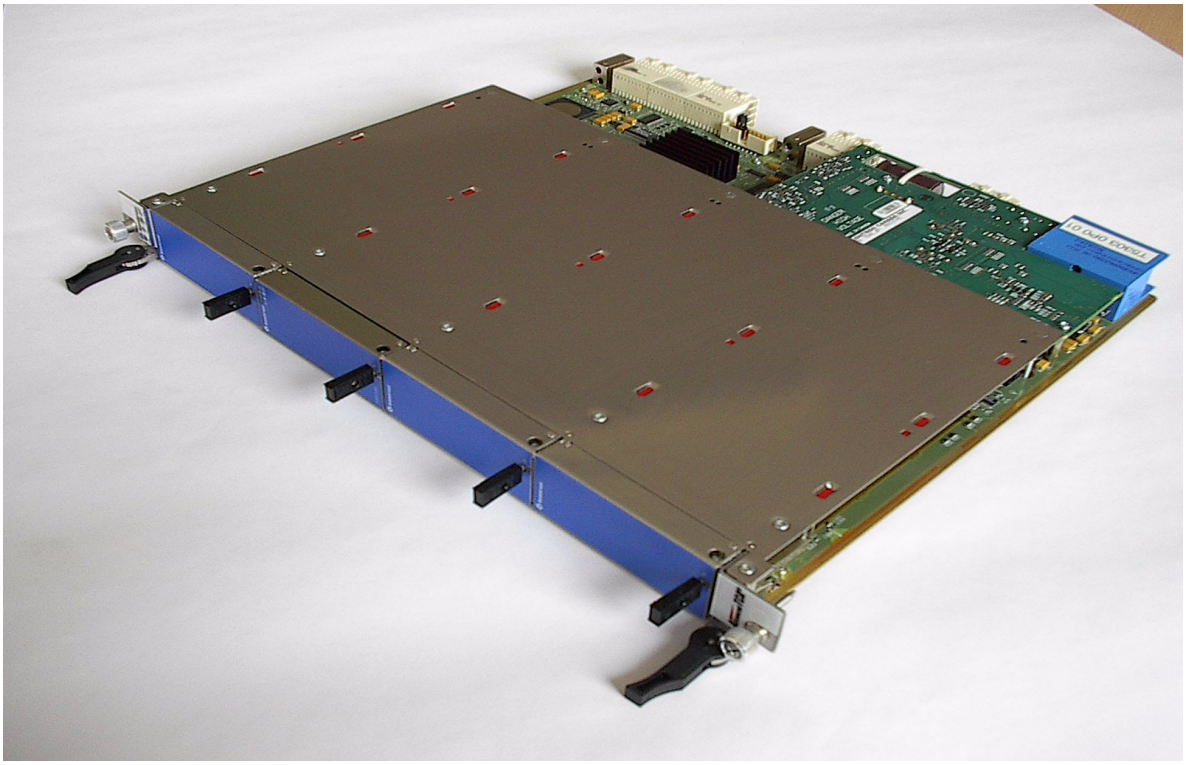
AT8400 Diagnostics Manual

AdvancedTCA

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Imprint

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About This Book

This document describes diagnostics commands the AT8400 Carrier board.

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PRELIMINARY

General Instructions on Usage

In order to maintain Kontron's product warranty, this product must not be altered or modified in any way. Changes or modifications to the device, which are not explicitly approved by Kontron Modular Computers GmbH and described in this manual or received from Kontron's Technical Support as a special handling instruction, will void your warranty.

This device should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This applies also to the operational temperature range of the specific board version, which must not be exceeded. If batteries are present their temperature restrictions must be taken into account.

In performing all necessary installation and application operations, please follow only the instructions supplied by the present manual.

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board please re-pack it as nearly as possible in the manner in which it was delivered.

Special care is necessary when handling or unpacking the product. Please, consult the special handling and unpacking instruction on the previous page of this manual.

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Chapter 1

Overview

1. Overview

The diagnostics for the AT8400 Kontron Carrier board is subdivided in two parts, the first part is running on the carrier itself and is integrated in a specially prepared image included in the Carrier firmware. That part includes diagnostics for:

- Broadcom BCM Ethernet Switch (BCM_xxx)
- CPLD onboard programmable logic device (CPLD_xxx)
- Telecom Clock Prodection Switch (TELCO_xxx)
- FUM Firmware Update Manager (FUM_xxx)
- IPMI Controller (IPMC_xxx)
- PowerPC IBM Host Processor (PPC_xxx)
- PLX PCI Express SWitch (PLX_xxx)

The second part of the diagnostics is running on the CPU board (either PrAMC or CPU Blade) that serves as PCI Express RootComplex. That part includes diagnostics for

- PLX PCI Express SWitch (PLX_xxx)
- SAS controller (SAS_xxx)

The diagnostics running onthe PCI Express Root complex are included into a Netboot image which will be booted after starting the diagnostics from the shell. (see 3.1 “Accessing the diagnostics on the PCI RootComplex CPU”)

Diagnostics are designed to run on the board under control of a local test sequencer. The diagnostics are designed to run in a controlled diagnostic environment. The tests are grouped by major functional blocks they relate to (Test case). Tests are written as test procedures where each procedure covers a specific functional block. The test-sequencer selects different test procedures to execute. It also retrieves results and progress indication from the test procedures.

Description of Test categories

Test group	Test group is allways Diagnostics.
Test case	Test case name in diagnostic test-suite is meant as an grouping of different test procedures for a certain part of the board (SAS, PPC, CPLD, ...)
Test procedure	Test procedure name as reported in journal and online
Test host	Either Carrier or PrAMC (or any other CPU being PCI Express Root-Complex)
Test IC	either quickturn or full
Test mode	normal or destructive
Diagnostic code	Diagnostic codes produced by this test procedure in case of failures.

1.1 Test scenarios

Different test scenarios can be started. A scenario is a sequence of test procedures.

The following scenarios are currently defined:

quickturn: The scenario quickturn contains tests executing quickly, but no destructive tests (TestIC=quickturn)

full: The scenario complete contains all tests but the destructive ones (TestIC=full)

write: The scenario write contains only destructive tests (TestIC=full, Test Mode = destructive)

If test mode is destructive the system will need some kind of re-initialization after running this test-procedure (e.g. reprogramming of permanent storage) Failure of destructive tests may leave the board unusable.

Chapter 2

Diagnostics running on the Carrier

2. Diagnostics running on the Carrier

2.1 Accessing the diagnostics on the Carrier

The diagnostics framework can be accessed from the CLI on the Carrier. The CLI (see “CLI reference manual”) provides the command:

```
diagnostics [options]
```

to start the diagnostics.

There are some options, which allow to either choose a pre-configured scenario or to use the interactive mode.

```
diagnostics interactive
diagnostics <scenario>
diagnostics <scenario> timedloop <1-9999999>
diagnostics <scenario> loop <1-9999999>
diagnostics <scenario> forever
```

If “interactive” is specified the switch will be restarted and the diagnostics loaded. The user gets a menu to select interactively a scenario. This requires to be connected via a serial console.

Otherwise, if a scenario is specified, this scenario is executed directly. You may start this scenario once or repeated for a time (timedloop), for a number of repetitions (loop) or forever. The results are stored and can be displayed by using “show logging diag-report”. Possible scenarios are “full” (all test purposes except the destructive ones), “quickturn” (scenarios running fast) or “write” (destructive scenarios).

Aftre having started diagnostics, you will first be asked to save unsaved changes in the configuration. After having saved the changes, the system will ask to reset the system

The output looks like the following

```
(AT8400 Ethernet Fabric) #diagnostics interactive
The system has unsaved changes.
Would you like to save them now? (y/n) n

Configuration Not Saved!
Are you sure you would like to reset the system? (y/n) y

System will now restart!
```

After system restart the console screen will show some bootup informations and the predefined test scenarios which can than be selected by typing the appropriate number.

Output example:

```
Startup...
Base System Software
Release HEAD 0.00
Platform ppc405
Build 20051208100210
Kernel release 2.4.20_HEAD-0.00
-----------------------------------------------------------------

Enabling: verbose
Enabling: interactive
STARTUP: Mounted /dev/mtdblock0 on /config
AdvancedTCA AMC Carrier diagnostics
==================================

1 - Run quickturn diagnostics
2 - Run full diagnostics
3 - Run write diagnostics

4 - Display logs

q - restart system
```

2.2 Broadcom BCM Gigabit Ethernet Switch

2.2.1 BCM_PCI

PCI interface test.

Test group:	Diagnostics
Test case:	bcm
Test procedure:	BCM_PCI
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	BCM-00010001, BCM-00010005

Description

The PCI test ensures accessibility of the BCM integrated PCI controller.

Failure impact

- BCM-00010001 diagnostic code results of failure to access the BCM PCI controller. The impact is complete loss of Ethernet functionality.
- BCM-00010005 diagnostic code results of failure loading the BCM drivers

2.2.2 BCM_DMA

DMA transfer test.

Test group:	Diagnostics
Test case:	bcm
Test procedure:	BCM_DMA
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal

Diagnostic code: BCM-00010002, BCM-00010005

Description

The test will verify read and write access to the on-chip BCM memories using DMA.

Failure impact

- BCM-00010002 diagnostic code results of failure to access the BCM using DMA. The impact is complete loss of Ethernet functionality.
- BCM-00010005 diagnostic code results of failure loading the BCM drivers

BCM shell test

```
U/A/S|Test|           Test        |Loop | Run |Pass |Fail |  Arguments
     | #  |           Name        |Count|Count|Count|Count|
-----+----+-----------------------+-----+-----+-----+-----+-----------
   S |  71| Table DMA             |    1|  129|  129|    0| (none)
```

2.2.3 BCM_REGRW

Register read/write test.

Test group: Diagnostics
Test case: bcm
Test procedure: BCM_REGRW
Test host: Carrier
Test IC: quickturn
Test mode: normal
Diagnostic code: BCM-00010003, BCM-00010005

Description

This test will verify read and write access to the on-chip BCM registers.

Failure impact

- BCM-00010003 diagnostic code results of failure to access the BCM registers. The impact is complete loss of Ethernet functionality.
- BCM-00010005 diagnostic code results of failure loading the BCM drivers

BCM shell test

```
U/A/S|Test|           Test          |Loop | Run |Pass |Fail |  Arguments
     | #  |            Name         |Count|Count|Count|Count|
-----+----+-------------------------+-----+-----+-----+-----+--------
     |   3| Register read/write     |    1|    1|    1|    0| (none)
```

2.2.4 BCM_MEMORY

On-chip memory test.

Test group: Diagnostics
Test case: bcm
Test procedure: BCM_MEMORY
Test host: Carrier
Test IC: quickturn
Test mode: normal
Diagnostic code: BCM-00010004, BCM-00010005

Description

This test will verify the BCM internal memory banks.

Failure impact

- BCM-00010004 diagnostic code results of failure of one or more BCM internal memories. The impact is complete loss of Ethernet functionality.
- BCM-00010005 diagnostic code results of failure loading the BCM drivers

BCM shell test

```
U/A/S|Test|            Test        |Loop | Run |Pass |Fail | Arguments
     | #  |            Name        |Count|Count|Count|Count|
-----+----+------------------------+-----+-----+-----+-----+----------
     |  50| Memory Fill/Verify     |    1|  129|  129|    0| (none)
```

```
U/A/S|Test|           Test         |Loop | Run |Pass |Fail | Arguments
     | #  |           Name         |Count|Count|Count|Count|
-----+----+------------------------+-----+-----+-----+-----+-----------
     |  51|Memory Random Addr/Data|    1|  129|  129|    0| (none)
```

```
U/A/S|Test|           Test         |Loop | Run |Pass |Fail | Arguments
     | #  |           Name         |Count|Count|Count|Count|
-----+----+------------------------+-----+-----+-----+-----+----------
     |  52|Rand Mem Addr,write all|    1|  129|  129|    0| (none)
```

2.2.5 BCM_LOOPBACK

Internal loopback test.

Test group:	Diagnostics
Test case:	bcm
Test procedure:	BCM_LOOPBACK
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	BCM-00010005, BCM-00010101 - BCM-00010114

Description

The Ethernet interfaces are tested by establising an PHY loopback internal to the Ethernet PHYs. It will send test patterns and check correct reception of the test-patterns for each Ethernet interface. The loopback is either through the BCM internal SERDES PHY for SERDES based links or through the external 1000BaseT PHY.

Diagnostic codes

BCM-00010101	PHY 1 failed
BCM-00010102	PHY 2 failed
BCM-00010103	PHY 3 failed
BCM-00010104	PHY 4 failed

BCM-00010105	PHY 5 failed
BCM-00010106	PHY 6 failed
BCM-00010107	PHY 7 failed
BCM-00010108	PHY 8 failed
BCM-00010109	PHY 9 failed
BCM-0001010A	PHY 10 failed
BCM-0001010B	PHY 11 failed
BCM-0001010C	PHY 12 failed
BCM-0001010D	PHY 13 failed
BCM-0001010E	PHY 14 failed
BCM-0001010F	PHY 15 failed
BCM-00010110	PHY 16 failed
BCM-00010111	PHY 17 failed
BCM-00010112	PHY 18 failed
BCM-00010113	PHY 19 failed
BCM-00010114	PHY 20 failed

Failure impact

- BCM-00010005 diagnostic code results of failure loading the BCM drivers
- BCM-000101nn diagnostic code results of failure of one or more PHYs. The impact is complete loss of Ethernet connectivity on the corresponding interface.

BCM shell test

```
# base fabric
U/A/S|Test|           Test        |Loop | Run |Pass |Fail | Arguments
     | #  |           Name        |Count|Count|Count|Count|
-----+----+-----------------------+-----+-----+-----+-----+-----------
   S |  19| PHY Loopback          |    1|   28|   28|    0| (none)
```

2.3 CPLD onboard programmable logic device

2.3.1 CPLD_HOST_REG

Register read test.

Test group:	Diagnostics
Test case:	cpld
Test procedure:	CPLD_HOST_REG
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	CPLD-00020001 CPLD-00020006 CPLD-000201xx

Description

This test checks register level access to the CPLD for PPC readable registers. It reads all registers and checks for any possible error conditions that indicate a failure of the CPLD logic.

Failure impact

- CPLD-00020001 diagnostic code results of failure to access the CPLD. The impact is failure of the board.
- CPLD-00020006 diagnostic code results of failure to read CPLD register. The impact is failure of the board.
- CPLD-000201xx diagnostic code results of a reading of an error condition from the CPLD. The register indicating the error is listed in the ‘xx’ of the diagnostic code. The impact is failure of the board.

2.3.2 CPLD_HOST_REGRW

Register read/write test.

Test group:	Diagnostics
Test case:	cpld
Test procedure:	CPLD_HOST_REGRW
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	CPLD-00020001 CPLD-00020002

Description

This test tests the correct functionality of the EBC access to the CPLD and the CPLD state machine. It performs read and write accesses in turn to the two CPLD debug registers (addresses A1=0x55 and A2=0xAA) with changing data patterns (0x00, 0xff, 0xaa and 0x55).

One hundred cycles of writes/reads with all four data patterns to both addresses are performed, read data is checked for each access to match written data. The sequence of each cycle is:

1. write 0xff to A1
2. write 0x00 to A2
3. read and check from A1
4. read and check from A2
5. write 0xaa to A1
6. write 0x55 to A2
7. read and check from A1
8. read and check from A2

Failure impact

- CPLD-00020001 diagnostic code results of failure to access the CPLD. The impact is failure of the board.
- CPLD-00020002 diagnostic code results of a reading of an error condition from the CPLD. The impact is failure of the board.

2.3.3 CPLD_IPMC_REG

IPMC register read test.

Test group:	Diagnostics
Test case:	cpld
Test procedure:	CPLD_IPMC_REG
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	CPLD-00020003 CPLD-00020004 CPLD-00020007 CPLD-000202xx CPLD-000203xx

Description

This test checks register level access to the CPLD for IPMC readable registers. It reads all registers and checks for any possible error conditions that indicate a failure of the CPLD logic. This tests uses the KCS interface for accessing the IPMC accessible CPLD registers.

Failure impact

- CPLD-00020003 diagnostic code results of failure to access the IPMC through the KCS interface. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.
- CPLD-00020004 diagnostic code results of failure to access CPLD registers from IPMC. The impact is failure of the board.
- CPLD-00020007 diagnostic code results of failure to read CPLD register. The impact is failure of the board.
- CPLD-000202xx diagnostic code results of a reading of an error condition from the CPLD. The register indicating the error is listed in the ‘xx’ of the diagnostic code. The impact is failure of the board.
- CPLD-000203xx diagnostic code results of a reading of an error condition from the AMC related register of the CPLD. The register indicating the error is listed in the ‘xx’ of the diagnostic code. The impact is failure of the board.

2.3.4 CPLD_IPMC_REGRW

IPMC register read/write test.

Test group:	Diagnostics
Test case:	cpld
Test procedure:	CPLD_IPMC_REGRW
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	CPLD-00020003 CPLD-00020004 CPLD-00020005

Description

This test performs read and write accesses in turn to the two IPMC CPLD debug registers (addresses 0x55 and 0xAA) with changing data patterns (0x00, 0xff, 0xaa and 0x55).

One hundred cycles of writes/reads with all four data patterns to both addresses are performed, read data is checked for each access to match written data.

Access to the IPMC is performed via KCS interface.

Failure impact

- CPLD-00020003 diagnostic code results of failure to access the IPMC through the KCS interface. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.
- CPLD-00020004 diagnostic code results of failure to access CPLD registers from IPMC. The impact is failure of the board.
- CPLD-00020005 diagnostic code results of a reading of an error condition from the CPLD. The impact is failure of the board.

2.4 Telecom Clock Protection Switch

NOTE: This part of the diagnostics is not yet implemented. The test procedure all-ways returns “fail”

2.4.1 TELCO_SWITCH

Clock protection switch test.

Test group:	Diagnostics
Test case:	telco
Test procedure:	TELCO_SWITCH
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	TELCO-00030001

Description

Check protection switch readings for consistency.

Failure impact

- TELCO-000030001 diagnostic code results of failure of the protection switch. Impact is failure of telecom clock distribution.

2.5 FUM Firmware Update Manager

2.5.1 FUM_SEEPROM

Firmware update manager SEEPROM read test.

Test group:	Diagnostics
Test case:	fum

Test procedure: FUM_SEEPROM_READ
Test host: Carrier
Test IC: full
Test mode: normal
Diagnostic code: FUM-00040001 FUM-00040002

Description

The tests reads both memory banks connected to the firmware update manager and checks the stored images for consistency by verifying the stored CRC. It does this for all valid memory banks. At least one memory bank must contain a valid image.

Possible failure are

- failure to read memory bank 1
- failure to read memory bank 2

Failure impact

- FUM-00040001 diagnostic code results from inconsistency of memory bank 1. Impact is loss of update functionality for the IPMC.
- FUM-00040002 diagnostic code results from inconsistency of memory bank 2. Impact is loss of update functionality for the IPMC.

2.5.2 FUM_UPDATE

Firmware update manager update test.

Test group: Diagnostics
Test case: fum
Test procedure: FUM_UPDATE_IPMC
Test host: Carrier
Test IC: full
Test mode: destructive
Diagnostic code: FUM-00040001 FUM-00040002 FUM-00040003 FUM-00040004

Description

This test initiates multiple IPMC update cycles to test the IPMC update procedure. It therefore tests both memory banks in read/write mode and tests the update connection to the IPMC

The tests reads the currently active memory bank of the FUM and checks its consistency. It then executes 2 update cycles using the currently active image read from the active memory bank. This will re-program the IPMC with the currently active image and will write this image to both memory banks at the same time. It will therefore perform full writes to both memory banks, to the IPMC flash memory.

Possible failures are

- failure of memory bank 1
- failure of memory bank 2
- failure of communication link to IPMC
- failure of IPMC programming procedure (e.g. due to failed IPMC flash programming procedure)

Failure impact

- FUM-00040001 diagnostic code results from inconsistency of memory bank 1. Impact is loss of update functionality for the IPMC.
- FUM-00040002 diagnostic code results from inconsistency of memory bank 2. Impact is loss of update functionality for the IPMC.
- FUM-00040003 diagnostic code results from update failure when using memory bank 1. Impact is loss of update functionality for the IPMC.
- FUM-00040004 diagnostic code results from update failure when using memory bank 2. Impact is loss of update functionality for the IPMC.

2.6 IPMI Controller

2.6.1 IPMC_SENSORS

Sensor test.

Test group:	Diagnostics
Test case:	ipmc
Test procedure:	IPMC_SENSORS
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	IPMC-00050001 IPMC-000501nn IPMC-000502nn IPMC-000503nn

Description

This test checks that all sensors shows adequate values. This includes voltage, temperature, current and fuse sensors. It checks that all values read from sensors are within given thresholds.

Sequence (regression)

- read all sensors from the IPMC.
- check that all values are within their thresholds.

Execute

```
<ipmitool -v sensor list> to get a list witH all sensors.
```

Possible failures are

- the diagnostic code encodes the number of the failed sensor in the last two hexa-decimal digits.

Failure impact

- IPMC-00050001 diagnostic code results of failure to access the IPMC through the KCS interface. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.
- IPMC-000501nn diagnostic code results from a failure to read the sensor nn. Impact is loss of the sensor, i.e. the sensor has failed.
- IPMC-000502nn diagnostic code results from the sensor nn reading values outside its defined known-good values, either exceeding thresholds or indicating failure

conditions. Impact depends on failed sensor (e.g. voltage failing, temperature exceeded)
- IPMC-000503nn diagnostic code results from sensor nn update in progress. This means that the sensor reading is currently not updated.

2.6.2 IPMC_SEEPROM_READ

SEEPROM read test.

Test group:	Diagnostics
Test case:	ipmc
Test procedure:	IPMC_SEEPROM_READ
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	IPMC-00050001 IPMC-00050007

Description

This test checks that the whole SEEPROM on the IPMC is accessible and contains valid data.

Sequence

- Write a pattern to all FRU Data memory space.
- Re-read the written data
- Check for binary identity
- Restore original FRU Data

Execute:

```
ipmitool fru write <FRU_FILE>
```

Failure impact

- IPMC-00050001 diagnostic code results of failure to access the IPMC through the KCS interface. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.
- IPMC-00050007 diagnostic code results from a failure to successfully read the IPMC attached SEEPROM. Impact is failure of IPMC.

2.6.3 IPMC_SEEPROM_RW

SEEPROM read/write test.

Test group:	Diagnostics
Test case:	ipmc
Test procedure:	IPMC_SEEPROM_RW
Test host:	Carrier
Test IC:	full
Test mode:	destructive
Diagnostic code:	IPMC-00050001 IPMC-00050002 IPMC-00050008

Description

This test checks that the whole SEEPROM on the IPMC is accessible and contains valid data.

Sequence

- Write a pattern to all FRU Data memory space.
- Re-read the written data
- Check for binary identity
- Restore original FRU Data

Execute:

```
ipmitool fru write <FRU_FILE>
```

Failure impact

- IPMC-00050001 diagnostic code results of failure to access the IPMC through the KCS interface. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface. IPMC-00050002 diagnostic code results from a failure to successfully write and read the IPMC attached SEEPROM. Impact is failure of IPMC.
- IPMC-00050008 diagnostic code results from incorrect FRU data.

2.6.4 IPMC_WATCHDOG

Watchdog test.

Test group:	Diagnostics
Test case:	ipmc
Test procedure:	IPMC_WATCHDOG
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	IPMC-00050001 IPMC-00050003

Description

Program watchdog and test that watchdog pre-timeout is correctly reported.

Failure impact

- IPMC-00050001 diagnostic code results of failure to access the IPMC through the KCS interface. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.
- IPMC-00050003 diagnostic code results from a failure of the watchdog in generating the pre-timeout. Impact is loss of watchdog functionality.

2.6.5 IPMC_IPMB0

IPMB0 test.

Test group:	Diagnostics
Test case:	ipmc
Test procedure:	IPMC_IPMB0

Test host: Carrier
Test IC: quickturn
Test mode: normal
Diagnostic code: IPMC-00050001 IPMC-00050004

Description

This test checks that the IPMB-0 is accessible from the IPMC.

Failure impact

- IPMC-00050001 diagnostic code results of failure to access the IPMC through the KCS interface. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.
- IPMC-00050004 results from failure to access IPMB-0 bus. Impact is loss of communication with shelf manager.

2.6.6 IPMC_GA

Geographical Address test.

Test group: Diagnostics
Test case: ipmc
Test procedure: IPMC_GA
Test host: Carrier
Test IC: quickturn
Test mode: normal
Diagnostic code: IPMC-00050001 IPMC-00050005

Description

This test checks that the Geographical Address is correct.

Sequence of operations

- Read the Geographical Address for the IPMC with the Get Address Info command.
- Check the value returned with the current slot is valid

Failure impact

- IPMC-00050001 diagnostic code results of failure to access the IPMC through the KCS interface. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.
- IPMC-00050005 results from failure to read the GA address. Impact is loss of communication with shelf manager.

2.6.7 IPMC_BIST

Built in self test results.

Test group: Diagnostics
Test case: ipmc
Test procedure: IPMC_BIST
Test host: Carrier
Test IC: quickturn
Test mode: normal

Diagnostic code: IPMC-00050001 IPMC-00050006

Description

This test checks the built in self test result of the IPMC.

Failure impact

- IPMC-00050001 diagnostic code results of failure to access the IPMC through the KCS interface. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.
- IPMC-00050006 results from a failed BIST in the IPMC. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.

2.7 PPC IBM PowerPC host processor

2.7.1 PPC_RAMT

RAM test.

Test group: Diagnostics
Test case: ppc
Test procedure: PPC_RAMT
Test host: Carrier
Test IC: quickturn
Test mode: normal
Diagnostic code: PPC-00060001

Description

This tests performs a comprehensive SDRAM memory test of the board. This includes

- data bus test (walking 1 testpattern)
- address bus test (walking 0 and walking 1 testpatterns)
- SDRAM read/write test using different test patterns.

In the case of test failures, an error value is written into the CPLD postcode warning register.

Result

- SDRAM test results are displayed on the bootloader serial console as shown below:

```
DRAM:  Reading SDRAM SPD data
SDRAM configuration read from SPD:
    Size per side = 128MB
    Organization: 2 sides, 4 banks, 10 Columns, 13 Rows, Data width = 32
bits
    Refresh clock cycles: 976, CAS latency: 3
    Total size: 256 MB
Testing data lines, base address 00000000
Testing data lines, base address 08000000
Testing address lines, testaddr 00000000
Testing address lines, testaddr 0ffffff8
Testing memory (complete), testpattern 55555555 and aaaaaaaa
Test: 256MB - ok
```

Failure impact

- PPC-00060001 diagnostic code results from a memory error. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.

2.7.2 PPC_ETHER

Ethernet interface test.

Test group:	Diagnostics
Test case:	ppc
Test procedure:	PPC_ETHER
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	PPC-00060002

Description

This test checks the PPC405 FE interface by using the ethloop command. The ethloop command sends an ethernet testframe and waits for its receipt. After a timeout has been elapsed without receiving the frame, an error message is displayed. There are 3 different loopback tests available which can be started using the ethloop command from the bootloader console:

- ethloop mac: The FE MAC is switched into loopback mode before sending the packet. This tests only the PPC405 internal FE circuitry.
- ethloop phy: The PHY is switched into loopback mode before sending the packet. This tests the data path to the PHY and back. This test is also performed when bootloader POST tests are enabled, in case of a test failure an error code is stored in the CPLD postcode warning register.
- ethloop ext: The ethernet frame must be looped back by an external loopback plug. This tests the data path including in and outside the PHY.

Parameters: see above

Result

- When invoking a bootloader command, a success message as shown below is displayed:

```
=> ethloop phy
Using ppc_405x_eth0 device
Got ethernet loopback frame, len=64
loopback test successfully completed
=>
```

When performed during POST, the following message is displayed on the bootloader serial console:

```
POST eth405 PASSED
```

Failure impact

- PPC-00060002 diagnostic code results from a failure of the management Ethernet port. Impact is loss of management access through the Ethernet management port.

2.7.3 PPC_UART

Serial line test.

Test group:	Diagnostics
Test case:	ppc
Test procedure:	PPC_UART
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	PPC-00060003

Description

This test checks sending and receiving characters on the serial line by setting the PPC405 UART into loopback mode. This test is performed automatically during POST in the case that the environment variable ‘post_en’ has been set. In case of a test failure an error code is stored in the CPLD postcode warning register.

Parameters: none

Result

- The message ‘POST serial passed’ is displayed on the bootloader serial console:

POST serial PASSED

Failure impact

- PPC-00060003 diagnostic code results from a failure of the management serial port. Impact is loss of management access through the serial management port.

2.7.4 PPC_EBC

EBC settings test.

Test group:	Diagnostics
Test case:	ppc
Test procedure:	PPC_EBC
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	PPC-00060004

Description

This test checks the settings of the PPC405 external bus controller (EBC). EBC configuration and status registers are accessed indirectly by reading and writing device control registers EBC0_CFGADDR (DCR 0x012) and EBC0_CFGDATA (DCR 0x013). Reading and writing device control registers is done using the cpldtool which provides access to the CPU’s device control registers.

Device access is configured by programming the EBC configuration registers. For each device, its Peripheral Bank Configuration Register (EBC0_BnCR) and its Peripheral Bank Access Parameters (EBC0_BnAP) have to be programmed properly.

The Configuration Register of device #n (n=0:7) is read using the sequence below

```
# ./cpldtool mtdcr 0x12 0x0[n]
wrote dcr: 0x12    value: 0x00000000[n]
# ./cpldtool mfdcr 0x13
dcr: 0x13    value: 0xfc0dc000
#
```

The Access Parameters of device #n are read using the sequence below

```
# ./cpldtool mtdcr 0x12 0x1[n]
wrote dcr: 0x12    value: 0x00000010[n]
# ./cpldtool mfdcr 0x13
dcr: 0x13    value: 0xfc0dc000
#
```

Parameters: see above

Result

- Settings of the EBC must match with those described in the KCO-AT8400.h configuration file.

Failure impact

- PPC-00060004 diagnostic code results from an EBC error. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.

2.7.5 PPC_I2C

I2C bus test.

Test group:	Diagnostics
Test case:	ppc
Test procedure:	PPC_I2C
Test host:	Carrier
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	PPC-00060005

Description

This test performs a bus scan on the I2C bus. All I2C devices found are compared with the devices defined in the I2C_ADDR_LIST (see KCO-AT8400.h). The test will fail in the case that an I2C device address not defined in the I2C_ADDR_LIST has been found or in the case that not all of the I2C addresses listed are found. In this case, an error code is stored in the CPLD postcode warning register.

Parameters: none

Result

- The message ‘POST I2C passed’ is displayed.

POST I2C PASSED

Failure impact

- PPC-00060005 diagnostic code results from an I2C error. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.

2.7.6 PPC_PCI

PCI bus test.

Test group: Diagnostics
Test case: ppc
Test procedureprocedure: PPC_PCI
Test host: Carrier
Test IC: quickturn
Test mode: normal
Diagnostic code: PPC-00060006

Description

This test checks the PCI devices present on the bus by reading the /proc/pci file.

```
# cat /proc/pci
PCI devices found:
Bus  0, device   1, function  0:
  Class 0280: PCI device 14e4:b404 (rev 1).
    IRQ 27.
    Master Capable.  Latency=128.
    Non-prefetchable 32 bit memory at 0xbfff0000 [0xbfffffff].
#
```

Parameters: none

Result

- PCI seetings and configuration space of devices found are displayed (see above).

Failure impact

- PPC-00060006 diagnostic code results from an I2C error. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.

2.7.7 PPC_FLASH_READ

Flash read test.

Test group: Diagnostics
Test case: ppc
Test procedure: PPC_FLASH_READ
Test host: Carrier
Test IC: quickturn
Test mode: normal
Diagnostic code: PPC-00060007

Description

This tests reads all images and data stored on the on-board flash and checks the embedded checksums.

Failure impact

- PPC-00060007 diagnostic code results from an flash read error. The impact is loss of applications running on carrier host processor if the active images and/or configurations are corrupted. This impacts at least Ethernet functionality and command line interface.

2.7.8 PPC_FLASH_RW

Flash read/write test. This test can be run automatically. The test script is executed on the SUT.

Test group:	Diagnostics
Test case:	ppc
Test procedure:	PPC_FLASH_RW
Test host:	Carrier
Test IC:	full
Test mode:	destructive
Diagnostic code:	PPC-00060008

Description

This test is used to check if the flash is attached properly to the PPC405 external bus controller. Similar to SDRAM tests, a data and address bus check is performed. It has been taken into concern, that single flash bits can only be changed from ‘1’ to ‘0’ and that changing a flash bit from ‘0’ to ‘1’ requires erasing of a complete flash sector (all bits in this sector are changed from ‘0’ to ‘1’.

The test uses the ppc-flash utility which is based on the linux MTD layer and is thus running from linux user space. The utility provides 4 basic modes to test flash sectors:

erase: This mode allows erasing flash sectors in a given MTD partition. To erase sectors, ppc-flash is called with the following syntax:

```
ppc-flash erase MTD-DEV startaddr endaddr
```

fill: This mode allows writing a testpattern into the sectors of a given MTD partition. It is important to note that the flash sector is checked to be erased before writing the testpattern. This way can ensure, that address errors are detected because the resulting overlapping address ranges will lead to sectors already written during filling procedure. The syntax to fill sectors is the same as for erasing:

```
ppc-flash fill MTD-DEV startaddr endaddr
```

compare: This mode allows comparing the sector contents of a given MTD partition with the testpattern written before. The syntax is as follows:

```
ppc-flash comp MTD-DEV startaddr endaddr
```

test: This mode allows testing if the flash sectors of a given MTD partition are empty or not. Syntax is the same as for compare:

```
ppc-flash test MTD-DEV startaddr endaddr
```

The basic modes must be combined to build a test scenario which tests the flash memory completely. The test goal is not to test the flash device itself but the correct connection to the CPU's data and address lines. Data line connection is done by the testpattern used in the ppc-flash utility, which includes all combinations of adjacent data lines. The following testpattern is used:

```
{ 0xCCAAAACC,0xAAAACCAA,0xAACCAAAA,0x00000000,
0xFFFFFFFF,0x00000000,0xCCAAAACC,0xAAAACCAA }
```

Parameters: see above

Returns:

0 - command executed successfully

-1 - an error occured during execution

Failure impact

- PPC-00060008 diagnostic code results from an flash read/write error. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.

2.7.9 PPC_SEEPROM

Test group: Diagnostics
Test case: ppc
Test procedure: PPC_SEEPROM
Test host: Carrier
Test IC: quickturn
Test mode: normal
Diagnostic code: PPC-00060009

SEEPROM test.

Description

Read and the SEEPROM used for storing low-level board configuration e.g. SPD data for RAM and check data for consitency.

Failure impact

- PPC-00060009 diagnostic code results from an SEEPROM read error. The impact is loss of applications running on carrier host processor. This impacts at least Ethernet functionality and command line interface.

2.8 PLX PCI Express Switch

2.8.1 PLX_LANEGOOD

Test for lane good status of PCI Express switch.

Test group: Diagnostics
Test case: ppc
Test purpose: PLX_LANEGOOD
Test host: Carrier
Test IC: quickturn

Test mode: normal
Diagnostic code: PLX-00070005 PLX-00070008 PLX-000703nn PLX-000704nn

Description

This tests reads the e-keying status of all AMC PCI Express ports. If an AMC PCI Express port is enabled via e-keying, it checks for the LANEGOOD signals of the associated PLX port and reports an error if no LANEGOOD status is detected.

Failure Impact

- PLX-00070005 diagnostic code results from failure to read PLX LANEGOOD status. Impact is failure of IPMC subsystem.
- PLX-00070008 diagnostic code results from PCIe is in reset. The PCIe is going to reset if the upstream port is deactivated. Impact is failure of PCI express infrastructure on all ports.
- PLX-000703nn diagnostic codes results if e-keying status is enabled for PLX port nn but no LANEGOOD status bit is detected. This occurs if a processor-AMC is inserted in an AMC bay configured as downstream or a GE-AMC is inserted in an AMC bay configured as upstream or PCIe infrastructure on AMC fails. Impact is failure of PCI express infrastructure on port nn.
- PLX-000704nn diagnostic code results if e-keying status is enabled for PLX port nn but LANEGOOD status is incorrect. Impact is failure of PCI express infrastructure on port nn.
-

Port table

For the diagnostic codes PLX-000703nn or PLX-000704nn the port nn which fails is indicated. The following relation is valid

- port 0 : AMC-B4
- port 1 : AMC-B3
- port 2 : Update Channel
- port 8 : AMC-B2
- port 9 : AMC-B1
- port 10 : SAS (no ekeying, not checked)

2.9 Example of diagnostics output

```
1 - Run quickturn diagnostics
2 - Run full diagnostics
3 - Run write diagnostics

4 - Display logs

q - restart system

Choice: 1
tcc: journal file is /opt/kontron/diag/at8400/scenario.quickturn/
journal
PPC_RAMT            : started
PPC_RAMT            : PASS (PPC RAM Test)
PPC_ETHER           : started
PPC_ETHER           : PASS (PPC Ethernet Interface Test)
PPC_UART            : started
PPC_UART            : PASS (PPC Serial Line Test)
PPC_EBC             : started
PPC_EBC             : PASS (PPC EBC Settings Test)
PPC_I2C             : started
PPC_I2C             : PASS (PPC I2C Bus Test)
PPC_PCI             : started
PPC_PCI             : PASS (PPC PCI Bus Test)
PPC_FLASH_READ      : started
PPC_FLASH_READ      : PASS (PPC Flash Read Test)
PPC_SEEPROM         : started
PPC_SEEPROM         : PASS (PPC Seeprom Test)
CPLD_HOST_REG       : started
CPLD_HOST_REG       : FAIL (CPLD PPC Register Read Test)
CPLD_HOST_REGRW     : started
CPLD_HOST_REGRW     : PASS (CPLD PPC Register Read/Write Test)
CPLD_IPMC_REG       : started
CPLD_IPMC_REG       : FAIL (CPLD IPMC Register Read Test)
CPLD_IPMC_REGRW     : started
CPLD_IPMC_REGRW     : PASS (CPLD IPMC Register Read/Write Test)
IPMC_SENSORS        : started
IPMC_SENSORS        : FAIL (IPMC Sensor Test)
IPMC_SEEPROM_READ   : started
IPMC_SEEPROM_READ   : PASS (IPMC SEEPROM Read Test)
IPMC_WATCHDOG       : started
IPMC_WATCHDOG       : 10 of 60 seconds
IPMC_WATCHDOG       : PASS (IPMC Watchdog Test)
IPMC_IPMB0          : started
IPMC_IPMB0          : PASS (IPMC IPMB0 Test)
IPMC_GA             : started
IPMC_GA             : PASS (IPMC Geographical Address Test)
IPMC_BIST           : started
IPMC_BIST           : PASS (IPMC Built-In-Self-Test Result)
TELCO_SWITCH        : started
TELCO_SWITCH        : FAIL (TELCO Clock Protection Switch Test)
BCM_PCI             : started
BCM_PCI             : PASS (BCM PCI Interface Test)
BCM_DMA             : started
BCM_DMA             : PASS (BCM DMA Transfer Test)
BCM_REGRW           : started
BCM_REGRW           : PASS (BCM Register Read/Write Test)
BCM_MEMORY          : started
BCM_MEMORY          : 10 of 360 seconds
BCM_MEMORY          : 20 of 360 seconds
BCM_MEMORY          : 30 of 360 seconds
BCM_MEMORY          : 40 of 360 seconds
```

```
BCM_MEMORY          : 50 of 360 seconds
BCM_MEMORY          : 60 of 360 seconds
BCM_MEMORY          : 70 of 360 seconds
BCM_MEMORY          : 80 of 360 seconds
BCM_MEMORY          : 90 of 360 seconds
BCM_MEMORY          : 100 of 360 seconds
BCM_MEMORY          : PASS (BCM On-Chip Memory Test)
BCM_LOOPBACK        : started
BCM_LOOPBACK        : PHY= 1
BCM_LOOPBACK        : 10 of 60 seconds
BCM_LOOPBACK        : PHY= 2
BCM_LOOPBACK        : PHY= 3
BCM_LOOPBACK        : PHY= 4
BCM_LOOPBACK        : PHY= 5
BCM_LOOPBACK        : PHY= 6
BCM_LOOPBACK        : PHY= 7
BCM_LOOPBACK        : PHY= 8
BCM_LOOPBACK        : PHY= 9
BCM_LOOPBACK        : PHY= 10
BCM_LOOPBACK        : PHY= 11
BCM_LOOPBACK        : PHY= 12
BCM_LOOPBACK        : PHY= 13
BCM_LOOPBACK        : PHY= 14
BCM_LOOPBACK        : PHY= 15
BCM_LOOPBACK        : PHY= 16
BCM_LOOPBACK        : FAIL (BCM Internal (PHY) Loopback Test)
PLX_LANEGOOD        : started
PLX_LANEGOOD        : PASS (PLX PCIE Lane Good Status Test)
DUT_INFO            : started
/opt/kontron/diag/at8400/dutinfo/dutinfo: 0: command not found
Builtin FRU device
  Board Mfg         : Kontron
  Board Product     : AT8400
  Board Serial      : 1000611064
  Board Part        : T5303###_1-0000
  Board Extra       : 00a0a55c368140
  Board Extra       :
030400010202000000000000000000000000000000000000000000000000000000000000
  Product Mfg       : Kontron
  Product Name      : AT8400
  Product Part      : T5303###_1-0000
  Product Version   : 01
  Product Serial    : 1000611064
  Product Asset     :
  Product Extra     : Part Name: XXXXXXXX
  Product Extra     : Product Number: XXXXXX
  Product Extra     : Part Number: XXXXX-XXXXX
  Product Extra     : Serial number: CCYYWWXXXX
  Product Extra     : Engineering Date Code: YYWW
DUT_INFO            : PASS (DUT information)
TEST RUN started at : 1970-01-01 00:00:29
TEST RUN ended at   :            00:06:17
Hostname            : (none)
Operating system    : Linux
Kernel Info         : 2.4.20_HEAD-0.00
Device under test information:
Builtin FRU device
  Board Mfg         : Kontron
  Board Product     : AT8400
  Board Serial      : 1000611064
  Board Part        : T5303###_1-0000
  Board Extra       : 00a0a55c368140
  Board Extra       :
030400010202000000000000000000000000000000000000000000000000000000000000
  Product Mfg       : Kontron
```

```
  Product Name     : AT8400
  Product Part     : T5303###_1-0000
  Product Version  : 01
  Product Serial   : 1000611064
  Product Asset    :
  Product Extra    : Part Name: XXXXXXXX
  Product Extra    : Product Number: XXXXXX
  Product Extra    : Part Number: XXXXX-XXXXX
  Product Extra    : Serial number: CCYYWWXXXX
  Product Extra    : Engineering Date Code: YYWW

TEST procedure              RESULT          CODE
--------------------------- --------------- -------------------------
PPC_RAMT                    PASS
PPC_ETHER                   PASS
PPC_UART                    PASS
PPC_EBC                     PASS
PPC_I2C                     PASS
PPC_PCI                     PASS
PPC_FLASH_READ              PASS
PPC_SEEPROM                 PASS
CPLD_HOST_REG               FAIL            CPLD-00020101
CPLD_HOST_REGRW             PASS
CPLD_IPMC_REG               FAIL            CPLD-00020201
CPLD_IPMC_REGRW             PASS
IPMC_SENSORS                FAIL            IPMC-00050221 IPMC-0005022b
IPMC_SEEPROM_READ           PASS
IPMC_WATCHDOG               PASS
IPMC_IPMB0                  PASS
IPMC_GA                     PASS
IPMC_BIST                   PASS
TELCO_SWITCH                FAIL            TELCO-00030001
BCM_PCI                     PASS
BCM_DMA                     PASS
BCM_REGRW                   PASS
BCM_MEMORY                  PASS
BCM_LOOPBACK                FAIL            BCM-00010101
PLX_LANEGOOD                PASS
DUT_INFO                    PASS
-------------------------------------------------------------------------
Test run statistics: TOTAL # executed =26, PASS=21, FAIL=5
-------------------------------------------------------------------------
Do you want to save /tmp/journal-diag.tar.gz to /config/journal-
diag.tar.gz (y/n)? [y]
`/tmp/journal-diag.tar.gz' -> `/config/journal-diag.tar.gz'
Results:
Total tests:            26      PASS = 21       FAIL = 5
WARNING: Diagnostics failed
```

Chapter 3

Diagnostics on PCI Root Complex

3. Diagnostics running on PCI RootComplex

3.1 Accessing the diagnostics on the PCI RootComplex CPU

To run the diagnostics on the root Complex CPU a diagnostic netboot image will be used. This image, once loaded into the PrAMC or the CPU blade, allows to run diagnostics in a defined and well-known environment

The diagnostics framework is build to run on a Redhat installed system, e.g. a PrAMC or a CPU blade (AT8001) that is used as a PCI express RootComplex. The diagnostics framework is accessed by typing

```
root@localhost:/opt/kontron/diag/bin/run-diag
```

on the console. You will then get a list of all options

```
root@localhost:/root> /opt/kontron/diag/bin/run-diag
/opt/kontron/diag/bin/run-diag [-vsnRLC] [-T file] [-t dir] [-d dir] [-
g dyn_scen] [-r dir] test-suite [scenario-name] [scenario]
   -v            make /opt/kontron/diag/bin/run-diag a bit more verbose
   -t dir        specifies directory as TET_ROOT
   -d dir        look for test suites in specified directory defaults to
                 current directory
   -r dir        write results to directory, NOTE: dir will be removed
                 completeley prior to execution, defaults to test-suite-
                 directory/test-suite/SCENARIO.SCENARIO-NAME
   -s            silent mode, no progress indication from test purposes
   -R            run reporting tool on generated log file
   -C            run cause/action reporting tool on generated log file
   -L            output all logfiles
   -T <file>     generate compressed tar file of log file and journal
   -n            do not run test suite
   -g dyn_scen   create a custom scenario
   -F            run tcc in foreground
   -S interval   save journal to -T tarfile every interval seconds
                 during tcc run test-suite specifies the test suite to
                 run
   scenario-name specifies the TET scenario name within the scenario
                 file to use, default is "all"
   scenario      specifies the TET scenario file to use, default is
                 "scenario"
```

To run AT8400 diagnostics, use

```
root@localhost:/root> /opt/kontron/diag/bin/run-diag -R at8400 quick-
turn
```

You can as well start the diagnostics for the Kontron PrAMC, the GE AMC or the Storage AMC by using (e.g. for AM4001):

```
root@localhost:/root> /opt/kontron/diag/bin/run-diag -R am4001
root@localhost:/root> /opt/kontron/diag/bin/run-diag -R am4300
root@localhost:/root> /opt/kontron/diag/bin/run-diag -R am4500
```

Note: the -R switch that activates output of a complete report of test results after the test run.

You can remotely access the system via its eth0 interface using SSH. Standard login name is

```
Username: root
Password: root
```

If you want to permanently store test results, you can store the results in a local file and transfer it to a remote location, for example using Secure Copy (SCP).

Example

```
run-diag -T /tmp/at8400-diag-report.tar.gz -R at8400
scp /tmp/at8400-diag-report.tar.gz username@hostname:/reports/diagnos-
tics/at8400/today
```

The -C switch invokes a report which also outputs cause/action statements.

3.2 PLX PCI Express Switch

3.2.1 PLX_PCIE

PCI Express configuration space test.

Test group:	Diagnostics
Testcase:	ppc
Test procedure:	PLX_PCI
Test host:	PrAMC
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	PLX-00070001 PLX-000701nn

Description

Read the PCI configuration space of the PLX switch. Checks that the PLX is detected and present. Checks default values for the PLX PCI configuration space. This test also checks the default values of all ports by accessing the appropriate port configuration registers (see PLX 8532 databook v0.96 chapter 9).

Failure Impact

- PLX-00070001 diagnostic code results from failure to detect and access the PCI Express switch. Impact is failure of PCI express infrastructure.
- PLX-000701nn diagnostic code results from failure to detect and access the PCI Express port nn. Impact is failure of PCI express infrastructure on port nn.

3.2.2 PLX_SEEPROM

SEEPROM test.

Test group:	Diagnostics
Test case:	ppc
Test procedure:	PLX_SEEPROM
Test host:	PrAMC
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	PLX-00070001 PLX-00070002 PLX-00070007

Description

Read SEEPROM from carrier and check embedded CRC.

Failure Impact

- PLX-00070001 diagnostic code results from failure to detect and access the PCI Express switch. Impact is failure of PCI express infrastructure.
- PLX-00070002 diagnostic code results from failure to read and verify PLX SEEPROM. Impact is possible failure of PCI express infrastructure. (see 3.2.3 “PLX_INITOK”)
- PLX-00070007 diagnostic code results from EEPROM not configured.

3.2.3 PLX_INITOK

Test for correct initialization of PCI Express switch.

Test group:	Diagnostics
Test case:	ppc
Test procedure:	PLX_INITOK
Test host:	PrAMC
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	PLX-00070001 PLX-00070003 PLX-00070004 PLX-000702nn

Description

Check PLX configuration registers for successful initialization. SEEPROM read must have finished and no fatal error conditions signaled.

Failure Impact

- PLX-00070001 diagnostic code results from failure to detect and access the PCI Express switch. Impact is failure of PCI express infrastructure.
- PLX-00070003 diagnostic code results from failure read SEEPROM successfully at startup. Impact is failure of PCI express infrastructure. (see 3.2.2 “PLX_SEEPROM”)
- PLX-00070004 diagnostic code results from detection of fatal error in PCI express switch. Impact is failure of PCI express infrastructure.
- PLX-000702nn diagnostic code results from detection of fatal error on PCI express port nn. Impact is failure of PCI express infrastructure on port nn.

3.3 LSI SAS Controller

3.3.1 SAS_PCIE

PCI Express configuration space test.

Test group:	Diagnostics
Test case:	sas
Test procedure:	SAS_PCIE
Test host:	PrAMC
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	SAS-00080001

Description

Read the PCI configuration space of the SAS controller. Checks that the SAS controller is detected and present. Checks default values for the PCI configuration space.

Failure Impact

- SAS-00080001 diagnostic code results from failure in accessing SAS controller. Impact is failure of SAS controller subsystem.

3.3.2 SAS_FLASH_READ

Flash memory read test

Test group:	Diagnostics
Test case:	sas
Test procedure:	SAS_FLASH_READ
Test host:	PrAMC
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	SAS-00080004 SAS-00080005 SAS-00080006

Description

Read flash firmware from controller and verify consistency by checking embedded CRC. Same test as for SAS_DEV.

Typical output

see 3.3.4 “SAS_DEV”

Failure Impact

- SAS-00080004 diagnostic code results from failure in identifying the SAS controller. Impact is failure of SAS controller subsystem.
- SAS-00080005 diagnostic code results from failure in verifying the SAS BIOS code. Impact is failure of SAS controller BIOS.
- SAS-00080006 diagnostic code results from failure in verifying the SAS firmware code. Impact is failure of SAS controller subsystem.

3.3.3 SAS_FLASH_RW

Flash memory read/write test

Test group:	Diagnostics
Test case:	sas
Test procedure:	SAS_FLASH_RW
Test host:	PrAMC
Test IC:	full
Test mode:	destructive
Diagnostic code:	SAS-00080002 SAS-00080003

Description

Flash firmware into SAS controller and verify correct operation.

Failure Impact

- SAS-00080002 diagnostic code results from failure in reading the SAS controller flash. Impact is failure of SAS controller subsystem.
- SAS-00080003 diagnostic code results from failure in writing the SAS controller flash. Impact is failure of SAS controller subsystem.

NOTE: This part of the diagnostics is not yet implemented. The test procedure always returns “fail”

3.3.4 SAS_DEV

Checks the versions and revisions of the SAS1064e chip, the firmware and the BIOS.

Test group:	Diagnostics
Test case:	sas
Test procedure:	SAS_DEV
Test host:	PrAMC
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	SAS-00080004 SAS-00080005 SAS-00080006

Description

Checks the versions and revisions of the SAS1064e chip, the firmware and the BIOS.

```
sasdiag_Linux -r1procedure
```

Typical output

```
LSI Logic Corp. Diagnostic Utility
Copyright 2005 LSI Logic Corp.
Utility Version 1.00

Log Option selected is - No Log Required
Detailed Log will not be printed on Screen OR in Log File

Time Stamp      : Fri Aug 26 17:18:29 2005

Selected Device :

Device ID         Bus          Device          Function
  0x50             0            9               0

VALID DEVICE TEST                          : PASS
VALID BIOS TEST                            : PASS
VALID FIRMWARE TEST                        : PASS
-------------------------------------------------------------

Time Stamp      : Fri Aug 26 17:18:29 2005
```

Failure Impact

- SAS-00080004 diagnostic code results from failure in identifying the SAS controller. Impact is failure of SAS controller subsystem.
- SAS-00080005 diagnostic code results from failure in verifying the SAS BIOS code. Impact is failure of SAS controller BIOS.
- SAS-00080006 diagnostic code results from failure in verifying the SAS firmware code. Impact is failure of SAS controller subsystem.

3.3.5 SAS_MPTPAGE

Checks MPT configuration page.

Test group:	Diagnostics
Test case:	sas
Test procedure:	SAS_MPTPAGE
Test host:	PrAMC
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	SAS-00080007

Description

Typical output

```
LSI Logic Corp. Diagnostic Utility
Copyright 2005 LSI Logic Corp.
Utility Version 1.00


Log Option selected is - No Log Required
Detailed Log will not be printed on Screen OR in Log File

Time Stamp      : Fri Aug 26 17:32:03 2005


Selected Device :

Device ID         Bus         Device         Function
  0x50             0           9               0

MPT CONFIGURATION PAGE TEST              : PASS
------------------------------------------------------------

Time Stamp      : Fri Aug 26 17:32:03 2005
```

Failure Impact

- SAS-00080007 diagnostic code results from failure in the MPT configuration page. Impact is failure of SAS controller subsystem.

3.3.6 SAS_PERSPAGE

Checks the persistent configuration pages.

Test group:	Diagnostics
Test case:	sas
Test procedure:	SAS_PERSPAGE
Test host:	PrAMC
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	SAS-00080008

Description

Typical output

```
LSI Logic Corp. Diagnostic Utility
Copyright 2005 LSI Logic Corp.
Utility Version 1.00


Log Option selected is - No Log Required
Detailed Log will not be printed on Screen OR in Log File

Time Stamp      : Fri Aug 26 17:34:06 2005


Selected Device :

Device ID         Bus         Device         Function
  0x50             0           9              0

PERSISTENT CONFIGURATION PAGE TEST       : PASS
------------------------------------------------------------

Time Stamp      : Fri Aug 26 17:34:07 2005
```

Failure Impact

- SAS-00080008 diagnostic code results from failure in the persistent configuration page. Impact is failure of SAS controller subsystem.

3.3.7 SAS_FWACTIVITY

Checks the SAS firmware activity.

Test group:	Diagnostics
Test case:	sas
Test procedure:	SAS_FWACTIVITY
Test host:	PrAMC
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	SAS-00080009

Description

Typical output

```
LSI Logic Corp. Diagnostic Utility
Copyright 2005 LSI Logic Corp.
Utility Version 1.00

Log Option selected is - No Log Required
Detailed Log will not be printed on Screen OR in Log File

Time Stamp      : Fri Aug 26 17:35:41 2005


Selected Device :

Device ID          Bus          Device          Function
  0x50              0            9               0

FIRMWARE ACTIVITY TEST                    : PASS
------------------------------------------------------------

Time Stamp      : Fri Aug 26 17:35:41 2005
```

Failure Impact

- SAS-00080009 diagnostic code results from failure in detecting active firmware. Impact is failure of SAS controller subsystem.

3.3.8 SAS_BUFFER

Checks read/write access to buffers

Test group:	Diagnostics
Test case:	sas
Test procedure:	SAS_BUFFER
Test host:	PrAMC
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	SAS-0008000A

Description

Typical output

```
LSI Logic Corp. Diagnostic Utility
Copyright 2005 LSI Logic Corp.
Utility Version 1.00

Log Option selected is - No Log Required
Detailed Log will not be printed on Screen OR in Log File

Time Stamp      : Fri Aug 26 17:41:27 2005


Selected Device :

Device ID         Bus         Device         Function
  0x50             0           9              0

READ/WRITE BUFFER TEST                    : PASS
------------------------------------------------------------

Time Stamp      : Fri Aug 26 17:41:27 2005
```

Failure Impact

- SAS-0008000A diagnostic code results from failure in reading/writing SAS buffers. Impact is failure of SAS controller subsystem.

3.4 LSI SASEXP SAS Expander

3.4.1 SASEXP_DEV

Check SAS Expander device.

Test group:	Diagnostics
Test case:	sas
Test procedure:	SASEXP_DEV
Test host:	PrAMC
Test IC:	quickturn
Test mode:	normal
Diagnostic code:	SAS-00090001 SAS-00090002 SAS-00090003 SAS-000901nn

Description

Query SAS expander for status and check for any errors. Check general register access on SAS Expander.

Failure Impact

- SASEXP-00090001 diagnostic code results from failure in accessing the SAS controller. Impact is failure of SAS controller subsystem.
- SASEXP-00090002 diagnostic code results from failure in accessing the SAS expander. Impact is failure of SAS storage subsystem.

- SASEXP-00090003 diagnostic code results from failed boot of SAS expander (i.e. power-up configuration stored in SEEPROM not correctly applied). Impact is failure of SAS storage subsystem.
- SASEXP-000901nn diagnostic code results from failure of SAS PHY nn. Impact is failure of SAS interface attached to PHY nn.

3.4.2 SASEXP_SEEPROM_RW

SAS Expander SEEPROM Read/Write Test

Test group:	Diagnostics
Test case:	sas
Test procedure:	SASEXP_SEEPROM_RW
Test host:	PrAMC
Test IC:	full
Test mode:	destructive
Diagnostic code:	SAS-00090001 SAS-00090004

Description

Write to SEEPROM and verify correct operation.

Failure Impact

- SASEXP-00090001 diagnostic code results from failure in accessing the SAS controller. Impact is failure of SAS controller subsystem.
- SASEXP-00090004 diagnostic code results from failure in read/write to SEEPROM.

Appendix A

Preparing the netboot environment

A. Preparing the netboot environment

A.1 AM4001/2 BIOS settings

The AM4001/2 BIOS has to be prepared to boot from network, therefore enter BIOS setup and configure:

- OEM FEATURE -> LAN BOOT -> PXE ROM -> enabled

After having enabled the PXE ROM the system should be rebootet.

Next step is to select the right network I/F and the correct boot order by entering the BIOS setup again and configure

- Boot -> Network Drives -> Network:IBA GE Slot 0100 v1231

  This selection will later be the netboot interface eth0 on the AM4001/2

  That matches to a Carrier I/F in the following way:

  AM4001/2 in slot B4: IBA GE Slot 0100 corresponds to I/F 0/9

  AM4001/2 in slot B4: IBA GE Slot 0101 corresponds to I/F 0/10

  AM4001/2 in slot B2: IBA GE Slot 0100 corresponds to I/F 0/13

  AM4001/2 in slot B2: IBA GE Slot 0101 corresponds to I/F 0/14

- Boot -> 1st Boot Device -> Network:IBA GE Slot 0100 v1231

Used BIOS Version: I0105 or higher

A.2 PXE LINUX

PXE LINUX is part of the Linux syslinux.RPM, informations about that RPM can be seen by typing:

```
rpm -ql syslinux.rpm
```

To setup PXE bootserver correctly, there is a documentation available in RHEL4 in the directory

```
/usr/share/doc/syslinux-2.11/pxelinux.doc
```

The configuration can easily be done by following this documentation, main things to do are:

First, you have to copy /usr/lib/syslinux/pxelinux.0 to the tftpserver directory /tftpboot by typing:

```
cp /usr/lib/syslinux/pxelinux.0 /tftpboot
```

Second, there must be the file “default”available in directory /tftpboot/pxelinux.cfg with the following content

```
[root@build pxelinux.cfg]# cat default
default diag-netboot
prompt 1
display pxeboot.msg
timeout 5
label diag-netboot
kernel diag-netboot.kernel
serial 0 115200 0
append initrd=diag-netboot.initrd root=/dev/ram ramdisk_size=131072
console=ttyS0,115200
```

This will configure correct boot options (name of kernel, initrd, sizes) and some settings (show messages, serial settings, prompt, ...).

A.3 TFTP server

A tftp- and dhcp-server has to be prepared to be used by PXEboot.

The netboot images for the ramdisk (diag-netboot.initrd) and the kernel (diag-netboot.kernel) have to be copied into directory /tftpboot, readable for all.

For the DHCP server the MAC address of the used GE I/F of the AM4001/2 has to included (see BIOS settings Netboot I/F)

Appendix B

Getting Help

B. Getting Help

If at any time you encounter difficulties with your application or with any of our products, or if you simply need guidance on system setups and capabilities, contact our Technical Support at:

North America	EMEA
Tel.: (450) 437-5682	Tel.: +49 (0) 8341 803 xxx
Fax: (450) 437-8053	Fax: +49 (0) 8341 803 xxx

If you have any questions about Kontron, our products, or services, visit our Web site at: www.kontron.com

You also can contact us by E-mail at:

North America: support@ca.kontron.com

EMEA: support@kontron-modular.com

Or at the following address:

North America	EMEA
Kontron Canada, Inc.	Kontron Modular Computers GmbH
616 Curé Boivin	Sudetenstrasse 7
Boisbriand, Québec	87600 Kaufbeuren
J7G 2A7 Canada	Germany

RETURNING DEFECTIVE MERCHANDISE

Before returning any merchandise please do one of the following if your product malfunctions:

- **Call**

1. Call our Technical Support department in North America at (450) 437-5682 and in EMEA at +49 (0) 8341 803 xxx. Make sure you have the following on hand: our Invoice #, your Purchase Order #, and the Serial Number of the defective unit.
2. Provide the serial number found on the back of the unit and explain the nature of your problem to a service technician.
3. The technician will instruct you on the return procedure if the problem cannot be solved over the telephone.
4. Make sure you receive an RMA # from our Technical Support before returning any merchandise.

- **Fax**

1. Make a copy of the request form on the following page.
2. Fill it out.
3. Fax it to us at: North America (450) 437-0304, EMEA +49 (0) 8341 803 xxx

- **E-mail**

1. Send us an e-mail at: RMA@ca.kontron.com in North America ant at ____@_____.com in EMEA. In the e-mail, you must include your name, your company name, your address, your city, your postal/zip code, your phone number, and your e-mail. You must also include the serial number of the defective product and a description of the problem.

WHEN RETURNING A UNIT

- In the box, you have to include the name and telephone number of a person whom we can contact for further explanations if necessary when returning goods. **Where applicable, always include all duty papers and invoice(s) associated with the item(s) in question.**
- Ensure that the unit is properly packed. Pack it in a rigid cardboard box.
- Clearly write or mark the RMA number on the outside of the package you are returning.
- Ship prepaid. We take care of insuring incoming units.

North America	EMEA
Kontron Canada, Inc.	Kontron Modular Computers GmbH
616 Curé Boivin	Sudetenstrasse 7
Boisbriand, Québec	87600 Kaufbeuren
J7G 2A7 Canada	Germany



Return to Manufacturer Authorization Request

Contact Name:	_____		
Company Name:	_____		
Street Address:	_____		
City:	_____	Province/State:	_____
Country:	_____	Postal/Zip Code:	_____
Phone Number:	_____	Extension:	_____
Fax Number:	_____	E-Mail:	_____

Serial Number	Failure or Problem Description	P.O. # (if not under warranty)

Fax this form to Kontron's Technical Support department in North America at (450) 437-0304 and in EMEA at +49 (0)8341 803 XXX