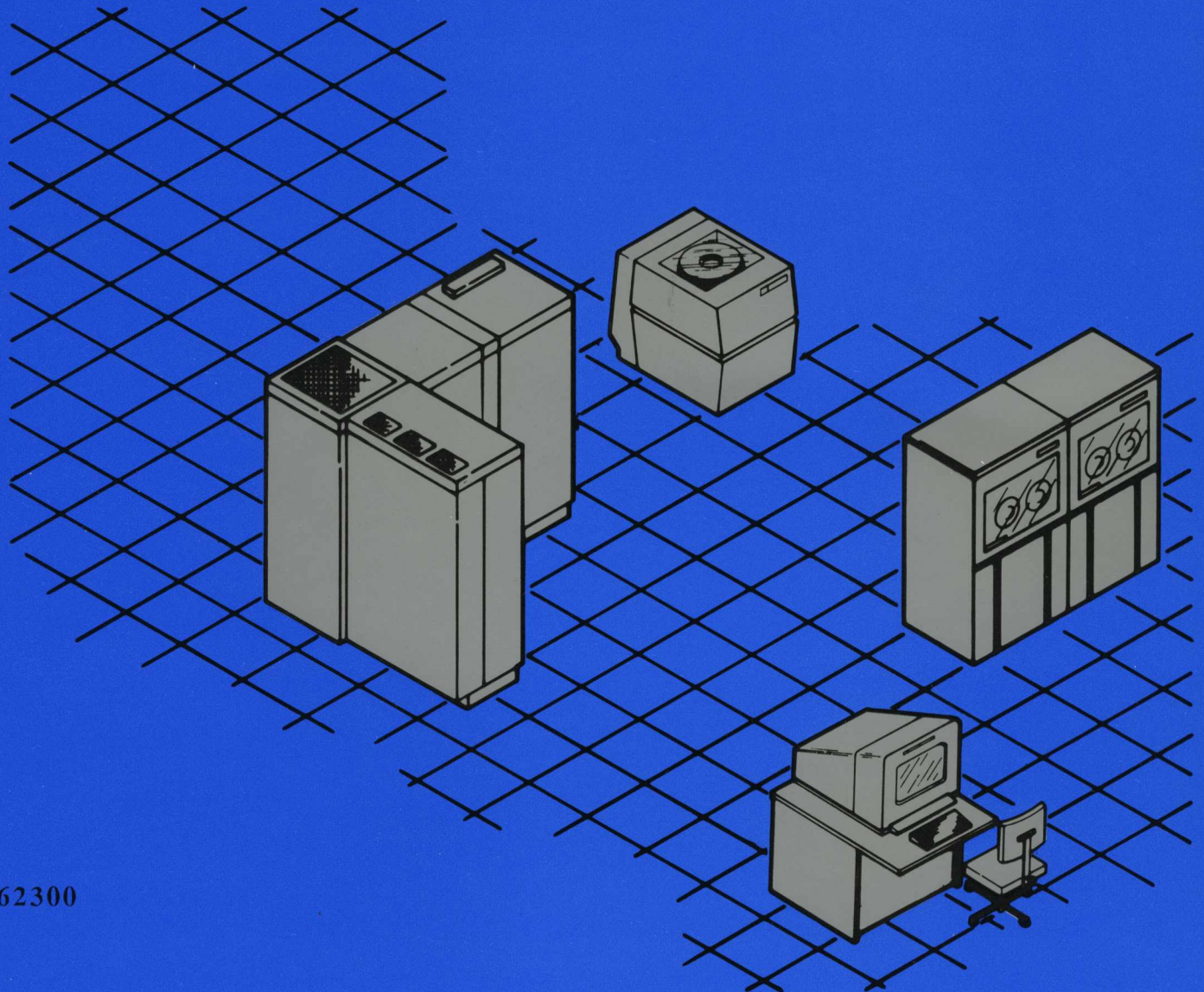


**Control Data
Computer Systems**
Site Preparation



CYBER 180 Models 840, 850, 860



60462300

CYBER 180 Models 840, 850, 860

60462300

REVISION RECORD

REVISION	DESCRIPTION
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<p>Publication No. 60462300</p>	

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or use Comment Sheet in the back of this manual.

LIST OF EFFECTIVE PAGES

New features, as well as changes, deletions, and additions to information in this manual, are indicated by bars in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

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Title Page	-	2-31	C						
2	C	2-32	C						
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PREFACE

Four reference manuals are published by CONTROL DATA® to use before installation. The manuals are designated as site preparation manuals. These manuals are required for complete documentation of the system.

Local building, fire-ordinance, or electrical codes may vary, so CONTROL DATA® recommends consulting with local authorities before installing the computer system. Any changes made that differ from the procedures described in the manuals must be approved by a site planning representative of Computer Facility Services (CFS)-DESCO, Inc. CFS-DESCO assists Control Data customers to prepare their sites for installation of 840/850/860 computer systems.†

The manuals are available from:

Control Data Corporation
Literature and Distribution Services
308 North Dale Street
St. Paul, Minnesota 55103

A description of the manuals follows.

GENERAL INFORMATION

The Site Preparation General Information manual (publication number 60275100) discusses the following issues that are the basis for site planning:

- Site location
- Space considerations
- Site construction
- Site protection
- Air conditioning
- Site water system
- Lighting
- Acoustics
- Power requirements
- Power distribution
- Convenience outlets
- Grounding
- Communications
- Data media storage

† The term site planning representative in this manual refers to a CFS-DESCO site planning representative.

SYSTEM DATA

The System Data Site Preparation manual (publication number 60462300) is the manual you are now reading. It contains information applicable to a specific computer system but excludes information on peripheral equipment. The manual contains the following:

- Specifications for the computer system including the number, function, and placement of cabinets
- Equipment data sheets detailing the power and environmental requirements of the system cabinets as well as the dimensions and physical configurations
- Electrical schematics documenting external power connections among the system cabinets and between the system switchgear

PERIPHERAL EQUIPMENT DATA

The Site Preparation Peripheral Equipment Data manual (publication number 60275300) documents only peripheral equipment. The manual contains the following:

- Equipment data sheets including the power and environmental requirements, the physical configuration, and the dimensions of each peripheral unit
- Listings of optional cables

MONITORING AND POWER DATA

The Site Preparation Monitoring and Power Data manual (publication number 60451300) contains physical, electrical, and environmental data related to wall-mounted panels and terminator power supplies. This manual also contains data on motor-generator sets used with computer systems. The manual contains the following:

- Wall-mounted box information
- Wall-mounted box data sheets
- Wall-mounted box schematics
- Electrical machinery motor-generator set data sheets
- Kato motor-generator set data sheets
- Piller motor-generator set data sheets

DISCLAIMER

Site preparation information for system equipment operation is valid only as described in this manual and other referenced manuals and documents. Control Data cannot be responsible for problems that result from improper site preparation or from the customer's failure to comply with applicable building, electrical and fire codes or ordinances.

IT IS THE CUSTOMER'S RESPONSIBILITY TO ENSURE THAT APPLICABLE BUILDING, ELECTRICAL, AND FIRE CODES OR ORDINANCES ARE FOLLOWED.

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PART 1

SYSTEM SPECIFICATIONS

SYSTEM SPECIFICATIONS

1

INTRODUCTION

The basic computer system consists of the following:

- Central Processor (CP)
- Central Memory (CM)
- Input/Output Unit (IOU)
- Interbay

CABINET CONFIGURATIONS

The standard computer system is configured as shown in figure 1-1.

Table 1-1 lists the system standard products. Table 1-2 lists the system options. Table 1-3 lists the system power options.

Table 1-1. CYBER 180 Model 8x0 Standard Products

Model Number	Description	Cabinet
180-8x0	Central Computer, consisting of: Central processor Memory of 2M words Input/output unit with 10 peripheral processors and 12 I/O channels Interbay	Four cabinets (form an L-shaped configuration when connected)

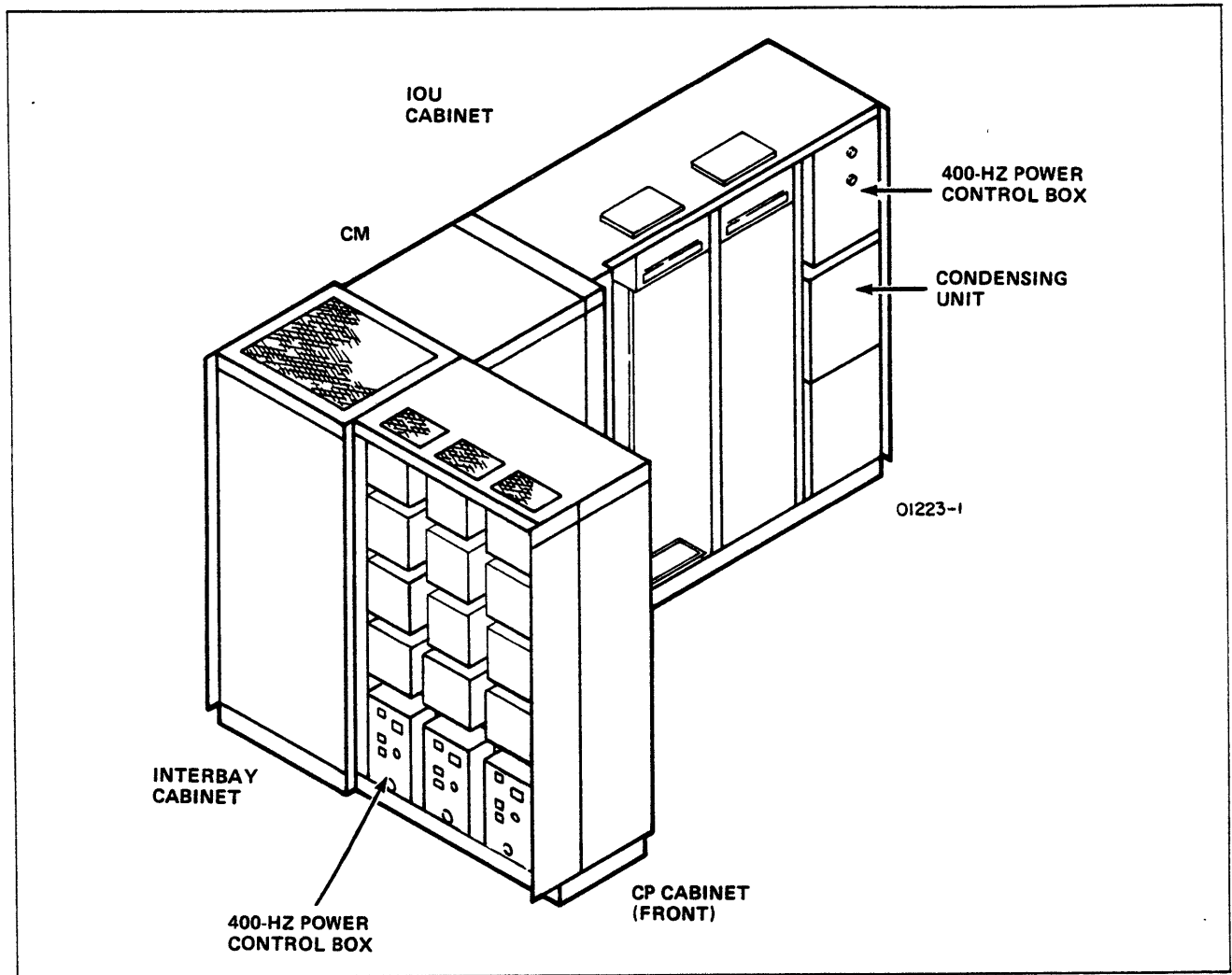


Figure 1-1. Standard Central Computer

Table 1-2. System Options (Sheet 1 of 2)

Model Number	Description	Cabinet
18001-1	Data channel converter (DCC) - Permits one-to-eight 3000 series peripheral equipments to attach to the CYBER channel. Includes table top cabinet. Meets UL requirements for 115/230-V, 50/60-Hz power.	Standalone tabletop unit
18001-2	Data channel converter (DCC) - Permits one-to-eight 3000 series peripheral equipments to attach to the CYBER channel. Includes tabletop cabinet. Meets UL and CSA requirements for 115-V, 50/60-Hz power.	Standalone tabletop unit
18002-1	System console - Consists of 21-in CRT display and fixed keyboard.	Standalone cabinet
18002-2	System console - consists of 15-in CRT display and detachable keyboard.	Tabletop unit
18352-1	Peripheral processor increment - Adds five peripheral processors and 12 I/O channels. Resultant system has 15 peripheral processors and 24 I/O channels.	Mounts in IOU cabinet
18352-2	Peripheral processor increment - Adds five peripheral processors. Resultant system has 20 peripheral processors and 24 I/O channels.	Mounts in IOU cabinet
18551-16	Memory increment - Adds 2M words to increase memory from 2M to 4M words.	Mounts in CM cabinet
18551-32	Memory increment - Requires prior installation of 18551-16. Initial 18551-32 adds 4M words to increase memory from 4M words to 8M words. Additional 18551-32 options can be installed to increase memory to 12M words or 16M words.	Mounts in CM cabinet
18553-2	Cache increment - Adds 2K words of cache memory to increase cache memory from 2K words to 4K words.	Mounts in CP cabinet
18557-2	Second central processor (applicable to model 860 only). Adds second CP (CP-1).	Standalone cabinet
18674-1	50-L/min (14-gal/min) water cooling unit - Cools standard computer system. (Superseded by 18677-1 water cooling unit.)	Standalone cabinet
18675-1	220-L/min (58-gal/min) water cooling unit - Cools computer system with options. (Superseded by 18675-3 water cooling unit.)	Standalone cabinet

Table 1-2. System Standard Options (Sheet 2 of 2)

Model Number	Description	Cabinet
18675-3	265-L/min (70 gal/min) water cooling unit - Cools computer system with options.	Standalone cabinet
18677-1	102-L/min (27-gal/min) water cooling unit - Used with 18674-1 water cooling unit to cool computer system with options.	Standalone cabinet
18852-2	IOU expansion - Adds five DMA peripheral processors to expand DMA IOU upgrade (18854-3) or secondary IOU (18856-2) from five to ten DMA peripheral processors. Adds logic for five DMA channels to expand IOU from five to ten DMA channels. Requires five DMA channel increments (18853-1, 18853-2, 18853-3, or a mix).	Mounts in IOU cabinet
18853-1	DMA channel increment - Adds one ISI/DMA channel to IOU expansion (18852-2) or secondary IOU (18856-2).	Mounts in IOU cabinet
18853-2	DMA channel increment - Adds one CYBER 170 DMA channel to IOU expansion (18852-2) or secondary IOU (18856-2).	Mounts in IOU cabinet
18853-3	DMA channel increment - Adds one IPI/DMA channel to IOU expansion (18852-2) or secondary IOU (18856-2).	Mounts in IOU cabinet
18854-3	DMA IOU upgrade - Replaces IOU subsystem to provide high speed DMA I/O capability. Includes 25 peripheral processors, 24 CYBER 170 12-bit data channels; three internal channels for real timeclock, two-port multiplexer, and maintenance registers; and three external maintenance channels. Requires concurrent installation of five DMA channels. Installation requires removal of original IOU subsystem.	Standalone cabinet
18856-2	Secondary IOU - Requires installation of DMA IOU upgrade (18854-3) and concurrent installation of five DMA channel increments and the 19003-1 system console. Adds 20 CYBER 170 peripheral processors, 24 CYBER 170 channels, five DMA peripheral processors, and logic for five DMA channel increments (18853-1, 18853-2, 18853-3, or a mix).	Standalone IOU cabinet
19003-1	System console - Consists of microcomputer, 14-in flat CRT, and detachable keyboard.	Tabletop unit
65347-1	Temperature/humidity recorder (60 Hz) - Continuously records room temperature and humidity on a 7-day chart.	Wall-mounted panel
65347-2	Temperature/humidity recorder (50 Hz) - Continuously records room temperature and humidity on a 7-day chart.	Wall-mounted panel

Table 1-3. System Power Options

Model Number	Description	Cabinet
10513-740	Frequency converter; 60- to 400-Hz, 40-kVA MG. Separate control cabinet.	Two standalone units (MG and control cabinet)
10513-780	Frequency converter; 60- to 400-Hz, 80-kVA MG. Separate control cabinet.	Two standalone units (MG and control cabinet)
10514-740	Frequency converter; 50- to 400-Hz, 40-kVA MG. Separate control cabinet.	Two standalone units (MG and control cabinet)
10514-780	Frequency converter; 50- to 400-Hz, 80-kVA MG. Separate control cabinet.	Two standalone units (MG and control cabinet)

The computer system also includes a system power monitor (SPM). The SPM is a wall-mounted monitor and control box that provides dew-point calculating, temperature monitoring, sequential on/off control of system power, fault sensing, alarm indication, and system shutdown.

The computer system requires but does not include the following equipment:

- System console
- Emergency off switches (customer supplied and installed)
- Terminator power supply (if the system utilizes a 405 card reader and/or a 580 line printer)
- Motor-generator (M-G) set
- Water cooling unit(s)

The system console includes a keyboard, cathode-ray-tube (CRT) display, and power supply. The emergency off switch is customer furnished and installed and removes all power from the computer room. The terminator power supply delivers 40 V dc at 20 A to the 405 card reader and the 580 line printer. The motor-generator (M-G) set consists of a motor generator (MG) and a control cabinet. An M-G set is purchased from Control Data and converts 50- or 60-Hz input power to 400-Hz power for the central computer and peripheral equipment. M-G sets are available for outputs of either 40 or 80 kVA. The water cooling units remove heat generated by the processor and memory cabinets. An external chilled water system is required for the water cooling unit(s).

ENVIRONMENTAL REQUIREMENTS

The environmental requirements for the computer system are:

- Permissible range of air temperature: 15 °C to 32 °C (59 °F to 90 °F).
- Dew Point Limit: 14 °C (58 °F).
- Permissible range of room humidity: 35% to 60% (the dew point limit must not be exceeded within the room humidity range).
- Maximum rate of temperature change per hour: 6 °C (10 °F).

HUMIDITY AND TEMPERATURE MONITORING

The wall-mounted system power monitor (SPM) is a box supplied with each system. The SPM provides humidity monitoring, temperature monitoring, dew point calculating, sequential on/off control of system power, fault sensing, alarm indication, and system shutdown. The SPM displays room temperature and relative humidity on the front panel. Accuracy is +1.5 °F for temperature and +3.5% relative humidity.

CAUTION

If the maximum dew point of 14 °C (58 °F) is exceeded, condensation may occur within the liquid-cooled cabinets. This can cause serious damage to components in these cabinets and requires a 24-hour drying out period before restarting the system. When the dew point alarm sounds, immediate steps should be taken to lower the humidity in the computer area. If the humidity cannot be quickly lowered, the system enters a predetermined automatic shutdown procedure.

DEW POINT CALCULATING

The SPM monitors the air surrounding the computer system and calculates the dew point. To be effective, the SPM should be located in an area that represents the overall temperature-humidity environment of the central computer. Consider the following guidelines when selecting a location for the SPM:

- Do not locate the SPM near a doorway. When the door is opened, the SPM is exposed to changing concentrations of humidity.
- Do not locate the SPM near other equipment that could affect its ability to sample the temperature and humidity. If an SPM for another central computer is in the same area, do not locate the air exhaust of one SPM near the air intake of the other SPM.
- Do not locate the SPM above open floor panels. Air flowing up from under the floor could give a false reading.

To protect factory calibration of the SPM:

- Do not splash water or other liquids on the SPM.
- Do not expose the SPM to humid conditions that can cause moisture to form on the unit.
- Do not expose the SPM to materials such as hygroscopic sugars, glycerines, glycols, or glycol vapor.
- Do not use the SPM in atmospheres containing contaminants such as sulfur dioxide, acid vapors, chlorine ammonia, acetone, alcohols, alkaline vapors, acetylene, ethylene oxide, or salt air. Use of any of the contaminants within the computer room for cleaning or any other purpose requires a system shutdown until the contaminants clear from the atmosphere.

NOTE

Small amounts of acetone or alcohol can be used in the same room as the SPM without adversely affecting its operation.

COMPUTER ROOM REQUIREMENTS

The computer room must provide space for the computer system, related power service panels, and air conditioning equipment, and for movement of test equipment and personnel as described in the Site Preparation General Information manual. Normally, the computer room does not contain an M-G set. Due to the noise and heat generated by the MG, this equipment is generally located in a separate room. Other computer room requirements for the system equipment are on the data sheets in this manual.

The room must provide locations for all system wall-mounted panels and emergency off switches. It also must provide for clearances around the SPM. These clearances (as viewed from the front of the SPM) are: 254 mm (10 in) on the left, 102 mm (4 in) on the right, 254 mm (10 in) on the top, and 254 mm (10 in) on the bottom. The SPM may also be mounted in a cabinet. The cabinet must be vented to allow the SPM fan to remove the heat generated by it.

The optional temperature/humidity recorder, if installed, must be mounted so that its 1.83-m (6-ft) power cord reaches the left side power connector on the SPM.

Additional information concerning wall-mounted boxes and switches is available in the Site Preparation Monitoring and Power Data manual.

The computer room and the MG room require 50- or 60-Hz incoming utility power for air conditioning, lighting, test equipment, system cooling, and the system M-G set(s). The M-G set converts the utility power to 400-Hz power for the computer system and certain peripheral equipment. All system power is subject to emergency off control, which is manually initiated from wall-mounted, conveniently located emergency-off boxes.

The customer provides and installs emergency off switches at all locations in the computer room in accordance with national and local electrical codes. These switches should be the nonautomatic reset type, such as a break glass push button station (for example, Allen Bradley Co., 800T-NX114) or a key reset control unit (for example, Square D Co., DID1R), to restrict their use to emergencies only. The interconnection for a system emergency off configuration, consisting of multiple, series-connected emergency off switches, is shown in the power distribution diagram (figure 3-1).

ROOM AIR

The room air requires filtering to avoid damage to the magnetic surface areas of the disk and tape units. Refer to chapter 3 of the Site Preparation General Information manual for additional information.

ROOM FLOOR

The computer room floor requires a raised floor to provide space for signal cables, power cables, and water pipes. Control Data recommends a minimum clearance of 305 mm (12 in) under the floor. The raised floor consists of pedestals supporting a grid structure. The grid structure is made of metal stringers spaced to form squares. Tiles rest on the grid and the computer cabinets rest on the tiles.

NOTE

To prevent accessibility problems beneath the raised floor, do not route unnecessary power cables, signal cables, water pipes or air ducts under the computer cabinets.

Additional information concerning the raised floor is available in chapter 2 of the Site Preparation General Information manual.

FLOOR PLAN

Figure 1-2 (SI metric units) and figure 1-3 (U.S. customary units) show the recommended raised-floor plans for the standard central computer. These plans minimize cutting of the grid structure and maximize access to signal, power, and water cutouts. Any modification of these plans will be outlined in the floor plan provided by the site planning representative. Templates of the floor cutouts are included in the early ship kits or sooner upon request.

To make installation easier, use tape to mark the intended location of the computer system on the raised floor.

NOTE

If a cutout is located over a stringer, the stringer must be cut and removed. The remaining stringer should be supported by installing additional pedestals accordingly.

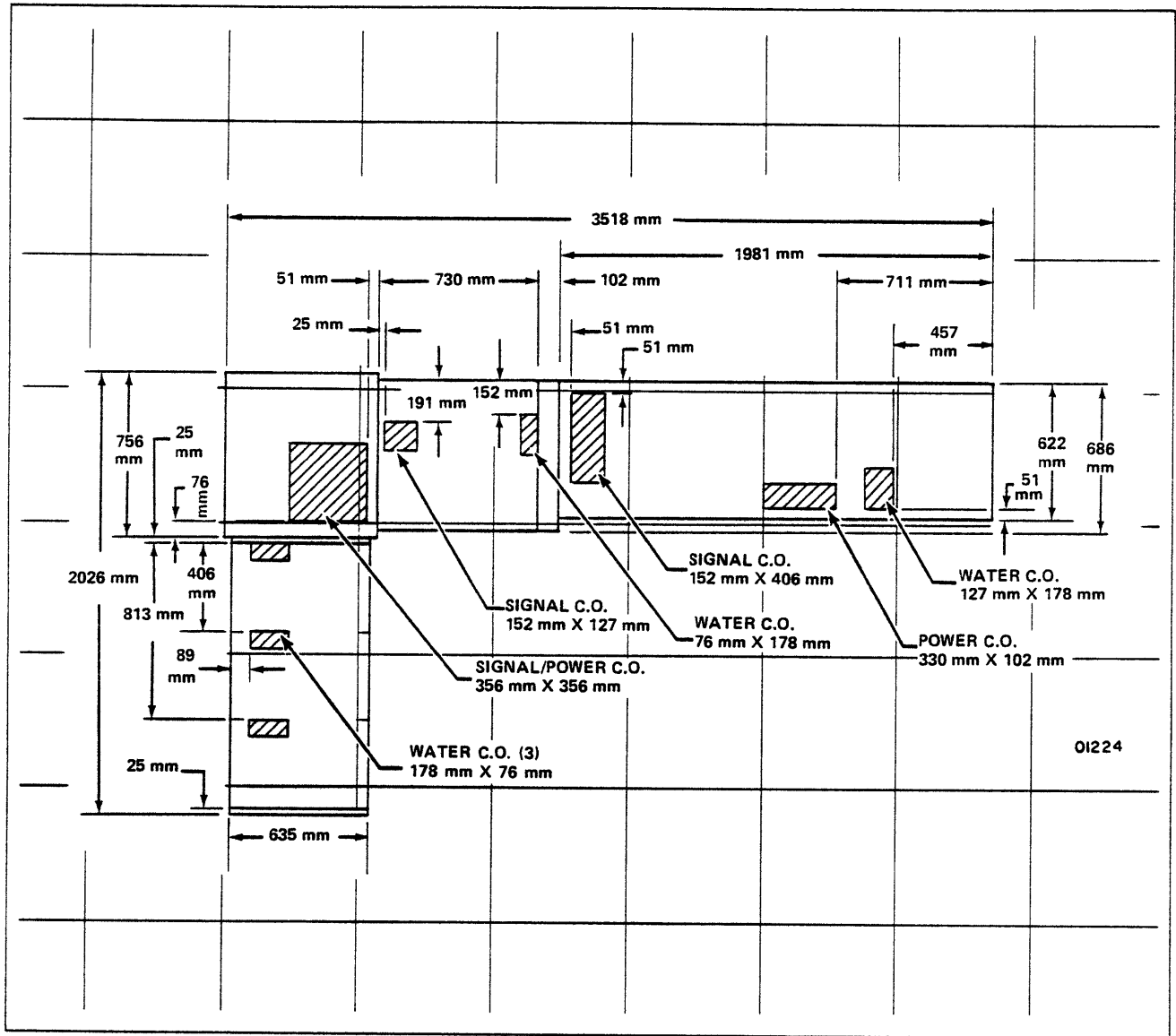


Figure 1-2. Floor Plan (600-mm by 600-mm Grid) for Standard Central Computer

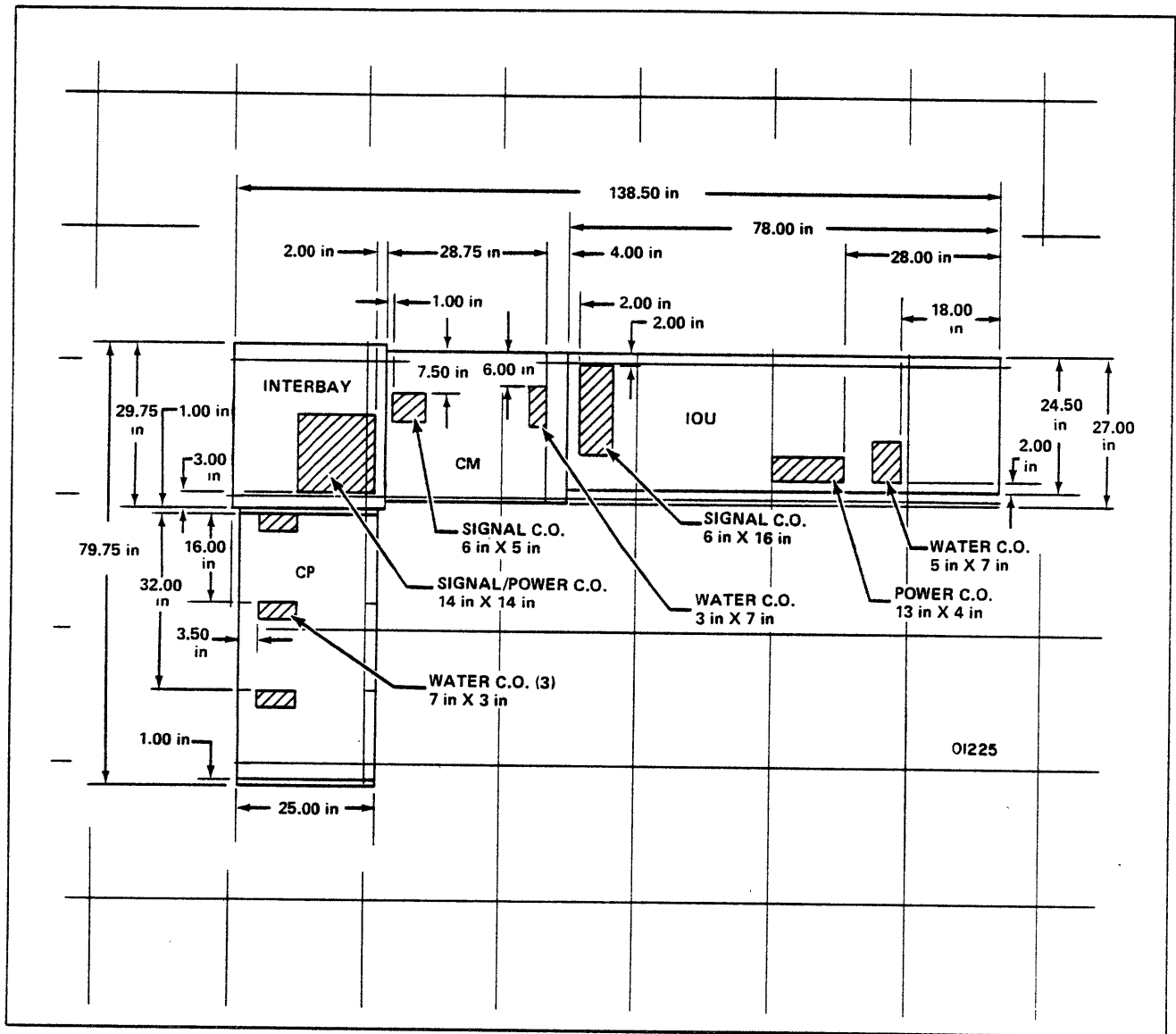


Figure 1-3. Floor Plan (24-in by 24-in Grid) for Standard Central Computer

COMMUNICATION LINE ACCESS REQUIREMENTS

Two standard telephones must be installed within 12.2 m (40 ft) of the mainframe. These telephone lines are required in order to provide a telecommunication path for the Remote Terminal Driver via the input/output unit (IOU) multiplexer as well as communication with technical support personnel during Remote Technical Assistance (RTA) operations.

SYSTEM SIGNAL CABLES

Control Data provides the computer system signal cables. Time-dependent cables have a fixed length so the equipment using these cables must be located within the cable length limitations. Cables that are not time-dependent are as uniform in length as possible and are as short as possible to minimize signal transmission delays. Some cables that are not time-dependent are available in maximum allowable lengths at an additional cost.

Figure 1-4 shows system cable quantities, connector pins, and standard and maximum lengths. Standard and maximum cable lengths are the same when the figure shows only one length. Additional information on cables is in the Site Preparation Peripheral Equipment Data manual.

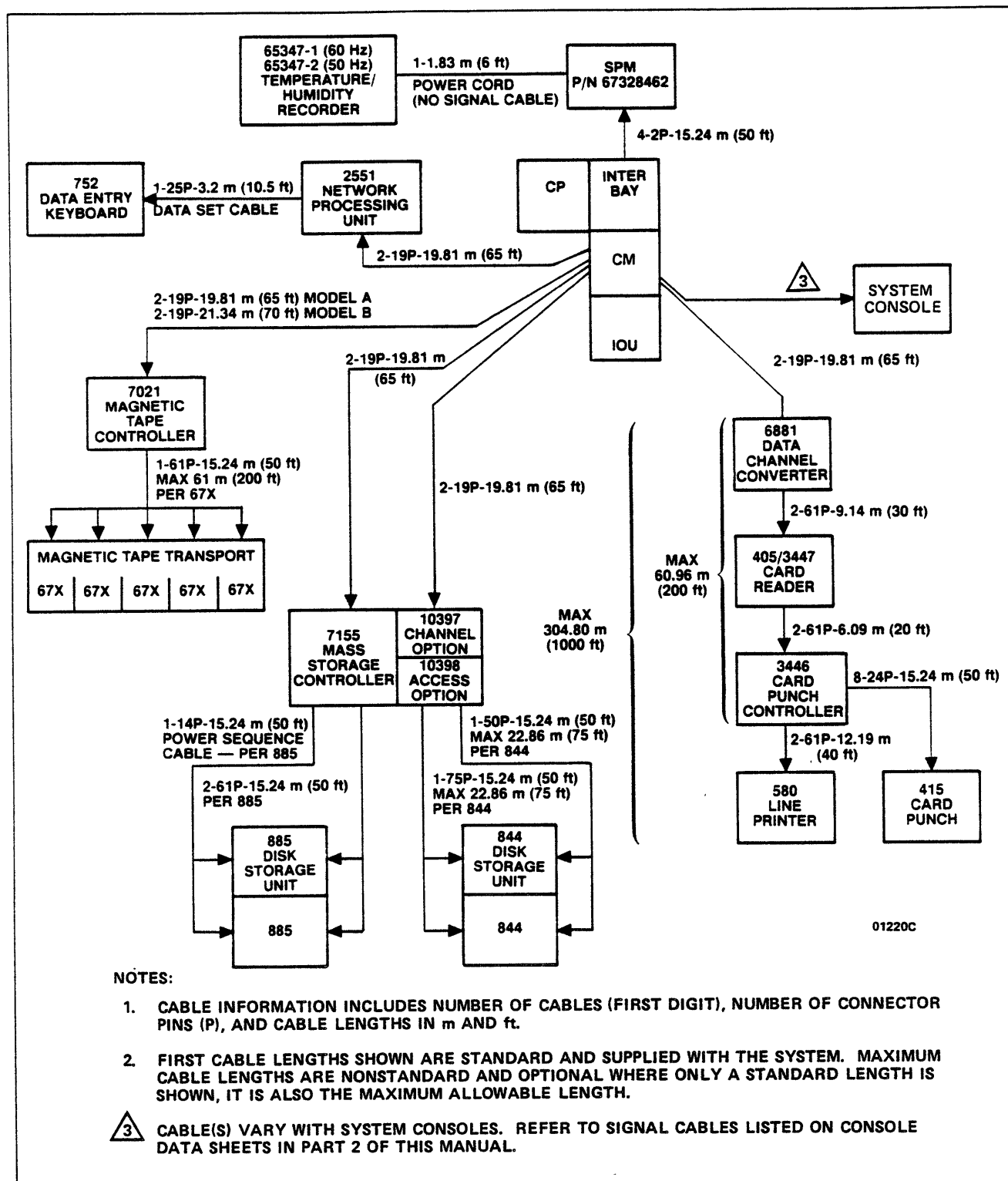


Figure 1-4. System Signal Cables

SYSTEM COOLING

The computer system requires a chilled water supply to cool each of the system cooling units.

The standard IOU cabinet contains a refrigerant cooling system that includes one 10-kW (3-ton) condensing unit. The IOU uses a hybrid cooling method involving refrigerant, forced air, and water to remove heat generated by it.

The refrigerant-air cooling system contains three closed loop paths. One path is refrigerant that the condensing unit circulates around the electrical components to absorb heat. The second path is cooled site water that removes heat from the condensing unit and transfers it out of the computer system. The third path uses two blowers to circulate cooled air around the electrical components within the cabinet.

The CP and CM cabinets and optional 18854-3 and 18856-2 IOU cabinets use water circulated by an external water cooling unit to absorb heat generated by the electrical components. The CM and optional IOUs also have internally-mounted blowers that circulate room air through their cabinets.

The water cooling system has two types of closed-loop paths. One path is distilled water that the water cooling unit circulates around the electrical components to absorb heat (chassis water loop). The other path is chilled site water that removes heat from the water cooling unit and transfers it to the site chilled water system.

The system consoles and wall-mounted panels generate a small amount of heat. The system consoles are cooled by internal blowers that circulate room air through their cabinets. The wall-mounted panels are cooled by natural heat convection via room air.

WATER SYSTEM

The following paragraphs define the requirements for the water system that cools the water cooling units and the condensing units. Control Data must approve any variation from the requirements.

The chassis water closed-loop path extends outside of the computer cabinets and under the raised floor, and connects to the water cooling unit above the raised floor. The chilled site water path extends outside of the water cooling unit, under the raised floor, and outside the computer room, and connects to water chillers or to heat exchangers.

The portion under the raised floor (figures 1-5 and 1-6) consists of supply and return lines and the associated plumbing hardware. Figure 1-5 shows the water hookup for a standard computer system, while figure 1-6 shows an example hookup of a computer system with options. These figures also indicate which parts the customer provides and installs.

The customer provides and installs the chillers and heat exchangers. The number of chillers and/or heat exchangers required and their connections to the closed-loop water system depends on the provisions at each individual site. Specific information can be obtained from the site planning representative.

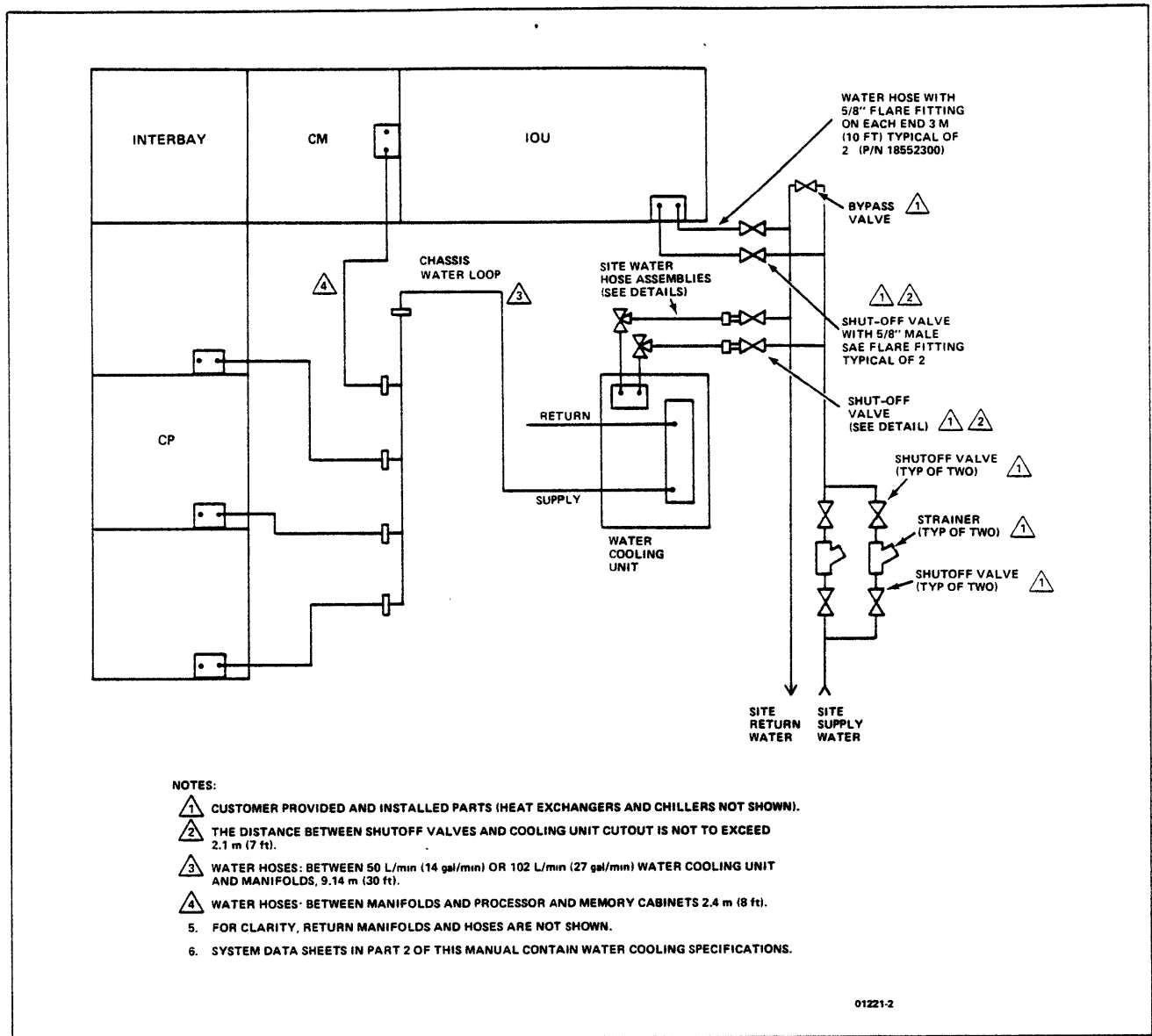
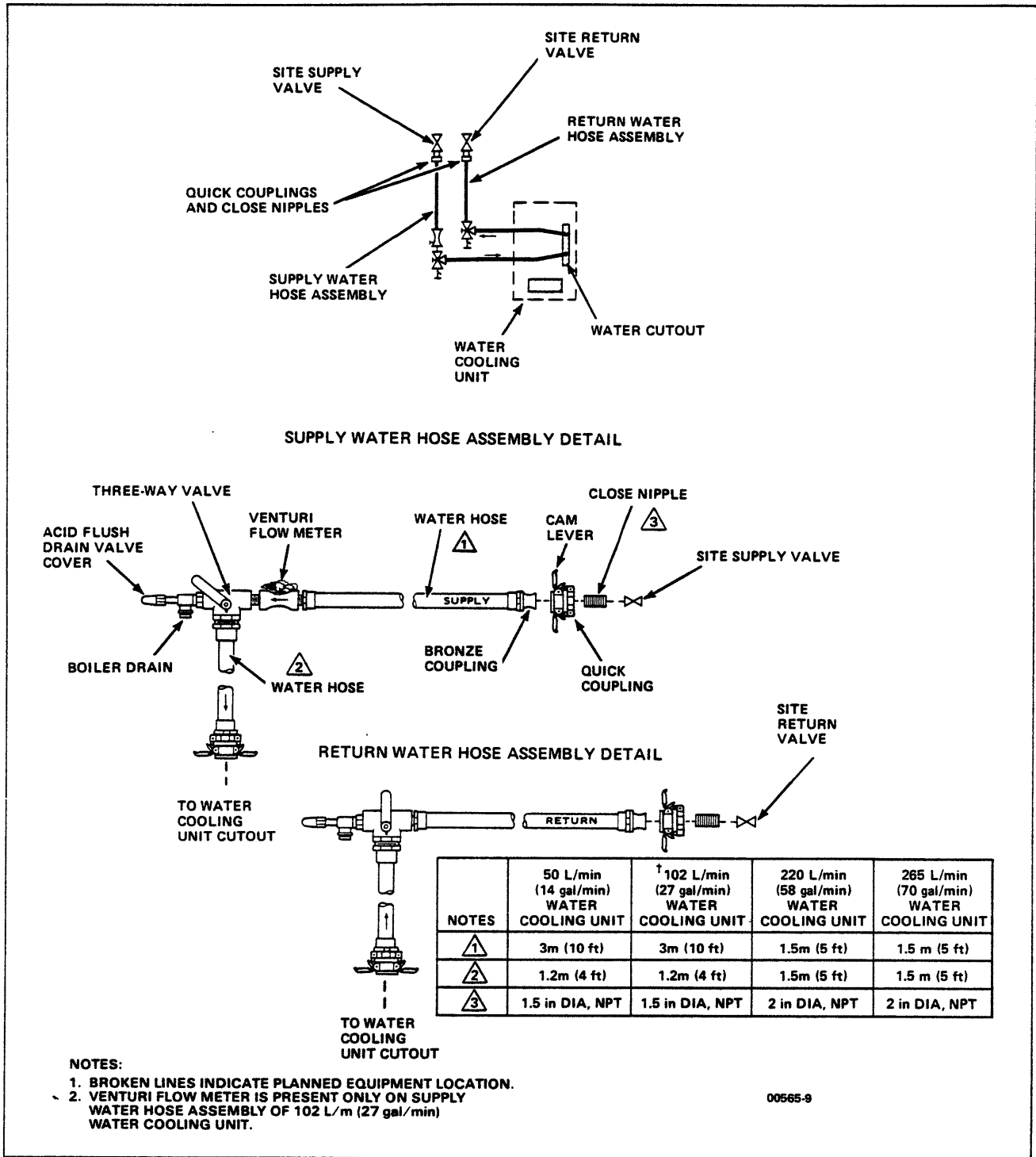
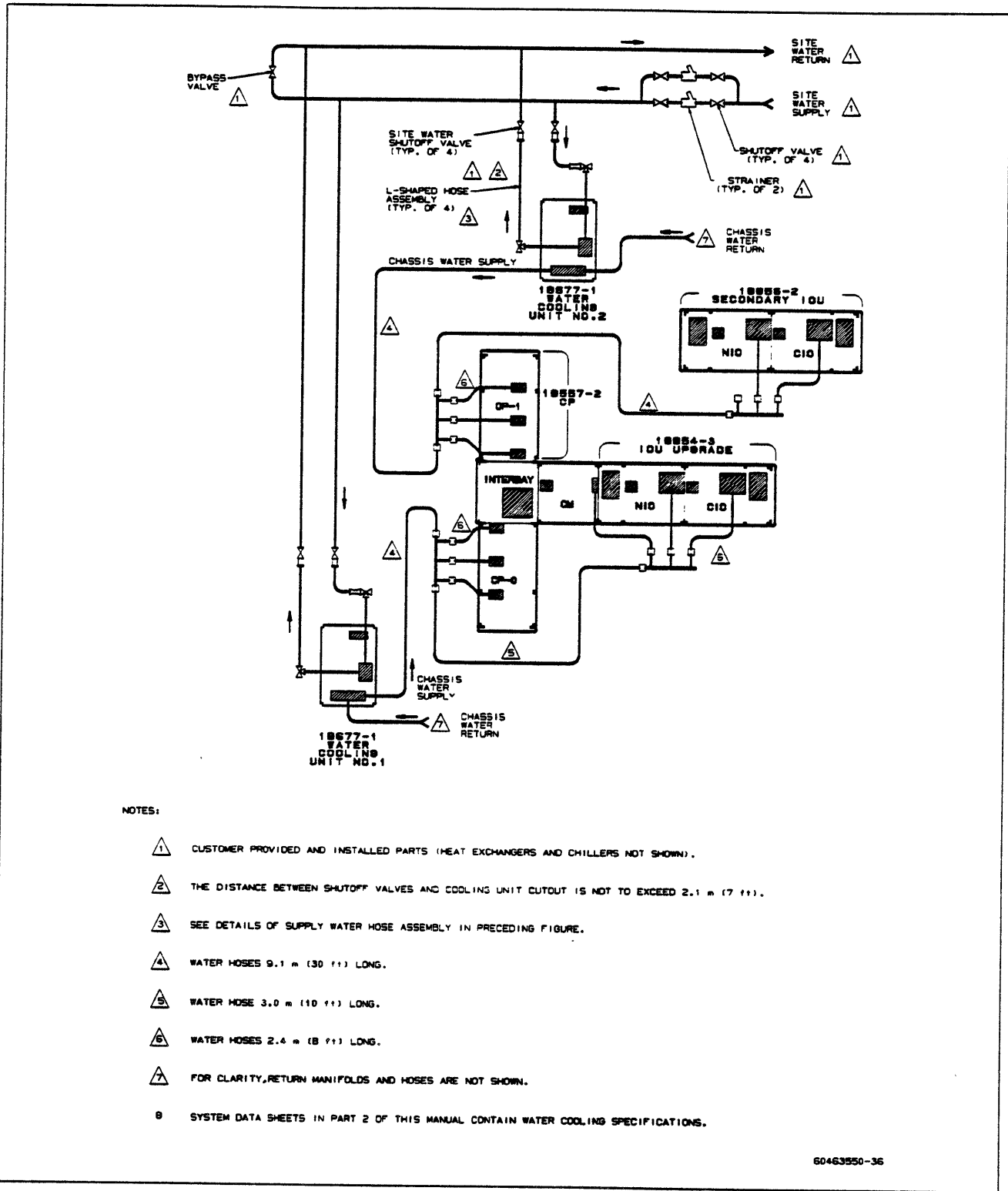


Figure 1-5. Water Hookup for Standard Computer System

Details of figure 1-5:





NOTES:

- 1 CUSTOMER PROVIDED AND INSTALLED PARTS (HEAT EXCHANGERS AND CHILLERS NOT SHOWN).
- 2 THE DISTANCE BETWEEN SHUTOFF VALVES AND COOLING UNIT CUTOUT IS NOT TO EXCEED 2.1 m (7 ft).
- 3 SEE DETAILS OF SUPPLY WATER HOSE ASSEMBLY IN PRECEDING FIGURE.
- 4 WATER HOSES 9.1 m (30 ft) LONG.
- 5 WATER HOSE 3.0 m (10 ft) LONG.
- 6 WATER HOSES 2.4 m (8 ft) LONG.
- 7 FOR CLARITY, RETURN MANIFOLDS AND HOSES ARE NOT SHOWN.
- 8 SYSTEM DATA SHEETS IN PART 2 OF THIS MANUAL CONTAIN WATER COOLING SPECIFICATIONS.

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Figure 1-6. Example Water Hookup for Computer System With Options

The site water characteristics for the closed-loop water system may vary due to mineral content, bacterial growth, and evaporation. Control Data recommends testing to determine if the water meets the following requirements:

- Hardness: Total not to exceed 150 ppm CaCO₃ (per ASTM D 1126-60)
- pH level: To be maintained between 7.0 and 8.5
- Suspended Solids: Total not to exceed 500 ppm (per ASTM D 1888-6MT)

The temperature, flow rate, head loss, and pressure for the water system must fall within specific ranges for both the condensing unit and water cooling units. Detailed information concerning water specifications is provided in system data sheets in this manual.

CAUTION

Operation below the minimum specified water temperature or above the maximum specified dew point may cause condensation to form on the central computer cabinets. Condensation can cause damage to the components and rusting of cabinet parts.

Operation above the maximum specified water temperature requires modification to the condensing and water cooling units.

Operation above the maximum specified water pressure may cause damage to the condensing and water cooling units.

WATER ALARM INDICATOR

Control Data recommends installing a device under the raised floor on the computer room floor to warn personnel of leakage from a broken pipe or hose. Recommended devices include either a float-operated switch or an electronic water-sensing switch that controls an audible alarm and a sump pump. Control Data also recommends installing warning devices in the water return lines to warn personnel of the absence of water or of an abnormal drop in water pressure.

CAUTION

Control Data recommends keeping a master floor plan readily available at the site in case of an emergency. The floor plan should show the locations of all shut-off valves, alarm indicators, and sump pumps.

REFRIGERANT GAS SAFETY PRECAUTIONS

Control Data condensing units use an R-12 liquid refrigerant. Failure of the condensing unit or a fire can cause excessive temperature and/or pressure buildup of the refrigerant. Each condensing unit has a temperature/pressure-sensitive fusible plug that acts as a pressure-relief valve by releasing the refrigerant gas to prevent an explosion.

HAZARDS OF REFRIGERANT GAS

Refrigerant gas is inert. It is heavier than air and tends to collect in low areas, such as under the raised floor. A small amount of gas, if trapped, can be highly concentrated. A concentration of 0.1 percent (1000 parts per million) is a safe level for repeated daily exposure without adverse effects.

WARNING

Large quantities of concentrated gas replace oxygen and can cause serious illness or suffocation.

Additional hazard results when R-12 refrigerant gas concentrations come into the presence with any open flame and form a toxic gas. A toxic gas concentration of 0.5 to 2.5 percent is life-threatening for personnel having a continuous exposure of 5 to 15 minutes without air ventilation.

CALCULATION OF REFRIGERANT GAS CONCENTRATIONS

Refrigerant gas concentrations depend on the amount of liquid refrigerant released into the air as a gas and the volume of space it occupies. The IOU cabinet contains one 10-kW (3-ton) condensing unit with 9.3 kg (20.6 lb) of liquid refrigerant. As an example, in an average room of 1133 cubic meters (40000 cubic feet):

- A single condensing unit releasing its refrigerant gas could cause a gas concentration of 0.158 percent.
- Two condensing units releasing their refrigerant gas could cause a gas concentration of 0.316 percent. This is close to the lethal concentration where an open flame exists.

Potential gas concentrations are calculated from the following formula:

$$\text{Percent of gas concentration} = \frac{Q \times C}{V}$$

Q = Kilograms (pounds) of liquid refrigerant released.

C = 19.23 (307 U.S. customary units).

V = Volume of room space in cubic meters (cubic feet).

PRESSURE-VENTING NETWORK

Each computer system condensing unit includes a flexible 0.9 m (3 ft) metallic hose connected to the pressure relief safety valve. The other end of the metallic hose terminates in a 9.5 mm (3/8 in) flare union (female) that hangs below the raised floor under the condensing unit. The flare union provides a connection to a pressure-venting network.

Installation of a pressure-venting network consists of piping that connects the metallic hose from the pressure relief valve on the condensing unit to a discharge point outside the building. This ensures that emergency venting by the pressure relief valve will safely release the refrigerant gas into the outside atmosphere.

The customer provides and installs the venting network. Although the customer is not obligated to install a pressure-venting network, Control Data strongly recommends that it be installed. Detailed information and instructions for a venting network may be obtained from the site planning representative.

The final decision on installation of a pressure-venting network should be based on calculation of potential lethal refrigerant levels in consideration with the following:

- Physical location of the condensing units.
- State and local building codes and regulations which may require a pressure venting network.
- Total amount of liquid refrigerant R-12 stored in the computer room.
- Volume of the computer room or area where the condensing units are located.
- Total occupancy and approximate evacuation time of the site by personnel in any emergency.

PART 2

SYSTEM DATA SHEETS

SYSTEM DATA SHEETS

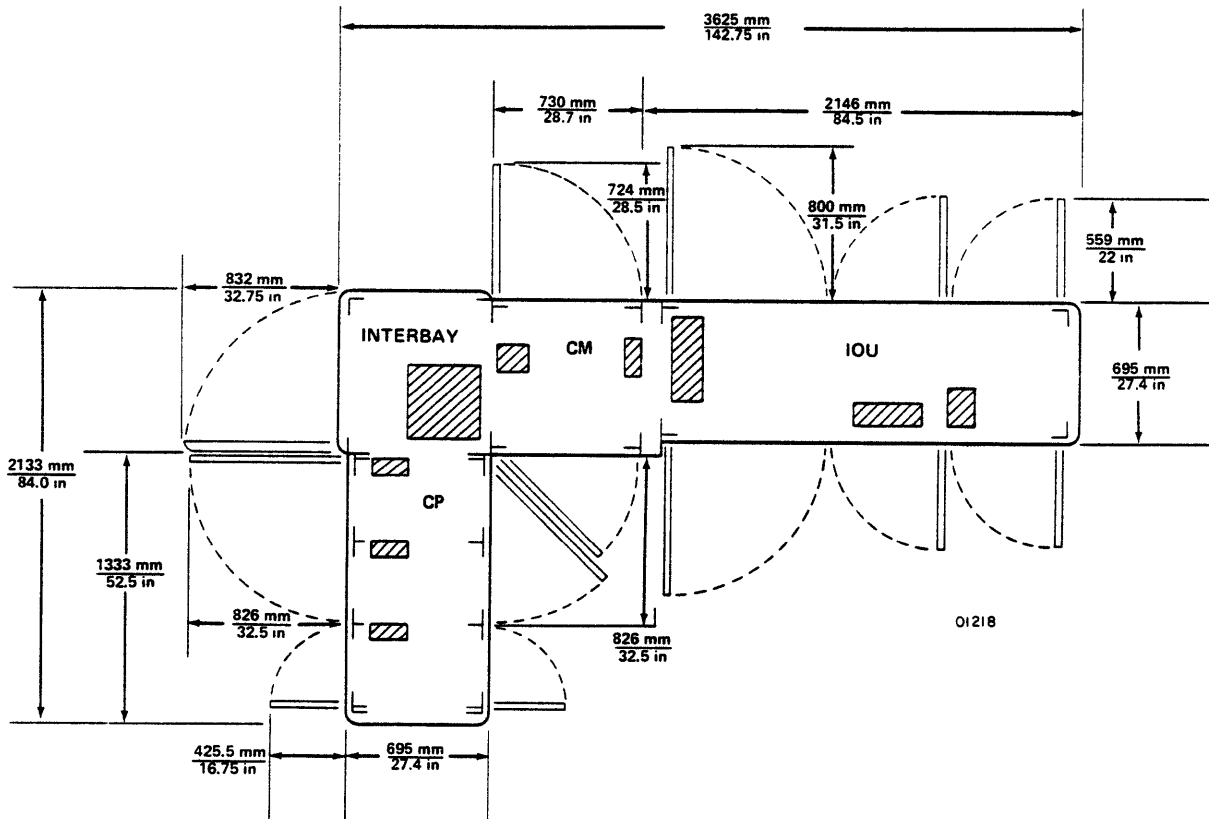
2

This section contains data sheets for the system consoles, water cooling units, central computer, optional processor, optional DMA IOU upgrade, and optional secondary IOU. The physical, electrical, environmental, and cooling information on the data sheets is for maximum equipment configurations.

This section is layed out to present a schematic of the equipment or configuration on the page opposite the data sheets.

Data sheets for the SPM and the system motor-generator sets are in the Site Preparation Monitoring and Power Data manual.

STANDARD COMPUTER SYSTEM



PHYSICAL SPECIFICATIONS

Width: 3625 mm (142.75 in)
 Depth: 2133 mm (84.00 in)
 Height: 1930 mm (76.00 in)
 Weight: 2542 kg (5600 lb)

STANDARD COMPUTER SYSTEM

ELECTRICAL SPECIFICATIONS

Power Consumption, steady state, maximum			
Cabinet	400-Hz (volts, phase, kVA)	60-Hz (volts, phase, kVA)	50-Hz (volts, phase, kVA)
CP	120/208-V, 3- \emptyset , 12.0-kVA	-	-
CM	120/208-V, 3- \emptyset , 3.0-kVA	120-V, 1- \emptyset , 0.6-kVA	240-V, 1- \emptyset , 0.6-kVA
IOU	120/208-V, 3- \emptyset , 4.6-kVA	120/208-V, 3- \emptyset , 4.9-kVA	220-V, 3- \emptyset , 4.9-kVA or 240-V, 3- \emptyset , 4.9-kVA
Interbay	-	-	-

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
CP	-	Power from interbay cabinet
CM	-	Power from interbay cabinet
IOU	400-Hz, 20-A, 3- \emptyset , 1 and 60-Hz, 20-A, 3- \emptyset , 1 or 50-Hz, 20-A, 3- \emptyset , 1	203 mm (8 in) 203 mm (8 in) 203 mm (8 in)
Interbay	400-Hz, 100-A, 3- \emptyset , 1 and 60-Hz, 15-A, 1- \emptyset , 1 or 50-Hz, 15-A, 1- \emptyset , 1	152 mm (6 in) 152 mm (6 in) 152 mm (6 in)

COOLING SPECIFICATIONS

Type of cooling: Distilled water
 Source of cooling: A 50-L/min (14-gal/min) water cooling unit (18674-1) cools the CP and CM. An internal 3-ton condensing unit cools the IOU.

Cabinet	Maximum Heat Rejection Rates					
	To air		To water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
CP	1 182	4 035	10 636	36 313	11 818	40 348
CM	347	1 183	3 118	10 645	3 465	11 828
IOU	889	3 033	7 999	27 302	8 888	30 335
Interbay	-	-	-	-	-	-
Total	2 418	8 251	21 753	74 260	24 171	82 511

ENVIRONMENTAL SPECIFICATIONS

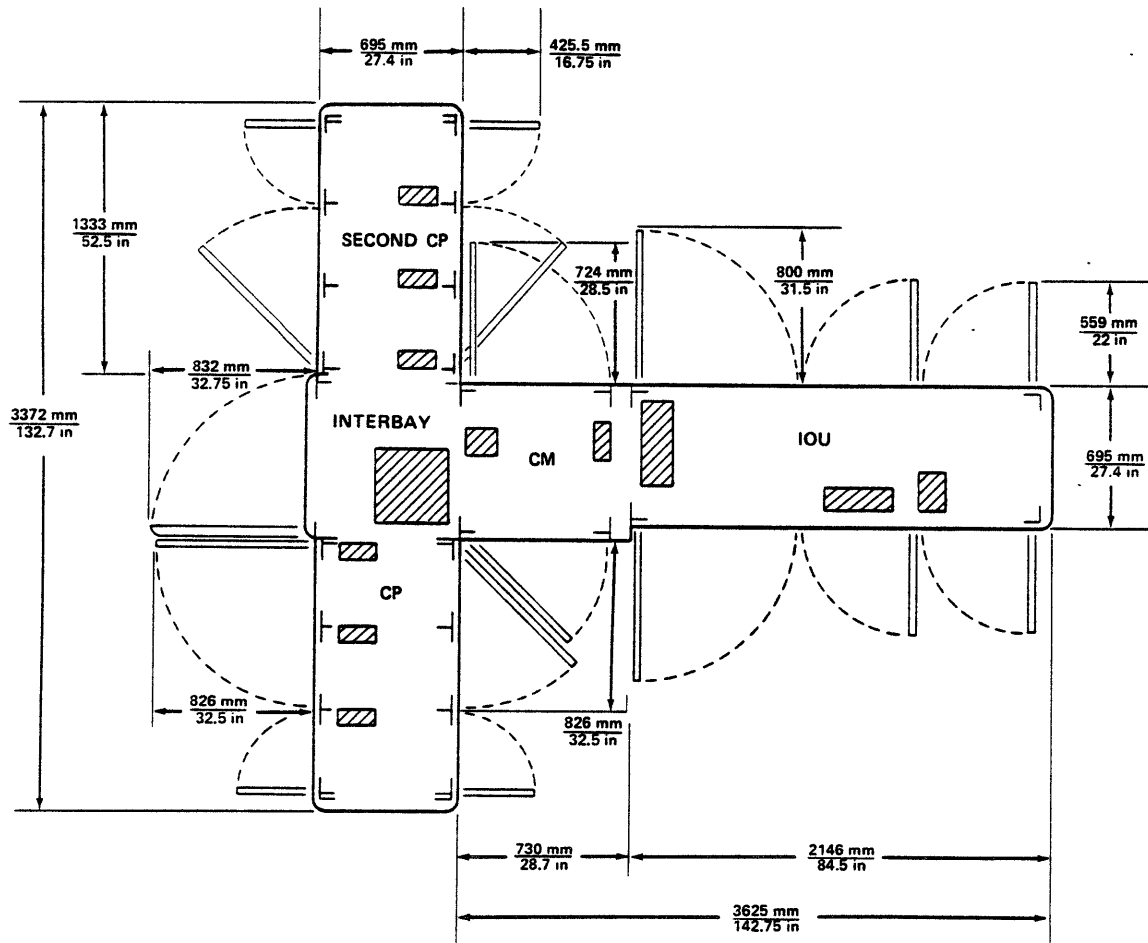
Room Relative Humidity Range: 35% to 65%
 Room Dew Point Limit: 13 °C (56 °F)

Room Conditions	Minimum	Recommended	Maximum
Operating Temperature	15 °C (59 °F)	23 °C (74 °F)	32 °C (90 °F)
Storage Temperature	5 °C (40 °F)	-	49 °C (120 °F)

Water Conditions	Minimum	Recommended	Maximum
Temperature	4.4 °C (40 °F)	7.2 °C (45 °F)	26.7 °C (80 °F)
Flow Rate	3.0 L/min (0.8 gal/min)	3.8 L/min (1.0 gal/min)	15.1 L/min (4.0 gal/min)
Supply Pressure	103.4 kPa (15 psi)	275.8 kPa (40 psi)	689.4 kPa (100 psi)
Note: Minimum differential pressure required (supply/return) is 69 kPa (10 psi).			

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SECOND CENTRAL PROCESSOR 18557-2



01217

PHYSICAL SPECIFICATIONS

Width: 1 333 mm (52.5 in)
 Depth: 695 mm (27.4 in)
 Height: 1 930 mm (76.0 in)
 Weight: 955 kg (2 100 lb)

SECOND CENTRAL PROCESSOR (18557-2)

ELECTRICAL SPECIFICATIONS

Power Consumption, steady state, maximum			
Cabinet	400-Hz (volts, phase, kVA)	60-Hz (volts, phase, kVA)	50-Hz (volts, phase, kVA)
CP	120/208-V, 3- ϕ , 12.0-kVA	-	-

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
CP	-	Power from interbay cabinet

COOLING SPECIFICATIONS

Type of cooling: Distilled water
 Source of cooling: 50-L/min (14-gal/min) water cooling unit (18674-1),
 102-L/min (27-gal/min) water cooling unit (18677-1),
 220-L/min (58-gal/min) water cooling unit (18675-1), or
 265-L/min (70-gal/min) water cooling unit (18675-3)

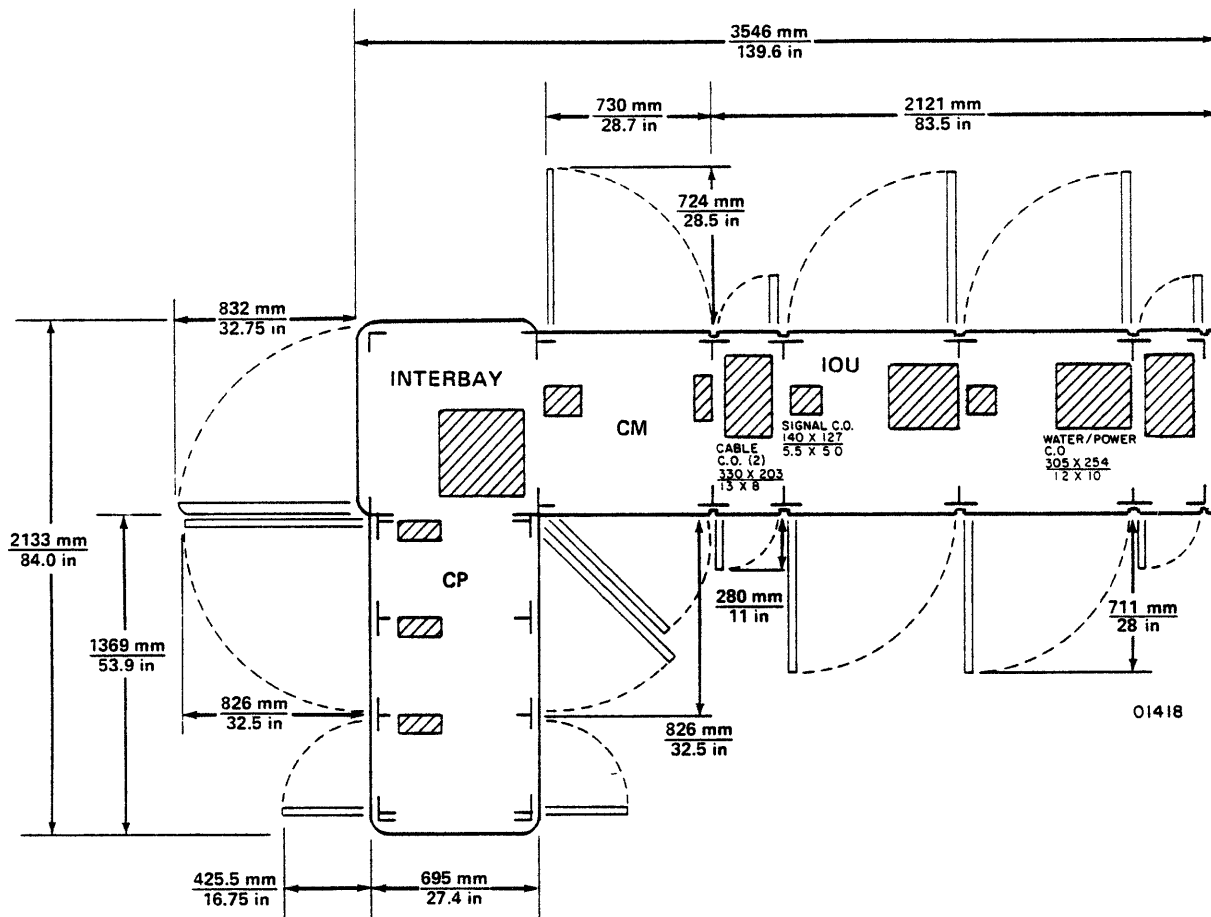
Cabinet	Maximum Heat Rejection Rates					
	To air		To water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
CP	1 182	4 035	10 636	36 313	11 818	40 348

ENVIRONMENTAL SPECIFICATIONS

Room Relative Humidity Range: 35% to 65%
 Room Dew Point Limit: 13 °C (56 °F)

Room Conditions	Minimum	Recommended	Maximum
Operating Temperature	15 °C (59 °F)	23 °C (74 °F)	32 °C (90 °F)
Storage Temperature	5 °C (40 °F)	-	49 °C (120 °F)

DIRECT MEMORY ACCESS (DMA) IOU UPGRADE 18854-3



PHYSICAL SPECIFICATIONS

Width: 2 121 mm (83.5 in)
 Depth: 686 mm (27.0 in)
 Height: 1 930 mm (76.0 in)
 Weight: 1 021 kg (2 250 lb)

DIRECT MEMORY ACCESS (DMA) IOU UPGRADE 18854-3

ELECTRICAL SPECIFICATIONS

Power Consumption, steady state, maximum			
Cabinet	400-Hz (volts, phase, kVA)	60-Hz (volts, phase, kVA)	50-Hz (volts, phase, kVA)
IOU	120/208-V, 3- \emptyset , 10.0-kVA	120-V, 1- \emptyset , 1.4-kVA	220-V, 1- \emptyset , 1.4-kVA or 240-V, 1- \emptyset , 1.4-kVA

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
IOU	-	Power from interbay cabinet

COOLING SPECIFICATIONS

Type of cooling: Distilled water
 Source of cooling: 50-L/min (14-gal/min) water cooling unit (18674-1),
 102-L/min (27-gal/min) water cooling unit (18677-1),
 220-L/min (58-gal/min) water cooling unit (18675-1), or
 265-L/min (70-gal/min) water cooling unit (18675-3)

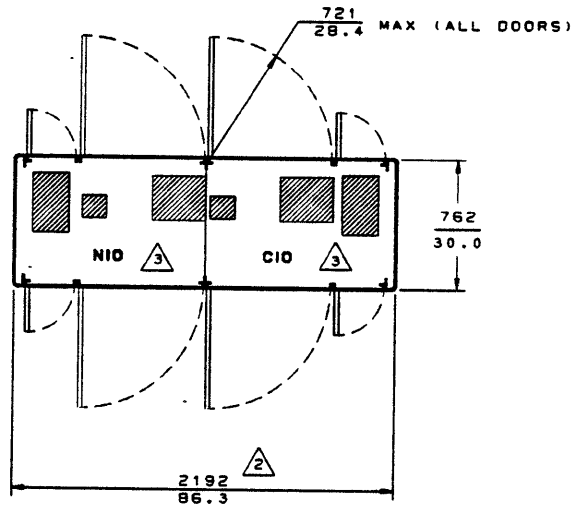
Cabinet	Maximum Heat Rejection Rates					
	To air		To water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
IOU	1 269	4 328	11 413	38 954	12 682	43 282

ENVIRONMENTAL SPECIFICATIONS

Room Relative Humidity Range: 35% to 65%
 Room Dew Point Limit: 13 °C (56 °F)

Room Conditions	Minimum	Recommended	Maximum
Operating Temperature	15 °C (59 °F)	23 °C (74 °F)	32 °C (90 °F)
Storage Temperature	5 °C (40 °F)	-	49 °C (120 °F)

SECONDARY IOU (18856-2)



NOTES:

- 1 ALL DIMENSIONS ARE IN $\frac{\text{mm}}{10}$.
- 2 DIMENSION INCLUDES END PANELS.
- 3 AIR EXHAUST FROM TOP OF UNIT (2 PLACES).

60463550-38

PHYSICAL SPECIFICATIONS

Width: 2 192 mm (86.3 in)
 Depth: 762 mm (30.0 in)
 Height: 1 930 mm (76.0 in)
 Weight: 1 021 kg (2 250 lb)

SECONDARY IOU (18856-2)

ELECTRICAL SPECIFICATIONS

Power Consumption, steady state, maximum			
Cabinet	400-Hz (volts, phase, kVA)	60-Hz (volts, phase, kVA)	50-Hz (volts, phase, kVA)
NIO	120/208-V, 3- \emptyset , 5.3-kVA	120-V, 1- \emptyset , 0.7-kVA	220-V, 1- \emptyset , 0.7-kVA or
CIO	120/208-V, 3- \emptyset , 4.7-kVA	120-V, 1- \emptyset , 0.7-kVA	240-V, 1- \emptyset , 0.7-kVA

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
NIO	400-Hz, 30-A, 3- \emptyset , 1 and	25 mm (1 in)
	50 Hz, 15 A, 1 \emptyset , 1 or	25 mm (1 in)
	60 Hz, 15 A, 1 \emptyset , 1	25 mm (1 in)
CIO	400-Hz, 15-A, 3- \emptyset , 1 and	25 mm (1 in)
	50 Hz, 15 A, 1 \emptyset , 1 or	25 mm (1 in)
	60 Hz, 15 A, 1 \emptyset , 1	25 mm (1 in)

COOLING SPECIFICATIONS

Type of cooling: Distilled water
Source of cooling: 102 L/min (27 gal/min) water cooling unit (18677-1),
 220 L/min (58 gal/min) water cooling unit (18675-1), or
 265 L/min (70 gal/min) water cooling unit (18675-3)

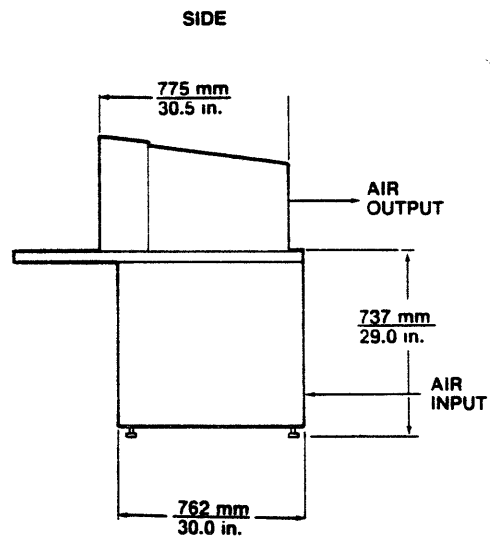
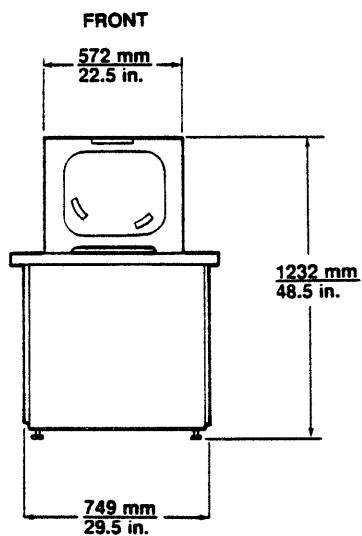
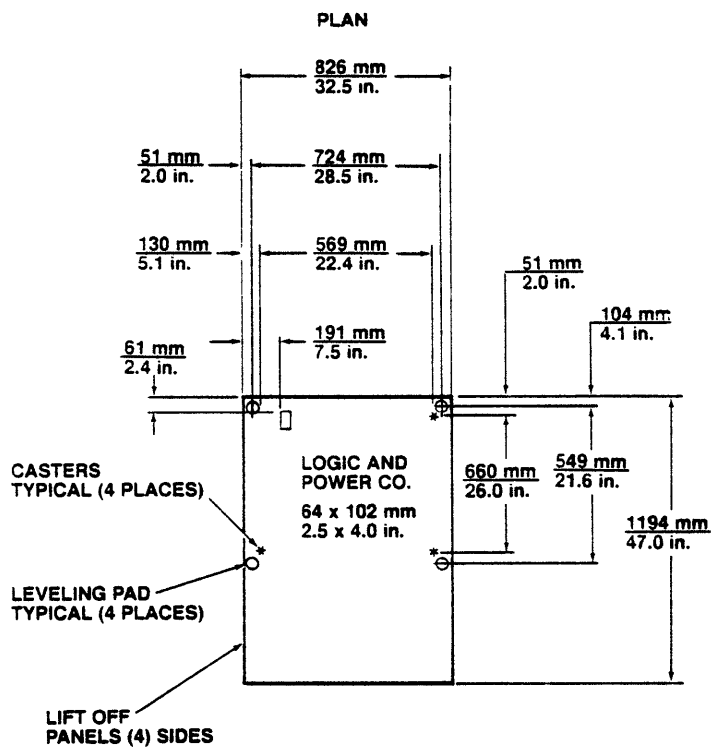
Cabinet	Maximum Heat Rejection Rates					
	To air		To water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
NIO	797	2 719	7 169	24 469	7 966	27 188
CIO	472	1 609	4 244	14 485	4 716	16 094

ENVIRONMENTAL SPECIFICATIONS

Room Relative Humidity Range: 35% to 65%
Room Dew Point Limit: 13 $^{\circ}$ C (56 $^{\circ}$ F)

Room Conditions	Minimum	Recommended	Maximum
Operating Temperature	15 $^{\circ}$ C (59 $^{\circ}$ F)	23 $^{\circ}$ C (74 $^{\circ}$ F)	32 $^{\circ}$ C (90 $^{\circ}$ F)
Storage Temperature	5 $^{\circ}$ C (40 $^{\circ}$ F)	-	49 $^{\circ}$ C (120 $^{\circ}$ F)

SYSTEM CONSOLE 18002-1



PHYSICAL SPECIFICATIONS

Width: 838 mm (33 in)
 Depth: 1 194 mm (47 in)
 Height: 1 244 mm (49 in)
 Weight: 177 kg (390 lb)

01219

SYSTEM CONSOLE 18002-1

ELECTRICAL SPECIFICATIONS

Power Consumption, steady state, maximum			
Cabinet	400-Hz (volts, phase, kVA)	60-Hz (volts, phase, kVA)	50-Hz (volts, phase, kVA)
System Console	120/208-V, 3- \emptyset , 0.8-kVA	120-V, 1- \emptyset , 0.3-kVA	220-V, 1- \emptyset , 0.3-kVA

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
System Console	400-Hz, 15-A, 3- \emptyset , 1	508 mm (20 in)
	and 60-Hz, 15-A, 1- \emptyset , 1	406 mm (16 in)
	or 50-Hz, 15-A, 1- \emptyset , 1	406 mm (16 in)

COOLING SPECIFICATIONS

Type of cooling: Internal fan
Source of cooling: Room air

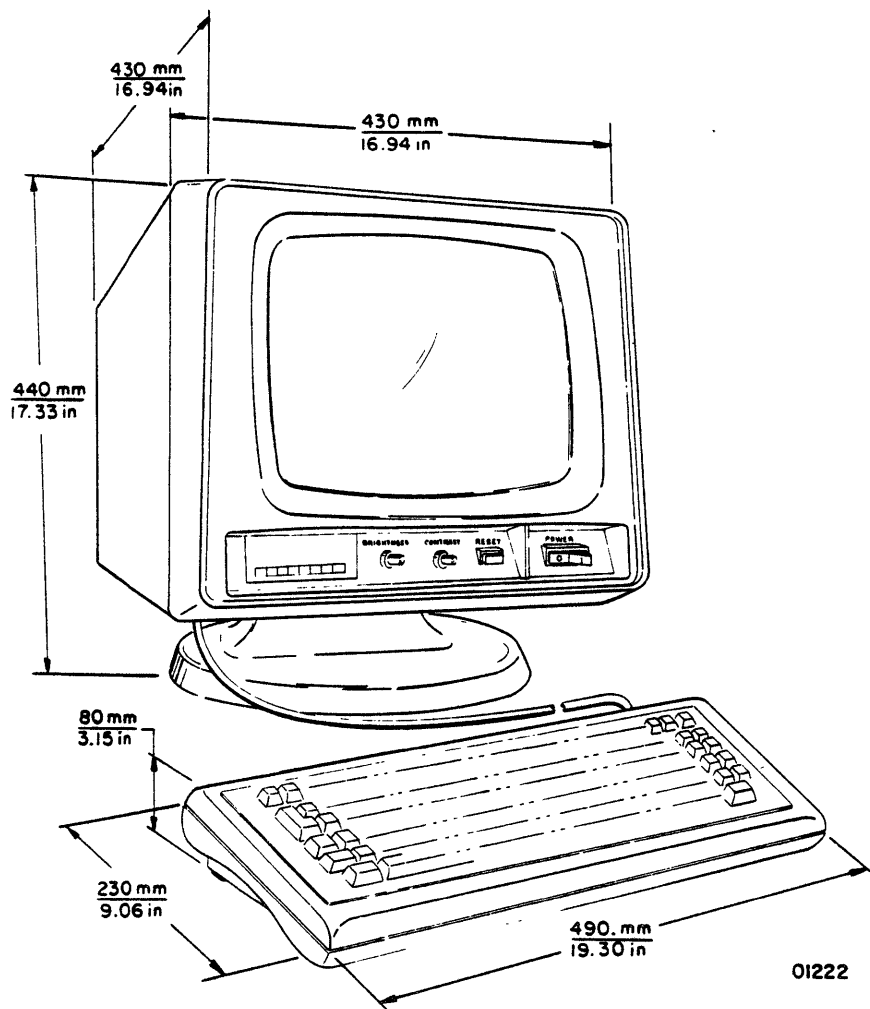
Cabinet	Maximum Heat Rejection Rates					
	To air		To water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
System Console	888	3 030	-	-	888	3 030

ENVIRONMENTAL SPECIFICATIONS

Room Relative Humidity Range: 35% to 60%
Room Dew Point Limit: 13 °C (56 °F)

Room Conditions	Minimum	Recommended	Maximum
Operating Temperature	15 °C (59 °F)	23 °C (74 °F)	32 °C (90 °F)
Storage Temperature	5 °C (40 °F)	-	49 °C (120 °F)

SYSTEM CONSOLE 18002-2



PHYSICAL SPECIFICATIONS

Width: 430 mm (16.9 in)
Depth: 430 mm (16.9 in)
Height: 440 mm (17.3 in)
Weight: 21.8 kg (48 lb)

SYSTEM CONSOLE 18002-2

ELECTRICAL SPECIFICATIONS

Power Consumption, steady state, maximum			
Cabinet	400-Hz (volts, phase, kVA)	60-Hz (volts, phase, kVA)	50-Hz (volts, phase, kVA)
System Console	-	120-V, 1- ϕ , 0.2-kVA	220-V, 1- ϕ , 0.2-kVA or 240-V, 1- ϕ , 0.2-kVA

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
System Console	60-Hz, 15-A, 1- ϕ , 1 or 50-Hz, 15-A, 1- ϕ , 1	- -

COOLING SPECIFICATIONS

Type of cooling: Internal fan
Source of cooling: Room air

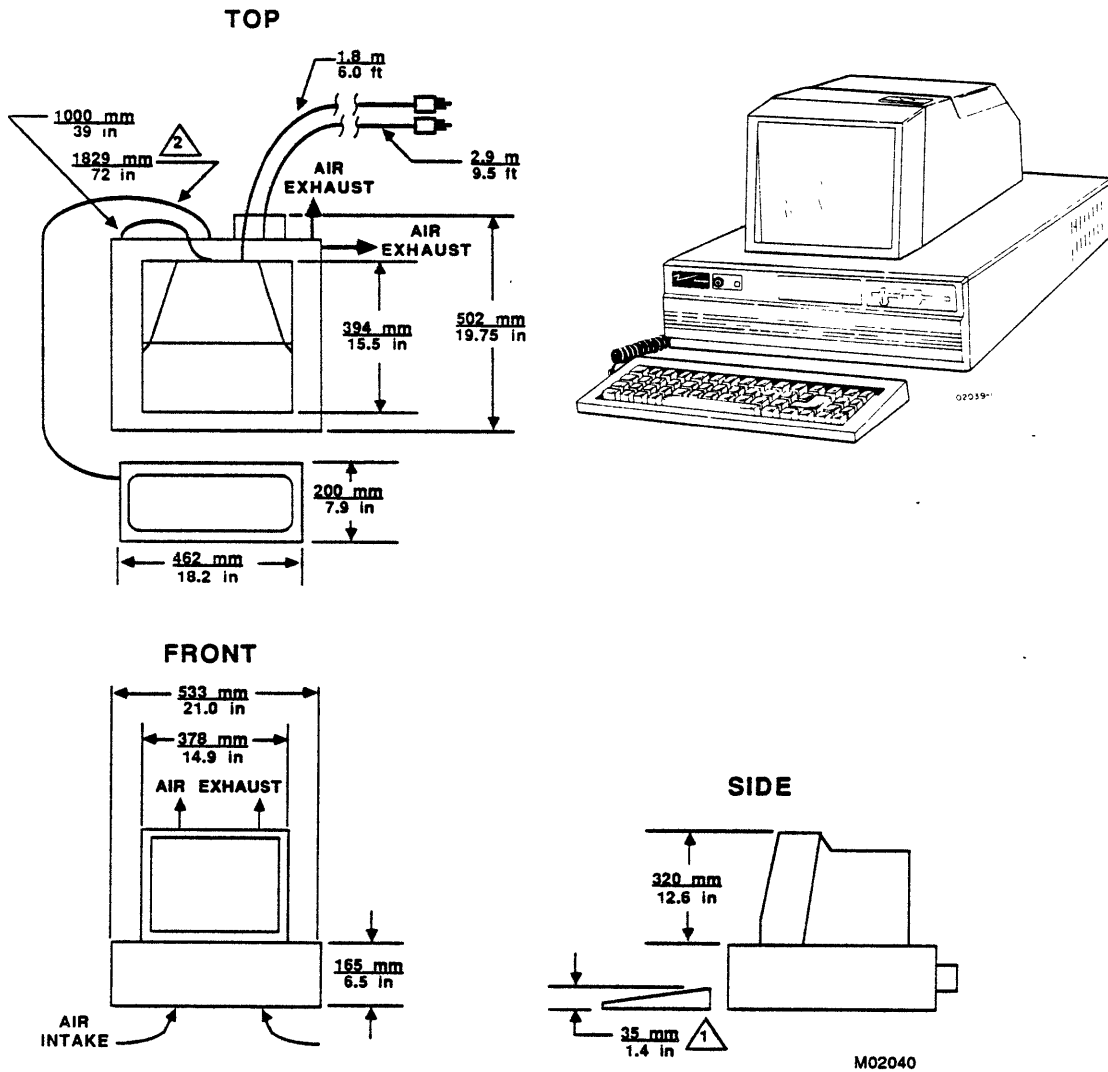
Cabinet	Maximum Heat Rejection Rates					
	To air		To water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
System Console	122	416	-	-	122	416

ENVIRONMENTAL SPECIFICATIONS

Room Relative Humidity Range: 35% to 60%
Room Dew Point Limit: 13 °C (56 °F)

Room Conditions	Minimum	Recommended	Maximum
Operating Temperature	15 °C (59 °F)	23 °C (74 °F)	32 °C (90 °F)
Storage Temperature	5 °C (40 °F)	-	49 °C (120 °F)

SYSTEM CONSOLE (19003-1)



- NOTES:**
- ① MAXIMUM HEIGHT WITH KEYBOARD FEET DOWN.
 - ② COILED LENGTH. EXTENDED LENGTH IS 2743 mm (108 in).

PHYSICAL SPECIFICATIONS

	<u>Microcomputer</u>	<u>Monitor</u>
Width:	533 mm (21 in)	378 mm (14.9 in)
Depth:	502 mm (19.75 in)	394 mm (15.5 in)
Height:	165 mm (6.5 in)	320 mm (12.6 in)
Weight:	16 kg (35.3 lb)	18.1 kg (40 lb)

SYSTEM CONSOLE (19003-1)

ELECTRICAL SPECIFICATIONS

Power Consumption, steady state, maximum			
Cabinet	400-Hz (volts, phase, kVA)	60-Hz (volts, phase, kVA)	50-Hz (volts, phase, kVA)
System Console	-	120-V, 1- \emptyset , 1.4-kVA	220-V, 1- \emptyset , 1.4-kVA or 240-V, 1- \emptyset , 1.4-kVA

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
System Console	60-Hz, 15-A, 1- \emptyset , 1 or 50-Hz, 15-A, 1- \emptyset , 1	- -

COOLING SPECIFICATIONS

Type of cooling: Internal fan
Source of cooling: Room air

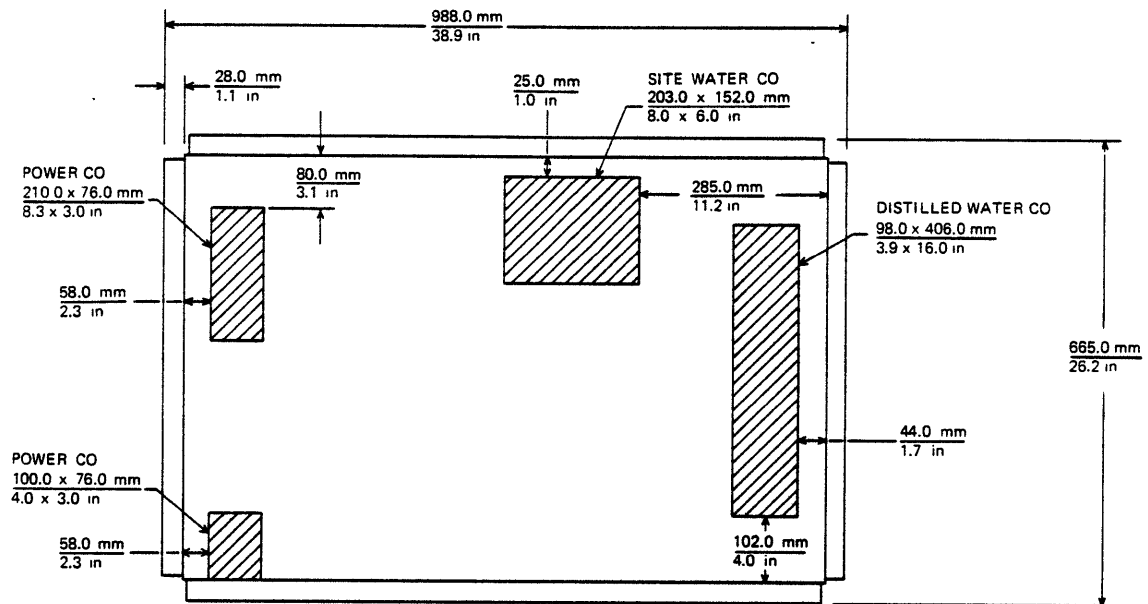
Cabinet	Maximum Heat Rejection Rates					
	To air		To water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
System Console	To be supplied	To be supplied	-	-	To be supplied	To be supplied

ENVIRONMENTAL SPECIFICATIONS

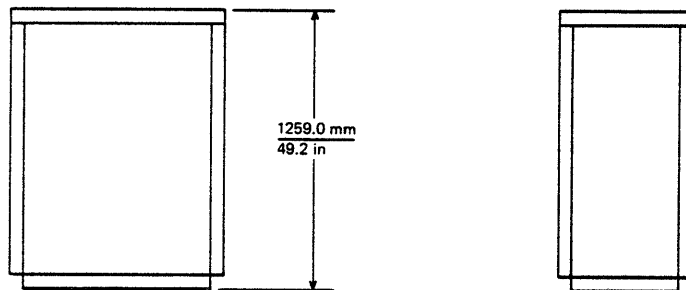
Room Relative Humidity Range: 20% to 80%
Room Dew Point Limit: 13 °C (56 °F)

Room Conditions	Minimum	Recommended	Maximum
Operating Temperature	10 °C (50 °F)	23 °C (74 °F)	32 °C (90 °F)
Storage Temperature	5 °C (40 °F)	-	49 °C (120 °F)

50-L/MIN (14-GAL/MIN) WATER COOLING UNIT (18674-1)



FRONT



00094-1

PHYSICAL SPECIFICATIONS

Width: 988 mm (38.9 in)
 Depth: 665 mm (26.2 in)
 Height: 1 259 mm (49.2 in)
 Weight: 227 kg (500 lb)

50-L/MIN (14-GAL/MIN) WATER COOLING UNIT (18674-1)

ELECTRICAL SPECIFICATIONS

Power Consumption, steady state, maximum			
Cabinet	400-Hz (volts, phase, kVA)	60-Hz (volts, phase, kVA)	50-Hz (volts, phase, kVA)
50-L/min (14-gal/min) Water Cooling Unit	-	208-V, 3- ϕ , 1.4-kVA	380-V, 3- ϕ , 1.4-kVA or 415-V, 3- ϕ , 1.4-kVA

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
50-L/min (14-gal/min) Water Cooling Unit	60-Hz, 15-A, 3- ϕ , 1 or 50-Hz, 15-A, 3- ϕ , 1	153 mm (6 in) 153 mm (6 in)

COOLING SPECIFICATIONS

Type of Cooling: Chilled water
 Source of Cooling: Closed-loop chilled water system (customer supplied)

Cabinet	Maximum Heat Rejection Rates					
	To air		To water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
50-L/min (14-gal/min) Water Cooling Unit	500	1 707	16 500	56 314	17 000	58 021

Water Conditions	Minimum	Recommended	Maximum
Temperature	4 °C (40 °F)	7 °C (45 °F)	10 °C (50 °F)
Flow rate	30 L/min (8 gal/min)	53 L/min (14 gal/min)	68 L/min (18 gal/min)
Supply Pressure	-	-	690 kPa (100 psi)

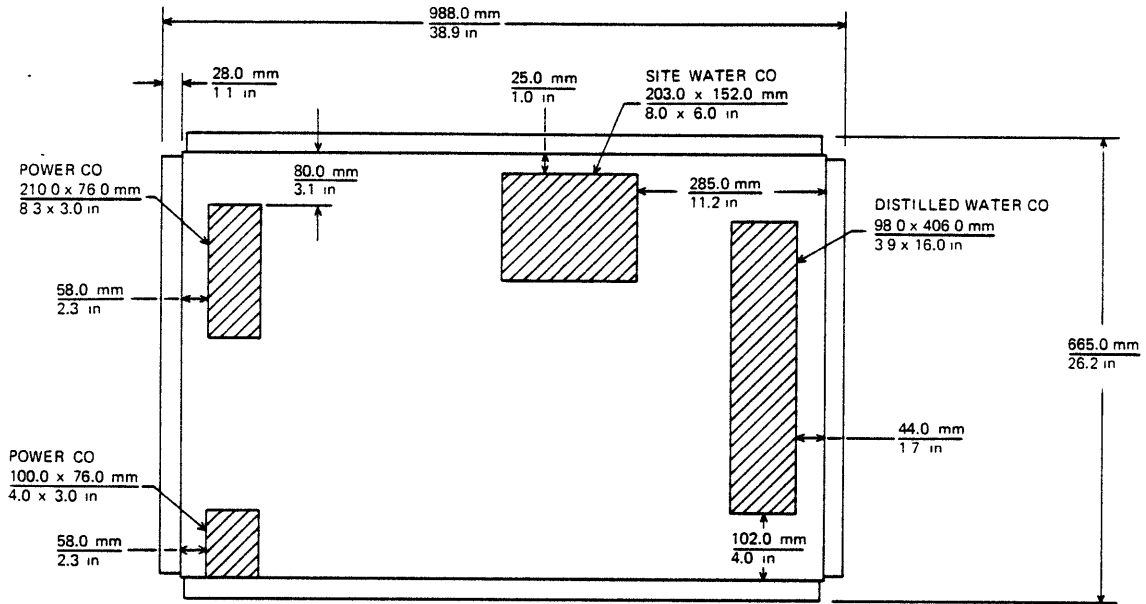
ENVIRONMENTAL SPECIFICATIONS

Room Relative Humidity Range: 35% to 60%
 Room Dew Point Limit: 13 °C (56 °F)

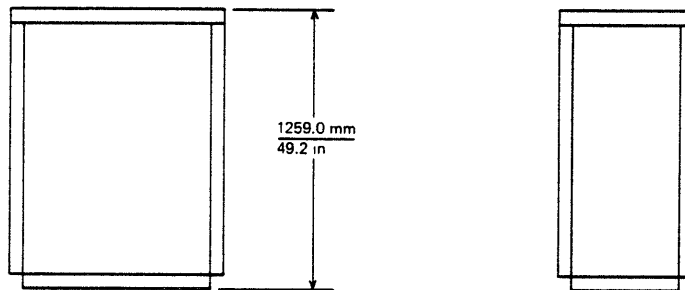
Room Conditions	Minimum	Recommended	Maximum
Operating Temperature	15 °C (59 °F)	23 °C (74 °F)	32 °C (90 °F)
Storage Temperature	5 °C (40 °F)	-	49 °C (120 °F)

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102-L/MIN (27-GAL/MIN) WATER COOLING UNIT (18677-1)



FRONT



00094-1

PHYSICAL SPECIFICATIONS

Width: 988 mm (38.9 in)
Depth: 665 mm (26.2 in)
Height: 1 257 mm (49.5 in)
Weight: 227 kg (500 lb)

**102-L/MIN (27-GAL/MIN) WATER COOLING UNIT
(18677-1)**

ELECTRICAL SPECIFICATIONS

Power Consumption, steady state, maximum			
Cabinet	400-Hz (volts, phase, kVA)	60-Hz (volts, phase, kVA)	50-Hz (volts, phase, kVA)
102-L/min (27-gal/min) Water Cooling Unit	-	208-V, 3- \emptyset , 3.6-kVA	380-V, 3- \emptyset , 3.6-kVA or 415-V, 3- \emptyset , 3.6-kVA

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
102-L/min (27-gal/min) Water Cooling Unit	60-Hz, 15-A, 3- \emptyset , 1 or 50-Hz, 15-A, 3- \emptyset , 1	153 mm (6 in) 153 mm (6 in)

COOLING SPECIFICATIONS

Type of Cooling: Chilled water
 Source of Cooling: Closed-loop chilled water system (customer supplied)

Cabinet	Maximum Heat Rejection Rates					
	To air		To water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
102-L/min (27-gal/min) Water Cooling Unit	552	1 884	27 576	94 116	28 128	96 000

Water Conditions	Minimum	Recommended	Maximum
Temperature	4 °C (40 °F)	7 °C (45 °F)	10 °C (50 °F)
Flow rate	30 L/min (8 gal/min)	53 L/min (14 gal/min)	68 L/min (18 gal/min)
Supply Pressure	-	-	690 kPa (100 psi)

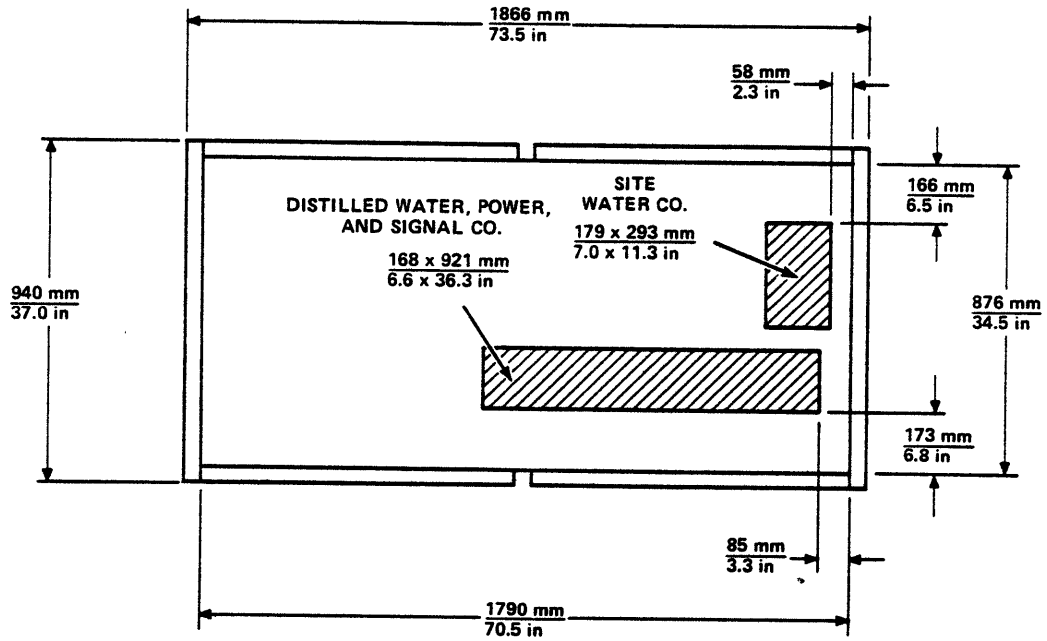
ENVIRONMENTAL SPECIFICATIONS

Room Relative Humidity Range: 35% to 60%
 Room Dew Point Limit: 13 °C (56 °F)

Room Conditions	Minimum	Recommended	Maximum
Operating Temperature	15 °C (59 °F)	23 °C (74 °F)	32 °C (90 °F)
Storage Temperature	5 °C (40 °F)	-	49 °C (120 °F)

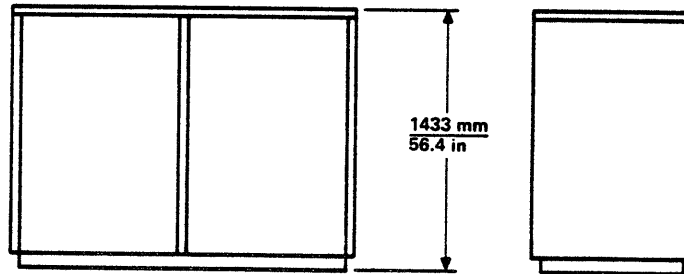
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220-L/MIN (58-GAL/MIN) WATER COOLING UNIT (18675-1)



FRONT

SIDE



01028-2

PHYSICAL SPECIFICATIONS

Width: 1 866 mm (73.5 in)
 Depth: 940 mm (37.0 in)
 Height: 1 433 mm (56.4 in)
 Weight: 686 kg (1 510 lb)

**220-L/MIN (58-GAL/MIN) WATER COOLING UNIT
(18675-1)**

ELECTRICAL SPECIFICATIONS

Power Consumption, steady state, maximum			
Cabinet	400-Hz (volts, phase, kVA)	60-Hz (volts, phase, kVA)	50-Hz (volts, phase, kVA)
220-L/min (58-gal/min) Water Cooling Unit	-	208-V, 3- \emptyset , 4.3-kVA	380-V, 3- \emptyset , 4.3-kVA or 415-V, 3- \emptyset , 4.3-kVA

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
220-L/min (58-gal/min) Water Cooling Unit	60-Hz, 25-A, 3- \emptyset , 1 or 50-Hz, 25-A, 3- \emptyset , 1	102 mm (4 in)

COOLING SPECIFICATIONS

Type of cooling: Chilled water
 Source of cooling: Closed-loop chilled water system (customer supplied)

Cabinet	Maximum Heat Rejection Rates					
	To air		To water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
220-L/min (58-gal/min) Water Cooling Unit	4 200	14 400	80 200	273 600	84 400	288 000

Water Conditions	Minimum	Recommended	Maximum
Temperature	4 °C (40 °F)	7 °C (45 °F)	10 °C (50 °F)
Flow rate	132 L/min (35 gal/min)	170 L/min (45 gal/min)	208 L/min (55 gal/min)
Supply Pressure	-	-	690 kPa (100 psi)

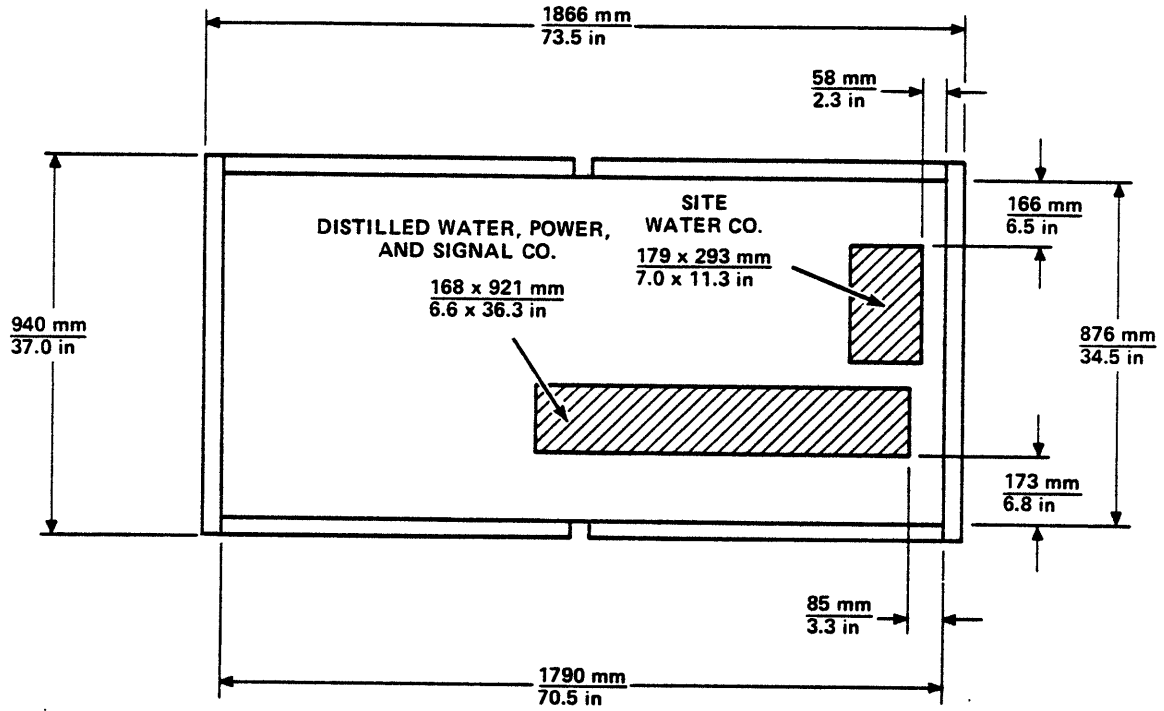
ENVIRONMENTAL SPECIFICATIONS

Room Relative Humidity Range: 35% to 60%
 Room Dew Point Limit: 13 °C (56 °F)

Room Conditions	Minimum	Recommended	Maximum
Operating Temperature	15 °C (59 °F)	23 °C (74 °F)	32 °C (90 °F)
Storage Temperature	5 °C (40 °F)	-	49 °C (120 °F)

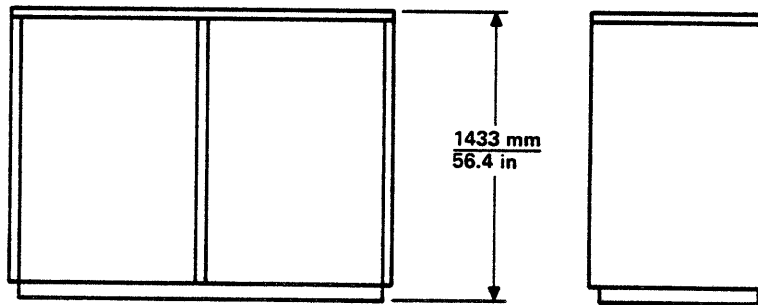
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**265-L/MIN (70-GAL/MIN) WATER COOLING UNIT
(18675-3)**



FRONT

SIDE



01028-2

PHYSICAL SPECIFICATIONS

Width: 1 866 mm (73.5 in)
 Depth: 940 mm (37.0 in)
 Height: 1 433 mm (56.4 in)
 Weight: 540 kg (1 300 lb)

**265-L/MIN (70-GAL/MIN) WATER COOLING UNIT
(18675-3)**

ELECTRICAL SPECIFICATIONS

Power Consumption, steady state, maximum			
Cabinet	400-Hz (volts, phase, kVA)	60-Hz (volts, phase, kVA)	50-Hz (volts, phase, kVA)
265-L/min (70-gal/min) Water Cooling Unit	-	208-V, 3- \emptyset , 5.0-kVA	380-V, 3- \emptyset , 3.9-kVA or 415-V, 3- \emptyset , 3.9-kVA

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
265-L/min (70-gal/min) Water Cooling Unit	60-Hz, 25-A, 3- \emptyset , 1 or 50-Hz, 25-A, 3- \emptyset , 1	102 mm (4 in)

COOLING SPECIFICATIONS

Type of cooling: Chilled water
 Source of cooling: Closed-loop chilled water system (customer supplied)

Cabinet	Maximum Heat Rejection Rates					
	To air		To water (60 Hz)		To water (50 Hz)	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
265-L/min (70-gal/min) Water Cooling Unit	4 600	15 800	92 400	315 400	79 200	270 300

Water Conditions	Minimum	Recommended	Maximum
Temperature	4 °C (40 °F)	7 °C (45 °F)	10 °C (50 °F)
Flow rate	132 L/min (35 gal/min)	170 L/min (45 gal/min)	197 L/min (52 gal/min)
Supply Pressure	-	-	690 kPa (100 psi)

ENVIRONMENTAL SPECIFICATIONS

Room Relative Humidity Range: 35% to 60%
 Room Dew Point Limit: 13 °C (56 °F)

Room Conditions	Minimum	Recommended	Maximum
Operating Temperature	15 °C (59 °F)	23 °C (74 °F)	32 °C (90 °F)
Storage Temperature	5 °C (40 °F)	-	49 °C (120 °F)

PART 3

POWER REQUIREMENTS

CENTRAL COMPUTER PRIMARY POWER

The central computer 400-Hz primary power requirements are:

400-Hz, 120/208-V, 3-phase, 4-wire.

The central computer 50- or 60-Hz primary power requirements are one of the following:

- 60-Hz, 120/208-V, 3-phase, 4-wire, plus ground.
- 50-Hz, 220/380-V, 3-phase, 4-wire, plus ground.
- 50-Hz, 240/415-V, 3-phase, 4-wire, plus ground.

M-G SET PRIMARY POWER AND M-G SET SELECTION

The M-G set converts 50- or 60-Hz input power to 400-Hz power for the computer system. The input power must be selected in accordance with the utility line power available at the site. The available M-G sets are listed below.

- 50-Hz, 230-V (+10%), 40-kVA, 3-phase, 4-wire.
- 50-Hz, 398-V (+10%), 40-kVA, 3-phase, 4-wire.
- 50-Hz, 398-V (+10%), 80-kVA, 3-phase, 4-wire.
- 60-Hz, 220-V (+10%), 40-kVA, 3-phase, 4-wire.
- 60-Hz, 440-V (+10%), 40-kVA, 3-phase, 4-wire.
- 60-Hz, 460-V (+10%), 80-kVA, 3-phase, 4-wire.

The customer, the Control Data salesperson, and the site planning representative determine the size of the M-G set(s). The customer purchases the M-G set from Control Data. Control Data delivers it to the site and the customer wires and installs it.

The size of the M-G set should be determined by the following criteria:

- The kVA values on the system data sheets reflect maximum equipment configurations. The actual operating kVA values are 20 to 30 percent less than the kVA values listed on the system data sheets.
- If future expansion is expected, the larger M-G set should be selected. The cost savings of a small M-G set would be offset by rewiring costs for the larger M-G set.
- Maximum operating efficiency is obtained when the MG is loaded at approximately 85 percent of rated output.

CAUTION

The M-G set is manufactured to meet Control Data specifications. Use of other 400-Hz power sources may damage the central computer and/or peripheral equipment and is not permitted, unless they meet or exceed Control Data specifications.

The customer provides 50- or 60-Hz site utility power capable of handling the starting current of the MG in accordance with local codes. Detailed M-G set information is available in the Site Preparation Monitoring and Power Data manual.

SYSTEM POWER MONITOR

Table 3-1 indicates the required connections between the SPM and the M-G control cabinet. Detailed information on the SPM is available in the Site Preparation Monitoring and Power Data manual. The appropriate M-G set manual is listed in the Related Publications part of the preface. The table's column headings relate to the diagrams in those manuals. The listed designations are signal information that will appear exactly as shown in the table.

SYSTEM GROUNDING

The customer must meet the safety grounding requirements described in the Site Preparation General Information manual and must shield all power and control runs and ground the shielding.

The following types of shielding are acceptable:

- Totally enclosed conductive busways.
- Steel, thin-walled, metallic conduit.
- Flexible metallic conduit.
- Braided metallic-shielded jacketing.
- Zip-on, flexible, metallic-shielded jacketing.

Cable shielding for equipment with casters and with a drop cable should terminate at the junction box located beneath the raised floor. Local codes determine the exact placement of the junction box.

Cable shielding for equipment not on casters should extend into the cabinet. If the shielding is rigid and local codes permit, a short length of flexible shielding should connect to the rigid shielding at a point beneath the raised floor. If the shielding is flexible, it should be extended directly into the cabinet.

Table 3-1. Connections Between SPM and M-G Control Cabinet

SPM Diagram Designation	Function	M-G Control Cabinet Diagram Designations†
M-G Start	Provides remote M-G starting capability by supplying 120 V ac from SPM to M-G control cabinet.	<ul style="list-style-type: none"> ● To remote control voltage at computer. ● 120 V ac from computer. ● Control voltage from computer. ● To remote control voltage from computer. ● Remote control on.
M-G Voltage Adjust	Enables adjustment of the M-G output voltage from the SPM.	<ul style="list-style-type: none"> ● To remote voltage adjust potentiometer. ● Customer remote VAR. ● To remote voltage adjust.
M-G Status	Indicates through a closed-contact signal to SPM that main input power is available from M-G. Contact opens upon loss of main input.	<ul style="list-style-type: none"> ● To remote power status indicator. ● Remote power status contact. ● To customer power status indicator. ● To remote power status indicator circuit. ● Contact: motor on.

†Terminology variations used by vendors on Interconnection Wiring (IW), Interconnecting (I), or External Interconnection (EI) diagrams.

WARNING

The SPM has been designed to meet Control Data specifications. Damage to the equipment and injury to personnel may result because of improper connections made to the SPM. Any nonstandard connections made to the SPM must be approved by the site planning representative.

GRID GROUNDING

Connecting the computer system cabinets to a grid ground maximizes electromagnetic compatibility (EMC) and minimizes electromagnetic interference (EMI) among the system cabinets.

The cabinets are immune to EMI and do not require grid grounding. If the site has a grid and the grid meets EMC requirements, Control Data recommends connecting the computer cabinets to the grid as an added EMC factor. The Site Preparation General Information manual covers the EMC grid requirements.

The EMC grounding connections are 25.4 mm (1 in) wide, tinned copper, braided grounding straps. The computer system is shipped with one end of each grounding strap connected to an EMC ground lug, located next to the power cutout in each cabinet (figures 1-2 and 1-3). The customer is responsible for connecting the strap to the grid.

EMERGENCY OFF SWITCHES

The customer provides and installs emergency off switches at all locations in the computer room in accordance with national and local electrical codes. These switches should be the nonautomatic reset type, such as a break glass push button station (for example, Allen Bradley Co., 800T-NX114) or a key reset control unit (for example, Square D Co., D1D1R), to restrict their use to emergencies only. The interconnection for a system emergency off configuration, consisting of multiple, series-connected emergency off switches, is shown in the power distribution diagram (figure 3-1).

POWER DISTRIBUTION

Figure 3-1 indicates typical 50- and 60-Hz power distribution for the computer system. The site planning representative provides a simplified power distribution diagram tailored to the computer system configuration.

The customer provides and installs all items related to the computer system power distribution as defined in this manual and in the Site Preparation General Information manual. These items include all primary power source circuit breakers, panels, disconnect switches, ductwork, magnetic contactors, and power wiring (including wiring required for signal-cable terminator power distribution). The customer also wires and installs the M-G set(s) and the wall-mounted panels furnished by Control Data.

Power wiring must extend 610 mm (24 in) above the surface of the raised floor. Insulation should be stripped back 152 mm (6 in) on all multiple-wire cables and 13 mm (0.5 in) on individual wires.

WARNING

The SPM 50/60-Hz power must be connected to the same feed (breaker box) as the MG control cabinet. This will prevent the SPM power from staying on if the MG cabinet power shuts off.

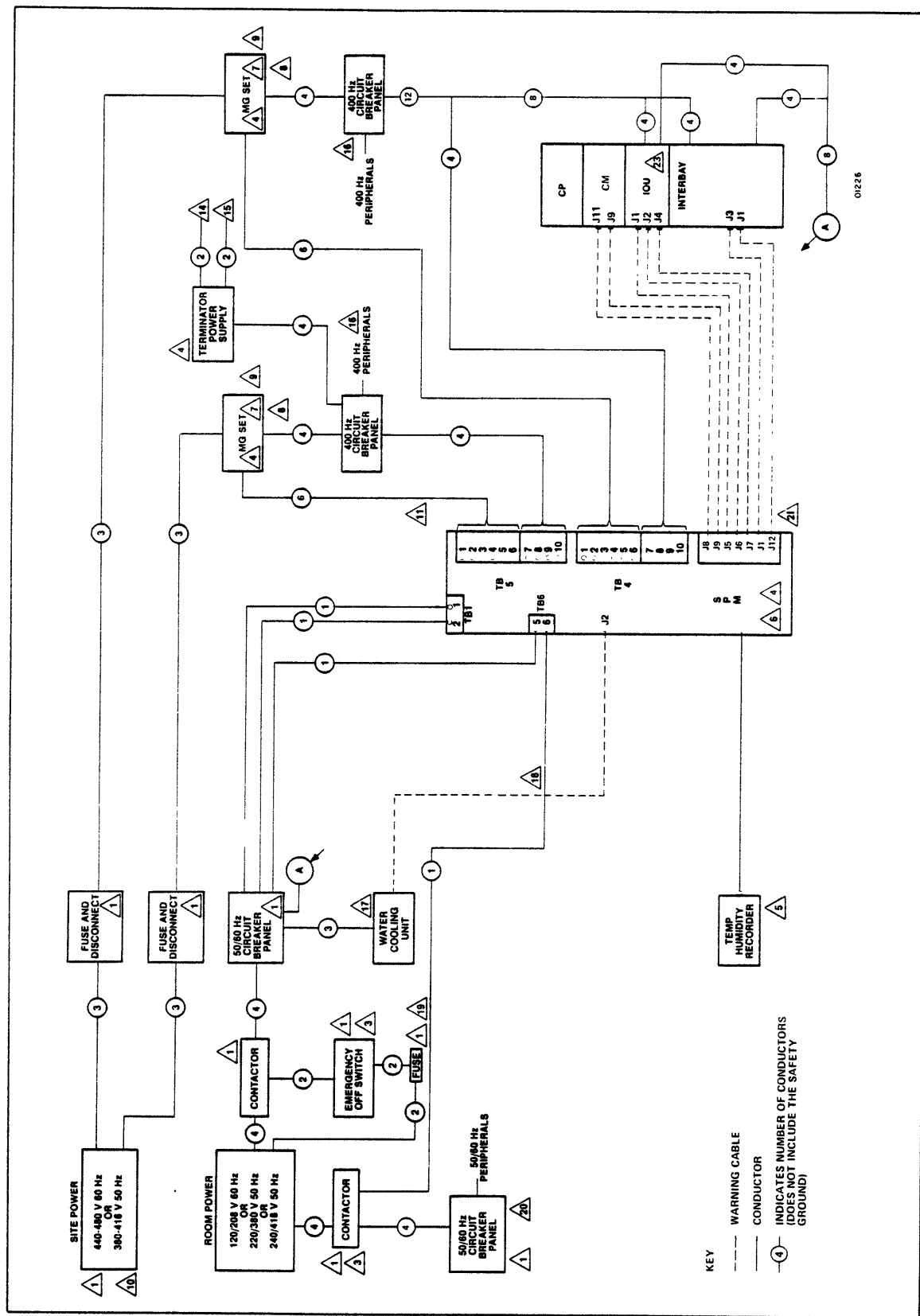


Figure 3-1. Power Distribution Diagram

NOTES:

1

CIRCUIT BREAKER PANELS, MAGNETIC CONTACTORS, MAIN DISCONNECT SWITCHES, JUNCTION BOXES, EMERGENCY OFF SWITCHES AND ASSOCIATED WIRING ARE CUSTOMER-FURNISHED AND INSTALLED PRIOR TO COMPUTER EQUIPMENT INSTALLATION.

2. ALL WIRING MUST BE IN ACCORDANCE WITH APPLICABLE LOCAL AND NATIONAL CODES AND MUST BE LABELED FOR IDENTIFICATION OF SOURCE AND TERMINATION.

3

EMERGENCY OFF SWITCHES ARE REQUIRED WITH THE SYSTEM. THEY SHOULD BE LOCATED AT EYE LEVEL WITH ONE NEAR EACH EXIT AND ONE NEAR THE SYSTEM POWER MONITOR. THEY ARE TO BE WIRED IN SERIES.

4

THIS PART IS FURNISHED BY CONTROL DATA AND IS INSTALLED BY CUSTOMER.

5

THE TEMPERATURE/HUMIDITY RECORDER HAS A 1.8-m (6-ft) POWER CORD WITH A NEMA 5-15 3-PRONG POWER PLUG WHICH PLUGS INTO THE SPM.

6

LOCATE SPM AT EYE LEVEL AND INSTALL IT NEAR ENOUGH TO THE CENTRAL COMPUTER SYSTEM SO THAT THE 15.2-m (50-ft) MONITOR CABLES CAN BE INSTALLED UNDER THE RAISED FLOOR AND CONNECTED TO THE COMPUTER CABINETS. THE DISTANCE BETWEEN THE RAISED FLOOR AND THE ROOM FLOOR IS 457 mm (18 in).

POWER TO THE SPM MUST BE WIRED FROM A SEPARATE CIRCUIT BREAKER THAT IS NOT CONTROLLED BY ANY OF THE POWER CONTROL PANELS WITHIN THE SYSTEM. THE CIRCUIT BREAKER MUST BE CONTROLLED ONLY BY THE EMERGENCY OFF SWITCHES.

7

THE SIZE OF DISCONNECT AND MOTOR POWER WIRING SHALL BE BASED ON MOTOR POWER CHARACTERISTICS SPECIFIED IN THE SITE PREPARATION MONITORING AND POWER DATA MANUAL.

8

VOLTAGE LOSS BETWEEN THE MG AND 400-Hz CIRCUIT BREAKER PANEL MUST NOT EXCEED 2 PERCENT OF THE RATED OUTPUT OF THE MG.

9

OUTPUT OF MG IS 40- OR 80-kVA, 208-V, 400-Hz, 3- ϕ .

10

THE REQUIRED MAIN INPUT POWER FOR 40-kVA MG IS:
220-V \pm 10% AND 440-V \pm 10%, 3- ϕ , 60-Hz
OR:
230-V \pm 10% AND 398-V \pm 10%, 3- ϕ , 50-Hz

THE REQUIRED MAIN INPUT POWER FOR 80-kVA MG IS:
460-V \pm 10%, 3- ϕ , 60-Hz
OR:
398-V \pm 10%, 3- ϕ , 50-Hz

11. MG VOLTAGE ADJUST, MG START, AND MG STATUS WIRING BETWEEN THE SPM AND MG CONTROL CABINET MUST HAVE SEPARATE RACEWAYS (THREE INDEPENDENT RUNS OF TWO WIRES) UNLESS ADEQUATELY SHIELDED BY USE OF CONDUIT, GREENFIELD, OR BRAIDED SHIELD WITHIN THE POWER CABLES.
12. ALL POWER AND 40-V DC TERMINATOR POWER WIRING MUST BE SHIELDED BY USE OF CONDUIT, GREENFIELD OR BRAIDED SHIELD WITHIN THE POWER CABLE.

13

THE 50/60-Hz AND 400-Hz POWER CABLES MUST NOT BE RUN IN THE SAME RACEWAY.

14

THESE WIRES CARRY \pm 20-V DC TERMINATOR POWER TO 405 CARD READER (IF USED).

15

THESE WIRES CARRY \pm 20-V DC TERMINATOR POWER TO 580-XXX LINE PRINTER (IF USED).

- 16 THESE WIRES CONNECT TO ASSOCIATED PERIPHERAL EQUIPMENTS REQUIRING 400-Hz POWER.
- 17 THESE WIRES PROVIDE 50/60-Hz POWER TO CIRCUITS WHICH SHOULD ALWAYS REMAIN ON EXCEPT WHEN THE EMERGENCY OFF SWITCH IS PULLED (FOR EXAMPLE: COMPUTER CONDENSING AND WATER COOLING UNITS AND TEST EQUIPMENT SERVICE OUTLETS).
- 18 THIS CIRCUIT MAY BE USED TO SWITCH CONTROL POWER FOR AN ADDITIONAL MAGNETIC CONTACTOR. THE CIRCUIT MAY BE ADJUSTED TO CLOSE 0 TO 5 MINUTES PRIOR TO APPLICATION OF 400-Hz POWER AND IS ADJUSTABLE TO STAY ON 0 TO 5 MINUTES AFTER REMOVAL OF 400-Hz POWER.
- 19 THIS 5-A FUSE IS CUSTOMER-FURNISHED AND INSTALLED.
- 20 THE 50/60-Hz POWER TO THE CENTRAL COMPUTER SYSTEM MAY BE SUPPLIED FROM THIS PANEL ALSO.
- 21 THE CABLES ARE SUPPLIED WITH SPM. CABLE PART NUMBERS ARE LISTED IN THE CYBER 180 MODEL 840/850/860 INSTALLATION AND CHECKOUT MANUAL (PUBLICATION NUMBER 60461660).
22. APPROVAL MUST BE OBTAINED FROM THE SITE PLANNING REPRESENTATIVE FOR NONSTANDARD CONNECTIONS.
- 23 REPRESENTS STANDARD IOU. OPTIONAL 18854-3 IOU RECEIVES 400-Hz AND 50/60-Hz POWER FROM THE INTERBAY VIA INTERNAL POWER CABLES. THE 18854-3 IOU ALSO HAS ONLY ONE CABLE THAT CONNECTS TO THE SPM.

APPENDIX A

SYSTEM ALARMS

SYSTEM ALARMS

A

A fault detection system and alarm system protects the computer system from environmental extremes and indicates the loss of site utility power.

Alarms include visual indications on the display station screen, visual indications on the system cabinets, and audible and visual alarms on the SPM.

SHORT-WARNING FAULTS

Short-warning faults cause either an immediate or a delayed shutdown from the entire system or from the cabinet affected by the fault. If the fault is not corrected, shutdown occurs 2.5 seconds after a warning.

LONG-WARNING FAULTS

Long warning faults cause an indication (with no resulting action) of a potential problem or cause a shutdown after timing out for several minutes.

Fault conditions are generated from three main sources:

- The SPM which monitors the computer and the computer room environment for temperature and humidity.
- The cabinets, which monitor power, cable, temperature, and voltage faults.
- The M-G control cabinet which monitors the main power to the M-G.

VISUAL INDICATORS

A visual indication of a fault appears on the display station screen and, in some cases, at the individual cabinet indicators.

CABINET DISPLAYS

Each cabinet in the computer system has lights on the power control box that indicate the following faults (table A-1)..

Table A-1. Indicator Lights

CP Cabinet	Memory Cabinet	IOU Cabinet
Power On fault	Heat Sink High Temp	High Temp fault
Cable fault	Chiller fault	Blower 1 fault
Power Supply Off fault	Regulator High Temp	Blower 2 fault
Primary High Temperature fault	Backup fault	Low Temp fault
Chiller fault	Low Temp	Cond Unit fault
2.2-V fault	Blower fault	
-4.7-V fault	+ 5-V fault	
Back-Up High Temperature fault	- 2.2-V fault	
Back-Up Low Temperature fault	- 5.2-V fault	
	Circuit Breaker off	
	Power on	

DISPLAY STATION

The display station has two alarm indications that appear on its screen: CPU POWER FAILURE and CM or IOU SHUTDOWN IMMINENT. The CPU POWER FAILURE display indicates that a short-warning fault occurred. The CM or IOU SHUTDOWN IMMINENT display indicates that a long-warning fault occurred. When either of these indications occurs, the CP interrogates bits in a fault register to determine the type of fault and the appropriate course of action. Table A-2 describes the alarms and the resulting actions.

AUDIBLE INDICATORS

A small horn on the front of the SPM sounds an alarm. The alarm continues until:

- The fault is corrected.
- A short warning fault occurs and removes power from the system.

CAUTION

To avoid automatic shutdown of the system, an audible alarm requires immediate action to lower humidity or temperature in the computer area.

Table A-2. System Alarms (Sheet 1 of 2)

Item Monitored	Sensing Location	Fault	Type of Warning	Resulting Action
Dew Point	SPM	< -17 °C, > 13.7 °C < 0 °F, > 56.7 °F	Long	Appropriate fault indicator lights, horn sounds
Temperature	SPM	< 12 °C, > 32 °C < 54 °F, > 90 °F	Long	Appropriate fault indicator lights, horn sounds
MG margin (monitors up to 4 MG's)	SPM	± 20% of 120 V	Long	Appropriate fault indicator lights, horn sounds
Relative Humidity	SPM	< 20%, > 70%	Long	Environmental fault light on, horn sounds
Column	SPM	Less than 10% of nominal voltage	Long	Appropriate column fault light on, horn sounds
Chiller-Output water Temperature	SPM	< 0 °C, > 26 °C < 32 °F, > 80 °F	Long	Appropriate chiller fault light on, horn sounds
Remote warning for column warning	SPM	Selected column is going to shut down	Long	Appropriate fault indicator lights, long warning on remote display station, horn sounds
Remote warning for column off	SPM	Selected column has shut down	Long and short	Horn sounds
External Environmental Warning	Limit set on external monitor	Allows warning from external environmental monitor	Long	Horn sounds warning of possible shutdown
External Environmental Fault	Limit set on external monitor	Allows shutdown from external environmental monitor	Long and short	Long horn sounds, followed by short horn, then shutdown
Dew Point Fault	SPM	> 14 °C > 58 °F	Long and short	Long horn sounds, followed by short horn, then shutdown

Table A-2. System Alarms (Sheet 2 of 2)

Item Monitored	Sensing Location	Fault	Type of Warning	Resulting Action
Temperature Fault	SPM	> 40 °C > 104 °F	Long and short	Long horn sounds, followed by short horn, then shutdown
Relative Humidity Fault	SPM	> 96%	Long and short	Long horn sounds, followed by short horn, then shutdown

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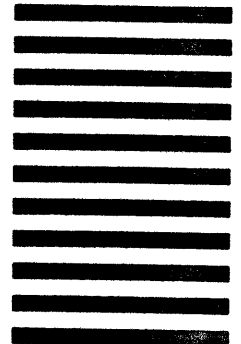


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