



QMirror/BK™ Version 1.5.1

Installation and Users Guide

**Real-time objects and data backup
from source system to PC server
for IBM iSeries**

First Edition (May 2021)

This edition applies to the licensed program QMirror/BK version 1.5.1, and to all subsequent releases until otherwise indicated in the new editions. Make sure you are using the proper edition for the level of the product.

© Copyright Middleware Technologies Limited 2005-2021. All rights reserved.

End-User License Agreement (EULA) for MTL Software

SOFTWARE PRODUCT: QMirror/BK – real-time objects and data backup from AS400 to PC server

LICENSES: Shareware

IMPORTANT – READ CAREFULLY

This End-User License Agreement ("EULA") is a legal agreement between the End User (either an individual or a single entity) and Middleware Technologies Limited ("MTL") for the MTL SOFTWARE PRODUCT. By installing the SOFTWARE PRODUCT, the End User agrees to be bound by the terms of this EULA. If the End User does not agree to the terms of this EULA, the End User is not authorized to install and/or use the SOFTWARE PRODUCT.

SOFTWARE PRODUCT LICENSE

The SOFTWARE PRODUCT is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties. The SOFTWARE PRODUCT is licensed, not sold.

1. GRANT OF LICENSE

This EULA grants the End User the following rights with respect to the SOFTWARE PRODUCT:

MTL grants the End User an individual, personal, nonexclusive license to make and use copies of the SOFTWARE PRODUCT for the sole purpose of using it. The End User may install copies of the SOFTWARE PRODUCT on an unlimited number of computers provided that the End User is the only individual using the SOFTWARE PRODUCT. If the End User is an entity, MTL grants it the right to designate one individual within the organization to have the right to use the SOFTWARE PRODUCT in the manner provided above.

2. UPGRADES/UPDATES

If the SOFTWARE PRODUCT is an upgrade from another product, whether it is from MTL or another supplier, the End User may use or transfer the SOFTWARE PRODUCT only in conjunction with that upgraded product, unless the End User destroys the upgraded product. If the SOFTWARE PRODUCT is an MTL product, the End User may use that upgraded product only in accordance with this EULA. If the SOFTWARE PRODUCT is an upgrade of a component of a package of software programs which the End User licensed as a single product, the SOFTWARE PRODUCT may be used and transferred only as part of that single product package and may not be separated for use on more than one computer.

3. DESCRIPTION OF OTHER RIGHT AND LIMITATIONS

- Limitations on Reverse Engineering, De-compilation, and Disassembly

The End User may not reverse engineer, decompile, or disassemble the object code portions of the SOFTWARE PRODUCT, except and only to the extent that such activity is expressly permitted by applicable law notwithstanding this limitation.

- Software Transfer

The End User may permanently transfer all of the rights (not a part of them) under this EULA, provided the recipient agrees to the terms of this EULA.

- Termination

Without prejudice to any other rights, MTL may terminate this EULA if the End User fails to comply with the terms and conditions of this EULA. In such event, the End User must destroy all copies of the SOFTWARE PRODUCT and all of its component parts.

4. COPYRIGHT

All title and copyrights in and to the SOFTWARE PRODUCT (including but not limited to any images, photographs, animations, video, audio, music, and text incorporated into the SOFTWARE PRODUCT), the accompanying printed materials, and any copies of the SOFTWARE PRODUCT are owned by MTL or its suppliers. The SOFTWARE PRODUCT is protected by copyright laws and international treaty provisions. Therefore, you must treat the SOFTWARE PRODUCT like any other copyrighted material.

5. NO WARRANTIES

MTL expressly disclaims any warranty for the SOFTWARE PRODUCT. The SOFTWARE PRODUCT and any related documentation are provided "as is" without warranty of any kind, either express or implied, including, without limitation, the implied warranties, or merchantability, fitness for a particular purpose, or no infringement. The entire risk arising out of use or performance of the SOFTWARE PRODUCT remains with you.

6. NO LIABILITY FOR DAMAGES

In no event shall MTL or its suppliers be liable for any damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or any other pecuniary loss) arising out of the use of or inability to use this MTL product, even if MTL has been advised of the possibility of such damages.

MISCELLANEOUS

- If you acquired this product in the United States, this EULA is governed by the laws of the United States. If this product was acquired outside the United States, then local laws may apply.
- MTL does not allow you to utilize our SOFTWARE PRODUCT to do anything that violates the local law. If you utilize our SOFTWARE PRODUCT to do the illegal activity, the consequent result shall be on your own responsibility. If you disagree with this item, please do not install and/or use the SOFTWARE PRODUCT.
- Should you have any questions concerning this EULA, or if you desire to contact MTL for any reason, please contact customer.support@qmirror.com

Contents

(010) How to implement QMirror/BK?1
 (020) Quick start2

Part I: Configure AS400 Database

(100) Create AS400 user profiles for QMirror/BK3
 (110) Check AS400 configuration4

Part II: Configure QMirror/BK

(200) Install QMirror/BK.....5
 (210) Configure QMirror/BK7
 (220) About QMirror/BK internal SQLite database8
 (300) Simulation Test9

Part III: QMirror/BK Operation

(400) Back up AS400 libraries17
 (410) Exclude objects from QMirror/BK object list18
 (420) Normal running QMirror/BK.....19
 (430) End QMirror/BK.....20
 (440) Get QMirror/BK running log and status21
 (450) Add more libraries from AS40022
 (460) Learn QMirror/BK object transfer status23
 (470) Recovery mode.....24
 (500) Prepare batch programs to execute QMirror/BK.....25
 (510) Install QMirror/BK as a Windows service.....26
 (520) Uninstall QMirror/BK27

Appendix A: System Table Structures

(A00) Library master (ZALIBR).....28
 (A10) AS400 object master (ZAMTBF)29
 (A50) Job log file (ZJBLOG) / Job status file (ZJBSTS).....30
 (A60) Journal master (ZJMASF)31
 (A70) System log file (ZPCLOG / ZPCLOG2).....32
 (A80) System control file (ZSERVR).....33

Appendix B: System Messages

(B10) Error messages.....34
 (B20) Warning messages.....35

(010) How to implement QMirror/BK?

There are three parts to implement QMirror/BK:

Part 1: Configure AS400

Part 2: Configure QMirror/BK

Part 3: Do simulation test before go production

It only takes a few minutes to complete.

Go to [\(020\) Quick start](#)

(020) Quick start

The steps to quick start QMirror/BK:

Install QMirror/BK –

1. Create AS400 user profiles for QMirror/BK
2. Install QMirror/BK
3. Configure QMirror/BK
4. Simulation Test

Execute QMirror/BK –

1. Build up library list from AS400 libraries (command option 4)
(to start journaling for physical files)
2. Save libraries from AS400 by tape
(saving time to back up large objects by FTP)
3. Start instance (command option 1)
4. Log monitoring (command option L)
5. Status monitoring (command option S)

Add more AS400 libraries into QMirror/BK –

1. End QMirror/BK (command option 2)
2. Add more AS400 libraries into QMirror/BK (command option 4)
(to start journaling for physical files)
3. Save libraries from AS400 by tape
(saving time to back up large objects by FTP)
4. Start QMirror/BK (command option 1)

Go to (100) Create AS400 user profiles for QMirror/BK

(100) Create AS400 user profiles for QMirror/BK

1. To create an AS400 user profile 'QMIRROR' on AS400,
 enter command:

```
CRTUSRPRF USRPRF(QMIRROR) PASSWORD(xxxxxxxx) USRCLS(*USER)
SPCAUT(*ALLOBJ *JOBCTL *IOSYSCFG *SAVSYS *SECADM)
PWDEXPITV(*NOMAX)
```
2. Or use any existing user profile which owns
SPCAUT(*ALLOBJ *JOBCTL *IOSYSCFG *SAVSYS *SECADM) authority
3. The user profile has to have the authority to execute the following commands:
 ALCOBJ, CHGJOB, CHGJRN, CHGPF, CHGPFM, CHKOBJ, CLRSVAVF, CPYF,
 CRTDTAATA, CRTJRN, CRTJRNRCV, CRTLIB, CRTMSGQ, DLTDTAARA, DLTJRNRCV,
 DLTOBJ, ENDJRNPF, MOV OBJ, RNMOBJ, RSTLIB, RSTOBJ,
 SAVLIB, SAVOBJ, SNDJRNE, STRJRNPF
4. If you are using non-ASCII character set, the AS400 user profile CCSID for QMirror/BK should not be 65535
5. If QMirror/BK is running, you have to reboot QMirror/BK after you changed the password of AS400 user profile for QMirror

Go to [\(110\) Check AS400 configuration](#)

(110) Check AS400 configuration

Normally, QMirror/BK should run well under common AS400 configuration. If you have a slow backup speed, you will need to check or tune your AS400 configuration.

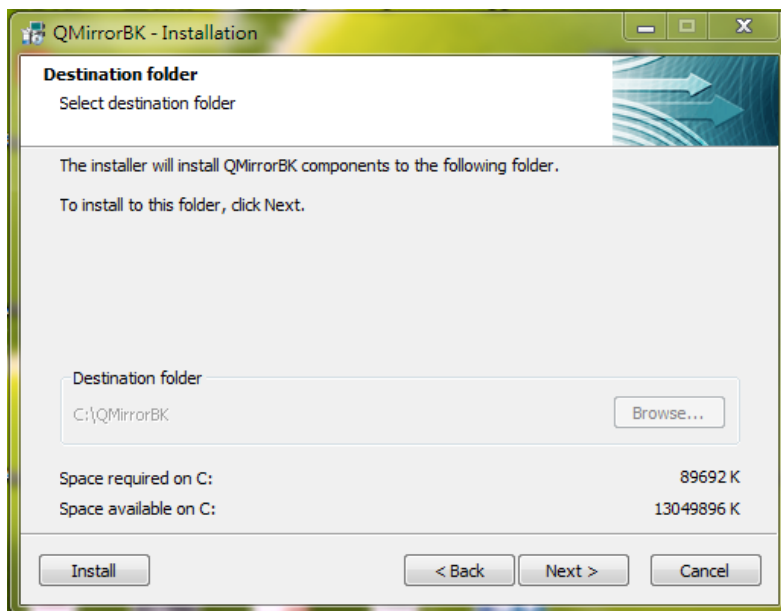
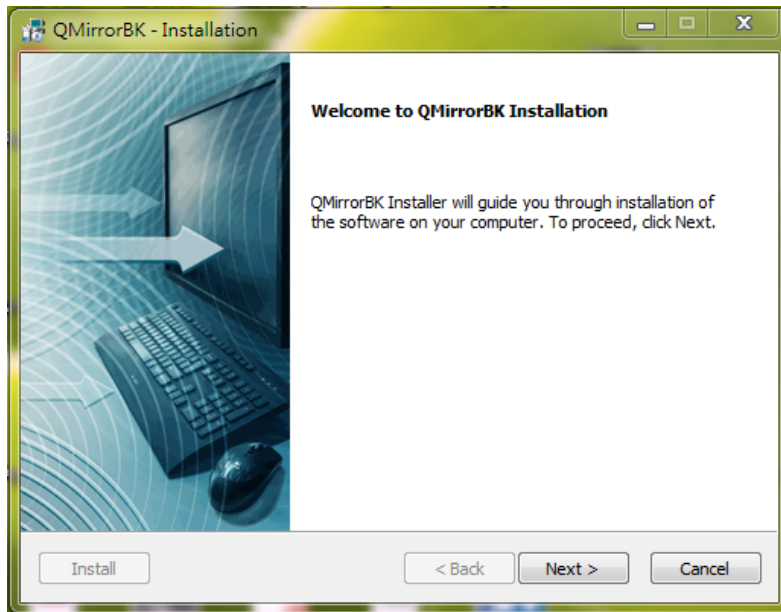
Please refer to the following paragraphs to check with your AS400 configuration. Watch the QMirror/BK performance status and tune accordingly.

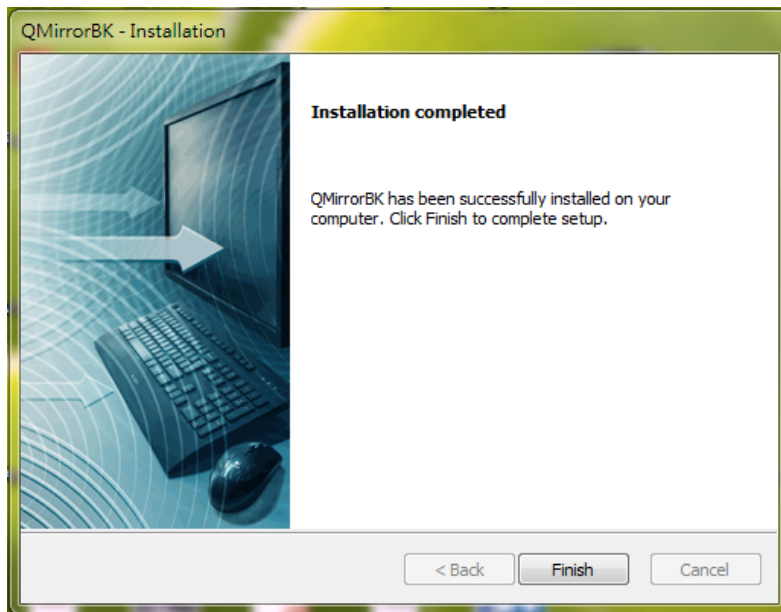
1. Use command STRTCPSVR to start FTP server and DDM server.
2. Manage access using FTP exit programs.
You can provide additional security by adding FTP exit programs to further restrict FTP access to your AS400. Please refer to
https://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/rzaiq/rzaiqreferenceexit.htm
3. Use command DSPUSRPRF QUSER to verify that the user's status is *ENABLED.
4. Use command STRHOSTSVR *ALL to start the optimized host server daemons.
5. Amend QZDASOINIT/QUSER PJ jobs back to normal priority.
 - a) QZDASOINIT runs priority based on QSYS/QPWFSERVER *CLS
 - b) Default value = 20
 - c) Use command CHGCLS CLS(QPWFSERVER) RUNPTY(20)
 - d) Restart QSERVER subsystem
6. Use command
CHGPJE SBSDB(OSYSWRK) PGM(OSQSRVR) MAXJOBS(*NOMAX)
to set SQL maximum number of jobs to *NOMAX. You might refer to
http://publib.boulder.ibm.com/infocenter/wasinfo/v6r1/index.jsp?topic=/com.ibm.websphere.base.iseries.doc/info/series/ae/tins_is_cfgsql.html
7. Tune AS400 server for Java SQL Database access. Please refer to
<http://archive.midrange.com/java400-1/200210/msg00036.html>
8. QMirror/BK needs these ports for the connection to AS400 - 23, 446, 449, 8470, 8471, 8472, 8473, 8474, 8475, 8476.

Go to [\(200\) Install QMirror/BK](#)

(200) Install QMirror/BK

1. Download QMirror_BK_151.zip from <http://www.qmirror.com>
2. Uninstall QMirror/BK's earlier version from Windows program menu list
3. Unzip, execute QMirror_BK_151.exe, and follow the instructions





4. A program menu 'QMirror BK' will be created on Windows
5. Execute QMirror/BK from program menu list
6. Or execute QMirror/BK on a DOS prompt
E.g. c:\QMirrorBK\qmirror.bat

Check QMirror/BK directory properties is necessary for some editions of Windows.
Make sure all users own full control permissions of QMirror/BK directory on security folder.

Go to (210) Configure QMirror/BK

(210) Configure QMirror/BK

1. Accept the terms of the license agreement

```
Accept the terms of the license agreement? (y/N/q) y
```

2. AS400 IP Address or Hostname

3. AS400 User ID

4. AS400 Working Library (default is 'QMIRROR')

5. QMirror/BK License Key

6. Select Character Set

```
Character Set: (1-ASCII 2-DBCS/Unicode Others)
```

7. Set Default CCSID if the Character Set is DBCS/Unicode

8. Maximum Transfer Threads

9. Output Queue Backup Gap

10. Message handling

```
Email Messages: (N-None E-Error only W-Error and Warning) e
Email Message is Error only (y/N/q) y

Email SMTP Host: (E.g. qmirror.com) qmirror.com
Email SMTP Host is qmirror.com (y/N/q) y

Email Address: (E.g. webmaster@qmirror.com; john@abc.com) admin@qmirror.com
Email Address is admin@qmirror.com (y/N/q) y

Try to send a test mail to admin@qmirror.com ...
The test mail was sent successfully.
```

11. Configuration Description

Go to [\(220\) About QMirror/BK internal SQLite database](#)

(220) About QMirror/BK internal SQLite database

QMirror uses SQLite as its internal database. The database is located at
c:\QMirrorBK\QMIRROR_BK.db

To browse or change data on SQLite database, please install 'DB Browser for SQLite'.

For more information, please visit the website at <http://sqlitebrowser.org>

Go to [\(300\) Simulation Test](#)

(300) Simulation Test

Simulation test is a well designed function for you to quickly review QMirror/BK in a few minutes. Execute Simulation Test requires QMirror/BK library list to be empty. To empty QMirror/BK library list, take command option 3 – ‘Remove libraries from library list’.

Simulation test uses the following AS400 commands to build up simulation environments:

CRTLIB, CRTDTAARA, CRTSRCPF, ADDPFM, CPYF, CRTPF, CRTLF, MOVOBJ, CHGOBJD, CRTCLPGM, and SQL statements to INSERT, UPDATE physical file.

Start QMirror/BK, take command option T – ‘Simulation test’

```

20xx/xx/xx 15:33:59 Login AS400 at xxx.xxx.xxx.xxx ...
20xx/xx/xx 15:34:06 Timer Synchronizing
20xx/xx/xx 15:34:03 AS400 - Serial number xxxxxxxx Model xxx
20xx/xx/xx 15:34:03 OS400 - Version x Release x Modification x
20xx/xx/xx 15:34:03 QMirror working library on AS400 is QMIRROR

QMirror/BK x.x.x (released in 20xx/xx) command list (QMBK):
 1 - Start QMirror/BK
 4 - Build up object list from AS400 libraries
 6 - Show selected library list
 7 - Show excluded object list
 8 - ENDJRNPF unselected libraries
 K - Change license key
 R - Switch to recovery mode
 T - Simulation test
 U - Uninstall QMirror/BK
 Q - Quit
Your option is (1/4/5/6/7/8/k/r/t/u/Q) t

```

QMirror/BK will create two libraries, BK001 and BK002. Then build up simulation data in both libraries.

```

Build up simulation data

CRTLIB      - Create library BK001
CRTLIB      - Create library BK002

CRTDTAARA   - Create data area dtaara101 on library BK001
CRTDTAARA   - Create data area dtaara202 on library BK002

CRTSRCPF    - Create source physical file QCLPSRC on library BK001
ADDPFM      - Add source physical file member CLP101 to QCLPSRC
              Insert CLP statements into source CLP101
CPYF        - Copy source member CLP101 to CLP102

CRTSRCPF    - Create source physical file QDDSSRC on library BK001
ADDPFM      - Add source physical file member FILE101 to QDDSSRC
              Insert DDS statements into source FILE101
CRTPF       - Create physical file FILE101 from DDS on library BK001
              Insert 5 records into FILE101

ADDPFM      - Add source physical file member FILE101_LF to QDDSSRC
              Insert DDS statements into source FILE101_LF
CRTLF       - Create logical file FILE101_LF from DDS on library BK001

Done.
    
```

You can use PDM to review object list in libraries BK001 and BK002.

```

Work with Objects Using PDM

Library . . . . . BK001          Position to . . . . .
                                Position to type . . . . .

Type options, press Enter.
  2=Change      3=Copy          4=Delete      5=Display      7=Rename
  8=Display description  9=Save          10=Restore     11=Move ...

Opt Object      Type      Attribute  Text
FILE101        *FILE     PF-DTA     Physical file 101
FILE101_LF     *FILE     LF         Logical file for FILE101
QCLPSRC        *FILE     PF-SRC
QDDSSRC        *FILE     PF-SRC
DTAARA101     *DTAARA     Text of dtaara101

Parameters or command
===>
F3=Exit        F4=Prompt      F5=Refresh     F6=Create
F9=Retrieve    F10=Command entry  F23=More options  F24=More keys
    
```

Take command option 4 – ‘Build up object list from AS400 libraries’

```

Please take the following steps:
  Take a look at QMirror/BK simulation test data on your AS400
  Use command option 4 to build up object list from library BK001 and BK002

QMirror/BK x.x.x (released in 20xx/xx) command list (QMBK):
  1 - Start QMirror/BK
  4 - Build up object list from AS400 libraries
  6 - Show selected library list
  7 - Show excluded object list
  8 - ENDJRNPF unselected libraries
  K - Change license key
  R - Switch to recovery mode
  Q - Quit
Your option is (1/4/5/6/7/8/k/r/Q) 4
    
```

Build up object list from library BK001 and BK002.

```

Auto-select new libraries from source AS400 to target AS400? (y/N) n
New libraries auto-select disabled

Build up object list from source AS400 to target AS400 -
Enter source AS400 library name (*ALLUSR/generic*/name): BK001
Replicate from source libraries BK001 (y/N/q) y

BK001      selected. Analyzing...

OBJ        TYPE      SIZE(Kb)  TEXT
-----
DTAARA101  *DTAARA          9  Text of dtaara101
QCLPSRC    *FILE            58
FILE101    *FILE            91  Physical file 101
FILE101_LF *FILE            29  Logical file for FILE101
QDDSSRC    *FILE            58
FILE101    *FILE            13  member FILE101
QCLPSRC    *FILE            9   member CLP101
QCLPSRC    *FILE            9   member CLP102
QDDSSRC    *FILE            9   member FILE101
QDDSSRC    *FILE            9   member FILE101_LF

Library BK001 has 10 objects/members, 0Mb
Total needs to transfer 10 objects/members, 0Mb

Build up object list from source AS400 to target AS400 -
Enter source AS400 library name (*ALLUSR/generic*/name): (BK001/q) BK002
Replicate from source libraries R002 (y/N/q) y

BK002      selected. Analyzing...

OBJ        TYPE      SIZE(Kb)  TEXT
-----
DTAARA202  *DTAARA          9  Text of dtaara202

Library BK002 has 1 objects/members, 0Mb
Total needs to transfer 11 objects/members, 0Mb

Build up object list from source AS400 to target AS400 -
Enter source AS400 library name (*ALLUSR/generic*/name): (BK002/q) q

Backup simulation data to save files

CRTLIB     - Create library BK_SAVF
CRTSAVF    - Create save file BK001 on library BK_SAVF
SAVLIB     - Save library BK001 to BK_SAVF/BK001
CRTSAVF    - Create save file BK002 on library BK_SAVF
SAVLIB     - Save library BK002 to BK_SAVF/BK002

Done.
    
```

Simulation Test backed up libraries BK001 and BK002 to save files in library BK_SAVF.

Use command 1 – ‘Start QMirror/BK’

```

Please use command option 1 to start QMirror/BK

QMirror/BK x.x.x (released in 20xx/xx) command list (QMBK):
 1 - Start QMirror/BK
 3 - Remove libraries from library list
 4 - Build up object list from AS400 libraries
 6 - Show selected library list
 7 - Show excluded object list
 8 - ENDJRNPF unselected libraries
 K - Change license key
 R - Switch to recovery mode
 U - Uninstall QMirror/BK
 Q - Quit
Your option is (1/3/4/5/6/7/8/k/r/u/Q) 1
    
```

QMirror/BK Starts running.

```

20xx/xx/xx 15:59:11 End instance QMBK if running ...
20xx/xx/xx 15:59:16 W103: QMirror/BK license will expire at the end of this month
20xx/xx/xx 15:59:16 Please extend your QMirror/BK license on www.qmirror.com
20xx/xx/xx 15:59:16
20xx/xx/xx 15:59:16 QMirror/BK x.x.x start up (QMBK) ...
20xx/xx/xx 15:59:17 AS400 - Serial number xxxxxxxx Model xxx
20xx/xx/xx 15:59:17 OS400 - Version x Release x Modification x
20xx/xx/xx 15:59:17 QMirror working library on AS400 is QMIRROR
20xx/xx/xx 15:59:17 Check AS400 FTP status ...
20xx/xx/xx 15:59:17 AS400 FTP threads enabled
20xx/xx/xx 15:59:17 Journal status verification ...
20xx/xx/xx 15:59:17 Total 2 libraries ...
20xx/xx/xx 15:59:18 Back up threads started
20xx/xx/xx 15:59:19 Journal thread QMIRROR/JRN started
20xx/xx/xx 15:59:19 Initiating AS400 journaling ...
20xx/xx/xx 15:59:19 Mirror start from 20xxxxxx/155900
20xx/xx/xx 15:59:19 Reorganize working library ...
20xx/xx/xx 15:59:21 Mirror preparing ...
20xx/xx/xx 15:59:33 Mirror threads started
20xx/xx/xx 15:59:36 Delay 26 secs. From 20xxxxxx/155900 to 155910
20xx/xx/xx 15:59:40 Delay 1 secs. From 20xxxxxx/155910 to 155939
20xx/xx/xx 15:59:40 Replication now is up-to-date
20xx/xx/xx 15:59:44 Back up - QMIRROR/QZQMBKTRG0 *TRIGGER
    
```

Simulation test continues to create and change objects on AS400. Physical file BK001/FILE001 will be inserted with more records and changes.

```

Continue simulation test

CRTDTAARA - Create data area dtaara102 on library BK001
CRTDTAARA - Create data area dtaara103 on library BK001
MOV OBJ   - Move data area dtaara101 from library BK001 to BK002
20xx/xx/xx 15:59:57 Object deleted (S) - BK001/DTAARA101 *DTAARA
20xx/xx/xx 16:00:01 Back up - BK002/DTAARA101 *DTAARA
20xx/xx/xx 16:00:01 Back up - BK001/DTAARA102 *DTAARA
20xx/xx/xx 16:00:02 Back up - BK001/DTAARA103 *DTAARA
CHGOBJD   - Change source physical file QCLPsrc text
ADDPFPM   - Add source physical file member CLP103 to QCLPsrc
            Insert CLP statements into source CLP103
CRTCLPGM  - Create CLP program CLP103
ADDPFPM   - Add source physical file member FILE101_L2 to QDDSSRC
            Insert DDS statements into source FILE101_L2
CRTLF     - Create another logical file FILE101_L2 from DDS on library BK001
20xx/xx/xx 16:00:15 Physical file BK001/QCLPsrc changed
20xx/xx/xx 16:00:15 Delay 7 secs. From 20xxxxxxx/155959 to 160010 (3 rcds)
20xx/xx/xx 16:00:20 Back up - BK001/QCLPsrc/CLP103
20xx/xx/xx 16:00:24 Delay 6 secs. From 20xxxxxxx/160010 to 160020 (5 rcds)
            Double records in file FILE101 (total 10 rcds)
20xx/xx/xx 16:00:27 Back up - BK001/CLP103 *PGM
20xx/xx/xx 16:00:27 Back up - BK001/QDDSSRC/FILE101_L2
            Double records again in file FILE101 (total 20 rcds)
20xx/xx/xx 16:00:34 Delay 6 secs. From 20xxxxxxx/160020 to 160030 (5 rcds)
            Double records again in file FILE101 (total 40 rcds)
20xx/xx/xx 16:00:43 Back up - BK001/FILE101_L2 *FILE
20xx/xx/xx 16:00:43 Delay 5 secs. From 20xxxxxxx/160030 to 160040 (30 rcds)
            Double records again in file FILE101 (total 80 rcds)
            Double records again in file FILE101 (total 160 rcds)
20xx/xx/xx 16:00:53 Delay 5 secs. From 20xxxxxxx/160040 to 160050 (40 rcds)
            Double records again in file FILE101 (total 320 rcds)
20xx/xx/xx 16:01:03 Delay 5 secs. From 20xxxxxxx/160050 to 160100 (80 rcds)
            Double records again in file FILE101 (total 640 rcds)
20xx/xx/xx 16:01:13 Delay 5 secs. From 20xxxxxxx/160100 to 160110 (160 rcds)
            Double records again in file FILE101 (total 1280 rcds)
20xx/xx/xx 16:01:23 Delay 5 secs. From 20xxxxxxx/160110 to 160120 (320 rcds)
20xx/xx/xx 16:01:33 Delay 5 secs. From 20xxxxxxx/160120 to 160130 (640 rcds)
            Double records again in file FILE101 (total 2560 rcds)
20xx/xx/xx 16:01:54 Delay 6 secs. From 20xxxxxxx/160140 to 160150 (1280 rcds)
            Double records again in file FILE101 (total 5120 rcds)
            Update file FILE101 set COL02=333,COL03='333' where COL01='3'
            Update file FILE101 set COL02=55555,COL03='55555' where COL01='5'
20xx/xx/xx 16:02:16 Delay 8 secs. From 20xxxxxxx/160200 to 160210 (3854 rcds)
20xx/xx/xx 16:02:24 Delay 6 secs. From 20xxxxxxx/160210 to 160220 (1024 rcds)

Done.

You can do more changes on library BK001 or BK002 if you like.

```


To simulate recovery procedure, stop QMirror/BK first, then rename library BK001 and BK002 to BK001_NEW and BK002_NEW. Restore library BK001 and BK002 from save files from library BK_SAVF.

```

Please take the following steps:
Use Cntl-C to end QMirror/BK
Rename library BK001 to BK001_NEW: RNMOBJ OBJ(QSYS/BK001) OBJTYPE(*LIB) NEWOBJ(BK001_NEW)
Rename library BK002 to BK002_NEW: RNMOBJ OBJ(QSYS/BK002) OBJTYPE(*LIB) NEWOBJ(BK002_NEW)
Restore library BK001: RSTLIB SAVLIB(BK001) DEV(*SAVF) SAVF(BK_SAVF/BK001)
Restore library BK002: RSTLIB SAVLIB(BK002) DEV(*SAVF) SAVF(BK_SAVF/BK002)
Run run_qmirror_qmbk.bat
Take command option 2 to end QMirror/BK
Take command option R to switch to recovery mode
Run qmirrorBK.exe
Take command option 9 to start recovery
After recovery, compare library BK001 with BK001_NEW, and BK002 with BK002_NEW
    
```

You can use PDM to list library BK*.

```

                                Work with Libraries Using PDM                                I520P

List type . . . . . *ALL                Position to . . . . .

Type options, press Enter.
  2=Change      3=Copy                4=Delete      5=Display
  7=Rename      8=Display description  9=Save        10=Restore ...
                                ASP
Opt  Library   Type      Device      Text
BK_SAVF *TEST
BK001  *TEST   QMirror/BK test library for SAVF
BK001_NEW *TEST   QMirror/BK test library 001
BK002  *TEST   QMirror/BK test library 002
BK002_NEW *TEST   QMirror/BK test library 002
                                Bottom
    
```

Execute QMirror/BK and take command option 2 - 'End current instance'. Take command option 'R' to switch QMirror/BK to recovery mode.

QMirror/BK recovery mode does not allow batch login, use qmirror.bat instead.

Take command option 9 - 'Start recovery'.

```

xx/xx/xx 17:15:14 > > > RECOVERY MODE < < <

20xx/xx/xx 17:15:14 Login AS400 at xxx.xxx.xxx.xxx ...
20xx/xx/xx 17:15:18 Timer Synchronizing
20xx/xx/xx 17:15:16 AS400 - Serial number xxxxxxxx Model xxx
20xx/xx/xx 17:15:16 OS400 - Version x Release x Modification x
20xx/xx/xx 17:15:16 QMirror working library on AS400 is QMIRROR

20xx/xx/xx 17:15:17 Earliest save date/time at 20xxxxxx/154746
20xx/xx/xx 17:15:17 Earliest saved object - BK001
20xx/xx/xx 17:15:17 Journal backup stopped at 20xxxxxx/160220

QMirror/BK x.x.x (released in 20xx/xx) command list (QMBK):
 6 - Show selected library list
 9 - Start recovery
 B - Switch to backup mode
 G - Recovery triggers setting only
 Q - Quit
Your option is (6/9/b/t/Q) 9

Earliest save date/time 20xxxxxx/154746
Earliest saved library - BK001
Recovery from date (20xxxxxx/q):
Recovery from time (154746/q):
Recovery from 20xxxxxx/154746 (y/N): y

20xx/xx/xx 17:21:38 QMirror/BK x.x.x recovery mode start up (QMBK) ...
20xx/xx/xx 17:21:40 Object deleted - BK001/DTAARA101 *DTAARA
20xx/xx/xx 17:21:41 Recovery object - BK001/DTAARA102 *DTAARA
20xx/xx/xx 17:21:41 Recovery object - BK001/DTAARA103 *DTAARA
20xx/xx/xx 17:21:41 Recovery object - BK002/DTAARA101 *DTAARA
20xx/xx/xx 17:21:41 Recovery object - BK001/CLP103 *PGM CLP
20xx/xx/xx 17:21:41 Recovery start from 20xxxxxx/155959
20xx/xx/xx 17:21:41 Reorganize working library ...
20xx/xx/xx 17:22:16 Journal recovery preparing ...
20xx/xx/xx 17:22:21 Physical file BK001/QCLPSRC changed
20xx/xx/xx 17:22:22 Recovery data from 20xxxxxx/155959 to 160007 (3 rclds)
20xx/xx/xx 17:22:22 Recovery member - BK001/QCLPSRC/CLP103
20xx/xx/xx 17:22:28 Physical file BK001/QCLPSRC changed
20xx/xx/xx 17:22:28 Recovery data from 20xxxxxx/160007 to 160010 (3 rclds)
20xx/xx/xx 17:22:29 Recovery data from 20xxxxxx/160010 to 160017 (1 rclds)
20xx/xx/xx 17:22:29 Recovery object - BK001/FILE101_L2 *FILE LF
20xx/xx/xx 17:22:31 Recovery data from 20xxxxxx/160017 to 160019 (5 rclds)
20xx/xx/xx 17:22:32 Recovery member - BK001/QDSSRC/FILE101_L2
20xx/xx/xx 17:22:34 Recovery data from 20xxxxxx/160019 to 160020
20xx/xx/xx 17:22:34 Recovery data from 20xxxxxx/160020 to 160030 (5 rclds)
20xx/xx/xx 17:22:35 Recovery data from 20xxxxxx/160030 to 160040 (30 rclds)
20xx/xx/xx 17:22:35 Recovery data from 20xxxxxx/160040 to 160050 (40 rclds)
20xx/xx/xx 17:22:36 Recovery data from 20xxxxxx/160050 to 160100 (80 rclds)
20xx/xx/xx 17:22:36 Recovery data from 20xxxxxx/160100 to 160110 (160 rclds)
20xx/xx/xx 17:22:39 Recovery data from 20xxxxxx/160110 to 160120 (320 rclds)
20xx/xx/xx 17:22:46 Recovery data from 20xxxxxx/160120 to 160130 (640 rclds)
20xx/xx/xx 17:22:54 Recovery data from 20xxxxxx/160130 to 160141 (1200 rclds)
20xx/xx/xx 17:22:54 Recovery data from 20xxxxxx/160141 to 160150 (80 rclds)
20xx/xx/xx 17:23:04 Recovery data from 20xxxxxx/160150 to 160201 (1200 rclds)
20xx/xx/xx 17:23:14 Recovery data from 20xxxxxx/160201 to 160201 (1210 rclds)
20xx/xx/xx 17:23:16 Recovery data from 20xxxxxx/160201 to 160210 (1174 rclds)
20xx/xx/xx 17:23:25 Recovery data from 20xxxxxx/160210 to 160220 (1024 rclds)
20xx/xx/xx 17:23:26 Recovery data from 20xxxxxx/160220 to 172325
20xx/xx/xx 17:23:26 Journal recovery completed
20xx/xx/xx 17:23:29 Recovery triggers setting

20xx/xx/xx 17:23:34 Recovery completed

```

You can use PDM to compare object list between libraries BK001 and BK001_NEW.

```

Work with Objects Using PDM

Library . . . . . BK001          Position to . . . . .
                                Position to type . . . . .

Type options, press Enter.
  2=Change      3=Copy      4=Delete      5=Display      7=Rename
  8=Display description  9=Save      10=Restore      11=Move ...

Opt Object      Type      Attribute  Text
CLP103      *PGM      CLP      QMirror/BK test CLP 103
FILE101      *FILE      PF-DTA    Physical file 101
FILE101_LF   *FILE      LF        Logical file for FILE101
FILE101_L2   *FILE      LF        Logical file for FILE101 #2
QCLPSRC      *FILE      PF-SRC    CLP source file
QDDSSRC      *FILE      PF-SRC
DTAARA102    *DTAARA      Text of dtaara102
DTAARA103    *DTAARA      Text of dtaara103
    
```

Bottom

STRSQL, use the following SQL statement to check if data in file BK001/FILE101 is same as BK001_NEW/FILE101.

SELECT COL01,COUNT(*),SUM(COL02) FROM BK001/FILE101 GROUP BY COL01 ORDER BY COL01

```

Display Data
Data width . . . . . :
Position to line . . . . . Shift to column . . . . .
.....1.....2.....3.....4.....5.....6.....7
Column 01      COUNT ( * )      SUM ( COL02 )
1              1,024              1,024
2              1,024              2,048
3              1,024              340,992
4              1,024              4,096
5              1,024              56,888,320
***** End of data *****
    
```

To remove simulation test data:

1. End QMirror/BK
2. Use QMirror/BK command option '3' to clear entire library object list
3. Delete library BK001 and BK002 on AS400

Go to [\(400\) Back up AS400 libraries](#)

(400) Back up AS400 libraries

To back up full AS400 libraries, enter 'Y' during instance configuration.

```
Auto-select new libraries from AS400 for backup? (y/N) Y
```

Any new libraries created on AS400 except library name starts with 'Q' (not include QGPL) or '#' will be backed up to PC server.

Or, to back up selected libraries only on AS400, enter 'N' during instance configuration.

```
Auto-select new libraries from AS400 for backup? (y/N) N
```

Then select libraries from AS400. Any library name starts with 'Q' or '#' is not accepted. QMirror/BK working library is also not accepted.

```
Building library list from AS400 for backup -  
Enter source AS400 library name (*ALLUSR/generic*/name): libr_a  
Replicate from source library LIBR_A (y/N/q) Y
```

Object type as *JRN, and *JRNRCV will not be replicated.

The triggers list is kept on object QZQMBKTRG0 *FILE and saved to PC server.

Go to [\(410\) Exclude objects from QMirror/BK object list](#)

(410) Exclude objects from QMirror/BK object list

If you want to exclude specified objects from QMirror/BK object list, you can change download flag TBDWFG to 'X' in system table QMIRROR.ZAMTBF.

E.g. UPDATE QMIRROR.ZAMTBF
 SET TBDWFG='X'
 WHERE TBLIB='LIBR1' AND TBOBJ='FILEA' AND TBMBR='FILEA'

QMirror/BK will end object journaling from AS400 and drop the objects from PC server which TBDWFG is 'X'.

Go to [\(220\) About QMirror/BK internal SQLite database](#)

Go to [\(420\) Normal running QMirror/BK](#)

(420) Normal running QMirror/BK

To execute QMirror/BK on a new shell, take command option 1 - 'Start QMirror/BK'.

```

QMirror/BK x.x.x (released at 20xx/xx) command list (QMBK):
1 - Start QMirror/BK
4 - Build up object list from source AS400 libraries
6 - Show select library list
7 - Show excluded object list
8 - ENDJRNPF unselected libraries
K - Change license key
R - Switch to recovery mode
T - Simulation test
U - Uninstall QMirror/BK
Q - Quit
Your option is (1/4/5/6/7/8/k/r/t/u/Q) 1
    
```

Now QMirror/BK is starting to back up from AS400 to PC server.

Go to [\(430\) End QMirror/BK](#)

(430) End QMirror/BK

Execute QMirror/BK in a new shell and take command option 2 - 'End current instance'.

```

QMirror/BK x.x.x (released at 20xx/xx) command list (QMBK):
 0 - Reboot QMirror/BK if running
 1 - Start QMirror/BK
 2 - End QMirror/BK
 L - Log monitoring
 S - Status monitoring
 Q - Quit
Your option is (0/1/2/D/L/S/q) 2
    
```

Or, you can use Ctrl-C to terminate QMirror/BK immediately.

Go to [\(440\) Get QMirror/BK running log and status](#)

(440) Get QMirror/BK running log and status

QMirror/BK current status is kept in the system table QMIRROR.ZJBSTS. Please refer to [\(A50\) Job log file \(ZJBLOG\) / Job status file \(ZJBSTS\)](#) for table structure and field comments.

The administrator may monitor QMirror/BK running log and status on any PC at any place as following.

Execute QMirror/BK in a new shell. Take command option L - 'Log Monitoring'.

Execute QMirror/BK in a new shell. Take command option S - 'Status Monitoring'.

The monitoring displays will be refreshed every ten seconds. For security consideration, the only way to stop monitoring display is using Ctrl-C.

Go to [\(450\) Add more libraries from AS400](#)

(450) Add more libraries from AS400

1. Execute QMirror/BK in a new shell
2. End QMirror/BK if running (command option 2)
3. Add more AS400 libraries into QMirror/BK (command option 4)
(to start journaling for physical files)
4. **Save libraries from AS400 by tape**
(saving time to transfer large objects by FTP)
5. Start QMirror/BK (command option 1)

Go to [\(460\) Learn QMirror/BK object transfer status](#)

(460) Learn QMirror/BK object transfer status

Object status is kept in field TBDWFG, QMIRROR.ZAMTBF.

- 'A' - Wait to transfer
- 'G' - Transferring
- 'R' - Transferred, ready to replicate
- 'X' - Excluded from QMirror/BK
- 'Z' - Transferred and replicating

For examples:

1. To know which object is not ready

```
SELECT * FROM QMIRROR.ZAMTBF  
WHERE TBDWFG<>'Z' AND TBDWFG<>'X'
```

2. To know which tables are excluded from QMirror/BK

```
SELECT * FROM QMIRROR.ZAMTBF WHERE TBDWFG='X'
```

Go to [\(220\) About QMirror/BK internal SQLite database](#)

Go to [\(470\) Recovery Mode](#)

(470) Recovery mode

When disasters come, you need to fix the hardware and restore the system and user data from tapes.

Take command option 'R' to switch to recovery mode. Then restart QMirror/BK and take command option '9' to start recovery.

When do recovery, the triggers will be disabled on AS400. After recovery, the trigger will be enabled again on the AS400.

Go to (500) Prepare batch programs to execute QMirror/BK

(500) Prepare batch programs to execute QMirror/BK

A faster way to execute QMirror/BK is to use batch programs.

A batch program named 'run_qmirror_qmbk.bat' was created in the QMirror/BK directory. Follow the instruction in 'run_qmirror_qmbk.bat' to preset all the parameters needed by QMirror/BK. You can get all the encrypted data from QMirror/BK console displayed under the interactive mode.

(Notes: QMirror/BK keeps the last workable run_qmirror_qmbk.bat into run_qmirror_qmbk.bat.ba2 automatically, so there is no need to re-edit run_qmirror_qmbk.bat again when you upgrade QMirror/BK to a newer version.)

Go to [\(510\) Install QMirror/BK as a Windows service](#)

(510) Install QMirror/BK as a Windows service

Notice:

1. QMirror/BK must be installed before QMirror/BK service.
2. QMirror/BK service must be installed on the same PC server which has QMirror/BK installed.

To install QMirror/BK as a Windows service:

1. Download QMirror_BK_151s.zip from <http://www.qmirror.com>
2. Uninstall the earlier QMirror/BK service from the Windows program menu list
3. Unzip, execute QMirror_BK_151s.exe, and follow the instructions
4. A program menu 'QMirror BK Service' will be created on Windows
5. Edit the preset parameters as needed in c:\QMirrorBKService\QMBK.ini
(Notes: QMirror/BK service keeps the last workable QMBK.ini into QMBK.ini.ba2 automatically, so there is no need to re-edit QMBK.ini again when you upgrade QMirror/BK service to a newer version.)
6. Start QMirror/BK service by launching 'Services' from the Windows 'Control Panel / Administrative Tools'

Refer to [\(440\) Get QMirror/BK running log and status](#)

Go to [\(520\) Uninstall QMirror/BK](#)

(520) Uninstall QMirror/BK

Take command option 'U' to clear and delete working library on AS400.

```

QMirror/BK x.x.x (released in 20xx/xx) command list (QMBK):
 1 - Start QMirror/BK
 3 - Remove libraries from library list
 4 - Build up object list from AS400 libraries
 6 - Show selected library list
 7 - Show excluded object list
 8 - ENDJRNPF unselected libraries
 K - Change license key
 R - Switch to recovery mode
 U - Uninstall QMirror/BK
 Q - Quit
Your option is (1/3/4/5/6/7/8/k/r/u/Q) u

Clear and delete QMirror working library on AS400? (y/N) y

20xx/xx/xx 17:38:03 End journal physical files from journal QMIRROR/JRN
20xx/xx/xx 17:38:03 This may take minutes ...
20xx/xx/xx 17:38:03 Completed ending physical files journaling from journal QMIRROR/JRN
20xx/xx/xx 17:38:03 Journal QMIRROR/JRN deleted
20xx/xx/xx 17:38:04 Journal receiver QMIRROR/JRCV0001 deleted
20xx/xx/xx 17:38:04 Delete QMirror working library QMIRROR on Source AS400
20xx/xx/xx 17:38:06 QMirror/BK is uninstalled from AS400
20xx/xx/xx 17:38:06 QMirror/BK is terminated
    
```

Then select 'Uninstall QMirror/BK' from Windows program menu list or execute
 c:\QMirrorBK\uninstall.exe

(A00) Library master (ZALIBR)

Field name	Key	Data type	Description
=====	===	=====	=====
LIBRFM	K	CHAR(10)	Source library name
LIBRST		CHAR(1)	Status 'X' – Excluded from QMirror/BK
LIBRAJ		CHAR(1)	Auto-journaling
LIBRTX		CHAR(50)	Text
LIBFRDT		NUMBER(8,0)	Last save date
LIBFRTM		NUMBER(6,0)	Last save time

Go to [\(220\) About QMirror/BK internal SQLite database](#)

(A10) AS400 object master (ZAMTBF)

Field name	Key	Data type	Description
=====	===	=====	=====
TBLIB	K	CHAR(10)	AS400 library name
TBOBJ	K	CHAR(10)	Object name
TBMBR	K	CHAR(10)	Member name
OBJTP		CHAR(8)	Object type
OBJAT		CHAR(10)	Object attribute
TBREPL		CHAR(1)	To be replicated
TBJLIB		CHAR(10)	Journal library
TBJNAM		CHAR(10)	Journal name
TBTXT		CHAR(50)	Text
TBDWFG		CHAR(1)	Object status Refer to (460) Learn QMirror/BK transfer status
TBPRTY		NUMBER(2,0)	Transfer priority
TBSTS		CHAR(1)	Object status 'E' - Error occurred for this object
OBSIZE		NUMBER(15,0)	Object size

Go to [\(220\) About QMirror/BK internal SQLite database](#)

(A50) Job log file (ZJBLOG) / Job status file (ZJBSTS)

Field name	Key	Data type	Description
=====	===	=====	=====
ZJTYPE		CHAR(1)	Log type blank - Delay status 'D' - Backup status 'E' - Error occurred 'R' - Recovery status
ZJJBID		NUMBER(3,0)	Job ID
ZJRPDT		NUMBER(8,0)	Reporting date
ZJRPTM		NUMBER(6,0)	Reporting time
ZJACTN		CHAR(30)	Action description
ZJLIB		CHAR(10)	AS400 library name
ZJOBJ		CHAR(10)	AS400 file name
ZJMBR		CHAR(10)	AS400 member name
ZJDATE		NUMBER(8,0)	Journal date
ZJTIME		NUMBER(6,0)	Journal time
ZJRCDS		NUMBER(10,0)	Journal records
ZJBSTS		CHAR(1)	Status code blank - Normal delay 'S' - Starting delay
ZJRMRK		CHAR(128)	Remark

Refer to [\(220\) About QMirror/BK internal SQLite database](#)

Refer to [\(440\) Get QMirror/BK running log and status](#)

(A60) Journal master (ZJMASF)

Field name	Key	Data type	Description
=====	===	=====	=====
ZMJLIB	K	CHAR(10)	Journal library
ZMJNAM	K	CHAR(10)	Journal name
ZMJNDX		NUMBER(3,0)	Journal index
ZMCRCV		CHAR(10)	Current journal receiver
ZMCSEQ		NUMBER(10,0)	Current sequence number
ZMJRCV		NUMBER(4,0)	No. of last deleted journal receiver
ZMRMRK		CHAR(128)	Remark

Go to [\(220\) About QMirror/BK internal SQLite database](#)

(A70) System log file (ZPCLOG / ZPCLOG2)

Field name	Key	Data type	Description
=====	===	=====	=====
ZPLGDT		NUMBER(8,0)	Logging date
ZPLGTM		NUMBER(6,0)	Logging time
ZPLSEQ		NUMBER(3,0)	Sequence number
ZPLOGS		TEXT	QMirror/BK log

Go to [\(220\) About QMirror/BK internal SQLite database](#)

(A80) System control file (ZSERVR)

Field name	Key	Data type	Description
=====	===	=====	=====
ZVERNO		CHAR(10)	QMirror/BK version number
ZSVRID		CHAR(4)	Configuration ID
ZRECOVERY		CHAR(1)	'Y' - recovery mode
ZSYSDB		CHAR(1)	Separated system database
ZATPIP		CHAR(30)	AS400 IP address
ZAUSER		CHAR(10)	AS400 user ID
ZSLKEY		CHAR(31)	QMirror/BK license key
ZACHAR		CHAR(10)	Character set
ZCCSID		CHAR(5)	DBCS/Unicode default CCSID
ZAJBPR		NUMBER(2,0)	AS400 job priority
ZXDLJB		NUMBER(2,0)	Maximum transfer threads
ZMSIZE		NUMBER(5,0)	Optimum mirror block size
ZJBLOG		CHAR(10)	Log flags
ZMLMSG		CHAR(1)	Email option 'N' - None 'E' - Error messages 'W' - Error and warning messages
ZMHOST		CHAR(64)	Email SMTP host
ZMADDR		CHAR(128)	Email address
ZMRDLN		NUMBER(5,0)	Maximum record length
ZJMRDT		NUMBER(8,0)	Replication cutoff date
ZJMRTM		NUMBER(6,0)	Replication cutoff time
ZDESC		CHAR(50)	Configuration description

Go to [\(220\) About QMirror/BK internal SQLite database](#)

(B10) Error messages

- E001: AS400 user <user> does not have the authority to execute QMirror/BK
- E002: Object list is empty. Please build up object list from AS400 libraries
- E004: Make sure the latest PTFs are applied to the AS400 server at <IP address>
- E101: QMirror/BK license is expired or incorrect
- E103: Configuration failure
- E106: Configuration ID <id> is incorrect
- E201: System control record in system table <database.table> is missed
- E203: QMirror/BK already started
- E204: Failed to start QMirror/BK
- E301: AS400 at <IP address> is not running
- E302: AS400 user password is incorrect
- E303: AS400 connection failure
- E304: <journal work file> cannot be created or has been locked
- E305: Mirror threads could not be started
- E306: Journal reading failure

(B20) Warning messages

W101: QMirror/BK configuration terminated

W103: QMirror/BK license will be expired at the end of this month

W104: QMirror/BK command terminated

W303: AS400 at <IP address> is not running. Will re-connect <n> minutes later.

W305: Failed to build up the replication path. Re-starting QMirror/BK.

W307: AS400 journal <library/journal> is not available now. Will try again later.

W308: AS400 journal <library/journal> does not exist or read error

W310: Replication error - <library/file/member/rnn>

W402: AS400 at <IP address> is not running.

Will re-connect <n> minutes later.