CONTROL DATA® 6000 SERIES COMPUTER SYSTEMS

Site Preparation and Installation Manual

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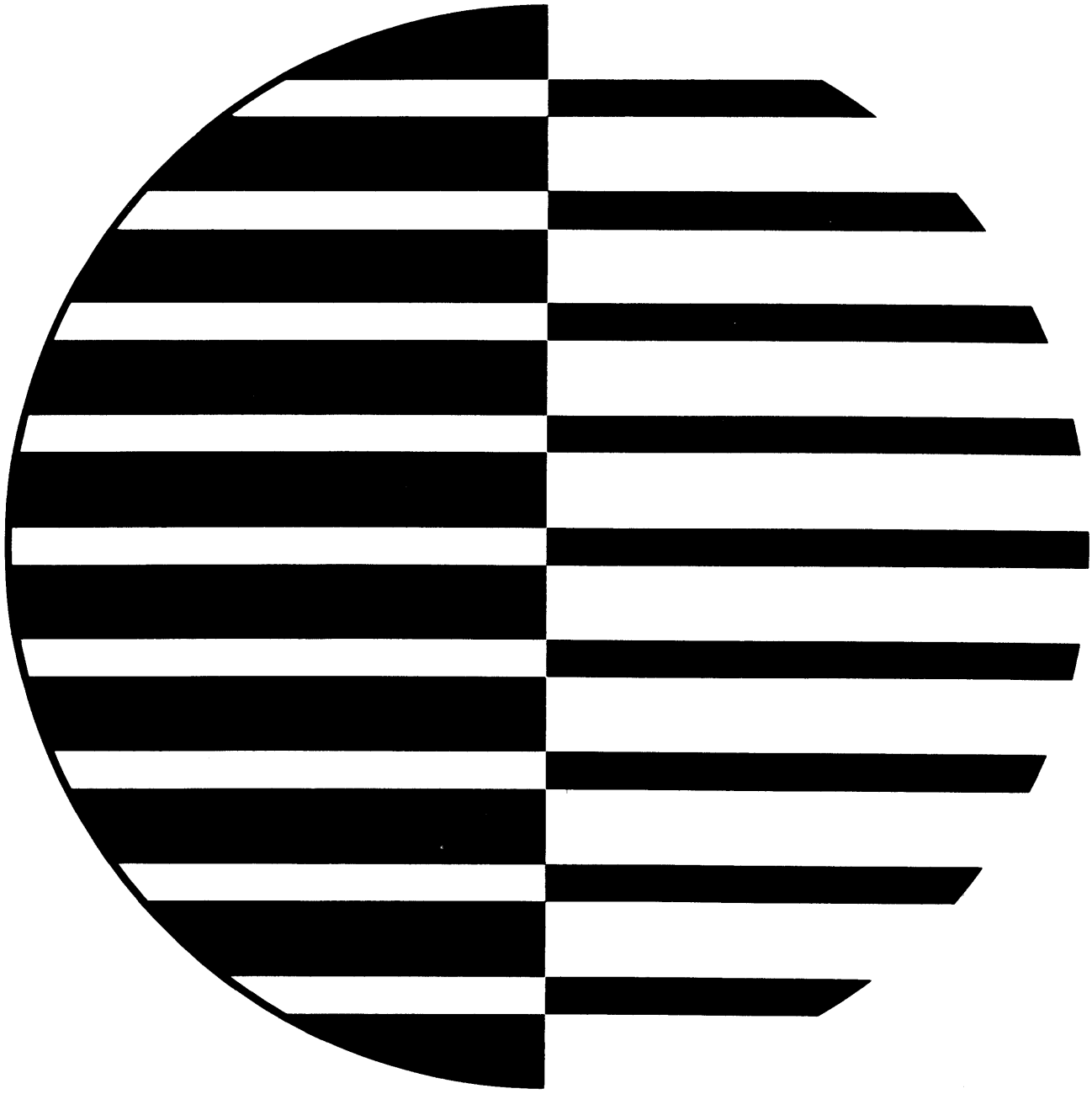

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	Changes and additions to this manual are published
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Address comments concerning this manual to:

Control Data Corporation
Technical Publications Department
4201 North Lexington Avenue
St. Paul, Minnesota 55112

or use Comment Sheet in back of this manual.

GENERAL SITE AND INSTALLATION SPECIFICATIONS

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EQUIPMENT DATA SHEETS

GENERAL SITE AND INSTALLATION SPECIFICATIONS

PREINSTALLATION

Detailed long-range planning and coordination is essential for the successful installation of a CONTROL DATA 6000 Series Computer System. The completed installation site must meet the environmental and operating requirements described in this manual, but factors such as construction methods are left to the user's discretion. A qualified Control Data site planning engineer is available at all times for advice and assistance.

Control Data Corporation suggests that the following schedule be used in preinstallation planning:

FOUR MONTHS BEFORE DELIVERY

A tentative layout of the computing system is made. Consult the Control Data site planning engineer for a discussion of power and cooling requirements, floor construction, and proposed layout.

THREE MONTHS BEFORE DELIVERY

A Control Data site planning engineer visits the site. The final system layout is approved by Control Data Corporation and signal cables are ordered. Ninety days are required to produce the cables, which are custom-made for each installation.

TWO WEEKS BEFORE DELIVERY

MG sets are delivered for installation. All building construction should be completed and air conditioning equipment should be operational at this time.

SYSTEM ORGANIZATION

In most cases, a Control Data 6000 Series Computer System consists of a central computer, one or more display consoles, a disk system, and other peripheral equipment. The many possible configurations of these units enable each system to be tailored to satisfy the user's specific requirements.

The model number, name, and a brief description of each logical unit in the 6000 Series is listed in the respective section of this manual. Also presented is a physical description of the cabinets in which the logical units are housed. (In some instances the cabinet name is different from the logical units which it may contain.) Additional information concerning the functions of these logical units is available from the Control Data representative.

The various types of 6000 Series central computers, along with their available options, are listed in this manual. Numerous combinations can thus be arranged, allowing each user to obtain the speed, memory capacity, and computing capability needed for his specific applications. A complete description of the logical operation of each of the central computers is presented in its respective reference manual, and the user should feel free to consult the Control Data representative should any questions arise.

EQUIPMENT LAYOUT

The arrangement and layout of equipment in a 6000 Series system is determined by considering several relatively independent factors, such as:

- Personnel traffic flow and material handling
- Machine visibility and operating characteristics
- Physical limitations such as cable length
- Aesthetic appearance

As an aid to planning, templates of each cabinet are included in this manual. Additional material may be obtained from the Control Data representative.

TRAFFIC FLOW AND MATERIAL HANDLING

Paper handling and card equipment such as printers, punches and readers must be easily accessible for efficient operation. Equipment should be laid out to permit sufficient space for passage of carts and personnel. Adequate space and clearance must be provided for waste or take-up containers. Since large amounts of material can be consumed in a short time, it is recommended that storage for paper supplies be placed adjacent to the operational area. Entry to the supply area should not require passage through the remainder of the computer area.

Portable machines are often serviced in the Customer Engineering area. Access to this area should be convenient and on the same floor level as the computer area. In the interest of safety, machines such as magnetic tape transports should not be moved on ramps from one level to another.

VISIBILITY AND OPERATING CHARACTERISTICS

Although visibility of equipment is not required for operation, most efficient operation results when the operator can visually monitor the physical activity of the computing system. The operating personnel who are responsible for monitoring equipment should be able to see the equipment without extensive movement. If more than one operator is involved in the computing area, monitoring responsibility may be divided among them.

Many of the electronic equipments have no moving parts and do not require operator intervention; however, many such equipments use lighted indicators to show various operating conditions. All such machines should be arranged so that the indicators may be seen from the computing system console area.

Printers, card punches, and similar devices produce appreciable amounts of waste. This waste may find its way into dust-sensitive equipment such as card readers, magnetic tape transports, and paper tape readers. Waste-producing machines should therefore be located away from dust-sensitive mechanisms. By locating the waste-producing machines near the return inlets of the room air conditioning system, much of the dust can be filtered out before it circulates appreciably. Since the printers and punches are comparatively noisy, these should be located in an area where a moderately high noise level is not objectionable.

SIGNAL CABLES

Signal cables are provided by Control Data Corporation to interconnect the various units of 6000 Series systems. These cables provide for the transmission of data and control signals throughout the system. Both twisted-pair and coaxial cables are used, depending on the requirements of the specific application.

The twisted-pair or coaxial conductors of a signal cable are combined into a bundle approximately 5/8 inch (0.016 meter) in diameter and encased in a polyvinylchloride (PVC) sheath. The weight of a signal cable is approximately 0.4 pound per foot (0.6 kg/m).

TWISTED-PAIR CABLES

Cables of this type contain 23 signal lines, each of which is twisted with a ground line. The ground lines are all joined in a common connection at each end of the cable and are brought out to one of the pins in the 24-pin connector. Each end of the cable terminates in a 24-pin plug (Amphenol 67-06P20-37P, CDC 245139-1). Corresponding 24-socket receptacles are mounted in each of the cabinets using this type of signal cable. Twisted-pair signal cables must not exceed a length of 50 feet (15.2 meters).

COAXIAL CABLE

This type of cable consists of 19 coaxial conductors and is used for transmission of critical data or timing signals. Because of timing considerations, coaxial cables are limited to a length of 70 feet (21.3 meters).

CUSTOMER ENGINEERING AREA

For proper maintenance of a 6000 Series System, an area must be reserved in which Control Data customer engineering personnel may perform repair of printed circuit cards, adjustment of typewriters, and similar duties. This area should be on the same level as the computer area, preferably adjacent to it.

The Customer Engineering area should have a total illumination of 100 foot-candles at 30 inches above the floor (1,076 lux at 0.76 meter above the floor), with sufficient ventilation and climate control to accommodate two magnetic tape transports. It should be a minimum of 300 square feet (27.8 square meters) in area, with the smaller dimension no less than 10 feet (3.05 meters). Adequate working and storage space for spare parts should be provided.

The following electrical power should be available. The frequency will be either 50 cycle or 60 cycle, depending upon the locality of the installation.

50/60-cycle, single-phase	115 VAC	convenience outlets according to local code
50/60-cycle, single-phase, 3-wire	115 VAC, 30 amperes	to accommodate Hubbell connector number 3331-G
50/60-cycle, three-phase, 5-wire	208 VAC, 20 amperes	to accommodate Hubbell connector number 3521

6000 SERIES SYSTEM TEST EQUIPMENT

The Customer Engineering area should include the following test equipment, or its equivalent:

Quantity	Equipment
2	Tektronix Type 547 Oscilloscopes
2	Tektronix Type 1A1 Preamplifiers
2	Tektronix Oscilloscope Carts
1	Triplett Type 630A Voltmeter

Also, the ordinary hand tools commonly used in an electrical and mechanical maintenance area should be available. These should include:

- soldering tools
- pliers
- screwdrivers
- taper pin insertion tools
- crimping tools

Control Data Corporation provides the test equipment and tools if the computer system is leased, or if it has a contract to provide maintenance for purchased equipment.

BUILDING AND ENVIRONMENTAL REQUIREMENTS

The building or area chosen to house the computing system should meet the space and convenience requirements of the present component layout, as well as provide for future expansion. If a new building is to be constructed, it is well to first determine a suitable layout of computing system components. This layout (with the other building requirements) should then be presented to the architect.

The building or area should be selected on the basis of three basic requirements:

- Floor loading and type of construction
- Climate control and cooling facilities
- Availability of adequate electrical power

FLOOR

The functions performed by the floor of the computer area are as follows:

- Support of equipment and personnel
- Concealment of ductwork, cables, and water pipes
- Distribution of cooling air for equipment, if plenum cooling is used

These requirements are most easily and inexpensively satisfied if a raised floor is laid above the normal room floor. The use of a raised floor eliminates the necessity for making openings in the normal floor, which is usually not designed for such purposes. A suitably constructed and installed raised floor permits equipment layouts to be changed with ease, and enhances the appearance of the computer area.

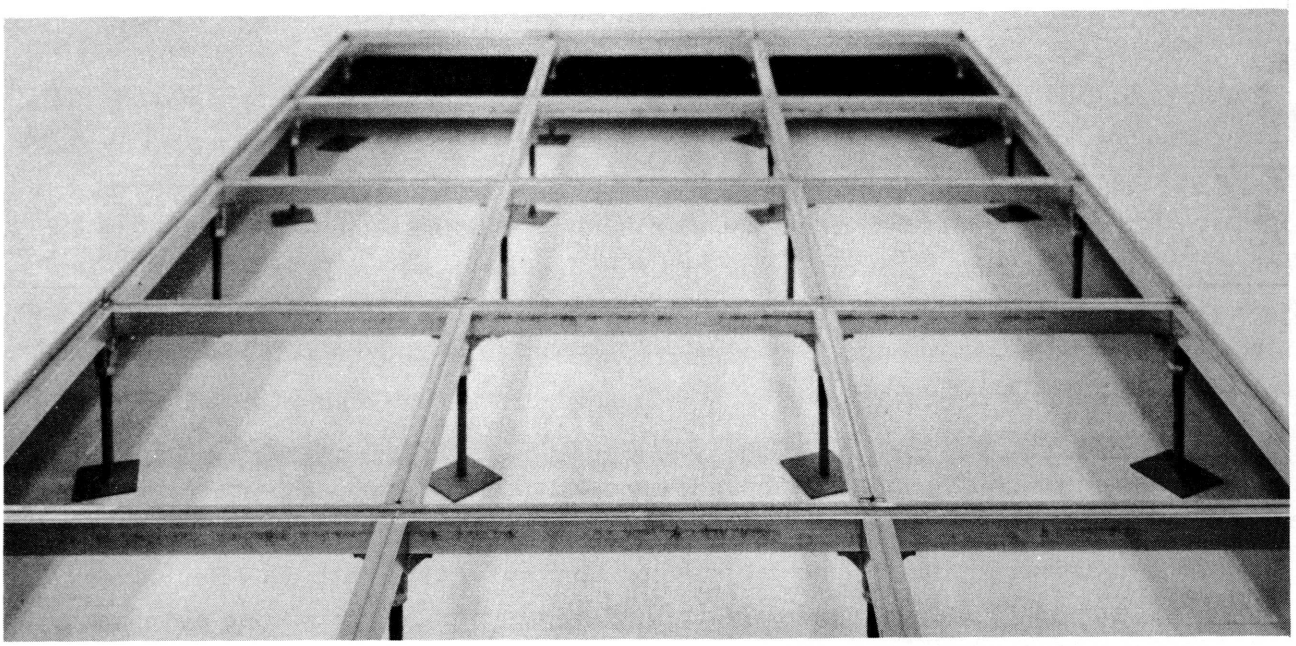


Figure 1. Raised Floor, Pedestal Type

Loading

In calculations of floor loading, it is important to consider the following points:

- The weight of each bay of the central computer cabinet rests on four 25-sq.in. (0.0161 m^2) leveling pads, giving a support area per bay of 100 square inches (0.0644 m^2).
- In calculating normal room floor loading, 10 pounds per square foot (48.7 kg per square meter) must be allowed for the weight of the raised floor.
- The weight of cables and plumbing must be included. (Signal cables weigh approximately 0.4 pound per foot, 0.6 kilogram per meter.)

The weights of individual cabinets are listed in the respective sections of this manual. In order to accommodate certain of the peripheral equipment cabinets, the floor must be able to withstand a concentrated load of 200 lbs/in.^{2} (104,050 kg/m^2).

Floors which have small individual panels, e.g., 2' x 2' (0.37 m^2), are usually able to withstand greater loads then those with larger dimensions. In addition, small panels are easier to handle when making layout changes.

Leveling

The floor should be level within 1/16 inch per 5 feet (0.17 cm. per meter), and within 1/8 inch (0.32 cm) over any continuous length of cabinets joined end-to-end.

If a new building is to be constructed, it is advantageous to install the computer room floor 12 to 18 inches (approximately 0.5 meter) lower than the normal building floor. The raised floor can then be installed flush with the normal building floor, eliminating the need for ramps.

Power wiring from the distribution panels to the machine units is routed beneath the floor in ducts, raceways, or other approved devices. This wiring is provided by the user prior to delivery, and should conform to local codes. It is recommended that power wiring be bussed from a central point and distributed along two or three feeder ducts. Such an arrangement minimizes clutter beneath the floor.

The central computer cabinets in 6000 Series Systems are cooled by internal compressors and refrigeration systems. Each refrigeration system is equipped with a heat exchanger which must be supplied with cooling water. Space must be provided under the raised floor for water supply and return pipes, valves, and other equipment.

For the peripheral equipment and subsystems commonly used with 6000 Series Systems, the underfloor space may be used as a cooling air plenum. To minimize air losses, ductwork height should be held to an absolute minimum consistent with local codes.

For satisfactory air movement, the minimum recommended underfloor clearance is 6 inches (0.15 meter). A seal under the perimeter of each panel helps to minimize air losses and prevent dirt from entering the plenum.

All cables enter cabinets through the area under the base. The raised floor must enable easy and relatively unrestricted routing of cables beneath it. Raised floors of the pedestal type, shown in Figure 1, are recommended for this purpose. Raised floors of the raceway type require the use of longer cables and are quite inflexible for expansion or change of layout. Control Data Corporation recommends the pedestal type of raised floor.

Raised flooring which satisfactorily fulfills the requirements will generally be of the following type:

- 12 to 18 inches (approximately 0.5 meter) above the normal room floor.
- Square flooring panels approximately 2' x 2' (0.37 square meter).
- Panels constructed of metal or metal-clad wood.
- Panels covered by floor covering such as vinyl or vinyl-asbestos tile.

WATER SUPPLY

The refrigeration system in the central computer cabinet dissipates heat by means of a water-cooled heat exchanger. The system connects to water supply and return pipes in the area under the base of the cabinet. Each bay of the cabinet is furnished with two connecting hoses for attachment to the supply and return pipes. Both pipes must be equipped with valves having SAE 5/8 inch (approximately 0.0159 meter) male flare fittings. A separate set of valves and fittings must be provided for each bay of the cabinet. Pressure drop through the system is negligible. Each bay must be provided with water under the conditions listed below, and it is recommended that the water supply be filtered.

Temperature		Flow Rate	
Fahrenheit degrees	Centigrade degrees	Gallons per minute	Liters per minute
80	27	4.3	16.25
70	21	2.5	9.5
60	16	2.1	7.75

Water Alarm Indicator

The normal room floor (under the raised floor) should be equipped with one or more devices to warn of the presence of water in the event of a broken pipe or hose. A float-operated switch controlling both an audible alarm and a sump pump is recommended.

AIR CONDITIONING

Cabinets such as console displays and peripheral equipment are cooled by forced air. These cabinets contain the internal blowers needed to propel the air past heat-dissipating components. The majority of cabinets use room air for cooling, although some may be equipped to receive cooling air from beneath the floor. All cabinets exhaust directly into the computer room.

The air-conditioning facilities must be designed according to the procedures outlined in document No. 60155900, Design Program for a Computer Installation Enviromental System. This document is available from Installation Engineering, Computer Division.

Recording Instruments

Control Data Corporation recommends that temperature and humidity recording instruments be installed in the computing area. This may be a 7-day automatic chart that monitors both the condition of the plenum air supply and the condition of the air in the computer room. The recording instrument should provide a visual or audible alarm indication if temperature and/or humidity approach the limiting conditions.

DEW POINT

In order to prevent condensation in the central computer cabinet, the dew point temperature of the air in the computer room should never be allowed to exceed 50°F (10°C). An instrument (see data sheet at the back of this section) for recording the temperature and dew point of the computer room air is furnished with the system. The instrument has an automatic chart, and is equipped with an audible alarm to indicate when the set dew point is exceeded. The instrument is to be installed in a location where it can

monitor the air surrounding the central computer and other cabinets cooled by internal refrigeration systems.

The dewpoint recorder is wall-mounted. Dimensions and other data are listed in the equipment data sheets at the back of this section.

CAUTION

If the maximum dew point is exceeded, condensation may cause serious damage to components in the central computer cabinet. 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 must be shut down.

In order to maintain calibration and avoid damage to the sensing element, the following precautions should be observed:

- Care should be taken not to splash water or other liquids on the recorder or to expose it to saturated humidity conditions which will cause water to run off.
- The recorder should not be exposed to ionic or hygroscopic materials such as hygroscopic sugars, glycerine, and glycols, or vapors of the latter.
- The recorder should not be used in atmospheres containing contaminants such as:

Sulphur dioxide	Alkaline vapors
Acid vapors	Acetylene
Chlorine	Ethylene oxide
Ammonia	Salt air

Alcohols

- Except in very dilute concentrations in the atmosphere, acetone should also be avoided.

If any of the above materials must be used in the room for cleaning equipment, floors, windows, etc., the unit must be turned off and the two grilles blocked off until the room has been cleared of the contaminant.

COOLING AIR DISTRIBUTION

Three types of air distribution systems are presented in this section. The examples described should be used as a guide only. The selection of the specific method will depend upon careful analysis of the installation, and it is recommended that the user engage the services of an air-conditioning consultant. Each installation must conform to local building codes regarding the use of the raised floor as a plenum.

Underfloor Plenum Method

In this type of system, air is drawn from the underfloor plenum through openings under each cabinet, and exhausted directly into the room from openings at the top of the cabinet. This method of cooling presents a neat appearance and is relatively simple and inexpensive.

The space under the raised floor is used as a plenum, with air entering it from an external source. This plenum should be slightly above atmospheric pressure. A clearing of 6 inches (0.15 meter) between the bottom of the raised floor panels and the top of any cabling or ductwork beneath the floor is required for proper air movement.

Air Duct Method

In some installations it may be impossible to supply cooling air to every cabinet, using the raised floor as a plenum. In these cases, air may be ducted from a central source directly to the base of each cabinet. The raised floor must be of sufficient height to conceal air ducts, electrical ducts, and signal cables. It should be noted, however, that with fixed ductwork for cooling air, system expansion and layout changes will be more difficult.

Ambient or Room Method

In many cases, this method will be the simplest and most economical. Both the supply and return ducts open into the computer room, and may be installed in the ceiling. The location of the ducts will depend upon the system layout and care must be exercised so that "hotspots" do not occur. All machines must be equipped with blowers. Equipment with under floor inlets may be raised to permit room air entry.

AIR FILTER REQUIREMENTS

The air filtering system consists of the filters in the air conditioning units and the filters in the computing system cabinets. It is the principal means of removing dust and dirt particles which tend to recirculate in the atmosphere of the computer room. All filters should be checked and cleaned regularly, as discussed in the section of this manual entitled Area Cleanliness.

The filters in the air conditioning units should equal the filtering capability of the equipment filters in the computing system cabinets. In general, these should be of a type having a low pressure loss and capable of removing the larger-sized "nuisance" particles as well as an appreciable portion of the smaller particle sizes. The two general types of filters which may be used are Mechanical and Electrostatic. The specifications met by the equipment air filters are listed below:

Mechanical Filter	Efficiency of 80% with a particle size of 5 microns, as determined by discoloration test using National Bureau of Standards method with 96% Cottrell Precipitate and 4% Cotton Linters.
	Efficiency of 30% when tested by National Bureau of Standards discoloration test using atmospheric dust.

Electrostatic Filter	Efficiency of 90% at a velocity of 500 feet per minute (153 meters per minute), as determined by National Bureau of Standards Dust-Spot Method using atmospheric air without the addition of dust or contaminant.

ILLUMINATION

A minimum of 50 foot-candles (538 lux) of total illumination should be maintained in the computing area. In order to obtain better visibility of lighted indicators, excessively brilliant illumination should be avoided. Direct sunlight is not recommended.

ACOUSTICS

The principal sources of noise in the computing system are electromechanical mechanisms such as printers and card punches. These should be located in an area where a relatively high noise level is not objectionable. Although not essential for system operation, the user may consider it desirable to acoustically treat the computing area. For best results, the services of an acoustical consultant should be engaged; however, the following general points may be observed. Floors and walls should be constructed of a properly sealed material which will not transmit vibrations to other areas. Echoes and reverberating effects may be diminished by treating walls and doors with an absorbent material. In most instances, the greatest reduction in noise level can be obtained by acoustical treatment of the ceiling; in addition, it is usually fairly convenient to do this. Acoustic ceiling tile presents a neat appearance and enhances the computing area.

VIBRATION

The user should consult the Control Data representative before installing a computing system in a building or area known to be subject to vibrational or shock effects. The computing systems in the 6000 Series will withstand minor or intermittent vibrations occurring at low frequency; however, Control Data Corporation does not guarantee a vibration tolerance and each such installation must be individually inspected to certify satisfactory operation.

ALTITUDE

The equipment data sheets specify the volume of air propelled through the cabinets by the internal cabinet blowers. This figure is given under sea level conditions of pressure and air density. The cooling properties of air are directly proportional to its mass. Assuming constant temperature, the volume required to contain a given mass of air increases with altitude at a rate of approximately 33% per 10,000 feet (3048 meters). Thus, because of decreased atmospheric pressure and air density at

this altitude, the volume of air must be increased by one third to provide the same cooling as at sea level. The user should take this into account when planning his air conditioning system.

The cabinet blowers in 6000 Series systems will provide sufficient volume of air flow for satisfactory cooling under ambient pressure conditions up to an altitude of 10,000 feet (3048 meters).

LIGHTNING

In many instances, it is advisable that the user install lightning protectors in the computer power distribution system, both as a protection against damage to electronic components from power line surges, and as a fire prevention measure for the computing system and the building in which it is housed. Lightning protection is necessary if the installation is in a locality in which electrical storms are common, particularly if primary power is supplied by overhead lines.

MAGNETIC TAPE STORAGE ENVIRONMENT

In determining the layout of the computing system, the user should consider requirements for storage of magnetic tape. Steel storage bins should be provided in which the tape reels may be stored vertically with a partition between reels. Extremes of temperature and humidity should be avoided. Recommended storage conditions are:

40% to 50% relative humidity
62° F to 78° F (16.7° C to 25.5° C) temperature.

If environmental extremes should occur, the tape should be brought to ambient conditions before use. The time required for tape reconditioning will usually vary from 4 to 16 hours, depending upon conditions to which it was subjected. Direct heat, such as lamps or heating coils, should not be used to "warm up" a tape. Fewer errors will occur if the tape storage area is maintained at the same temperature and humidity as the computing area.

The reels of tape should be stored in self-sealing cases for protection from dust and sharp environmental changes. It is recommended that tape be rewound once or twice a year, in order to release stresses due to expansion or contraction.

Tape should not come in contact with any magnetic material, and reels should not be stored in a cabinet having magnetic catches. Any magnetic field intensity greater than approximately 70 oersteds can cause loss of information.

AREA CLEANLINESS

The principal function of the air filters in the computing system cabinets is to capture dust which may be circulating in the room atmosphere. The equipment air filters in the computing system cabinets should be cleaned approximately once a week. It is suggested that the filters in the air conditioning units be cleaned on a similar schedule.

When an underfloor plenum system is used to cool the computer cabinets, some dust may originate beneath the raised floor. This is produced chiefly by deterioration effects of the normal room floor, and may be held to a minimum if the floor is properly conditioned. In particular, if the normal room floor is of concrete, it should be sealed and treated to prevent "dusting".

All paper-handling equipment is subject to varying amounts of static charge which attracts dust particles and tobacco ash. Also, static build-up on magnetic tape handlers will attract small particles. For this reason, smoking should not be permitted in the computer area.

Most raised floors are not water-tight and if an open or non-waterproof raceway is used beneath them, wet mopping of the floor may result in a serious shock hazard to cleaning personnel. It is recommended that suitable precautions be taken to protect all underfloor wiring. If this is not possible, a waterless cleaner should be used on the floor, although cleaners of this type have been found to produce a certain amount of dust.

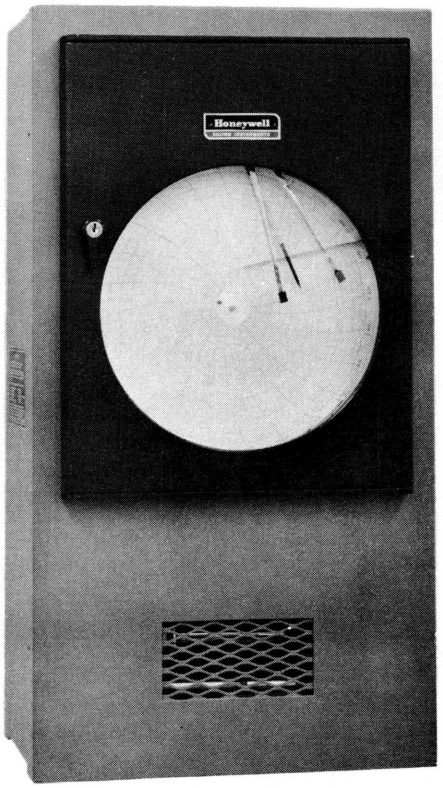
FIRE PRECAUTIONS

All printed circuit cards used in the computing system are manufactured from flame-retarding material. This material is self-extinguishing and represents a minimal fire hazard. For this reason, inclusion of CO_2 fire extinguishing equipment within computer cabinets is of little merit and is not recommended. Accidental discharge of quantities of CO_2 into a computer at operating temperature will usually destroy all electronic components, necessitating replacement of the system. Damage by CO_2 or other installed fire extinguishing equipment is not covered by the product warranty.

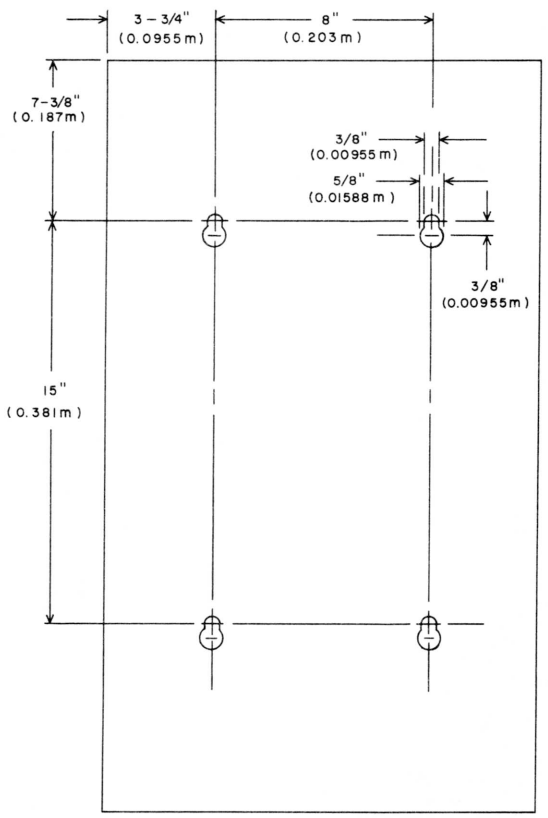
Normal fire precautions should be observed within the computer area with an adequate supply of fire extinguishing equipment available near combustible items such as magnetic tape, tabulating cards, and paper tape. The supply of paper in the computing area should be limited to that required for efficient operation. All other paper should be stored in a separate area. Waste paper should not be allowed to accumulate and should be collected in metal baskets.

The building in which the computing area is located should conform to local codes and insurance regulations regarding protective devices such as automatic sprinkling systems and emergency exit doors.

EQUIPMENT DATA SHEETS



DEW POINT RECORDER



WALL MOUNTING DIMENSIONS

DEW POINT RECORDER

Height	29-3/4 inches (0.755 meter)
Width	15-1/2 inches (0.394 meter)
Depth	7-1/2 inches (0.19 meter)
Maximum depth, door open	20 inches (0.58 meter)
Weight	66.5 lbs (30.2 Kg)

POWER, SWITCHGEAR, AND CONVERTER SPECIFICATIONS

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EQUIPMENT DATA SHEETS

TEMPLATES

POWER, SWITCHGEAR, AND CONVERTER SPECIFICATIONS

ELECTRICAL POWER

Control Data 6000 Series Computer Systems are available for operation on both 50-cycle and 60-cycle electrical power. For the basic electronic modules, this power is converted by a motor-generator set to 400-cycle frequency. This section contains a brief discussion of input power specifications, switchgear and frequency converters. A more detailed discussion may be found in Control Data Corporation Engineering Specification 118102, available from Installation Engineering, Computer Division.

System electrical schematics for each system in the 6000 Series will be printed at a later date for inclusion in the respective section of this manual. Schematics of individual cabinets are available upon request.

The power requirements are as follows:

1) 50/60-cycle, single-phase, 115 ± 10 vac. This provides power to each cabinet for blowers and utility outlets.

2) 400-cycle, 3-phase, 208 vac, 4-wire. This is produced by a motor generator frequency converter and provides primary power for the d-c supplies. The motor generator frequency converter requires 3-phase, 3- or 4-wire, 50/60-cycle power, at a line-to-line voltage of either 208, 220, or 440 vac. Design center motor voltage is either 220 or 440 vac, with a voltage tolerance of 10% and a frequency tolerance of 5%.

3) Peripheral equipment will require either 50/60 cycle, 3-phase, 4-wire, Y-connected, 208 ± 20 vac; or 50/60 cycle, single-phase, 115 ± 10 vac.

4) Earth ground. Each cabinet is provided with two grounding lugs, and should be connected to earth ground using either insulated or bare AWG #8 wire (8.37 sq. mm.). The cabinets should be connected together in series with one end brought out to ground, but at no point should the ground connection form a closed loop.

FREQUENCY CONVERTER (MG SET)

Each MG set is a brushless frequency converter consisting of a 50/60-cycle 3-phase induction motor driving an integral 400-cycle 3-phase generator. The motor is a standard NEMA Design B squirrel cage induction motor. The generator is a salient pole, rotating field synchronous machine with a 3-phase a-c exciter. A 3-phase rectifying circuit, mounted on the converter shaft, rectifies the output of the a-c exciter and supplies d-c to the generator field. To ensure proper alignment, the motor and generator stators are mounted in a common frame and the rotors are mounted directly on the same shaft. When being used separately, the MG set may be installed on any flat surface capable of supporting the weight, and it is not necessary to bolt the unit to the floor. The wires carrying the 400-cycle power from the MG set to the distribution panel should be sized to allow no more than a 2% voltage drop over the entire length of the run.

POWER DISTRIBUTION

Power distribution is designed for ease of installation and convenience of use. Each cabinet has terminal strips and/or junction boxes which are used for all power connections. The terminal strips and internal wiring conform to the National Electrical Code.

The user must supply and install all circuit breakers, panels, disconnects, ductwork, magnetic contactors, and all power cabling, including cabling required for signal cable terminator power distribution. The MG set contains its own internal overload protection; however, the user must supply main line disconnects in accordance with local codes. Power cables must extend 18 inches (0.457 meter) above the raised floor at the terminating point in each electronics cabinet, and must extend 36 inches (0.914 meter) above the raised floor at each peripheral equipment. Insulation should be stripped back 6 inches (0.15 meter) on the cables and 1/2 inch (0.0127 meter) on individual wires. The cabinets will accept either rigid or flexible conduit or flexible cable. If permitted by local codes, Control Data Corporation personnel will connect the cables to the cabinet terminals during installation.

PHASE ROTATION

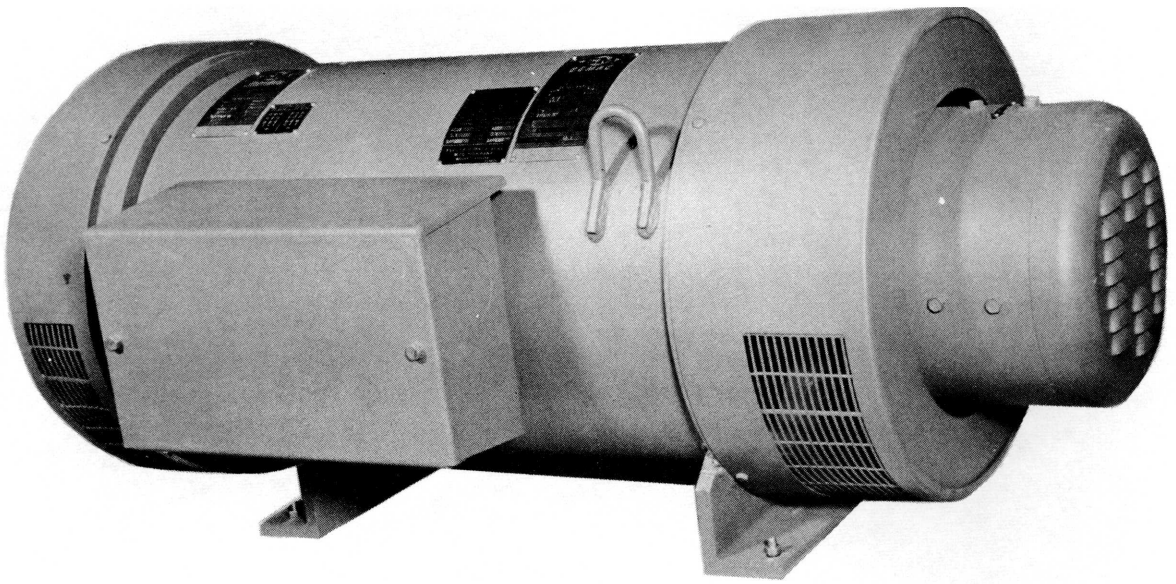
The receptacles used to connect the MG set and the various 3-phase peripheral equipments to the primary source of 50/60-cycle, 3-phase, 4-wire power must be wired for proper phase rotation. When viewing the front of the receptacle, the sequence is Phase A, Phase B, Phase C (in a clockwise direction). The wiring conforms to the National Electrical Code, and the wires are coded as follows:

Black	Phase A (or X)
Yellow or Orange	Phase B (or Y)
Red	Phase C (or Z)
White	Neutral
Green	Ground

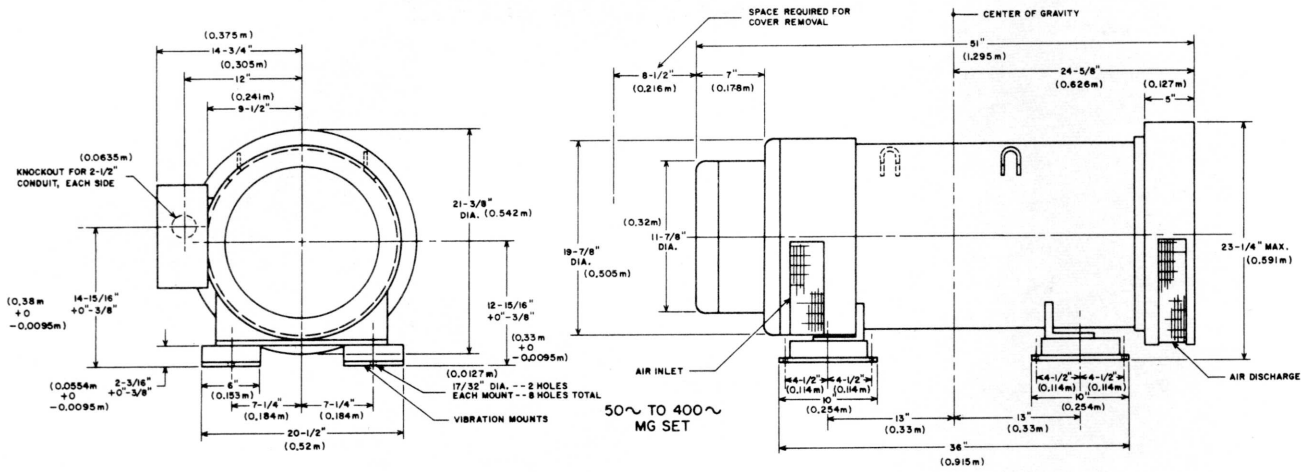
(Equipments of other manufacturers may employ non-code phase rotation.)

The wires distributing the 400-cycle, 3-phase, 208 vac from the MG set need not be connected in sequence, because 400-cycle power is used only to energize d-c supplies and phase rotation is not important.

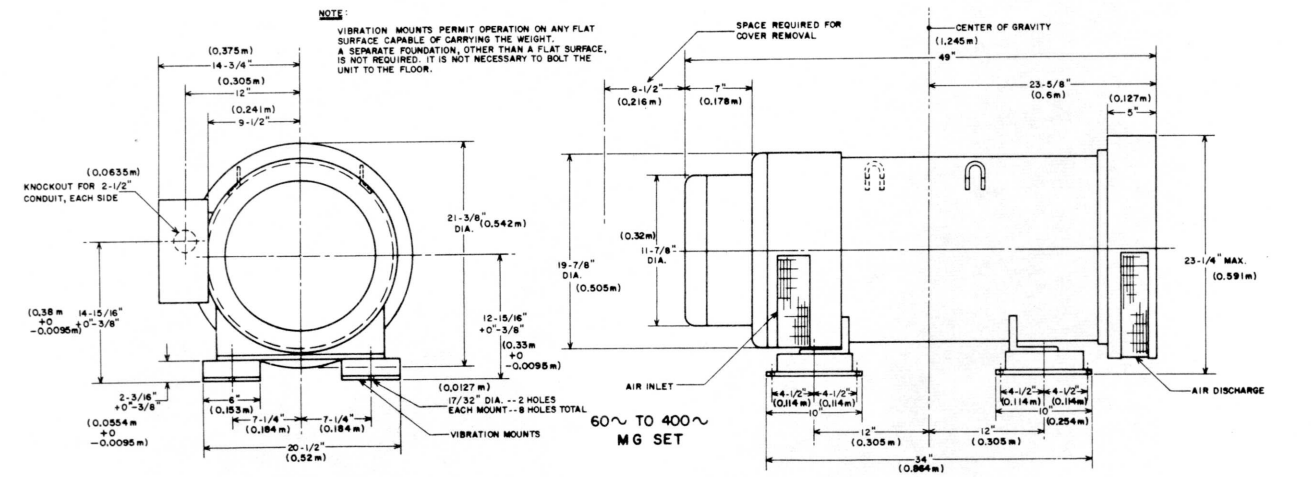
EQUIPMENT DATA SHEETS



20 KVA MG SET



MG Set, 50~ to 400~

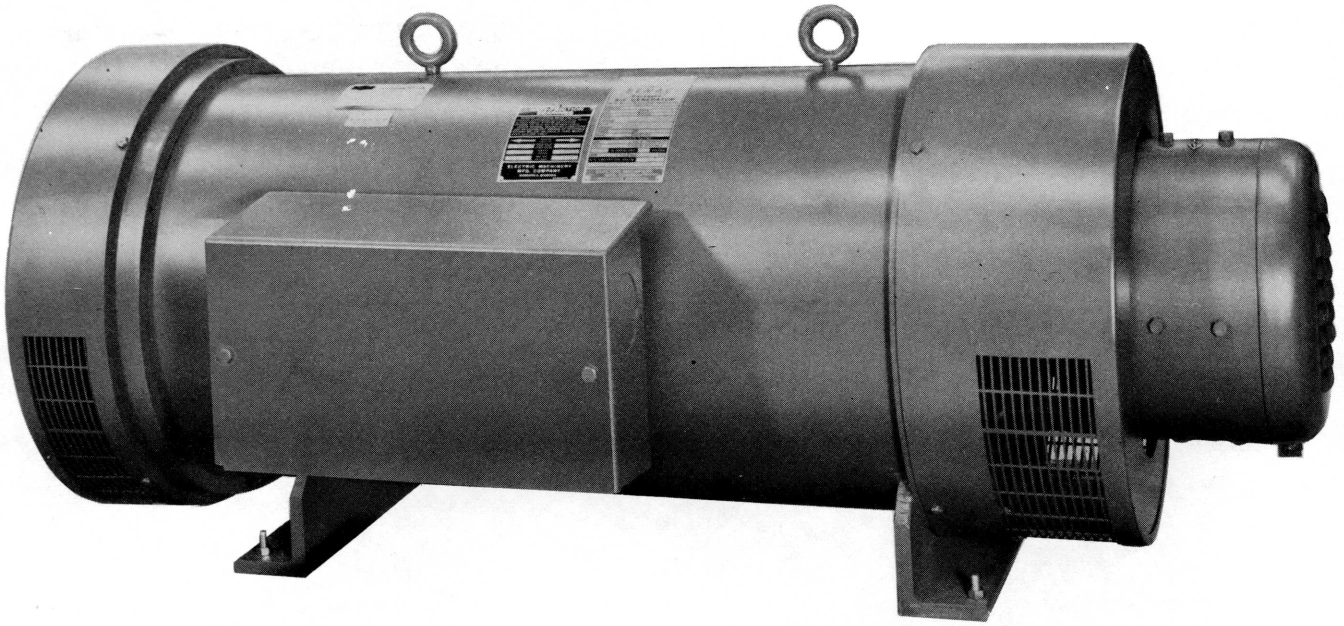


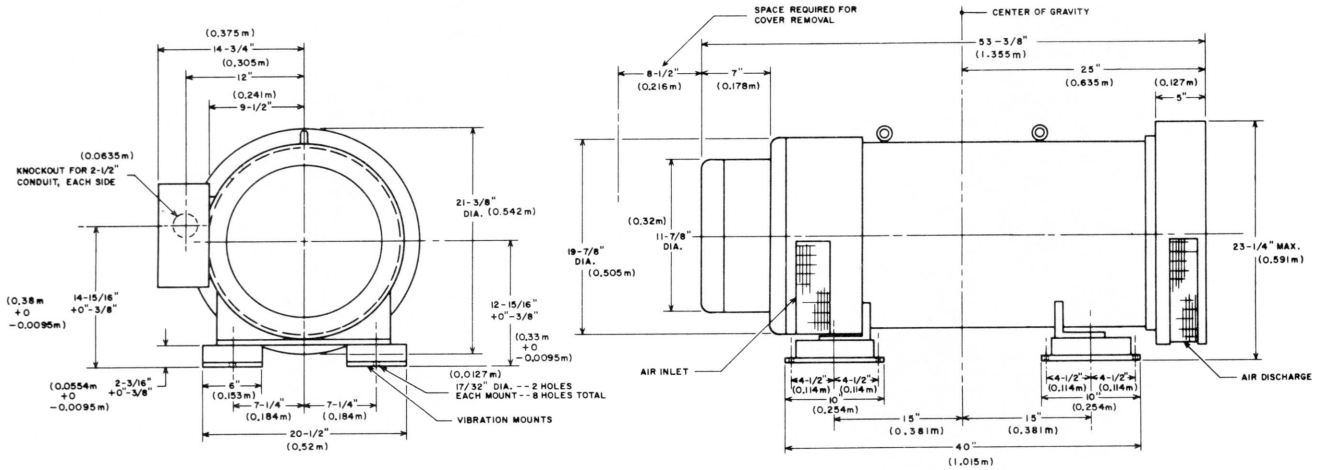
MG Set, 60~ to 400~

20 KVA MG SET

Height		23 1/4 inches (0.59 meter)
Depth		24 5/8 inches (0.625 meter)
Heat		15,000 BTU/hr (3780 kg-cal/hr)
Breaker size, 50/60 cycle, 208 volt, three phase		125A
Air required at inlet		675 CFM (1150 m^3/hr)
Source of cooling air		room
Motor power rating		30 horsepower (22.4 kilowatts)
Generator output rating		20 KVA (16 kilowatts)
	50~ to 400~	60~ to 400~
Weight	1350 lbs (612 kg)	1200 lbs (544 kg)
Width	51 inches (1.295 meters)	49 inches (1.245 meters)

(Allow 8-1/2 inches, 0.216 meter, for cover removal.)

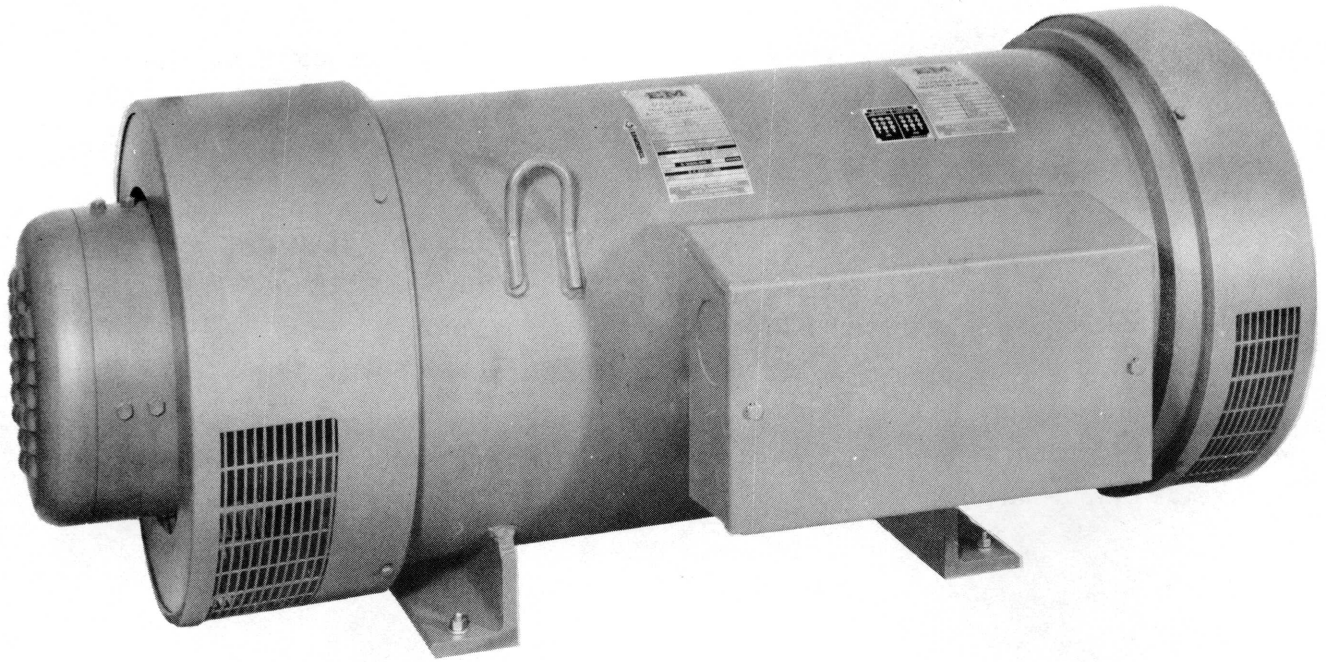


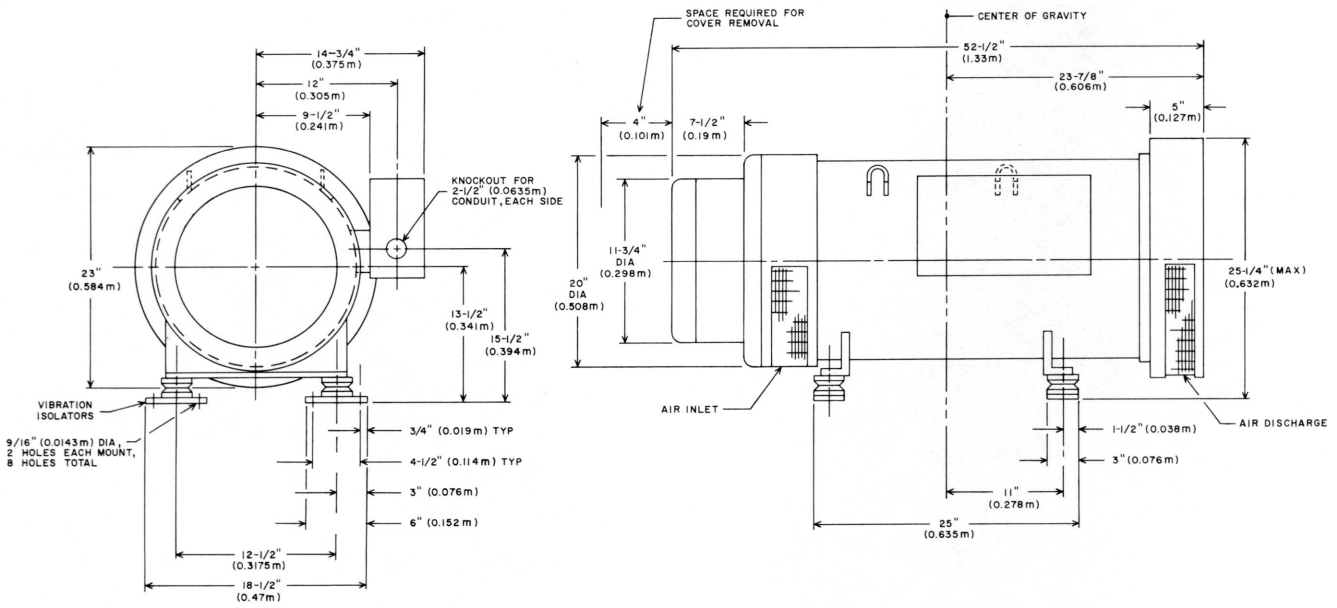

(0.375m)
14-3/4"
(0.305m)
12"
(0.241m)
9-1/2"
(0.0635m)
KNOCKOUT FOR 2-1/2" CONDUIT, EACH SIDE
21-3/8" DIA. (0.542m)
(0.38m +0 -0.0095m)
14-15/16" +0"-3/8"
12-15/16" +0"-3/8"
(0.33m +0 -0.0095m)
(0.0127m)
(0.0554m +0 -0.0095m)
2-3/16" +0"-3/8"
5" (0.153m)
7-1/4" (0.184m)
7-1/4" (0.184m)
17/32" DIA. - - 2 HOLES EACH MOUNT - - 8 HOLES TOTAL
VIBRATION MOUNTS
20-1/2" (0.52m)
SPACE REQUIRED FOR COVER REMOVAL
CENTER OF GRAVITY
53-3/8" (1.355m)
8-1/2" (0.216m)
7" (0.178m)
25" (0.635m)
(0.127m)
5"
(0.32m)
11-7/8" DIA.
19-7/8" DIA. (0.505m)
23-1/4" MAX. (0.591m)
AIR INLET
AIR DISCHARGE
4-1/2" (0.114m)
4-1/2" (0.114m)
10" (0.254m)
15" (0.381m)
15" (0.381m)
4-1/2" (0.114m)
4-1/2" (0.114m)
10" (0.254m)
40" (1.015m)

30 KVA MG SET

30 KVA MG SET
60~ to 400 ~

Height	23 1/4 inches (0.59 meter)
Depth	24 5/8 inches (0.625 meter)
Width (allow 8 1/2 inches, 0.216 meter, for cover removal)	53 3/8 inches (1.355 meters)
Weight	1300 lbs. (590 kg)
Heat	30,600 BTU/hr (7710 kg-cal/hr)
Breaker size, 60 cycle, 208 volt, three phase	200 A
Air required at inlet	750 CFM (1275 m^3/hr)
Source of cooling air	room
Motor power rating	50 horsepower (37.2 kilowatts)
Generator output rating	30 KVA (27 kilowatts)



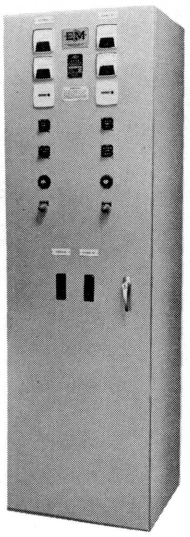


50 KVA MG SET (60~ to 400~)

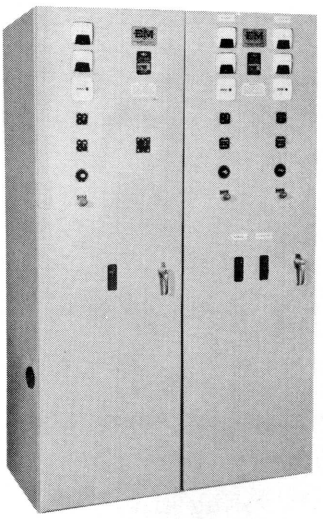
50 KVA MG SET

60~ to 400~

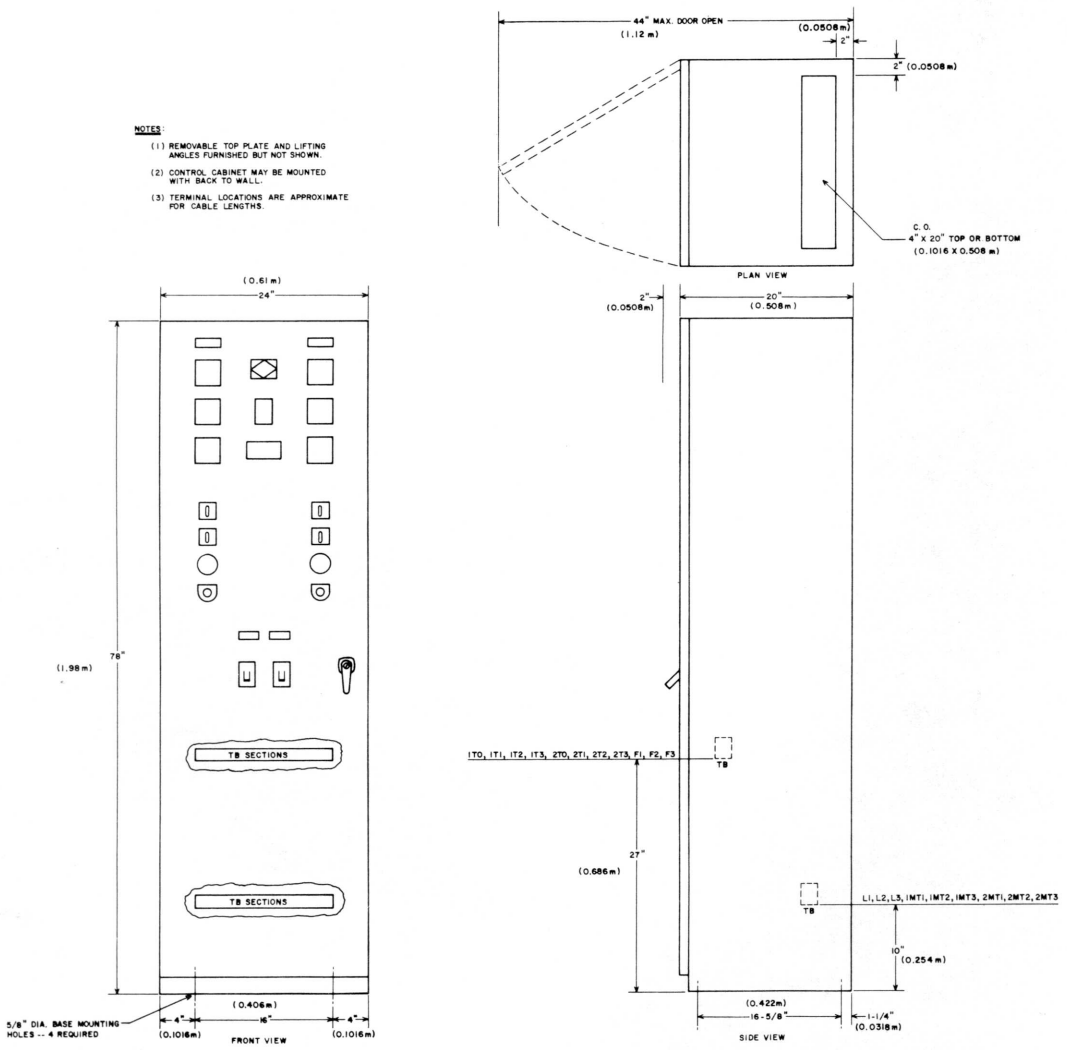
Height	25 1/4 inches (0.485 meter)
Depth	26 1/4 inches (0.502 meter)
Width	52 1/2 inches (1.335 meters)
(allow 4 inches, 0.1017 meter, for cover removal)	
Weight	1700 lbs (770 kg)
Heat	41,000 BTU/hr (kg-cal/hr)
Breaker size, 60 cycle, 208 volt, three phase	225A
Air required at inlet	875 CFM (1485 m^3/hr)
Source of cooling air	room
Motor power rating	60 horsepower (44.7 kilowatts)
Generator output rating	50 KVA (40 kilowatts)



Control Cabinet for 2 MG Sets



Control Cabinet for 3 MG Sets

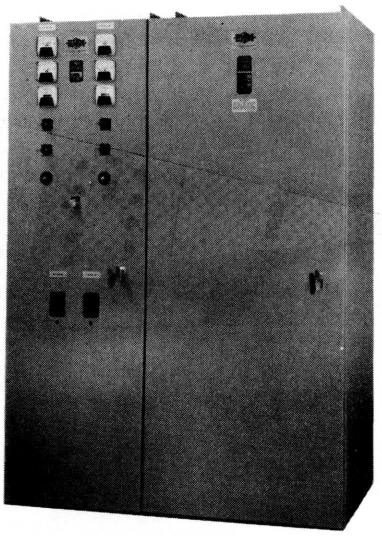


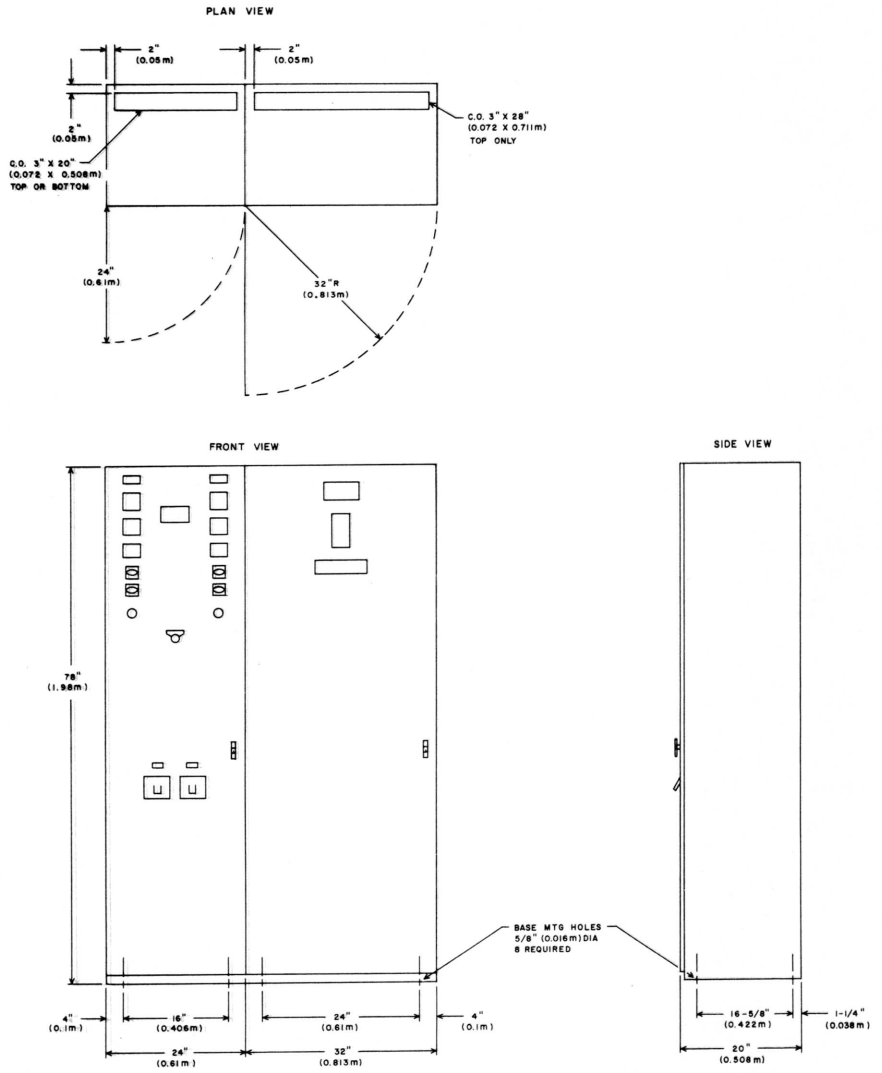
CONTROL CABINET FOR 20 KVA AND 30 KVA MG SETS

CONTROL CABINET

FOR 20 KVA & 30 KVA MG SETS

Width	24 inches (0.61 meter)
Depth	20 inches (0.508 meter)
Maximum depth, door open	44 inches (1.12 meters)
Height	78 inches (1.98 meters)
Weight, each cabinet	430 lbs (195 kg)





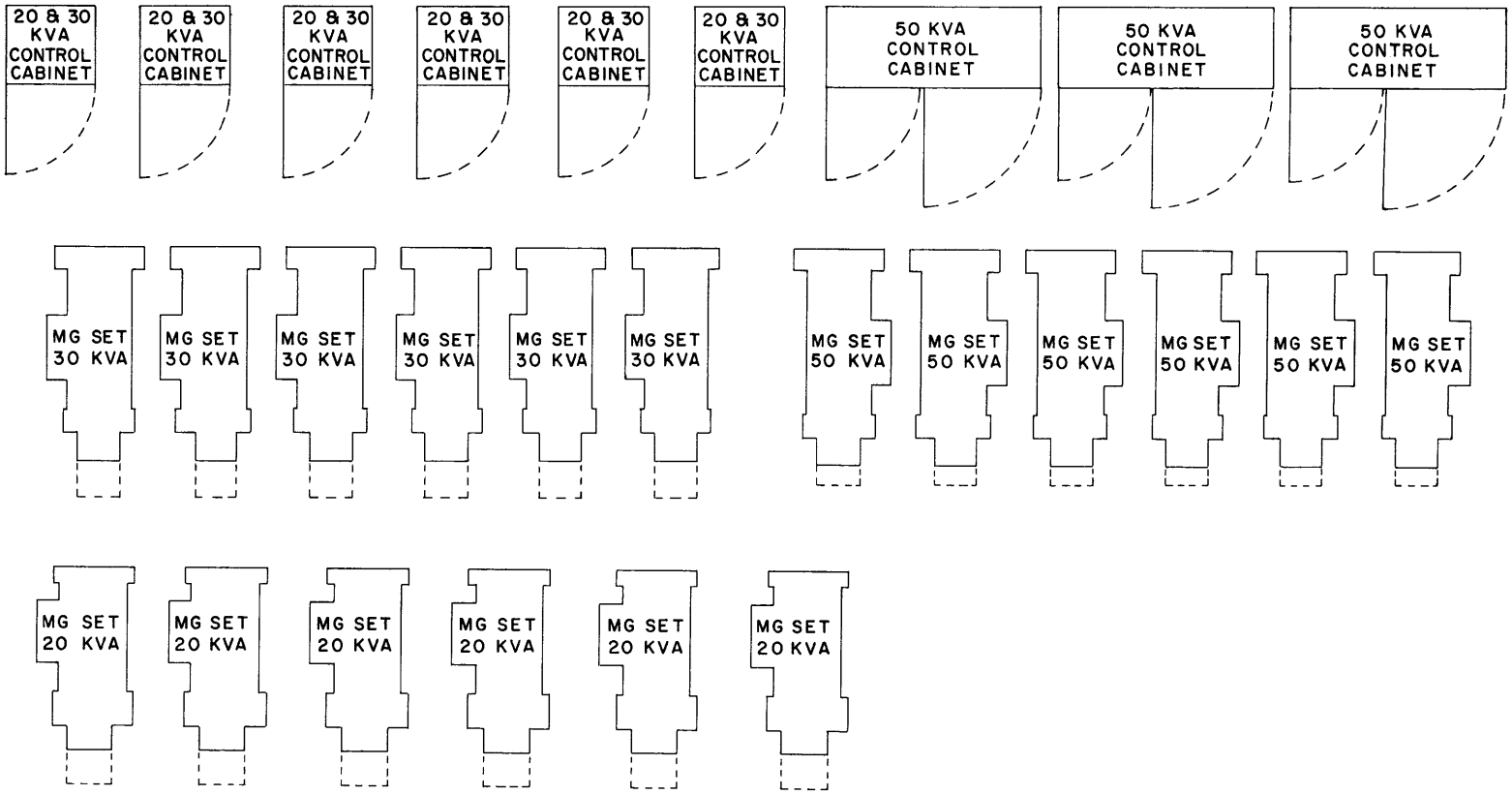
CONTROL CABINET FOR 50 KVA MG SETS

CONTROL CABINET

FOR 50 KVA MG SETS

Width	56 inches (1.42 meters)
Depth	20 inches (0.508 meter)
Maximum depth, doors open	52 inches (1.32 meters)
Height	78 inches (1.98 meters)
Weight	2200 lbs (998 kg)

TEMPLATES


20 & 30 KVA CONTROL CABINET
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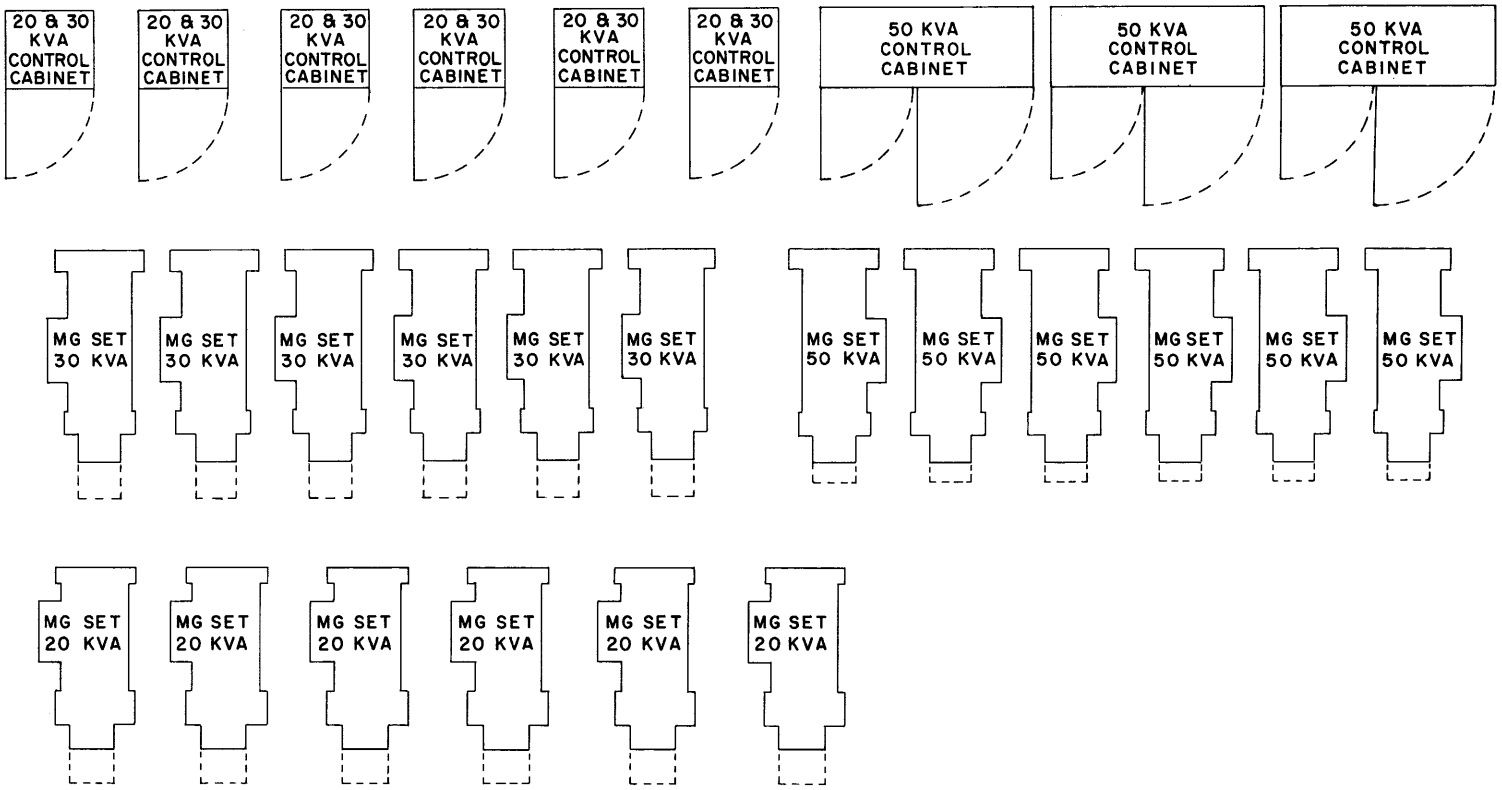
Scale: 1/4" = 1 ft.


20 & 30 KVA CONTROL CABINET
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MG SET 20 KVA

Scale: 2 cm = 1m.

CONTROL DATA 6400 SYSTEM SPECIFICATIONS

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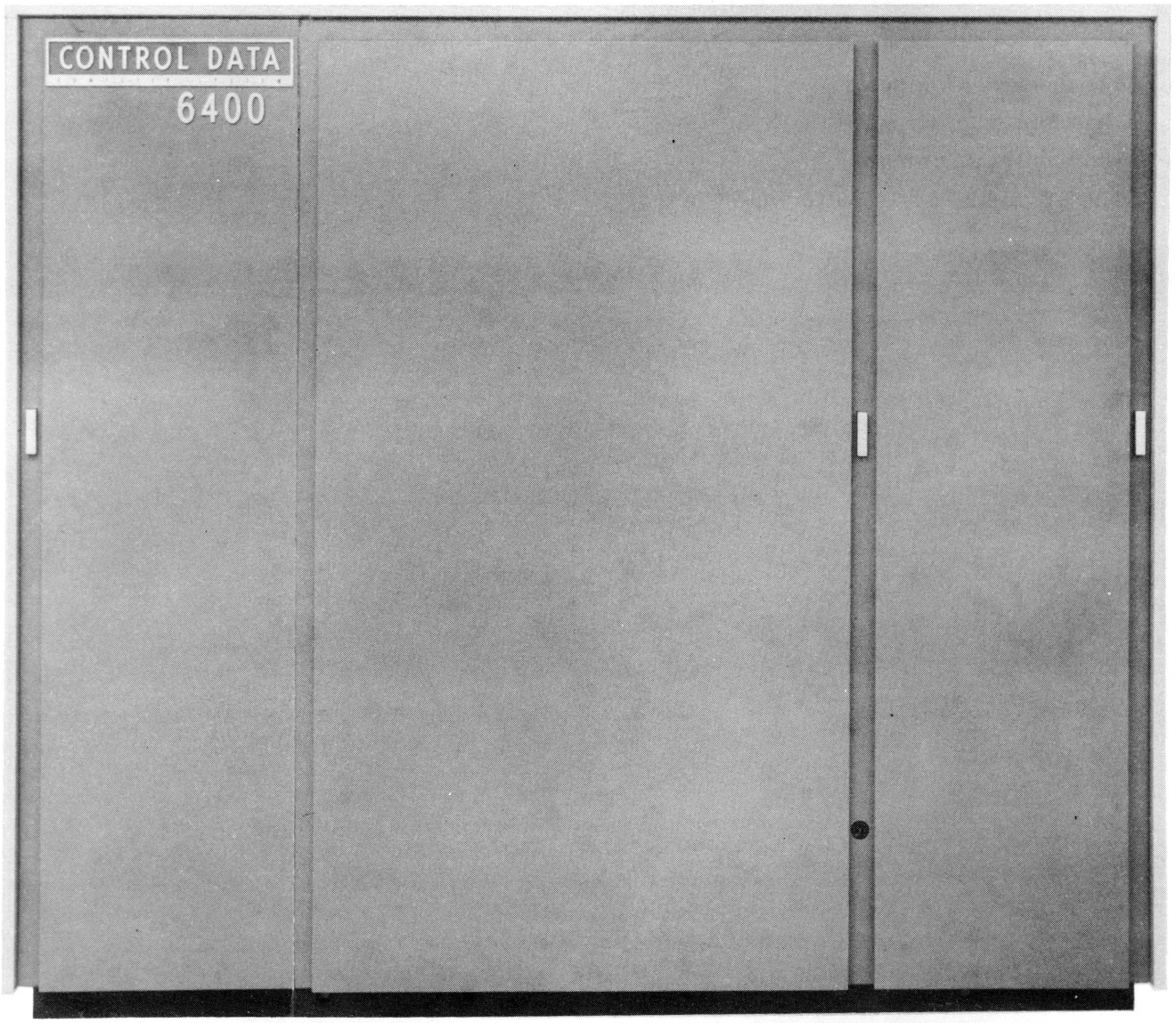

CONTROL DATA
6400

CONTROL DATA 6400 SYSTEM SPECIFICATIONS

CABINETS

The basic electronic portion of a 6400 System is housed in cabinets of the type shown. The central computer is housed in a cabinet consisting of up to 3 sections, or "bays", joined at the center. Other equipment such as the Model 6411 Augmented I/O Buffer and Control is installed in a single-bay cabinet which may be separate from the central computer cabinet.

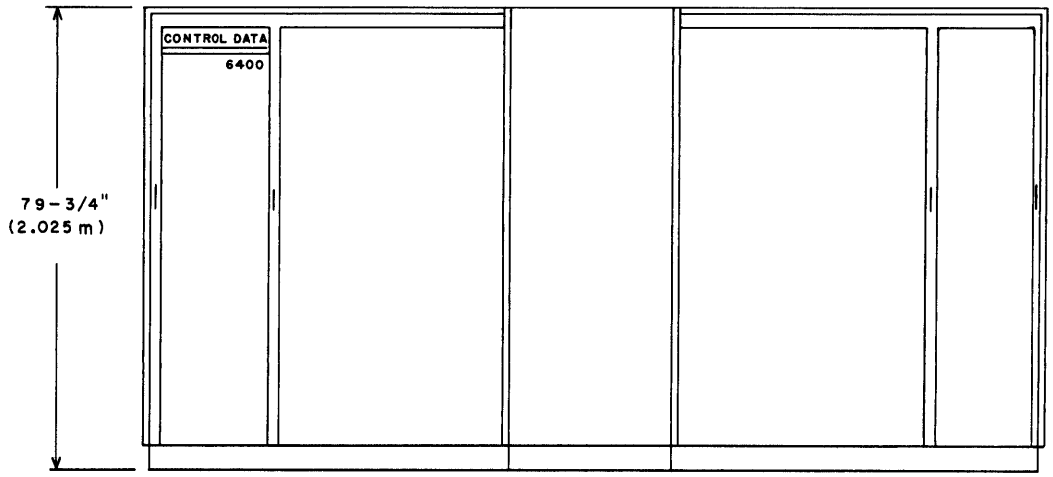
Each bay contains up to 4 chassis of logic circuits, memories, and other electronic components. The chassis are hinged at the end toward the center of the cabinet complex and may be swung out for servicing. In addition, each bay contains power supplies and a refrigeration system for the chassis which it houses. A floor cut-out is required beneath each bay to allow for passage of power cabling and water supply connections.

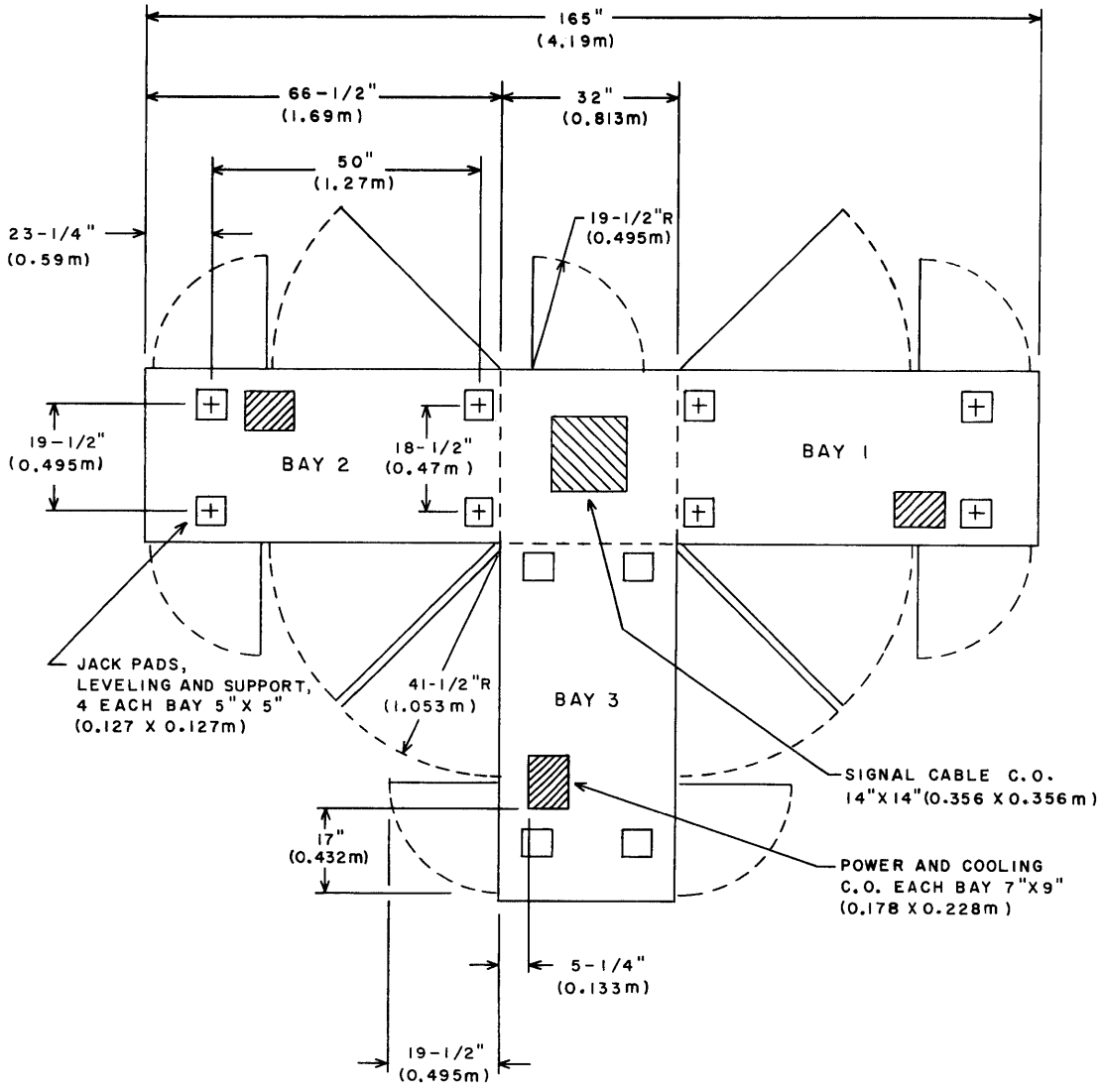
All signal and logic cable connections are made at the center area of the cabinet complex. A floor cut-out is required beneath the central area for signal cables to peripheral equipment. A filler panel with an access door is provided for central computer cabinets having only two bays. A complete end enclosure with an access door on each side is included for single-bay cabinets installed separately.

TABLE 1. EQUIPMENT DESCRIPTIONS

MODEL NO.	DESCRIPTION	CABINET
6401	CENTRAL COMPUTER with 131, 072 words of magnetic core storage, 10 peripheral and control processors with storage. Power and cooling apparatus included.	Bays 1, 2, & 3
6404	CENTRAL COMPUTER with 65, 536 words of magnetic core storage, 10 peripheral and control processors with storage. Power and cooling apparatus included.	Bays 1 & 2
6405	CENTRAL COMPUTER with 32, 768 words of magnetic core storage, 10 peripheral and control processors with storage. Power and cooling apparatus included.	Bays 1 & 2
6410	ADDITIONAL CENTRAL PROCESSOR includes arithmetic and control functions of the 6400 and may be added to a 6401, 6404 or 6405 to provide increased processing capability. One 6410 may be added to a 6400 Central Computer.	Mounts in central computer cabinet
6411	AUGMENTED I/O BUFFER AND CONTROL includes 16, 384 words (60 bit) of storage and 10 peripheral and control processors with storage. Communicates with central computer via standard channel.	Occupies a single-bay cabinet

EQUIPMENT DATA SHEETS





6401 CENTRAL COMPUTER

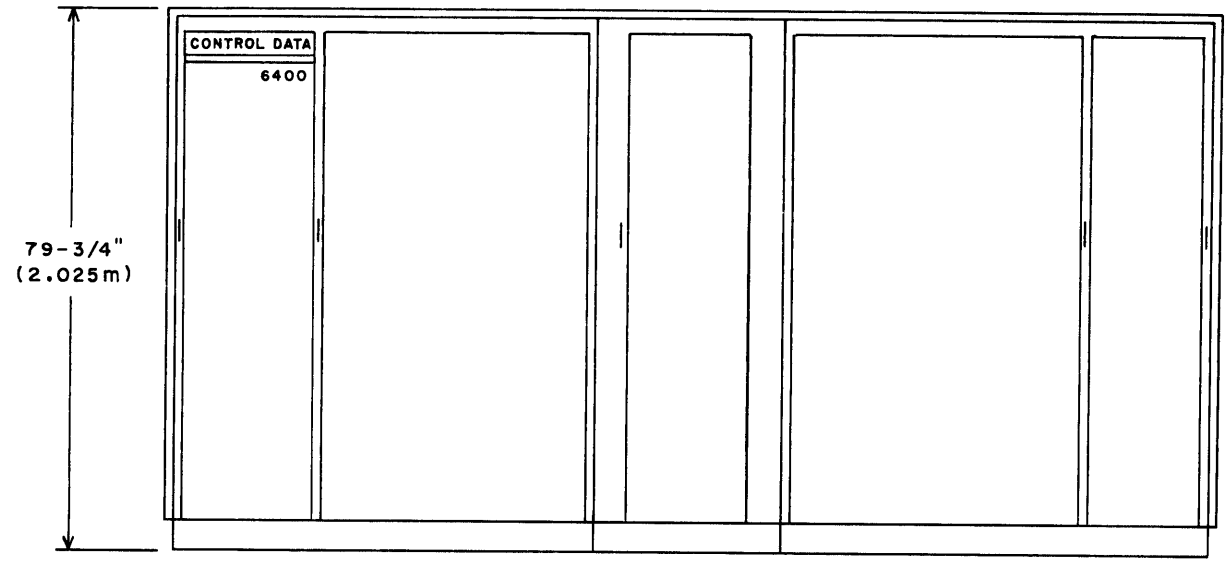
6401 CENTRAL COMPUTER

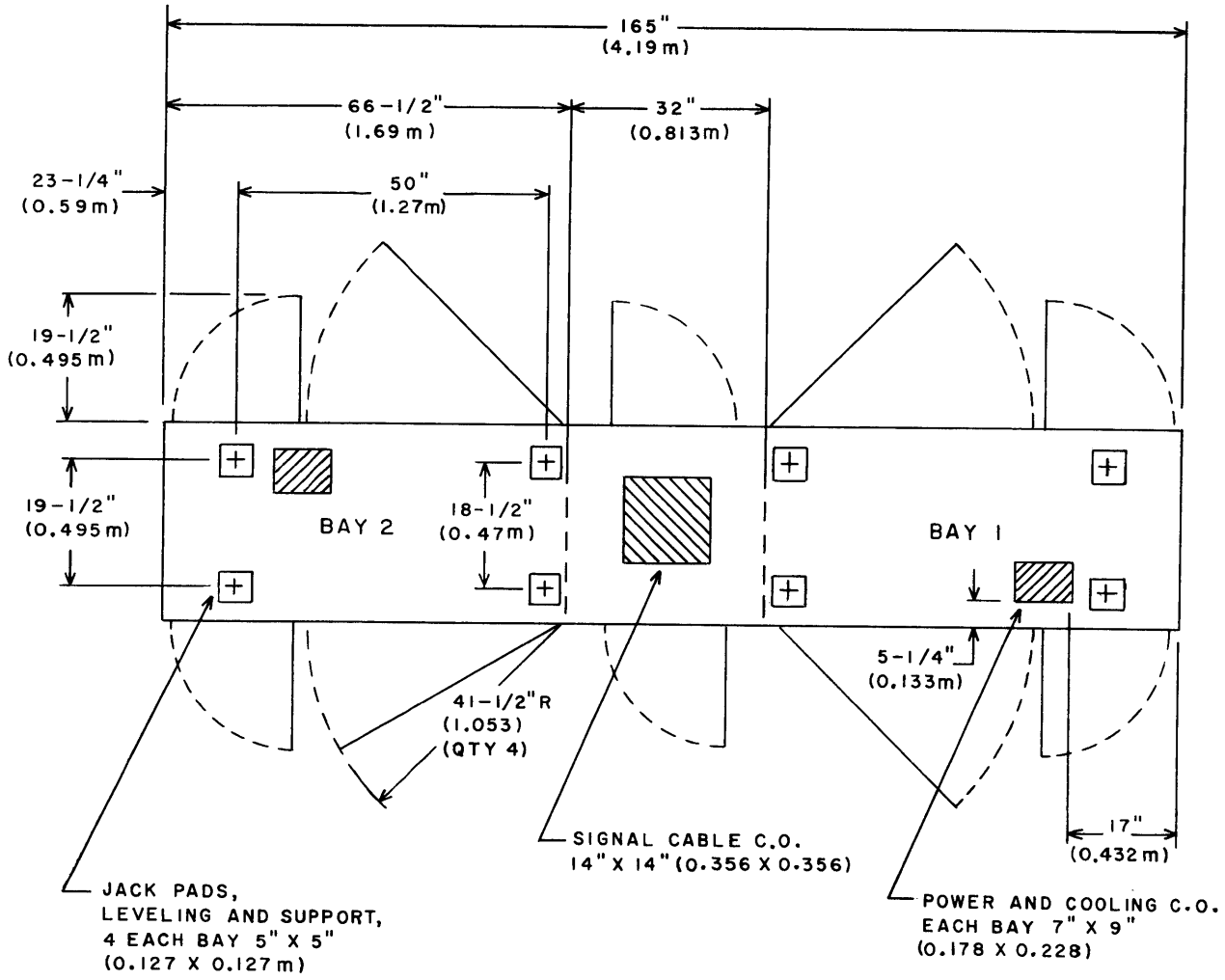
Height	79 3/4 inches (2.025 meters)
Width	165 inches (4.19 meters)
Depth	98 1/2 inches (2.5 meters)
Maximum depth, including all access doors extended	140 inches (3.555 meters)
Weight	11,400 lbs (5,260 kg)
Heat	95,400 BTU/hr (25,000 kg-cal/hr)

Water Flow and Temperature Requirements

Temperature		Flow per Minute	
Fahrenheit	Centigrade	Gallons	Liters
80°	27°	12.9	48.75
70°	21°	7.5	28.5
60°	16°	6.22	23.25

Electrical Power	KVA	Line Current	Breaker Size
400 cycle, 208 volt, three phase	21.75	60.2 amperes	30A (3 required)
50/60 cycle, 208 volt, three phase	6.22	17.3 amperes	15A (3 required)





6404 CENTRAL COMPUTER

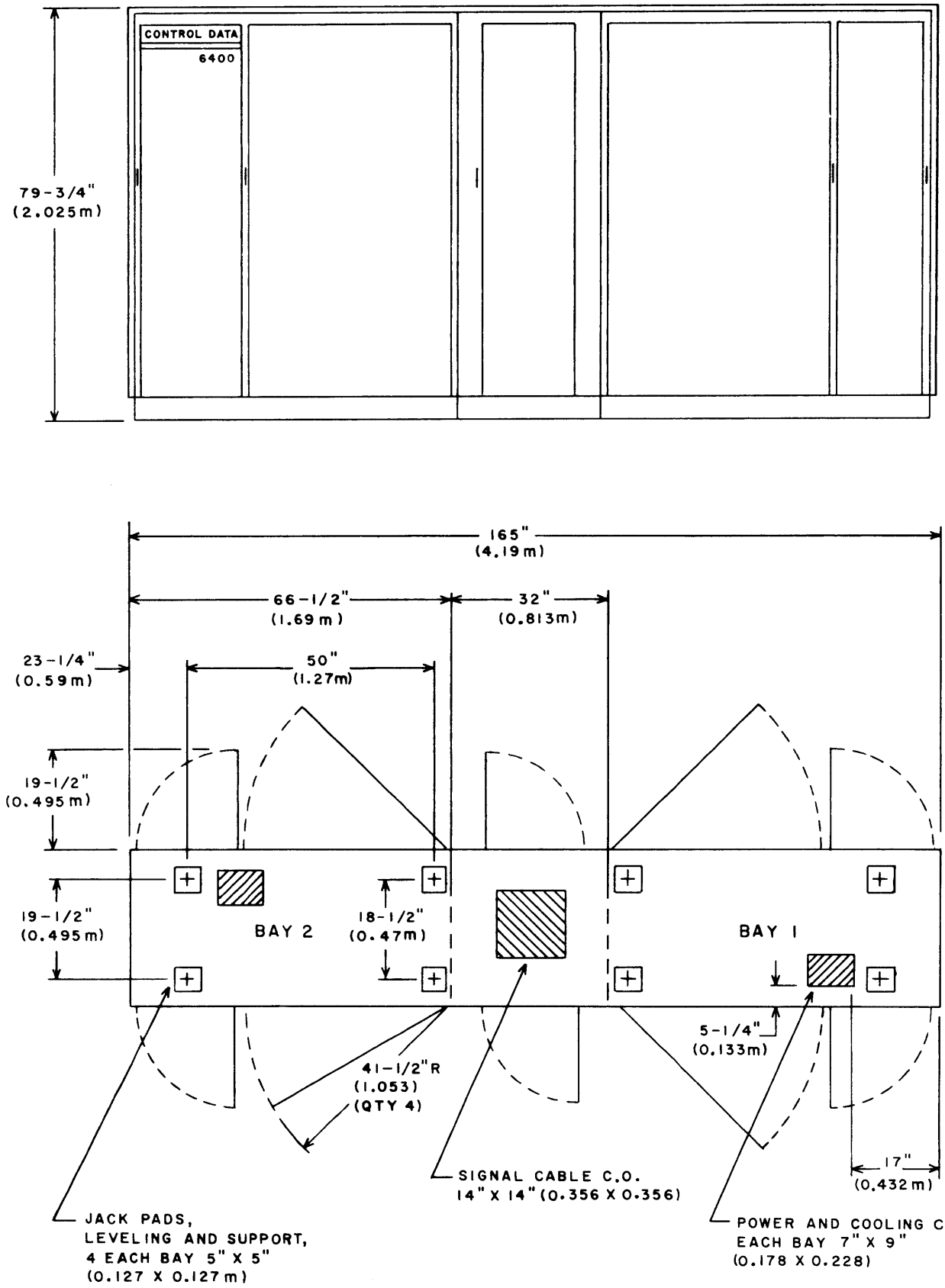
6404 CENTRAL COMPUTER

Height	79 3/4 inches (2.025 meters)
Width	165 inches (4.19 meters)
Depth	32 inches (0.813 meter)
Maximum depth, including all access doors extended	115 inches (2.82 meters)
Weight	7,800 lbs (3,540 kg)
Heat	69,250 BTU/hr (17,200 kg-cal/hr)

Water Flow and Temperature Requirements

Temperature		Flow per Minute	
Fahrenheit	Centigrade	Gallons	Liters
80°	27°	8.6	32.5
70°	21°	5.0	19.0
60°	16°	4.15	15.5

Electrical Power	KVA	Line Current	Breaker Size
400 cycle, 208 volt, three phase	14.5	40 amperes	30A (2 required)
50/60 cycle, 208 volt, three phase	4.15	11.5 amperes	15A (2 required)



6405 CENTRAL COMPUTER

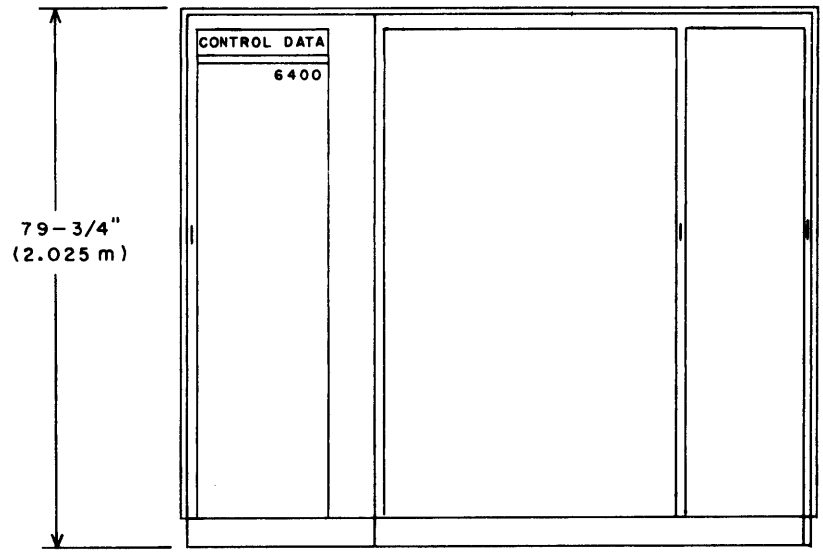
6405 CENTRAL COMPUTER

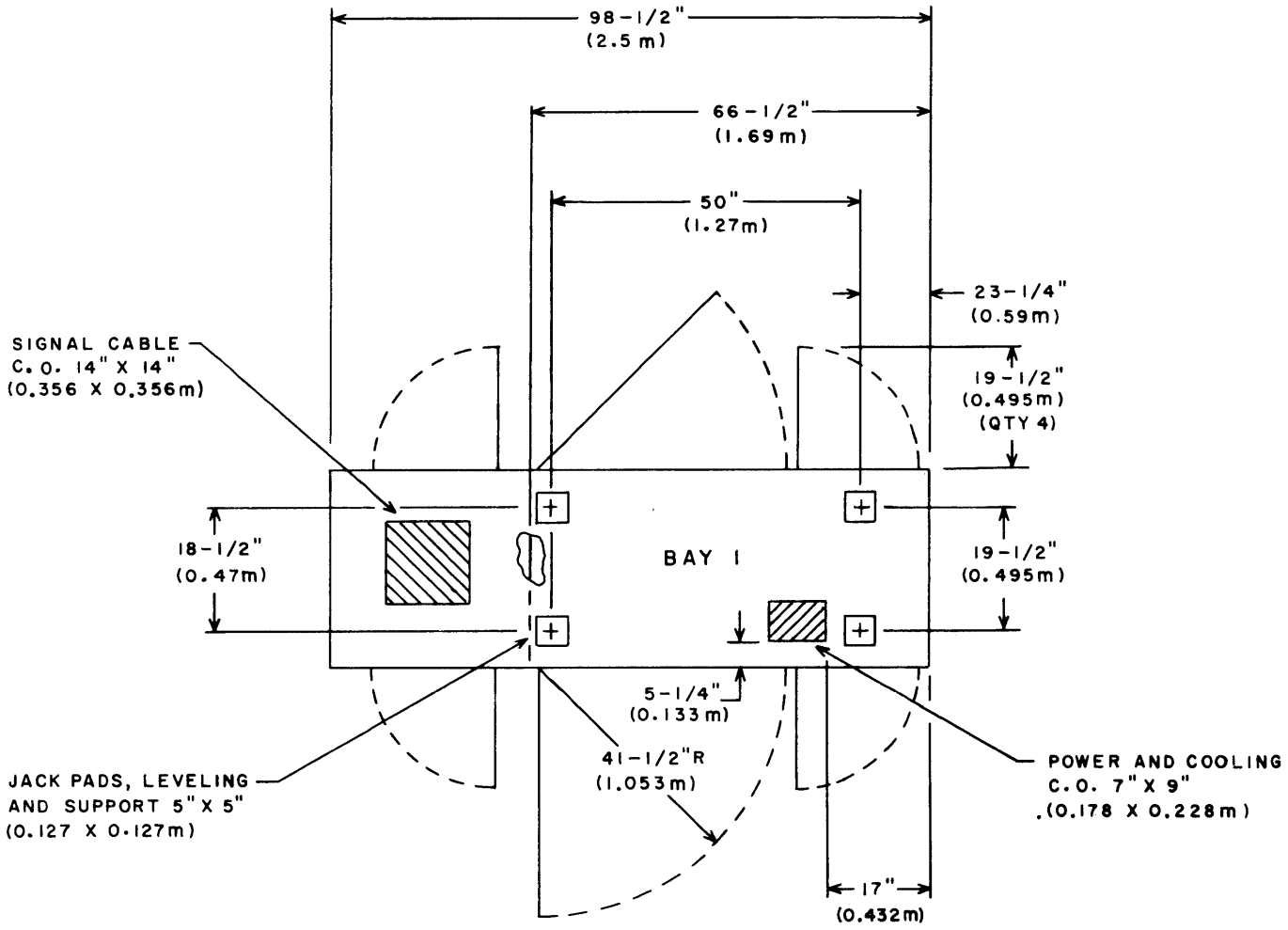
Height	79 3/4 inches (2.025 meters)
Width	165 inches (4.19 meters)
Depth	32 inches (0.813 meter)
Maximum depth, including all access doors extended	115 inches (2.82 meters)
Weight	7,800 lbs (3,540 kg)
Heat	69,250 BTU/hr (17,200 kg-cal/hr)

Water Flow and Temperature Requirements

Temperature		Flow per Minute	
Fahrenheit	Centigrade	Gallons	Liters
80°	27°	8.6	32.5
70°	21°	5.0	19.0
60°	16°	4.15	15.5

Electrical Power	KVA	Line Current	Breaker Size
400 cycle, 208 volt, three phase	14.5	40 amperes	30A (2 required)
50/60 cycle, 208 volt, three phase	4.15	11.5 amperes	15A (2 required)





6411 AUGMENTED I/O BUFFER AND CONTROL

6411 AUGMENTED I/O BUFFER AND CONTROL

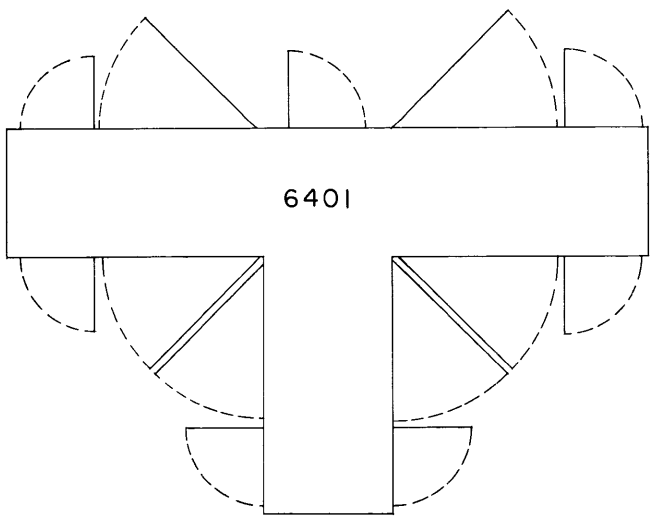
Height	79 3/4 inches (2.025 meters)
Width	98 1/2 inches (2.5 meters)
Depth	32 inches (0.813 meter)
Maximum depth, including all access doors extended	115 inches (2.82 meters)
Weight	4,200 lbs. (1,905 kg)
Heat	31,400 BTU/hr (7,910 kg-cal/hr)

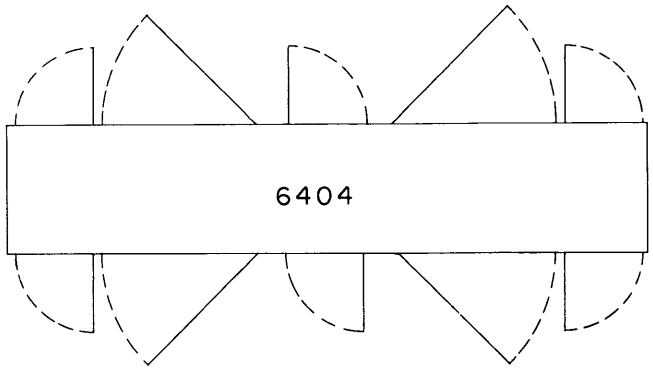
Water Flow and Temperature Requirements

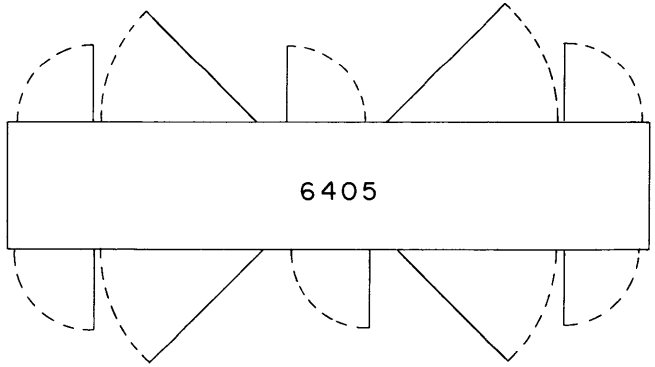
Temperature		Flow per Minute	
Fahrenheit	Centigrade	Gallons	Liters
80°	27°	4.3	16.25
70°	21°	2.5	9.5
60°	16°	2.06	7.75

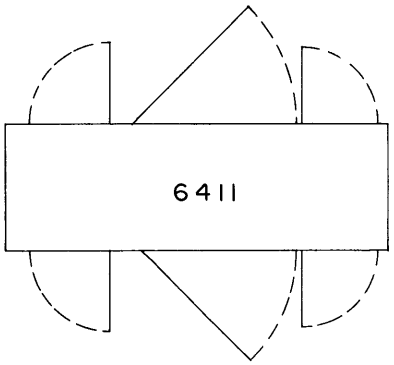
Electrical Power	KVA	Line Current	Breaker Size
400 cycle, 208 volt, three phase	7.25	20 amperes	30A
50/60 cycle, 208 volt, three phase	2.06	5.5 amperes	15A

TEMPLATES









Scale: 1/4" = 1 ft.

CONTROL DATA 6600 SYSTEM SPECIFICATIONS

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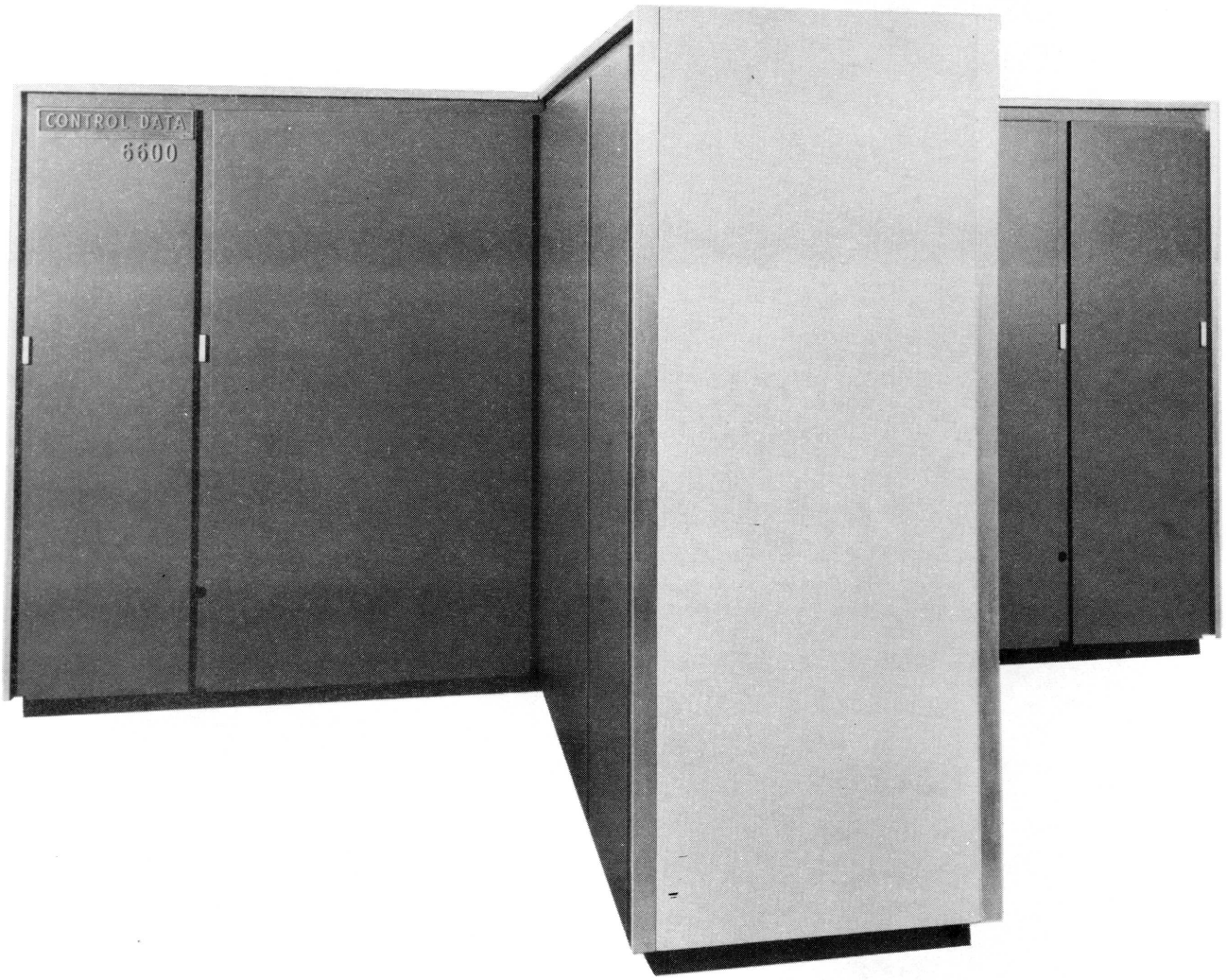

CONTROL DATA
6600

CONTROL DATA 6600 SYSTEM SPECIFICATIONS

CABINET

The Central Computer of a 6600 System is housed in a cabinet of the type shown. The cabinet consists of up to 4 sections, or "bays" joined at the center.

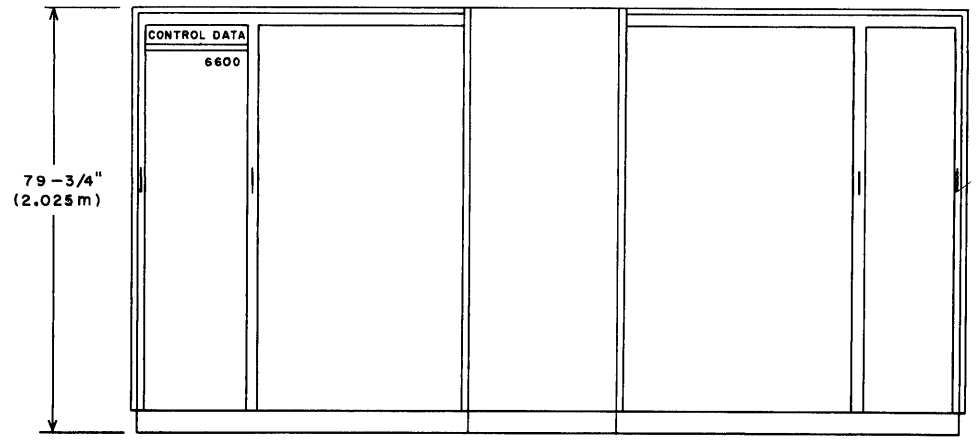
Each bay contains up to 4 chassis of logic circuits, memories, and other electronic components. The chassis are hinged at the end toward the center of the cabinet complex, and may be swung out for servicing. In addition, each bay contains power supplies and a refrigeration system for the chassis which it houses. A floor cut-out is required beneath each bay to allow for passage of power cabling and water supply connections.

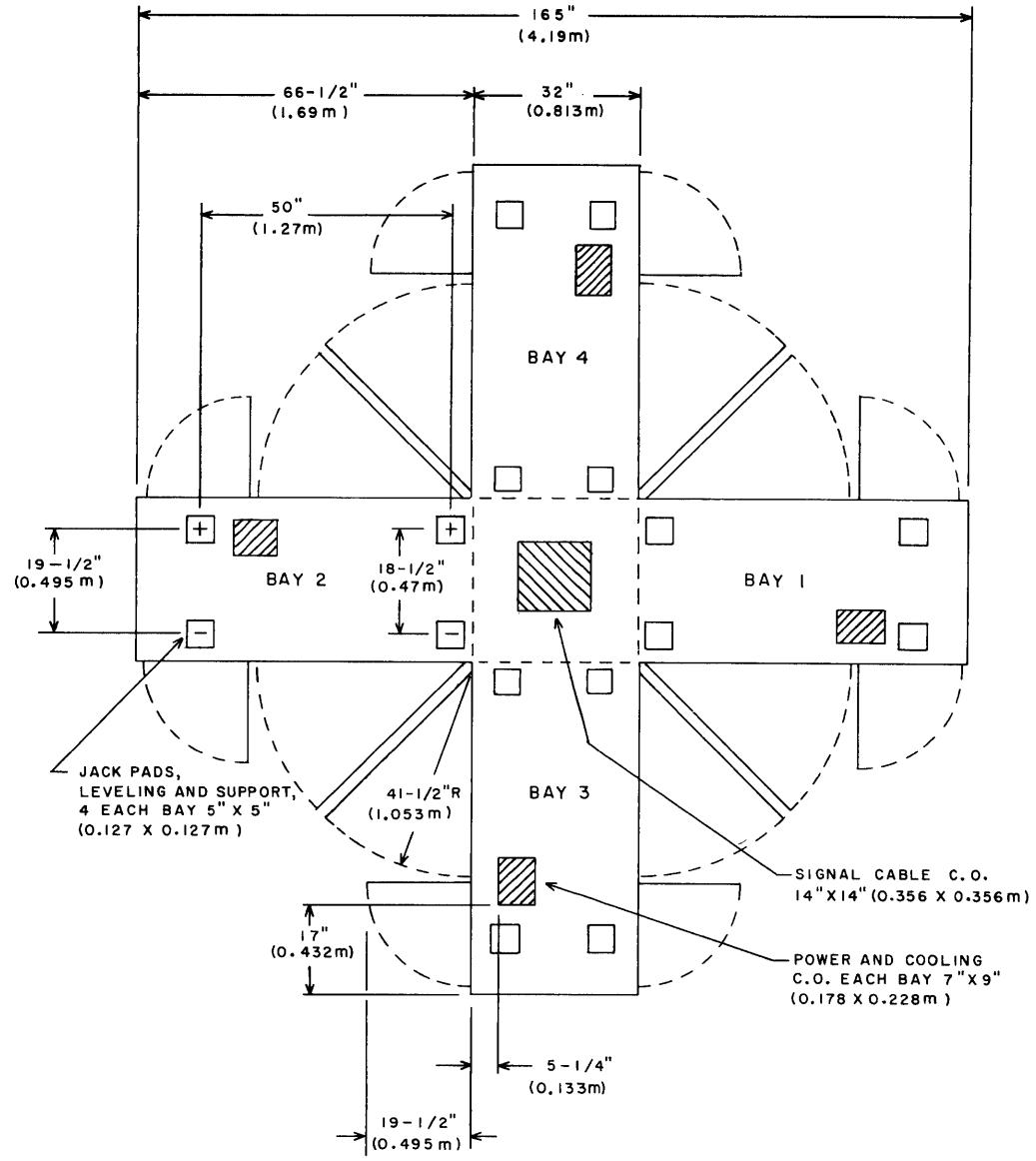
All signal and logic cable connections are made at the center area of the cabinet complex. Filler panels with access doors are provided for systems having less than 4 bays. A floor cut-out is required beneath the central area for signal cables to peripheral equipment.

TABLE 1. CENTRAL COMPUTER TYPES

MODEL NO.	DESCRIPTION	CABINET SIZE
6601	CENTRAL COMPUTER with 131, 072 words of magnetic core storage, 10 peripheral and control processors with storage. Power and cooling apparatus included.	4 Bays
6604	CENTRAL COMPUTER with 65, 536 words of magnetic core storage, 10 peripheral and control processors with storage. Power and cooling apparatus included.	3 Bays

EQUIPMENT DATA SHEETS





6601 CENTRAL COMPUTER

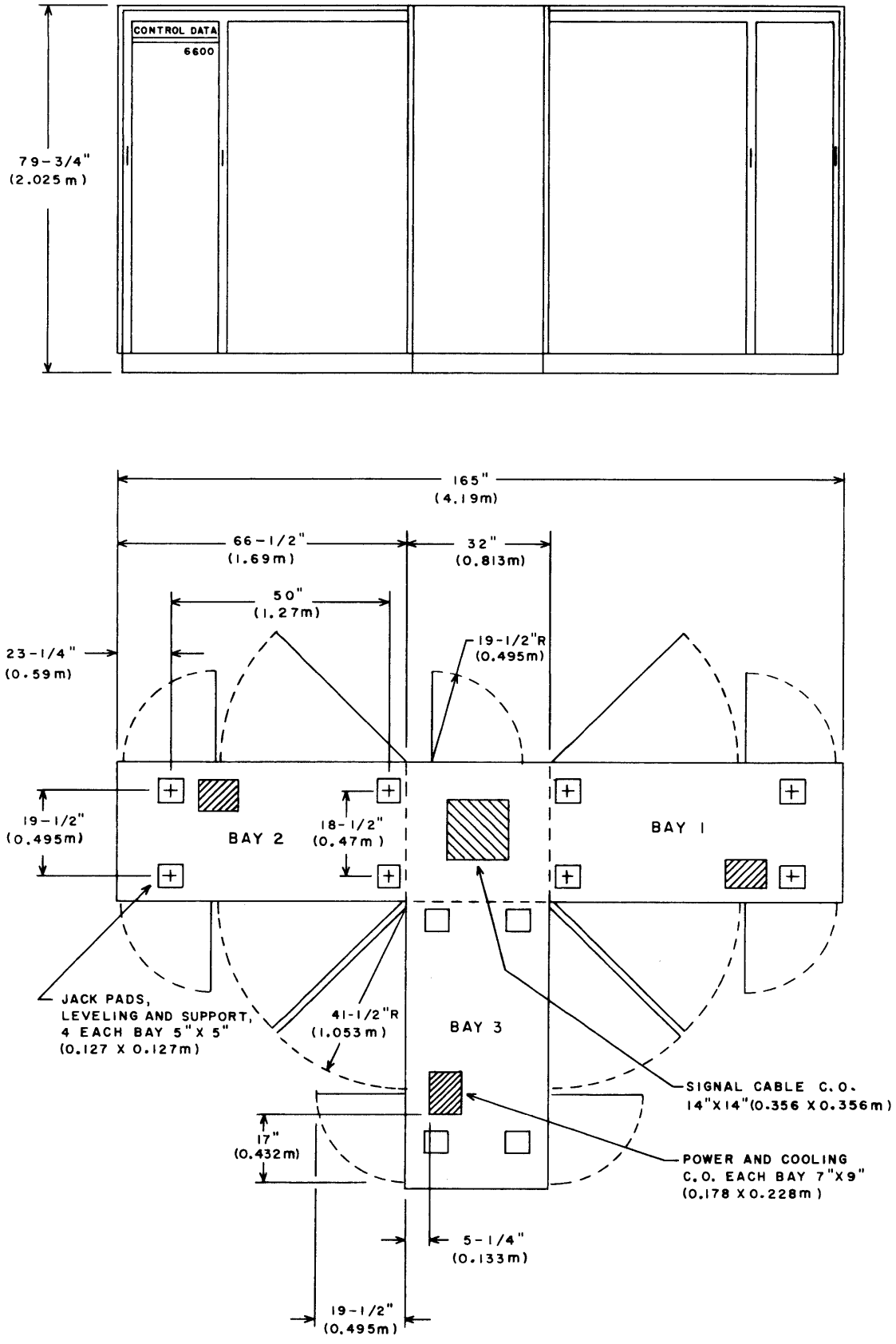
6601 CENTRAL COMPUTER

Height	79 3/4 inches (2.025 meters)
Width	165 inches (4.19 meters)
Depth	165 inches (4.19 meters)
Weight	15,000 lbs (6,800 kg)
Heat	102,000 BTU/hr (25,650 kg-cal/hr)

Water Flow and Temperature Requirements

Temperature		Flow per Minute	
Fahrenheit	Centigrade	Gallons	Liters
80°	27°	17.2	65
70°	21°	10.0	38
60°	16°	8.3	31

Electrical Power	KVA	Line Current	Breaker Size
400 cycle, 208 volt, three phase	29	80.4 amperes	30A (4 required)
50/60 cycle, 208 volt, three phase	8.3	2.5 amperes	15A (4 required)



6604 CENTRAL COMPUTER

6604 CENTRAL COMPUTER

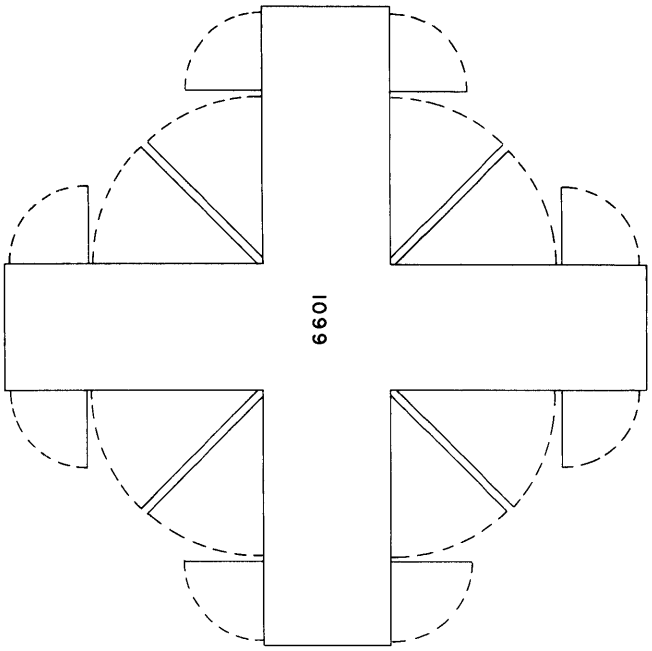
Height	79 3/4 inches (2.025 meters)
Width	165 inches (4.19 meters)
Depth	98 1/2 inches (2.5 meters)
Maximum depth, including all access doors extended	140 inches (3.555 meters)
Weight	11,400 lbs (5,260 kg)
Heat	95,400 BTU/hr (25,050 kg-cal/hr)

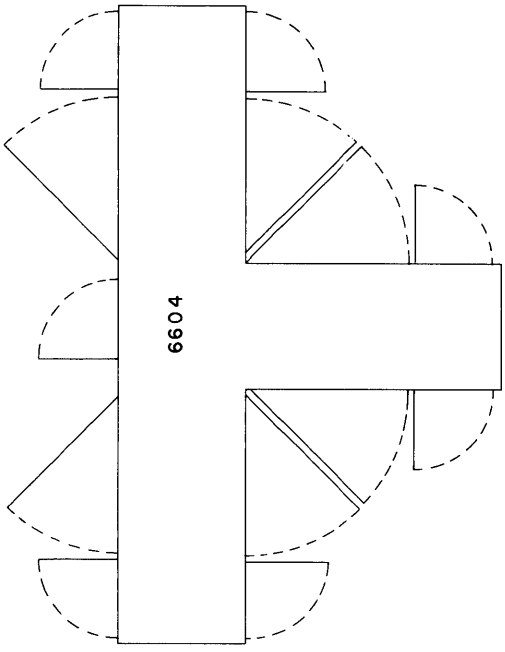
Water Flow and Temperature Requirements

Temperature		Flow per Minute	
Fahrenheit	Centigrade	Gallons	Liters
80^{o}	27^{o}	12.9	48.75
70^{o}	21^{o}	7.5	28.5
60^{o}	16^{o}	6.22	23.25

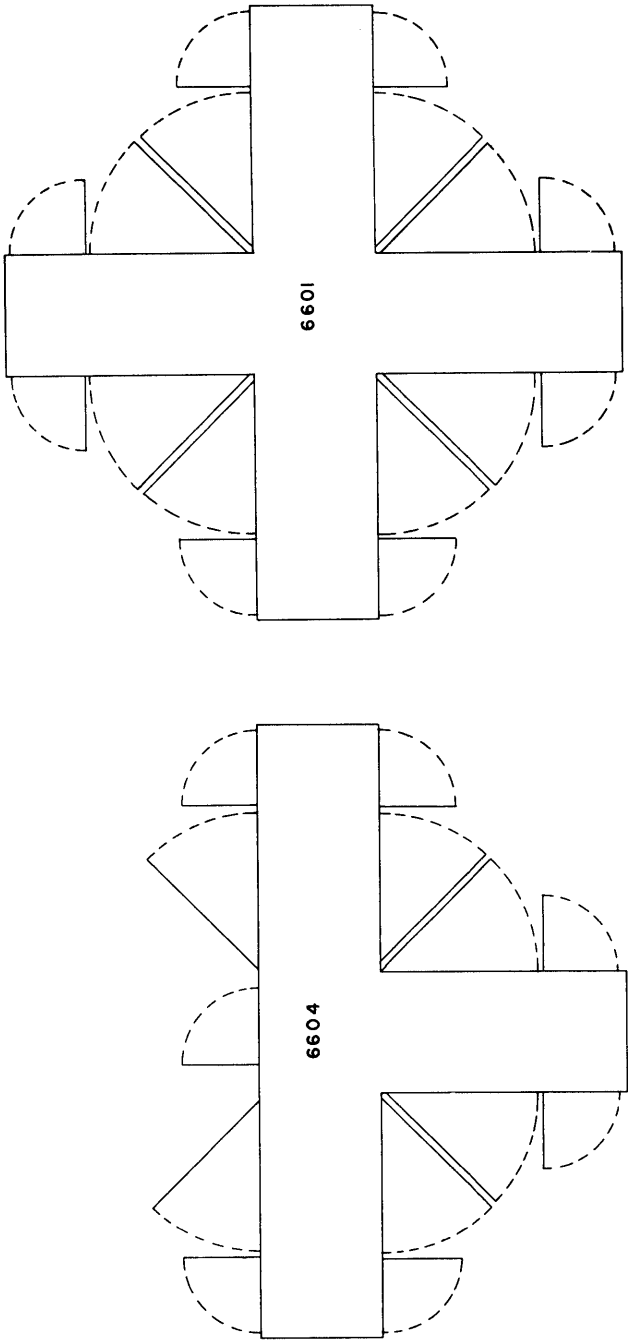
Electrical Power	KVA	Line Current	Breaker Size
400 cycle, 208 volt, three phase	21.75	60.2 amperes	30A (3 required)
50/60 cycle, 208 volt, three phase	6.22	17.3 amperes	15A (3 required)

TEMPLATES





Scale: 1/4" = 1 ft.



Scale: 2 cm = 1 m.

PERIPHERAL EQUIPMENT SPECIFICATIONS

CONTENTS

PERIPHERAL EQUIPMENT SPECIFICATIONS

CABINETS

Templates of the cabinets housing 6000 Series peripheral equipment are presented in the back of this section. Many of the equipments such as the Console Display are distinctively packaged along functional lines. Other cabinets are built to house electronic components and are designed for convenient access with a minimum of wasted space.

CONTROLLERS

Many of the peripheral devices require controller electronics which is housed separately from the associated equipment. Depending upon the individual system, these peripheral controllers will be housed either in the Central Computer cabinet or in the general purpose Peripheral Controller cabinet. The Peripheral Controller cabinet contains power supplies and a cooling system enabling it to accommodate a variety of logic configurations. The cooling system is a freon refrigeration unit which exchanges heat with the ambient air in the computer room.

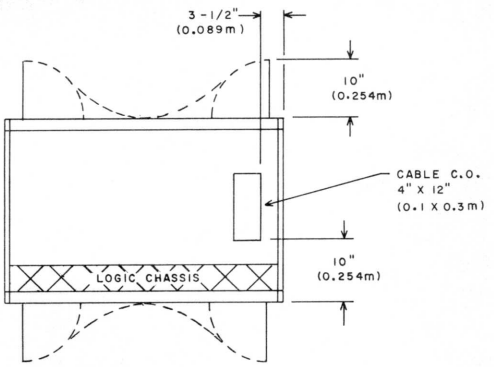
NOTE

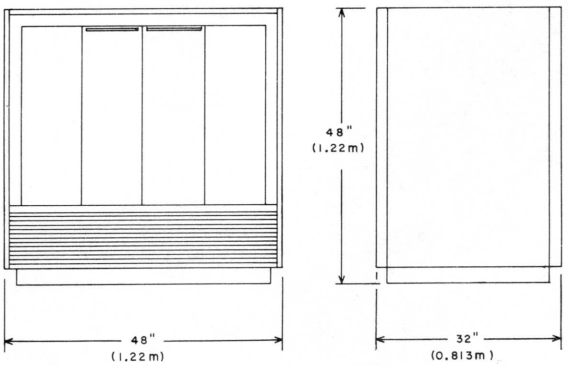
The Model 6681 Data Channel Converter permits 6000 Series computing systems to use 3000 Series peripheral equipment. For information on these, see the 3000 Series Site Preparation & Installation Manual, (Pub. No. 60110400). This manual is available from the Control Data representative.

TABLE 1. PERIPHERAL EQUIPMENT AND CONTROLLERS

MODEL NO.	ITEM	CABINET
6602	CONSOLE DISPLAY with associated controller.	Console is self-contained; controller mounts in either the Central Computer cabinet or the Peripheral Controller cabinet.
6603	DISK SYSTEM with associated controller.	Disk System is self-contained in two cabinets; controller mounts in either the Central Computer cabinet or the Peripheral Controller cabinet.
6622	MAGNETIC TAPE CONTROLLER permits reading and writing of any one of four model 626 Magnetic Tape Transports. Operates from one standard channel.	Mounts in either the Central Computer cabinet or the Peripheral Controller cabinet.
6681	DATA CHANNEL CONVERTER permits 6000 Series computer systems to use 3000 Series peripheral equipment.	Mounts in either the Central Computer cabinet or the Peripheral Controller cabinet.
6682	SATELLITE COUPLER permits direct connection between any two standard 12-bit bi-directional channels.	Mounts in either the Central Computer cabinet or the Peripheral Controller cabinet.
626	MAGNETIC TAPE TRANSPORT. 150 inches per second, 800 bpi, 240 kc, one inch tape.	Self-contained.

EQUIPMENT DATA SHEETS



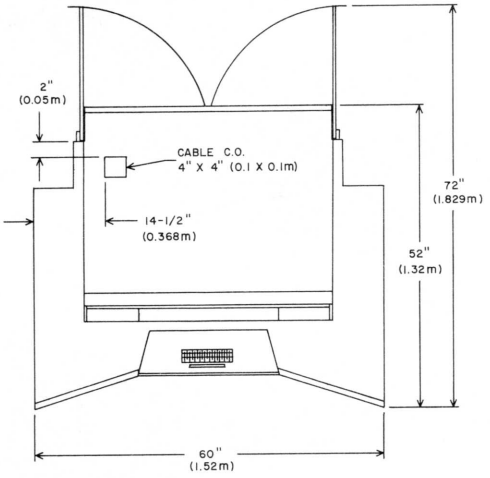


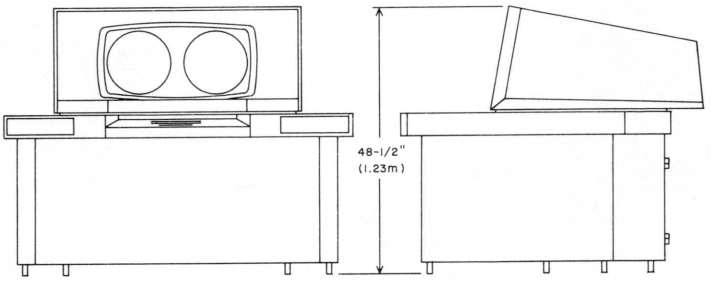
GENERAL PURPOSE PERIPHERAL CONTROLLER CABINET

GENERAL PURPOSE PERIPHERAL CONTROLLER CABINET

Height	48 inches (1.22 meters)
Width	48 inches (1.22 meters)
Depth	32 inches (0.813 meter)
Maximum depth, including all access doors extended	68 inches (1.775 meters)
Weight	800 lbs (362 kg)
Heat	3900 BTU/hr (983 kg-cal/hr)
Line Current, 400 cycle, 208 volt, three phase	5 amperes, maximum
Line Current, 50/60 cycle, 115 volt, single phase	5 amperes, average
Breaker Size, 400 cycle, 208 volt, three phase	15A
Breaker Size, 50/60 cycle, 115 volt, single phase	15A

The general-purpose Peripheral Controller cabinet contains a freon refrigeration unit which exchanges heat with the ambient air in the computer room.

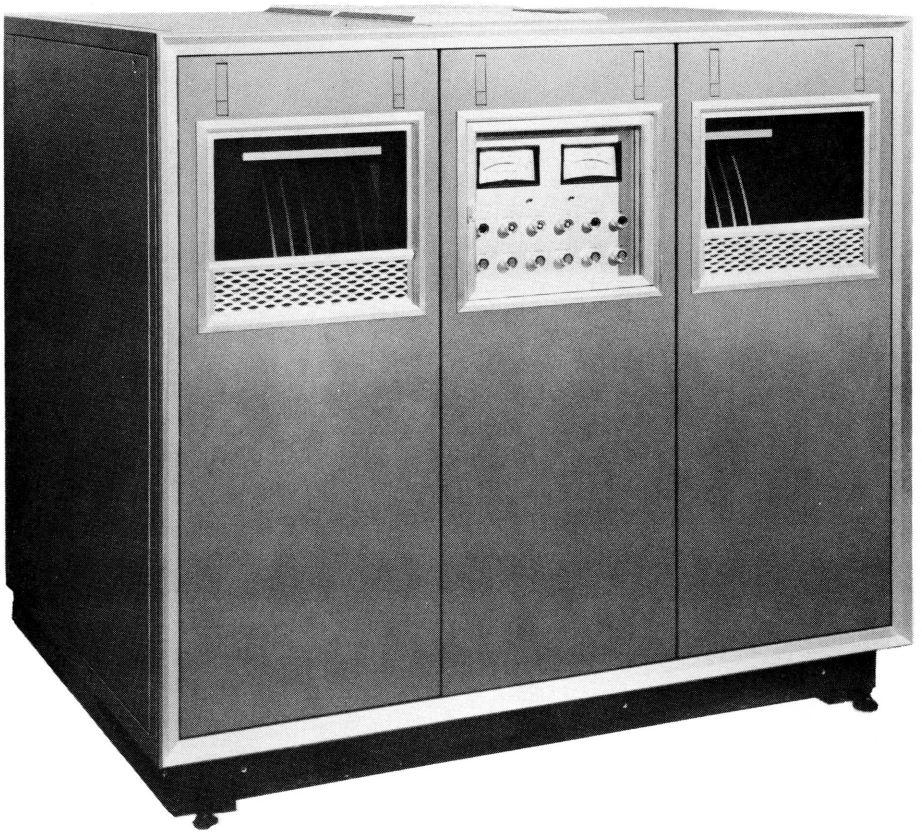


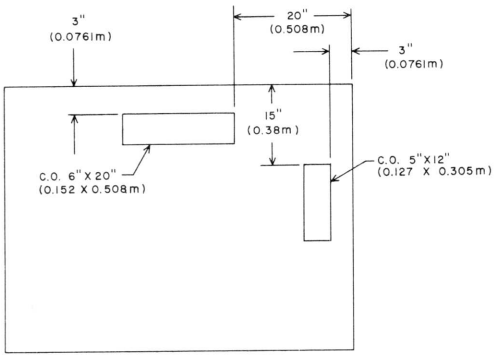


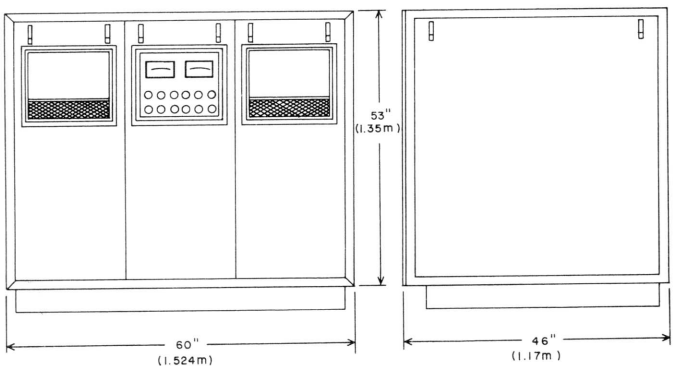
6602 CONSOLE DISPLAY

6602 CONSOLE DISPLAY

Height	48 1/2 inches (1.23 meters)
Width	60 inches (1.52 meters)
Depth	52 inches (1.32 meters)
Maximum depth, including access doors extended	72 inches (1.829 meters)
Weight	900 lbs (408.24 kg)
Heat	2100 BTU/hr (529 kg-cal/hr)
Line Current, 400 cycle, 208 volt, three phase	5 amperes
Line Current, 50/60 cycle, 115 volt, single phase	5 amperes
Breaker Size, 400 cycle, 208 volt, three phase	15A
Breaker Size, 50/60 cycle, 115 volt, single phase	15A
Air required at inlet	300 CFM (510 m^3/hr)
Source of cooling air	room





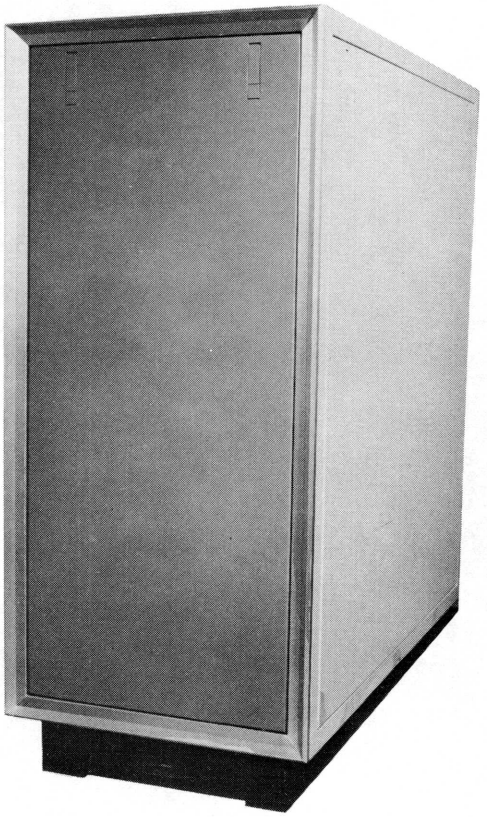


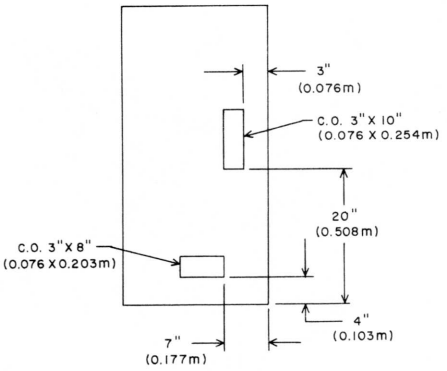
6603 DISK SYSTEM (Disk Cabinet)

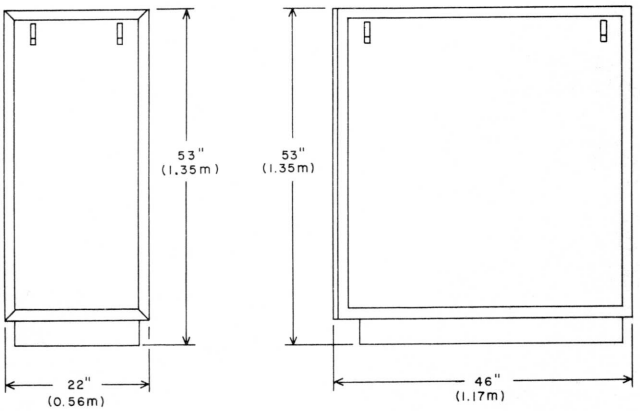
6603 DISK SYSTEM

(Disk Cabinet)

Height	53 inches (1.35 meters)
Width	60 inches (1.524 meters)
Depth	46 inches (1.17 meters)
Weight	2800 lbs (1270 kg)
Heat	24,000 BTU/hr (6045 kg-cal/hr)
Line Current, 400 cycle, 208 volt, three phase	5 amperes
Breaker Size, 400 cycle, 208 volt, three phase	15A
Air required at inlet	500 CFM (850 m^3/hr)
Source of cooling air	room





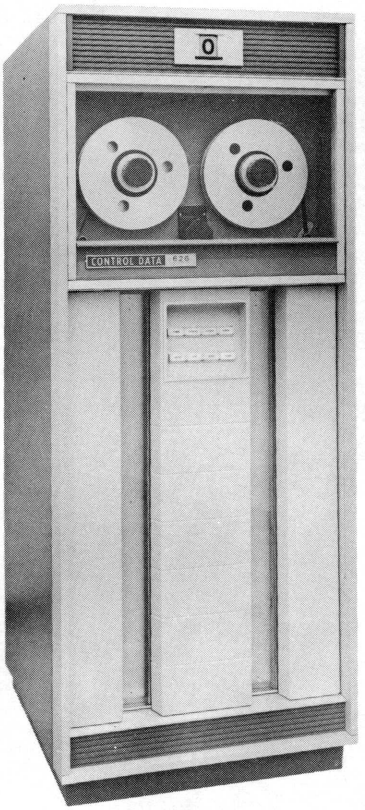


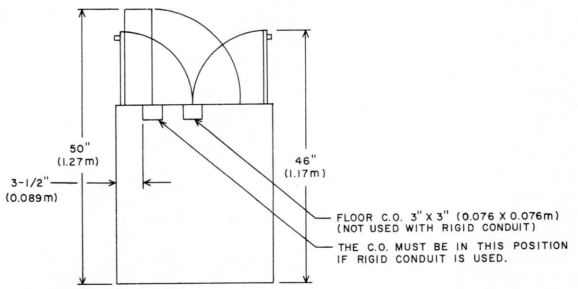
6603 DISK SYSTEM (Auxiliary Cabinet)

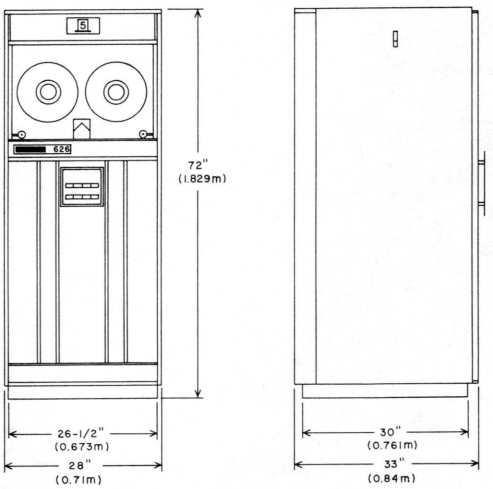
6603 DISK SYSTEM

(Auxiliary Cabinet)

Height	53 inches (1.35 meters)
Depth	46 inches (1.17 meters)
Width	22 inches (0.56 meters)
Weight	850 lbs (385.5 kg)
Line Current, 50/60 cycle, 208 volt, three phase	70 amperes, maximum
Breaker size, 50/60 cycle, 208 volt, three phase	70A





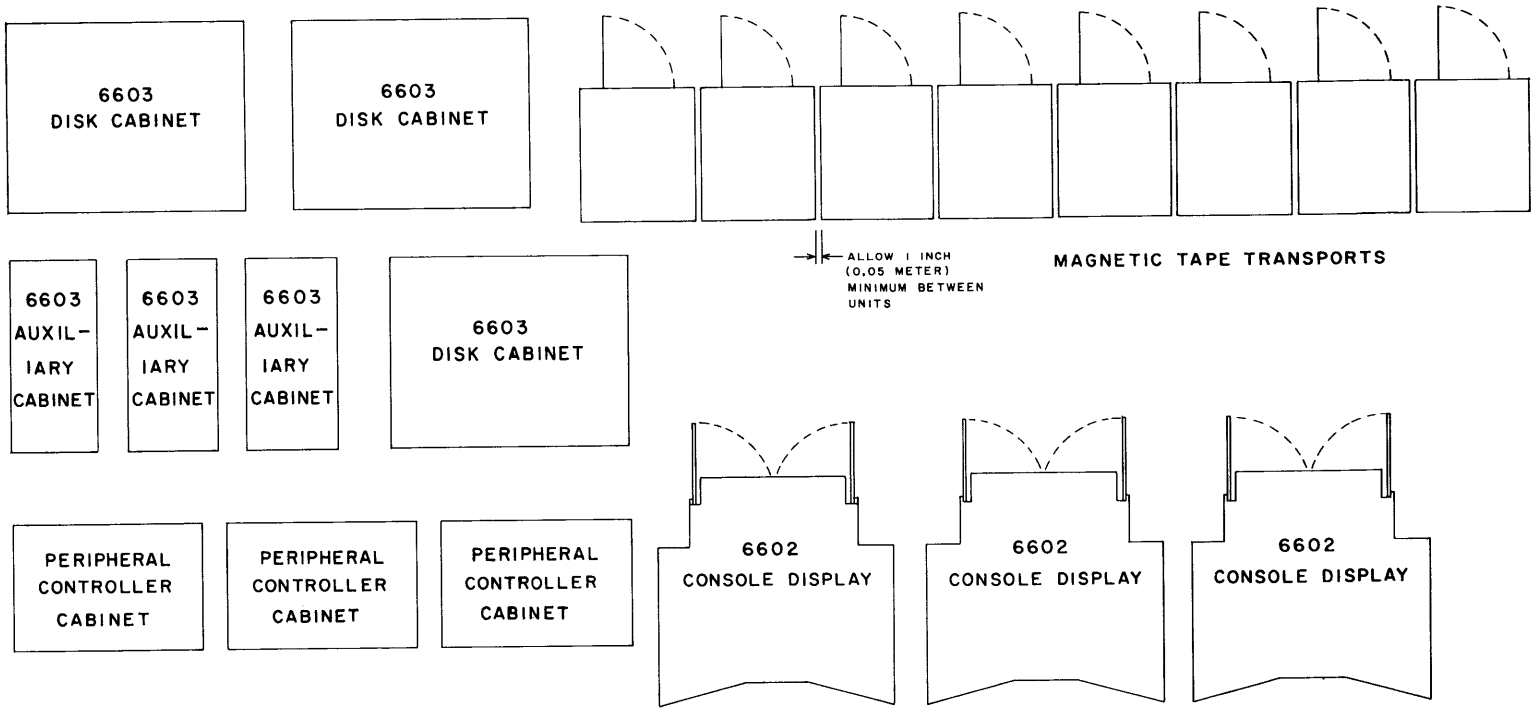


626 MAGNETIC TAPE TRANSPORT

626 MAGNETIC TAPE TRANSPORT

Height		72 inches (1.829 meters)	
Width		28 inches (0.71 meter)	
Depth		33 inches (0.84 meter)	
Maximum depth, including access doors and chassis extended		50 inches (1.27 meters)	
Weight, supported by 4 casters		1200 lbs (545 kg)	
Heat		BTU/hr	kg-cal/hr
	Operating	11000	2775
	Loaded/Ready	7000	1765
	Unloaded and Power On	2000	504
Line Current, 50/60 cycle, 208 volt, three phase		11 amperes, maximum	
Breaker Size, 50/60 cycle, 208 volt, three phase		15A	
Air required at inlet		1000 CFM (1700 m^3/hr)	
Source of cooling air		room	
Distance from signal cable receptacle to floor		45 inches (1.14 meters)	
Power connector, attached to short cord		Hubbell #3521	

TEMPLATES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DISK CABINET
6603
DISK CABINET
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(0.05 METER)
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MAGNETIC TAPE TRANSPORTS
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CONSOLE DISPLAY
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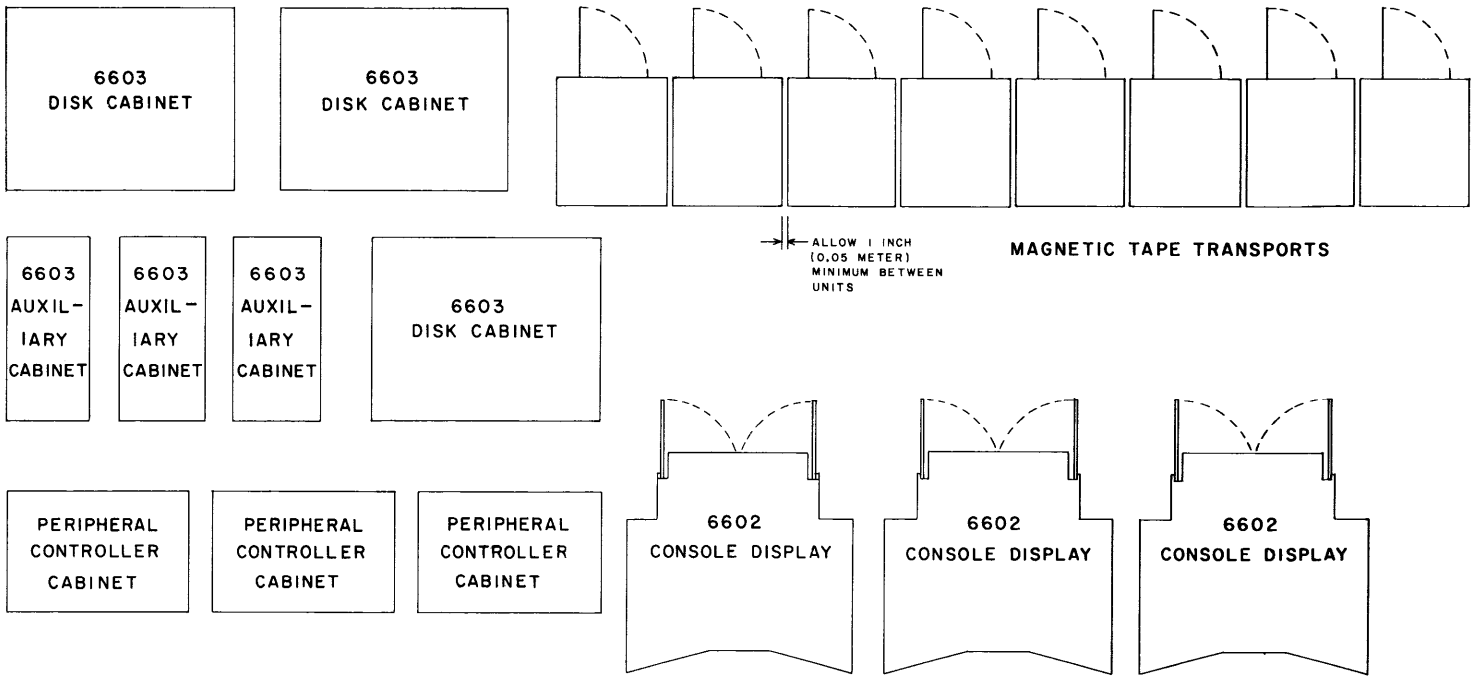
CONSOLE DISPLAY
6602
CONSOLE DISPLAY

Scale: 1/4" = 1 ft.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6602
CONSOLE DISPLAY
6602
CONSOLE DISPLAY
6602
CONSOLE DISPLAY

Scale: 2 cm = 1 m.

CUT ALONG LINE

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