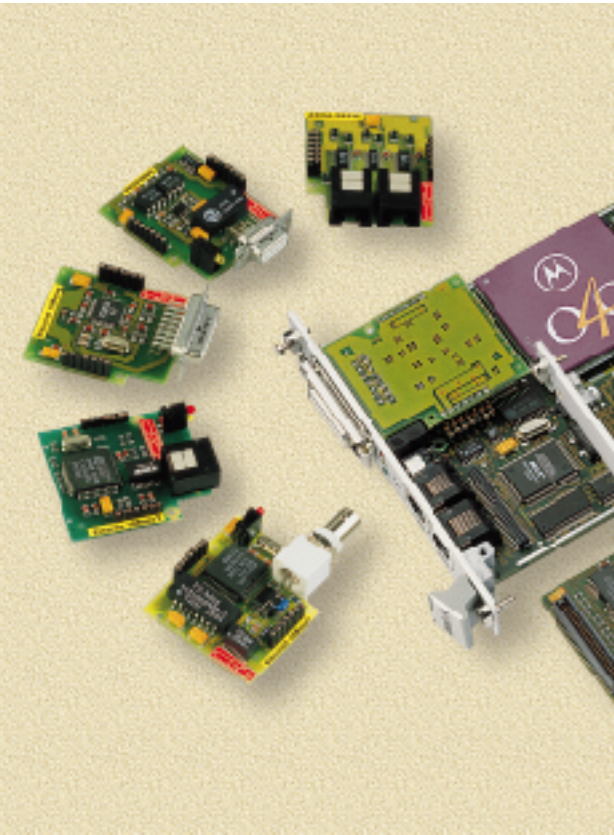




HIGH-  
PERFORMANCE  
CPUs  
SINGLE-BOARD  
COMPUTERS

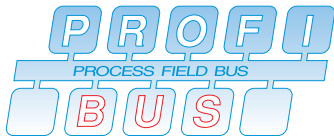
# VM42/62

## Scalable VMEbus Single-Board Computer



### Extraordinary Computation & Communications Performance

- ▶ High-performance Motorola MC68040/MC68060 CPU
- ▶ QUad-channel Integrated Communications Controller
- ▶ Up to six serial interfaces
- ▶ Serial interfaces accessible by front-panel and CXC
- ▶ Flexible front-panel options
- ▶ Up to 64 MByte DRAM & 4 MByte FLASH
- ▶ CXC interface
- ▶ Extremely low power consumption
- ▶ Extended operating temperature range capability
- ▶ Extensive software support
- ▶ CE conformance



A VMEbus single-board computer featuring an unprecedented level of flexibility and incorporating the MC68xx040/060 and 32-bit MC68EN360 high-performance QUad-channel Integrated Communications Controller (QUICC).

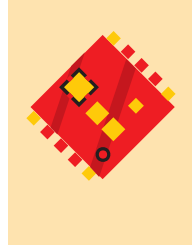


Reg. No. 0548 - 02



# Ordering Information

## VM42/62



| Product      | Description   | Order No. |
|--------------|---|-----------|
| VM62-BASE    | VMEbus single-board computer comprising MC68060 @ 66MHz, MC68EN360 @ 33MHz, 256 kByte dual-ported SRAM (with Goldcap for back-up), up to 6 serial interfaces (two available on the front panel as RS232 (RJ45) and an additional four with Ethernet support divided between the CXC and SI-interfaces), CXC interface, PEPbug | 16624     |
| VM62-BASE    | Same as order no. 16624 but with 1 MByte dual-ported SRAM   | 16625     |
| VM62-BASE    | Same as order no. 16624 but with 50 MHz MC68060 and 25 MHz MC68EN360  | 12349     |
| VM62-BASE    | Same as order no. 12349 but with 1 MByte dual-ported SRAM   | 12350     |
| VM42-BASE    | VMEbus single-board computer comprising MC68040 @ 33MHz, MC68EN360 @ 33MHz, 256 kByte dual-ported SRAM (with Goldcap for back-up), up to 6 serial interfaces (two available on the front panel as RS232 (RJ45) and an additional four with Ethernet support divided between the CXC and SI-interfaces), CXC interface, PEPbug | 12344     |
| VM42-BASE    | Same as order no. 12344 but with 1 MByte dual-ported SRAM   | 12345     |
| VM42-BASE    | Same as order no. 12344 but with MC68040V @ 33MHz (3.3V technology)   | 12346     |
| VM42-BASE    | Same as order no. 12346 but with 1 MByte dual-ported SRAM   | 12347     |
| DM600        | Memory Piggyback with 4 MByte DRAM and 1 MByte FLASH memory for VM42/62   | 11852     |
| DM600        | Memory Piggyback with 4 MByte DRAM and 4 MByte FLASH memory for VM42/62   | 11853     |
| DM601        | Memory Piggyback with 16 MByte DRAM and 1 MByte FLASH memory for VM42/62  | 11854     |
| DM601        | Memory Piggyback with 16 MByte DRAM and 4 MByte FLASH memory for VM42/62  | 11855     |
| DM602        | Memory Piggyback with 1 MByte DRAM and 1 MByte FLASH memory for the VM42/62   | 12765     |
| DM603        | Memory Piggyback with 32 MByte DRAM and 1 MByte FLASH memory for the VM42/62  | 16329     |
| DM603        | Memory Piggyback with 32 MByte DRAM and 4 MByte FLASH memory for the VM42/62  | 16330     |
| DM604        | Memory Piggyback with 8 MByte DRAM and 1 MByte FLASH memory for the VM42/62   | 15911     |
| DM604        | Memory Piggyback with 8 MByte DRAM and 4 MByte FLASH memory for the VM42/62   | 15912     |
| DM605        | Memory Piggyback with 64 MByte DRAM and 1 MByte FLASH memory for the VM42/62  | 16369     |
| DM605        | Memory Piggyback with 64 MByte DRAM and 4 MByte FLASH memory for the VM42/62  | 16368     |
| SI-10B2      | 10Base2 Thin Ethernet interface piggyback with RG58 coax. connector   | 9925      |
| SI-10B5      | 10Base5 Ethernet (AUD) interface piggyback with 15-pin D-Sub connector  | 9924      |
| SI-10BT      | 10BaseT Twisted pair Ethernet interface piggyback with RJ45 connector   | 9926      |
| SI-DUMMY     | Front panel without extra interface(s)  | 12351     |
| SI-PB232     | Serial interface piggyback for 2x RS232 connections (Modem interface) with 2x RJ45 connectors   | 11850     |
| SI-PB232-ISO | Serial interface piggyback for 1x optoisolated RS232 connection with 1x RJ45 connector  | 11851     |
| SI-PB485-ISO | Optoisolated RS485 interface piggyback with 9-Pin D-Sub connector   | 9927      |
| CABLE-VM42   | 3 metre RS232 Serial Interface cable with RJ12 to 9-Pin D-Sub (female)  | 12383     |

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**Important : The VM42/62 must be ordered with a memory module (DM60x) and a front-panel with integrated SI - piggyback module.**

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# CXC Overview

## VM42/62

**The CXC extends the already abundant industrial I/O capability of the CPU and also allows custom design according to the guidelines laid-down in the CXC specification.**

PEP has named these mezzanine plug-in units 'Controller eXtension Modules' (CXMs). These 96-pin CXMs are designed to operate with CXC-based host modules which includes the VM62 and VM42.

Designed primarily to operate in harsh industrial environments, this versatile modularity provides not only a cost-effective engineering solution but also allows customers a near exhaustive selection of system configurations through a portfolio of over 30 CXMs providing analog, digital and other I/O extensions such as SCSI and fieldbus connection (High-speed PROFIBUS, CAN, LON and Interbus-S.) Hence, a feature of the VM42/62 is that the 'raw' serial signals from the 'QUICC' SCC2, SCC3 and SCC4 channels, being internally wired to the CXC interface, may be used by dedicated signal translation modules.

Network interfacing is provided if required by ordering the relevant front-panel which comes complete with the appropriate SI-piggyback and serial port connectors. Naturally, to cater for those customers who merely wish to take advantage of the computing power and CXC capability that the VM42/62 offers, blank front-panels without the networking options have been devised.

# Real-Time Software Support

## VM42/62

**With several real-time operating systems available, each targeting specific markets, PEP is able to support the most popular brands suitable for the majority of applications due to the open nature of the QUICC and its implementation on the VM42/62.**

### VxWorks

Wind River's VxWorks distributed real-time operating system includes integrated networking facilities and a complete software development environment for Windows and UNIX hosts such as high-end PC and SUN Workstations.

Major features of VxWorks include a fast, multitasking kernel with preemptive scheduling and fast interrupt response, extensive intertask communications and synchronisation facilities, efficient UNIX-compatible memory management, multi-processor facilities, a shell for user interface, symbolic and source level debugging capabilities, performance monitoring and an I/O file system.

### OS-9

OS-9 is a flexible, modular real-time operating system for 680x0-based applications featuring a scalable architecture built around a powerful standalone microkernel, with ROM-able extensions that can be dynamically loaded and linked to the system while it is up and running. OS-9 is available in different configurations, designed to provide the compact size and I/O support required. *Embedded OS-9* is designed for FLASH or PROM-based applications; *Disk-based OS-9* adds support for floppy, RAM disk, SCSI hard disk and tape units; *Extended OS-9* adds TCP/

IP networking and NFS support. The *Ultra* ANSI compiler represents advanced compiler technology for 680x0 microprocessors and is a complete implementation in accordance with the ANSI X3.159-1989 and POSIX standards. *FasTrak* provides graphical tools on UNIX-based workstations or Windows-based PCs.

### pSOSystem

Integrated Systems' pSOSystem software provides a full featured runtime and development environment for embedded systems. The complete cross development environment enables developers to use UNIX workstations or PC compatible host systems running C and C++ language compilers, source language and target-level debuggers, a pSOS\* application simulator and visual debugging and profiling tools.

### VRTX32

Spectra represents the first application of a client-server architecture to real-time and embedded software development. Its advanced open software backplane offers unparalleled productivity, convenience and flexibility in host-target connection.

### LynxOS

LynxOS is compatible with UNIX V.3, with complete IEEE 1003.3 POSIX compliance and full support for X.11 (X-Windows), Motif, NFS and TCP/IP. LynxOS incorporates a fully preemptive scheduler to ensure that any application tasks can be rescheduled if a higher priority task becomes ready to run.

# Product Overview

## VM42/62



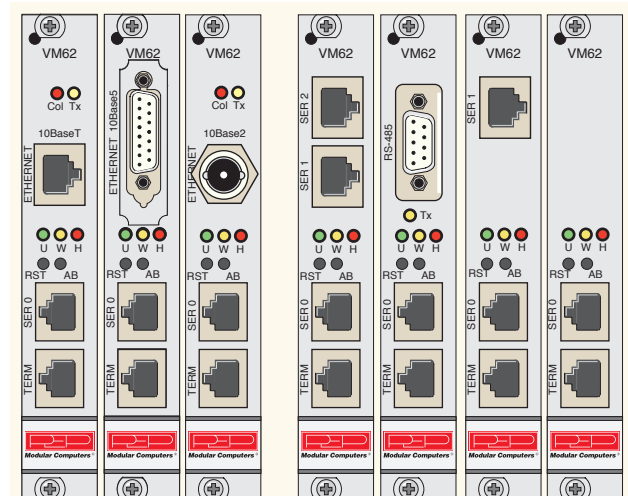
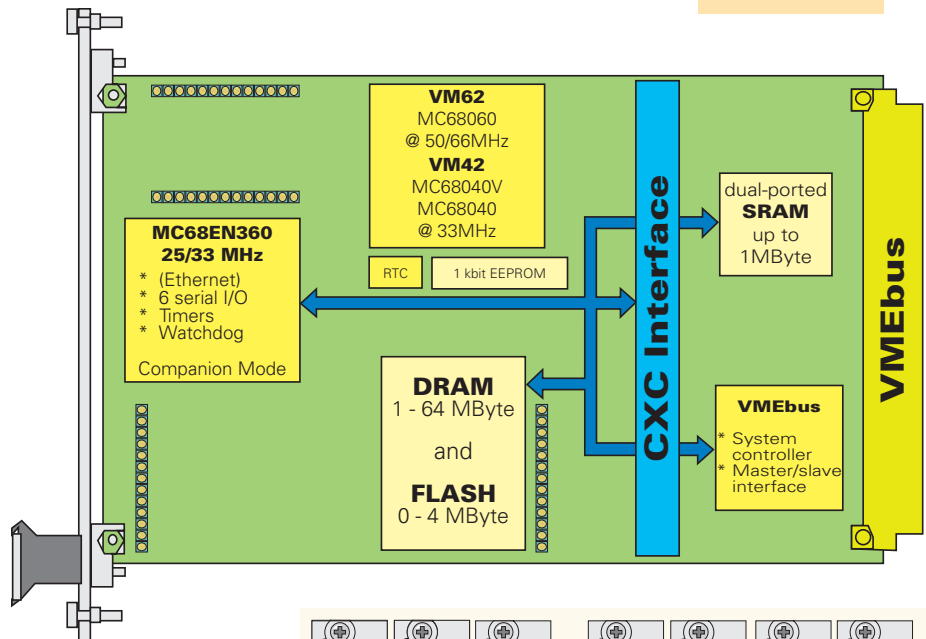
PEP's VM42/62 combines high computational performance with flexible I/O through its VMEbus and CXC interfaces and excellent communication ability afforded by the Motorola 'QUICC' communication controller.

A combination of high performance CPUs (Motorola MC68xx040/MC68xx060) and the Quad Integrated Communications Controller chip, the Motorola MC68EN360, 'QUICC' not only enable computational performances from approximately 35 MIPs to over 100 MIPs, but dispense with the usual restrictions associated with communications over serial interfaces.

Communication tasks are dealt with by the 'QUICC' Communications Processor Module (CPM), freeing the CPU from such time-consuming chores. In addition, the 'QUICC', used together with PEP's CXC interface is ideally suited for communication applications with up to 6 serial interfaces including LAN, WAN or fieldbuses (PROFIBUS, CAN, LON.)

The use of standard interfaces (VME and CXC) allows combination and customization using currently available off-the-shelf products.

The PEP VM42/62 comprises a base module (with a selection of CPUs and SRAM blocks), memory piggyback and SI-interface module. The complete package provides support for several popular real-time operating systems including: VxWorks, OS-9, VRTX, pSOS+, LynxOS and others on request.



## I/O Extension

The illustrated front-panels show the possible connections of the SCC1 communications channel for Ethernet, RS232, RS485 or blank. These have been developed to adapt the usable multi-protocol serial channels of the MC68EN360 to the physical interfaces:

- ▶ Ethernet 10Base5
- ▶ Ethernet 10Base2
- ▶ Ethernet 10BaseT
- ▶ RS485 Optoisolated
- ▶ 2xRS232 Modem compatible
- ▶ 1xRS232 Optoisolated

An additional CXC module (CXM-SIO3) routes 2 or 3 of the available but unused serial interfaces to its front-panel allowing different physical connections (RS232, RS485, RS422).

This versatile modularity provides not only a cost-effective engineering solution but also allows customers a near exhaustive selection of system configurations through VME and CXC modules which provide analog, digital and other I/O extensions such as SCSI and fieldbus connections (PROFIBUS, CAN, LON and others on request).

# Specifications

## VM42/62

### CPU

MC68060 @ 66 MHz ~ 100 MIPs (3.3V technology)  
MC68060 @ 50 MHz ~ 80 MIPs (3.3V technology)  
MC68040 @ 40 MHz ~ 50 MIPs  
MC68040 @ 33 MHz ~ 35 MIPs (3.3V technology)

### Communications Controller

MC68EN360 @ 25/33MHz

### Memory

1/4/8/16/32/64 MByte (32-bit access) DRAM<sup>†</sup>  
1/4 MByte (32-bit access) FLASH<sup>†</sup>  
256 kByte or 1 MByte dual-ported SRAM with data retention via Goldcap  
2 kbit serial EEPROM for applications

### Real-Time Clock

V3021 with year, month, week, day, hour, min., sec.

### Tick

Built-in on MC68EN360 providing a programmable periodic interrupt

### Timer

4x16, 2x32-bit resolution built-in timers on the MC68EN360

### Time-Out

On-board BERR\* time-out fixed at 8µs with software enable/disable

### Watchdog

Enabled by software with front-panel LED; generates RESET

### Interrupts

VMEbus IRQ1\* - IRQ7\* interrupts, enable/disable;  
SYSFAIL\* and ACFAIL\* handlers

### System Controller

Single-level (BR3\*), FAIR, RWD (Release When Done); Automatic First-Slot Detection  
VME and DP SRAM Read-Modify-Write cycle support

### Address Modifier

A24 Access Code : HEX 39/3A/3D/3E  
A16 Access Code : HEX 29/2D  
User Defined : HEX 10-17/18-1F

### Slave Functions

Dual-ported SRAM for VME;  
up to 16 software selectable VME base addresses  
VME Mailbox IRQ

### CXC Interface

DIN 41612 (C), 96-pin, 3 NMSI ports, DMA

### VMEbus Interface

DIN 41612 (C), 96-pin P1 connector  
A24/A16:D16/D8 master and slave

### Networking

All Ethernet interfaces conform to IEEE 802-3 and are available on SI-xx piggybacks

### Serial-Interfaces

From MC68EN360 (ports SMC1 and SMC2) with standard RS232 configuration

### Power Consumption #

Typ. 5W for MC68060 and MC68040V @ 50/33 MHz  
Typ. 7W for MC68040 @ 33 MHz

### Temperature

0°C to +70°C (standard)  
-40°C to +85°C (extended)  
-55°C to +85°C (storage)

### Humidity

0 to 95% non-condensing

### Weight / Dimensions

270g (with 10BaseT and memory piggybacks)  
100mm x 160mm 3U format  
Single-slot (4HP)

### Front-Panel Functions

3 LEDs: red: Halt  
yellow: Watchdog enabled  
green: General purpose user

2 Switches: AB: Abort function (NMI)  
RST: Reset (CPU & VMEbus)

Other LEDs showing Ethernet or RS485 activity are present depending on the version ordered

<sup>†</sup> Available on DM60x Memory Piggyback

# (with 4 MByte DRAM, 256 kByte SRAM and 1 MByte FLASH memory)

# Features

## VM42/62

### CPU Options

The configuration table illustrates the capabilities of the available CPUs. The 68060 processors operating at 66 MHz deliver up to 100 MIPs while the 68040 processors operating at 33 MHz deliver up to 35 MIPs.

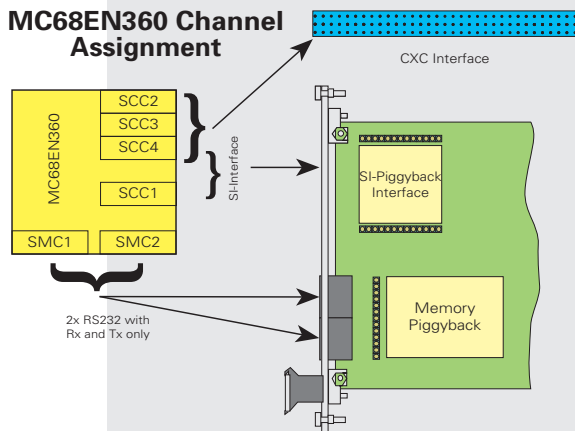
| Processor | Product | CPU | MMU | FPU | Supply |
|-----------|---------|-----|-----|-----|--------|
| MC68060   | VM62    | ✓   | ✓   | ✓   | 3.3V   |
| MC68040V  | VM42    | ✓   | ✓   |     | 3.3V   |
| MC68040   | VM42    | ✓   | ✓   | ✓   | 5.0V   |

### 68EN360

25/33 MHz - the 'QUICC' chip used in "companion mode" is tightly coupled to the CPU. Working as an I/O and system controller, it provides all the necessary interfaces, timers and clocks etc. in addition to the DRAM memory controller.

### Serial Channels

Six are provided by the QUICC - Two SMC channels are ported to the front panel and the remaining four SCC channels may be configured for the CXC interface as shown.



Each VM42/62 comes complete with 2 RS232 serial interfaces provided by the SMC1 and SMC2 channels of the QUICC controller ported to the lower half of the front panel. The SCC1 channel of the QUICC provides the interface to one of the available SI-x piggybacks. All other channels (SCC2, SCC3 and SCC4) of the QUICC are ported to the CXC interface except for the SI-PB232 piggyback which has additional control provided by the SCC4 channel.

### CXC Interface

The 96-pin interface allows other I/O possibilities to be realized by utilising PEP's plug-in cards with digital, analog, serial and SCSI interfaces. Fieldbus controllers complete the interface range.

### Ethernet Interface

Three different SI piggybacks equipped with all the associated control logic are available providing 10Base2, 10Base5 or 10BaseT interfaces.

### RS232 Serial Interfaces

2 SI-piggybacks provide MODEM compatible RS232 communication.

### RS485 Fieldbus Interfaces

This SI-piggyback provides a fully optoisolated RS485 interface piggyback with a 9-pin D-Sub connector.

### DMA Channels

2 independent channels are provided by the QUICC chip for use by applications requiring DMA transfer between VMEbus, CXC-modules, DRAM, FLASH memory and dual-ported SRAM.

### DRAM/FLASH

This memory, complete with a 32 bit-wide access bus is placed on a piggyback with addressing capability for up to two memory banks of 64 MByte each. The on-board programmable FLASH memory allows the user to produce low-cost upgrades by over-writing existing stored data and may also be configured as a boot device.

### SRAM

This is a dual-ported battery-backed (Gold-cap) static memory area with a 16 bit-wide access bus. Users of the VMEbus and CPU both have access to this memory.

### EEPROM

A 2 kbit EEPROM is provided on-board; 1 kbit has been pre-programmed with PEP production data leaving the remaining available space for user application code.