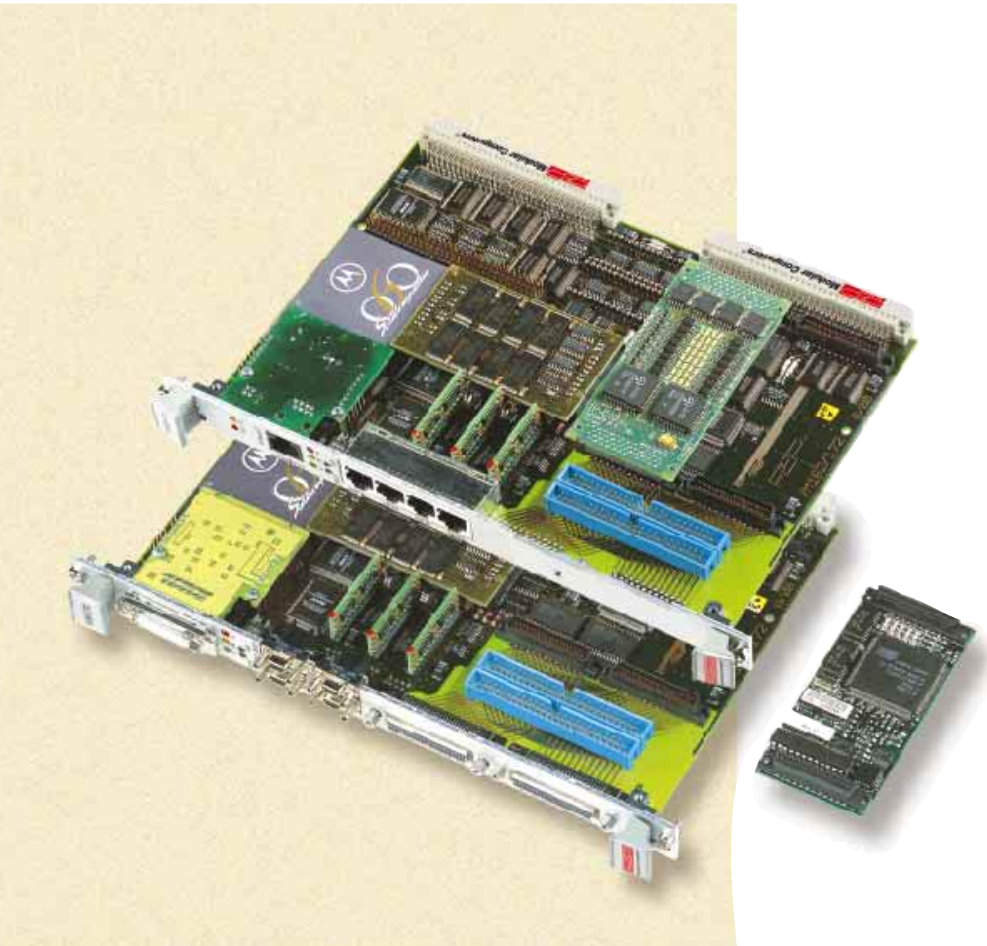
HIGH-PERFORMANCE CPUs
SINGLE-BOARD COMPUTERS

VM162/172

VMEbus Single-Board Computer with IndustryPack™ Support



Computation and Communications Performance

- High-performance Motorola MC68040/MC68060 CPU
- QUad-channel Integrated Communications Controller (QUICC)
- Up to five serial interfaces
- Four serial interfaces on front-panel
- Flexible front-panel options for network and serial I/O
- Up to 64 MByte DRAM & 4MByte FLASH
- Two IndustryPack (IP) interfaces
- CXC interface
- Serial interfaces accessible by front-panel and CXC
- Low power consumption
- Advanced mechanics with shielded connector for each IP
- CE conformance

PROFI PROCESS FIELD BUS

A scalable VMEbus single-board computer featuring 2 independent IndustryPack (IP) Interfaces and incorporating the MC68040/060 and MC68EN360 QUad-channel Integrated Communications Controller.

CERTIFIED DIN ISO 9001 QUALITY SYSTEM

Modular Computers®

Ordering Information

VM162/172

Product	Description	Order No.
VM172-BASE	VMEbus single-board computer comprising MC68060 @ 66MHz, MC68EN360 @ 33 MHz, 256 kByte dual-ported SRAM (with Goldcap for back-up), five serial interfaces (four available on the front panel as RS232 (RJ45) and one available from the choice of SI6-networking piggybacks), CXC interface, two IP interfaces and PEPbug	**16626**
VM172-BASE	Same as order no. 16626 but with 1 MByte dual-ported SRAM	**16627**
VM172-BASE	Same as order no. 16626 but comprising MC68060 @ 50MHz, MC68EN360 @ 25 MHz	**16134**
VM172-BASE	Same as order no. 16134 but with 1 MByte dual-ported SRAM	**16194**
VM162-BASE	VMEbus single-board computer comprising MC68040 @ 33MHz, MC68EN360 @ 33 MHz, 256 kByte dual-ported SRAM (with Goldcap for back-up), five serial interfaces (four available on the front panel as RS232 (RJ45) and one available from the choice of SI6-networking piggybacks), CXC interface, two IP interfaces and PEPbug	**16026**
VM162-BASE	Same as order no. 16026 but with 1 MByte dual-ported SRAM	**16193**
DM600	Memory Piggyback with 4 MByte DRAM and 1 MByte FLASH memory for VM162/172	**11852**
DM600	Memory Piggyback with 4 MByte DRAM and 4 MByte FLASH memory for VM162/172	**11853**
DM601	Memory Piggyback with 16 MByte DRAM and 1 MByte FLASH memory for VM162/172	**11854**
DM601	Memory Piggyback with 16 MByte DRAM and 4 MByte FLASH memory for VM162/172	**11855**
DM602	Memory Piggyback with 1 MByte DRAM and 1 MByte FLASH memory for the VM162/172	**12765**
DM603	Memory Piggyback with 32 MByte DRAM and 1 MByte FLASH memory for the VM162/172	**16329**
DM603	Memory Piggyback with 32 MByte DRAM and 4 MByte FLASH memory for the VM162/172	**16330**
DM604	Memory Piggyback with 8 MByte DRAM and 1 MByte FLASH memory for the VM162/172	**15911**
DM604	Memory Piggyback with 8 MByte DRAM and 4 MByte FLASH memory for the VM162/172	**15912**
DM605	Memory Piggyback with 64 MByte DRAM and 1 MByte FLASH memory for the VM162/172	**16369**
DM605	Memory Piggyback with 64 MByte DRAM and 4 MByte FLASH memory for the VM162/172	**16368**
SI6-10B2-IP	10Base2 Thin Ethernet interface piggyback with RG58 coax. connector	**16136**
SI6-10B5-IP	10Base5 Ethernet (AUI) interface piggyback with 15-pin D-Sub connector	**16137**
SI6-10BT-IP	10BaseT Twisted pair Ethernet interface piggyback with RJ45 connector	**16147**
SI6-DUMMY-IP	Front panel without networking interface(s)	**16028**
SI6-PB485-IP	Optoisolated RS485 interface piggyback with 9-Pin D-Sub connector	**16192**
SC-232I	Optoisolated RS232 interface piggyback with TxD, RxD, DTR and CTS signals and Baud rate up to 38.4 kBaud	**12919**
SC-485I	Optoisolated RS485 interface piggyback for half-duplex communication at a Baud rate up to 38.4 kBaud	**13468**
CABLE-RS232	3 metre RS232 Serial Interface cable with RJ45 to 25-Pin D-Sub (male) for terminal connection	**15191**

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Important : The VM162 and VM172 must be ordered with a memory module (DM60x) and a front-panel with integrated SI6-piggyback module.

For different memory configurations or products requiring the 2 x 50-pin D-Sub front-panel connectors instead of the flat-band cable option, please contact the nearest PEP sales office for further information.

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CXC Overview
VM162/172

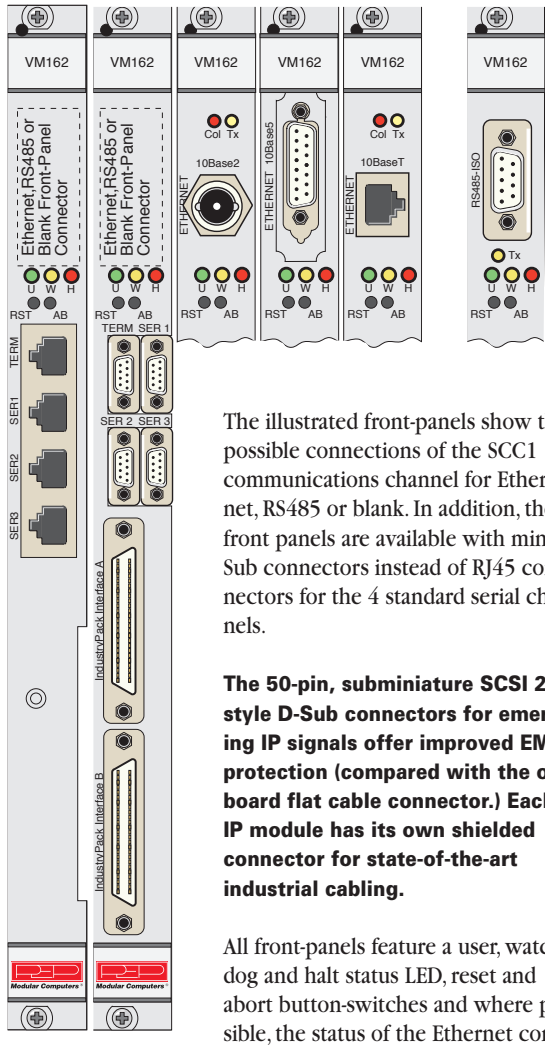
Although the VM162/172 adds a new dimension to computer architecture with its direct IndustryPack interface, it is also a continuation of the successful range of PEP's CPU boards with communication processors and CXC capability. The CXC extends the already abundant industrial I/O capability of the CPU and also allows custom design according to the guidelines laid-down in the CXC specification.

PEP has named these mezzanine plug-in modules Controller eXtension Modules (CXM).These 96-pin CXMs are designed to operate with CXC based host modules which includes the VM162/172.

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 Bitbus.) Hence, a feature of the VM162/172 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 SI6-piggyback, serial port connectors and the standard 50-pin on-board IP connector. Naturally, to cater for those customers who merely wish to take advantage of the computing power and CXC capability that the VM162 offers, blank front-panels without the networking options have been devised.

Front-Panel & I/O Connection
VM162/172



The illustrated front-panels show the possible connections of the SCC1 communications channel for Ethernet, RS485 or blank. In addition, the front panels are available with mini-D-Sub connectors instead of RJ45 connectors for the 4 standard serial channels.

The 50-pin, subminiature SCSI 2 style D-Sub connectors for emerging IP signals offer improved EMI protection (compared with the on-board flat cable connector.) Each IP module has its own shielded connector for state-of-the-art industrial cabling.

All front-panels feature a user, watchdog and halt status LED, reset and abort button-switches and where possible, the status of the Ethernet communication.

SC and SI6 Piggybacks adapt the multi-protocol serial channels of the 'QUICC' to the physical interfaces provided on the VM162/172's front-panel and CXC:

SCC1 channel supports:

SI6-10B5	Ethernet 10Base5 (AUI)
SI6-10B2	Ethernet 10Base2 (Thin)
SI6-10BT	Ethernet 10BaseT (Twisted Pair)
SI6-PB485-ISO	Optoisolated RS485

SCC2 to SCC4 channels support:

SC-232I	Optoisolated RS232 Modem module
SC-485I	Optoisolated RS485 piggyback

Product Overview

VM162/172

HIGH-PERFORMANCE CPUs SINGLE-BOARD COMPUTERS

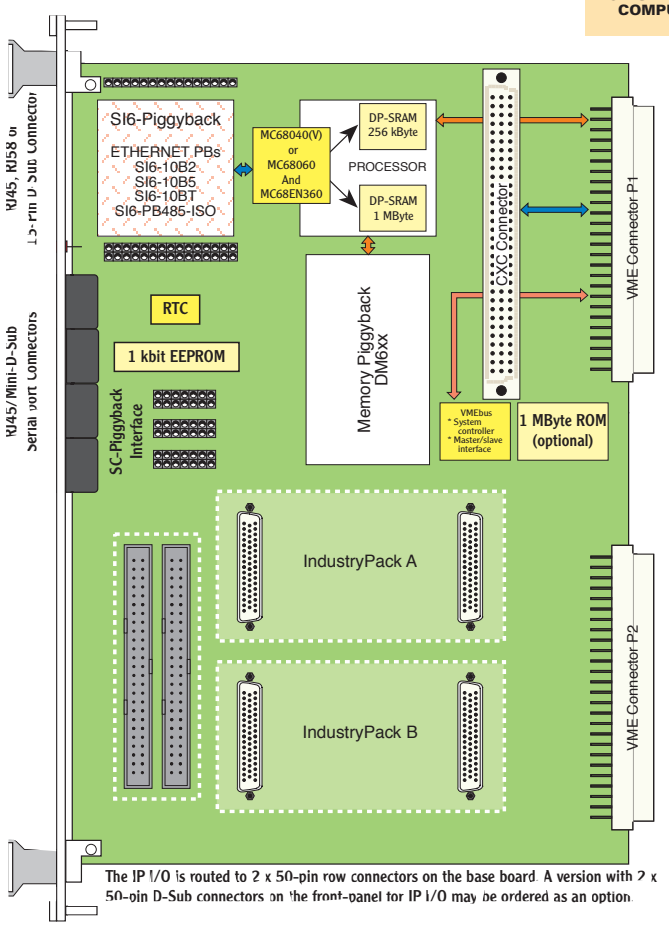
PEP's VM162/172 combines high computational performance and flexible I/O requirements through its twin IndustryPack and single CXC interface with excellent communication ability afforded by the Motorola 'QUICC' controller.

A combination of high-performance CPUs (Motorola MC68040/MC68060) 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 serial communication.

Application-specific tailoring is assured through versatile interface options which, together with PEP's CXC interface, makes this 6U VMEbus CPU ideally suited for communication and automation applications. With up to 6 serial interfaces resident within the same real-estate and support for standard LAN or WAN interfaces provided, communicational versatility is guaranteed.

Two on-board EPROM sockets are designed to accommodated ROMed applications and/or the PEPbug debug monitor. The VM162/172 is supplied with these sockets empty and the PEPbug programmed into the FLASH memory residing on one of the DM6xx memory piggybacks.

The PEP VM162/172 Board Support Package is available for several popular real-time operating systems: OS-9, VxWorks, VRTX/OS and pSOS+.



IndustryPack Flexibility

Fully integrated within the VM162/172 CPU boards are two IndustryPack carrier interfaces. Each interface accesses an 8/16-bit data-bus and supports IP class 1 modules.

The IP concept is based on an open specification allowing vendors to fabricate an independent library of digital, analog, communication or counter mezzanine plug-in modules for example that are compatible with carrier boards from manufacturers like PEP. With a few hundred such mezzanines currently available, users can easily find the appropriate interface to a wide variety of industrial requirements.

In accordance with the IP specification, PEP has implemented two 8/16-bit data width interfaces each operating at 8 or 32MHz that support interrupts and communicate with the host carrier via 50-pin connectors with embedded address, data, control and power lines. These cater for more than 90% of the available IP modules which do not require DMA support.

- Up to 2 standard or one double-sized IP
- Supports I/O, ID, memory & IRQ
- Supports 8/16-bit IP access
- Prog. IP bus speed (8/32 MHz)/IP
- 2 interrupts/IP
- ≤ 8 MB linear memory space/IP
- Overload protection (fuses)/IP

Specifications

VM162/172

CPUs

MC68040(V) @ 33 MHz
MC68060 @ 50 MHz or 66 MHz

Communications Controller

MC68EN360 Companion processor for network support on SI6 piggybacks

Memory

1/4/8/16/32/64 MByte (32-bit access) DRAM†
1/4 MByte (32-bit access) FLASH†
256 kByte or 1 MByte dual-ported SRAM with data retention via Goldcap
2 kbit serial EEPROM for configuration data
2 ROM sockets for up to 1 MByte device (optional)

Real-Time Clock

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

Tick

Built-in on MC68EN360 providing a programmable periodic interrupt (default 10ms)

Timer

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

Time-Out

On-board BERR* time-out min. 8µs, max. 128µs
128µs VMEbus BERR* both with software enable/disable

Watchdog

Enabled by software with front-panel LED

Interrupts

VME IRQ1* - IRQ7* interrupts, enable/disable; Mask Register; SYSFAIL* and ACFAIL* handlers

System Vectors

Abort switch	level 7 autovector
ACFAIL*	level 7 autovector
TICK	level 6 vector prog.
SYSFAIL*	level 5 autovector
Mailbox IRQ	level 3 autovector
CXC	vector prog.

System Controller

Single-level (BR3*), FAIR, RWD (Release When Done); Automatic First-Slot Detection

† Available on DM60x Memory Piggyback

Address Modifier

A32 Access Code : HEX 09/0A/0D/0E
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;
16 software selectable base addresses

IndustryPack Interface

Two card holders with I/O ported to 50-pin flat-band cable or optional shielded D-Sub connectors on front-panel

CXC Interface

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

VMEbus Interface

DIN 41612 (C), 96-pin P1/P2 connector
A32/A24/A16:D32/D16/D8 master/slave

Networking

All Ethernet interfaces conform to IEEE 802-3 and are available on SI6-xx piggybacks

SC-Interface

Serial interface from MC68EN360 (ports SCC2, SCC3 and SCC4) with standard RS232 configuration

Power Consumption#

VM172 with MC68060 ≈ 5.5W @ 50 MHz
VM162 with MC68040V ≈ 5.5W @ 33 MHz
VM162 with MC68040 ≈ 7.5W @ 33 MHz

Common

Temperatures:	0ºC to +70ºC (standard)
	-55ºC to +85ºC (storage)
Humidity:	0 to 95% non-condensing
Weight:	440 g (with 10BaseT and DM600 PB)
6U Dimensions:	233mm x 160mm; single-slot (4HP)

Front-Panel

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

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

Features
VM162/172

CPU Options

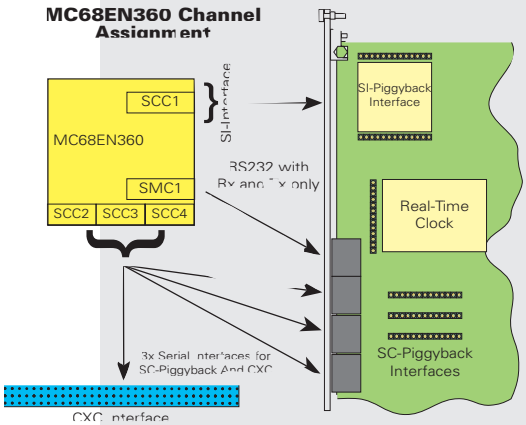
The 68060 processor operating at up to 66 MHz provides the highest performance while the 68040(V) at 33 MHz sets the standard in the Motorola CISC portfolio.

68EN360

The 'QUICC' chip operates as an I/O and communication companion providing 4, high-speed serial channels, timers, clocks and Time Slot Assignment (TSA).

Serial Channels

All high-speed SCC channels are equipped with hardware hand-shaking and are available for a variety of applications. SCC1 can be configured for either ethernet or RS485 (e.g. PROFIBUS) use by fitting the appropriate SI6 piggyback. SCC2 - SCC4 are configured by default for RS232 operation. An SMC1 interface provides a simple RS232 connection for console/debug operations.



RS485 Interfaces

This is a fully optoisolated RS485 SI6-interface piggyback with a 9-pin D-Sub connector.

CXC Interface

The 96-pin interface allows other I/O possibilities to be realised by utilising PEP's plug-in cards such as the CXM-PFB12, CXM-CAN, CXM-LON, CXM-SCSI or CXM-SIO3.

Ethernet Interface

Three different SI6 piggybacks complete with all the associated control logic are available providing 10Base2, 10Base5 or 10BaseT interfaces.

IndustryPack

Any two IndustryPacks from a wide-range may be fitted to cater for the needs of digital, analog, communication or counter functions. PEP also offers customers an integration service for the chosen IP module and RT-OS with the VM162/172 carrier board.

SC-Interface

Three RS232 SC-Piggybacks are fitted as standard which can be replaced by optoisolated RS232 or RS485 piggybacks as required.

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 (Goldcap) 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.

Boot ROM/FLASH

2 DIL sockets supporting up to 1 MByte of 16-bit memory are available for use if the FLASH on the DM60x piggyback is not required.