



**CDC[®] CYBER 170
COMPUTER SYSTEMS
MODELS 845 AND 855**

**CDC[®] CYBER 180
COMPUTER SYSTEMS
MODELS 845 AND 855**

**SECTION 2
SYSTEM DATA**



**CDC[®] CYBER 170
COMPUTER SYSTEMS
MODELS 845 AND 855**

**CDC[®] CYBER 180
COMPUTER SYSTEMS
MODELS 845 AND 855**

**SECTION 2
SYSTEM DATA**

SITE PREPARATION MANUAL

REVISION RECORD

REVISION	DESCRIPTION
A (10-12-81)	Manual released.
B (05-20-82)	Manual revised; Engineering Change Order 43479. Technical and editorial changes. This edition obsoletes all previous editions.
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or use Comment Sheet in the back of this manual.

MANUAL TO EQUIPMENT LEVEL CORRELATION SHEET

This manual reflects the equipment configurations listed below.

EXPLANATION: Locate the equipment type and series number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

EQUIPMENT TYPE	SERIES	WITH FCOs	COMMENTS
AB115-A	01	-	Released.
	02	02033	
	03	02245	
	04	02301	
	05	02312	
	06	02566	
	07	02612	
	08	02642	
	09	02704	
	10	02705	
	11	02714	
	12	02773	
	13	02791	
	14	02820	
	15	02829	
	16	02842	
	17	02872	
	18	02928	
	19	03018	
	20	02978	
	21	02878	
	22	02898	
	23	03041	
	24	03075	
		03131	
		03423	
		03392	
AD112-A	01	-	Released.
	02	44015	
	03	44122	
	04	44123	
	05	44465	
	06	44479	
	07	44645	
	08	44798	
	09	44663	
	10	44806	
	11	44180	
	12	44872	
	13	44916	
	14	44921	
	15	44940	
	16	45127	
	17	44805	
	18	45257	
	19	45288	
	20	45142	
	21	45238	
	22	45344	

EQUIPMENT TYPE	SERIES	WITH FCOs	COMMENTS
	23	45797	
	24	45793	
	25	46398	
	26	45341	
	27	46492	
	28	46681	
	29	EC046082	
	30	46807	
	31	46938	
	32	47130	
	33	EC046115	
	34	46111	
	35	47415	
	36	47367	
	37	47668	
	38	47865	
AD112-B	01	-	Released.
	02	44805	
	03	45257	
	04	45288	
	05	45142	
	06	EC045784	
	07	EC045793	
	08	45341	
	09	46681	
	10	46938	
	11	47130	
	12	EC046115	
	13	46111	
	14	47415	
	15	47668	
AD112-C	01	-	Released.
	02	46938	
	03	47130	
	04	47415	
	05	47668	
	06	EC047332	
AD113-A	01	-	Released.
	02	46938	
	03	47130	
	04	47576	
	05	47415	
	06	47668	
BS137-A	01	-	Released.
	02	EC041789	
	03	42783	
	04	43538	
	05	44583	
	06	45200	
	07	44805	
	08	44680	
BS213-A	01	-	Released.
	02	47021	

PREFACE

Control Data Corporation uses a Computer Facility Services (CFS) organization to assist the customer in preparing a site for a computer system or station installation.

A valuable reference before and after installation is a set of four manuals and a handbook published by Control Data Corporation. The manuals are designated as site preparation sections 1, 2, 3, and 4. Complete documentation of a system requires all the sections and the handbook.

Control Data Corporation urges the customer to consult local authorities if requirements in the manuals conflict with those in either the local building, fire-ordinance, or electrical codes. Any deviations from the manual procedures and/or requirements for reasons other than complying with local regulations must be approved by the Control Data CFS organization.

The manuals are available from:

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

A description of the sections and handbook follows.

SECTION 1. GENERAL INFORMATION

The section 1 manual, large- and medium-scale computer systems (publication number 60275100), details the aspects of site preparation common to more than one system. The section 1 manual contains the following:

- Site planning procedures.
- Equipment layout.
- Signal and power cabling layout and location.
- Building and environmental requirements.
- Paper tape, punch card, and magnetic recording media storage.
- Fire and security precautions.
- Grounding systems.
- Switchgear, converters, and system power requirements.
- Electromagnetic interference and compatibility testing.
- Notebook.

SECTION 2. SYSTEM DATA

The section 2 manual, System Data (publication number 60458210), is the manual you are now reading. It contains information applicable to a specific computer system but excludes information on peripheral equipment. The section 2 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 in the system and switchgear.

SECTION 3. PERIPHERAL EQUIPMENT DATA

The section 3 manual, Peripheral Equipment Data (publication number 60275300), documents only peripheral equipment. The section 3 manual contains the following:

- A table describing each peripheral unit and indicating if the unit is self-contained.
- Equipment data sheets, which include the power and environmental requirements, the physical configuration, and the dimensions of each peripheral unit.

SECTION 4. MONITORING AND POWER DATA

The section 4 manual, Monitoring and Power Data (publication number 60451300), contains physical, electrical, and environmental data related to wall-mounted panels and to terminator power supplies. This section also contains data on motor-generator sets used with computer systems. The section 4 manual contains the following:

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

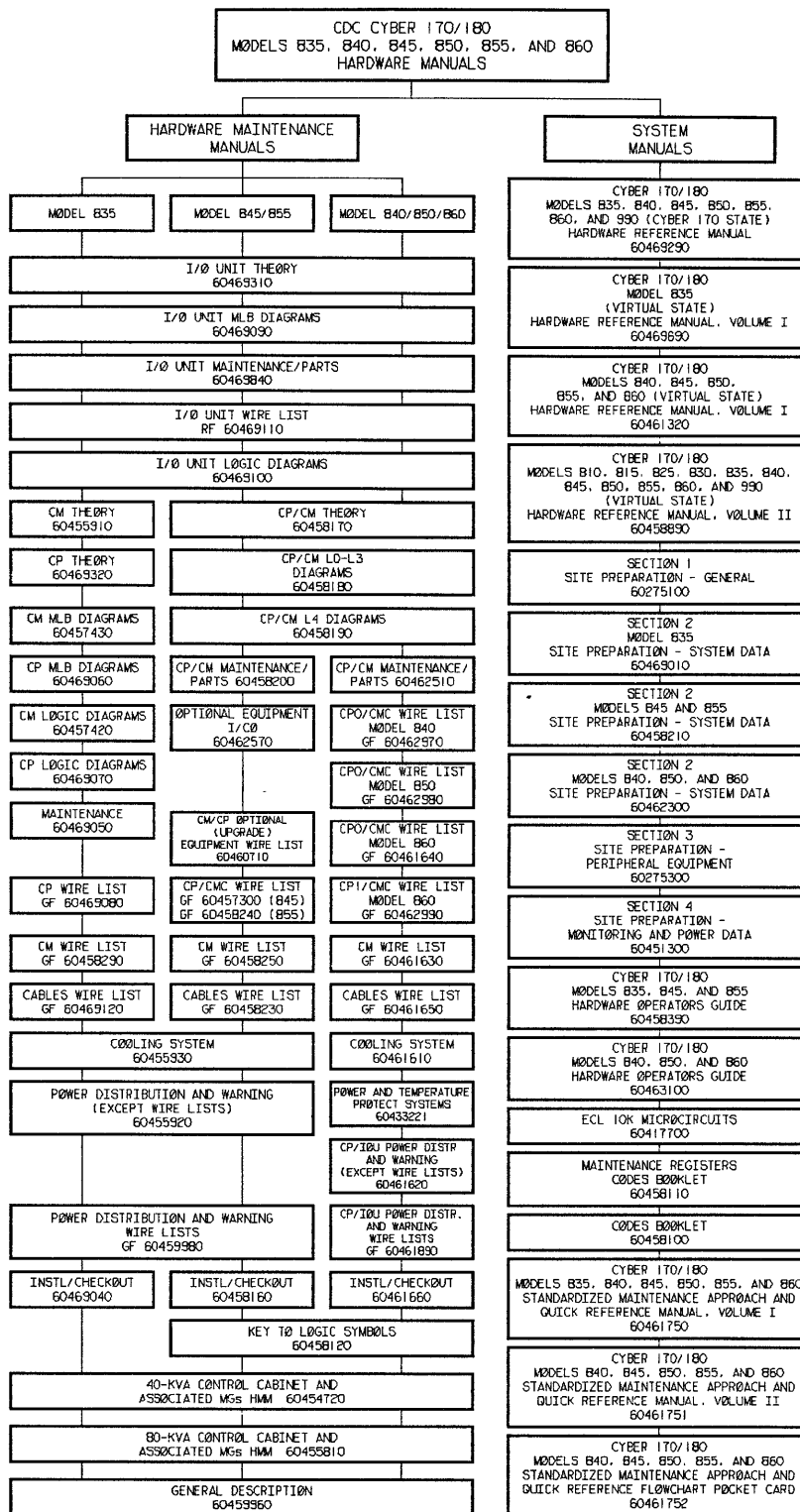
SITE ENVIRONMENTAL MAINTENANCE HANDBOOK

This handbook (publication number 60424500) contains information applicable to the computer system site. It describes site maintenance recommendations and procedures necessary for reliable computer operations and minimum maintenance schedules and guidelines.

The handbook contains the following information:

- Guidelines and recommendations for the proper implementation of general site maintenance, such as cleanliness, floor coverings and safety.
- Guidelines and recommendations for the proper implementation of technical site maintenance, such as environmental control, water treatment and handling, cabling, lighting and power.

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08/66

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PART 1

SYSTEM SPECIFICATIONS

INTRODUCTION

The models 845 and 855 computer systems contain the following standard central computer cabinets:

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

The following central computer cabinets are optional:

- Second Central Processor (second CP).
- 845 and 855 Memory Expansion (CM expansion).

Figure 1-1 shows the configuration of a central computer that contains the standard cabinets. Figure 1-2 shows the configuration of a central computer that includes the optional second CP and CM expansion cabinets.

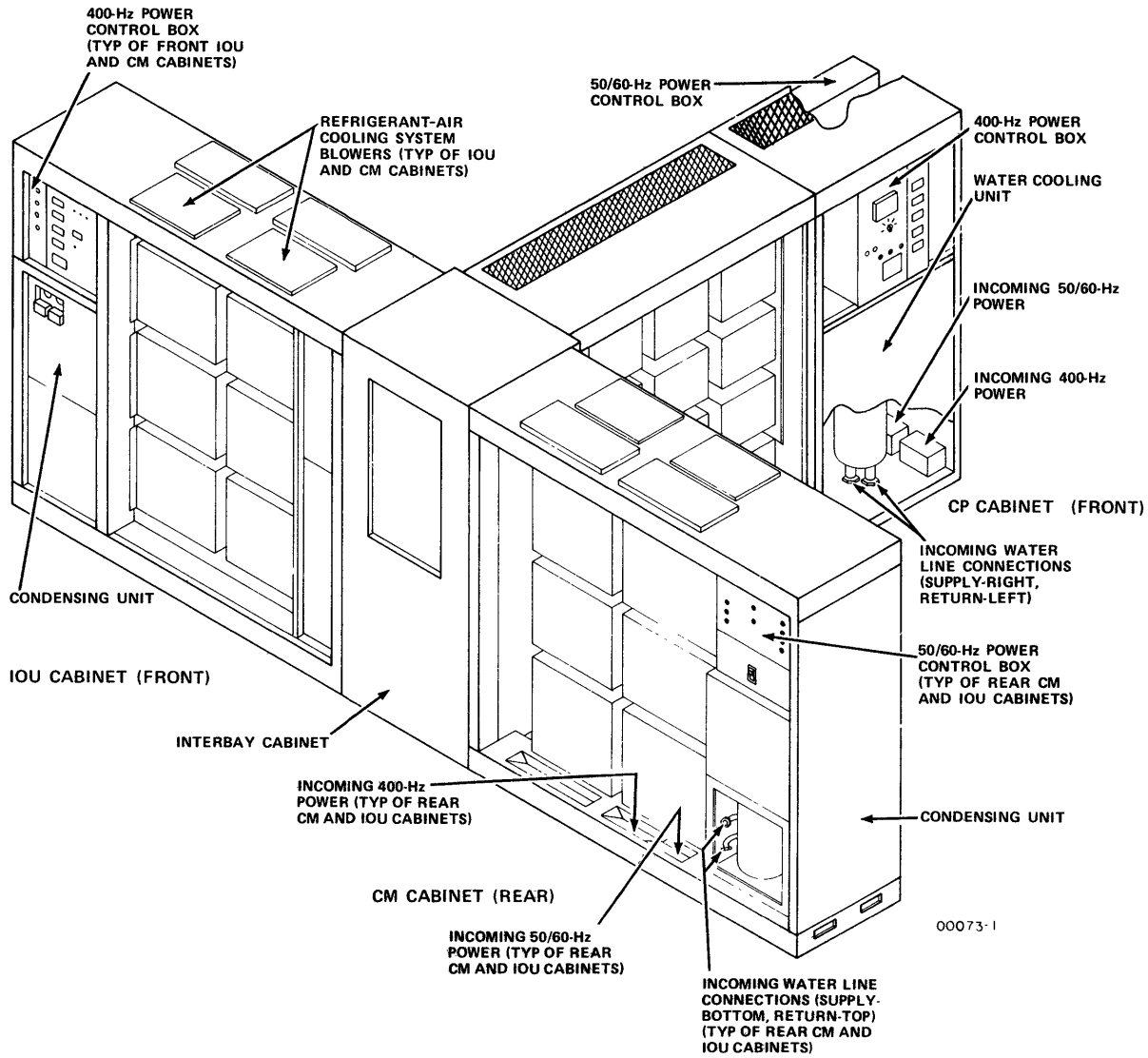


Figure 1-1. Central Computer

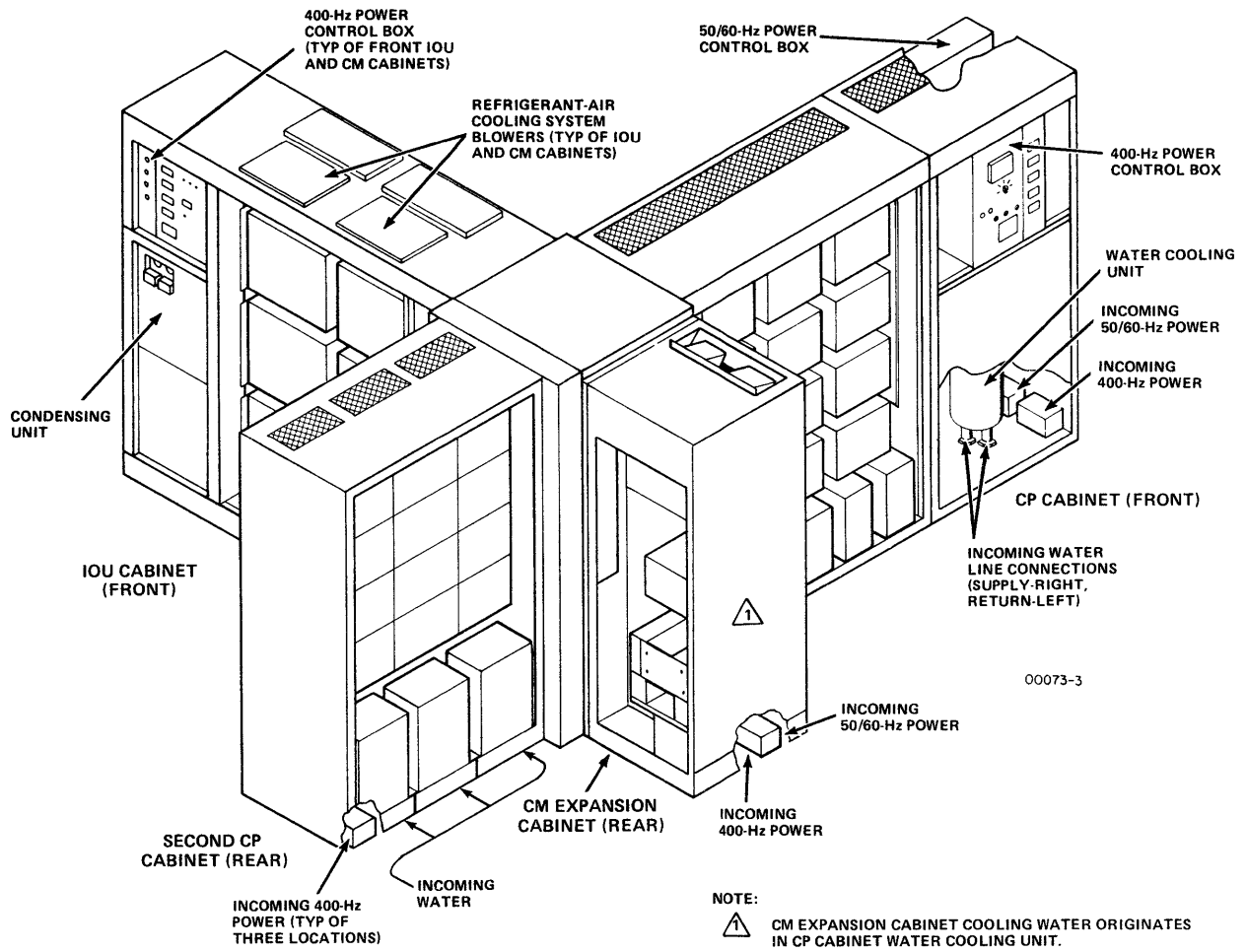


Figure 1-2. Central Computer with Optional Second CP and CM Expansion Cabinets

The standard and optional central computer cabinets contain a variety of hardware, including logic circuit boards, power supplies, and cooling systems. The CP cabinet has a water cooling system with an internal water cooling unit, and the second CP cabinet has a water cooling system with an external water cooling unit. The CM expansion cabinet has a water-air cooling system but does not have its own water cooling unit; the CM expansion cabinet receives its cooling water from the CP cabinet's water cooling unit. The CM and IOU cabinets have refrigerant-air cooling systems with one internal condensing unit per system.

External power cables, signal cables, and water lines installed beneath the computer room floor enter the cabinets through openings in the base of each cabinet.

In addition to the central computer cabinets, the model 845/855 computer system includes a system console in a stand-alone cabinet. The station includes a keyboard, cathode-ray-tube display, associated logic, power supplies, and cooling fans.

The wall-mounted control and monitoring equipment for the model 845/855 computer system consists of the following:

- System Power Control Panel (SPCP).
- Terminator power supply (for use with the 405 card reader and the 580 line printer).

The system does not include but does require emergency off switches and a motor-generator (M-G) set. An emergency off switch removes all power from the computer room.

The M-G set provides 400-Hz power for the central computer and certain peripheral equipment. An M-G set purchased from Control Data consists of a motor generator (MG) and a control cabinet. M-G sets are available for either 50- or 60-Hz input power and for outputs of either 40- or 80-kVA.

Table 1-1 lists the system specifications, table 1-2 lists the system standard options, and table 1-3 lists the system power standard options.

Table 1-1. System Specifications

Description	Cabinet
<p>Central computer, comprising:</p> <p>Central processor, including 2K (K represents 1024) words of cache memory</p> <p>Central memory of 524K words</p> <p>Input/output unit with 10 peripheral processors and 12 data channels</p> <p>Power supplies</p> <p>10-kW (3-ton) condensing unit (one per CM and IOU cabinet)</p> <p>17-kW (5-ton) water cooling unit (one for CP cabinet)</p>	<p>Four cabinets in T-shaped configuration</p>
<p>System console (18002-1)</p>	<p>Stand-alone cabinet</p>
<p>SPCP</p>	<p>Wall-mounted panel</p>
<p>Terminator power supply (for use with 405 Card Reader and 580 Line Printer)</p>	<p>Wall-mounted box</p>

Table 1-2. System Standard Options*

Model Number	Description	Cabinet
18001-1**	Single Data Channel Converter (DCC) - permits one to eight 3000 series peripheral equipments to attach to the CYBER channel. Includes one DCC and cabinet. Meets UL requirements for 115/230 V, 50/60-Hz power.	Stand-alone table-top unit
18001-2**	Single Data Channel Converter (DCC) - permits one to eight 3000 series peripheral equipments to attach to the CYBER channel. Includes one DCC and cabinet. Meets UL and CSA requirements for 115 V, 50/60-Hz power.	Stand-alone table-top unit
18002-2	System console - consists of a 15-in CRT display and a detachable keyboard.	Table-top unit
18352-1	Peripheral processor increment - adds 5 peripheral processors and 12 input/output (I/O) channels, resulting in a total of 15 peripheral processors and 24 I/O channels.	Mounts in IOU cabinet
18352-2	Peripheral processor increments - adds 5 peripheral processors, resulting in a total of 20 peripheral processors and 24 I/O channels.	Mounts in IOU cabinet
18459-1	845 Processor upgrade - upgrades a 170-845 processor to a 170-855 performance level.	Mounts in CP cabinet
18551-4	Memory increment - adds 524K words of integrated-circuit memory to increase memory from 524K to 1048K words. Additional 18551-4 options may be added to increase memory in 524K increments from 1048K to 2097K words.	Mounts in CM cabinet
18553-1	Cache increment - adds 2K words of cache memory, increasing cache memory from 2K words to 4K words.	Mounts in CP cabinet
18557-1	Second central processor - adds a second central processor to 170-855 or 180-855 systems. Requires prior installation of 18558-1 memory expansion option.	Central computer cabinet
18558-1	845/855 Memory expansion - upgrades 845/855 central memory to 4 194 304 words from 2 097 152 words. Installation of this option requires removal of all existing memory.	Central computer cabinet
18674-1	50-1/min (14-gal/min) Water cooling unit - provides cooling for 18557-1.	Stand-alone cabinet
65347-1	Temperature/humidity recorder (60-Hz) - continuously records room temperature and humidity.	Wall-mounted panel
65347-2	Temperature/humidity recorder (50-Hz).	Wall-mounted panel
<p>* Except for the model 845 option, 18459-1 and the model 855 option, 18557-1, all options apply to both models 845 and 855. **Either 18001-1 or 18001-2 DCC is required for use with 580 Line Printer and/or 405 Card Reader.</p>		

Table 1-3. System Power Standard Options

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

ENVIRONMENTAL REQUIREMENTS

The environmental requirements for the computer system are:

- Permissible range of air temperature: 15 °C to 30 °C (59 °F to 86 °F).
- Dew-point limit: 13 °C (56 °F).
- Permissible range of room humidity: 35 to 60 percent (the dew-point limit must not be exceeded within the room humidity range).
- Maximum rate of temperature change: 5 °C (9 °F) per hour.

DEW-POINT AND TEMPERATURE MONITORING

One function of the SPCP, a wall-mounted box supplied with the system, is to monitor the room dew point and the temperature around the computer components and to warn of abnormal conditions by activating audible and visual alarms. Refer to appendix A for a description of the system alarms.

CAUTION

If the maximum dew point of 13.3 °C (56 °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 SENSOR

A dew-point sensor located in the SPCP monitors the dew point. For the sensor to be effective, the SPCP should be mounted in an area as close as is practical to the computer system's cabinets.

To protect factory calibration and the sensing element of the dew-point sensor, observe the following:

- Do not splash water or other liquids on the SPCP.
- Do not expose the SPCP to humid conditions that cause moisture to form on the unit.
- Do not use acetone in the same room as the SPCP, except in diluted concentrations.

An optional temperature/humidity recorder is available at an extra cost for sites that require additional monitoring of room temperature and/or humidity. The recorder is a wall-mounted panel that plugs directly into the SPCP for power. It is equipped with a 7-day chart and with pens that continuously record room temperature and/or humidity.

COMPUTER ROOM REQUIREMENTS

The computer room must provide space for equipment cabinets, related power service panels, air conditioning equipment, and movement of test equipment and personnel, as described in the Section 1, General Information, Site Preparation Manual. Normally the computer room does not contain the 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 must also provide for clearances around the SPCP. These clearances (as viewed from the front of the SPCP) are: 255 mm (10 in) on the left, 102 mm (4 in) on the right, and 255 mm (10 in) on the bottom. These clearances provide access to jumper plugs and switches and allow air to circulate through the SPCP to the internal dew-point sensor.

The optional temperature/humidity recorder, if installed, must be mounted so that its 1.8-m (6-ft) power cord reaches the left-side power connector on the SPCP.

Additional information concerning wall-mounted boxes and switches is available in the Section 4, Monitoring and Power Data, Site Preparation Manual.

The computer room and the M-G set room require 50- or 60-Hz 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's logic circuits and components and certain peripheral equipment. All system power is subject to emergency off control, which is manually initiated from wall-mounted, conveniently located switches.

Because the system's physical and mechanical requirements are complex, the computer room air and floor require special attention.

ROOM AIR

The room air requires filtering to avoid possible contamination of or damage to the magnetic surface areas of peripheral storage devices, such as disk and tape units. Refer to the Section 1, General Information, Site Preparation Manual for additional information.

ROOM FLOOR

The computer room 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 stand 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 the Section 1, General Information, Site Preparation Manual.

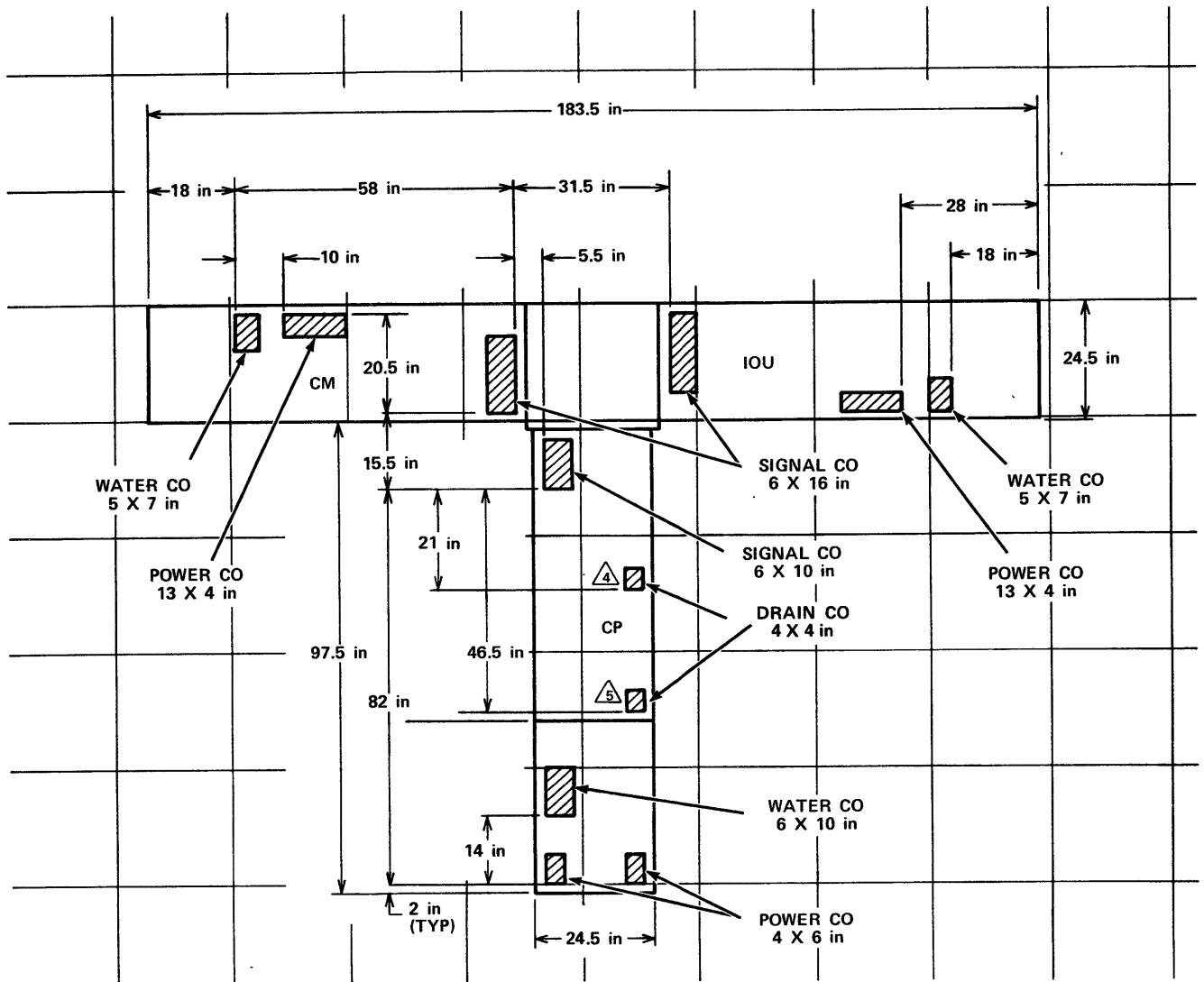
FLOOR PLAN

The recommended raised-floor plans for the different central computer configurations are shown in both US customary units and SI metric units. Figures 1-3 and 1-4 (US customary units and SI metric units, respectively) show the floor plans for a central computer with standard cabinets. Figures 1-5 and 1-6 (US customary units and SI metric units, respectively) show the floor plans for a central computer with optional second CP and CM expansion cabinets. These plans require the minimum amount of cutting of the understructure grid stringers and provide maximum access to signal, power, and water cutouts. Any modifications to these plans will be outlined in the floor plan diagram provided by the Computer Facility Services site planner. This diagram takes into consideration particular system layout requirements and constraints.

NOTE

If a cabinet cutout is located over a floor stringer, the portion of the stringer beneath the cutout must be cut and removed. Support the remaining portion of the stringer by installing additional pedestal(s).

To expedite the installation process, use tape to mark the intended location of the central computer on the raised floor.

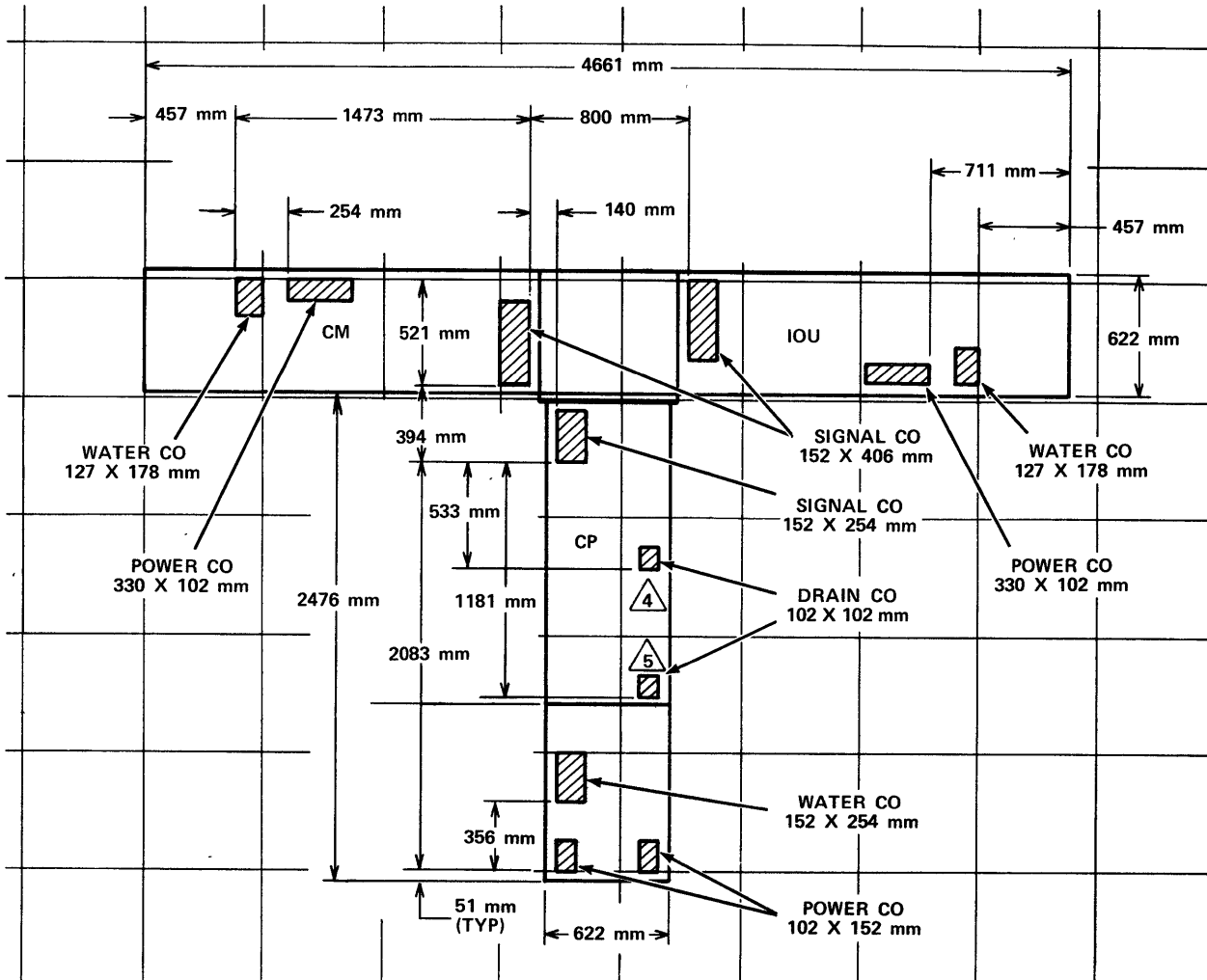


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NOTES:

1. CABINET OUTLINE REPRESENTS THE OUTER EDGES OF THE CABINET FRAME WITHOUT OUTER PANELS, TRIM, OR DOORS.
 2. GRID LINES REPRESENT LOCATIONS OF METAL STRINGERS. AREAS WITHIN THE STRINGERS REPRESENT TILES RESTING ON THE STRINGERS.
 3. ALL EDGES OF FLOOR CUTOUTS (CO) THAT ARE CLOSE TO THE CABINET FRAME ARE 2 IN FROM THE FRAME.
- ▲ DRAIN CO FOR CENTRAL COMPUTERS WITH SERIAL NOS. 101 THROUGH 113.
 ▼ DRAIN CO FOR CENTRAL COMPUTERS WITH SERIAL NOS. 114 AND ABOVE.

Figure 1-3. Floor Plan (24-in by 24-in Grid) for Central Computer Without Optional Cabinets



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NOTES:

1. CABINET OUTLINE REPRESENTS THE OUTER EDGES OF THE CABINET FRAME WITHOUT OUTER PANELS, TRIM, OR DOORS.
2. GRID LINES REPRESENT LOCATIONS OF METAL STRINGERS. AREAS WITHIN THE STRINGERS REPRESENT TILES RESTING ON THE STRINGERS.
3. ALL EDGES OF FLOOR CUTOUTS (CO) THAT ARE CLOSE TO THE CABINET FRAME ARE 51 mm FROM THE FRAME.

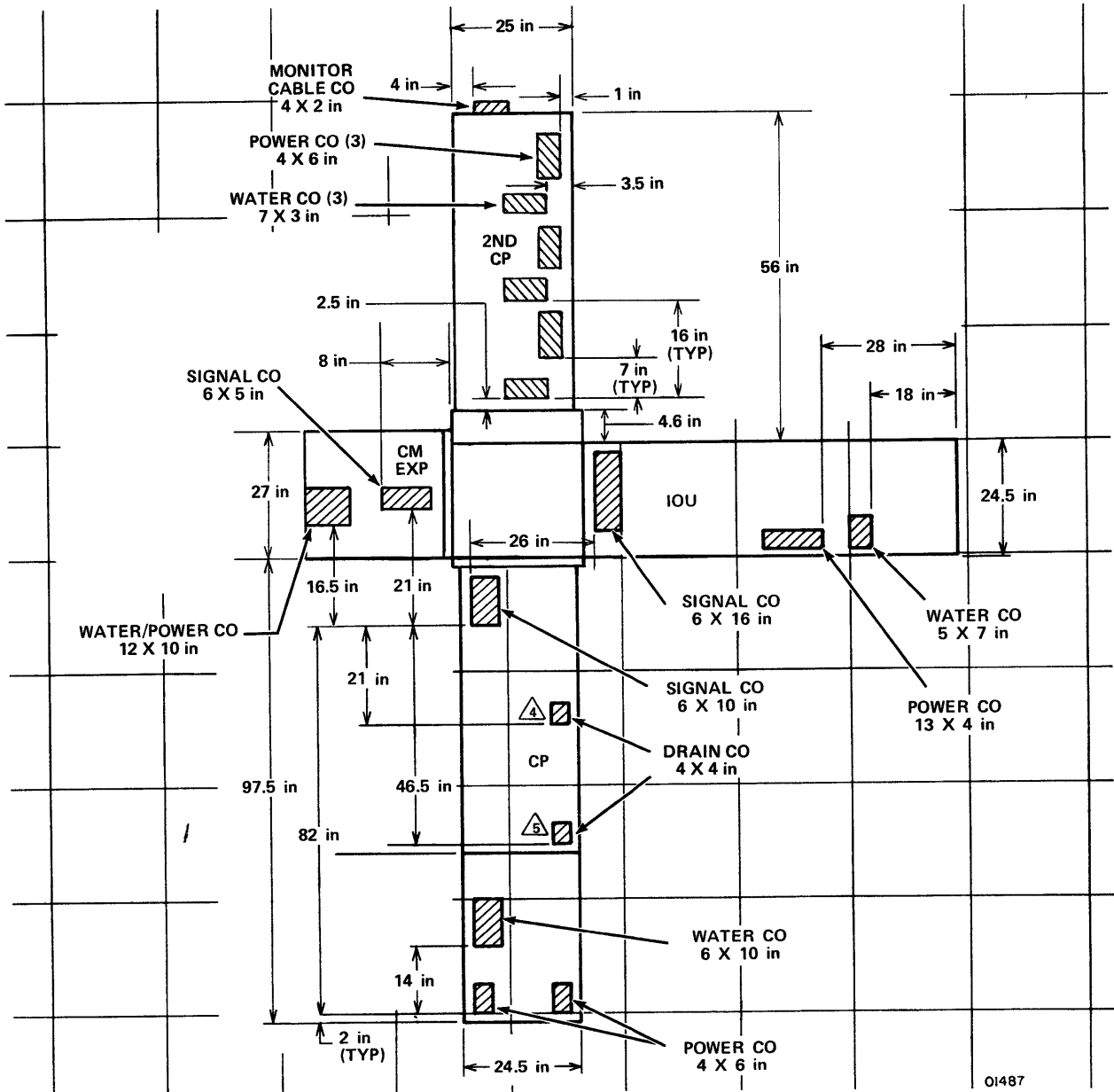


DRAIN CO FOR CENTRAL COMPUTERS WITH SERIAL NOS. 101 THROUGH 113.



DRAIN CO FOR CENTRAL COMPUTERS WITH SERIAL NOS. 114 AND ABOVE.

Figure 1-4. Floor Plan (600-mm by 600-mm Grid) for Central Computer Without Optional Cabinets

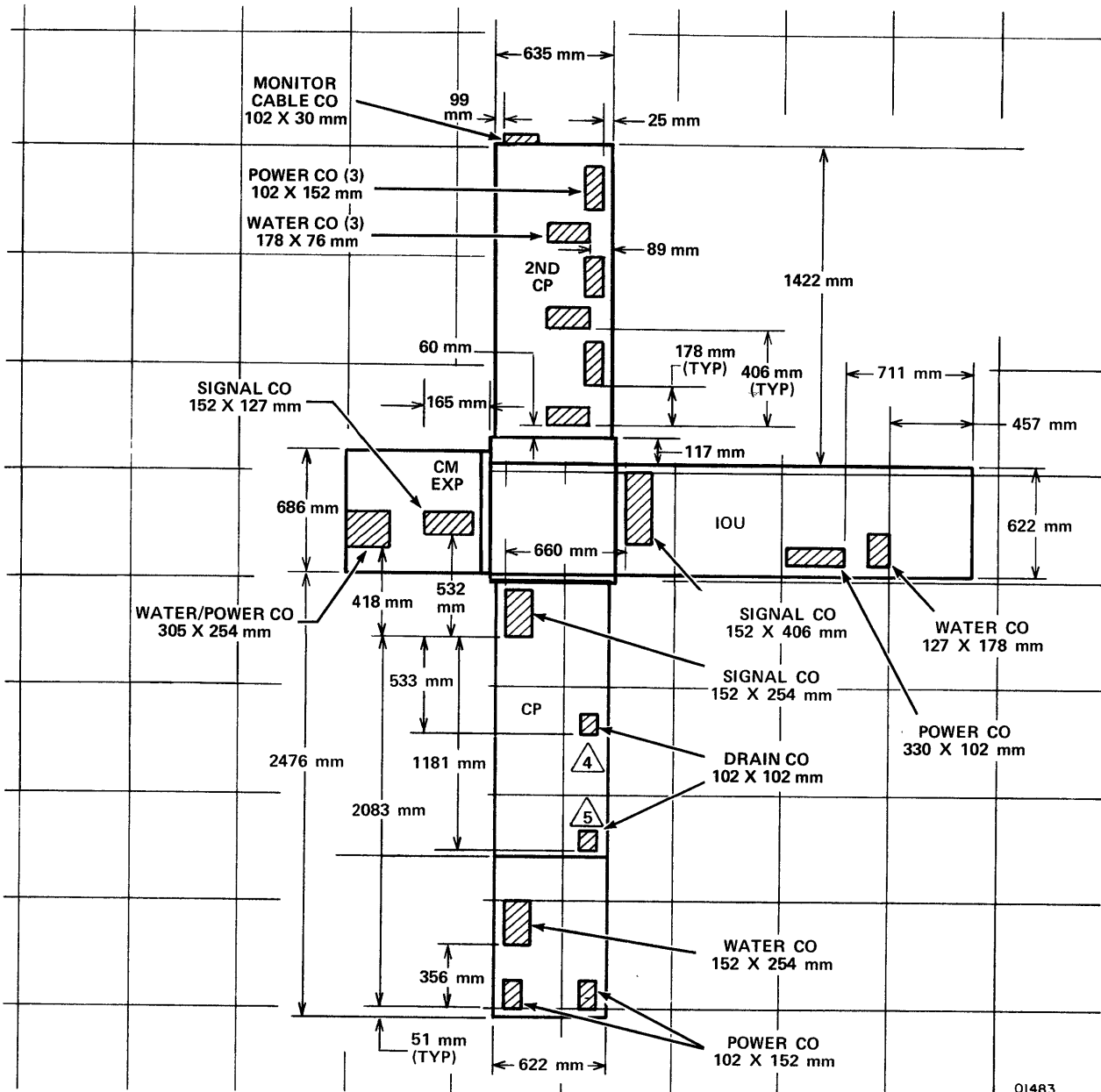


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NOTES:

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4. DRAIN CO FOR CENTRAL COMPUTERS WITH SERIAL NOS. 101 THROUGH 113.
5. DRAIN CO FOR CENTRAL COMPUTERS WITH SERIAL NOS. 114 AND ABOVE.

Figure 1-5. Floor Plan (24-in by 24-in Grid) for Central Computer with Optional Second CP and CM Expansion Cabinets



NOTES:

1. CABINET OUTLINE REPRESENTS THE OUTER EDGES OF THE CABINET FRAME WITHOUT OUTER PANELS, TRIM, OR DOORS.
 2. GRID LINES REPRESENT LOCATIONS OF METAL STRINGERS. AREAS WITHIN THE STRINGERS REPRESENT TILES RESTING ON THE STRINGERS.
 3. ALL EDGES OF FLOOR CUTOUTS (CO) THAT ARE CLOSE TO THE CABINET FRAME ARE 51 mm FROM THE FRAME.
- △ 4 DRAIN CO FOR CENTRAL COMPUTERS WITH SERIAL NOS. 101 THROUGH 113.
- △ 5 DRAIN CO FOR CENTRAL COMPUTERS WITH SERIAL NOS. 114 AND ABOVE.

Figure 1-6. Floor Plan (600-mm by 600-mm Grid) for Central Computer with Optional Second CP and CM Expansion Cabinets

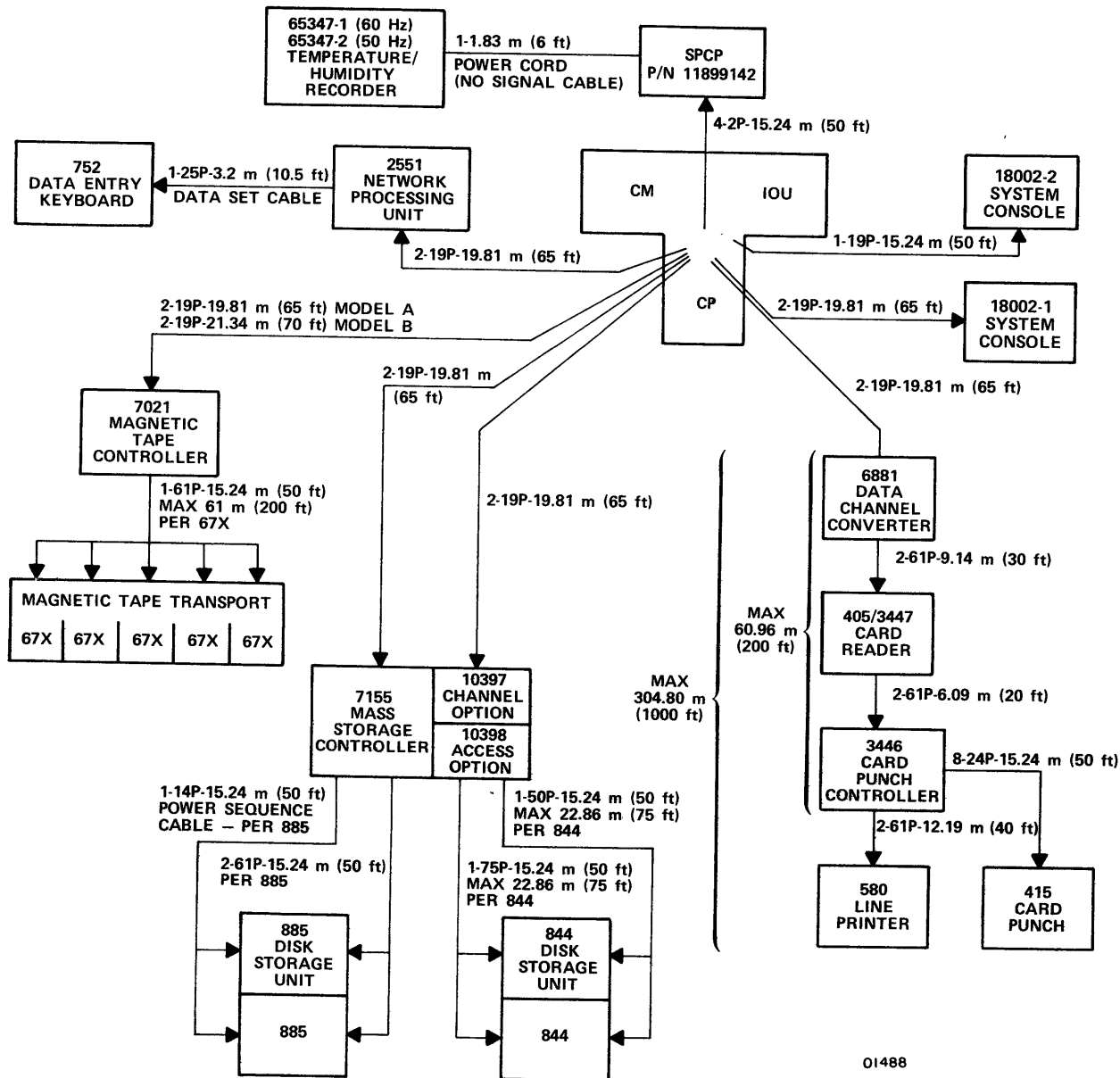
TELECOMMUNICATIONS

Two standard telephones installed within 12.2 m (40 ft) of the interbay cabinet satisfy telecommunication requirements. One telephone allows diagnostic testing by a technical support person at a remote technical assistance center. The other telephone permits communication with the technical support person during diagnostic testing.

SIGNAL CABLES

Control Data provides the computer system signal cables. Many of the cables carry time-dependent signals and have a fixed length. Equipment using fixed-length cables must have room locations that are within the cable length limitations. Signal cables that do not carry time-dependent signals are as uniform in length as possible to minimize the number of different cable lengths and are as short as possible to minimize signal transmission delays. Some of the cables that do not carry time-dependent signals are available in maximum allowable lengths at an additional cost.

Figure 1-7 indicates 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 cable length information is in system data sheets in this manual and in the Section 3, Peripheral Equipment Data, Site Preparation Manual.



NOTES:

1. CABLE INFORMATION INCLUDES NUMBER OF CABLES (FIRST DIGIT), NUMBER OF CONNECTOR PINS (P), AND CABLE LENGTHS IN m AND ft.
2. FIRST CABLE LENGTHS SHOWN ARE STANDARD AND SUPPLIED WITH THE SYSTEM. MAXIMUM CABLE LENGTHS ARE NONSTANDARD AND OPTIONAL. WHERE ONLY A STANDARD LENGTH IS SHOWN, IT IS ALSO THE MAXIMUM ALLOWABLE LENGTH.

Figure 1-7. Signal Cables for Typical Computer System

SYSTEM COOLING

The CM and IOU cabinets have refrigerant-air cooling systems with one 10-kW (3-ton) condensing unit per cabinet. The refrigerant-air cooling system includes three closed-loop paths. One path contains refrigerant, which the condensing units circulate around the electrical components to absorb heat. Another path contains cooled site water, which removes heat from the condensing units and transfers it out of the system. The third path uses blowers (two per cabinet), which circulate cooled air around the electrical components to assist in transferring heat.

The CP and second CP cabinets have water cooling systems with internal and external 17-kW (5-ton) water cooling units, respectively. The water cooling system has two closed-loop paths. One path contains distilled water, which the water cooling unit circulates around the electrical components to absorb heat. The other path contains cooled site water, which removes heat from the water cooling unit and transfers the heat out of the system.

The CM expansion cabinet has a water-air cooling system. This cooling system, which does not have its own water cooling unit, receives distilled water from the CP cabinet's water cooling unit. A blower in the CM expansion cabinet assists in removing heat from the cabinet.

The system console and wall-mounted panels generate only a small amount of the total computer room heat. The system console is cooled by an internally mounted blower that circulates room air through its cabinet; the wall-mounted panels are cooled by natural heat convection via room air.

CLOSED-LOOP WATER SYSTEM

The following paragraphs define the requirements for the customer-installed closed-loop water system that cools the condensing and water cooling units. Control Data must approve any variation from the requirements. The closed-loop water system extends outside of the computer cabinets, under the raised floor, and connects above the raised floor either to water chillers directly or to water chillers via heat exchangers.

The portion of the closed-loop water system under the raised floor (figure 1-8 and 1-9) consists of supply and return lines and the associated plumbing hardware. These figures specify which system parts the customer provides and installs.

NOTE

Terminate the closed-loop water system close enough to each computer cabinet water-entry point to ensure that CDC-supplied water hoses can connect to the system. Figures 1-8 and 1-9 indicate the locations of the computer cabinet water-connection points and the maximum distances (notes 2 and 3) to the closed-loop termination points.

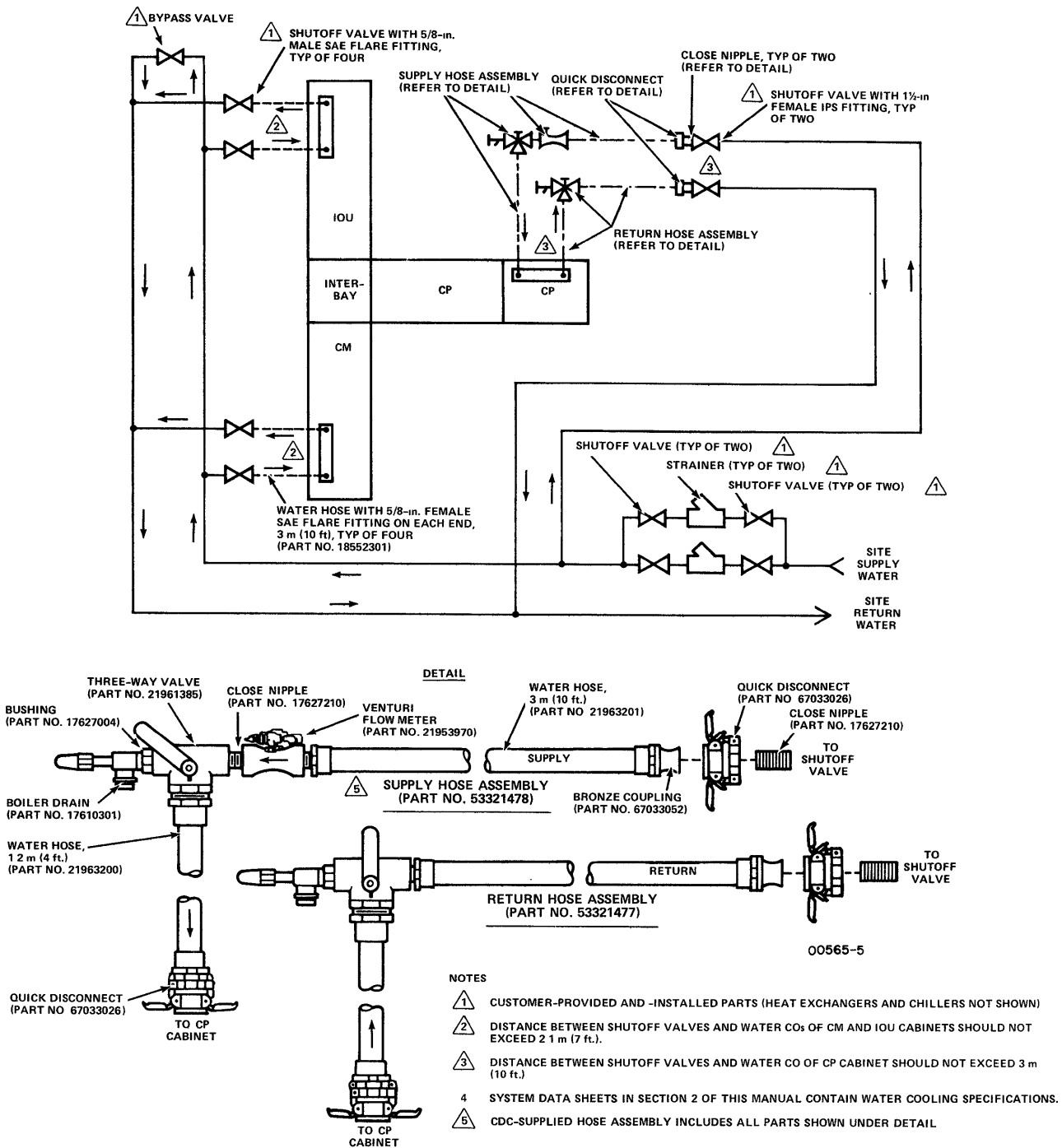
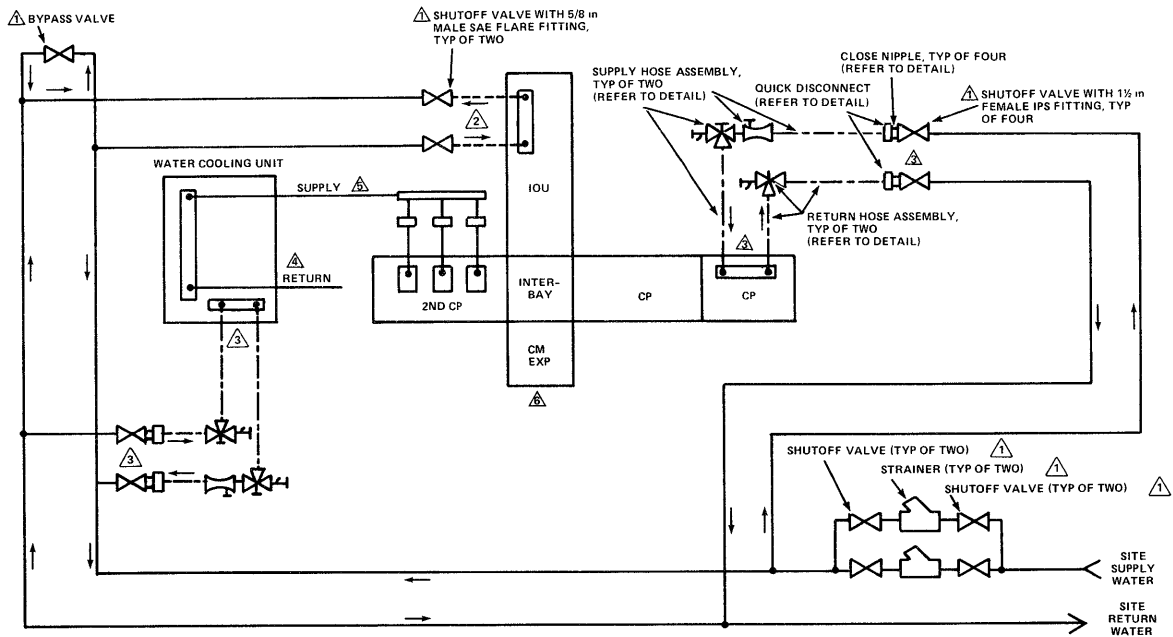
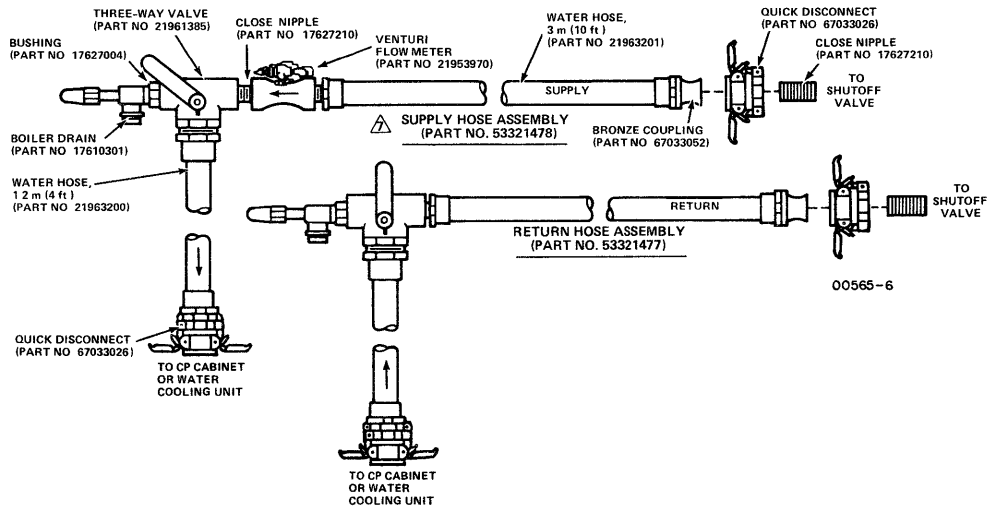


Figure 1-8. Closed-Loop Water System for Central Computer Without Optional Cabinets



DETAIL



NOTES

- ▲ CUSTOMER-PROVIDED AND -INSTALLED PARTS (HEAT EXCHANGERS AND CHILLERS NOT SHOWN)
- ▲ DISTANCE BETWEEN SHUTOFF VALVES AND WATER CO₂ OF CM AND IOU CABINETS SHOULD NOT EXCEED 2.1 m (7 ft.)
- ▲ DISTANCE BETWEEN SHUTOFF VALVES AND WATER CO OF CP CABINET OR WATER COOLING UNIT SHOULD NOT EXCEED 3 m (10 ft.)
- ▲ FOR CLARITY, RETURN MANIFOLDS AND HOSES ARE NOT SHOWN
- ▲ LENGTH OF WATER HOSES BETWEEN WATER COOLING UNIT AND MANIFOLDS IS 7.6 m (25 ft.)
- ▲ CP WATER COOLING UNIT CONNECTS TO CM EXPANSION CABINET VIA HOSES ROUTED THROUGH INTERBAY CABINET
- ▲ CDC-SUPPLIED HOSE ASSEMBLY INCLUDES ALL PARTS SHOWN UNDER DETAIL
- 8. SYSTEM DATA SHEETS IN SECTION 2 OF THIS MANUAL CONTAIN WATER COOLING SPECIFICATIONS

Figure 1-9. Closed-Loop Water System for Central Computer with Optional Second CP and CM Expansion Cabinets

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 depend on the provisions at each individual site. Specific information can be obtained from the Computer Facility Services site planner.

The characteristics of the site water used for the closed-loop water system may vary for each installation due to mineral content, bacterial growth, and evaporation. Control Data recommends testing the closed-loop water system to determine if the water quality is within the following requirements:

- Hardness: total not to exceed 200 parts per million (ppm) CaCO₃ (per ASTM D 1126-60).
- pH level: to be maintained between 7.0 and 9.5 (per ASTM D 1293-62T).
- Suspended solids: total not to exceed 10 ppm (per ASTM D 1888-6MT).

If the preceding requirements are not met, Control Data recommends that a water treatment program be established.

The temperature, flow rate, head loss, and pressure for the closed-loop water system must fall within specific ranges for both the condensing and water cooling units.

NOTE

If flow rates are not within the specified range, obtain a water flow regulator (purchased locally) and connect to site supply water line. Adjust to specified flow rate.

Detailed information concerning water specifications is provided in the system data sheets in this manual.

CAUTION

Operation below the minimum specified water temperature or above the maximum specified room dew point may cause condensation to form on the central computer cabinets. Condensation can cause damage to 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 of the computer room 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 emergency. The floor plan should show the locations of all shut-off valves, alarm indicators, and sump pumps.

REFRIGERANT SAFETY PRECAUTIONS

Control Data condensing units use a liquid refrigerant. An internal mechanical 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- and pressure-sensitive fusible plug, which acts as a safety relief valve by expelling 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 refrigerant gas replace oxygen and can cause serious illness or suffocation.

* Determined by the American Conference of Governmental Industrial Hygienists, E. I. DuPont de Nemours & Co., Inc.; Freon Fluorocarbons, Properties, and Applications product bulletin E-2, dated March, 1971.

If refrigerant gas comes in contact with an open flame, it forms a toxic gas.

WARNING

A toxic gas concentration* of 0.5 to 2.5 percent is lethal 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 air as a gas and the volume of space that it occupies. A model 845 or 855 system contains two 10-kW (3-ton) condensing units with 9.3 kg (20.6 lb) of liquid refrigerant each. As an example, in an average room of 1133 m³ (40 000 ft³):

- A single condensing unit releasing its refrigerant gas could cause a gas concentration up to 0.158 percent.
- Both 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:

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

Symbol	Description
Q	Kilograms (pounds) of liquid refrigerant released.
V	Volume of room space in cubic metres (cubic feet).
C	19.23 (307 if equation is expressed in US customary units).

* When 29.5 kg (65 lb) of liquid refrigerant escapes into the air, it expands to approximately 5.7 m³ (200 ft³) of gas.

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 3/8-inch flare union (female) and 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 provision and installation of a venting network is the responsibility of the customer. Although state and local building codes and regulations may not require a pressure-venting network, Control Data strongly recommends the installation of this system. Detailed information and instructions for a venting network may be obtained from the Control Data site engineering personnel.

The final decision on installation of a pressure-venting network should be based upon a calculation of potentially lethal refrigerant levels after consideration of the following:

- State and local building codes and regulations.
- Total amount of liquid refrigerant R-12 stored in computer room.
- Volume of the computer room.
- Total occupancy and approximate evacuation time of the site by personnel in any emergency.

PART 2

SYSTEM DATA SHEETS

)

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SYSTEM DATA SHEETS

2

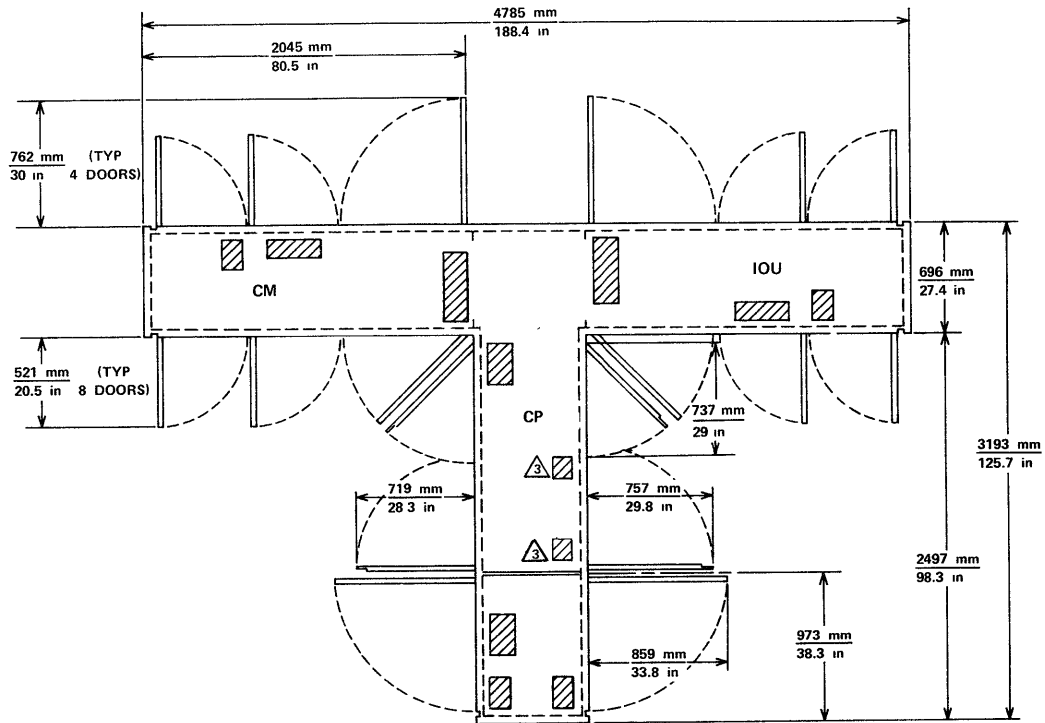
The physical, electrical, environmental, and cooling information for maximum equipment configurations appears on one of two data sheets for each cabinet. Systems with fewer options will draw less power and transfer less heat to the air and to the cooling water.

The other data sheet for each cabinet contains cabinet plan, front and side views, together with cabinet dimensions. The dimensions include the maximum width and depth of the central computer cabinets with all doors extended.

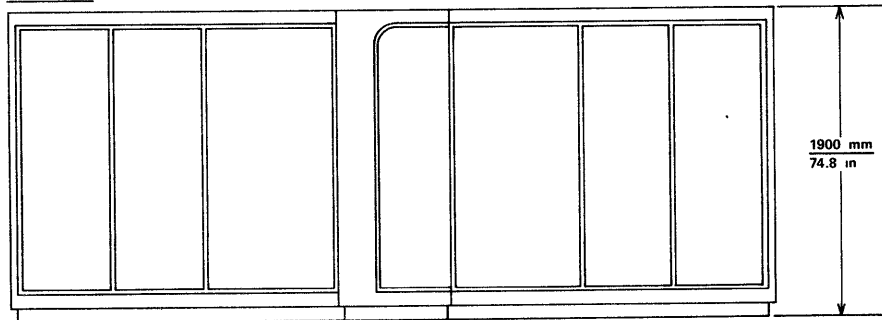
Data sheets for the SPCP, temperature/humidity recorder, terminator power supply, and M-G sets are in the Section 4, Monitoring and Power Data, Site Preparation Manual.

CP, CM, AND IOU CABINETS

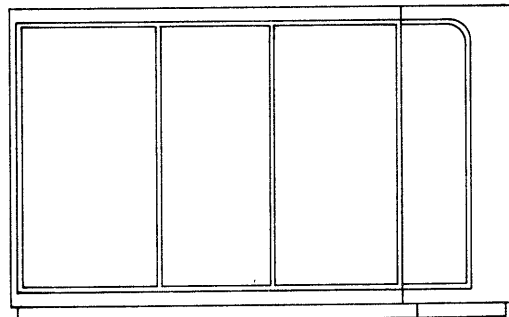
PLAN



FRONT



SIDE



NOTES:

1. THE CABINET OUTLINE REPRESENTS OUTER CABINET SURFACE. THE DASHED LINES REPRESENT OUTER EDGES OF THE CABINET FRAME AND DOOR-SWING AREAS.
2. DIAGONAL LINES REPRESENT FLOOR CUTOUTS. REFER TO FLOOR PLAN IN SECTION 1 FOR DETAIL.
3. REFER TO FLOOR PLAN IN SECTION 1 FOR SERIAL NUMBERS ASSOCIATED WITH EACH CUTOUT.

CP, CM, AND IOU CABINETS

PHYSICAL SPECIFICATIONS

Width: 4785 mm (188.4 in)
 Depth: 3193 mm (125.7 in)
 Height: 1900 mm (74.8 in)
 Weight: 3764.9 kg (8300 lb)

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 , 13.7-kVA	120/208-V, 3- \emptyset , 1.4-kVA	220/380-V, 3- \emptyset , 1.4-kVA or 240/415-V, 3- \emptyset , 1.4-kVA
CM	120/208-V, 3- \emptyset , 5.8-kVA	120/208-V, 3- \emptyset , 5.4-kVA	220/380-V, 3- \emptyset , 5.4-kVA or 240/415-V, 3- \emptyset , 5.4-kVA
IOU	120/208-V, 3- \emptyset , 4.6-kVA	120/208-V, 3- \emptyset , 4.9-kVA	220/380-V, 3- \emptyset , 4.9-kVA or 240/415-V, 3- \emptyset , 4.9-kVA

Cabinet	Circuit Breakers (Hz, Amperes, Phase, Quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
CP	400-Hz, 50-A, 3- \emptyset , 1 and 60-Hz, 15-A, 3- \emptyset , 1 or 50-Hz, 15-A, 3- \emptyset , 1	102 mm (4 in) 102 mm (4 in) 102 mm (4 in)
CM	400-Hz, 30-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)
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)

COOLING SPECIFICATIONS

Type of cooling: Distilled water (CP), refrigerant-air (CM, IOU)
 Source of cooling: Internal 50-l/min (14-gal/min) water cooling unit (CP), internal 10-kW (3-ton) condensing unit and blowers (CM, IOU)

Cabinet	Maximum Heat Rejection Rates					
	To Air		To Water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
CP	734*	2505*	13970	47670	14704	50175
CM	928*	3166*	9378	31997	10306	35163
IOU	889*	3033*	7999	27302	8888	30335
Total	2551*	8704*	31347	106969	33898	115673

*Based upon an environment of 22°C (72°F) at 50% room humidity.

Cabinet	Water Conditions	Minimum	Recommended	Maximum
CP CM IOU	Temperature	4°C (40°F) 4°C (40°F) 4°C (40°F)	7°C(45°F) 7°C(45°F) 7°C(45°F)	10°C (50°F) 27°C (80°F)* 27°C (80°F)*
CP CM IOU	Head loss	- 1.7 kPa (0.25 psi) 1.7 kPa (0.25 psi)	- 2.4 kPa (0.35 psi) 2.4 kPa (0.35 psi)	- 20.7 kPa (3.0 psi) 20.7 kPa (3.0 psi)
CP CM IOU	Supply pressure	137.9 kPa (20 psi) 103.4 kPa (15 psi) 103.4 kPa (15 psi)	344.7 kPa (50 psi) 275.8 kPa (40 psi) 275.8 kPa (40 psi)	689.4 kPa (100 psi) 689.4 kPa (100 psi) 689.4 kPa (100 psi)

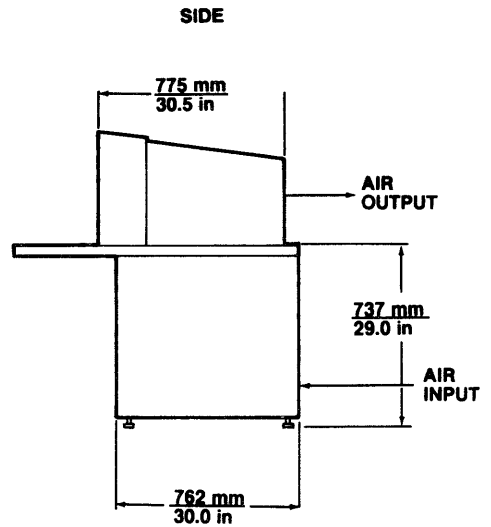
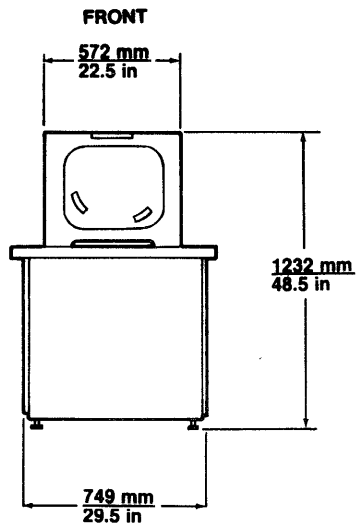
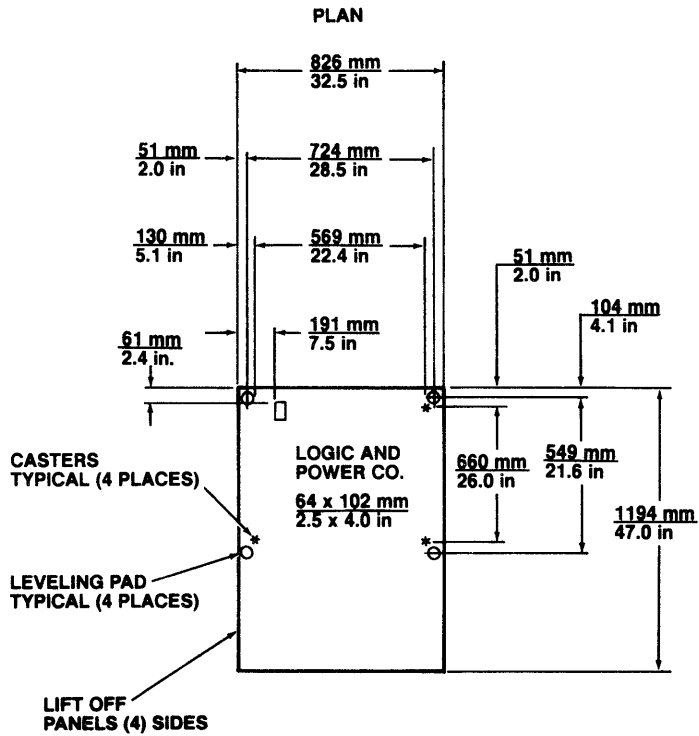
*If CM or IOU cabinet has same site water supply as the CP cabinet, maximum water supply temperature is 10°C (50°F).

ENVIRONMENTAL SPECIFICATIONS

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

Cabinet	Room Conditions	Minimum	Recommended	Maximum
CP CM IOU	Operating temperature	15°C (59°F) 15°C (59°F) 15°C (59°F)	23°C (74°F) 23°C (74°F) 23°C (74°F)	30°C (86°F) 30°C (86°F) 30°C (86°F)
CP CM IOU	Storage temperature	-40°C (-40°F) 4°C (40°F) 4°C (40°F)	- - -	60°C (140°F) 49°C (120°F) 49°C (120°F)

SYSTEM CONSOLE (18002-1)



01219

SYSTEM CONSOLE (18002-1)

PHYSICAL SPECIFICATIONS

Width: 838 mm (33 in)
 Depth: 1194 mm (47 in)
 Height: 1244 mm (49 in)
 Weight: 177 kg (390 lb)

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- ϕ , 0.8-kVA	120-V, 1- ϕ , 0.3-kVA	220-V, 1- ϕ , 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- ϕ , 1 and 60-Hz, 15-A, 1- ϕ , 1 or 50-Hz, 15-A, 1- ϕ , 1	508 mm (20 in) 406 mm (16 in) 406 mm (16 in)

COOLING SPECIFICATIONS

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

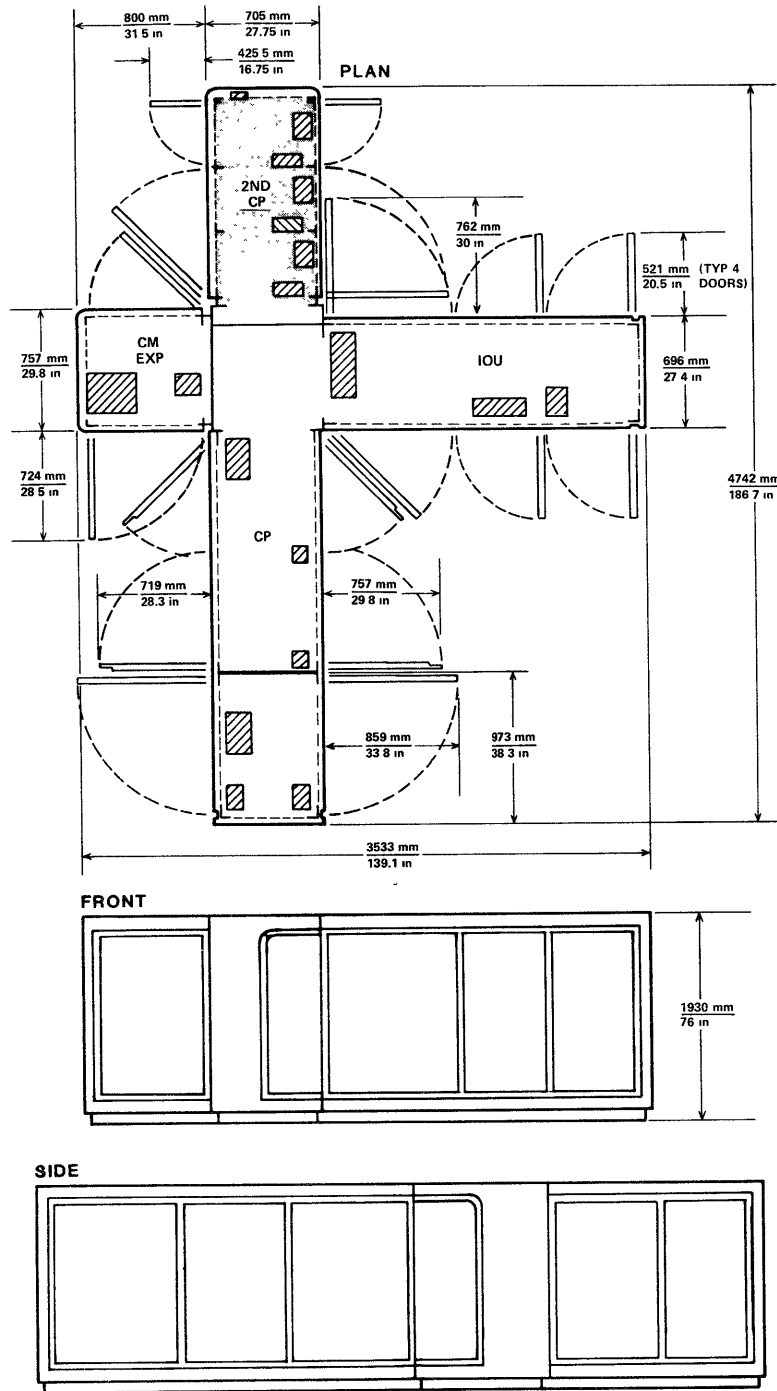
Cabinet	Maximum Heat Rejection Rates					
	To Air		To Water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
System Console	888	3030	-	-	888	3030

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)

SECOND CP CABINET (18557-1)



NOTES:

- 1 THE CABINET OUTLINE REPRESENTS OUTER CABINET SURFACE THE DASHED LINES REPRESENT OUTER EDGES OF THE CABINET FRAME AND DOOR-SWING AREAS
- 2 DIAGONAL LINES REPRESENT FLOOR CUTOUTS REFER TO FLOOR PLAN IN SECTION 1 FOR DETAIL.

01484

SECOND CP CABINET (18557-1)

PHYSICAL SPECIFICATIONS

Width: 1457 mm (57.36 in)
 Depth: 705 mm (27.75 in)
 Height: 1930 mm (76 in)
 Weight: 953 kg (2100 lb)

ELECTRICAL SPECIFICATIONS

Power Consumption, Steady State, Maximum			
Cabinet	400-Hz (Volts, Phase, kVA)	60-Hz (Volts, Phase, kVA)	50-Hz (Volts, Phase, kVA)
Second CP	120/208-V, 3- ϕ , 12.0-k/VA	-	-

Cabinet	Circuit Breakers (Hz, amperes, phase, quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
Second CP	400-Hz, 15-A, 3- ϕ , 3	25.4 mm (1 in)

COOLING SPECIFICATIONS

Type of Cooling: Distilled water
 Source of Cooling: External 50-l/min (14-gal/min) water cooling unit

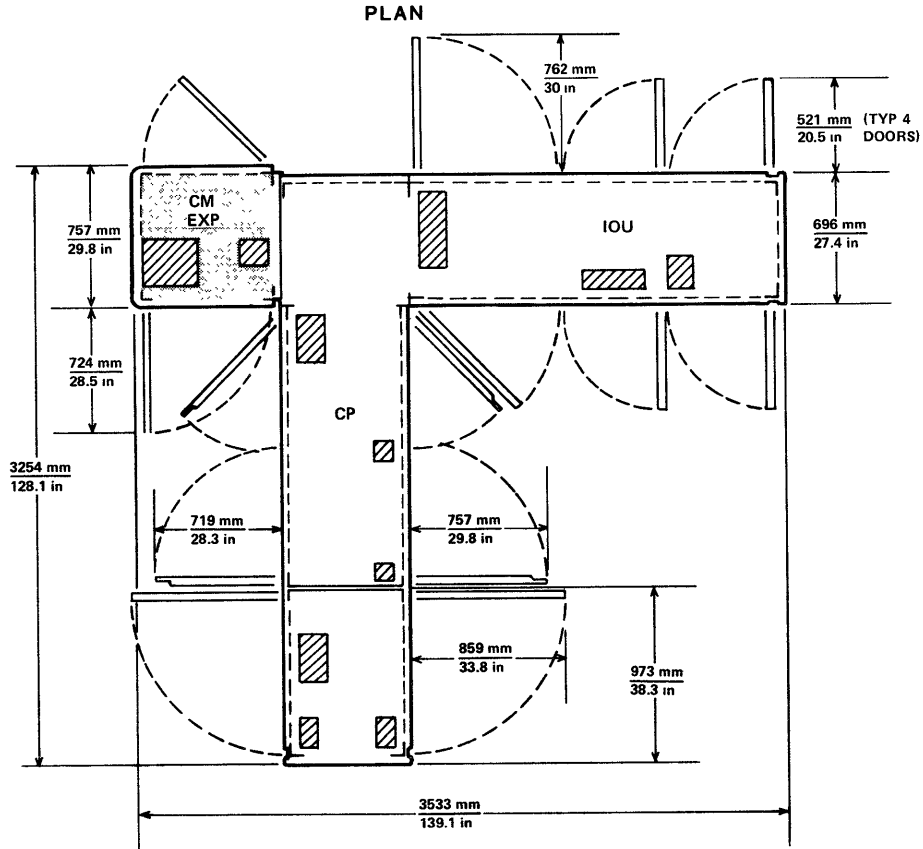
Cabinet	Maximum Heat Rejection Rates					
	To Air		To Water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
Second CP	1182	4035	10640	36313	11822	40348

ENVIRONMENTAL SPECIFICATIONS

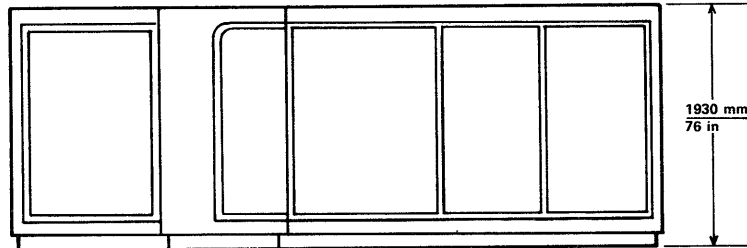
Room Relative Humidity Range: 35% to 60%
 Room Dew Point Limit: 13°C (56°F)

Room Conditions	Minimum	Recommended	Maximum
Operating temperature	15°C (59°F)	23°C (74°F)	30°C (86°F)
Storage temperature	-40°C (-40°F)	-	60°C (140°F)

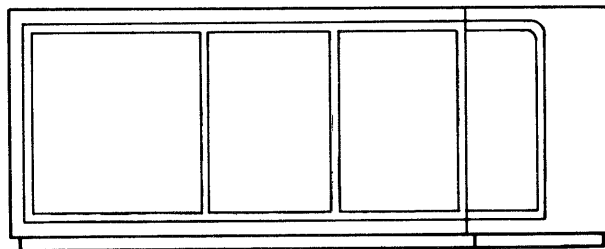
CM EXPANSION CABINET (18558-1)



FRONT



SIDE



01489

NOTES:

- 1 THE CABINET OUTLINE REPRESENTS OUTER CABINET SURFACE. THE DASHED LINES REPRESENT OUTER EDGES OF THE CABINET FRAME AND DOOR-SWING AREAS.
- 2 DIAGONAL LINES REPRESENT FLOOR CUTOUTS. REFER TO FLOOR PLAN IN SECTION 1 FOR DETAIL.

CM EXPANSION CABINET (18558-1)

PHYSICAL SPECIFICATIONS

Width: 800 mm (31.5 in)
 Depth: 757 mm (29.8 in)
 Height: 1930 mm (76.00 in)
 Weight: 468 kg (1030 lb)

ELECTRICAL SPECIFICATIONS

Power Consumption, Steady State, Maximum			
Cabinet	400-Hz (Volts, Phase, kVA)	60-Hz (Volts, Phase, kVA)	50-Hz (Volts, Phase, kVA)
CM Expansion	120-V/208-V, 3- \emptyset , 3.6-kVA	120-V, 1- \emptyset , 0.6-kVA	240-V, 1- \emptyset , 0.6-kVA

Cabinet	Circuit Breakers (Hz, Amperes, Phase, Quantity)	Power Connector Terminal Strip Locations Above Cabinet Base
CM Expansion	400-Hz, 15-A, 3- \emptyset , 1 60-Hz, 15-A, 1- \emptyset , 1 or 50-Hz, 15-A, 1- \emptyset , 1	25.4 mm (1 in) 25.4 mm (1 in) 25.4 mm (1 in)

COOLING SPECIFICATIONS

Type of cooling: Distilled water - air
 Source of cooling: CP cabinet 50-l/min (14-gal/min) water cooling unit and CM expansion cabinet blower.

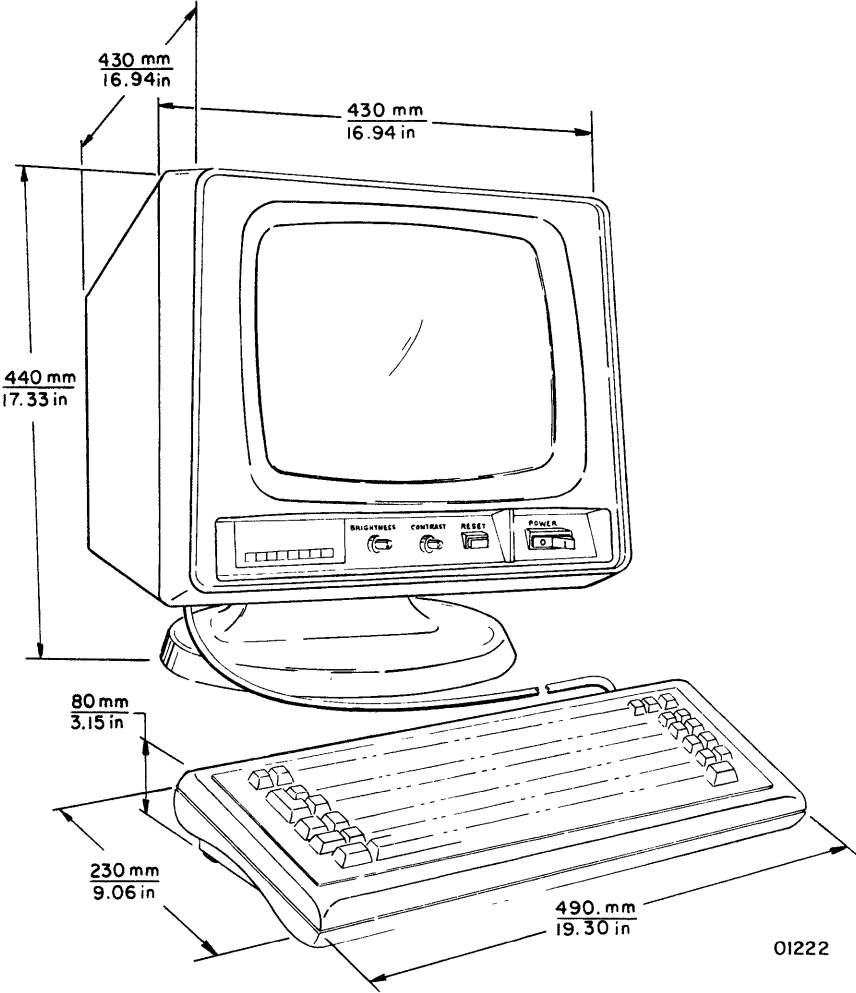
Cabinet	Maximum Heat Rejection Rates					
	To Air		To Water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
CM Expansion	406	1385	3651	12460	4057	13845

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)	30°C (86°F)
Storage temperature	-40°C (-40°F)	-	60°C (140°F)

SYSTEM CONSOLE (18002-2)



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)

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 , 0.2-kVA	220-V, 1- \emptyset , 0.2-kVA or 240-V, 1- \emptyset , 0.2-kVA

Cabinet	Circuit Breakers (Hz, Amperes, Phase, Quantity)	Power Connector
System Console	60-Hz, 15-A, 1- \emptyset , 1 or 50-Hz, 15-A, 1- \emptyset , 1	NEMA 5-15 2.1-m (7-ft) cord -

COOLING SPECIFICATIONS

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

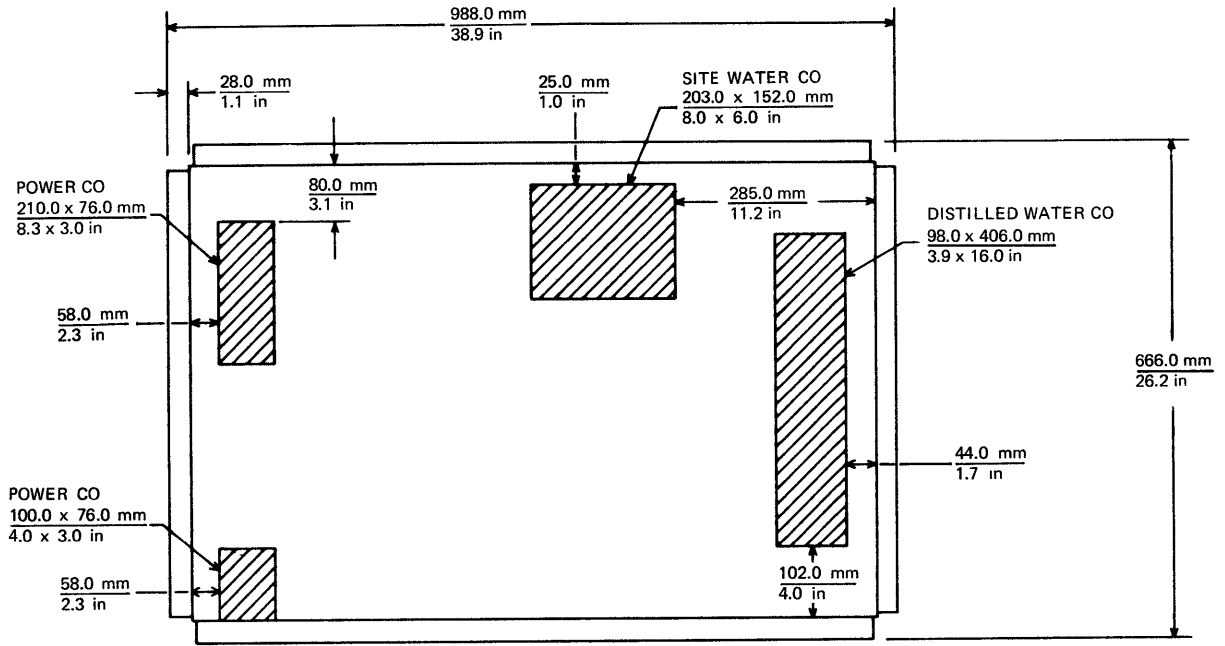
Cabinet	Maximum Heat Rejection Rates					
	To Air		To Water		Total	
	Watts	Btu/h	Watts	Btu/h	Watts	Btu/h
System Console	122	416	-	-	122	416

ENVIRONMENTAL SPECIFICATIONS

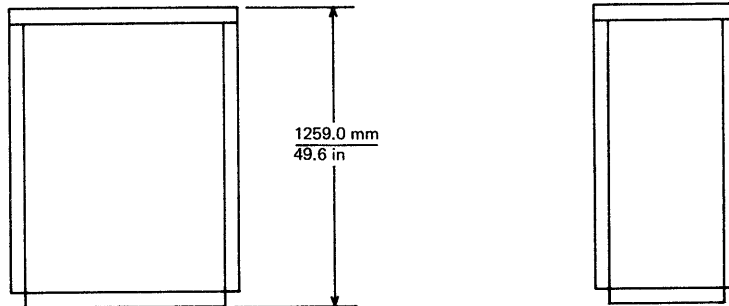
Room Relative Humidity Range: 35% to 60%
 Room Dew Point Limit: 13°C (56°F)

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)

WATER COOLING UNIT (18674-1)



FRONT



00094

WATER COOLING UNIT (18674-1)

PHYSICAL SPECIFICATIONS

Width: 988 mm (38.9 in)
 Depth: 665 mm (26.2 in)
 Height: 1259 mm (49.6 in)
 Weight: 227 kg (500 lb)

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- \emptyset , 1.4-kVA	380-V, 3- \emptyset , 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- \emptyset , 1 or 50-Hz, 15-A, 3- \emptyset , 1	153 mm (6 in) 153 mm (6 in)

COOLING SPECIFICATIONS

Type of Cooling: Distilled water
 Source of Cooling: Closed-loop water cooling system

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	1707	16500	56314	17000	58021

Water Conditions	Minimum	Recommended	Maximum
Temperature	4°C (40°F)	7°C (45°F)	10°C (50°F)
Flow rate	30.2 l/min (8 gal/min)	52.9 l/min (14 gal/min)	68.1 l/min (18 gal/min)
Supply Pressure	-	-	689 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)	-	9°C (120°F)

PART 3

POWER REQUIREMENTS

CENTRAL COMPUTER PRIMARY POWER

The central computer requires 400-Hz primary power for logic circuits and components and 50- or 60-Hz primary power for the condensing units, water cooling unit, and control circuits.

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, depending on the individual site:

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

When operating at a site with 50-Hz utility power, the cooling systems of the central computer cabinets receive the appropriate voltages from the following voltage conversion components:

- Autotransformers in the CM and IOU cabinets convert voltage for the CM and IOU cabinet condensing units.
- Buck-boost transformers in the CM and IOU cabinets convert voltage for the CM and IOU cabinet blowers.
- Delta-wye transformer in the CP cabinet converts voltage for the water cooling unit within the CP cabinet.
- Delta-wye transformer in the optional water cooling unit converts voltage for this unit which is used with the optional second CP.
- Stepdown transformer in the CM expansion cabinet converts voltage for this cabinet.

Peripheral equipment power requirements are provided in the Section 3, Peripheral Equipment Data, Site Preparation Manual.

M-G SET PRIMARY POWER

The M-G set supplies 400-Hz power to the central computer logic circuits and components by converting 50- or 60-Hz site utility power to 400-Hz power. M-G sets are available for either 50- or 60-Hz input power and for outputs of either 40- or 80-kVA.

The M-G set 50- or 60-Hz primary power requirements for 40-kVA M-G sets are:

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

The M-G set 50- or 60-Hz primary power requirements for 80-kVA M-G sets are:

- 50-Hz, 398-V (+10%), 3-phase, 4-wire.
- 60-Hz, 460-V (+10%), 3-phase, 4-wire.

POWER DISTRIBUTION

Terminal strips and/or junction boxes provide convenient power connection locations and power installations for the computer system cabinets.

Figure 3-1 shows a typical 50/60-Hz power distribution scheme for a central computer without optional cabinets. Figure 3-2 shows a typical 50/60-Hz power distribution scheme for a central computer with optional CM expansion and second CP cabinets.

NOTE

The number of indicated conductors in a run in figure 3-1 and 3-2 does not include the safety ground.

The customer provides and installs all items related to computer system power distribution as defined in this manual and in the Section 1, General Information, Site Preparation Manual. These items include all primary power source circuit breakers, panels, disconnect switches, ductwork, magnetic contactors, and power cabling (including cabling required for signal-cable terminator power distribution). Upon delivery, the customer also wires and installs the selected M-G set(s) and the wall-mounted panels furnished by Control Data.

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

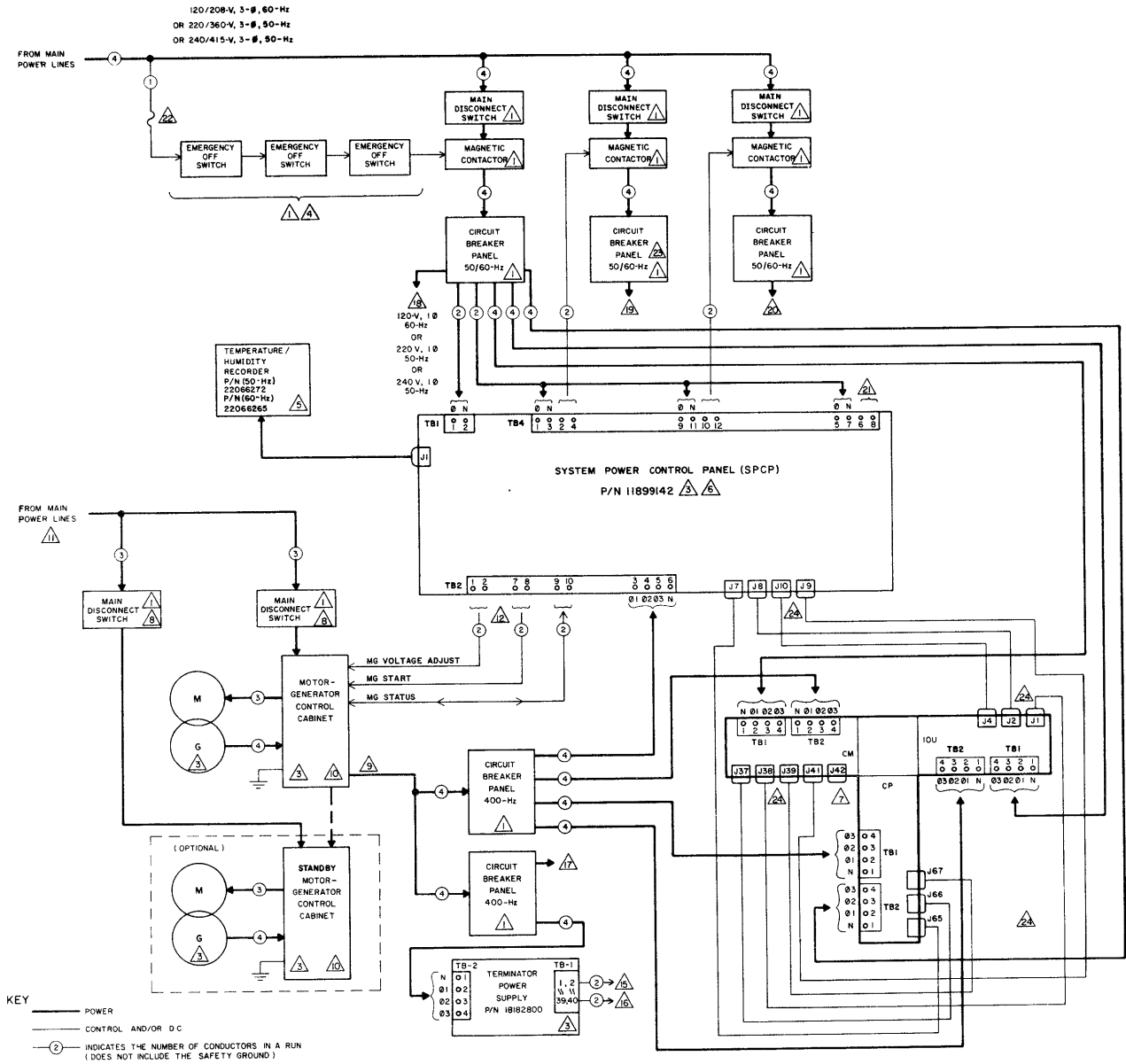


Figure 3-1. Power Distribution Diagram for Central Computer Without Optional Cabinets (Sheet 1 of 2)

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. PART IS FURNISHED BY CONTROL DATA AND INSTALLED BY CUSTOMER.
4. 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 CONTROL PANEL. THEY ARE TO BE WIRED IN SERIES.
5. 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 SPCP.
6. LOCATE SPCP 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 SPCP 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. THIS CONNECTOR REQUIRES TERMINATOR PLUG P/N 24616098 (SUPPLIED WITH SPCP).
8. 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.
9. VOLTAGE LOSS BETWEEN THE MG AND COMPUTER EQUIPMENT MUST NOT EXCEED 2 PERCENT OF THE RATED OUTPUT OF THE MG.
10. OUTPUT OF MG IS 40- OR 80-kVA, 208-V, 400-Hz, 3-Ø.
11. REQUIRED MAIN INPUT POWER FOR 40-kVA MG IS
220-V $\pm 10\%$ AND 440-V $\pm 10\%$, 3-Ø, 60-Hz
OR:
230-V $\pm 10\%$ AND 398-V $\pm 10\%$, 3-Ø, 50-Hz
REQUIRED MAIN INPUT POWER FOR 80-kVA MG IS:
460-V $\pm 10\%$, 3-Ø, 60-Hz
OR:
398-V $\pm 10\%$, 3-Ø, 50-Hz
12. MG VOLTAGE ADJUST, MG START, AND MG STATUS WIRING BETWEEN THE SPCP 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.
13. ALL POWER AND 40-V DC TERMINATOR POWER WIRING MUST BE SHIELDED BY USE OF CONDUIT, GREENFIELD OR BRAIDED SHIELD WITHIN THE POWER CABLE.
14. THE 50/60-Hz AND 400-Hz POWER CABLES MUST NOT BE RUN IN THE SAME RACEWAY.
15. THESE WIRES CARRY ± 20 -V DC TERMINATOR POWER TO 405 CARD READER (IF USED).
16. THESE WIRES CARRY ± 20 -V DC TERMINATOR POWER TO 580-XXX LINE PRINTER (IF USED).
17. THESE WIRES CONNECT TO ASSOCIATED PERIPHERAL EQUIPMENTS REQUIRING 400-Hz POWER.
18. 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).
19. THE SAME INFORMATION APPLIES AS IN NOTE 18 EXCEPT THE BREAKER PANEL MAY BE SHUT OFF BY THE SERVICE SWITCH WITHIN THE SPCP.
20. THESE WIRES PROVIDE 50/60-Hz POWER TO EQUIPMENTS THAT REQUIRE POWER WHEN 400-Hz POWER IS AVAILABLE.
21. 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.
22. THIS 5-A FUSE IS CUSTOMER-FURNISHED AND INSTALLED.
23. THE 50/60-Hz POWER TO THE CENTRAL COMPUTER SYSTEM MAY BE SUPPLIED FROM THIS PANEL ALSO.
24. THE 15.2-m (50-ft) MONITOR CABLES FROM SPCP TO MAINFRAME ARE P/N 53615357. THE 3-m (10-ft) INTERBAY JUMPER CABLES ARE P/N 53615356. THE CABLES ARE SUPPLIED WITH SPCP. (REFER TO NOTE 6.)
25. APPROVAL MUST BE OBTAINED FROM COMPUTER FACILITY SERVICES FOR NON-STANDARD CONNECTIONS.

Figure 3-1. Power Distribution Diagram for
Central Computer Without Optional Cabinets (Sheet 2 of 2)

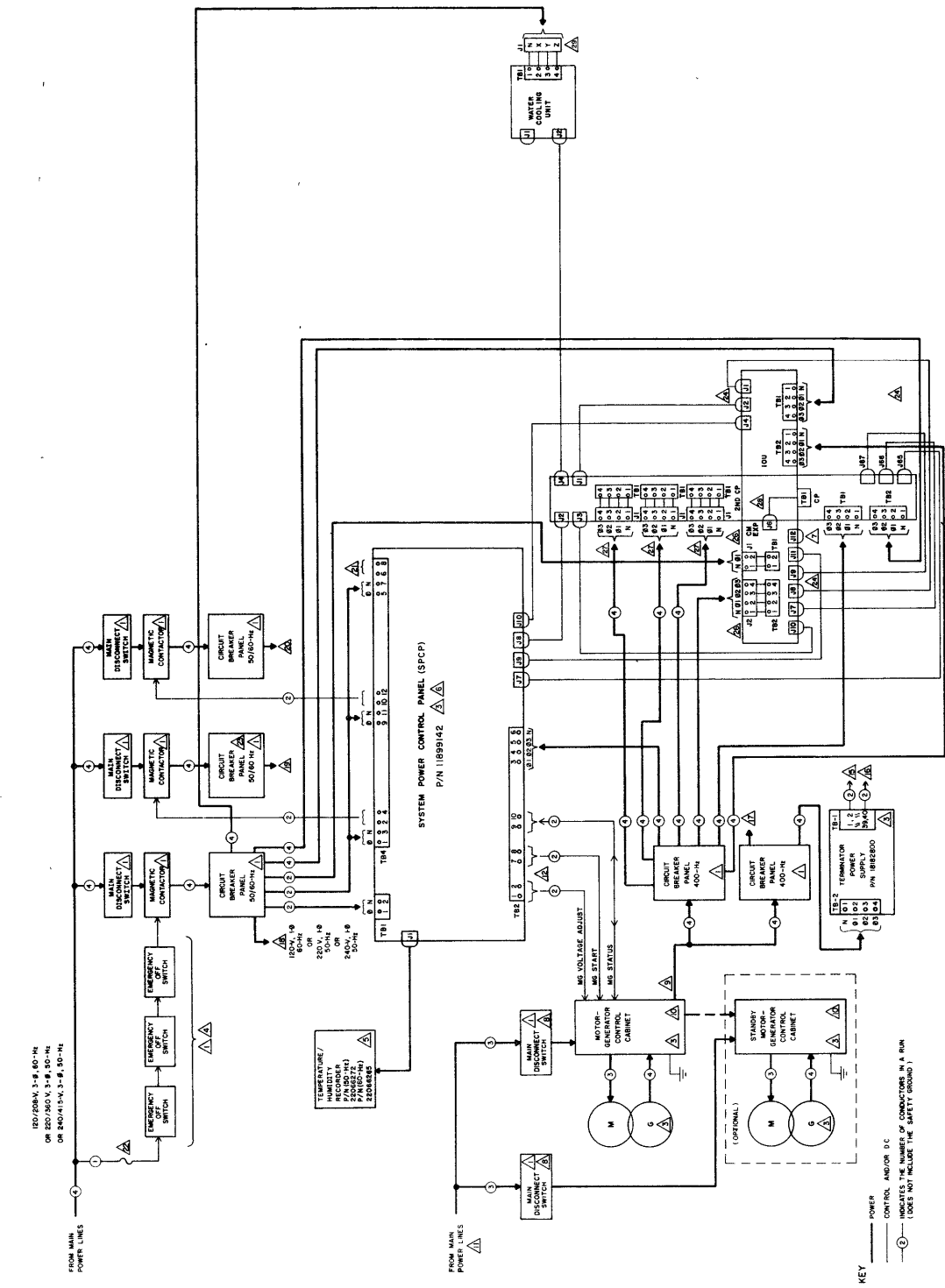


Figure 3-2. Power Distribution Diagram for Central Computer with Optional Second CP and CM Expansion Cabinets (Sheet 1 of 3)

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. PART IS FURNISHED BY CONTROL DATA AND INSTALLED BY CUSTOMER.
4. 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 CONTROL PANEL. THEY ARE TO BE WIRED IN SERIES.
5. 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 SPCP.
6. LOCATE SPCP 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 SPCP 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. THIS CONNECTOR REQUIRES TERMINATOR PLUG P/N 24616098 (SUPPLIED WITH SPCP).
8. 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.
9. VOLTAGE LOSS BETWEEN THE MG AND COMPUTER EQUIPMENT MUST NOT EXCEED 2 PERCENT OF THE RATED OUTPUT OF THE MG.
10. OUTPUT OF MG IS 40- OR 80-kVA, 208-V, 400-Hz, 3-Ø.
11. REQUIRED MAIN INPUT POWER FOR 40-kVA MG IS:
220-V $\pm 10\%$ AND 440-V $\pm 10\%$, 3-Ø, 60-Hz
OR:
230-V $\pm 10\%$ AND 398-V $\pm 10\%$, 3-Ø, 50-Hz
REQUIRED MAIN INPUT POWER FOR 80-kVA MG IS:
460-V $\pm 10\%$, 3-Ø, 60-Hz
OR:
398-V $\pm 10\%$, 3-Ø, 50-Hz
12. MG VOLTAGE ADJUST, MG START, AND MG STATUS WIRING BETWEEN THE SPCP 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.
13. ALL POWER AND 40-V DC TERMINATOR POWER WIRING MUST BE SHIELDED BY USE OF CONDUIT, GREENFIELD OR BRAIDED SHIELD WITHIN THE POWER CABLE.
14. THE 50/60-Hz AND 400-Hz POWER CABLES MUST NOT BE RUN IN THE SAME RACEWAY.
15. THESE WIRES CARRY ± 20 -V DC TERMINATOR POWER TO 405 CARD READER (IF USED).
16. THESE WIRES CARRY ± 20 -V DC TERMINATOR POWER TO 580-XXX LINE PRINTER (IF USED).
17. THESE WIRES CONNECT TO ASSOCIATED PERIPHERAL EQUIPMENTS REQUIRING 400-Hz POWER.
18. 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).
19. THE SAME INFORMATION APPLIES AS IN NOTE 18 EXCEPT THE BREAKER PANEL MAY BE SHUT OFF BY THE SERVICE SWITCH WITHIN THE SPCP.
20. THESE WIRES PROVIDE 50/60-Hz POWER TO EQUIPMENTS THAT REQUIRE POWER WHEN 400-Hz POWER IS AVAILABLE.
21. 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.
22. THIS 5-A FUSE IS CUSTOMER-FURNISHED AND INSTALLED.
23. THE 50/60-Hz POWER TO THE CENTRAL COMPUTER SYSTEM MAY BE SUPPLIED FROM THIS PANEL ALSO.
24. THE 15.2-m (50-ft) MONITOR CABLES FROM SPCP TO MAINFRAME ARE P/N 53615357. THE 3-m (10-ft) INTERBAY JUMPER CABLES ARE P/N 53615356. THE CABLES ARE SUPPLIED WITH SPCP. (REFER TO NOTE 6.)

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Figure 3-2. Power Distribution Diagram for Central Computer with Optional Second CP and CM Expansion Cabinets (Sheet 2 of 3)

25. APPROVAL MUST BE OBTAINED FROM COMPUTER FACILITY SERVICES FOR NON-STANDARD CONNECTIONS.
26. POWER WIRING CAN BE CONNECTED TO J1 AND J2 OR TB1 AND TB2.
27. POWER WIRING CAN BE CONNECTED TO J1 OR TB1.
28. WATER COOLING UNIT WARNING CABLE.
29. DROP CORD IS SUPPLIED BUT IS NOT WIRED TO TB1. POWER WIRING CAN BE CONNECTED TO J1 OR TB1.

Figure 3-2. Power Distribution Diagram for Central Computer with Optional Second CP and CM Expansion Cabinets (Sheet 3 of 3)

M-G SET SELECTION

M-G sets are available for either 50- or 60-Hz input power and must be selected in accordance with the utility line power available at the site. Two different sized M-G sets (outputs of 40- and 80-kVA) are offered as separate cost items by Control Data.

The customer, in conjunction with the Control Data salesperson and site planner, determines the size of the M-G set(s). Control Data delivers the selected M-G set to the customer, who then wires and installs it.

When determining which size M-G set to select, the following information should be taken into consideration:

- The kVA values on the system data sheets reflect maximum equipment configurations. Actual operating values are generally 20 to 30 percent less than these figures.
- When future expansion is expected, selection should be based upon maximum equipment configuration values. If it is not, the cost effectiveness of operating a small M-G set will probably be offset by the cost of rewiring for a larger one as the system expands.
- An M-G set operates most efficiently and cost effectively when loaded at approximately 85 percent of its rated output.

CAUTION

Regulated power is provided by the M-G set, which is manufactured to meet Control Data specifications. Use of other 400-Hz power sources may cause damage to the central computer and/or peripheral equipment. Therefore, the use of other 400-Hz power sources is not permitted, unless they either meet or exceed the Control Data specifications.

The customer must provide 50- or 60-Hz site utility power that is capable of handling the starting current of the MG in accordance with local codes. Detailed M-G set information is available in the Section 4, Monitoring and Power Data, Site Preparation Manual.

SYSTEM POWER CONTROL PANEL

Table 3-1 indicates the required connections between the SPCP and the M-G control cabinet. For the SPCP schematic diagram, refer to the CYBER 170/180 Models 835, 845, and 855 Power Distribution and Warning System Manual listed in the preface. Refer to the appropriate M-G set manual listed in the preface for the M-G control cabinet interconnection wiring (IW), interconnecting (I), or external interconnection (EI) diagram. The type of diagram varies with the vendor.

WARNING

Improper use or installation of the SPCP could result in personal injury or damage to the equipment. Approval must be obtained from Computer Facility Services for non-standard connections.

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

SPCP Schematic Diagram Designation	Function	M-G Control Cabinet Vendor Diagram Designations*
M-G Start	Provides remote M-G starting capability by supplying 120 V ac from SPCP to M-G control cabinet.	<ul style="list-style-type: none"> ● To remote control voltage at computer. ● 120 vac 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 SPCP.	<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 SPCP that main input power is available to MG. Contact opens upon loss of main input power.	<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 WI, I, and EI diagrams.

EMERGENCY OFF SWITCHES

The customer must provide and install emergency off switches at all computer room exits and at all other principal locations in the computer room per the National Electrical Code and any other local codes. These switches should be of the non-automatic 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 diagrams (figures 3-1 and 3-2).

SYSTEM GROUNDING

In addition to meeting the safety grounding requirements described in the Section 1, General Information, Site Preparation Manual, the customer 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 (for example, Zippertubing).

For the central computer equipment and peripheral equipment not on casters, cable shielding 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 below the surface of the raised floor and extend into the cabinet. If the shielding is flexible, it should extend directly into the cabinet.

For each piece of peripheral equipment on casters and with a drop cable, cable shielding should terminate at a junction box located below the surface of the raised floor. The junction box should be immediately below the peripheral equipment cable cutout or as close as possible. Local codes determine the exact placement of the junction box.

GRID GROUNDING

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

Due to the EMI-immunity design of the cabinets, models 845 and 855 are exempt from grid grounding requirements. If, however, the computer system is installed on a grid that meets EMC grid requirements, Control Data recommends connecting the cabinets to it as an added EMC factor. (Refer to the section 1, General Information, Site Preparation Manual for specific information concerning EMC grid requirements.)

The EMC grounding connections are 25.4-mm (1-in) wide, tinned-copper, braided, grounding straps (Control Data part number 24534811). 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 (figure 1-3). The customer is responsible for placing the unconnected end of the strap through the cutout opening in the cabinet and the raised floor and connecting the strap to the grid.

APPENDIX A

SYSTEM ALARMS

SYSTEM ALARMS

A

An intricate fault detection and alarm system protects the computer system from damaging temperature and dew-point conditions and indicates the loss of site utility power.

Alarms include visual indications on the system console screen, visual indications on the system cabinets, and an audible alarm on the SPCP.

Conditions that cause the alarms originate from the following sources:

- The SPCP, which monitors the computer room temperature and humidity.
- The CP and second CP cabinets, which monitor chassis temperatures controlled by their water cooling units.
- The CM and IOU cabinets, which monitor chassis temperatures controlled by their cooling system condensing units and blowers.
- The CM expansion cabinet, which monitors chassis temperature controlled by both its blower and the CP cabinet water cooling unit.
- The system M-G control cabinet, which monitors the site utility power to the control cabinet.

SHORT-WARNING FAULTS

Short-warning faults cause either an immediate or a delayed removal of power from either the entire computer system or from the cabinet affected by the fault. If the fault is not corrected, power removal occurs 2.5 seconds after a warning for the CM, CM expansion, and IOU cabinets and 2.5 seconds or 12 seconds after a warning for the CP and second CP cabinets. When the warning affects only one cabinet, such as the CM, power remains on in the remaining cabinets.

LONG-WARNING FAULTS

Long-warning faults indicate potential problems that may or may not result in removal of power depending on the affected cabinets and the duration of the warning.

VISUAL INDICATORS

Most of the faults cause a visual indication to appear on the system console screen and/or at the individual cabinets. Table A-1 identifies the cabinet visual indicators; table A-2, which describes the system alarms and the resulting actions, identifies the faults for which there are no visual indications.

CABINET DISPLAYS

The CP, CM, IOU, CM expansion, and second CP cabinets have indicator lights for identifying cabinet faults. Table A-1 lists the cabinets and their indicator lights.

Table A-1. Fault Indicator Lights

FAULT INDICATOR LIGHTS	CP	2ND CP	CM	CM EXP	IOU
2.2 V Fault		X		X	
-2.2 V Fault				X	
2.2 OC, 2.2 OV, 4.7 OC, 4.7 OV	X				
4.7 V Fault		X			
+5 V Fault				X	
-5.2 V Fault				X	
Backup High Temp		X			
Backup Low Temp		X			
Backup Fault				X	
Backup Temp Fault	X				
Blower Fault				X	
Blower 1 Fault			X		X
Blower 2 Fault			X		X
Cable Fault	X	X			
Chiller Fault		X		X	
Circuit Breaker Off				X	
Cond Unit Fault			X		X
Clg Unit Fault	X				
Heat Sink High Temp				X	
High Temp Fault			X		X
Low Temp				X	
Low Temp Fault			X		X
Power Sply Off	X				
Power Supply Off		X			
Primary High Temp		X			
Primary Temp Off	X				
Primary Low Temp Fault	X				
Regulator High Temp				X	

SYSTEM CONSOLE

Two alarm indications may appear on the screen: POWER FAILURE and ENVIRONMENT WARNING. The POWER FAILURE display indicates a short-warning fault; the ENVIRONMENT WARNING display indicates a long-warning fault.* 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. A display of POWER/ENVIRONMENT NORMAL appears on the system console screen when the fault is corrected.

AUDIBLE INDICATORS

A small horn on the left side of the SPCP sounds to indicate a room temperature or dew-point fault. The alarm continues until:

- The fault is corrected.
- A short-warning fault 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.

* Depending on the system level installed at the site, the alarm indications may instead be CPU POWER FAILURE (short-warning fault) and CM or IOU SHUTDOWN IMMINENT (long-warning fault).

Table A-2. System Alarms (Sheet 1 of 5)

Item Monitored	Sensing Location	Fault	Type of Warning	Resulting Actions
Room dew point	SPCP	$\geq 11^{\circ}\text{C}$ (52°F)	Long	The horn sounds at the SPCP, and ENVIRONMENT WARNING appears on the system console screen. Alarm indications remain until the dew point drops below 11°C (52°F) or rises to activate a short warning.
Room dew point	SPCP	$\geq 13^{\circ}\text{C}$ (56°F)	Short	The horn sounds at the SPCP, and POWER FAILURE appears on the system console screen. Power is removed from the system if the fault is present 2.5 seconds after detection.
Room temperature	SPCP	$\geq 35^{\circ}\text{C}$ (95°F)	Long	The horn sounds at the SPCP, and ENVIRONMENT WARNING appears on the system console screen. Alarm indications remain until the temperature falls below 35°C (95°F) or rises to activate a short warning.
Room temperature	SPCP	$\geq 38^{\circ}\text{C}$ (100°F)	Short	The horn sounds at the SPCP, and POWER FAILURE appears on the system console screen. Power is removed from the system if the temperature does not fall below 38°C (100°F) within 2.5 seconds.
Chassis high temperature (primary)	CP cabinet	$\geq 35^{\circ}\text{C}$ (95°F)	Short	POWER FAILURE appears on the system console screen. Power is removed from the CP cabinet if the fault is present 12 seconds after detection.
Chassis high temperature (backup)	CP cabinet	$\geq 40^{\circ}\text{C}$ (104°F)	Short	POWER FAILURE appears on the system console screen, and an indicator lights on the CP cabinet. Power is removed from the CP cabinet if the fault is present 2.5 seconds after detection.
Chassis low temperature (primary)	CP cabinet	$< 14^{\circ}\text{C}$ (57°F)	Short	POWER FAILURE appears on the system console screen, and an indicator lights on the CP cabinet. Power is removed from the CP cabinet if the temperature does not rise to 14°C (57°F) within 12 seconds.

Table A-2. System Alarms (Sheet 2 of 5)

Item Monitored	Sensing Location	Fault	Type of Warning	Resulting Actions
Chassis low temperature (backup)	CP cabinet	< 13°C (55°F)	Short	POWER FAILURE appears on the system console screen, and an indicator lights on the CP cabinet. Power is removed from the CP cabinet if the temperature does not rise to 13°C (55°F) within 2.5 seconds.
Chassis high temperature	Second CP cabinet columns	Column 1: > 38°C (100°F) Columns 2 and 3: > 35°C (95°F)	Short	POWER FAILURE appears on the system console screen and an indicator lights on the affected column. Power is removed from the affected column if the fault is present 12 seconds after detection.
Chassis high temperature (backup)	Second CP cabinet columns	Column 1: > 47°C (117°F) Columns 2 and 3: > 40°C (104°F)	Short	POWER FAILURE appears on the system console screen, and an indicator lights on the affected column. Power is removed from the affected column if the fault is present 2.5 seconds after detection.
Chassis low temperature (backup)	Second CP cabinet columns	Dew formation on column input water line	Long: 30 s Short: 2.5 s	ENVIRONMENT WARNING appears on the system console screen, and an indicator lights on the affected column. POWER FAILURE appears on the system console screen if the fault is present 27.5 seconds after detection. Power is removed from the affected column if the fault is still present 30 seconds after detection.
Logic power supplies (-2.2 V, -4.7 V)	CP cabinet and second CP cabinet columns	Over-current/over-voltage	None	Activates without a system console indication. Removes power from the CP cabinet or the affected column immediately, and lights an indicator on the cabinet or affected column.

Table A-2. System Alarms (Sheet 3 of 5)

Item Monitored	Sensing Location	Fault	Type of Warning	Resulting Actions
Warning cable fault	CP cabinet and second CP cabinet	Open in warning cable fault loop	None	Activates without a system console indication. Removes power from the CP cabinet or the affected column immediately, and lights an indicator on the CP cabinet or affected column.
Water cooling unit	CP cabinet and second CP cabinet columns	Water level or pressure	Short	POWER FAILURE appears on the system console screen, and an indicator lights on the CP cabinet or on all three columns. Power is removed from the CP cabinet or all three columns if the fault is present 2.5 seconds after detection.
Chassis high temperature	CM and IOU cabinets	> 35°C (95°F)	Long	ENVIRONMENT WARNING appears on the system console screen, and an indicator lights on the affected cabinet. The display remains on the screen until the temperature falls below 35°C (95°F) or rises enough to activate a short warning.
Chassis high temperature (primary)	CM and IOU cabinets	> 49°C (120°F)	Short	POWER FAILURE appears on the system console screen, and an indicator lights on the affected cabinet. Power is removed from the affected cabinet if the fault is present 2.5 seconds after detection.
Chassis high temperature (backup)	CM and IOU cabinets	54°C (130°)	None	Activates without a system console indication. Removes power from the affected cabinet immediately.
Chassis low temperature (primary)	CM and IOU cabinets	< 14°C (57°F)	Long	ENVIRONMENT WARNING appears on the system console screen, and an indicator lights on the affected cabinet. Power is removed from the affected cabinet if the temperature does not rise to 14°C (57°F) within 2 minutes.
Cooling blowers	CM and IOU cabinets	Blower failure	Short	POWER FAILURE appears on the system console screen, and an indicator lights on the affected cabinet for blower 1 or blower 2. Power is removed from the affected cabinet if the fault is present 2.5 seconds after detection.

Table A-2. System Alarms (Sheet 4 of 5)

Item Monitored	Sensing Location	Fault	Type of Warning	Resulting Actions
Condensing unit	CM and IOU cabinets	High pressure in compressor head	Short	POWER FAILURE appears on the system console screen, and an indicator lights on the affected cabinet. Power is removed from the affected cabinet if the fault is present 2.5 seconds after detection.
Chassis smoke sensors	CM and IOU cabinets	Smoke	None	Activates without a system console indication. Removes power from the affected cabinet immediately.
High heat sink temperature (primary)	CM expansion cabinet	$\geq 430\text{C}$ (1100F)	Long: 60 s Short: 2.5 s	ENVIRONMENT WARNING appears on the system console screen, and an indicator lights on the CM expansion cabinet. POWER FAILURE appears on the system console screen if the fault is present 57.5 seconds after detection. Power is removed from the CM expansion cabinet if the fault is still present 60 seconds after detection.
High heat sink temperature (backup)	CM expansion cabinet	$\geq 540\text{C}$ (1300F)	None	Activates without a system console indication. Removes power from the CM expansion cabinet immediately, and lights an indicator on the CM expansion cabinet.
Low temperature	CM expansion cabinet	Water temperature less than room dew-point	Long: 60 s Short: 2.5 s	ENVIRONMENT WARNING appears on the system console screen, and an indicator lights on the CM expansion cabinet. POWER FAILURE appears on the system console screen if the fault is present 57.5 seconds after detection. Power is removed from the CM expansion cabinet if the fault is still present 60 seconds after detection.
Cooling blowers	CM expansion cabinet	Blower failure	Long: 60 s Short: 2.5 s	ENVIRONMENT WARNING appears on the system console screen, and an indicator lights on the CM expansion cabinet. POWER FAILURE appears on the system console screen if the fault is present 57.5 seconds after detection. Power is removed from the CM expansion cabinet if the fault is still present 60 seconds after detection.

Table A-2. System Alarms (Sheet 5 of 5)

Item Monitored	Sensing Location	Fault	Type of Warning	Resulting Actions
DC bus voltage circuit breakers (Circuit Breaker Off)	CM expansion cabinet	Out-of-limit bus voltages	None	Activates without a system console indication. Removes power from the CM expansion cabinet immediately, and lights an indicator on the CM expansion cabinet.
Logic power supplies (-2.2 V, +5 V, -5.2 V)	CM expansion cabinet	Over-current/over-voltage	None	Activates without a system console indication. Removes power from the CM expansion cabinet immediately, and lights an indicator on the CM expansion cabinet.
Water cooling unit	CM expansion cabinet	Water level or pressure	Long: 60 s Short: 2.5 s	ENVIRONMENT WARNING appears on the system console screen, and an indicator lights on the CM expansion cabinet. POWER FAILURE appears on the system console screen if the fault is present 57.5 seconds after detection. Power is removed from the CM expansion cabinet if the fault is still present 60 seconds after detection.
Fault detection system (backup fault)	CM expansion cabinet	Fault fails to remove power from cabinet in prescribed time	None	POWER FAILURE may or may not appear on the system console screen. Removes power from the CM expansion cabinet immediately, and lights an indicator on the CM expansion cabinet.
Site utility power	SPCP via M-G control cabinet	Failure of site 50/60-Hz power	Short	POWER FAILURE appears on the system console screen. If the site utility power returns within 2.5 seconds, the system recovers without interruption to processing and without the loss of data. If power does not return within 2.5 seconds, a manual restart is necessary.

COMMENT SHEET

MANUAL TITLE: CDC CYBER 170/180 Computer Systems Models 845 and 855
Section 2 System Data Site Preparation Manual

PUBLICATION NO.: 60458210

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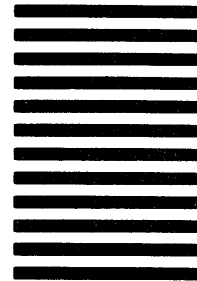
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