C *omputing*
S *urface*

The CS-2 Processor Module

S1002–10M128.02

meiko

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Contents

Safety Precautions *i*

Federal Communications Commission (FCC) Notice

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Shielded cables must be used with this unit to ensure compliance with the FCC Class A limits.

General Precautions

- Adhere strictly to the instructions and warnings provided in this documentation.
- Do not push objects into the interior of the equipment through any openings. Hazardous voltages and moving parts are present. Conductive objects could cause electric shock, fire, or damage to the equipment.
- It is not permitted to make mechanical or electrical modifications to the equipment. The manufacturer is not responsible for regulatory compliance of equipment that has been modified. You may also invalidate your warranties if you make unauthorised changes to your equipment.
- When connecting a visual display unit to your module your attention is drawn to the instructions that are issued by the device manufacturer.
- Your module may contain disk devices. Your attention is drawn to the instructions that are issued by the device manufacturers.
- A lithium battery is installed on many of the boards in the module — it is an integral component of the non-volatile RAM (or NVRAM). Lithium batteries are not customer replaceable. If they are mishandled there is a danger that they may explode. Always consult Meiko if you suspect that the battery needs replacing. Never dispose of lithium batteries in a fire or attempt to dismantle.
- Many of the electronic components fitted in the module are fragile or static sensitive. They should only be handled by trained engineers. You must observe anti-static precautions when handling boards or electronic devices.
- Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception, requiring the operator to take whatever steps are necessary to correct the interference.

Lifting

The module is heavy and must be lifted by two people or by using the Genie lifting equipment that is supplied by Meiko (large multi-module systems only).

When using the Genie fork lift you must first attach the two lift-clamp assemblies to either side of the module. Unscrew the securing screw that holds the telescopic section of the lift-clamp closed. Insert the rear locating pins into the holes at the rear edge of the module (the open end of the box section should face the front of the module). Align the front locating pins with the holes at the front of the module and tighten the holding screw.

Locate the forks of the Genie lift into the two box sections in the lift clamps. Raise the module by turning clockwise the handle on the Genie lift. Lower the module by turning the handle anti-clockwise.

Warning – Your attention is drawn to the operating instructions for the Genie lift that are supplied by the lift's manufacturers.

- Genie fork lift, part number 73-FORK-GENIE.
- Module lifting gear, part number 65-MODULELIFT

Overview *1*

The Processor Module is a physical enclosure for up to 4 processor boards. Supporting infrastructure within the module consists of cooling fans, power supply, and connections to the CS-2 data network, the CS-2 control network, and external SCSI peripheral buses. Up to 4 SCSI disk devices may also be fitted within the module and connected to the processor boards in one of three standard configurations (all disks connected to one board, two disks to each of two boards, or one disk per board). An LED panel at the front of the module offers a 4x4 array of LEDs per board which are software controlled. The module is fully enclosed and FCC compliant.

The CS-2 processor module is intended for installation on a CS-2 bay which provides a firm level support, network interconnect, and power distribution.

1

Module Packaging *2*

CS-2 modules are shipped in units of 1 to 4. The packaging consists of a wood base, packing foam, antistatic bag, and enclosing triple wall card outer.

Packing Dimensions

All dimensions are approximate.

Packing dimensions (single module):

Height	74 cm (29”)
Width	34 cm (13.5”)
Length	112 cm (44”)

Packing weight (without module):

4 module skid	20 Kg (44 lbs)
Module base	4.5 Kg (10 lbs)
Filler	1.8 Kg (4 lbs)
Outer card cover	4.5 Kg (10 lbs)
Packing foam	0.2 Kg (0.4 lbs)
Total (1 module)	**11 Kg (24.4 lbs)**
Total (4 modules)	**31 Kg (68.4 lbs)**

Module weight (without processor boards or peripherals):

Module weight	43.5 Kg (96 lbs)

Processor board weights (all processor options fitted):

MK401 (Dino)	2 Kg (4.4 lbs)
MK405 (Quatro)	3 Kg (6.6 lbs)
MK403 (VPU)	2.7 Kg (6.0 lbs)

Backplane boards:

MK515 Controller	0.15 Kg (0.33 lbs)
MK516 SCSI card	0.15 Kg (0.33 lbs)
MK511/2 Switch	0.15 Kg (0.33 lbs)

Peripherals:

Disk carrier	0.6 Kg (1.3 lbs)
Disk device	0.8 Kg (1.8 lbs)
Total per disk	**1.4 Kg (3.1 lbs)**

Unpacking

Warning – You are reminded of the safety precautions listed in *General Precautions* **on page ii.**

Modules are shipped in groups of 4 or 1.

For 4 module shipments each module is packaged individually and secured with the others onto a lar ge skid. To unpack a four module skid cut the outer banding and remove one module. Space the remaining three module packs uniformly over the skid.

- To unpack each module first cut the banding and remove the outer card carton by lifting it clear of the module.
- Remove the protective foam from the top and front of the module.
- Remove the antistatic bag by pulling upwards.
- Lift the module from the packing base. Note: the module is heavy and must be lifted by at least two people or by using a Genie lift.
- Check the module for damage and advise the transportation company immediately if any is found.

Retain all packaging and use it when shipping the module.

Installing the Processor Module 3

You must read this chapter thoroughly and completely before using your CS-2 module.

Location

The processor module must be located in a CS-2 Bay. This provides a firm level support for the module and has been designed to maximise the flow of cooling air through the module.

Warning – Overheating can damage this pr oduct. Do not block or cover any openings that ar e built into the module, and do not place the module near any sour ces of heat.

Modules sit on module trays that are fixed to the bay by telescopic rails. The tray must be extended from the bay before a module may be loaded onto it or removed from it.

Warning – Never extend mor e than one loaded module tray .

To extend the tray first unscrew the two retaining screws and then pull the tray forward. Lift the module onto the tray ensuring that the feet on the base of the module mate with the holes in the tray . Fix the module into position using the captive screws on the underside of the tray .

Warning – Your attention is drawn to the lifting instructions in *Safety Precautions* **on page i.**

The bay may carry a number of Beta Phase connections to the module. These connectors must be opened using the Meiko Beta Phase Controller before the module tray is pushed into position.

Warning – Failure to open the Beta Flex connectors before pushing the module trays into position will damage your equipment.

With the Beta Phase connectors held open by the Beta Phase Controller push the module tray into position. On each of the telescopic arms is a spring slip that must be pushed-in to allow the arm to slide. Push the tray into position carefully, ensuring that the Beta Phase connectors are correctly situated. Lock the module tray into position using the two captive screws at the front of the tray.

After pushing the module tray into position use the Beta Phase Controller to close the connectors.

Using the Meiko Beta Phase Controller

Connect the Beta Phase controller to the 37-way connector located behind the module mounting position. Connect the Beta Phase Controller to a mains outlet using the supplied cable. Use the Activate button on the box to open all the Beta Phase connectors used by that module — pressing the same button a second time will close the connectors. Status lights on the box show the condition of each connector; red indicates open, amber indicates power is being applied, green indicates no power. When using the Controller it is safe to hold the Beta Phase connectors open for prolonged periods.

Power Supply

Check that the voltage and frequency of your power supply is suitable for your equipment. The power supply unit is auto-ranging, 110–230 V, 50/60/400 Hz. Maximum current is 15 A.

Power Connections

Power is supplied to the processor module by a 3-way cable that is supplied by Meiko.

The following cable types are available:

- Harvey Hubble to Harvey Hubble.
- Harvey Hubble to UK 13A outlet.
- Harvey Hubble to US 15A outlet.

Where several processor modules are used Meiko may also supply a mains distribution board. This connects eight modules to one power supply outlet.

- Power distribution panel, European. Part number 65-DIST-EUR-01
- Power distribution panel, USA. Part number 65-DIST-US-01

Warning – You must only use power cords and distributions panels that ar e supplied by Meiko. These have the corr ect power rating for your system.

Warning – You should check that you have been supplied with the corr ect type of power cord and distribution boards.

Fuses

Five fuses are located at the rear of the processor module as shown in Figure 3-1 on page 15. One fuse protects the power supply unit from the incoming mains supply. Two fuses protect the fans and 2 protect the disk drives.

- Main fuse: standard 250V, 15A. Part number 22-F0100-04E150.
- Fan fuse: anti-surge 250V, 10A. Part number 22-F0100-04E100.
- Fan fuse: anti-surge 250V, 5A. Part number 22-F0100-04E500.
- Disk fuse: anti-surge 250V, 10A. Part number 22-F0100-04E100.
- Disk fuse: anti-surge 250V, 5A. Part number 22-F0100-04E500.

There are 4 fuses located on the module backplane alongside the 4 SCSI card connectors (see Figure 3-2 on page 16). These fuses protect the ±12 V and the ±5 V circuits on both the backplane and all boards that draw their power supply from it (including the backplane cards and the LED panel). Access to these fuses is gained from the rear of the module and requires the SCSI backplane cards to be removed. All 4 fuses are the same type:

- 1.25×0.52”, 4 A anti-surge, HCR ceramic. Part number 22–FU100–03E400.

Warning – The backplane fuses may only be changed by trained engineers.

Operation

The power supply is operated by the main on/off switch located above the power connector. 0 represents off, 1 represents on.

When first switched on five LEDs are visible through the rear of the power supply unit. Initially three of these should be green, two are red. After a short delay all LEDs should be green.

Warning – A fault is present if any light remains red for more than 10 seconds after first switching on, or changes from green to red during operation. Switch the power supply off, disconnect from the main supply, and contact Meiko for advice.

Removable Panels

Warning – Ensure the power supply is switched off and disconnected from the main supply before removing the module’s front or side panels.

The front and side panels may be removed from the module. Removing the front panel gives access to the LED board, the processor boards, and the disk devices. The side panels may be removed but there is no requirement to do so, except to protect them during transit or when lifting the module into a bay .

Warning – Processor boards and disk devices should only be fitted or removed by trained engineers.

To remove the front panel pull it forward. The front panel is retained by four clips, one in each corner of the panel. When fitting the front panel ensure that the tinted window is aligned with the module's LED display.

The side panels are held in place by 5 key slots on the side of the module. To remove the a side panel slide it forward and pull it off.

External Connections

The processor module includes a number of connectors to the front and rear of the module.

At the Rear of the Power Supply Unit

1×25-way D-type connector:
RS232 connector for module control card diagnostics. This connection is for use by Meiko's trained engineers only.

2 ×9-way D-type connectors:
X-CAN and G-CAN connectors. The X-CAN is the middle connector — this is used to connect the modules within a cluster (up to 3 bays/24 module systems). The G-CAN is the right-most connector — this is used to interconnect clusters. When using more than one cluster at least two modules in each cluster must be connected to the G-CAN; all unused G-CAN connectors must have terminators fitted. Within a cluster the X-CAN connections are daisy-chained using Meiko supplied cables.

- G-CAN terminators, part number 60-CS2MA009-1T.
- X-CAN interconnect, part number 60-CA0246-1T

At the Rear of the Module

Upper 8 cards slots:
Up to eight module switch cards (MK511 or MK512) are fitted in the upper card slots.

Lower 5 card slots:
Up to 4 module SCSI cards (MK516) and 1 module control card (MK515) may be fitted to the lower card slots.

Warning – The module switch cards, module controller card, and the module SCSI cards are not user serviceable. They should only be fitted or removed by trained engineers.

At the Front of the Module

Behind the front panel are four polarised 50-way connectors. Two of these are used to connect to the MK525 module LED board. Fit the board to the upper connectors when the module is mounted on the lower shelf of a bay, and the lower connectors when the module is mounted on the upper shelf.

The connectors for the 4 processor boards and the 4 disk carriers are also located behind the front panel.

Warning – Processor cards and disk devices are not user serviceable. They should only be fitted or removed by trained engineers.

External Indicators

A number of LEDs are visible through the tinted window of the module's front panel.

Four 4×4 matrices of red LEDs are driven by the processor boards. The SPARC processor on single SPARC boards controls all 16 LEDs, whereas each processor on a 4-SPARC board controls one row or four lights. The default patterns shown on the LEDs are generated by the Boot PROM and the Operating System — the

pattern may be changed by the user under software control. When power is first applied to the boards all red LEDs should illuminate, fade, and then display a random pattern.

Below each matrix of red LEDs are 3 more LEDs. The green and amber lights are driven by the processor board's CAN interface — the green light is the board's heart-beat, the amber light indicates a transmit of data. The red light is a status light for an optional hard disk that is installed below the processor board.

Two LEDs in the top right hand corner of the display are driven by the module controller. The green light is a heart-beat signal, the amber light flashes each time the module controller is sending information over the CAN bus.

Module Identification Number

At the rear of the power supply unit are three dials — each represents one nibble from a 12 bit network address, or *netid*. The netid for each module must be unique and modules must be numbered sequentially starting from 0.

Enter each nibble of the address onto the dials using a suitable screwdriver.

Note: for two module systems the module id's must differ in the least significant bit only. Module id's of 0 and 1, or 2 and 3 are therefore permitted, but 1 and 2 are not.

Warning – You must ensure that the power is disconnected before setting the module address.

Additional Note for Revision A MK526:

Having identified a module's network address each nibble of the 12 bit address is bit-flipped (e.g. 01 11 becomes 1110). The resulting 3 nibbles are then entered onto the dials using a suitable screw driver.

The following table summarises the module id's for systems of up to 32 modules. The dials for module 5, for example, must be set to 00A.

Module	Dials			
0–3	0 0 0	0 0 8	0 0 4	0 0 C
4–7	0 0 2	0 0 A	0 0 6	0 0 E
8– 11	0 0 1	0 0 9	0 0 5	0 0 D
12–15	0 0 3	0 0 B	0 0 7	0 0 F
16 – 19	0 8 0	0 8 8	0 8 4	0 8 C
20 – 23	0 8 2	0 8 A	0 8 6	0 8 E
24–27	0 8 1	0 8 9	0 8 5	0 8 D
28 –31	0 8 3	0 8 B	0 8 7	0 8 F

Operating Conditions

Recommended operating temperature	10–25 °C (50–80 °F)
Peak operating temperature	32 °C (90 °F)
Temperature gradient	10 °C (18 °F) per hour
Storage temperature	-18–60 °C (0–140 °F)
ANSI media data integrity (max.)	32 °C (89.6 °F)
Relative humidity	20–80% non-condensing
Storage humidity	10–90% non-condensing
Altitude	3000 m (10 000 feet)
Operating Shock	1 G

Figure 3-1 The CS-2 Processor Module

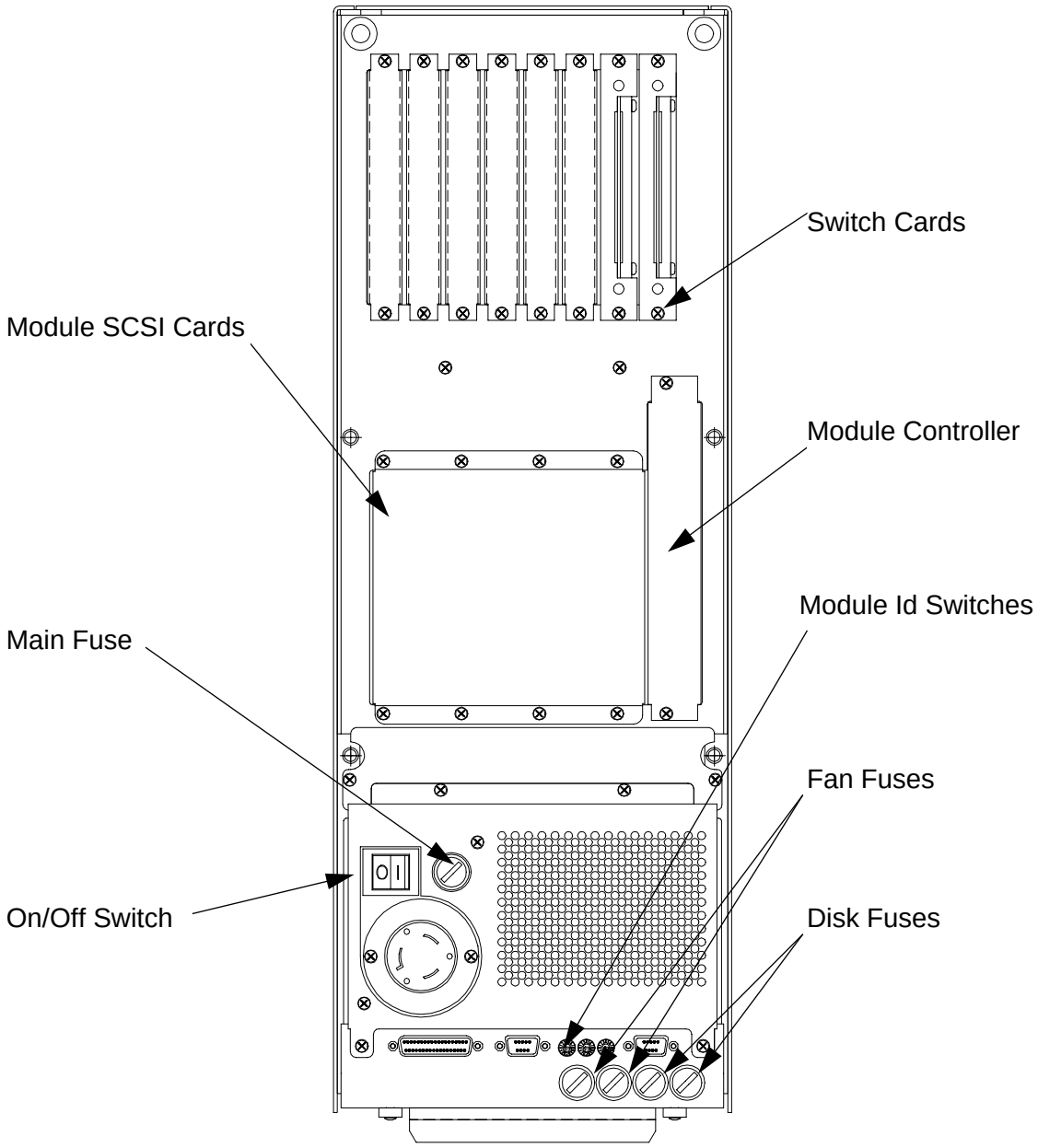
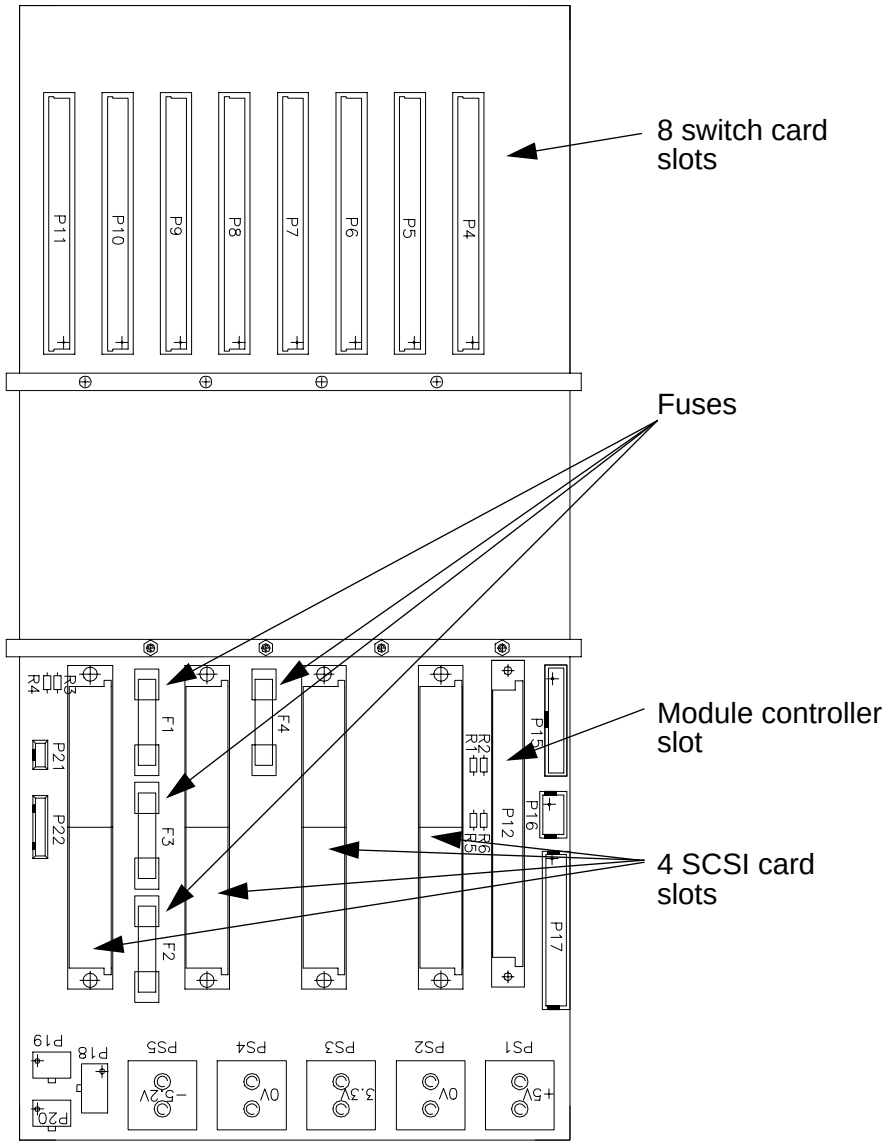


Figure 3-2 The MK510 Processor Module Backplane (not user serviceable)



Installing Processor Boards *4*

Warning – The procedures in this chapter must only be undertaken by trained engineers.

Warning – You must disconnect the power supply befor e installing pr ocessor boards into the pr ocessor module.

Three types of processor board are available:

- MK401 (single-SPARC with I/O), also known as Dino. This is a general purpose compute processor and operating system server.
- MK405 (quad-SPARC board), also known as Quatro. This is a high performance compute server.
- MK403 (single-SPARC, dual Fujitsu VPU), also known as VPU. This is a high performance vector processor.

Blanking plates must be installed in unused board slots to ensure correct cooling and compliance with RFI regulations.

Installation

The same installation procedure is used to install all three board types.

Insert the board so that it fits into the guide rails at the top and bottom of the module, ensuring that the component side is to the left (viewed facing the module). Gently push the board squarely on the front panel. Before pushing the board fully into position fold back the levers at each end of the front panel so that they are at 90^{o} to the board. Push the board in further until the base of the two levers is touching the card cage; push the board into position by pushing firmly on both levers until they are flat. Secure using the captive screw at each end of the board's front panel.

To remove the board pull both levers out — this will lever the board away from the module's connections. Pull the board clear of the module.

You should take care not to damage the connectors within the module.

You should also take care not to damage the RFI (copper) seals along the edge of the board's front panel.

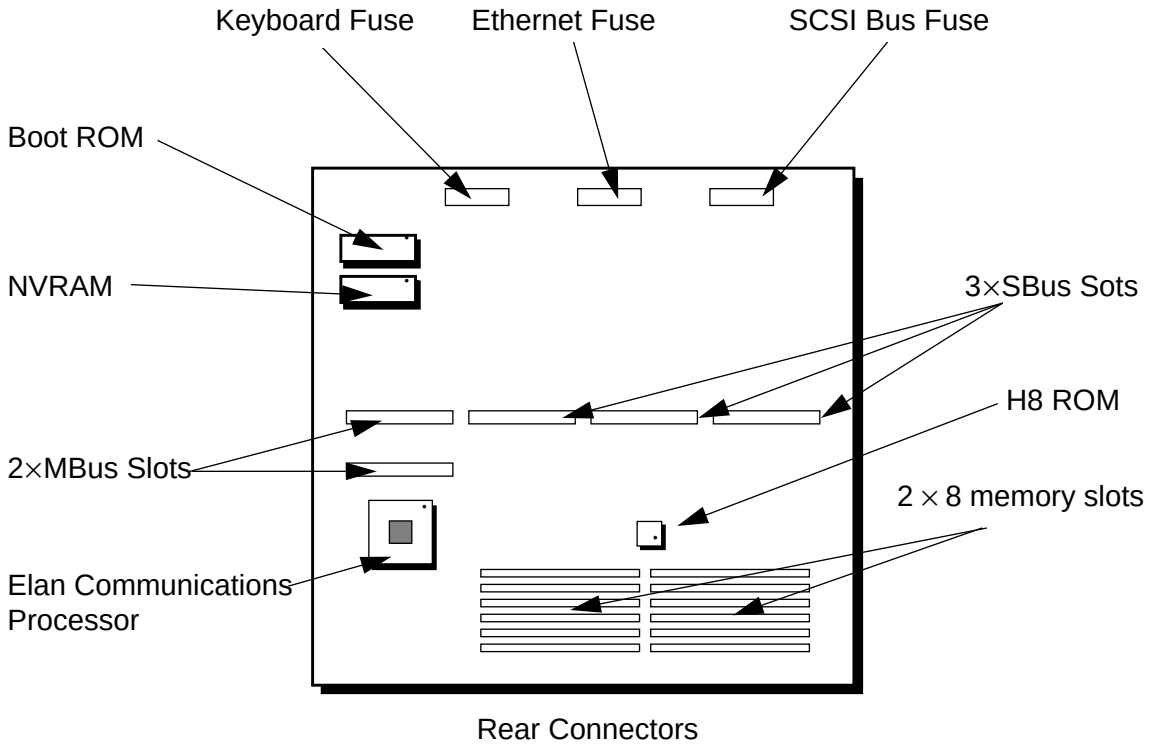
MK401 Single-SPARC Board

Field Upgradeable Components

The MK401 has the following field upgradeable components (see Figure 4-1):

- Superscalar SPARC processor module fitted to MBus slot.
- Three SBus slots.
- 16 memory slots.
- Boot ROM.
- H8 ROM.
- Non-volatile RAM (NVRAM).
- Fuses.

Figure 4-1 MK401 Components



Take care not to damage the component or its neighbours when installing or removing these devices.

MBus Processor Modules

Superscalar SPARC modules may be installed in the two MBus slots — when using just one module it must be installed in the slot nearest the communications processor (the one nearest the back of the board). Installation is simple — push the processor into the connector on the MK401 and secure into position with a screw at each corner.

As newer higher performance SPARC modules become available, Meiko will offer these as field upgrade options. Simply unplug the old unit and replace with the new.

SBus Modules

Three SBus slots are provided and these may be fitted with standard SBus modules. As with the processor modules SBus modules are simply plugged into the SBus connectors and secured with 2 screws. When using SBus cards that have external connections, for example a graphics card, remove the appropriate panel from the front of the MK401 — the panel is held in place by two small screws.

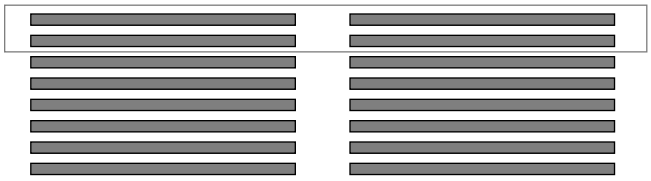
SBus devices are numbered from 0 to 2, device 0 being next to the processor slots. Device 4 is the on-board Ethernet and SCSI bus. Device 5 is the second on-board SCSI bus.

Memory

Up to 16 single in-line memory modules (SIMMs) may be fitted to the MK401 board (JEDEC 36bit SIMMs). The array is constructed of 4 groups of 4 SIMMs, arranged as shown in Figure 4-2. Within each group the SIMMs must be identical, but there is no requirement for the groups to be the same.

SIMMs can be either 4Mbit DRAM or 16Mbit DRAM technology, either single or double sided. This gives a minimum memory configuration of 16Mbytes and a maximum of 512Mbytes.

Figure 4-2 Memory slots on an MK401; the dotted region shows one of the 4 groups of 4 memory slots.



Boot ROM

The boot ROM may be upgraded from time to time. It is held in a DIL socket and is easily replaced.

H8 ROM

The H8 ROM may be upgraded from time to time. It is held in a socket and is easily replaced using the appropriate tool.

NVRAM

The non-volatile RAM holds system configuration information, environment variables, and the clock. It is held in a DIL socket and is easily replaced. Note however that the information within the NVRAM can only be restored by Meiko's engineers.

The NVRAM contains lithium batteries which have special handling and disposal requirements — your attention is drawn to the *General Precautions* on page ii.

Fuses

There are 3 fuses on the MK401.

Keyboard fuse: 20 × 5mm 1 A quick blow ceramic.

Ethernet fuse: 20 × 5mm 1 A quick blow ceramic.

SCSI bus fuse: 20 × 5mm 500 mA quick blow ceramic.

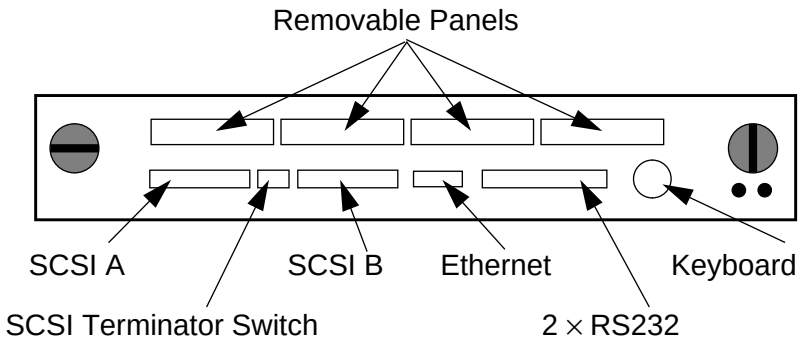
External Connections

External connections are provided for a keyboard/mouse (8 pin circular socket), RS232 interfaces (2 channels provided by one 25-way D-type connector), Ethernet (15-way D-type connector), and two independent SCSI buses (each via a 50-way miniature connector).

Front Panel Connections

Removable panels provide access to connectors on the optional SBus boards.

Figure 4-3 MK401 Front Panel Connections



RS232 Connections

The two RS232 channels are connected as follows. Signal ground is pin 7, chassis ground in pin 1.

Table 4-1 RS232 Channel A Pinout.

Signal	Input/Output	Pin number
TXD	Out	2
RXD	In	3
RTS	Out	4
CTS	In	5
CSR	In	6
DCD	In	8
DB	In	15

Table 4-1 RS232 Channel A Pinout.

Signal	Input/Output	Pin number
DD	In	17
DA	On	24
DTR	On	20

Table 4-2 RS232 Channel B Pinout.

Signal	Input/Output	Pin number
TXD	Out	14
RXD	In	16
RTS	Out	19
CTS	In	13
DCDB	In	12

Adding SCSI Peripherals

The MK401 includes two SCSI-2 controllers — both SCSI buses are available via connections on the front panel or via the processor module backplane. Up to 3 additional SCSI buses can be added using standard SBus cards, and these are available via connections on the SBus cards.

The 2 on-board SCSI buses can be taken from the processor module backplane by using an MK516 module SCSI card. This transfers the buses onto polarised ribbon cable connectors which can be wired to SCSI disks within the processor module.

The MK516 can support up to 5 SCSI buses, only 2 are currently used.

SCSI Termination

Two switches on the MK401 front panel allow the SCSI bus termination to be switched; with the switches down termination is on.

If *either* the front panel connections *or* the backplane connections are used, or no devices are attached at all, then the on-board termination must be turned on. Only when both front-panel and backplane connectors are used together should the on-board termination switches be turned off, and in this case the SCSI bus must be terminated at both ends.

External Indicators

Two LEDs (one green, one amber) are included on the front panel. The green LED is the heart beat from the board's CAN controller. The amber light illuminates each time the CAN controller transmits on the CAN bus. Both should flash steadily. These indicators are also displayed on the module's LED display.

The green LED flashes at a slow steady rate (once per second) when operating normally. A quicker flash rate (2×normal) indicates that the SPARC processor is not responding; a very quick flash rate (3×normal) indicates that the H8 processor on the module controller is not responding.

Each processor board within a processor module controls a 4×4 matrix of red LEDs on the module's front panel. The MK401 displays a random pattern on these when running the Boot ROM. When Solaris has been booted a circulating pattern is displayed. The pattern can be changed by user programs.

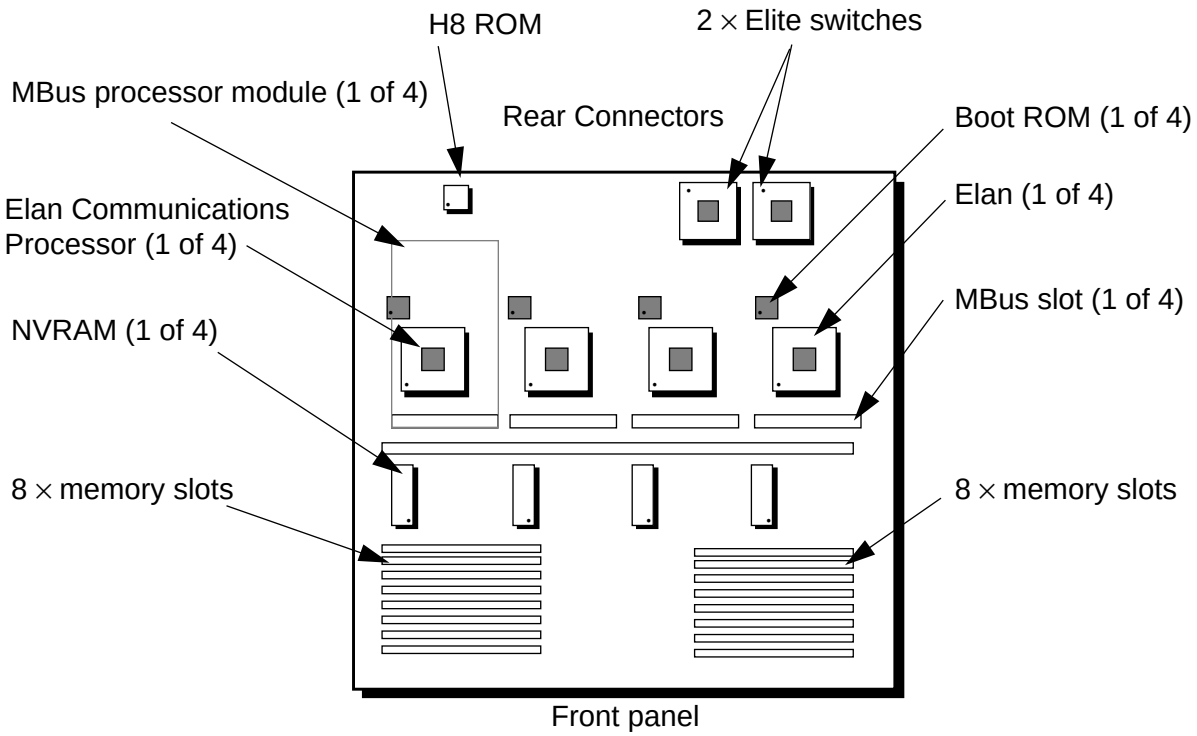
MK405 Quad-SPARC Board

Field Upgradeable Components

The MK405 has the following field upgradeable components (see Figure 4-4):

- Superscalar SPARC processor modules fitted to MBus slots.
- 16 memory slots.
- Boot ROMs.
- H8 ROMs.
- Non-volatile RAM (NVRAM).

Figure 4-4 MK405 Components



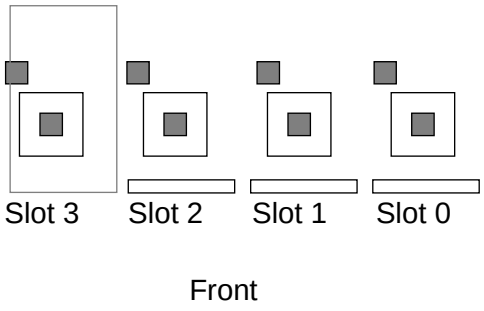
MBus Processor Modules

Up to 4 Superscalar SPARC modules may be installed in the MBus slots. Installation is simple — push the processor into the connector on the MK405 and secure into position with a screw at each corner.

As newer higher performance SPARC modules become available, Meiko will offer these as field upgrade options. Simply unplug the old unit and replace with the new.

The processor slots are numbered from 0 to 3, from right to left (when viewed from the front) as shown in Figure 4-5.

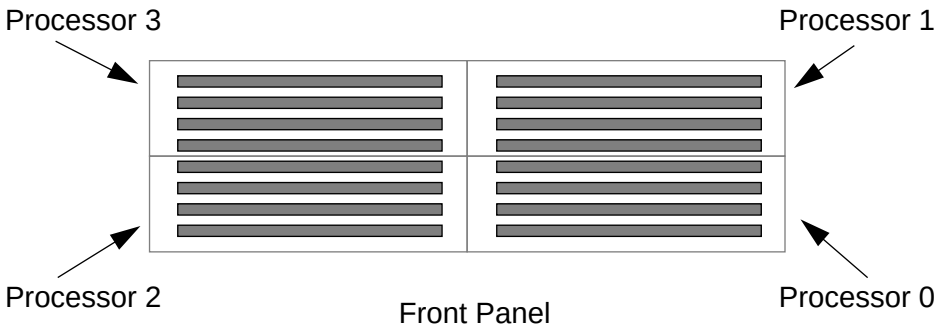
Figure 4-5 MK405 Processor Numbering



Memory

Up to 16 single in-line memory modules (SIMMs) may be fitted to the MK405 board (JEDEC 36bit SIMMs). The array is constructed of 4 groups of 4 SIMMs, one group for each processor — see Figure 4-6. Within each group the SIMMs must be identical but there is no requirement for the groups to be the same.

Figure 4-6 Memory slots on an MK405 showing the allocation of slots to each of the 4 processors.



SIMMs can be either 4Mbit DRAM or 16Mbit DRAM technology, either single or double sided. This gives a total minimum memory configuration of 64Mbytes and a maximum of 512Mbytes (16–128Mbytes per processor).

Boot ROM

The boot ROMs may be upgraded from time to time.They are held in sockets and are easily replaced using the appropriate tool.

H8 ROM

The H8 ROMs may be upgraded from time to time. They are held in sockets and are easily replaced using the appropriate tool.

NVRAM

The non-volatile RAMs hold system configuration information, environment variables, and the clock. They are held in a DIL sockets and are easily replaced. Note however that the information within the NVRAM can only be restored by Meiko's engineers.

The NVRAM contains lithium batteries which have special handling and disposal requirements — your attention is drawn to the precautions listed in the *General Precautions* on page ii.

External Indicators

The MK405 front panel includes two pairs of LEDs. In the middle are two amber LEDs — illumination of these indicates an error with the Elite switches. The green/amber LED pair are the board's CAN bus indicators — green is the board's heartbeat, and amber indicates a transmission onto the bus.

The green LED flashes at a slow steady rate (once per second) when operating normally. A quicker flash rate (2×normal) indicates that the SPARC processor is not responding; a very quick flash rate (3×normal) indicates that the H8 processor on the module controller is not responding.

Each processor board within a processor module controls a 4×4 matrix of red LEDs on the module's front panel. Each of the four processors on an MK405 controls one row of 4 lights. Processor 0 controls the top row, processor 3 the bottom.

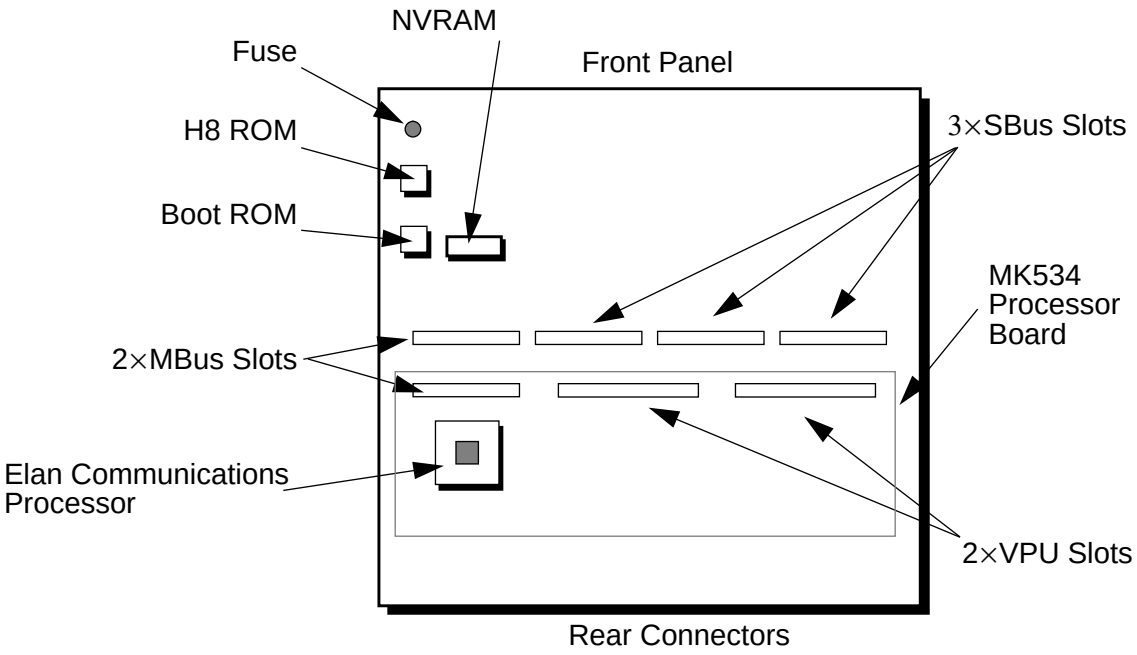
MK403 Vector Processor Board

Field Upgradeable Components

The MK403 has the following field upgradeable components (see Figure 4-7):

- Superscalar SPARC processor module fitted to MBus slot.
- Three SBus slots.
- Two VPU slots.
- Boot ROM.
- H8 ROM.
- Non-volatile RAM.
- Fuses.

Figure 4-7 MK403 Components



MBus/VPU Processor Modules

Early VPU boards are fitted with standard MBus SPARC modules and two VPU modules — these plug into the MBus/VPU slots on the MK403 mother board.

Later shipments include a single cache coherent processor board that includes both the dual VPU processors on a single plug-in board; this board plugs into the MBus and 2 VPU sockets on the MK403 motherboard. A standard Superscalar SPARC module plugs into the second MBus slot.

SBus Modules

Three SBus slots are provided and these may be fitted with standard SBus modules. As with the processor modules SBus modules are simply plugged into the SBus connectors and secured with 2 screws.

When using SBus cards that have external connections, for example a graphics card, remove the appropriate panel from the front panel of the MK403 — the panel is held in place by two small screws. When using SBus SCSI cards the external connections are made via the SCSI connectors on the MK403 front panel.

SBus devices are numbered from 0 to 2, device 0 being next to the processor slots.

Boot ROM

The boot ROM may be upgraded. It is held in a socket and is easily replaced using the appropriate tool.

H8 ROM

The H8 ROM may be upgraded from time to time. It is held in a socket and is easily replaced using the appropriate tool.

NVRAM

The non-volatile RAM holds system configuration information, environment variables, and the clock. It is held in a DIL socket and is easily replaced. Note however that the information within the NVRAM can only be restored by Meiko's engineers.

The NVRAM contains lithium batteries which have special handling and disposal requirements — your attention is drawn to the precautions listed in the *General Precautions* on page ii.

Fuses

One fuse is used to protect the external keyboard/mouse. This fuse is 250 mA quick blow, Meiko part number 22–fu400–02e250.

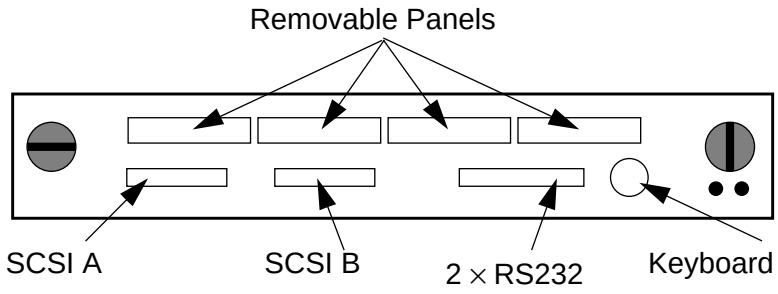
External Connections

External connections are provided for a keyboard/mouse (8 pin circular socket), RS232 interfaces (2 channels provided by one 25-way D-type connector), and two independent SCSI buses (each via a 50-way connector). Note that the MK403 does not include SCSI controllers — the SCSI connectors must be connected to SCSI SBus cards.

Front Panel Connections

Removable panels provide access to connectors on the optional SBus boards.

Figure 4-8 MK403 Front Panel Connections



RS232 Connections

The two RS232 channels are connected as follows. Signal ground is pin 7, chassis ground in pin 1.

Table 4-3 RS232 Channel A Pinout.

Signal	Input/Output	Pin number
TXD	Out	2
RXD	In	3
RTS	Out	4
CTS	In	5
CSR	In	6
DCD	In	8
DB	In	15
DD	In	17
DA	On	24
DTR	On	20

Table 4-4 RS232 Channel B Pinout.

Signal	Input/Output	Pin number
TXD	Out	14
RXD	In	16
RTS	Out	19
CTS	In	13
DCDB	In	12

External Indicators

Two LEDs (one green, one amber) are included on the front panel. The green LED is the heart beat from the board's CAN controller. The amber light illuminates each time the CAN controller transmits on the CAN bus. Both should flash steadily. These indicators are also displayed on the module's LED display.

The green LED flashes at a slow steady rate (once per second) when operating normally. A quicker flash rate (2×normal) indicates that the SPARC processor is not responding; a very quick flash rate (3×normal) indicates that the H8 processor on the module controller is not responding.

Each processor board within a processor module controls a 4×4 matrix of red LEDs on the module's front panel. The MK403 displays a random pattern on these when running the Boot ROM. When Solaris has been booted a circulating pattern is displayed. The pattern can be changed by user programs.

Installing Backplane Boards *5*

Warning – The procedures in this chapter must only be undertaken by trained engineers.

Warning – You must disconnect the power supply befor e installing boards into the pr ocessor module.

A number of boards can be connected to the rear of the processor module. Along the top edge of the module backplane are connectors for up to 8 switch cards. Below these are another 5 slots; 4 are used for the module SCSI cards, and one (the larger one) for the module control card.

Blanking plates must be fitted over unused backplane slots to ensure correct cooling and compliance with RFI regulations.

Installation

The installation procedure for all backplane cards is similar. Note however that SCSI cards are normally installed during the module's manufacture and are not readily removed.

Remove the blanking plate from the rear of the module by removing the screws at each end. In some case, particularly when removing boards, it is useful to remove the covers from the neighbouring card slots.

Insert the card into the card guides ensuring that the component side of the card faces the right. Firmly push the card into the position ensuring that the card mates correctly with the backplane connection.

After installing a module controller card you must reinstall the blanking plate.

MK511/2 Module Switch Cards

Up to 8 module switch cards can be connected to the module backplane to provide a first layer of switching. Even numbered backplane connectors carry plane 0 of the switch network, the odd numbered connectors carry plane 1. A fully connected module containing single SPARC boards requires just two cards in slots 0 and 1, whereas a module containing quad-SPARC boards requires 8 switch cards.

The MK511 contains a single Elite that provides the first level of network switching. The MK512 is a buffer card that has no switching and is used solely when directly connecting two modules — in this case one module contains MK511 switch cards, the second contains MK512 buffer cards.

Neither card has special installation requirements, and neither card includes field serviceable components.

MK515 Module Control Card

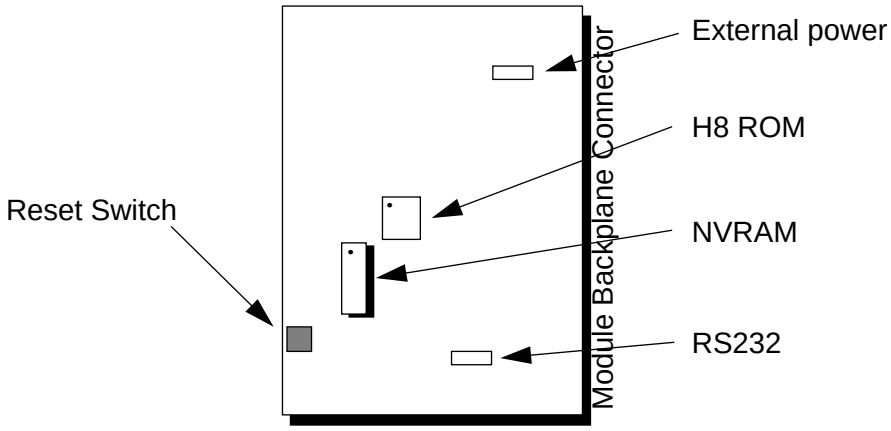
Monitors the status and configuration of the module, propagating error conditions over the CAN bus (for interception by the System Software) and initiating module shutdown under critical conditions (such as major component failure).

Field Upgradeable Components

The MK515 has the following field upgradeable components:

- H8 ROM.
- Non-volatile RAM (NVRAM).

Figure 5-1 MK515 Components



Meiko may upgrade the H8 ROM from time to time.

The non-volatile RAM (NVRAM) holds system configuration information, such as the number of module switches. The NVRAM contains Lithium batteries which have special handling and disposal requirements — your attention is drawn to the *General Precautions* on page ii.

External Indicators

Two LEDs (one green, one amber) are visible from the rear of the module. The green LED is the module controller's CAN heart beat, the amber light illuminates each time the controller writes to the CAN bus. These indicators are also displayed in the top right hand corner of the module's LED display.

Reset Switch

The reset switch is not accessible when the board is mounted in the module. It is used by Meiko engineers when bench testing the board.

External Connections

Two 3 pin connectors are provided for Meiko engineering use. They are used for bench testing of the board, and allow power and diagnostic RS232 connections to be made.

MK516 SCSI Cards

Transfers up to 5 SCSI buses from the processor module backplane to external connectors. Five ribbon cable connectors transfer the buses to disk devices mounted within the module, and one Beta Phase connector connects with externally mounted devices.

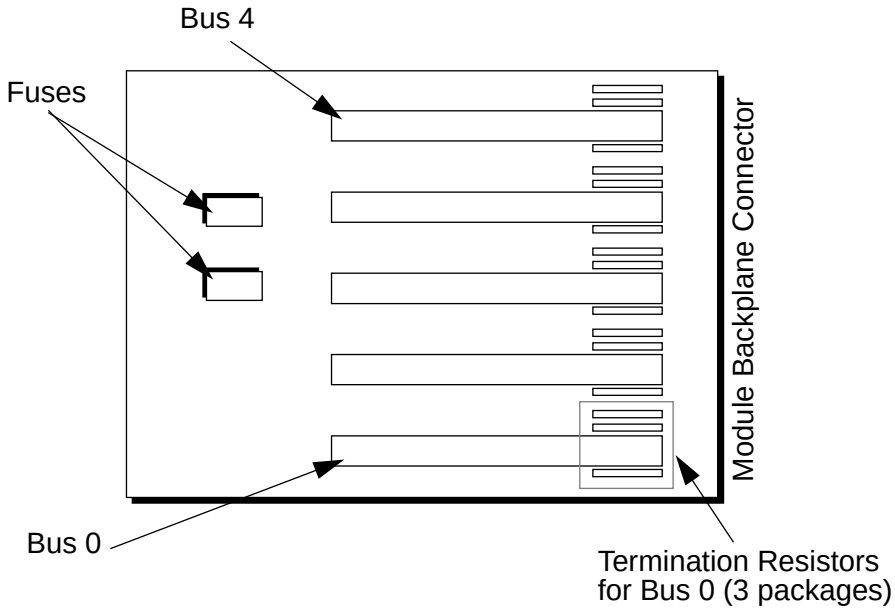
Field Upgradeable Components

The MK516 has the following field upgradeable components:

- Fuses
- Termination resistors

The fuses should only be fitted if on-board SCSI bus termination is used (rarely). Fuses are 125 V, 2 A micro 273 series. The termination resistors must be soldered in place — there are 3 SIL packages for each bus, each package is an 8 pin, 6 terminal 220/330 R device.

Figure 5-2 MK516 Components



Installing SCSI Devices 6

Warning – The procedures in this chapter must only be undertaken by trained engineers.

The MK401 processor board is equipped with two independent SCSI-2 controllers and includes 3 SBus slots that may be used to add additional SCSI controllers. The MK403 Vector Processing board has no on-board SCSI controllers, but does have 3 SBus slots that can be used to add SCSI devices.

The CS-2 Processor Module includes space for up to 4 SCSI disk devices — these are connected to the SCSI controllers on the processor boards.

Additional SCSI disk devices or SCSI devices requiring frequent access (CD, tape, etc.) may be mounted externally to the processor module.

Module Disk Devices

The SCSI bus connection between the processor boards and the disk devices is via the Module SCSI Cards installed at the rear of the module. The Module SCSI cards take up to five[1] independent SCSI buses from each processor board and transfer these to ribbon cable connections and a Beta Phase connector.

1. Only 2 are currently used; the remainder are for future expansion.

Disk devices mounted within the processor module are wired directly to the ribbon cable connectors. This wiring is added during manufacture of the module; two connection options are available:

- One disk per processor board — each of the four disks is connected to SCSI bus 0 on the processor board.
- A pair of disks connected to processor boards 0 and 1, each using a separate SCSI bus.

Installing the Disk Devices

The four disk devices within the processor module are each mounted in a removable disk carrier. The disk carrier is connected to the module backplane by a 50-way connector that carries power, indicator signals, and the SCSI bus.

Warning – You must disconnect the module fr om the power supply befor e installing a disk device.

Fixing the Disk Device into the Carrier

To install a 3.5” SCSI disk into a disk carrier:

- Remove the base plate from the carrier by removing the 6 screws.
- Connect the disk to the power supply and SCSI bus connectors.
- At the front of the disk connect the LED activity output to the disk carrier.
- Mount the disk drive into the carrier using four screws that are inserted from two sides of the carrier. Note that the screw must be long enough to accommodate the thickness of the carrier wall.

Fixing the Carrier into the Processor Module

Insert the carrier into the processor module so that the indicator lights on the front of the carrier are at the top. Push into position and secure with the two captive screws.

External Indicators

Three LEDs show from the front of the disk carrier. The green LED is the power light, the red LED is the activity light, and the yellow is the fail indicator. The activity signal is also displayed on the module's LED panel using the small circular red LED.

External SCSI Devices

External SCSI devices may be connected in two ways:

Front Panel Connections:
Some processor board types have SCSI bus connections on their front panels. When using these the cable should be routed behind the module's front panel and into the cable guide below the module.

Module SCSI Card Connections:
The module SCSI cards (MK516) fitted to the rear of the module has an external Beta Phase connection. This may be used to connect the processor boards to a Peripheral Module.