

IPC-1041 SBC User's Manual
For MCSI PART NO. 73400 IPC-1041
PC/104 Single Board Computers
For Industrial/Embedded Systems Applications

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Revised January 22, 2001
Revision 0.2

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PREFACE

This manual provides information about the MCSI IPC-1041 PC/104 Single Board Computer. This information is intended for users who must implement IBM PC/AT compatible computer solutions to a wide variety of applications that cannot be satisfied using conventional desktop computers. This manual assumes that the reader has a good understanding of MS-DOS and the standard IBM PC/AT compatible architecture. For more information on the IBM PC compatible hardware and software architecture, refer to any of the many books available on the subject. A few suggestions are listed below:

- *PC/104 Specification Version 2.3*, PC/104 Consortium
- *Advanced MS-DOS Programming*, Microsoft Press
- *Programmers Guide to the IBM PC*, Microsoft Press
- *Programming the 80386*, Sybex
- *Undocumented DOS*, Addison Wesley

INVENTORY CHECKLIST

The complete IPC-1041 All-In-One Single Board Computer package consists of the following:

IPC-1041 All-In-One Single Board Computer
IPC-1041 I/O Cable Set
IPC-1041 Software Utilities Diskette
This Manual

If any of the above is missing or appears to be damaged, inform MCSI immediately.

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SECTION 1 - INTRODUCTION

The IPC-1041 PC/104 Single Board Computer (SBC) is a high performance system board that provides the primary elements for building an IBM PC/AT compatible computer for a wide variety of embedded systems applications. The IPC-1041 SBC contains all the basic elements found in a standard IBM PC/AT compatible desktop computer system. The most outstanding features include: an on-board VGA display controller which supports most popular flat panel displays, and a compact PC/104 size form factor, making it ideally suited for embedded applications.

The IPC-1041 SBC is fully compatible with the PC/104 Specification Version 2.3, which means virtually all the software written for the IBM PC/AT will run on the IPC-1041 SBC.

The IPC-1041 uses an 80C386SX mega cell, which is 100% compatible with the Intel 80C386SX microprocessor.

FEATURES

A complete list of features is listed below:

- IBM PC/AT Compatible PC/104 Computer
- Includes an Intel 80C386SX compatible microprocessor
- ALI ChipSet
- AMI Industry Standard BIOS
- 40MHz Operation
- Standard PC/104 Architecture
- 4MB DRAM System Memory (soldered on-board), Externally Expandable to 32MB
- VGA Controller with CRT/LCD Interface with 512K Video Memory
- PS2/AT Compatible Keyboard Port
- Two High Speed Serial Ports, COM1, COM2, COM3, COM4, or disabled
- Enhanced Parallel Printer Port, LPT1, LPT2, or disabled
- Clock/Calendar with Battery Back-up
- Low Power CMOS Design
- PC/104 Size Multi-layer Board for Low EMI and High Reliability
- Dual Floppy Disk Port Supports Two 3.5" or 5.25" Drives up to 2.88M-bytes
- IDE Hard Disk Port
- On-board Mini Speaker
- On-board External Power Connector for Stand-alone Operation
- Optional External Reset
- Optional *Datalight* DOS 6.22 Operating System

SECTION 2 - SYSTEM DESCRIPTION

The following sections describe the major system features of the IPC-1041 PC/104 Single Board Computer.

PROCESSOR

The IPC-1041 SBC uses a high performance 40MHz, 386SX compatible microprocessor. The 386SX microprocessor is fully object code compatible with the 8086/8088, 80286, and 80386 family of products. Some of the distinctive features include:

- 16-bit External Data Bus
- 32-bit Internal Architecture
- 32M-byte Directly Addressable Memory Space
- Internal 14 Word by 16-bit Register Set
- Operand Addressing Modes
- Bit, Byte, Word, and String Operations
- 8 & 16-bit Signed/Unsigned Arithmetic
- Integrated Memory Manager

SYSTEM MEMORY (DRAM)

The IPC-1041 SBC includes 4MB DRAM on-board and supports external memory up to 32MB with a maximum access time of 60ns.

DMA CONTROLLER

The IPC-1041 SBC memory refresh and DMA functions are included in the System Controller chip that includes the equivalence of two 82C37 DMA controllers. The two DMA controllers are cascaded to provide four DMA channels for transfers to 8-bit peripherals (DMA1) and three channels for transfers to 16-bit peripherals (DMA2). DMA2 Channel 0 provides the cascade interconnection for the two DMA devices thereby maintaining IBM PC/AT compatibility. The DMA channel assignments are listed below:

- DMA Channel 0: Not Used (8-bit)
- DMA Channel 1: Not Used (8-bit)
- DMA Channel 2: Floppy Disk (8-bit)
- DMA Channel 3: Not Used (8-bit)
- DMA Channel 5: Not Used (16-bit)
- DMA Channel 6: Not Used (16-bit)
- DMA Channel 7: Not Used (16-bit)

The DMA request (DRQx) and acknowledge (DACKx/) lines are available on the PC/104 connector.

INTERRUPT CONTROLLER

The IPC-1041 SBC has the equivalence of two 82C59A interrupt controllers included in the System Controller chip. The controllers accept requests from peripherals, resolve priorities on pending interrupts and interrupts in service, interrupt the CPU, and provide the vector address of the interrupt service routine. The two interrupt controllers are cascaded in a fashion compatible with the IBM

PC/AT. The interrupt priority and assignments are shown below in descending order of priority:

<i>Highest</i>	IOCHCK/	Parity Check (Non-maskable)
	IRQ0	System Timer (Not Available)
	IRQ1	Keyboard (Not Available)
	IRQ8	Real Time Clock (Not Available)
	IRQ9	S/W Redirect to INT 0AH (IRQ2)
	IRQ10	Not Used
	IRQ11	Not Used
	IRQ12	Not Used
	IRQ13	Co-processor (Not Available)
	IRQ14	Fixed Disk
	IRQ15	Not Used
	IRQ3	Serial Port 2
	IRQ4	Serial Port 1
	IRQ5	Parallel Port 2 (Not Used)
	IRQ6	Floppy Disk Controller
<i>Lowest</i>	IRQ7	Parallel Port 1

The interrupt request lines IRQx and IOCHCK/ are available on the PC/104 connector except as noted above.

TIMERS

The IPC-1041 SBC has the equivalence of an 82C54 Programmable Timer included in the System Controller chip. The 82C54 is a three-channel Programmable Counter/Timer chip. The three timers are driven by a 1.19MHz clock source derived from the on-board 14.31818MHz crystal oscillator. The three timers are used as follows:

- TIMER Channel 0: System Timer
- TIMER Channel 1: Timer for DRAM refresh
- TIMER Channel 2: Tone Generation for Audio

CLOCK/CALENDAR AND CMOS RAM

The IPC-1041 SBC has the equivalence of an MC146818 real time clock/calendar with 128 bytes of CMOS RAM. An on-board lithium battery provides power to the RTC chip for at least ten years when the system power is off.

The 128 byte CMOS RAM consists of 14 bytes used by the clock/calendar, and 114 bytes used by the system BIOS.

Should your CMOS become corrupted, i.e. loss of battery power or accidentally clobbered, strange errors may occur while attempting to run your programs. Refer to Section 3.0 for instructions on resetting the initial SETUP values.

KEYBOARD

The IPC-1041 SBC contains an IBM PC/AT compatible keyboard controller for interfacing to a generic IBM PC/AT compatible keyboard. The keyboard controller assembles the serial data from the keyboard into bytes and interrupts the CPU via IRQ1 after each byte is ready to be read. The IRQ1 service routine reads port 60H to get the keyboard scan code and acknowledges by sending a positive

pulse to port 61H to clear the interrupt for the next byte. Refer to Appendix D for the keyboard connector location and pin assignments.

MOUSE PORT

The IPC-1041 SBC contains an IBM PS2 compatible mouse port for interfacing to a generic serial mouse. The mouse port controller assembles the serial data from the mouse into bytes and interrupts the CPU via IRQ1 after each byte is ready to be read. The IRQ1 service routine reads port 60H to get the scan code and acknowledges by sending a positive pulse to port 61H to clear the interrupt for the next byte. Refer to Appendix D for the mouse port connector location and pin assignments.

SPEAKER PORT

The IPC-1041 SBC contains an on-board sub-miniature audio speaker to provide audio interface to the user. Because of the small size of the speaker, the sound output is much reduced over that of the standard speaker found in most desktop computers. A connector is provided to connect an external speaker if the sound output is not sufficient. Refer to Appendix D for the speaker port connector location and pin assignments.

RESET SWITCH

The IPC-1041 SBC includes an on-board power detector and power on reset circuit to reset the computer after power is applied, and to hold the computer reset during low power, brownout conditions. In addition, there are provisions for connecting an external, normally open, push button reset switch. Refer to Appendix D for the reset switch connector location and pin assignments.

PRINTER PORT

The IPC-1041 SBC contains a multimode parallel port that has the equivalence an IBM PC/AT Parallel Printer Port. The multimode parallel printer port supports the PS/2 type bi-directional parallel port (SPP), the enhanced parallel port (EPP), and the extended capabilities port (ECP) parallel port modes. The port can be configured as a standard IBM PC/AT compatible LPT1, LPT2, or LPT3 printer port, or disabled completely using the CMOS SETUP utility. Refer to Appendix E for the printer configuration jumpers, and Appendix D for the connector location and pin assignments.

SERIAL PORTS

The IPC-1041 SBC has the equivalence of two NC16C550 UARTs. The two UARTs can be configured as standard IBM PC/AT compatible serial ports or individually disabled using the CMOS SETUP utility.

Refer to Appendix E for the serial port configuration jumpers and Appendix D for the connector location and pin assignments.

FLOPPY DISK PORT

The IPC-1041 SBC contains an IBM PC/AT compatible dual floppy disk port with the equivalence of an NEC PD72056B Floppy Disk Controller, an on-chip analog data separator, and an IBM PC/AT compatible floppy disk adapter bus interface circuit. The Floppy Disk Port can be disabled using the CMOS SETUP Utility. An on-board three section analog filter provides optimum performance with

the following disk drive types:

5.25"	360K Double-Sided
3.5"	720K High Capacity
5.25"	1.2M High Capacity
3.5"	1.44M High Density
3.5"	2.88M High Density

Refer to Appendix D for the connector location and pin assignments.

IDE HARD DISK PORT

The IPC-1041 SBC contains an Integrated Drive Electronics (IDE) Port that directly interfaces to hard disk drives with embedded controllers. The IDE Port can be configured using the CMOS SETUP Utility. Refer to Appendix D for the connector location and pin assignments.

VGA DISPLAY PORT

The IPC-1041 SBC includes an HMC HM86508 VGA CRT display and flat panel controller. The VGA display port is fully compatible with IBM VGA, EGA, CGA, and MDA display adapters, and provides improved performance and additional functionality. The board includes 512KB of high-speed video memory. The VGA display controller supports the following maximum display resolutions:

800x600	256 Colors (512KB VRAM)
640x480	256 Colors for STN/TFT LCD Flat Panel

The VGA controller is designed to support most popular flat panel displays and can provide simultaneous operation for most CRT/flat panel configurations. Since the timing and interface requirements differ radically for each type of flat panel display, the VGA control BIOS must be customized specifically to meet the requirements of the individual display. The supported flat panel displays and their applicable BIOS's are listed in Appendix G.

SECTION 3 - SETUP

The IPC-1041 SBC uses an AMI BIOS that contains an internal Setup Utility for configuring the system. The system configuration settings are stored in the on-board CMOS memory, which is backed up by a Lithium battery. Should your CMOS become corrupted, i.e. loss of battery power or accidentally clobbered, strange errors may occur while attempting to run your programs. A jumper at JP2 has been provided to force the BIOS to use its internal default SETUP values. This is accomplished by first removing power from the IPC-1041 and momentarily interrupting the battery power to the system controller chip. To interrupt the battery power, remove the shunt from JP2 pins 1-2 and install on pins 2-3. After waiting a few seconds, return the shunt to JP2 pins 1-2.

The Setup Utility can be invoked by first causing a cold boot (reset) or a warm boot (**Cntrl Alt Del**) and pressing the **Del** key when instructed. This will cause the memory diagnostics to be aborted and the Setup Utility to display the MAIN SETUP MENU. Using the **↑↓** cursor keys, move the highlighted bar to the option you wish to modify and then press **Enter** to select it. When in the MAIN SETUP MENU, the **F2** and **F3** keys are used to select the colors used in the setup screens, and the **F10** key is used to save the changes before exiting the Setup Utility. The **Esc** key may be used to exit the Setup Utility without saving the changes. The **PgUp** and **PgDn** keys are used to scroll through the selections for a given setting. **PgUp** is also used to decrease the setting and **PgDn** to increase the setting.

After making the desired selections from the various setup menus press the **Esc** key to exit the current menu. You save your selections by pressing the **F10** key or by selecting the appropriate selection from the MAIN SETUP MENU.

Notes:

1. The user should be aware that improper selection of certain values in the ADVANCED SETUP UTILITY may cause unpredictable results. If this occurs select the AUTO CONFIGURATION WITH OPTIMAL SETTINGS from the MAIN SETUP MENU.
2. If your system does not require a keyboard be sure to set the "Keyboard" to **Absent**.
3. In order to change the interrupt settings for the serial ports, you must select the PERIPHERAL SETUP MENU to change the settings.

SECTION 4 - INSTALLATION

This section describes the procedures for installing the IPC-1041 PC/104 Single Board Computer into your system. The following is a list of typical peripherals required to build a minimum system:

- Power Supply
- IBM PC/AT Type Keyboard
- Display Monitor
- Floppy or Hard Disk with MS-DOS or PROMDISK Disk Emulator

INSTALLING OTHER PC/104 MODULES

The IPC-1041 SBC contains the full PC/104 expansion bus at female connectors CN4 and CN3.

COMPLETING THE INSTALLATION

To complete the installation, the following steps should be followed:

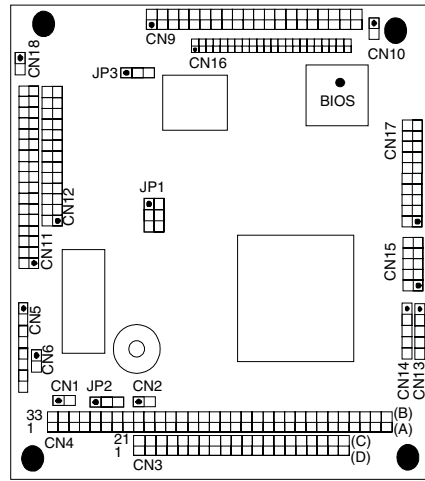
1. Set the configuration jumpers in accordance with Appendix E.
2. Install other PC/104 modules as required.
3. Connect the applicable I/O cables and peripherals, i.e. floppy disk, IDE hard disk, monitor, keyboard, power supply, etc.
4. Connect an IBM PC compatible keyboard.
5. Turn power on to the display monitor.
6. Turn power on to the power supply.
7. After the BIOS sign-on message is displayed, press the **Del** key to enter the Setup Utility.
8. Reconfigure the IPC-1041 CMOS using the internal SETUP.
9. Boot the system.

APPENDIX A - SPECIFICATIONS

This appendix lists the specifications for the IPC-1041 All-In-One Single Board Computer.

CPU:	Includes Intel compatible 80C386SX (40MHz)
Memory:	System Memory: 4MB On-board, Externally Expandable to 32M-bytes
BIOS:	AMI with Internal SETUP and ROM defaults
Clock/Cal:	PC/AT Compatible with battery back-up
PC/104 Bus:	PC/104 Expansion bus (64-pin CN4 & 40-pin CN3 Header/Connectors)
DMA:	7 Channels (4 8-bit & 3 16-bit)
Timers:	3 Programmable
Interrupts:	16
Reset:	Controlled by on-board power detector with provisions for external reset switch CN6
I/O Ports:	2 -RS-232 Serial Ports at header/connector CN17 1 - Parallel Printer Port at connector CN12 1 - PS2 Keyboard Port at header CN13 1 - PS2 Mouse Port at header CN14 1 - On-board Speaker with Speaker Port at header CN2 1 - Dual 3.5"/5.25" Floppy Disk Port at connector CN11 1 - IDE Hard Disk Port at connector CN9 1 - External Power Connector CN5
Video Port:	1 - VGA Video Port at header/connector CN15 1- Flat Panel/LCD Port at header/connector CN16 Chipset: HMC HM86508 VRAM: 512K Resolution: CRT: 800 x600 256 Colors, LCD/TFT/STN: 640x480
Speed:	8-40MHz
Battery:	Replaceable Lithium for Clock/Calendar & CMOS RAM (ten years typical)
Benchmark:	LANDMARK v2.0 = 41MHz
Size:	PC/104 Size board 3.55"L X 3.78"H
Weight:	9 Oz.
Power:	+5VDC @ 1.4A

APPENDIX B - BOARD OUTLINE



• Denotes Pin 1

APPENDIX C - MEMORY AND I/O MAPS

The following is the memory map for the IPC-1041 SBC. The addresses are fully PC/AT compatible, unless otherwise specified.

IPC-1041 SBC Memory Map

Address	Used For
00000H - 003FFH	Interrupt Vectors
00400H - 005FFH	BIOS Values
00600H - 9FFFFH	User RAM (DOS)
A0000H - BFFFFH	Reserved for EGA*
C0000H - C7FFFH	Video BIOS*
C8000H - DFFFFH	ROM Scan Devices*
E0000H - FFFFFH	BIOS
100000H - 1FFFFFFFH	User Memory

**External to the IPC-1041*

The following is the I/O map for the IPC-1041 SBC. I/O addresses are fully PC/AT compatible, unless otherwise specified.

IPC-1041 SBC I/O Map

Address	Function
000H - 01FH	DMA Controller #1
020H - 021H	Interrupt Controller #1
022H - 023H	Configuration Address Register
040H - 05FH	System Timers
060H - 06FH	Keyboard, Status, & System Control
070H - 07FH	Clock/Calendar & CMOS Ram Access
080H - 09FH	DMA Page Register
0A0H - 0BFH	Interrupt Controller #2
0C0H - 0DFH	DMA Controller #2
0F0H	Clear Math Co-processor Busy
0F1H	Reset Math Co-processor
108H - 109H	I/O Controller Configuration Registers
1F0H - 1F8H	IDE Hard Disk
278H - 27FH	Parallel Printer Port LPT2
2E8H - 2EFH	Serial Port COM4
2F8H - 2FFH	Serial Port COM2
378H - 37FH	Parallel Printer Port LPT1
3E8H - 3EFH	Serial Port COM3
3F0H - 3F7H	Floppy Disk Controller
3F8H - 3FFH	Serial Port COM1

APPENDIX D - CONNECTORS

CN4 PC/104 Interface Connector

Pin	Signal	Pin	Signal
A1 (1)	IOCHK/	B1 (33)	GND
A2 (2)	SD7	B2 (34)	RESET
A3 (3)	SD6	B3 (35)	+5VDC
A4 (4)	SD5	B4 (36)	IRQ9
A5 (5)	SD4	B5 (37)	-5VDC
A6 (6)	SD3	B6 (38)	DRQ2
A7 (7)	SD2	B7 (39)	-12VDC
A8 (8)	SD1	B8 (40)	
A9 (9)	SD0	B9 (41)	+12VDC
A10 (10)	IOCHRDY	B10 (42)	(KEYWAY)
A11 (11)	AEN	B11 (43)	SMEMW/
A12 (12)	SA19	B12 (44)	SMEMR/
A13 (13)	SA18	B13 (45)	IOW/
A14 (14)	SA17	B14 (46)	IOR/
A15 (15)	SA16	B15 (47)	DACK3/
A16 (16)	SA15	B16 (48)	DRQ3
A17 (17)	SA14	B17 (49)	DACK1/
A18 (18)	SA13	B18 (50)	DRQ1
A19 (19)	SA12	B19 (51)	REFRESH
A20 (20)	SA11	B20 (52)	SYSCLK
A21 (21)	SA10	B21 (53)	IRQ7
A22 (22)	SA9	B22 (54)	IRQ6
A23 (23)	SA8	B23 (55)	IRQ5
A24 (24)	SA7	B24 (56)	IRQ4
A25 (25)	SA6	B25 (57)	IRQ3
A26 (26)	SA5	B26 (58)	DACK2/
A27 (27)	SA4	B27 (59)	TC
A28 (28)	SA3	B28 (60)	BALE
A29 (29)	SA2	B29 (61)	+5VDC
A30 (30)	SA1	B30 (62)	OSC
A31 (31)	SA0	B31 (63)	GND
A32 (32)	GND	B32 (64)	GND

() Denotes PCB connector

CN3 PC/104 Interface Connector

Pin	Signal	Pin	Signal
C0 (21)	GND	D0 (1)	GND
C1 (22)	SBHE/	D1 (2)	MEMCS16/
C2 (23)	LA23	D2 (3)	IOCS16/
C3 (24)	LA22	D3 (4)	IRQ10
C4 (25)	LA21	D4 (5)	IRQ11
C5 (26)	LA20	D5 (6)	IRQ12
C6 (27)	LA19	D6 (7)	IRQ15
C7 (28)	LA18	D7 (8)	IRQ14
C8 (29)	LA17	D8 (9)	DACK0/
C9 (30)	MEMR/	D9 (10)	DRQ0
C10 (31)	MEMW/	D10 (11)	DACK5/
C11 (32)	SD8	D11 (12)	DRQ5
C12 (33)	SD9	D12 (13)	DACK6/
C13 (34)	SD10	D13 (14)	DRQ6
C14 (35)	SD11	D14 (15)	DACK7/
C15 (36)	SD12	D15 (16)	DRQ7
C16 (37)	SD13	D16 (17)	+5VDC
C17 (38)	SD14	D17 (18)	MASTER/
C18 (39)	SD15	D18 (19)	GND
C19 (40)	(KEYWAY)	D19 (20)	GND

() Denotes PCB connector

CN13 Keyboard Header/Connector

Pin	Signal
1	KBCLK
2	KBDATA
3	N/C
4	GND
5	+5VDC

CN14 PS2 Mouse Connector

Pin	Signal
1	MDATA
2	N/C
3	GND
4	+5VDC
5	MCLOCK

CN11 Floppy Disk Port Connector

Pin	Signal Name
2	RPMLC
4	Not Used
6	Not Used
8	INDEX/
10	MOTOR0/
12	DRIVE SELECT1/
14	DRIVE SELECT0/
16	MOTOR1/
18	DIRECTION/
20	STEP/
22	WRITE DATA/
24	WRITE GATE/
26	TRACK0/
28	WRITE PROTECT/
30	READ DATA/
32	HEAD SELECT/
34	DISK CHANGE/

All odd numbered pins are GND

CN9 IDE Hard Disk Port Connector

Pin	Signal	Pin	Signal
1	IDERST/	2	GND
3	IDED7	4	IDED8
5	IDED6	6	IDED9
7	IDED5	8	IDED10
9	IDED4	10	IDED11
11	IDED3	12	IDED12
13	IDED2	14	IDED13
15	IDED1	16	IDED14
17	IDED0	18	IDED15
19	GND	20	Not Used
21	Not Used	22	GND
23	IDEIOW/	24	GND
25	IDEIOR/	26	GND
27	Not Used	28	IDEALE
29	Not Used	30	GND
31	IRQ14	32	IOCS16/
33	IDESA1	34	Not Used
35	IDESA0	36	IDESA2
37	HDCS0/	38	HDCS1/
39	IDEACT/	40	GND

CN12 Printer Interface Connector

Pin	Signal	Pin	Signal
1	STROBE/	14	AUTOFD/
2	PDAT0	15	ERROR/
3	PDAT1	16	INIT/
4	PDAT2	17	SLCTIN/
5	PDAT3	18	GND
6	PDAT4	19	GND
7	PDAT5	20	GND
8	PDAT6	21	GND
9	PDAT7	22	GND
10	ACK/	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SLCT	26	GND

CN17 Serial Port #1 Connector

Pin	Signal Name
1	CARRIER DETECT
2	RECEIVE DATA
3	TRANSMIT DATA
4	DATA TERMINAL READY
5	GND
11	DATA SET READY
12	REQUEST TO SEND
13	CLEAR TO SEND
14	RING INDICATOR
15	N/C

CN17 Serial Port #2 Connector

Pin	Signal Name
6	CARRIER DETECT
7	RECEIVE DATA
8	TRANSMIT DATA
9	DATA TERMINAL READY
10	GND
16	DATA SET READY
17	REQUEST TO SEND
18	CLEAR TO SEND
19	RING INDICATOR
20	N/C

CN6 Reset Header/Connector

Pin	Signal Name	Description
1	RESET/	Connect to switch, ground this pin to reset
2	GND	Ground

CN10 IDE LED Header/Connector

Pin	Signal Name	Description
1	HDDACT/	Connect to IDE LED anode (-)
2	+5VDC	Connect to IDE LED anode (+)

CN1 Keylock Header/Connector

Pin	Signal Name	Description
1	KBLOCK/	Connect to ground to inhibit keyboard
2	GND	Ground

CN2 Speaker Port Header/Connector

Pin	Signal Name	Description
1	+5VDC	Connect to Speaker (+)
2	SPEAKER	Connect to Speaker (-)

CN18 Power LED Header/Connector

Pin	Signal Name	Description
1	+5VDC	Connect to LED anode
2	GND	Connect to LED cathode

CN5 Auxiliary Power Connector

Pin	Signal Name
1	+5VDC
2	+12VDC
3	-12VDC
4	GND
5	GND
6	-5VDC
7	+12VDC
8	+5VDC

CN16 LCD Interface Connector

Pin	Signal	Pin	Signal
1	+12V	2	+12V
3	GND	4	GND
5	+5V	6	+5V
7	FPVEE	8	GND
9	P0	10	P1
11	P2	12	P3
13	P4	14	P5
15	P6	16	P7
17	P8	18	P9
19	P10	20	P11
21	P12	22	P13
23	P14	24	P15
25	P16	26	P17
27	P18	28	P19
29	P20	30	P21
31	P22	32	P23
33	GND	34	GND
35	SHFCLK	36	FLM
37	M	38	LP
39	GND	40	ENABLK
41	GND	42	N/C
43	FPVDD	44	+5V

CN15 VGA Display Header/Connector

Pin	Signal	Pin	Signal
1	RED	6	N/C
2	GREEN	7	N/C
3	BLUE	8	GND
4	HSYNC	9	GND
5	VSYNC	10	GND

APPENDIX E - CONFIGURATION JUMPERS

JP1 CPU Speed Setting

CPU Speed	1-2	3-4	5-6
8MHz	OFF	ON	ON
16MHz	ON	OFF	ON
20MHz	OFF	OFF	ON
25MHz	ON	ON	OFF
40MHz	ON	OFF	OFF

JP2 Clear CMOS Jumper

1-2	Normal Operation (Default)
2-3	Clear CMOS Setup

JP3 BIOS Programming Jumper

2-3	5V Vpp
1-2	12V Vpp

APPENDIX F - BIOS ERROR BEEP CODES

During the POST (Power On Self Test) routines, which are performed each time the system is powered on, errors may occur.

Nonfatal errors are those which, in most cases, allow the system to continue the boot up process. The error messages normally appear on the screen.

Fatal errors are those, which will not allow the system to continue the boot-up procedure. If a fatal error occurs, you should consult with MCSI Customer Service for possible repairs.

These fatal errors are communicated through a series of audible beeps. The numbers on the fatal error list below correspond to the number of beeps for the corresponding error. All errors listed, with the exception of number eight, are fatal errors.

No. of Beeps	Error Message
1	Refresh Failure - The memory refresh circuitry is faulty.
2	Parity Error - A parity error was detected in the first 64K block of system memory.
3	Base 64KB Memory Failure - A memory failure occurred within the first 64KB of memory.
4	Timer Not Operational - Timer #1 has failed to function properly.
5	Processor Error - The CPU chip has generated an error.
6	8042-Gate A20 Failure - The keyboard controller (8042) contains the Gate A20 switch which allows the CPU to operate in virtual mode. This error message means that the BIOS is not able to switch the CPU into protected mode.
7	Processor Exception Interrupt Error - The CPU chip has generated an exception interrupt.
8	Display Memory Read /Write Error - The video adapter is either missing or the video memory is faulty. PLEASE NOTE: This is not a fatal error.
9	ROM Checksum Error - The ROM checksum value does not match the value encoded in the BIOS.
10	CMOS Shutdown Register Read/Write Error - The shutdown register for the CMOS memory has failed.

APPENDIX G - LIST OF FLAT PANELS SUPPORTED

The IPC-1041 CPU has been tested with the following flat panel displays. Since the timing and interface requirements are different for each display type and manufacturer, the BIOS chip must be reprogrammed with the applicable BIOS file, located on the distribution diskette, as shown in the table below:

Manufacturer	Part Number	BIOS File	Description
Casio	MD650TS00-01	37MLCD.ROM	Mono DSTN 640x480
Hitachi	LMG5160XUFC	37MLCD.ROM	Mono DSTN 640x480
Hitachi	TX26D60/TX24D55	37TFTS1.ROM	TFT 640x480-SYNC (16bit)
Hitachi	TX26D60/TX24D55	37TFTS2.ROM	TFT 640x480-SYNC (18/24 bit)
Hosiden	HLM6667	37MLCD.ROM	Mono DSTN 640x480
NEC	NL8060AC26-04	37TFT861.ROM	TFT 800x600-SYNC (16 bit)
NEC	NL8060AC26-04	37TFT862.ROM	TFT 800x600-SYNC (18/24 bit)
NEC	NL8060AC26-05	37TFT861.ROM	TFT 800x600-SYNC (16 bit)
NEC	NL8060AC26-05	37TFT862.ROM	TFT 800x600-SYNC (18/24 bit)
NEC	NL8060BC31-02	37TFT861.ROM	TFT 800x600-SYNC (16 bit)
NEC	NL8060BC31-02	37TFT862.ROM	TFT 800x600-SYNC (18/24 bit)
Optrex	DMF-50260NFU-FW-8	37MLCD.ROM	Mono DSTN 640x480
Panasonic	S817	37PLASMA.ROM	PLASMA 640x480
Planar	EL640.480-A	37EL.ROM	EL 640x480
Sanyo	LCM-5331-22NTK	37DSTN.ROM	Color DSTN 640x480
Sharp	LM64C35P	37DSTN.ROM	Color DSTN 640x480
Sharp	LQ10D321	37TFTS1.ROM	TFT 640x480-SYNC (16 bit)
Sharp	LQ10D321	37TFTS2.ROM	TFT 640x480-SYNC (18/24 bit)
Toshiba	LTM09C015A	37TFTLP1.ROM	TFT 640x480-LP (16 bit)
Toshiba	LTM09C015A	37TFTLP2.ROM	TFT 640x480-LP (16/24 bit)
Toshiba	LTM09C015A	37TFTS1.ROM	TFT 640x480-SYNC (16 bit)
Toshiba	LTM09C015A	37TFTS2.ROM	TFT 640x480-SYNC (18/24 bit)

The flash chip can be programmed on-board using the FLASH634.COM utility.

Example: To program the BIOS with the 37MLCD.ROM file, at the DOS prompt type:

```
flash634 37m lcd .rom
```

When the program is finished reboot the system.

Note: The default BIOS for IPC-1041 CPU is the 37DSTN.ROM