# I600 Series

INDUSTRIAL RACK MOUNT PCs

# *Hardware Guide*

XYCOM AUTOMATION
Open the Possibilities℠

| Revision | Description | Date |
|---|---|---|
| A | Manual Released | 4/01 |
| B | Update notes | 4/01 |

Part Number 160000(B)



**United States FCC Part 15, Subpart B, Class A EMI Compliance 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.

**For European Users: 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.

**INSTALLATION: ELECTROMAGNETIC COMPATIBILITY WARNING**
The connection of non-shielded equipment interface cables to this equipment will invalidate FCC EMI and European Union EMC compliance and may result in electromagnetic interference and/or susceptibility levels which are in violation of regulations which apply to the legal operation of this device. It is the responsibility of the system integrator and/or user to apply the following directions which relate to installation and configuration:

All interface cables must include shielded cables. Braid/foil type shields are recommended. Communication cable connectors must be metal, ideally zinc die-cast backshell types, and provide 360 degree protection about the interface wires. The cable shield braid must be terminated directly to the metal connector shell, ground drain wires alone are not adequate.

Protective measures for power and interface cables as described within this manual must be applied. Do not leave cables connected to unused interfaces or disconnected at one end. Changes or modifications to this device not expressly approved by the manufacturer could void the user's authority to operate the equipment.

EMC compliance is, in part, a function of PCB design. Third party add-on AT/XT peripheral PCB assemblies installed within this apparatus may void EMC compliance. FCC/CE compliant PCB assemblies should always be used where possible. Xycom Automation can accept no responsibility for the EMC performance of this apparatus after system integrator/user installation of PCB assemblies not manufactured and/or expressly tested and approved for compliance by Xycom Automation. It is the responsibility of the system integrator/user to ensure that installation and operation of such devices does not void EMC compliance.

**BATTERY REPLACEMENT 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.

**CPU REMOVAL AND REPLACEMENT CAUTION:**
Use caution when removing the CPU from its board. After removing the DRAM, carefully slide the CPU from its position without bumping or bending components behind or around the CPU.

# Table of Contents

# 1 Product Overview

The Xycom Automation 1600 Industrial Rack Mount PCs put the power and versatility of a PC-compatible computer in an industry standard package. It is ideal for the factory floor and other industrial applications. The 1600 industrial rack mount PC  meets the requirements of a wide variety of applications where both a powerful PC and a durable industrial enclosure are required.

The system integrates the computer card cage, mass storage options, and power supply options in a truly industrial standard 19" EIA form factor with rack mount 4U height. The open architecture design accepts ISA and PCI cards and a variety of single-board computers. The 1600's design allows easy access to the boards, switches, power supply, and drives.

## PRODUCT FEATURES FOR THE 1600

- Rack mount 4U height
- Choice of backplanes with up to 7 PCI expansion slots
- Intel® Socket 370 Celeron® or Pentium® III processors up to 700 MHz
- Up to 256 MB SDRAM
- AGP graphics controller with 4 MB video RAM
- PCI IDE Controller
- Built-in 10/100 BaseT Ethernet port
- Parallel, two RS-232, video, and one combined PS/2 mouse and keyboard ports on rear
- Lockable front door panel for preventing unwanted access
- PS/2 keyboard and mouse connectors behind the lockable front door
- 1.44 MB front accessible floppy or LS-120 drive
- Three 5.25" front accessible drive bays
- Internal hard drive up to 20 GB
- Preloaded with MS-DOS, Windows® 95, Windows® 98, or Windows NT®
- Power-on switch with power indicator and reset switch behind the lockable door, also includes HDD LED indicator(s)
- 82 CFM cooling fan that dissipates heat in the chassis with replaceable and easy-to-clean air filters in the front door to protect drives, connectors, and internal components from excessive dust
- Hold-down clamp for protecting add-on cards against vibration
- Optional dual redundant 300 W AC and -48 V DC power supplies

## External Views

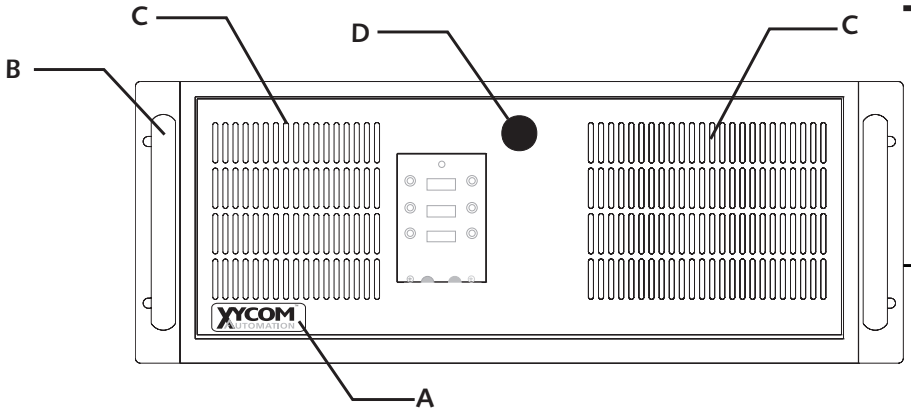



Figure 1. Front view with the door closed.
**A**, Logo area
**B**, Case handles
**C**, Air filters
**D**, Access latch

**Logo area:** The front panel incorporates a logo panel that can be customized. Figure 6 depicts the label dimensions and provides the recommended requirements for a customized label.

**Case handles:** These can be used to carry the 1600 and to maneuver it into position when mounting.

**Air filters:** There are two air filters mounted in each side of the front door. These filters separate particulate contaminants from the cooling air drawn into the 1600.

• Refer to page 33 for instructions on cleaning the air filters.

**Access latch:** Latches and locks the front panel door. The knob does not need to be locked in order for the door to stay closed.

***Note:*** When not being serviced, close and lock door.

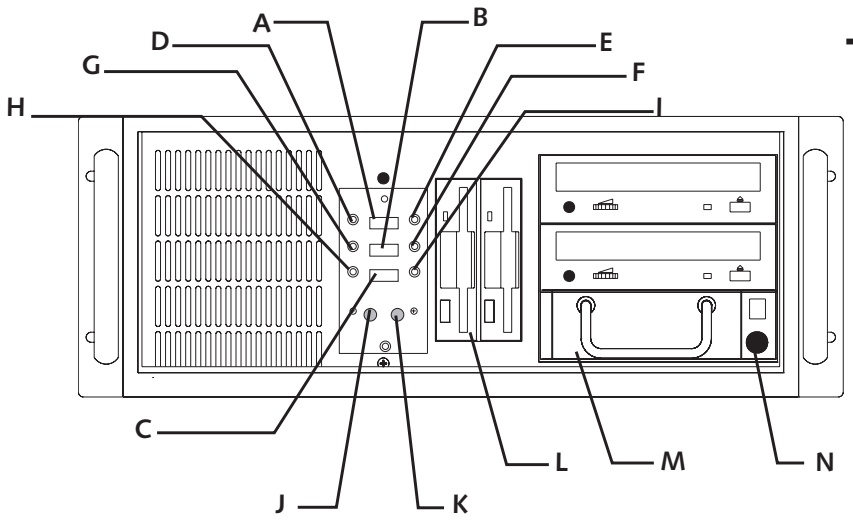



Figure 2. Front view with the door open.
**A**, Power ON/OFF switch
**B**, Reset switch
**C**, PS Reset switch
**D**, Power LED indicator light
**E**, HDD1 LED indicator light
**F**, HDD2 LED indicator light
**G**, PS Alarm LED indicator light
**H**, PS1 LED indicator light
**I**, PS2 LED indicator light
**J**, PS/2 mouse connector
**K**, PS/2 keyboard connector
**L**, 3.5" drive bays
**M**, 5.25" drive bays
**N**, Removable drive lock

**Power ON/OFF switch:** This switch should be positioned to OFF (O) until the system is properly configured and connected to an appropriate power source.

**Reset switch:** This switch restarts the computer.

**PS Reset switch:** The power supply reset switch resets the power supply (PS) alarm triggered by a power supply interruption. This switch is present only on units with dual redundant 300 watt AC power supply.

**Power LED indicator light:** This LED glows green when power is applied to the 1600.

**HDD1 LED indicator light:** This LED glows green to indicate the hard drive is being accessed.

**HDD2 LED indicator light:** This LED glows green to indicate a second hard drive is being accessed (only if a second CPU is installed—not available at this time).

**PS Alarm LED indicator light:** This LED is available only with a dual redundant 300 watt AC power supply unit and flashes when one of the power supplies malfunctions. To reset the PS Alarm, press the PS Reset switch.

**PS1 LED indicator light:** This LED is available only with a dual redundant 300 watt AC power supply unit and glows green when the first power supply is functioning properly.

**PS2 LED indicator light:** This LED is available only with a dual redundant 300 watt AC power supply unit and glows green when the second power supply is functioning properly.

**PS/2 mouse connector:** A mouse can interface with the system through this six-pin PS/2-compatible connector.

• Refer to page 42 for pin assignments for the mouse connector.

***Note:*** Do not connect a mouse to this front connector if a mouse is plugged into the keyboard connector on the rear panel. Doing so may cause each mouse to operate improperly.

**PS/2 keyboard connector:** A keyboard can interface with the system through this six-pin PS/2-compatible connector.

• Refer to page 42 for pin assignments for the keyboard connector.

> ***Note:*** Do not connect a keyboard to this front connector if a keyboard is plugged into the keyboard connector on the rear panel. Doing so may cause the keyboards to operate improperly.

**3.5" drive bays:** These front accessible bays can hold up to two 3.5" storage devices, including 1.44 MB floppy, LS-120, and internal hard drives.

**5.25" drive bays:** These bays hold up to three 5.25" mass storage devices, including CD-ROM, CD-Writable, Zip, 5 GB tape, removable 6.4 GB hard, or removable 12 GB hard drives.

> ***Note:*** The 1600 units hold a maximum of four IDE devices. Therefore, only two 5.25" mass storage devices can be accommodated when both the LS-120 and internal hard drives are installed in the 3.5" drive bays.

**Removable drive lock:** If a removable drive is installed in the system, it must be locked in order to operate. The display above the lock displays an **O** when locked and a **U** when unlocked. The display also flashes when the removable hard drive is active.

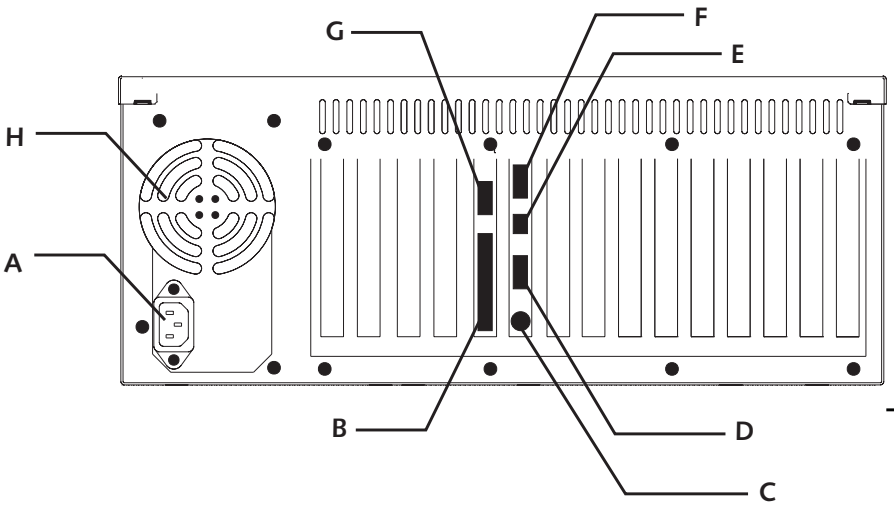



Figure 3. Rear view.
**A**, Power connector
**B**, Parallel port
**C**, PS/2 keyboard and mouse connector
**D**, COM1 serial connector, RS-232
**E, Ethernet port**
**F, Video connector**
**G,** COM2 serial connector, RS-232
**H**, Fan Outlet grille

**Power connector:** For AC power units, the standard power cord must be securely positioned before turning power ON. The 1600's autoranging AC power supply requires no switch adjustment. For -48 volt DC units, the positive, negative, and ground wires must be properly connected to the corresponding holes.

- Refer to page 40 for power connector pin assignments.
- Refer to page 30 for proper AC power cord installation.
- Refer to page 30 for instructions on creating a DC power supply cable.

**Parallel port:** A printer usually interfaces with the system through this 25-pin connector.

- Refer to page 40 for parallel port pin assignments.

**PS/2 keyboard and mouse connector:** Both a keyboard and a mouse can be connected to this PS/2 compatible port through the Y adapter cable included with your unit. Connect a mouse to the cable with an icon of a mouse on it and a keyboard into the cable with an icon of a keyboard on it (see figure ). If connecting only a keyboard, you can connect directly to the PS/2 compatible connector on the rear of the unit. If connecting only a mouse, the mouse must be connected using the Y adapter cable port with an icon of a mouse on it.

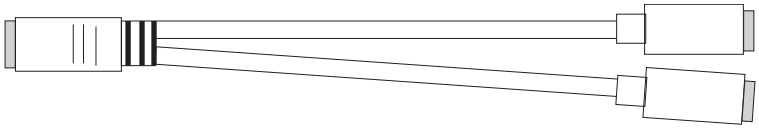


Figure 4. Y adapter cable for rear keyboard and mouse connector.

- Refer to page 43 for the keyboard/mouse connector pin assignments.

***Note:*** Do not connect a keyboard to this rear connector if a keyboard is plugged into the keyboard connector on the front panel. Doing so may cause the keyboards to operate improperly.

***Note:*** Do not connect a mouse to this rear connector if a mouse is plugged into the keyboard connector on the front panel. Doing so may cause each mouse to operate improperly.

**COM1 serial connector, RS-232:** This RS-232 compatible serial port is located right above the PS/2 keyboard/mouse connector (see figure 3).

• Refer to page 41 for COM1 serial port pin assignments.

**Ethernet port:** This RJ45 connector provides a 10 BaseTX and 100 BaseTX autosensing Ethernet connection.

• Refer to page 43 for Ethernet connector pin assignments.

**Video connector:** This 15-pin high-density female connector is used to connect a monitor to the unit's video output.

• Refer to page 44 for video connector pinouts.

**COM2 serial connector, RS-232:** This RS-232 compatible serial port is located above the parallel port (see figure 3).

• Refer to page 42 for COM2 serial port pin assignments.

**Fan outlet grille:** Unobstructed airflow is essential to proper ventilation and cooling of the 1600. Do not obstruct this outlet.

## Opening the Unit

To prepare your unit for installation or to reconfigure an installed unit's hardware options, you may want to upgrade the unit's memory, add expansion cards, or change a connector's jumper setting. You will need to open the unit to access the motherboard.

### To Open the Unit

***Warning:*** You must disconnect the power cable and any other external cables connected to the unit before opening the unit. To close the unit, perform the open unit steps in reverse order.

1. Turn off the unit.
2. If the 1600 is mounted on its optional slide rails, slide it forward, out of the rack or cabinet in which it is mounted.
3. Disconnect the power and any other cables connecting the 1600 to external devices.
4. Remove the 1600 from any rack or case in which it has been mounted.

5. Remove the three Phillips-head screws from the top panel.

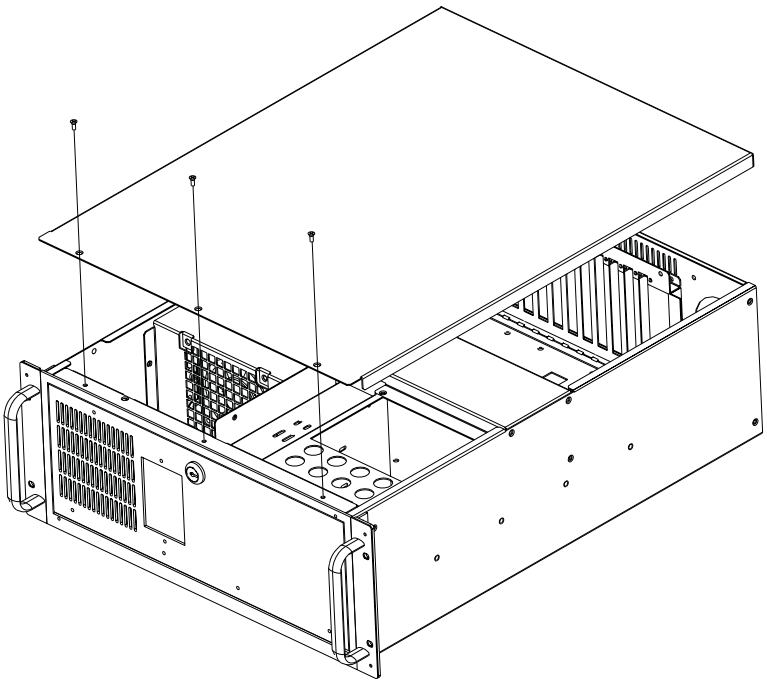


Figure 4. Removing the top cover.

6. Tilt the front of the top panel upward, and then slide the panel back towards the rear of the unit until it is free.

## Internal View

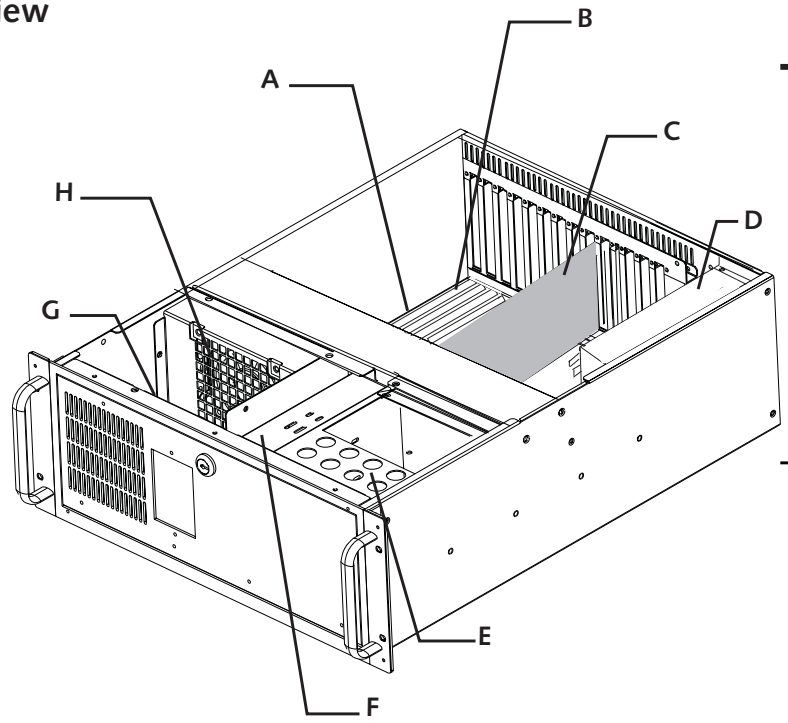



Figure 5. Internal system components.
**A**, Backplane
**B**, ISA/PCI expansion slots
**C**, CPU board
**D**, Power supply
**E**, 5.25" drive bays
**F**, 3.5" drive bays
**G**, Speaker
**H**, Cooling fan

**Backplane:** Depending on your system, the backplane has either eight ISA and four PCI, five ISA and seven PCI, seven ISA and four PCI, or 7 ISA and 4 PCI available for expansion.

**ISA/PCI expansion slots:** Refer to page 20 for instructions on adding expansion cards.

**CPU board:** Refer to your board manual for information about the CPU board.

**Power supply:** The power supply is located in the rear of the unit. 300 watt AC power supply is standard. Dual redundant 300 watt AC and -48 volt DC power supplies are optional.

- Refer to page 17 for power supply specifications.

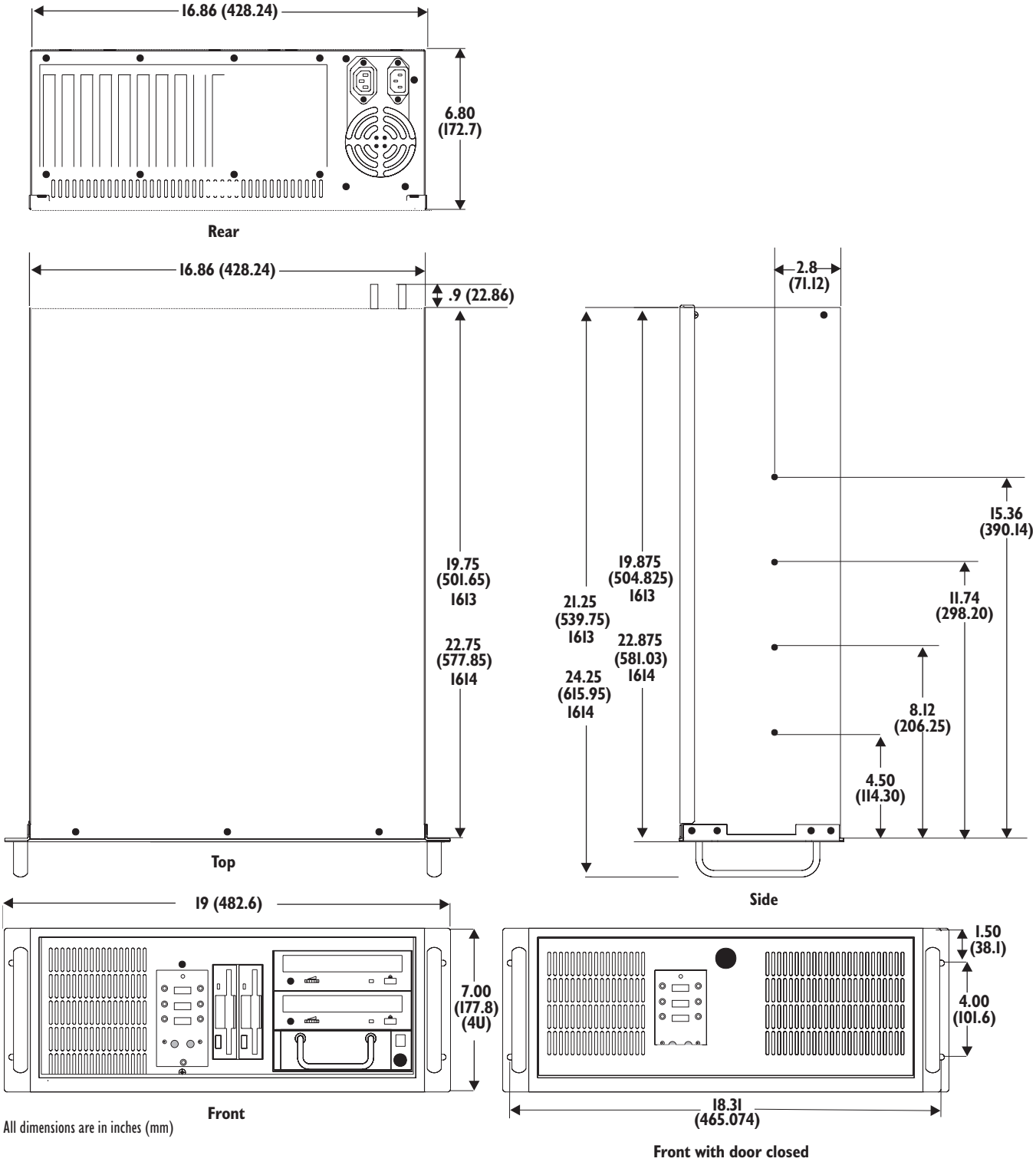
**5.25" drive bays:** Refer to page 21 for instructions on adding and removing 5.25" devices.

**3.5" drive bays:** Refer to page 22 for instructions on adding and removing 3.5" devices.

**Speaker:** This speaker provides buzzing alarms when signaled by software applications.

**Cooling fan:** This 82 CFM cooling fan dissipates heat in the chassis.

# PRODUCT MOUNTING AND DIMENSIONS FOR 1613 AND 1614




All dimensions are in inches (mm)

## CREATING A CUSTOMIZED LOGO

You may place a customized label on the unit. Figure 6 provides the dimensions and recommended requirements for a customized label.

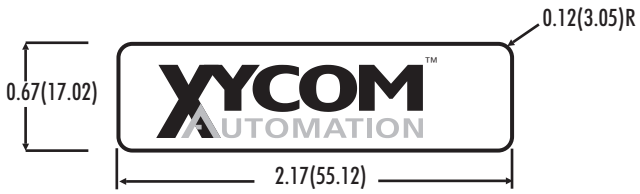



Figure 6. Customized logo.

Once you have created a customized label, place it over the "Xycom Automation" label.

# PRODUCT SPECIFICATIONS AND RATINGS

## Environmental

| | Operating | Nonoperating |
|---|---|---|
| Temperature | 0C to 50C | -20C to 60C |
| Humidity | 20% to 80% RH, noncondensing | 5% to 90% RH, noncondensing |
| Shock[a] | 2g peak acceleration, 11 msec duration | 7.5g peak acceleration, 11 msec duration |
| Vibration<br>5 to 2000 Hz | .5 g acceleration | 0.081" peak to peak displacement<br>2g maximum acceleration |
| Altitude | Sea level to 15,000 ft. | Sea level to 50,000 ft. |

[a]Mounted by the flange only (not rail mounted).

## Cooling Fan Capacity[b]

82 CFM with dust filters

[b]Does not include power supply fans.

## Electrical

| Power supply | 300 W AC | 2 x 300 W AC Redundant | -48 V DC |
|---|---|---|---|
| Rated input | 115/230V AC, autoranging, 50-60 Hz, 7.0A (maximum) @ 115V, 3.0A (maximum) @ 230V | 115/230V AC, autoranging, 50-60 Hz, 7.0A (maximum) @ 115V, 3.0A (maximum) @ 230V | DC -48V@1.7A |

## Unit Weight

48.2 lbs (23 kg)

## Regulatory Compliance

FCC, Class A

CE

## Safety Agency Approvals

UL

cUL

# 2 Hardware Options

## CONNECTING EXTERNAL OPTIONS

To attach peripherals and make other external connections to your unit, refer to pages 9-11 for connector locations and appendix A for pin assignments.

## SYSTEM MEMORY

You can order your CPU factory-configured for many configurations of SDRAM. You can reconfigure the SDRAM capacity by changing the SDRAM Double In-line Memory Modules (DIMMs) on the unit's motherboard. Each of the 168-pin DIMM modules on the unit's motherboard provides an interface for 256 MB of SDRAM. SDRAM sizes of 32, 64, 128, and 256 MB may be used.

The SBC-370 board has four DIMM modules, supporting up to 1 GB SDRAM.

The SBC-SLOT1 board has two DIMM modules, supporting up to 512 MB SDRAM.

Part numbers for SDRAM are on page 34.

### To Install Memory

> ***Warning:*** To prevent any component damage or injury, please make sure your 1600 unit is completely powered down before performing any installation or maintenance and wear a ground wrist strap or other static-dissipating device.

1. Open the unit as described on page 12.
2. Remove the hold-down bar by removing the seven screws securing it (two connecting the hold-down bar to the 5.25" drive bay, two on the left side when facing the front panel, and three on the right side when facing the front panel). Lift the bar out of the unit.

3. Insert memory vertically.

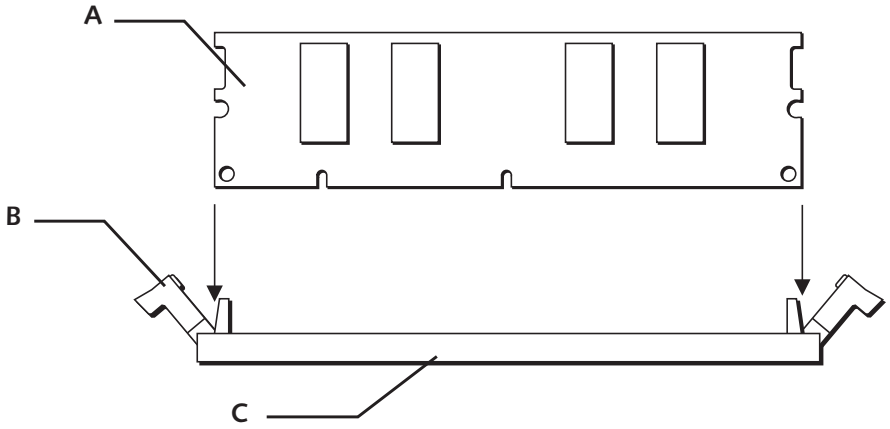



Figure 7. Installing memory.
**A**, DIMM Memory
**B**, Locking Mechanism
**C**, DIMM Socket

4. Lock into place.

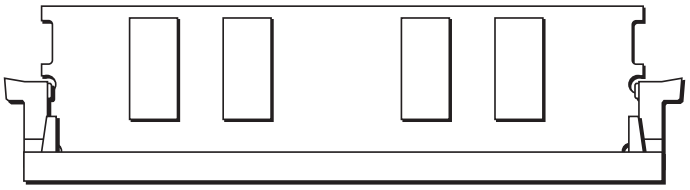


Figure 8. Memory installed.

## ISA/PCI EXPANSION

The 1600 comes with a choice of backplanes: eight ISA and four PCI, five ISA and seven PCI, or seven ISA and four PCI available expansion slots.

### To Add ISA/PCI Cards

1. Check that the memory, I/O configuration, and processor requirements for the board you want to install do not conflict with the CPU and memory maps of boards already installed in your system. Refer to pages 44-48 for information about the SBC-370 and SBC-SLOT1 boards.

***Warning:*** To prevent any component damage or injury, please make sure your 1600 unit is completely powered down before performing any installation or maintenance and wear a ground wrist strap or other static-dissipating device.

2. Open the unit as described on page 12.
3. Remove the hold-down bar by removing the seven screws securing it (two connecting the hold-down bar to the 5.25" drive bay, two on the left side when facing the front panel, and three on the right side when facing the front panel). Lift the bar out of the unit.

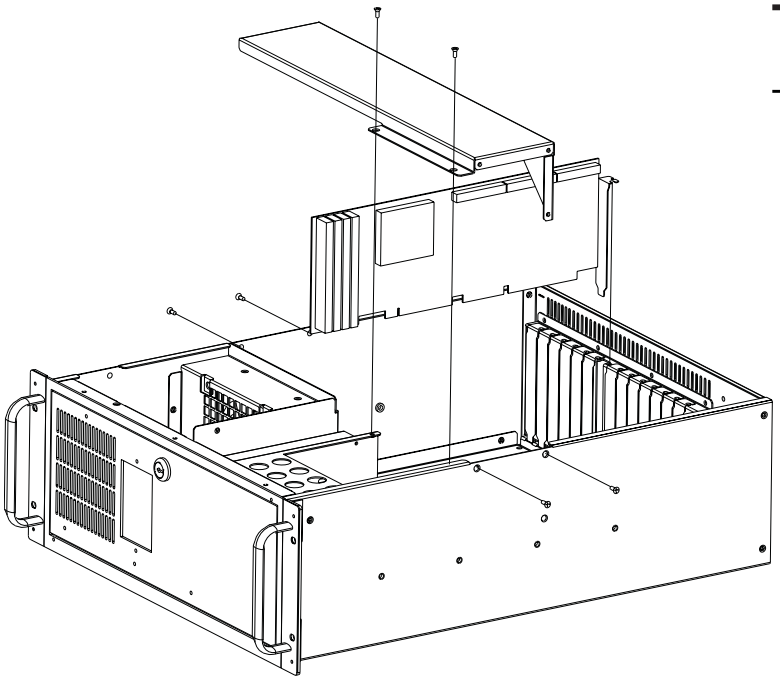


Figure 9. Card assembly.

4. Remove the ORB cover for the slot that the card will occupy. Save the screw.

***Note:*** When installing cards into a system equipped with the combination ISA/PCI backplane, you may install an ISA card in the shared ISA/PCI slot or a PCI card in the PCI slot immediately adjacent to it. Due to physical clearance limitations, you may NOT install an ISA card in the shared ISA/PCI slot and a PCI card in the adjacent PCI slot.

5. Slide the card into the slot. Push down on the card evenly until it firmly rests in the card cage connectors.

> ***Note:*** DO NOT force the card or apply uneven pressure.

6. Secure the card's ORB to the 1600 by replacing and tightening the screw that was removed.

## INTERNAL DRIVE OPTIONS

### To Add or Replace 5.25" Devices

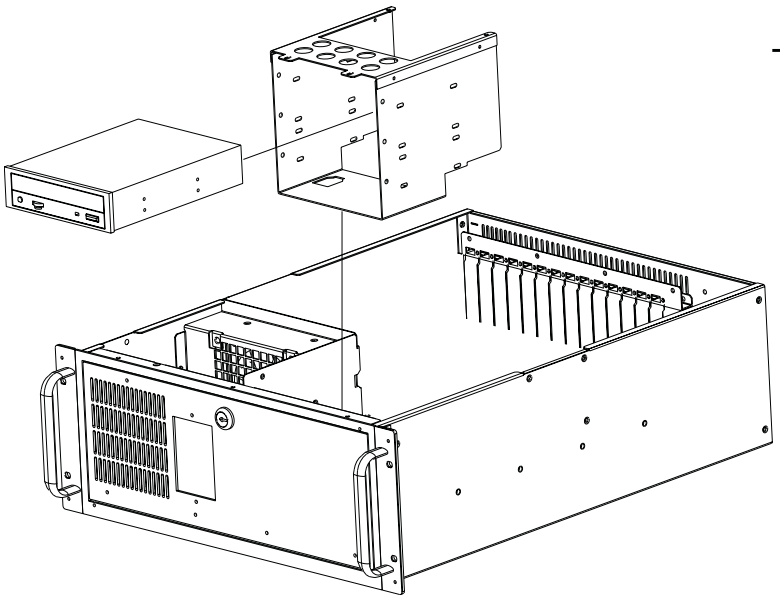
1. Check that the memory, I/O configuration, and processor requirements for the device you want to install do not conflict with the CPU and memory maps of boards already installed in your system. If you must install an additional controller card, verify that its requirements do not conflict either. Refer to pages 44-48 for information about the SBC-370 and SBC-SLOT1 boards.

> ***Warning:*** To prevent any component damage or injury, please make sure your 1600 unit is completely powered down before performing any installation or maintenance and wear a ground wrist strap or other static-dissipating device.

2. Remove the top cover as described on page 12.
3. Remove the hold-down bar by removing the seven screws securing it (two connecting the hold-down bar to the 5.25" drive bay, two on the left side when facing the front panel, and three on the right side when facing the front panel). Lift the bar out of the unit.
4. Remove device and power cables if they're already connected to existing devices.
5. Remove the two screws securing the 5.25" drive bay to the front panel.
6. Slide the 5.25" drive bay approximately 1" towards the back of the chassis.

7. Lift to remove the drive bay.

Figure 10. 5.25" drive assembly.



8. Add or replace 5.25" devices to the drive bay by securing each with screws.

***Note:*** If the drive bay is equipped with blue shock mounting grommets, insert stabilizing cylinders into center of each grommet before securing devices with screws.

### To Add or Replace 3.5" Devices

1. Check that the memory, I/O configuration, and processor requirements for the device you want to install do not conflict with the CPU and memory maps of boards already installed in your system. If you must install an additional controller card, verify that its requirements do not conflict either. Refer to pages 44-48 for information about the SBC-370 and SBC-SLOT1 boards.

***Warning:*** To prevent any component damage or injury, please make sure your 1600 unit is completely powered down before performing any installation or maintenance and wear a ground wrist strap or other static-dissipating device.

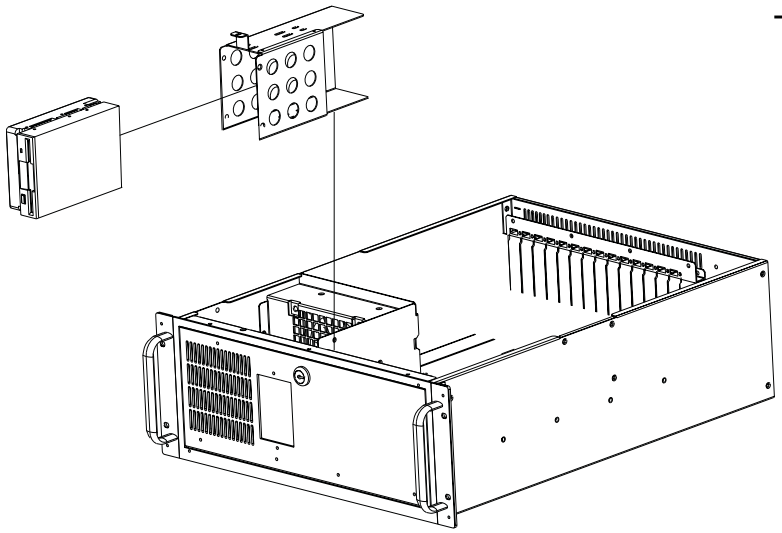
2. Remove the top cover as described on page 12.
3. Remove the hold-down bar by removing the seven screws securing it (two connecting the hold-down bar to the 5.25" drive bay, two on the left side when facing the front panel, and three on the right side when facing the front panel). Lift the bar out of the unit.
4. Remove device and power cables if they're already connected to existing devices.
5. Remove the screw securing the 3.5" drive bay to the front panel.

6. Slide the 3.5" drive bay approximately 1" towards the back of the chassis to free it from the latches.

> ***Note:*** It may be necessary to remove cards that are in the way.

7. Lift to remove the drive bay.

Figure 11. 3.5" drive assembly.



8. Add or replace 3.5" devices to drive bay by securing each with screws.

# 3 Installation

***Note:*** The procedures in the section are intended for service personnel only.

***Note:*** The 1600 Series computer configured with the -48 V DC input power option is for installation in a restricted access location only.

## ENVIRONMENTAL CONSIDERATIONS

The system's rugged design allows it to be installed in most industrial environments. You can refer to the unit's electrical and environmental specifications and tolerances (page 17) for more detailed information.

### System Power

Using isolation transformers on the incoming AC power line to the system is always a good practice. An isolation transformer is especially desirable in cases in which heavy equipment is likely to introduce noise onto the AC line. The isolation transformer can also serve as a step-down transformer to reduce the incoming line voltage to a desired level. The transformer should have a sufficient power rating (units of volt-amperes) to supply the load adequately.

Proper grounding is essential to all safe electrical installations. Refer to the relevant federal, state/provincial, and local electric codes that provide data such as the size and types of conductors, color codes, and connections necessary for safe grounding of electrical components. The code specifies that a grounding path must be permanent (no solder), continuous, and able to safely conduct the ground-fault current in the system with minimal impedance (minimum wire required is 18 AWG, 1 mm).

Observe the following practices:

- Separate ground wires (P.E. or Protective Earth) from power wires at the point of entry to the enclosure. To minimize the ground wire length within the enclosure, locate the ground reference point near the point of entry for the plant power supply.
- All electrical racks or chassis and machine elements should be Earth Grounded in installations where high levels of electrical noise can be expected. The rack/chassis should be grounded with a ground rod or attached to a nearby Earth structure such as a steel support beam. Connect each different apparatus to a single Earth Ground point in a "star" configuration with low impedance cable. Scrape away paint and other nonconductive material from the area where a chassis makes contact with the enclosure.

## Excessive Heat

The chassis is designed to dissipate heat with force convection cooling (drawing air from the front and exhausting hot air out the back). Therefore, the rack must provide sufficient air circulation paths in the front and back areas. The chassis temperature is usually elevated above ambient temperatures in a rack environment. Maximum ambient temperatures in and around the rack must not exceed the maximum temperature specification (see page 17).

When the air temperature is higher than the specified maximum in the rack, use a fan or air conditioner to lower the temperature.

## Electrical Noise

Electrical noise is seldom responsible for damaging components, unless extremely high energy or high voltage levels are present. However, noise can cause temporary malfunctions which can result in hazardous machine operation in certain applications. Noise may be present only at certain times, may appear at widely-spread intervals, or in some cases may exist continuously.

Noise commonly enters through input, output, and power supply lines and may also be coupled through the capacitance between these lines and the noise signal carrier lines. This usually results from the presence of high voltage or long, close-spaced conductors. When control lines are closely spaced with lines carrying large currents, the coupling of magnetic fields can also occur. Use shielded cables to help minimize noise. Potential noise generators include switching components, relays, solenoids, motors, and motor starters.

Refer to the relevant Federal, State/Provincial, and local electric codes which provide data such as the size and types of conductors, color codes, and connections necessary for safe grounding of electrical components. It is recommended that high- and low-voltage cabling be separated and dressed apart. In particular, AC cables and switch wiring should not be in the same conduit with all communication cables.

## Line Voltage Variation

The power supply section of the unit is built to sustain the specified line fluctuations (see page 17) and still allow the system to function in its operating margin. As long as the incoming voltage is adequate, the power supply provides all the logic voltages necessary to support the processor, memory, and I/O.

Unusual AC line variations may cause undesirable system shutdowns. As a first step to reduce line variations, you can correct any possible feed problems in the distribution system. If this correction does not solve the problem, use a constant voltage transformer. The constant voltage transformer stabilizes the input voltage to the systems by compensating for voltage changes at the primary in order to maintain a steady voltage at the secondary. When using a constant voltage transformer, check that the power rating is sufficient to supply the unit.

## Location and Enclosure

- Place the unit to allow easy access to the system ports.
- Account for the unit's dimensions when selecting an installation location or enclosure (see page 15).
- Place the unit at a comfortable working level.
- Mount the unit in an upright position.
- Consider locations of accessories such as AC power outlets and lighting (interior lighting and windows) for installation and maintenance convenience.
- Prevent condensation by installing a thermostat-controlled heater or air conditioner.
- Avoid obstructing the air flow to allow for maximum cooling.
- Place any fans or blowers close to the heat-generating devices. If using a fan, make sure that outside air is not brought inside the enclosure unless a fabric or other reliable filter is used. This filtration prevents conductive particles or other harmful contaminants from entering the enclosure.
- Do not select a location near equipment that generates excessive electromagnetic interference (EMI) or radio frequency interface (RFI) (equipment such as high- power welding machines, induction heating equipment, and large motor starters).
- Do not place incoming power line devices (such as isolation or constant voltage transformers, local power disconnects, and surge suppressers) near the system. The proper location of incoming line devices keeps power wire runs as short as possible and minimizes electrical noise transmitted to the unit.
- Make sure the location does not exceed the unit's shock, vibration, and temperature specifications (see page 17 for specifications).
- Install the unit so it does not cause a hazard from uneven mechanical loading.
- Incorporate a readily-accessible disconnect device in the fixed wiring on permanently connected equipment.
- Avoid overloading the supply circuit.

# INSTALLING THE UNIT

After you have selected and prepared an appropriate location, you can install the unit.

> ***Note:*** Ensure that the unit's chassis is grounded to the rack or panel enclosure.

## Rack-Mounting

You can position and secure the unit in a 19" universal spacing rack. Refer to the mounting specifications (page 15) to complete these steps.

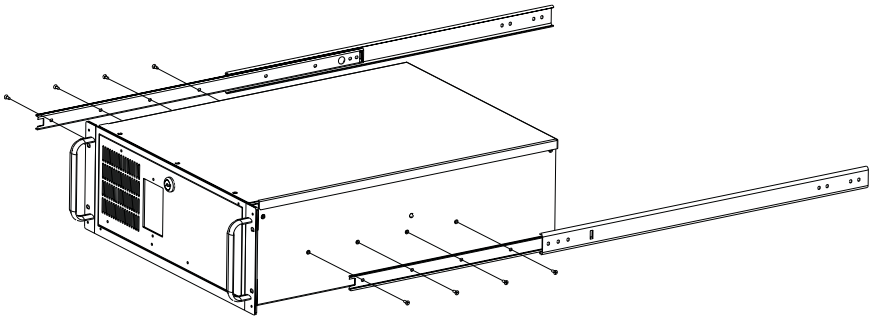
***Warning:*** Install the unit in a manner that does not create an unsafe load condition when mounted in the rack. You may need to reconfigure other equipment in the rack.

### To Mount the Unit with Slide Rails

***Warning:*** Proper installation permits the rack to remain stable and upright while the unit has been slid fully out of the rack.

1. Disconnect all cables and cords from the unit.
2. Place the unit on a solid work surface.
3. Attach the slide rails to the unit (Xycom Part number 1600-RMS).
4. Install the unit securely in the rack with standard rack-mounting hardware so that the drive access door faces outward.
5. Torque the rail-mounting screws to 35 in/lbs (3.95 Nm).

Figure 12. Installing optional slide rails.

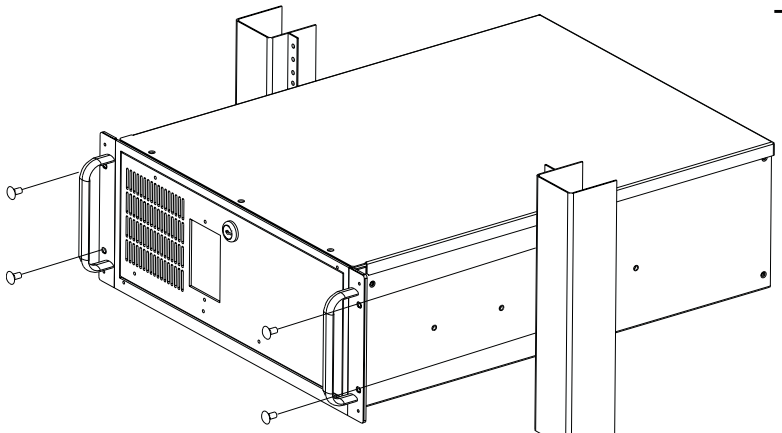


Torque screws to 35 in/lbs (3.95 Nm)

### To Rack-Mount the Unit

1. Attach the unit securely in the rack using the proper mounting hardware for your rack.

Figure 13. Installing the mounting hardware.



Torque screws to 35 in/lbs (3.95 Nm).

2. Install the unit in the rack, using standard rack-mounting hardware, so that the drive access door faces outward.
3. To remove the unit from the rack, reverse the procedure.

***Warning:*** For applications in which shock and vibration are present, we highly recommend using slide rails to support the 1600 unit more securely.

## Wall-Mounting

### Wall Mounting Specifications:

Wall material: 1/8" steel minimum, tapped holes

Mount Screw: 1/4-20 (M6 x 1)

Torque: 35 inch/lbs

### To Wall-Mount the Unit

1. Remove the rack mount ears with handles by removing the screws holding them in place.
2. Replace the screws.
3. Attach wall-mounting brackets (Xycom order number 1600-WMB) on both sides of the unit.

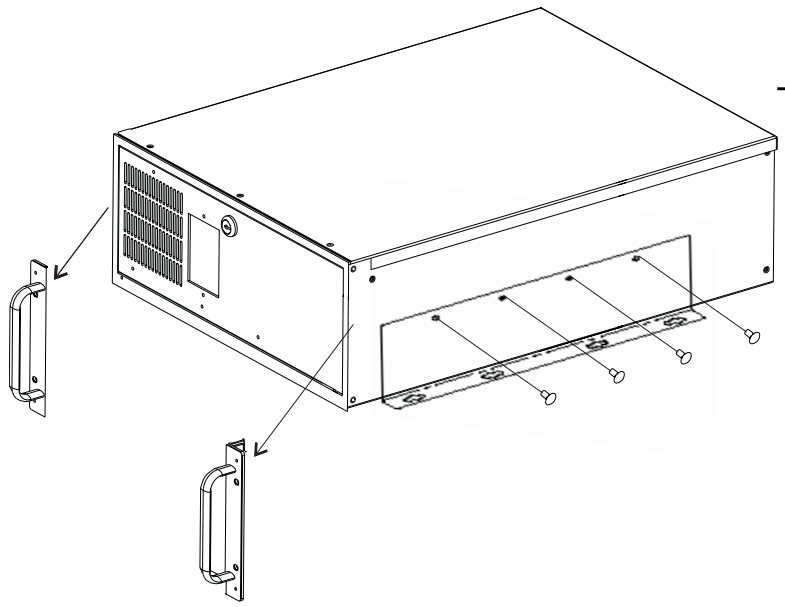


Figure 14. Installing wall-mounting hardware.

## THE POWER SUPPLY

See page 17 for the electrical specifications.

### To Attach the Power Cable

1. If your unit is equipped with -48 volt DC power supply, you must create a power cable before you can connect your unit to a power source. See "Creating a DC Power Supply Cable" below.
2. Attach one end of the power cord to the power receptacle and the other end to a properly grounded outlet.

## Creating a DC Power Supply Cable

### To Create a DC Cable

1. Cut the wire cable to the desired length.
2. Strip 0.25-inch (6 mm) of insulation from the end of the conductor wire. No bare wire should be exposed when the cable is connected to the workstation.
3. Tin the wire ends with solder if using stranded wire. This will keep the wire from fraying.

***Warning:*** When inserting the wire ends of the power cable into the terminal block, be sure there is no exposed wire. Trim the wire ends of the cable or cut a new cable if necessary.

4. Insert the three wire ends of the power cable into the three holes of the terminal block (see figure 15 below). Insert the Protective Earth GND ground, + (positive), and - (negative) wires into the corresponding holes. Be sure that no bare wires are exposed.

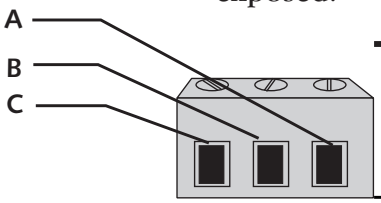



Figure 15. **A**, +(positive); **B**, -(negative); **C**, Protective Earth GND ground

5. Tighten the three screws above the wires to hold them firmly in place.

***Warning:*** Never tighten the three screws of the terminal block when the cable is connected to a power source. The screws are conductive and have full contact with the cable wire.

# 4 Maintenance

## PREVENTIVE MAINTENANCE

Preventive maintenance consists of several basic procedures that will reduce the chance of system malfunction. Schedule preventive maintenance along with the regular equipment maintenance to minimize down time.

- Base your maintenance schedule on the type of environment the system is in (i.e., if the area is dusty, schedule maintenance more often than if it is a dry, clean area).
- Remove dust and dirt from PC components. If dust builds up on heat sinks and circuitry, an obstruction of heat dissipation could cause the unit to malfunction. If dust reaches the electronic boards, a short circuit could occur.
- Check connections to I/O modules, especially in environments where shock could loosen the connections. Check all plugs, sockets, and module connections.
- Remove unnecessary articles, such as drawings or manuals, from the unit. They can obstruct air flow and create hot spots, which causes the system to malfunction.
- Do not place noise-generating equipment near the unit.
- Replace the module with the correct type. If the new module solves the problem but the failure reoccurs, check for inductive loads that may be generating voltage and current spikes and may require external suppression.

## PRODUCT REPAIR PROGRAM

Xycom Automation's Product Repair and Customization Department (PR&C) restores equipment to normal operating condition and implements engineering changes that enhance operating specifications. Returned products are tested with standard Xycom Automation test diagnostics.

### To prepare the unit for shipment

1. Obtain an RMA number for your unit by calling your nearest Xycom Automation Repair Department or Xycom Automation, Inc. at 1-800-289-9266 or 734-429-4971. Please have the following information available:
   - Company name and shipping and billing addresses
   - Type of service desired: product repair or product exchange
   - Product model number, part number, quantity, serial number(s), and warranty status
   - Failure mode and failure systems
   - Purchase order number or repair order number
2. Make sure the front panel assembly is properly attached to the unit.

3. Attach failure information to the unit to speed processing.
4. Place the unit securely in its original packaging or an equivalent heavy-duty box.
5. Mark the RMA number on your purchase order and on the outside of the box.
6. Send the unit to the address given when you receive your RMA number.

## REPLACING FAN

We do not recommend replacing the single 82 CFM fan yourself. Please contact Xycom Automation's Product Repair and Customization Department (PR&C). For product repair procedures, refer to page 32.

## CLEANING AIR FILTERS

The air filters play a very important role in prolonging the life of your chassis and its components. Clean, filtered air that circulates through the chassis keeps the temperature down and prevents component failure by keeping them dust free. All air filters should be checked and cleaned periodically for optimum system performance.

### To Clean the Air Filters

1. Open the front panel door.
2. Remove the nut securing each filter housing to the front door.
3. Slide the housing off.
4. Clean each filter by running them under water.
5. Reinstall the completely dried filters.

***Warning:*** Do not replace the filters unless they are completely dry. Wet filters may allow moisture into the chassis, which can cause system failure and malfunction.

## SPARE PARTS

Stock spare parts to minimize down time resulting from part failure. The spare parts stocked should be 10 percent of the number of each unit used. Main CPU cards should have one spare each. Each power supply should have a back-up. In applications where immediate operation of a failed system is required, you may need to stock an entire spare computer module.

| Description | Xycom Part Number |
|---|---|
| Drives | |
| 10 GB | 139923-001 |
| 1.44 MB floppy | 139924-001 |
| 5 GB tape drive EIDE | 139926-001 |
| Black Toshiba 40 X EIDE CD-ROM | 139927-001 |
| Sony 4x4x24 Rewritable CD-ROM | 139928-001 |
| LS-120 | 139929-001 |
| I/O Mega Zip drive 100 MB | 139930-001 |
| CPU board | |
| Socket 370 Celeron (SBC-370) 433 MHz processor | 138715 |
| Penitum III (SBC-370) 600 MHz processor | 140238 |
| Pentium III (SBC-370) 700 MHz processor | 140239 |
| Slot 1 Pentium III (SBC-SLOT1) 600 MHz processor | 140238 |
| Slot 1 Pentium III (SBC-SLOT1) 700 MHz processor | 140239 |
| Backplane | |
| 8 ISA/4PCI passive backplane | 139922-001 |
| 5 ISA/7 PCI backplane | 139941-001 |
| 7 ISA/4 PCI | 140550 |
| SDRAM | |
| 32 MB PC-100 DIMM | 128668 |
| 64 MB PC-100 DIMM | 128674 |
| 128 MB PC-100 DIMM | 133800 |
| 256 MB PC-100 DIMM-use two 128 MB PC-100 DIMM | 133800 x 2 |
| Power Supply | |
| 300 Watt AC | 139925-001 |
| Redundant 300 watt hot swappable AC | 139931-001 |
| -48 Volt DC 250 Watt | 139932-001 |
| Accessories | |
| Sliding Brackett | 1600-WMB |
| Rail Kit | 1600-RMS |

# 5 Troubleshooting

This chapter is intended to supplement the rest of the manual. It provides charts of general operational and BIOS problems, their possible causes, and corrective actions that can be taken. Consult chapter 3 for installation and chapter 4 for maintenance information.

> ***Note:*** When replacing a particular unit or performing service procedures, remember that the unit may have been customized and options installed. Make sure to maintain configuration changes that were made to support the customization or options.

## REPAIRING THE UNIT

A problem could develop that requires you to replace a component. If the unit is under warranty, we recommend you order a complete replacement unit rather than replacing only the damaged part. If you replace a part instead of replacing the entire unit, you may find that other parts are defective and additional downtime may occur.

If the unit is no longer under warranty, you may wish to replace only the defective part to reduce costs. Spare parts (see page 34) can be ordered directly from Xycom Automation. We do not recommend third-party replacement components since they may not be compatible with the unit's hardware and software.

When a failed unit is returned to Xycom Automation for repair, a detailed and accurate problem description must accompany it (see page 32).

## TROUBLESHOOTING CHARTS

Following are two troubleshooting charts to help diagnose and correct problems. Each chart provides one or more probable causes and a corresponding course of action for each problem. The causes listed are not necessarily complete, and the recommended action may not necessarily be appropriate for a particular situation.

Possible causes are ordered by the simplicity of the corrective action.

The charts are only guidelines and do not replace proper diagnostic procedures. It remains your responsibility to verify that the actions taken to correct a problem are appropriate.

Also, you should try to determine the failure's root cause. For example, if the line fuse has blown, you should try to establish the reason for the excess current that caused the fuse to blow to prevent it from recurring.

## General Operational Problems

Use this chart when there is a problem, but no error messages occur during power-up or normal operation.

| Problem | Cause | Action |
|---|---|---|
| Blank screen on attached monitor | Power disconnected | Check power supply voltage and connection integrity |
| | Video cable disconnected | Check video cable and connection integrity |
| | Line fuse blown | Replace fuse and determine cause |
| | Faulty RAM | Replace DIMMs (see page 18) |
| Screen color or picture is distorted | Video drivers were not loaded | Load correct video drivers |
| Printer functions not working | Printer is not on-line | Check printer power and on-line status |
| | Cable disconnected | Check cable connections |
| | Improper HMI or other application print function parameters | Check print function settings for correct printer type, page size, and orientation. Refer to your software documentation. |
| | CMOS setup is incorrect | Verify CMOS setup and correct if necessary |
| | Printer port configuration incorrect | Check printer port configuration |
| | HMI or other application software configuration problem | Check software configuration. Refer to your software documentation. |
| | Printer not working | Replace printer |
| Floppy disk not working | Disk not formatted | Use formatted disk |
| | CMOS configuration incorrect | Check CMOS setup data for floppy enable |
| | Floppy disk cables not connected correctly | Check power and data cable connections |
| | Floppy disk drive configuration incorrect | Check drive is installed, configured, and connected |
| Hard disk drive not working | CMOS configuration incorrect | Check CMOS setup data |
| | Disk not formatted or partitioned | Format and install operating system |
| | Disk drive cables not connected correctly | Check power and data cables connection |
| | Disk drive configuration incorrect | Check drive configuration |
| | DOS not loaded | Load MS-DOS |

## BIOS Error Messages

Use this chart when the BIOS detects a problem during the Power On Self Test (POST). After the problem is detected, a BIOS error message displays (before the Windows operating system starts). Refer to board manual to change BIOS settings.

| Message | Possible Cause | Action |
|---|---|---|
| Keyboard error | A key was held during Power On Self Test (POST) | Reboot with no keys pressed |
| | Keyboard controller disconnected from CPU | Check controller connection to CPU board |
| | Keyboard malfunction | Replace keyboard |
| | Keyboard controller malfunction | Replace controller |
| | Keypad malfunction | Replace unit |
| Real-time clock error | Real-time clock information lost | Reset time and date in Setup Menu and reboot |
| | Hardware error in real-time clock | Replace CPU board |
| Operating system not found | A non-system floppy disk is present in the floppy disk drive | Remove disk and reboot |
| | CMOS setup data is incorrect | Verify CMOS setup data, correct if necessary, and reboot |
| | Hard disk has lost operating system data | Partition and reformat the hard disk. If the problem persists, the hard disk may need to be replaced. |
| | Hard disk has failed | Replace hard disk |
| Failure fixed disk | Hard disk cables disconnected | Check hard disk cables for proper connection. Verify hard disk spins up when power is applied. |
| | CMOS setup data is incorrect | Verify CMOS setup data, correct if necessary, and reboot |
| | Hard disk has lost operating system data | Partition and reformat hard disk. If the problem persists, the hard disk may need to be replaced. |
| | Hard disk has failed | Replace hard disk |
| Incorrect Drive A type. Run SETUP | CMOS setup data is incorrect | Verify setup data, change if necessary and reboot |
| Floppy disk controller error or no controller present. Press F2 on keyboard for setup. | Floppy disk controller configuration incorrect | Check floppy disk cables and disk controller configuration. Replace floppy disk controller if malfunction persists. |
| | Floppy disk controller has failed | Replace floppy disk controller |
| System CMOS checksum bad. Run SETUP. | CMOS data corrupted | Input correct CMOS setup data, save values, and reboot |
| (# of Kbytes)K System RAM failed at offset | Diagnostic message | Visually inspect memory modules for poor connection. Replace CPU board if problem persists. |
| (# of Kbytes)K System RAM Passed | POST memory test passed | No action required |
| System BIOS shadowed | BIOS areas being shadowed | No action required |
| Video BIOS shadowed | BIOS areas being shadowed | No action required |

| Message | Possible Cause | Action |
|---|---|---|
| Previous boot incomplete. Default configuration used. | Previous boot did not complete | Enter Setup, access the Exit Menu, choose the "Get Default Values" option, save the settings, exit Setup, then reboot |
| Diskette drive A (or B) error | Floppy drive error | Check cable to floppy drive. Check Setup Menu configuration. Reboot. |

# A System Configuration

## PIN ASSIGNMENTS

This section specifies pin assignments of connectors.

### AC Input Power Connector

This connector is the 3-pin power input for the AC and dual redundant AC units.

| AC Pin Number | AC Description |
|---|---|
| 1 | L |
| 2 | N |
| 3 | AC GND |

### DC Input Power Connector

| Pin Number | Description |
|---|---|
| 1 | GND |
| 2 | -VIN |
| 3 | +VIN |

### Parallel Connector

| Pin Number | Description |
|---|---|
| 1 | STROBE |
| 2 | PD(0) |
| 3 | PD(1) |
| 4 | PD(2) |
| 5 | PD(3) |
| 6 | PD(4) |
| 7 | PD(5) |
| 8 | PD(6) |
| 9 | PD(7) |
| 10 | PACK |
| 11 | PBUSY |
| 12 | PE |

| Pin Number | Description |
|---|---|
| 13 | SELECT |
| 14 | AUTOFEED |
| 15 | PERROR |
| 16 | INIT |
| 17 | SELIN |
| 18 | GND |
| 19 | GND |
| 20 | GND |
| 21 | GND |
| 22 | GND |
| 23 | GND |
| 24 | GND |
| 25 | GND |

## COM1 Serial Connector, RS-232

| Pin Number | Name |
|---|---|
| 1 | DCD |
| 2 | RXD |
| 3 | TXD |
| 4 | DTR |
| 5 | GND |
| 6 | DSR |
| 7 | RTS |
| 8 | CTS |
| 9 | RI |

## COM2 Serial Connector, RS-232

| Pin Number | Name |
|---|---|
| 1 | DCD |
| 2 | RXD |
| 3 | TXD |
| 4 | DTR |
| 5 | GND |
| 6 | DSR |
| 7 | RTS |
| 8 | CTS |
| 9 | RI |

## PS/2 Keyboard Connector

on front panel or keyboard side of Y cable

| Pin Number | Name |
|---|---|
| 1 | KB DATA |
| 2 | NC |
| 3 | GND |
| 4 | +5V |
| 5 | KB CLK |
| 6 | NC |

## PS/2 Mouse Connector

on front panel or mouse side of Y cable

| Pin Number | Name |
|---|---|
| 1 | MS DATA |
| 2 | NC |
| 3 | GND |
| 4 | +5V |
| 5 | MS CLK |
| 6 | NC |

## PS/2 Keyboard/Mouse Connector (on rear)

| Pin Number | Name |
|---|---|
| 1 | KB DATA |
| 2 | MS DATA |
| 3 | GND |
| 4 | +5V |
| 5 | KB CLK |
| | MS CLK |

## Ethernet (LAN RJ45) Port

This connector is used for 10 BaseTX or 100 BaseTX Ethernet connection.

| Pin Number | Description |
|---|---|
| 1 | TX+ |
| 2 | TX- |
| 3 | RX+ |
| 4 | 75 Ω termination |
| 5 | 75 Ω termination |
| 6 | RX- |
| 7 | 75 Ω termination |
| 8 | 75 Ω termination |

## VGA Connector

| Pin Number | Description |
|---|---|
| 1 | RED |
| 2 | GREEN |
| 3 | BLUE |
| 4 | NC |
| 5 | GND |
| 6 | GND |
| 7 | GND |
| 8 | GND |
| 9 | NC |
| 10 | GND |
| 11 | NC |
| 12 | DDC DAT |
| 13 | HSYNC |
| 14 | VSYNC |
| 15 | DDC CLK |

# SYSTEM INTERRUPTS (IRQS)

## SBC-370 Board

| IRQ | Description |
|---|---|
| IRQ0 | System Timer |
| IRQ1 | Keyboard |
| IRQ2 | Cascade to IRQ Controller |
| IRQ3 | COM2/COM4 |
| IRQ4 | COM1/COM3 |
| IRQ5 | Unused |
| IRQ6 | Floppy Drive (FDC) |
| IRQ7 | Printer |
| IRQ8 | Real Time Clock |
| IRQ9 | Unused |
| IRQ10 | Unused |
| IRQ11 | Unused |
| IRQ12 | PS/2 Mouse |

| IRQ | Description |
|---|---|
| IRQ13 | FPU |
| IRQ14 | Primary IDE |
| IRQ15 | Secondary IDE |

### SBC-SLOT1 Board (applies to the 1614 only)

| IRQ | Description |
|---|---|
| IRQ0 | System Timer |
| IRQ1 | Keyboard |
| IRQ2 | Cascade to IRQ Controller |
| IRQ3 | COM2/COM4 |
| IRQ4 | COM1/COM3 |
| IRQ5 | Unused |
| IRQ6 | FDC |
| IRQ7 | Printer |
| IRQ8 | RTC Clock |
| IRQ9 | Unused |
| IRQ10 | 7880 SCSI |
| IRQ11 | 82559LAN |
| IRQ12 | PS/2 mouse |
| IRQ13 | FPU |
| IRQ14 | Primary IDE |
| IRQ15 | Secondary IDE |

## DMA CHANNEL ASSIGNMENTS

### SBC-370

| Channel | Function |
|---|---|
| 0 | Available |
| 1 | Available |
| 2 | Floppy disk ( 8-bit transfer ) |
| 3 | Available |
| 4 | Cascade for DMA Controller 1 |
| 5 | Available |
| 6 | Available |
| 7 | Available |

## SBC-SLOT1 (applies to the 1614 only)

| DMA Channel | Function |
|---|---|
| 0 | Available |
| 1 | Available |
| 2 | Floppy Disk (8-bit transfer) |
| 3 | Available |
| 4 | Cascade for DMA controller 1 |
| 5 | Available |
| 6 | Available |
| 7 | Available |

# MEMORY MAP

## SBC-370 1st MB Memory Address Map

The default setting is highlighted.

| Memory Address | Description |
|---|---|
| 00000-9FFFF | System Memory |
| A0000-BFFFF | VGA Buffer |
| C0000-CBFFF | VGA BIOS |
| D6000-D7FFF | DOC 2000 |
| E0000-FFFFF | System BIOS |
| 1000000- | Extend BIOS |

## SBC-SLOT1 1st MB Memory Address Map (applies to the 1614 only)

| Memory Address | Description |
|---|---|
| 00000-9FFFF | System memory |
| A0000-BFFFF | VGA buffer |
| C0000-C7FFF | VGA BIOS |
| C8000-CFFFF | SCSI BIOS |
| D6000-D7FFF | DOC 2000 |
| E0000-FFFFF | System BIOS |
| 1000000- | Extend BIOS |

# I/O MAP

## SBC-370

| I/O Address Range | Description |
|---|---|
| 000-01F | DMA Controller #1 |
| 020-021 | Interrupt Controller #1, Master |
| 040-05F | 8254 Timer |
| 060-06F | 8042 (Keyboard Controller) |
| 070-07F | Real time Clock, NMI (non-maskable interrupt) Mask |
| 080-09F | DMA Page Register |
| 0A0-0BF | Interrupt Controller #2 |
| 0C0-0DF | DMA Controller #2 |
| 0F0 | Clear Math Coprocessor Busy |
| 0F1 | Reset Math Coprocessor |
| 0F8-0FF | Math Coprocessor |
| 1F0-1F8 | Fixed Disk |
| 200-207 | Game I/O |
| 278-27F | Parallel Printer Port 2 (LPT3) |
| 2E8-2EF | Serial Port 4 |
| 2F8-2FF | Serial Port 2 |
| 300-31F | Prototype Card |
| 360-36F | Reserved |
| 378-37F | Parallel Printer Port 1 (LPT2) |
| 380-38F | SDLC, Bisynchronous 2 |
| 3A0-3AF | Bisynchronous 1 |
| 3B0-3BF | Monochrome Display and Printer Adapter (LPT1) |
| 3C0-3CF | Reserved |
| 3D0-3DF | Color/Graphics Monitor Adapter |
| 3E8-3EF | Serial Port 3 |
| 3F0-3F7 | Diskette Controller |
| 3F8-3FF | Serial Port 1 |
| 443 | Watchdog Timer Enable |
| 043 | Watchdog Timer Disable |

## SBC-SLOT1

| I/O Address Range | Description |
|---|---|
| 000-01F | DMA Controller #1 |
| 020-021 | Interrupt Controller #1, Master |
| 040-05F | 8254 Timer |
| 060-06F | 8042 (Keyboard Controller) |
| 070-07F | Real time Clock, NMI (non-maskable interrupt) Mask |
| 080-09F | DMA Page Register |
| 0A0-0BF | Interrupt Controller #2 |
| 0C0-0DF | DMA Controller #2 |
| 0F0 | Clear Math Coprocessor Busy |
| 0F1 | Reset Math Coprocessor |
| 0F8-0FF | Math Coprocessor |
| 1F0-1F8 | Fixed Disk |
| 200-207 | Game I/O |
| 278-27F | Parallel Printer Port 2 (LPT3) |
| 2E8-2EF | Serial Port 4 |
| 2F8-2FF | Serial Port 2 |
| 300-31F | Prototype Card |
| 360-36F | Reserved |
| 378-37F | Parallel Printer Port 1 (LPT2) |
| 380-38F | SDLC, Bisynchronous 2 |
| 3A0-3AF | Bisynchronous 1 |
| 3B0-3BF | Monochrome Display and Printer Adapter (LPT1) |
| 3C0-3CF | Reserved |
| 3D0-3DF | Color/Graphics Monitor Adapter |
| 3E8-3EF | Serial Port 3 |
| 3F0-3F7 | Diskette Controller |
| 3F8-3FF | Serial Port 1 |
| 443 | Watchdog Timer Enable |
| 043 | Watchdog Timer Disable |

## AGP VGA CONTROLLER

- S3 Trio® 3D/2x AGP VGA controller
- 133 MHz AGP bus speed
- Screen resolutions supported up to 1280 x 1024 x 64K colors @ 60 Hz refresh
- Screen resolutions also supported up to:
    - 1600 x 1200 x 64K colors at 85 Hz refresh, non-interlaced mode
    - 1024 x 768 x 16M colors at 85 Hz refresh, non-interlaced mode

# Index

160000(B)

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