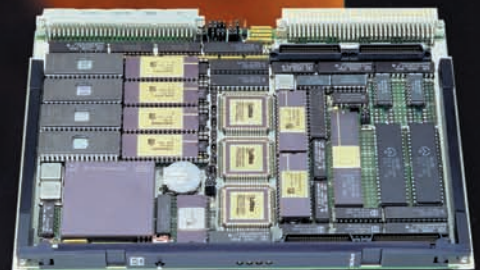
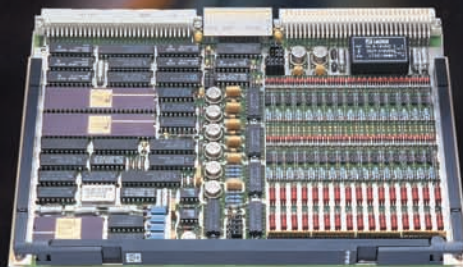
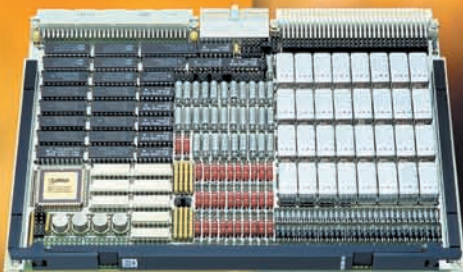




Computer

## True Military VMEbus Systems

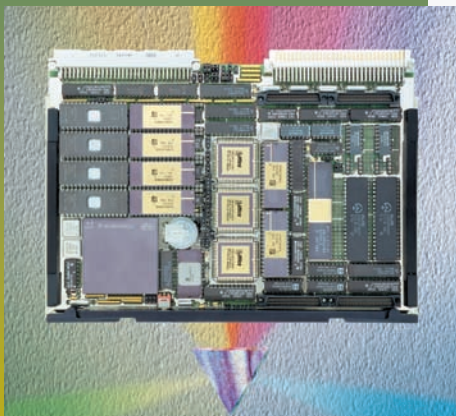
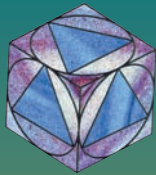


Short Form Catalogue 2001



# CM COMPUTER

*Since its establishment in 1987, CM Computer has designed and manufactured the highest performance VMEbus products, balancing proven old-school military hardware design with the advantages of current COTS open architectures*



## ***The Leader in VMEbus I/O & ATR Chassis***

At CM Computer, we believe that every system built with our products must guarantee immediate flawless operation after spending a winter night on the freezing deck of an aircraft carrier in the North Sea, or after withstanding suffocating midday summer heat on an aircraft runway located on a North African dessert.

On the other hand, we do not subscribe to recent theories that promote pseudo-military COTS products filled with piggybacked sub-modules, populated with cheap plastic parts contained in ultra-small packages.

CM maintains the classic theory that each component must be specifically selected from the start in accordance with rigorous quality criteria: outstanding performance over the full temperature range, optimum-size heat dissipation packages, premium quality, solid mechanical assembly to the PCB and minimum thermal path to the cooling frame.

Component selection, broad experience in electronic design, first class printed circuit boards and certified quality manufacturing are key factors in our success. Our customers find that even our low cost industrial boards offer unmatched reliability, often comparable to the latest military range products from our competitors.

Look inside this Short Form Catalogue to learn about our range of VME64 boards available in four distinct temperature grades from commercial class to full military conduction cooled versions.

Significant sections of this brochure introduce the new line of CM ATR enclosures, expressly designed for maximum versatility and easy System Integration. Be sure to find out more.



## *Experience*

For over 13 years, prime contractors have selected CM to be their VMEbus supplier for more than a hundred first class industrial and military programs worldwide.

Our experience enhances product innovation and competitiveness. The current series of boards is based on well proven technology that accepts only solutions that have been field demonstrated to be most efficient.

CM engineers take great care to generate the most extensive technical manuals, comprehensive product datasheets and a complete set of real-time source code BSPs and BIT functions.

## *Product Functionality*

CM products are expressly designed for the most demanding customers who appreciate uncompromising quality and require true military performance in their applications.

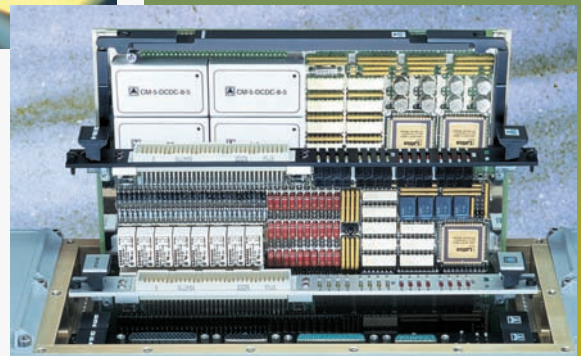
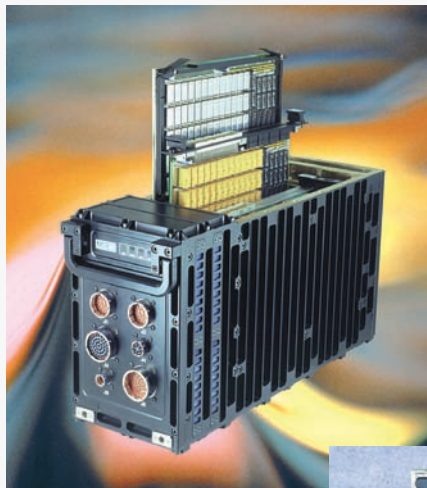
Because today's military electronics demand extensive Built-In-Test capabilities, CM modules dedicate up to 35% of hardware resources to BIT, allowing 100% failure detection capability.

The entire product line supports a broad set of practical features and functionalities. Our boards offer increased I/O channel density, full overload protection, galvanic isolation, diverse I/O voltage levels, dual I/O wiring methods, multiple board mechanics, reduced power consumption and much more.

## *ATR Chassis for Next Generation Programs*

Our complete range of military enclosures serves general purpose applications dimensioned for up to 12 slots. CM ATR chassis deliver full VME64 compatibility in combination with protection levels unachievable with traditional avionics chassis.

Whatever your application, whatever board mechanics you use, I/O wiring solution, specific sub-buses or transition I/O modules you need, CM enclosures provide the right solution.



*Year after year CM Computer continues to offer cost-effective products of extreme quality and operational reliability, earning CM a solid reputation as a leading military VMEbus manufacturer in Europe and the USA*

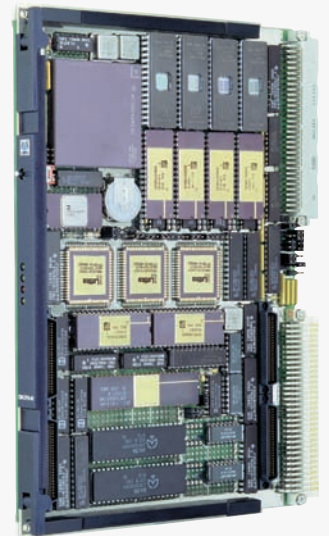


# MILITARY VMEbus BOARDS

## PROCESSOR BOARDS

The CM-CPU-40/60 is a general purpose 32 bit true military computer which incorporates all features and peripherals most demanded in today's military and industrial applications.

The powerful 32 bit mezzanine interface increases memory or supplements the existing full set of on-board peripherals.



### CM-CPU-40

### CM-CPU-60

<b>Description</b>	Low cost Single Board Computer	Low cost Single Board Computer
<b>Processor</b>	MC-68040 @ 40 MHz.	MC-68060 @ 66 MHz.
<b>SRAM Memory</b>	8 MB	8 MB
<b>Eprom/Flash</b>	4 MB	4 MB
<b>RTC</b>	Calendar + Timer + Alarm	Calendar + Timer + Alarm
<b>Serial Port</b>	2 x RS-232/422	2 x RS-232/422
<b>Ethernet Port</b>	Am7990 Controller	Am7990 Controller
<b>Additional I/O</b>	2xRS-232, SCSI, Parallel + 3 Timers	2xRS-232, SCSI, Parallel + 3 Timers
<b>Mezzanine</b>	1553, ARINC-429, Graphics, Eth., etc.	1553, ARINC-429, Graphics, Eth., etc.
<b>Power Dissipation</b>	11 Watts	11 Watts
<b>Board Range</b>	C+I+R+883	C+I+R+883

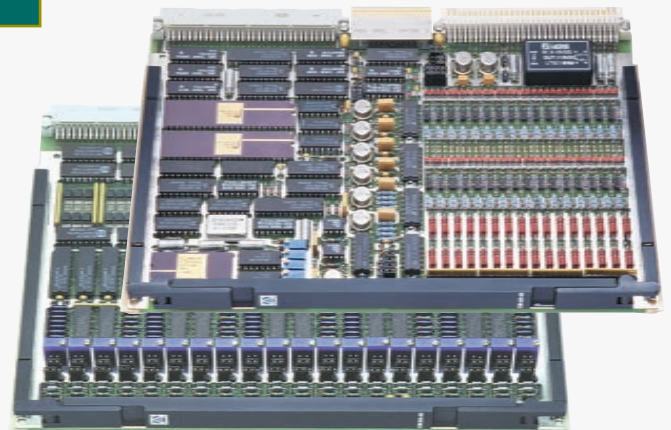
## ANALOG I/O

CM analog boards offer a highly flexible I/O cabling solution using connectors on the front panel and P2.

A wide variety of unipolar/bipolar I/O voltage ranges is available covering all industry standard levels.

Extensive Built-In-Test is based on a wraparound loop that disconnects external analog I/O signals and connects internal test signals in order to verify correct module operation.

All versions are built with low power CMOS devices, featuring average power consumption of 3 Watts per board.



### CM-AD-45

### CM-DA-40

### CM-DA-50

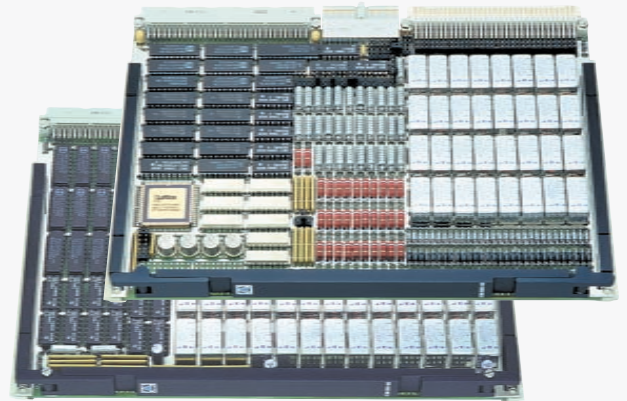
<b>Description</b>	32 Channel A/D Input Module	24 Channel D/A Output Module	24 Channel D/A Output Module
<b>Channels</b>	32 Single-ended or 16 Differential	24 Single-ended	24 Single-ended
<b>Resolution</b>	12 bit AD-1674 Converter	12 bit DA-7545 Converter	14 bit DA-7538 Converter
<b>VIN/OUT Unipolar</b>	0-5, 0-10, 0-50 & 0-100 Volts.	0-5, 0-10 VDC or External Vref.	0-5, 0-10 VDC or External Vref.
<b>VIN/OUT Bipolar</b>	±2.5, ±5, ±10, ±25, ±50 & ±100 Volts.	±5 or ±10 VDC or External Vref.	±5 or ±10 VDC or External Vref.
<b>Overload Protection</b>	Up to 120 VDC Input	Up to 20 mA or Short circuit	Up to 20 mA or Short circuit
<b>Isolation</b>	---	Full Galvanic Isolation >800V	Full Galvanic Isolation >800V
<b>Built-In-Test</b>	100% Board Coverage	---	100% Board Coverage
<b>Other Features</b>	Dual Port SRAM, Interrupter	Input Vref. per Channel	Input Vref. per Channel
<b>VMEbus Interface</b>	A24/D16 Standard Slave	A24/D16 Standard Slave	A24/D16 Standard Slave
<b>Board Range</b>	C+I+R+883	C+I+R+883	C+I+R+883

# MILITARY VMEbus BOARDS

## DISCRETE I/O

Discrete Output boards have a flexible stage per channel that can be factory fitted to support a choice of eleven different output devices (Relays, Optocouplers, FETs, SSR, TTL, etc.).

Discrete Input sections incorporate an Input Change Detector that samples and compares all input channels and asserts interrupts on any change. Additionally, the CM-DI-42 does not require power from the application and accepts any generic external DC switching device.



### CM-DO-40

### CM-DI-40

### CM-DI-42

### CM-DIO-40

Description	Discrete Output Module	Discrete Input Module	Discrete Input Module	Discrete I/O Module
Channels	64	64	64	32+32
VIN/OUT	Up to 400 VDC/AC @ 1 A	3 to 300 VDC/AC RMS	Any DC switching device	3 to 300 VIN / 400 VOUT
Input Protection	---	30% Nominal, 300% Peak	100% Nominal	30% Nominal, 300% Peak
Isolation	Galvanic Isolation >800V	Galvanic Isolation >800V	Galvanic Isolation >800V	Galvanic Isolation >800V
Built-In-Test	100% Board Coverage	100% Board Coverage	100% Board Coverage	100% Board Coverage
Other Features	Supports 11 Output Devices	Channel Change Detector	Channel Change Detector	Supports 11 Output Devices
Board Range	I+R+883	I+R+883	I+R+883	I+R+883

## SYNCHRO / RESOLVER I/O

All Synchro/Resolver modules offer 16 bit resolution and independent high accuracy I/O transformers per channel. Built-In-Test wraparound is achieved by incorporating supervisory input S/R converters in output modules and vice versa.

### CM-SD-40

### CM-DS-40

### CM-SDS-40

Description	S/R Input Module	S/R Output Module	S/R I/O Module
Channels	16	8	4+4
VIN / VOUT	11,8/26/90 VRMS	11,8/26/90 VRMS	11,8/26/90 VRMS
Built-In-Test	100% Board Coverage	100% Board Coverage	100% Board Coverage
Isolation	Gal. Isolation >800V	Gal. Isolation >800V	Gal. Isolation >800V
Board Range	I+R+883	I+R+883	I+R+883



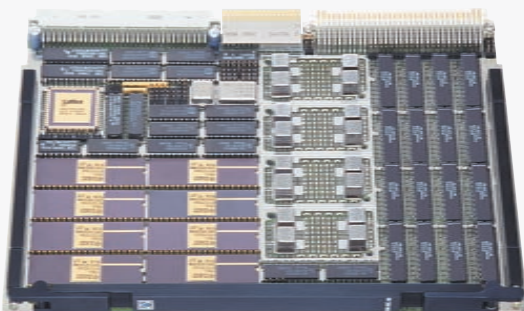
## SERIAL I/O

This universal serial module supports standard communication protocols up to 5 Mbs. BIT capabilities even allow testing on-board transceivers.

### CM-IOC-40

**Description**  
**Serial Ports**  
**Serial Controller**  
**Isolation**  
**Built-In-Test**  
**Board Range**

16 Channel Serial I/O Module  
 16 Full Duplex Ports RS-232/422/423/485  
 Z8530 or Z-85230 up to 20 MHz  
 Galvanic Isolated Transceivers > 1000 Vp  
 100% Board Coverage  
 C+I+R+883





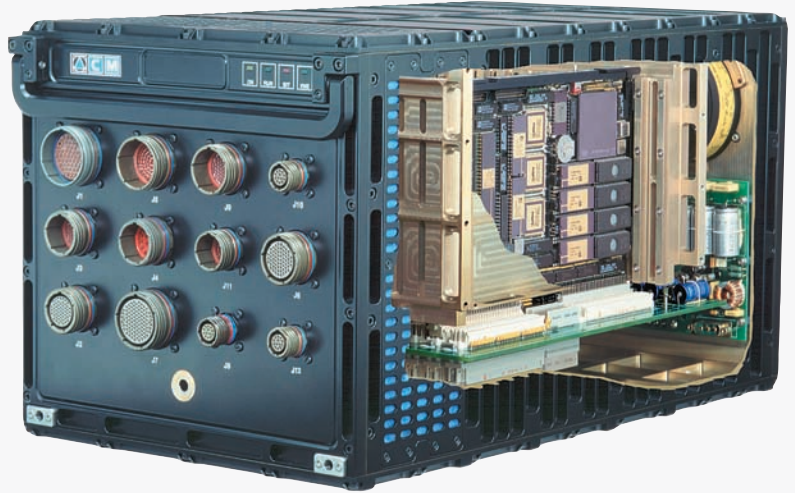
# MILITARY VMEbus ENCLOSURES

## Chassis Description

CM enclosures exceed the requirements of MIL-STD-5400 & MIL-STD-16400 aerospace, airborne, ground-mobile or naval applications.

Our complete chassis range offers 8 different sizes and versions covering 6U applications of 1/2, 3/4 or 1 ATR of capacity. The 3U version is ideal for cost-effective systems up to 10 slots.

We manufacture two chassis heights. Low Profile VME32 versions feature minimum size and weight. High Profile VME64 versions offer extended I/O capacity due to the additional 50 mm of free space below the backplane.



## Chassis Specification Guide

	CM-RA-20 3U VME32	CM-RA-20 3U VME64	CM-RA-20 6U VME32	CM-RA-20 6U VME64	CM-RA-30 6U VME32	CM-RA-30 6U VME64	CM-RA-40 6U VME32	CM-RA-40 6U VME64
<b>Size</b>	1/2 ATR Long	1/2 ATR Long	1/2 ATR Long	1/2 ATR Long	3/4 ATR Long	3/4 ATR Long	1 ATR Long	1 ATR Long
<b>Slots</b>	10	10	5	5	7	7	12	12
<b>Backplane</b>	BP10L	BP10H	BP32L	BP64H	BP32L	BP64H	BP32L	BP64H
<b>Width</b>	137,5 mm	137,5 mm	137,5 mm	137,5 mm	190,5 mm	190,5 mm	285 mm	285 mm
<b>Height</b>	227 mm	277 mm	227 mm	277 mm	227 mm	277 mm	227 mm	277 mm
<b>Depth</b>	450 mm	450 mm	450 mm	450 mm	465 mm	465 mm	495 mm	495 mm
<b>Weight</b>	6,1 Kg	7 Kg	5,8 Kg	6,7 Kg	6,5 Kg	7,9 Kg	10 Kg	12 Kg
<b>Power Sup.</b>	♦♥	♦♥♠①	♦♥	♦♥♠①	♥♠①	♥♠①	①②③	①②③④⑤
<b>Sealed</b>	☒	☒	☒	☒	☒	☒	☒	☒
<b>Fans (CFM)</b>	1 (>50)	1 (>50)	1 (>50)	1 (>50)	1 (>50)	1 (>50)	2 (>200)	2 (>200)
<b>I/O def. (†)</b>	163 + 5	273 + 5	163 + 5	273 + 5	264 + 5	378 + 5	408 + 5	568 + 5

(†) CM default panel I/O + power pins. Custom front panel configurations are available upon request.

The CM line of enclosures offers a better total solution, incorporating a wide range of practical functionalities, innovations, details and options. All mechanical parts have been carefully machined and computer optimized in order to decrease weight without sacrificing mechanical performance.

Functional details include a retractable handle for transport, rear panel fan finger guards, front panel LED indicators and reserved space for chassis identification plate, etc.



The removable front panel and top and bottom covers simplify maintenance of circuit cards, power supply and backplane I/O wiring.

A set of integrated cooling fins throughout the outer sidewalls and rear panel greatly improves the chassis natural convection cooling effectiveness.

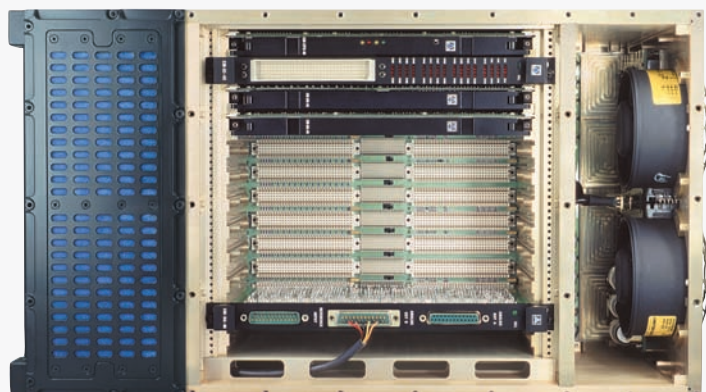
Fan assisted versions have 2 or 3 oversized air-intakes. VMEbus cards are oriented in parallel with the chassis sidewalls. This forces air to flow around both sides of the module and maintain a homogeneous flow rate per slot. A set of removable cover plates allow optimum slot by slot airflow regulation.

Cooling of sealed dry air versions is based on the combination of conduction to the cool baseplate and enhanced natural convection.

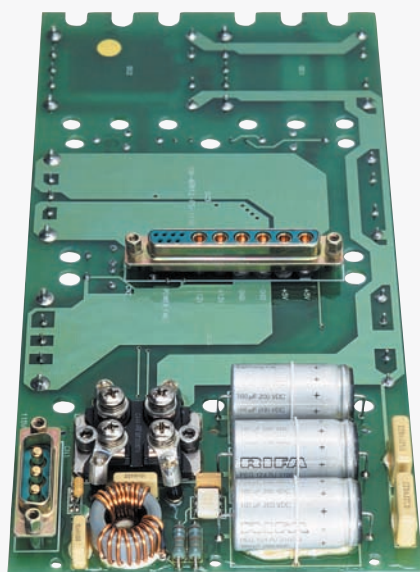
# MILITARY VMEbus ENCLOSURES

CM chassis offer up to 3 independent I/O wiring solutions and are capable of accommodating on a slot-by-slot basis any type of standard form-factor VMEbus module. These features allow easy design of your application without limitations regarding board mechanics or I/O.

The High Profile chassis, with its free space below the VME64 backplane, is ideal for housing I/O transition cards, complementary sub-buses or any type of user defined J0 and J2 I/O wire-wrapping.



## Power Supply



All power supplies are full military class and incorporate new generation DC/DC converters with up to 90% efficiency. Nominal input voltages are 115 VAC and 28 VDC according to MIL-STD-704.

Galvanically isolated output voltages are standard ( $> 500$  VRMS). Outputs are also overvoltage and overcurrent protected, including thermal shutdown.

High dissipation devices are integrated on the chassis rear panel structure for optimum cooling and superior MTBF.

All units incorporate Power Fail Monitor and a dual line input voltage filter.

### Power Supply Watts (†)

<b>Power Supply ♦</b>	150 W (+5 VDC @ 10 A // $\pm 12$ VDC @ 4A)
<b>Power Supply ♥</b>	175 W (+5 VDC @ 15 A // $\pm 12$ VDC @ 4A)
<b>Power Supply ♠</b>	200 W (+5 VDC @ 20 A // $\pm 12$ VDC @ 4A)
<b>Power Supply ①</b>	250 W (+5 VDC @ 30 A // $\pm 12$ VDC @ 4A)
<b>Power Supply ②</b>	300 W (+5 VDC @ 40 A // $\pm 12$ VDC @ 4A)
<b>Power Supply ③</b>	400 W (+5 VDC @ 60 A // $\pm 12$ VDC @ 4A)
<b>Power Supply ④</b>	450 W (+5 VDC @ 60 A // $\pm 12$ VDC @ 6A)
<b>Power Supply ⑤</b>	500 W (+5 VDC @ 60 A // $\pm 12$ VDC @ 8A)

(†) 3.3 VDC @ 5A available on all models

## VMEbus Backplane

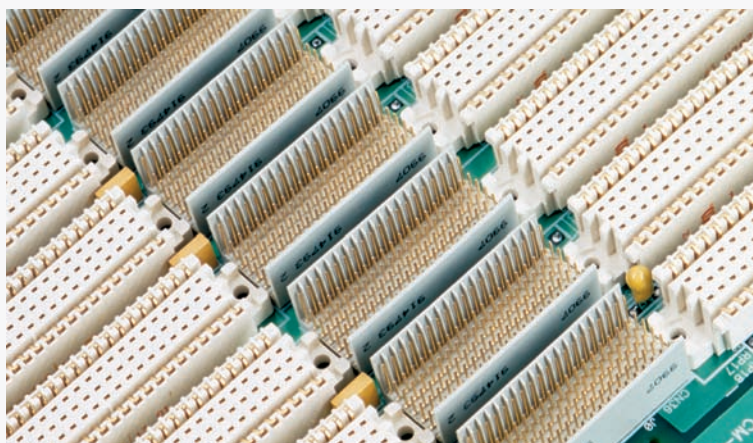
CM ATR enclosures are supplied with leading-edge fully compatible VMEbus backplanes. Backplane PCBs are monolithic, low noise, with two dedicated ground shielding layers and standard passive resistive terminators.

J0, J1 and J2 connectors are military class I according to MIL-C-55302.

VME64 backplanes fitted with 5 row connectors are installed in High Profile chassis.

VME32 backplanes fitted with 3 row connectors are installed in Low Profile chassis. They incorporate integrated J2 user I/O routing across the PCB to a set of intermediate D type Canners.

Additional TTL circuitry is implemented on backplanes for Power Fail Monitor functions and for driving the chassis front panel LED indicators.





## ENVIRONMENTAL SPECIFICATIONS

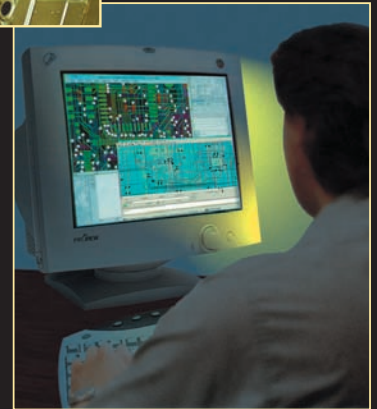
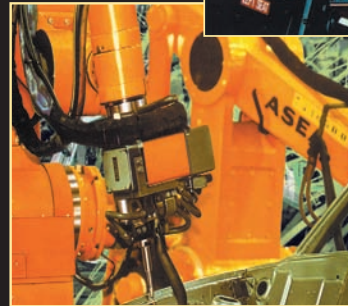
CM Computer boards are manufactured in four distinct build standards, 100% hardware & software compatible. All modules share the same electrical circuitry but differ in component grade and mechanical format.

**Commercial (C):** Implements low cost Commercial plastic IC's rated from 0 to +70 °C. Continuous board operation from 0 to +55 °C.

**Industrial (I):** Built with Industrial range plastic or ceramic IC's from -40 (-25) to +85 °C. Continuous board operation from -20 to +70 °C.

**Military-Rugged (R+):** Manufactured with ceramic IC's from -55 to +125 °C. Class I MIL-C-55302 connectors. Conduction cooled PCB. Continuous operation -40 to +85 °C. Storage -50 to +120 °C. Compliance with MIL-STD-810E and MIL-E-5400.

**Military-STD-883 (883):** Features conduction cooled PCB and MIL-STD-883 ceramic IC's (-55 to +125 °C). Class I MIL-C-55302 qualified connectors. Continuous board operation from -55 to +90 °C. Storage -60 to +130 °C. Boards exceed MIL-STD-810E & MIL-E-5400 environmental specs.



## SOFTWARE SUPPORT

All CM products are supported with comprehensive real time "C" drivers in source code. Board support packages are complemented with extensive BIT functions.

**Wind River Systems VxWorks Tornado.** Validated BSPs for the leading VxWorks operating system integrated on Workstation or PC development environment.

**Generic "C" Language Driver.** Drivers available in source code. The user may freely adapt this code for any application, operating system or ANSI "C" compiler.

Note: Drivers for other leading operating systems may optionally be supplied upon request.

## QUALITY ASSURANCE

CM products are known worldwide for outstanding quality. All design, manufacturing and testing processes have been approved and fully ISO-9001 certified. Quality programs in place include extensive burn-in cycles, automatic testing, compatibility analysis and self calibration procedures. We provide a 2 year warranty on all products.



Computer

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For more extensive information, contact CM Computer or your representative.