



**KONTRON AMERICA, INC.**

**MOBILE COMPUTING DIVISION**

**EMBEDDED COMPUTER MODULE**

**QUICK REFERENCE GUIDE**



© Kontron America, Inc.  
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# Embedded Computer Module

## 1.0 DOCUMENT REVISION HISTORY

Revision	Date	Edited By	Changes from last revision
0.10	12/07/2004	GMA	Initial Draft.
0.20	01/14/2004	GMA	Feedback updates.
0.90	02/17/2004	GMA	Pre-release review and updates.
1.20	05/23/05	CSF	Release Updates

## 2.0 USER INFORMATION

### 2.1 Objective

This document is intended to give basic definition of the Kontron Embedded Computer Module (ECM) base computer. The base computer alone is not a functional device and requires a docking station designed to interface with the ECM in order for it to become functional. Depending on desired I/O and degree of ruggedness required for the End Users application, Kontron America—Mobile Computing Division can either supply a Development Kit for End Users to design their own interfaces or Kontron can customize a dock.

For a technical reference guide of the Kontron Development Docking Stations, please refer to the CD utilities disk (P/N 224-0078).

### 2.2 Assumptions

The reader is assumed to have already designed, or is using a Kontron America—Mobile Computing Division pre-designed docking station to run their application.

### 2.3 Scope

The information presented in this guide is basic to the ECM and simply covers the pin-out of the docking connector, the level of certification obtained and the MIL-STD testing performed on the ECM only. Customers designing their own interfaces to the ECM are responsible for meeting required certification and testing using the ECM and their own specific docking devices. Depending on required certification and/or testing, the application circuits use in the ECM may not be suitable for all applications. In particular, additional components may need to be added to these circuits in order to

meet specific EMI/EMC, or safety isolation requirements. Such regulatory requirements and the techniques for meeting them vary by industry and are beyond the scope of this document.

## 2.4 About This Manual

This document provides information about products from Kontron America—Mobile Computing Division. No warranty of suitability, purpose, or fitness is implied. While every attempt has been made to ensure that the information in this document is accurate, the information contained within this document is supplied **“as-is”** and can change without notice.



For the circuits, descriptions and tables indicated, Kontron America—Mobile Computing Division assumes no responsibility as far as patents or rights of third parties are concerned.

## 2.5 Copyright Notice

Copyright © 2005 Kontron America, Inc.

All rights reserved. No part of this manual may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), without the express written permission of Kontron America—Mobile Computing Division.

## 2.6 Symbols Used In This Manual

Symbol	Meaning
	This symbol indicates the danger of injury to the user or the risk of damage to the product if the corresponding warning notices are not observed.
	This symbol indicates that the product or parts that may be damaged if the corresponding warning notices are not observed.

- ® Windows, Windows XP Professional, Windows 2000 Professional and MS-DOS, are registered trademarks of the Microsoft Corporation.
- ® IBM, PC-AT, OS/2 and PS/2 are registered trademarks of the International Business Machines Corporation.
- ® Intel and Pentium are registered trademarks of Intel Corporation.
- ® UNIX is a registered trademark and exclusively licensed from the X/Open Company Limited.
- ® LINUX is a registered trademark and exclusively licensed by Linus Torvalds
- ® Solaris is a registered trademark of Sun Microsystems, Inc.

Other product names cited in this manual may also be trademarks and are used here solely for identification purposes.

## 2.7 Safety Instructions



Please read this section carefully and observe the following instructions – and those on the computer - for your own safety and correct use of the ECM.

Kontron built and tested the ECM computer in accordance with EN60950. In order to maintain this condition and ensure safe operation, you must observe the instructions and warnings contained here and elsewhere in this manual.



**Do not operate an ECM with wireless capability in areas sensitive to radio interference, such as airplanes and hospitals without turning these devices off using Windows O/S functions.**

For Operating Systems other than Windows, turn the system off to stop transmitting.

- Operate the ECM in accordance with the instructions for use.
- Make sure electrical receptacles match the regulations in your area.
- Place cables, especially the power cable, out of traffic areas where people could trip over them.
- Do not put an AC power connection in sockets shared by a number of other power users.
- Do not use an extension cable.
- Plug the power cable into a nearby socket to prevent an accidental disconnection.
- Use only the cables supplied by Kontron.
- Do not place the ECM in the proximity of heat sources or in a damp location. Make sure it has adequate ventilation.
- Connect to ECM interface: only devices and components that meet the requirements of a SELV circuit (security low voltage output) in accordance with EN60950.
- Lock or screw down all plugs on the connection cables to the housing.
- You may not safely operate the ECM if:
  - it has visible damage or
  - it no longer functions.Shut down the computer and secure it against unintentional operation.
- Any extensions to the computer must meet legal stipulations and the device specifications.
- Only authorized Kontron technical repair personnel may perform assembly, extensions, new settings, alterations or repairs while under warranty.
- Only use original accessories approved by Kontron.

## 2.8 Safety Instructions for the CMOS Lithium Battery

The CPU board is equipped with an internal, rechargeable CMOS lithium battery. Please refer to the “Technical Data” section for information about battery type.

- This battery is not user-replaceable.
- Kontron shall not assume any warranty obligation if any attempt is made to replace the battery by individuals other than those at Kontron repair facilities.
- Please observe local regulations for the disposal of the battery and the disposal information of the battery-manufacturers.



## 2.9 FCC Statement

**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. This 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.

### CANADIAN NOTICE

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

### EUROPEAN UNION NOTICE

**Warning:** This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures to mitigate such interference.

### CAUTION

**Danger of explosion** if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

### WARNING

Only authorized service personnel should attempt to repair this equipment. Improper repairs can create a safety hazard.



## ANTENNA WARNING



**Warning:** To comply with the FCC RF exposure compliance requirements, a separation distance of at least 20 cm (8 inches) must be maintained between the antenna of the Embedded Computer Module (ECM-1400) and all persons and must not be co-located or operating in conjunction with any other antenna or radio transmitter.

## USE ON AIRCRAFT CAUTION:

**Caution:** Regulations of the FCC and FAA prohibit airborne operation of radio-frequency wireless devices because their signals could interfere with critical aircraft instruments.

## 2.10 Care and Maintenance

Clean all other areas of the ECM with a damp, soft cloth. You may dampen the cloth with a mild household cleaner or simply water. If a mild household cleaner is used, wipe again with a damp cloth only and then with a dry cloth.



- ***Do not use strong solvents, such as benzene, thinner or rubbing alcohol that could discolor paint or plastic.***
- ***Do not use commercial household cleaners or cosmetics, as they may harm the surface.***
- ***Do not spray water, as liquid damages the computer or causes it to work improperly.***

## 2.11 Warranty

### LIMITED WARRANTY

*Kontron America, Inc. (KAI)* warrants to the original owner that all will be free from defects in materials and/or workmanship for a period of one (1) year from the date of shipment.

In the event of malfunction or other indication of failure attributable directly to faulty workmanship and/or materials, then, upon return of the product with proof of date-of-shipment to *Kontron America, Inc.*, 14118 Stowe Drive, San Diego, CA 92064, *KAI will*, at its option, repair or replace said products or components, to whatever extent it will deem necessary to restore said products to proper operating condition. For product purchased outside of the Continental United States of America, please refer to documentation supplied with the equipment to determine proper return and/or repair location.

During the one (1) year period after the date-of-shipment, all labor and materials will be provided without charge. There shall be no warranty for either parts or labor after the expiration of the one (1) year period from the date of shipment. Products that have been tampered with, abused, mishandled, deliberately altered or taken apart will not be covered by this warranty agreement. This is the Customer's sole remedy for breach of warranty.

Units must be returned via Returned Material Authorization (RMA) process applicable to the country of purchase origin, freight prepaid and insured. Units returned without proof of date-of-shipment or out-of-warranty units returned, will be repaired or replaced, upon approval by Customer of *KAI* repair/replacement charge estimate, and the Customer will be charged for repair costs. If Customer elects not to authorize repairs or replacement, a service charge may be assessed.

Products will be returned to Customer, after repair or replacement has been completed, by carrier and method chosen by *KAI*. Should the Customer desire some other specific form of conveyance, or be located beyond the USA borders, then the Customer must bear the costs of return shipment.

The responsibility for the failure of any *KAI* product, or component thereof, which in the discretion of *KAI*, shall have resulted from accident, abuse, or misapplication of the product, shall be assumed by the Customer, and *KAI* shall assume no liability as a consequence of such events under the terms of this warranty. Failure caused by penetration of any liquid or salt water, or from regular exposure to a saltwater environment shall be the responsibility of the Customer.

While every effort on the part of *KAI* has been made to provide clear and accurate technical information on the application of its products, *KAI* assumes no liability for any damage which may arise from the use of said technical information.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

There are no warranties given with respect to the products of *KAI* other than the warranty described above.

**All other express or implied warranties are hereby disclaimed, including, but not limited to, warranty of merchantability or fitness for a particular purpose.**

The warranty shall have no greater duration than the duration period for the express written warranty applicable to this product and shall terminate automatically at the expiration of such period. No action shall be brought for breach of any implied or express warranty after one year subsequent to the expiration of the duration period of the express written warranty.

Incidental and consequential damages caused by malfunction, defect or otherwise, and with respect to breach of any express or implied warranty, are not the responsibility of *KAI*, and to the extent permitted by law, are hereby excluded both for property and for injury damage.

## 2.12 Technical Support

If you should encounter difficulties with your application or with this product, or need guidance on setting up your system, we are ready to assist you. Please contact our Technical Support department at the following locations:

### **USA:**

Technical Support are: 8:00AM to 5:00PM CST – Monday – Friday

TEL: (888) 343-5396 (Toll free in US and Canada)  
(952) 974-7200

FAX: (952) 949-2791

E-mail: [support@kontronmobile.com](mailto:support@kontronmobile.com)

When you call, make sure to have the following information on hand:

- unit part number (P/N),
- serial number (S/N) of the defective unit (found on the back of the unit).

Then, explain the nature of your problem to the service technician.

If you have any questions about Kontron America—Mobile Computing Division, or our products and services, you may reach us at the aforementioned telephone numbers, by e-mail, or by writing to:

Kontron America—Mobile Computing Division  
7610 Executive Drive  
Eden Prairie, MN 55344 USA

## 2.13 Returning Defective Merchandise

Before returning any merchandise, please follow these instructions:

In the **USA / North America**, contact:

Kontron America Inc., Mobile Computing Division, Technical Support

Hours are: 8:00AM to 5:00PM CST– Monday – Friday

TEL: (888) 343-5396 (Toll free in US and Canada)  
(952) 974-7200

FAX: (952) 949-2791

E-mail: [support@kontronmobile.com](mailto:support@kontronmobile.com)

In **Europe**:

Contact our Service Department and request an  
RMA # (Return Material Authorization) by:

Fax: (+49) 8165-77 331

E-mail: [service@kontron.com](mailto:service@kontron.com)

**In Asia:**

Contact your sales representative and request an  
RMA # (Return Material Authorization) by:

FAX: 011-886-2-2910-3482

E-mail: [sales@kontron-asia.com](mailto:sales@kontron-asia.com)

**In China:**

Contact your sales representative and request an  
RMA # (Return Material Authorization) by:

FAX: +86-21-5426-1650

E-mail: [FAE@kontron.com.cn](mailto:FAE@kontron.com.cn)

## BASIC SPECIFICATIONS, ENVIRONMENTALS AND CERTIFICATIONS

### 2.14 SPECIFICATIONS

#### 2.14.1 Processor:

- Intel® M738 Processor
- System Bus: 400MHz
- Intel® 855GME Chipset

#### 2.14.2 Operating Systems Supported

- Windows® 2000 Professional
- Windows® XP Professional

#### 2.14.3 RAM/CACHE

- DDR 333MHz DRAM (PC2700)
- 64MB Video DRAM
- Standard 2MB L2 CACHE

#### 2.14.4 I/O Available via Docking Connector to a Docking Station

- Power: 12 VDC input, Class II Power Supply
- Power switch, HDD activity LED and Power LED signals
- Video: One LVDS output
- Video: One RGB analog output (Simultaneous different image, different resolution)
- Sound: AC97 compliant stereo speaker out, stereo MIC in, & Line out
- PS/2 keyboard and mouse
- Mouse/Keyboard Interface: Electronically compliant IBM PS/2
- Serial Ports: Two open COM ports.
- Parallel Port: One
- USB: Four bootable USB 2.0 Ports
- Bus: 33MHz PCI 2.0
- Smart battery interface
- Ignition switch signal for auto power on states

#### 2.14.5 Integrated Wireless LAN Features

- Intel® Centrino Wireless Pro 2200BG 802.11b/g
- Antenna
- Software controlled radio off/on

#### 2.14.6 Chassis Construction

- Conductive cooled cast magnesium alloy

## 2.14.7 Physical Characteristics

- Weight: w/o RHDD: 1.32lbs./60kg (w/o hard drive)
- Size (in.): 4.32w x 6.57d x 1.90h
- Size (cm): 10.97w x 16.68d x 4.82h

## 2.14.8 Temperature and Power and Power Management Systems

- Temperature System
  - Temperature management system will not allow system to turn on at temperatures below -15C (5F) unless extended temperature option is installed.
  - Temperature Management system will prevent system from power-up if temperature is above operating limit.
  - Temperature override options are available through CMOS setup.
- Power and Power Management System
  - ACPI Compliance
  - 500ms debounce protection on power switch
  - Graceful shutdown and inactivity timers.
  - "Auto On" vehicle key signal for remote power on and graceful power down

## 2.15 Environmental Specifications

### 2.15.1 Temperature

- Standard Operating: -15C to 60C (5F to 140F)
- Storage: -25C to 60C (-13F to 140F)

### 2.15.2 Humidity

- Operating: 10-90% relative humidity, non-condensing.
- Storage: Mil-Std-810F, Method 507.4; 5-95% relative humidity, non-condensing

### 2.15.3 Water, Dust and Salt Fog

- Rain and blowing Rain: Mil-Std-810F Method 506.4, Procedure I
- Water Submersion: 1 meter for 1 minute, non-operating
- Sand and Dust: Mil-Std-810F, Method 510.4, Procedure I, II and III
- Salt Fog: Mil-Std-810F, Method 509.4

### 2.15.4 Shock and Crash Hazard

- Functional: Mil-Std-810F, Method 516.5, Procedure I
- Operational: 40Gs at 45Hz to 200Hz; 18 drops
- Non-Operational: 75Gs at 80-Hz to 2000Hz; 12 drops
- Crash Hazard: Mil-Std-810F, Method 516.5, Procedure IV

### 2.15.5 Vibration

- Mil-Std-810F, Method 514.4, Procedure I, Cat. 20, Table 514C-VII Figure 514.5C-0-1 – composite wheeled vehicle.

<u>Hz</u>	<u>Power Spectral Density (<math>g^2/Hz</math>)</u>
10	0.015
40	0.015
50	0.00015

### 2.15.6 Altitude

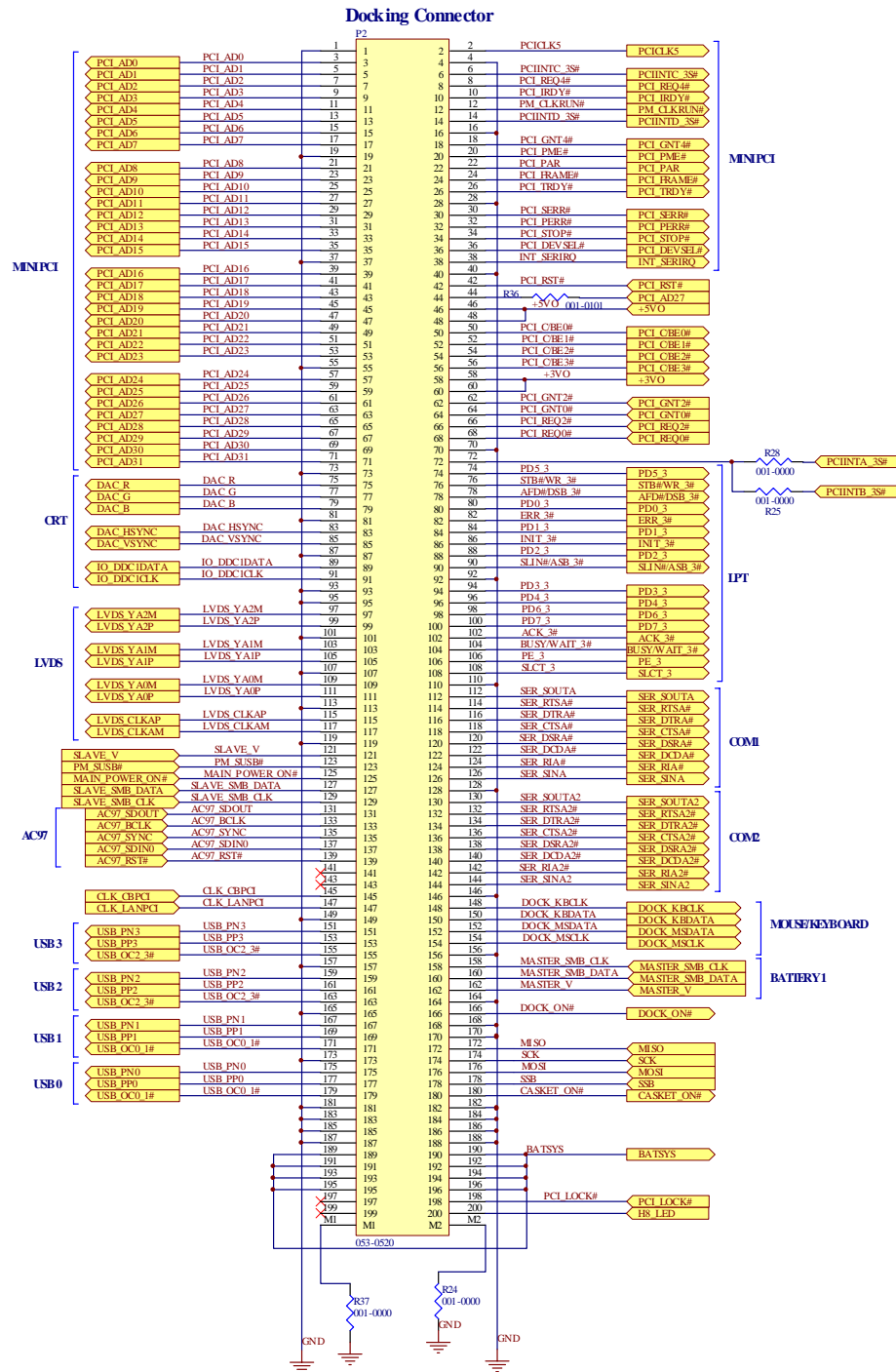
- Operational: -300m to 3000m
- Non-Operational: -400m to 15,000m

## 2.16 Certifications

### 2.16.1 EMI/EMC and Safety

- FCC Class A
- CE Class A
- ETL
- cETL

## 2.17 ECM Docking Connector Schematic



**Figure 4.2.1 ECM Docking Connector**



## 2.18 ECM Docking Connector Pin Out

Pin	Signal		Pin	Signal
1	GND		101	GND
2	H8/REMOTE STATIC ON#		102	ACK_3#
3	PCI_AD0		103	LVDS_YA1M
4	GND		104	BUSY/WAIT_3#
5	PCI_AD1		105	LVDS_YA1P
6	INTC		106	PE_3
7	PCI_AD2		107	GND
8	PCI_REQ4#		108	SLCT_3
9	PCI_AD3		109	LVDS_YA0M
10	PCI_IRDY#		110	GND
11	PCI_AD4		111	LVDS_YA0P
12	PM_CLKRUN#		112	TSOUTA
13	PCI_AD5		113	GND
14	INTD		114	TRTSA#
15	PCI_AD6		115	LVDS_CLKAP
16	GND		116	TDTRA#
17	PCI_AD7		117	LVDS_CLKAM
18	PCI_GNT4#		118	TCTSA#
19	GND		119	GND
20	PCI_PME#		120	TDSRA#
21	PCI_AD8		121	SLAVE_V
22	PCI_PAR		122	TDCDA#
23	PCI_AD9		123	PM_SUSB#
24	PCI_FRAME#		124	TRIA#
25	PCI_AD10		125	MAINPOWERON#
26	PCI_TRDY#		126	TSINA
27	PCI_AD11		127	SLAVE_SMB_DATA
28	GND		128	GND
29	PCI_AD12		129	SLAVE_SMB_CLK
30	PCI_SERR#		130	TSOUTA2
31	PCI_AD13		131	AC97_SDOUT
32	PCI_PERR#		132	TRTSA2#
33	PCI_AD14		133	AC97_BCLK
34	PCI_STOP#		134	TDTRA2#
35	PCI_AD15		135	AC97_SDIN0
36	PCI_DEVSEL#		136	TCTSA2#
37	GND		137	AC97_SYNC
38	SERIRQ		138	TDSRA2#
39	PCI_AD16		139	AC97_RST#
40	GND		140	TDCDA2#
41	PCI_AD17		141	SCL_3(NC in ECM)

42	PCI_RST#	142	TRIA2#
43	PCI_AD18	143	SDA_3(NC in ECM)
44	+3VALWAYS	144	TSINA2
45	PCI_AD19	145	CLK_CBPCI
46	+5VO	146	GND
47	PCI_AD20	147	CLK_LANPCI
48	+5VO	148	DOCK_KBCLK
49	PCI_AD21	149	GND
50	PCI_C/BE0#	150	DOCK_KBDATA
51	PCI_AD22	151	USB_PN3
52	PCI_C/BE1#	152	DOCK_MSDATA
53	PCI_AD23	153	USB_PP3
54	PCI_C/BE2#	154	DOCK_MSCLK
55	GND	155	USB_OC2_3#
56	PCI_C/BE3#	156	GND
57	PCI_AD24	157	GND
58	+3VO	158	MASTER_SMB_CLK
59	PCI_AD25	159	USB_PN2
60	+3VO	160	MASTER_SMB_DATA
61	PCI_AD26	161	USB_PP2
62	PCI_GNT2#	162	MASTER_V
63	PCI_AD27	163	USB_OC2_3A#
64	PCI_GNT0#	164	GND
65	PCI_AD28	165	GND
66	PCI_REQ2#	166	GND
67	PCI_AD29	167	USB_PN1
68	PCI_REQ0#	168	GND
69	PCI_AD30	169	USB_PP1
70	GND	170	GND
71	PCI_AD31	171	USB_OC0_1#
72	INT_A/C	172	MISO
73	GND	173	GND
74	PD5_3	174	SCK
75	DAC_R	175	USB_PN0
76	STB#/WR_3#	176	MOSI
77	DAC_G	177	USB_PP0
78	AFD#/DSB_3#	178	SSB
79	DAC_B	179	USB_OC0_1#
80	PD0_3	180	CASKET_ON#
81	GND	181	GND
82	ERR_3#	182	GND
83	DAC_HSYNC	183	GND
84	PD1_3	184	GND
85	DAC_VSYNC	185	GND
86	INIT_3#	186	GND

87	GND		187	GND
88	PD2_3		188	GND
89	IO_DDC1DATA		189	BATSYS
90	SLIN#/ASB_3#		190	BATSYS
91	IO_DDC1CLK		191	BATSYS
92	GND		192	BATSYS
93	GND(NC in ECM)		193	BATSYS
94	PD3_3		194	BATSYS
95	GND		195	BATSYS
96	PD4_3		196	BATSYS
97	LVDS_YA2M		197	HDD_LED
98	PD6_3		198	PCI_LOCK#
99	LVDS_YA2P		199	DCINDETECT
100	PD7_3		200	H8 SYSTEM STATUS LED
M1	Resistor to GND		M2	Resistor to GND

**Figure 4.2.2 ECM-III Docking Connector Pin Out**

## 3.0 Removable Hard Drive Module

### 3.1 Description

The removable hard drive module is ruggedized and is manufactured specifically for use in the ECM. It allows for ease of use and replacement by the End User without having to remove the ECM from its designated location; when software updates or changes are required. The Module can be equipped with several different styles and sizes of storage devices, spindle or solid state, providing the 2.5" form factor is maintained.

## 4.0 BIOS

The BIOS is proprietary and licensed through AMI. Modifications or changes are the sole responsibility of the manufacturer.

## 5.0 Embedded Controller

The H8 Embedded Controller is provided Phoenix Multikey. Modifications or changes are the sole responsibility of the manufacturer.

## 6.0 Operating Systems

Current operating systems qualified by Kontron America—Mobile Computing Division are Windows XP Professional and Windows 2000 Professional. Other operating systems such as Solaris or Linux may be qualified, at the Customers expense, by Kontron America—Mobile Computing Division.

## 7.0 Dynamic Speed Stepping

Although the CPU is a 1.4GHz Pentium M processor, there are several settings through the Windows XP Power Schemes options that allow for the system to regulate processor speed based on available power, application CPU demand and ECM utilization environment.

The following is relevant to Windows XP only. Windows 2000 does not have native support of dynamic CPU clocking via FID.

Control of the Dothan (Pentium M (90 nm) frequency mode (FID) and voltage (VID) is supported by Windows XP natively. Selection of the Power Scheme (control panel) will determine the processor power policy.

<b>Policy</b>	<b>Behavior</b>
None	Always run in highest power/performance state. No speed step, therefore always in the highest freq and voltage modes.
Constant	Always run in lowest power/performance state. Not applicable here.
Adaptive	CPU Performance and power consumption is based on CPU demand.
Degrade	Always run in lowest power/performance state. Does not allow anything but LFM, low frequency mode. Besides speed step, stop clock throttling will be used. We have seen no power improvement when the system goes into stop clock throttling. Because of this, stop clock throttling is still being investigated.

<b>Power Scheme</b>	<b>AC power</b>	<b>Battery power</b>
Home/Office Desktop	None	Adaptive
Portable/Laptop	Adaptive	Adaptive
Presentation	Adaptive	Degrade
Always on	None	None
Minimal power man.	Adaptive	Adaptive
Max Battery	Adaptive	Degrade

The Dothan also will enforce a thermal solution for further power saving and self-protection.