5974 PC–104 Card

COPYRIGHT

TRADEMARKS

NOTICE TO USER

The information contained in this document is believed to be correct. However, Octagon assumes no responsibility for any of the circuits described herein, conveys no license under any patent or other right and makes no representations that the circuits are free from patent infringement. Octagon makes no representation or warranty that such applications will be suitable for the use specified without further testing or modification.

Octagon Systems Corporation general policy does not recommend the use of its products in life support applications where the failure or malfunction of a component may directly threaten life or injury. It is a Condition of Sale that the user of Octagon products in life support applications assumes all the risk of such use and indemnifies Octagon against all damages.

OCTAGON SYSTEMS®

THE MICRO PC® COMPANY

6510 W. 91st AvenueDoc. Order #03586 Rev 0493
Westminster, CO 80030 **Tech. Support:** 303–426–4521

IMPORTANT!

Please read before installing your product.

Octagon's products are designed to be high in performance while consuming very little power. In order to maintain this advantage, CMOS circuitry is used.

CMOS chips have specific needs and some special requirements that the user must be aware of. Read the following to help avoid damage to your card from the use of CMOS chips.

Using CMOS Circuitry in Industrial Control

Industrial computers originally used LSTTL circuits. Because many PC components are used in laptop computers, IC manufacturers are exclusively using CMOS technology. Both TTL and CMOS have failure mechanisms, but they are different. This section describes some of the common failures which are common to all manufacturers of CMOS equipment. However, much of the information has been put in the context of the Micro PC.

Octagon has developed a reliable database of customer-induced, field failures. The average MTBF of Micro PC cards exceeds 11 years, yet there are failures. Most failures have been identified as customer-induced, but there is a small percentage that cannot be identified. As expected, virtually all the failures occur when bringing up the first system. On subsequent systems, the failure rate drops dramatically.

- Approximately 20% of the returned cards are problem-free. These cards, typically, have the wrong jumper settings or the customer has problems with the software. This causes frustration for the customer and incurs a testing charge from Octagon.
- Of the remaining 80% of the cards, 90% of these cards fail due to customer misuse and accident. Customers often cannot pinpoint the cause of the misuse.
- Therefore, 72% of the returned cards are damaged through some type of misuse. Of the remaining 8%, Octagon is unable to determine the cause of the failure and repairs these cards at no charge if they are under warranty.

The most common failures on CPU cards are over voltage of the power supply, static discharge, and damage to the serial and parallel ports. On expansion cards, the most common failures are static discharge, over voltage of inputs, over current of outputs, and misuse of the CMOS circuitry with regards to power supply sequencing. In the case of the video cards, the most common failure is to miswire the card to the flat panel display. Miswiring can damage both the card and an expensive display.

- **Multiple component failures** - The chance of a random component failure is very rare since the average MTBF of an Octagon card is greater than 11 years. In a 7 year study, Octagon has never found a single case where multiple IC failures were not caused by misuse or accident. It is very probable that multiple component failures indicate that they were user-induced.

- **Testing "dead" cards** - For a card that is "completely nonfunctional", there is a simple test to determine accidental over voltage, reverse voltage or other "forced" current situations. Unplug the card from the bus and remove all cables. Using an ordinary digital ohmmeter on the 2,000 ohm scale, measure the resistance between power and ground. Record this number. Reverse the ohmmeter leads and measure the resistance again. If the ratio of the resistances is 2:1 or greater, fault conditions most likely have occurred. A common cause is miswiring the power supply.

- **Improper power causes catastrophic failure** - If a card has had reverse polarity or high voltage applied, replacing a failed component is not an adequate fix. Other components probably have been partially damaged or a failure mechanism has been induced. Therefore, a failure will probably occur in the future. For such cards, Octagon highly recommends that these cards be replaced.

- **Other over-voltage symptoms** - In over-voltage situations, the programmable logic devices, EPROMs and CPU chips, usually fail in this order. The failed device may be hot to the touch. It is usually the case that only one IC will be overheated at a time.

- **Power sequencing** - The major failure of I/O chips is caused by the external application of input voltage while the Micro PC power is off. If you apply 5V to the input of a TTL chip with the power off, nothing will happen. Applying a 5V input to a CMOS card will cause the current to flow through the input and out the 5V power pin. This current attempts to power up the card. Most inputs are rated at 25 mA maximum. When this is exceeded, the chip may be damaged.

- **Failure on power-up** - Even when there is not enough current to destroy an input described above, the chip may be destroyed when the power to the card is applied. This is due to the fact that the input current biases the IC so that it acts as a forward biased diode on power-up. This type of failure is typical on serial interface chips.

- **Serial and parallel** - Customers sometimes connect the serial and printer devices to the Micro PC while the power is off. This can cause the failure mentioned in the above section, *Failure upon power-up*. Even if they are connected with the Micro PC on, there can be another failure mechanism. Some serial and printer devices do not share the same power (AC) grounding. The leakage can cause the serial or parallel signals to be 20-40V above the Micro PC ground, thus, damaging the ports as they are plugged in. This would not be a problem if the ground pin is connected first, but there is no guarantee of this. Damage to the printer port chip will cause the serial ports to fail as they share the same chip.

- **Hot insertion** - Plugging cards into the card cage with the power on will usually not cause a problem. (**Octagon urges that you do not do this!**) However, the card may be damaged if the right sequence of pins contacts as the card is pushed into the socket. This usually damages bus driver chips and they may become hot when the power is applied. This is one of the most common failures of expansion cards.

- **Using desktop PC power supplies** - Occasionally, a customer will use a regular desktop PC power supply when bringing up a system. Most of these are rated at 5V at 20A or more. Switching supplies usually require a 20% load to operate properly. This means 4A or more. Since a typical Micro PC system takes less than 2A, the supply does not regulate properly. Customers have reported that the output can drift up to 7V and/or with 7-8V voltage spikes. Unless a scope is connected, you may not see these transients.

- **Terminated backplanes** - Some customers try to use Micro PC cards in backplanes that have resistor/capacitor termination networks. CMOS cards cannot be used with termination networks. Generally, the cards will function erratically or the bus drivers may fail due to excessive output currents.

- **Excessive signal lead lengths** - Another source of failure that was identified years ago at Octagon was excessive lead lengths on digital inputs. Long leads act as an antenna to pick up noise. They can also act as unterminated transmission lines. When 5V is switch onto a line, it creates a transient waveform. Octagon has seen submicrosecond pulses of 8V or more. The solution is to place a capacitor, for example 0.1 µF, across the switch contact. This will also eliminate radio frequency and other high frequency pickup.

INTRODUCTION

The 5974 PC–104 Card allows you to add any card designed to the PC–104 format to a Micro PC system. A PC–104 card plugs directly into the 5974. Standoffs for additional support of the PC–104 card are provided with your PC–104 card.

TERMINATION

The PC–104 contains optional solder–in terminators that may be required by some PC–104 cards. Use 47PF capacitors in C1–C54. Use 47 ohm, 10–pin terminating resistor networks in RN1–RN7. Pin 1 of the resistor network should go to the square pad of RN1–RN7.

TECHNICAL SPECIFICATION

The 5974 contains no active components and requires no system power.

Environmental

The temperature range of a system will generally be limited by the PC–104 card.

Size

4.5 in. x 4.9 in.

CONNECTOR PINOUTS

Micro PC "A" and PC-104 Connector			
Pin #	**Description**	**Pin #**	**Description**
A1	I/O CH CK*	A17	A14
A2	D7	A18	A13
A3	D6	A19	A12
A4	D5	A20	A11
A5	D4	A21	A10
A6	D3	A22	A9
A7	D2	A23	A8
A8	D1	A24	A7
A9	D0	A25	A6
A10	I/O CH RDY	A26	A5
A11	AEN	A27	A4
A12	A19	A28	A3
A13	A18	A29	A2
A14	A17	A30	A1
A15	A16	A31	A0
A16	A15	A32	Gnd

* = active low

NOTE: A32 applies only to the PC-104 connector.

Micro PC "B" and PC-104 Connector			
Pin #	**Description**	**Pin #**	**Description**
B1	GND	B17	DACKI*
B2	RESET	B18	DRQ1
B3	+5V	B19	DACK0*
B4	IRQ2	B20	CLOCK
B5	-5V	B21	IRQ7
B6	DRQ2	B22	IRQ6
B7	-12V	B23	IRQ5
B8	Reserved	B24	IRQ4
B9	+12V	B25	IRQ3
B10	Analog Gnd	B26	DACK2*
B11	MEMW*	B27	T/C
B12	MEMR*	B28	ALE
B13	IOW*	B29	Aux +5V
B14	IOR*	B30	OSC
B15	DACK3*	B31	Aux Gnd
B16	DRQ3	B32	Aux Gnd

* = active low

NOTE: B32 applies only to the PC-104 connector.