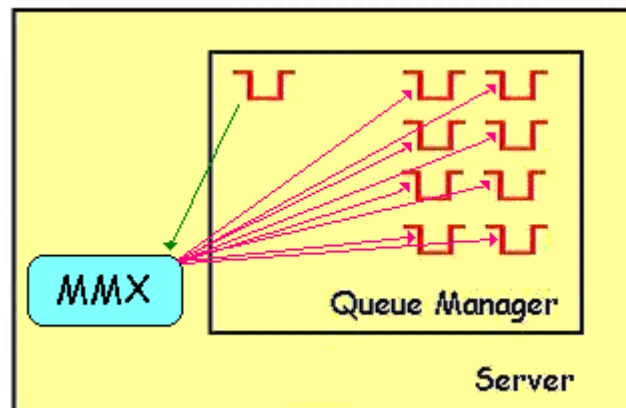
1.1 Overview

Message Multiplexer (MMX) is a MQ application that will move messages from a single input queue to 'n' output queues ('n' can up to 99). MMX has been tested on Windows, Unix, Linux and z/OS environments.

MMX can move messages from a single source queue to (up to) 99 target queues. Messages put to each target queue are an exact replicate of the original message from the source queue (including the message's MQMD).

MMX performs each MQGET and the subsequent "n" MQPUT(s) under a Unit of Work (UOW), so that message integrity is kept.

1.2 Context Diagram (Logical View)



2 Installing Message Multiplexer

This section describes how to install Capitalware's MMX.

2.1 Windows Installation

To install MMX on Windows, do the following instructions:

- Run the install program called: **mmx-setup.exe**
- The installer follows the standard Windows install procedures and provides default values for the user.
- When the install program has completed execution, there will be a newly created folder under *Start -> All Programs* called *MMX*.
- To run MMX, select the MMX icon from within the MMX folder.

The user may copy or ftp the mmx.exe and mmxc.exe files from one Windows server to another Windows server.

2.2 Unix and Linux Installation

To install MMX on Unix or Linux, first unzip the **mmx.zip** and then select the appropriate TAR file for the target platform. You will find 8 TAR files in the original ZIP file:

- **AIX/mmx_aix.tar**
- **HPUX_IA64 /mmx_hpux_ia64.tar**
- **HPUX_PA-RISC /mmx_hpux.tar**
- **Linux_x86/mmx_linux_x86.tar**
- **Linux_POWER/mmx_linux_power.tar**
- **Linux_zSeries//mmx_linux_zseries.tar**
- **Solaris_SPARC/mmx_solaris.tar**
- **Solaris_x86/mmx_solaris_x86.tar**

Steps to install the server-side security exit:

1. ftp or copy the selected TAR file to the target platform to the */opt/capitalware/* directory.
2. Un-tar the mmx_XXX.tar file into the */opt/capitalware/* sub-directory (XXX is either aix, hpux, solaris or linux)

```
cd /opt/capitalware/  
tar -xvf mmx_XXX.tar
```

2.3 IBM i Installation

To install the MMX on IBM i, first unzip the **mmx.zip** and then select the files in the IBM i (iSeries) directory.

- **mmx.savf** is the IBM i 'Save File' that contains MMX

Steps to install MMX:

1. Log onto the target IBM i server and do the following command:

```
CRTSAVF FILE(QGPL/MMX)
```

2. ftp the IBM i files to the IBM i server as follows:

```
ftp -s:mmx_iseries.ftp iseries_hostname
```

```
your-IBM i-userid  
your-IBM i-password  
  
binary  
cd QGPL  
put mmx.savf  
  
quit
```

3. Log onto the target IBM i server and do the following commands:

```
RSTLIB SAVLIB(MMX) DEV(*SAVF) SAVF(QGPL/MMX)  
CLRSVF FILE(QGPL/MMX)  
CHGOBJOWN OBJ(MMX) OBJTYPE(*LIB) NEWOWN(QMQM)
```

2.4 z/OS Installation

To install the MMX for z/OS, first unzip the **mmx.zip**. The zip file contains 1 z/OS XMIT prepared dataset.

- **MMX.LOAD.ZOS** is the XMIT dataset that contains the z/OS load-module.

Steps to install MMX:

1. ftp the z/OS XMIT prepared datasets to the z/OS LPAR.

```
ftp -s:mmx.ftp z/OS_hostname
```

```
your-z/OS-userid
your-z/OS-password

binary
quote SITE recfm=fb lrecl=80 blksize=3120
put MMX.LOAD.ZOS
quit
```

If the user receives the following error message then they will need to pre-allocate the z/OS dataset:

```
ftp> put MMX.LOAD.ZOS
200 Port request OK.
550-SVC99 RETURN CODE=4 S99INFO=0 S99ERROR=38656 HEX=9700 S99ERSN code X'000003F3'.
550 Unable to create data set xxxxx.MMX.LOAD.ZOS for STOR command.
```

To pre-allocate the XMIT dataset go to option 3.2 of ISPF and allocate the dataset: MMX.LOAD.ZOS.

Use the following dataset attributes when allocating the dataset:

Space	
Units	BLOCKS
Primary Quantity	40
Secondary Quantity	40
Directory Blocks	0
DCB Parameters	
RECFM	FB
LRECL	80
BLKSIZE	3120
DsnType	Blank

After the user has pre-allocated the dataset, they can redo the ftp commands.

2. Log on to z/OS LPAR and issue the following TSO RECEIVE commands:

TSO RECEIVE INDATASET(MMX.LOAD.ZOS)

After issuing the above commands, the following product dataset will appear:

- **+HLQ+.CPTLWARE.MMX.LOAD** is the dataset that contains the z/OS load-module.

3 Starting MMX

This section describes the various ways that the MMX can be started. Currently, MMX via WebSphere MQ's triggering system, manually or by a scheduling package.

3.1 Triggered Execution

If the local input queue has been setup for triggering (i.e. Trigger First) then when a message arrives on the input queue and the message count goes from 0 to 1 (trigger on first), the queue manager will start MMX. The Backup component will begin processing each message on the input queue and writing the message's content including MQMD to a file.

3.2 Manual Execution

MMX can be manually started from a Command Prompt. First change to the MMX directory (i.e. C:\Capitalware\MMX) and then type *mmx.exe* and then press *Enter*.

3.3 Scheduled Execution

MMX can be setup to be run under a scheduling package. (For example, Windows 2000 **Scheduled Task** service.) You may prefer to have MMX executed daily. Therefore, use the scheduling package's tools to setup the necessary parameters for daily execution.

3.4 Command-line parameters

This section describes the required and optional command-line parameters for the MMX.

```
mmx.exe [-i Path_FileName_for_inifile]
```

Required Parameter	Description
-i	The full path and filename of the MMX IniFile.

3.5 z/OS Batch Execution

Here is a sample JCL to run MMX:

```
//RUN01 EXEC PGM=MMX, PARM=' -i MMXIN '
//STEPLIB DD DISP=SHR, DSN=+HLQ+ .CPTLWARE .MMX .LOAD
//SYSPRINT DD SYSOUT=*
//SYSOUT DD SYSOUT=*
//MMXIN DD DISP=SHR, DSN=+HLQ+ .CPTLWARE .INIFILE(MMX)
```

4 IniFile Parameters

4.1 Logging

- **PerformLogging** specifies what type of logging the user wishes to have. PerformLogging supports 2 values: [Y / N], where Y is Yes and N is No. The default value is N.

PerformLogging =N

- **LogFile** specifies the location of the log file. The default is as follows:

For Windows:

LogFile=C:\Capitalware\MMX\mmx.log

For Unix / Linux:

LogFile=/opt/capitalware/MMX/mmx.log

4.2 MQ

- **DestructiveGet** allows MMX the choice of either copying or moving the message from the original input queue. DestructiveGet supports 2 values: [Y / N]. The default value is Y.

DestructiveGet=Y

- **GetWithConvert** causes MMX to retrieve messages with or without MQGMO_CONVERT option. GetWithConvert supports 2 values: [Y / N]. The default value is Y.

GetWithConvert=Y

- **OpenInputQShared** causes MMX to open the input queue in either shared or exclusive mode. OpenInputQShared supports 2 values: [Y / N]. The default value is Y.

OpenInputQShared=Y

- **GetBufferSize** specifies the maximum message size to be retrieved from the input queue. GetBufferSize supports values from 1 to 104857600 (100MB). The default value is 65536.

GetBufferSize=65536

- **TimeOut** specifies time-out value for the MQGET function. TimeOut supports values from 1 to 2147483648. The default value is 10 seconds. *Note: To specify 'wait forever' set TimeOut to 0 (zero).*

TimeOut =10

- **QMgrName** specifies the name of the queue manager. There is no default value.

QMgrName = MQA1

- **InputQName** specifies the name of the input queue. There is no default value.

InputQName = MQA1

- **OutputQCount** specifies the maximum number of output queues that the message will be written to. OutputQCount supports values from 1 to 99. The default value is 0.

OutputQCount=5

- **OutputQName##** specifies the name of the output queue where ## an index number. There is no default value.

OutputQName01 = TEST.OUT.QA
OutputQName02 = TEST.OUT.QB

- **UseArchive** specifies whether or not the contents of the message should be written to the ArchiveFile. UseArchive supports 2 values: [Y / N]. The default value is N.

UseArchive = Y

- **ArchiveFile** specifies the name of the archive file which the contents of the message will be written to if UseArchive is set to Y. The default value is 'mmx-archive.txt'.

ArchiveFile = mmx-archive.txt

4.3 Other

- **SequenceNumberFlag** is a z/OS (OS/390) only flag. It states whether or not there are sequence numbers in columns 72 to 80. SequenceNumberFlag supports 2 values; [Y / N]. The default value is N.

SequenceNumberFlag = N

5 Log File

To verify that the process flow was successful, you can view the log file for the events that are generated.

5.1 Windows

The log file is located at the following (assuming a default install of C:\Capitalware\MMX):

C:\Capitalware\MMX\mmx.log

All log entries will be marked with **INFO**, **WARNING** or **ERROR** in columns 21 to 26.

```

2011/04/08 18:28:49 INFO #00717: *****
2011/04/08 18:28:49 INFO #00721: MMX is now starting.
2011/04/08 18:28:49 INFO #00729: MMX version 1.3.1 (windows)
2011/04/08 18:28:49 INFO #00732: Current Log file is mmx.log
2011/04/08 18:28:49 INFO #00735: PerformLogging=N
2011/04/08 18:28:49 INFO #01107: The following are the parameters used for this execution.
2011/04/08 18:28:49 INFO #01117: DestructiveGet : Y
2011/04/08 18:28:49 INFO #01127: GetWithConvert : Y
2011/04/08 18:28:49 INFO #01137: Get Buffer Size : 1024000
2011/04/08 18:28:49 INFO #01147: OpenInputQShared : N
2011/04/08 18:28:49 INFO #01157: Timeout value : 0
2011/04/08 18:28:49 INFO #01167: UseArchive : Y
2011/04/08 18:28:49 INFO #01177: ArchiveFile : mmx-archive.txt
2011/04/08 18:28:49 INFO #01195: Queue Manager Name: MQWT1
2011/04/08 18:28:49 INFO #01213: Input Queue Name : TEST.Q10
2011/04/08 18:28:49 INFO #01223: Output Queue Count: 2
2011/04/08 18:28:49 INFO #01246: Output Queue #01 : TEST.Q1
2011/04/08 18:28:49 INFO #01246: Output Queue #02 : TEST.Q2
2011/04/08 18:28:49 INFO #01716: MQConn CC=0 RC=0 on connection to MQWT1
2011/04/08 18:28:49 INFO #01911: MQOpen CC=0 RC=0 for TEST.Q10
2011/04/08 18:28:49 INFO #02015: MQOpen CC=0 RC=0 for TEST.Q1
2011/04/08 18:28:49 INFO #02015: MQOpen CC=0 RC=0 for TEST.Q2
2011/04/08 18:29:57 INFO #02413: Quit message received - time to go.
2011/04/08 18:29:57 INFO #02101: MQClose CC=0 RC=0 for TEST.Q10
2011/04/08 18:29:57 INFO #02186: MQClose CC=0 RC=0 for TEST.Q1
2011/04/08 18:29:57 INFO #02186: MQClose CC=0 RC=0 for TEST.Q2
2011/04/08 18:29:57 INFO #01798: MQDisc CC=0 RC=0 on disconnecting from MQWT1
2011/04/08 18:29:57 INFO #01294: Statistics of this executions:
2011/04/08 18:29:57 INFO #01304: Messages Read : 11
2011/04/08 18:29:57 INFO #01314: Messages Written : 20
2011/04/08 18:29:57 INFO #01320: MMX is now stopping.

```

5.2 Unix and Linux

The log file is located at the following (assuming a default install of /opt/capitalware/MMX/):

/opt/capitalware/MMX/mmx.log

All log entries will be marked with **INFO**, **WARNING** or **ERROR** in columns 21 to 26.

```

2011/04/08 18:28:49 INFO #00717: *****
2011/04/08 18:28:49 INFO #00721: MMX is now starting.
2011/04/08 18:28:49 INFO #00729: MMX version 1.3.1 (AIX)
2011/04/08 18:28:49 INFO #00732: Current Log file is mmx.log
2011/04/08 18:28:49 INFO #00735: PerformLogging=N
2011/04/08 18:28:49 INFO #01107: The following are the parameters used for this execution.
2011/04/08 18:28:49 INFO #01117: DestructiveGet : Y
2011/04/08 18:28:49 INFO #01127: GetWithConvert : Y
2011/04/08 18:28:49 INFO #01137: Get Buffer Size : 1024000
2011/04/08 18:28:49 INFO #01147: OpenInputQShared : N
2011/04/08 18:28:49 INFO #01157: Timeout value : 0
2011/04/08 18:28:49 INFO #01167: UseArchive : Y
2011/04/08 18:28:49 INFO #01177: ArchiveFile : mmx-archive.txt
2011/04/08 18:28:49 INFO #01195: Queue Manager Name: MQWT1
2011/04/08 18:28:49 INFO #01213: Input Queue Name : TEST.Q10
2011/04/08 18:28:49 INFO #01223: Output Queue Count: 2
2011/04/08 18:28:49 INFO #01246: Output Queue #01 : TEST.Q1
2011/04/08 18:28:49 INFO #01246: Output Queue #02 : TEST.Q2
2011/04/08 18:28:49 INFO #01716: MQConn CC=0 RC=0 on connection to MQWT1
2011/04/08 18:28:49 INFO #01911: MQOpen CC=0 RC=0 for TEST.Q10
2011/04/08 18:28:49 INFO #02015: MQOpen CC=0 RC=0 for TEST.Q1
2011/04/08 18:28:49 INFO #02015: MQOpen CC=0 RC=0 for TEST.Q2
2011/04/08 18:29:57 INFO #02413: Quit message received - time to go.
2011/04/08 18:29:57 INFO #02101: MQClose CC=0 RC=0 for TEST.Q10
2011/04/08 18:29:57 INFO #02186: MQClose CC=0 RC=0 for TEST.Q1
2011/04/08 18:29:57 INFO #02186: MQClose CC=0 RC=0 for TEST.Q2
2011/04/08 18:29:57 INFO #01798: MQDisc CC=0 RC=0 on disconnecting from MQWT1
2011/04/08 18:29:57 INFO #01294: Statistics of this executions:
2011/04/08 18:29:57 INFO #01304: Messages Read : 11
2011/04/08 18:29:57 INFO #01314: Messages Written : 20
2011/04/08 18:29:57 INFO #01320: MMX is now stopping.

```

5.3 IBM i

The log file is located at the following (assuming a default install of QIBM/UserData/capitalware/MMX/):

QIBM/UserData/capitalware/MMX/mmx.log

All log entries will be marked with **INFO**, **WARNING** or **ERROR** in columns 21 to 26.

```

2011/04/08 18:28:49 INFO #00717: *****
2011/04/08 18:28:49 INFO #00721: MMX is now starting.
2011/04/08 18:28:49 INFO #00729: MMX version 1.3.1 (iSeries)
2011/04/08 18:28:49 INFO #00732: Current Log file is mmx.log
2011/04/08 18:28:49 INFO #00735: PerformLogging=N
2011/04/08 18:28:49 INFO #01107: The following are the parameters used for this execution.
2011/04/08 18:28:49 INFO #01117: DestructiveGet : Y
2011/04/08 18:28:49 INFO #01127: GetWithConvert : Y
2011/04/08 18:28:49 INFO #01137: Get Buffer Size : 1024000
2011/04/08 18:28:49 INFO #01147: OpenInputQShared : N
2011/04/08 18:28:49 INFO #01157: TimeOut value : 0
2011/04/08 18:28:49 INFO #01167: UseArchive : Y
2011/04/08 18:28:49 INFO #01177: ArchiveFile : mmx-archive.txt
2011/04/08 18:28:49 INFO #01195: Queue Manager Name: MQWT1
2011/04/08 18:28:49 INFO #01213: Input Queue Name : TEST.Q10
2011/04/08 18:28:49 INFO #01223: Output Queue Count: 2
2011/04/08 18:28:49 INFO #01246: Output Queue #01 : TEST.Q1
2011/04/08 18:28:49 INFO #01246: Output Queue #02 : TEST.Q2
2011/04/08 18:28:49 INFO #01716: MQConn CC=0 RC=0 on connection to MQWT1
2011/04/08 18:28:49 INFO #01911: MQOpen CC=0 RC=0 for TEST.Q10
2011/04/08 18:28:49 INFO #02015: MQOpen CC=0 RC=0 for TEST.Q1
2011/04/08 18:28:49 INFO #02015: MQOpen CC=0 RC=0 for TEST.Q2
2011/04/08 18:29:57 INFO #02413: Quit message received - time to go.
2011/04/08 18:29:57 INFO #02101: MQClose CC=0 RC=0 for TEST.Q10
2011/04/08 18:29:57 INFO #02186: MQClose CC=0 RC=0 for TEST.Q1
2011/04/08 18:29:57 INFO #02186: MQClose CC=0 RC=0 for TEST.Q2
2011/04/08 18:29:57 INFO #01798: MQDisc CC=0 RC=0 on disconnecting from MQWT1
2011/04/08 18:29:57 INFO #01294: Statistics of this executions:
2011/04/08 18:29:57 INFO #01304: Messages Read : 11
2011/04/08 18:29:57 INFO #01314: Messages Written : 20
2011/04/08 18:29:57 INFO #01320: MMX is now stopping.

```

5.4 z/OS

The log file is located at the following (assuming a default install of SYSPRINT):

All log entries will be marked with **INFO**, **WARNING** or **ERROR** in columns 21 to 26.

```

2011/04/08 18:28:49 INFO #00717: *****
2011/04/08 18:28:49 INFO #00721: MMX is now starting.
2011/04/08 18:28:49 INFO #00729: MMX version 1.3.1 (zOS
2011/04/08 18:28:49 INFO #00732: Current Log file is SYSPRINT
2011/04/08 18:28:49 INFO #00735: PerformLogging=N
2011/04/08 18:28:49 INFO #01107: The following are the parameters used for this execution.
2011/04/08 18:28:49 INFO #01117:   DestructiveGet      : Y
2011/04/08 18:28:49 INFO #01127:   GetWithConvert     : Y
2011/04/08 18:28:49 INFO #01137:   Get Buffer Size    : 1024000
2011/04/08 18:28:49 INFO #01147:   OpenInputQShared  : N
2011/04/08 18:28:49 INFO #01157:   Timeout value     : 0
2011/04/08 18:28:49 INFO #01195:   Queue Manager Name: MQA1
2011/04/08 18:28:49 INFO #01213:   Input Queue Name  : TEST.Q10
2011/04/08 18:28:49 INFO #01223:   Output Queue Count: 2
2011/04/08 18:28:49 INFO #01246:   Output Queue #01  : TEST.Q1
2011/04/08 18:28:49 INFO #01246:   Output Queue #02  : TEST.Q2
2011/04/08 18:28:49 INFO #01716: MQConn CC=0 RC=0 on connection to MQA1
2011/04/08 18:28:49 INFO #01911: MQOpen CC=0 RC=0 for TEST.Q10
2011/04/08 18:28:49 INFO #02015: MQOpen CC=0 RC=0 for TEST.Q1
2011/04/08 18:28:49 INFO #02015: MQOpen CC=0 RC=0 for TEST.Q2
2011/04/08 18:29:57 INFO #02413: Quit message received - time to go.
2011/04/08 18:29:57 INFO #02101: MQClose CC=0 RC=0 for TEST.Q10
2011/04/08 18:29:57 INFO #02186: MQClose CC=0 RC=0 for TEST.Q1
2011/04/08 18:29:57 INFO #02186: MQClose CC=0 RC=0 for TEST.Q2
2011/04/08 18:29:57 INFO #01798: MQDisc CC=0 RC=0 on disconnecting from MQA1
2011/04/08 18:29:57 INFO #01294: Statistics of this executions:
2011/04/08 18:29:57 INFO #01304:   Messages Read      : 11
2011/04/08 18:29:57 INFO #01314:   Messages Written   : 20
2011/04/08 18:29:57 INFO #01320: MMX is now stopping.

```

6 Appendix A – mmx.ini file

The table below is the supplied mmx.ini file. The IniFile supports the following keywords and their values:

```
SequenceNumberFlag = N
PerformLogging = N
Timeout = 0
LogFile = mmx.log
DestructiveGet=Y
OpenInputQShared=N
GetBufferSize = 102400
QMgrName = MQA1
InputQName = TEST.IN.Q
OutputQCount = 3
OutputQName01 = TEST.OUT.Q1
OutputQName02 = TEST.OUT.Q2
OutputQName03 = TEST.OUT.Q3
```

Note: Keywords are case sensitive.

Initialization keyword definitions:

- **PerformLogging** specifies what type of logging the user wishes to have. PerformLogging supports 2 values: [Y / N], where Y is Yes and N is No. The default value is N.

PerformLogging =N

- **LogFile** specifies the location of the log file. The default is as follows:

For Windows:

LogFile=C:\Capitalware\MMX\mmx.log

For Unix / Linux:

LogFile=/opt/capitalware/MMX/mmx.log

- **DestructiveGet** allows MMX the choice of either copying or moving the message from the original input queue. DestructiveGet supports 2 values: [Y / N]. The default value is Y.

DestructiveGet=Y

- **GetWithConvert** causes MMX to retrieve messages with or without MQGMO_CONVERT option. GetWithConvert supports 2 values: [Y / N]. The default value is Y.

GetWithConvert=Y

- **OpenInputQShared** causes MMX to open the input queue in either shared or exclusive mode. OpenInputQShared supports 2 values: [Y / N]. The default value is Y.

OpenInputQShared=Y

- **GetBufferSize** specifies the maximum message size to be retrieved from the input queue. GetBufferSize supports values from 1 to 104857600 (100MB). The default value is 65536.

GetBufferSize=65536

- **TimeOut** specifies time-out value for the MQGET function. TimeOut supports values from 1 to 2147483648. The default value is 10 seconds. *Note: To specify 'wait forever' set TimeOut to 0 (zero).*

TimeOut =10

- **QMgrName** specifies the name of the queue manager. There is no default value.

QMgrName = MQA1

- **InputQName** specifies the name of the input queue. There is no default value.

InputQName = MQA1

- **OutputQCount** specifies the maximum number of output queues that the message will be written to. OutputQCount supports values from 1 to 99. The default value is 0.

OutputQCount=4

- **OutputQName##** specifies the name of the output queue where ## an index number. There is no default value.

OutputQName01 = TEST.OUT.QA

OutputQName02 = TEST.OUT.QB

OutputQName03 = TEST.OUT.QC

OutputQName04 = TEST.OUT.QD

- **UseArchive** specifies whether or not the contents of the message should be written to the ArchiveFile. UseArchive supports 2 values: [Y / N]. The default value is N.

UseArchive = Y

- **ArchiveFile** specifies the name of the archive file which the contents of the message will be written to if UseArchive is set to Y. The default value is 'mmx-archive.txt'.

ArchiveFile = mmx-archive.txt

- **SequenceNumberFlag** is a z/OS (OS/390) only flag. It states whether or not there are sequence numbers in columns 72 to 80. SequenceNumberFlag supports 2 values; [Y / N]. The default value is N.

SequenceNumberFlag = N

7 Appendix A – Technical Support

The support for MMX can be found at the following location (requires a support contract):

Online Help Desk Ticketing System at
www.capitalware.com/phpst/

By email at:
support@capitalware.com

By regular mail at:

Capitalware Inc.
Attn: MMX Support
Unit 11, 1673 Richmond Street, PMB524
London, Ontario N6G2N3
Canada

8 Appendix D – Summary of Changes

- MMX v1.4.1
 - Fixed an issue with being started by a triggered message
- MMX v1.4.0
 - Added GetWithConvert keyword
 - Enhanced commit/backout processing
 - Created binaries/executables for all major platforms
- MMX v1.3.0
 - Fixed a bug with the message buffer length
 - Changed fopen mode parameters
 - Cleaned up the code
- MMX v1.2.0
 - Added the ability to have MMX started via MQ triggering
 - Added UseArchive and ArchiveFile (removed LogMessage)
- MMX v1.1.1
 - Added the 'Quit' message feature
- MMX v1.1.0
 - Added LogMessage option
- MMX v1.0.1
 - Added DestructiveGet and OpenInputQShared options
- MMX v1.0.0
 - Initial release.

9 Appendix E – License Agreement

Apache License
Version 2.0, January 2004
<http://www.apache.org/licenses/>

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

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10 Appendix F – Notices

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